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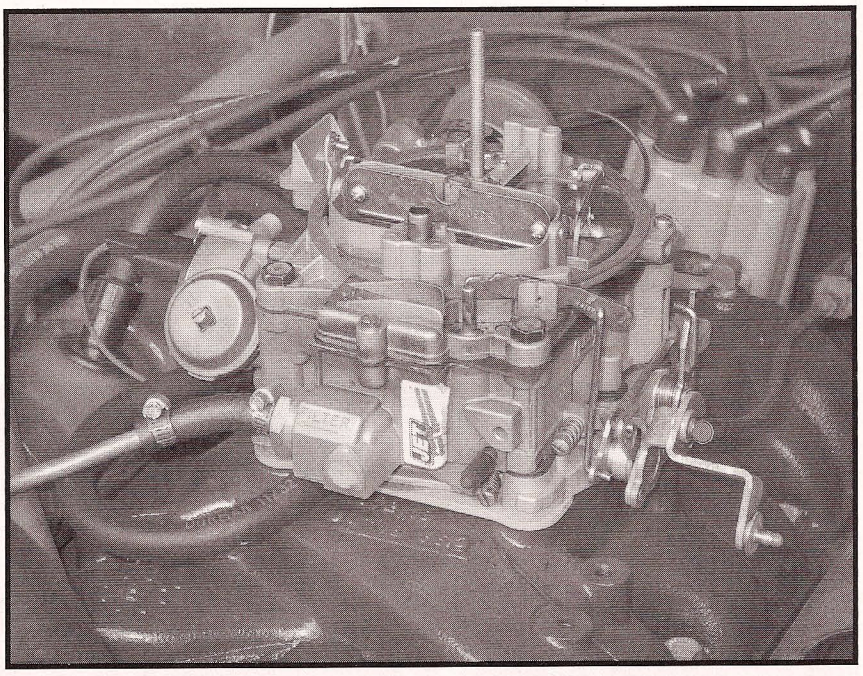
CARBURETORS

QUADRA-JET

BY TONY NAUSIEDA

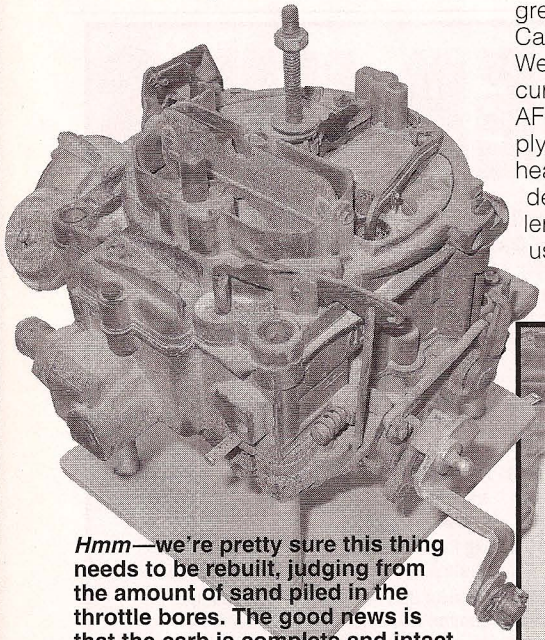
Photos by Tony Nausieda



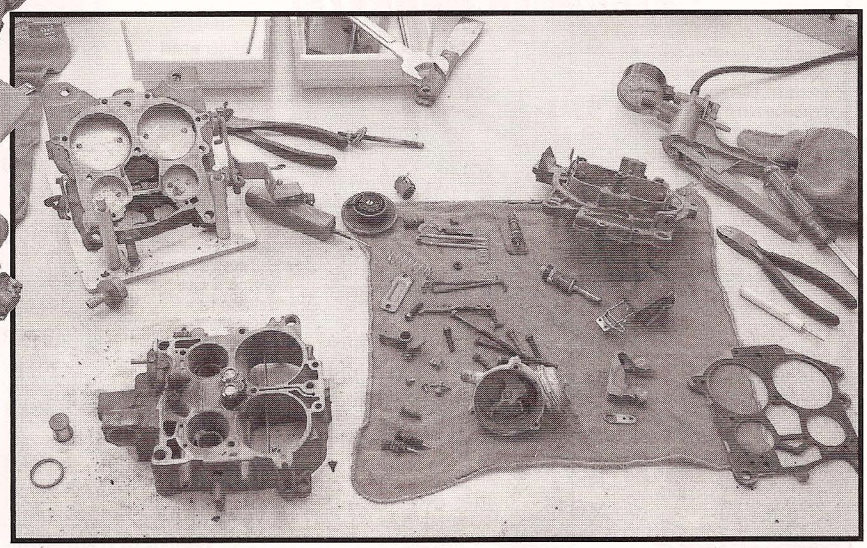
***Quadra-junk, Quadra-bog*—you've heard them all before. Why do so many** gearheads love to hate the Rochester Quadrajet? Because it's arguably the most intricate, precise carburetor design ever produced? Because its small primary bores allow stingier fuel economy than most two-barrel carbs? Because its vacuum-operated secondary circuit ensures your engine is never over-carbureted? Because even the smallest Q-jets flow a respectable 750 cfm?

Nope, we think these name-calling skeptics just don't understand how Quadrajets work, and more importantly, how to tune them. Most of you can probably rebuild a Holley blindfolded, but the added complexity of the Q-jet that makes it such a great fuel mixer certainly deters folks from blueprinting them for performance applications.

We recently came across a factory '66 Buick 425ci Q-jet carb/intake assembly and thought it would make a great induction upgrade for our Carter-AFB-equipped 401ci Buick. We weren't too happy with the 401's current 10-11 mpg, and we felt the AFB's 585-cfm capacity wasn't supplying enough air to keep the big nailhead sufficiently fueled. The Q-jet's design seemed to solve both problems; its small primaries should give us a few more miles between gas stops, and its 750-cfm capacity ought to strengthen the 401's pathetically weak top-end charge. Even better, the induction combo would remain stock-appearing (the Q-jet was part of a rare 340hp engine upgrade for the '66 GS). We called up JET Performance, which specializes in rebuilding and tuning the venerable Quadrajet to suit virtually any application. We took notes as JET's resident fuel-systems guru Sean Murphy revived our tired carb—cosmetically as well as functionally. In true *Car Craft* tradition, we

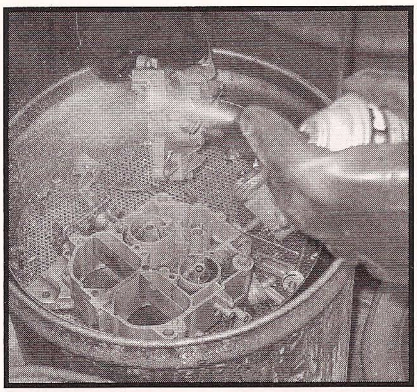


***Hmm*—we're pretty sure this thing needs to be rebuilt, judging from the amount of sand piled in the throttle bores. The good news is that the carb is complete and intact, and Sean matched the stamped codes to the original application ('66 425ci Super Wildcat). We stole both the carb and intake from a self-service junkyard for $15. That's an exceptionally awesome deal, but you should be able to score a good Q-jet core anywhere for no more than $10-$15. Nearly every GM four-barrel application from '65-'81 used a Q-jet, so you should have little trouble finding a decent one.**

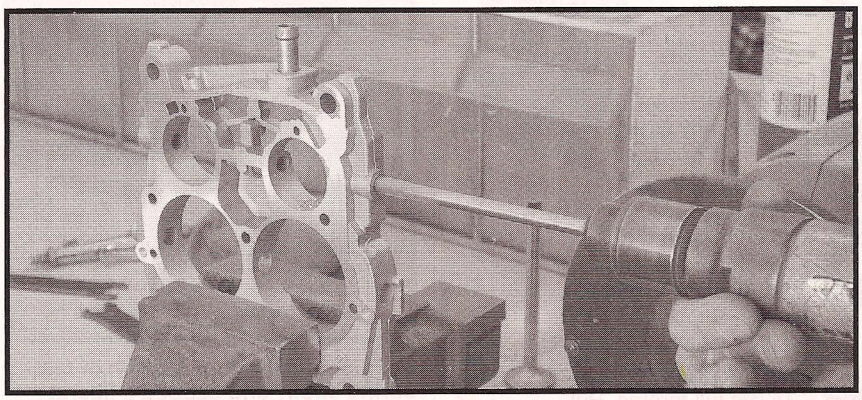


We're glad Sean knew what he was doing, because the task was starting to look pretty formidable after the major disassembly. It's hard to tell from the picture, but he kept close track of all the small parts so nothing got lost.

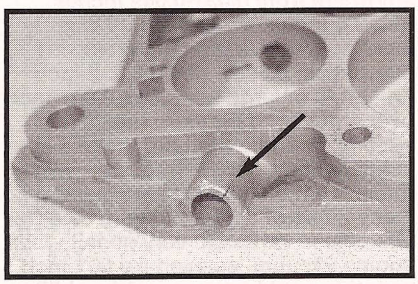
concluded the project by installing and testing the new induction system on our GS. Not dragstrip testing, mind you, but real-world testing, by driving our beast 2000-plus miles from Milwaukee to Los Angeles. The Q-jet performed flawlessly and gave us great fuel economy and more than enough newfound passing power for the arrow-straight two-lane roads of middle America. It just may be the next best thing to EFI.



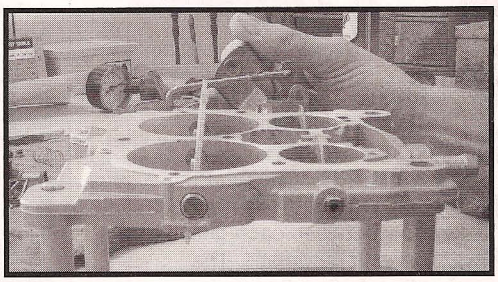
After completely disassembling the Q-jet, it was time to begin the cosmetic resto. The pile of metal parts was chemically dipped to get them squeaky-clean. These pieces are fresh from the chemical dip, and Sean is shown giving them a final cleaning with carburetor cleaner.



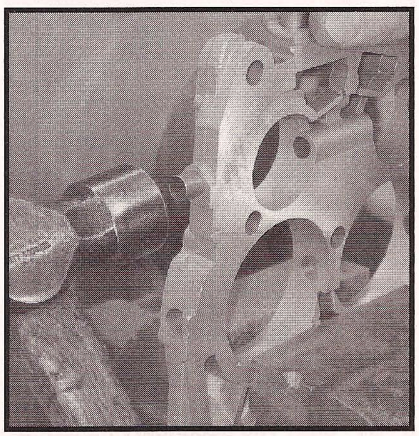
Sean used a drill-mounted reamer to bore out the bushings, ensuring the throttle-shaft holes are aligned axially. This guarantees smooth throttle operation with no vacuum leakage past the shaft holes. JET doesn't install bushings in the secondary-side throttle-shaft holes because the secondaries are only used a small percent of the time.



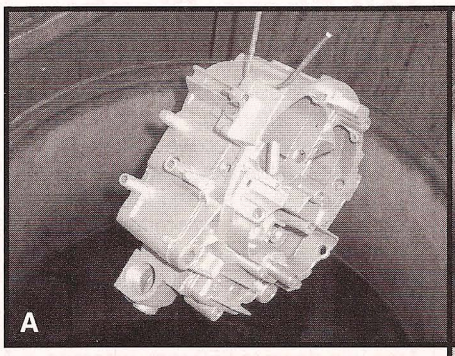
Uh-oh. We found a pretty significant crack in the baseplate where the throttle shaft pivots. These holes usually become worn and cause vacuum leaks past the shaft, but calling this crack a vacuum "leak" is quite an understatement. After assessing the damage, the baseplate was glass-beaded before any repairs were made.

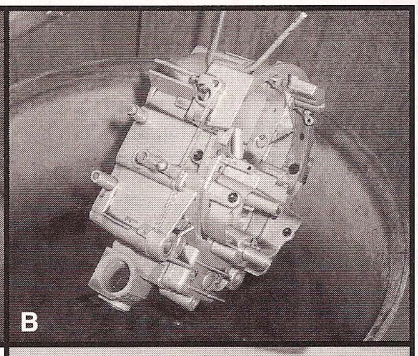


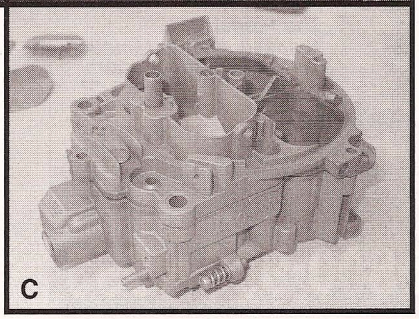
Hey, it's starting to look like a carb again. The throttle linkage has been assembled using replated hardware and the throttle plates have been screwed to the replated shafts (red Loctite was dabbed on each screw before tightening). Notice the tapered edges on the secondary-circuit throttle blades, which create a positive seal to close off the throttle bores. Sean didn't fully tighten the blades to the shaft until they were adjusted so no gaps were visible in the closed position. Here Sean is showing the proper adjustment for the WOT throttle-blade angle. The primary-circuit throttle blades are perpendicular to the baseplate, but the secondary-circuit throttle blades are slightly angled. This angle is necessary to keep the airflow as laminar as possible (not turbulent) for a straight shot into the intake plenum.



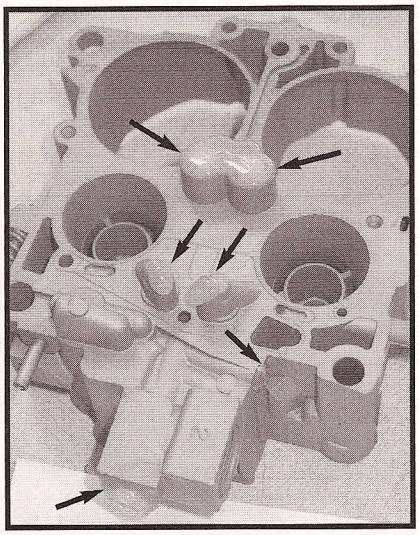
After surfacing the top of the base plate with a disc sander, Sean installed a thin-walled bronze bushing in each throttle-shaft hole. He dabbed a little red Loctite on the outer shell of the bushings before gently tapping them into place. The bushings went in perfectly, even though the cracked hole had been slightly enlarged.



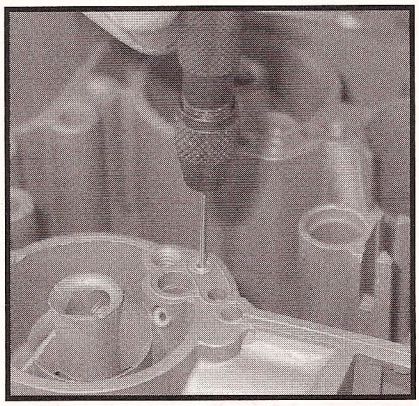




The recoloring process is quick, and the results are nothing short of spectacular. Each of the die-cast components—the air horn, main body, and choke housing—are bead blasted (*A*), then dipped into a heated zinc solution for a few seconds (*B*), rinsed, and blown dry with compressed air. The recolored pieces (*C*) have a new-looking, concours-quality finish.



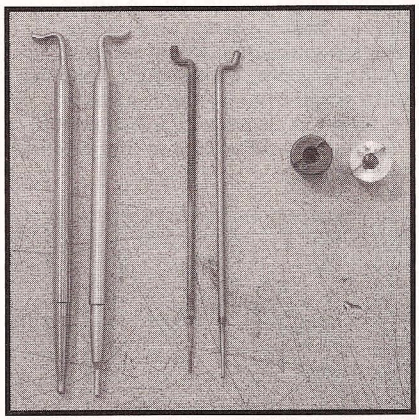
Next, Sean mixed up a batch of fast-curing epoxy and dabbed a liberal amount on each of the six cast-in plugs (*arrows*). These plugs are notorious for leaking fuel, yet this cast-plug design remained unchanged through the '80s-era Q-jets. The epoxy is a permanent fix to this inherent design flaw; they won't leak if the epoxy is properly applied.



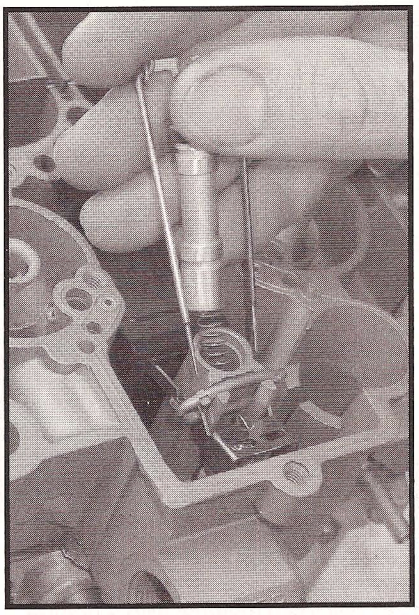
After the epoxy cured, Sean flipped over the main body and went to work on the idle tubes. These tubes meter the amount of fuel available to the engine at idle speeds—essentially, they function as the "jets" of the idle circuit. Proper sizing of these tubes is a function of the camshaft profile and intake design. Sean drills the tubes anywhere from 0.031-0.049 inches. Since our camshaft was only slightly more aggressive than the stock 401 bumpstick, he selected a 0.039-inch drill bit to enlarge the tubes 0.004-inch over stock for a bit more fuel at idle speeds. Sean pointed out that it's absolutely necessary to know the customer's engine specs when making these kinds of adjustments to Quadrajets. These carbs are very sensitive to engine vacuum, so even a 0.001-inch variation could sour your driveability.

All Show, Plenty of Go

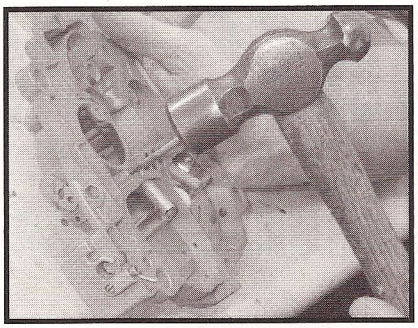
We installed the Q-jet on a rainy Milwaukee afternoon. We couldn't wait to test it out, so we wheeled the GS out onto the wet streets—that turned out to be a bad idea. The new carb was so much more responsive that the car had virtually no traction all the way through Third gear. Besides the bolstered upper-rpm performance, we were now able to crank the idle down to 650 rpm, whereas the old AFB wouldn't allow the engine to run below 800. After pleading for mercy to the Buick gods, we pointed the GS toward Los Angeles and set out for sunnier scenery. We were rewarded with an impressive 17 mpg average over 2,400 miles of driving—a 42 percent improvement over the previous 12-mpg best we'd achieved with the AFB.



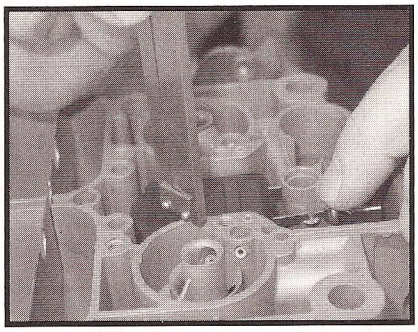
Here you can see the contrast between the old and new secondary metering rods, primary metering rods, and primary jets (shown from left to right). In order to motivate the air/fuel charge, the primary metering rods were downsized to 0.044 inch, and the secondary rods were waned down to a "CV" size. The secondary metering rods were hung on an "L" hanger. They're designated from "B" to "V," and each consecutive letter means the rod holes are drilled 0.005-inch lower to plunge the metering rods deeper into the jets. Sean chose a 0.075-inch primary jet, which slightly richens the mixture over the stock calibration.



The power piston meters additional fuel by lowering and raising the primary metering rods in and out of the jets. The purpose of the power piston spring is to raise up the power piston and flow more fuel when the engine vacuum gets low enough (under higher load conditions). Taking into account our mild cam specs, Sean selected a purple spring which "comes on" at 9 in-Hg, and is "fully in" at 5 in-Hg. A wilder-cammed engine would be more suited to a lighter spring rate to compensate for producing less vacuum.



The four tubes on the underside of the air horn tend to loosen up over time. The inner two are the high-speed air bleeds, and the outer two function as secondary pickup tubes. Tap them gently with a hammer to ensure they're seated (but not enough to mangle 'em).



Almost there—Sean's just finished installing a slightly larger 0.135-inch needle-and-seat (versus the stock 0.110-inch assembly), and now he's dialing in the float level.

Final reassembly yields a stunning finished product. The carb turned out so cherry that we're certain it'll make the rest of the engine bay look all that much worse, but we're pleased that it runs even better than it works. **CC**

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Dept CC0109
17491 Apex Cir.
Huntington Beach, CA 92647
714/848-5515
www.jetchip.com