



[TECH]

M A N U F A C T U R E

Keeping it Quiet

John's Industries' 9-inch axles are the strong, silent type

By Barry Kluczyk Photography by the Author

John Melchiori hates loud rearends.

Who doesn't? But Melchiori, who founded John's Industries more than 40 years ago, has made it his mission to put the decibels on the down low.

"Of all the sounds you want to hear from your hot rod, the ring-and-pinion isn't one of them," he says. "It's been a more difficult challenge in recent years, because of industry changes that altered the way most of the gears are machined. We've taken a number of steps to combat that."

He calls the company's effort The Quiet Zone Series, which includes road testing each and every one of the 9-inch third member assemblies they build and listening to the rearend through headphones linked to sensors in the axlehousing. If it's too loud, it doesn't ship.

"Original Ford axles are whisper-quiet," says Melchiori. "The machining on them was excellent. Our techniques aim to get as close to that as possible."

He must be onto something, because John's Industries' roster of regular customers reads like a who's who of the hot rodding world; and you've undoubtedly seen the company's

axles in tech stories and feature cars. Its auspicious acknowledgement for a company located in Michigan, but about as far from the hustle of Motown that you can get ... Caspian.

Located more than 500 driving miles from Detroit—in the gorgeous wilderness of the state's sparsely populated Upper Peninsula, encompassing about 17 percent of Michigan's land

area, but holding only about 3 percent of the population—it's closer to Green Bay, Wisconsin, or Duluth, Minnesota, than the Motor City.

Caspian, and the surrounding area, used to be the epicenter of iron mining, but the mines closed down more than 40 years ago. Melchiori was a few years out of high school, then, but had already learned his way around cars and machine shops. He started young, sweeping floors in his uncle's garage, before



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With more than 40 years of experience, John's Industries' 9-inch third member assemblies feature their own case casting and billet aluminum pinion support, along with all-new supporting components, including the ring-and-pinion and carrier.

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John's Industries
(906) 265-9999
www.johnsindustries.com

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moving up to brake jobs and other repairs. It continued in high school, with automotive trade classes and banging gears on the clandestine quarter-mile that had been marked off on a lonely stretch of highway outside of town.

"I rebuilt my own Muncie four-speed and ended up building them for others," he says. "I also took a stab at narrowing my own axles in the early days of the trend, in the early '70s. The first set lasted only a couple of minutes, but I continued to work at it and figured it out."

By the mid '80s, Melchiori was in business for himself and

discovered a hungry market for Ford 9-inch axles, which he was rescuing and rebuilding from salvaged vehicles.

"At first, it was mostly the truck guys who wanted them," says Melchiori. "There was a significant need for them and that kept us busy for a number of years."

But like those tough differentials, the gears in Melchiori's head were turning, searching for new ideas to expand his growing brand's reach. His interest in hot rods seemed like the logical next step, so he started advertising in street rod magazines.



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Each third member assembly begins with a nodular iron case or a cast-aluminum case, each available in 3.062-inch and larger 3.25-inch bores. John's Industries' own nodular iron case is made to a unique specification that makes it about 70 percent stronger than factory castings. It's offered with the conventional 3.062-inch bore.



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A variety of popular carriers are available, including the company's own Trac-Loc limited-slip unit, which is assembled in-house. It gets started, here, with the carbon clutch pack in the housing.



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The carrier assembly continues with the installation of the spider gears in the case, which work with the clutch pack in a limited-slip design to reduce the wheel speed of the fastest-turning wheel in order to maintain the same relative speed between the wheels.



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With all of its guts assembled, the Trac-Loc carrier is buttoned up and prepped for installation in the third member.



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Work moves on to assembly of the third member, starting with a nodular iron case, mounted on a special vise developed by John's Industries. Dubbed the Orbit 480, for its range of motion, it's designed specifically for assembling 9-inch centersections.

First, the third pinion bearing is installed. It fits within the case, driven into place through the pinion opening. A few well-positioned taps on the outer race seats it; lock rings are then installed.



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■ Proper pinion preload, the force between the pinion bearing assembly and the race, is essential for quiet operation and longevity. When the pinion nut is tightened, it forces the yoke against a crush sleeve. Insufficient force will hold the pinion bearing too far from the race, resulting in not enough preload, while too much force will result in excessive preload. The proper preload is determined with a torque-measuring tool, which should indicate 13-15 in-lb for the proper preload on a 9-inch with new bearings.

“Nobody else was really doing anything like that at the time, and it gave us a good foothold in the market,” says Melchiori. “We knew the product really well, too, but over the years, we were relying more on suppliers for supporting parts, because the pool of take-off parts from salvaged vehicles was shrinking.”

Over time, demand for John’s Industries’ axle assemblies was outstripping the capacity of parts vendors to keep him with an adequate supply of housings, third members and other supporting components. And with ever-increasing horsepower demands and the need to match them with stronger, durable rearends, Melchiori had the housings, third member cases and other parts cast and produced locally. The company has three stamping dies, with a fourth on its way.

“We have our own housings stamped, and the third member cases cast exclusively for us,” says Melchiori. “Along with ensuring the inventory we need, that move also helped us up our game when it came to quality and production, because we had more control over the machining process.”

And then came the louder gearsets.

“Generally speaking, the industry changed the way it machines the teeth on the ring-and-pinion gears, mostly in order to reduce machining time,” he says. “The result was significantly louder operation on the highway. It was unacceptable to me, and we started pushing back to achieve quieter performance for our customers.”

With that in mind, we booked a flight to the Upper Peninsula to check out the operation and the testing procedures for ourselves, finding that each and every Quiet Zone Series assembled third member is installed in the company’s test vehicle and road-tested.

After listening to more than one axle during the road tests, we were surprised by the differences in sound levels they produced. Melchiori is right about the elevated noise levels, particularly when compared against the original-production ring-and-pinions.

“It’s a challenge, but it’s one we’re dedicated to,” he says. “The vehicles people are building are very high quality, and they deserve high-quality axles that don’t detract from the rest of the driving experience.”

Well put. Here’s to quiet axles  everywhere, from old iron country.

■ Adjuster nuts on the 9-inch are one of its many advantages, because they make setting the ring gear backlash very easy. Rather than the shims used on many axle designs, including Ford’s own 8.8-inch, the 9-inch adjuster nuts simply require loosening one side and tightening the other to shift the gear into the proper position.

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■ With the pinion in place, the differential assembly, with the ring gear installed on it, is slipped into place at the rear of the housing. Note that the assembly is installed with its bearings and races already in place.

■ Next, the mesh pattern of the gears is checked, starting with applying some marking compound to a number of the ring gear teeth. Ideally, the pinion should mesh near the center of the face of the rear gear teeth. There’s a drive and coast side to the ring gear teeth and the drive side is the more critical side of the mesh pattern.

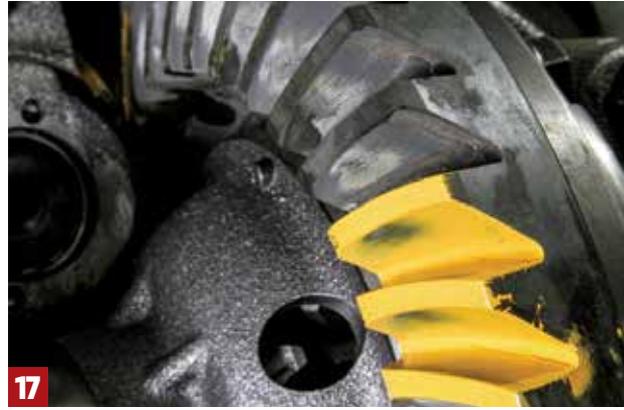
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■ The first pattern inspection, here, showed the mesh was a little too close to the heel (outer) edge of the teeth. Adjustments are made by adjusting the pinion cartridge shims and re-setting the ring gear backlash. It can take several attempts and shim adjustments to get it just right.



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■ After a couple of adjustments, the pattern has moved inward on the teeth, indicating this mesh contact pattern is good to go.



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■ The assembled third member is sent for road testing, where it is installed in the company's test vehicle. The easily removable design of the centersection is one of the things that has always made the 9-inch a favorite with racers and it certainly helps facilitate such tests here.

■ The test vehicle is an S-10 that's mechanically stock, except for the rear axle setup. It was also lowered for a proper hot rod stance.



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■ The S-10 is modified with a lift equalizer in the bed, featuring a ring that holds the third member during installation and removal, allowing a pit stop-like changeover from one centersection to the next in about 20 minutes.

■ With the newly assembled third member installed, it's driven for approximately 20 miles, at different speeds, to confirm not only its operation, but gauge its noise levels and ensure it meets the Quiet Zone Series standards.



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WHY THE FORD 9-INCH?

Introduced in 1957 and produced through 1986, the ubiquitous Ford 9-inch rearend is the industry standard for hot rods, off-roaders, race cars, and just about everything else with rear-wheel drive, with a whole sub-industry set up to build aftermarket replicas and service the population of surviving originals.

But how and why did it become the de facto high-performance axle choice? Three primary reasons:

1. Strength: Compared to other admittedly strong axles such as the big Dana axles used in Mopars, the 9-inch's strength advantage is a greater hypoid distance, or gear offset, which is the measurement between the center of the ring gear and the center of the pinion gear. Greater distance means there's more gear-tooth surface contact between

the ring gear and pinion, for greater strength. There are other strength-enhancing attributes, but this is the biggie.

2. Drop-Out Third Member: The 9-inch wasn't the first axle design to feature a removable, or "dropout," centersection, but as its reputation for strength grew, builders found the design had a lower center of gravity and was much easier to work with, allowing comparatively quick changeovers or servicing, especially at the track.

3. Virtually Unlimited Gear Ratios: Without differential housing restrictions to worry about, a 9-inch differential will accept essentially any gear ratio that can be thrown at it. As such, the aftermarket industry has responded over the decades with more available ratio choices than any other axle type. There's nothing like it.



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■ Inside the test truck, two sets of headphones connected to special sensors mounted in the axlehousing allow technicians to listen to the inside of the axle and note the drive and coast sound levels of the ring-and-pinion. We listened to different assemblies on more than one testdrive and were amazed at the audible variances.



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■ Some of the third member assemblies are shipped individually, while others are installed in complete axle assemblies that John's Industries builds in-house. They even make their own housing centers, which include three production styles: standard, heavy-duty, and extreme. There are two rear cover choices, too: round and notched.



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■ Axletubes are welded to the housing center on a unique, rotating jig that helps produce more consistent welds and does so quite quickly.



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■ Here's a close-up of one of the welds, each of which is critical to the assembly.

■ The mounting options for the axles are almost limitless, and John's maintains an inventory of mounting brackets for popular applications such as GM A-bodies, vintage Fords, and more. They'll even do custom applications, as long as they have the dimensions and/or the brackets from the original axle as a template.



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■ John's machines their own axles, too, from supplied blanks. They prefer screw-in studs versus conventional press-in studs for a few reasons, not the least of which dimensional accuracy and greater safety. They're more secure once they're attached to the axle flange.



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■ There are even several drum brake options to complement the axle assembly, including production-style 10- and 11-inch sizes in both the small- and big-bearing designs. John's also installs Wilwood disc brakes.



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■ This clever, Buick-style finned brake drum is made by John's and designed to look like the original, but is machined on the back side to work with the standard Ford brake components.



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All boxed up and ready to go, this complete axle assembly, like most others, is shipped bare, so the installer can paint it to his or her specifications. And it'll be quiet.