



AVRO AIRCRAFT LIMITED
MALTON - ONTARIO

TECHNICAL DEPARTMENT

REPORT NO. _____

SHEET NO. _____

1

PREPARED BY

DATE

R. Waechter

April 1959

CHECKED BY

DATE

AIRCRAFT:

ARROW I

PERFORMANCE

ARROW I - THEORY VS FLIGHT TEST EXPERIENCE

1) Take-off and Landing

Ref.71/FAR/22 Aircraft 25201 Analysis of Initial Take-offs and Landings (Flights 1 to 9) May 1958.

71/PERF/19 Revision of Estimation Data for Arrow 1 and 2 Take-off and Landing Performance, June 1958.

- a) Take-off ground run 19% longer than estimated due to unstick speeds approximately 30 knots higher than estimated. Revised $CL_{TO} = 0.50$ compared to original of 0.65.
- b) Take-off air runs to a 50 ft. height are considerably shorter than estimated for the A/B off case but longer for the A/B on case; which for the former case, with A/B off, more than offsets the longer ground run and therefore gives a total distance to 50 feet of 7,167 feet compared to an estimated value of 10,050 feet under standard sea level conditions. The ratio of $V_{50'}$ to V_{TO} averages around 1.1 for the A/B off case and 1.38 for the one and only A/B on case compared to the estimated value of 1.27 for both the A/B on and off cases. This then accounts for some of the differences in air distances, although a major contributing factor for the short air runs in the A/B off case is the higher than estimated unstick and "air" speeds, approaching minimum drag, making T-D approximately 55% better.



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1) Take-off and Landing (continued)

- c) Landing tests were only analysed from the 50 ft. height to touchdown, nosewheel down and to chute open point; while for the complete ground run the final braking system was not installed and no attempt was made to come to a complete stop after applying a normal short landing technique. Airspeeds at 50' and at touchdown and the time from touchdown to nosewheel down were all higher than estimated but V_{50}/V_{TD} averaged approximately 1.1 compared to an estimated value of 1.15, making air distances shorter by approximately 25%. The time from touchdown to chute fully open was also higher than estimated, but no attempt was made to stream the chute as quickly as possible after touchdown. Four seconds appears to be a reasonably "quick" time from touchdown to nosewheel down, chute fully open and brake application. High touchdown speeds are most probably due to pilot's visibility requirements.
- d) Pilot's indicated airspeed values appeared to be considerably lower than measured ground speed values at unstick and at touchdown, most probably due to position error with ground effect.