Bye-8725-68
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Report — OXCART A-12 Aircraft Experience Data and Systems Reliability

15 Jan 1968

DIRECTORATE of SCIENCE & TECHNOLOGY
Office of Special Activities

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INTRODUCTION

This document contains experience data of the OXCART A-12 as of 31 December 1967, including its BLACK SHIELD deployment and operations commencing in, and continuing since, May 1967.

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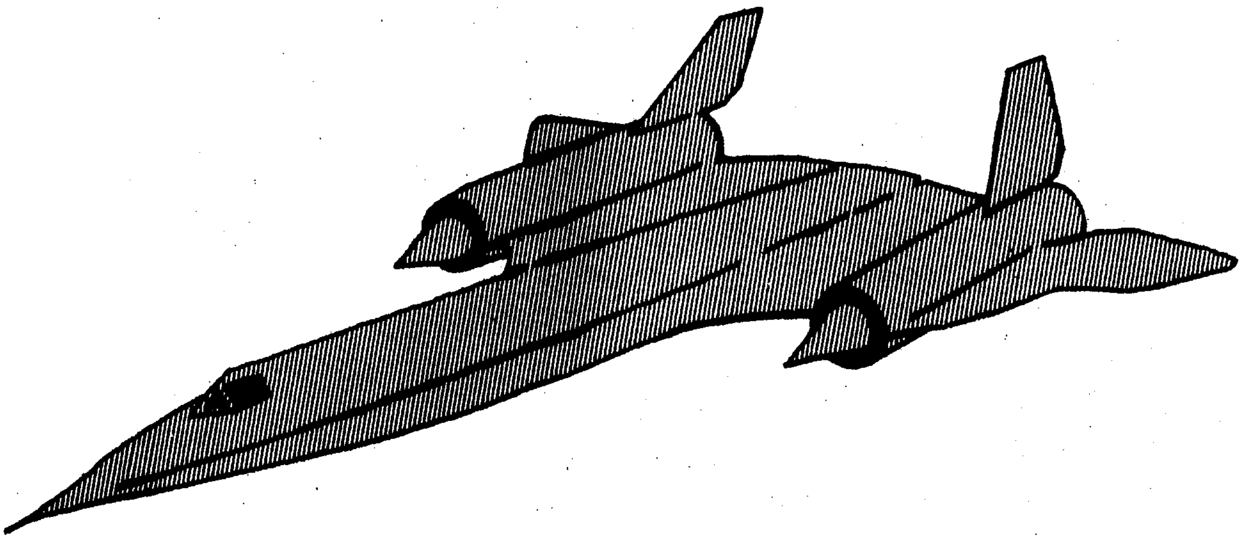

AIRFRAME DATA	ENGINE DATA	PERFORMANCE
1. LENGTH: 99 FEET 2. SPAN: 56 FEET 3. WEIGHT (BASIC) 52,700 LBS. 4. WEIGHT (FUELED) 122,500 LBS.	1. TWO P&W JT11D20A AFTERBURNING TURBO-JET WITH BYPASS 2. MAX. THRUST: 32,500 LBS. 3. OPERATING LIMIT: MACH 3.2 @ 100,000FT.	(STANDARD DAY) 1. SPEED: MACH 3.2 (1860 KNOTS) 2. ALTITUDE: 87,000+ FT. 3. RANGE: 3600 NM W/O AIR REFUELING, (CURRENT OBJECTIVE)

OXCART
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HANDLE VIA BYEMAN CONTROL SYSTEM

EXPERIENCE RECORD

AIRCRAFT

First Flight	26 April 1962
Total Flights	2670
Total Hours	4438:00
Total Flights at Mach 3.0	900
Total Hours at Mach 3.0	571:06
Longest Flight at Mach 3.0	3:50 Hours
Longest Mach 3.2 Time on a Single Flight	3:30 Hours
Longest Single Flight Duration	7:40 Hours
Speed - Max	Mach 3.29
Altitude - Max	90,000 Feet

J-58 ENGINES

Total Engine Flights	9412
Total Engine Hours	19,738
Total Engine Flights at Mach 3.0	4294
Total Engine Flight Hours at Mach 3.0	2690
Total Ground Test Hours	26,135
Total Mach 3.0 Environmental Ground Test Hours	6497
Total 150 Hour Qualification Tests	6

INS

Total Flights	1616
Total Flight Operating Hours	3715
Total Operating Time	45,739

SAS - AUTO PILOT

Total Flights	2669
Total Flight Hours	4437
Total Operating Hours	42,850

CAMERAS

	I	IV
Total Flights	262	67
Total Flight Operating Hours	194	37
Total Flights Above Mach 3.0	159	47
Total Hours at Mach 3.0	94	32
Longest Flight at Mach 3.0	1.5	1.3

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PILOTS (6)

Average Pilot Experience	15 Years
Average Total Flight Time (All Aircraft)	4110 Hours
Time in A-12 (Least/Avg/Most)	144/413/483 Hours
Time in Project	1.3/5 Years
Average A-12 Flights	257

LIFE SUPPORT

Total Suit Flights (Detachment)	1751

EWS

Total Flight Tests	110

DETACHMENT

Activated	1 October 1960
Time in Training as a Unit	60 Months*
Average Time in Project (Personnel)	46/50 Months

*Detachment 1, 1129th began training as a unit coincident with delivery of first aircraft (trainer) in January 1963. Prior to that it had been supporting LAC flight test effort.

OXCART A-12 AIRCRAFT INVENTORY

Operational Aircraft	6
Two-Seater Trainer	1
Flight Test Aircraft	1

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FLIGHT DEVELOPMENT STAGES

The single most important problem pacing the flight development (opposite page) of the A-12 has been the air inlet and its control system. This system which provides the proper amount of ram air to the engines at all flight conditions must minimize shock expulsions (unstarts), automatically recover (restart) when shock expulsions do occur, and at the same time operate at optimum efficiency in order to maximize engine performance and aircraft range. The notations under development stages I through IV A all refer to problems and components of this system. Resolution of these has lead to a reliability commensurate with the operational readiness established in December 1965.

Fuselage Station 715 Joint Beefup (Stage IV B) involved strengthening fuselage structure at the wing joint because of heavier electronic warfare systems payload weight requirements.

FLIGHT DEVELOPMENT STAGES

I. Mach 2.35 (To July 1964)

A. Duct Roughness at Mach 2.4
B. Unacceptable Restart Capability
C. Inlet Instability and Unstarts

II. Mach 2.8 (July 1964 - March 1965)

A. Inlet Mice Corrected IA
B. Aft Bypass Incorporation Corrected IB
C. Inlet Instability and Unstarts Still Encountered

III. Mach 3.0 (March 1965 - August 1965)

A. Spike Static Probe and "J" Cam Inlet Control Improved IIC But Did Not Correct Condition

IV. Mach 3.2 (26 August 1965 - 20 November 1965)

A. Retrofit to Lockheed Electronic Inlet Control Corrected IIC
B. Fuselage Station 715 Joint Beefup

V. Operational Alert (December 1965 On)

A. Operational Capability
B. Aircraft Performance Optimization and Envelope Extension

VI. Phase Out (December 1966)

A. On 29 December 1966 a decision was made by higher authority to terminate the OXCART program as of 31 December 1967. An orderly phase-out program was implemented to carry out this decision.

VII. Operational Deployment (May 1967)

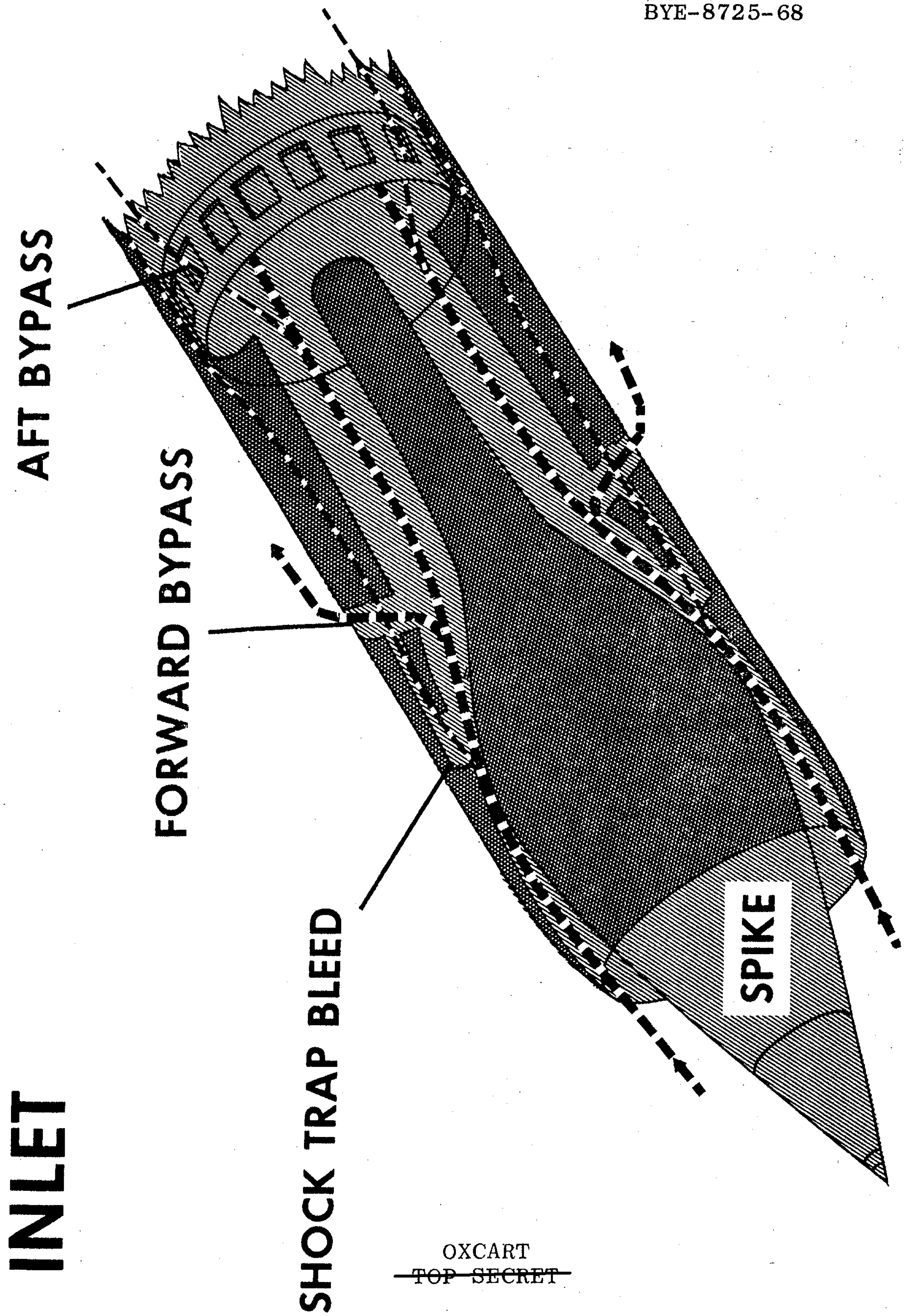
VIII. Operational Deployment extended through 30 June 1968 (December 1967).

FUNCTION OF THE A-12 INLET

A supersonic inlet or air induction system is designed to provide best possible aerodynamic performance over a range of supersonic Mach numbers with a stable and steady flow of air to the engine. However, due to constraints imposed by supersonic aerodynamics, truly optimum performance with an ideal shock pattern and an inlet airflow exactly matched to the engine airflow requirement can only be provided at one flight condition. Since the OXCART aircraft must cruise for considerable periods of time at a Mach 3 speed, maximum possible range is realized by providing this optimum inlet performance at the Mach 3 cruise condition. The basic geometry and airflow characteristics of the inlet are then varied to provide a minimum compromise of aerodynamic performance and efficiency at lower flight speeds. Some of this needed flexibility is provided by varying the position of the inlet spike. Since the airflow which can be admitted by the inlet is in excess of that which can be accepted by the engine at other than the design condition, this excess airflow is dumped overboard through a series of forward bypass doors or passed down the nacelle airflow passage around the engine through a series of aft bypass doors.

In addition to those airflow passages shown on the accompanying sketch, a system is also provided for bleeding off the low energy boundary layer air which forms along the surface of the spike. This improves inlet efficiency by making the entire main inlet flow passage available to the high energy, high velocity air.

A rather complicated automatic electronic control system senses aerodynamic environment to provide the proper scheduling of spike and forward bypass door positions at all flight conditions. Aft bypass door positions are selected manually by the pilot.


INLET
AFT BYPASS
FORWARD BYPASS
SHOCK TRAP BLEED
SPIKE

A-12 SORTIES/PROFILES ABOVE MACH 3.0 - DETACHMENT AIRCRAFT

This chart depicts a breakout of those Detachment sorties flown from 25 March 1965 through 31 December 1967 wherein the A-12 aircraft flew above Mach 3.0. The profiles column lists the number of times the aircraft accomplished the high/fast operational profile during the sorties flown in the period, i.e., high and fast after takeoff, descend for air refueling, climb back up to high and fast again, etc.

The A-12 major/minimum modification program got underway in the latter part of August 1965. Sorties flown during the period outlined in Section A were in non-modified aircraft.

A-12 SORTIES AND PROFILES ABOVE MACH 3.0 - DETACHMENT ACFT/SORTIES

(Through 31 December 1967)

	Sorties	Profiles
A. 25 Mar 65 - 31 Aug 65:		
Total Sorties	52	
Total Profiles		57
B. 31 Aug 65 - 31 Dec 67:		
Total Sorties	600	
Total Profiles		920
C. Summary (25 Mar 65 - 31 Dec 67):		
Total Sorties	652	
Total Profiles		977

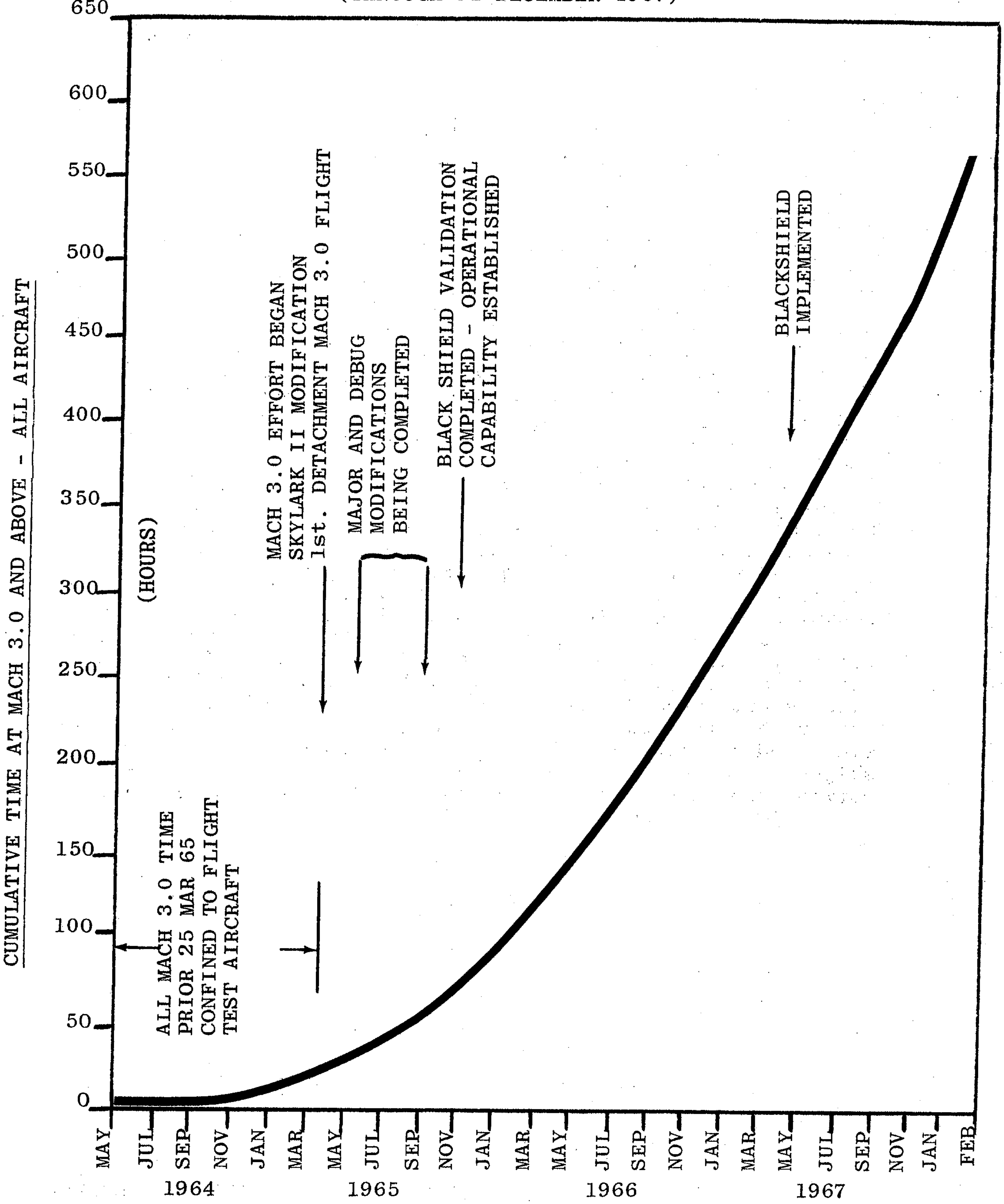
First Detachment A-12 flight above Mach 3.0 on 25 March 1965 by Aircraft 128.

CUMULATIVE TIME AT MACH 3.0 AND ABOVE

The rate of accumulation of Mach 3.0 time as shown by the slope of the curve (opposite page) began to substantially increase in March 1965. Prior to this time, Mach 3.0 flight was confined to the three flight test aircraft only. After March 1965 each of the seven detachment (operational) aircraft as they completed necessary modifications began to fly at Mach 3.0 and above on a routine basis.

The significance of this data is that during the past thirty-three months since 25 March 1965, 571 flight hours at Mach 3.0 and above have been accumulated as compared to only 15 Mach 3.0 hours accumulated during the three years from first flight in April 1962 to 25 March 1965.

(THROUGH 31 DECEMBER 1967)

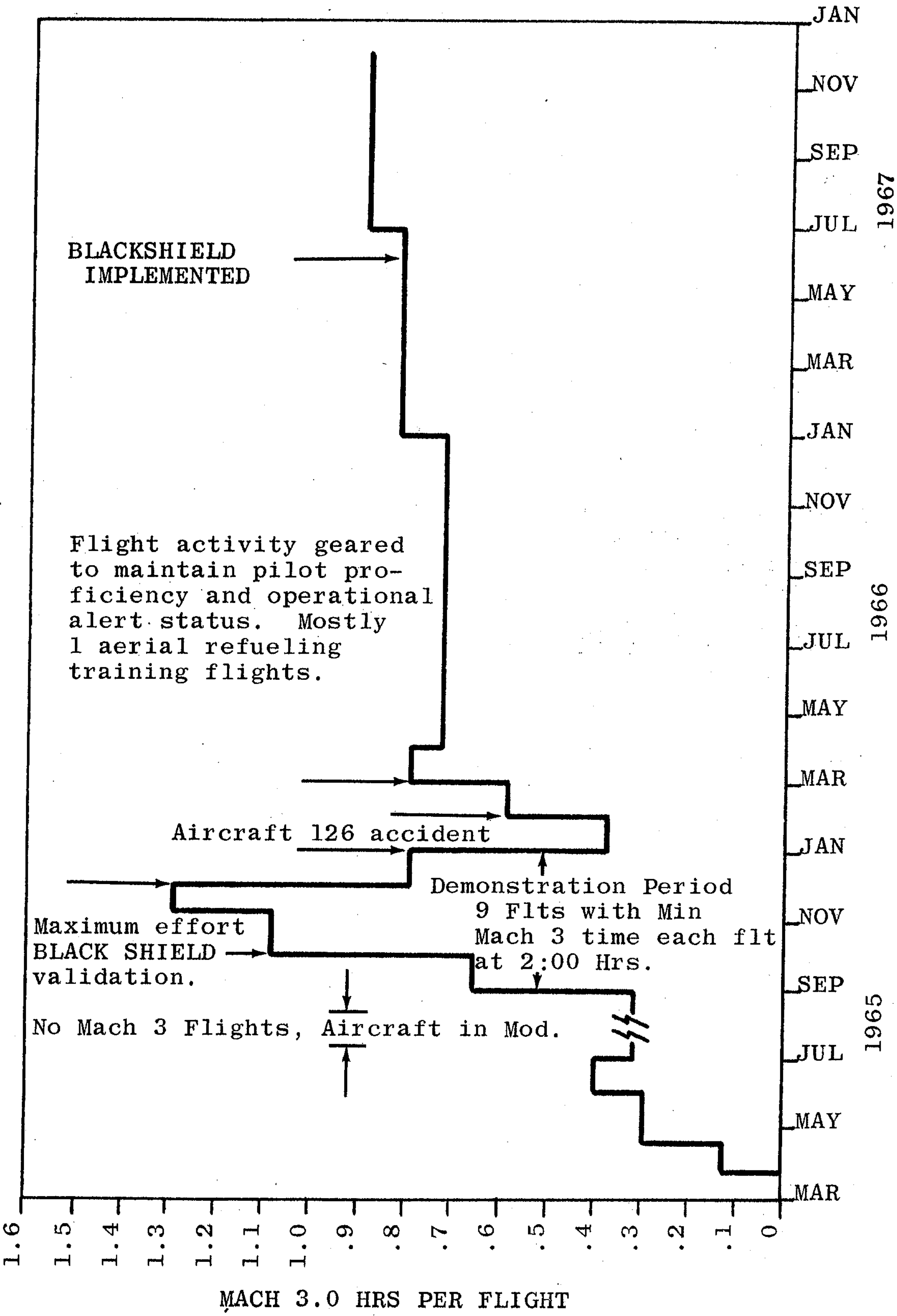


DETACHMENT AIRCRAFT
AVERAGE MACH 3 HOURS PER FLIGHT

The chart opposite shows the average time spent at Mach 3 and above for each flight. It is based upon all Mach 3 flights of detachment aircraft for the period examined including the relatively short Lockheed and detachment operated functional check flights as well as the longer multiple refueling training flights and simulated missions. Prior to 25 March 1965 there were no Mach 3 flights on detachment aircraft. The peak of 1.28 Mach 3 hours per flight during the fall of 1965 reflects the validation or demonstration period wherein three refueling simulated missions were performed. During January 1966 flight activity was substantially curtailed during the investigation of aircraft 126 accident with only some of the short functional check flights lasting a very few minutes at Mach 3. This is normal procedure after a period of inactivity wherein it is necessary to recheck all systems during short periods at Mach 3 prior to resuming the longer Mach 3 training flights. By spring 1966 a normal level of training activity was resumed reflecting about 3/4 hours at Mach 3 per flight. The period between January and July 1967 reflected training flights with usually one or sometimes two refueling(s) rather than the longer and more costly three refueling simulated missions performed during the fall of 1965. The slight increase in average Mach 3 time per flight for the current reporting period reflects the BLACK SHIELD activity.

DETACHMENT AIRCRAFT AVERAGE MACH 3 HOURS PER FLIGHT

(THROUGH 31 DECEMBER 1967)



DETACHMENT FLIGHTS
SORTIE EFFECTIVENESS

The chart opposite shows the trend of sortie effectiveness from a low of 25% in 1964 to the low eighties during 1967. Each flight or sortie is rated either effective or not effective on the basis of all subsystems performing properly such that all planned objectives of the sortie were satisfactorily accomplished. The total sorties flown are divided into the number rated effective to arrive at the percent effective figure. The sorties rated not effective do not mean that all such sorties were prematurely terminated or aborted. Certainly all premature terminations or aborts which did occur are included in these data as are those sorties which were fully completed but on which all planned objectives could not be accomplished. Premature terminations assignable to each subsystem are reflected subsequently under Subsystem Sortie Reliability. Hence the difference in Sortie Effectiveness and Sortie Reliability.

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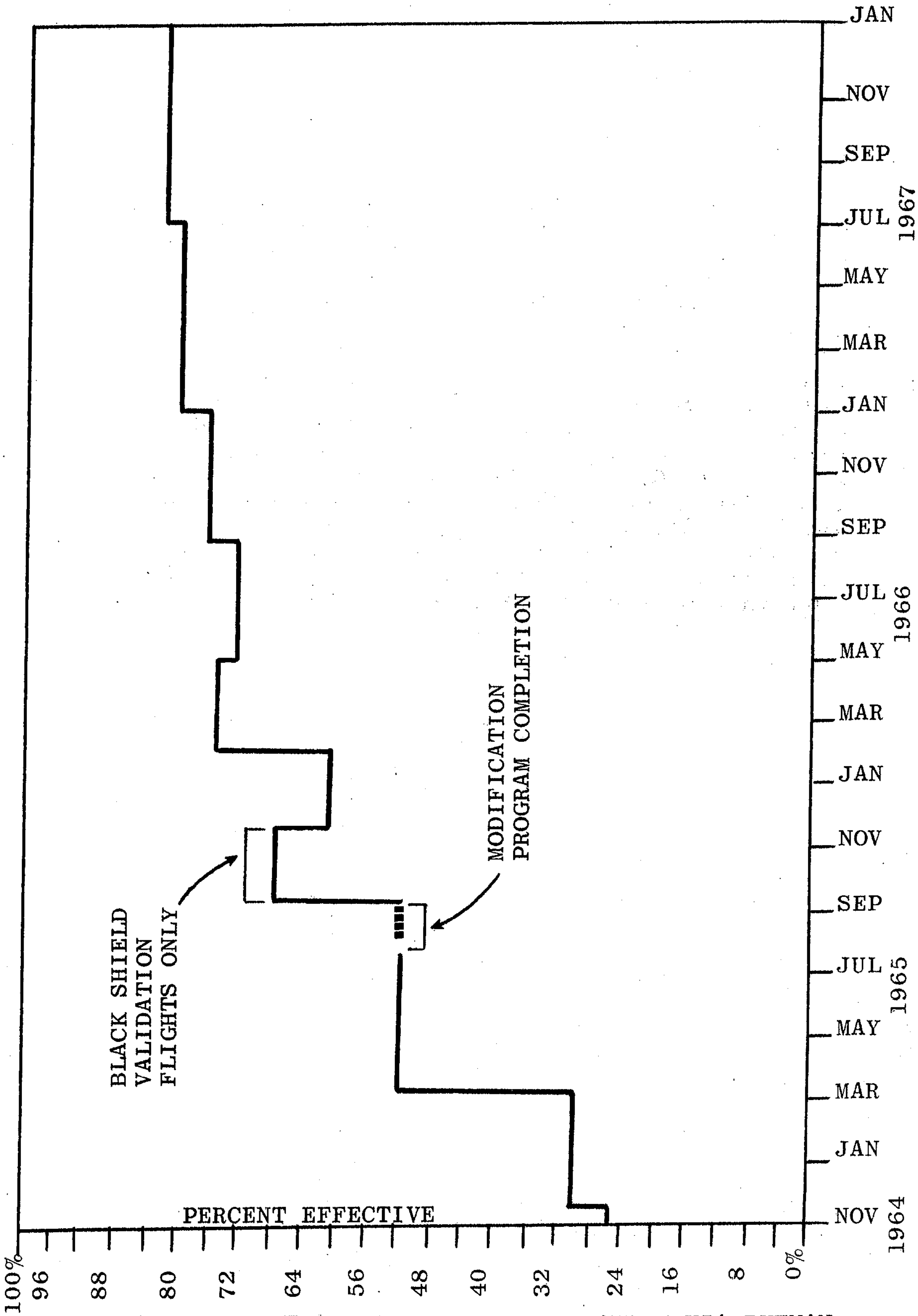
DETACHMENT FLIGHTS SORTIE EFFECTIVENESS

(THROUGH 31 DECEMBER 1967)



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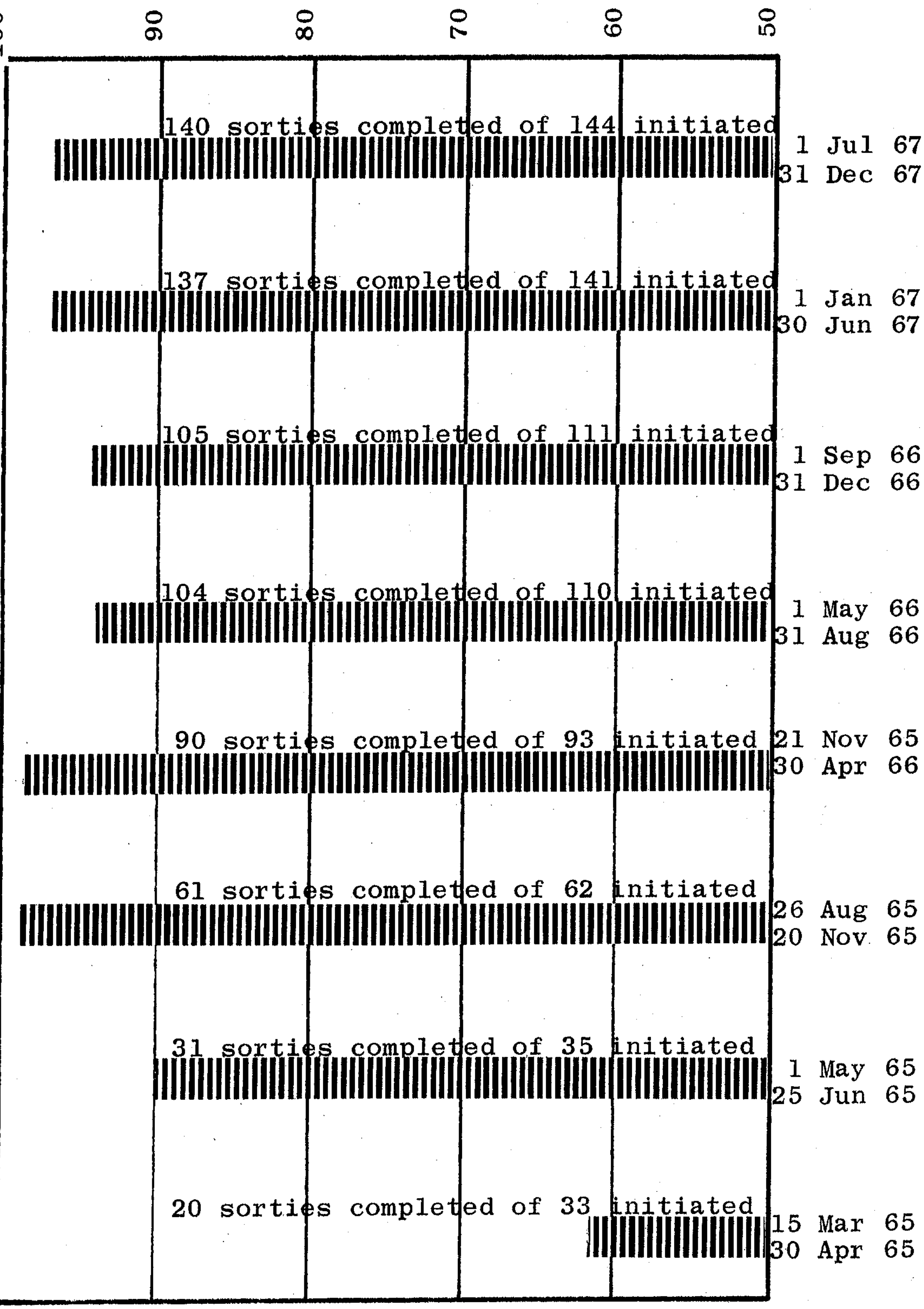
HANDLE VIA BYEMAN
CONTROL SYSTEM

INLET SORTIE RELIABILITY TREND

The chart opposite presents the inlet sortie reliability trend and indicates a general improvement of inlet reliability. For the period 21 November 1965 to 30 April 1966, only three of all attempted sorties were prematurely terminated due to problems with the inlet system. These three flights were prematurely terminated due to inlet unstarts or other problems associated with actuation or scheduling of the inlet spike and/or bypass doors. A slightly less reliable rate obtained over the period 1 May to 31 August 1966 during which six sorties were terminated out of 110 initiated, all for reasons similar to those mentioned for the period 21 November 1965 to 30 April 1966. The rate remained almost constant through the 1 September to 31 December 1966 period when six sorties were terminated out of 111 initiated, again for the same reasons as cited earlier. There was considerable improvement in inlet performance between 1 January 1967 and 31 December 1967 when only eight sorties were terminated out of 285 initiated.

PERCENT SORTIES COMPLETED



INLET SORTIE RELIABILITY TREND

(Sorties Not Prematurely Terminated)

ENGINE SORTIE RELIABILITY TREND

The facing chart presents the engine reliability trend and indicates a generally very high current level of reliability for the engine with an overall average level of reliability for the time period covered on this chart of better than 98% (779 flights successfully completed of 795 initiated). Of 653 sorties attempted in the period 21 November 1965 to 31 December 1967 which represents more than 24 months of operations, only twelve sorties were prematurely terminated due to a problem with the engine. One engine problem occurred as a result of a failure in the system which injects fuel into the afterburner, specifically a loss of an afterburner spraybar threaded-end plug. The other premature terminations due to engine problems were caused by an inlet guide vane failure which caused a compressor inlet temperature sensor failure, an independent compressor inlet temperature sensor failure, exhaust gas temperature and RPM fluctuation, two engine electrical harness deficiencies, lack of ability to trim exhaust gas temperature on an engine due to a burned out trimmer motor, and two afterburner fuel control malfunctions. Design changes have been developed to correct the hardware problems which caused the first six described failures. The other six failures are considered to be of a random nature.

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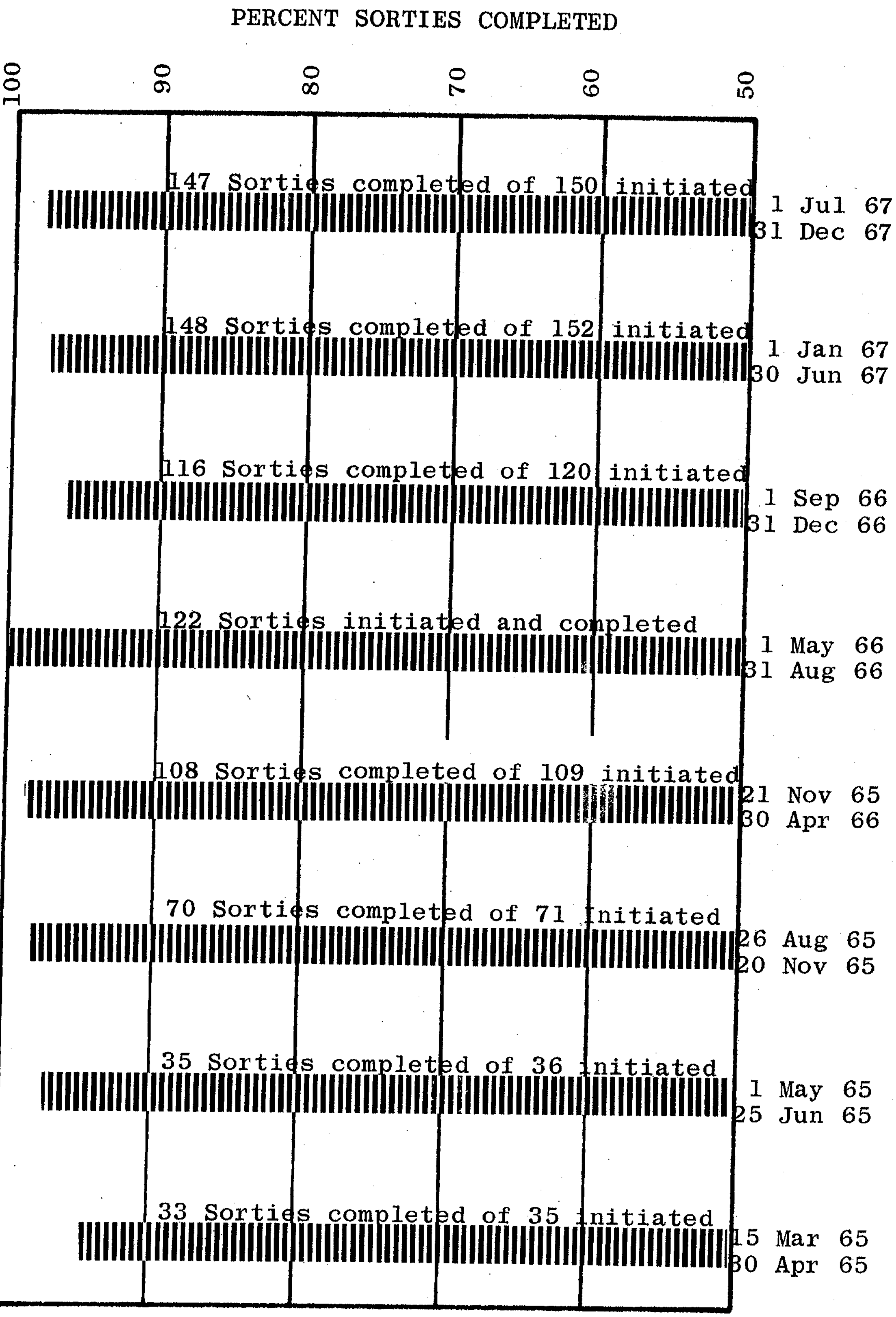
ENGINE SORTIE RELIABILITY TREND

(Sorties Not Prematurely Terminated)



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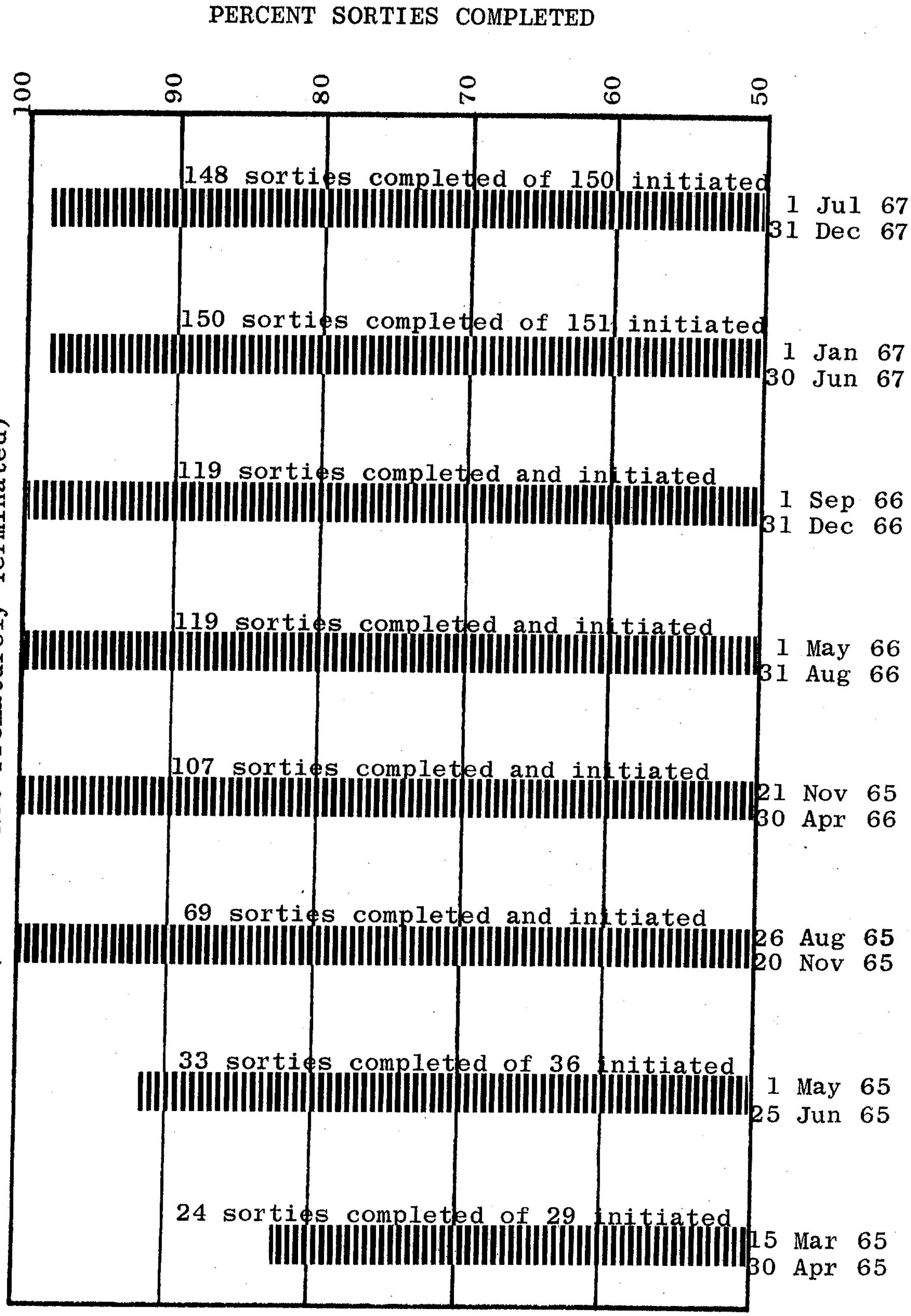
HANDLE VIA BYEMAN
CONTROL SYSTEM

NAVIGATION SYSTEM RELIABILITY TREND

During this reporting period, two sorties were prematurely terminated due to apparent INS malfunctions. One of the terminations resulted from a bad steering motor in the repeater circuit. The other, upon more extensive ground checking, was due to a broken wire on Phase A of the number 3 inverter and was, in fact, an interface malfunction. Although the in-flight reliability of the INS has remained at a very high level, the mean-time-between-failure hours have been decreasing steadily, primarily because of the very large number of operating hours already on the systems. On rare occasions even diligent ground maintenance is unable to prevent an air abort. Under present OXCART phasedown ground rules no funds have been made available for an INS IRAN program which is necessary to raise the mean-time-between-failures up to the original level.

NAVIGATION SORTIE RELIABILITY TREND

(Sorties Not Prematurely Terminated)



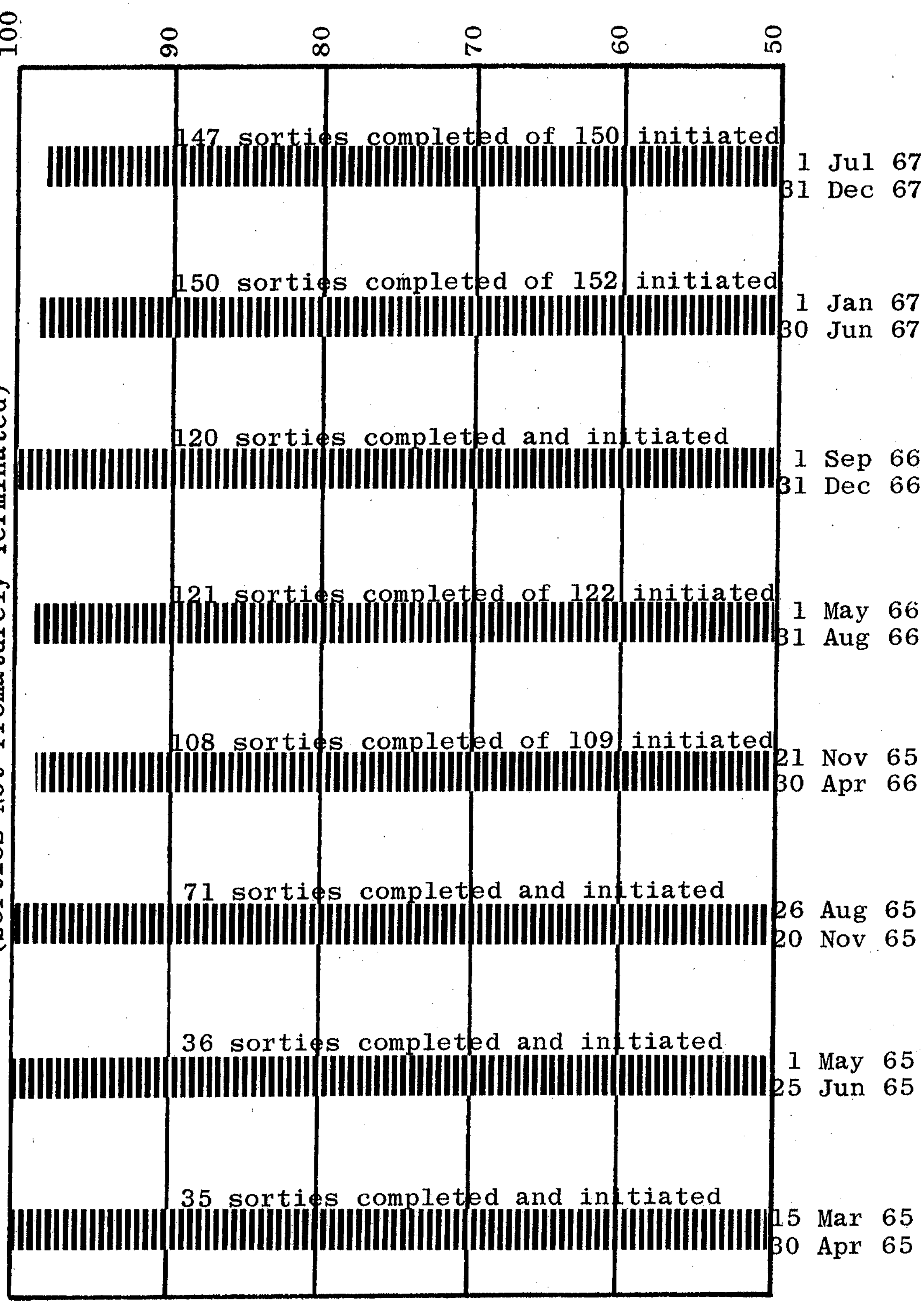
AUTO FLIGHT CONTROL SORTIE RELIABILITY TREND

During this reporting period only one sortie was prematurely terminated due to a flight control system malfunction. Specifically, a roll transfer valve in the roll channel of the stability augmentation system opened intermittently with hot oil applied. This was a random "one of a kind" malfunction.

AUTO FLIGHT CONTROL SORTIE RELIABILITY TREND

(Sorties Not Prematurely Terminated)

PERCENT SORTIES COMPLETED



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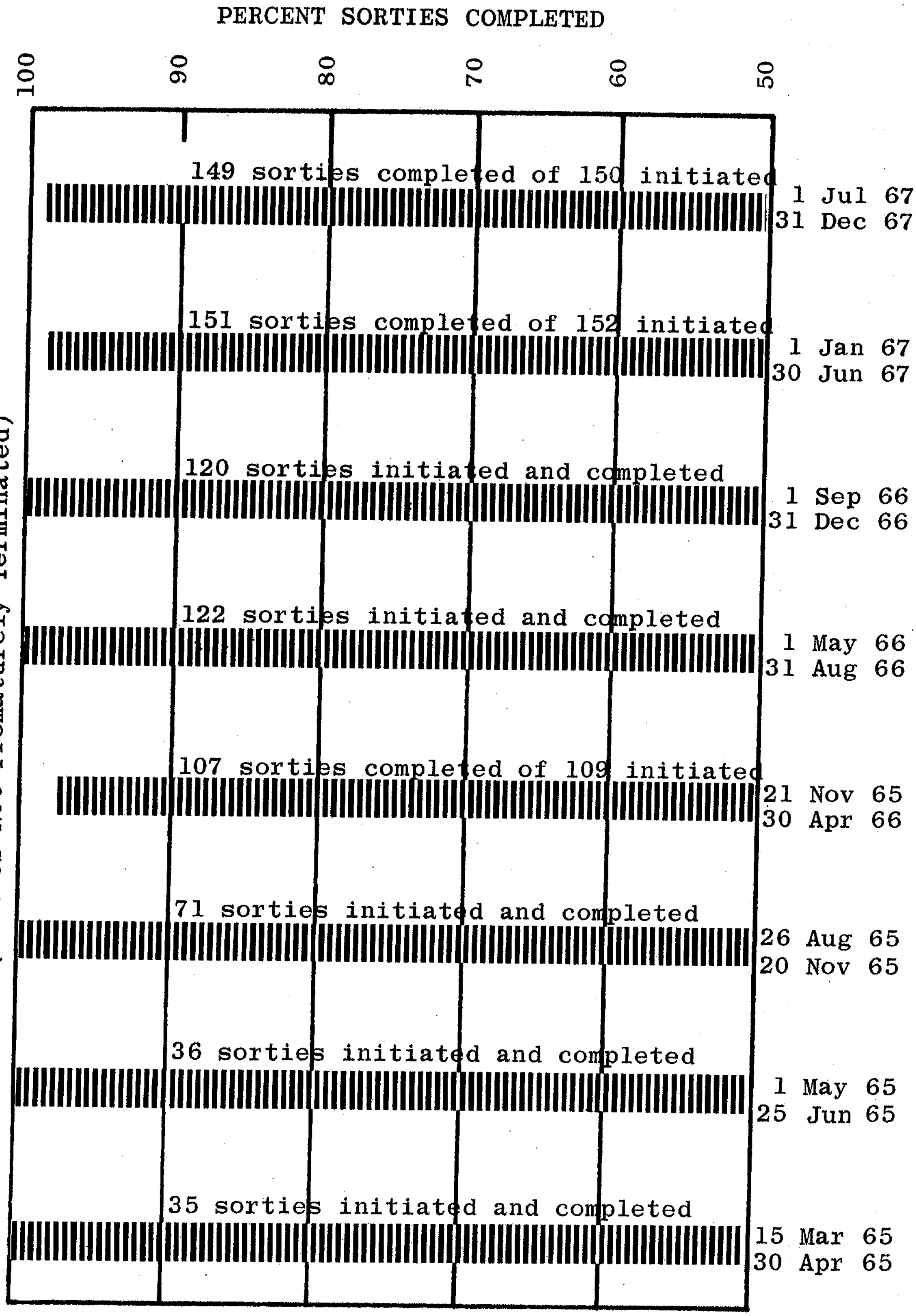
HYDRAULIC SYSTEM SORTIE RELIABILITY TREND

The aircraft hydraulic system sortie reliability level has remained steadily high, between 98-100% since March 1965. Four flights were terminated prematurely due to hydraulic system problems during the period 21 November 1965 to 30 December 1967, out of a total of 791 sorties initiated.



HYDRAULIC SYSTEM SORTIE RELIABILITY TREND

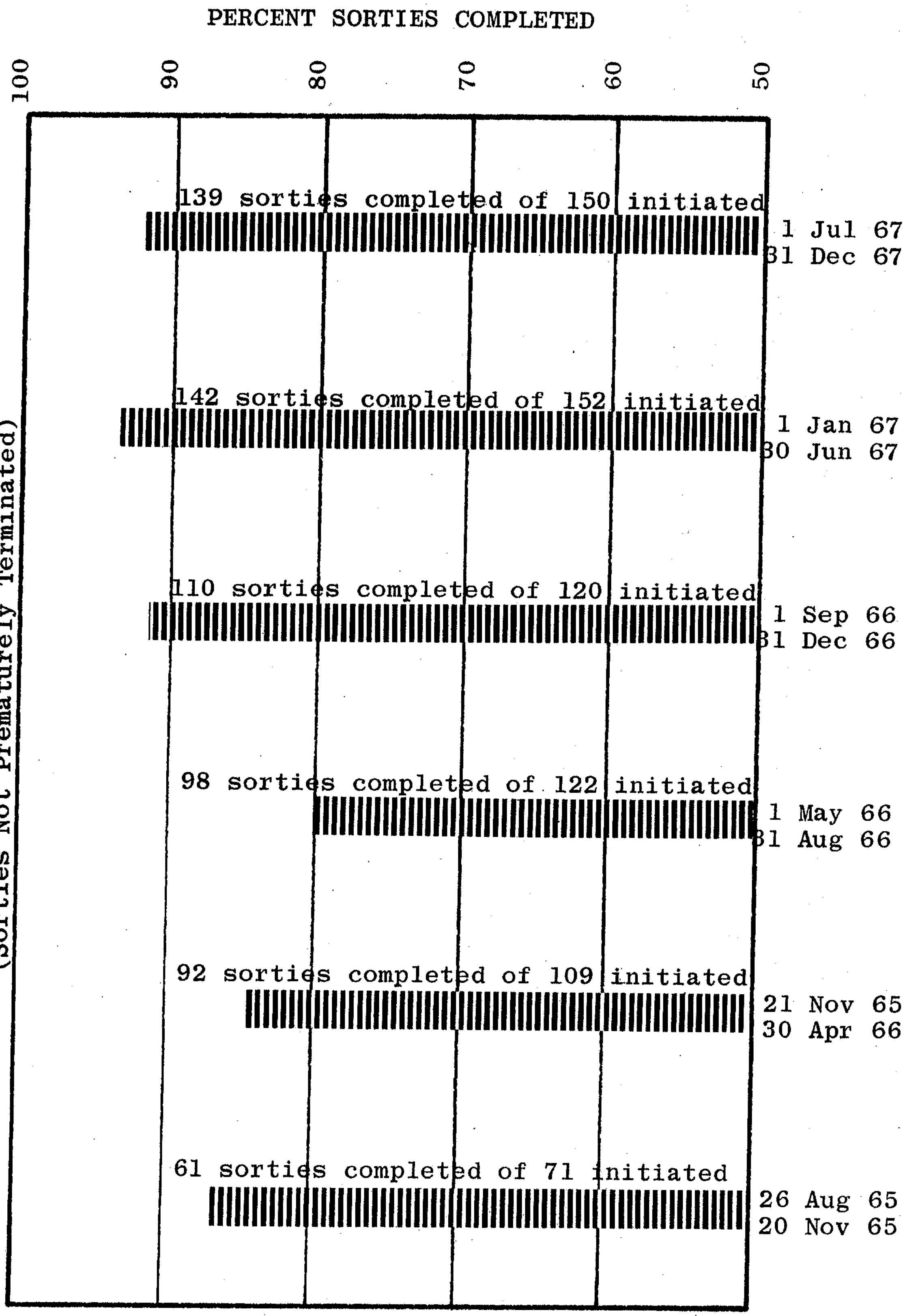
(Sorties Not Prematurely Terminated)

"OTHER" SYSTEMS RELIABILITY

"Other" systems referred to cover a wide variety of systems and events. A detailed listing is contained on the page following the facing chart. There was marked improvement in the number of premature terminations during the period 1 July through 31 December 1967 when only eleven flights out of 150 initiated were terminated for "other" systems or events. Special emphasis is being placed on higher quality control and closer supervision to achieve continued improvement.

"OTHER" SORTIE RELIABILITY

(Sorties Not Prematurely Terminated)



SUMMARY - PREMATURE TERMINATIONS

The opposite table first summarizes the prematurely terminated sorties assignable to each of the foregoing subsystem charts for the latest period examined from 1 July 1967 through 31 December 1967. The number of sorties initiated for each subsystem may differ because only the sorties on which that particular subsystem was used is counted. The engine, being used on every sortie, reflects the total number of 150 sorties initiated during the period.

"Other" includes all other premature terminations assigned to the indicated problems or components which are not part of the foregoing major subsystems examined.

<u>Total</u> premature terminations for the period 1 July 1967 through 31 December 1967 are 24 out of a total of 150 sorties initiated.

SUMMARY - FOREGOING
MAJOR SYSTEMS AND OTHER
PREMATURE TERMINATIONS
OF AIRCRAFT FLIGHTS

1 July Through 31 December 1967

Major Systems:

1.	Inlet :	Unstarts, Spike, Fluctuations	4
2.	Engine :	ENP, Fuel Flow Nozzle Fluctuations and Oil Pressure Fluctuations Due Engine Harness Problem*	3
3.	AFCS :	SAS Pitch Control, SAS Roll	3
4.	Hydraulic:	Left System Failed	1
5.	INS :	Large Terminal Error and Bad Steering	2
			13

"Other"

1.	Faulty Fuel Pressure Indicator	1
2.	Roll SAS Malfunction, Due Faulty Servo's	1
3.	INS Failure, Due #3 Inverter Inoperative	1
4.	Autonav Steering Error, Due Pilot Error	1
5.	HF/SSB Inoperative	1
6.	ARC-50 Failure	1
7.	Camera Failed	1
8.	SAS Yaw Transients and Rudder Oscillations, Due Power Interruption	1
9.	Fillet Panel Loss	1
10.	Pitch Trim Malfunction	1
11.	Fuel Leak	1
		11

*See Para 13, Page 45, BX-6727

CAMERA SYSTEMS

Type I cameras are built by Perkin-Elmer. There are five Type I "C" series in the inventory. With the phase-down of the OXCART program the two Type I "A" series were placed in storage.

Type IV cameras are built by Hycon. There are three of these in the inventory. Two of these have been validated and declared operationally ready. The third is scheduled for prevalidation and validation flights on or about 15 January 1968.

The first summation (opposite page) includes only test flights at Mach 3 and 80,000 feet altitude plus the twenty-two operational missions. The second summation includes all flights including operational missions since the beginning of the program.

CAMERA PERFORMANCE

(As of 31 December 1967)

Test Flight Time at Mach 3 and 80,000 feet

Type I "A" Series	Type I "C" Series
980 Min.	5667 Min.

Type IV

1903 Min.

TOTAL FLIGHT EXPERIENCE

Type I "A" Series	Type I "C" Series
98 Flights	164 Flights
75 Hours	119 Hours
6 Failures	9 Failures

Type IV

67 Flights
37 Hours
11 Failures

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ELECTRONIC WARFARE SYSTEM

A brief functional description of the Electronic Warfare Systems follows:

DEFENSIVE:

BIG BLAST - [redacted] (b)(3)

BLUE DOG - [redacted] (b)(3)

PIN PEG - [redacted] (b)(3)

MAD MOTH - [redacted] (b)(3)

A redundancy exists between the recognition and jamming systems employed, thus giving a lower degree of vulnerability to the aircraft and accounting for the high degree (100%) of total system reliability.

ELINT COLLECTION:

[redacted] (b)(3)

ELECTRONIC WARFARE SYSTEM RELIABILITY

BLACK SHIELD OPERATIONAL MISSIONS

TYPE SYSTEM	MISSIONS	SUCCESSES	PERCENT
DEFENSIVE	22	22	100%
ELINT COLLECTION	22	21	95.5%

Approved for Release: 2017/02/03 C01395626

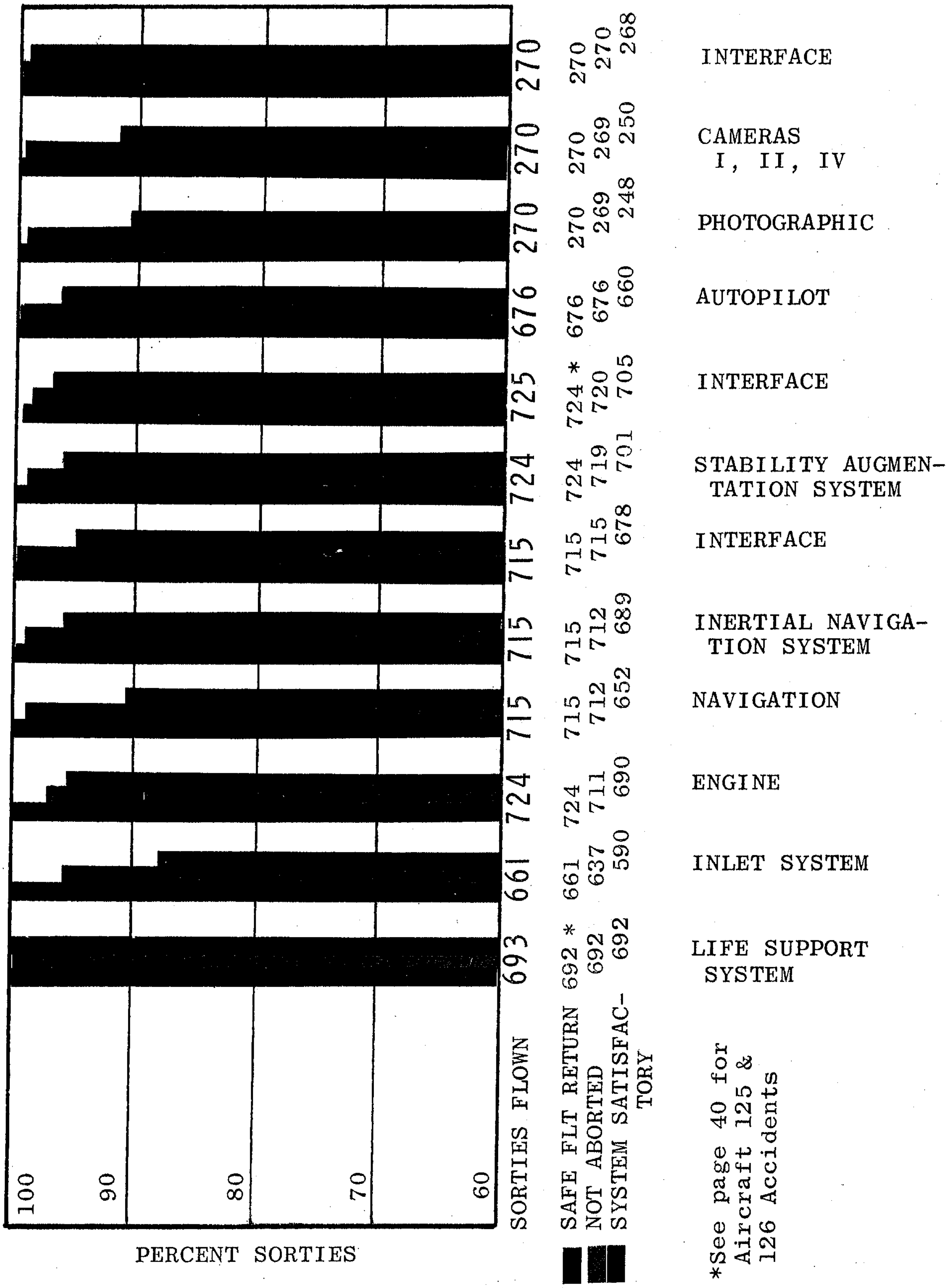
SYSTEM RELIABILITY

The chart opposite summarizes three levels of reliability for each major system from 26 August 1965 through 31 December 1967. The first (red) barometer for each system reflects the percent of sorties completed safely by that system relative to the total sorties initiated for that system. The second or green barometer reflects the percent of the sorties initiated which were not prematurely terminated or aborted because of that system. The third (black) barometer reflects the percent of sorties initiated during which that system operated completely satisfactorily. Numerical figures used in the percentages are shown below each barometer.

"Interface" refers to the system listed to the left of "interface" and accounts for malfunctions which are not assignable as a fault of the system itself but which affected the system's overall operation. Typical examples are aircraft generated electrical power or cooling air interruptions to such systems as the cameras, navigation and stability systems.

SYSTEM RELIABILITY

ALL FLIGHTS SINCE DEBUG MOD WITH DETACHMENT AIRCRAFT 26 AUGUST 1965 - 31 DECEMBER 1967



*See page 40 for Aircraft 125 & 126 Accidents

SCOPE CROWN "E" (2 AIR REFUELING MISSION)

This mission was developed as a camera package evaluation route. Resolution targets at Phoenix, Arizona, and Area 51 are covered. The route also incorporates an over-water air refueling 450 N.M. off the coast of California. Route was first flown in June 1967.

[redacted]

(b)(3)

SCOPE CROWN "F" (3 AIR REFUELING MISSION)

This mission was developed from SCOPE CROWN "E". An additional air refueling and cruise climb leg was added to simulate an operational mission for pilot training. Mission was first flown in June 1967.

A-12 AIRCRAFT ACCIDENT RELIABILITY

The chart opposite reflects the four aircraft accidents which have occurred during the program through 31 December 1967.

Of interest is the fact that not any of these accidents involved the high Mach number-high temperature regime of flight in which this program has spearheaded the state-of-the-art. Also of interest is that two of these accidents occurred in the local home base area within feet of the run-way. All of these accidents involved traditional problems inherent in any aircraft.

Aircraft 123's accident occurred on 24 May 1963 away from the base on a routine training flight. It involved a plugged pitot static tube during icing conditions resulting in erroneous cockpit instrument indications of air speed. The pilot was ejected safely.

Aircraft 133's accident occurred on 9 July 1964 during landing approach. It involved a malfunction of the flight control surface actuating system resulting in a continuous and uncontrollable roll. The pilot was ejected safely.

Aircraft 126's accident occurred on 28 December 1965 during take-off climb-out. It involved a human error wherein the flight line electrician connected the wiring for the yaw and pitch gyros of the stability system in reverse. This resulted in complete uncontrollability of the aircraft. The pilot was ejected safely.

Aircraft 125's accident occurred on 5 January 1967 during descent about 85 miles from the base. It involved a fuel system gaging malfunction resulting in a higher than actual indicated fuel quantity reading. Because of this, the aircraft was out of fuel before reaching the base. The pilot was killed on impact with the ground because of a malfunction precluding man-seat separation after ejection from the aircraft.

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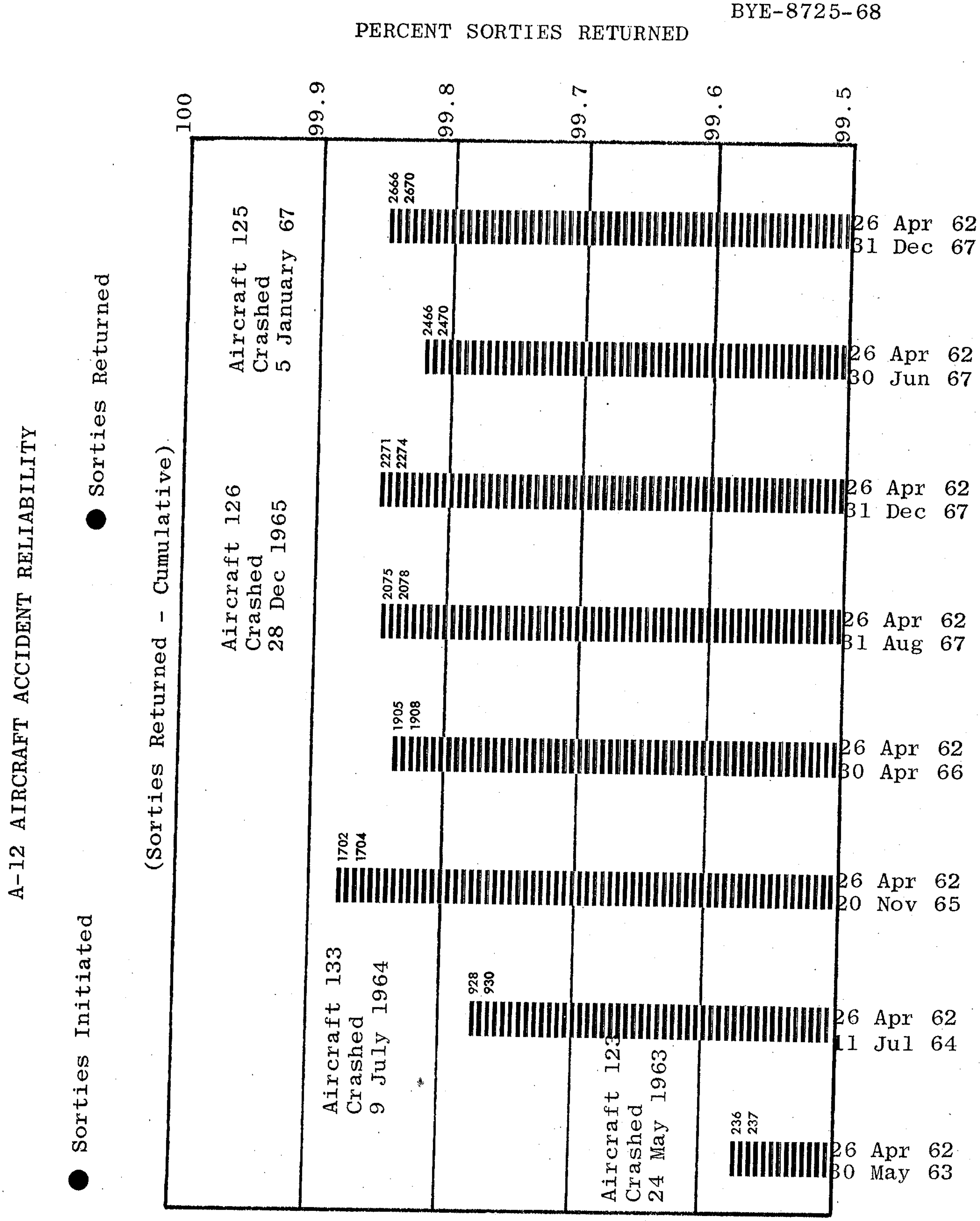

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HANDLE VIA BYEMAN
CONTROL SYSTEM

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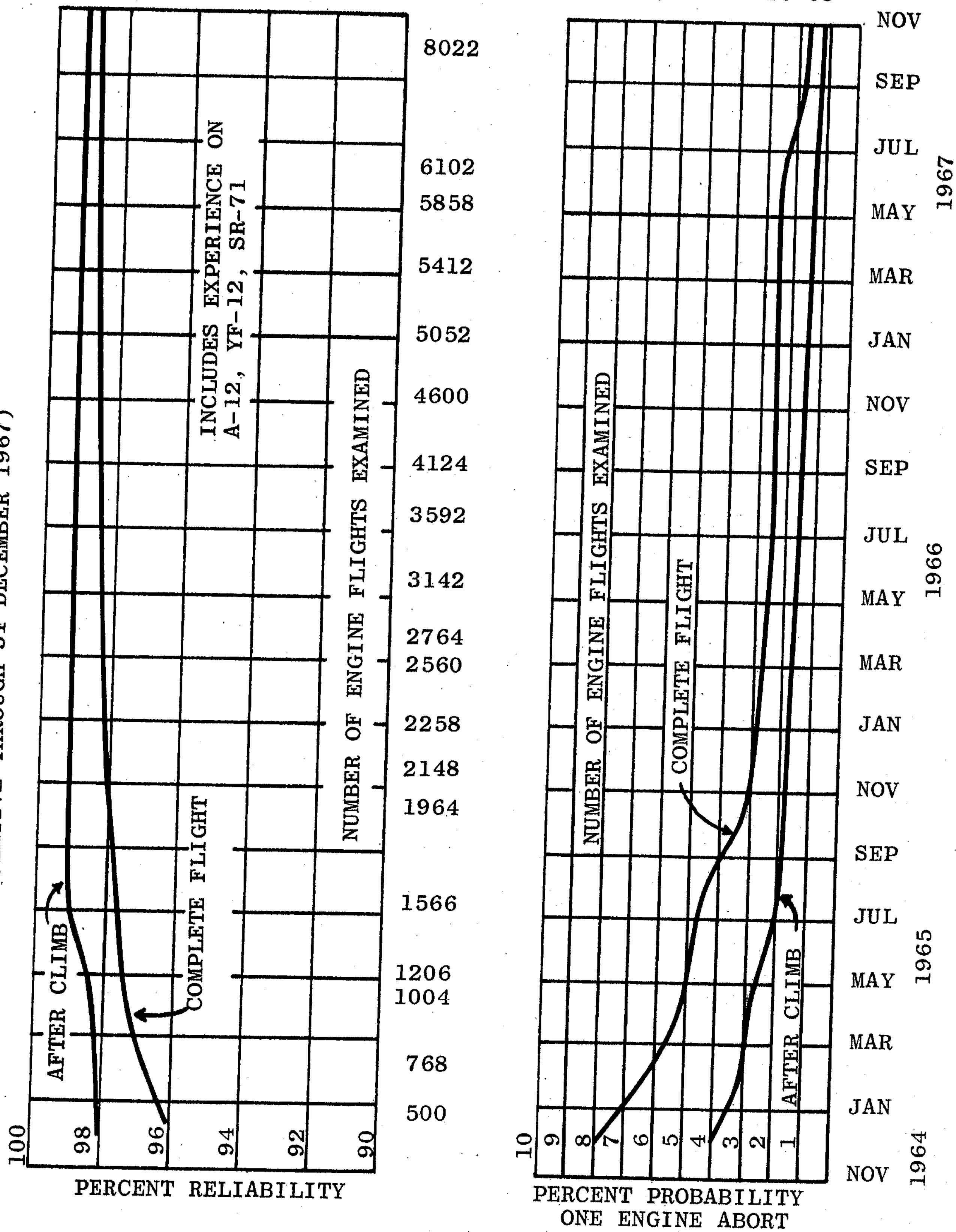
ENGINE RELIABILITY

The accompanying chart presents J-58 engine abort reliability. A differentiation is made between aborts which occurred at any time during a flight (complete flight) and those which occurred after climb. The aborts which occurred after climb are considered to be more representative of those which might occur over denied territory. The abort reliability on an after climb basis is better than 99%. This level of reliability is computed on the basis of 8022 J-58 engine flights which have taken place since the development of an operable aircraft inlet system on all programs including the A-12, YF-12, and SR-71.

J-58 ENGINE (ABORT) RELIABILITY FOR ENGINE CAUSE

CUMULATIVE THROUGH 31 DECEMBER 1967)



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BLACK SHIELD
DEPLOYMENT AND OPERATIONAL SUMMARY

A. DEPLOYMENT

1. 22 May 1967 ACFT NO 131 flew non-stop from Area 51 to Kadena AB, Okinawa in 6:10 hours. The flight required top-off and 3 aerial refuelings and attained 79,000 feet during cruise at Mach 2.9 for two legs and 3.1 for one leg.

2. 24 May 1967 ACFT NO 127 flew non-stop from Area 51 to Kadena AB, Okinawa in 6:00 hours. The flight was similar to that of ACFT NO 131 above except an altitude of 81,000 feet was reached during cruise.

3. 26 May 1967 ACFT NO 129 flew from Area 51 to Wake Island in 4:30 hours. Landing at Wake Island was precautionary due to a malfunctioning navigation system. The flight was made at Mach 2.9 at 76,000 feet altitude. The aircraft proceeded uneventfully to Kadena on 27 May 1967.

B. OPERATIONAL SORTIES

(All missions employed the Type I camera) (altitudes and Mach numbers represent maximum attained during mission).

1. BSX-001, 31 May 1967. Mission was flown at Mach 3.1 and 80,000 feet for a duration of 3:45 hours. Imagery quality: Good.

2. BSX-003, 10 June 1967. Mission was flown at Mach 3.1 and 81,000 feet for a duration of 4:30 hours. Imagery quality: Good.

3. BX-6705, 20 June 1967. Mission was flown at Mach 3.1 and 82,000 feet for a duration of 5:30 hours. Imagery quality: Excellent.

4. BX-6706, 30 June 1967. Mission was flown at Mach 3.1 and 81,000 feet for a duration of 5:00 hours. Imagery quality: Good.

5. BX-6708, 13 July 1967. Mission was flown at Mach 3.15 and 82,100 feet for a duration of 3:40 hours. Imagery quality: Good.

6. BX-6709, 19 July 1967. Mission was flown at Mach 3.17 and 82,000 feet for a duration of 4:58 hours. Imagery quality: Excellent.

7. BX-6710, 20 July 1967. Mission was flown at Mach 3.16 and 82,450 feet for a duration of 4:55 hours. Imagery quality: Good, despite haze problem.

8. BX-6716, 21 August 1967. Mission was flown at Mach 3.2 and 80,000 feet for a duration of 3:55 hours. Imagery quality: Good to Excellent.

9. BX-6718, 31 August 1967. Mission was flown at Mach 3.20 and 81,000 feet for a duration of 5:12 hours. Imagery quality: Good until camera malfunctioned.

10. BX-6722, 16 September 1967. Mission was flown at Mach 3.15 and 80,000 feet for a duration of 4:01 hours. Imagery quality: Good.

11. BX-6723, 17 September 1967. Mission was flown at Mach 3.16 and 81,000 feet for a duration of 4:00 hours. Imagery quality: Excellent.

12. BX-6725, 4 October 1967. Mission was flown at Mach 3.14 and 81,000 feet for a duration of 4:09 hours. Imagery quality: Excellent.

13. BX-6727, 6 October 1967. Mission was flown at Mach 3.19 and 81,000 feet for a duration of 2:20 hours. Imagery quality: Good. Mission was prematurely terminated due to a faulty oil pressure indicator.

14. BX-6728, 15 October 1967. Mission was flown at Mach 3.19 and 81,000 feet for a duration of 3:41 hours. Imagery quality: Good.

15. BX-6729, 18 October 1967. Mission was flown at 3.21 and 81,000 feet for a duration of 4:01 hours. Imagery quality: Good.

16. <u>BX-6732, 28 October 1967.</u> Mission was flown at Mach 3.15 and 83,500 feet for a duration of 3:49 hours. Imagery quality: Good.

17. <u>BX-6733, 29 October 1967.</u> Mission was flown at Mach 3.23 and 82,000 feet for a duration of 3:56 hours. Imagery quality: Good.

18. <u>BX-6734, 30 October 1967.</u> Mission was flown at Mach 3.20 and 85,000 feet for a duration of 3:44 hours. Imagery quality: Good.

19. <u>BX-6737, 8 December 1967.</u> Mission was flown at Mach 3.20 and 82,500 feet for a duration of 3:59 hours. Imagery quality: Good.

20. <u>BX-6738, 10 December 1967.</u> Mission was flown at Mach 3.17 and 81,000 feet for a duration of 3:51 hours. Imagery quality: Good.

21. <u>BX-6739, 15 December 1967.</u> Mission was flown at Mach 3.20 and 86,000 feet for a duration of 4:09 hours. Imagery quality: Good.

22. <u>BX-6740, 16 December 1967.</u> Mission was flown at Mach 3.20 and 86,200 feet for a duration of 3:56 hours. Imagery quality: Good.