

Project: JDM B20A Engine Swap

Write up by: [Alan Ida](#)

Car model: 1990-1991 Honda Prelude

Engine Model: B21A1

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Over the years, many people have performed a JDM (Japanese Domestic Market) B20A engine swap on the third generation Prelude (1988-1991). Previously, there has not been an article written about swapping the engine. Many people who have thought about performing the swap have a lot of questions. Hopefully, this article will answer most of those questions. This site does not give a detailed step-by-step procedure, instead it gives a general overview of the swap.

This swap is primarily directed towards 1990-1991 Prelude Si owners with the 2.1L (B21A1) engine. The reason is because the 2.1L engine is notorious for burning oil. The original 2.0L (USD M B20A5 and JDM B20A) engine did not suffer the same problem. This article is based on my personal experiences in swapping the engine on my '90 Prelude Si 4WS. Your experiences may be better or worse than mine.

Tools For The Job

The bulk of the work can be performed with ordinary hand tools (sockets, ratchets, extensions, wrenches, screwdrivers, etc.). You will need an impact gun and impact sockets to remove the tight nuts and bolts. A car lift will make your life so much easier, if you have access to one. It can prevent back injuries and allows you to get the proper leverage on certain parts of the car. If a lift is not available to you, it can be done with a floor jack and 4 jack stands. And obviously you will need an engine hoist with ratchet straps or a chain.

I recommend doing this swap in a garage, if possible. Extra items to make your life easier include a drop light, clutch pilot tool, large breaker bar (1/2" drive), torque wrenches (1/2" & 3/8"), a ball joint separator (not the wedged fork), plastic or rubber mallet, penetrating lube, and an extra person. I performed the swap by myself. The only help I needed was having someone hold the crankshaft in place while breaking the pulley bolt and the flywheel bolts loose.

If you have a torch, it may be quite useful for removing the exhaust system. Scared yet? It's not too bad. You just need the time to work on it. It took me 2 weeks to perform the swap after work at night and on weekends. I took my time to do it right and carefully torqued all of the nuts and bolts. With plenty of help and proper equipment, it could probably be done in 3 to 5 full days.

Swapping The Engine

Before starting on the engine swap, I highly recommend that you have the factory Helms manual for reference. I also recommend that you purchase all of the necessary genuine Honda parts before starting. The parts list that I gathered was rather extensive. I wanted to make sure that there was not going to be any problems later on. Your shopping list may not be as big as mine. My parts list included:

- Valve cover gasket
- Oil pan gasket
- Intake manifold gasket
- Exhaust manifold gasket
- Exhaust A-pipe gaskets (2 rings)
- EGR gasket
- Cylinder Sensor gasket
- Exhaust manifold-to-block bolts
- Exhaust manifold-to-bracket bolts
- Distributor cap, rotor and O-ring
- Timing belt
- Water pump and o-ring
- Main seal (clutch side of crankshaft)
- Clutch disc, pressure plate, release bearing
- Clutch slave cylinder
- Engine mount bolts and nuts
- PCV valve
- Spark plugs
- Accessory belts
- Engine splash guard bolts
- Axle/half-shaft spring clips (inner and outer)
- Fuel filter and washers
- Aluminum dowel pins (engine to transmission mating)
- Stub axle nuts
- Cotter pins (lower ball joint)
- Fluids (Power steering, tranny, clutch, coolant, engine oil)
- Shop rags
- Hi-temp wheel bearing grease or silicone grease
- Gasket sealer

Although there are a lot of parts to buy, keep in mind that it is much easier to change out the parts with the engine out of the car and within easy reach. You will not want to change the parts out later on once the engine is installed and the parts are harder to get to. Get the stuff done now while it is easy.

Most of the engine components will need to be transferred from the B21A1 engine to the JDM B20A. Everything bolts up directly to the JDM engine because it is the same block and head. The only difference is the internals.

Even though the JDM engine came with the intake and exhaust manifolds, I wanted to use the B21A1 manifolds because it had the correct connections (EGR valve, O2 sensor, cruise control vacuum source, etc.). I wanted to avoid tripping the check engine light. The JDM engine does not have a connection for the EGR pipe because it doesn't have an EGR valve). It also had 2 oxygen sensors connected at the front of the exhaust manifold (both sensors were crushed anyway). The B21A1 only has 1 oxygen sensor and it is located on the B-pipe. The JDM engine did not have a flywheel installed - it did have an automatic transmission plate though. My car has a manual transmission, so I just transferred the flywheel/clutch assembly and reused the flywheel bolts from the MT. The flywheel bolts are engraved with either AT or MT, depending on the transmission type.

It is also necessary to transfer the engine mount bracket from the B21A1 for the driver side. The JDM B20A bracket does not line up with the USDM engine mount. This engine mount bracket was easy to swap over since I replaced the timing belt and water pump as well. The bracket bolts to the side of the block near the water pump.

More than likely, the oil pan will need to be transferred. When my JDM engine arrived, the oil pan was crushed because it was strapped down to the pallet. After removing the USDM intake manifold, it will probably need to be cleaned out.

My intake manifold had oil sludge built up throughout the inside of the runners. This was attributed to the oil blow-by from the worn rings. The sludge was caked on so heavily that I needed a shop rag and a flat blade screwdriver to clean it out.

There are a few parts on the B20A engine that I left in place. I did not swap the distributor, cylinder position sensor, oil cooler, and the water pipe on the backside of the block. I did not have to reset the timing on the distributor since it was already set at the factory. Also, the JDM water pipe is slightly longer than the US spec. I had to shorten the pipe so it would fit the rest of the plumbing on the car. I used a saber saw to cut it to size. The reason I used the JDM water pipe is because the B21A1 pipe was severely rusted.

An important item that the B20A engine did not come with were the aluminum dowel pins that fit between the transmission and the engine block. I could not transfer the dowel pins from the B21A1 block without destroying them. Therefore, it was necessary to buy a new set.

The only physical difference with the B20A engine is the location of the exhaust support bracket on the B-pipe (next to the flex pipe), which is on the backside of the block. The exhaust bracket cannot be bolted to the block. This does not pose a problem with the exhaust system. The exhaust is rigidly mounted and there are no unusual noises (rattling or knocking).

One of the biggest frustrations that can arise is separating the ball joints from the lower control arm, without the right tool. A ball joint separator comes in handy. I don't recommend using the wedged fork because it will damage the ball joint (grease will squirt out). I used a device that is similar to a c-clamp, but it has a hole cut out at the top so it can slip around the ball joint stud. The picture above is the tool that I used. It is made by Ottawa Tool Company - part number is OTC 7315. It is actually listed as a tie rod end remover, but it works wonders on all ball joints. I still had to hit the control arm with a hammer in order to break the ball joint loose, while the tie rod tool was clamped on the joint.

When disconnecting/reconnecting the power steering pump and lines, be careful not to spill any power steering fluid on the pulleys or the accessory belts. It will slip and squeal when the new engine is started.

After the JDM engine was installed and I started it up for the first time, the RPM's would drop by 200 revs whenever I depressed the clutch pedal. At first I thought that the thrust washers for the crankshaft were bad. But after cycling the clutch numerous times, the problem eventually stopped. I believe this was due to the ECU "learning" to compensate for the extra load on the crankshaft when the clutch was pressed in. Also, the odometer did not start working until the car was driven for about 10 miles. I do not know why it took so long for it to start working.

My first driving impression was the B20A engine had a touch more power than the B21A1. Although I think this can be attributed to the fact that the B21 had worn rings and therefore, had a lower compression. Since October 2001, I have racked up 45,000 miles and I have not had any problems with the engine. The check engine light has never tripped and it does not burn a drop of oil.

As previously stated, your experiences may differ from mine. You may have to put forth more or less work on your JDM engine than what I did. Overall, I was quite thorough with the installation.

This is all I can remember for now. Good luck with the swap if you decide to do it yourself.

Edit 4/23/04: I would recommend that you replace or swap out the main crank pulley with the B20A pulley or get a new one. At 205,000 miles, my old pulley, which was transplanted from the B21A1 failed (the outer ring separated from the inner core). The outer ring dug into the side of the engine block and cut a hole in the side engine cover (timing belt cover). The side engine cover was a pain to replace since there is very limited space.