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Avro
CF105
SS-
117

AVRO ARROW

monthly progress report



AVRO AIRCRAFT LIMITED

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J. H. PARKIN
BRANCH

MAY 29 1995

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AVRO ARROW
PROGRESS REPORT

SS 117

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AVRO ARROW
PROGRESS REPORT

MARCH 1958

AVRO AIRCRAFT LIMITED
MALTON - ONTARIO

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INTRODUCTION

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This Progress Report has been prepared to indicate the current position of the ARROW Program at Avro Aircraft Limited and at the major sub-contractors associated with the Program.

Three elements of progress are reported as follows:

- (1) The physical progress in terms of percentage completed at the reporting date
- (2) Manhour expenditures
- (3) Dollar expenditures

The Master Phasing Chart represents the program being reported against. Where necessary for better definition, one bar on the Master Phasing Chart has been expanded into several bars in the Progress Reports.

Dollar expenditure charts show cumulative costs including labor, overhead, direct charges, material, administrative overhead, fees, and sales tax where applicable.

Engineering manhour expenditure charts show the direct cumulative manhours, including sub-contract engineering personnel used directly by Avro in the basic program. However, Engineering hours expended by outside sources of sub-systems, such as R.C.A., Honeywell and Orenda Engines Limited, are not included. Progress charts for some of the related external programs are included. Future reports will contain data of this type as it becomes available for other external programs. Manufacturing manhour expenditure charts include equivalent manhours for sub-contract work.

Amendments to basic information, over the previous issue of the report, are indicated thus ★.

This report is the last to be issued using the present format, since the expansion in scope of the ARROW program makes it necessary to extend the report coverage correspondingly.

It is proposed that future reporting action be based upon the Program Planning Report called out as item 6.6 in the Statement of Work for the Avro ARROW Program (Brochure No. SS 118).

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MASTER PHASING CHART

PROGRAM FIVE (AMENDED)

STAGE 1 PRELIMINARY ENGINEERING

	1953	1954	1955	1956
PRELIMINARY DESIGN		GO-AHEAD		
MOCK-UP			ARROW 1	MOCK-UP BOARD FOLLOW-UP
WIND TUNNEL PROGRAM		BUILD		TEST
MODEL SPECIFICATION			ARROW 1 DRAFT	ARROW 1 SPEC. COMPLETE

STAGE 2 DESIGN & PRODUCTION - ARROW 1

	1953	1954	1955	1956
ENGINEERING DESIGN			START RELEASE	1st A/C
SUB-SYSTEMS DAMPING			HUGHES	MINNEAPOLIS-HONEYWELL
AIR CONDITIONING			1st ORDER PLACED	LAST ORDER
STRUCTURAL TEST			1st TEST	1st STRAIN GAUGE INSTALLED ON STATIC A
SYSTEMS TESTS		DETAILS	START SYSTEMS TESTS	START FUEL SYSTEMS TESTS
PLANNING AND TOOL DESIGN				
TOOL MANUFACTURE				
PROCUREMENT				
MANUFACTURING				
PRODUCTION FLIGHT TEST				
ENGINEERING FLIGHT TEST PROGRAM				
AIRCRAFT COMPLETION				
AIRCRAFT ACCEPTANCE				
J-75 ENGINE DELIVERIES				TWO SETS FOR 1st AIRCRAFT

STAGE 3 DESIGN & PRODUCTION - ARROW 2

	1953	1954	1955	1956
ENGINEERING DESIGN				START RELEASE
SUB-SYSTEMS ASTRA I				1st PRODUCTION ORDER
AIR CONDITIONING				
IROQUOIS				
ARMAMENT				DUR
STRUCTURAL TEST				
SYSTEMS TESTS				
PLANNING AND TOOL DESIGN				
TOOL MANUFACTURE				
PROCUREMENT				
MANUFACTURING				
PRODUCTION FLIGHT TEST				
ENGINEERING FLIGHT TEST PROGRAM				
AIRCRAFT COMPLETION				
AIRCRAFT ACCEPTANCE				

STAGE 4 AIRCRAFT SUPPORT

	1953	1954	1955	1956
GROUND SUPPORT EQUIPMENT			ARROW 1 G.S.E.	START SUBCONTRACT
MANUALS				R.C.A.F. PRELIMINARY DATA R
AIRFRAME SYSTEMS TRAINER				PRO
SPARES				

GO AHEAD REQUIRED

	1953	1954	1955	1956
PROCUREMENT 29 AIRCRAFT				
29 AIRCRAFT MANUFACTURE				
FLIGHT TEST VEHICLES, OPERATION AND MAINTENANCE				
AIRFRAME SYSTEMS TRAINER, ENGINEERING				
ADDITIONAL ARROW 2 AIRCRAFT				

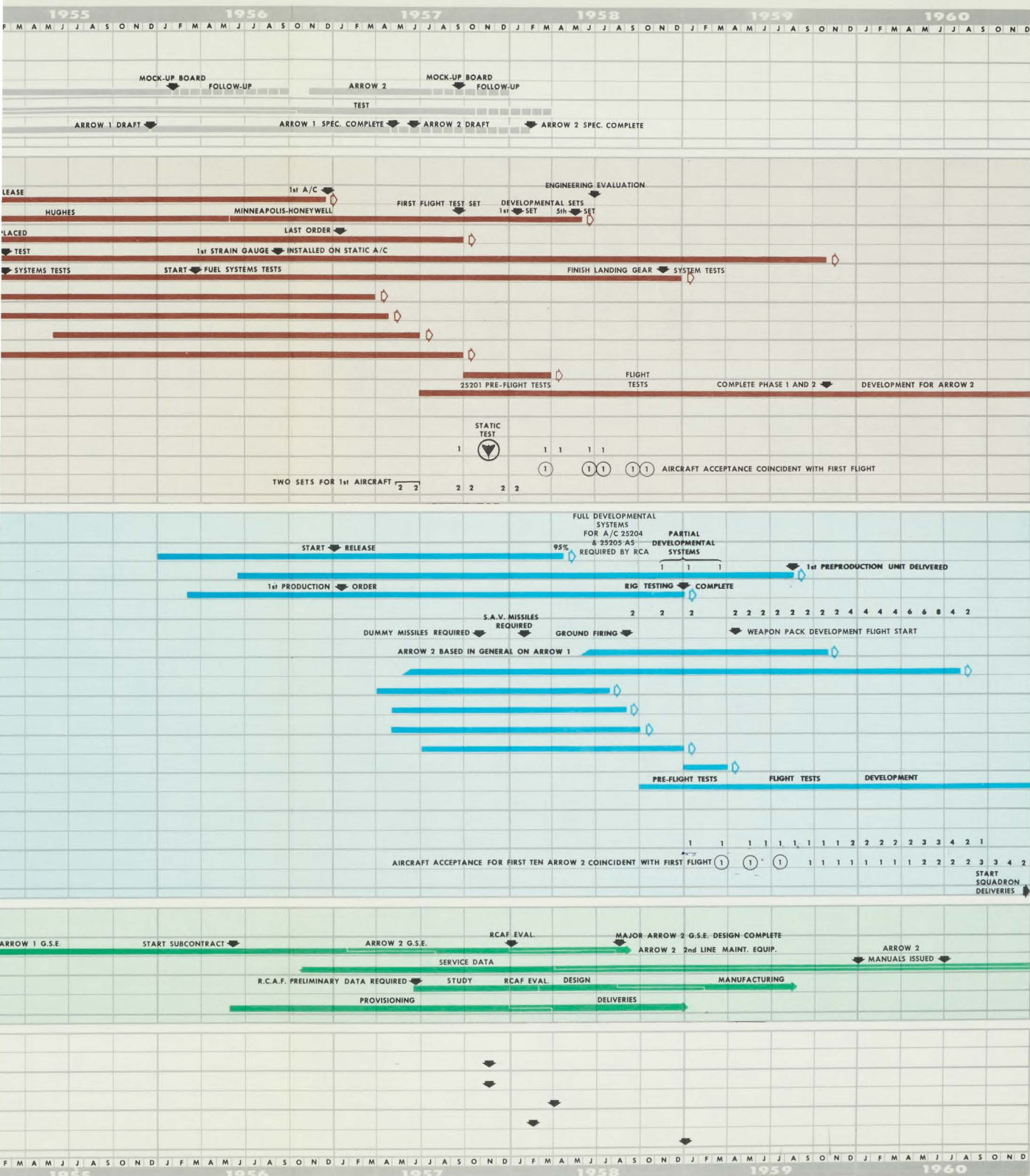
◇ FURTHER WORK REQUIRED ON SECOND AND SUBSEQUENT AIRCRAFT

★ INDICATES AMENDMENT TO BASIC INFORMATION SINCE LAST ISSUE

PROGRAM
FIVE (AMENDED)

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AVRO ARROW



— FURTHER WORK REQUIRED ON SEVENTH AND SUBSEQUENT AIRCRAFT
— AMENDMENT TO BASIC INFORMATION SINCE LAST ISSUE

DATA AS AT MAR. 31 1958

 AVRO AIRCRAFT LIMITED

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SUMMARY

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SUMMARY

The Summary section includes the Master Phasing Chart, Allocation of Aircraft, Manhour and Dollar Expenditure Charts for the Engineering, Tooling and Production programs.

ENGINEERING

At present a program is being negotiated to modify aircraft 25204 and 25205 into development vehicles for the ASTRA I electronic system. The first flight dates shown in this report for these two aircraft are based on the assumption that they are built to the standard ARROW I configuration, incorporating an interim electronic system and with structural modifications for the ASTRA I installation.

The Allocation of Aircraft chart has been

redrawn to show a more detailed presentation of the function of each test vehicle.

A nominal 5% fee has been included in the actual dollar expenditure figures from April 1st, 1957 to facilitate comparison, pending negotiation of fees subsequent to March 1957.

TOOLING

Dollar expenditures for the tooling program are substantially the same as our planned figure.

PRODUCTION

Expenditures on the program are proceeding within the planned program budget.

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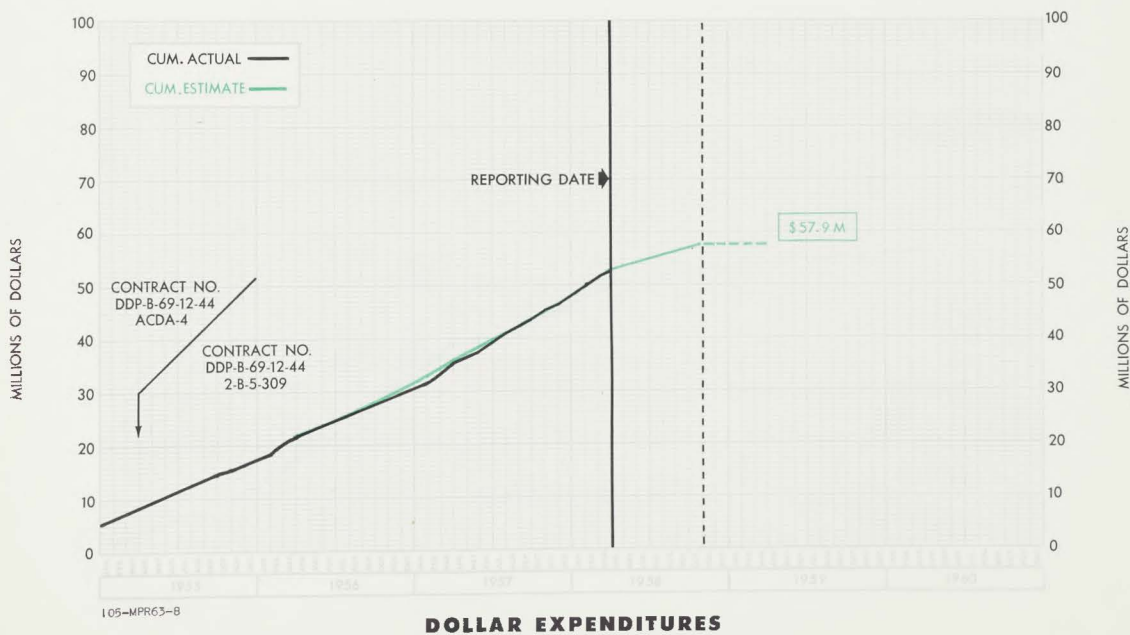
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ENGINEERING

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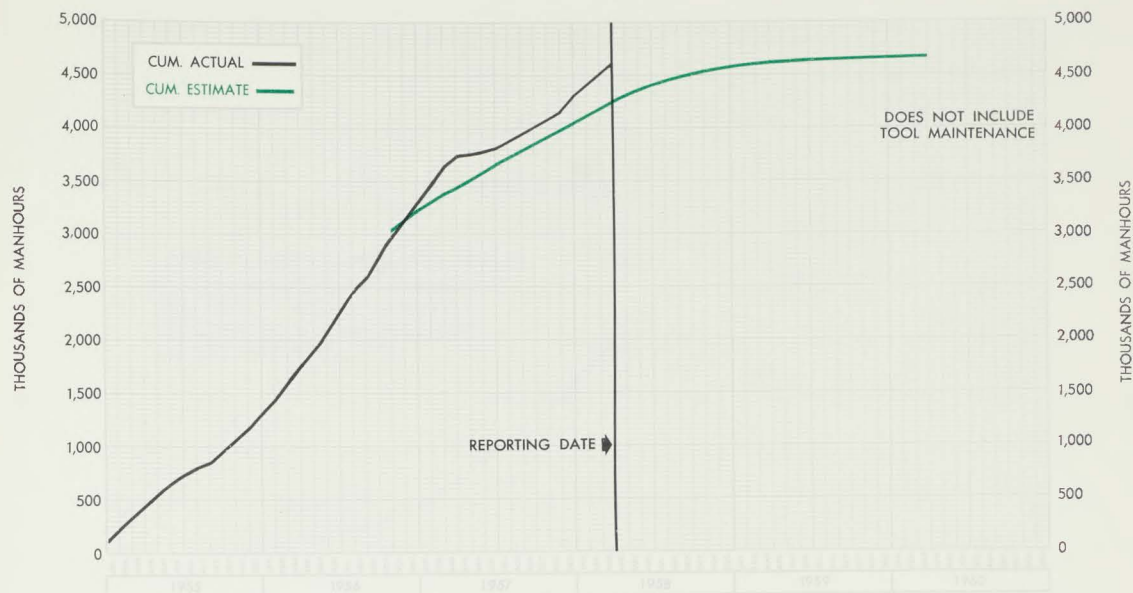
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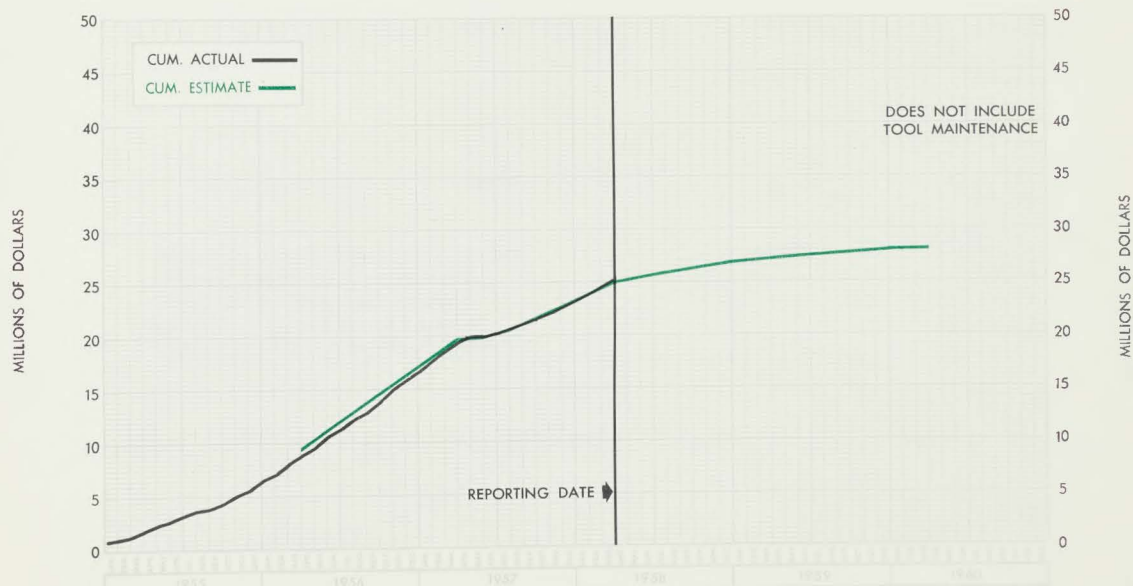


TOOLING

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MANHOUR EXPENDITURES



105-MPR64-8

DOLLAR EXPENDITURES

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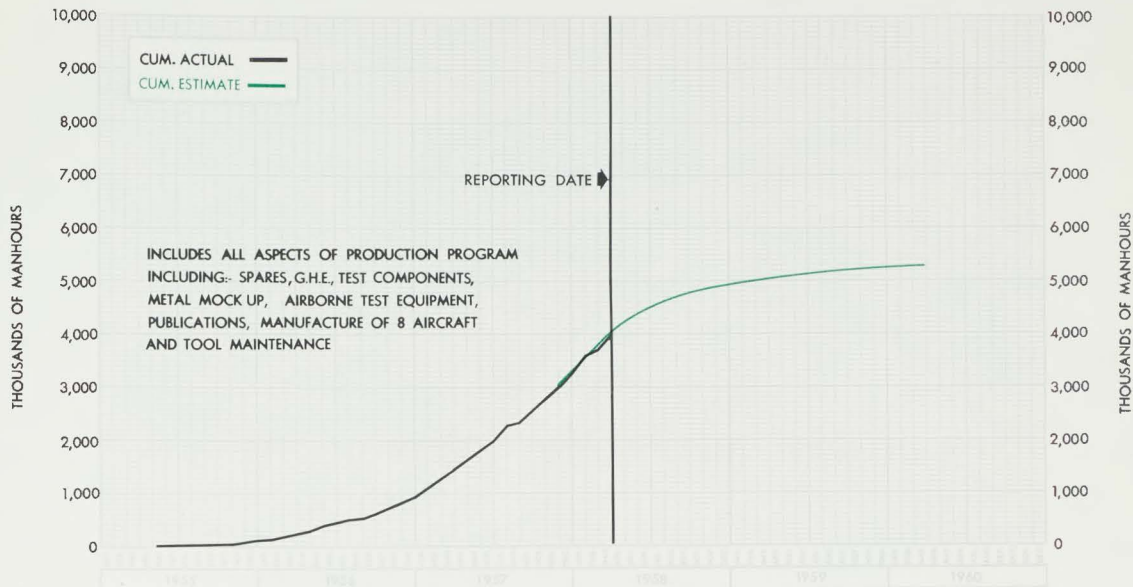
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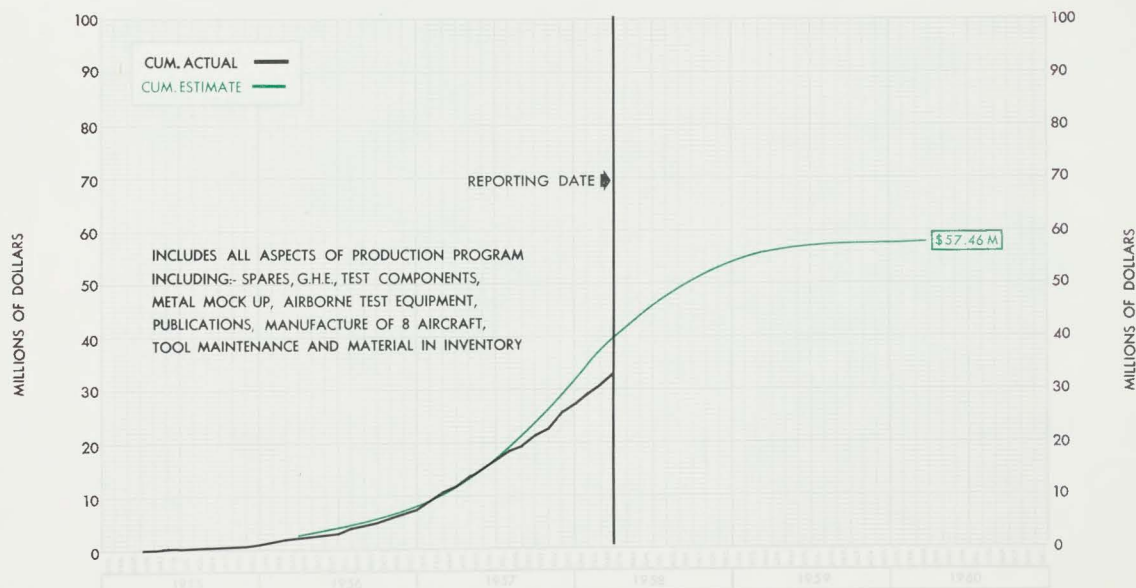


PRODUCTION

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MANHOURLY EXPENDITURES



105-MPR65-8

DOLLAR EXPENDITURES

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**SECTION 2
ENGINEERING - DESIGN AND TECHNICAL**

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ENGINEERING - DESIGN AND TECHNICAL

Changes to the engine installation and gear-box mockup were approved by the RCAF on February 17th, 1958.

It is intended that further wind tunnel tests will be carried out on the 1/24 spinning model, but at present no definite schedule is available for these tests

as they depend on the availability of the wind tunnel.

On the ARROW 2 Engineering Parts Release Schedule the Drop Tank estimate has been deleted, the estimates for 16 components have been amended, and a schedule has been added for the outer wing.

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SECTION 3

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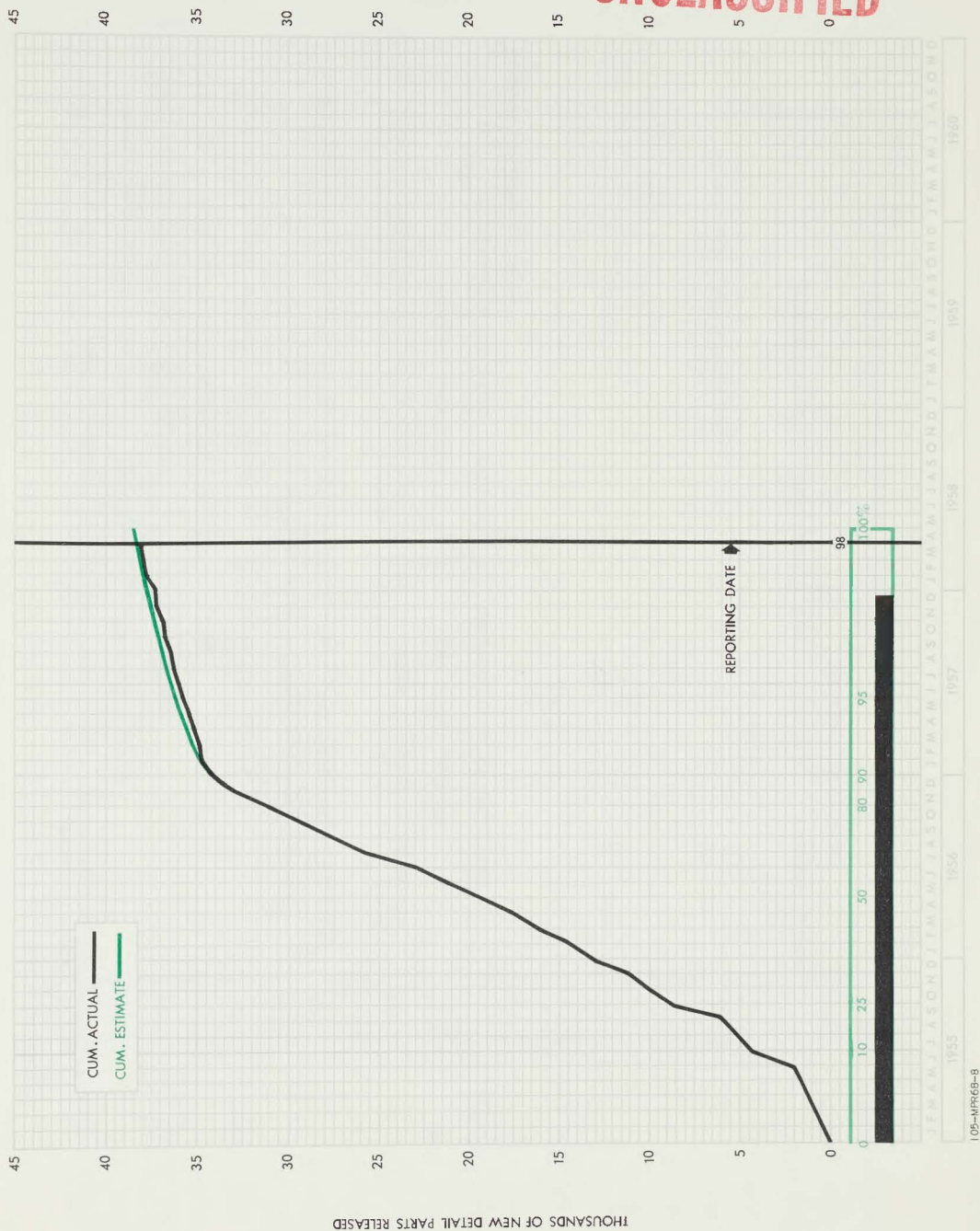
SECTION 5



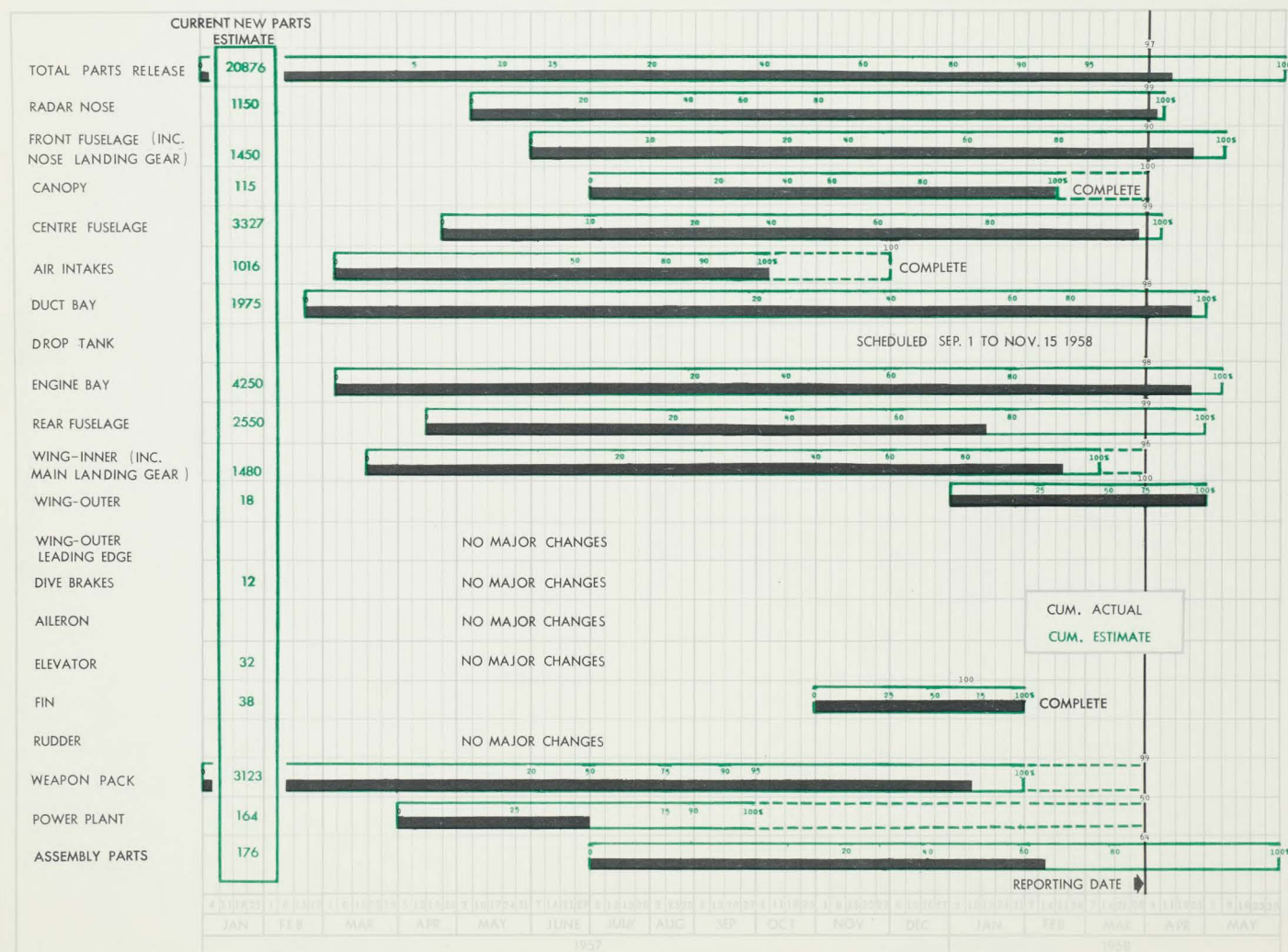
THOUSANDS OF NEW DETAIL PARTS RELEASED

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ENGINEERING PARTS RELEASE - ARROW 1 AIRCRAFT NOS. 25201 TO 25205



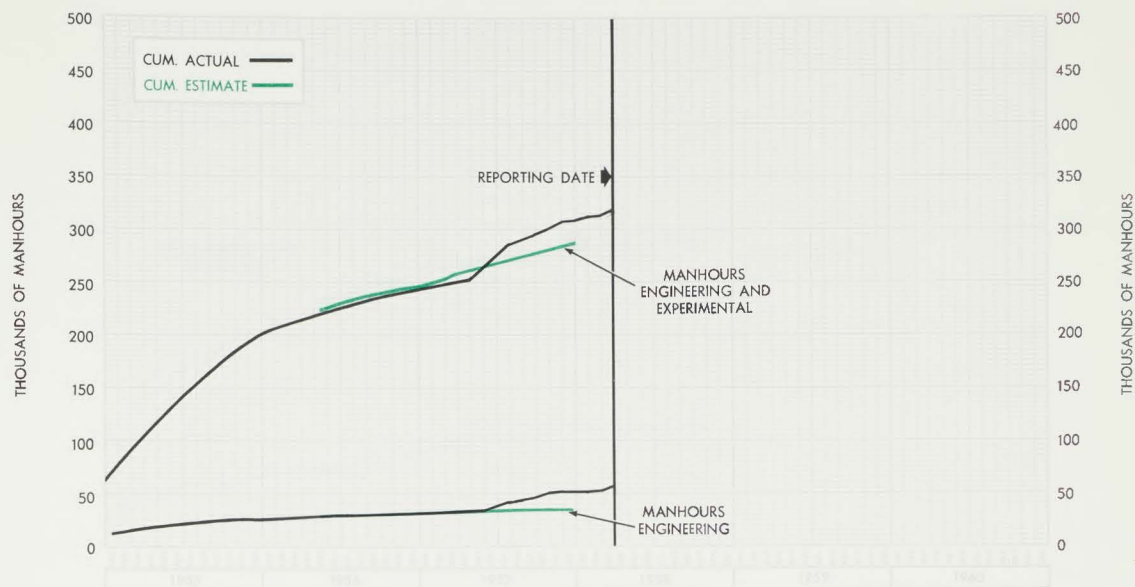
ENGINEERING PARTS RELEASE SCHEDULE ARROW 2



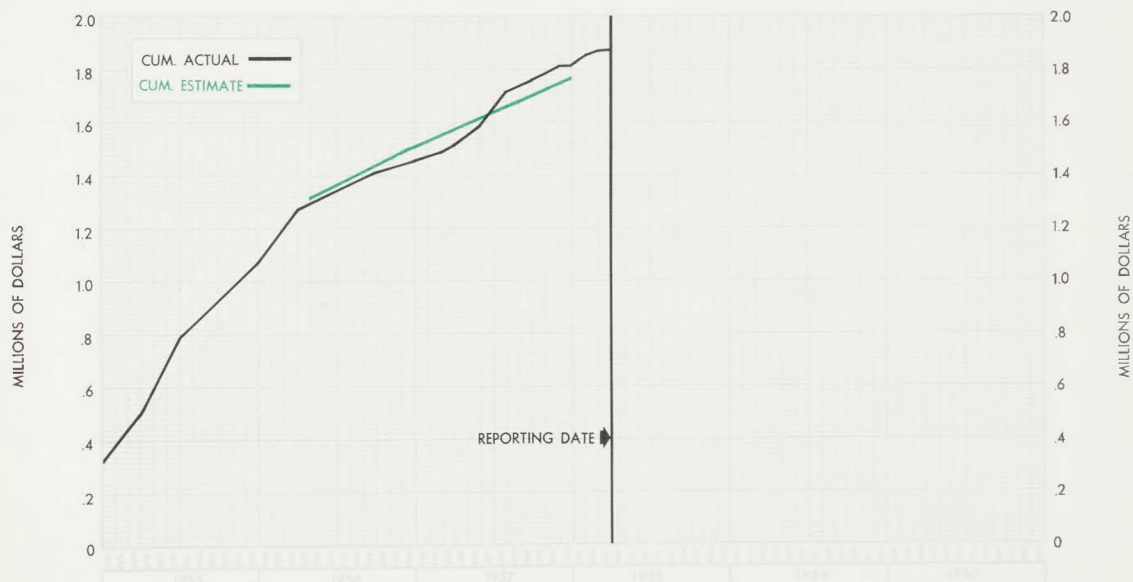
105-MPR69-7

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ENGINEERING MOCKUPS



MANHOURLY EXPENDITURES



105-MPR70-7

DOLLAR EXPENDITURES

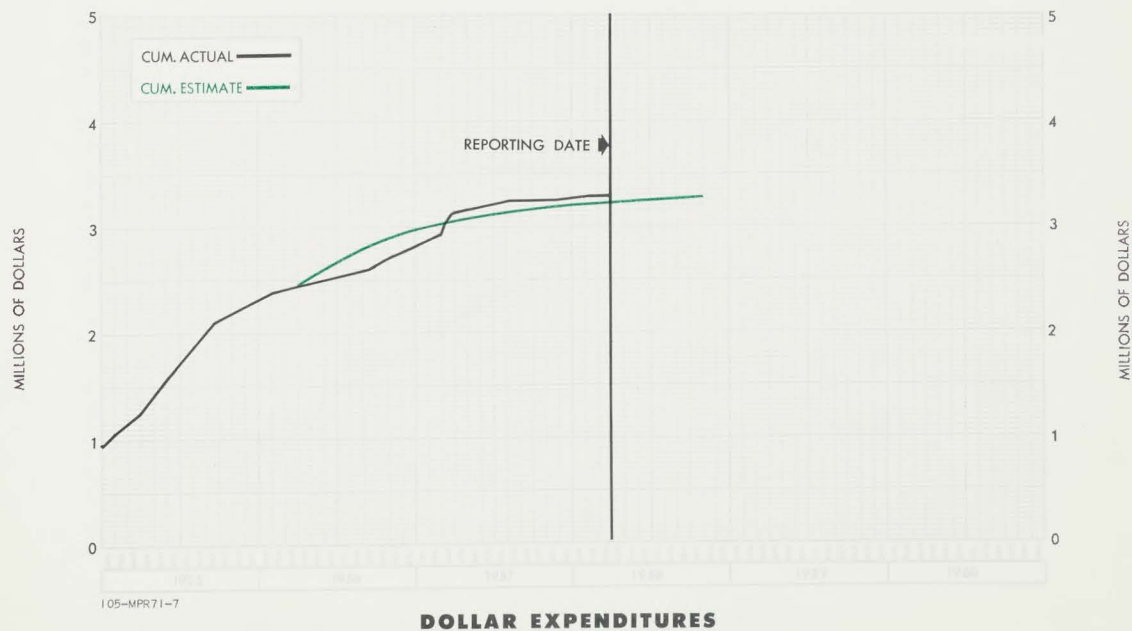
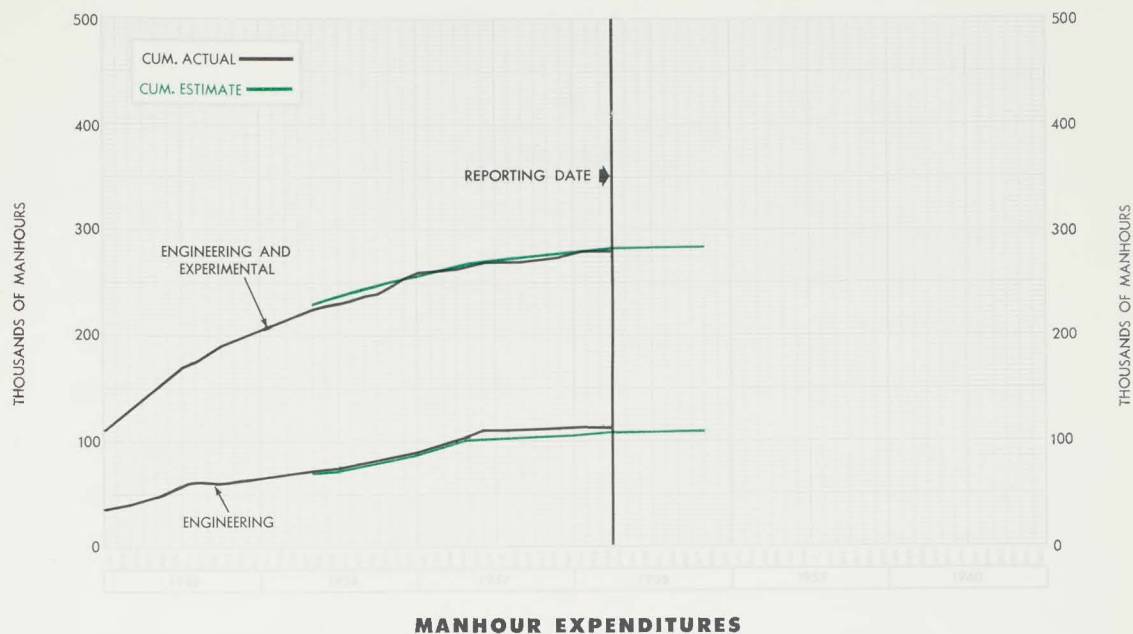
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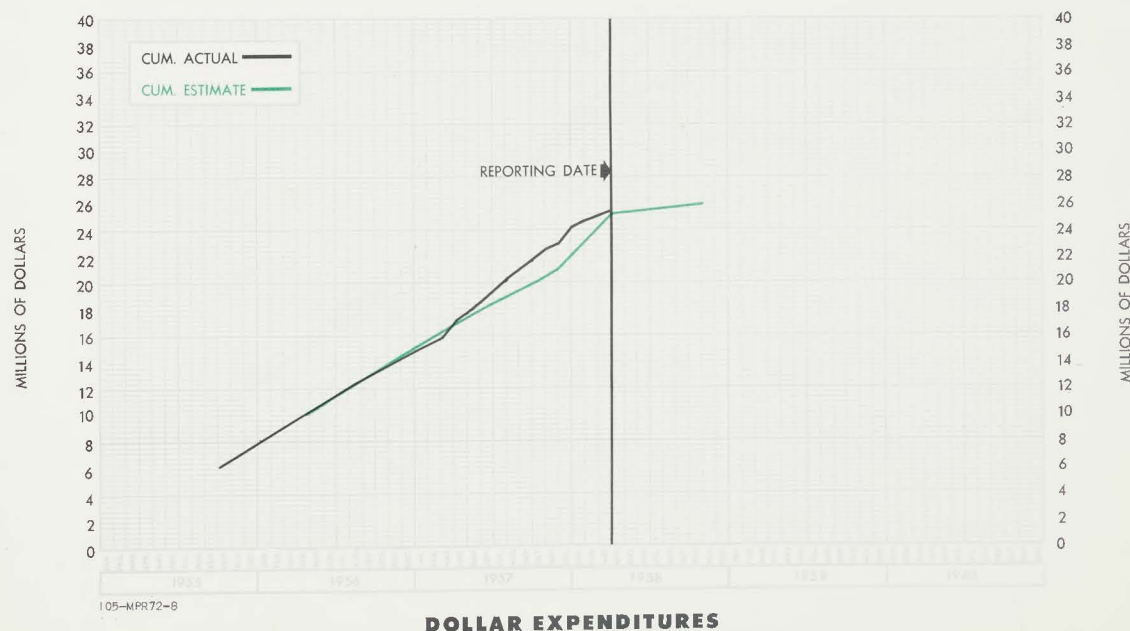
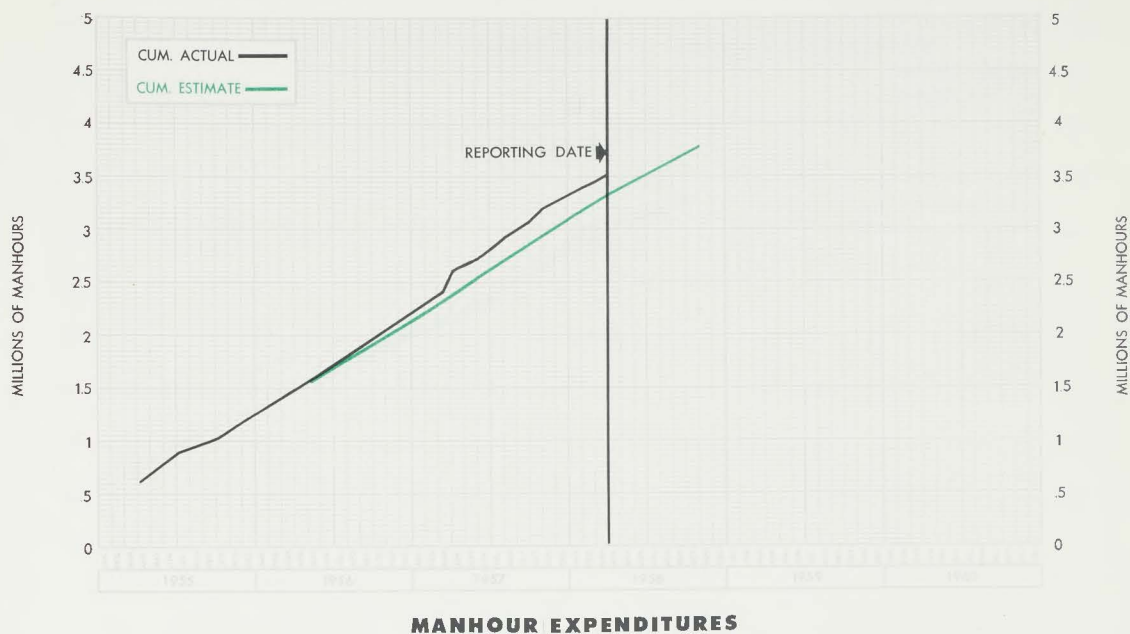
WIND TUNNEL AND FREE FLIGHT MODEL TESTS





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AIRCRAFT DESIGN-EXCLUDING GROUND SUPPORT EQUIPMENT, MOCKUPS, MODELS AND A.S.T.



105-MPR72-8

SECTION 3

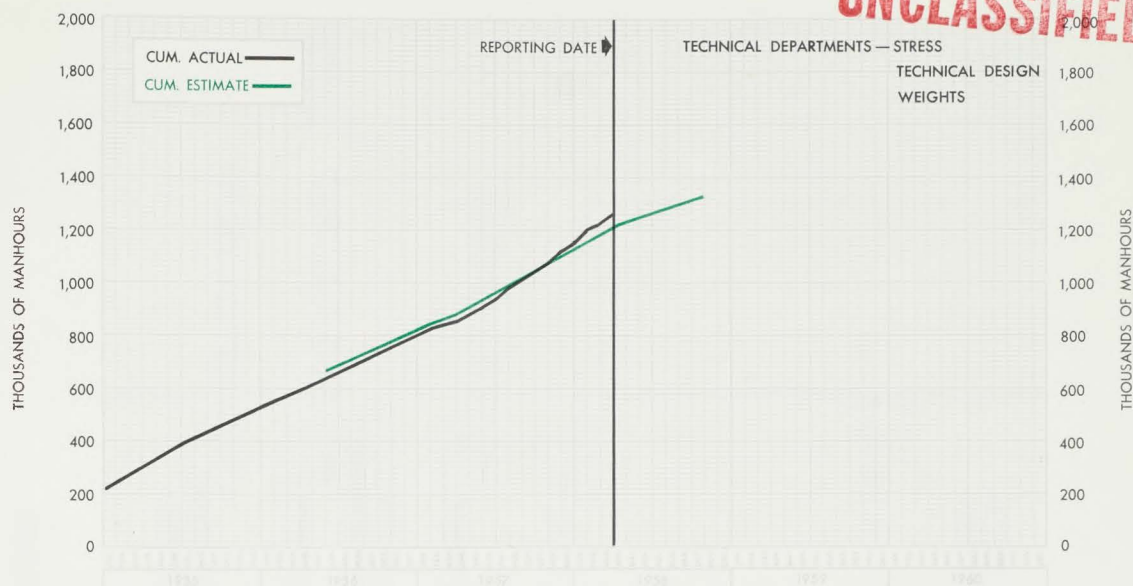
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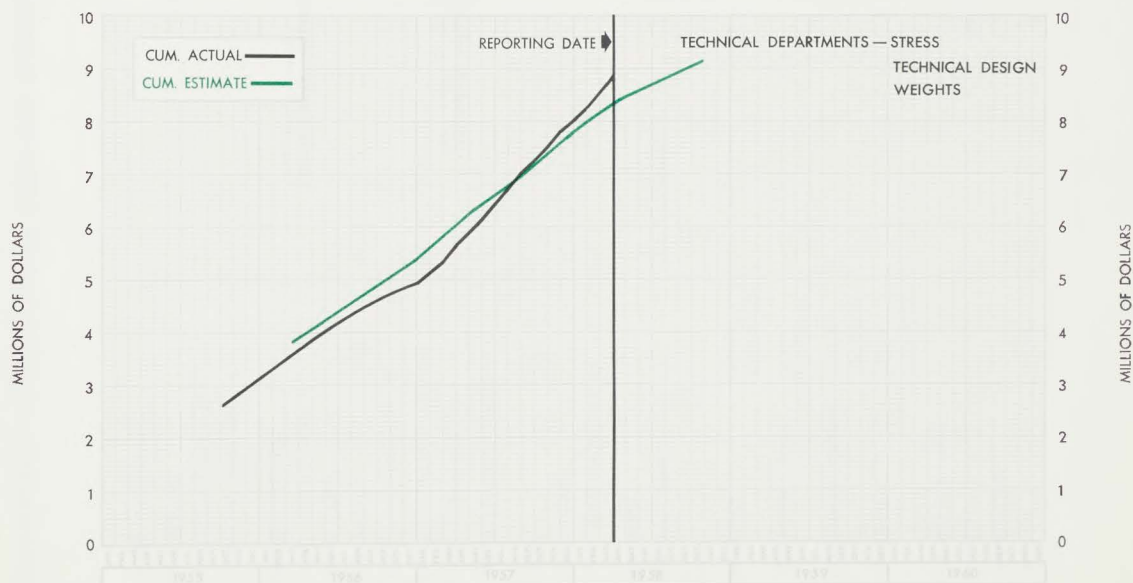


TECHNICAL DEPARTMENTS

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MANHOUR EXPENDITURES



105-MPR73-7

DOLLAR EXPENDITURES

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MINNEAPOLIS-HONEYWELL (MH-64) DAMPING SYSTEM

AVRO ARROW PROGRESS REPORT

FLIGHT TEST SYSTEMS

- MANUFACTURE
- FLIGHTWORTHINESS TESTING
- FLIGHT TEST ANALYSIS

DEVELOPMENT SYSTEMS

- BASIC SYSTEM DESIGN
- SYSTEM DESIGN
- MANUFACTURE
- FLIGHTWORTHINESS TESTING
- FULL QUALIFICATION TESTING
- BASIC SYSTEM ANALYSIS
- SPECIAL PROBLEM ANALYSIS

G-LIMITER

- MANUFACTURE
- FLIGHTWORTHINESS TESTING

MAINTENANCE

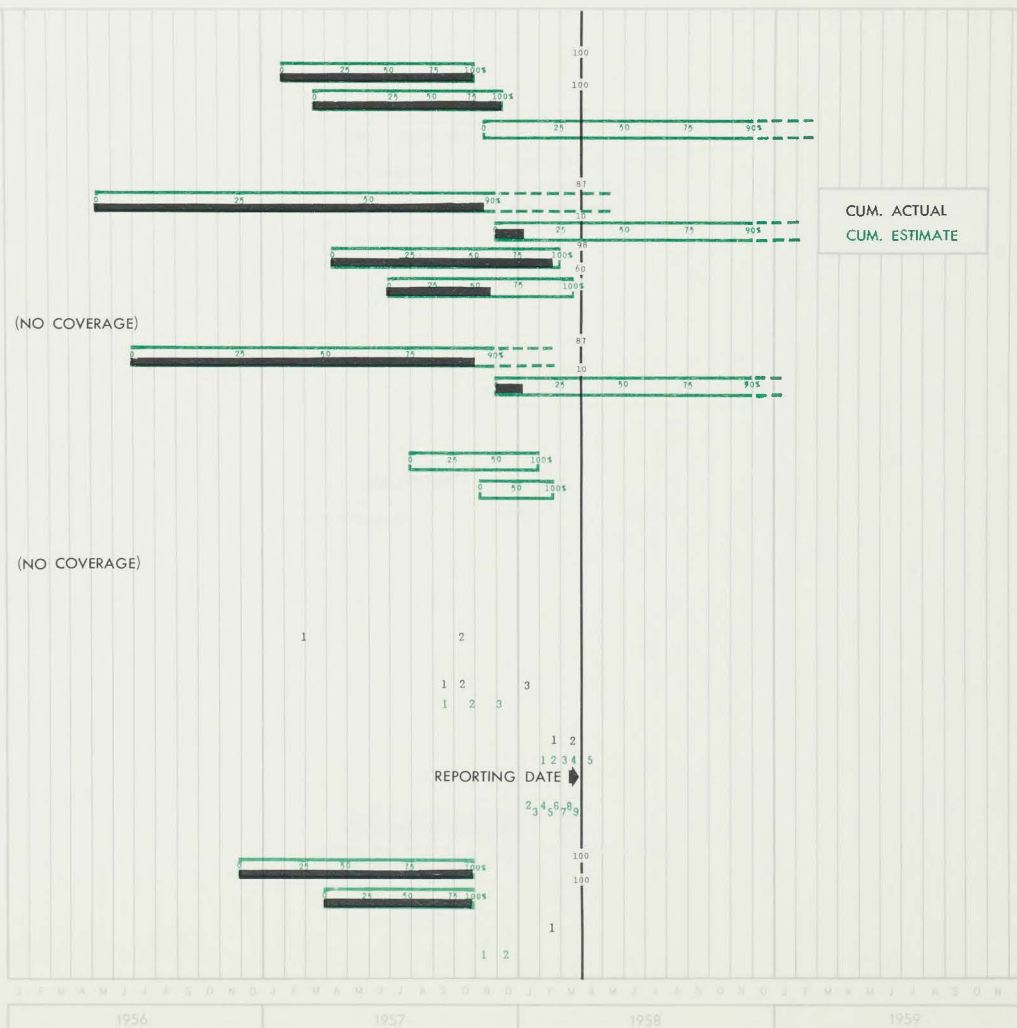
- RELIABILITY STUDY

DELIVERY

- SIMULATOR
- FLIGHT TEST SYSTEMS
- DEVELOPMENT SYSTEMS
- G-LIMITER

SPECIAL TEST EQUIPMENT

- DESIGN
- MANUFACTURE
- DELIVERY

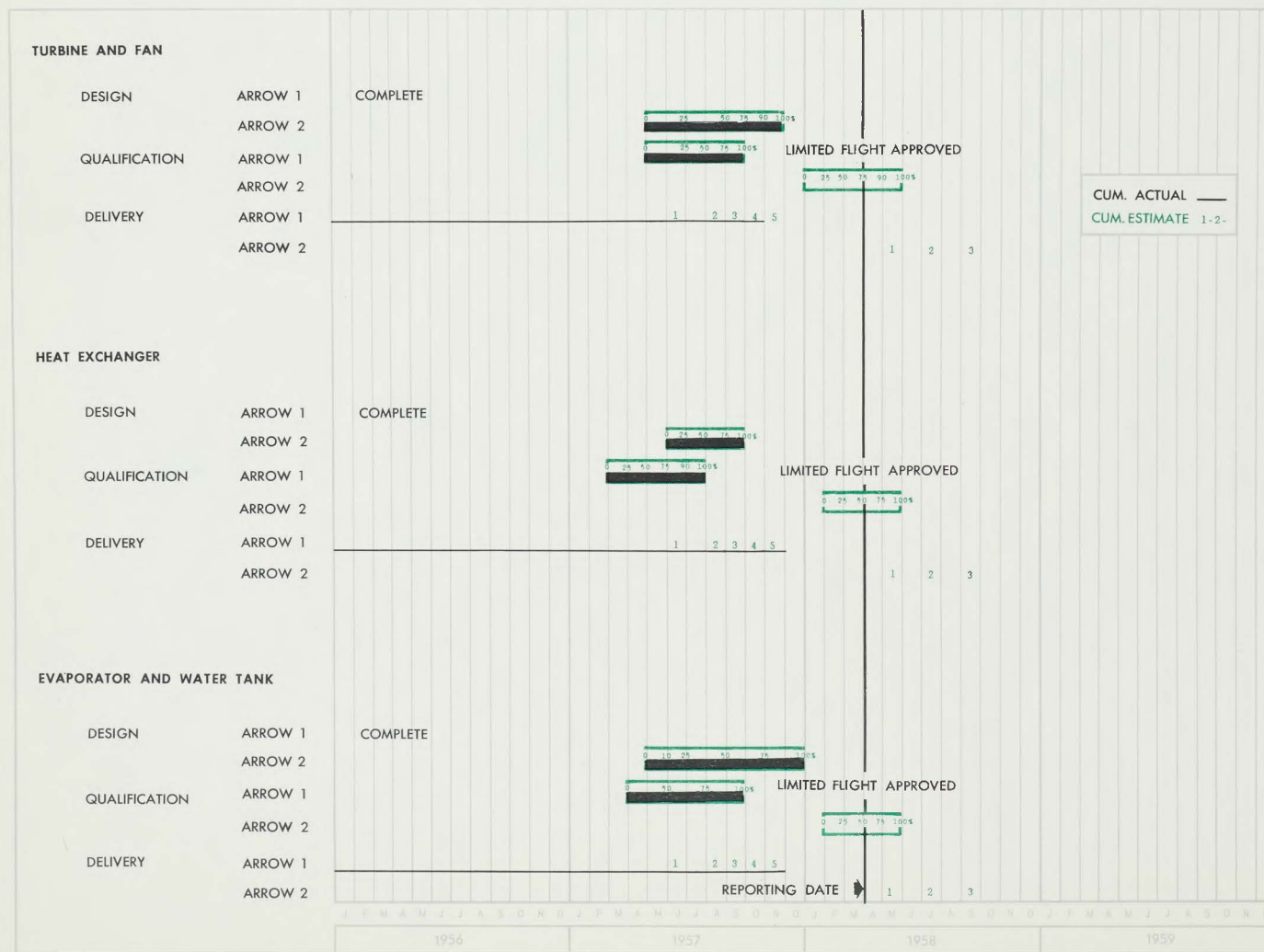


218-CA-6

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AIR CONDITIONING SYSTEM



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219-CA-6

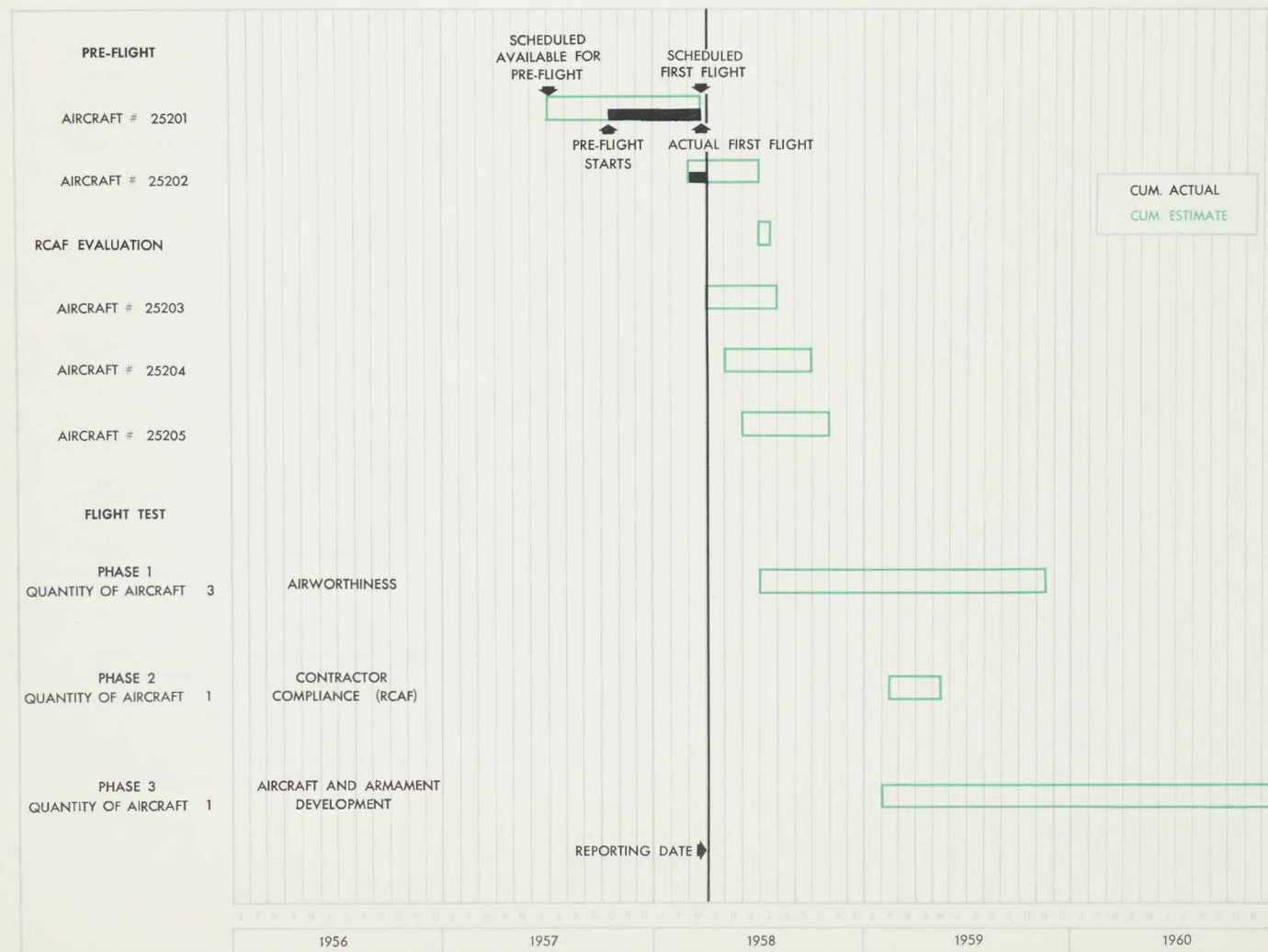
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ENGINEERING - TEST PROGRAM

The note "Operation and maintenance of flight test vehicles not funded" has been deleted from the Flight Test Program bar charts for ARROW 1 and 2 and also from the man-hour and dollar expenditure Flight Test charts.

The start of Phase 1 testing on the ARROW 1 Flight Test bar chart is now scheduled for July 1st, 1958 in line with the Allocation of Aircraft chart in Section 1 and the note regarding the provision of time for AFCS development is deleted.

FLIGHT TEST PROGRAM ARROW 1



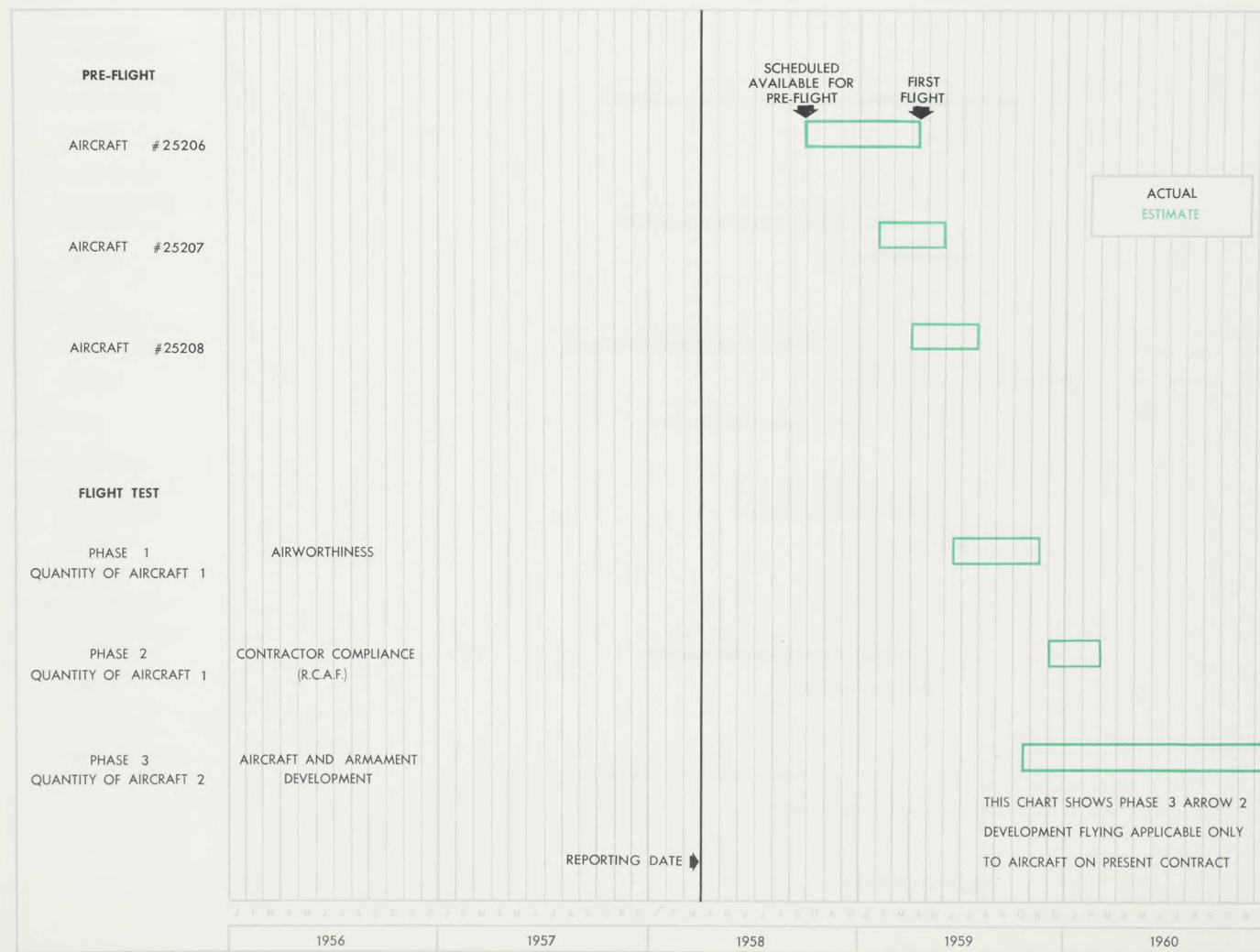
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FLIGHT TEST PROGRAM ARROW 2



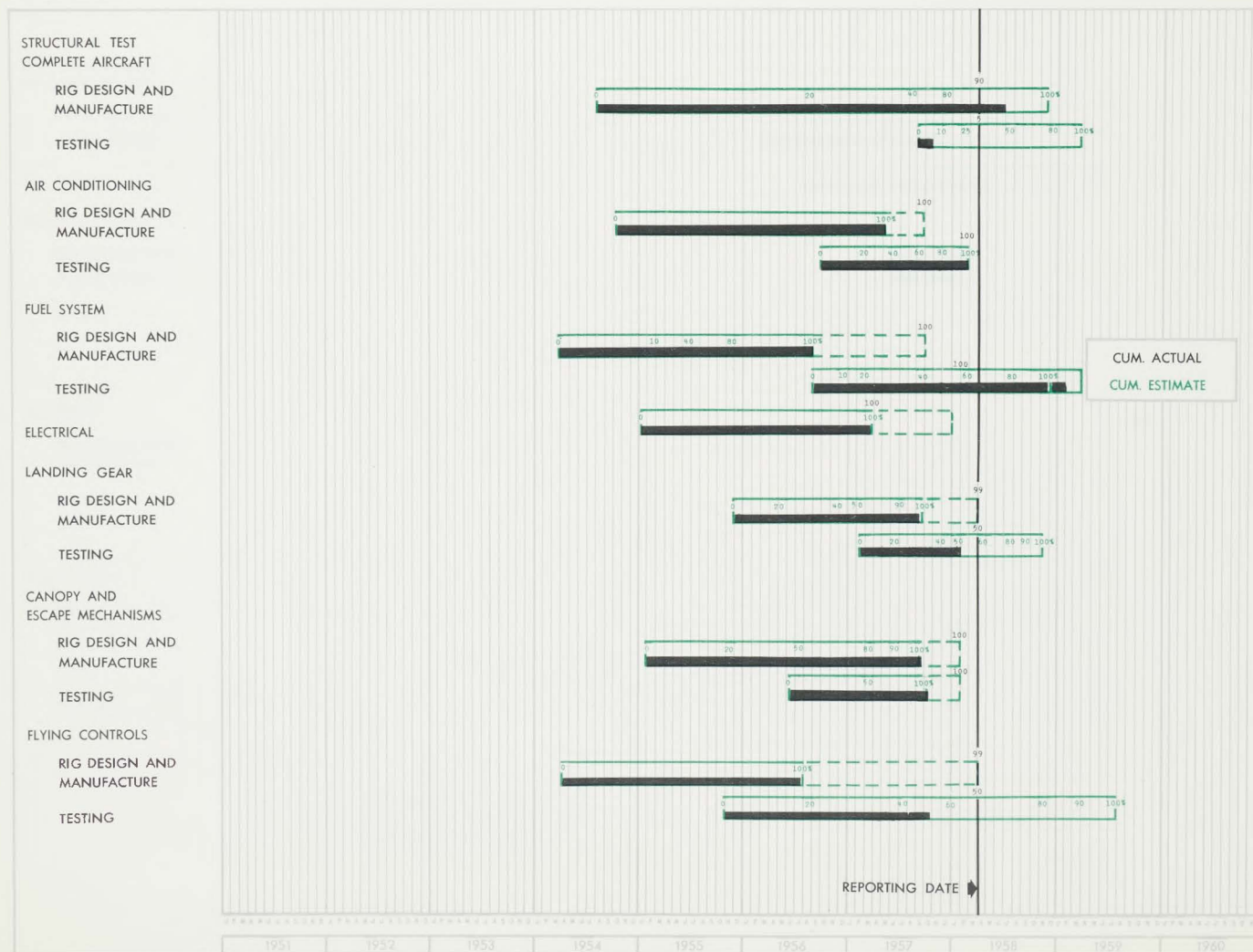
105-MPR75-B

AVRO ARROW PROGRESS REPORT

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MAJOR TESTS OF STRUCTURE AND SYSTEMS - ARROW 1



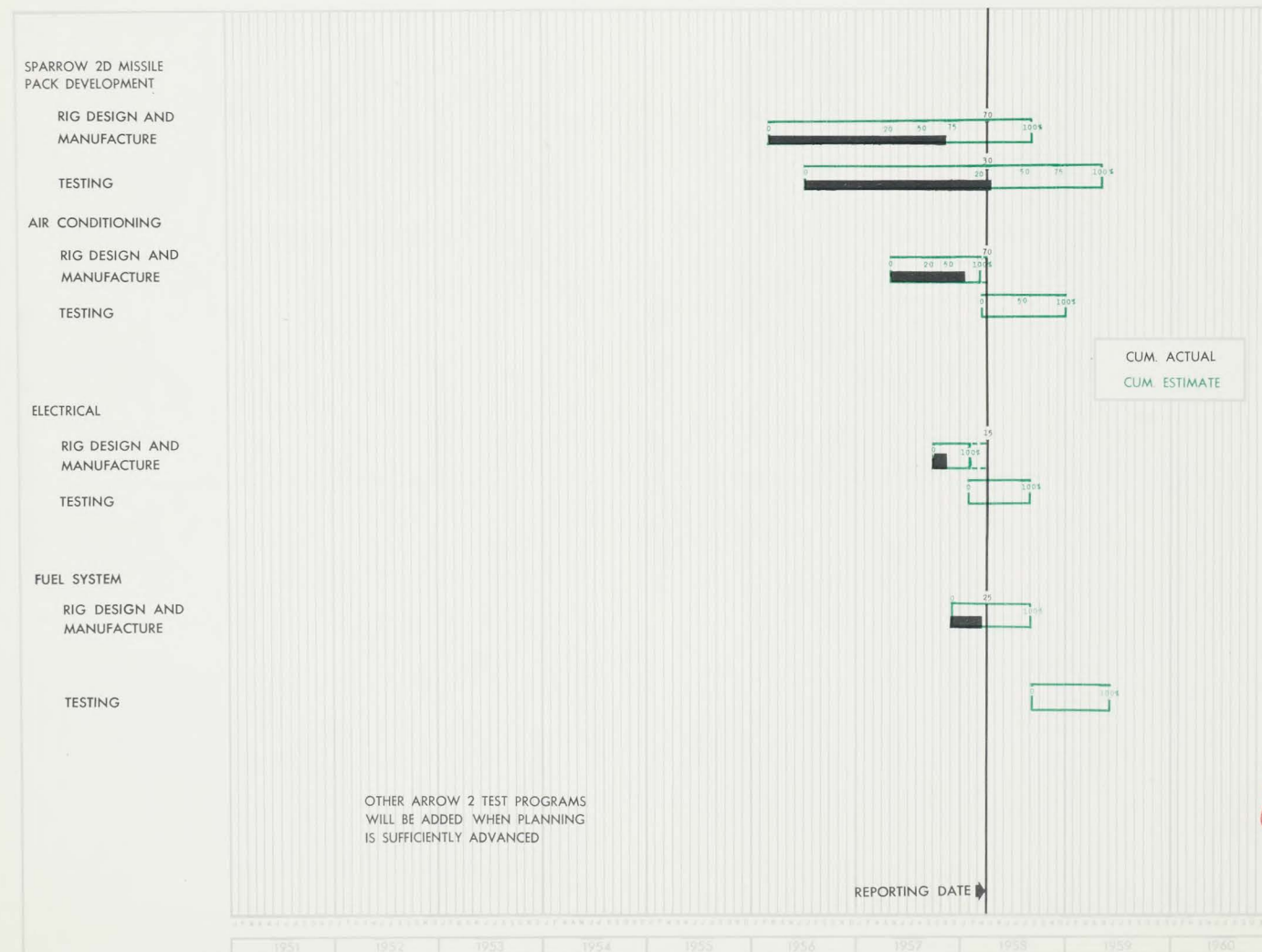
105-MPR76-7

AVRO ARROW PROGRESS REPORT

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MAJOR TESTS OF STRUCTURE AND SYSTEMS — ARROW 2



105-MPR76A-6

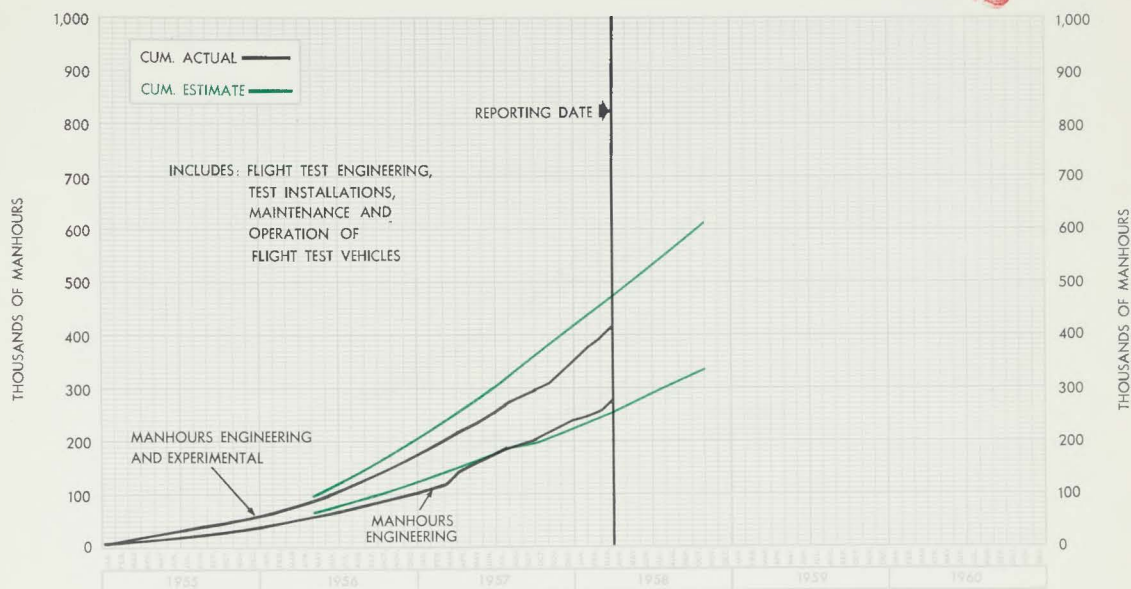
ARROW 2 PROGRESS REPORT

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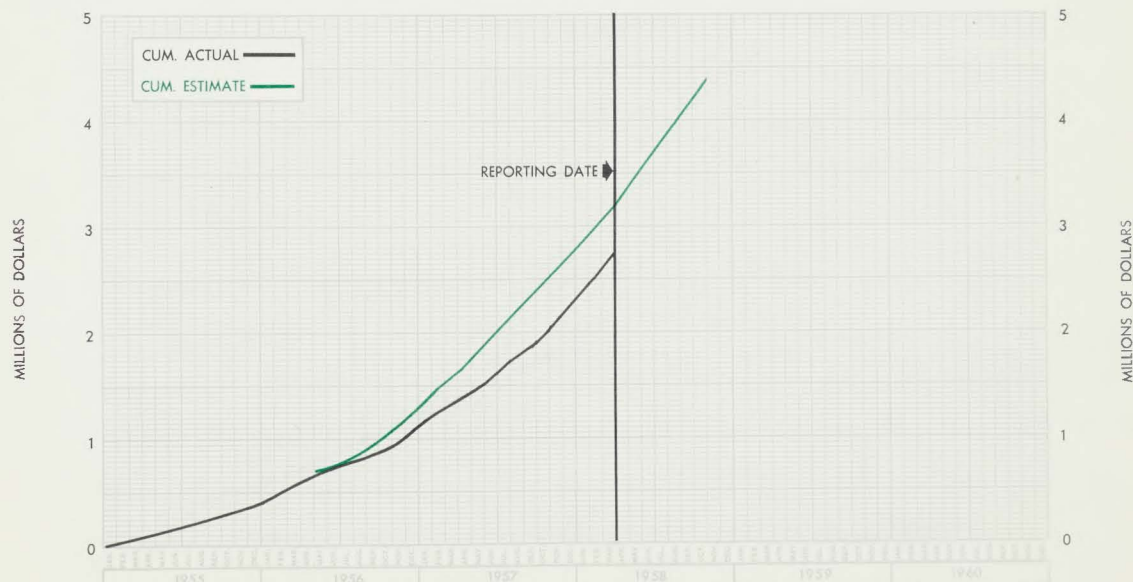
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ENGINEERING FLIGHT TEST



MANHOUR EXPENDITURES

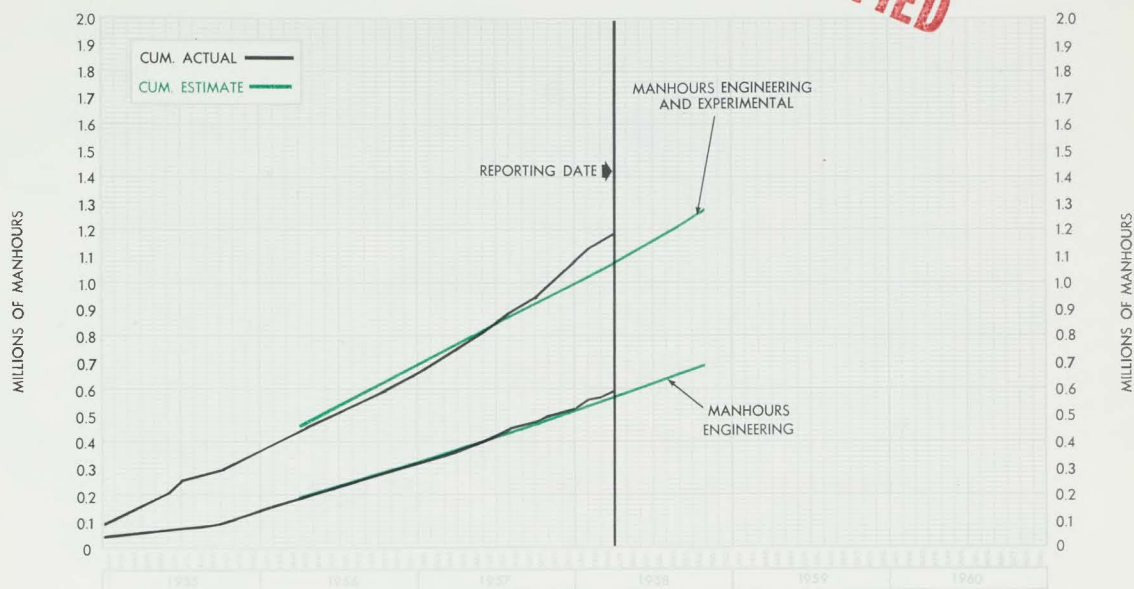


DOLLAR EXPENDITURES

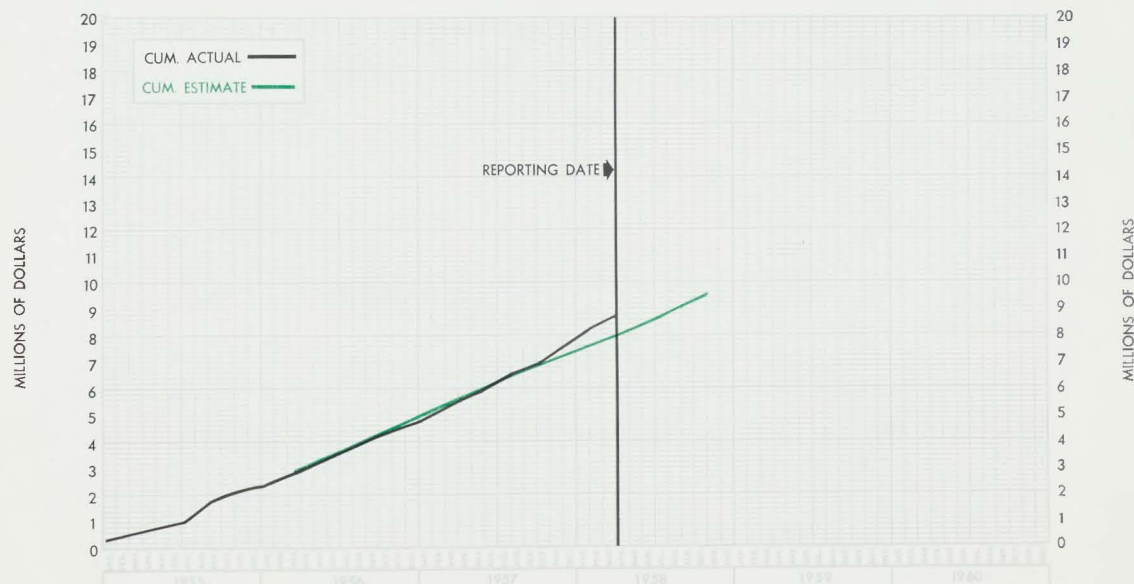
105-MPR77-7

STRUCTURE AND SYSTEMS TESTS

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MANHOUR EXPENDITURES



DOLLAR EXPENDITURES

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**SECTION 4
ENGINEERING -
GROUND SUPPORT EQUIPMENT
AND
SYSTEMS TRAINERS**

SECTION 4

SECTION 5



ENGINEERING - GROUND SUPPORT EQUIPMENT AND SYSTEMS TRAINERS

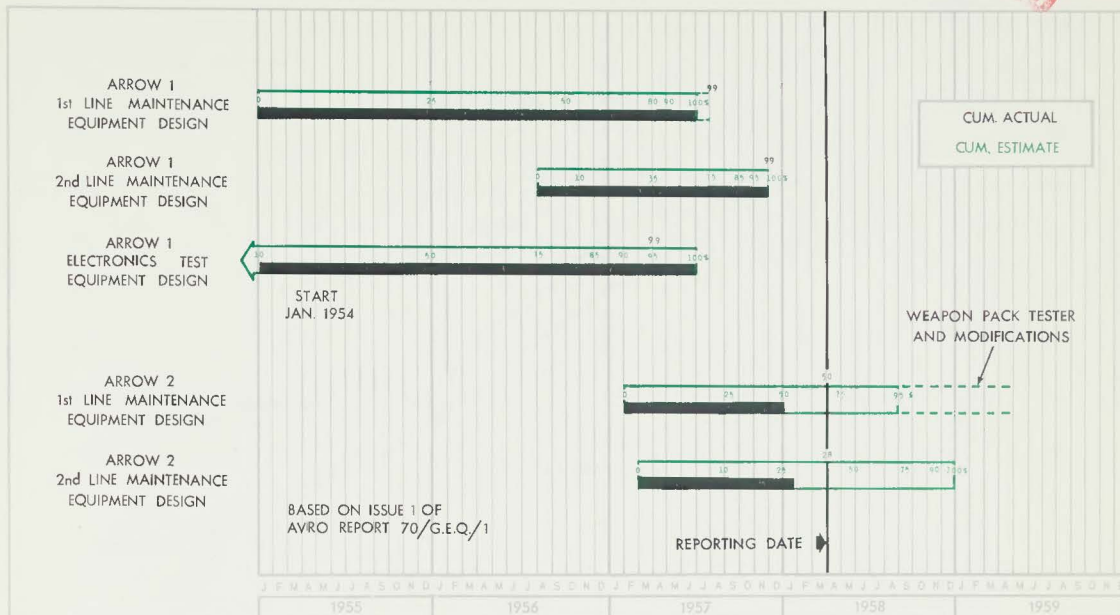
The Airframe Systems Trainer bar chart has been re-titled Systems Trainers, and schedules

added for the various stages of the Airframe Ground Support Equipment Trainer.

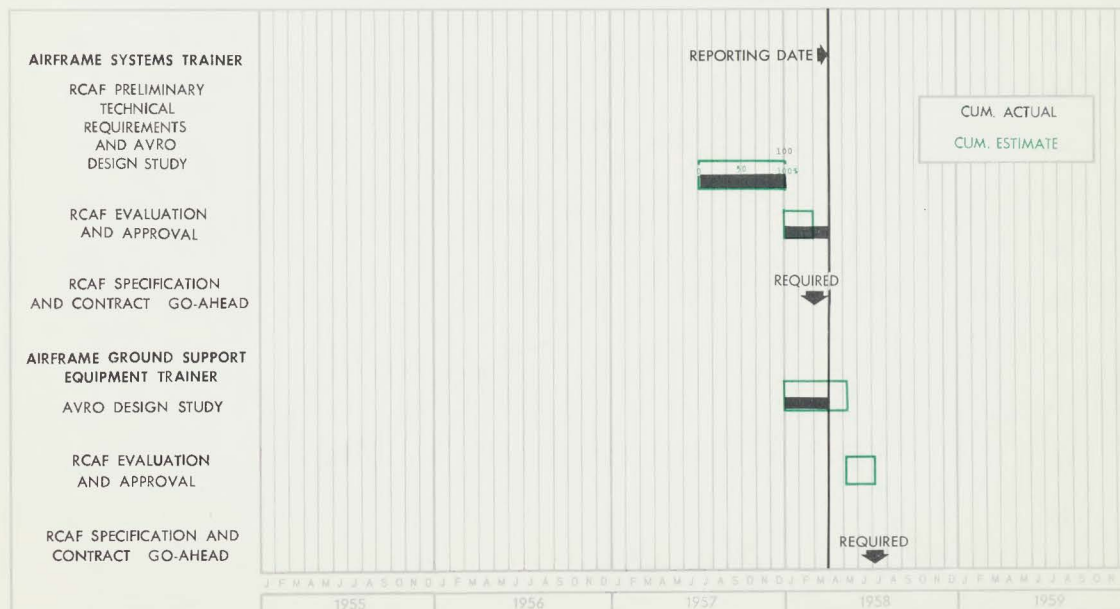
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ENGINEERING GROUND SUPPORT EQUIPMENT AND SYSTEMS TRAINERS



ENGINEERING GROUND SUPPORT EQUIPMENT

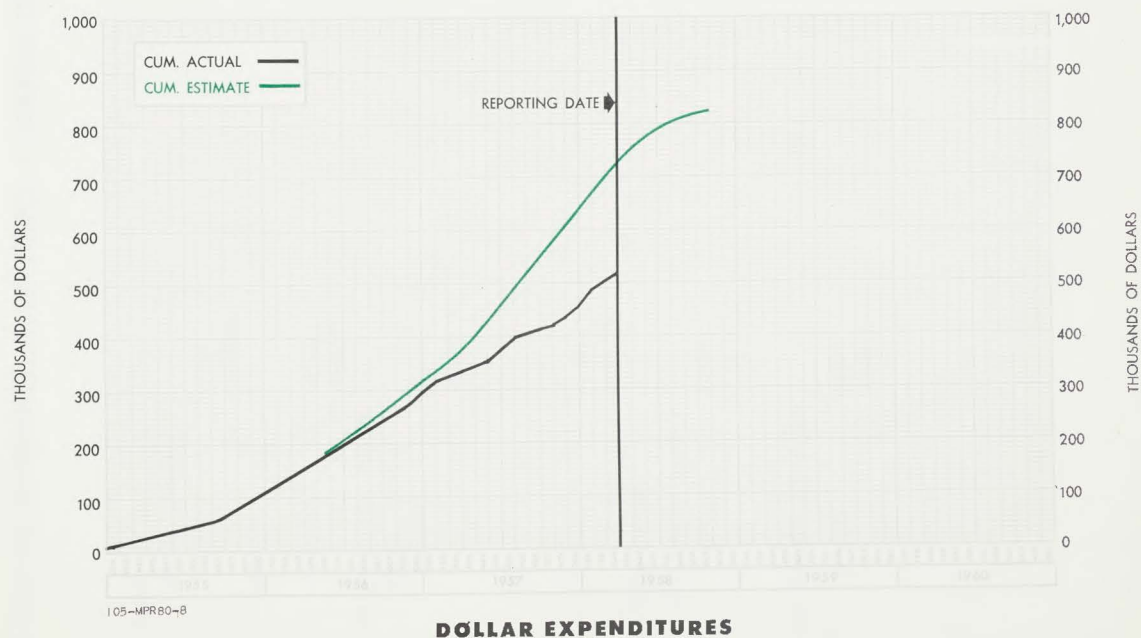
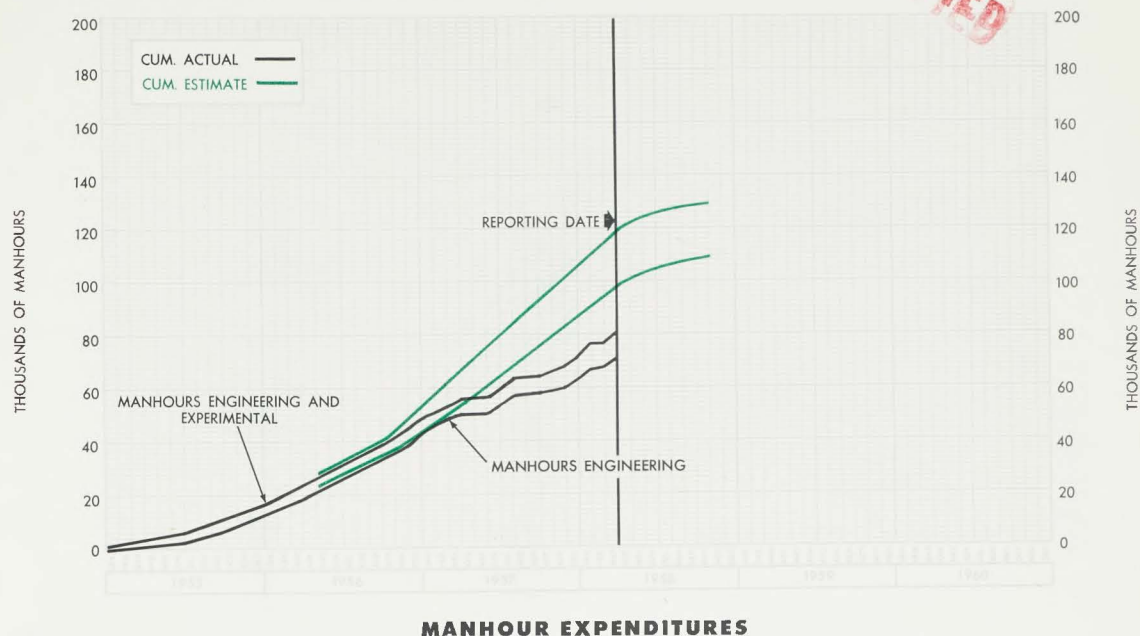


105-MPR79-7

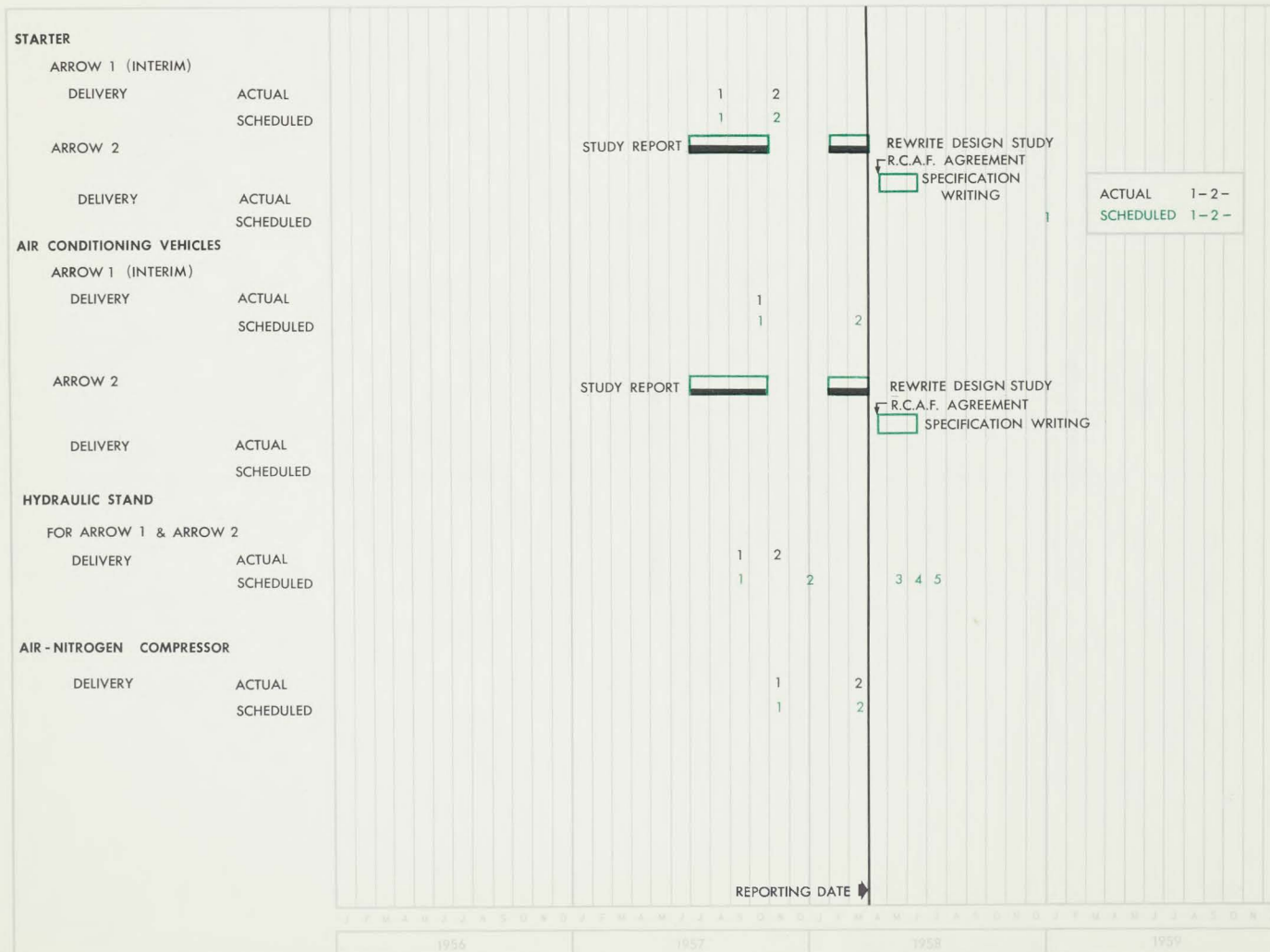
SYSTEMS TRAINERS

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GROUND SUPPORT EQUIPMENT — DESIGN AND DEVELOPMENT



GROUND SUPPORT EQUIPMENT - MAJOR ITEMS



105-MPR2884-4

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AIRFRAME SYSTEMS TRAINER DESIGN STUDY



105-MPRB1-7

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SECTION 5
TOOLING AND MANUFACTURING

SECTION 5



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TOOLING AND MANUFACTURING

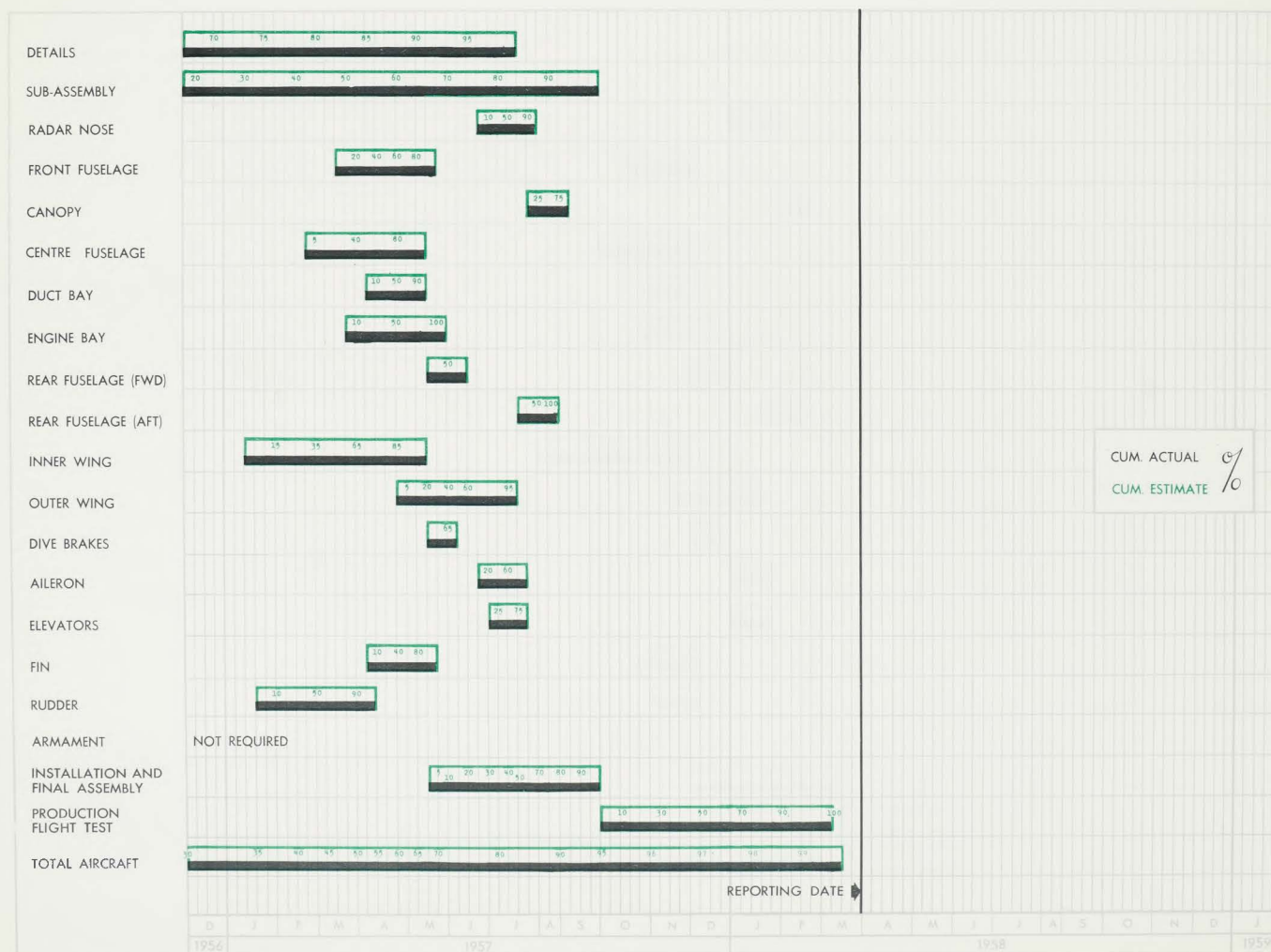
This section deals with those phases of the program which relate to the Manufacturing Division. It affords a comparison of total Tooling and Production costs with performance in terms of percentage completed at the reporting date. More detailed breakdown of total production costs now available has resulted in amendment of total production expenditures.

Bar charts showing the progress of the first eight aircraft and the static test aircraft are included.

Manhour and dollar expenditures for the production of spares, ground support equipment, publications and the metal mockup are shown, as are costs for test components, airborne test equipment and production material. A more detailed breakdown of production material costs is now available and expenditures have been amended to include material in inventory for three aircraft.

The section also contains tables which reflect the supply position for pacing items of Avro furnished equipment and for Government Supplied Material.

PROGRESS CHART — FIRST AIRCRAFT



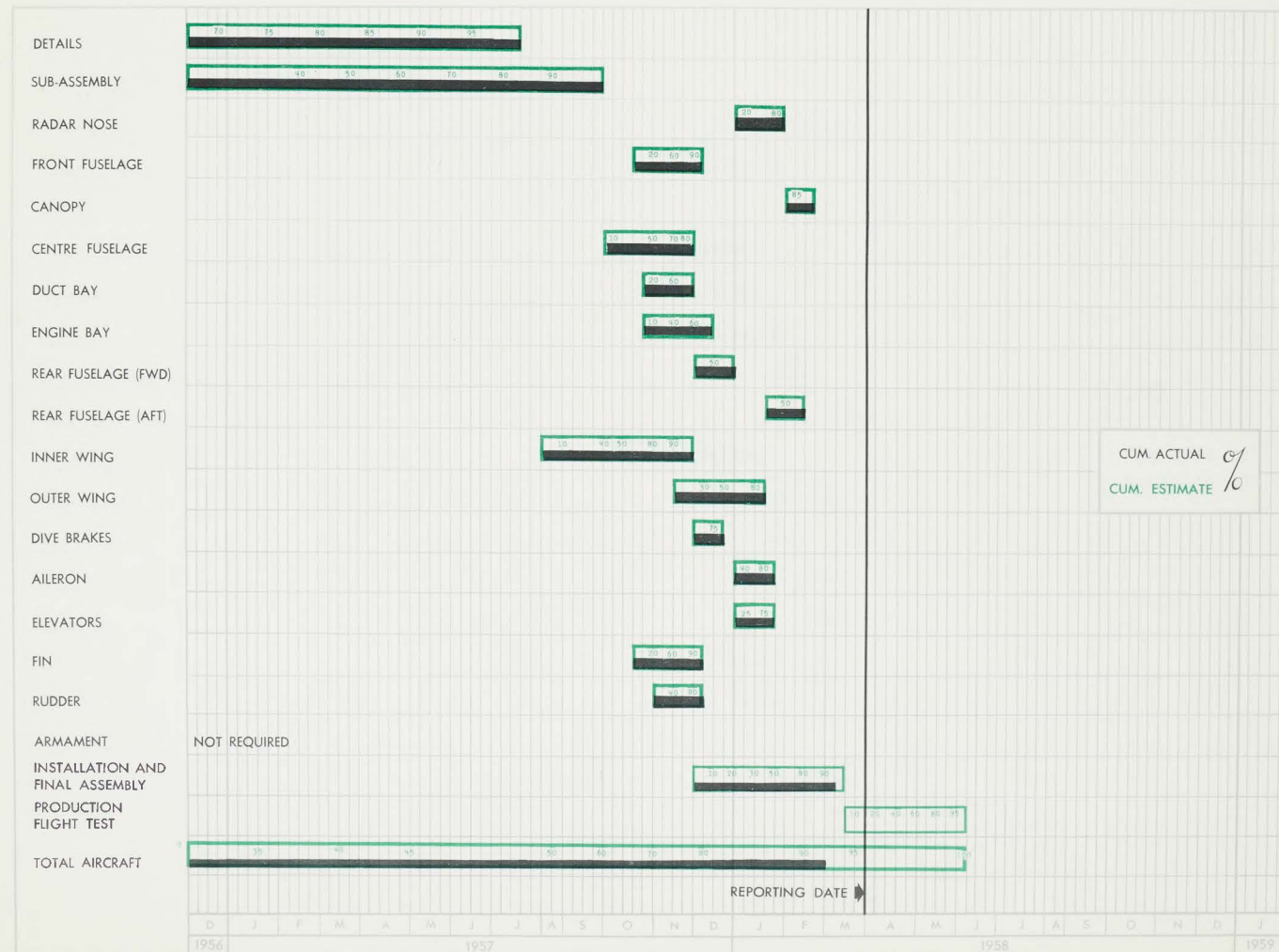
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PROGRESS CHART - SECOND AIRCRAFT



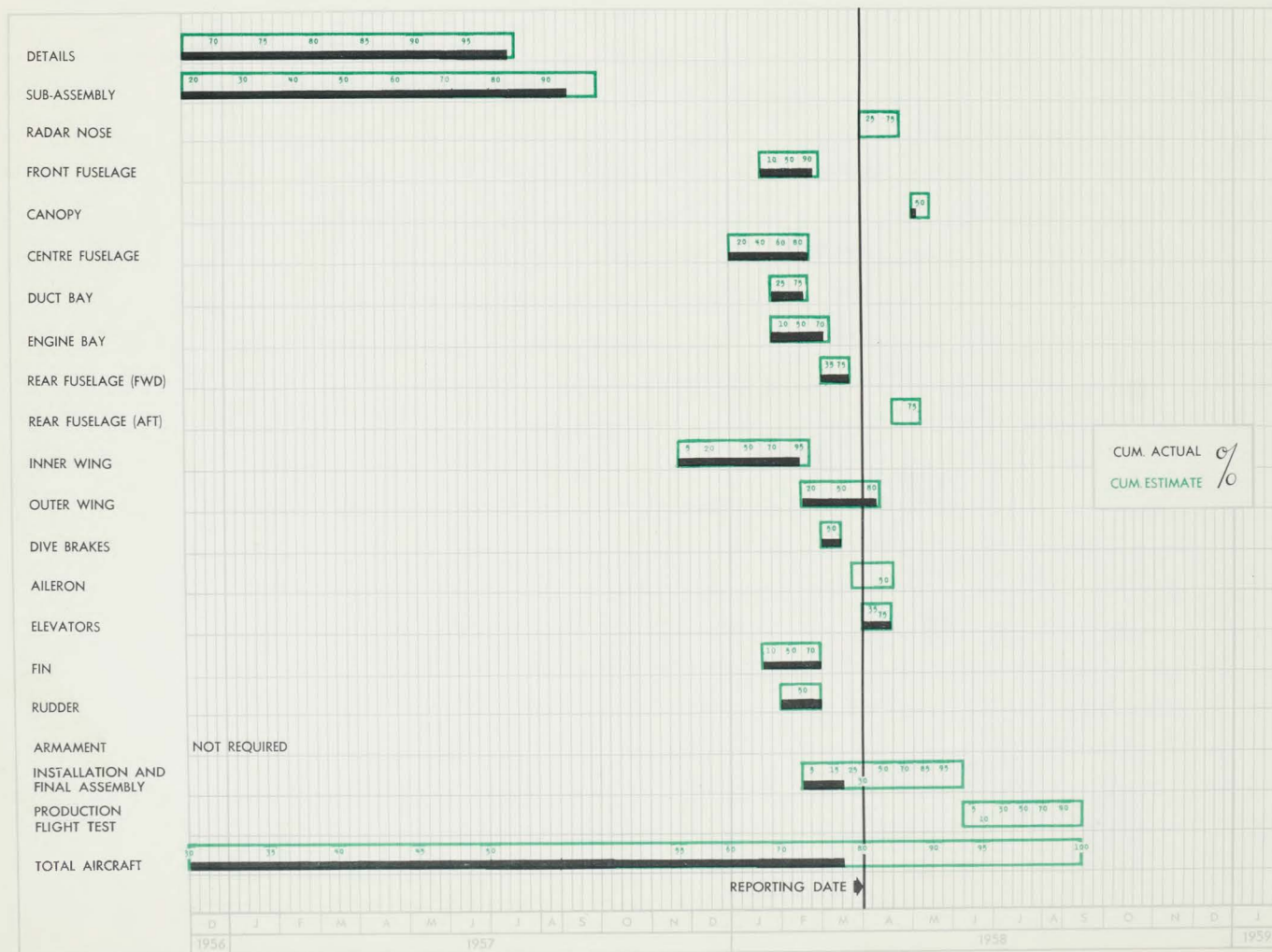
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PROGRESS CHART — FOURTH AIRCRAFT



105-MPR35-7

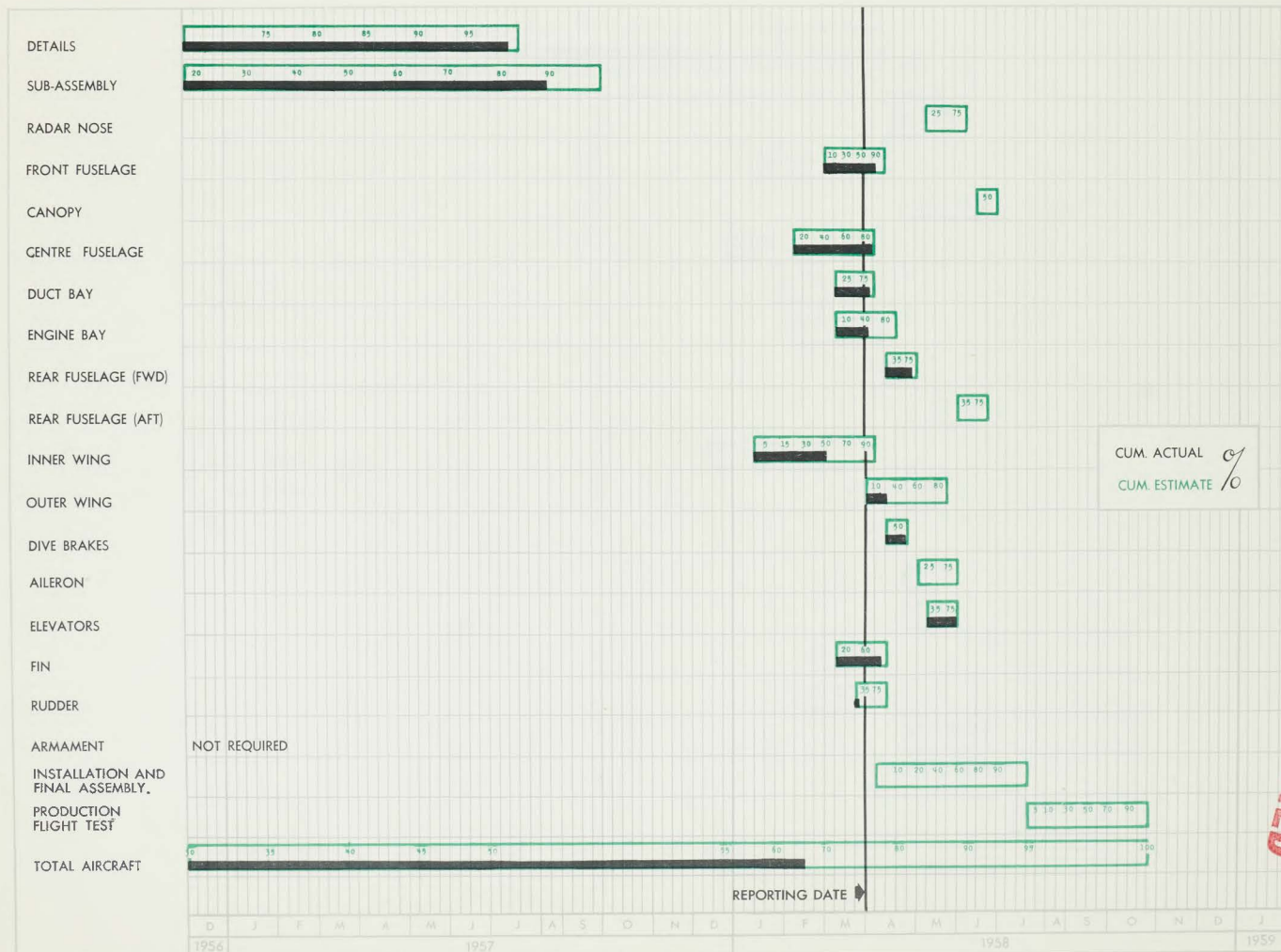
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AVRO ARROW PROGRESS REPORT

PROGRESS CHART - FIFTH AIRCRAFT



105-MPR36-7

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PROGRESS CHART — SIXTH AIRCRAFT

DETAILS

SUB-ASSEMBLY

RADAR NOSE

FRONT FUSELAGE

CANOPY

CENTRE FUSELAGE

DUCT BAY

ENGINE BAY

REAR FUSELAGE (FWD)

REAR FUSELAGE (AFT)

INNER WING

OUTER WING

DIVE BRAKES

AILERON

ELEVATORS

FIN

RUDDER

ARMAMENT

INSTALLATION AND
FINAL ASSEMBLY

PRODUCTION
FLIGHT TEST

TOTAL AIRCRAFT

CUM. ACTUAL %
CUM. ESTIMATE %

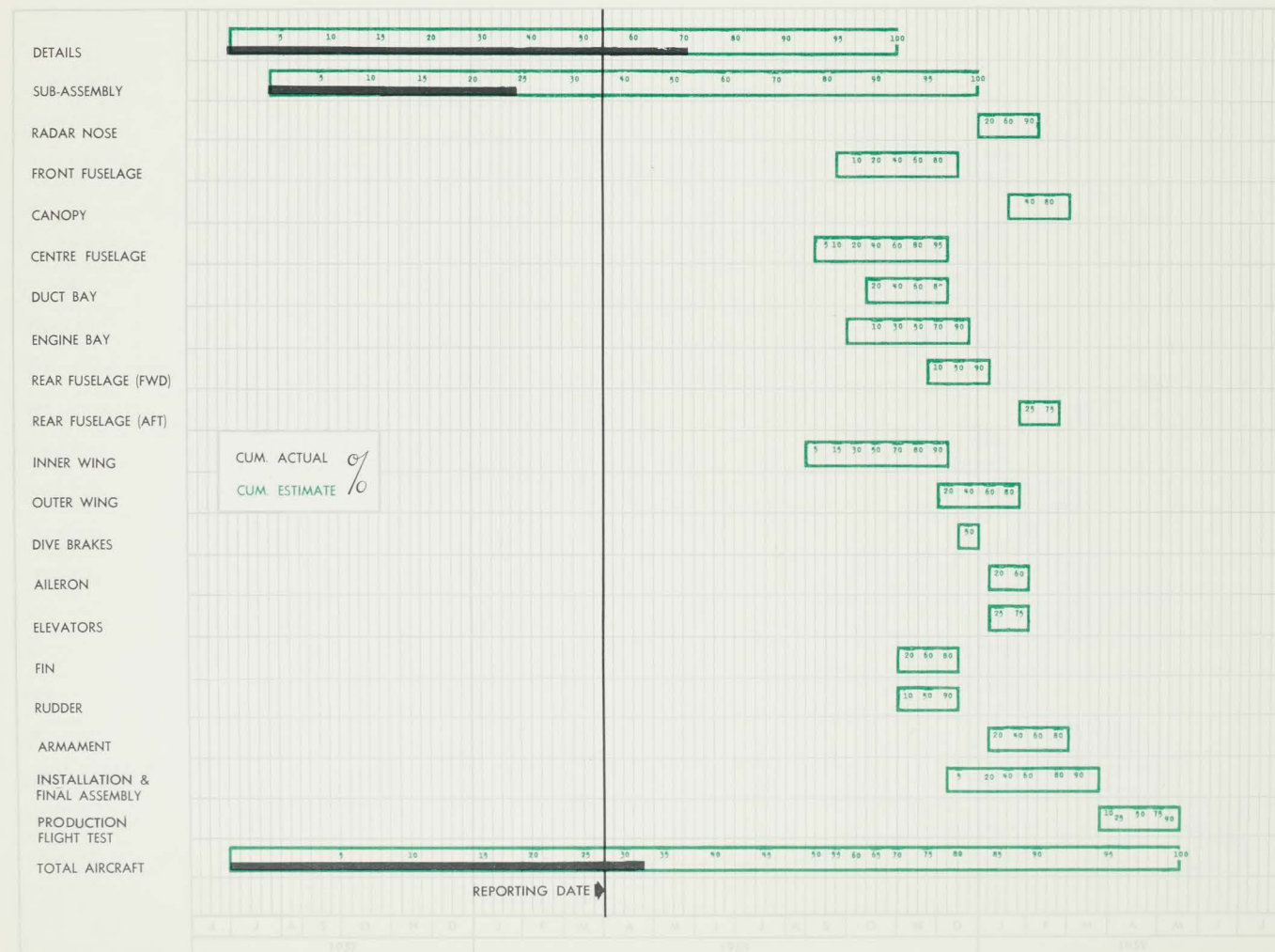
REPORTING DATE

AVRO ARROW PROGRESS REPORT

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PROGRESS CHART — SEVENTH AIRCRAFT



105-MPR 38-4

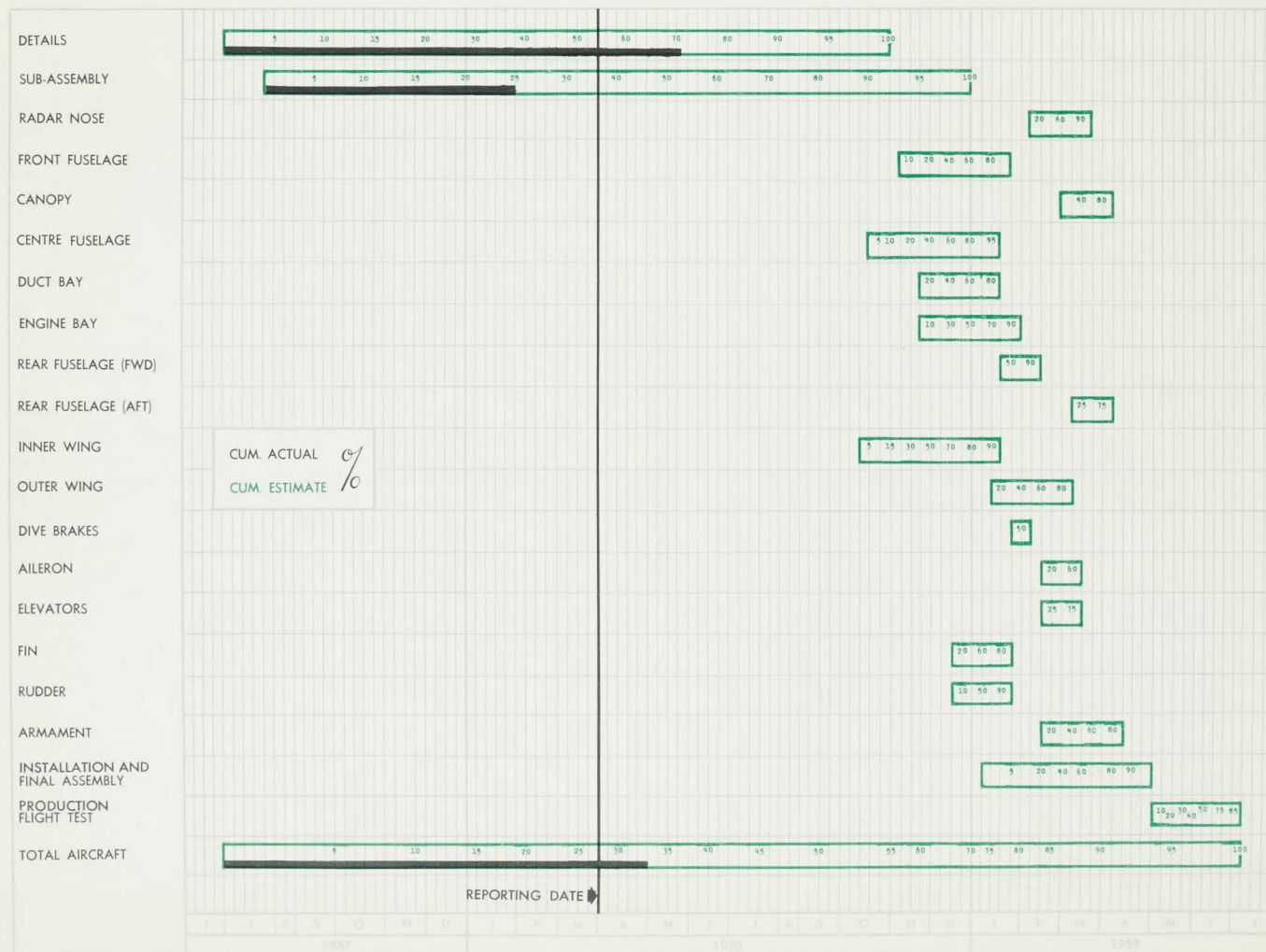
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PROGRESS CHART — EIGHTH AIRCRAFT



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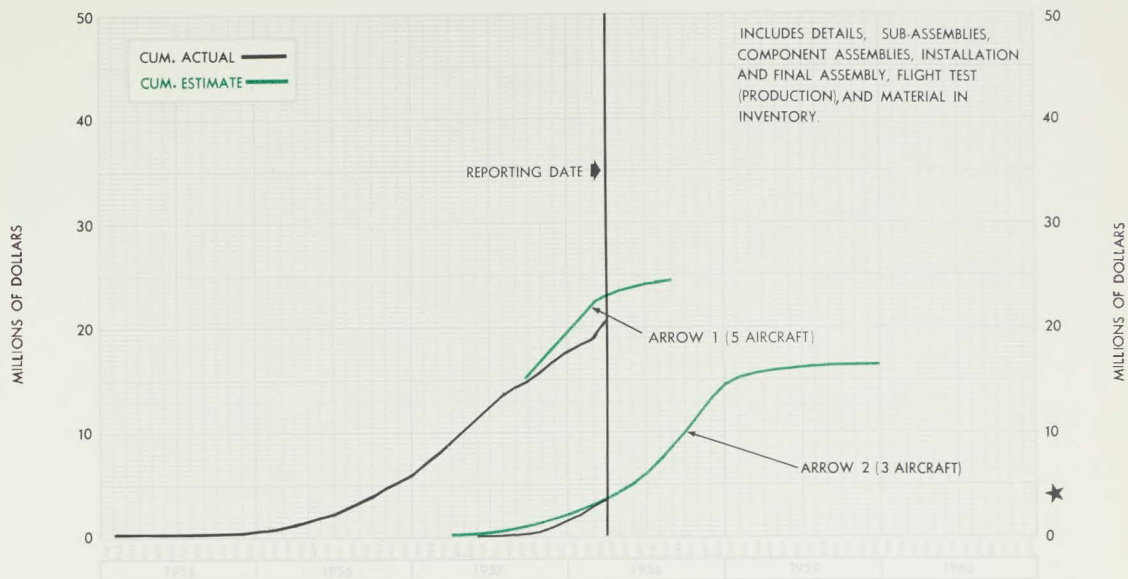
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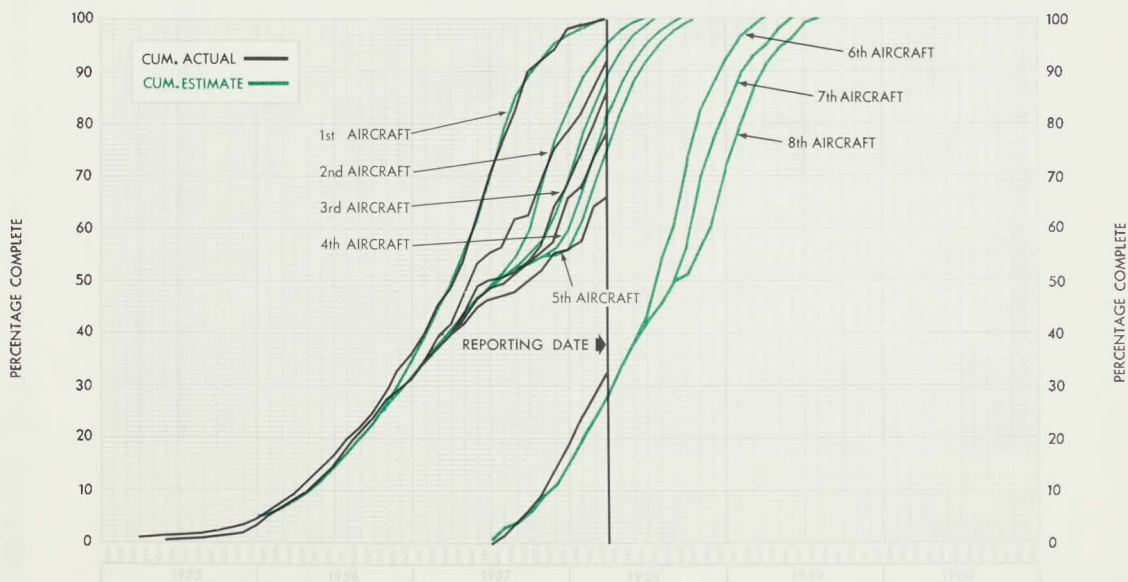
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TOTAL PRODUCTION - COSTS AND PERFORMANCE



DOLLAR EXPENDITURES



105-MPR49-B

PHYSICAL PERFORMANCE

PROGRESS CHART — STATIC TEST AIRCRAFT



105-MPR40-7

AVRO ARROW PROGRESS REPORT

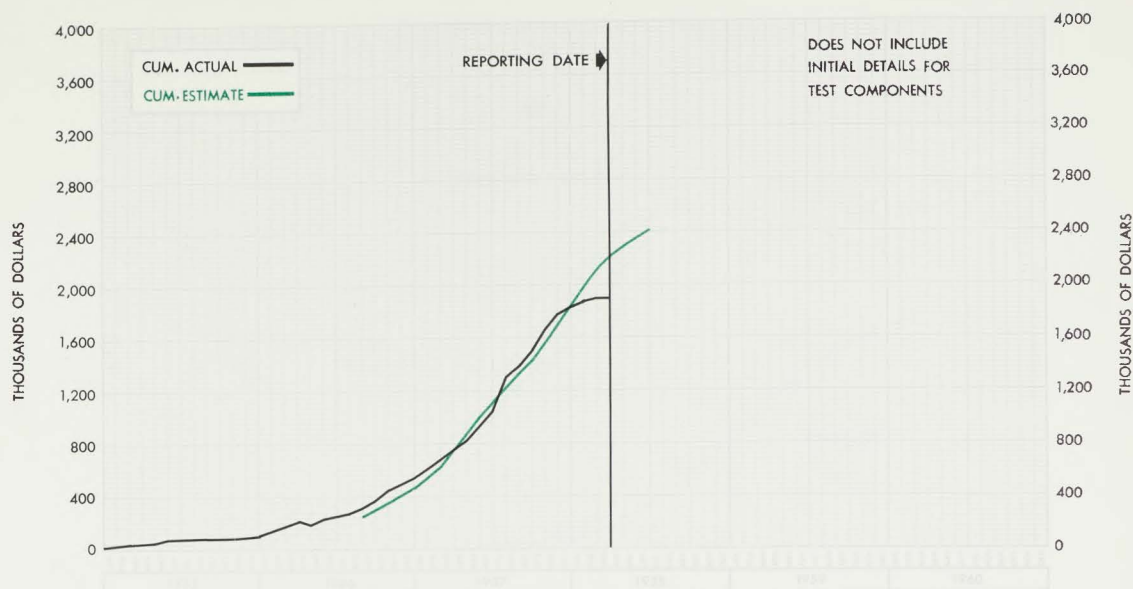
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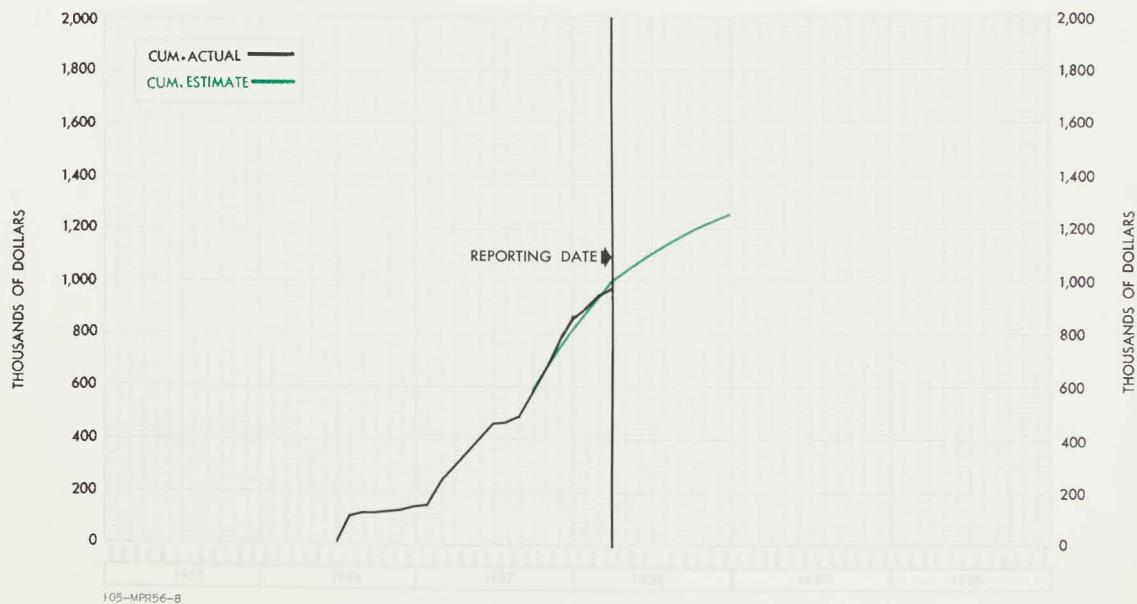
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TEST COMPONENTS AND AIRBORNE TEST EQUIPMENT COSTS



TEST COMPONENT DOLLAR EXPENDITURES

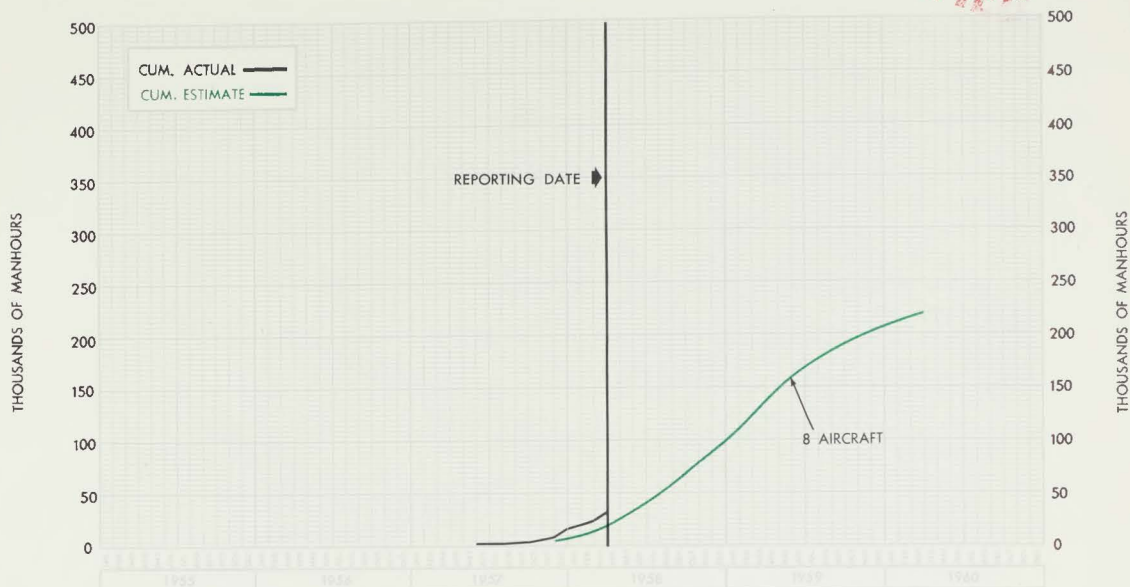


105-MPR56-B

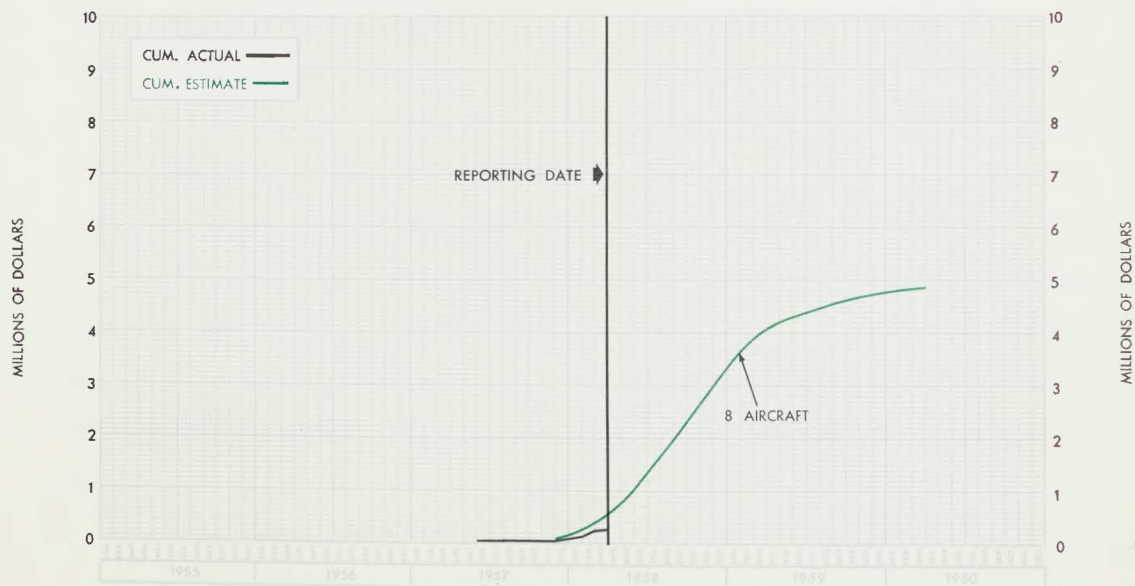
AIRBORNE TEST EQUIPMENT DOLLAR EXPENDITURES

UNCLASSIFIED

SPARES PRODUCTION



MANHOURLY EXPENDITURES

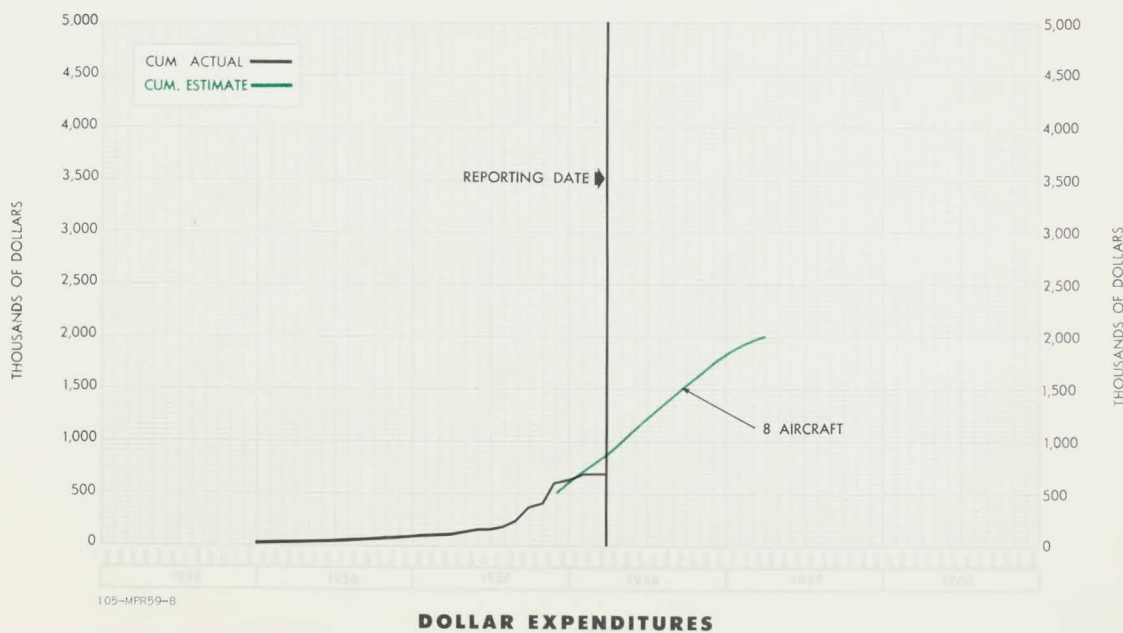


109-MPR59-B

DOLLAR EXPENDITURES

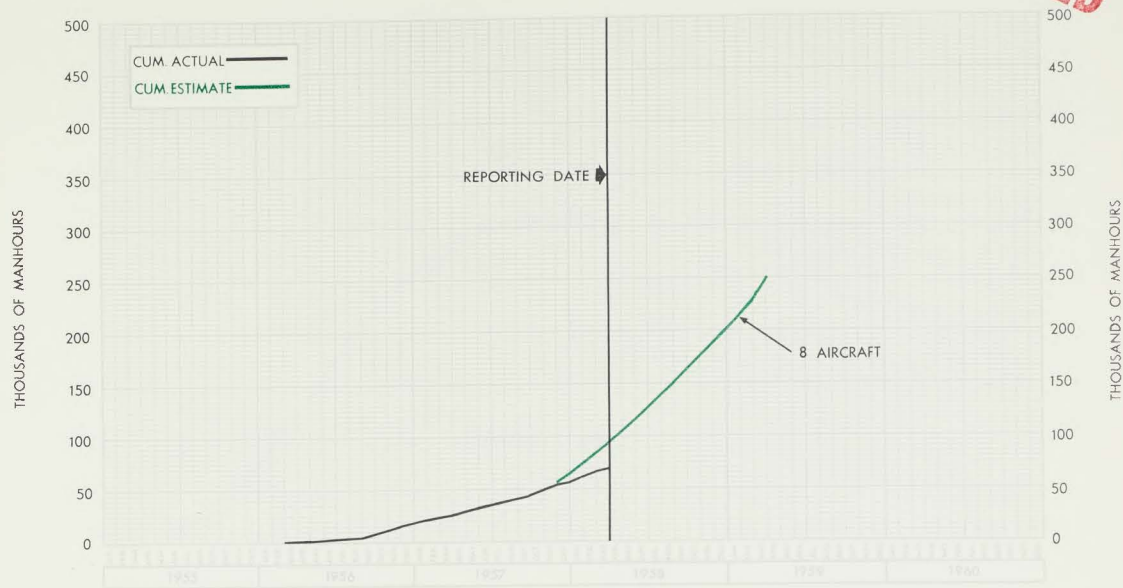
GROUND SUPPORT EQUIPMENT PRODUCTION

UNCLASSIFIED

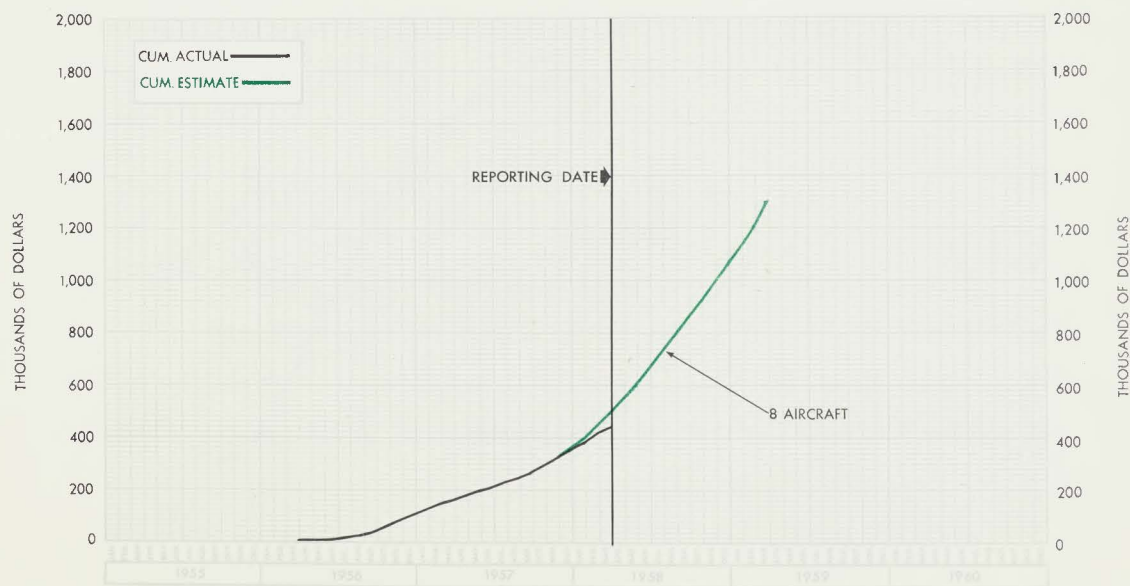


UNCLASSIFIED

PUBLICATIONS



MANHOURLY EXPENDITURES

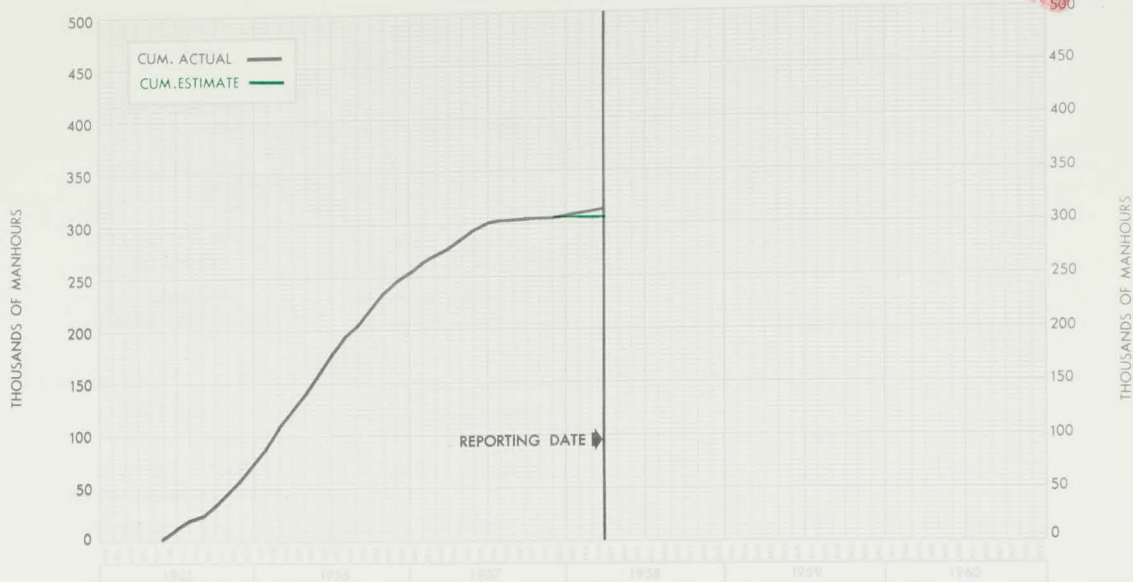


105-MPR60-8

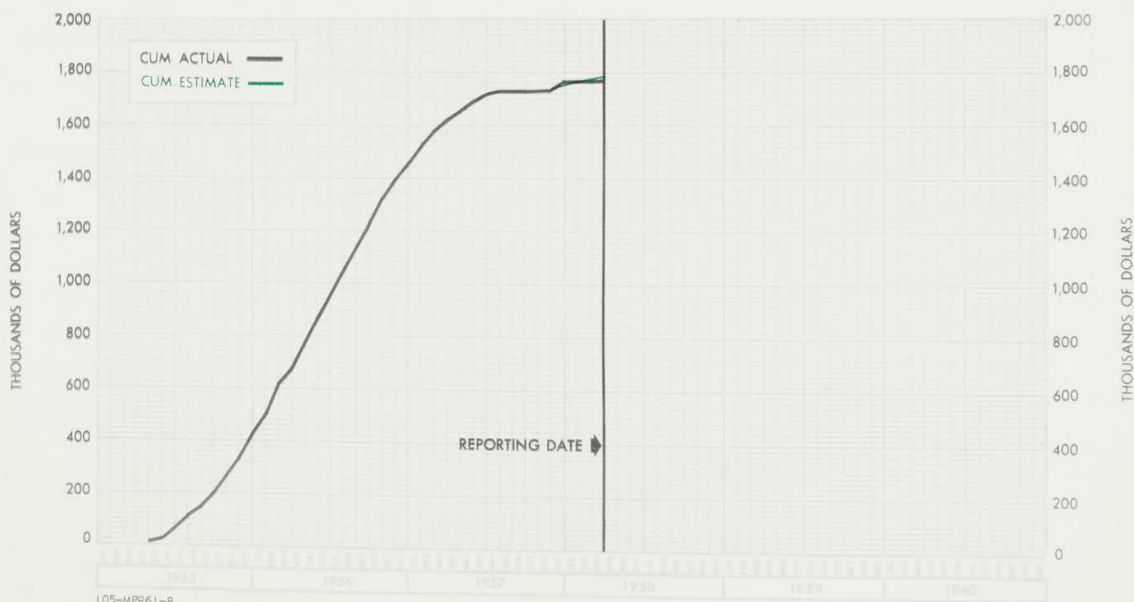
DOLLAR EXPENDITURES

UNCLASSIFIED

METAL MOCK UP PRODUCTION



MANHOURLY EXPENDITURES



105-MPR61-B

DOLLAR EXPENDITURES



AVRO FURNISHED EQUIPMENT (PACING ITEMS) – PAGE 1

UNCLASSIFIED

PAGE 1

1960

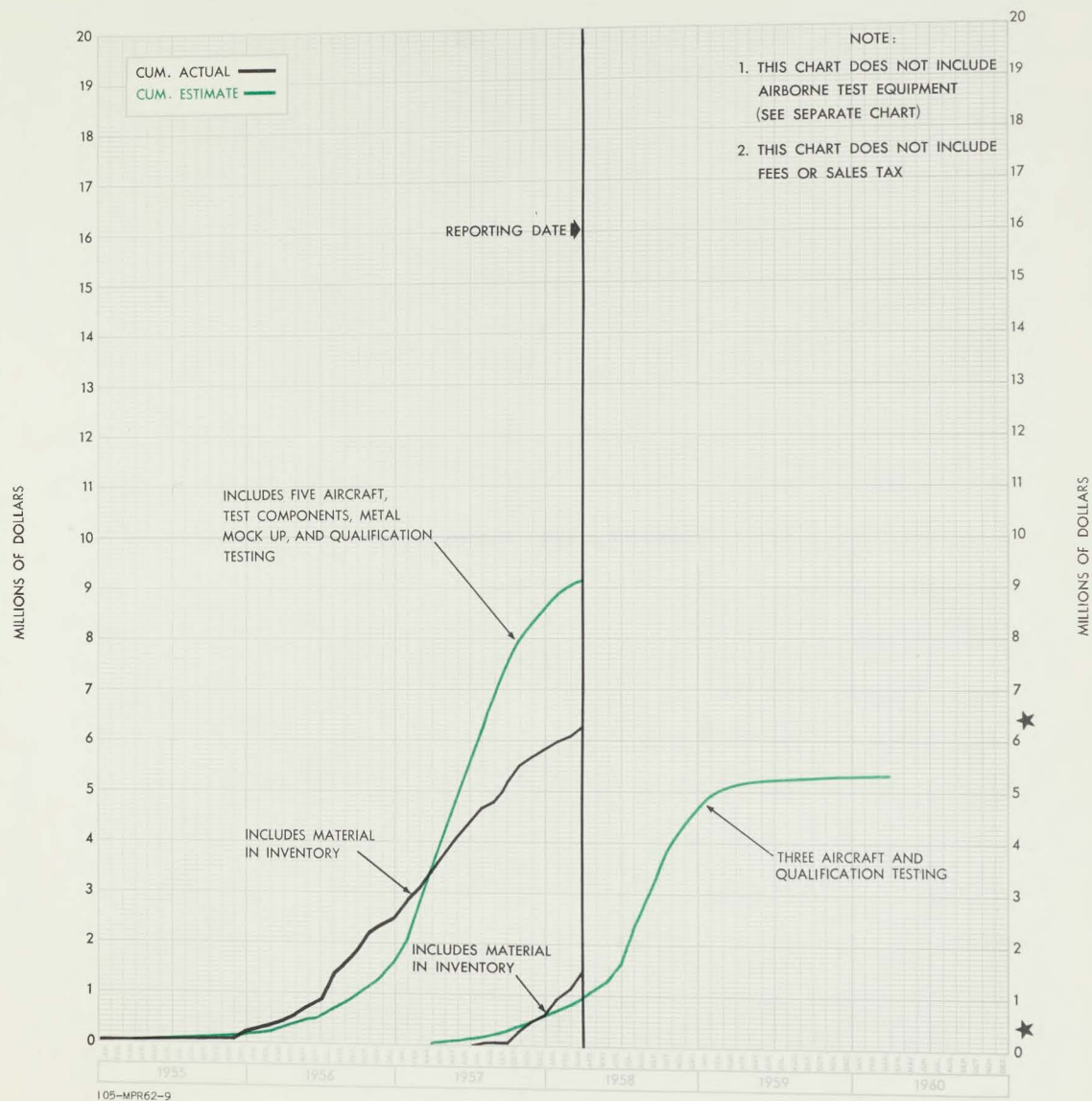
DESCRIPTION		1957	1958	1959	1960
	PER MONTH		1 1 1 1	1 1 1	
AIRCRAFT ACCEPTANCES	CUMULATIVE TOTAL	1	3 5	6 7 8	
	PER MONTH	1	1 1 1	1 1 1	
AIRCRAFT COMPLETIONS	CUMULATIVE TOTAL	1	3 5	6 7 8	
FUEL SYSTEM	APPROX. 113 ITEMS				
VALVE, FUEL NO AIR		1 2 3 4 5		6 7 8	
PUMP, FUEL BOOSTER		1 2 3 4 5		6 7 8	
FLOW PROPORTIONER		1 2 3 4 5			
CENTRE OF GRAVITY CONTROL		1 2 3 4 5		6 7 8	
FLYING CONTROLS	APPROX. 15 ITEMS				
DAMPING SYSTEM		1 2 3 4 5		6 7 8	
DECELERATION PARACHUTE		1 2 3 4 5		6 7 8	
LOW PRESSURE PNEUMATICS	APPROX. 17 ITEMS				
VALVE, CANOPY SEAL		1 2 3 4 5		6 7 8	
OXYGEN	APPROX. 5 ITEMS				
CONVERTER, OXYGEN		1 2 3 4 5			
HYDRAULIC UTILITIES	APPROX. 82 ITEMS				
COMPENSATOR		1 2 3 4 5		6 7 8	
PUMP, CONSTANT DELIVERY		1 2 3 4 5		6 7 8	
HYDRAULIC FLYING CONTROLS	APPROX. 55 ITEMS				
POWER CONTROL, ELEVATOR		1 2 3 4 5		6 7 8	
POWER CONTROL, AILERON		1 2 3 4 5		6 7 8	
POWER CONTROL, RUDDER		1 2 3 4 5		6 7 8	
ARMAMENT HYDRAULICS	APPROX. 24 ITEMS				
VALVE, MANIFOLD ASSY				6 7 8	
REPORTING DATE					

ACTUAL ITEMS RECEIVED _____
 REQUIREMENT SCHEDULE -1-2-
 PROMISED DATES FOR 1ST A/C
 OLD  REVISED 

AVRO ARROW PROGRESS REPORT

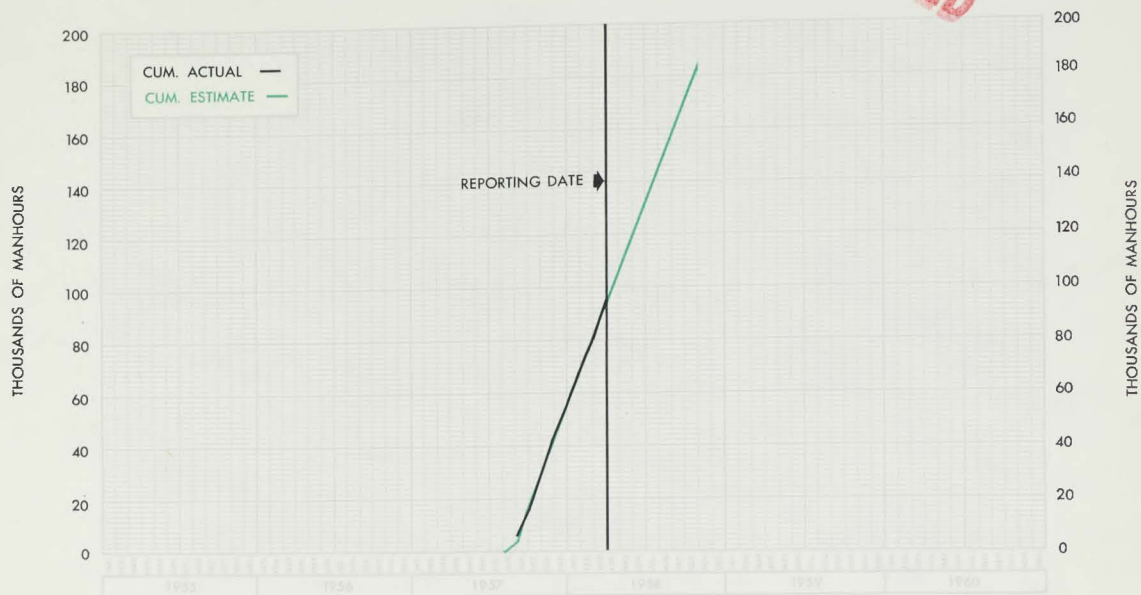
PRODUCTION MATERIAL DOLLARS

UNCLASSIFIED

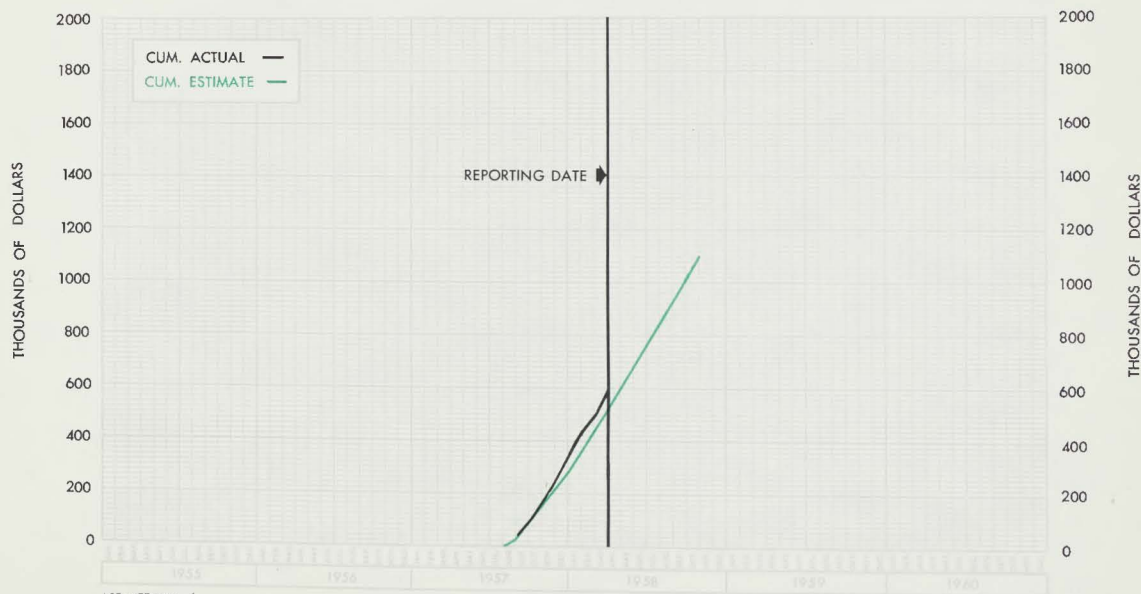


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INSTRUMENTATION LABORATORY



MANHOUR EXPENDITURES



105-MPR2883-4

DOLLAR EXPENDITURES

