EMETER INSTAL A GYPSY QUEEN 71 ENGINE D DOVE AIRCRAF ROBERTSON. R 12723/R

NOTE NO. 23.
FEBRUARY, 1955.

THE COLLEGE OF AERONAUTICS

CRANFIELD

Flight Tests on a Torquemeter installed on Gipsy Queen 71 Engine on Dove Aircraft

- by -

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SUMMARY

The torquemeter failed at 178 hrs. 50 minutes flying. Torquemeter powers compared with engine powers deduced from maker's curves give the following results:

1) At low BHP readings the torquemeter tends to over-read

2) At high BHP readings the torquemeter tends to under-read.

Introduction

In pursuance of M.O.S. Contract No. 6/ENG/4289/CB.11(b) a torquemeter supplied by M.O.S. through the De Havilland Engine Company was installed on Gipsy Queen 70 Engine No. 65888 on the port side of Dove G-ALVF for development and proving flying.

Installation

The torquemeter was installed in January 1951 to integrate with the Student Flying Programme then in progress. The Air Registration Board gave the necessary clearance for this modification as the aircraft was flying on Civilian Registration, and laid down inspection at a 50 hr. cycle. The torquemeter required bringing up to current modification state and this was done by fitting the coupling shroud ring of the engine to the annulus ring of the torquemeter assembly so bringing the matched Bibby coupling of the torquemeter unit up to standard.

To simplify the installation a Desynn type oil pressure transmitter was used for torquemeter indications, a large SAE case indicator being installed in the fuselage. Fluctuations in the early stages of the tests were eliminated by fitting a simple anti-surge dash pot (Fig. 1) in the oil pressure line from the torquemeter to the Desynn transmitter. The oil pressure transmitter during the tests was prone to shift of calibration zero. This it is considered was caused by transmitter vibration but time did not permit modification.

Flight Tests

Torquemeter readings were taken at various power settings during the course of normal student flight test work. These readings are classed into two groups:

1) Tests in which aircraft and engine conditions have to stabilize before observations are made, e.g. speed power, level speed and fuel consumption tests.

2) Tests in which, though engine conditions are set, power may vary, e.g. Partial Climbs.

Results

The observed engine conditions are corrected to DED 2000 the sea level power being obtained from De Havilland Test Report EE.1241.

Fig. 2 shows for three different calibrations of the torquemeter transmitter the BHP correction to achieve the power given by maker's curves. The zero shift of the torquemeter transmitter is clearly apparent.

Fig. 3 shows the torquemeter indicated powers and the powers deduced from maker's curves during partial and steady climbs.

Conclusions

From these results it appears that the torquemeter in its present form over-reads at low BHP values and under-reads at high BHP values. Further testing over a larger series of powers would be desirable to check these results.

Recommendations

The College of Aeronautics would like to continue the flight testing of the torquemeter when rebuilt incorporating the improvements suggested by Mr. Bickerton of the De Havilland Engine Company and using a modified system of oil pressure indication preventing zero shift of the Calibration and eliminating vibration difficulties.

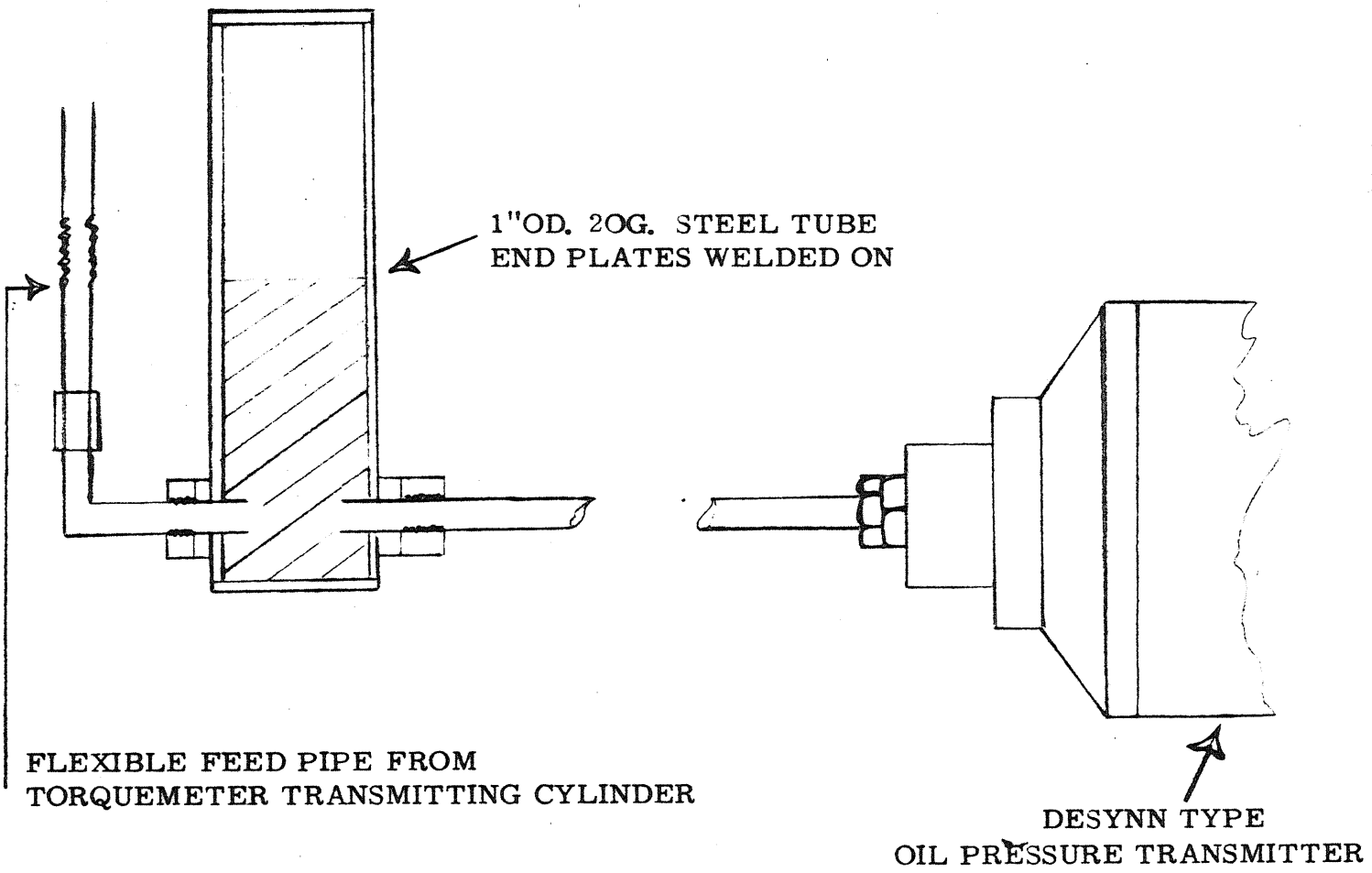

FIGURE 1.

DASH POT IN OIL LINE FROM TORQUEMETER TO PREVENT FLUCTUATIONS.

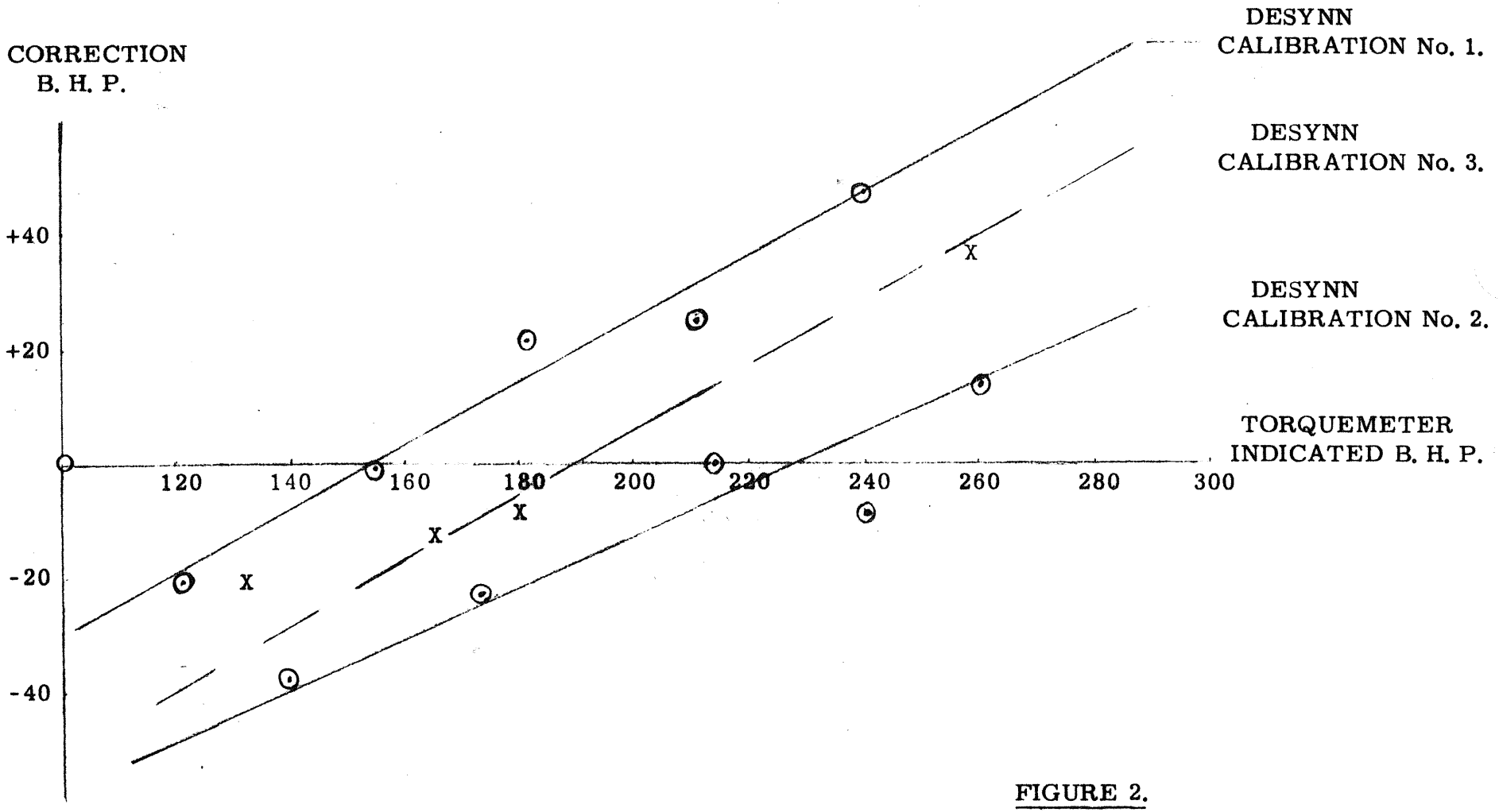

FIGURE 2.

OBSERVATIONS DURING STEADY POWER CONDITIONS.

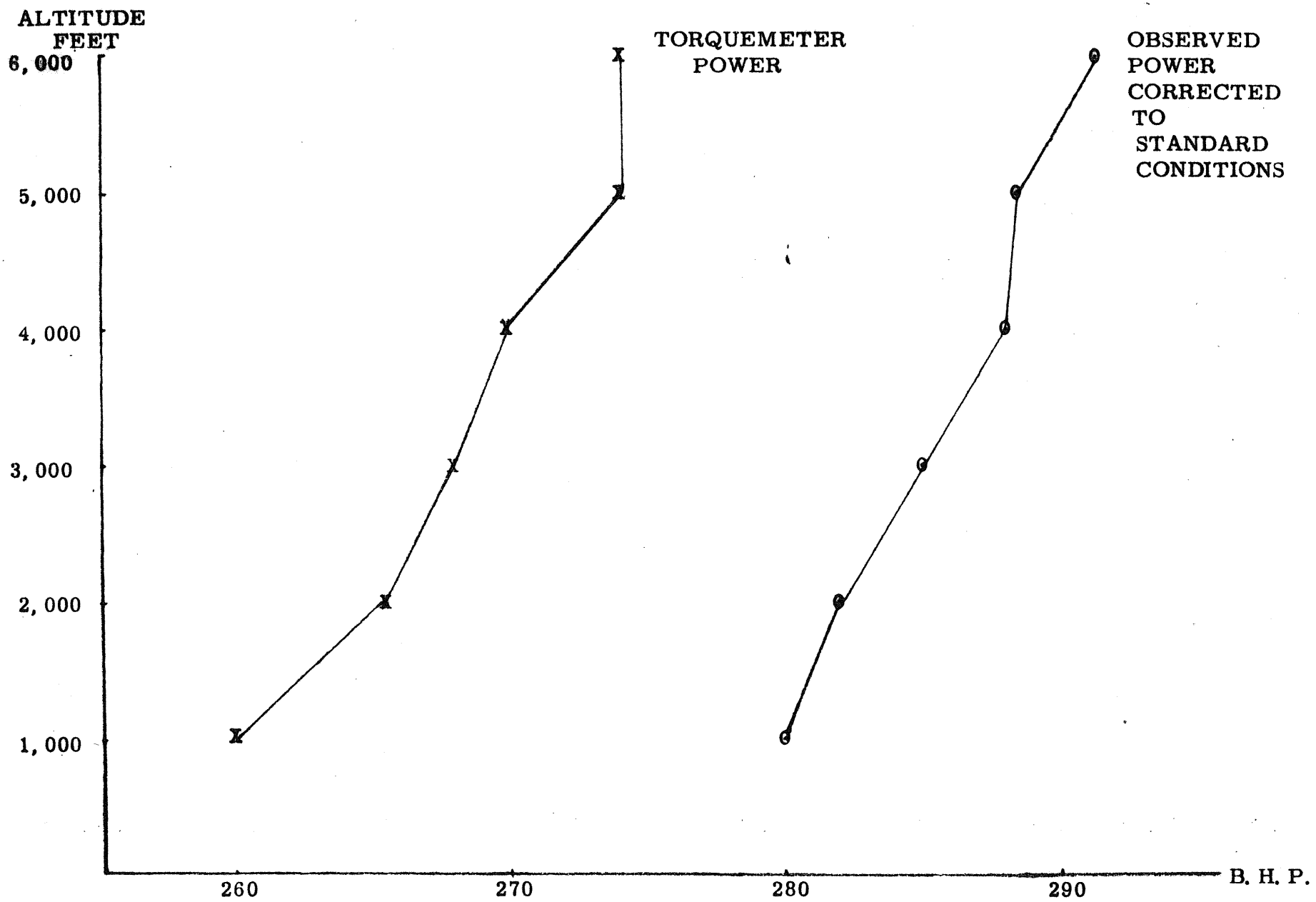

FIGURE 3. OBSERVATIONS DURING CLIMBS.