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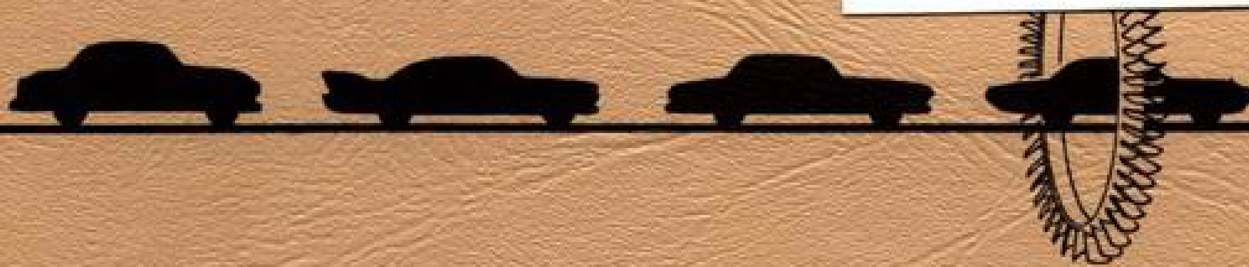

History of Chrysler Corporation GAS TURBINE VEHICLES

CHRYSLER CORPORATION

HISTORY OF CHRYSLER CORPORATION'S GAS TURBINE VEHICLES

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INTRODUCTION

The earliest work on gas turbine engines at Chrysler Corporation dates back to the late 1930s, before World War II, when an exploratory engineering survey was conducted. This survey indicated that the gas turbine engine had the potential to become an automotive power plant. It also indicated, however, that neither materials nor turbine design and manufacturing techniques had advanced to the point where the cost and time of intensive research would be warranted.

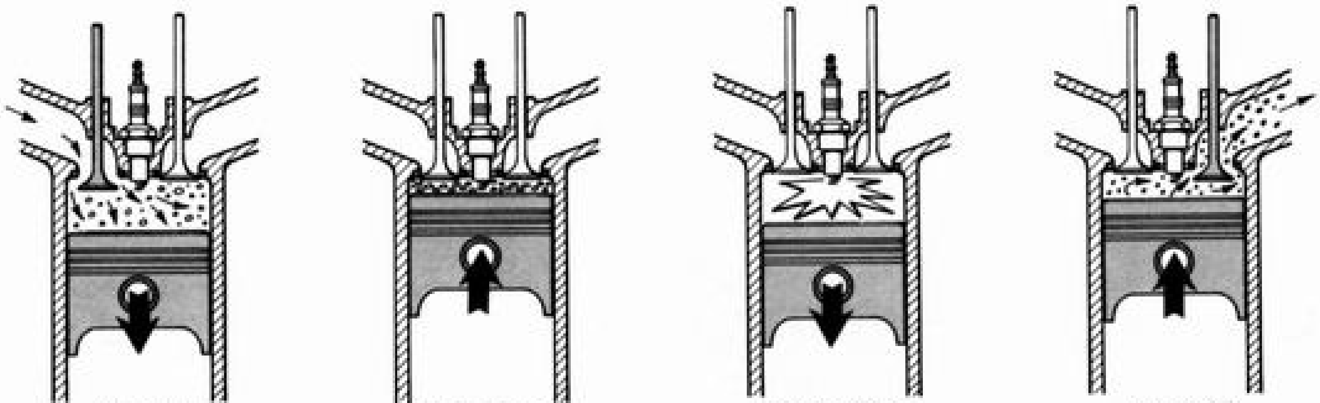
At the close of World War II, studies on new concepts in gas turbine design were started. As a result of this work, Chrysler was awarded a contract by the U. S. Navy in late 1945 to design and build an aircraft turboprop engine. This contract, although terminated in 1949, resulted in the development of a turboprop engine which achieved fuel economy approaching that of piston-type aircraft engines.

Chrysler research scientists and engineers then returned to their original objective -- the automotive gas turbine engine. During the early 1950's, experimental gas turbine power plants were operated on dynamometers and in test vehicles. Active component development programs were carried out to improve compressors, regenerators, turbine sections, burner controls, gears, and accessories. Progress was such that in early 1954, Chrysler announced the successful road testing of a production car powered by a turbine engine. Thus, the potential of the gas turbine was convincingly demonstrated and was shown to warrant further research and development.

Significant advances in fundamental gas turbine engine technology were made by Chrysler during the subsequent eighteen years. This expertise was recognized by the award of a Federal government contract in late 1972 to develop a gas turbine-powered car which met certain emission, fuel economy, performance, and cost requirements. Chrysler's 6th-generation turbine engine was selected as the baseline engine for upgrading to meet the contract goals. Work on this contract is expected to be completed in 1978.

In today's search for viable options in conserving our nation's energy, the gas turbine engine continues to be a prime candidate as an alternative power plant to the conventional automotive piston-type engine. Factors on which this conclusion is based include:

- Excellent fuel economy potential
- Inherent multi-fuel capability
- Inherent low exhaust emissions; no exhaust aftertreatment required
- Fewer moving parts
- Reduced maintenance
- Long engine life expectancy
- Engine coolant not required
- Vibration-free engine operation
- Engine does not stall with sudden overloading
- High standing start breakaway torque
- Reduced engine weight
- Negligible oil consumption
- No warm-up period necessary
- Cool exhaust gases
- Exhaust muffler/silencer not required.



PISTON ENGINE OPERATION

FUNDAMENTALS OF ENGINE OPERATION

Both the gas turbine engine and the conventional piston-type, four-cycle engine operate through use of air induction, compression, heating, and expansion. These functions occur repeatedly in each cylinder of a piston-type engine, but in the gas turbine engine, they are a continuous process, occurring in stages throughout components of the engine. The principal difference in the thermodynamic cycles of the two engines is that in the piston engine, combustion occurs at a constant volume (all at once when the piston is near the top of the cylinder) whereas in the turbine engine, combustion is continuous at a constant pressure. The peak pressures in the gas turbine engine range from 5 to 45 psi (34 to 310 kPa), idle to maximum power, while those in the piston engine are about ten times greater but are of very short duration.

A gas turbine engine has several major components connected together to form an operating system. In a typical aircraft jet engine, which is a type of gas turbine engine, air is first drawn into a compressor which increases air pressure and temperature. This air is then forced into a burner where it mixes with fuel, and combustion occurs. After being heated by combustion, hot gases expand through one or more turbine wheels to transform the thermal energy in the hot, high-pressure gases into mechanical energy. In a jet engine, the turbine wheel(s) take out only enough energy to drive the engine's compressor and the airplane accessory systems. Most of the energy remains in the stream of exhaust gases, so propelling power is provided by the forward thrust produced by the exhaust gas as it leaves the engine's tailpipe.

An aircraft turboprop engine, although quite similar to the jet engine, is more like an automotive gas turbine. It has an additional turbine wheel, a power turbine wheel, which uses most of the energy in the exhaust gases and transforms it into driving power for the propeller. In an automobile gas turbine engine, the power turbine wheel is used to deliver power to the wheels of the car.