

OAST KEY FACILITY REPORT

Lewis Research Center

FACILITY NAME: Rocket Engine Test Facility Complex      BUILDING NO.: 100-202'

YEAR BUILT: 1956      INITIAL COST: \$2,728,692      BOOK VALUE: \$3,717,383

DESCRIPTION: The Rocket Engine Test Facility Complex consists of a facility permitting the testing of full-scale rocket engines and a separate general office/control building.

The Rocket Engine Test Facility (202) is designed for sea-level testing of vertically mounted rocket engines. The Rocket Operations Building (100) contains the control room for the Rocket Engine Test Facility, a shop area and general office space.

ANNUAL KWH CONSUMPTION:

DATA SYSTEMS STATUS: SEL multiplexer and digitizer into the LeRC SEL Central Data Acquisition System.

NUMBER OF PEOPLE TO OPERATE: 8/shift

CAPACITY: At present, gaseous hydrogen-liquid oxygen is being run at 5,000 lbs. thrust and 600 psia although the current research configuration can accommodate chamber pressures up to 2,100 psia and thrust levels up to 20,000 lbs.

Propellant tanks in service are:

- 175 cubic foot vacuum-jacketed liquid hydrogen tank (1), 1440 psi
- 55 cubic foot liquid oxygen tank, LN2 bath (1), 1440 psi
- 133 cubic foot vacuum-jacketed liquid hydrogen tank (1), 5,000 psi
- 53 cubic foot cryogenic oxidizer tank, LN2 bath (1), 5,000 psi
- 55 cubic foot stainless steel clad storable fuel tank (2), 1440 psi
- 78 cubic foot stainless storable fuel tank (2), 6,000 psi
- 175 cubic foot stainless water tank (1), 1440 psi

The facility also has provisions for both gas and water storage. Currently, gaseous hydrogen and gaseous helium are being stored at 4000 psig and gaseous nitrogen is being stored at 3000 psig. A 450,000 gal. water storage tank is used for the scrubber and muffler as well as providing a source of water for the two 650 gal/min and 1400 gal/min (at 450 psi) pumps.

OPERATING DURATION: Fractional second tests to over 100 second tests.

PRIOR YEAR PROGRAMS: Cooling and Combustion Technology, Rocket engines.

FACILITY UTILIZATION: 1 shift

CURRENT PROGRAMS: 1. Cooling and Combustion Technology, Rocket; 2. High Density Fuels and LOX Cooling, Rocket.

UTILIZATION: 3 test days/week

BACKLOG: Programs scheduled thru January 1981.

PROJECTED USE: Continuation of current programs.

EXPECTED UTILIZATION: Continuous

PROJECTED LIFE OF FACILITY: Indefinite

RELATIONSHIP TO OTHER TECHNICAL FACILITIES: This facility is unique because of its multi-propellant capabilities and its high pressure capability.

PLANNED IMPROVEMENTS:

1. Installation of 3 gas storage bottles for 6000 psi gaseous hydrogen and 1 bottle for 6000 psi gaseous helium,
2. Installation of a second test stand, horizontally firing, 200 to 1000 lb. thrust.

## LERC - RETF TEST STAND CAPABILITY

### o CONDITIONS AT TEST ARTICLE:

	(OPERATIONAL)	(FALL 1982)
o LH <sub>2</sub> - 6.1 #/SEC @ 3500 PSI	-----	& @ 4000 PSI
o GH <sub>2</sub> - 6.1 #/SEC @ 3500 PSI	-----	& @ 5000 PSI
o LOX - 37 #/SEC @ 3500 PSI	-----	& @ 4000 PSI

### o FACILITY CAPABILITY:

- o LH<sub>2</sub> - 995 GAL, 5000 PSI (OPERATIONAL)
- o LOX - 396 GAL, 5000 PSI (OPERATIONAL)
- o H<sub>2</sub>O - 583 GAL, 6000 PSI (OPERATIONAL)
- o GH<sub>2</sub> - 4000 PSI (OPERATIONAL)  
(6000 PSI - FALL 1982)
- o GHe - 4000 PSI (OPERATIONAL)  
(6000 PSI - JAN 1981)
- o GN<sub>2</sub> - 3000 PSI (OPERATIONAL)
- o HYDROCARBONS - 583 GAL, 6000 PSI (OPERATIONAL)
- o COOLING WATER - 54 INCH MAIN - 650 GPM & 1400 GPM  
PUMPS @ 450 PSI (OPERATIONAL)

### o COST OF ACTIVATION:

- o ALL SYSTEMS CURRENTLY ACTIVE
- o FUNDS FOR PLANNED IMPROVEMENTS AVAILABLE AND/OR APPLIED FOR

# ROCKET ENGINE TEST FACILITY

LOCATION: TEST CELL - SOUTH 40  
CONTROL ROOM - ROCKET OPERATIONS BUILDING (ROB)

TECHNOLOGY AREAS SUPPORTED:

- ROCKET COOLING AND COMBUSTION
- ROCKET PERFORMANCE AND STABILITY
- LOW CYCLE THERMAL FATIGUE

DESCRIPTION:

- SEA LEVEL TESTING OF VERTICALLY MOUNTED ROCKET ENGINES (20K, 600 Pc)
- TEST FIRE INTO EXHAUST GAS MUFFLER & SCRUBBER SYSTEM
- HIGH ENERGY AND TOXIC PROPELLANTS (F<sub>2</sub>, RP-1, N<sub>2</sub>O<sub>4</sub>, UDMH-N<sub>2</sub>H<sub>4</sub>, GH<sub>2</sub>, LH<sub>2</sub>, GO<sub>2</sub>, LO<sub>2</sub>)
- SUPPORT SYSTEMS :
  - GH<sub>e</sub>, GH<sub>2</sub>, GN<sub>2</sub>, LN<sub>2</sub>, CO<sub>2</sub>, COOLING WATER (Pumped and Press)
  - WATER TREATMENT SYSTEM, VACUUM SYSTEM
  - HIGH SPEED DIGITIZER
  - 360 DATA PROCESSING WITH ONLINE TERMINALS
  - REMOTELY LOCATED CONTROL ROOM

HISTORY: FACILITY OPERATIONAL SINCE 1958