THE CAR CRITIC

BY ROGER HUNTINGTON

I SWORE I wouldn't do any more "crystal-ball-gazing" and rumor-riding on the coming models after my miserable batting average on the '55s . . . but now and then you get a rumble that's too good to keep, even though it's just a rumor (note that last word!). This one concerns the 1956 version of GM's HydraMatic transmission. I think I mentioned a month or so ago that it would retain the basic fluid clutch and 4-speed planetary gearing layout, but that the shift points would be very much smoother than ever before. (The series of light jerks when shifting has always been a big argument torque converter salesmen used with new car buyer.)

Now it doesn't take an Einstein to figure out that, to get smoother shifts with planetary gearing, you've got to permit some *slip* somewhere. That is, a planetary gearset can only multiply torque by having one of the three elements (sun gear, ring, or planet carrier) held *stationary;* when you want to change gear ratio under power—as with the H-M—one of the elements that is rotating must be stopped pretty suddenly. This is what gives the jerk. The only way you could smooth it out would be to fix it so the brake band or plate clutch that holds the stationary member would apply gradually—and thus slip in the process of taking hold.

It's no trick to arrange this . . . just choke down the oil passages supplying pressure to the band and clutch pistons. Matter of fact, GM did just this for the shift from 2nd to 3rd on their '54 and '55 boxes. (This is the critical shift, since there's a broad ratio jump of 1.81:1, and it'll really belt you if you let the friction elements release and engage too quickly.

But there's a rub: Slip means friction—and friction means *heat.* I understand there is sufficient friction produced by this slipping with a high-torque engine under certain conditions to heat the transmission oil near the critical point for clutch wear. On the '55 HydraMatics for Cadillac and Pontiac they've attempted to calm down the 2nd-to-3rd shift by reducing the ratio jump to 1.70:1 (accomplished by raising the ratio of the front planetary unit from 1.45 to 1.55:1). It is also significant that the new 270-hp Cadillac Eldorado carries an inconspicuous *oil cooler* alongside the transmission sump, using water flow from the radiator to absorb heat from the oil.

You'll find this gimmick on all the '56 H-M's . . . and I hear they're going to take full advantage of the oil cooling by purposely introducing *a lot more slip* in the shifts. The actual "shift points" will not be well defined as they are now, and they say the thing will act almost like a torque converter. On the other hand, every BTU of heat that goes into the oil due to slip means that much less power going to the rear wheels—so performance won't be helped a bit. Ho-hummm. . . .

IN MY ARTICLE on future automotive engines in the April issue of MOTOR *Life* I mentioned the possibility of a "marriage" of the conventional piston engine with the gas turbine—that is, expand the exhaust gas from the piston engine through a simple turbine and feed the torque back to the crankshaft. Since then I've received a number of requests for more information on this idea.

In the first place, engineers have always been aware that we were throwing a lot of good, healthy energy right out the tailpipe. If you measure the flow rate and temperature of the exhaust gases passing out of an automobile engine, a few quick thermodynamic calculations will show that something like 40 per cent—nearly *half*—of all the heat energy (BTU's) in the gasoline is being wasted! At the moment of exhaust valve opening the gas pressure in the cylinder may be around 70 lbs./sq. in., and at a temperature of 3000° F.! This represents a literal whirlwind of energy as it passes out through the exhaust line. If even half of it could somehow be recovered the total power output of the engine would be *doubled* and fuel consumption cut in half—since a modern auto engine can convert only about ⅕ of the heat energy in the fuel into useful power at the flywheel.

Inventors have always dreamed of harnessing some of this lost energy. The logical answer, of course, would be to let the gases turn a turbine and gear it back to the crankshaft. The rub here is that the exhaust gases are so hot that it requires a precision-built turbine unit, constructed of expensive, high-alloy steels, to take the abuse. Ordinary steels would wilt like taffy. (In practice the gas temperatures aren't as rough as suggested above; by the time they have expanded through the exhaust valve and traveled down the pipe the temp has dropped considerably. One authority quotes an exhaust temp range on an automobile engine from around 400° F. cruising at low speed to around 1600° at high speed with full throttle.)

In fact, it's only been in the last few years, with the intensive development of

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turbojet engines in military aviation, that science has finally learned how to design and build efficient high-temperature gas turbines.

Sure as the world, the gas turbine is tomorrow's passenger car engine . . . but whether we'll ever see the two married in a compound engine before the G.T. takes over for good only the old dollar sign can decide in the long run!

THE one-piece stamped ball-joint rocker arm was one of the hot "cloakroom" subjects at the recent SAE annual meeting in Detroit. "Why didn't I think of that," they're all saying. The whole deal is so ridiculously simple that it's almost too good to be true. You can punch them out like popcorn at a fraction of the cost of casting or forging rocker arms, like the rest of the boys do (GM uses a rocker that's stamped in two halves and spot welded on some of their commercial current engines).

Also, the new stamped rockers are light . . . and weight is always a problem with overhead valve linkages. A more obscure advantage that most analysts haven't noticed is that, without the limitations imposed by a rocker *shaft*, the designer has much more freedom of valve placement. With the ball joint merely supported on a stud stuck in the head, you could use some pretty strange valve angles and positions if you wanted to.

You don't have this freedom when you have to pivot the rockers on a shaft; notice that Chrysler Corp. had to use *two* shafts with their hemispherical combustion chamber. This costs money . . . in fact, costs were the major reason for switching to the vertical exhaust valve and single shaft layout on the new Plymouth V-8 (basic engine also used on some models of the other three cars). This new freedom of valve location with ball-joint rockers could be an important factor in future combustion chamber designs.

Actually, Pontiac must be given the credit for the stamped ball-joint rocker. I understand they've been working on it for four years! They shared it with Chevrolet like a good brother . . . and GM gets another jump on the field.

Admittedly, engineers are still a bit skeptical about how the ball joints are going to stand up on the long grind (the kind of everyday driving grind that you can't possibly duplicate on the test track or in the lab). The things are so simple —almost crude—that a Walter Bentley or Fred Duesenberg, men who designed some of the world's finest and longest lasting cars, would shed tears at the sight! One drawing-board jockey I know even observed that both Chev and Pontiac had left space in the heads for rocker shafts and brackets in case the ball joints didn't pan out! Meanwhile the auto industry watches with bated breath . . . •