TOP SECRET

Bye 2737-66
Copy No. 48

Report - OXCART A-12 Aircraft Experience Data and Systems Reliability

23 September, 1966

DIRECTORATE of SCIENCE & TECHNOLOGY
Office of Special Activities

Handle via BYEMAN controls

TOP SECRET

BYE-2737-66

INTRODUCTION

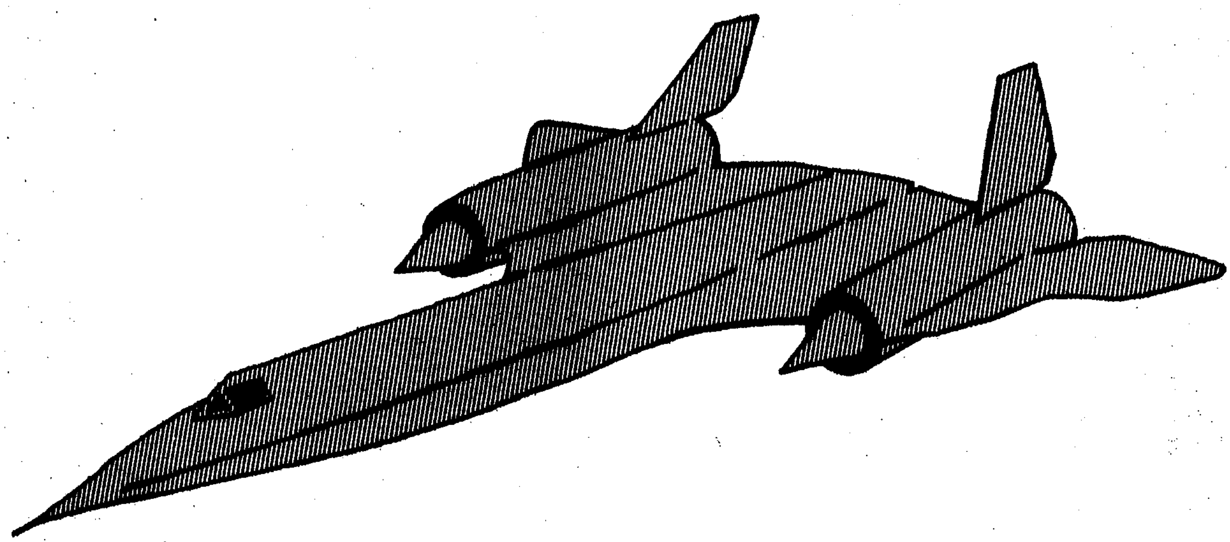
This document contains experience data of the OXCART A-12 as of 31 August 1966 which we believe justifies its operational readiness status with a high degree of confidence.

BYE-2737-66

TABLE OF CONTENTS

BYE- 2737-66

A-12



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)

BYE-2737-66

EXPERIENCE RECORD

AIRCRAFT

First Flight	26 April 1962
Total Flights	2078
Total Hours	3186:39
Total Flights at Mach 3.0	485
Total Hours at Mach 3.0	244:39
Longest Flight at Mach 3.0	3:50
Speed - Max	Mach 3.29
Altitude - Max	90,000 ft.

J-58 ENGINES

Total Engine Flights	5194
Total Engine Hours	8370
Total Engine Flights at Mach 3.0	1914
Total Engine Flight Hours at Mach 3.0	939
Total Ground Test Hours	23,111
Total Mach 3.0 Environmental Ground Test Hours	6505
Total 150 Hour Qualification Tests	6

INS

Total Flights	1081
Total Flight Operating Hours	2361
Total Operating Time	30,754

SAS - AUTO PILOT

Total Flights	2433
Total Flight Hours	3690
Total Operating Hours	35,271

CAMERAS

	I	II
Total Flights	145	59
Total Flight Operating Hours	109	49
Total Flights Above Mach 3.0	43	33
Total Hours at Mach 3.0	39	33
Longest Flight at Mach 3.0	1.5	2.0

BYE-2737-66

PILOTS (6)

Average Pilot Experience	14.2 Years
Average Total Flight Time	3751 Hours
Time in A-12	241/297/339 Hrs.
Time in Project	3.2/3.4 Years
Average A-12 Flights	186

LIFE SUPPORT

Total Suit Flights (Detachment)	1480

EWS

Total Flight Tests	53

DETACHMENT

Activated	1 October 1960
Time in Training as a Unit	January 1963 *(36 months)
Average Time in Project (Personnel)	36/40 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	7
Two-Seater Trainer	1
Flight Test Aircraft	2

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.

BYE-2737-66

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)

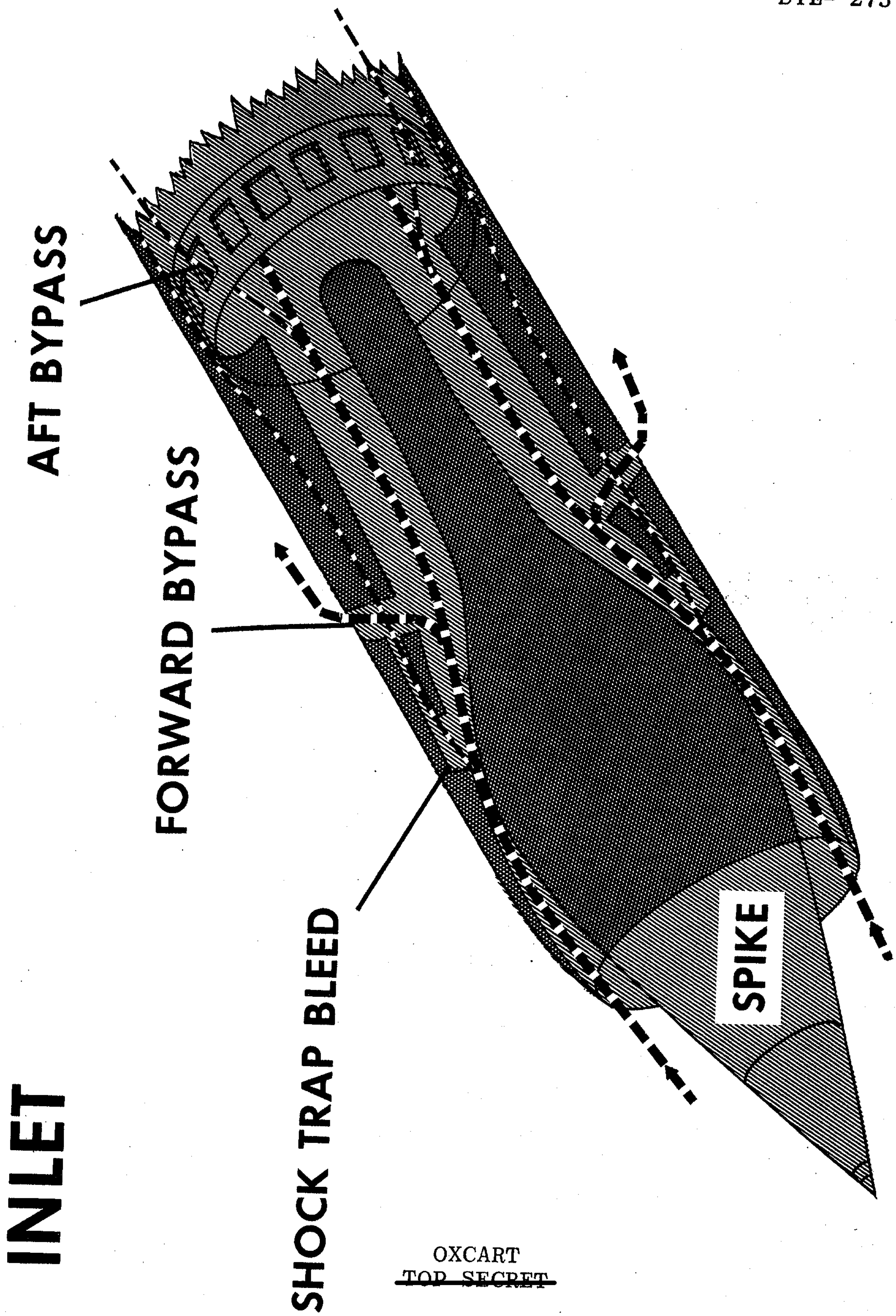
A. Operational Capability
B. Aircraft Performance Optimization and Envelope Extension

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

BYE-2737-66

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

This chart depicts a breakout of those Detachment sorties flown between 25 March 1965 and 1 September 1966 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.

All sorties/profiles listed on the chart were flown without a major malfunction or incident which would have precluded continuance on the high/fast operational type profile.

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

(through 31 August 1966)

	Sorties	Profiles
A. 25 Mar 65 - 31 Aug 65:		
Total Sorties	52	
Total Profiles		57
B. 31 Aug 65 - 31 Aug 66:		
Total Sorties	212	
Total Profiles		335
C. Summary (25 Mar 65 - 31 Aug 66):		
Total Sorties	264	
Total Profiles		392

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

All of above listed sorties and profiles flown without major incident or malfunction which would have precluded continuance high/fast profile.

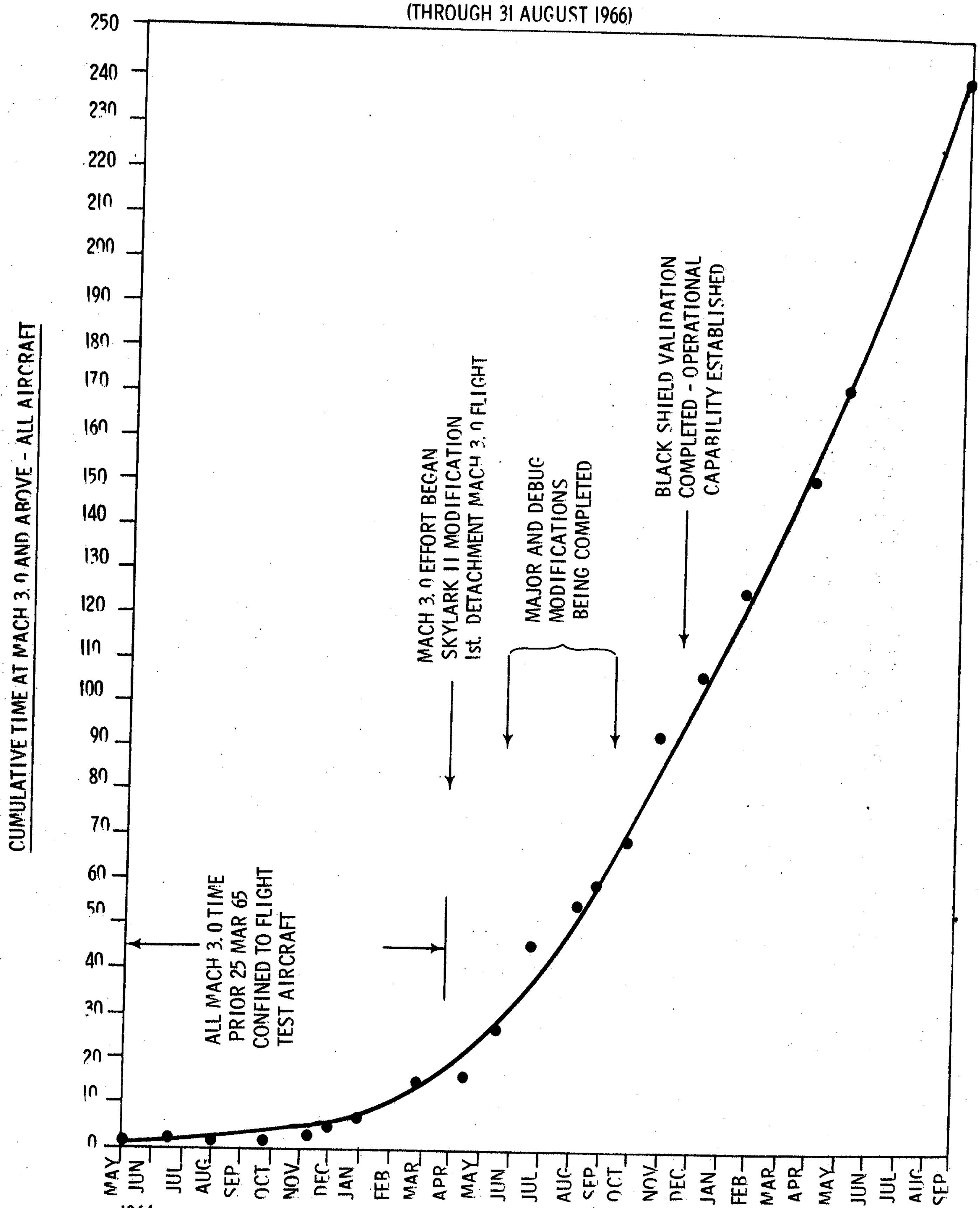
BYE-2737-66

CUMMULATIVE 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 seventeen months since 25 March 1965, 229 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. This is a ratio of about thirteen to one.

(THROUGH 31 AUGUST 1966)



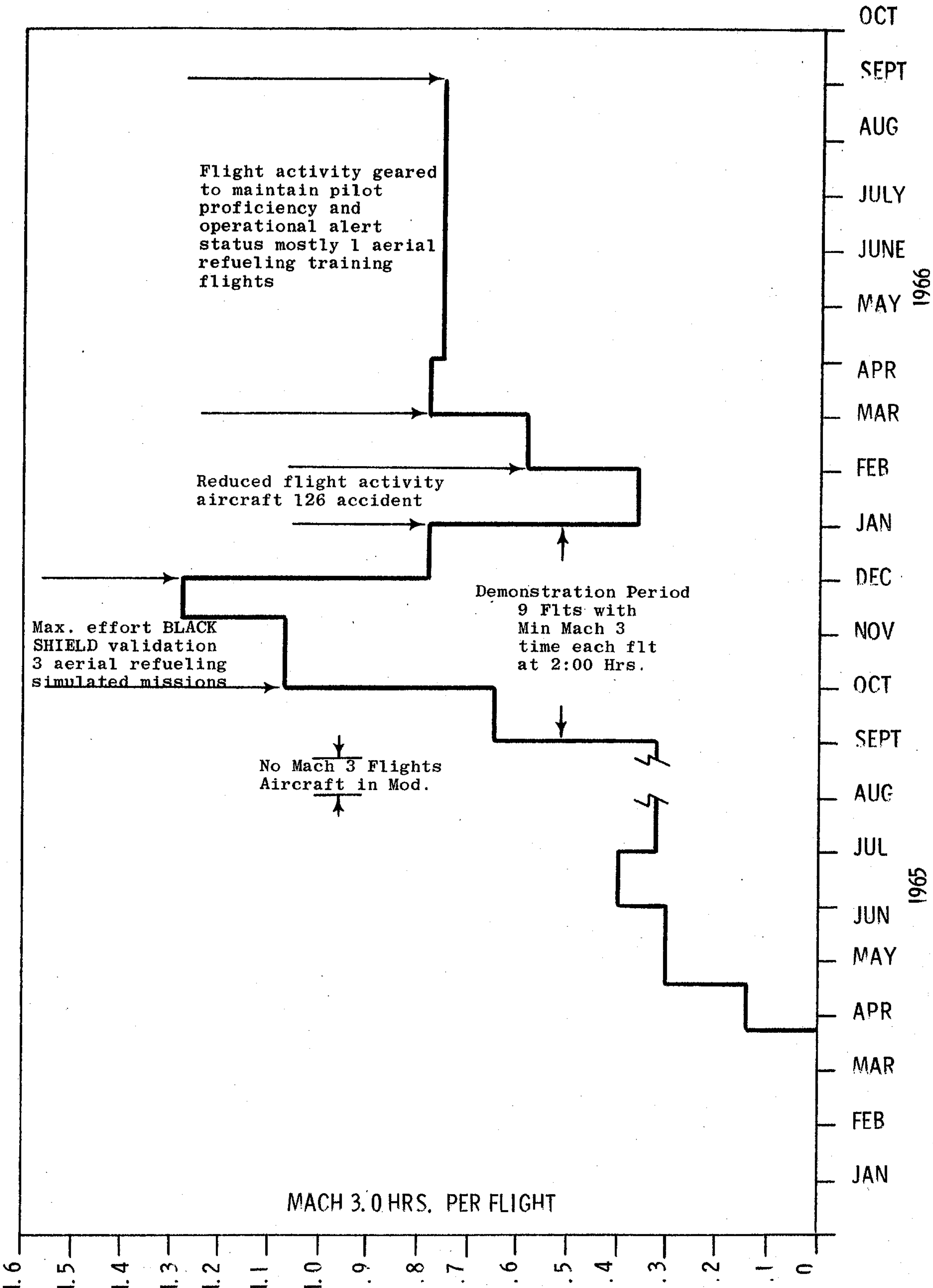
BYE-2737-66

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 264 Mach 3 flights of detachment aircraft 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 current period comprises training flights with usually one refueling rather than the longer and more costly three refueling simulated missions performed during the fall of 1965 demonstration period.

DETACHMENT AIRCRAFT AVERAGE MACH 3 HOURS PER FLIGHT

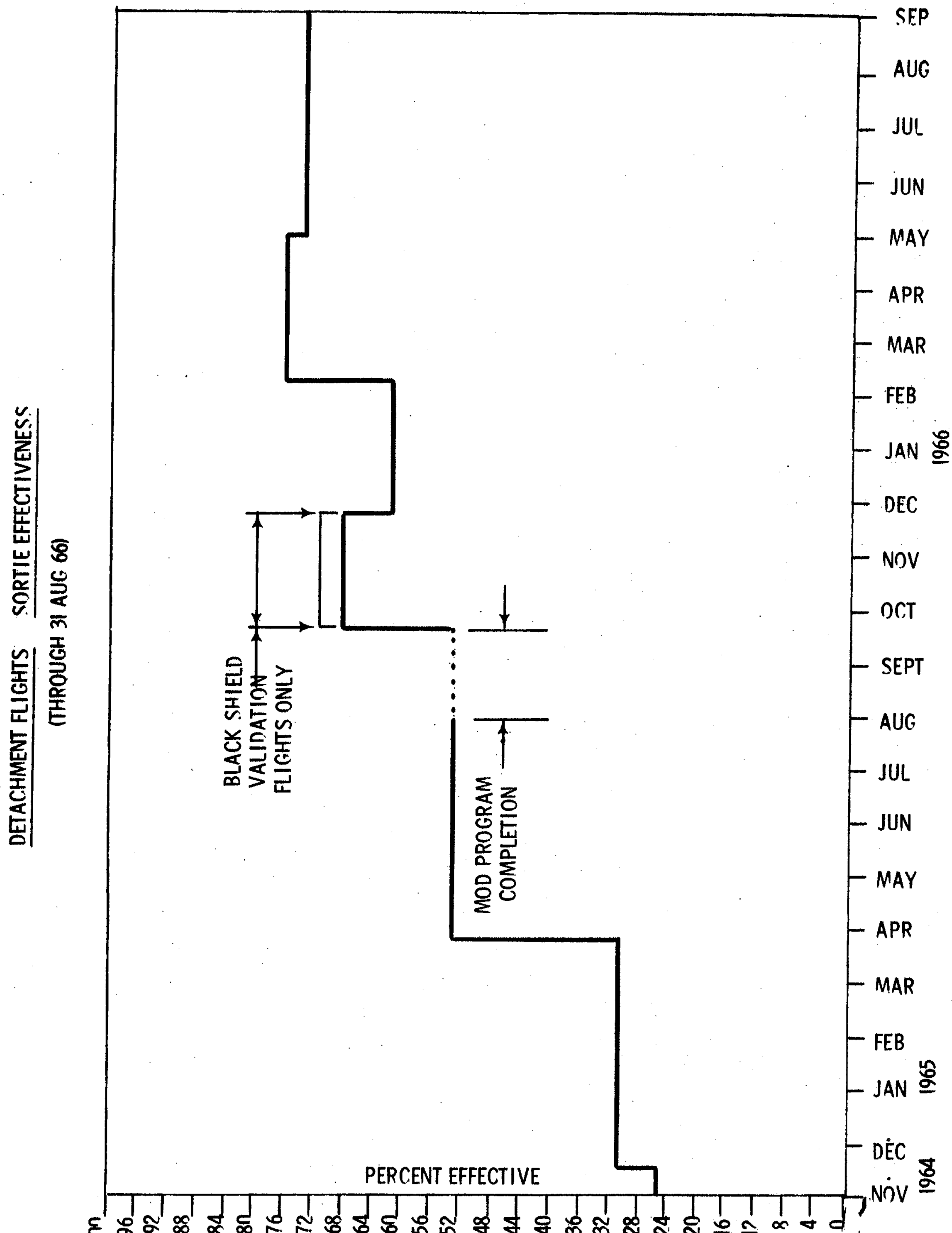
(THROUGH 31 AUGUST 66)



BYE-2737-66

DETACHMENT FLIGHTS
SORTIE EFFECTIVENESS

The chart opposite shows the trend of sortie effectiveness from a low of 25% in 1964 to the mid-seventies during the spring and summer of 1966. 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 but along with those sorties which were completed and 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.


DETACHMENT FLIGHTS SORTIE EFFECTIVENESS
(THROUGH 31 AUG 66)
BLACK SHIELD VALIDATION FLIGHTS ONLY
MOD PROGRAM COMPLETION
PERCENT EFFECTIVE
100 96 92 88 84 80 76 72 68 64 60 56 52 48 44 40 36 32 28 24 20 16 12 8 4 0
NOV DEC 1964
JAN FEB MAR APR MAY JUN JUL AUG SEPT OCT NOV DEC 1965
JAN FEB MAR APR MAY JUN JUL AUG SEP 1966

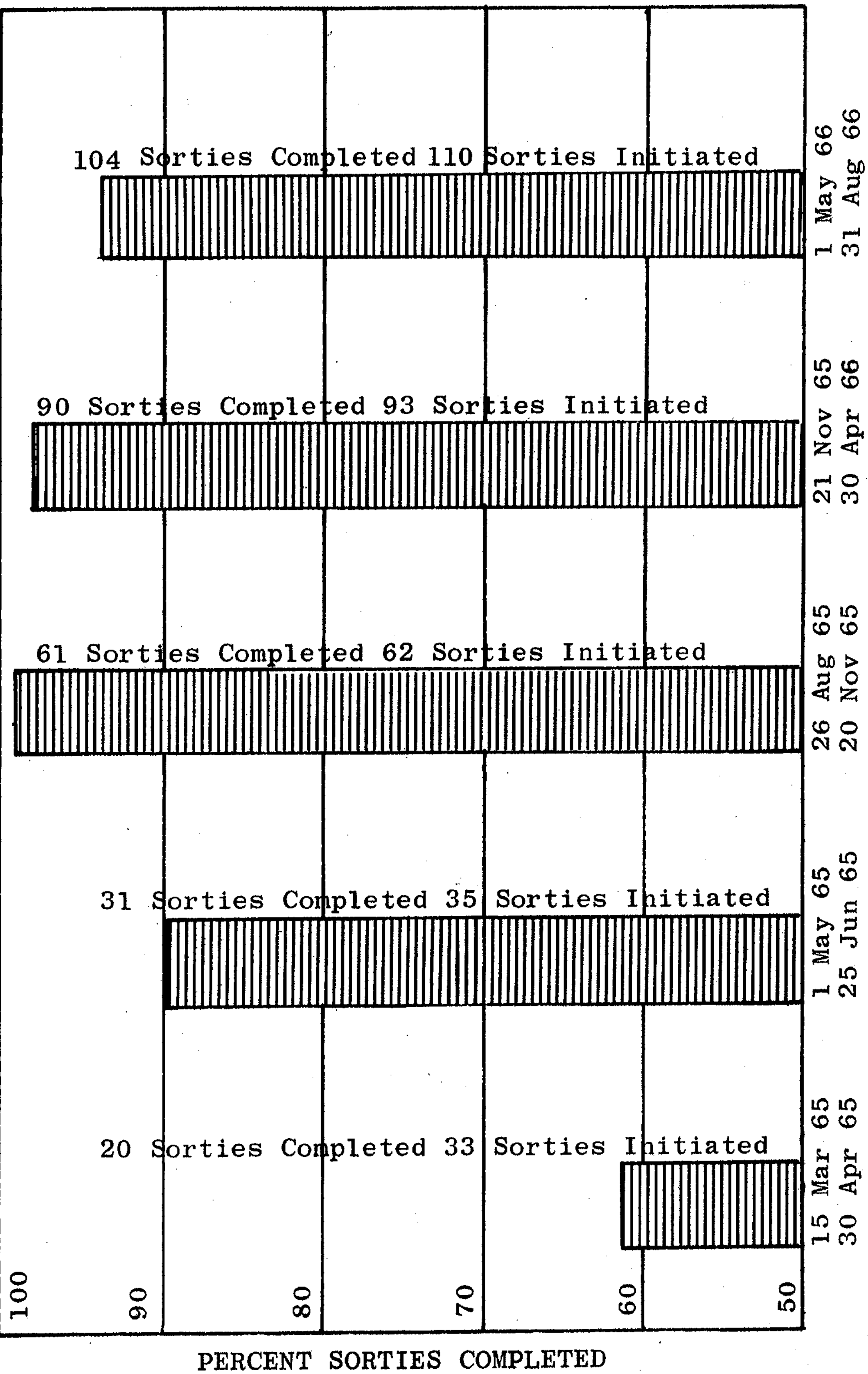
BYE-2737-66

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 31 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.

INLET SORTIE RELIABILITY TREND

(Sorties Not Prematurely Terminated)

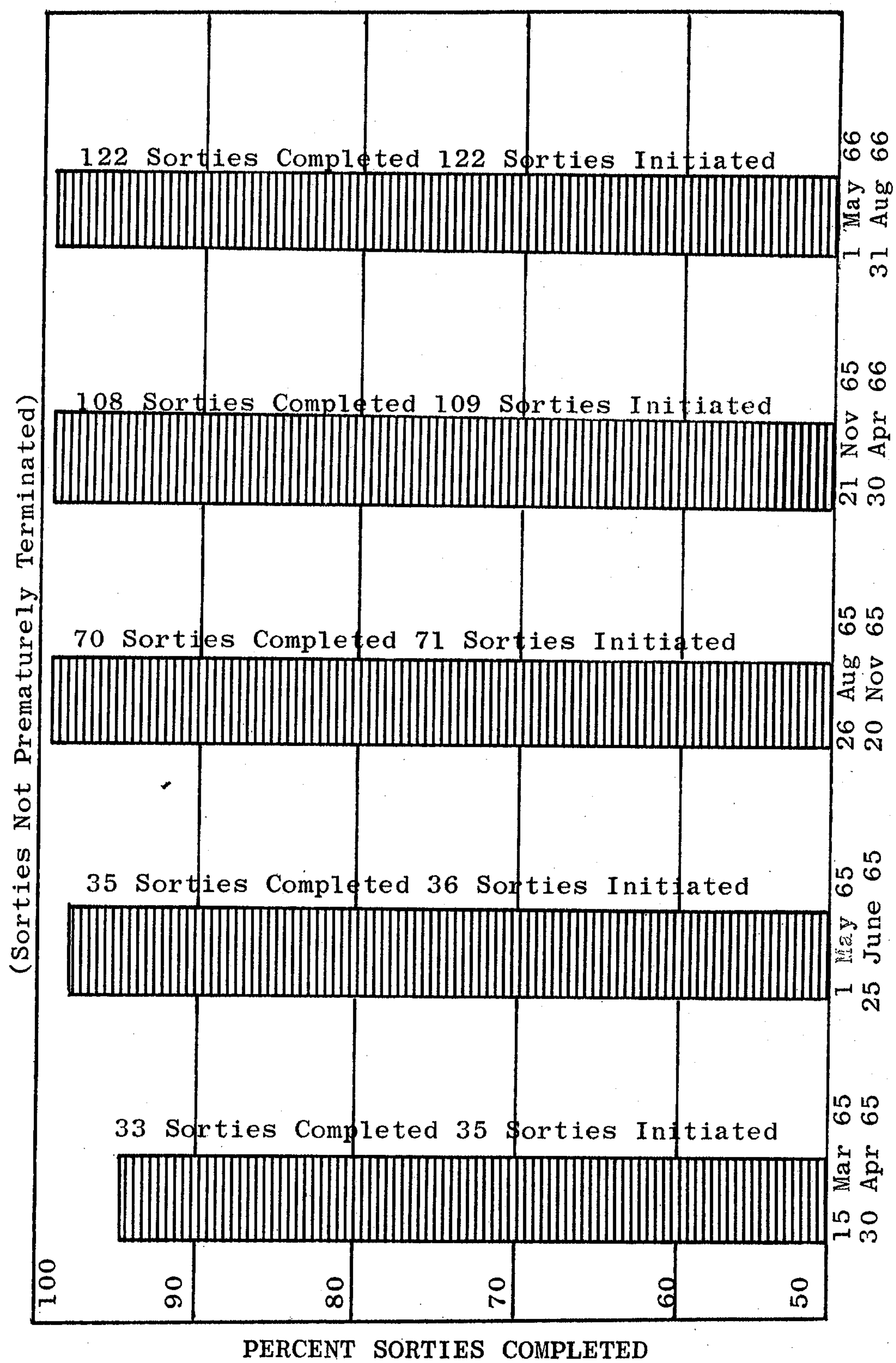


BYE-2737-66

ENGINE SORTIE RELIABILITY TREND

The facing chart presents the engine reliability trend and indicates a general improvement to a very high current level of reliability for the engine of better than 99%. Of 231 sorties attempted in the period 21 November 1965 to 31 August 1966, only one sortie was prematurely terminated due to a problem with the engine. This 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. An improved design which corrects this problem and provides a doubly redundant method of securing this plug has now been incorporated in all engines.

ENGINE SORTIE RELIABILITY TREND



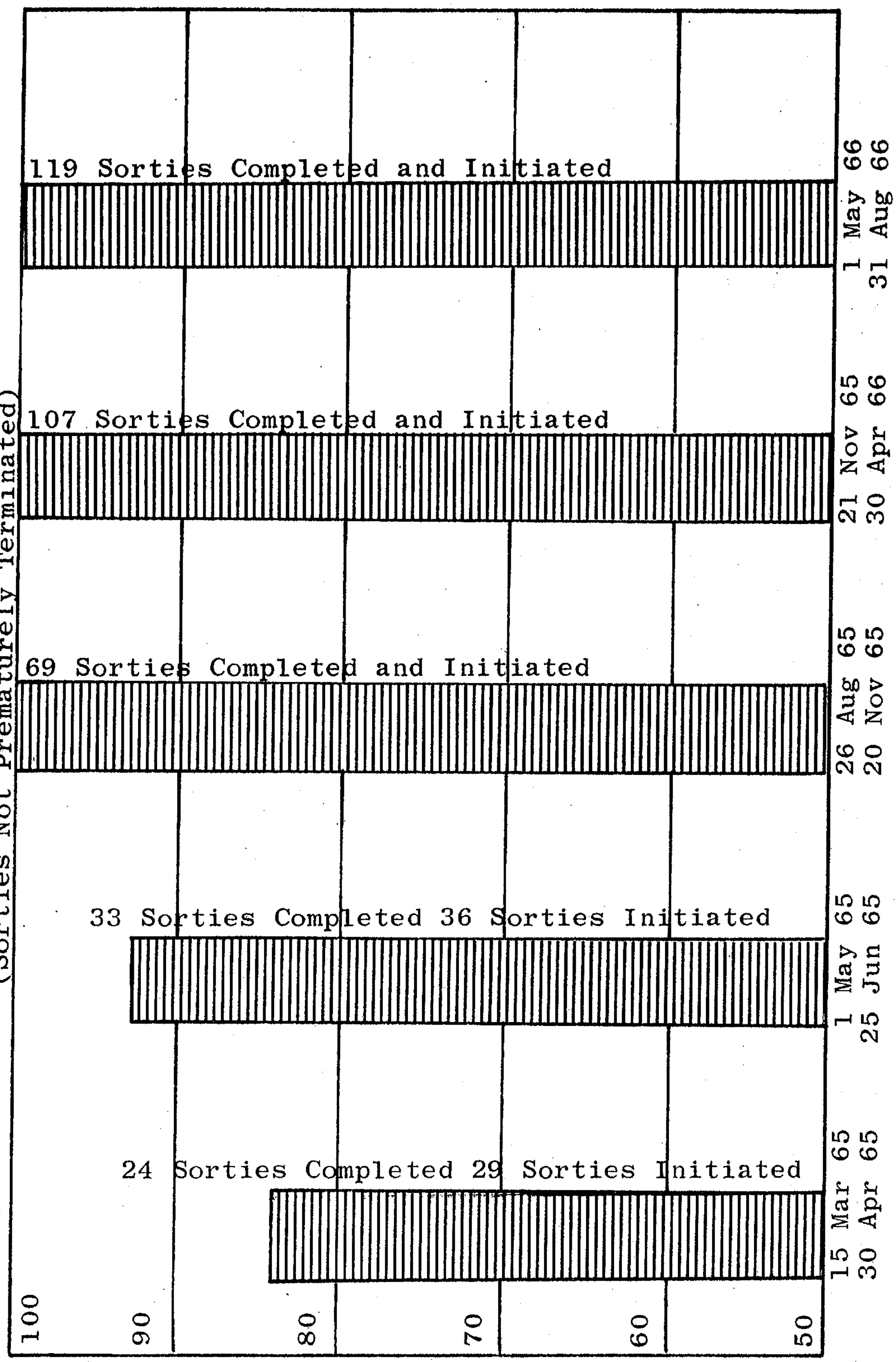
BYE-2737-66

NAVIGATION SYSTEM RELIABILITY TREND

The inertial navigation system sortie reliability trend, noted on the page opposite, has shown steady improvement. The system has not caused any premature termination of sorties flown since August 1965.

NAVIGATION SORTIE RELIABILITY TREND

(Sorties Not Prematurely Terminated)



PERCENT SORTIES COMPLETED

INERTIAL NAVIGATION SYSTEM

The following Inertial Navigation System performance charts (7) are plots by specific time periods of number of flights along the vertical scale versus specification ratio along the horizontal scale. The specification ratio is the actual distance error at the end of a flight divided by the allowable design specification error for the time period of the flight. A specification ratio of 1.0 or less means the flight was within the allowable specification limit.

Each chart indicates (a) the percentage of flights within a specification ratio of 1.0, (b) the specification ratio which includes 95% of all the flights for the time period noted, and (c) the percentage of flights included within a specification ratio of 4.0. For example, for Jan-Feb-Mar 1965, 56.2% of the flights were within a specification ratio of 1.0, 95% of the flights fell within a specification ratio of 3.5 and 94.9% fell within a specification ratio of 4.0.

A comparison of the charts indicates that the percentage of in-specification INS flights steadily increased during calender year 1965 reaching a maximum value of 91.2% for the Oct-Nov-Dec 1965 time period. This value decreased slightly to 88.3% during Jan-Feb-Mar 1966 and to 85.6% during April-May-June 1966. For the months of July and August 91.2% of the flights were within specification.

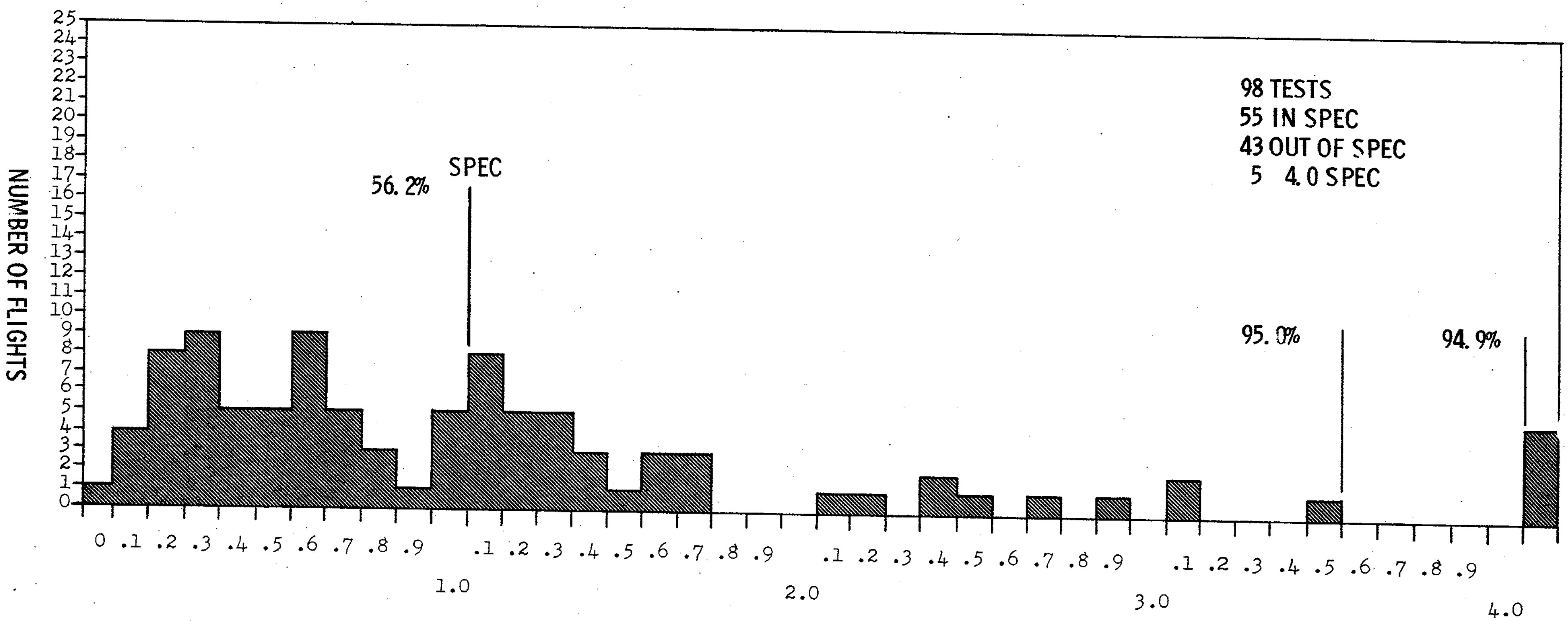
It should be noted that based on a component-by-component analysis of the INS, the best consistent performance that can be expected of the 330 INS is approximately 85% in-specification and any values greater than 85% should be viewed as being definitely above the normal expected performance.

It is also interesting to note that if all of the components in the 330 system performed within their respective tolerances, and if simultaneously all the tolerances were on the high side of the tolerance limits, the best INS performance attainable would only be 1.2 specification.

BYE-2737-66

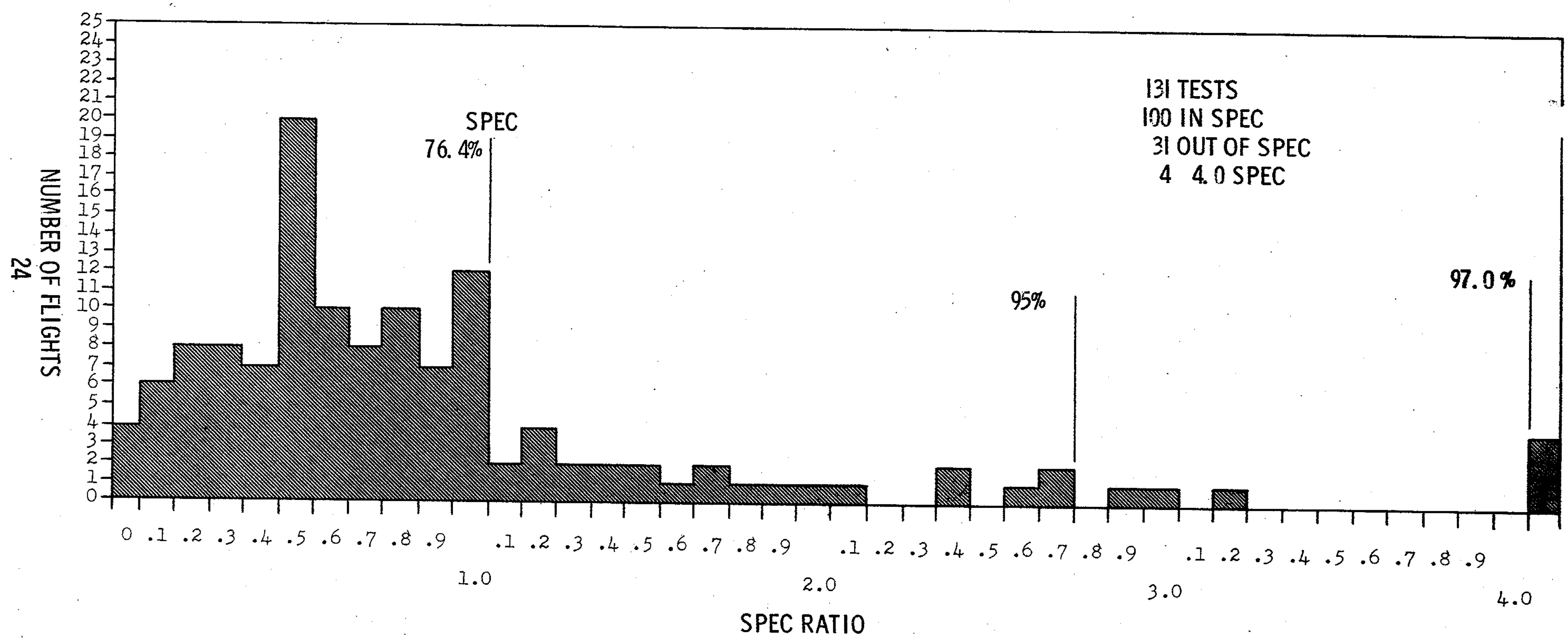
INERTIAL NAVIGATION SYSTEM

JAN-FEB-MAR 1965



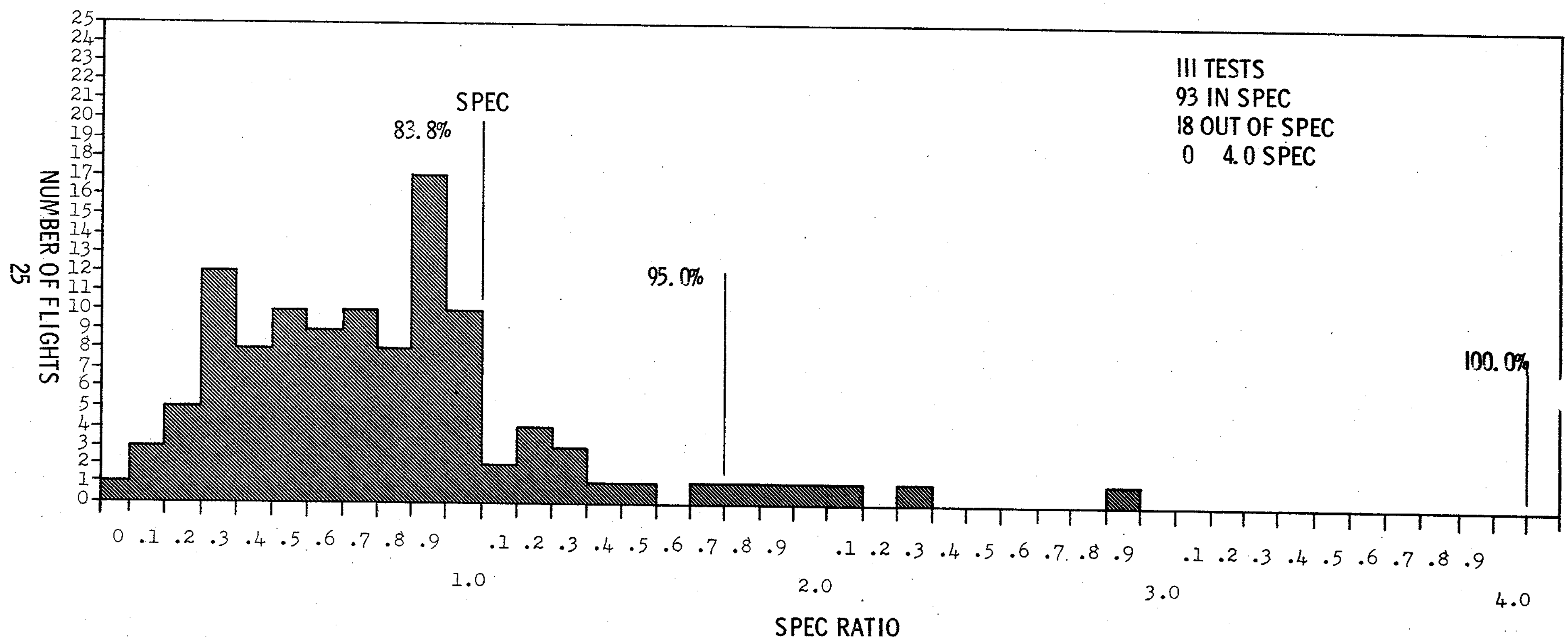
INERTIAL NAVIGATION SYSTEM

APR-MAY-JUN 1965



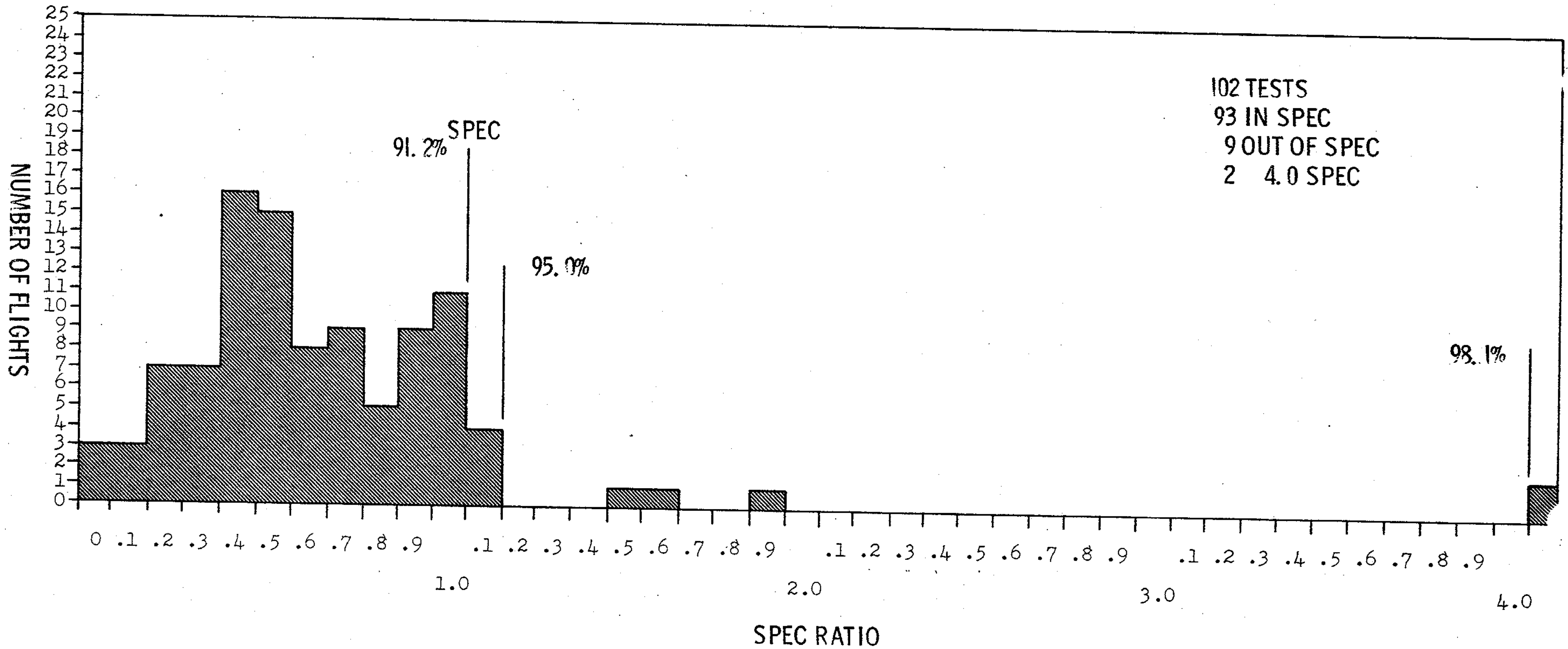
INERTIAL NAVIGATION SYSTEM

JUL-AUG-SEP 1965



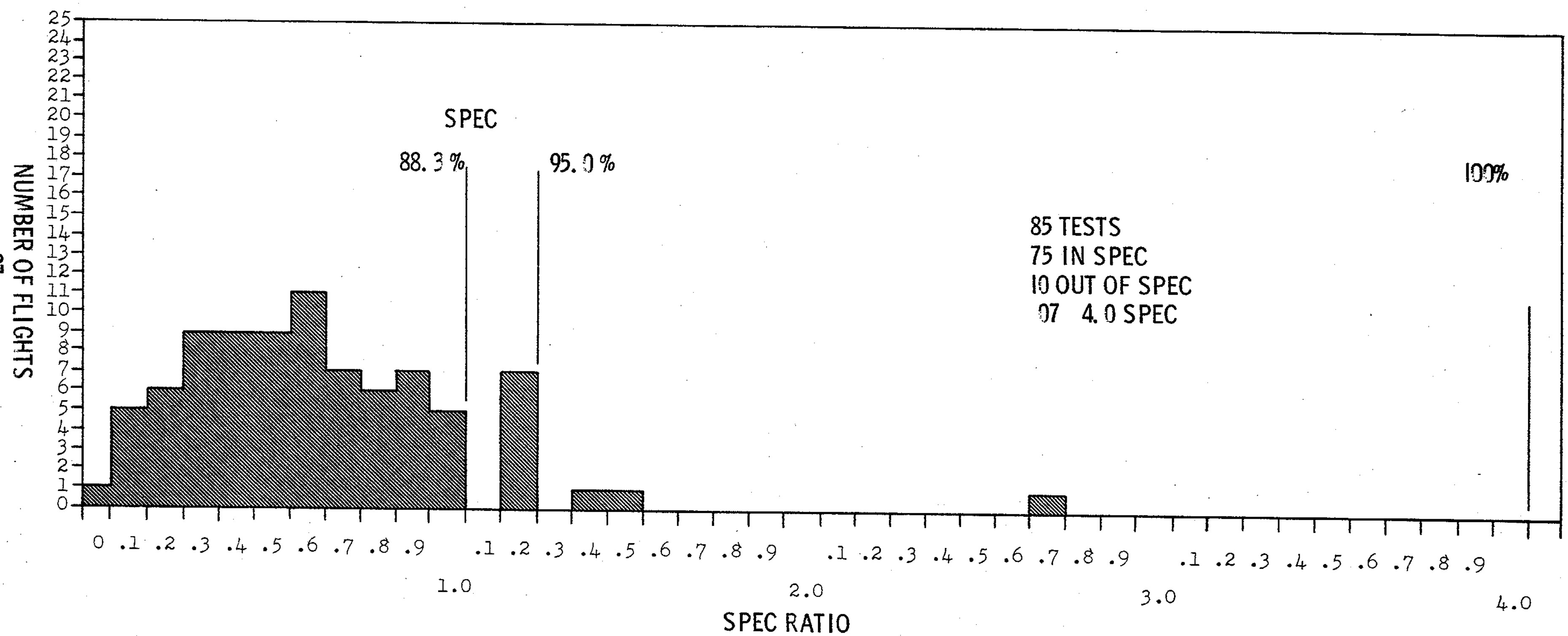
INERTIAL NAVIGATION SYSTEM

OCT-NOV-DEC 1965



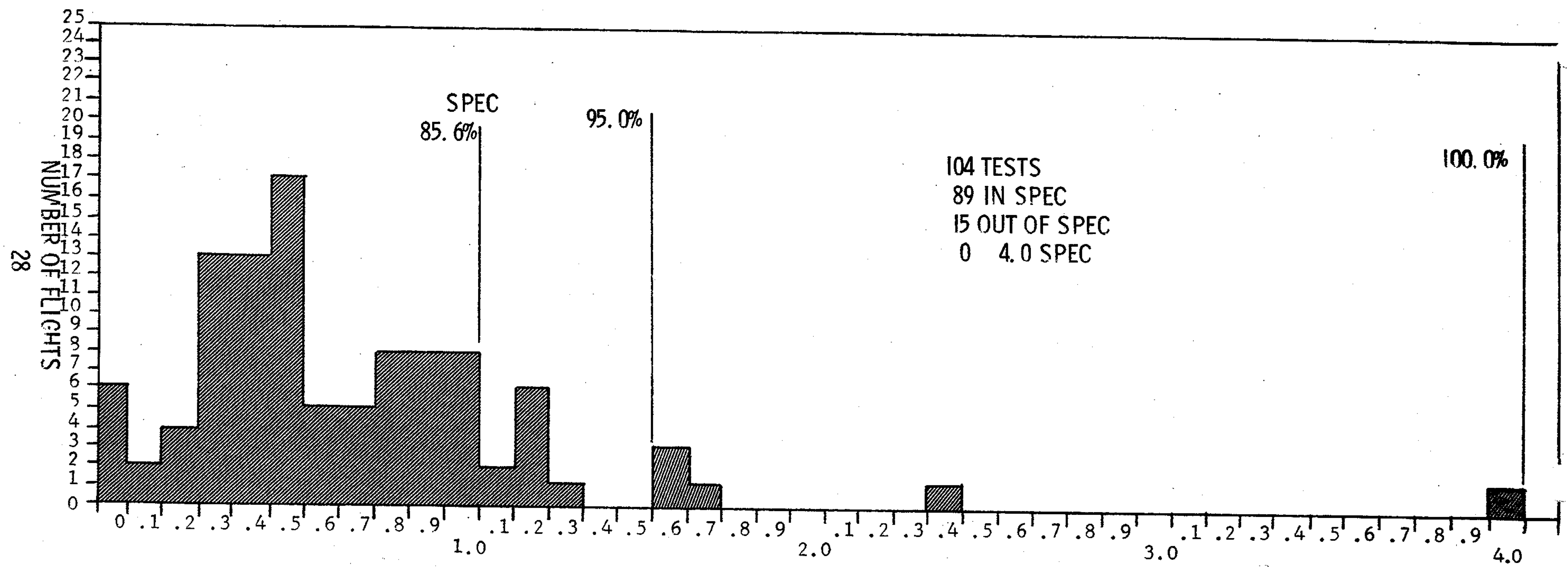
INERTIAL NAVIGATION SYSTEM

JAN-FEB-MAR 1966



INERTIAL NAVIGATION SYSTEM

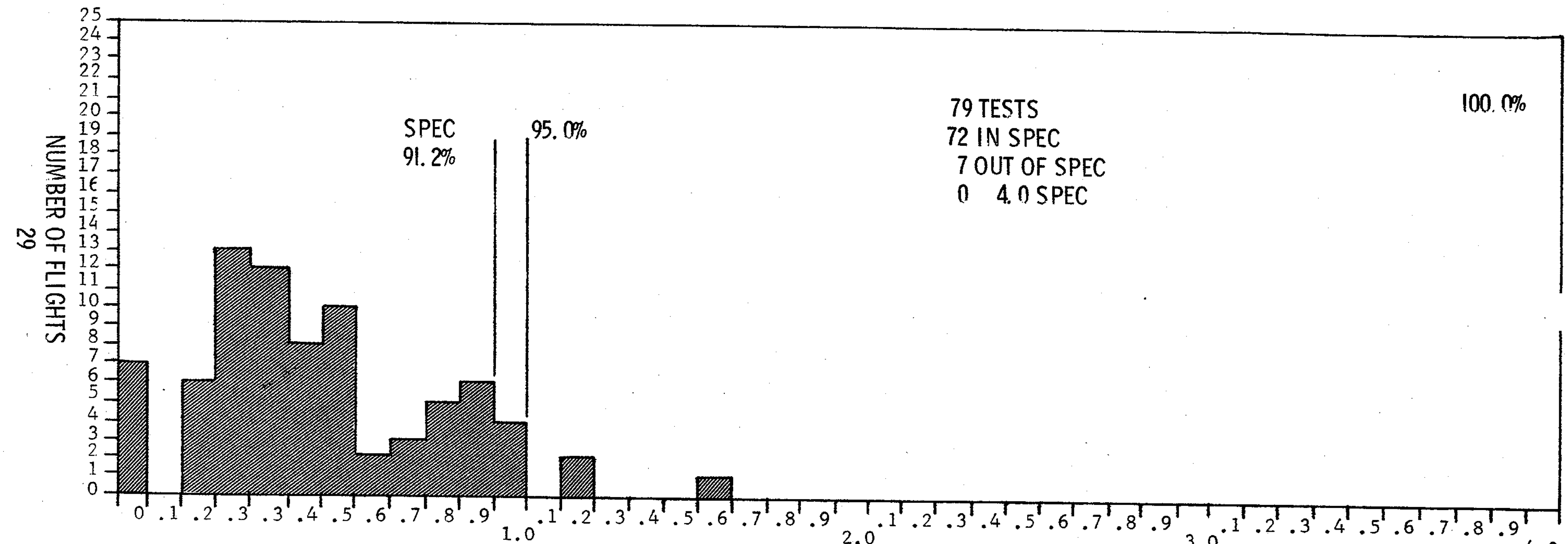
APR-MAY-JUN 1966



SPEC RATIO

INERTIAL NAVIGATION SYSTEM

JUL-AUG 1966

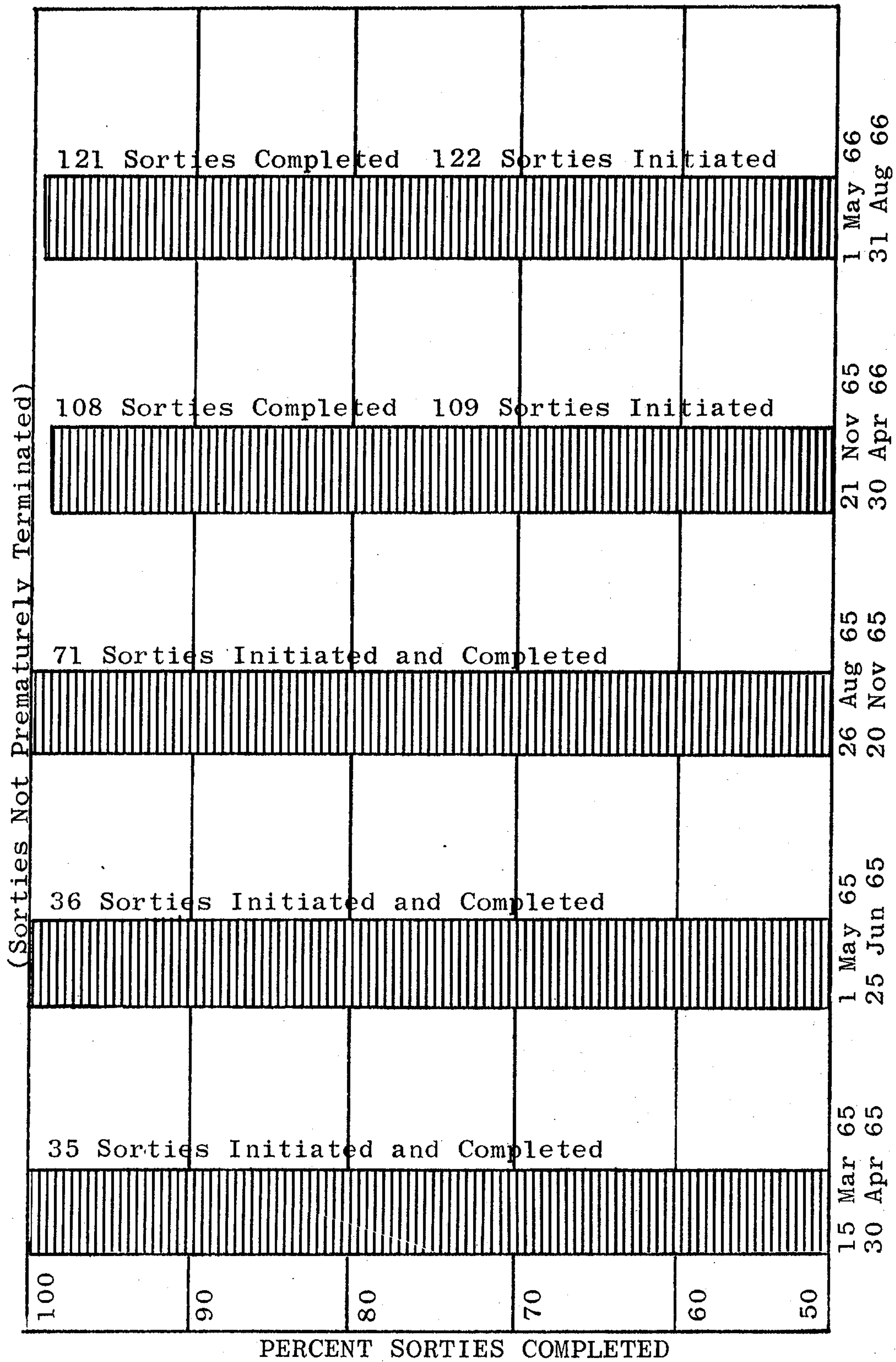


BYE-2737-66

AUTO FLIGHT CONTROL SORTIE RELIABILITY TREND

The automatic flight control system sortie reliability trend has remained relatively steady at 99-100% level since March 1965. Only two sorties were prematurely terminated since early 1965 due to an automatic flight control gyro problem.

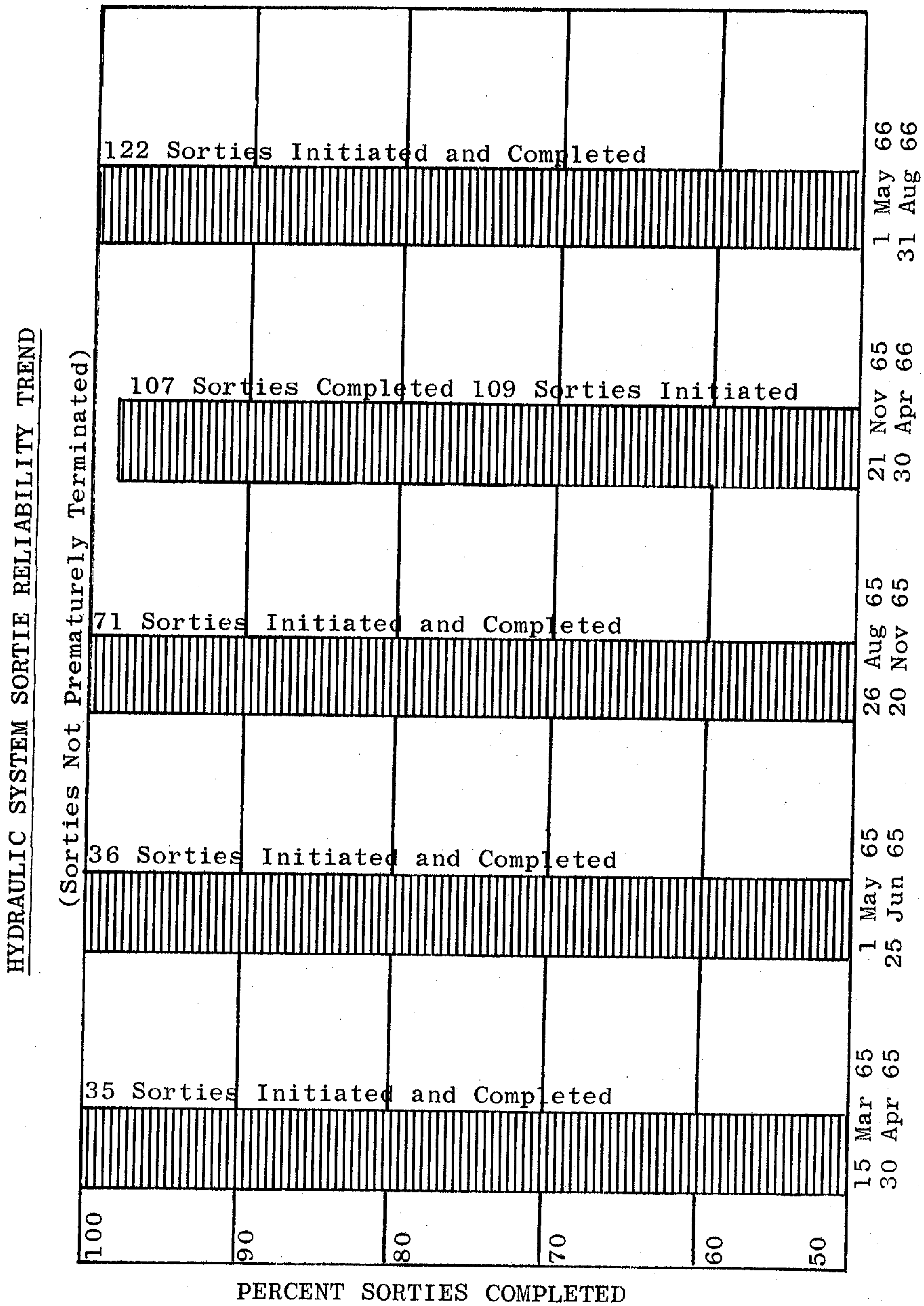
AUTO FLIGHT CONTROL SORTIE RELIABILITY TREND



BYE-2737-66

HYDRAULIC SYSTEM SORTIE RELIABILITY TREND

The aircraft hydraulic system sortie reliability level has remained steadily high, between 98-100%, since March 1965. Two flights were terminated prematurely due to hydraulic system problems during the period 21 November 1965 to 31 August 1966, out of a total of 231 sorties initiated.

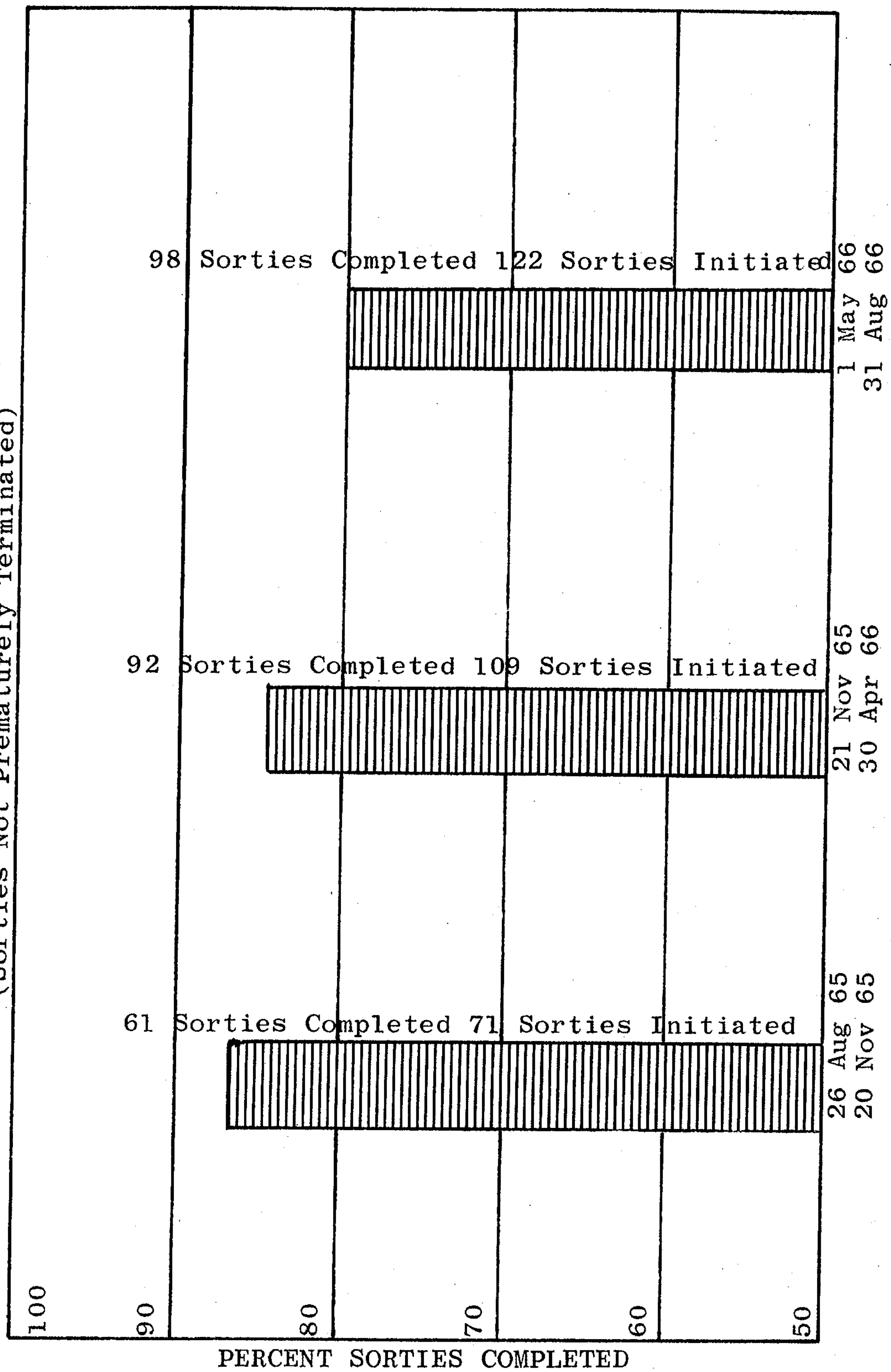

HYDRAULIC SYSTEM SORTIE RELIABILITY TREND
(Sorties Not Prematurely Terminated)
122 Sorties Initiated and Completed
1 May 66
31 Aug 66
107 Sorties Completed 109 Sorties Initiated
21 Nov 65
30 Apr 66
71 Sorties Initiated and Completed
26 Aug 65
20 Nov 65
36 Sorties Initiated and Completed
1 May 65
25 Jun 65
35 Sorties Initiated and Completed
15 Mar 65
30 Apr 65
100
90
80
70
60
50
PERCENT SORTIES COMPLETED

"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. It should be pointed out, however, that three sorties during the 1 May 1966 to 31 August 1966 period were prematurely terminated for precautionary reasons. The trend in premature termination presented for "other" systems appears to remain constant. Special emphasis is being placed on higher quality control and closer supervision to achieve improvement.

"OTHER" SORTIE RELIABILITY

(Sorties Not Prematurely Terminated)



BYE-2737-66

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 May 1966 through 31 August 1966. 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 122 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.

Total premature terminations for the period 1 May 1966 through 31 August 1966 are 31 out of a total of 122 sorties initiated.

BYE-2737-66

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

1 May 1966 Through 31 August 1966

Major Systems:

1.	Inlet:	Unstarts, Spike, Fluctuations	6
2.	AFCS :	Right Yaw	1
		Major Systems Sub-Total	7

"Other"

1-4	ARC-50	4
5-6	Cockpit Pressure	2
7-9	Shorted SAS Connectors	3
*10-11	Fuel Reserve, Bad Weather	2
12-13	Fuel Leaks	2
14	Oil Pressure Indicator	1
15	Air in Fuel Lines	1
16	Spike Actuator	1
17	Air Refueling Pressure Switch	1
18	Hydraulic Pressure Indicator	1
19	Oil Temperature Gauge	1
20	Surge Box Contamination	1
21	Runaway EGT Switch	1
22	Misrigged Aircraft	1
*23	After Burner - Precautionary	1
24	Electrical Power Interruption	1
		24

*Precautionary

BYE- 2737-66

CAMERA SYSTEMS

Type I cameras are built by Perkin-Elmer. There are two Type I "A" series cameras in the inventory and six Type I "C" series.

Type II cameras are built by Eastman Kodak. There are two of these in the inventory.

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

Performance in general has been acceptable with the Type I exhibiting better resolution and the Type II having greater reliability.

BYE-2737-66

CAMERA PERFORMANCE

(As of 31 August 1966)

Test Flight Time*

Type I "A" Series	Type I "C" Series	Type II
792 Min.	1049 Min.	1649 Min.

*Only Flights At Mach 3 and 80,000'.

TOTAL FLIGHT EXPERIENCE

Type I "A" Series	Type I "C" Series	Type II
95 Flights	50 Flights	59 Flights
72 Hours	37 Hours	49 Hours
6 Failures	5 Failures	5 Failures

EO 12958 3.3(b)(1)>25Yrs
(N)

BYE-2737-66

ELECTRONIC WARFARE SYSTEM

A brief functional description of the Electronic Warfare Systems follows:

BIG BLAST - [redacted]

BLUE DOG - [redacted]

PIN PEG - [redacted]

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. It appears at this time that the antenna problems associated with PIN PEG operation have been solved.

AIRCRAFT FLIGHT

ELECTRONIC WARFARE SYSTEM RELIABILITY

100%

*ONE OR BOTH ECM SYSTEMS OPERATED ON ALL RUNS

SYSTEM	ATTEMPTS	SUCCESSES	PERCENT
SA-2 MISSILE GUIDANCE JAMMER (BLUE DOG)*	42	42	100%
FAN SONG NOISE JAMMER (BIG BLAST)*	53	52	98%
PASSIVE DF ON FAN SONG (PIN PEG)	53	48 (1)	90.5%

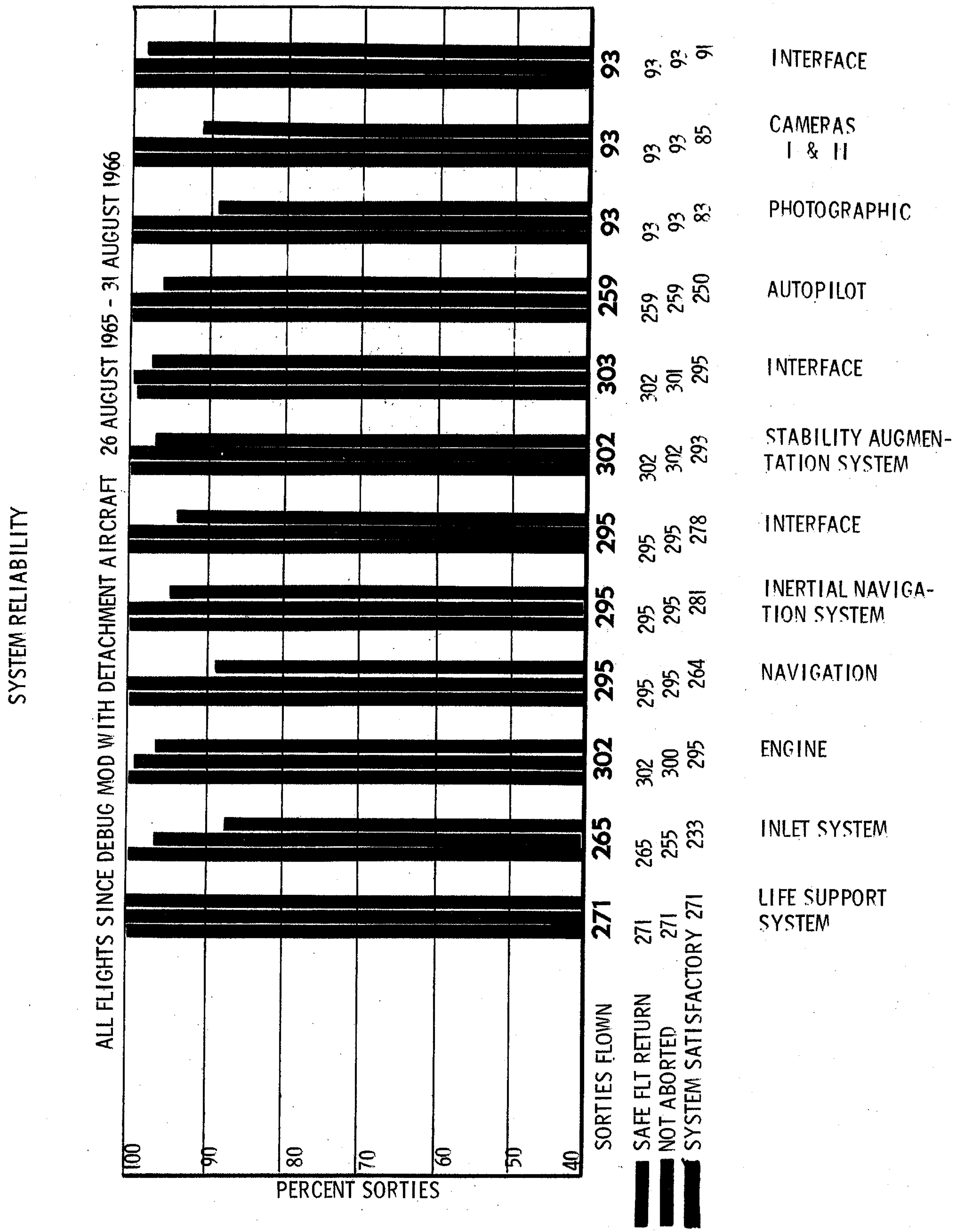
(1) Failures caused by antenna problems.

BYE-2737-66

SYSTEM RELIABILITY

The chart opposite summarizes three levels of reliability for each major system from 26 August 1965 through 31 August 1966. 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 AUGUST 1966
PERCENT SORTIES
100
90
80
70
60
50
40
SORTIES FLOWN
SAFE FLT RETURN
NOT ABORTED
SYSTEM SATISFACTORY
LIFE SUPPORT SYSTEM 271 271 271 271
INLET SYSTEM 265 265 255 233
ENGINE 302 302 300 295
NAVIGATION 295 295 295 264
INERTIAL NAVIGATION SYSTEM 295 295 295 281
INTERFACE 295 295 295 278
STABILITY AUGMENTATION SYSTEM 302 302 302 293
INTERFACE 303 302 301 295
AUTOPILOT 259 259 259 250
PHOTOGRAPHIC 93 93 93 83
CAMERAS I & II 93 93 93 85
INTERFACE 93 93 93 91

BYE- 2737-66

BLACK SHIELD VALIDATION RECORD

The upper chart (facing page) indicates the number of BLACK SHIELD operational profile missions scheduled during validation period, and the number airborne, with effectiveness indicated as a percentage in the right hand column.

The lower chart indicates the number of airborne validation type operational profile sorties which accomplished the mission with reasons for unsatisfactory missions. Effectiveness is indicated in the right hand column.

These special BLACK SHIELD validation were conducted between 5 October and 20 November 1965.

BLACK SHIELD SCHEDULE AND VALIDATION FLIGHT SUCCESS

SCHEDULE SUCCESS

AIRCRAFT	SORTIES SCHEDULED	AIRBORNE	CANCELLED		% EFFECTIVE
			MAINTENANCE	OTHER	
126	5	5			100
127	3	3			100
128	6	5	1		83
130	1	1			100
TOTAL	15	14	1		93

VALIDATION FLIGHT SUCCESS

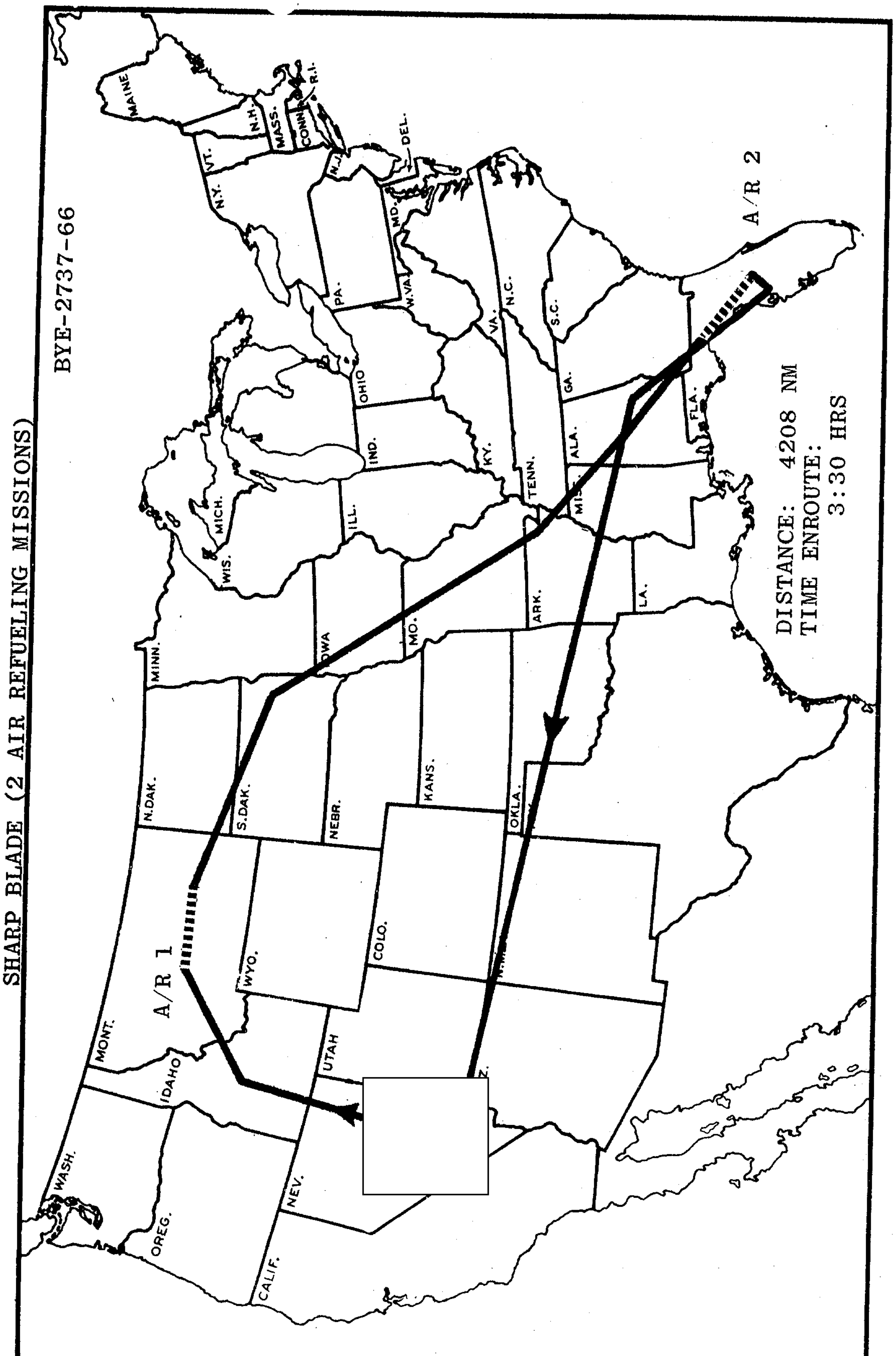
ACFT	SORTIES AIRBORNE	SAT	UNSATISFACTORY			UNSAT SYSTEM							PERCENT
			WEA	MAINT	OTHER	PROPUL-SION	AIR-FRAME	ACFT SYSTEM	CAMERA	COM NAV	ECM	OTHER	
126	5	3		2						2			60
127	3	3											100
128	5	3		2						2		1	60
130	1	1											100
TOTAL	14	10		4						4		1	71

BYE-2737-66

SHARP BLADE 2 AIR REFUELING MISSION

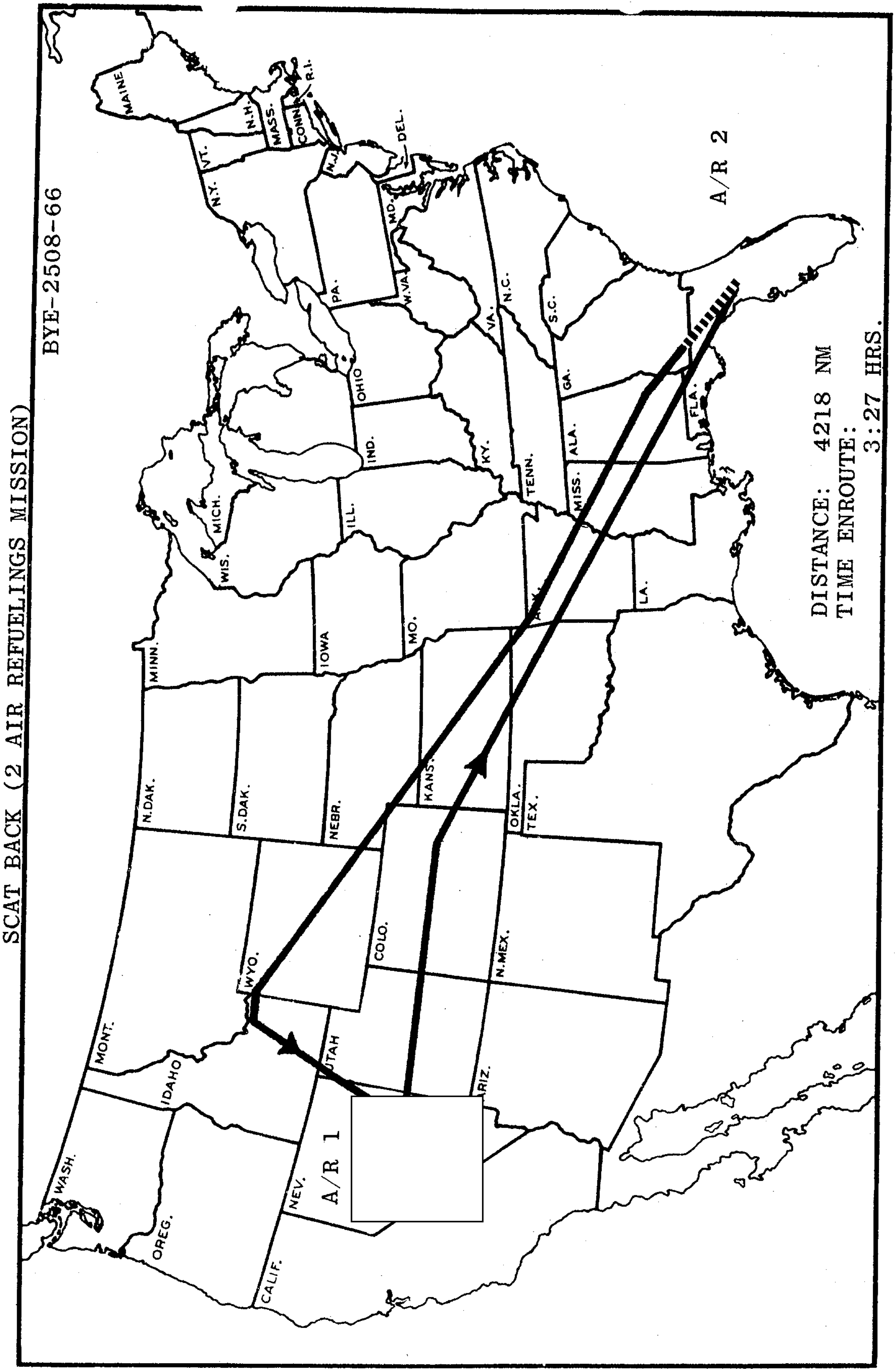
This was the first long training mission planned to closely simulate an operational mission and refuel at a great distance from the local area and/or home base. Legs are approximately 1800 NM between refuelings. This route was first flown in November 1965.

SHARP BLADE (2 AIR REFUELING MISSIONS)



SCATBACK 2 AIR REFUELING MISSION

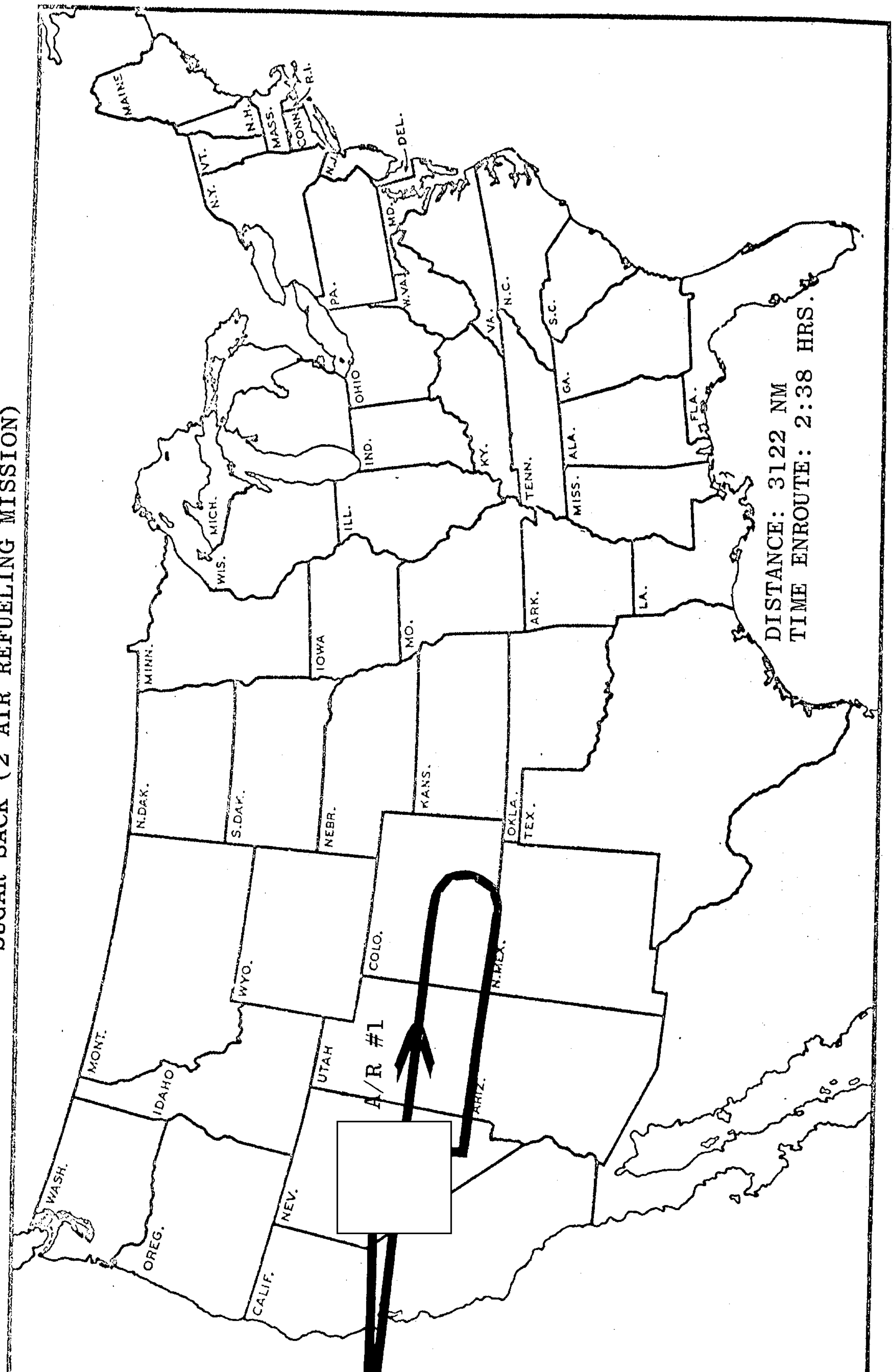
This mission was developed as an alternate to SHARP BLADE to be used when the weather precluded refueling in the Montana area. Legs are approximately 1800 NM between refuelings. Route was first flown in March 1966, and is regularly scheduled and flown two or three times per week.


SCAT BACK (2 AIR REFUELINGS MISSION)
BYE-2508-66
A/R 1
A/R 2
DISTANCE: 4218 NM
TIME ENROUTE: 3:27 HRS.
MAINE
N.H.
VT.
MASS.
CONN.
R.I.
N.Y.
N.J.
DEL.
MD.
PA.
W.VA.
VA.
N.C.
S.C.
GA.
FLA.
ALA.
MISS.
TENN.
KY.
OHIO
IND.
ILL.
MICH.
WIS.
MINN.
IOWA
MO.
LA.
KANS.
NEBR.
S.DAK.
N.DAK.
OKLA.
TEX.
COLO.
N.MEX.
WYO.
MONT.
UTAH
ARIZ.
IDAHO
NEV.
WASH.
OREG.
CALIF.

BYE-2737-66

SUGAR SACK 2 AIR REFUELING MISSION

This mission was developed to practice over water rendezvous procedures that would be used an on operational mission. The air refueling area is approximately 450 n.m. off the coast of California and was first used on 28 July 1966. This is presently the only over water refueling area in use and is scheduled regularly for training missions.



SUGAR SACK (2 AIR REFUELING MISSION)

BYE-2737-66

A-12 AIRCRAFT ACCIDENT RELIABILITY

The chart opposite reflects the three aircraft accidents which have occurred during the program.

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 runway. All of these accidents involved traditional problems inherent in any aircraft. The life environment system ejected the pilot safely in all three of these accidents with two of these ejections occurring a few hundred feet from the ground.

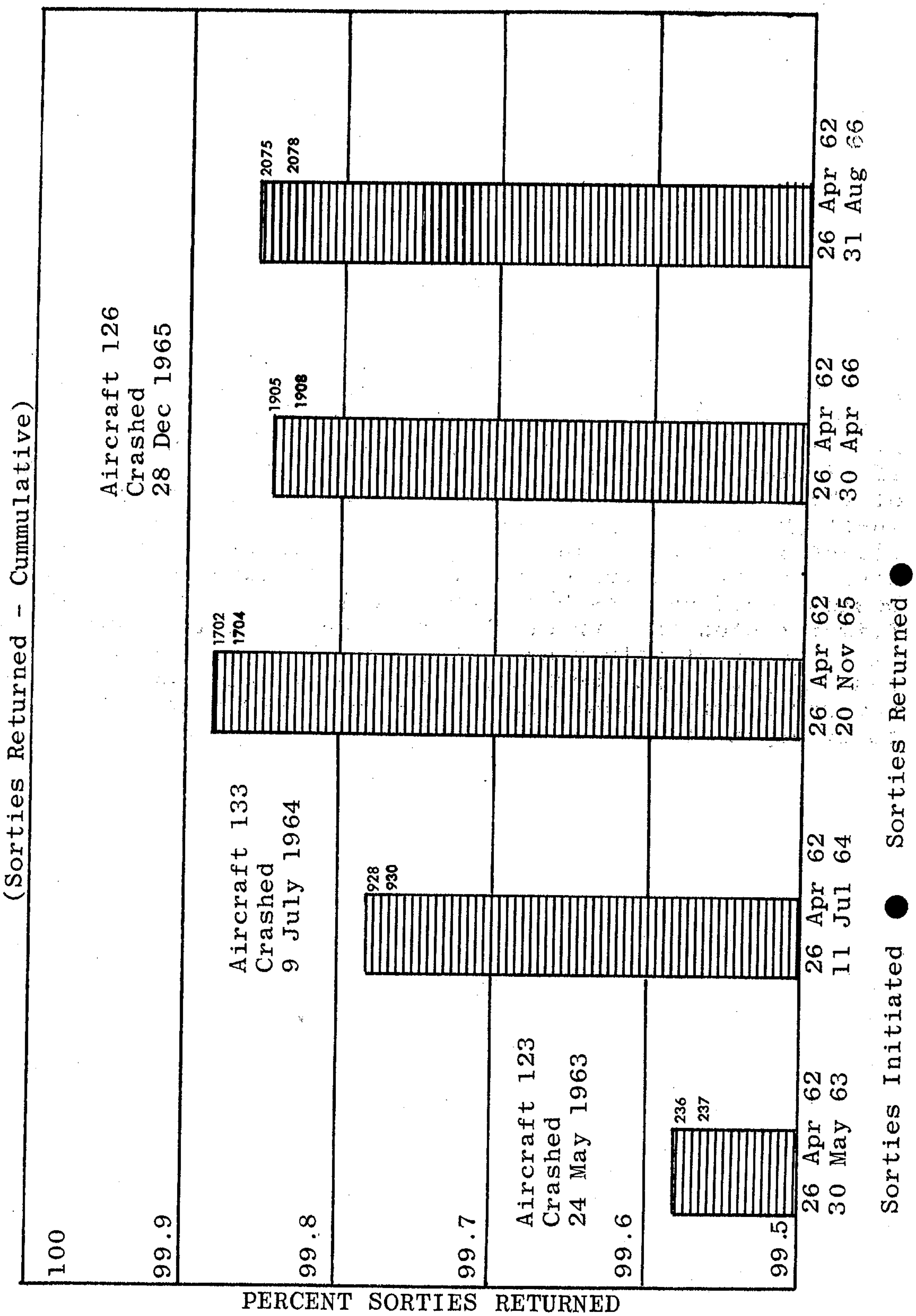
Aircraft 123's accident occurred away from the base on a routine training flight. It involved a plugged pitot static tube during icing conditions resulting in erroneous cockpit instrument indications of air speed.

Aircraft 133's accident occurred during landing approach. It involved a malfunction of the flight control surface actuating system resulting in a continuous and uncontrollable roll.

Aircraft 126's accident occurred 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.

A-12 AIRCRAFT ACCIDENT RELIABILITY

(Sorties Returned - Cummulative)



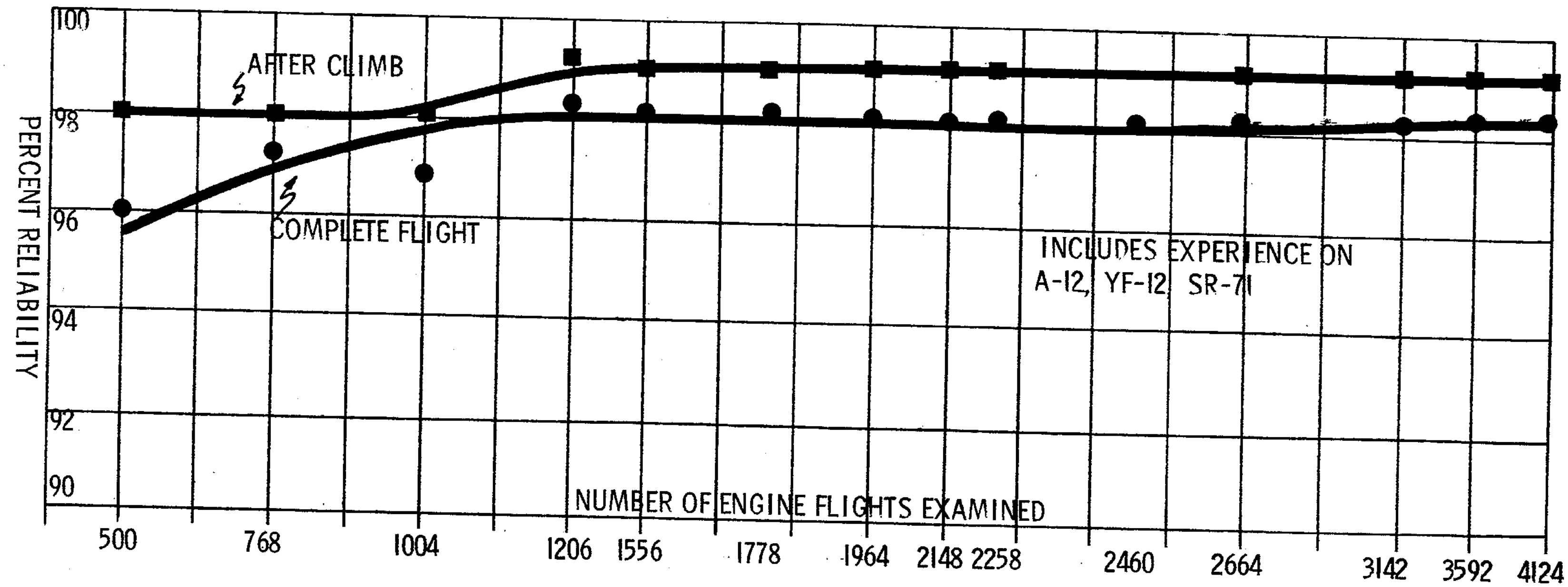
BYE-2737-66

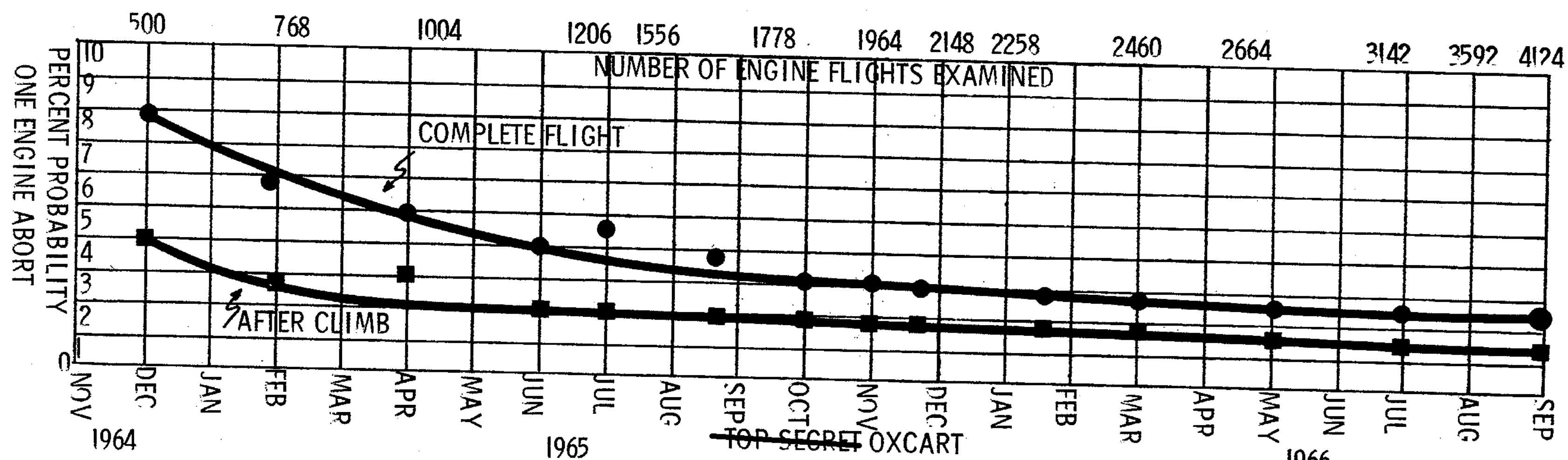
ENGINE RELIABILITY

The accompanying chart presents J58 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 4124 J58 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. Of these 4124 engine flights, only eleven of the aborted flights actually represent instances of complete in-flight loss of power from one engine or involuntary in-flight shut down of an engine. Of these eleven instances, seven occurred after climb and prior to landing approach. Design modifications have been developed and successfully flight tested to correct the deficiencies which caused each of these abort situations. The probability of complete loss of power from both engines is extremely low. No J58 powered aircraft has ever failed to return from a flight due to an engine cause.

J-58 ENGINE (ABORT) RELIABILITY FOR ENGINE CAUSE

(CUMULATIVE THROUGH 31 AUGUST 1966)





OPERATIONAL SUCCESS RISK SUMMARY

PROBABILITY OF NOT LOSING AIRCRAFT OVER DENIED TERRITORY ON ANY SPECIFIEL MISSION - INCLUDES ALL HAZARDS.	98 PERCENT
PROBABILITY OF MISSION SUCCESS ONCE AIRCRAFT IS AIRBORNE.	85 PERCENT
PROBABILITY OF SUCCESSFULLY LAUNCHING ONE AIRCRAFT AT SPECIFIED TIME AND DATE.	85 PERCENT
PROBABILITY OF SUCCESSFUL MISSION AT SPECIFIED TIME AND DATE.	70 PERCENT