TEXT AND PHOTOS BY CHRIS HOLLEY

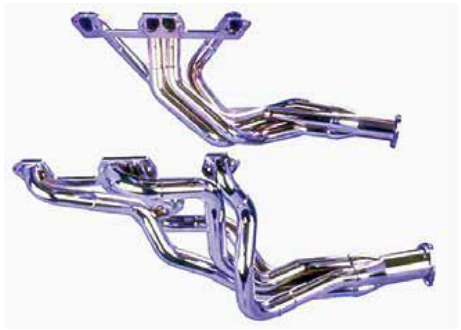
STEP UP YOUR PERFORMANCE

TUBE TECHNOLOGIES INCORPORATED STEP HEADERS ADD 15 HP

Headers. The mere word conjures up images of a serious operating mill with an equally ear-pleasing, authoritative rumble of performance. While that dreamy state seems satisfying, as John Conlee sang, "These rose-colored glasses that I'm looking through show only the beauty 'cause they hide all the truth."

And the truth is that operating a vehicle equipped with headers often seems filled with hassles and additional maintenance. Many headers require denting and dinging of one or more of the tubes to fit into the engine bay properly. The header gaskets tend to blow out, which leads to pesky exhaust leaks. Ground clearance becomes a concern due to the low-hanging pipes that must clear the steering and suspension components as they snake around and out of the chassis. Many sparkplug wires have been sacrificed to the automotive gods in the name of performance when a wayward wire burns on a hot primary tube. Lastly, sparkplug removal can be a challenge with some headers because of the primary tube layout.

Since 2001, we have drag raced our low- to mid-11-second 969 pump-gas 340 Dart at many of the dragstrips in the Mid-Atlantic and Northeast, and during that time we have run through three cheap pairs of 1 5/8-inch primary to 3-inch collector headers. We have often wondered whether, if we actually selected a nicer pair of headers, would the Dart's elapsed times (e.t.) drop? To find out, we contacted the representatives at Tube Technologies Inc. (TTi) about a pair of step headers (PN TTi340A) for the 340. The headers had 1 5/8-inch primaries that step to 1 3/4-inch pipes, which converged into a 3-inch collector. While we only needed headers for our small block, TTi provides headers and full exhaust systems for A-engines, B-engines, RB-engines, Gen II and Gen III Hemis, and Poly engines. They also cover a wide range of vehicles including A-, B-, C-, and E-body Mopars, late-model LD and LX platforms, Ram trucks, and four-cylinder Neons.



Tube Technologies Inc. (TTi) manufactures quality headers and full exhaust systems for A-engines, B-engines, RB-engines, Gen II and Gen III Hemis, and Poly engines. TTi covers a range of vehicles, including A-, B-, C-, and E-body Mopars, late-model LD and LX cars, Ram trucks, and four-cylinder Neons.

TTi provides the proper reliefs in the primary pipes to clear the oil pan rail, steering linkages, the starter, and the torsion bars. These headers are designed to fit without any modifications to the pipes so long as the engine is in the stock location. TTi has a list of aftermarket components that its headers will fit. Check the company's website for the information.

With some header designs of other manufacturers, the driver-side torsion bar has to be removed, but with the TTi cylinder No. 7 removable primary pipe design, the torsion bar can remain in place during the installation. This design reduces the difficulty of installing the header onto the engine.

The passenger-side header has the same quality design as the driver side. We had the headers finished in a polished ceramic coating with a thermal barrier. This silver high-luster, show-quality finish cleans easily if greasy fingerprints get on it or oil (from a filter change) drips onto the headers.

Before we installed the TTi step headers, we needed to establish a baseline with our old headers. We took the Dart to Beaver Springs Dragway (Beaver Springs, Pennsylvania) to make a few qualifying passes prior to competing in the venue's Pro Dial Outlaw class (pro tree bracket racing). The qualifying provided us with four runs ranging from 11.285 to 11.316 seconds in the quarter-mile at 115.98 to 116.85 mph in a density altitude (DA) of 990 to 1,560 feet. Based upon weather correction factoring, the best qualifying run (at DA of 1,013 feet) converted to sea level at 60 degrees F, with a barometer of 29.92 inches, and humidity of zero percent (SAE J607 standard) was 11.247 seconds at 117.51 mph.

OUT WITH THE OLD

With the baseline established and the winner's trophy in hand, we returned home and placed the Dart on a vehicle hoist in preparation of the header swap.

With the Dart up in the air, we unbolted the bullet mufflers from the collector flanges. We removed an oxygen sensor and a crankcase evac tube check valve from each header. To allow greater access to the passenger-side header, we detached both engine mount nuts from the K-member, and the oil filter was unthreaded from the block and discarded. We had both headers ready for removal from the bottom side of the chassis, so the Dart was lowered to gain access to the engine bay. We removed the only exhaust gas temperature (EGT) probe on the passenger-side bank from cylinder No. 2. With the EGT out of the way, all six header bolts were removed from the cylinder head, which permitted us to gently lay the loose header against the engine and apron (inner fender). Once the header was dropped out of the way, we were not surprised to find a badly burnt header gasket. The header was now ready to be pulled from the underside of the chassis, so we raised the Dart back up and employed a screw jack to raise the 340 (by screwing against the oil pan) in the engine bay. When the engine was sufficiently high, the passenger-side header was slipped around the torsion bar and out of the Dart's engine bay.

With the header out of the chassis, we removed the screw jack and turned our attention to the driver-side header. That header required even more work to remove. We needed to pull the starter to provide additional clearance for the header removal. Even with a mini-starter installed on the 340, we had limited access to each fastener, so expect this step to take some time. With our cheap headers, one of the primary tubes wrapped around the steering center link, which required us to knock the driver-side inner tie rod and pitman arm loose from the center link. The last component that was in the way was the B&M transmission shifter cable, which extended from the shifter to an oil pan rail bracket at the Torqueflite. To provide the

clearance, the oil pan bracket was pulled and slipped out of the way. With the screw jack raising the engine, the header dropped from the engine bay after it was wrestled around the steering box.

Once both headers were removed, we noted that the headers had suffered from lack of ground clearance based upon several partially flattened primary tubes. Both header gaskets had also been leaking.

With the TTi headers lying next to our cheap headers on the shop floor, it was obvious that the TTi headers were of better construction. The TTi headers had heavy-duty flanges, beefier-looking pipes, better-quality welds, and primary pipes that did not cross over any other tubes, which will provide unobstructed access to the spark-plugs. The TTi headers looked more compact, which will improve the ground clearance of the Dart. We ordered the headers with EGT bungs in the primary tubes and oxygen sensor bungs and crankcase evac tubes welded into each collector. Additionally, each header was ordered in TTi's polished ceramic coat with a thermal barrier, and both headers received a silver high-luster, show-quality finish.

IN WITH THE NEW

It would be nice to say the reassembly process was a breeze, but as with every header installation, challenges must be overcome. The passenger header was the easy side to mount once the engine was jacked up as high as it would go. The header slipped around the floorpan and between the engine block and the lower apron. With the engine settled back on its mounts, a new exhaust gasket was slipped between the primary header flange and the cylinder head. Each unobstructed header bolt threaded into the cylinder head without much fanfare. We torqued each bolt, and then a new oil filter was installed.

The driver-side header was a much greater pain to install. Even with cylinder No. 7's primary exhaust pipe removed, we fought to get the header into place. It seemed no matter how we adjusted the header, it hit something. The steering column was in the way most of the time. When we jacked the engine up off of the mounts, the transmission bellhousing shield hit the driveshaft tunnel at the firewall, which limited are ability to raise the engine to an adequate height. Eventually we had to remove the transmission crossmember and lower the rear of the transmission to provide the clearance we needed for the installation. Even with the engine raised and the transmission lowered, we worried about scraping the

We ordered each header with an exhaust gas temperature (EGT) probe bung welded into the foremost primary pipe (cylinders 1 and 2). TTi took great care to ensure that each bung was placed the same distance from the exhaust valve to provide consistent readings from cylinder to cylinder.

We wanted to see if step headers would improve the performance of our 1969 340 Dart over the cheap, off-the-shelf straight tube headers we have run for years. A presumed benefit of a step header over a straight tube header is they will provide better scavenging, which will broaden the torque curve of the engine.

We had TTi install bungs for an oxygen sensor and an evacuation check valve tube into each collector. TTi can install the bungs in the collector or in the reducer/adapters, which is bolted to the collector flange.

TTi provided an installation kit with the headers. The kit includes gaskets, collector adapters (extensions), all the mounting hardware, and detailed instructions that include installation procedures and maintenance info.

We have had three different pairs of cheap headers on our 340 since 2001. All the headers hung low, which resulted in slightly flattened primary tubes. Each header required one or more tubes to be dinged to fit into the engine bay and around the steering and suspension components. The cheap headers also blew out header gaskets often.

The removal of the header bolts of the old headers was a chore. There was limited clearance between the flange and the primary tube. The header bolts have to be removed a little at a time until the header is free from the cylinder head.

To remove the headers, the engine mount nuts were removed. This would allow us the opportunity to jack the engine up off of the K-member, which would provide additional room to remove the headers.

Although it looks like the passenger-side header slipped right out of the chassis once the oil filter was removed, we actually used a screw jack (not in the photo) to raise the engine off of the K-member. With the additional inch of clearance, the header almost dropped out of the chassis.

We were not surprised to see that the passenger-side header gasket was leaking. This has been a common occurrence with the cheap headers we have used for the last 18 years. No matter what sealant or bolt torque we employed, the results were always damaged header gaskets.

The TTi passenger-side header was guided into position without any difficulty. The header fit great. We did not have to massage the header pipes at any point. The header bolts were easily installed, and the thick flanges clamped the header gasket tightly between the flange and the cylinder head.

To remove the driver-side header, we had to knock the inner tie rod and the pitman arm free from the steering center link. Additionally, the starter had to be removed, and the B&M shifter cable bracket had to be unbolted from the transmission pan rail.

To install the TTi driver-side header, we had to raise the engine, but the aftermarket transmission bellhousing shield would not allow the engine to be raised enough to install the header. We were forced to remove the transmission crossmember to drop the transmission slightly to aid in the installation. If we did not have the bellhousing shield, we would have been able to raise the engine high enough to install the header without the transmission crossmember's removal.

To protect the finish on the headers, we taped the primary tubes with several layers of 2-inch tape. Even with the multiple layers of tape, we scraped off all of the layers in a few areas. Luckily, we did not damage the high-luster finish on the pipes.

primary tubes during the installation, so we taped each primary tube with masking tape to protect its coat and polish. Once the header slipped past the steering column and the steering box, we snaked the No. 7 primary tube around the steering components and into the header collector.

We raised the transmission back into place and installed the crossmember. The engine mounts were torqued after the engine was lowered onto the K-member. All of the steering components we had disassembled during header removal were reconnected. The starter was reinstalled to the transmission bellhousing, and the transmission shifter cable bracket was reattached to the rail of the transmission pan. Lastly we slid in a new exhaust gasket and tightened each header bolt through the header flange and into the cylinder head.

The TTi headers hugged the floorpan of the Dart. These should never hit the ground because they are packaged tightly around the engine and transmission. If something hits the pavement now, it will be the oil pan.

With the headers bolted in place, we installed the oxygen sensor into the driver-side header bung. The crankcase evac tube check valve was also installed onto the fitting that was welded into the collector by TTi. The passenger-side evac tube check valve installed onto the header with little room to spare, and the passenger-side oxygen sensor would not fit into the bung on the header (by the time this story is in print, the small oversight will have been corrected by TTi and the oxygen sensor will fit correctly). We ended up having to seal the bung with a block-off plug because the oxygen sensor would not fit in the limited space where the bung had been placed. The used bullet mufflers connected to the headers without any difficulty, and the muffler tether clamps and cables were reinstalled on each TTi header and its corresponding muffler. We installed an EGT probe into each bung that had been welded into the primary tubes of cylinders 1 and 2.

Once the EGTs were installed, a final torque of the header and engine mount bolts was performed. The correct oil level was reestablished when a little oil was added to replace what we had lost during the filter removal.

After a final check for header pipe interference and tightness of each header bolt, we started the Dart. Immediately the sound of the 340 was slightly but noticeably different; it was raspier than before, but with open headers every well-tuned

engine sounds raspy and mean. We were amazed at the ground clearance the TTi headers provided. They were so snuggly wrapped around the engine that they merely peaked out from under the chassis and were barely visible even when looking at the front of the Dart while kneeling.

AT THE DRAGWAY

Pleased with the headers, we packed up the Dart and took it to Beaver Springs Dragway to see if the TTi header performance was as impressive as the high-luster polish on each tube. After several weekend rainouts, we finally had a nice day to get the Dart to the strip. On our first run of the day, the Dart left the starting line with a fairly flat feeling, and a misfire was quickly noticed before mid-track, so we lifted the throttle pedal, which hurt the quarter-mile e.t. and the trap speed.

Back in the pits, we pulled the plugs (not something we usually do at the track; this was only the second time in hundreds of races). We found the new sparkplug in cylinder 7 was the source of the problem. Luckily, with the excellent TTi header tube layout in the engine bay, we unthreaded the fouled plug with a 5/8-inch sparkplug socket, a 3/8-inch ratchet, and a 24-inch-long extension. On the old headers, plugs 5 and 7 were blocked by the primary tube from cylinder 3, which required us to use a wrench and the sparkplug socket to remove the plug (all the while burning our hands on the header tubes). We screwed in a new plug, checked the resistance of cylinder 7's sparkplug wire, and checked the cap and rotor for any problems. We found no additional complications, so we readied the Dart for another run.

After the plug replacement, the 340 ran great. The Dart's elapsed times ranged from 11.341 to 11.356 seconds at speeds all in excess of 117 mph, with a best of 117.49 mph. For the entire test session, the eighth-mile e.t.'s were all 7.17 seconds at over 94 mph. With track temperatures hovering around 115 degrees F, the Dart's 60-foot times were all 1.55 seconds. Although the DA was more than double what it was for our baseline runs, which appeared to slow the elapsed times with the TTi step headers, the weather correction of the best run to sea level evened the playing field and resulted in an 11.159 e.t. at 119.191 mph (at a DA of 2,284 feet).

Were the TTi step headers worth the investment? The TTi step headers picked up almost a tenth of a second (0.088) in the quarter-mile and increased the finish

With the driver-side header installed, we slipped the cylinder No. 7 tube into place. There is no need for a clamp or gasket; the pipe slides together, and the flange at the cylinder head holds the pipe in place.

With the header installed, we added the oxygen sensor and the crankcase evacuation check valve to the collector. The fit on the driver side was excellent.

We reinstalled the bullet mufflers onto the TTi headers. The mufflers are much closer to the floorpan and snuggly packaged around the transmission. The muffler tethers connected to the TTi header collector properly.

The Percy's EGT probe fit into the header primary tube. The adapter tightened into the bung, and the probe nut secured the probe into the adapter.

We were amazed at the ground clearance the TTi headers provided. They were so snuggly wrapped around the engine that they merely peaked out from under the chassis and were barely visible even when looking at the front of the Dart while kneeling.

The ground clearance with the TTi headers is greatly improved. TTi packs the pipes much closer to the floorpan and around the transmission. If something hits the ground, it will not be the header pipes.

The old headers had been known to hit the floor at the transition from the beaver tail of the trailer to the level floor (green arrow), but with the TTi headers this is a thing of the past. Now if we cannot get the trailer perfectly level or tilted backward slightly, the Dart should still be able to be removed without dragging on the plywood floor.

The new TTi headers look really sharp in the engine bay. We were pleased with the fit and finish of the headers. The installation of the TTi headers was the least difficult of all the headers we have installed on the Dart.

line trap speed by over 1.5 mph (1.686 mph). Based upon the differences in trap speeds, the TTi headers freed up an additional 15 rear wheel horsepower over the baseline headers (TTi 363.95 rwhp versus baseline 348.77).

Should you consider a pair of TTi step headers for your Mopar? Well, do you like quality headers that are designed for your Chrysler product and that fit properly without the requirements of dinging or denting the tubes for clearance? Do you value thick header flanges designed to keep the gaskets tightly sealed and to end gasket failures. Is having excellent header ground clearance a concern? Would you like to have easy access to all the sparkplugs and maintain your peace of mind that the plug wires will not contact or burn on the header tubes? If you take your ride to the track, is picking up horsepower at the drive wheels and lowering your e.t.'s something you desire? If you've been answering yes all this time, give the TTi representatives a call or visit the company's website. TTi will provide you with headers or an entire exhaust system that will step up the performance of your Mopar.

PHOTO COURTESY OF TODD DZIADOSZ

We took the Dart to Beaver Springs Dragway in Pennsylvania to evaluate the performance changes of the 340. The baseline of the Dart with the old headers ran a best of 11.285 seconds at 116.85 mph. The weather-corrected baseline at a density altitude of 1,013 feet provided a best quarter-mile run of 11.247 seconds at 117.51 mph.

PHOTO COURTESY OF TODD DZIADOSZ

After a quick burnout, the Dart equipped with the TTi step headers blistered an 11.341 at 117.49 mph at a density altitude of 2,284 feet, which resulted in a weather-corrected 11.159 e.t. at 119.19 mph.

PHOTO COURTESY OF TODD DZIADOSZ

There is air under those front tires. The TTi step headers picked up almost a tenth of a second in the quarter-mile (0.88) and increased the finish line trap speed by over 1.5 mph. The differences in trap speeds showed that the TTi headers unleashed an additional 15 rear wheel horsepower over the baseline headers (TTi 363.95 rwhp versus baseline 348.77).

SOURCES

TUBE TECHNOLOGIES INC. (TTI)
951-371-4878
TTIEXHAUST.COM