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PICTURES: By Redline Motorsports

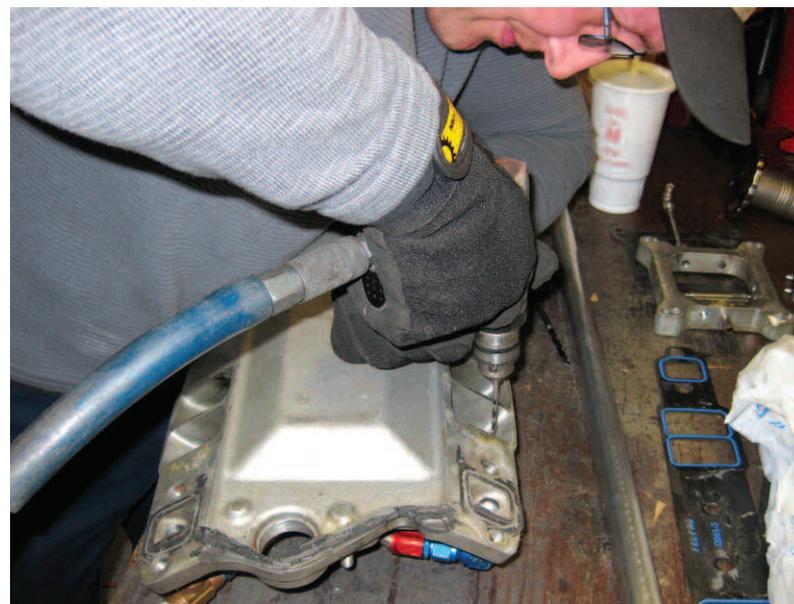
IT'S ELECTRIC

SWITCHING TO
HOLLEY EFI YIELDS
BETTER DRIVABILITY
AND MORE POWER
FOR A BOOSTED '68
FIREBIRD



It's been said many times, and often it has been true; Carbs typically make more *peak* power than EFI. As gasoline leaks into the top of the intake manifold, it removes some of the heat from the incoming air. But for its benefits in that aspect, the lack of atomization can really hurt drivability. Especially as the demands for air and fuel become larger. Imagine trying to take a big gulp of air while someone drips water into your open mouth. The engine can choke and cough, just as you would.

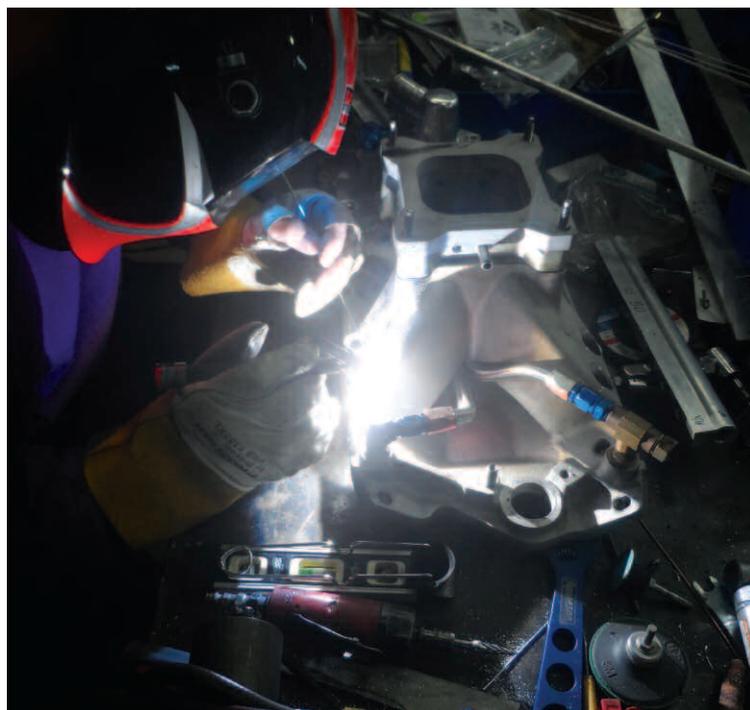
We begin the EFI conversion by removing the Edelbrock intake manifold and drilling through the runners to mount the injectors.



Port injection, on the other hand, sprays fuel in a fine mist through the intake runner of the cylinder head at the back of the valve—more like trying to breathe in a Florida summer. And, more importantly, when the engine does cough or hiccup with EFI, you can adjust the fueling at any RPM. This level of precision can sometimes lead to more power below the curve as well. However, even with a carb setup that runs tip-top, it can never compare to the amount of features that EFI offers. A carb is just a carb. It is an air and fuel delivery device. EFI is so much more.



By reusing the existing intake manifold on the blown 434ci small-block, the owner was able to save a few dollars and keep our testing consistent.



After many test-fits, the aluminum injector bungs were carefully TIG-welded into place.



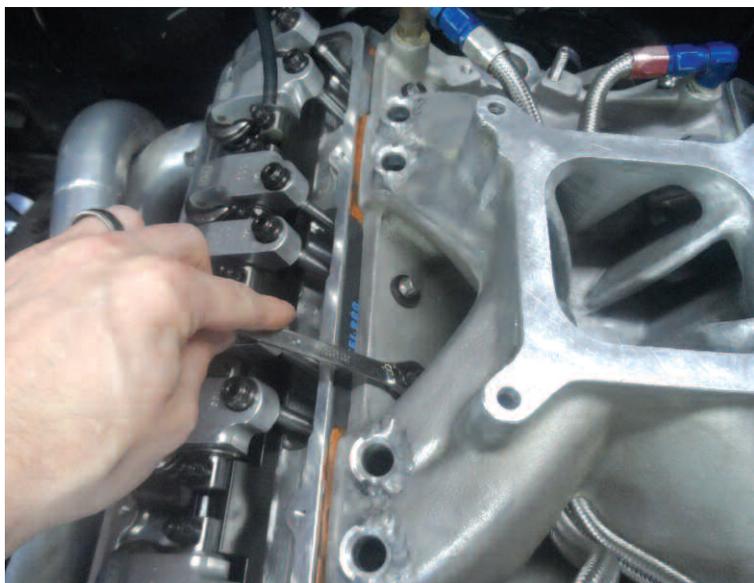
New fuel rails were fabricated using pre-made blanks. Once lined up to the injectors in the manifold, the blanks were marked, drilled and machined. A lip is needed for the O-ring, which seals the injector to the rail.



The extra material was then ground down and polished smooth so as not to obstruct the intake path.



The Holley 160 lb/hr injectors were put into the rails one last time to mock up the supports for the fuel rails.



Now that fabrication is complete, the intake manifold was installed on the small-block.



This is the full complement of Holley EFI components used for the swap including the Dominator ECU, ignition coils, 160 lb/hr injectors, throttle body, NTK wideband O2 sensor, and wiring harness.



The Holley 4-barrel throttle body is a simple swap for a carb atop the intake manifold—even with the blower hat.



Originally this '68 Firebird had a fuel pump sufficient for sustaining the 43 psi of fuel pressure needed for EFI, but the volume turned out to be insufficient so it was swapped for a Weldon 2345.

Chad Burrell took his 1968 Firebird to Redline Motorsports, Inc. in Bloomington, Illinois, looking to add a data logger. Using a 434 cubic-inch small-block Chevy with an intercooled ProCharger F-2 setup, the 'bird had run 8.59 at 162 mph on its best pass with E85 fuel. At this level, you really do need some way to keep an eye on the vitals like air/fuel ratio as you are going down the track. By keeping a close eye on the tune, you will know exactly how hard to push it and how to troubleshoot any issues along the way.



Holley clearly labels the wiring harness to avoid any issues. These simply plug into the injectors.



Redline chose to mount the Holley ignition coils on the firewall. New plug wires were cut to fit. By switching from a single coil and distributor, much more spark energy is available.

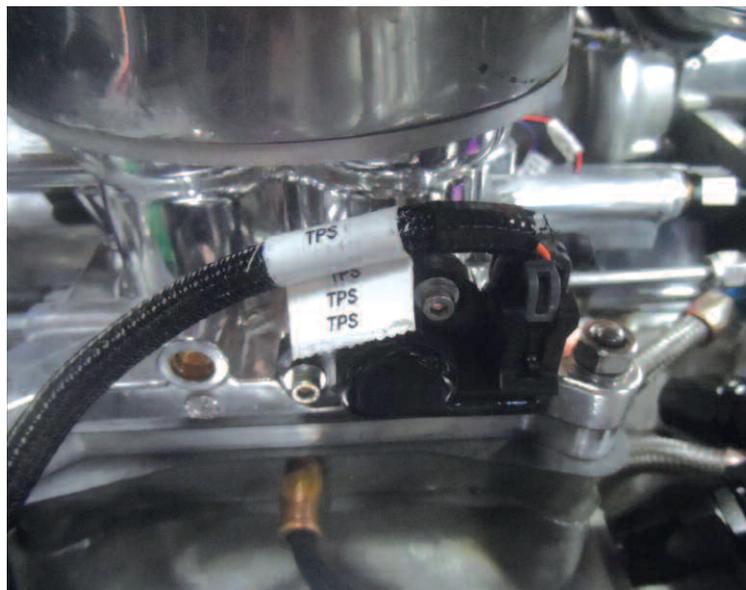


The cam position sensor basically replaces the distributor and acts as a dummy.

Looking at the cost difference between a quality data logger and Holley EFI, it became apparent that he could also add better drivability at the same time. What Chad and the crew at Redline did not know was that there were additional gains to be had from better fuel distribution and stronger spark energy. When all was said and done, Chad's Firebird picked up 10 horsepower while running a more rich and safe tune. In the future, he plans on adding Redline's 8-channel EGT Kit, which is plug-and-play with the Holley EFI system, to keep an eye on each cylinder for even greater precision. If it means more power, better drivability and fewer engine mishaps, it is hard to knock (no pun intended) EFI and its cost benefit. Check out the photos and captions to see how this carbureted Firebird was converted to EFI.



In order to get the crank position, Holley uses this external crank sensor, which must be at a set distance from the balancer that you measure with a feeler gauge.



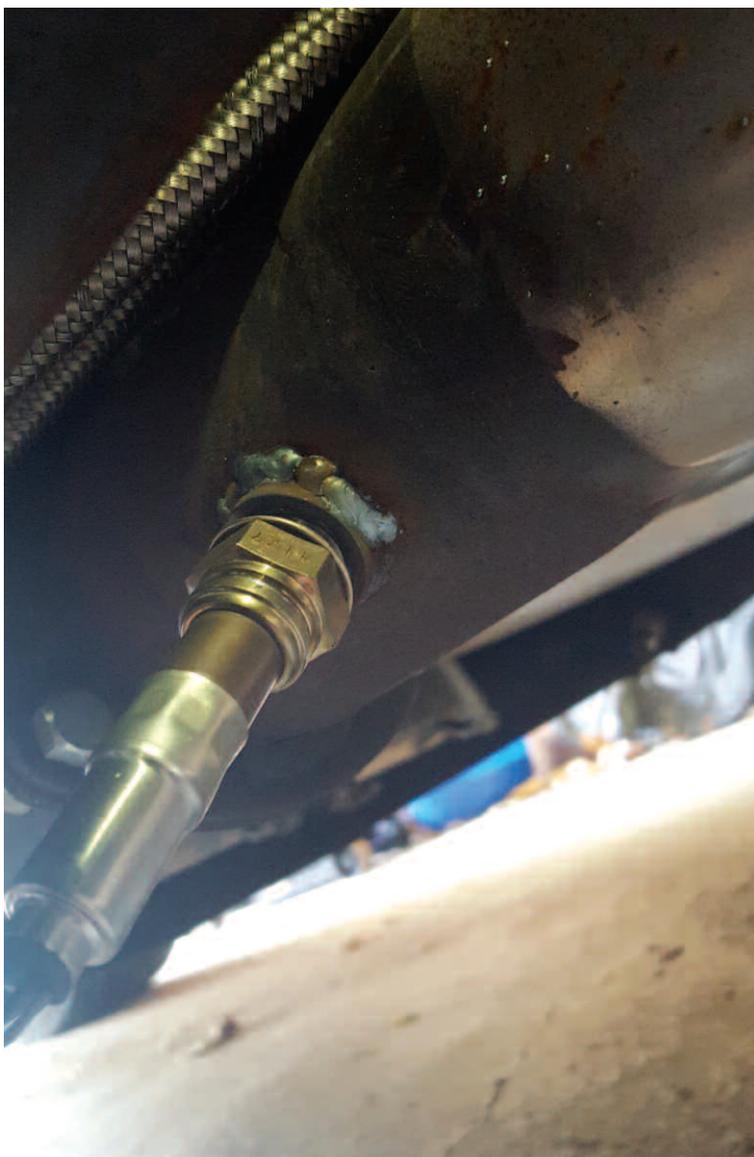
The throttle position sensor as well as IAC and air temp is integrated in the Holley throttle body, so it just needs to be plugged in to the harness.



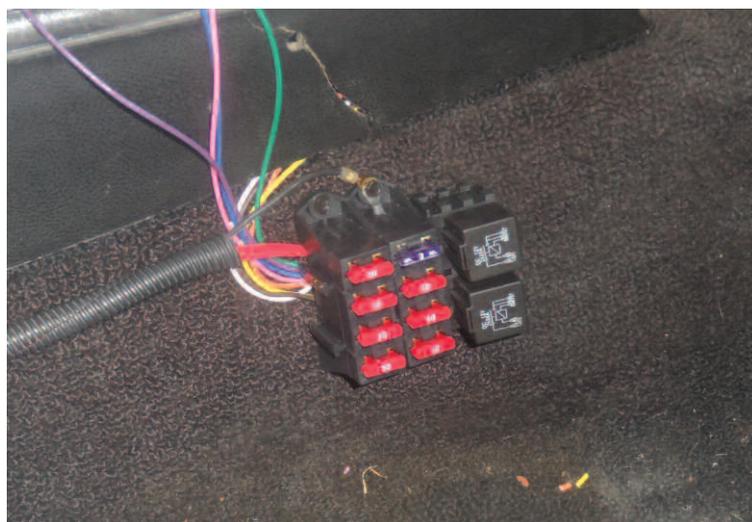
The fuel pressure sensor and harness plug into the regulator, which will be one of many data points for the Holley EFI Dominator. There are all sorts of safety features in the software that can protect the engine such as a fuel pressure drop that would cause the engine to go lean.



The wiring is fed through this existing hole in the firewall. A rubber grommet will be added once the wiring is terminated to seal the engine bay off from the interior.



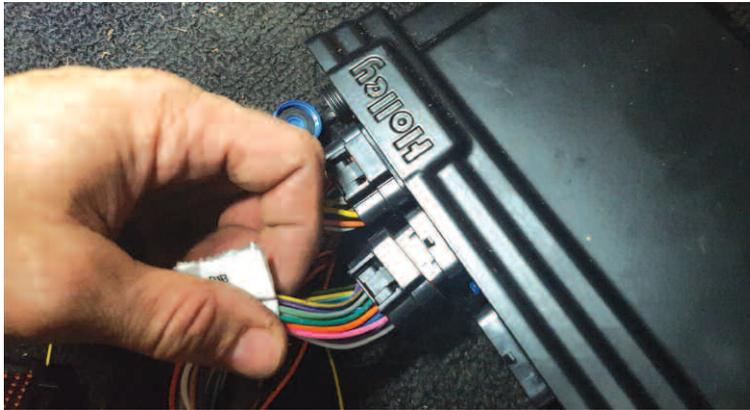
If you don't already have one, you need to weld a bung into the exhaust for the wideband O2 sensor. The Holley EFI adjusts the fueling based upon the wideband O2 sensor readings, and can also data log air/fuel ratio along with many other inputs.



Additional fuses are needed to wire in the Holley ECU. If you fear wiring, fear not because this is all it takes. Pretty much everything else is plug and play.

PARTS LIST

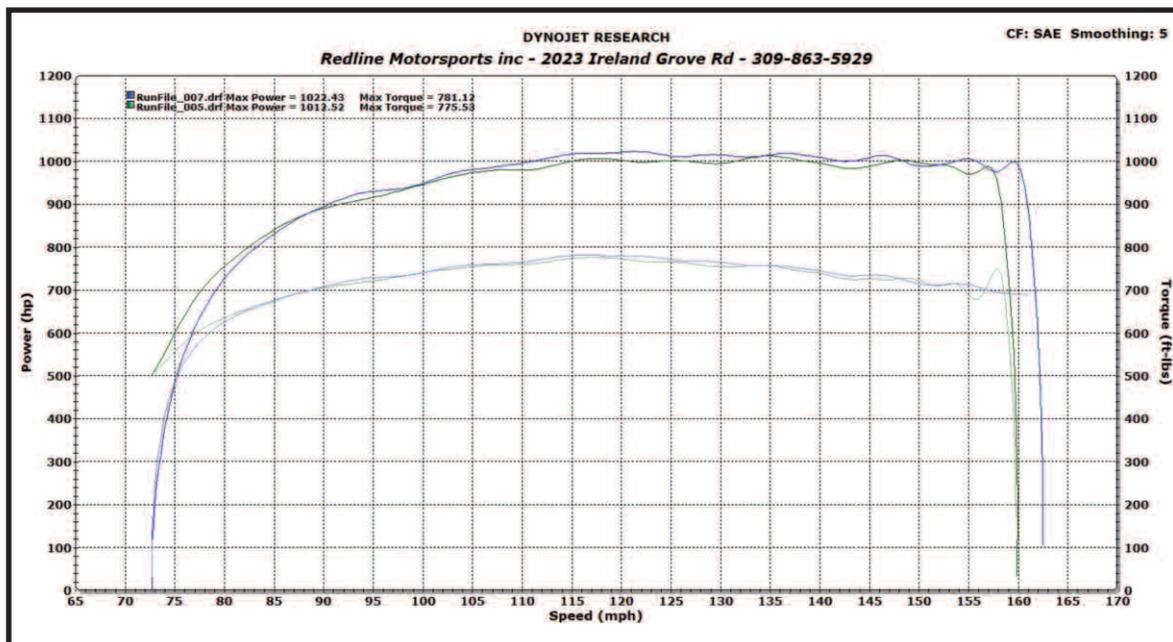
- 534-85 (8) Holley injector bungs
- 112-588 Throttle body
- 554-114 Dominator ECU
- 558-308 Main power harness
- 558-104 Universal MPFI harness
- 558-200 V-8 injector harness
- 558-410 Ignition harness
- (8) 556-112 HP smart coils
- 558-312 HP smart coils sub harness
- 558-307 Coil on plug harness
- 534-199 2nd wide band harness
- (2) 554-100 NTK wide band O2 sensor
- 554-102 Fuel sender
- 554-107 3-bar map sensor
- 534-10 Coolant temp sensor
- 9920-107 Air temp sensor
- 554-118 Crank sensor
- 522-168 160 lb/hr injectors
- 2345-A Weldon fuel pump



Redline chose to mount the ECU in the cabin. The wires that were fed through the firewall simply plug in. To data log or tune with a laptop, a USB cable connects to the ECU, which is one reason why mounting in the cabin is so appealing.

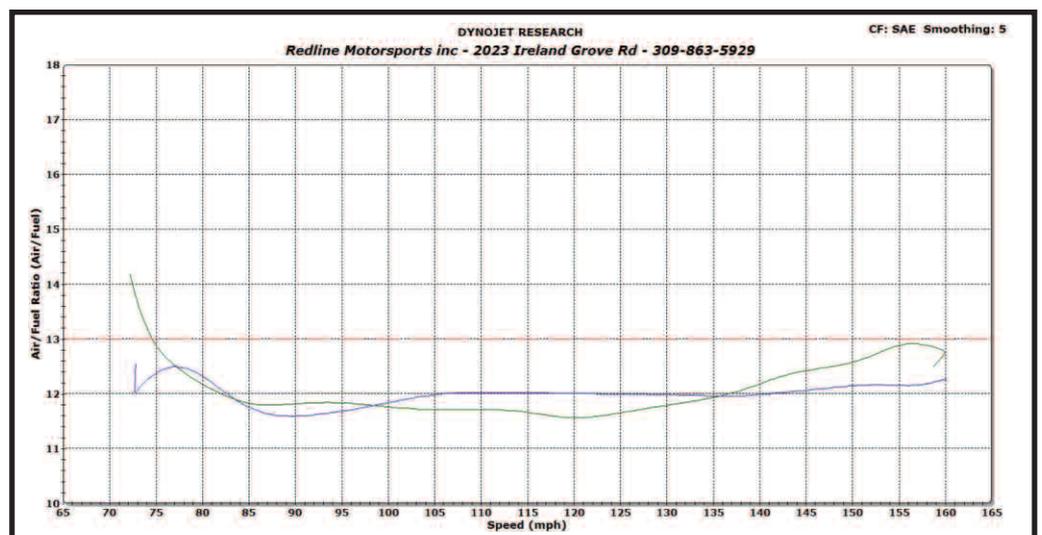


All back together this E85-sipping, 434 cubic-inch behemoth is ready to make some serious steam on the dyno. The street-going '68 Firebird is packing a cog-driven ProCharger F-2 supercharger, air-to-air intercooler, and water/meth injection.



As you can see, it picked up power at nearly every rpm. Even with a loose converter, the small-block cranked out 1,022 hp and 781 lb-ft of torque. At peak, that is a 10hp and 6lb-ft gain, which was not even the primary objective of the conversion. Of course, any time you can pick up power with a safer tune is always nice. Timing was set at 23 degrees for both runs.

When you look at the air/fuel ratio, you can see the real benefit of switching to EFI. The blue line is with the Holley EFI, which is much more stable. Using the carb, it dips down to around 11.5:1 near the middle of the run before hitting almost 13:1 at the top of the pull at max boost. Meanwhile, with Holley EFI it barely goes a touch over 12:1 at the top end and is much more stable overall. Which graph would your pistons prefer?



//SOURCES

Holley Performance
888-464-6553
Holley.com

Redline Motorsports, Inc.
308-863-5929
Redline-Motorsports.com