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& SPORT UTILITY MAGAZINE

OCTOBER 1994 ♦ VOL. 10 No. 6



## Jeep WRANGLER

350 V-8 INSTALL

PRESERVING  
TODAY'S  
TRAIL  
RESOURCES



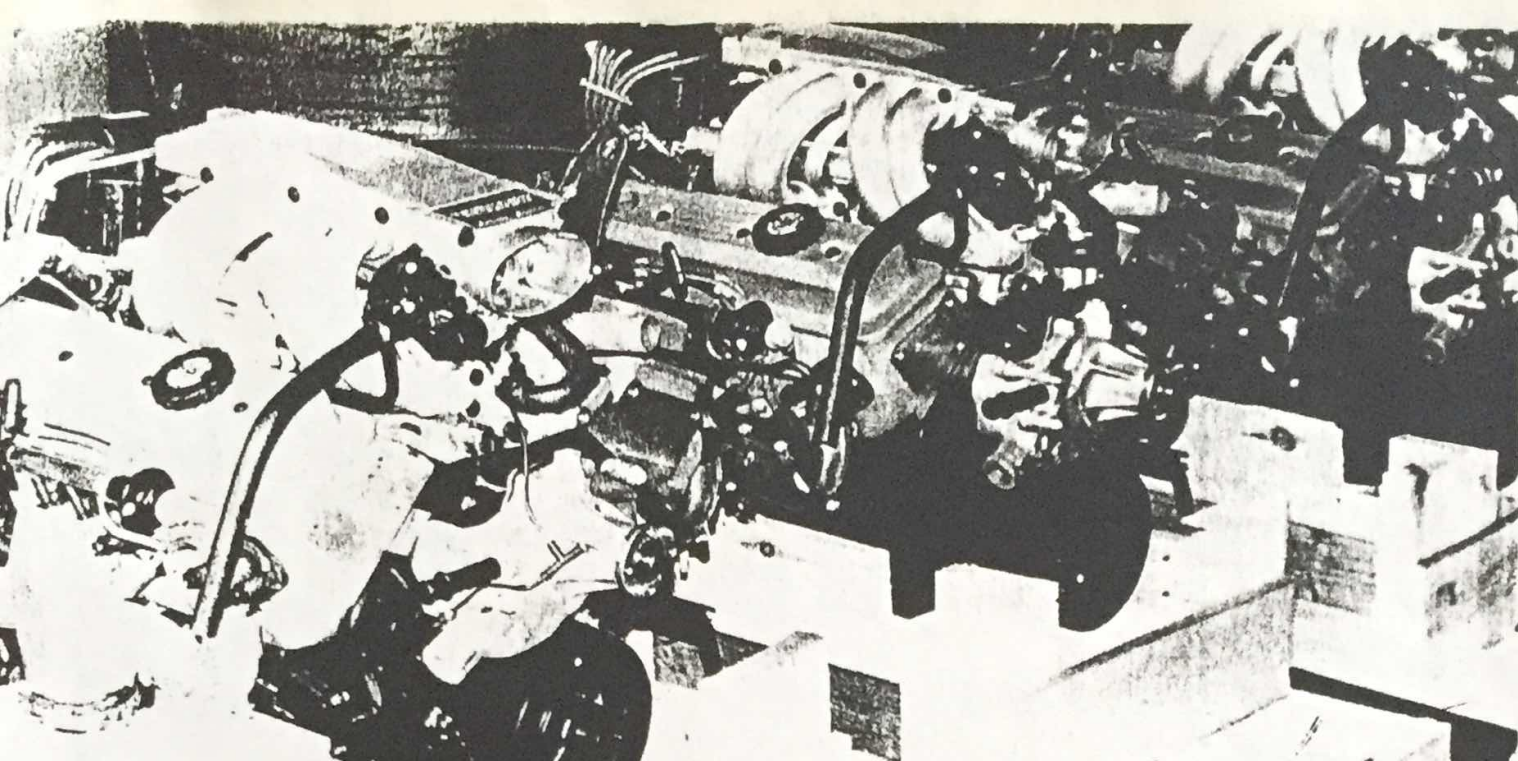
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## ARIZONA:

EXPLORING THE OLD WEST





# Jeep Wrangler

## TPI 350 CONVERSION

### JB Conversions Swaps in an L98

The GM TPI 350 engine we are using is from a wrecked 1989 Corvette. TPI engines can also be found in models such as the Chevy IROC, the Pontiac Trans Am and the Formula Firebird; however, the Corvette TPI is the only one with aluminum heads. Corvette TPI engines also are rated at a slightly higher horsepower. These engines were designed for fairly heavy vehicles, so horsepower and torque peaks are reached at a lower rpm (less than 4500 rpm). This is the perfect match for a Jeep. By the way, a Wrangler is not as light as you may think; its curb weight is 26 pounds more than a Jeep Cherokee.

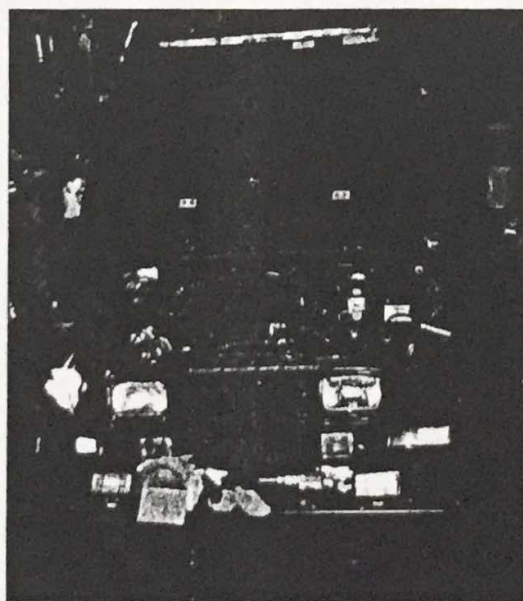
#### EDITOR'S NOTE:

A motor with this kind of power is a waste if you can't get it to the ground. John White has installed a Dana 44 rear end from a Grand Cherokee. This allowed the installation of a Detroit locker. The front is equipped with an ARB air locker. Now with the new 4.11 gears and locking differentials, the horses can get to the trail.

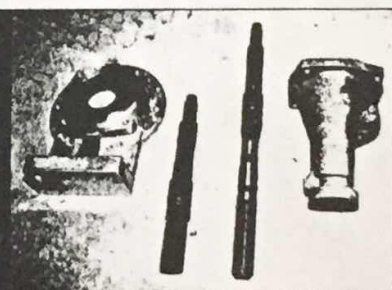
John White is one owner of JB Conversions, and an expert at swapping everything from trannys to engines for Jeeps. JB offers the Jeep TPI V-8 Conversion Guide and a video — detailed guides that will answer any questions you may have about engine swaps. We feel that this source may be the best yet for people looking to swap more horses into their Jeeps.

BY JOHN WHITE

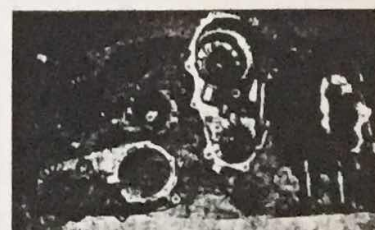
Jeeps have been set up with almost every engine and transmission combination that will fit into the sheet metal — and even some that won't. We have



With the stock six-cylinder motor removed, you are ready to begin the new installation. The OEM transmission and transfer case also are removed at this point. Even the clutch fluid reservoir and the pedal are removed. Both of the stock engine mounts must be cut out and ground smooth with the frame rails. The engine compartment size in the Wrangler has ample room for a small-block V8. Even a big-block engine will fit fairly well.

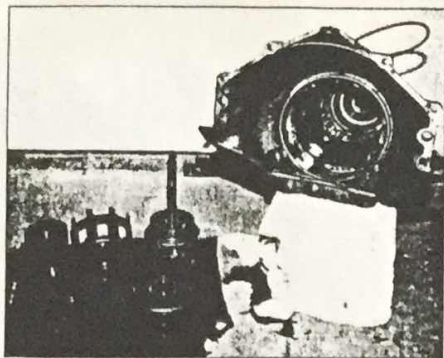


The components of the Advance Adapters kit include the NP231 to TH700R4 adapter and a new TH700R4 output shaft. Notice the shorter length of the new shaft compared to the original GM output shaft. The original GM transmission tail housing and shaft are not reused.

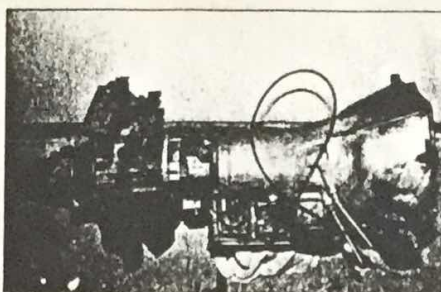


The NP231 transfer case must be disassembled to change the input shaft for the conversion.

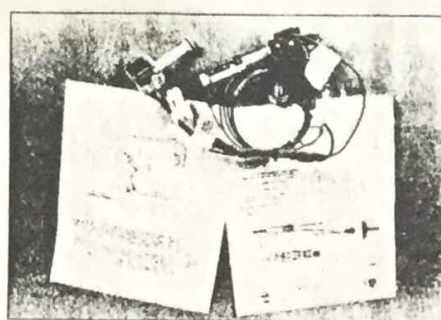




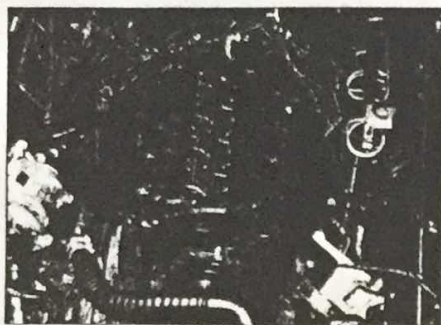
*The TH700-R4 is partially disassembled to install the new, 23-spline output shaft.*



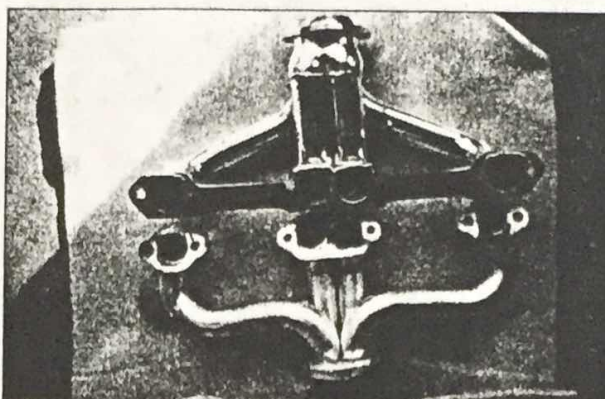
*When assembled, the new trans to transfer case package looks factory. It is a good idea to bolt the parts together and check the fit before installing them in the vehicle.*



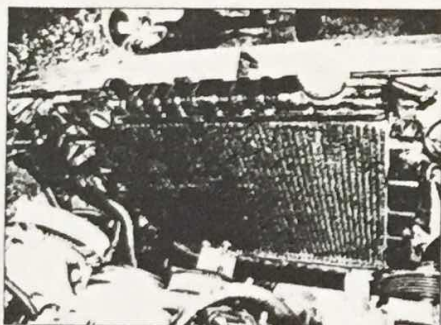
*The torque converter lockup function is managed by this special harness. Retaining the lockup feature in your transmission will help maintain gas mileage.*



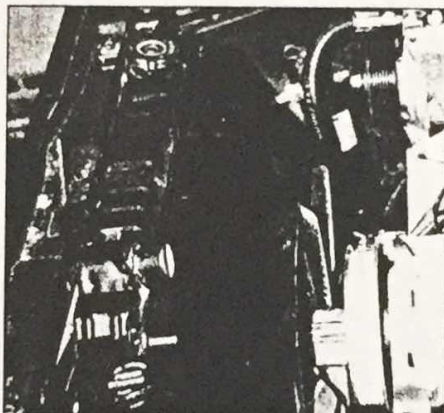
*With the motor mounts in place and the bell housing bolted up, the motor is fully positioned. The new motor mounts from Advance Adapters are adjustable, making motor alignment very easy. There is no need for a remote oil filter.*



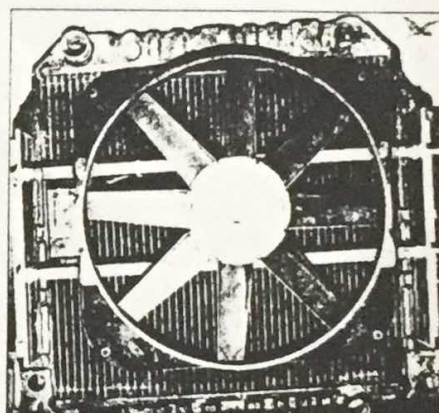
*The stock exhaust manifolds will work, and they will clear the motor mounts. Ours had a crack in one of the primaries, so we opted for a set of direct Corvette replacement D-port headers by Hedman Hedders. Since the fuel lines will pass fairly close to the headers, we chose to have them coated with a special high-temp coating by Jet Hot, Inc. This coating will reduce the outer skin temperature of the headers, thus avoiding overheating of the fuel inside the lines.*



*The stock, two-core radiator was replaced with a custom four-row unit. This is required for better cooling and to match the V8 water outlet locations.*



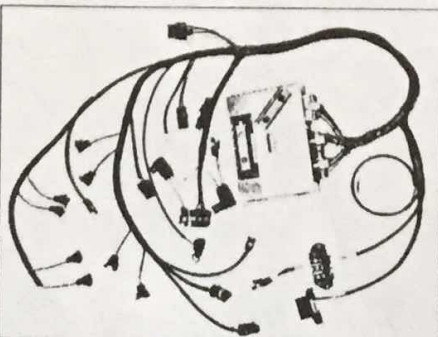
*The fan shroud, from a '91 model four-cylinder Wrangler, must be trimmed to clear the front engine accessories. The power steering fluid reservoir is from a '91 six-cylinder Wrangler mounted to existing holes in the radiator. All engine accessories and brackets are unmodified and taken directly from the Corvette.*



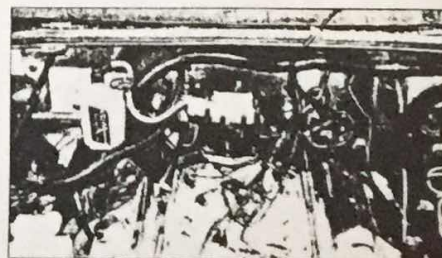
*A Flex-A-Lite M150 electric fan was installed to remedy the cooling problem, and it is performing very well. This unit has a built-in thermostat and switch.*

found that taking a basic Jeep body and chassis and throwing in a little Corvette horsepower results in a very well-matched system. So here we highlight a conversion process that involves the retrofitting of a fuel-injected Chevy small-block V8 into a stock '89 model Jeep Wrangler.

Our engine came from a wreck, and it was obvious that it had been out of service for a while. Since we intended to take the horsepower figures a bit higher than stock, it didn't really matter that the motor



*The computer and harness are from Howell Industries. The Corvette computer is not used due to the difficulty in adapting it to this application. This harness retains all the stock diagnostics and is smog legal.*



*The new harness exits the firewall through the same rubber grommet that the original Jeep computer harness used. This central location is perfect, as it will enable the harness to enter the motor area directly behind the plenum. The manifold base and plenum have also been ported and polished by Extrude Hone, Inc. This extrusion process dramatically increases airflow through the TPI intake, resulting in more horsepower.*



## 350 CONVERSION

needed some work. If your intentions are to install a used motor without having to overhaul it, you should look for a clean, low-mileage unit that is still in the car.

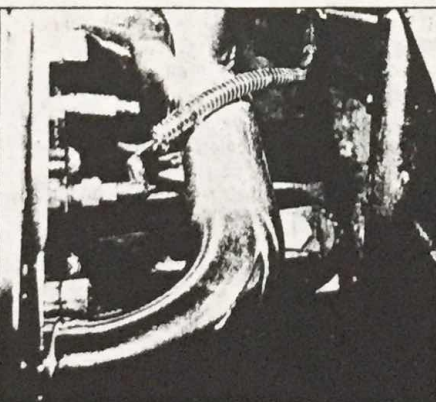
This may sound like a difficult combination to find, but with some diligent searching, you should be able to find one. General Motors has put more than one million TPI-equipped cars on the road, and we have seen prices from \$800 to \$4,000 for a complete engine. Always inspect the motor thoroughly for crash damage before you buy it. A front end collision can cause a cracked crank, but the only indication may be a bent harmonic balancer.

If you are buying a junk-yard engine, try to get the whole package: engine, computer, harness, transmission, sensors, hoses, fuel pump and anything else that appears to be attached to the motor. Even though you undoubtedly won't use everything, it is best to have what you do need without having to run back to the junk yard.

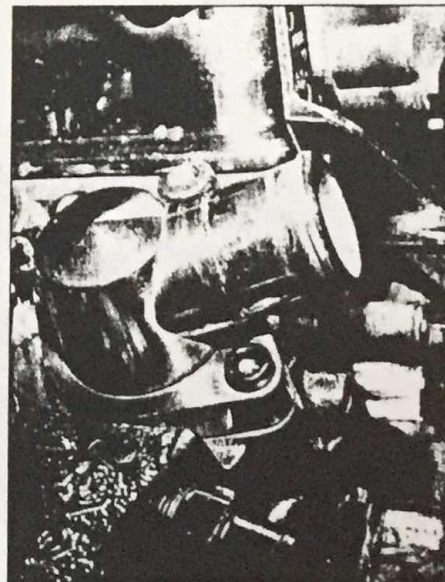
The transmission we chose for the job is a GM TH700-R4, an overdrive unit. Someone else beat us to the original Corvette transmission, so we obtained a TH700-R4 from an '88 Chevy full-size V8 pickup truck. This transmission is good for off-roading because it has a low stall speed torque converter. Late-model TH700-R4's are by far the best, so don't buy anything older than an '86 model. It should be noted that the GM transmission will not bolt directly to the Jeep transfer case due to differences in bolt patterns. A special adapter is required to enable the bolt-up. We contacted Advanced Adapters, Inc., for ours.

Another point of interest is the wiring for both the new computer and the remaining stock systems. Removing the stock engine wiring will drastically improve the appearance of the engine compartment. Removal of all unnecessary wires will also make trouble-shooting much easier should an electrical problem occur. Before removing any wiring,

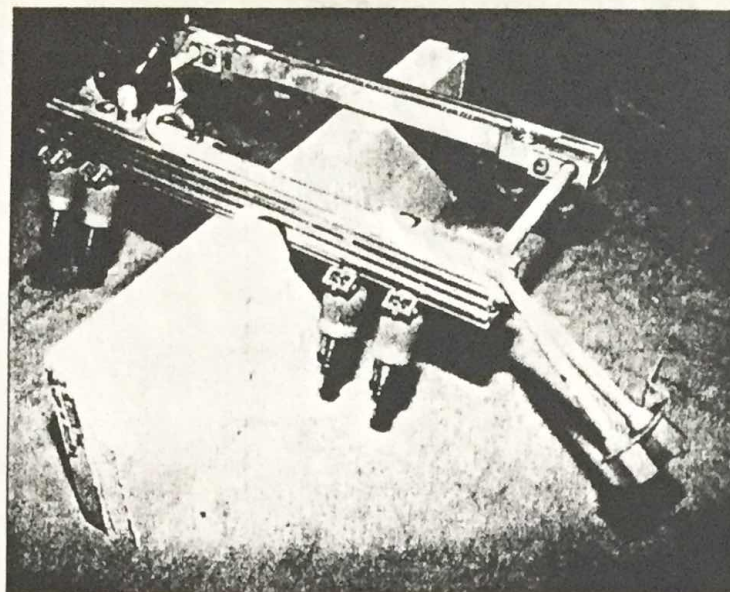
*If the engine has been sitting for a long time in the wrecked vehicle as ours had, we strongly recommend removing the fuel rail and injectors and visually inspecting the inside of the rail. This is the best time to check for gunk or trash in the rails. Omitting this step and running the engine with injector cleaner could force the deposits into the injectors and may ruin them. They are not cheap to replace.*



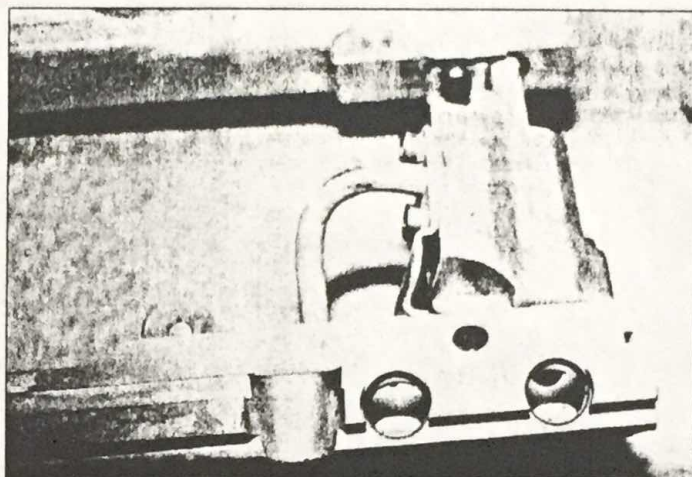
*For the Jeep dash gauges to function properly, the stock Jeep coolant temp and oil pressure sensors must be used on the GM motor. The thread sizes do not match, so it is necessary to use adapter bushings to enable the sensors to screw into the new motor. These two sensors are for the gauges only, and are not tied into the computer in any way; don't confuse them with the coolant temp and oil pressure sensors utilized by the computer harness.*



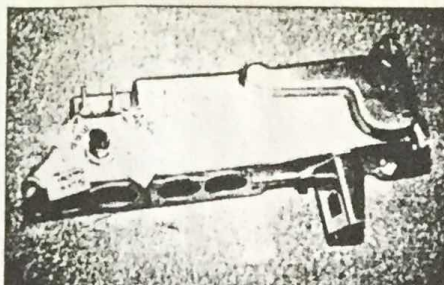
*To ease installation of the upper radiator hose, we installed a 360-degree, rotatable O-ring water neck.*



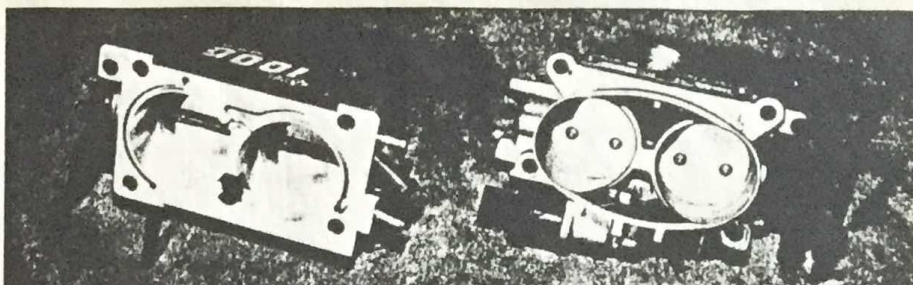
*The old fuel injectors were also in terrible condition, as revealed by close inspection and testing by the experts at Tuned Port Injection Specialists. A reconditioned, flow matched set was installed along with a Crane adjustable fuel pressure regulator. The folks at TPIS also custom mapped a PROM to handle the modified engine.*



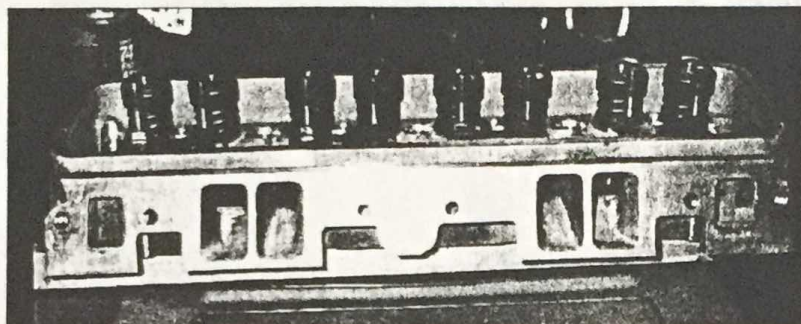




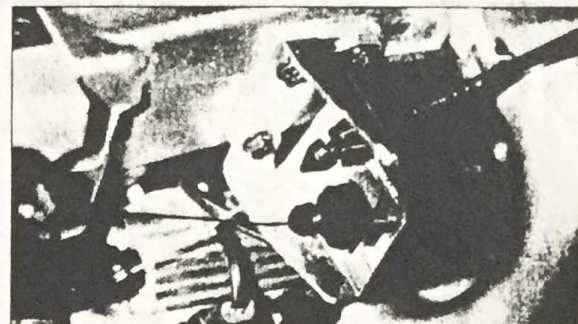
*This view of the underside of the plenum shows the vacuum port locations for the MAP sensor, fuel pressure regulator and brake booster. If these sensors are reused from the donor car, they should be checked.*



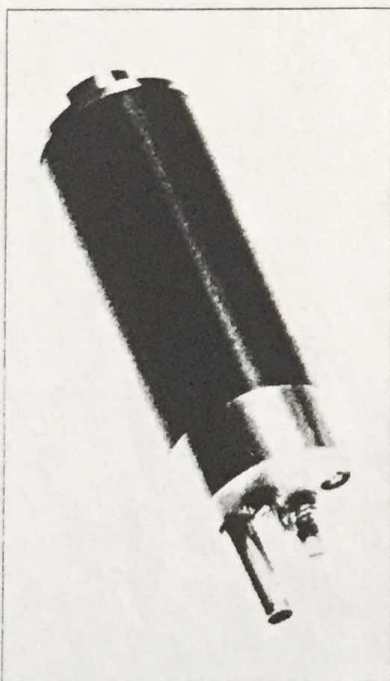
*The throttle body used in this conversion is a high-flow, large-bore ACCEL unit on the left. This 1000 cfm unit was used to allow enough flow for the other performance modifications made to the engine. Stock units, like the one on the right, will work for lower hp motors and can be refurbished by The Carburetor Shop.*



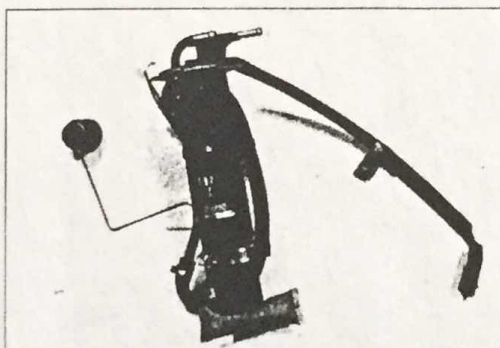
*The stock aluminum heads were as bad as the piston rings. Cylinder pressure was down as low as 90 psi. Barret Landry of Autoworks reworked the heads with a three-angle valve job and a full race-quality porting job. The original rocker arms were replaced with high-quality, 1.6 ratio Crane roller rockers to gain more horsepower and reliability.*



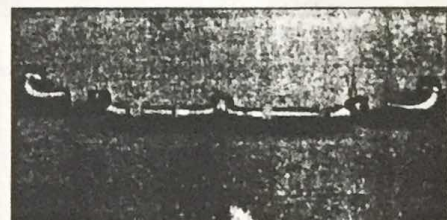
*The original Jeep throttle cable is retained, but the transmission detent cable is from the Corvette. They fit perfectly and mount to the stock TPI plenum bracket. Be sure to check for adequate travel for both cables.*



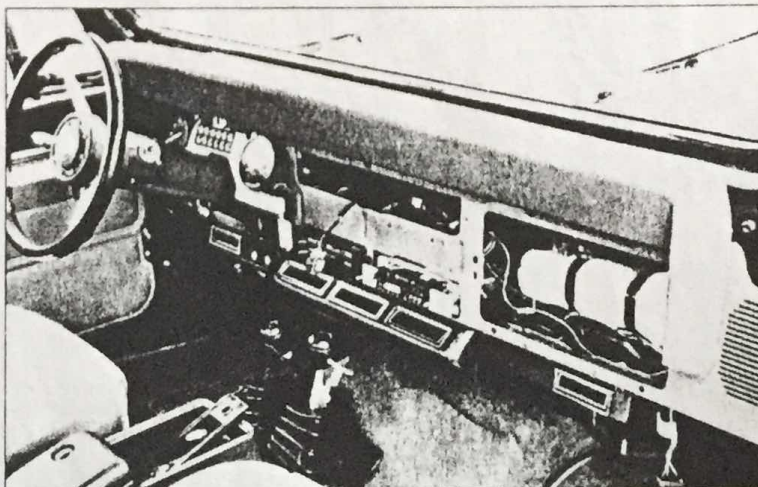
*The fuel pressure and flow rate are critical factors for proper engine and computer function. We are using the Essex aluminum in-tank, high-pressure pump for our conversion. This is the Cadillac of fuel pumps, and it is capable of supplying adequate fuel for a stock or highly modified engine. For safety and durability reasons, metal jacketed fuel lines from Earl's Performance Products are installed throughout the fuel system.*



*The fuel feed pickup line location is in the tank sender. Do not confuse this with the return line tube. Having the lines reversed will keep fuel from reaching the motor.*



*The air intake is fabricated from individual fittings from Dynaflex, Inc. These fittings are normally used in exhaust pipe fabrication for large semi trucks. The fabricated intake is fitted with dual K&N filters. A rubber plenum snout joins the unit to the engine.*



*The computer is mounted behind the glovebox. The fit is tight, but none of the wires are put into a bind. Don't forget to install the PROM chip. Most of the foam was later removed to prevent the computer from getting hot. The stock floor shift was removed with the manual Jeep transmission. The new shifter for the TH700-R4 is a B&M Street Stick. It bolted directly to the floor pan and required only slight modification to fit into the stock shift boot.*



## 350 CONVERSION

consult the wiring schematics in the Chilton manual or the OEM Jeep Service Manual.

The wiring required for the TPI engine sensors and new computer is surprisingly simple and compact. The instructions for installing the new harness and the computer are complete and easy to follow. Factory diagnostics are retained so that the TPI motor can be scanned at any GM service center if necessary. Excellent sources for the computer and the harness are Howell Engine Developments and TPI Specialties, Inc. Their systems operate in open and closed loops and will manage fine-tuning the engine function as well or better than a factory harness.

After the conversion had been completed, minimal fine tuning was performed to get the V8 in peak running order. The power increase was amazing. There is no comparison to the original inline six. The performance modifications made to our TPI are not a necessity, but the added power is very noticeable, and the effective rpm range was bumped up about 1000 rpm.

A bone-stock TPI 350 in this application is a perfect fit, and the power level is far superior to any stock Jeep available today. We compared the street performance and low-end trail grunt of the TPI Wrangler to a 1991 model Wrangler with a slightly modified 4.0-liter H.O. inline six-cylinder. The V8 Jeep beat the 4.0 liter every time and in every way.

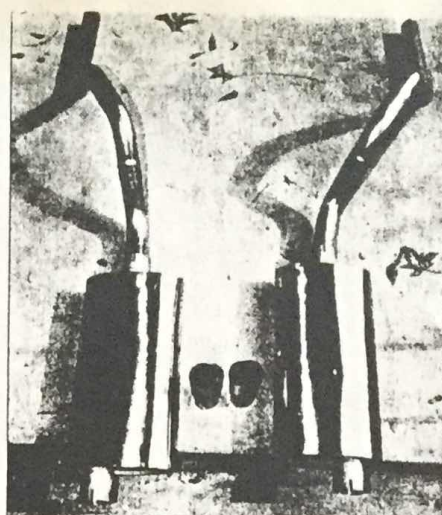
Overall, the conversion is not that difficult to perform; however, it does take an extreme amount of time and labor, plus an abundance of parts. Many of the parts are OEM, but some are custom-made to fit the application. Certain items required either welding or complete fabrication, so it will be extremely helpful to have a fab shop nearby.

If you would like to have a conversion guide, a valuable reference in your conversion effort, call JB Conversions for listings of all the parts required for the conversion and where to get them. The folks at JB have found that a great many hours are spent tracking down parts and finding what works and what doesn't. Trial and error is the wrong way to learn, so they decided to

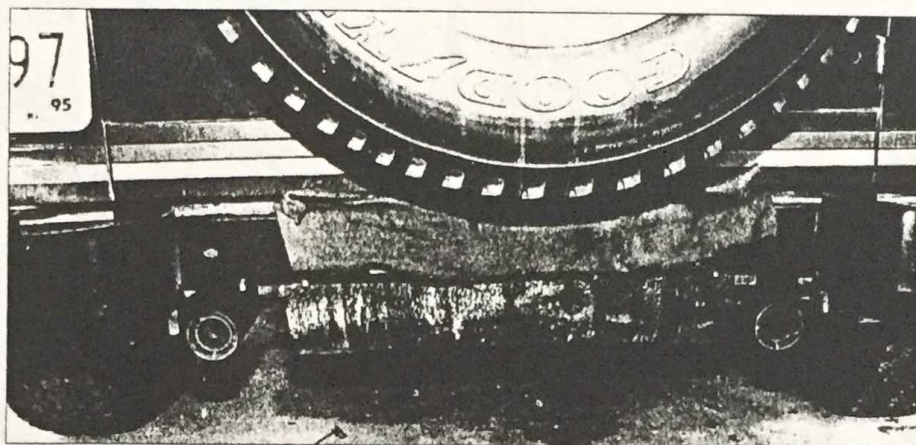
write it all down. JB Conversions offers complete instructional guides and parts kits for the TPI conversion, including, but not limited to the engine and pre-adapted transmissions. Also available is a catalog of Jeep off-roading accessories.

The TPI guide will cover the conversion by detailing three key points: the actual conversion steps for the installation, the attributes of a used TPI motor and performance add-ons to increase torque and hp.

**4WD**



*The exhaust system consists of a pair of 2 1/2-inch Borla Hemi mufflers. They are constructed of stainless steel and are of a straight-through design. The exhaust piping is also 2 1/2-inch, mandrel-bent tubing from Borla. A 2 1/2-inch equalizer tube was also installed to join the two exhaust pipes just after the headers.*

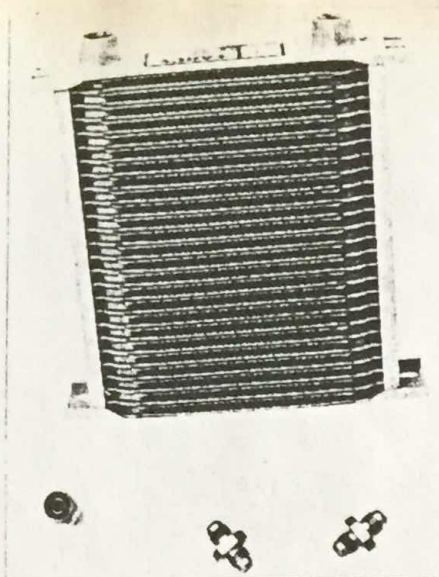


*The exhaust tips exit the Jeep on each side of the gas tank. This was possible because the rear track bar was not reinstalled after the installation of a heavier-than-stock Dana 44 rear end. If the rear track bar is retained, it will be easier to exit both tail pipes on the same side (passenger side).*

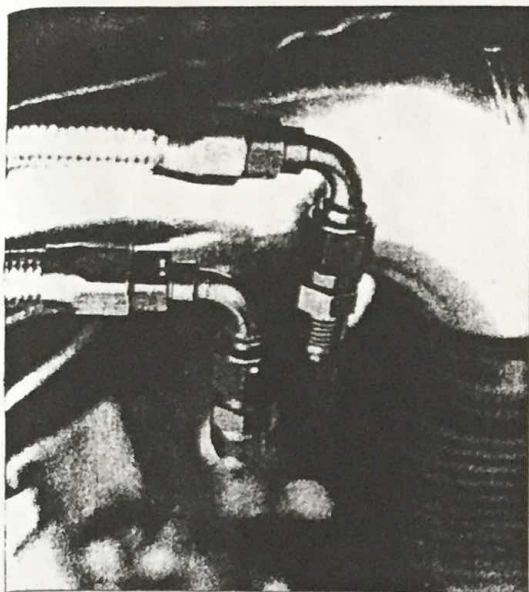


*Crane roller rockers were used to ensure consistent valve timing and reduced friction in the valvetrain.*

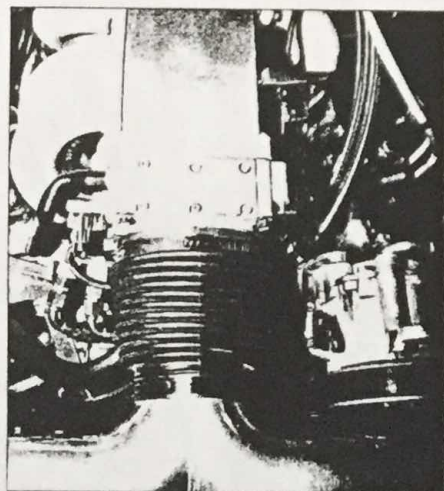




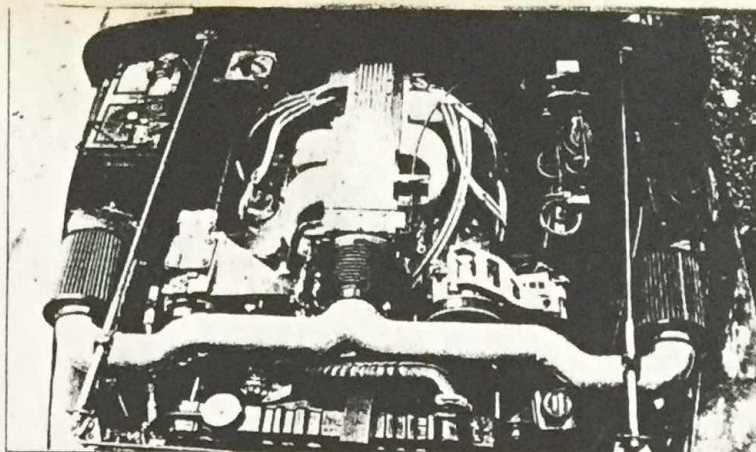
A transmission cooler is imperative to long transmission life. Earl's Performance was contacted for this cooler and the braided lines to plumb it.



The AN fitting on our transmission lines provides a tight seal and good looks.



The stock air box to throttle body adaptor was used to connect our custom air intake.



This is the finished product. The original valve covers had faded to a dull orange, so they were replaced with polished aluminum covers from B&B Performance. The entire TPI unit was also coated with a high-luster coating from MCCI Jet Hot.

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