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GUS-0347✓

13 July 1959

Notes for Mr. Bissell
Minority Dissent on GUSTO

1. In order that the A-12/KINGFISH design be attractive we must presuppose that the BARLOCK radar will be very close in performance to the estimate made by ATIC and not nearly as good as estimated by OSI/SEI; furthermore that the A-12/KINGFISH design can achieve a radar cross-section as low as estimated by Frank Rodgers. On the other hand the radar cross section of the FISH design is known from actual tests. The uncertainties here lie in the ability to retain this low cross section in going from models to real aircraft and again in BARLOCK performance.
2. The OSI/SEI BARLOCK performance estimate is such that the FISH design is in what might be called a 50/50 region of radar detections/tracking. On the basis of the ATIC estimate the FISH would be practically undetectable. By the same standards the A-12/KINGFISH designs fall in this 50/50 region only on the ATIC basis; by OSI/SEI estimate these designs are almost in the A-11, B-47, etc. category.
3. It is expected that it will be much more difficult to reach the radar cross section in the order of one sq. meter with the A-12/KINGFISH designs than it was to reach the smaller cross section of the FISH design. Should BARLOCK performance be closer to the OSI/SEI estimate, or should model tests reveal inability to reduce the cross section to a sufficiently low level, or if the progression from models to actual aircraft involve small increases in radar cross section then the A-12/KINGFISH designs turn out but slightly better than A-11 in terms of radar detection and tracking. All of this comes about because of the very high sensitivity to small changes in cross section at these levels of cross section.
4. The sonic boom problem remains ill defined but has been categorized as a 50/50 type of occurrence. The volumetric difference between the FISH and A-12/KINGFISH designs is such that these latter will generate a boom of about four times the intensity of that of the FISH. Hence the A-12/KINGFISH sonic boom would be likely to cover a greater width and be more complete in longitudinal track.
5. While the Soviets may believe there is little chance that the F108 and B70 will ever become operational, so long as these programs continue they must at least think of developing an active countermeasure to these Mach 3, 65,000-75,000' altitude aircraft. Any such countermeasure would probably retain a higher level of effectiveness against the Mach 3.2,

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85,000' altitudes of the A-11/12/KINGFISH than against the Mach 4, 90,000' FISH performance.

6. Discounting the paragraph above I fear the A-12/KINGFISH direction merely delays A-11 by three or four months. The price of useable low radar cross section, I fear, is operational complexity. If this price is too high we should get on with A-11 post haste.

[Redacted Signature Box]

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EUGENE P. KIEFER ✓

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GUS-0346✓

13 July 1959

Notes for Mr. Bissell re GUSTO additional factors bearing on decisions reached at 8 July meeting.

1. P&W can provide M3.5 version of J-58 if decision is made in July; total cost thru FY 1962 still \$72.5 M.

1st Flt.	A-11	A-12	KINGFISH
M 3.2 eng.	Jan 61	Jan 61 (all tin)	May 61
M 3.5 eng.	July 61	July 61	July 61
H: M 3.2 eng.	86,500	83,000	84,000
H: M 3.5 eng.	89,500	86,000	87,000

2. Convair people do not believe the decision to cancel B-58B is firm. Their story is that B-58B costs were questioned by Gen. LeMay. Gen. Mark Bradley is to be in Ft. Worth next Friday, 17 July to examine Convair cost estimates.

Convair also supplies these estimates to modify B-58A to B-58B:

- Alternate 1. Build a B-58B from a programmed but unbuilt B-58A.
Incremental cost \$2.075M including \$1.6M for 4 J-79-9 engines.
- Alternate 2. Modify an already built B-58A to B-58B.
Incremental cost \$6.02M including costs of 4 J-79-9 engines.

These costs presume airplane no. 68 (B-58B prototype) remain in program. This airplane is priced at \$39M including non-recurring tooling costs, etc.

Convair propose a third alternate, a six engine version of B-58A with J-79-5 engines; cost increment \$2.63M including engines.

3. GE J-79-9 engine program costs as best I can deduce are:

Total additional funds needed to 150 hour qualification \$50M. One half of this amount has been funded between Jan. and July of this year.

Production engines begin at \$600,000 decreasing to \$250,000 each at the 500th engine.



EUGENE P. KIEFER

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GUS-0348✓

13 July 1959

MEMORANDUM FOR: Dr. James R. Killian

SUBJECT: Status of Project GUSTO

1. Since the time of reporting to you on 15 November 1959 the Convair and Lockheed companies have continued their design study efforts to evolve a suitable successor to the U-2 aircraft. The major features of four possible alternate designs appear in the tabulation below.

Designation:	A-11	A-12	KINGFISH	FISH
Mfgr.:	LAC	LAC	Convair	Convair
Speed:	M 3.2	M 3.2	M 3.2	M 4
Alt. Start Cruise:	86,500 ft.	83,000	84,000	90,000
Range:	4,100 n.mi.	3,940	4,070	3,900
Gross Weight:	94,500 lbs.	110,000	101,000	38,300
Length:	106 ft.	100'	78'	47'
Wing Span:	56 ft.	56'	52'	37'
Power Plant:	2-J58A/B	2-J58A/B	2-J58A/B	2-Ramjets 2-J85
1st Flight:	Jan 1961	Jan 61 (metal) May 61 (radar matls.)	May 61	Jan 61

2. The A-11 design by Lockheed represents an attempt to obtain the highest level of aerodynamic performance without recourse to operational complexity beyond conventional aerial refuelling and is uncompromised by unusual features intended to minimize detection by radar. This design is backed by about two months of study and low speed wind tunnel tests only.

3. The A-12 and KINGFISH designs are of most recent vintage. These designs attempt to retain operating simplicity in addition to incorporating features to minimize their radar echo. Only a few radar model tests at 70 mc. have been accomplished on the KINGFISH version in the short time since these designs were started. Hence the estimates of aerodynamic performance and other characteristics have not as yet been substantiated by tests and detailed study. There is very little difference between these two designs at the present time.

SECRET

SECRETGUS-0348
PAGE TWO

4. The FISH proposal represents the design approach recommended in the 15 November report to you. This design is a modification of the original SUPER HUSTLER concept. The aircraft is carried aloft and accelerated to supersonic speed by a B-58 mother craft.

5. Wind tunnel model tests have demonstrated the validity of the estimated aerodynamic characteristics. However, the more powerful engines scheduled for the B-58B series aircraft are needed for acceleration. Structural testing has established confidence in the materials of construction. Radar testing including a full scale model has established that the aircraft should have an exceedingly small radar echo at frequencies near 70 megacycles, 600 megacycles, and S-Band. While it would be desirable to further reduce the radar cross section the amounts and extents of the higher-than-desired radar echos are relatively small.

6. The ability of the Soviets to detect and track overflying aircraft by radar depends upon the extent and ability of the radar network in addition to the nature of the echo. The most potent radar expected in the Soviet network during the next few years is the S-band BARLOCK. Using estimates made by the Air Force ATIC of the BARLOCK radar it could be said that the FISH design, at the level of radar echo shown in full scale model tests, would be almost never detected or tracked. However, on the basis of more stringent estimates of BARLOCK performance by CIA it must be said that the radar echo from the FISH aircraft would be such as to indicate detection of something on Soviet radar scopes particularly after the first few exposures. The low echo level and high speed of the FISH aircraft would enable only sporadic and disconnected tracking.

7. No radar testing has been accomplished as yet at S-Band frequencies on the A-12 or KINGFISH designs. It has been estimated however that, while the radar echo of these two designs might not be reduced to the same level as that of the FISH, it could be made sufficiently low so as to make radar tracking extremely difficult.

8. The presence of any of the four proposed aircraft would be disclosed to an airborne infra-red detection system should the Soviets develop this manner of surveillance against intruders.

9. Although a body of theory exists to describe the sonic boom phenomena the practical data available are quite meager and not well related. Aircraft such as these proposed are estimated to cause some form of sonic boom at irregular intervals along perhaps half the ground track. Due to smaller size the FISH proposal is expected to generate a less intense sonic boom than the other three designs.

SECRET

SECRETGUS-0348
PAGE THREE

10. All four of these aircraft are estimated to have sufficient range to reach all Sino-Soviet territory. The A-11, A-12, and KINGFISH designs could operate from a single base in the U.S. with rendezvous refuellings outbound and inbound from KC-135 tankers based in Alaska and Greenland. A third rendezvous refuelling would be needed with a tanker based in North Africa for the deepest penetrations. The FISH aircraft would require bases in Alaska and either Greenland or England and buddy refuelling of the B-58 mother from a KC-135 on longest missions. Landing facilities for the FISH and for a cargo aircraft for retrieval would be needed at three locations near Soviet territory or the FISH could be towed to home base by a KC-135 as in a prolonged rendezvous aerial refuelling.

11. In recent days the continuance by the Air Force of the B-58B airplane program and that of the J-79-9 engine has become quite unlikely. Since the B-58B aircraft is needed to accelerate the FISH to supersonic speed in order to launch, the cancellation of the B-58B together with the operational complexity of the FISH proposal lead to the conclusion that further consideration of the FISH is unwarranted. Similarly, due to the conventionally high radar echo expected from the A-11 design further consideration of this proposal is unwarranted.

12. Approximately three to four months of testing and study may be needed to establish the same level of confidence in the estimates of radar echo, aerodynamic performance, and other characteristics of the A-11 or KINGFISH designs as is now held in the case of the FISH proposal. It is recommended that approval be given to undertake the necessary tests and detailed study at an estimated cost of \$1,750,000. Because of the similarity of designs this additional work would be undertaken with but one and not both of the contractors now in this program.

RICHARD M. BISSELL, JR.
Deputy Director
(Plans)

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