

ECE BUS



LTV AEROSPACE
CORPORATION



External Combustion Engine Bus

ORGANIC RANKINE CYCLE ENGINE PROJECT

The project is being conducted under a grant from the U. S. Department of Transportation (DOT) to the Dallas Transit System. The Ground Transportation Division of LTV Aerospace Corporation, under contract to the Dallas Transit System, is supervising the program and is the technical monitor. The Sundstrand Aviation Division of the Sundstrand Corporation, Rockford, Illinois, developed the engine as a subcontractor. The completed engine was installed in the rear of a conventional 25-passenger bus manufactured by Highway Products, Inc., Kent, Ohio.

PHASE I PROGRAM

The objective of this program is to develop and demonstrate the technical feasibility of a Rankine Cycle Engine as a low exhaust emission power source for a passenger bus. The particular engine being developed in this project uses an organic working fluid rather than water, hence the name, "Organic Rankine Cycle Engine." The engine you see installed in the bus is an engineering research model designed to accomplish the basic program objective and obtain engineering data to determine its feasibility. The bus itself is an engineering test vehicle with instrumentation installed to measure the engine and vehicle performance. The bus is not intended to be used in revenue passenger service. Exhaust emissions measurements of the gasoline engine normally installed in this bus were performed by the U. S. Environmental Protection Agency at Ann Arbor, Michigan. Exhaust emissions of the installed Organic Rankine Cycle Engine

will be performed by the same agency under the same conditions for a direct comparison of the emissions from the two engines.

ENGINE SYSTEM DESCRIPTION

In a Rankine Cycle Engine, a working fluid with suitable expansion and condensation characteristics, varying with temperature, is circulated through a system consisting of a vaporizer, prime mover, and condenser. The working fluid is completely enclosed and made to recirculate by a pump. The working fluid is changed from a liquid to vapor in the vaporizer by the addition of heat. The vapor is expanded through a prime mover which will provide power to the driveshaft and engine accessories. In the condenser the vapor is converted back to its liquid state and is ready to go through the cycle again.

The low-pollution characteristics of a Rankine Cycle Engine stem from the fact that combustion of fuel takes place in the open air and is more complete than the burning in an enclosed cylinder of the conventional internal combustion engine.

This particular engine being developed operates on the basic principal of the Rankine Cycle just described and has the following characteristics:

1. Working fluid — CP-25 (Toluol)
2. Prime mover — Turbine
3. Fuel — Propane
4. Maximum working fluid temperature — 700°F
5. Maximum working fluid pressure — 700 PSI
6. Horsepower — 120 gross

For further information, please contact:

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