

Engineering Highlights of the New

Lincoln

BY ROGER HUNTINGTON

New engine, new frame and new body top the list of honest improvements, making a great car greater.

THE 1956 LINCOLN would still be a *new* car even if it weren't for that sleek new ultra-low body. Under the beautiful outside lines lie a host of vital technical improvements that will be of great importance to the potential Lincoln driver. A lot of people shop style only, but the '56 Lincoln buyer will be getting that and a lot more. In fact, some of the mechanical improvements—like the safety door latches, intake air temperature control, and power steering layout—are advanced enough to set a pattern for the industry. Lincoln Engineering has done a good job for '56.

Let's have a closer look . . .

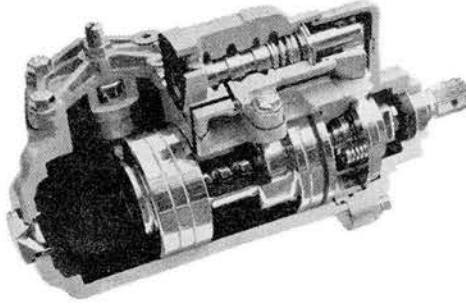
I've mentioned in these columns before that Lincoln engineers have begun to stress *low-speed torque* in engine design. (Oldsmobile has done this for several years—in contrast to Buick, for example, which can practically disregard it with the very high stall speed on their Dynaflow transmission.) Lincoln started the torque policy last year by increasing piston displacement and compression ratio, and going to relatively "cool" valve timing combined with large valves and high valve *lift*. This not only raises the maximum torque figure, but shifts the peak of the torque curve back to a *lower rpm*. The net result on the road is to greatly improve the punch at low

speeds around town (at *part* throttle as well as full throttle), and at medium speeds when passing out on the highway. Top speed isn't helped much.

Anyway, Lincoln has gone right along with this policy for '56. Bore has been further increased one-sixteenth of an inch and stroke is .16 inches longer, giving a total of 368 cubic inches. Compression ratio is up from 8.5-to-1 to 9-to-1. Valve lift has been increased from .384 inches to .417 inches through a change in the cam and rocker arm lift ratio. Diameter of the intake valves remains at two inches, but exhaust diameters have been increased one-eighth of an inch (to 1 $\frac{5}{8}$). The area of the intake ports in the heads and manifold have been increased as much as 15 per cent—and they now look about like you could stick your leg through 'em, no kidding! The result of all this business is that the peak of the torque curve has been maintained at a modest 2500 rpm, while the maximum torque figure has been boosted from 342 lb.-ft. to an astonishing 401 lb.-ft.! (Ed. note: This 401 figure is still a tentative rating as this is written.)

These changes have had their effect on the top end, too. They now rate 285 hp at 4600 rpm, up 60 hp from the '55s. An increase in venturi size of the four-barrel carburetor helps here.

Everything mentioned up to now helps to boost the performance of the engine on the dynamometer. But any auto enthusiast knows there can be a big difference between what an engine will show under ideal test room conditions and the bread-and-butter performance on the street and highway. It doesn't do any good to point to another 50 hp in advertised rating if the other guy is blowing exhaust in your face! That's why a couple of Lincoln's new gimmicks for '56 are especially significant; they don't show up in the advertised power and torque ratings taken on the dyno, but they do a lot for that jump when you want it.



Lincoln's new power steering is a more compact Saginaw unit which now has one adjustment, against former three.

As you know, Lincoln has been using carb venturi vacuum to advance the spark for several years now (no centrifugal advance mechanism). One bug with this system is that, when you pop the throttle open suddenly, it takes a second for the added air flow through the carb to build up venturi vacuum to retard the spark. Thus the spark is momentarily advanced too much; it's apt to detonate (especially with the new 9-to-1 compression ratio), and there's a hesitation in the torque flow. For 1956, Lincoln is using an auxiliary spark retard diaphragm operated by manifold vacuum; this drops instantaneously when you floor the throttle and retards that spark right now. Very effective out on the road.

But possibly the most significant of all the new features on the '56 Lincoln is the "air-conditioned" carburetion system. That's right . . . not only do they *clean* the air, but they're now even trying to serve it up at the right *temperature*! As you may know, breathing hot underhood air on the highway on a warm day can cost as much as 10 or 15 hp—and plenty of torque—on a big engine. Engines like cool air. On the other hand, for fast warm-up and flexibility at low speed the intake air should be near room temperature.

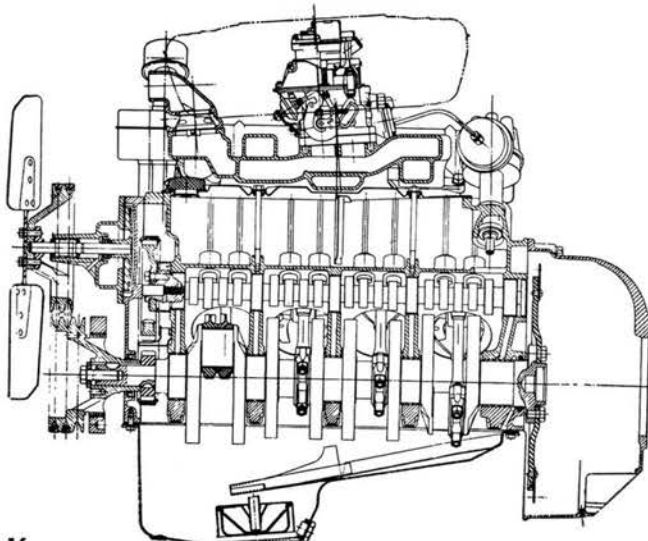
Detroit has been dodging this problem for 40 years . . . but Lincoln is finally trying to do something about it with a reasonably compact, inexpensive mechanism. They use, in effect, two air intake ducts leading to the air filter. One passes over a muff on the left exhaust manifold for heated air, and the other comes through a tube from the front grille opening for cool air. A thermostatically operated valve at the junction of the two ducts controls the amount of air coming each way. The thermostat is set to open the cool air duct when intake air temp reaches 68-72 degrees F. This doesn't mean that intake air temp will never exceed this (it can't be less than the outside temp), but gone are the days when the engine will have to pull on 140-degree air.

The high compression ratio and increased displacement have obliged Lincoln engineers to do a little beefing up. Rugged copper-lead alloy replaces babbitt for the bearings, and pistons have been beefed considerably. A brand new cast crankshaft has the two center counterweights eliminated; it's stiffer and lighter. The former gear-type oil pump has been replaced by an entirely new *rotary* type (only one in the industry now). Since this is a more or less positive-displacement pump, our oil pressure doesn't drop off so much at very low rpm; other advantages are quieter operation, better hydraulic lifter performance, and less loss of pumping capacity with wear.

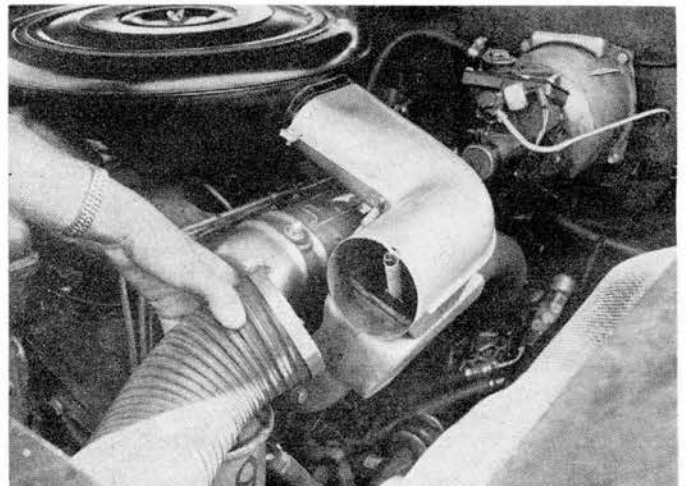
Other new engine features include improved 18-mm spark plugs with longer electrode life; 12-volt electrical system; new fuel filter; improved automatic choke; a drop-center intake manifold that lowers the carb 1 $\frac{1}{2}$ inches (mixture now runs *up-hill*!); better crankcase and valve chamber ventilation system; improved umbrella seals to keep oil from getting down valve stems; and dual exhausts standard on all models.

Here is truly a *modern engine*!

Side cross section of the 1956 Lincoln engine. New and light cast crankshaft has two center counterweights eliminated.



One of two intake ducts leading to air cleaner, which will provide engine with either hot or cool air as needs dictate.

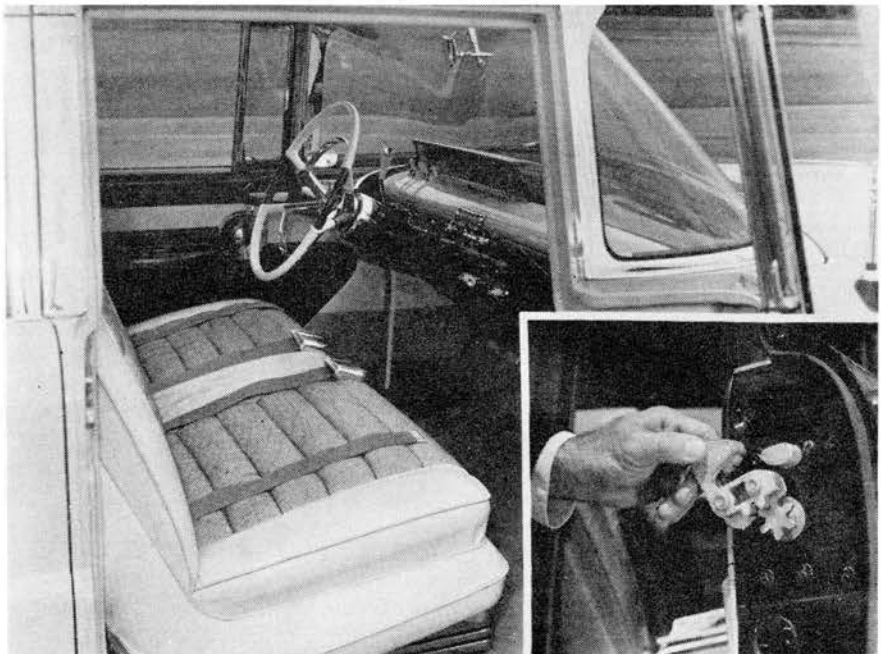
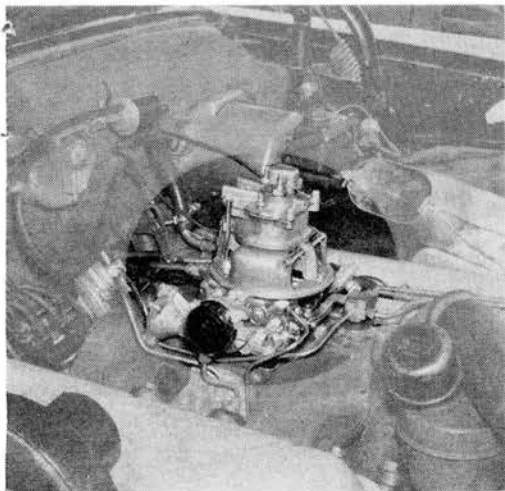


There are no important changes in transmission and drive line on the '56 Lincoln, other than some beefing-up here and there to take the higher engine torque. Transmission is still the three-speed planetary gearbox with conventional torque converter. They still retain the kick-down low-gear start; with part throttle you start up in second gear and shift once to direct drive. Hotchkiss drive is employed, and the 3.07-to-1 axle gear ratio is now standard on all models. Only disadvantage of this drive line combo is that torque converter slip sops up a lot of the initial jump from a standing start—and gobs of engine torque doesn't help much. The 3.07-to-1 rear end is no help, either. Your 0-30 mph time on this rig will be well over four seconds . . . but if the new Lincoln owner isn't too worried about his standing in the Traffic Light Grand Prix, the '56 drive line will be smooth as butter and give good mileage.

THE NEW CHASSIS

The new '56 body with its ultra-low lines has called for a new frame. This one has the side channels boxed full length (instead of just between the X members as last year), and the new shallow X member passes *under* the drive shaft! Minimum frame ground clearance has been reduced from 7.4 inches to 6.7 inches. I stated in my article on body design in the July '55 issue of *MOTOR Life* that Detroit was awfully touchy about reducing ground clearance. But here's a healthy cut—for better or worse! Front and rear suspension are pretty much as last year, except that the rear leaf springs are now hung *outboard* on the frame. This serves both to lower the body and to widen the rear spring base, for better roll stability. (This outboard rear spring mounting may have much to do with the improved handling of the '56 Lincoln that Ken Fermoye mentions in his driver's report on the preceding pages.) Ball-joint front suspension is retained.

Air-conditioned carburetor of Lincoln's new controlled-temperature setup (left).



Three of Lincoln's new safety features are shown in this layout: (1) dished steering wheel; (2) seat belts; (3) latch designed to hold door closed during a collision.

Brakes are the same size as last year (207.5 sq. in. of friction area), but Lincoln engineers have managed to eliminate the need for those troublesome minor brake adjustments. They grind the linings on a slightly smaller radius and make the drum friction surface somewhat rougher: the drum actually keeps the lining *worn* to the right clearance! The new Saginaw "in-line" power steering layout on the '56 Lincoln is very interesting. Formerly the control valve and power units were in two more or less separate sections side-by-side. Now the power piston and steering worm are built in one unit "coaxially" (on the same center) with the steering shaft, with the control valve on the outside of the housing. It's much more compact, cheaper, and there is now only one adjustment compared with three previously. Bread-and-butter engineering, fellows!

Lincoln is stressing safety design on the 1956 line. Ford Engineering has had a crash research program under way at the Dearborn test grounds for some months, and some of the findings are already appearing on the production line. For example, it was found that *back-and-forth* forces were more responsible for doors flying open in a crash than *outward* forces. So they designed a new long door latch that will take an inch or more of back-and-forth movement before releasing. (See picture.) This design will appear as standard equipment on all 1956 Ford Motor Co. cars.

Also, the new Lincoln steering wheel is very deeply "dished"; it is thought that much of the energy of a forward crash would be absorbed in bending back the rim and spokes of the wheel without seriously injuring the driver. With regular wheels the steering shaft at the center can be pretty lethal. And finally, seat belts will be offered as optional equipment on

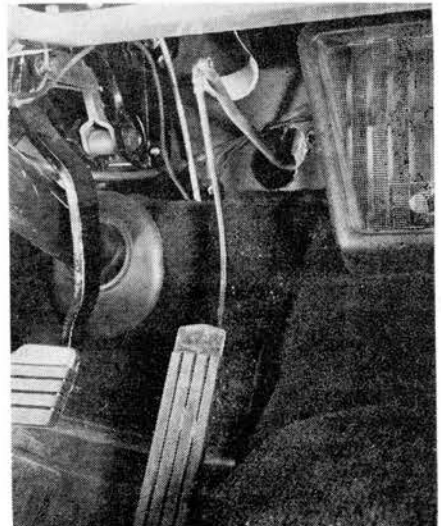
the new Lincolns. The Ford research definitely showed that belts were beneficial in crash safety, so they're taking the bull by the horns and offering them. (Understand that crash safety is such a touchy "public relations" subject around the Motor City that you've got to give a manufacturer credit for even admitting that there is such a thing! Believe me, the front offices have thought loud and long before deciding to touch seat belts.)

GENERAL OBSERVATIONS

The new Lincoln is a *big* car. It's seven inches longer than the 1955 model, 1½ inches wider, and 250 pounds heavier. Wheelbase is increased from 123 inches to 126. And this increase in size didn't just happen when the stylists cut loose on

(Continued on page 63)

Brakes and clutch pedals have been suspended. Now throttle gets treatment.



LINCOLN ENGINEERING
(Continued from page 17)

the new body. The Ford front office wanted a bigger package to stack up alongside the bulbous Cadillacs, Chryslers, and Packards. The '55 Lincoln was a neat, trim greyhound and a great road car . . . but you've got to have *brute bulk* these days to really rate with the "prestige" crowd. Lincoln has got it now. Also, you can make a car *look* lower by making it longer and wider. The new Lincoln is actually 2.4 inches lower than the '55; couple that with the increased length and width, and . . . well, those new lines just send you!

And then, of course, there's the usual line-up of goodies: Power steering, power seats and windows standard; air-conditioning, power brakes, tinted glass, etc. optional; new fabrics and leathers; 49 different optional interior trim sets, nine new colors and 34 two-tone options. Well, there's just a whole lot of car in this '56 Lincoln.

In closing, a word to current Lincoln owners who would like to "modernize" their earlier models to bring the performance up with the '56 jobs. Actually, there are so many changes on the new engine that you'd just about have to swap a complete power unit to really "56-ize" your car. The cost would be prohibitive. You can, of course, adapt certain individual '56 engine components on your earlier engine. I'm sure you could rig up that new temperature-controlled air induction system on an older model without too much trouble. The big '56 carburetor should add a few horsepower at the top end. You could bore out exhaust ports on early engines to take the large '56 exhaust valves. The new high-lift rockers would increase your valve lift seven per cent and should help torque considerably.

But the combined effect of all these changes still wouldn't stay with that big '56 engine. Your next best move seems to be a special camshaft. As mentioned earlier, the '55 Lincolns used relatively cool valve timing for maximum low-speed torque. This is apparent when you note that the top speed of the '55 model is actually less than that of the '54! Now by sacrificing some of this low end you can put a special cam in your engine that will kick the overall road performance up over the new jobs. Several companies supply good road cams for the Lincoln ohv V-8 engine, in both roller and flat lifters. Total cost of this modification would run at least \$150. If you can invest \$400 or so the very best you could do with it would be one of the new McCulloch supercharger kits. This combo will really go; the '56 owners will be wondering what went by! And it's just as quiet as stock, idles perfectly, there's no loss of low-speed torque (in fact you gain above 1800 rpm), and the thing will stand up for thousands of miles if you don't abuse it.

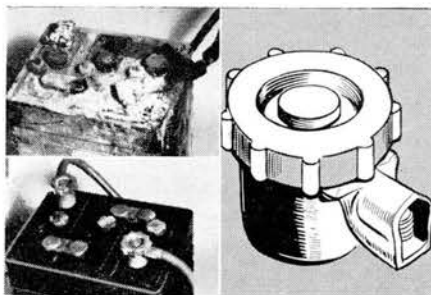
So you take it from here . . . •

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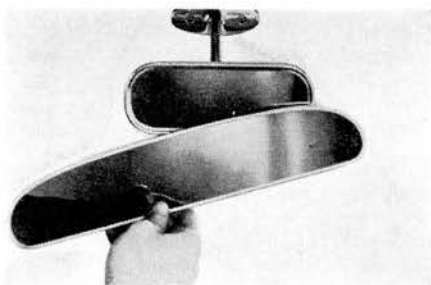
Wheeling with Deeling
Five Gadgets I Like . . .



By Ray Deeling



Acid corrosion on battery terminals used to be a real—and expensive—headache for me. This corrosion weakened the whole electrical system, and I'd find myself replacing a battery after just a few months of service. Then I heard about the ingenious Battery Booster terminal housings you see pictured above. These housings contain an acid-neutralizing reservoir which eliminates power-sapping sulfation and acid corrosion, increases the efficiency and life of the generator and distributor, and even improves the fidelity of your car radio! Battery Boosters give extra power for starting, lights, accessories. Easily attached or removed in minutes. Price, including two new copper cable terminals, is only \$3.95 per pair. Try a set. They do the job, and are guaranteed to last the life of your car.



There are quite a few "wide angle" mirrors on the market, but most of them sell for anywhere from \$4.00 to \$8.00. Now along comes the See-All Panoramic Mirror for only \$1.49! This is an extra wide, 13 3/4" job, and it really puts eyes in the back of your head. Takes in the entire rear area at a glance, day or night, and doesn't minimize danger by reducing the size of the cars behind. Specially tinted to filter out glare, and it clamps securely in seconds to any

inside mirror. Order several so you can make driving safer for your car-owning friends. The price again: only \$1.49 each, on money-back guarantee.



If you're like me, you get plenty tired of the constant wind roar when you get out on the highway. This Wind Silencer is the answer—it reduces wind noises to a gentle whisper, lets you talk or listen to your car radio in living room quiet. Just snap the silencers on the lead edges of your car doors with the special rubber-shimmed clips—that's all there is to it. Designed by aeronautical engineers. Steel, with chrome finish. Only \$2.98 for the pair, postpaid.

THE EYES
HAVE IT easy day or night with this all-purpose adjustable eye visor. My wife claims they do a



better job against glaring sun and night lights than dark glasses, car visors and tinted windshield glass combined. They don't interfere with regular glasses and are light weight and comfortable to wear. Hinged Visor tilts for use as shade or sunglasses. Only \$1.00 per pair.

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and
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This isn't an automotive item, but it's so good that I couldn't resist telling you about it. It's a line filter that stops radio and TV noises caused by motors, appliances, etc. Just plug radio or TV into filter, plug filter into wall, and buzz-free reception is guaranteed. Only \$1.00, including postage.

MONEY-BACK GUARANTEE
If any item you order isn't 100% satisfactory, let us know within 10 days and we'll refund your money in full—no questions asked. We pay postage when you send full amount with order.

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<input type="checkbox"/> See-All Mirror (1.49 ea.)	<input type="checkbox"/> I enclose \$1.00 dep. on each item; will pay post., COD charges.
<input type="checkbox"/> Wind Silencer (\$2.98 pr.)	Make of car..... Year.....
<input type="checkbox"/> Eye Visors (\$1.00 pr.)	Name.....
<input type="checkbox"/> Radio-TV Filter (\$1.00)	Address.....
	City..... Zone..... State.....