MODERN VINTAGE QUICKCHANGE REARS

The Appeal and Practicality of Old and New Quickchanges

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Photography by Steve Coonan and Geoff Miles

The whine of a quickchange is as much a part of hot rodding as the rumble of a lumpy cam. While vintage rearends have their place, modern quickchanges like these from Winters offer a stronger but very traditional looking alternative that you can actually hammer on and still keep in one piece. Shown flanking Winters' new steel tube and bell Champ rear are a V8 quickchange center section, a V8 and a Champ-size banjo center, and assorted gear covers and helical and straight-cut spur gears. In addition to the gusseted gear covers shown, they make an equally old school straight-finned cover. They come with a cast, machined or polished finish, and all are available for V8 and Champ-size rears.

PARTS IS PARTS

Quickchange rearends have topped hot rodders' list of desirable parts since they first appeared in the 1940s. The ability to change gear ratios in a hurry without swapping the ring and pinion was a boon to racers, from the circle tracks to the drag strips. For hot rodders, quickchanges simply checked all the boxes: they looked cool, they sounded cool, and they performed. The idea that a guy could drive his highway-geared roadster to a race, pull the rear cover and change the spur gears to blast down the strip, then change back for the ride home was pretty appealing.

Today these rears haven't lost an ounce of that appeal. They're as desirable as ever, and now there are modern versions that handle more horsepower, offer greater reliability, and still have the traditional hot rod look of those seen on racetracks and lake beds of the '40s and '50s. Since we're always game for modern equipment in a vintage package, we paid a visit to Winters Performance to learn more. For over 40 years they've manufactured track-proven rears at their facility in York, Pennsylvania, and in the process their name has practically become synonymous with the quickchange. They were able to shed a little light on how quickchanges have evolved, what rears are available for street-driven hot rods, and the pros and cons of vintage units versus new.

QUICKCHANGE 101

The idea behind the quickchange is fairly simple. With a standard rearend, the number of teeth on the ring and pinion gears determines the gear ratio—which translates into how many revolutions the driveshaft makes to rotate the wheel one full turn. If you've got a highway-friendly gear, you're not making any headlines running stoplight-to-stoplight or at the track. A quickchange allows you to alter that ratio by incorporating an extra pair of gears within the rearend that are easily accessible and can be changed for different driving conditions.

Imagine a typical early Ford banjo rear: the driveshaft is coupled to a pinion gear that turns the ring gear, putting power to the pavement. On a quickchange, the driveshaft is coupled to a through-shaft, or lower shaft, that bypasses the ring gear, extending to the back of the rearend. The end of the lower shaft is splined to accept a spur gear, or change gear, that meshes with another spur gear directly above it. This top spur gear is connected to the pinion, which turns the ring gear. By removing the back cover on the quickchange, the spur gears can either be flipped top-to-bottom to change the ratio, or they can be swapped for a different gear set entirely.

It would be tough to nail down when and where the first quickchange was built. There were certainly homemade versions and crude prototypes that led to the early production rears developed by guys like Californians "Cookie" Ledington (Cook's Machine Works), Ted Halibrand and Pat Warren, and Jim Frankland in Florida. Those production units were mostly based on the same premise: scoop the guts out of a Ford banjo rear (the differential, ring and pinion), install them in a cast aluminum or magnesium quickchange center with a through-shaft and a set of spur gears, and bolt it back together with the stock bells and axles. There were several variations on the concept, including some with a change gear housing that was literally welded to the back of the banjo center. But the most common ones were known as the small Model A (or Midget) quickchange, the slightly larger Ford V8, and the large Champ rears. They were introduced in the late-'40s, and quickly gained a strong foothold in the performance community.

VINTAGE VERSUS MODERN

These days hot rodders scavenge swap meets and want ads for old quickchanges, hoping to find enough parts to assemble a useable rearend. There's an allure to those old rears and the soul they seem to carry with them. But that soul was earned through severe beatings on the racetrack, so cracked housings, worn bearings and burnt gears are common. If you know what to look out for, and with a little luck, you can find a rebuildable original you can run on the street. But you have to remember that originals were not engineered to handle the kind of horsepower today's hot rodders are coaxing out of their engines—even vintage powerplants.

Exactly how much horsepower they can handle is a source of endless debate because horsepower alone doesn't determine the stress placed on the rear; you also have to consider the driving surface, the type of tire, the weight of the car and the weight of the driver's right foot. We know that up through the late-'50s and early-'60s there were Fuel dragsters going well over 150mph using V8 quickchanges (smoking the tires the whole way). But we've also watched a mild 283-powered highboy roadster break a Halibrand in two with a side-step of the clutch, coughing up half the center section, both change gears and the pinion right in the street. With that in mind, it's easy to see how you can invest a fair amount in a rearend that may or may not stay in one piece. For those restoring historic hot rods, an original quickchange is the natural choice. But for everyone else—even those building '40s and '50s period hot rods—it's hard to argue the advantages of new, vintage-style quickchanges.

The quickchange business has grown and evolved thanks to the burgeoning racing industry. One company that's risen to the top is Winters Performance. Their rears can be found on winning entries in virtually every corner of the racing world, from NASCAR Late Model Stock Cars to Pike's Peak, Formula Drift to Bonneville. What differentiates them from a hot rodding perspective is that they've paid attention to what hot rodders want, and in response have developed some of the most convincing, traditional-style rears we've seen. Walk through any car show or vintage race and, unless you're counting rear cover bolts, you'd be hard pressed to tell a Winters from a vintage quickchange without climbing under the car.

"We were always in the hot rod business because you could take one of our racing rears and stick it in a street car," says Vaughn "Beaver" Winter Jr. He and his sister, Nina, are the children of founder Vaughn Winter Sr., and they handle the

Rated for 800+ horsepower, the Champ quickchange is the largest Winters street rear, with a 10-inch, 4.12 ring and pinion and a gear drive track differential. This steel tube and bell version has a polished center, but they're available in a cast finish as well. They're equipped with axle housing flanges for 31-spline big bearing and big bearing "Torino" axles, and can be run with OEM-style drum or disc brakes.

day-to-day operations. "When we saw a demand for it, we talked to and listened to guys like Dick Spadaro, the Slover's at Pete & Jake's and Barry Lobeck to help us figure out what we should try and do with our designs." Their racing rears were introduced in the '70s with their heavy-duty, 10-inch ring gear rearend (the basis for their Champ hot rod rear). But the company actually started back in the mid-'50s.

"I was just out of the Air Force, stationed in Cheyenne, Wyoming, and I was a drag racer," says Vaughn Sr. "I started building automatic transmissions because at the time it was hard to find anyone doing that work. I built the first one or two on our kitchen table, and it almost cost me my marriage." Fortunately it didn't (he and his wife, Madeline, are still happily married), and the business grew quickly. He moved into a one-car garage as car dealers 100 miles south in Denver shipped him transmissions to rebuild. Drag racers also took notice, thanks to word-of-mouth and to Vaughn's own exploits in a '53 Studebaker Gasser. "For a time it was B&M and us," he says. "We were in a lot of winning cars."

In 1958, he and Madeline moved back to their hometown of York, Pennsylvania, where Winters Performance Products found a permanent home. Their line expanded to include all manner of transmissions and components, torque converters, and eventually 9-inch and quickchange rearends. They developed a loyal following among racers and dealers (including fellow racer "Speedy Bill" Smith at Speedway Motors), and they continued improving their products the old fashioned way: by listening. "A lot of our development came from talking directly with the customers," says Beaver. "If we would have a failure, we'd hear about it and we would re-engineer the parts. I was always hands-on with the customers, so when problems would come up I'd talk with engineering and I'd talk with my dad, and that's where new products would come from."

That's not to say Beaver's been a "front-of-house" guy all his life. To the contrary, he's done everything from sweeping floors and cleaning oil spills to shipping rears and running manual lathes and CNC equipment in the machine shop. "I was paying taxes when I was like 10 years old," he says.

V8 OR CHAMP?

We mentioned that after recognizing hot rodders' demand for their rears, Winters turned to some veterans for advice. "Barry Lobeck initially helped us get into it," Beaver says. "He helped us, and he let us display a few of our racing rears in his booth at the York NSRA show around '94 or '95." Those early rears barely resemble their offerings today from a traditional hot rodder's perspective. But they became the basis for all of Winters' street rears, which fall into two categories: the V8 and the Champ.

The smaller V8 quickchange is based on an early Ford banjo rearend. It has an 8-3/8-inch ring and pinion with a 3.78:1 ratio, and uses six-spline spur gears (i.e. the lower shaft and pinion have six splines on their ends) and either a 28- or 31-spline Wedgelock differential. V8 rears are rated for up to 550 horsepower, which is stout enough to handle most vintage engines.

With engines surpassing that 550hp threshold—or when you just like the looks of a more husky rearend—the bigger Champ quickchange is the best option. It's based on the old Ford ¾-ton truck rear, and it uses a larger 10-inch, 4.12 ring and pinion with 10-spline spur gears and a 31-spline differential. It's a stronger rearend that's rated for 800+ horsepower (though Beaver works with drift racers running 1,300 horsepower through Champ rearends without any problem).

What the V8 and Champ rears have in common is increased strength over original quickchanges. Clearly there is a benefit to their modern differential carriers, but literally everything from

the high-strength A206 aluminum housings to the ring and pinion gears, change gears and heat-treated lower shafts are stronger and can take far more abuse than the quickchanges of 50+ years ago.

Winters' street offerings really took off when the late Dick Spadaro, along with Jason and Jerry Slover at Pete & Jake's, became involved. "Spadaro was working on converting an early Ford banjo rear to a quickchange, and we had a ring and pinion that would work for that project," Beaver says. "He was so knowledgeable it was incredible. He knew everything about those rearends, and he was instrumental in helping us along with that V8 Center Kit."

That kit, called the Early Ford V8 Center Kit (which is still available from Winters), allows you to convert a '35 to '48 Ford banjo to a quickchange. It includes a V8 center section, a 4.11 ring and pinion, one carrier bearing, a set of spur gears and axle bell gaskets. You choose either a six- or 10-spline closed drive-style lower shaft, then set it up with your factory Ford differential, bells and axles.

For those who want to use original Ford bells but want the benefits of a modern differential, another option is simply called the V8 Center Kit. Unlike the Early Ford kit above, it comes with the lower shaft and Wedgelock differential. Also, the V8 Center—and all Winters quickchanges with the exception of the Early Ford kit—uses a straddle mount pinion, which simply means there's an additional bearing at the ring gear end of the pinion for added strength.

The next evolution came when Winters introduced their own tapered steel bells for the V8 quickchange, which was a homerun with hot rodders as soon as it debuted in 2008. "Originally our V8 rear had the cast aluminum 12-rib side bells," Beaver says. Those aluminum bells are still available. "But Spadaro and the Slovers suggested whole-heartedly that we needed to make the steel tube and bell."

It's become a staple of their line, and it also led to a steel tube and bell version of the Champ rearend that was introduced last year. Historically, small bells from the Ford banjo were mated with the early Champ rears using an adapter ring. Winters offers such an adapter for those who prefer that look. But the new tube and bell Champ uses a larger version of the tapered steel bell that bolts directly to the center section. It's a nicely designed piece that streamlines the appearance of the heavy Champ rear while maintaining a traditional look.

Incidentally, if you're making more power than your original banjo was designed to take but a quickchange isn't in the plan, Winters makes a stock-appearing banjo. It features their early-style bells and a strong, lightweight cast aluminum center. They're available in standard size, with an 8-3/8-inch 3.78 ring and pinion, or full-size, with a 10-inch 4.12 gear, and come with the same gear drive differential found in the quickchange versions.

The smaller V8 quickchange is shown with forged bells prior to the steel tubes being welded in place. These are rated for 550hp and use an 8-3/8-inch, 3.78 ring and pinion and a Wedgelock differential. Shown here is the straight-fin gear cover with a cast finish. Particularly when fully polished and fitted with the gussetted rear cover, the latest Winters V8 quickchange really takes on a vintage look.

Most people can spot a quickchange from a mile away because of the all-important finned or gusseted gear cover on the back. It holds the bearings for the lower shaft and pinion, and also provides access to the spur gears. By their own admission some of Winters' early covers didn't quite capture the "traditional look," but their latest covers easily pass as authentic, vintage pieces. About the only immediately apparent difference is the number of bolts or studs holding them on. Vintage V8-style quickchanges, with some exceptions, use six bolts, while Winters street rears use 10 for added strength.

One thing that sometimes gets confused when discussing quickchanges is the number of bolts versus the number of splines. There are six- and 10-bolt rears, and there are six- and 10-spline rears. The former refers to the number of rear cover bolts, the latter to the splines in the change gears. All of Winters' V8 rears use six-spline gears while their Champs use 10-spline. Of course, there is the odd exception to this rule.

There are several different versions of Winters' V8 and Champ rears in addition to those mentioned, from centers mated to cast aluminum side bells to independent versions of both. There's also a Champ Heavy Duty that uses a different center section and deep-dish gear cover similar to the old Frankland

PARTS IS PARTS

We've never seen so many quickchanges in one place as we did while touring Winters' facility. With the exception of the housing castings, which are done in Ohio, and a few select components the rears are made entirely in-house.

Raw castings are loaded into a CNC machining center for operations ranging from boring and drilling to facing and decking mounting surfaces. On the left are V8 quickchange centers and at right are aluminum Dana 60 housings they also manufacture. Winters has always invested in new technology and equipment that allows them to produce their rears more efficiently, but they also rely on skilled craftsmen to run that equipment and handle other manual processes.

Each fastener is torqued to the proper specs and preloads to ensure correct alignment. Stainless steel ARP fasteners are available as an upgrade to Winters' standard hardware. Here longtime employee Andrew Staples attaches steel bells and torques the pinion nut on a V8 rear before the retainer and spur gears are installed.

Modified rears, as well as an even larger Xtremeliner rear that's geared for 300+mph land speed efforts. The "Heavy Duty" moniker comes from the early days of Winters' street rears when it was their strongest rearend. These days, however, all rears are cast using A206 aluminum—a low silicone and iron and high-copper alloy that's very strong and maintains it's strength at relatively high temperatures. It's the same alloy they use in critical, high-stress military and aerospace components.

Just as Winters has refined the design of their rear covers, design elements from earlier racing rears have been tweaked or eliminated for a more traditional hot rod-friendly look. For example, the V8 centers originally had a provision for a Midget shifter cast into the side, as well as a large inspection plug on the driver's side in front of the rear cover. Both of those have been eliminated from the street rear, and the oil fill has been moved between the webbing on the side so that it's less visible.

QUICKCHANGES FOR THE STREET

Anytime you adapt racing equipment for the street there are going to be gains (performance) and losses (typically in comfort or efficiency). The fact is that modern quickchanges are actually completely streetable even with their race-bred internals. But there are a few things you should know.

Regarding differentials, there's no question today's carriers are superior to those used 50+ years ago. In the case of Winters rears, the same parallel gear Wedgelock differential used in their V8-style racing quickchange is in the street version—and a very similar (albeit larger) gear drive differential is in the Champ street rear. "That parallel gear differential works really well for the street," says Beaver. "It turns real nice, there's a nice transition, and it's durable."

At the heart of the quickchange are the spur gears, which are either straight-cut or helical. Straight-cut gears are most common; they're always used in racing, and they're responsible for the famous "quickchange whine" you've heard or heard about. It's a great sound, but it can be a bit much on long hauls—especially in a closed car. That's where helical gears come into play—they're inherently quieter than straight-cut gears, so they're great for around town and highway driving. But the angle of their teeth creates side thrust under heavy acceleration or deceleration—thrust that the bearings are not designed to handle. So when you're tromping the throttle and running the gears, you'll want to have the straight-cut spur gears whining away.

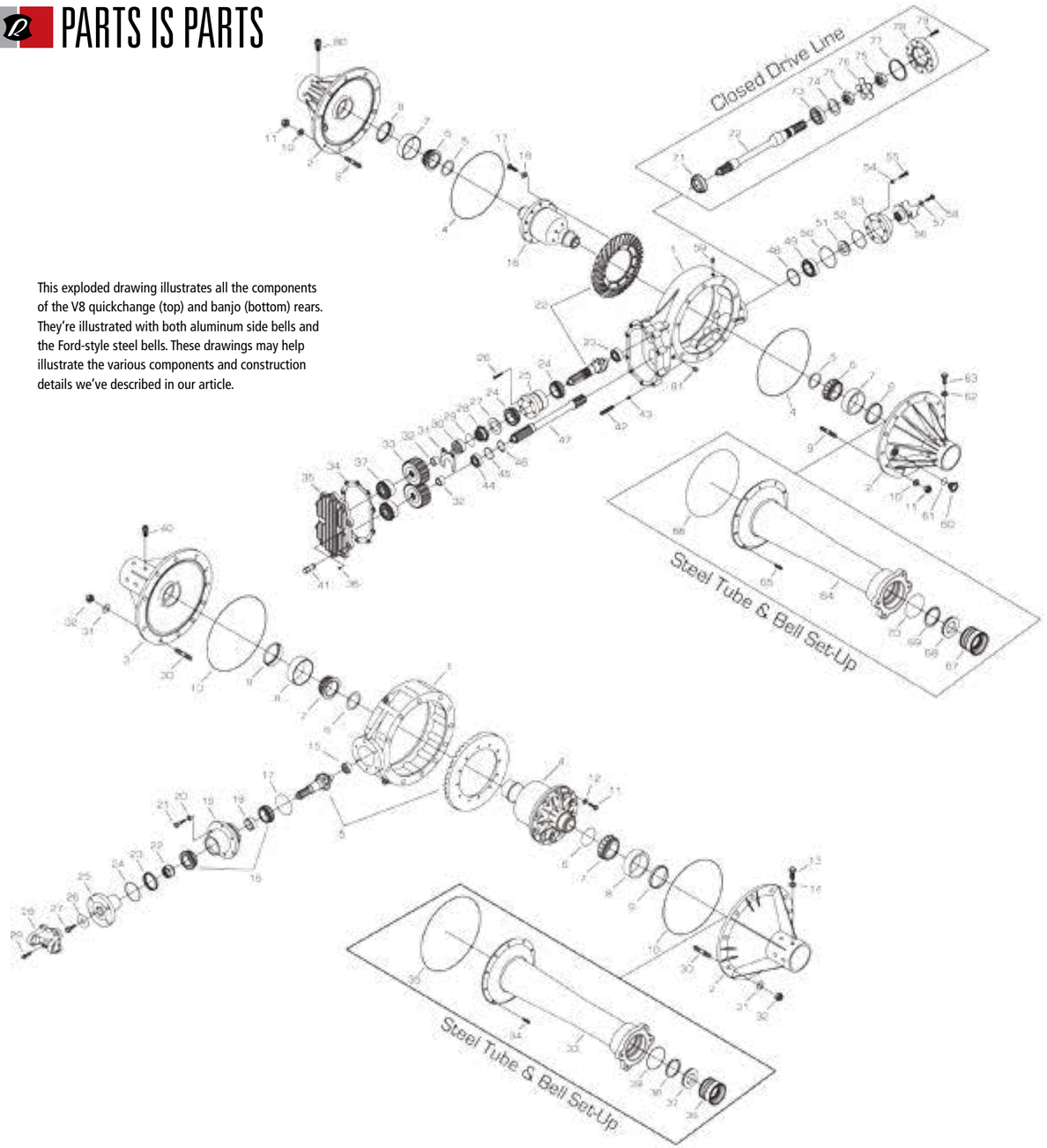
Whenever the gears are switched, the rear needs to be re-filled with GL5-rated lubricant. Winters offers their own brand, but say that any quality lubricant is fine. Venting is necessary, and since there are no vent provisions in the housing Winters recommends drilling anywhere on the driver's side bell. That way the vent is toward the smooth side of the ring gear; anywhere too close to that gear—especially on the side where the teeth are—is going to pump oil all over your chassis rather than letting air in and pressure out like a vent's supposed to. (There is a pipe plug on the top of the center section, but

Vaughn Winter Sr. started Winters in the mid-'50s, rebuilding automatic transmissions out of his home in Wyoming (where he also campaigned a '53 Studebaker Gasser). Though today Winters is known in hot rodding circles for their quickchanges, which debuted in the '70s, they still manufacture an extensive line of transmissions and components under the Maverick name—Vaughn's call sign in the military.

In '58 Winters re-located to York, Pennsylvania, where they're still based today. Madeline Winters, Vaughn's wife, is seen here working their display at a late-'60s trade event. Both Vaughn and Madeline spend time in the office each week (Vaughn's in every day), but their children, Beaver and Nina, now lead the operation.

PARTS IS PARTS

This exploded drawing illustrates all the components of the V8 quickchange (top) and banjo (bottom) rears. They're illustrated with both aluminum side bells and the Ford-style steel bells. These drawings may help illustrate the various components and construction details we've described in our article.



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