Welcome

DIY: K20/K24 Swap into 2001+ Civic(EM2)

by Michael Domingoes

General message from yours truly: I appreciate everyone who has used this site and many others that come on here to find help with all your needs. Some of the info found here such as how to wire the o2 sensor and small stuff can also be used for other k20/k24 swap vehicles. Just remember to take your time and be careful with anything you do aftermarket. Remember that this is merely a guide to help you with the install/swap of the motor into your car. I tried to cover everything as much as possible and continue to add stuff when I do have time and/or come across other stuff that may need to be added. Thank You and have a nice day.

If you look around especially on Hasport.com you will see a long list of things you need to do the swap into your car. For some of you that have already done it you know that you will not need all the parts listed. Remember that the parts hasport has listed that you need is **NOT WHAT YOU REALLY NEED.** Here is a run down in general:

Parts needed:
-Complete k20/k24 motor changeover
-intermediate shaft
-O2sensor for the same type of motor (typically from a 02-04 rsx type-s)
-subframe from any rsx 02-06 or 02-05 si (ep3)
-Hasport Mount Kit.. (other companies make them to) (make sure you get engine specific mount)
-Hasport Wire Harness Conversion (I wont be using this, i will attempt to wire it myself)

(please note that if you do a k20 swap into the car you will need the k20 mount kit. If later on down the road you want to upgrade to the k24 you will need to order the **passenger mount only** which lowers the engine more since the k24 is actually taller than the k20. HOWEVER, you can already order the k24 mount kit ahead of time and still use the same mount for the k20)

-Parts needed from any 2002-2006 RSX:
-shifter cables (2002-2006 rsx only. can be base or type-s)
-headers and downpipe
-throttle cable (you can use a 92-95 single cam civic cable, much cheaper and easier to find)
-clutch lines from master to slave cylinder
-high pressure power steering hose
-power steering return line

Parts needed from an 2002-2005 civic si:
-ac line from compressor to condenser (if you want ac)
-axles (base RSX axles will work to. NON type S)
-radiator and fans (RSX will fit but need trimming, not very much I might add)
-upper and lower radiator hoses

Other stuff you will need:
-custom ac line from compressor to condenser (again if you want ac)
-92-95 power steering reservoir with bracket (they do sell aftermarket ones which work just as good, especially if you want looks too)

PLEASE READ THE **AIR CONDITION** section for more details on how to run the a/c lines as there is more than one option to getting your a/c up and running

Now.. Here is a list of parts they say you need but you DO NOT need to get. I repeat DO NOT:
-rsx shifter assembly (your car already has one stock)
-fuel line (your car already has one stock)
-brake booster line (your car already has one stock)
-purge line (your car already has one stock)
-90 accord negative battery cable (I have yet to find out why they added this in there but you still don't need it)
-custom hood latch (don't need it, however you will need to trim your hood if you use hydraulic power steering)

Here is what it costs me to get the parts. It may vary from state to state and different areas so keep this in mind that this is general pricing:
Here is the pricing of the parts I paid for everything. All these parts were new from the dealer unless otherwise stated that I got it from the junkyard

k20 intermediate shaft.....$220
Axles from 02+ si.....$100 from junkyard
RSX Subframe.....$600(quoted from Acura) $150 from junkyard
Hasport Mounts.....$400
Shifter Assembly.....$100
Shifter Cables.....$300
02+ si radiator. I used the rsx radiator.....$150 (TYC brand)
fans.....$30 universal fan from autozone
02+ si upper radiator hose.....$13
02+ si lower radiator hose.....$11
RSX Throttle cable..... $40
RSX Fuel Line.....$45
RSX Brake booster line.....$45
RSX Purge Line.....$40
02+ si ac line from compressor to condenser.....$100
RSX Clutch Line From slave to master.....$20 from junkyard
RSX high pressure power steering hose.....$240
RSX Power steering return line.....$50
92-95 Civic Power steering reservoir with bracket...$50

Optional Stuff:
Hondata.....about $900
Hasport/Hybrid Racing Engine Harness.....about $300**
(complete new harness)

***they do offer a core exchange for a different price. if I remember correctly I think it comes to $150 with core exchange. But to be safe just call and ask.*

So the grand total not including the motor on just the parts needed list for the swap comes out to roughly around $3754. Plus lets say 4% tax then that comes out to roughly 3900... give or take...

Just remember that this does not include the motor... I have seen complete motors that go for as low as $2000 for the SI to as much as $5000 or more for the JDM type R...

So now when you add everything that brings it up to roughly
$5900 or possibly lower to as much as $8900 or more

Also remember that you will not need to buy everything on the list if you have read my DIY... Basically you dont need the following
Shifter assembly
Fuel Line
Purge Line
Brake Booster Line

.. thats saving you at least $130.. if you can find a 92-95 civic single cam throttle cable that would save you a few more bucks

Another thing i want to add is this.. Make sure you get the correct o2 sensor for the type of motor you get. Yes the o2 sensor from the k20a3 and the k20a2 is different. I have proven this by buying both and trying it. The k20a2 and k20a use the same/similar o2 sensor and will work.

Another thing you might want to consider is getting K-pro before doing the swap. K-pro allows you to disable the immobolizer which saves you time and money on getting the car towed to the dealer to get the ecu reflashed. One thing i learned in my area is that the acura dealer near my house doesnt do reflash on the ecu but the one clear across town does. And in no way was i going to tow my car that far plus they were charging an arm and a leg not only for the tow but for the reflash itself. The k-pro also allows you to disable the secondary o2 sensor which isnt wired into the harness. If you are wiring the harness yourself then i recommend getting this.

If you are not planning on getting the k-pro then i recommend you get one of the plug-n-play harnesses from either hasport or hybrid-racing. Make sure you tell them to wire in the secondary o2 sensor in for you. You will need the secondary 02sensor wired in if you want to run the stock ecu. Not required if you run k-pro

Again if your not planning on getting the k-pro your car will have to be towed to acura to get the ecu and immobolizer and key reflashed to make it work. Unless you get a k20a JDM motor with the JDM ecu. Then there is a way for you to bypass the immobolizer.

Just to prove a point. A K20 Motor with a dual intake runner WILL.. and i repeat WILL fit in a 2001 civic.. but its a pain in the ass to put in

My 2 friends helping me out with the swap

Also the RBC Manifold will fit into the car BUT requires trimming of the front radiator support as you can see in the picture

However you will need to trim away at the upper radiator support area to make it fit. You have to trim about 3/4 an inch away just to make it clear.

Also note that you will need a karcepts adaptor to succesfully mount the k20 throttle body to the RBC manifold

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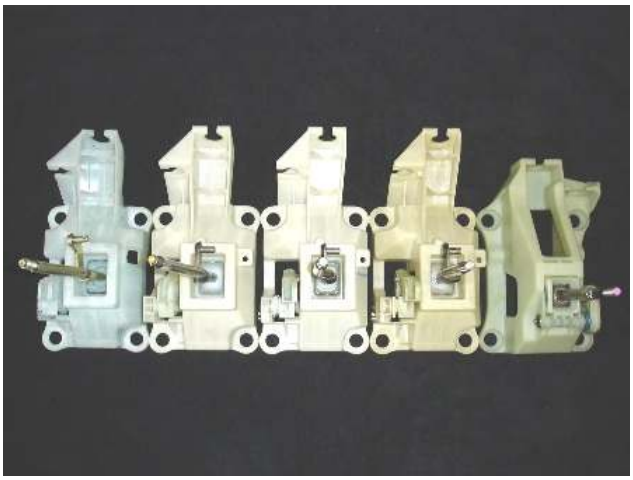
SHIFTER BOX COMPARISON

Left to Right: Revo, RSX-S, Base RSX, 01+ Civic (Non-Si), TSX



The Revo, RSX-S, Base RSX, and 01+ Civic (Non-Si) can all shift the 6 speed tranny, including reverse. The TSX shifter may be a different design but still bolts up to the same place as the other shifters and functions just as same. It can even use the same short shifter adapters as the other shifters.

The only differences in the Base RSX and 01+ Civic (Non-Si) vs. the RSX-S are in the bends in the shifter shaft itself!

If you look at the picture below. The left is the rsx-s and the right one is the base. The shifter itself is TOTALLY identical to all the other models. But notice the bend in the upper portion is different. Thats the only differnece between all the shifters. Is the BEND. has nothing to do with 5 or 6 speed. and has nothing to do with the short shifter adapters.

Here is a side by side comparison of the rsx-s (left) and the 01-05 civic (right)

And another comparison of the rsx-s (left) and the revo (right)

The shaft height on both the Revo and 01+ Civic (Non-Si) is .75" shorter vs. the RSX shifters. The main point to all of this is that the choice is yours, since the Revo, RSX-S, Base RSX, and 01+ Civic (Non-Si) will all work with the short shifter adpaters and they all can shift the 6 speed tranny (if so equipped).Tthe type of tranny regardless if its 5 or 6 speed is irrelevant to the shifter box. the shifter box itself. and i do mean the shifter box ONLY is the same casting for all the shifter boxes i have mentioned earlier along with the pics.

The ONLY REAL difference is the bend of the fork. All it comes down to when using the oem shifters is the height and the bend. Nothing to do with the 5 or 6 speed. Thats the part i am trying to stress out. Even with pictures and explanations people will still not believe.

If you pull your center console out and look at you shifter with a 5 speed tranny you will see it never goes all the way to the right. Put in a 6-speed tranny and put it into reverse and it will still not hit the right side. I know this for a fact cause i am using the same shifter that came in my 01 civic when i was 5-speed..... and i am stil using the same shifter in my car with the 6-speed tranny. Putting on a short shifter adapter will shorten the travel length even more and you use less travel of the shifter box entirely.

pictures courtesy of karcepts.com

REMOVING THE ENGINE

First thing you might want to do is pull out the your D17 motor out of your car. (alot of rags and brake/carb cleaner will help out alot at this point. The brake/carb cleaner comes in handy on cleaning up oil spills and cleaning the engine bay and parts etc.)

Jack up the front end of the car and take off the tires.

Drain you tranny fluid by removing the bolt on the side that looks like you have to use a square tool to fit in there. Basically a 3/8 ratchet will fit in there. After that pull out your axles very carefully as to not pull the shaft from the cup. You might need to use a really big screw driver to help leverage it out.

If you want to you can drain the oil at this time to help lighten the motor but not neseccary. Also while your at it be careful on pulling out the power steering resevoir cause you dont want to get the fluid all over the place. Then drain the radiator using the small white looking valve thing at the bottom of the radiator

Disconnect all hoses, lines, cables, battery, and wires from you motor. Take out the battery. Then take out the radiator by removing the brackets from the top of it.

Somehow your going to have to find a way to discharge you a/c system. It is illegal to discharge the freon into the air. But if you do then just stick something into the charging ports to release the air from the a/c. **(PLEASE NOTE that this is illegal and you take responsibility for your own action. Do not breathe the discharge and make sure you are out in a well ventilated area.)** Disconnect the a/c lines and move off any excess line to the side.

HERE IS A MOTOR DETAILED EXPLANTION OF HOW TO PULL THE MOTOR. If you already know how to pull the

motor out then skip this section.

Heres a more detailed explanation of how to remove your engine. If you already know how to do so then just skip these STEPS and continue on:

NOTE:
-Use fender covers to avoid damaging painted surfaces.
-To avoid damage, unplug the wirning connectors carefully while holding the connector portion.
-Mark all wiring and hoses to avoid disconnection. Also, be sure that they do not contact other wiring or hoses, or interfere with other parts.

1. Secure the hood in the wide open position (support rod in the lower hole).
2. Make sure you have the anti-theift code for the radio, then write down the frequencies for the radio's preset buttons.
3. Disconnect the negative cable from the battery first, the dissconnect the positive cable.
4. Remove the intake resonator.
5. Remove the battery and battery base.
6. Remove the battery cables from the fuse box, and remove the harness clamps.
7. Remove the intake air duct and ground cable.
8. Remove the clutch slave cylinder and clutch line bracket mounting bolt (M/T).
9. Remove the shift cable (CVT).
11. Relieve fuel pressure.
12. Remove the evaporative emission (EVAP) canister hose.
13. Remove the brake booster vacuum hose.
14. Remove the glove box stops, then open the glove box.
15. Disconnect the engine control module (ECM)/power control module (PCM) connectors.
16. Remove the harness clamps and grommet, then pull the engine wire harness through the bulk head.
17. Remove the throttle cable and cruise control cable by loosening the lock nuts, then slipping the cable ends out of the accelerator linkage. Take care not to bend the cable when removing them. Always replace any kinked cable with a new one.
18. Remove the adjusting plate mounting bolt, locknut and mounting bolt, then remove the power steering (P/S) pump belt and pump w/out disconnecting the P/S hoses.
19. Remove alternator.
20. Remove the A/C hose bracket and P/S hose bracket.
21. Remove the alternator lower bracket, then remove the A/C compressor with out dissconnecting the A/C hoses.
22. Remove the radiator cap.
23. Raise the hoist to full height.
24. Remove the front tires/wheels.
25. Remove the splash shield.
26. Loosen the drain plug in the radiator, drain the engine coolant.
27. Drain the transmission fluid:
-Manual Transmission.
-Automatic Transmission.
-CVT
28. Drain the engine oil. Reinstall the drain bolt using a new washer.
29. Disconnect the primary heated oxygen sensor (primary HO2S) connector and secondary heated oxygen sensor (secondary HO2S) connector, then remove the exshaust pipe and three way catalytic converter (TWC)(D17A2 engine).
30. Dissconnect the third heated oxygen sensor (third HO2S) connector, remove the exhaust pipe and TWC assembly (D17A6 engine).
31. Remove the exhaust pipe/muffler assembly (D17A1 engine).
32. Remove the shift cable covers, then remove the shift control cable (A/T).
33. Disconnect the suspension lower are ball joints and stabilizer links.
34. REmove the driveshafts. Coat all precision finished surfaces with clean engine oil. Tie plastic bags over the driveshaft ends.
35. Lower the hoist.
36. Remove the ground cable, upper radiator hose, lower radiator hose and heater hose.
37. Remove the automatic transmission fluid (ATF) cooler hoses, then plug the ATF cooler hoses and lines (A/T, CVT).
38. Attach the chain hoist to the engine as shown.
39. Remove the front mount mounting bolt.
40. Remove the side engine hount bracket mounting nuts.
41. Remove the transmission mount bracket mounting bolt/nuts.
42. Make sure the hoist brackets are positioned properly. Raise the hoist to full height. (If your not using a car hoist and using only an engine hoist then make sure the engine hoist is properly attached to motor and car is on jack stands on both sides)
43. Remove the rear mount mounting bolts.
44. Use a marker to make alignment marks on the reference lines that align w. the centers of the rear subframe mounting bolts.
45. Remove the front subframe.
46. Check that the engine/transmission is completely free of vacuum hoses, fuel and coolant hoses, and electrical wiring.
47. Slowly lower the engine about 150 mm (6 inch). Check once again that all the hoses and wires are disconnected from the engine/transmision. (If using and engine hoist and the car is on jack stands, then you raise the motor a few inches and check for clearance)
48. Lower the engine all the way. Remove the chain hoist from the engine. (If car is on jack stands then rasie the engine hoist all the way up till it clears over the front end of the car. Then slowly move the hoist till the motor clears the car and slowly lower the car.

Now take off the lower control arms from the subframe and not from the hub. This helps alleviate on step from taking it on and off the hub down the line.

Go into the glove compartment area and open it up by removing the 2 clips found inside of the glove box. This should expose the inner areas of the car. Inside there you will see you ecu and and wire harness. Remove the clips from ecu and you will need a long ratchet extension to get to the back bolts to pull out the ecu. Once the ecu is out yank out the wire harness from the engine bay area. Pull out the complete harness and put it off to the side.

Before continuing make sure there is NOTHING left connected to the motor except the mounts cause you dont want

anything to be yanked out while pulling the motor out. Also i forgot to mention that make sure you have taken out you intake, headers, and part of your exhaust till its not in the way of the subframe

IF PULLING MOTOR FROM THE TOP:
Remove the front and rear motor mounts. Attach the lift to the motor with the chains with one point to the far left of the tranny as close to the mount as possible and the other to the far right as possible. (i do suggest you have someone with you that has had experience using one of these, if not theres always a first time for everything.) Jack up the lift a little till you have some support from the lift. Then go ahead and remove the driver and passenger mounts. Then slowly lift the motor out while continously checking to make sure nothings connnected.

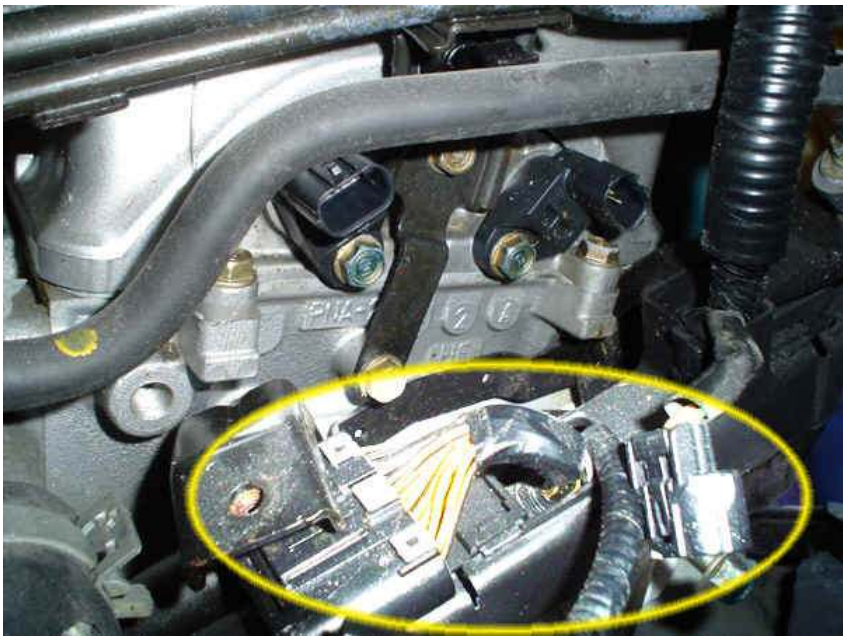
IF YOU HAVE A CAR LIFT DROPPING MOTOR FROM BOTTOM:
Remove the driver and passenger mounts and leave the front and rear mounts Using the engine lift connect the chain to the same points as described above and give the motor some support. Now take off the 4 bolts holding the subframe from under the car. Lower the engine lift to the ground. The whole motor along with the subframe should go straight to the ground. Disconnect the engine lift and then Lift the entire car up on the car lift and preston... Theres your motor out plain and simple

Here is a pic of my car when everything was finally pulled out

Now if you pulled the motor from the top. Jack the car back up so you have enough space to pull out the subframe. There are 4 bolts holding up your subframe. Take those 4 bolts out and the whole thing will drop.

After your motor is out. take the coolant sensor from the D17 and switch it with the K20 sensor. The sensor on the

k20 can be found here on the right hand side of the head (tranny side of the motor) right behind this black piece of plastic



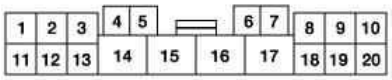
Lift up this plastic and it will reveal the radiator coolant temp sensor

sensor.jpg (62315 bytes)

WIRING THE ENGINE HARNESS

Next lets do the wireharness. If you bought a wireharness from hasport or hybrid-racing then perform there operations on prepping and install of there harness and skip this step and go onto the next section. If not read on.

First off lets start with the C101 Clip. Here is a picture courtesy of Dark2K1 from 7thgencivic.com. If you dont know what the C101 clip looks like its the really big clip that goes along with the rest of the clips that connect to the ecu. There is also a picture of it on the top-left of the image below. If you can follow the diagram below then you know what to do. If not let me try to guide you through it.



K20	Civic
1. Back-up light	1.
2. Back-up light switch	2.
3. Vehicule Speed Sensor	3.
4.	4. Back-up light
5.	5. Back-up light switch
6.	6. Vehicule Speed Sensor
7. Fan Control	7. Fan Control
8.	8.
9. CMP	9. ECT (not every model)
10. AirFuel Ratio Sensor Heater -	10.
11.	11.
12.	12.
13. AirFuel Ratio Sensor Signal -	13.
14. Relay ground	14.
15. AirFuel Ratio Sensor Heater +	15.
16. Starter	16. Starter
17. ECT	17. CMP
18. Oil Press light	18. Oil Press light
19. AirFuel Ratio Sensor Signal +	19. Relay ground
20. Coils ground	20. Coils ground

Note : The civic don't have AF Ratio sensor wired in the C101 connector. You must remake the complete wiring for this sensor. Just connect the wire of the RSX C101 directly to the sensor. On some car you should wire the Secondary O2 sensor and the O2 sensor heater relay for code free operation. The civic Sedan GX don't have the same wiring.

Release by Dark2k1
April 2005
dark2k1dx@hotmail.com

Okay here we go. I'll try to explain this as easy as possible. Especially for the newbies. I have learned from looking at my different harnesses that not all the colors may be the same. In my rsx harness it did look the same but in my jdm harnes the colors where different BUT.. and a big BUT.. even though the colors may be different it still had the same function. This works for all k20 harnesses (si, rsx, jdm) and HAS NOT been proven with the k24 harnesses yet. Or at least i havent checked it yet.

To the left of the image above is what the K20 harness clip looks like. To the right of you is how the civic one is wired up. Basically we have to make the k20 harness look like the civic one with 1 exception. The primary o2 will not be wired in..YET... Sounds simple so far?

So take the rsx clip and look at it from behind where the wires come out. Starting from the top left is pin 1. Refer to the diagram above to help you along. You can move it or cut it. Some of the pins may be smaller and/or bigger so you just have to cut and wire **ONE AT A TIME** each one individually. You dont wanna forget what wire came from where. Soooo .....

-move clip 1 into 4
-move clip 2 into 5
-move clip 3 into 6
-leave clip 7 as is
-leave clip 8 as is
-move clip 9 into 17
-take clip 10 - cut this wire off and label wire coming from harness with a piece of tape saying #10
-leave clip 11 and 12 as is
-take clip 13 - cut this wire off and label wire coming from harness with a piece of tape saying #13
-move clip 14 into 19
-take clip 15 - cut this wire off and label wire coming from harness with a piece of tape saying #15
-leave clip16 as is
-move clip 17 into 9
-leave clip 18 as is
-take clip 19 - cut this wire off and label wire coming from harness with a piece of tape saying #19
-leave clip 20 as is

The ones that you did cut (10, 13, 15, 19) Just pull the pins out from the clip cause we will no longer use it.

WIRING IN THE O2 SENSOR

Okay now the fun part of wiring the primary o2 sensor. You will need a relay to make this completely work or else you will throw a code saying sensor malfunction. If not there is a way around it but you might burn out the o2 sensor.

If you look on your o2 sensor there are 4 wires. 2 black, 1 white and 1 green.(if not you got the wrong o2 sensor. I did notice however that some o2 sensors will have a blue wire instead of a green) Take the o2 clip and hold it in front of you so it looks like this. If you want to do what i did and take a black permanent pen and mark on the side of the clip the numbers so you dont get confused. Make sure you dont get the 2 blacks mixed up cause when i tried reversing it, it didnt work anymore.

1 white	2 green
3 black	4 black

So now that you know about the o2 sensor wiring...Lets continue shall we .. On the left hand side of the diagram below is the color of the wires and clip #'s that we originally worked on from clip C101. On the right hand side is the wires and pin # from the o2 sensor. So just gotta match it up.

Clip 10 (black/white) ----------> Pin 4 (black) of the o2 sensor

Clip 19 (red) ----------> Pin 1 (white) of the o2 sensor

Clip 13 (red/yellow) ----------> Pin 2 (green or blue) of the o2 sensor

Clip 15 (white) ----------> Pin 3 (black) of the o2 sensor

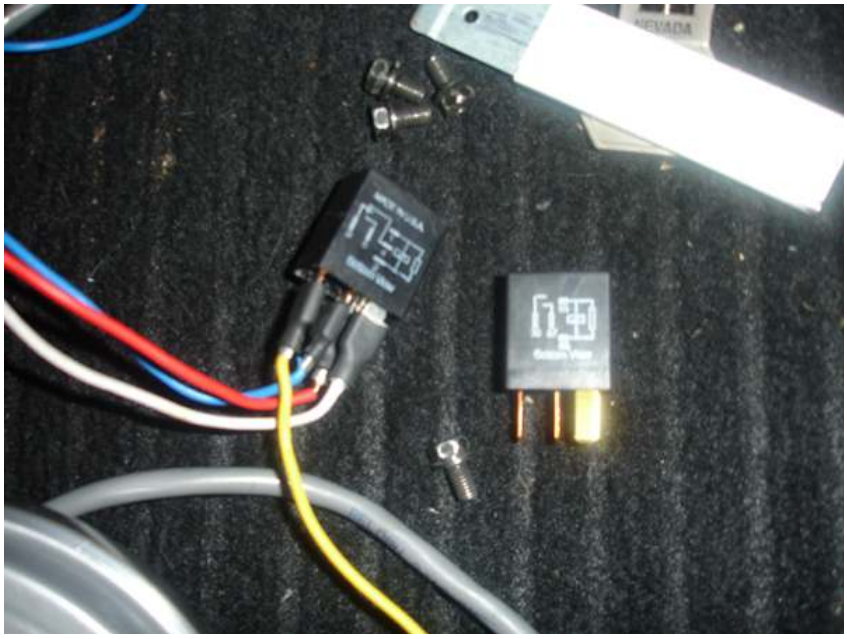
***12v relay-----> Pin 3 (black) of the o2 sensor

****Basically you take the 12v relay wire and combine it with clip 15 (white) and it goes into Pin 3 of the o2 sensor**

I FINALLY ADDED THE RELAY WIRING AS OF 3/5/06. So here is it how it goes

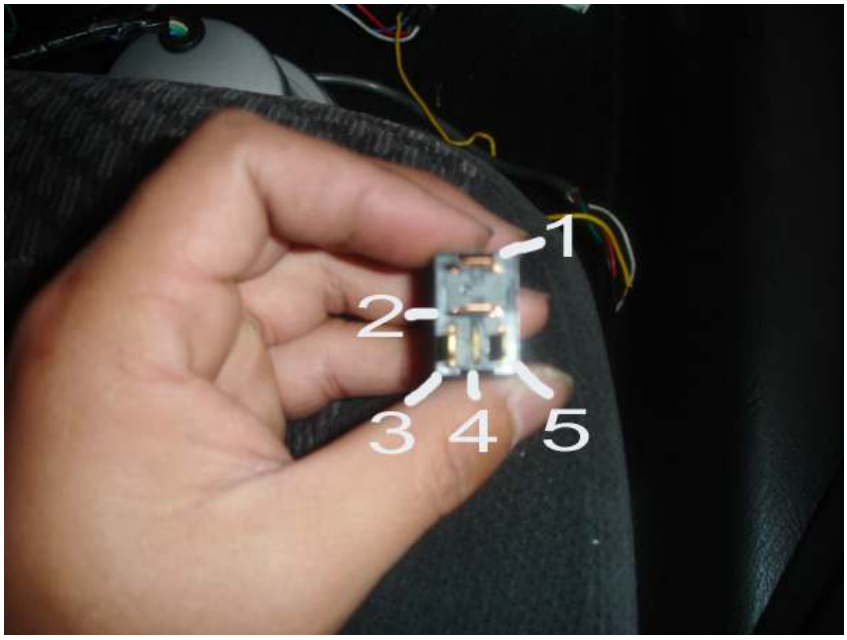
Well first lets get you a relay. It can be the same relay used found under the hood of you car in the fuse box. Or if you want call hybrid and see if they will sell you one.. if not just go to a junkyard or dealer and see if you can get one. It should look something like this.

Here is a better look of it up close



The one on the left was from hybrid and the one on the right is from the fuse box in the car. They both have worked for i have tried both so no troubles there.

So lets get started. First of all lets take this diagram i made here to follow off of. Some relays especially the one from the engine bay fuse box will not have Pin 4 so dont worry about it cause its not used.



If you have aftermarket relays and wondering what each pin is numbered. Heres is what each number stands for:
1 - 30
2 - 87
3 - 86
4 - 87a
5 - 85

Soooooo.... almost done

Pin 1 from the relay combines with Pin 15(white) of the C101 as stated earlier during the wiring of the C101 clip

Pin 2 goes to a constant 12+ volt source. (This is a source of power that is always on even when the key is off)

Pin 3 goes to connector E on the ecu which is the far right clip of the ecu. Let me explain. Look at Pin 8 on the connector E on the ecu. there should be an orange wire. Cut the wire and take the end of the wire that comes out from the ecu and connect this to the relay Pin 3. If there is no wire in the E connector Pin 8 then you need to find a pin to stick in there from another clip. If you did cut the orange wire. Just take the side that is coming from the harness and tape it off.

Pin 4 is not used

Pin 5 goes to a switched 12+ volt source. (This is a source that comes on when you turn the key. A good place for

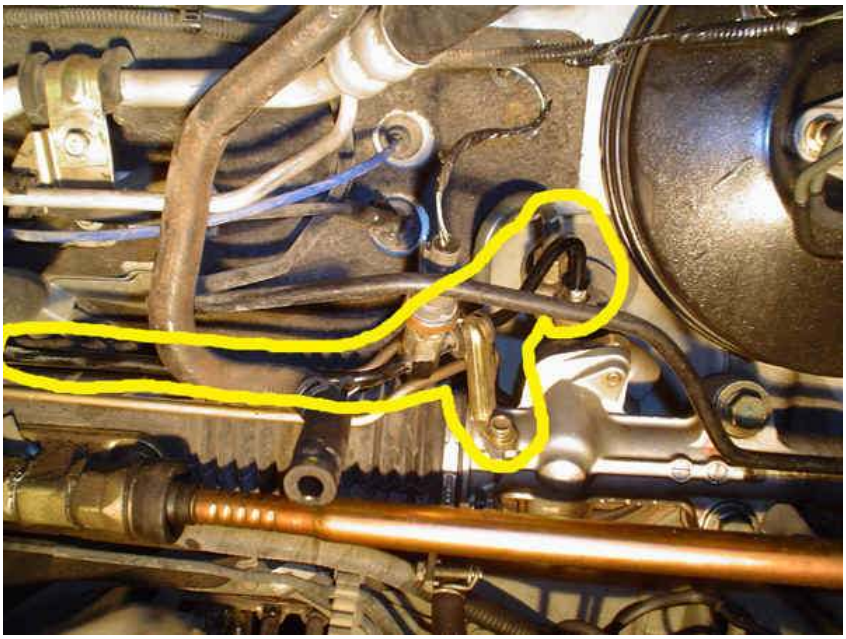
this is possibly the cigarette lighter if you cant find one.)

PREPPING THE ENGINE BAY

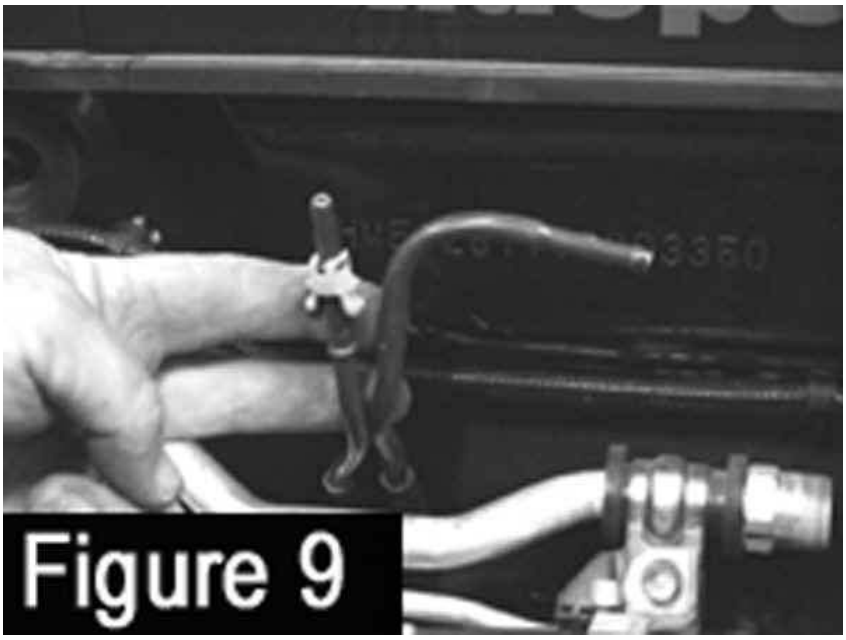
Okay now lets get the engine bay prepped a little. Some of you that want a nice looking engine bay now is the time to go to the store and pick u p some black glossy paint and paint the engine bay. If not then lets get moving.

After the wire harness is done. Take the ecu side of the harness and feed it through the hole in the firewall where the old wire harness went. Now if you look at the ecu. See the tabs that stick out on the left and right side of the ecu. I had to cut mines off with a dremel to make them fit in the slot where my original ecu is. Dont know if anyone else did that but thats what i came across. Dont connect the ecu to the harness yet.

Take your power steering line. It should look like half of it is a rubber hose and the other half of it is a metal line. The metal end of the hose screws right in to the stock location of where the original one was. You might have to bend the hose a little bit to get it to fit. Even the wire that connects to it will reach with a little effort. Just cut the plastic wire loom to help extend it.



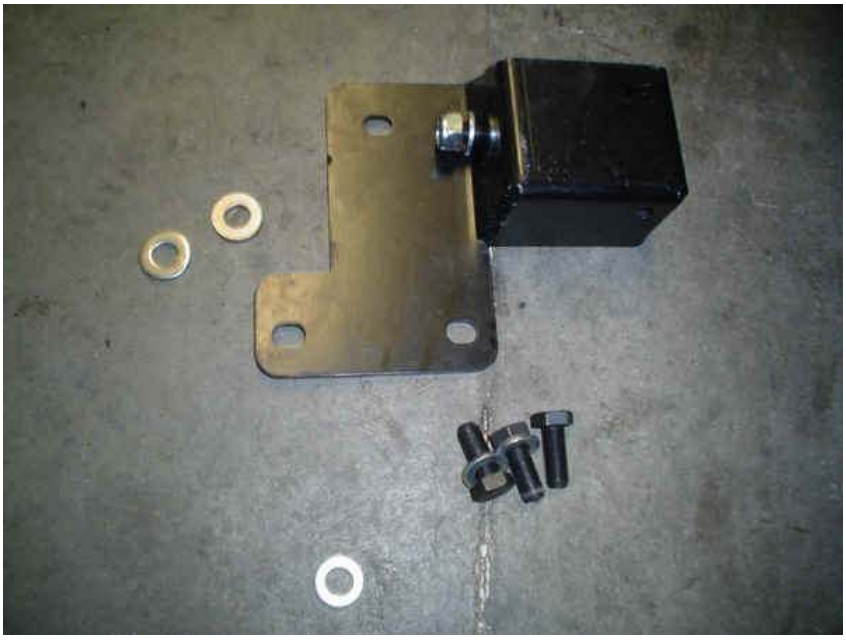
Now look for the fuel line and purge line that is sticking out of the firewall area. It should look something like this (picture taken from hasport manual) This is the lines that hasport tells you to buy in there manual. But in all reality its already in our cars.



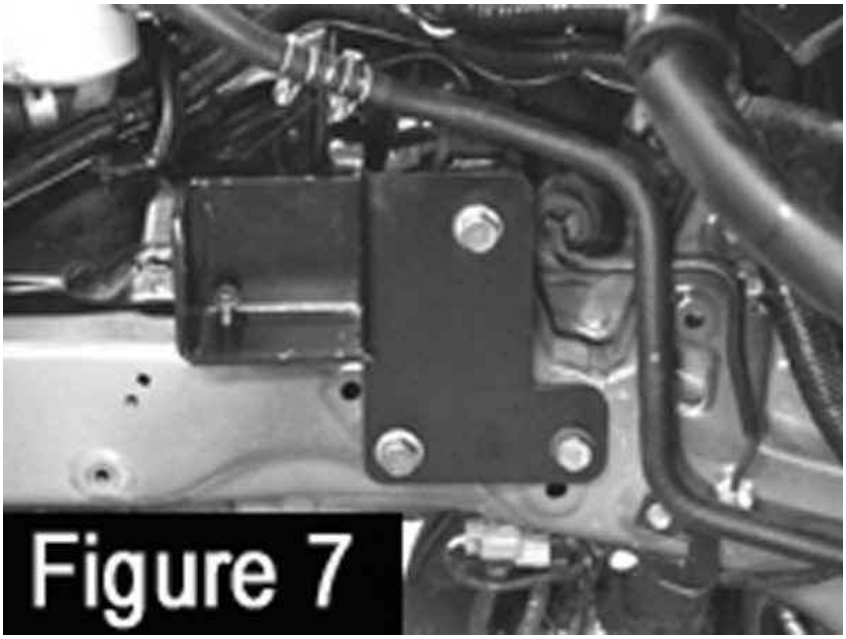
You have to gently bend the lines so that way it bends with the right line facing to the right and the left line is pointing towards the front of the engine bay. Now if you want to label these lines the left is the FUEL and the right one with the bend is the PURGE which hooks up to a vacuum on the manifold. Make sure you make no kinks in these lines or

else you have to replace it somehow someway.

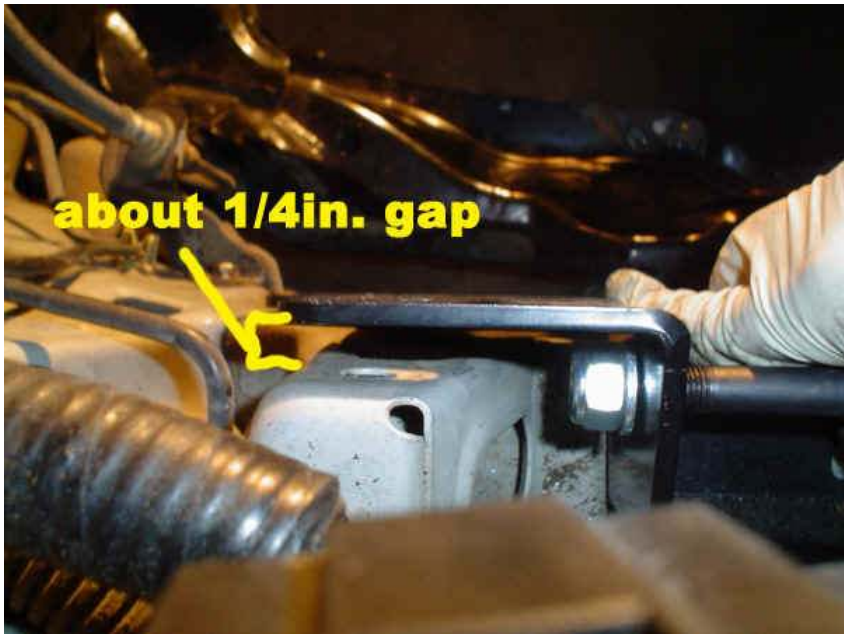
Now lets first start off with the left side bracket (passenger side). This is what was included with the hasport mounts to go on that side.



And this is how it supposed to look when its bolted onto the frame of the car.



Now one thing you might notice is that the washers or spacers they give you will not make the bracket fit flush to the frame of the car. In fact you end up short on spacers. Pick up a bunch of spacers that look just like the ones they supplied so you can mount it flush.... Heres what i mean



The bottom will mount flush except the top. I actually used the spacers on the bottom so it would be flush then didnt have any for the top. So check your package to see if they gave you more than 3 or 4 washers. If not then get a bunch more.

Okay now that side is mounted correctly. Lets move on to the driver side mount. For those of you with ABS you will have to modify the ABS bracket from what i read. I dont have ABS so i didnt have to come across it. SO if anyone who has ABS did the swap and wants to contribute anything about how to do it with the ABS and some pics or came across anything let me know so i can add it.

Okay now if you dont have ABS then the driver plate should be direct mount with 3 screws..... or so i thought.. i bolted one screw and the others wouldnt go in. You will basically need a dremel/ grinder to make the hole bigger on one side. Not all three holes lined up perfectly.

As you can see when the mount is flush to the frame the other 2 holes didnt line up perfectly. So basically what i did was i kept the bottom hole the same because that one lines up perfectly. The far right hole i had to grind it bigger up and to the left and the top one had to be grinded a little down and a little to the left.

Now take the radiator and put it into the original location of the stock ones. I used an RSX one and didnt have to modify anything. They say you have to trim around the cap opening around the grill... Seeing that as i had no grill cause i have an aftermarket one then it was real easy for me. As far as wires go for the fan on the radiator. Originally the wire hanging from the right is the A/C fan switch and the one on the left is the RADIATOR fan switch. Since this motor is reversed run the RADIATOR fan switch wire to the right hand side to make it easier access. I used an aftermarket universal fan so mounting it was easy. If you cant find an SI radiator fan just go to autozone or pepboys

or something and get the universal 17in fans for like $30 or something like that.

*NOTE: This is for when the car is back together. When you finally get the car running check the fans to make sure it is blowing the air towards the motor. If not then make sure you switch the wires to change the polarity so the fan blows the right direction.

AIR CONDITION INSTALL

If you take a look at your a/c compressor on your k20 you will see that it is has a harness coming off of it and it only has 1-wire coming off it. Thats fine and everything but i bet most of you are not wondering about that problem. Theres 2 things i am gona try and go through here. First thing is the a/c lines you gota use and how to wire your harness to the a/c compressor.

First lets start with the a/c lines. The really easy part is to order the a/c line from the 2002-2005 si model car or commonly known as the EP3. (This is for the U.S. Models). The part you will need from the car is the line from the compressor to the condensor. Which is that big looking intercooler thing on the front of your car.

anyways.. what you need if you dont want custom lines and want to use oem parts your gona need the following from the **EP3 ONLY**.

80325-S5T-A01 PIPE ASSY., AIR CONDITIONER (replaces the line coming out your firewall which is required if you want to use the oem suction hose)
80311-S5T-A01 HOSE, SUCTION (which makes the line wrap around the passneger side)
80315-S5T-E01 HOSE, DISCHARGE (goes from compressor to condenser and **YES** you can use the **RSX** one just for this hose only)

So how much is a/c worth to u??
brand new it comes out to

Prices where taken from hondapartsdeals.com
HOSE, SUCTION **$82.51**
HOSE, DISCHARGE **$92.34**
PIPE ASSY., AIR CONDITIONER **$77.56**

*To see shipping prices procced to checkout and create an account.
Sub-Total: **$252.41**

Now when it comes to the **Suction Hose** as stated above you got 3 options for it:

1- Get a custom line made from the compressor to the line coming out of the firewall (assuming you want to you your stock hose coming out of your firewall). If you do that they also need to put a LOW recharge port on the line so you can recharge the a/c.

2- Get the rsx line that comes off the compressor and goes to the line coming out of the firewall (this option will also allow you to use your stock hose coming out of your firewall). However this line also needs some modification because it has no recharge ports. So u need to have someone weld on a low recharge port somewhere on the line.

3- This last option requires no modification whatsoever but it does require you to buy one more part. You will need the ep3 line from compressor to the line coming out of the firewall. **BUT** you will also need the double lines that come out of the firewall. If you look at the back of the firewall where your a/c lines come out. There is 2 lines attached to one plate held in place by one bolt. You will need to order this line as well. Everything else is bolt-on from there. Slight bending of the line might be required. (See above for part numbers and costs for this option)

For the wiring part. I so far have come across 3 different wire configurations. I noticed that it can come from any particular vehicle and/or model. So bare with me on this

- First type of a/c wiring i have come across is the 1-wire which will clip right up to the stock a/c compressor. No modifications necessary.

- Second type is a 3-wire connector. The color of the wires are
-blue/red
-green/yellow
-blue/white
For this setup you have to take the blue/white wire and connect it to the green/yellow wire. Then the last wire which is the blue/red wire will go directly to the 1-wire compressor

-Last type is also a 3-wire connector. The color of the wires are
-blue/red
-red
-blue
For this etup you have to take the red wire and connect it to the blue wire. Then the last wire which is the blue/red wire will go directly to the 1-wire compressor

Im sure there are probably other color types out there i dont know about but if you have a blue/red wire and the other colors are different. Its safe to assume that the blue/red wire go to the compressor and the other 2 wires connect to each other.

Everything is pretty much straight forward from here on in. I havent gone into detail too much which the remaining steps only because i stopped taking pics of the swap halfway through. PLEASE NOTE that however, I will be updating this again with more details and pics of the following when i do another swap into my car. I will be pulling the motor out and doing some work too it. So when i do put it back in i will take pics to go along with putting the car back together. So dont worry. I will go into more details next update. I will even try to go into how to make a custom a/c line for the car. Think i might do it using oem parts to.

1. Attach Rear tranny bracket to tranny
2. Bolt up the k20 subframe to the car. Dont attach the Control-A arms to the frame yet.
3. Now bolt the k20 rear mount to the rear bracket. not the subframe. Found it easier this way. Hand tighten but still leave it a little loose so you can still move it.
4. Mount on the hasport mount (or whatever brand you got) to the engine. Passenger side and tranny side.
5. If your using an engine hoist. Lift the motor over the car. and slowly lower it into engine bay be careful not to hit anything. watch the fuel lines and power steering lines in the back and the radiator up front.
6. I have done it both ways. Do which ever is easiest for you. Either mount the tranny side first then match up the passenger side or mount passenger side then match up tranny side. Remember hand tighten but dont tighten fully till all 3 mounts are in
7. When all 3 are in and ready to go. Tighten all 3 mounts.
8. Install axles. First put the axle into the tranny. Then attach the control arm back to the subframe. Make sure that the axle is in the tranny and in the hub while bolting up the control arm. Be careful not to pull the axle out of the cups or else your asking for it.. haha.. (there is another way to do put in the axles but requires more work)
9. Connect the fuel line and the brake booster line and so forth back to the motor. Radiator hose lines. Make sure you left nothing out.
10. Attach the powersteering pressure line to powersteering pump
11. For the return line u can use any approved hoses to run from the pump to the resevoir. Just make sure it doesnt rub against the accesory belt.
12. Attach a/c lines if you have them (will go into more detail next update)
13. Almost there. Attach engine harness to motor. Run wires into the car on the passenger side where you originally pulled out the D17 wire harness. Plug C101 clip into in-dash harness and clip the rest to the ecu.
14. Check all your fluids and fill it up. Powersteering, raditor fluid, oil, tranny fluid, blinker fluid.
15. Connect your intake and headers and the rest of your exhaust system

Double check everything. Turn key to on. Make sure you hear the fuel pump priming. On-OFF-On-OFF a few times. Leave it ON then go into the engine bay and check all your fuel lines and make sure nothing is leaking and you dont smell any fuel. If you do CHECK IT again. Of vourse before you can start it you gotta have kpro. Turn the key to ON then connect your laptop and access the ecu.

1. Start the kpro software
2. click on "file" then "new"
3. choose the appropiate ecu and motor you are running and hit "ok"
4. look for the window that says "parameters"
5. click on "MISC"
6. remove the check mark from "immobolizer enabled" and "obd2 enabled"
7. Check that the "multiplexer" is set to normal
8. then click "file" and "save as" and save it somewhere you can find it for future use
9. then click "online" and then "upload" and it will start sending the calibration to your ecu. If the "upload" setting is a very light gray that means either you didnt turn the key to "on" or there is no power running to the ecu. Check all your connections
10. I suggest after calibration is done uploading. Turn the key to off position then turn the key back on. Then try starting the car.

Like with any swap double check everything twice before you even start her up for the first time. Even while the car is running. Check the temp from in the car. Make sure its not overheating. Once car is warmed up the radiator fan will come on. If you hear any unusual noise turn car off.

Once everything is all said and done. Heres your end result

Of course dyno tune is a must in my book. You don thave to but i highly suggest you do it

If anything i suggest that if you never done swaps before to have someone there to help you with it just in case you forget something. I will be updating this thing in the next month with pics when i redo my swap

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K20 Specs and General Info

K20A – Japan Spec
• HP 220 @ 8000 rpm
• Torque 152 lb/ft @ 7000 rpm
• Redline 8400 RPMS
• Bore 86mm
• Stroke 86mm
• Comp Ratio 11.5:1
• Displacement 1998cc
• Specific output 110HP/L

Trans Specs
• 1st 3.27:1
• 2nd 2.13:1
• 3rd 1.57:1
• 4th 1.21:1
• 5th .97:1
• 6th .78:1
• Final Drive 4.765

K20A - EURO spec
• 147 kW (200 hp) @7400 rpm
• Torque 196 Nm @5900 rpm
• Redline 8100 RPMS
• Bore 87mm
• Stroke 86mm
• Comp Ratio 11,0:1
• Displacement 1998 cm3
• Specific output 100HP/L

K20A2 – US spec RSX type S motor
• 200 HP@7400 rpm
• Torque 142 lb/ft @ 6000 rpm
• Redline 8100 RPMS
• Bore 86mm
• Stroke 86mm
• Comp Ratio 11.0:1
• Displacement 1998cc

• Specific output 100HP/L

Trans Specs
• 1st 3.267
• 2nd 2.13
• 3rd 1.54
• 4th 1.14
• 5th .92
• 6th .73
• Final Drive 4.388

K20A3 – US spec Ep3 / RSX motor
• 160 HP@6500 rpm
• Torque 132 lb/ft @ 5000 rpm
• Redline 6800 RPMS
• Bore 86mm
• Stroke 86mm
• Comp Ratio 9.8:1
• Displacement 1998cc
• Specific output 80HP/L

Trans Specs
• 1st 3.662
• 2nd 1.769
• 3rd 1.212
• 4th 1.14
• 5th .92
• Final Drive 4.765

K24A2 – US spec TSX motor
• 200 HP@6800 rpm
• Torque 166 lb/ft @ 4500 rpm
• Redline 7100 RPMS
• Bore 87mm
• Stroke 99mm
• Comp Ratio 10.5:1
• Displacement 2354cc
• Specific output 88.33Hp/L

Trans Specs manual
• 1st 3.262
• 2nd 1.88
• 3rd 1.35
• 4th 1.0
• 5th .82
• 6th .659
• Final Drive 4.765

K24A – US spec CRV motor
• 160 HP@6000 rpm
• Torque 162 lb/ft @ 3600 rpm
• Redline 6500 RPMS
• Bore 87mm
• Stroke 99mm
• Comp Ratio 9.6:1
• Displacement 2354cc
• Specific output 80HP/L

Trans Specs manual
• 1st 3.262
• 2nd 1.88
• 3rd 1.35
• 4th 1.0
• 5th .82
• Final Drive 4.765

2002-2004 Acura RSX Specs in Detail

POWERTRAIN	RSX	RSX TYPE-S
Engine Type	16-valve, DOHC, 2.0-liter, *i*-VTEC 4-cylinder	
Horsepower, SAE Net	160 hp @ 6500 rpm	200 hp @ 7400 rpm
Torque, SAE Net	141 lb.-ft. @ 4000 rpm	142 lb.-ft. @ 6000 rpm
Redline	6800 rpm	7900 rpm
Bore & Stroke	3.39 in. x 3.39 in. (86 mm x 86 mm)	
Displacement	122.1 cu. in. (1998 cc)	
Compression Ratio	9.8:1	11.0:1
Induction System	Programmed Fuel Injection (PGM-FI)	
Valvetrain	*i*-VTEC *intelligent* Variable Valve Timing and Lift Electronic Control (VTC), DOHC, 4-valves-per-cylinder, chain-driven camshafts and variable timing control	
Engine Block	Aluminum alloy with cast-in iron liners	
Cylinder Head	Aluminum alloy with 4 valves-per-cylinder pent-roof combustion chambers	
Emission Control	LEV-2 (Low Emissions Vehicle-II) emissions control	
Ignition System	Direct ignition system	
Alternator	110-amp max	
Battery	12V, maintenance-free	
Recommended Fuel	Unleaded	Premium Unleaded
Layout	Transverse-mounted, front engine, front-wheel drive	

Transmission		5-speed manual or 5-speed automatic transmission with Sequential SportShift and Grade Logic Control		6-speed manual - - - -	
		Manual	Automatic	Ratios (:1)	Manual
	Ratios (:1)				
		3.267	2.684		
	1st	1.880	1.500	1st	3.267
	2nd	1.212	0.983	2nd	2.130
	3rd	0.921	0.733	3rd	1.517
	4th	0.738	0.571	4th	1.147
	5th	3.583	2.000	5th	0.921
	Reverse	4.389	4.562	6th	0.738
	Final			Reverse	3.583
				Final	4.389

CHASSIS		RSX	RSX TYPE-S
Body Type		Steel unit body	
Front Suspension		Fully independent Control-Link MacPherson strut	
Rear Suspension		Fully independent compact double-wishbone with coil springs and stabilizer bar	
Shock Absorbers		Progressive-valve gas-pressurized	
Stabilizer Bars	Front	.90 in. (23 mm)	
	Rear	.75 in. (19 mm)	
Steering Type		Variable, speed sensitive rack-and-pinion power steering	
Steering Ratio		15.1:1	
Steering Wheel Turns (lock to lock)		2.64	
Turning Circle (curb to curb)		38.1ft. (11.6 m)	
Wheels		16 x 6 ½ JJ 5-spoke cast alloy wheels	
Tires		P205/55R16 Michelin MXM4 all-season high-performance	
Braking System		Four-wheel disc brakes with ABS	
Front Discs		Ventilated, 10.3 in. (262 mm) diameter; .82 in. (21 mm) rotor thickness	Ventilated, 11.8 in. (300 mm) diameter; .98 in. (25mm) rotor thickness
Rear Discs		Solid, 10.2 in. (260 mm) diameter; .35 in (9 mm) rotor thickness	
Anti-lock Braking System (ABS)		3-channel system with four wheel sensors	

	RSX	RSX TYPE-S
CAPACITIES		
Crankcase	4.2 US qt. (4.0 L)	4.7 U.S. qt. (4.5 L)

		M/T 5.6 US qt. (5.3 L)	
Cooling System		A/T 5.9 US qt. (5.6 L)	5.6 US qt. (5.3 L)
Fuel Tank		13.2 US gal. (50 L)	
Volumes	Passenger	79.2 cu. ft.	
	Cargo	17.8 cu. ft.	
	Total	97.0 cu. ft.	
FUEL ECONOMY		**RSX**	**RSX TYPE-S**
EPA Fuel Mileage–City / Highway		M/T 27 / 33	24 / 31
		A/T 24 / 33	
EXTERIOR DIMENSIONS		**RSX**	**RSX TYPE-S**
Wheelbase		101.2 in. (2570 mm)	
Track, front		58.4 in. (1483 mm)	
Track, rear		58.4 in (1483 mm)	
Overall Length		172.2 in. (4375 mm)	
Overall Width		67.9 in. (1725 mm)	
Overall Height		54.7 in. (1389 mm)	
Minimum Ground Clearance		6.0 in. (152 mm)	5.9 in. (149 mm)
Curb Weight		M/T 2721 lbs. (1234 kg) A/T 2789 lbs. (1256 kg)	2778 lbs. (1260 kg)

EXTERIOR DIMENSIONS	RSX	RSX TYPE-S
Weight Distribution (% front / rear)	5-speed Manual Transmission 64/36 Automatic Transmission 60/40	6-speed Manual Transmission 63/37

INTERIOR DIMENSIONS		RSX	RSX TYPE-S
Front	Head Room	37.8 in. (960 mm)	
	Leg Room	43.1 in. (1094 mm)	
	Hip Room	51.1 in. (1297 mm)	
	Shoulder Room	52.6 in. (1337 mm)	
Rear	Head Room	30.1 in. (866 mm)	
	Leg Room	29.2 in. (742 mm)	
	Hip Room	46.7 in. (1185 mm)	
	Shoulder Room	51.3 in. (1303 mm)	

WARRANTIES	RSX	RSX TYPE-S
Vehicle	4-year / 50,000-mile limited warranty	
Outer Body Rust-Through	5-year / unlimited-mile limited warranty	
Acura Total Luxury Care (TLC) with roadside assistance	4-year / 50,000-mile	

TSX Specs in Detail

POWERTRAIN	
Engine Type	16-valve, DOHC, 2.4-liter, *i*-VTEC™ 4-cylinder
Horsepower, SAE Net	200 hp @ 6800 rpm
Torque, SAE Net	166 lb-ft @ 4500 rpm
Redline	7100 rpm
Bore & Stroke	87 mm x 99 mm
Displacement	143.6 cu. in. (2354 cc)
Compression Ratio	10.5:1
Induction System	Programmed Fuel Injection (PGM-FI)
Valvetrain	i-VTEC intelligent Variable Valve Timing and Lift Electronic Control (VTEC™), DOHC, 4-valves-per-cylinder, chain-driven camshafts and variable timing control
Engine Block	Aluminum alloy with cast-in iron liners

Cylinder Head	Aluminum alloy with 4 valves-per-cylinder and pent-roof combustion chambers
Emission Control	LEV-2 (Low Emissions Vehicle-II)
Ignition System	Direct ignition system
Alternator	105 amp. max
Battery	12V, maintenance free
Recommended Fuel	Premium Unleaded
Layout	Transverse-mounted, front engine, front-wheel-drive

POWERTRAIN		
Transmission		
	6-speed manual	5-speed Sequential SportShift™ automatic
	Ratios (:1)	Ratios (:1)
	1st 3.267	1st 2.652
	2nd 1.880	2nd 1.517
	3rd 1.355	3rd 1.082
	4th 1.028	4th 0.773
	5th 0.825	5th 0.566
	6th 0.659	
	Reverse 3.583	Reverse 2.000
	Final 4.7	Final 4.44

CHASSIS		
Body Type		Steel unit body
Front Suspension		Independent, double-wishbone with coil springs and stabilizer bar
Rear Suspension		Independent multi-link double-wishbone with coil springs and stabilizer bar
Shock Absorbers		Telescopic, hydraulic nitrogen gas filled
Stabilizer Bars	Front	25.4 mm x 4.5 mm wall thickness
	Rear	15 mm solid
Steering Type		Torque-sensing, variable power assist rack-and-pinion
Steering Ratio		14.8:1
Steering Wheel Turns (lock to lock)		2.7
Turning Circle (curb to curb)		40.0 feet
Wheels		17x7JJ 7-spoke alloy wheels
Tires		Michelin P215/50R17 all-season high-performance

CHASSIS		
Braking System		4-wheel disc brakes with 4-channel ABS
Front Discs		Ventilated, 11.8 in (300 mm) diameter x 28 mm thickness
Rear Discs		Solid 10.2 in (260 mm) diameter x 9 mm thickness
Anti-lock Braking System (ABS)		4-channel
Vehicle Stability Assist (VSA)		Throttle control and brake control utilizing yaw, lateral g, speed and steering sensors for traction control and stability enhancement
Traction Control System (TCS)		Incorporated into VSA
CAPACITIES		
Crankcase		5.3
Cooling System		MT 7.4 U.S. qt. AT 7.3 U.S. qt.
Fuel Tank		17.1 gallons
Volumes	Passenger	91 cu. ft.
	Cargo	13.0 cu. ft. without Navigation System 12.8 cu. ft. with Navigation System
	Total	104 cu. ft. without Navigation System 103.8 cu. ft. with Navigation System
FUEL ECONOMY		
EPA Fuel Mileage–City/ Highway		Manual: 21/29 Automatic: 22/31
EXTERIOR DIMENSIONS		
Wheelbase		105.1 inches (2670 mm)
Track, front		59.6 inches (1515 mm)
Track, rear		59.6 inches (1515 mm)
Overall Length		183.3 in (4657 mm)
Overall Width		69.4 in (1762 mm)
EXTERIOR DIMENSIONS		
Overall Height		57.3 in (1456 mm)
Minimum Ground Clearance		4.7 in (Full-Load) 6.2 in (Unladen)

Curb Weight

MT without Navigation System	3230 lbs
MT with Navigation System	3241 lbs.
AT without Navigation System	3318 lbs.
AT with Navigation System	3329 lbs.

Weight Distribution (% front/rear)

MT	60/40
AT	61/39

INTERIOR DIMENSIONS

Front	Head Room	37.8 in (960 mm)
	Leg Room	42.4 in (1076 mm)
	Hip Room	54.4 in (1381 mm)
	Shoulder Room	55.4 in (1406 mm)
Rear	Head Room	37.3 in (947 mm)
	Leg Room	34.2 in (868 mm)
	Hip Room	54.4 in (1382 mm)
	Shoulder Room	53.5 in (1360 mm)

WARRANTIES	
Vehicle	4-year/50,000-mile limited warranty
Outer Body Rust-Through	5-year/unlimited-mile limited warranty
Acura Total Luxury Care (TLC) with roadside assistance	4-year/50,000 mile

The K20A3 does not have a standard DOHC VTEC valvetrain as we know it from the B-series engines - the K20A3 should actually be called a "DOHC i-VTEC-E" engine, because it uses a VTEC-E cam setup. The K20A2 is the "real" DOHC i-VTEC engine, utilizing the standard DOHC VTEC cam setup we're all familiar with. To help you understand the differences between the K20A2 and K20A3 engines, I've included the following information from a post I made elsewhere:

Allow me to evaluate. Let's start out by defining some terms:
VTEC - Variable valve Timing and lift Electronic Control. At low RPM, a VTEC engine uses a normal cam profile to retain a smooth idle, good fuel economy, and good low-end power delivery. The VTEC mechanism engages a high-lift, long-duration "race" cam profile at a set RPM value (i.e., ~5500RPM on the B16A) to increase high-end power delivery.

VTEC-E - Variable valve Timing and lift Electronic Control for Efficiency. This system isn't really VTEC as we know it. At low RPM, the VTEC-E mechanism effectively forces the engine to operate as a 12-valve engine - one of the intake valves does not open fully, thus decreasing fuel consumption. At a set RPM value (i.e., ~2500RPM in the D16Y5), the VTEC-E mechanism engages the 2nd intake valve, effectively resuming operation as a normal 16-valve engine. Note: in a VTEC-E engine, there are no high-RPM performance cam profiles; this engine is supposed to be tuned for fuel economy, right?

VTC - Variable Timing Control. This is a mechanism attached to the end of the intake camshaft only which acts as a continuously variable cam gear - it automatically adjusts the overlap between the intake and exhaust cams, effectively allowing the engine to have the most ideal amount of valve overlap in all RPM ranges. VTC is active at all RPMs.

i-VTEC - intelligent Variable valve Timing and lift Electronic Control. This is a combination of both the VTEC and the VTC technologies - in other words, i-VTEC = VTEC + VTC. Currently, the only engines that use the i-VTEC system are the DOHC K-series engines.

Now this is where things get tricky - Honda uses the term "DOHC i-VTEC" for two different systems: The first system is used in the K20A2 engine of the RSX Type-S. The second system is used in the K20A3 engine of the Civic Si.

The First System (K20A2):
This system is pretty close to the older DOHC VTEC engines. At low RPM, the K20A2 uses a normal cam profile to retain a smooth idle, good fuel economy, and good low-end power delivery. At 5800RPM, its VTEC mechanism engages a high-lift, long-duration "race" cam profile to increase high-end power delivery. The only difference between this i-VTEC engine and the older VTEC engines is the addition of the VTC system. The intake camshaft has the automatic self-adjusting cam gear which continuously optimizes valve overlap for all RPM ranges.

This system is used in engines powering the JDM Honda Integra Type-R, Civic Type-R, Accord Euro-R, and the USDM Acura RSX Type-S and TSX.

The Second System (K20A3):
This system does not really conform to the "DOHC i-VTEC" nomenclature, as Honda would like us to believe. As I mentioned in my previous post, it actually should be called "i-VTEC-E," because it uses a VTEC-E mechanism rather than a standard VTEC mechanism. At low RPM, the VTEC-E system effectively forces the engine to operate as a 12-valve engine - one of the intake valves does not open fully, thus decreasing fuel consumption. At 2200RPM, the VTEC-E system engages the 2nd intake valve, effectively resuming operation as a normal 16-valve engine. There are no high-RPM performance cam profiles; this engine is tuned to balance fuel economy and power, rather than

provide pure performance. On the intake cam, there is the VTC mechanism which basically is an automatic self-adjusting cam gear used to continuously optimize the valve overlap for all RPM ranges. This being a VTEC-E system - and not a true DOHC VTEC system - is the reason the K20A3 redlines at a measly 6800RPM, while the K20A2 is able to rev all the way to 7900RPM.

This system is used in engines powering the USDM Acura RSX base, Honda Civic Si, Accord 4-cylinder, CRV, and Element.

Special note: The K20A3 engine used in the Acura RSX base has a slightly different intake manifold design from the K20A3 engine used in the Civic Si. The RSX engine uses a dual-stage manifold, similar in concept to the manifold of the B18C1 in the old Integra GSR. It uses long intake runners at low-RPM to retain low end power, and switches at 4700RPM to a set of shorter intake runners to enhance high-end torque. This accounts for the extra 9 ft-lb of torque in the RSX (141 ft-lb, vs. 132 ft-lb in the Civic Si).

Myths:
1. The i-VTEC engine engages VTEC gradually, and not suddenly like in the old VTEC engines.

Wrong. The i-VTEC engine "engages VTEC" at a single set RPM, like always. Whoever started this rumor is a ****tard. Read the definitions above.

2. VTC engages at a set RPM.

Wrong. VTC is always activated. Read under "VTC" above.

3. The K20A3 engages VTEC at 5000+ RPM.

Wrong. Technically, there is no "VTEC" (as we think of it) in the K20A3 engine - it uses a VTEC-E technology, which engages at 2200RPM. Read under "The Second Sytem" above.

ARTICLES

ALL IN THE FAMILY
By Keith Buglewicz

A sense of nervousness has seeped into the Honda performance community. It comes not from new anti-racing laws, or emissions regulations that will weld the hoods of new cars shut. No, this nervousness comes directly from Honda itself.

K. It's just a letter, but in the coming years its significance to Honda enthusiasts will achieve the status that "B" has now. With the introduction of the Acura RSX, the new Honda Civic Si and CRV, Honda chucked more than 12 years of engine experience and aftermarket support out the window for a clean sheet of paper design. The new engine family is the K series, and on paper, it makes even the highest performance VTEC B series engine look like yesterday's blue plate special.

Look at the specs. The K20A2 in the RSX Type-S churns out a solid 200 hp from its 2.0- liters. That's 100 hp per liter, and you can thank i-VTEC for this specific output. The "VTEC" part of that acronym is already familiar to Honda enthusiasts. When the engine reaches a certain speed, rocker arms are locked together, linking them to a higher-lift cam, and allowing more fuel and air into the engine. In the world of variable valves, this is known as cam shifting right now, only Honda, Toyota, BMW and Porsche sell cam-shifting systems in the United States.

However, that little "i" means a lot. It means the K series engines are also equipped with VTC, or Variable Timing Control. This cam phasing system uses a spool gear, oil pressure and some fancy electronics to change the angle of the intake cam by plus or minus 30 degrees of timing.

The result is an engine with excellent power and especially torque, but one that still manages better fuel efficiency and lower emissions than its predecessor.

Now, this is all fine and good, but what does this mean for an aftermarket that has been centered on the B series engines? What can be done with it? Can it be turbocharged? Can it be swapped? Does it respond to the simplest bolt on mods? These are the questions on the minds of Honda enthusiasts, and we intend to answer as many as we can. First, let's take a close-up look at the engines as they come from the factory.

THE ENGINES
The K series currently consists of four power plants. The K20A3 is found under the hood of the standard RSX. With 160 hp at 6500 rpm and 141 lb-ft of torque at 4000 rpm, it churns out the same power as the B16A, 10 hp less than the B38C1, but much more torque than either one of them, all at a lower engine speed. The i-VTEC system works only on the intake cam on this engine, and it has a composite two-stage intake manifold.

Similar to the K20A3 is the K20A found under the hood of the new Civic Si. K20A-what? Well, we're not sure. The cars we've seen have all been pre-production vehicles, without the requisite engine code stamp on the block. The best information we have so far is that it's a K20A3, same as the RSX. But that sounds a little off to us. While it has the same i-VTEC system as the RSX, it boasts the fixed, single-stage aluminum intake manifold of the K20A2 under the hood of the RSX Type-S instead of the dual-stage manifold of the base RSX. Whatever the final engine code works out to being (we'll just call it a K20A for now), this manifold swap actually works against the Si, reducing its torque. It weighs in with the same 160 hp, but with only 132 lb-ft of torque at a higher 5000 rpm than its K20A3 sibling.

Following the logic of Honda's engine codes, the K24A1 is a 2.4-liter version of the K series. Following a philosophy similar to the B20 found in the previous CR-V, it's tuned to be a torque monster with a long, 99 mm stroke. That's a full 13 mm (0.51-in.) longer than any of the K20 engines. The extreme stroke works. With 162 lb-ft available at a low 3600 rpm, the CR-V is a veritable stump puller among small four-cylinder SUVs. At the top of the enthusiast heap is the K20A2 that powers the RSX Type-S. With a lofty 7900-rpm redline, 200 hp and 142 lb-ft of torque, this engine really is as good as its hype. With the exception of the stroked K24, the engines are all very similar structurally. All three of the 2.0-liter versions share the same 86 mm x 86 mm bore and stroke. This is known as a square design. An oversquare engine has a longer stroke than bore, like the K24. This generally results in more torque, but at the expense of peak power. Conversely an undersquare design (such as the S2000's engine) has a bore larger than stroke, and generally produces more high-end horsepower at the expense of torque. Not surprisingly, a square design like the K20 is a compromise between these two extremes, offering good torque and good horsepower without sacrificing or optimizing either. Aside from the manifold change on the Si's version of the K20, the main difference between these engines is the way they manipulate their valves.

VALVE DANCING

The K20A2 in the Type-S works the way you expect VTEC to work. The two camshafts are equipped with three cam lobes and rocker arms for each cylinder's pair of intake and exhaust valves. At 5800 rpm, oil pressure activates pins that lock the outer rocker arms to the center arm. This forces both valves to use the higher lift, longer duration center camshaft profile. However, this is augmented by VTC on the intake side, which manipulates the timing of the cam itself. This can be used to augment torque, reduce emissions or a variety of different things depending on what the computer thinks is best at the time. The RSX's K20A3, the Si's K20A and the CR-V's K24A1 use i-VTEC differently. First, it only operates on the intake valves. But even then, the philosophy is changed. Until the VTEC threshold is reached, the lesser K engines essentiality only use one intake valve per cylinder. The other is opened just a crack, enough to keep fuel from pooling behind the valve, but that's about it. In addition, the VTC is tuned primarily to keep emissions as low as possible. All this weirdness results in excellent swirl inside the combustion chamber and very efficient combustion. It's great for fuel efficiency and low emissions. However, it isn't so great for driving fun, as the engine inhales less deeply and revs lower.

FRANKENSTEIN RETURNS?

The K24A is more closely related to the K20A3 and K20A. While it uses the same i-VTEC tuning as those engines, it's the long stroke design that's intriguing. The difference is in the block. The K24's deck height is roughly 19 mm higher than its smaller siblings. It's also slightly bored, with 1 mm larger cylinders. The compression ratio is also down slightly from the non-Type-S engines, 9.6.1 vs. 9.8:1. So what? Well, the natural temptation is to throw the K20A2's efficient head onto the K24A1 block, raise the redline and have a torquey, ultra-powerful i-VTEC stroker Frankenstein monster engine.

The actual bolting on part wouldn't be too difficult, as the heads should mount right up. However, you do run into an issue with piston speed. At its 7900-rpm redline, the K20A2 in the Type-S has a piston speed of 4464 feet per minute (fpm). Thanks to its long stroke, the K24A1 comes close to that, running at 4225 fpm at its much lower redline of 6500 rpm. By the time you've spun your K24 up to just 6900 rpm, you're already at 4485 fpm, and at the 7900 rpm redline of the K20A2, you're at a crazy 5135 fpm. For comparison, even the hyperkinetic S2000 with its 9000 rpm redline doesn't exceed 5000 fpm (it maxes out at 49% fpm). And the Integra's B18C1 only reached 4573 fpm. Translation: If you're going to plunk a K20A2 head on a K24A1 block and redline the concoction to 7900 rpm without seriously building up the bottom end.. duck.

If you scan the chart on page 85, you'll see that we've covered most of the cars there. The Integra is just for comparison, of course, and we've hit the RSX and CR-V engines. So what's the S2000 doing there? That is the true wild-card in all this. It seems as though despite the different engine code (F20C1) and north-south orientation, the S2000's engine block is a kissing cousin of the K series. In fact, according to engine developer Paulus Lee at Advanced Engine Breathing Systems in San Diego, the head gaskets are the same. This means the S2000's standard VTEC head could, in theory, be put on the K series block.

HEAD GAMES

The head design of the different Ks are intriguing, beyond just valve manipulation. The K20A2 found in the Type-S is a wonderful design, according to just about everybody; Honda nailed it, putting even the very effective B series engines to shame. The valves are huge, noticeably bigger than the B series valves even without the use of a caliper. But measure them and the difference is that much more apparent. The intake valves on the K are 2 mm bigger than the B series intake valves, and the same goes for the exhaust valves. The intake port angle is also excellent, with a straighter shot into the combustion chamber than the B series. On the other side of the head, the improvements continue. While the B series heads force the exhaust gases through a strange humped path through the head, the K sends it straight out to the manifold.

There are other improvements. The K uses roller rocker arms. This not only reduces friction in the valvetrain, making more power possible it also frees up the aftermarket to offer durable billet cams for the Ks. Slipper followers like those in the B series put too much pressure on billet cams, wearing them down prematurely. Forged camshafts are

better, but expensive to produce in small numbers. Note the difficulty Crane has gone to in creating roller followers for its new billet B series cams. But with roller followers built in, we expect to see some radical profiles for these engines in coming months.

The other K head is not quite as efficient. While the Type-S head boasts big, smooth, unobstructed ports, the regular head features a strange groove cut into the wall between the intake valves. Undoubtedly there to help improve the single-valve operation of the VTEG system these engines use, any head porter can tell you this kind of weirdness plays havoc with airflow into the engine. The result is pretty clear. The Type-S K20A2 is the engine to have. While the other two K20s are OK in their fuel-miserly, non-polluting way - and the K24 is the undisputed torque champ - they are less ambitious, and offer less potential for improvement compared with the mighty K20A2.

THE BOTTOM OF IT

Under the head is an all-new block. Made of aluminum alloy, it's a beefy unit, heavily ribbed and gusseted for extra strength. However, it's also an open deck design. An open deck means that at the top of the block (the deck), the water jackets around the cylinders are open to the head, and rely on the head gasket for sealing. This limits the amount of boost that an engine block can withstand, because the individual cylinders can actually wobble slightly under high pressures. This is why drag racers will seal the deck on their B series engines before pumping the pressure up to bone-crushing levels.

But for a naturally aspirated engine, this is pretty darn strong. Flip the engine over and you're greeted with a bearing girdle that actually makes up the lower quarter of the block. Known as a split case, this design is much stronger than the internal bearing girdle used in the B engines. About the only drawback to this design is that it only uses two bolt mains, rather than the four bolt mains preferred by racers. No matter, considering the overwhelming beefiness of the design, this is still quite acceptable. Remove the lower part of the case, and you'll see there's a lot of room inside the block. This means that one could go pretty crazy with rod length before the block itself needed modification.

The crank is Honda's typical overbuilt forged unit. The Type-S crank is, again, the better of the two, being fully counterweighted. The rods are similar in both designs, although the Type-S rods are stronger to cope with the higher piston speeds encountered in the engine. The pistons are another matter, however. The Type-S pistons are about what one would expect, and are in fact quite similar in design to the high domed structure that one finds in the B series engines. The piston itself accounts for the higher compression in this engine, as the bore and stroke are identical. On the other hand, the lower end K series piston looks, well, weird. Off center on the top of the piston is an odd, round dish that for all the world looks like a bellybutton. We can only speculate that this is another way the non-Type-S engines achieve good fuel economy and low emissions.

WHAT ABOUT SWAPS?

It goes without saying that the various K's should swap into the RSX, Civic Si and CR-V engine bays without a problem. In fact, one of the first swaps we're likely to see is the anemic K20A in the Si being ditched in favor of the more powerful K20A2. This is a drop-in replacement. In fact, the same hatchback is sold in Europe with the K20A2 and called the Civic Type R, and there's some speculation that we'll see this exact car in the United States sometime in the 2003 model year.

But the real question is will it fit in the standard, non-Si EM-chassis 2001-2002 Civic? Well, after analyzing the size of the engine bays and the way the engines bolt in, we'll say that it's possible, but it won't be the drop-in replacement we've become accustomed to with the EJ Civics and the B series engines.

The EM Civic, the Civic Si, RSX and CR-V are all cousins under the skin. However, that EM Civic is the redheaded stepchild of the group. In an effort to save some RBD bucks, Honda opted to further revise the venerable D series engine which powered Civics since the late '80s, rather than plunk the new K engines in them. At 1.7- liters and 127 hp (in the EX), it runs well enough, and is still a solid economy car engine. Of course, EM Civic owners want more.

One major obstacle is the D series engine spins the wrong way. For a very long time, Honda engines all spun counterclockwise, backwards from almost every other engine on the market. Why? Well, it put the engine on the left side of the engine bay, which is the passenger side in Japan. This made the steering mechanism easier to route. But with Honda being an international company for several decades, it mainly was a case of corporate culture sticking around for no good reason.

The K series engines spin clockwise, like most other engines, and as a result they sit on the right side of the engine bay. In order to make one basic engine bay that would fit both a left-side and a right-side engine, Honda had to do a little bit of clever engineering. The transmission side of the engine in each car attaches directly to the frame using a beefy engine mount, which bolts to the tranny case. The pulley-side mount bolts to a "box" that is welded to the frame. The problem is that the "box" is on the right side of the engine bay in the RSX, Type-S, Si and CR-V, and on the left side in the EM Civics. Dimensionally, there isn't much of a problem. The K engines should fit into the Civic engine bay just fine without any clearance issues. Getting it to bolt in place, however, will require some tricky mounts. To top it all off, you'll have to drop in the K20 transmission and driveshafts as well. Even if the engine mount situation is solved, the cost of this engine swap (at least until K20A2 engines become more readily available) will be so much that one might as well just buy an RSX Type-S.

Of course, this doesn't mean that somebody won't try it. As for earlier EJ Civics or earlier Integras, we'd just leave that whole can of worms unopened until K20A2-powered EM Civics are commonplace.

WHAT DO TUNERS THINK?

The reaction to the Type-S engine has been overwhelmingly positive. Despite a few reservations about VTC, the engine has been greeted with open, loving arms. Many tuners have delved deep into the guts of the K engines, and

are coming back with some interesting findings. The non-Type-S engine has received a more lukewarm response. Although it is a decent engine, it isn't really the best choice for an enthusiast. We can expect to see intake and exhaust systems for this engine, maybe supercharger kits later down the road. But this is not like the B18A "LS" engine, which is a pretty good powerplant by itself. It's best left alone.

You're probably wondering what tuners have discovered about the engines, though. For example, how easy is it to turbocharge the K series'? What kind of internal mods have they made? Can you really put an S2000 head on a K block? The answers to these and other questions will be found in Part 2, in the next issue of HT.

Don't you just love cliffhangers'?

Part2: The Tuners' Perspective

In the April/May issue of Honda Tuning, we took an up-close look at Honda's new K series engine, the motivational power behind the RSX, new Civic Si and CR-V sport utility. We compared it to the B series powerplants, far and away the mainstay of the Honda tuning market, and discovered Honda really did its homework on this engine. With robust construction, bigger ports, extremely trick valvetrain, and a number of other goodies, we were positively giddy with excitement.

However, we're just a bunch of magazine schlubs, so we talked to some of the top tuners to discover what they thought of the K, what they have planned, and what obstacles they've had to overcome to achieve their goals. Although we wanted to give the tuners a little more time to develop their various K series projects.

RECAP

The K20A2 found under the hood of the RSX Type-S obviously king of the hill. While the A3 in the standard RSX and new Civic Si, and the A1 in the CRV, have been tuned with an eye toward fuel efficiency and low emissions, the A2 has been tuned for power.

The big difference between the A2 and the other K series engines is how the cam-switching part of iVTEC works. The A2 uses a cam-switching technique familiar to the most Honda fans. Extra rocker arms are slaved to one of two cams, increasing lift and duration at higher revs for better high-end power. The other engines use a version tuned for fuel efficiency. One intake valve is essentially closed when "off-cam," and when the switch happens, the closed valve is just slaved to the same cam the opening one does. No higher lift or duration, but some pretty good fuel economy and emissions figures.

The K20A2 is a gem of a powerplant, and is already making serious power in the Type R versions of the Integra (Yes, it's still called that in Japan.) and Civic. It's clear it has plenty of potential for performance, but how will it react to intake and exhaust modifications? What about nitrous oxide and forced induction? Can the engine be turbocharged or supercharged with all that cam-phasing wackiness?

BASIC TUNING

If you're looking for basic, bolt-on power you're in luck. The K20A2 responds beautifully to intake systems, some systems making a solid 10 hp at the wheels. Manufactures, such as AEM and Injen, are coming up with short ram and cold-air systems. Short ram systems bold right in, while the location of the windshield washer bottle requires a bit more work form cold-air systems. The bottle must be relocated or removed, and a small portion of the fender liner needs to be trimmed, as well.

For the skinny on exhaust systems, we turned to DC Sports of Corona, Calif. These guys have been in the Honda exhaust market longer then just about anyone in the United States and are the first to have both an effective cat-back system and header for the Type-S.

The engineer in charge of the K series engines, Jehan Tetangco, told us the RSX proved to be a tricky customer. Naturally, DC fell back on its prior knowledge of Honda engines, fitting a 2.25-inch B-pipe to the car. It promptly lost power. A 2-3/8-inch pipe lost even more power. After going backwards and fitting a 2-inch pipe, which pushed power back up to just less then stock levels, he finally reached for the B series power handbook and threw it away. Clearly, this K was a completely different animal.

After much experimentation, Tetangco finally discovered a combination that worked. According to DC Sports, its Twin Canister System axle-back system and a 2.5-inch B-pipe resulted in a solid 6 hp gain and an average 3 hp gain from 3000 rpm to redline.

Headers are even more difficult proposition. The good news is the catalytic converter is still separate form the exhaust manifold. However, it is shoved so close to the head that there is very little room for long exhaust runners. In fact, Tetangco discovered Honda's engineers did such a good job on runner size that he, instead, focused attention on the collector. After trying numerous designs, he discovered one that worked, again adding a nice 6 hp and 3 hp, average. Together, the header and cat back are good for 8.6 hp, according to DC Sports. However, add DC's cold-air intake system and the power gain shoots up to over 22 horses, with almost a 10 hp average from 3000 to redline. Clearly, intake, not exhaust, is the K20A2's biggest shortcoming from the factory.

NITROUS OXIDE AND FORCED INDUCTION

Traditionally, one of the quickest and easiest ways to get power form an engine is a shot of good ol' nitrous oxide. With more power just the push of a button (and a few hundred dollars) away, many vehicles fine themselves with nitrous bottles in the trunk for a little added oomph. Simple, single-fogger systems are commonplace, but multiple

fogger systems with ports drilled directly into the intake manifold are not unusual.

W spoke to Eric Vargas of Advanced Engine Management in Torrance, Calif. Eric is the brain behind AEM's burgundy, nitrous-charged RSX you might have seen in our sister publication, "Sport Compact Car." The car has been through a lot, including a blown engine caused by an unforeseen problem with the fuel delivery system.

The Integra (and previous Hondas) used a fairly conventional fuel and ignition system. The fuel routed to the rail where a regulator controlled pressure, and excess fuel was returned to the fuel tank. Even in the high-tech Integra, a mechanically activated distributor controlled the ignition.

The K series has a "headerless" fuel system, meaning the regulator and return line are actually in the tank. There is no fuel return from under the hood. This gives Honda the advantage of building the pump, regulator, return and fuel level sensor all in one unit. It also helps reduce evaporative emissions.

Vargas tells us the down side to this type of system is it becomes very difficult to build extra fuel pressure. It used to be that adding a fuel pressure regulator would build enough additional pressure from the stock pump to make forced induction or big nitrous applications relatively simple. The way the K series' fuel is supplied make building adequate pressure much more difficult.

Unfortunately, there is no simple workaround for this problem. The stock fuel pump is capable of about 55 lbs of pressure, adequate for low-horsepower (40 hp or so) nitrous system or very low-pressure turbo or supercharger. Any higher and the system will run very lean-a dangerous condition that could result in a blown engine.

For higher horsepower application, a return line will have to be run, meaning the single-piece fuel pump/regulator /return/level sender assembly in the tank will have to be separated into individual components. This is an expensive and time-consuming process that would make a bolt-in kit a more diffcult proposition. Of course, that hasn't kept HKS, Greddy and Jackson Racing from continuing to develop kits. Racing applications that need more than just a few pounds of boost are still in the future.

The ignition system is also very different. The B and H series engine use distributors, despite all the high-tech valve gizmos. The K uses a computer-controlled ignition without a distributor. While this is great for precisely retarding and advancing spark to meet different conditions, it makes it very difficult to alter the spark curve using external devices. Simply put, the engine freaks out and switches into limp mode until the computer itself is allowed to manipulate spark again.

ENGINE COMPUTER

It's easy to see the K's computer is the dominant force in the engine, and nobody knows Honda computers better than Doug Macmillan of Hondata in Torrance, Calif. After digging into the stock computer, his excavations have unearthed some surprising-and hopeful-answers.

First, the programming is extensive. The fuel maps alone take up more memory then all of the programming for the B series put together. Macmillan told us there are six non-VTEC and six high-lift cam tables. There are also another 24 that, as of press time, he was still working on. He also discovered the ignition tables and the tables governing VTC cam advance.

Additionally, he discovered something tuners are going to love about the stock ECU: Flash programmability. Unlike the previous car, this would make reprogramming of the computer far simpler. And with the hurdles surrounding ignition and cam timing for forced-induction engines, being able to directly manipulate these factors is crucial.

Macmillan also told us a possible trouble spot doesn't seem to affect the engine's performance potential. The RSX's compute is multi-plexed, meaning it sends multiple signals to different systems down the same line. This would have the potential to play havoc with aftermarket tuning but it seems the multi-plexing is confined to systems outside the engine compartment.

FRANKENSTEINS AND SWAPS

One of the greatest performance features of the B series engines is the interchangeability of the parts. With some modification, you can put a VTEC head with a Type R intake manifold on a B20 block and make yourself a monster of an engine.

Is the same true for the K? Skunk2 thinks so. It's in the process of building a naturally aspirated race engine based on the Frankenstein concept. With the K20A2's high-powered VTEC head mated to the CR-V's long-stoke K24A1, Michael Choi of Skunk2 told us he hopes to create a high-revving, high-power, high-torque monster that will rip the wheels off the shop's racecar. The biggest obstacle will be the lack of off-the-shelf, high-performance parts. Anybody wishing to build up the internals of their K engine will simply have to wait for those parts to fill the pipeline.

Engine swaps are a different story. We spoke to Brian Gillespie of Hasport, based in Phoenix, Ariz. Known throughout the tuning industry for its engine mount kits, Hasport has already been working on stuffing the K into its chassis mates.

The easy part is swapping the K series engines between car that were originally equipped with them. So, if you want more bang out of your Civic Si, it's relatively simple to drop in an RSX Type-S engine and be on your way. The only snag might be with swapping a K24 engine into the RSX or Civic, owing to its slightly taller block.

The non-Si Civics are a different matter. The current-model EM Civics are built on the same basic chassis as the

RSX and CR-V. This means that, theoretically, the K series engines should fit in the Civic chassis. However, the engines mount differently in their respective bays-the D series engines used in the Civics on the driver's side, the K on the passenger side. This is a more complicated proposition for potential swappers.

According to Gillespie, the trick is using the RSX subframe. This subframe simply bolts in place of the standard Civic subframe, and ahs the rear engine and transmission mount in the proper place for the K series engine. After that, it's a matter of developing the proper engine mount on the sides of the engine. Gillespie is confident the swap will be complete soon, and that before long he'll have a K20A2-powered Civic coupe up and running. This is great news for owners of current-model Civics who have been stymied by the D17's lack of tuning options.

FINAL WORD

The future is bright for the K series but, compared to what the aftermarket is use to, the K series is a whole new ball game. From the most basic tuning to the most advanced, it's going to take time for the RSX and its counterparts to get up to speed. But it will. Whether you like it or not, Honda is not making the B anymore. Smart tuners are going to get cracking on the new K as soon as they can. Those that don't, will undoubtedly be left behind.