



COAST-TO-COAST TEST VEHICLE — 1962 DODGE TURBO DART

Called the Dodge Turbo Dart, styling modifications to the car were adapted to reflect its radically different power plant. The bladed wheel motif of the grille and wheel covers reflected the appearance of the vital components of the gas turbine.

The car left New York City on December 27, 1961, to begin a coast-to-coast engineering evaluation. After travelling 3,100 miles (5 000 km) through snowstorms, freezing rain, sub-zero temperatures, and 25 to 40 mile per hour (40 to 65 km/h) head winds, it arrived in Los Angeles on December 31.

The turbine not only lived up to all expectations but had exceeded them. An inspection showed every part of the engine to be in excellent condition. Fuel economy was consistently better than that of a conventional car which had traveled with the turbine car and was exposed to the same conditions.

SPECIFICATIONS OF CHRYSLER CORPORATION'S THIRD GENERATION GAS TURBINE ENGINE

GENERAL

Type: Regenerative gas turbine

*Rated Output: Power - 140 bhp (104 kW) @4,570 rpm output shaft speed
Torque - 375 lb-ft (508 N·m) @zero rpm output shaft speed

Weight: 450 lb (204 kg)

Basic Engine Dimensions (without accessories): Length - 27 in. (686 mm)
Width - 35 in. (889 mm)
Height - 27 in. (686 mm)

With automotive accessories in place, the over-all length is: 36 in. (914 mm)

Fuels: Unleaded gasoline, diesel fuel, kerosene, JP-4, etc.

COMPONENTS

Compressor Section

- Single stage
- Centrifugal; 4:1 pressure ratio
- 14 channel diffuser
- Single scroll collector

Turbine Section

First Stage

- Single stage axial
- Fixed nozzle vanes

Second Stage

- Single stage axial
- Variable nozzle vanes

Regenerator: Type - Single rotating disk
Effectiveness - 90%

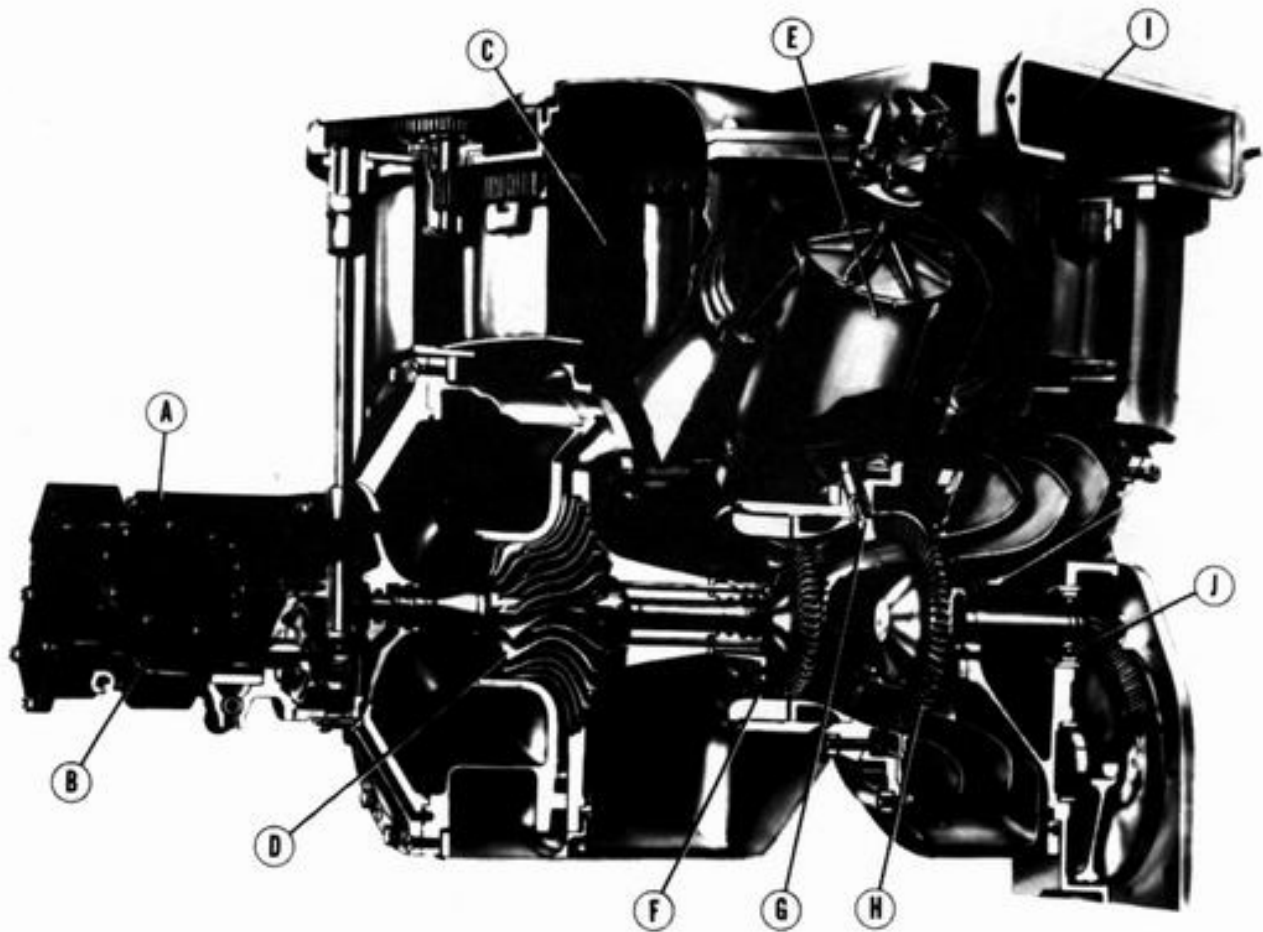
Burner: Type - Single can, reverse flow
Effectiveness - 99%

*DESIGN POINT CHARACTERISTICS

Maximum Gas Generator Speed - 44,600 rpm
Maximum Second Stage Turbine Speed - 45,700 rpm
Maximum Output Speed (after reduction gears) - 5,360 rpm
Maximum Regenerator Speed - 17 rpm
Compressor Air Flow - 2.2 lb/s (1.0 kg/s)
First Stage Turbine Inlet Temperature - 1700° F (927° C)
Exhaust Temperature (full power) - 500° F (260° C)

*Ambient conditions: Temperature - 85° F (29.5° C)

Barometric Pressure - 29.92 in. Hg
(101.3 kPa)

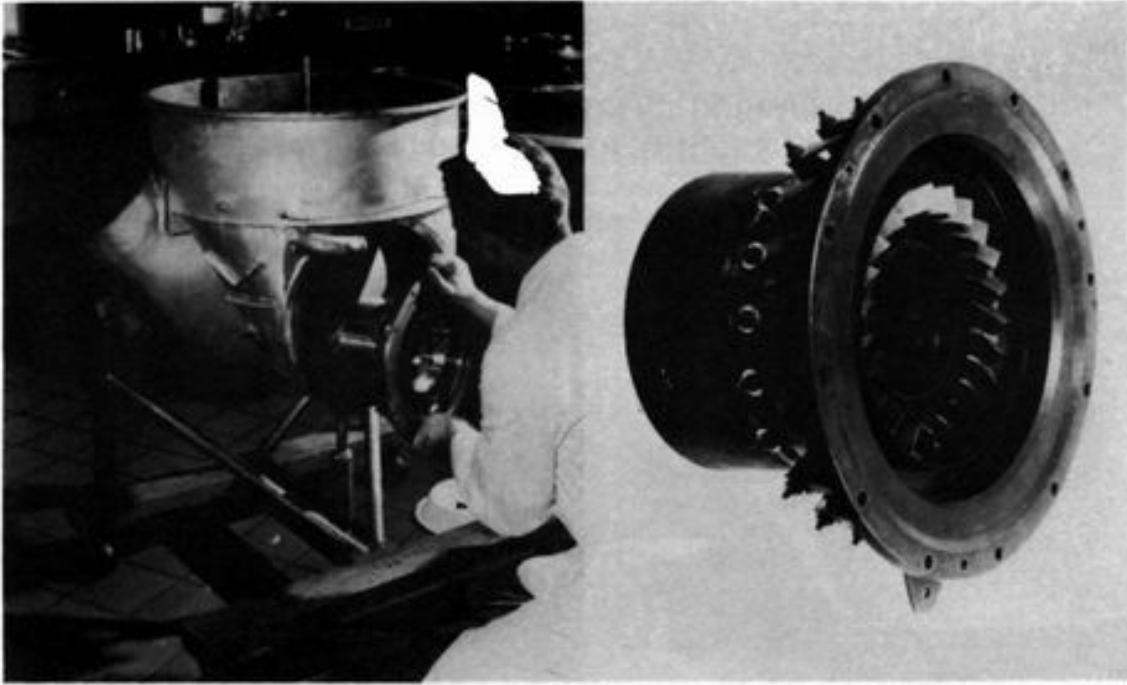


MAIN COMPONENTS OF THE THIRD GENERATION GAS TURBINE ENGINE

(A) the starter-generator; (B) fuel pump; (C) regenerator; (D) compressor impeller; (E) combustion chamber; (F) first-stage turbine, which drives the compressor impeller and accessories; (G) variable second-stage nozzle; (H) second-stage turbine which supplies power to the driveshaft; (I) one of two exhaust outlets; (J) single-stage helical reduction gear of 8.53-to-1 ratio which reduces power turbine rpm of 39,000 to 45,730, to a rated output speed of 4,570 to 5,360 rpm.

The key to the excellent performance and economy of the third-generation gas turbine (called the CR2A) was its new variable turbine nozzle mechanism.

The automatic second stage turbine nozzles provided optimum performance throughout the entire operating range of the engine. Thus, economy, performance, or engine braking could be maximized as required by the driver. For example, one area of performance is what is termed acceleration lag -- the time it takes the compressor section to reach operating speed, which would provide maximum power, after the accelerator pedal is depressed. The first generation turbine engine had an acceleration lag of 7 seconds from idle to full-rated output;



VARIABLE NOZZLE MECHANISM

Variable nozzle mechanism is installed by a research engineer in the rear of the Third Generation turbine engine housing (left). The nozzle mechanism (right) acts in shutter fashion to provide engine braking, improve acceleration and increase fuel economy by controlling and directing the angle of the jet stream to the power turbine blades.



1962 TURBINE TWINS



STOPOVER POINTS ON CONSUMER REACTION TOUR

the second generation engine required 5 seconds, while the third generation engine required less than 2 seconds to accomplish the same performance.

Another experimental turbine-powered car -- the Plymouth Turbo Fury -- joined the Dodge Turbo Dart, and the two turbine-powered cars began extensive consumer reaction tours at dealerships throughout the country in cities such as Los Angeles, San Francisco, Kansas City, St. Louis, Cleveland, Detroit, Chicago, etc. Two other turbine cars, a second Dodge and a second Plymouth, were added during the month of April in order to expand coverage of the tours. All four cars were powered by versions of the third generation turbine engine.

The tour schedule was similar in each area. When the cars arrived in a given city, they were first displayed to members of the local press. The press events involved explaining the turbine and answering questions, giving each newsman a ride in one of the cars and, in some cases, staging special tests. After members of the press had viewed the cars, they were then displayed at various dealerships.

One of the key reasons for these tours and exhibits was to elicit and evaluate consumer reactions to the turbine. The cars were shown at Plymouth and Dodge dealerships in approximately 90 major cities in the United States and Canada.

During this time hundreds of thousands of people came to see the turbine vehicles, and public interest was intense and serious. When asked, "If this car were offered for sale to the motoring public, do you think you would buy one?", 30 percent of the turbine viewers said, "Yes," they would definitely buy one and 54 percent answered they would think seriously of buying one.