

WACURTIS

1-WAC AVRO ARROW - 105
GENERAL

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BRIEF SUMMARY OF FIRST ARROW (AIRCRAFT 25201) PROGRESS

TO DATE

An operational requirement for a supersonic all-weather interceptor to follow the CF-100 was generated by the R.C.A.F. in November, 1952, and Spec. AIR 7-3, which covered the requirement for a design study, was issued to Avro in April, 1953.

A Ministerial directive giving Avro authority to proceed with the design study was issued in July, 1953.

Authority to proceed with the design and development of the CF-105 aircraft was received by Avro in May, 1954, at which time design of the air-frame was commenced.

The first issue of engineering information was made to Production in the latter part of 1954, and the first aircraft was rolled out of the Production Shop on October 4, 1957.

The first engine runs on Aircraft 25201 took place on December 4th, 1957, the aircraft starting taxi trials on December 24th, 1957, and the first flight was made on March 25th, 1958.

This brief report covers the flights made to date, and the preparation for the next phase of flying.

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Aircraft 25201 made nine flights in the first twenty-nine days of flying and generally achieved a high degree of reliability, two flights being made in one afternoon, and a third flight was in preparation for the same afternoon, but the weather deteriorated.

The aircraft flew supersonic on the third flight and reached Mach 1.52 at approximately 50,000 feet on the seventh flight.

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The aircraft has been flown by three different pilots, Mr. J. Zurakowski, Avro Chief Development Pilot, making the first seven flights, and F/L Woodman, RCAF C.E., P.E. Pilot, and Mr. Potocki, Avro Development Pilot, carrying out the eighth and ninth flights respectively. On the ninth flight, Mr. Potocki was cleared to fly up to Mach 1.7 and 55,000 feet, but, after carrying out assessment of the low speed handling and acceleration up to Mach 1.2, the weather closed in to almost zero ground visibility, and he did not attempt a speed run.

The aircraft has not yet been pushed to its maximum capability with the Pratt and Whitney J.75 engines, and probing at higher speeds will be carried out on the next series of flights.

Most of the flights have been carried out at a weight considerably in excess of the estimated production mission weight, the highest take-off weight being around 67,000 lb., and the highest landing weight being approximately 54,000 lb.

Total flying hours to date are: 8 hours and 10 minutes, of which at least one half hour has been above Mach 1.

PILOTS' IMPRESSIONS OF FLYING CHARACTERISTICS

The following is an extract from a detailed report by Mr. Zurakowski, on the handling qualities of the aircraft, based on his flights to date:

" 13. Conclusions

- 13.1 In general, handling characteristics and performance of aircraft agreed well with estimates.
- 13.2 Take-off, initial climb, and handling at low speeds (limited by 15° incidence) were satisfactory. Some longitudinal pitching at medium speed was eliminated after first flight by alterations to elevator control circuit and, in last flight, longitudinal behaviour of aircraft was much better. Speeds up to 450 knots A.S.I. and turns up to 2-1/2 'g' were tested at

- lower altitude. Lateral and longitudinal control was sensitive, and pilot's tendency to over-control was present.
- 13.3 In Flight No. 7, at 49,000 ft., aircraft reached $MN_1 = 1.52$ on climb, still accelerating, showing excess of thrust available. Handling of the aircraft at supersonic speeds at higher altitudes was good.
- 13.4 Landing characteristics of aircraft were satisfactory except that, apparently due to restriction of pilot's view ahead, landing speeds were higher than estimated. Drag chute reliability was high, deceleration power very good.
- 13.5 Engine control was very good, reliability high. Some loss of thrust at transonic speeds at higher altitudes was investigated.
- 13.6 Yaw damping system was a considerable help in accurate flying of the aircraft.

SIGNED: J. Zurakowski "

NOTES

- 13.2 The damping system is not yet installed on either the pitch or roll axis and this, coupled with the adjustments which are being made to the control feel system, should eliminate this condition.
- 13.4 An investigation is at present being carried out to improve the pilot's view on landing.
- 13.5 The loss in thrust is now believed to have been rectified by Pratt and Whitney.

A great deal of data recorded from flight test instrumentation is still being analyzed, but the behaviour and general performance of the aircraft is very close to that predicted.

The aircraft is at present having its first major inspection since

first flight, and certain equipment which had only limited flight approval is being replaced, snags cleared up, and the instrumentation brought to a higher standard in readiness for the next series of flight, which we hope to commence during the last week in May

We are scheduling eight to nine flights in Stage Two of our Flight Program, and the aircraft will be cleared on the first flight of this series to the following:

Mach No.	=	1.75		
E.A.S.	=	500 knots		
Altitude	=	60,000 ft.		
NW	=	250,000, that is:	n =	5 at 50,000 lb
			n =	3.85 at 65,000 lb.

The primary objectives of the second test series will be as follows:

- (a) Investigation of stability and control derivatives, using manual and damping step inputs.
- (b) To evaluate the revised flying control system.
- (c) To investigate the brake and gear dynamics.
- (d) To investigate possible engine performance deficiencies.
- (e) To evaluate the revised air conditioning system.

In summary, it can be said that the initial flight test program has been particularly successful and, although the initial flights were mainly scheduled for pilots' assessment, sufficient flying was achieved to be able to credit at least five hours to our Phase One flight test program, providing an excellent start to the Arrow Development Program.

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