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Part 1.

College of Aeronautics.

Characteristics of the High Temperature Mechanisms
of Creep and Recovery in Graphite.



Contract No. DA-91-591-E.U.C. 2629.

Quarterly Technical Status Report No. 1.

August 1st 1962 - October 31st, 1962.

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Cranfield, Bletchley,
Bucks, England.



1. Statement of Work Carried Out.

The calibration of the torsion creep apparatus fully described in F.T.N.I., of Contract No. DA-91-591-E.U.C. 1759 has continued throughout the period covered by this report. In addition some minor modifications have been made to the equipment. These have been as follows:-

- a. Extensive trials with various geometries of heating element have been led to the adoption of an element made by cutting a double spiral groove in a $\frac{1}{2}$ " thick wall graphite tube. Each spiral makes a single turn over the 3" heating zone. This element combines the optimum electrical resistance with longevity of life.
- b. Consideration has been given to the replacement of the inner graphite radiation shield by one made from carbon felt. This should considerably reduce radiation losses and enable temperature to be reached more readily with less power.
- c. The bus-bars and cables bringing current to the furnace were found to over-heat at maximum load (1500A). They have now been duplicated. A protective cut-out thermostat has been placed in the 16:1 step down transformer.
- d. A second pressure reducing valve, at present operated manually, has been installed in the hydraulic system. In addition an hydraulic accumulator has been installed in the line between this second reducing valve and the electromagnetic reversing valve. This measure, together with the introduction of more sensitive

pressure gauges, has been carried out in an attempt to obtain a constant load without the complications of a servo-control unit on the second reducing valve.

Tests have been carried out to determine the stability of the electronic recording system and the temperature control. The latter at all temperatures showed no discernible temperature variations.

Calibration of the electronic strain-measuring and load measuring units against known movements and loads is proceeding and it is hoped to include the full calibration figures in the next report.

Methods for the determination of the density of graphite have been compared in trials on various carbons and graphite. The technique of measuring weights loss on immersion in methanol or kerosene gave reproducible results and will be used in our experimental work.

2. Research Plans.

These remain as stated in the previous report.

3. Personnel, Administrative Actions, Conferences, etc.

The personnel engaged on this contract remain the same. College workshop personnel have contributed four hundred hours work in the period covered by this report.

Dr. Younger visited Harwell Experimental Graphite Plant on August 9th.

4. Utilisation of Funds.

The funds have been fully utilised in this period.

5. Important property required.

Delivery of the data amplifier has been made during this period.

6. Miscellaneous.

Nil.

