

Get reliable overdrive for your GM muscle car when you . . .

BUILD A TH200-4R FOR 1,000 HP

By Jefferson Bryant / Photos: Jefferson Bryant



➔ Art Carr loves the GM 700-R4 overdrive automatic as much as the next guy. The problem is, the stock stuff tends to blow up when subjected to real power. That's why he's a huge supporter of the 200-4R overdrive automatic. Blessed by GM's Hydramatic Division with superior guts, it only takes a few well-chosen tweaks to make a 200-4R live

behind as much as 1,000 hp. Got a 6-71 supercharged 468 Rat motor in your daily driver—like Robbie Whitlock's '66 Chevelle? Carr can build you a 200-4R that'll take the gaff. We stopped by Carr's California Performance Transmission and came away impressed by the 200-4R's clear advantage over competing four-speed automatics. First off, the 200-4R is an

analog transmission. That means, unlike the 4L80-E and its lesser "E" siblings, it isn't dependant on a computer to tell it what to do. This fact alone means the cost of a rebuildable core is much lower, a savings that quickly trickles down to your wallet. While it is true that the 700-R4 is also analog and rebuildable cores are priced as low as the TH200-4R, it has a fatal

flaw in the form of a weak input shaft and sun gear shell assembly. Its light-weight aluminum construction limits capacity to around 500 hp, less if the car is heavy.

The hassle is the shell is a very complex part and so far nobody has invested in the tooling required to manufacture a superior aftermarket replacement. On the other hand, the 200-4R is free of inherent deal breakers. Oh sure, it's ripe for improvement, and this story outlines just a few of the steps Carr takes to bring one up to snuff. We'll show you that in a minute. But the 200-4R has other inherent advantages over the 700-R4. Let's make a list:

- At 27¾ inches, it's the same length as a Powerglide or short-tail TH350, so swappers can reuse the driveshaft without modifications. By contrast, the 700-R4 measures 30¾ inches and generally requires a custom-length driveshaft.
- If you swap it for a 28¾-inch short-tail TH400, just change yokes and the original driveshaft fits.
- It shares the same 26¾ face-to-mount distance as the short-tail TH400, so it'll bolt right up to the TH400 transmission crossmember.
- The 700-R4's 3.06 First gear ratio is a little too much of a good thing for most applications. The 200-4R's 2.74:1 ratio makes more sense for V-8s, where low-end torque is in good supply.
- The overdrive ratio—0.70 for the 700-R4, 0.67 for the 200-4R—is virtually identical, but the 200-4R offers a better ratio spread (2.74, 1.57, 1:1, 0.67), which reduces rpm drops during gear changes. The 700-R4's ratios (3.06, 1.63, 1:1, 0.70) cause a drastic 46 percent rpm drop on the 1-2 upshift.
- GM designed the 700-R4 valvebody to prevent overdrive access at full-throttle to ensure survival. Not a good

sign. The 200-4R is free of such nonsense and is ready for big-block overdrive blasting with only minor beefing.

•The TH200-4R case has a dual-bolt pattern that fits Chevy, as well as all BOP V-8 blocks. The 700-R4 case requires an adapter behind non-Chevy blocks.

By now it should be clear there's a pretty strong case—pun intended—for the 200-4R. Let's dig in and see how Carr makes them live with big power.



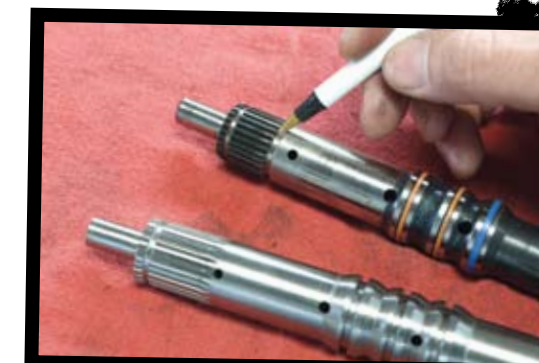
The second gear band (PN 12255) is lined with CPT red friction material that improves drum stopping and holding power. By contrast, the stock band (top) has recesses in its apply surface that reduce contact area.



The stator support is another 200-4R weak spot that's corrected by heat treating. The pen points out the worn splines on the stock support. The darkened splines on the stator support to the left have been heat-treated to prevent fatigue. Carr sells the heat-treated stator support separately (PN 12275) and says it's a must when installing a new torque converter. "Worn splines can catch the new converter's stator and cause a thrust load that's transferred into the engine and can wear out the crankshaft thrust bearing."



Stock TH200-4Rs get a bad rap in high-performance applications due to a weak intermediate drum assembly. On this cut-away, the pen points out the failure-prone undercut. Art Carr used Kenny Duttweiler's 10-second Buick GN as the test mule to research the problem. At first, he tried a welded bead to fill the area and eliminate the stress riser. It helped, but occasional breakage was still an issue. Carr then considered the metallurgy of the part and after some trial and error, arrived at a proprietary annealing/heat-treatment process that triples its strength. Problem solved.



The stock 200-4R input shaft is safe to about 550 hp. Shown here is the end of the shaft that fits into the overrun drum at the rear of the transmission. The pen points to a factory-machined undercut in the stock shaft. Again, it's a stress riser (potential fracture point) that also reduces the length of the splines. For maximum durability, Carr offers a replacement shaft (PN 12282, foreground) that's machined from superior 300M steel. Note how the splined surface is longer than stock for increased engagement into the drum and maximized load-transfer capacity.



All factory-issue 200-4Rs came with five direct-high clutch plates regardless of vehicle application. That's right, GM gave granny's Malibu grocery getter the same setup as an intercooled Grand National. For a significant increase in torque capacity, Carr juggles parts. Replacing the stock 0.080-thick steels with thinner Kolene-coated 0.076-thick steels and using 0.002-thinner-than-stock Red Eagle clutches results in an eight-pack and a 20 percent improvement in holding capability.



The stock overdrive clutch assembly uses three steels and two clutch plates. By removing 0.080 from the overdrive apply piston (*pen points*), Carr can add a third clutch plate for a 33 percent increase in torque capacity. Unlike a 700-R4, the 200-4R is not prevented by its valvebody program from running in Overdrive at wide-open throttle. The extra clutch capacity assures your 502 Rat motor won't overpower the clutch in triple-digit *Cannonball Run* mode.



The 2.350 diameter of the stock Second gear apply servo (*right*) limits its ability to apply pressure on the Second gear band. Carr solves the matter with his billet aluminum Super Servo (PN 12279). At 2.725 inches, it has more surface area than even the scarce Buick Grand National unit. The Super Servo holds the Second gear band with more clamping force to increase life while delivering crisper 1-2 upshifts.



Carr is not a proponent of lockup torque converters in high-performance applications. He says OE lockup clutches lack enough surface area to harness real horsepower, aren't worth the weight penalty, and sap power and dull throttle response due to the added mass. The finger points to the machined composite spacer that's installed inside CPT's 12-inch nonlockup converter in place of the clutch assembly (*on left*) that weighs 9 freakin' pounds. This CPT 12-inch converter has a 2,200-stall speed and is intended for use in 450hp street machines.



CPT also offers 9- and 10-inch nonlockup torque converters for the 200-4R. Here, converter assembler Juan Jimenez gets one ready for final assembly. In the case of CPT's 10-incher, careful selection of internal parts—particularly the stator—results in a torque converter that can handle 800 hp, stalls at 2,800 rpm, yet still delivers efficient highway cruising at 1,800 rpm. It's a favorite with Carr's Chevy 502 and 572 customers. The all-out 9-inch converter offering stalls at 3,500 to 3,800 rpm, but its stator design is efficient enough to cruise at much lower rpm in Overdrive.



Getting back inside the transmission, when a 200-4R is used with a non-lockup converter, the check valve and seal located in the end of the input shaft must be removed (*left*). These parts apply the lockup clutch feature in a stock transmission but are unnecessary. A fringe benefit is there's now more fluid available to lubricate the planetary gearset. A stock lockup-style input shaft is shown on the right for contrast.



On the stator side of the oil pump, the stock lockup valve (*right*) is replaced by a machined steel valve (*left*) that redirects the hydraulic circuitry to suit the conventional (nonlockup) torque converter.



The stock pressure regulator, boost valve, and spring (*right*) are set to provide line pressure of 60 psi in Park and Neutral, 110 psi in Reverse, 120 psi in First, 130 psi in Second, and 60 psi in Third and Overdrive. To allow the transmission to capture up to 1,000 hp without slippage, Carr swaps in replacement parts (*left*) that double the stock line pressure and deliver up to 300 psi in First and Second. All the parts needed to convert a 200-4R to nonlockup status are available from Carr. Call for specific details for your application.

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Testing on the transmission dyno showed the stock seven-vane pump impellor (*right*) can be responsible for pressure fluctuations, so Carr sells a 10-vane impellor (PN 17701) that boosts pump capacity by 20 percent. The extra pump volume assures constant line pressure, so the internal hydraulic circuits function properly under all conditions.



A cupped orifice plug is pressed into the 1-2 accumulator housing to close off exhaust oil flow for firm shifts. It's part of the CPT Hi-Tech valvebody kit.



The governor controls full-throttle upshift and downshift rpm when the gear selector is in Drive. The lighter the weights, the higher the shift points are. Traditionally, the Buick Grand National governor (*top*) has been sought by 200-4R builders, but Carr goes a step further. By machining the weights, any stock governor can be altered to provide the desired 5,000- to 5,400-rpm shift points. The caliper shows how much is removed from the weight.



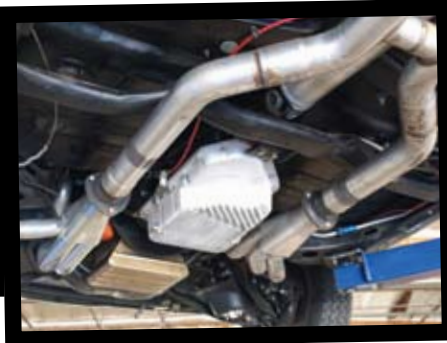
CPT's Richie Consoli performs final assembly on all CPT transmissions. Here he preps another 200-4R for duty behind an 800hp big-block. CPT can sell you a complete transmission or just the parts you need for your upgrade.



Every CPT transmission gets tested for proper function on this dyno before shipment. That way, you just bolt it in and go.



Here's the fatal flaw hiding inside every 700-R4. The sleazy cast-aluminum sun gear shell will crack or even disintegrate if pushed over 500 hp. Four-wheel-drive trucks with tall tires are especially hazardous to the 700-R4.



The CPT 200-4R in Robbie Whitlock's 800hp Chevelle has seen more than 10,000 street miles. Whitlock says, "The best thing is how the 3,500-stall speed gives a great launch at the strip, but the overdrive makes the 4.10 gears feel like 3.73s. I cruise the freeway home at 2,000 rpm."



Carr is quick to point out that excessive heat can destroy any transmission, so an auxiliary cooler is mandatory. Whitlock's blower drivebelt and mondo radiator pose insurmountable packaging hassles, so this undercar setup was devised. Without the preset thermostat controlled fan, it would be useless. If there's no natural airflow to cool the fins and tubes, you have to make your own. Trick fabbed aluminum brackets keep it all in place.



Improper throttle valve (TV) adjustment is another transmission killer. The bottom line is to make sure there's no TV cable slack with the carbs at WOT. Carr sells TV cable adapters for all popular carburetors. Dig the dual-850 double-pumpers. **END**

→ SOURCES

California Performance Transmission; 800/278-2277 or 714/901-3777; cpttransmission.com