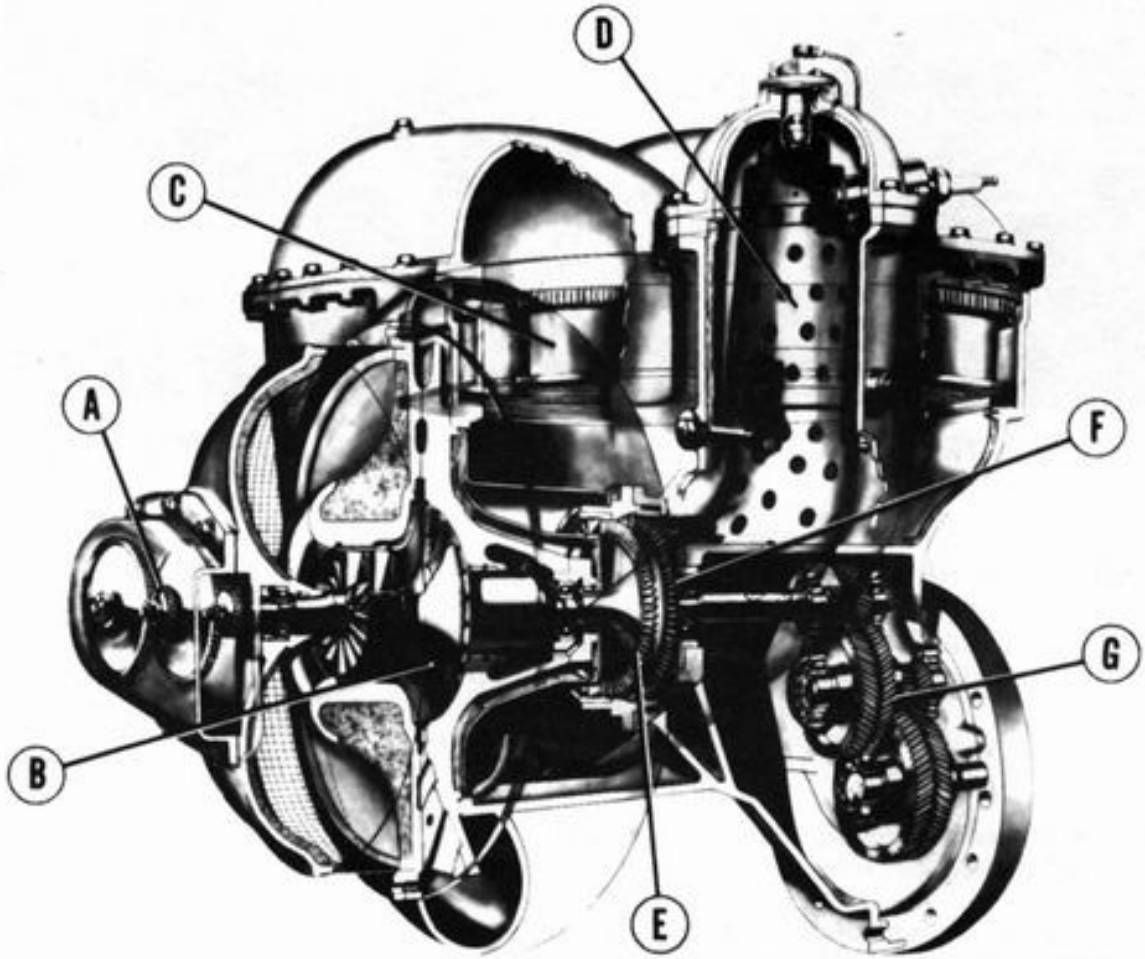
1956 TURBINE SPECIAL EN ROUTE CROSS-COUNTRY

In March 1956, another historic event took place -- the first transcontinental journey of an automobile powered by a gas turbine engine.

This turbine car, a four-door 1956 Plymouth sedan, a standard production model in every respect except for the revolutionary Chrysler-developed power plant, departed from the Chrysler Building in New York City on March 26. On March 30, 4 days and 3,020 miles (4 860 km) later, it completed its cross-country endurance test when it arrived at the City Hall in Los Angeles, California. The purpose of the run was to evaluate the turbine's durability, acceleration, fuel economy, control in traffic, action on steep grades, and operation under various climatic conditions. It marked another Chrysler Corporation "first" in the automotive record books and was considered a successful test.

Over the entire trip, fuel economy averaged approximately 13 mpg (18 L/100 km) using mostly unleaded gasoline and some diesel fuel. The run was interrupted only twice for minor repairs which did not involve the basic turbine engine (a faulty bearing in the reduction gear and an intake casting were replaced). The engine itself and its basic components performed very well and without failures of any kind.

This experimental turbine engine was essentially the same as the one tested previously in the 1954 Plymouth. However, it reflected progress in the following major points: parasitic seal and bearing friction losses were reduced; expensive ball and roller bearings were replaced with sleeve bearings on the high speed shafting; the combustion system was improved; and engine controls were developed further. Automatic controls then allowed the driver to operate the turbine just as he would a conventional automobile.



MAIN COMPONENTS OF THE FIRST GENERATION GAS TURBINE ENGINE

(A) accessory drive gears; (B) compressor impeller; (C) regenerator; (D) combustion chamber; (E) first-stage turbine, which drives the compressor impeller and accessories; (F) second-stage turbine, which supplies power to the transmission; and (G) double-stage reduction gearing to the transmission.

1959 PLYMOUTH TURBINE SPECIAL READY FOR ROAD EVALUATION

THE SECOND GENERATION TURBINE ENGINE

Basing their calculations on extensive test data and performance results of the 1956 cross-country trip, Chrysler engineers designed and developed a second engine. After extensive laboratory tests, it was installed in a standard production 1959 Plymouth four-door hardtop. In December 1958, this Turbine Special made a 576-mile (927 km) test run from Detroit to New York. The results showed significant improvements in fuel economy. This second generation turbine (also a laboratory development tool) operated in the 200 hp (149 kW) range; and, although it was improved in almost every respect, two areas were particularly outstanding -- efficiency and materials.

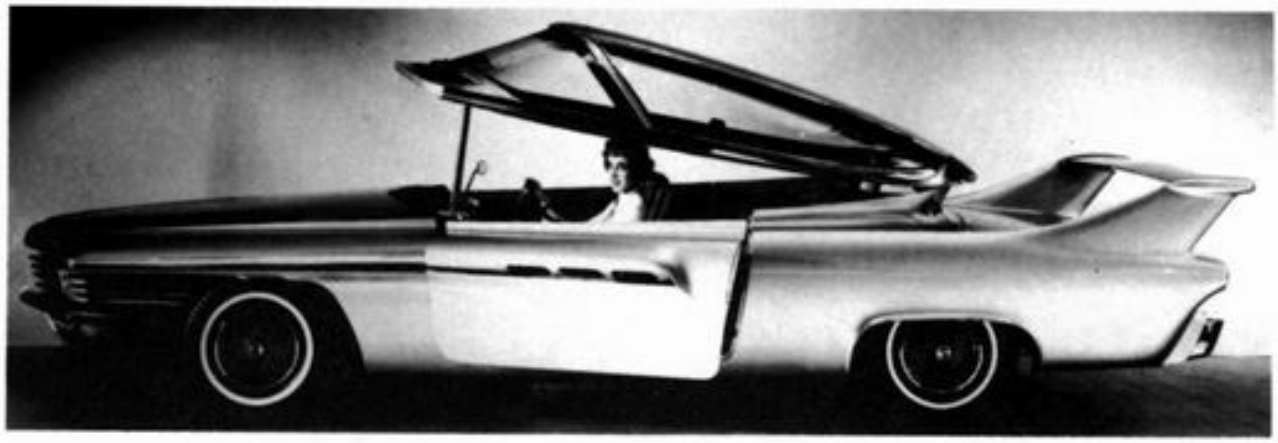
Three major engine components (compressor, regenerator, and burner) showed significant improvements in operating efficiency. The compressor efficiency was brought up to 80 percent, a 10 percent increase. The regenerator or heat exchanger unit at that time reclaimed almost 90 percent of the heat energy in the exhaust gas whereas peak efficiency in the 1956 cross-country run had been around 86 percent. Burner efficiency was also improved so that it was approaching the point of ideal combustion.

Less apparent, but fully as important as the engine design advances, was the progress in turbine metallurgy. Prior to this time, automotive turbine metals were similar to those used in aircraft jet engines. Although these existing materials were certainly adequate for test engines, they would not be suitable for automotive production for two key reasons: cost, and the simple fact that neither production capacity nor the available world supply of the required alloying materials could support such a program.

Through Chrysler metallurgical research, new materials were developed which did three things:

- Contained lower amounts of relatively expensive elements
- Could be fabricated by conventional means
- Had excellent resistance to heat and oxidation at elevated temperatures.

Applications for these new materials were combustion chamber liners, turbine wheels and blades, etc.



TURBOFLITE — ADVANCED POWER — ADVANCED STYLING

THE THIRD GENERATION TURBINE ENGINE

Encouraged by the previous progress, Chrysler engineers designed the third generation turbine, called the CR2A, and introduced it in three different vehicles. The initial showing was to newsmen on February 28, 1961. The vehicles were displayed publicly in Washington, D.C. March 5-9, 1961, in conjunction with the Turbine Power Conference of the American Society of Mechanical Engineers, co-sponsored by the Department of Defense.

The first of these gas turbine vehicles was an experimental sports type car called the "Turboflite"(shown above). In addition to the engine, other advanced ideas of the car were the retractable headlights, a deceleration air-flap suspended between the two stability struts, and an automatic canopied roof. This "idea" car received wide public interest and was shown at auto shows in New York City, Chicago, London, Paris, etc.

The second of the vehicles was a 1960 Plymouth which was standard in every respect except for the engine and minor exterior styling modifications.

1960 TURBINE-POWERED PLYMOUTH

TURBINE POWER FOR 1960 DODGE TRUCK

The final member of this trio was a two-and-a-half-ton Dodge truck which was a standard production vehicle -- except for its gas turbine engine. This application demonstrated the turbine's versatility and adaptability because the engine in this truck was basically the same as those in the passenger cars.

After months of test and development work, a third generation gas turbine engine was also installed in a modified 1962 Dodge.