RL. 853-1984

## Estimated Arrow Development Potential.

**Arrow Mk 1.** — First Flight March 25th 1958.
Five Aircraft — Approx 70 hrs. Test Flying To Cancellation Feb 20th 1959. — 95% of Aircraft Performance Specs. Cleared.
47,500 RCAF Spec. — 200nm Radius — 5 min Combat At 50,000 ft @ 2g 1.85 @ Mach 1.5 With No Loss In Speed or Altitude. To be Capable of Mach 2 and 60,000 ft. (Arrow Mk 2)
(Note:- Mk 1s had Interim Engines in. P+W J75.)

**Arrow Mk 2.** — Sixth A/C on — Due To Fly March 59.
Iroquois Engines (Lighter + More Thrust than P+W J75s). Would Easily Have Exceeded RCAF Spec. Performance And Would Probably Have Obtained World Speed + Altitude Record. Except For Engines Similar To Mark 1.
Avro were Proposing More Fuel Capacity To Increase Range To Approximately 3 Times RCAF Spec.

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**Arrow Mk. 2A.**

Proposal To Increase Fuel Capacity For Increased Range To Approximately 650nm Radius. i.e. 3 Times the RCAF Specification. Design Work on This Version had Already Been Completed And This Version Could Have Been Phased In Directly After The 36 Aircraft Under Contract i.e. Around Mid-1960.

**Arrow Mk 3.**

This Version was Under Study By Avro, Although The RCAF had Not Established A Requirement For It. The Main Change From The Mark 2/2A was The Increase In Combat Speed To M = 2.50 i.e. 1,650 mph And An Increase In Combat Altitude To Approx. 65,000 ft.

THIS VERSION WAS BASED ON A DEVELOPED IROQUOIS ENGINE DESIGNATED IROQUOIS 3 AND WHICH HAD 30,000 lb. OF THRUST EACH ENGINE, WITH AFTERBURNER. THE RANGE WOULD HAVE BEEN AROUND 500 NM RADIUS OF ACTION*, WITH IMPROVED. MANOEUVRE CAPABILITY OF 5 MIN. AT MACH 2.5 AT 60,000 FT. AND ABILITY TO PULL 2g AT THAT ALTITUDE AND SPEED, AT COMBAT WEIGHT, WITHOUT LOSS OF SPEED OR ALTITUDE.

THE MAIN VISUAL DIFFERENCE FROM EARLIER MARKS WOULD HAVE BEEN THE NEW INTAKES, WITH VARIABLE INTAKE RAMPS. THIS VERSION COULD HAVE BEEN IN OPERATION AROUND 1962-63, IF THE GO-AHEAD WAS GIVEN IN 1960.

* (CRUISE OUT AND BACK @ M = 0.92.)

ARROW MK 3A.

SIMILAR TO ARROW 3 BUT WITH UPDATED RADAR. TIMING WOULD HAVE DEPENDED ON RADAR DEVELOPMENTS.

ARROW MK 4.

THIS WAS OUR IDEA AT THAT TIME OF THE ULTIMATE DEVELOPMENT OF THE ARROW.

OVER AND ABOVE THE INTAKE AND NOZZLE CHANGES ON THE MK 3, THIS VERSION WOULD HAVE HAD AN INCREASE IN PERFORMANCE TO MACH 3, INCREASE IN COMBAT ALTITUDE TO 80,000 FT. AND INCREASE IN COMBAT RADIUS TO 575 NM. MANOEUVRE CAPABILITY AT 80,000 FT WOULD HAVE BEEN REDUCED TO 1.5g. SUSTAINED (NO LOSS IN SPEED OR ALTITUDE) BUT COMBAT TIME WOULD BE INCREASED TO 10 MINS.

THIS VERSION WOULD HAVE REQUIRED ABOUT 24,000 lb. MORE FUEL, CONTAINED IN WING PODS, WOULD HAVE WEIGHED APPROX. 100,000 lb AND WOULD HAVE REQUIRED A NEW LANDING GEAR TO TAKE THE HIGHER WEIGHT. MATERIAL CHANGES WOULD ALSO HAVE BEEN NECESSARY TO DEAL WITH THE ADDITIONAL SKIN TEMP AT MACH 3.

WHILE INITIAL STUDIES ON THE MK.A. HAD CONFIRMED THAT THE ABOVE PERFORMANCE WAS A REASONABLY ATTAINABLE GOAL, DETAILED DESIGN STUDIES HAD NOT BEEN AUTHORIZED BY COMPANY MANAGEMENT OR THE DEPT. OF DEFENCE PRODUCTION. WE WERE ATTEMPTING TO OBTAIN THIS AUTHORIZATION WHEN THE PROJECT WAS CANCELLED.

SINCE, TO OBTAIN FULL BENEFIT FROM THIS VERSION, THE AQUISITION RANGE WOULD HAVE HAD TO BE INCREASED TO COPE WITH THE HIGHER CLOSING SPEED AGAINST THE TARGET, THE TIMING OF THIS VERSION WOULD HAVE BEEN PACED BY RADAR DEVELOPMENTS. OUR BEST GUESS AT THE TIME WAS THAT THIS VERSION COULD BE PHASED INTO OPERATION BY 1965/66 IF THE PACE OF THE ARROW DEVELOPMENT PROGRAM HAD BEEN MAINTAINED. IT WOULD HAVE REQUIRED ENORMOUS EFFORT AND TESTING PROGRAMS, BUT WE HAD THE TEAM TO DO IT.

OTHER VERSIONS.

A NUMBER OF OTHER MISSION VARIANTS WERE BEING STUDIED IN THE PROJECT RESEARCH GROUP. THESE INCLUDED A RECONNAISSANCE VERSION, UTILISING THE ENORMOUS CAPACITY FOR RECON. EQUIPMENT IN THE ARMAMENT PACK. THIS VERSION HAD A RANGE OF OVER 2000 NM. A 'TOSS-BOMB' VERSION WAS ALSO STUDIED, CARRYING A 'HALF-SCALE' BLUE STEEL BOMB. THE PROCEDURE FOR THIS MISSION WAS TO CRUISE OUT FOR UP TO 1000 NM, — DIVE DOWN TO 5000 FT, TOSS THE BOMB AND CRUISE BACK THE 1000 NM TO BASE AT 50,000 FT. THE ARROW WAS A VERSATILE WEAPON SYSTEM WHICH COULD HAVE BEEN USED IN MANY ROLES. IT WAS NOT SUITABLE FOR TACTICAL USE AT LOW ALTITUDE, DUE TO THE OPTIMISATION OF THE CONFIGURATION FOR MAXIMUM PERFORMANCE AT HIGH ALT.

Jim Floyd. March 28th 1984.

# ARROW MK 4. — LONG RANGE — MISSION NO. 7.