SECTION II

PLUM BROOK ROCKET SYSTEMS DIVISION

TEST OPERATIONS REPORT

FOR THE MONTH OF

JANUARY 1969

SITE	SITE NAME	RESEARCH INSTALLATION & DESCRIPTION
B-1	HIGH ENERGY ROCKET ENGINE FACILITY	

CENTAUR
YOQ2273
(LVD - RF Lacovic;
RSD - EF Gustke)

Advanced Centaur Tests. Data will be obtained on pressurization and outflow of propellants (LH_2/LOX) from a battleship type Centaur tank. Only one propellant will be outflowed in any one test; LN_2 being substituted for non-flowing propellant.

On January 22 the first LH_2 test of the Block II series was performed. The purpose of this test was to check the pressure drop across the LH_2 duct during rated outflow and to verify that GH_2 was not trapped over the engine inlet valves during LH_2 transfer.

The LH_2 outflow rate was 11.3 lb/sec. and the LH_2 duct leg pressure drops were 0.90 and 0.96 psi. This verified the calculations of the pressure drops. Also, on transfer of LH_2 there was no evidence of GH_2 being trapped over the engine valves.

The next testing in "B-1" will be one- and two-burn LH_2 tests using the flight type pressurization panel. The panel will be chilled to cryogenic temperatures to simulate temperatures at "B-2".

The following items have been completed in preparation for these tests:

(1) The enclosure for temperature conditioning the flight type pressure panel has been fabricated and mounted.

(2) The LN_2 - GN_2 heat exchanger for temperature conditioning the flight type pressure panel has been fabricated.

The Block II LH_2 pressure panel tests will begin the latter part of February. However, the pressurization valves have not passed the acceptance tests at the vendor's plant and a delivery slippage will cause postponement of the B-1 testing.

SECTION II

PLUM BROOK ROCKET SYSTEMS DIVISION

TEST OPERATIONS REPORT

FOR THE MONTH OF

FEBRUARY 1969

SITE	SITE NAME	RESEARCH INSTALLATION & DESCRIPTION
B-1	HIGH ENERGY ROCKET ENGINE FACILITY	

CENTAUR
Y0Q2273
(LVD - RF Lacovic;
RSD - DD Edie)

Advanced Centaur Tests. Data will be obtained on pressurization and outflow of propellants (LH_2/LOX) from a battleship type Centaur tank. Only one propellant will be outflowed in any one test; LN_2 being substituted for non-flowing propellant.

During February the pressurization valves failed to pass the vendor's vibration test. This has delayed delivery of the pressure panel to Plum Brook and, therefore, has delayed the Block II pressure panel tests. The following tasks were completed in February in preparation for this testing:

(1) Flight type tubing was installed from the helium spheres to the pressure panel location and from this location to both the hydrogen and oxygen tanks of the BPTV.

(2) The pressure panel temperature conditioning system was completed and checked.

(3) Nearly all instrumentation was installed for the Block II pressure panel LH_2 test.

After these tasks were completed, all "B-1" personnel were transferred to the "B-2" facility. They will return upon delivery of the pressure panel. Block II testing with the pressure panel is scheduled to begin the latter part of March.

SECTION II

PLUM BROOK ROCKET SYSTEMS DIVISION

TEST OPERATIONS REPORT

FOR THE MONTH OF

MARCH 1969

SITE	SITE NAME RESEARCH INSTALLATION & DESCRIPTION
B-1	HIGH ENERGY ROCKET ENGINE FACILITY

CENTAUR
YOQ2273
(LVD - RF Lacovic;
RSD - DD Edie)

Advanced Centaur Tests. Data will be obtained on pressurization and outflow of propellants (LH_2/LOX) from a battleship type Centaur tank. Only one propellant will be outflowed in any one test; LN_2 being substituted for non-flowing propellant.

Due to further delay in the delivery of the Centaur pressure panel to Plum Brook, no personnel were assigned to B-1 during March. The delay has been caused by failure of the flight-type pressure panel solenoid valves to pass performance tests.

SECTION II

PLUM BROOK ROCKET SYSTEMS DIVISION

TEST OPERATIONS REPORT

FOR THE MONTH OF

APRIL 1969

SITE	SITE NAME	RESEARCH INSTALLATION & DESCRIPTION
B-1	HIGH ENERGY ROCKET ENGINE FACILITY	

CENTAUR
YOQ2273
(LVD - RF Lacovic;
RSD - DD Edie)

Advanced Centaur Tests. Data will be obtained on pressurization and outflow of propellants (LH_2/LOX) from a battleship type Centaur tank. Only one propellant will be outflowed in any one test; LN_2 being substituted for non-flowing propellant.

The Centaur tank pressurization panel was received at Plum Brook on April 15. It was installed in B-1, and was checked out with the chill system on April 22. Two valves failed to operate at the cold temperatures (260°R). On April 24 and 25 the two bad valves were replaced and the replacements were checked out. LeRC-Cleveland Centaur engineers decided to run LH_2 pressure panel tests with the panel at ambient temperatures to increase both the safety and reliability of the pressurization solenoid valves. On April 28 a successful checkout of the Centaur pressurization panel was made with the panel at ambient temperature. Liquid hydrogen outflow tests, using the pressurizing panel, are scheduled for May 1 and 2.

SECTION II

PLUM BROOK ROCKET SYSTEMS DIVISION

TEST OPERATIONS REPORT

FOR THE MONTH OF

MAY 1969

SITE	SITE NAME	RESEARCH INSTALLATION & (TASK NO.) - PROJECT ENGINEERS
B-1	HIGH ENERGY ROCKET ENGINE FACILITY	

CENTAUR (YOQ2273) — LVD - R.F. LACOVIC; RSD - D. D. EDIE

On May 2 the Centaur tank LH_2 outflow tests were made using the pressurization panel equipped with Valcor solenoid valves. As in previous LH_2 testing, the battleship Centaur tank was filled the day before and allowed to chill down overnight. Two 2-burn simulation and one single-burn simulation test were performed. Two additional helium burps were made at 3% ullage to verify high liquid level burp requirements. All tests were performed successfully and all equipment operated as programmed.

After this testing was completed, the LH_2 duct and outflow connection were removed and the LOX ducts and outflow connection were installed. Again, with the pressurization panel at ambient temperatures, four LOX outflow tests were performed on May 14. Valcor solenoid valves were used for GHe pressurization of the LOX tank. The first test was a 2-burn simulation with helium gas pressurizing the LOX tank through the standpipe. The second test was also a 2-burn simulation except that a bubbler ring was used during LOX tank pressurization. The third and fourth tests were one-burn simulations using varying programmed times for operation of the two LOX pressurization solenoid valves. All equipment performed as programmed.

On May 28, three LOX outflow tests were performed. For these tests the Valcor pressurization solenoid valves were replaced by Calmec pressurization solenoid valves. On a checkout on May 23 it was verified that the Calmec valves would operate at 140°R. The first test on May 28 was a two-burn simulation with the Calmec pressurization valves at ambient temperature. The second test was identical to the first except that the Calmec pressurization solenoid valves were chilled to 200°R before the test. The third test was a one-burn simulation with the Calmec valves chilled to 140°R before the tests. All equipment functioned properly and all tests were successful.