Introduction

This guide is a write-up by a Novak customer that was great to share his installation experience and knowledge of joining his SM420 to a modified Jeep I6 engine. It was thoughtfully performed and written and we thought our readers and customers would benefit from it, as below:

SM420 Behind a Jeep 4.0L
(In my case behind a 4.6L stroker)
By: A. Buchanan

I chose to do this swap build because I already had an SM420, it was just behind a tired 2.5l. The SM420 behind a 2.5 is less work to install and therefore more common. I found this transmission to be bullet-proof and the 7.2:1 granny gear gave me the crawl ratio I was after, plus I love the feel of the old school shift and the whine of flat gears in a solid iron box. Off-road the 2.5 could definitely hold its own, on the street but it proved to be difficult holding 60 MPH on the slightest of inclines.

How about the SM465?

Readers should note that the GM SM465 upgrade is essentially identical to the SM420 installation, with the exception of the transmission bearing diameter to bellhousing bore.

I wouldn't classify this as a swap, but a build. To me, building the Jeep is as fun as wheeling it, and rebuilding is even more fun. It's not just a hobby…it's a sickness really.

I have a '93 Wrangler sprung over a Ford 8.8 rear axle, turned by 4:56 ring and pinion gears. Traction to the ground is through a rear Detroit, and front ARB. The rubber meets the road on 35" Mickey Thompson Baja Claws. I had ditched the square head lights and swapped out the original grill and hood for an '83 CJ7 grill and hood. I wanted a machine that I could still drive to work and to the trails. Sure it performs better off-road than it does on road…It's a Jeep!

My hope is that what I have learned and share will help others who are looking for a similar set up. I could not find ANY good info on this build, much of this I figured out on my own. Everything I found online in forums turned out to be shattered pipe dreams. Since I pulled out the 2.5, I had to move my engine mounts forward. I can't say there is a specific dimension to locate the new mounts for the 4.0. Mock everything up on the floor of your garage. If you already have a 4.0 and you're just looking to swap in the SM420 this is easy.

The 2.5 to 4.0 swap is out of the scote up this write-up. Get yourself a T5 style bellhousing off an 80's CJ

with a 258. You can send this bellhousing to Novak Conversions in Logan, Utah and they will drill and tap the bolt pattern in the face for the SM420. The port for your CPS also needs to be machined. It is critical that the sensor port is in the exact location or your engine won't start, or f it does it will run terribly. Tolerances on the sensor installation are 0.010"-0.015" so be careful on this part! The angle from 12 o'clock is just as important as the distance from the flywheel pick up teeth. This sensor creates a 5 VDC square-wave pulse which signals the computer TDC of pistons for spark and injection timing.

You will notice that the bellhousing bore in the T5 style bell is too large and is sloppy on the SM420's retainer. You need to buy a new front bearing retaining flange or have a sizing ring machined so that your transmission input shaft is concentric with your pilot bushing and engine crank. I also purchased the retainer flange from Novak, installed it on the SM420, and transferred the transmission bolt pattern to the bellhousing. It is way stronger than the original and is machined out of a beautiful piece of billet steel. I machined and drilled my own bellhousing before I knew that Novak could do all this for me; trust me - save yourself the headache and send it in for modifications.

One of the most important parts that makes this system work is Novak's custom throwout bearing. This bearing's thickness can be adjusted to achieve maximum fulcrum advantage. There are other solutions for this but I found this to be the slickest. On the left is Novak's adjustable bearing. I adjusted mine to 1-7/16" to have a 1/16" air gap between the bearings face and the fingers on the pressure plate. On the right is a factory replacement throw out bearing out of a T5 it measures about 1-1/8" thick. I had the convenience of setting up the throwout bearing and adjusting it on my garage floor by setting the engine on stands and bolting the bellhousing to the engine block and SM420. If you do not have this option get ready for some heavy lifting. You may have to install the transmission a few times to get the throw out bearing adjusted to the perfect distance, or do the measuring and math as indicated in the Novak instructions. The clutch fork, spring, pivot ball, and slave cylinder native to the bellhousing are all used.

Have your flywheel and pressure plate inspected for warpage and hot spots. If they need new surfaces take them to a machine shop. The clutch disc used is from an 80's CJ with a 258. It is 10-7/8" diameter, 1-1/8" 10 spline. Take this opportunity with the assembly mocked up on the floor

to install the CPS sensor. As soon as the bellhousing is in the engine compartment, accessibility is limited. I drilled new holes in the CPS bracket to line up with the holes in the bellhousing.

The hole in the tub floor needs to be enlarged towards the firewall to clear the shift tower on the SM420. I also bent the shift lever so it would not interfere with the dash. A shifter boot from an 80's Ford F150 to cover the hole in the transmission tunnel. It isn't the prettiest, if I wanted pretty I would by a Rubicon. However, Novak does offer a new, blank aluminum tunnel cover and shifter boots, if you'd prefer.

The adapter kit is probably the most expensive part of this build. Novak sends easy-to-follow instructions on how to install the replacement tailshaft of the SM420. It is easy but take your time so you get every part and gear re-installed properly. What I liked about this adapter kit is the ability to clock your transfer case. I rotated mine as high as it would go. I already had the slip yoke eliminator kit and a CV style drive line so clocking the transfer case as high as it would go made sense and allowed me to ditch the t-case lowering kit and bolt the skid plate directly to the frame like it came from the factory.

A custom shift lever needs to be fabricated to shift the NP231, or Novak sells the SK2X kit.

There was debate which starter motor to use. I bought the large CJ starter that was native to the bellhousing. When I started the engine it made a hellish noise. Ever accidentally turned the key to start when the engine is already running? The problem was that starter was designed to work with a 4.2 flywheel which has 164 teeth and is 13" diameter. The 4.0 has 164 teeth but is 13.5" diameter. The gear on the starter also protrudes out too far so when installed the gear always meshes with the flywheel. Luckily the 4.0 starter bolts up perfectly to the T5 bellhousing.

The nice thing about this build is your entire drive train is shorter than the stock set up. Which is good and bad I guess. Good that you can decrease your driveline angles, bad that you have to go have both drivelines modified before you can drive around your new rig!

Note to the Installer

This document and the use of any Novak products assumes a safe and adequate working knowledge of the automotive systems involved. We do not know and there is no way for Novak to determine the skill level of the customer and/or the installer of Novak products, or for Novak to publish all of the information on fundamentals that an individual should know before attempting these advanced procedures. Vehicular conversion work can be among the most difficult of automotive mechanical and electrical tasks and it is upon the customer to ascertain whether they are working within their expertise or whether they should acquire assistance.

This guide is not intended to replace the service manual specific to your vehicle. It is not possible to document the

wiring, routing and specific system details of every Jeep and the installer should obtain and use both their vehicle's manual and the engines donor vehicle's manual in conjunction with these instructions.

Novak products and procedures are intended and recommended for off-road use only.

Your Local Legal Requirements

This guide is not meant to explain, interpret or notify the installer of local or national laws concerning vehicle changes, engine conversions and the emissions systems surrounding them. It is the installer's responsibility to know and understand their local legal requirements and regulations and to make their installation conform to demands of the jurisdictions in which they live. Novak does not recommend nor condone the disabling or modification of the vehicle or any system within it that could render it out of conformance with any laws in which the vehicle may be licensed or operate. Neither Novak Conversions nor its directors, principles or employees are responsible for any changes made to your vehicle.

We recommend you consult and know your own city, county, state or national laws. If your vehicle requires referee inspection, you may wish to establish a rapport with a referee and discuss your plans and seek advice and approval from them.