

COMBUSTION SYSTEM FOR RADIATION INVESTIGATIONS

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Description of Combustion System Hardware

The combustion system consists of an inlet interface flange, inlet diffuser, fuel struts and nozzles, combustor liner, liner housing and exhaust flange. The system will be installed in an existing test facility that can furnish combustion air at the conditions listed below. The system was designed for operation at 40 atmospheres inlet pressure, 900 K inlet temperature, and air flow to 80 kg/sec.

Six penetrations are provided in the outer pressure housing.

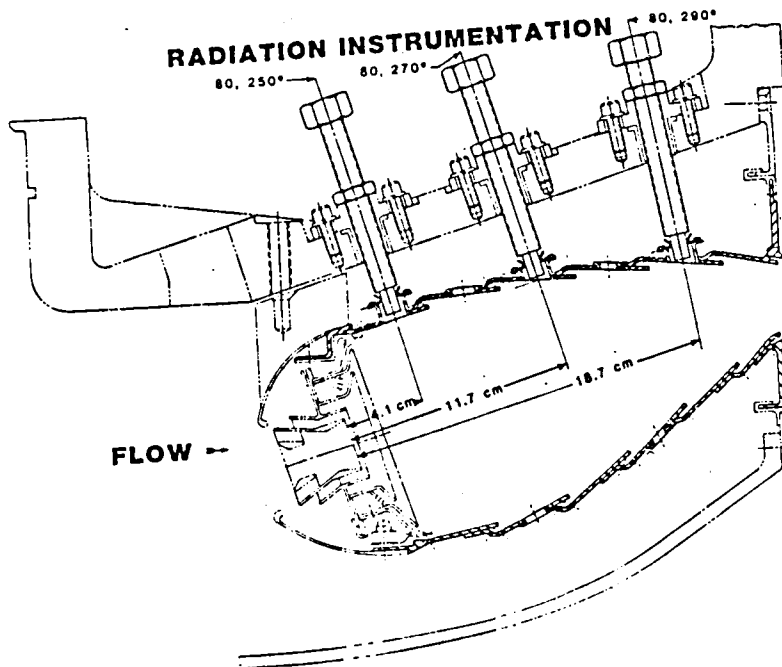
Adapters at the penetrations, permit use of various types of radiation instrumentation, such as total radiometers, spectral radiometers, porous plug and heat flux gages.

The primary zone of the combustor will have hardware modifications that will permit operation at different primary zone fuel-air ratios with constant overall fuel-air ratio.

Rotating exhaust instrumentation will be used to determine combustor performance in addition to the radiation data.

Hardware of an existing high temperature combustion system was modified to accept radiation instruments. Five total radiation radiometers and two heat flux gages were installed.

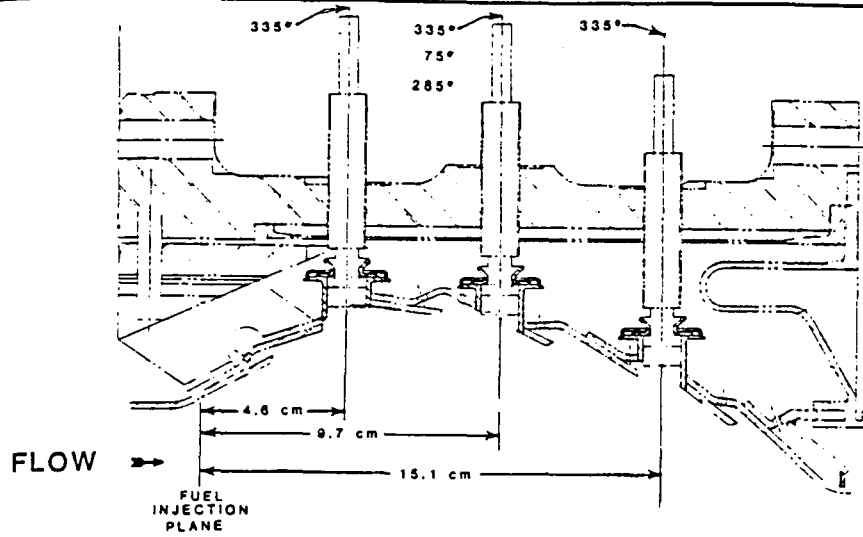
Data are presented showing total radiation at three axial positions of the combustor, and comparison of total radiation with data from a heat flux gage.



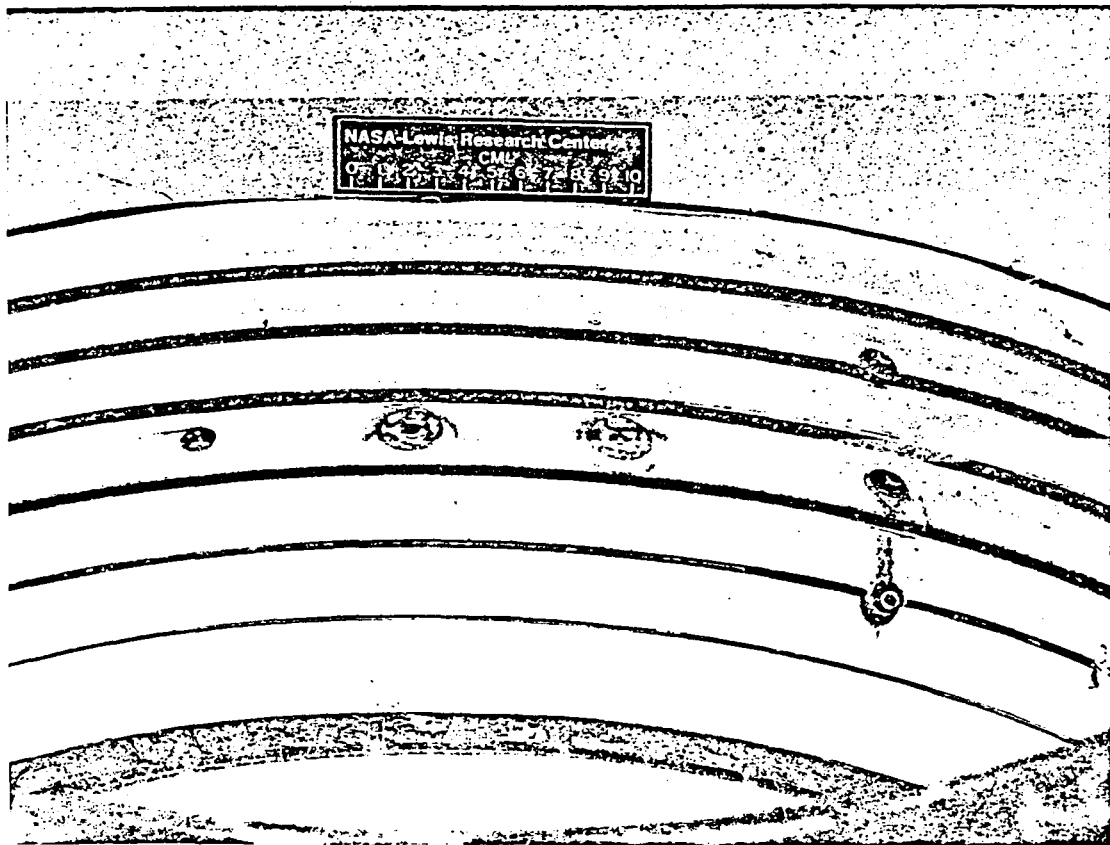
DESIGN CYCLE CONDITIONS

| | <u>INLET TOTAL</u> | | <u>DIFFUSER</u> | <u>COMBUSTOR</u> | |
|-----------|--------------------|-------|-----------------|------------------|---------|
| | Press. | Temp. | INLET | F/A | Exhaust |
| | MPa | K | MACH | | Temp. |
| | | | NO. | | K |
| TAKEOFF | 4.05 | 889 | 0.328 | 0.0275 | 1779 |
| CLIMB | 3.47 | 849 | .331 | .0248 | 1669 |
| CRUISE | 1.72 | 815 | .333 | .0257 | 1674 |
| TAXI IDLE | .50 | 517 | .337 | .0114 | 972 |

RADIATION INSTRUMENTATION



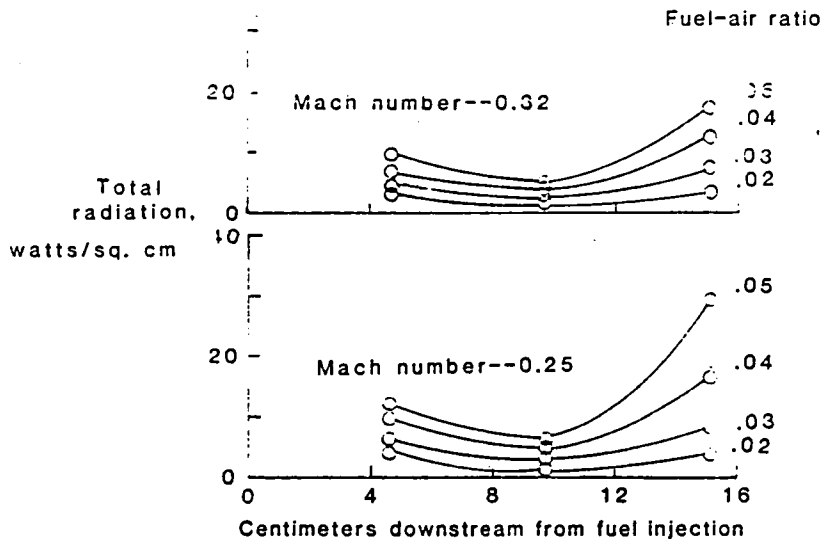
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TOTAL RADIATION

Combustor inlet

Pressure--0.69 MPa
Temp.--560 K



RADIATION AND HEAT FLUX

Press.--0.69 MPa
Temp.--560 K

