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Pontiac outlets in the country and they have been selling more performance models (GTO's, etc.) than anybody else. It's a mecca for Pontiac performance fans all over the midwest. They've got the parts and the answers.

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So the die was cast. Royal's Performance Department, headed by Milt Schornack, and with brothers Dave and Sid Warren on the wrenches, went to work. The basic test model was the 1967 GTO coupe with the optional Ram Air engine (360 hp at 5400 rpm), and a minimum of weight-producing accessories. It was finally decided to use two cars so we could get a side-by-side comparison for the first two tests.

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GTO

*A step-by-step plan for
peak performance*

Showroom Stock—14.11

e.t. 100.00 mph Bobcat

Treatment—13.08 e.t.

107.01 mph Blueprint—

12.43 e.t. 112.10 mph

(And it's all legal)

By Roger Huntington



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LEFT—Triple carbs are out for the '67 GTO's, but the big Rochester Quadrajets four-barrel produces almost as much in the horsepower department. Ram Air has been adapted to carb for even more go.

RIGHT—One of the critical points in blueprinting the GTO engine is proper cylinder head capacity. Machining will take it to specifications, but don't go too far if you are running stock class.

GTO with the standard Ram Air engine and a few convenience accessories like power steering, brakes, rally instrument pack, rally wheels, etc. The white Bobcat car was intended for competition later on, so was ordered with fewer of the heavy luxury accessories, the new easy-to-read competition tachometer on the hood, and was fitted with the beautiful Hurst lightweight forged aluminum wheels. This car was also ordered with standard Ram Air engine, and optional capacitor-discharge ignition system.

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It should also be mentioned here that we had the use of the fine Motor City Dragway in Detroit for our week-day testing. The Motor City people have been very cooperative with us magazine testers, and I'm the first to say that this type of comparison testing would be impossible without having the strip all to ourselves on a week day.

Thanks a million, Motor City.

First, let's look at the showroom car. As you probably know, GM cars cannot use multiple carburetion in 1967, so Pontiac's famous Tri-Power system has been discarded in favor of a new big-port manifold mounting the huge Rochester Quadrajets four barrel. This has a whopping 9.4 sq. in. of venturi area with all barrels open, and gives nearly as good breathing as the three duals. Engineers tell me the difference is only five or ten horses on the dyno, other factors equal. And, of course, the '67 GTO has some other important things going for it: Cubic inches have been upped from 389 to 400 and there's a brand new set of cylinder heads with larger ports and valves. Also, Pontiac, at last, has developed a beautiful set of cast iron exhaust headers to fit the GTO chassis. Always before they've had to use standard exhaust manifolds because the streamlined headers for the 421 H.O. engine in the big cars wouldn't clear the suspension on the "A" body. The new headers keep the individual exhaust pulses separated for several inches beyond each cylinder. They look real hairy!

Apparently, all these improvements more than offset the loss of carburetion because the standard '67 GTO's are definitely quicker by several degrees

than last year's cars with Tri-Power.

The optional Ram Air system has not been significantly changed from '66, other than adapting it to the Quadrajets carb. It still takes the cold air in through the hood scoop and there is an air box around the carb that seals against the underside of the hood via a thick foam "gasket." You get a very slight ram pressure as well as cold, dense air to the carb. This deal must add a good 20 horses. At the same time, many fans don't realize that you also get a hotter hydraulic cam and stiffer valve springs with the Ram Air package. This cam (Part No. 9785774) has 301° intake duration and .420 lift. The special springs give about 250 lbs. of pressure at full lift. This is enough to hit a solid 6000 rpm when the lifter plungers are adjusted out. It's a mighty strong combination. Incidentally, when you order the Ram Air package you automatically get 4.33 rear axle gears instead of the standard 3.55 GTO gears—(since most fellows will be dragging this package). And, when ordered with a four speed, you get the strong Muncie box with the close ratios (2.20 low).

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about 10° BTC) the car ran run after run in the low 14's e.t. at 98 to 100 mph trap speed. This is with Milt Shornack and Dave Warren driving. Both are very quick and experienced drag racing men. And don't forget, this was with *closed exhaust* and the standard Firestone Wide Oval street tires that come on all '67 GTO's. These latter have about one and one-half inches wider tread than the regular 7.75x14 red-lines that came on '66 GTO's and they definitely give much better traction both on dry and wet streets. They're not like a set of cheater slicks, but they're the best practical street tire yet available for big-inch performance machines like the GTO. The best run in this full street trim on the blue car netted a 14.11 e.t. at 100.00 mph.

You might remember that 1966 GTO's with the 360 horsepower Tri-Power H.O. engine with the old heads, 389 cubes and the old standard exhaust headers would turn e.t.'s in the mid-14's at around 95-97 in showroom trim.

Just for kicks, we threw a set of 9.00x14 M&H Super Stocks with seven inch tread width on the blue car - still with closed exhaust. These helped quite a bit off the line and Schornack pulled one run in 13.72 at 100.78 mph. The tires were worth about .3 seconds but gave no significant increase in speed.

One factor that hurt performance in showroom trim was the valve lifters pumping up at about 5100 rpm. Shifts had to be made at 5000, and now and then the engine would go sour toward the end of the quarter - turning just over 5000 in high gear with the 4.33 gears. Since the engine peaks its power about 5000 rpm, there would seem to be a little more performance available if shifts could have been made at 5500-6000 rpm. Even with the pump-up at 5100, the trap speeds might have been higher with 3.90 gears.

Anyway, that's pretty decent performance for a strictly showroom car that you can buy for around \$3000.

The white car was tested at the same time with the Royal Bobcat package. We've had CC stories on this package before so I won't go into great detail. Essentially, the changes involve carburetion, ignition and valve gear. The Quadrajets primary jets are opened up .003 (not secondaries), accelerator pump stroke is lengthened by cutting one-quarter inch off the shaft, and they wind up the coil spring on the secondary air valve, letting it open sooner. Special intake manifold gaskets block the heat risers. Special thin, .022 head gaskets also raise compression.

The spark advance curve is modified by sleeving the stop pin for the centrifugal weights and using lighter



ABOVE—Milt Schornack, Royal's top drag racing expert, gives particular attention to the valve job during the Bobcat installation, saving time on the subsequent blue-priming operation phase of the program.



LEFT — The distributor is another important item on the Bobcat check list. Lighter springs and a revamped advance curve results in a total spark advance of 42 degrees above the 2600 rpm level.

BELOW RIGHT — During hard acceleration runs, the rearend encounters terrific torque. A combination of Cure-Ride and Air-Lift products take care of the rear suspension problems for the Bobcat car.



ABOVE — Sid Warren carefully measures the block deck clearance to the minimum .0015 during blue-priming of the engine. This attention to detail is where you pick up that additional horsepower needed to win.



springs on them. They also grind off some of the weight cam so it advances faster at the low end. This gives them 15 degrees distributor advance (30 crank) at 2600 rpm crank speed instead of the stock 4500. Then the initial lead is cranked up from the stock six degrees to around 12, for a total of 42 degrees total advance above 2600 - and this seems to be the way these new big-valve heads want it. (The '66 engines generally wanted 36-40 degrees total.) Champion UJ-10-Y plugs gapped .030 for the street, were installed.

The maximum useable revs can be raised nearly 1000 rpm by merely re-adjusting the valve lash to bring the

hydraulic lifter plungers out to the absolute end of their travel. This can be readily done on engines with ball-joint rockers by turning the adjusting nuts on the rocker studs 'til the valve gear starts to click, showing the plungers are against the stops. Then turn in a quarter turn. The Royal people use special sleeved lock nuts on the Bobcat package that won't work loose. This lash adjustment stays for thousands of miles, and this quick job will permit up to 6000 rpm with Ram Air springs.

The above is pretty much what the Royal Bobcat package has included for the last four or five years. But in the last year or so Schornack has been



Bolting on a set of performance tuned headers is just like adding a few more horses. The white car came in for special attention with a set of Hurst experimental four-tube headers for maximum engine performance.



Extensive work was done to the front end on the blueprinted car, including installation of 90/10 Cure-Ride shocks for initial front end lift on hard runs.



During the Bobcat phase of the testing program, the heads on the GTO came in for extra special attention in order to gain the additional engine speed necessary for shifts in the 6000 rpm range. Special sleeved lock nuts were installed as part of the Bobcat package, guaranteeing positive lash adjustment for thousands of street miles. A big gain in engine speed was realized by careful adjustment of the ball-joint rockers as outlined in the text in step-by-step style.

headers with collector pointing straight back for efficiency. (Is Hurst going into the header business??)

So what did we get on the strip? We were pleasantly surprised. With closed exhaust and street tires (Wide Ovals) Dave Warren pulled a best run of 13.86 at 105.14 mph. This is roughly .30 sec. and five mph better than the showroom car in the same trim. The Bobcat had just about the same e.t. with street tires as the showroom car had with slicks. But the special tires helped the Bobcat more than it did the lower-power car. Putting M&H Super Stock 8.50x14's on the car improved the time to 13.32 at 105.63 mph. These tires have only a 6½-in. tread width but the one inch smaller diameter worked better with the 3.90 gears, while the big 9.50x14 seven inch tires seem to work better with 4.33 gears.

It was when we disconnected the mufflers, however, that the Bobcat really turned on. Best time: 13.08 at 107.01 mph! Opening the exhaust made a new car of it. Milt could shift a 5800 rpm and still be pulling pretty good, and it was pulling like crazy in the traps at 5100. Either a strong engine good headers — or combination of both!

Then there was that wild blueprint job. The white car was taken back to the Royal garage and the engine and chassis were completely reworked. Of course, the cylinder heads had already been done for the Bobcat job, so the blueprint job was mostly in the block. Here are some of the major specs: Thompson-Toledo forged pistons with .005 skirt clearance; Perfect Circle cast iron rings for quick seating, with .025 end gap; rod bearing clearance, .0025; main bearing clearance, .003. Block deck clearance was cut to the minimum .0015 — which made the thin head gaskets illegal. Stock bore was retained. The lower end balance job was done by Jim Cornell at Seco Engineering. Schornack beefed up the oil pump by using an 80-pound spring for more pressure and the pump was strengthened by using a thicker bottom plate — to prevent possible cracking of the thin stock plate at high revs. They also deepened the oil sump one inch and lengthened the pick-up tube a like amount — not so much to get a greater oil capacity but to keep the normal amount of oil away from the crankshaft on hard acceleration. (Oil-whipping by the crank can lose several hp.) Also, the heads were given a litter sharper valve job, with thinner seats, before buttoning up the engine.

Almost as much was done to the chassis as to the engine on this all-out stock setup job. For one, the stock factory clutch was replaced by a heavy-duty Schiefer clutch and flywheel. Rearend gears were changed back to 4.33's. (And may later be changed to special 4.56's from Perfection Gear Co.)

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pushing a more comprehensive cylinder head job for buyers who want just a little more. Milt feels the extra compression that is available — which is legal under stock rules — is important in overall street and strip performance. The job includes a careful CC'ing of the combustion chambers to bring the volume down from the usual 69-70 cc on factory heads to the minimum legal 65 cc. A mill cut of .007 will remove one CC, so most heads will take about a .028 mill to attain the 65 cc. Then, Milt goes ahead and does a good valve seating job (though not a razor-sharp job on street engines since it won't last) and the job is topped off by shim-

ming the valve springs to bring pressure up to the full factory value — or around 115 pounds on the seat.

This head job adds a few more horses, and the price for the whole Bobcat deal, parts and labor, runs right around \$225. A good dollar return.

In addition to these changes, the white car was fitted with 3.90 rearend gears, which the Royal people feel make the best all-around compromise for street and strip. They re-fit most of their Ram Air cars, which come through with 4.33's, with the 3.90's right off the bat. Also, the white was fitted with the Hurst wheels plus a set of special experimental Hurst four-tube



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GTO TRICK STUFF

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The front end of the car was raised a little over an inch by reversing the ball joints - which actually only *leveled* the body when using the big rear tires. Front shocks were replaced by 90/10 Cure-Rides, to let the front come up on initial take-off and to transfer more weight to the rear wheels. Rear shocks were the regular extra-heavy-duty factory shocks. A considerable amount of work was done on the rear suspension joints. With the GM four-link rear suspension on the A-body compacts you can get quite a lot of bounce and vibration in the flexible rubber joints when the clutch is engaged hard coming off the line. This can trigger wheel-hop, even though the arms are actually absorbing the axle wind-up. The Royal guys take care of this by replacing the rubber bushings in the rearend with hard *bronze* bushings, with no give at all. The ride is rough and noisy, and the car is not at all suitable for the street. But that rearend really gets down and *bites* on the line. This is helped further by using Air-Lift bags inside the rear coil springs.

So now we had a pretty complete stock racing machine - and yet one that would pass any NHRA or AHRA tech inspection - and I can truthfully say, that we were all pretty flabbergasted at the drag strip times. I should first point out, however, that these last tests were delayed and were run in 40 degree weather - compared with 60 degree temperatures for the earlier tests. This denser air adds considerably to the HP. I would estimate the effect to be about .10 seconds on e.t. and maybe one mph in trap speed. But this isn't taking anything away from this fabulous blueprint job that the Roy crew did. We first started running the car with the 8.50 x 14 tires having six and one-half inch treads. The car immediately started turning in the 12.70's and 12.80's at nearly 110 mph! The best time was a 12.68 at 110.02 mph.

But drivers Schornack and Dave Warren felt the gearing wasn't just right and there wasn't enough rubber working. The engine was turning 5800 rpm in the lights with the 8.50 tires and valve action seemed to be erratic. Back to the big 9.50x14's. These gave more rubber area with the seven inch tread width, and the one inch more diameter cut down peak rpm. It certainly was the formula! The crazy car immediately started running near 12.50's at 111 and 112 mph! Also, the engine was turning between 5600 and 5700 in the lights. Warren finally cut a fantastic 12.43 at 112.10!

I think we can conclude that the new '67 GTO's with the Quadrajet are some stronger than '66s with Tri-Power!

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