TRIPLE THREAT MX-5

Part 2: Opening the Exhaust and Dropping the Wheel Diameter

story by andy hollis • photos by andy hollis unless otherwise credited

On the surface, preparing a car for stock class autocross seems relatively easy: Take something sporty and just run it. In reality, the rules allow enough room that some testing and tuning can pay huge dividends.

Our new Mazda MX-5 has been responding nicely to those allowances. After improving the suspension with some Koni Sport dampers and an upsized Karcepts front anti-roll bar, we went after some more low-hanging fruit.

SCCA Street-class rules–the ones that now govern stock cars–also allow aftermarket exhaust systems. So, we wondered: Would running one give us any extra power?

Those same rules also gave us another variable to test: wheel diameter. Our Club-package MX-5 came stock with 17-inch wheels, yet the rules allow rim diameter to be increased or decreased by an inch. Could we find more speed with another change here? Time to do more testing.

PROJECT PLAN

project: preparing a 2016 Mazda MX-5 Club for national-level autocross.

part 1: basic track, street and autocross prep (February 2017).

part 2: upgrading the exhaust, testing different wheel-and-tire setups (this issue).

ann hollis photo

Preparing a car for stock class autocross competition means that modifications are limited, so testing each one is super important.

SPORTIER EXHAUST: LESS WEIGHT, MORE POWER, BETTER SOUND

Longtime Miata aftermarket parts supplier Goodwin Racing was one of the first to embrace the new ND model, and they offer a staggering array of parts to personalize your ride. More power, better sound and less weight can be just a mouse-click away.

Those three goals can be satisfied with a single purchase, as Goodwin offers a progression of exhaust systems from mild to wild. We went with their recommended SuperStreet axle-back muffler system.

One of the biggest drawbacks of running a performance exhaust on a four-cylinder engine is the dreaded drone at 3000 rpm–right where typical gearing places the engine for most highway driving. The SuperStreet exhaust solves this problem by adding a tuned Helmholtz resonator, much like what you'd see in an intake tract. Additional sound attenuation comes from a small glass-packed tip, with an optional insert included for even quieter operation.

Our first step was to see how this system's performance compared to the stock setup, so we headed to Automotive Specialist's track-prep location at Harris Hill Raceway, where they have a Dyno Dynamics chassis dyno. After baselining the OE system, we removed the rear muffler to simulate a straight pipe. After that we bolted on the SuperStreet exhaust and ran it both with and without the insert.

TRY THIS AT HOME: DIY STRAIGHT PIPE

We love fabbing up exhausts. Raw materials are relatively inexpensive, and there's no need for expert welding skills–this isn't something critical like a roll cage or suspension upright. Access to a small MIG machine and an angle grinder fitted with a cutoff wheel are all the tools we need. Oh, and a tape measure: Measure twice, cut once.

In addition to its big axle-back muffler section, the ND Miata exhaust system features two additional elements: a straight-through resonator located just in front of the rear axle, plus a catalytic converter up front.

Those two pieces alone offer enough sound attenuation that an uncorked MX-5 should easily pass sound regs at almost any autocross site. However, we'd still need to get those spent exhaust gasses out from under the bumper to meet the rules and keep from melting all the nearby plastic. That's where we needed a straight pipe.

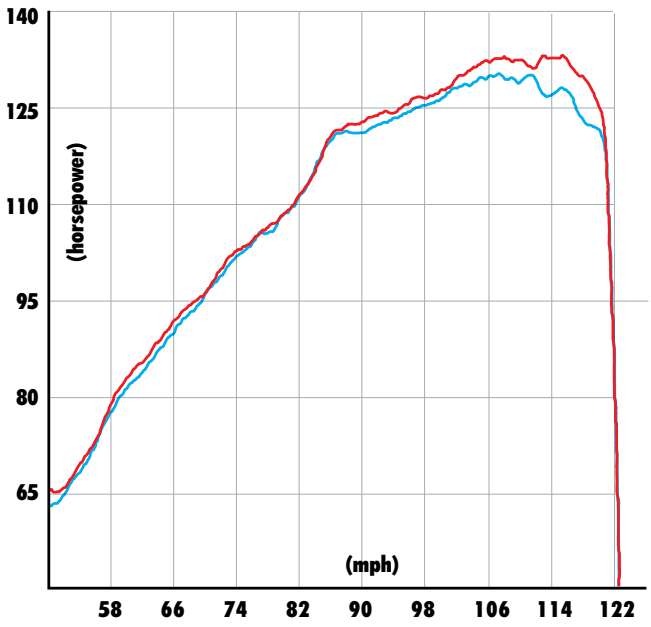
After removing the stock muffler, we took measurements and determined that our pipe needed about 9 inches of offset from entry to exit as well as a length of about 21 inches. We'd also need our straight pipe to mount to the stock ball flange connection.

With that in mind, we pored over product offerings from Summit Racing and ordered up the following: two 45-degree, 2.5-inch mandrel bends (AP Exhaust part No. 10725), and a 2.5-inch ball flange pipe adapter (Walker part No. 41726).

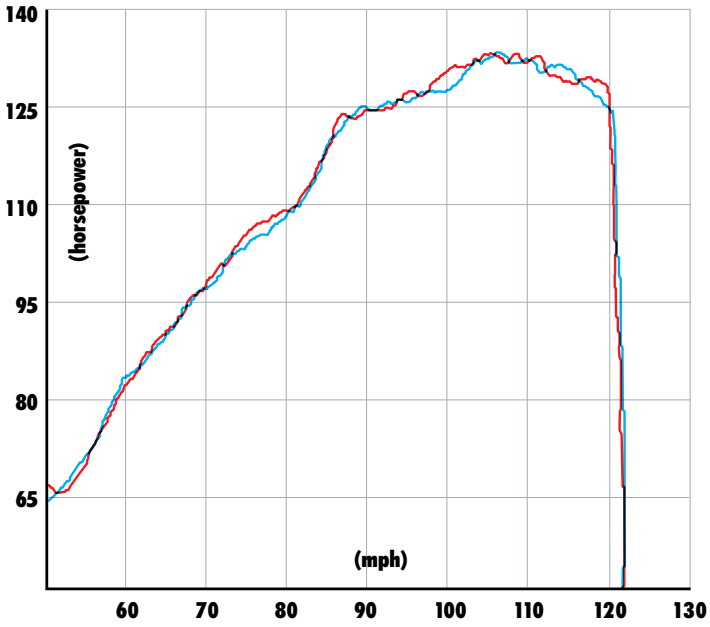
To get the length correct, we cut off the adapter's flared end. We also removed most of the flared end from one of the mandrel bends–we just left half an inch or so.

The adapter was inserted into that bend, with the other 45-degree bend butted up to the other side. Everything was carefully mocked up

Superstreet Exhaust vs. **Stock Exhaust**



Superstreet Exhaust vs. **Open Exhaust**



Swapping exhausts on the MX-5 is a breeze, requiring just two bolts and four exhaust hangers. Pro tip: Use soapy water on the hanger mounting studs to avoid busted knuckles.

In short, the SuperStreet made the same power as the open exhaust–but did so with less sound output. The SuperStreet consistently outperformed the stock system by 3 to 5 horsepower across the rpm range, with peak gains of about 8 horsepower near the top end. Performance with the insert installed fell between the two.

Next, we took a 3-hour drive over country roads with the uncorked SuperStreet. In short, we loved it. The OE system is so quiet you can't really hear the engine, while the SuperStreet delivers just the right sports car sound, especially above 4000 rpm. Highway drone when cruising? None.

The SuperStreet weighs in at a little more than 13 pounds, which is a nice 8-pound savings over the stock system. For the weight-conscious autocrossers out there, Goodwin also offers their so-named Race version, which eliminates the glass-packed tip and thus saves a few more pounds. Both exhausts sport an appealing polished stainless look. Priced at $429 and $329 respectively, these are flying off the shelves and we can see why.

and taped together before being tack welded. Once we were satisfied with a test-fit on the car, we welded everything together to seal the deal. To connect our straight pipe with the car itself–we're using a bumper mount stud as an attachment point–we welded on a common exhaust hanger strap.

The finished product weighs in at a little more than 3 pounds–not bad for less than $60 of materials and an afternoon's work. The straight pipe is louder–and, yes, more annoying–than the Goodwin muffler, so our home-brewed setup will only see use in national competition where every pound counts. Goodwin's SuperStreet remains a much better compromise for daily use, as well as for most track and local events.

SMALLER WHEELS: GAINING A MECHANICAL ADVANTAGE

When the Solo Events Board converted the old Stock category into Street a few years back, the key change was the move to 200-treadwear tires. And while there are lots of brand and model choices, no single one has dominated. This is especially true with the larger diameters, like 19s and 20s.

To give competitors more choices, the SCCA opened up the wheel allowance to allow competitors to go an inch up or down in diameter from stock. The stock wheel width, however, cannot be changed.

When combined with suitable tires, a side effect of that allowance is the possibility to make significant gearing changes to either enhance acceleration or increase speed in a gear to avoid shifts. We already did a little bit of the latter with our original move from the stock 205/45R17 tire size to our taller 225/45R17 competition tire. The goal here was to give us a little more space before hitting the rev limiter.

Now we'd try going the other way, running a shorter tire. Why? Follow our logic.

When running its stock tires, the MX-5 simply runs out of second gear too soon for autocross. Most autocrosses have a top speed near 60 mph, meaning we had two choices: run on the rev limiter or constantly shift up and back between second and third.

On the 225mm tires, the MX-5 tops out right around 56 mph in second gear–better than the stock setup, but we're giving up some acceleration to get there. So, we wondered, what if we used the rule allowance to move down to a 16-inch wheel and run a shorter 205/45R16 tire? For one, that would help acceleration. And while it wouldn't eliminate the need for a two-three shift, perhaps we could run a significant portion of the course in third gear.

Drivers of second-generation Toyota MR2s followed this model for years. The shorter tires would limit second gear to about 53 mph, but then they could just upshift to third and run most of the course with minimal shifting. How'd it work? That car dominated its class for years.

In addition to shorter gearing, we had another trick up our sleeve for the 16-inch sizing: the super-light SSR Type C wheel. Although they have been out of production for many years, these are still among the lightest autocross wheels out there. We found a set and figured out how to make them fit within the rules: They feature a 42mm offset in stock form, but a 4mm spacer allows them to clear our factory Brembo brake calipers while still meeting the offset limits found in the rules.

Best of all, this wheel and tire package dropped a whopping 6 pounds per corner. That is rotational weight, too, meaning it will have a big effect.

What's the faster autocross setup for our Mazda MX-5: the taller tire or the shorter one? To find out, we did some testing. The quick answer? It depends on the course and the driver.

THAT'S A BOLD STRATEGY; LET'S SEE IF IT PAYS OFF

To test our theory about wheel diameters, we headed out to our usual testing grounds at Mineral Wells. We packed along both our 16- and 17-inch wheels, each set mounted with Bridgestone Potenza RE-71R tires.

The permanent test course we typically use does not feature high enough speeds to require shifting, so instead we used the painted boxes left over from the recent CAM Challenge. This yielded a much more wide-open course, allowing our MX-5 to get well into the 60 mph range in some sections.

We first mounted up the 17s and did five familiarization runs. Although we neared the rev limiter a few times per run, we only needed to reach for third gear once. We then recorded three test runs in the 53.7-second range.

Then we installed our 16-inch wheels. After getting them up to temperature, we saw times quickly drop by about a half second. Result: Shorter tires were the clear winner here.

But wait, we weren't done gathering data. Normally we'd bracket the test by returning to the 17s to verify our data, but we were piggybacking test time with others who then needed the course direction reversed. Okay, we can roll with that–more data for us.

The reversed course direction yielded a faster course–and with the 16s required more than one shift into third gear. As a result, we posted more inconsistent runs, with our times ranging from 53.8 to 54.4 seconds.

Running this faster course on the 17s only required us to grab third gear once. Less shifting yielded smoother, more predictable laps, with our times ranging from 53.5 to 54.0 seconds. So now the 17-inch wheels looked more attractive. Clearly, course design is part of this equation, as are shifting technique and experience.

With the sun now low on the horizon, we decided to stack the deck even more in favor of the 17s by tightening up the faster section of the course. Our MX-5 could now run the entire course in second gear on the 17s, but not on the 16s. On the taller tires, times ranged from 54.7 to 55.0 seconds–exactly what we expected.

Then we fitted the 16s. Despite the required gear changes, we were surprised to find that the smaller tires immediately produced a mic-dropping run of 54.2 seconds. What? So we tried to back up those times. Each time, the clock stopped at 55.0 seconds.

We were mystified. That one single fast run was magical, with two upshifts and downshifts perfectly executed–but could not be replicated with late-day fatigue setting in. Moving back to the 17s to bracket the final test put us right back in the 54.7 to 55.0 range on those tires.

During the long tow home, we pondered the results for insights. On courses where speeds exceed 56 mph for substantial periods, the 16s seem to hold the most potential–if those gear changes can be perfectly executed. The 16s should also be better for courses slower than 53 mph, since we wouldn't need to shift gears at all.

Finding the right answer for those courses in the middle, however, can be a real toss-up. Will the 17s again produce the fastest times? This is exactly why we always stress the need to do your own testing.

Risk/reward will be the name of the game here. Once we have mastered the MX-5's shifter in the heat of battle, perhaps we'll revisit this subject.

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