PM Tests Promising New

Anti-Smog Kit

By Thomas E. Stimson

"THE ONLY CITY in the world where you can wake up in the morning and hear the birds cough!"

Thus, only partly in jest, does Dr. John T. Middleton of California's Air Pollution Research Center describe Los Angeles, the giant city where three out of every four people are disturbed in some way by air pollution which is produced primarily by automobiles.

Smog has become so bad in the Los Angeles area that leafy vegetables such as spinach and lettuce are no longer grown there commercially—the leaves become tough and acquire silvery streaks. More and more Los Angelinos are being afflicted with chronic respiratory ills, induced or aggravated by smog. There is a suspicion that smog contributes to heart disease and contains cancer-causing agents.

And the problem is no longer exclusively Los Angeles'. In many American cities such as Hartford, Washington, D.C., Detroit, and Denver, for example, smog has become an eye-irritating nuisance and is growing worse.

The most harmful of smog's pol-

LOW-HANGING BLANKET of smog, produced primarily by car exhausts, envelops downtown Los Angeles. Temperature inversion permits cool upper air to trap warmer, smog-filled air in mountain-rimmed bowl of city. Kit PM tested cut smog emissions about in half

PM TEST CAR RESULTS		
	WITH KIT INSTALLED	WITHOUT KIT
MILES PER GALLON	17.3	16.9
0-60 MPH	11.5 SECS	11 SECS
HORSEPOWER AT 3500 RPM	125	*120
HYDROCARBONS (PARTS PER MILLION)	232 (275 ALLOWED)	*533
PERCENT CARBON MONOXIDE	1.2 (1.5 ALLOWED)	*2.1
*AFTER DEALER "TUNE-UP"		

COMPARISON of economy, performance and smog output of Dodge engine before and after fitting Chrysler's Cleaner Air Package kit shows the improvement

EXHAUST PIPE containing sampling probes enables pollution control laboratory to make positive recordings of hydrocarbon and carbon monoxide emission

lutants are created when raw hydrocarbons combine with nitrogen oxides in the presence of sunlight. Both these substances are spewed into the atmosphere by automobiles, whose engines produce from two to three times the amount of smog-producing hydrocarbons and nitrogen oxides produced by all other sources of air pollutants.

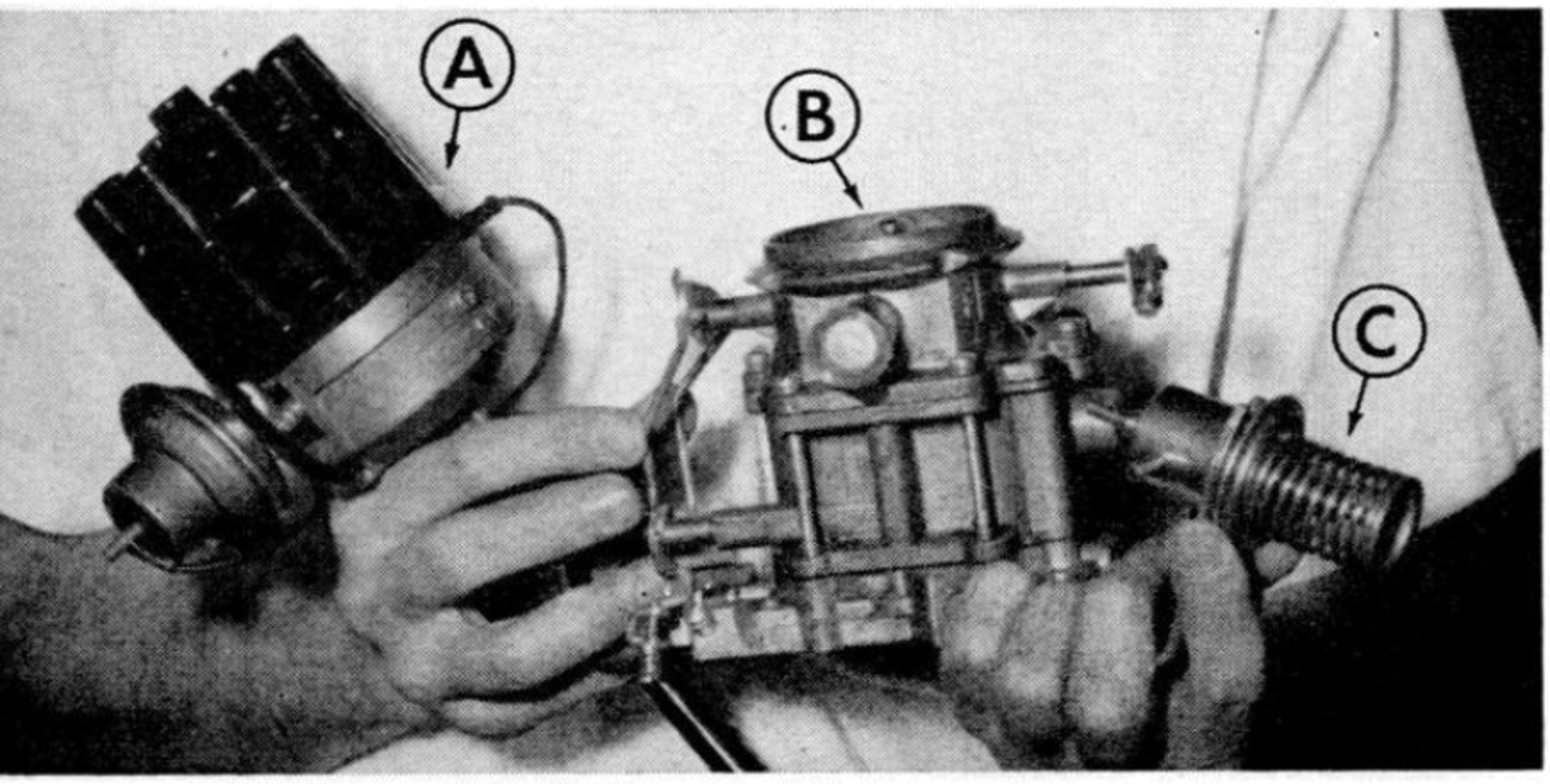
The waste is enormous, not only for Los Angelinos, but for most other motorists, too. Consider that about seven percent of the gasoline you buy is going to move through your engine unburned and disappear out the tailpipe unused. This means that a tidy part of many motorist's annual fuel dollars are spent in manufacturing smog instead of propelling the car.

California has passed laws compelling motorists to install anti-smog devices in their exhaust systems as soon as two or more designs are perfected. These devices —of the afterburner type—will be in addition to the prone-to-clog crankcase emission control valves that are now mandatory on new cars sold in California and standard equipment on a number of American cars this year.

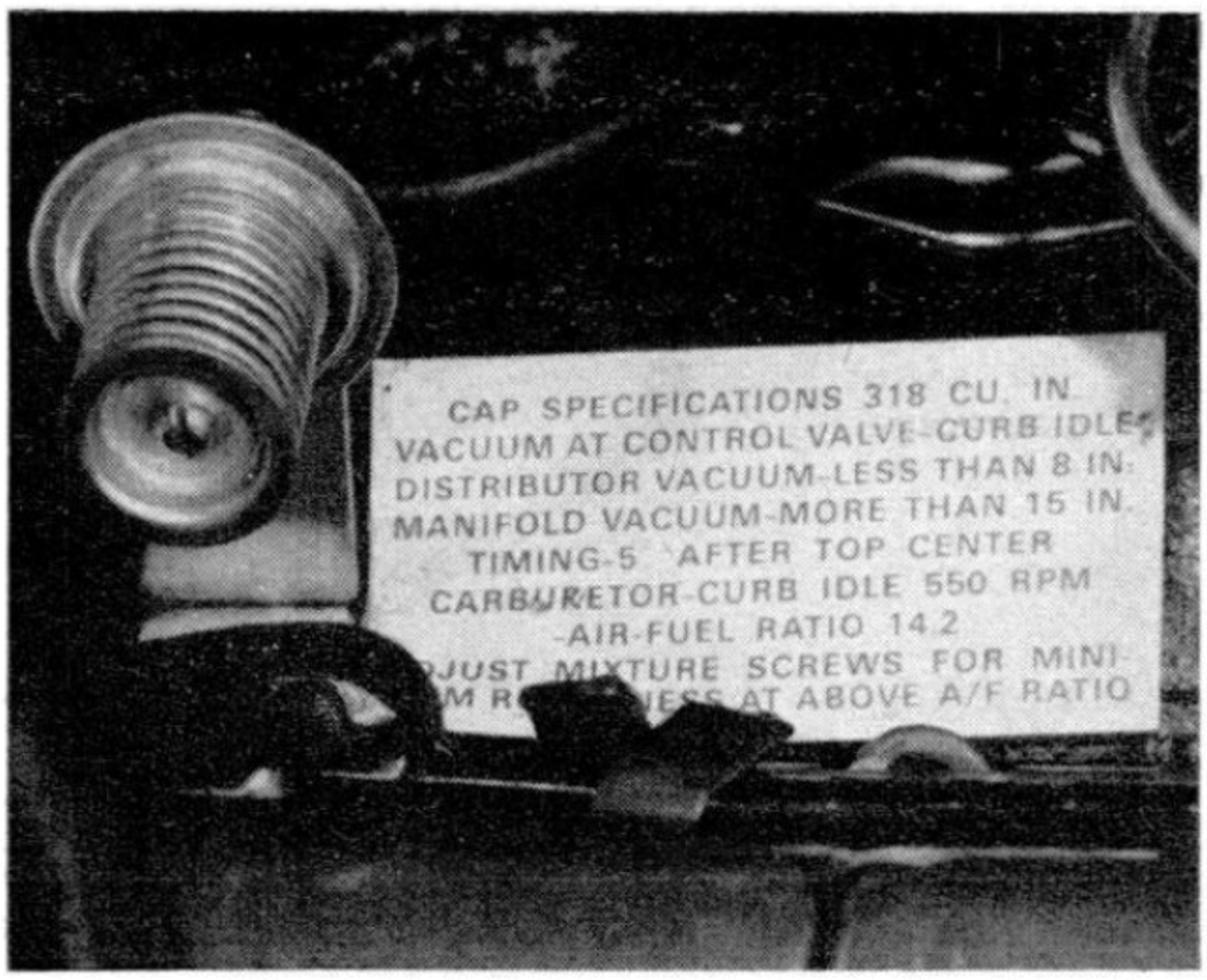
The afterburner type smog preventers are expected to cost at least $100, which means that California motorists will be faced with the dismal prospect of spending a half a billion dollars for afterburners.

But, happily, there's a new chance that automotive smog can be curtailed in a different way and at little extra cost. *Popular Mechanics* tested a modified automobile whose smog-forming emissions were well under California's stringent requirements. The new system is based on the idea of burning much of this unused gasoline right in the engine.

The car *Popular Mechanics* tested was



THREE ELEMENTS at left, make up Chrysler anti-smog kit: "A" is distributor reworked to idle at 5 after top dead center; "B" is carburetor with lean main jets and idle jets with 14.2-1 air-fuel ratio, reduced choke restriction; "C" is the vacuum advance valve that keeps spark advanced during deceleration. Not shown is a heavy duty engine cooling fan



DETAILED tune-up instructions on a metal tag are attached to engines of 1000 Chrysler Corporation cars that have been equipped with anti-smog kits

SMOG AFTERBURNER assembly replaces conventional muffler under car, but is complicated with valves, wires, etc. Cost to car owners would be over $100

an ordinary 1963 Dodge Polara that differed from its assembly-line mates in only one respect: it was equipped with Chrysler's *Cleaner Air Package.* This consists of a reworked carburetor, reworked distributor, a special vacuum advance valve, a special tune-up procedure, and the use of a six-bladed engine fan.

PM's test was the first public study of this anti-smog kit. We wanted to know two things about it: does it actually reduce smog and does it affect performance?

With the kit installed, I ran 300 miles of high-speed freeway driving and 100 miles of slow traffic. I put the car on a dynamometer for a power reading, then tried 0 to 60 m.p.h. accelerations against a stopwatch. Finally, I delivered the car to the California Motor Vehicle Pollution Control Board, which had agreed to measure and analyze the car's tailpipe emissions.

Later, the factory restored the car's engine to standard and I re-ran the tests.

With the kit, the car gave somewhat better mileage than without it. I averaged 17.3 m.p.g. with the kit installed; 16.9 m.p.g. after it was removed. These figures are based on true odometer readings.

Acceleration was slightly better without the kit, though it took a stopwatch to tell the difference. The 318-cu.-in. engine Polara with automatic transmission went from 0 to 60 m.p.h. in 11 seconds without the kit; half a second slower with it.

At this point, I deliberately tossed a monkey wrench into my test program. The factory tune-ups, with and without kit had been precise instrument-controlled operations. I wanted a "typical" tune-up by an average mechanic. A grease monkey at a nearby dealer found the timing okay. Then he "adjusted" the carburetor.

That typical tune-up cost five horsepower and created plenty of smog. On the dynamometer the car had delivered 125 horsepower to the rear wheels at 3500 r.p.m. with the kit. Now, without the kit and with the typical tune-up, the car was producing 120 horsepower.

California's anti-smog requirements for the future are: no more than 275 parts per million of hydrocarbons in the exhaust, no more than 1.5 percent carbon monoxide.

The state engineers found that with the CAP installed, the Dodge emitted 233 p.p.m. of hydrocarbons, 1.2 percent carbon monoxide. Each figure is well under the state requirements. Without the CAP kit (and after the typical tune-up) the engine emitted 533 p.p.m. hydrocarbons, 2.1 percent carbon monoxide. Too much of each.

How about street performance and handling? I could find little difference except that, with the anti-smog kit, the car freewheeled noticeably when I took my foot from the throttle, taking 4.5 seconds longer to decelerate from 50 to 20 m.p.h. on compression alone. This required more braking in traffic.

I'd heard that the anti-smog kit made for hard starts in cold weather, so I drove to the mountains and let the engine cold-soak all night. There was ice on the ground

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New Anti-Smog Kit

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next morning but the engine fired up just as in warm weather, with no apparent power loss.

All this suggests that Chrysler has found the answer to the smog problem, but this is only partly true. New cars, properly tuned, are fairly clean anyway, and *PM* tested a new car. Older cars that need a tune-up are the real smoggers. But even these can be cleaned up.

As Charles M. Heinen, Chrysler engineer who originated the CAP, puts it:

"Assume that a car emits contaminants at the rate of about 1000 p.p.m. for hydrocarbons and 3.5 percent carbon monoxide. If there is nothing basically wrong with the engine, a standard tune-up—including lubrication of engine linkages, servicing filters and replacing worn plugs or points —will cut these emissions just about in half. These are all recommended maintenance procedures, anyway.

"Any owner can cut smog production below 400 p.p.m. hydrocarbons and two percent carbon monoxide with a few additional adjustments every 5000 miles. These consist of checking timing, leaning the idle mixture and slightly raising the idle r.p.m."

All these adjustments help, but further modifications are necessary to reach the low emission levels California demands. That's where the anti-smog kit comes in.

An engine with the CAP differs from a standard engine in these ways: Size of carburetor's choke restriction is increased; the main jets give a leaner mixture; idle r.p.m. is increased to 550; carburetor-idle jets are adjusted to an air-fuel ratio of 14.2 to 1 (standard is 13 to 1).

The timing, at idle, is retarded to 5 degrees after top center, but a special vacuum advance control valve advances timing to normal when the throttle is pressed. The distributor is reworked to match.

Overheating in slow traffic, due to the retarded spark at idle, is prevented by a six-bladed cooling fan.

The CAP is receiving its first "blind" test by the public this year. Kits have been installed on 1000 Plymouths, Dodges and Chryslers selected at random from the Los Angeles assembly plant. No guinea pig purchaser knew he was getting a modified engine but each was asked to participate by allowing his car to be tested at intervals.

The Chrysler anti-smog kit is tailored for Chrysler's current production only, not for its older models or for any other makes. But the same principles can be used in designing anti-smog equipment for any make or year. Cost of the kit is expected to run between $10 and $15. ★ ★ ★