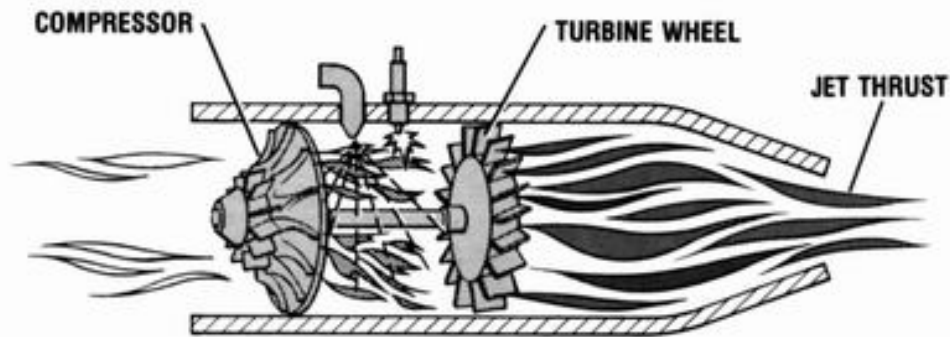


DIAGRAM OF GAS TURBINE OPERATION



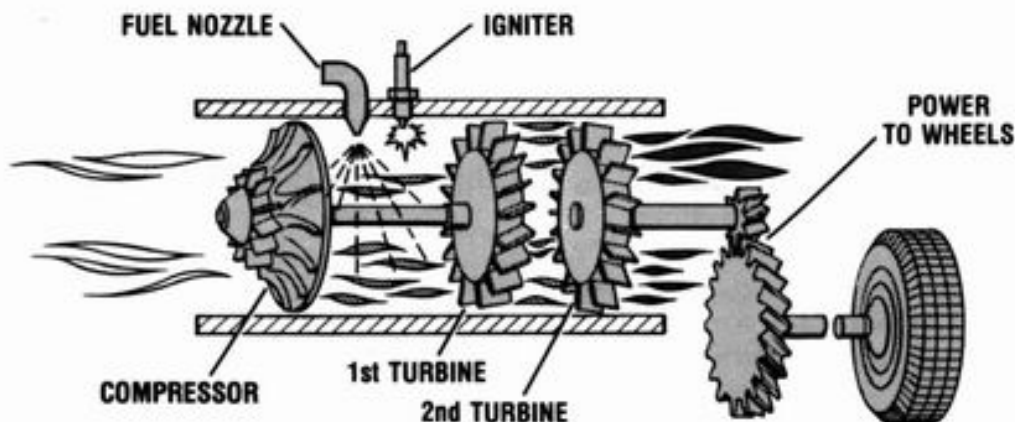
AIRCRAFT JET ENGINE

The turbine engine "makes its own wind." In an aircraft jet engine, the compressor draws in cool air which combines with fuel to produce a hot, rapidly expanding gas -- the "wind." This gas turns the turbine wheel -- the "windmill" -- which turns the compressor. The hot exhaust gases, escaping from the rear, provide jet thrust.

To perform efficiently the functions of an automotive power plant, Chrysler's gas turbine is designed with these main units:

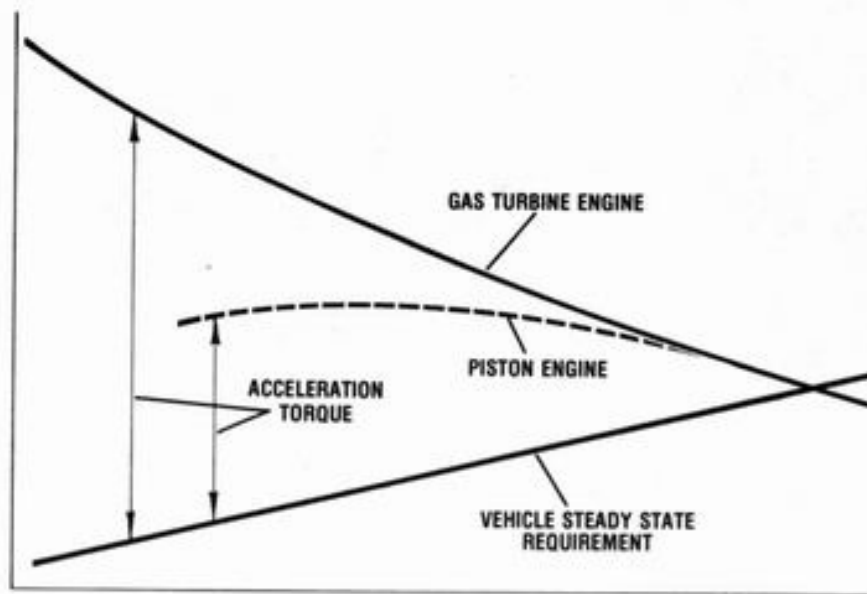
- Air compressor
- Burner
- First-stage turbine wheel (compressor turbine) to drive the compressor
- Second-stage turbine wheel (power turbine) to drive the car
- Regenerator(s).

The air compressor draws in air and compresses it to raise the pressure, at maximum power, to about 4 atmospheres, or about 45 psi (310 kPa). In the process of compression, air temperature rises several hundred degrees. This compressed air flows through the regenerator(s) where in current engines it picks up more heat, up to about 1400°F (760°C), and then enters the burner, where it combines with fuel, producing a temperature of about 1925°F (1052°C). This very hot stream of high-pressure gas then forces its way through the blades of the compressor turbine, which turns the compressor. It then goes through the blades of the power turbine, which is connected to the rear wheels to drive the car.



AUTOMOTIVE GAS TURBINE ENGINE

In the automotive gas turbine engine, there are two stages: 1st turbine drives the compressor; 2nd turbine drives the wheels.



COMPARISON OF TORQUE CHARACTERISTICS

At idle, the speed of the compressor and its turbine wheel in current engines is about 30,000 rpm, and the speed of the car-driving turbine wheel is zero when the vehicle is standing still. When the car is in motion, the compressor and its turbine wheel can operate at speeds above 60,000 rpm and the car-driving turbine can rotate at speeds in excess of 70,000 rpm. The high rotational speeds of the power turbine are geared down in the engine to a usable speed for driving the wheels of the car.

From the burner through the turbine wheels, there is a drop in temperature and pressure of the gases, but the gases still retain large amounts of heat which would be wasted if merely allowed to escape through the exhaust pipe. So a device for salvaging the heat energy is placed in the path of the out-rushing gases. This component is a regenerator, a form of heat exchanger. It recovers heat from the hot exhaust gases and transfers this potential energy to the high pressure air flowing from the compressor to the burner, reducing the burner heat rise requirement. This regenerator is the principal feature which differentiates an automotive gas turbine from an aircraft turbine.

One of the exceptional features of the automotive gas turbine is that it will operate satisfactorily on a wide range of fuels without engine adjustments. This includes such fuels as unleaded gasoline, kerosene, diesel fuel, JP-4 jet fuel, and alcohol.

Another exceptional feature is the turbine's torque characteristic. In a car, the turbine's torque is greatest at breakaway from a standing position and decreases as the car speed increases where it is less necessary. This contrasts with the piston engine's torque characteristic, which builds to a maximum in the mid-speed range and then declines.

The gas turbine's potential as an automotive power plant, its capability to operate on a wide range of fuels, and its exceptional torque characteristics have played key roles in its continued development by Chrysler. Use of the engine in an automotive application became a reality in early 1954 when it was used in the first Chrysler-built turbine vehicle.



1954 PLYMOUTH TURBINE CAR GETS A PROVING GROUNDS WORKOUT

THE FIRST TURBINE CAR

March 25, 1954, was a very important date in automotive gas turbine history: Chrysler Corporation disclosed the development and successful road testing of a 1954 production model Plymouth sport coupe powered by a gas turbine engine. This car was on display from April 7 through 11 at the Waldorf-Astoria Hotel in New York City. On June 16, 1954, it was demonstrated publicly at the dedication of the Chrysler Engineering Proving Ground near Chelsea, Michigan. This car marked the first attempt by an American automotive firm to install a gas turbine engine in a production automobile.

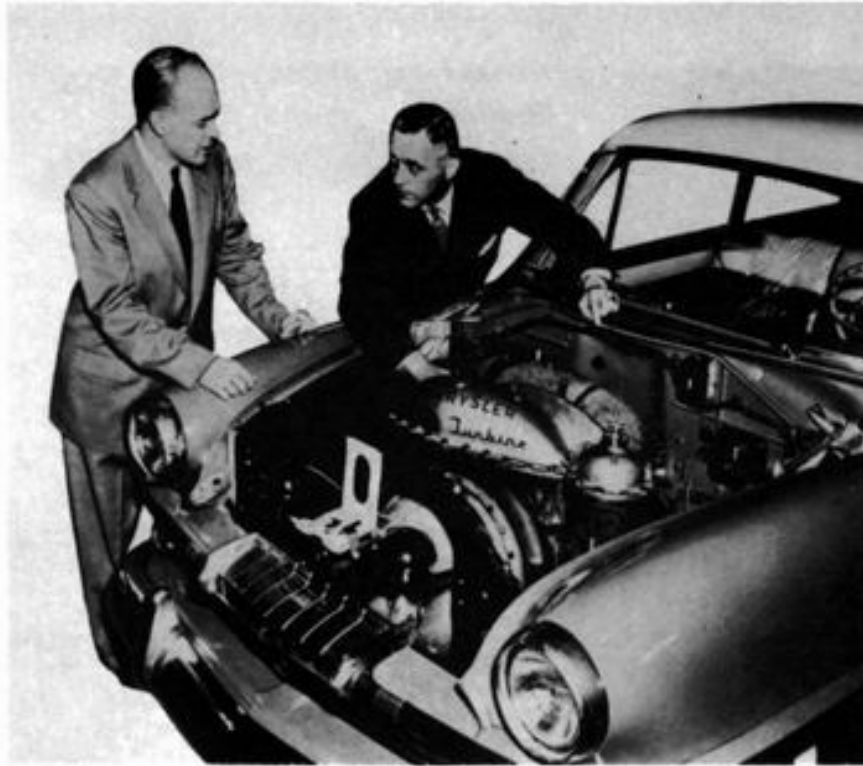
The engine was rated at 100 shaft horsepower (74.6 kW). Although built essentially as a laboratory development tool, it was considered to be a "milestone in automotive power engineering" because it embodied solutions to two of the major problems long associated with vehicular gas turbines -- high fuel consumption and scorching exhaust gas.

The key feature which contributed to removing these technical barriers was the revolutionary new heat exchanger, or regenerator. It extracted heat from the hot exhaust gases, transferred this energy to the compressed air, and thus reduced the burner's job of raising the gas temperature. The result was conservation of fuel as well as lower exhaust temperatures.

A gas turbine engine without a regenerator requires several times the amount of fuel used in a regenerator-equipped engine.

The regenerator also reduced the exhaust gas temperature from about 1200° F (650° C) at full engine power to a safe level of less than 500° F (260° C). Even more important, at idle the temperature was reduced to 170° F (77° C). By the time the gases pass through the exhaust ducts to the atmosphere, the temperature was reduced even further.

Even with these breakthroughs, a great deal of work and many development problems still remained. On the date of the original turbine disclosure (March 24, 1954), Chrysler Corporation stated: "Whether we ultimately shall see commercial production of gas turbines for passenger cars depends on the long-range solution of many complex metallurgical and manufacturing problems. There is no telling at this time how long it will take to solve these problems."



TURBINE ENGINE FITS NEATLY INTO 1954 PLYMOUTH

Almost a year later, the same basic engine was installed in a 1955 Plymouth. This car, although never displayed at public exhibits, was used for driving evaluation tests on Detroit area streets.



DETROIT TRAFFIC TEST FOR 1955 TURBINE