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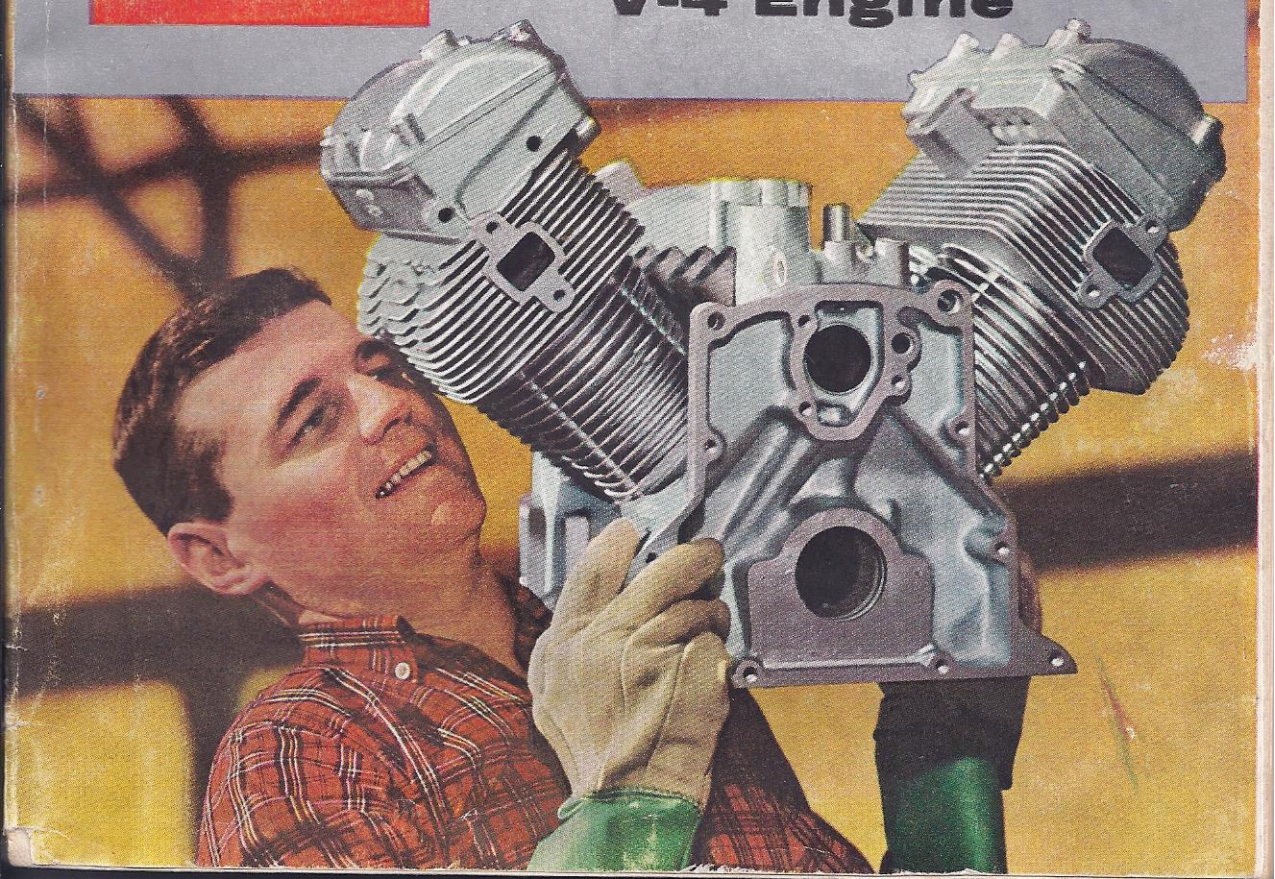
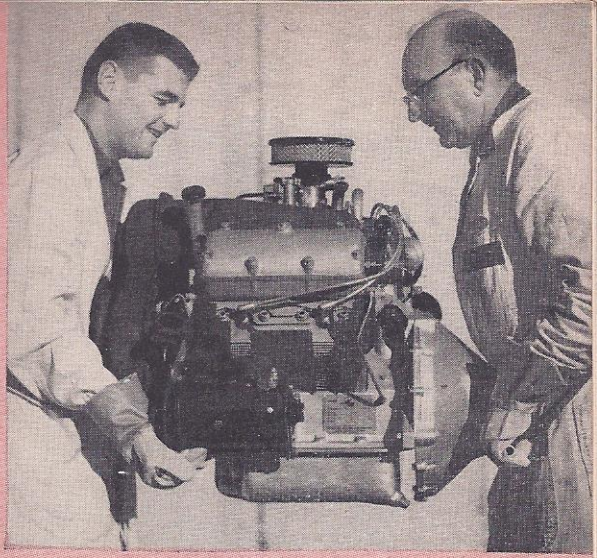
EXCLUSIVE!

Detroit's Aluminum V-4 Engine



Will a V-4 Like This Power a Future Light Car?



American Motors is already producing some aluminum engines for the armed services. They are V-4s, with two banks of two cylinders set at 90 degrees. Horsepower is 56 at 3,600 r.p.m., and the torque 90 pounds-feet at 2,000-3,000 r.p.m. The engine is air-cooled.

Dimensionally, it's tiny—roughly a two-foot cube. Bore and stroke are both 3.25 inches, and the displacement is 108 cubic inches. The compression ratio is low—7.5:1. Weight, without electrical equipment, is 214 pounds.

The engine produces .52 horsepower per cubic inch, which is less than that of present auto engines. American Motors explains it by the necessity of keeping the compression ratio low and the torque output high in military vehicles. Horsepower output could be pushed to .6 per cubic inch and beyond, engineers say, without difficulty.

A V-4 engine, here chosen for compactness, is no novelty. They are widely used in stationary and industrial installations. The V-4 has not been popular in passenger cars because it is more expensive to make than the in-line. The in-line, for instance, requires two cranks or "throws" in one plane, the V-4, four cranks in four planes.

The engine is not, of course, all aluminum. These parts are made of aluminum: block, crankcase, timing cover, cylinder heads, cylinder-head covers, and intake manifold. The exhaust manifold, connecting rods, crankshaft, valve train, timing gears, flywheel and fan pulley are made of iron or steel. Cylinders are made of die-cast porous aluminum so the metal will absorb and retain oil to cut friction. They are chrome-plated to reduce wear. Piston rings, of iron, are unplated.

Of the aluminum used, about 90 percent is the pure metal. The sand-cast parts—which include everything except the die-cast cylinders—contain from 1 to 1.5 percent copper, .6 iron, 4.5 to 5 silicon, .5 manganese, .4 to .6 magnesium, .3 zinc, .2 chrome and .2 titanium. Most of these are hardening agents.

This air-cooled aluminum engine has proved to be more efficient thermally—it makes better use of the heat energy it develops—than a water-cooled engine would be. That's because cylinder-head temperatures can be run at 400 to 435 degrees F., far beyond those of a water-cooled engine.