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[redacted] 25X1A

Copy 7 of 9

9 JUL 1963

MEMORANDUM FOR THE RECORD

SUBJECT : OXCART Suppliers Meeting 27 June 63

1. Subject meeting was attended by representatives of Lockheed, Pratt & Whitney, and [redacted] Headquarters was represented by General Carter, Colonel Giller, Colonel Ledford, and appropriate representatives of CIA and USAF. 25X1A

2. Aircraft #123 Accident.

A closed session limited to Lockheed and Headquarters was called for the purpose of correcting certain misunderstandings associated with the aircraft 123 accident and with the accident board report and its findings. [redacted] a board member, and [redacted] base commander, recounted an authentic history of the flight as reconstructed by the board centering around the pitot total pressure probe malfunction, the resulting false instrument readings, and pilot reactions. 25X1A

a. Lockheed actions resulting from board recommendations are: 25X1A

1. The probe heating system was retested and met the normal no-ice conditions with the heat on. Nevertheless LAC proposes to replace the present Rosemount pitot static probe with a new Rosemount probe designed to pass a severe 5 hour icing test. In addition, Service Bulletin #364 provides for the installation of a "heater-off" warning lite. This light not only will alert the pilot to the fact that he has not switched on his probe heat but will also light up if any part of the probe heating system malfunctions. LAC concluded that the heater was not on during the events preceding the accident although they maintain that, in their opinion, there is nothing unsafe about flying with the present probe if the heater is functioning properly. The new probe is to be installed in aircraft #129 and up and it was recommended by LAC that all prior vehicles be retrofitted with the new probe.

2. LAC is investigating the feasibility of an air pressure operated angle of attack indicator. The new Rosemount probe has pitch and yaw sensing ports designed for inlet control functions already provided for on this aircraft, therefore these could possibly be used for an angle of attack indicator.

3. Service Bulletin #365 provides for the installation of a crash resistant flight recorder and a separate pitot static [redacted] 25X1A

NRO review(s) completed.

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control system

must be modified for the speed and altitude range. The recorder will monitor 5 channels, i.e., speed, altitude, heading, normal acceleration, and time. It will be available by about 10 August.

4. Service Bulletin #353 provides for the installation of a fourth inverter and two batteries. A roll lockout circuit is also being incorporated in the SAS to permit inverter switchover without SAS pitch up if the roll channels are engaged.

5. A warning device indicating power-off will be incorporated in the TDL.

6. A nylon lanyard will fasten the sleeping bag cushion to the seat kit.

7. Clips will be provided to restrain the oxygen hoses.

8. The present parachute canopy release is the best available. No major change is contemplated.

25X1A E. After [redacted] reconstructed the flight events leading to the accident as agreed to by the board, [redacted] 25X1A not a board member, concurred in the analysis and said that in his opinion the choice between pilot error or material failure as the primary cause was very close. Colonel Ledford agreed that the pilot was probably instrument disoriented and that the accident was probably due to pilot error initiated by pitot plugging. Furthermore, he doesn't believe that the pilots know the system completely enough.

25X1A C. In response to this, [redacted] noted that the pilot training program was being changed. A ground training program is now being conducted by all A-12 pilots. Each pilot is made responsible for one sub-system and he must prepare and deliver a lecture on this system to all the other A-12 pilots. He also pointed out that all pilots must know this aircraft better than any they have ever flown before. Constant refreshers are required because so few hours are being flown by any one pilot. Mr. Johnson concurred in the above remark and pointed out that the ease and general lack of trouble with which this aircraft has been flown under normal conditions may be very deceiving to many pilots.

D. Mr. Johnson pointed out that if the restriction of no flying under IFR is maintained, we will have to be content with very little flying time and he personally was not concerned about IFR flying although [redacted] 25X1A still wanted only VFR flying. At this point, Colonel Ledford lifted the IFR restriction and instructed that each day be evaluated independently as far as flying conditions were concerned.

X. Mr. Paraughamy recommended that emergency procedures be reviewed for possible changes due to the accident. General Carter was very interested in whether or not various emergencies could be crammed into #124 to train pilots in emergency procedures. This will be investigated to see how #124 can be used without any major changes.

XII. In opening the general meeting, General Carter expressed the maximum urgency associated with every part of the program.

XV. Lockheed Aircraft Corporation.

A. Mr. Johnson cited the major Lockheed flight test problems. The most significant area of these involved envelope speed-altitude extension as limited by the airflow mis-match. A definitely better definition of the problem exists than did two months ago. This definition involves inlet spike and bypass door scheduling and stability, inlet pressure distortion, ejector secondary airflow and trailing edge flap oscillations as bearing on aircraft roughness.

B. Mr. Johnson presented the following breakdown describing current flight test problems:

Major Problems:

1. Inlet Controls

   Poor Operation, Design & Availability

2. Engine Controls

   Manual Trim Very Unsatisfactory Limits Thrust & Performance

3. Engine Oil Consumption

   4 to 5 Times Test Stand Measurements

4. Afterburner Liner Failures

   Even at Low P.I.T.'s

5. Low Windmilling R.P.M.

6. Nacelle Tail Flap Cycling

Causes Rough Operation at Low Mach No's

7. False Fire Warnings

Causes us to Abort Missions

8. Radio Operation of ARC-50

Needs Development

9. Insufficient Bypass Area in Nacelles with Screens In

Effects Single Engine Flight

10. General Operation of Package

INS Reliability

11. Critical Delivery of Vertical Tails [redacted] 25X1A

Minor Problems:

1. Brake Chatter
2. Pilot Comfort for Long Flights
   Chutes & Rudder Pedal Positions
3. Windshield Fogging Between
   Layers of Glass
4. Reliability of A/C Instrumentation
   Such as Oil Press. Gages, Nozzle
   Position Indicators, EGT System, Etc.

Unknown Areas:

1. Problems Due to High Temperatures
   & Prolonged Operation at High
   Altitude.
2. AR Cross Sections in Flight
3. Overall Performance at Final
   Weights & Power

C. As a primary factor bearing on aircraft speed/altitude extension, Mr. Johnson emphasized the inadequacy of the engine main fuel control turbine temperature manual trim (ref. item 2 Major Problems above) required for maintaining peak turbine temperatures for maximum aircraft acceleration. As stated, the trim motor response is too slow, the pilot must continually trim to keep temperature up, and trouble is experienced maintaining maximum temperature without an over-temperature as was experienced on flight 63 of aircraft 121. Headquarters recognizes that motor response has been too slow on earlier controls and is being corrected with faster units. Because of incompletion of a final

control cam configuration which must be based upon additional flight test, the pilot is required to trim often to maintain his acceleration. It was evident from the LAC presentation, however, on flight 68 of aircraft 121 which experienced slow acceleration, that the pilot trimmed only one time after takeoff and that turbine temperature therefore remained at 749° C and below throughout the flight which is 40° C or 72° F below the maximum allowable. 26 June '63 questioning of Pratt & Whitney and 25X1A personnel revealed that post flight inspection indicated that the controls had the capability of being trimmed substantially over the maximum allowable limit if so desired, and that there was no apparent reason why the trim was left so far below the maximum limit. An engine trimmed this low is not at maximum output. Regarding the last statement, Headquarters data shows that the over-temperature on flight 65 aircraft 121 did not occur during the acceleration portion of the flight but immediately upon takeoff. This tends to substantiate the Pratt & Whitney position that this over-temperature occurred because the engines were not trimmed prior to the flight rather than because of trimming problems during the flight. 25X1A 25X1A

25X1A 5. LAC, reviewed the problems associated with the Inlet Control System. They are as follows:

Flight Test Operation & Acceptance:

1. Spike loop instability due to high gain in the second stage valve resulting from sensitivity to supply line length. The fort rig line length is 18 feet longer than that used in the aircraft, whereas the NSD line length closely approximates the aircraft line length. Fort being changed to a NSD and A/C line length. LAC maintains that any valve which is sensitive to supply line length is improperly designed.

2. Shock expulsion sensor malfunction due to inadequate spring force.

3. Spike feed back system failures.

4. A switch from 50% to 100% gain in the second stage valve and a hi-gain slope on the F cam of the main control has resulted in spike instability. This has apparently been rectified by reverting back to a 50% gain plus the F cam in the main control.

NSD offered the following comments in rebuttal:

Spike loop instability was caused by [redacted] disassembly of skins in second stage valve and not caused by high gain. This has been corrected. (Ref. sub-paragraph a1) 25X1A

Spike instability in this instance was caused by E cam slope alone and not caused by 100% gain in valve. As added assurance that 100% gain would not cause trouble, the decision was made in May to revert to 50% gain in all spike actuator valves. Four spike actuators with 50% gain valves were delivered by 24 May. The F cam has been replaced with the F cam in the gain control with two F cam units delivered by 24 May. (Ref. sub-paragraph B4)

5. Heat exchanger misfit has resulted in shock position control malfunction.

6. Jet pipe valve instability in attitude control has resulted in malfunction.

At this point, NSD noted that the jet pipe valve currently has been working satisfactorily and is the heart of the hydro-mechanical control concept which concept was layed on by Mr. Johnson four years ago as an unalterable design prerequisite.

Inlet Control Status :

Airplane	Main Controls	Spike Actuators	By-Pass Actuators
121	Phase I Installed	Installed	Installed
122	Phase I Available 6/27	Installed	Available, But Manual Actuators in Use
124	Not Required During J75 Operations		
125	Phase II Available 7/3	Available 6/29	Installed
126	Phase II Available 7/6	Available 6/27	Installed
127	Phase II Available 7/13	Available 7/6	Installed
128	Phase II Available 7/20	Available 7/13	Available Now
129	LAC Inlet Control System Available 7/16		
130	LAC Inlet Control System Available 8/15		

25X1A

E. [redacted] of Lockheed indicated that the starter situation was well in hand with 3 Buick engine type carts in operation at [redacted] All three carts were manufactured for LAC initially by [redacted] but were underpowered because of mis-estimated aircraft/installed J58 engine starting requirements. All three carts therefore were modified to increase power output, the first cart being modified by [redacted] and the second and third being modified by LAC. In order to obtain a feel for experience accumulated, the question was asked as to how many starts each cart had made to date. [redacted] gave his answers and was joined by [redacted] of [redacted] with the following results:

Cart No.	Number Starts - [redacted]	Number Starts - [redacted]
1	263	53[redacted]
2	200	73
3	100	32

[redacted] then entered the discussion with figures which tended to substantiate those of [redacted] and offered the additional fact that the no. 2 cart had suffered several Buick engine failures in the process and the no. 3 cart was experiencing cooling system malfunctions and "hung" starts.

F. Mission capabilities as affected by available nitrogen and oxygen supply were reviewed by [redacted] and it was apparent that under certain conditions the amount of nitrogen and oxygen available could be critical. For example, after a 10.5 hour mission only 7% of the nitrogen is available as reserve in the presently installed system. This quantity can be increased to 29% by the addition of one R-12 DEMAR. The oxygen reserve on landing based upon a flow of 18 LPM is even more critical. For example, for the 1800 psi system as installed, there is zero hours reserve for an 8.5 hour mission and a -2 hours reserve for a 10.5 hour mission. The 2500 psi system to be installed under Service Bulletin #363 increases these quantities to 2 hours and zero hours respectively. A 2500 psi system which can be available by September 1963 would further increase these times to 7.3 hours and 5.3 hours respectively.

V. The operational readiness target date forecast was discussed with opinions ranging from October 1963 to January 1964. General Carter made it clear that the only interpretation of operational readiness date which he recognized was the date when sufficient aircraft, trained personnel, payload, etc., were ready to undertake a mission and deliver the intended results.

VI. Pratt & Whitney.

A. Pratt & Whitney discussed development progress and flight test problems. Again, a better definition of the airflow mis-match exists in the area of rotor speed suppression felt to be associated with inlet distortion resulting in false input signals to the engine main fuel control and resulting in a degradation of engine cycle efficiency. It was also evident that improper engine turbine temperature trimming is contributing to slow accelerations experienced on recent flights. Actions are underway to further define distortion, and improve turbine temperature trim.

B. Ground test performance data on development engines at high Mach number, altitude, and sea level conditions indicates that thrust is equal to or better than specification and that specific fuel consumption is equal to specification at and below 90% max. thrust. In order to maintain perspective a question was raised concerning specific fuel consumption at 100% max. thrust with the attendant answer that at this condition fuel consumption was 6% worse than specification. (Improvement in this latter area is an important part of the current development effort.)

C. The most important recently surfaced engine problem at this time is excessive oil consumption. The degree at present is not limiting test flight duration but will certainly limit longer test flights and be completely incompatible with mission requirements unless corrected. A maximum effort has been launched to define and correct the problem.

D. The engine #23 oil contamination incident has been pin pointed to a design deficiency, involving an upper lower shaft expander interference with the shaft bearing cage. This interference restricted cage rotation resulting in bearing failure. Immediate steps were taken to inspect all engines prior to further flight. (As of 2 July 11 engines had been inspected and found OK.)

E. Four recent incidents of afterburner liner cracking have occurred. Two appear to be associated with over-temperature. Two later occurrences appear to be vibration induced. (This liner configuration has undergone the equivalent of at least three 60 hour engine endurance tests on Florida test stands without incident. Current corrective action is directed toward remarking and testing liners with stiffened supporting members to dampen out suspected installation induced vibration and adding vibration instrumentation to the aircraft. Two "beefed up" liners are to be delivered for flight test by the week of 15 July.)

With the exception of six early model main fuel controls returned to [redacted] for scheduling inaccuracies, controls now at [redacted] appear to be doing what they are being told to do by the present cam and by the input signals coming from the aircraft inlet. The present cam based upon early design and

25X1A

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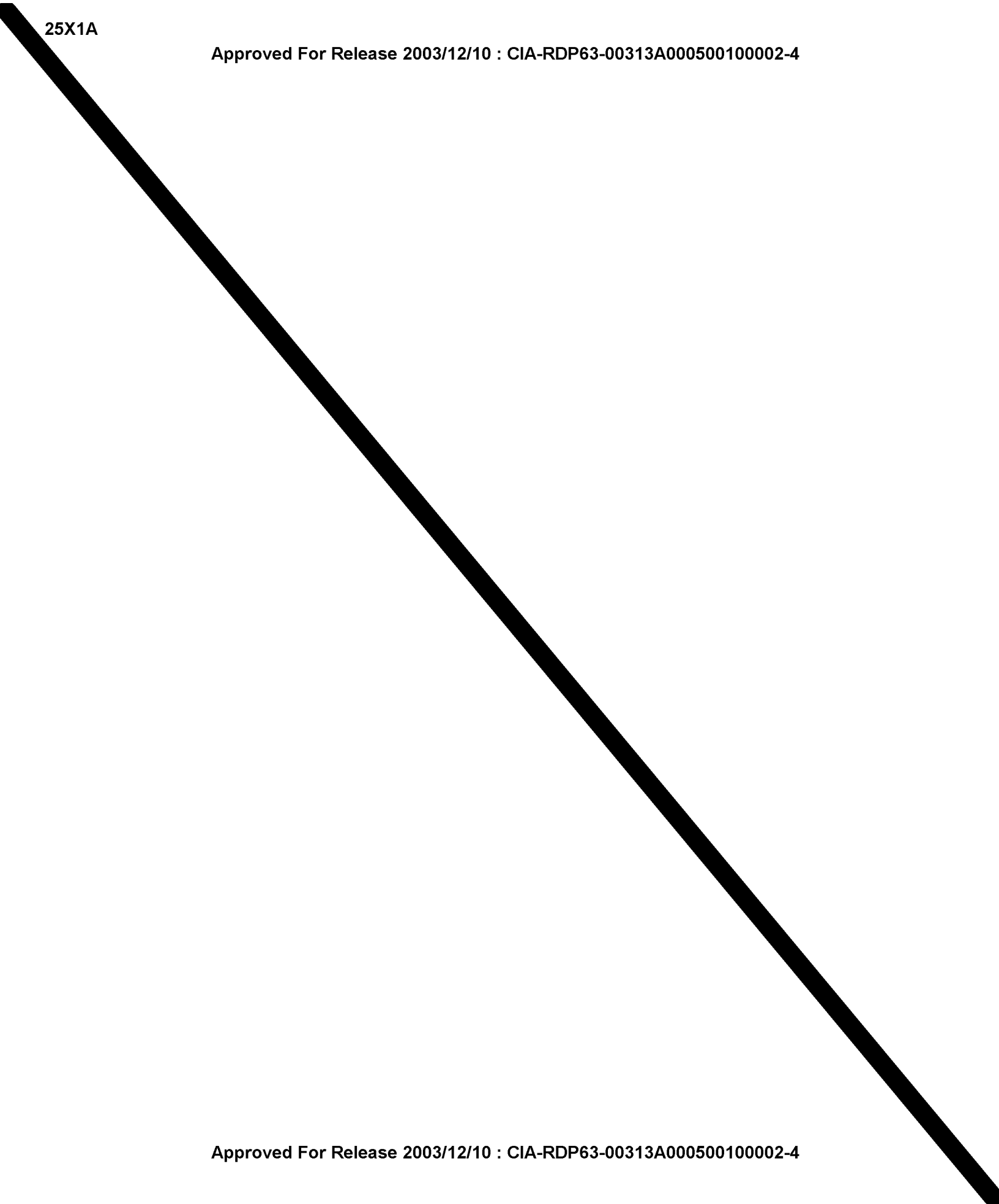
25X1A

ground test data must be reconfigured to become more compatible with the installation as additional flight test data becomes available before a final configuration is reached. An interim improved cam configuration based upon early flight test data is scheduled for late July control deliveries. (Deliveries of new controls from production and from overhaul are being limited by the calibration and acceptance test cycle at [redacted] and therefore are pacing new production and overhaul engine deliveries.) 25X1A

Twenty six of the thirty engines scheduled for delivery by 30 June have been delivered. Pacing factors have been main fuel control deliveries and oil consumption corrective actions required to pass final engine acceptance test.

F. Agreement on a new fuel specification involving improved vapor pressure and freeze point was reached between Lockheed and Pratt & Whitney.

[redacted]



Approved For Release 2003/12/10 : CIA-RDP63-00313A000500100002-4

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VIII. General Carter closed the meeting with a re-emphasis of the maximum urgency involved.

IX. A limited session with top management of all contractors and Headquarters was called to discuss extraordinary actions for accelerating the flight test program. The following took place: 25X1A

A. Implementation of earlier Monday shuttle [redacted]

B. Earlier daily scheduling of all flights to reduce limitation of consistent afternoon weather degradation.

25X1A 25X1A

C. Pressure was applied to Mr. Johnson to substantially increase his personal responsibilities and time in directing flight test operations [redacted]

[redacted]

D. Mr. Johnson resisted suggestions involving increasing his personnel or changing shift schedules, to increase productive output in order for faster aircraft turnaround.

(Action subsequent to this meeting involves Mr. Perangosky's planned 25X1A extended visit to [redacted], Assistant Chief Engineer, Pratt & Whitney, will also make an extended visit to [redacted] in the near future.)

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25X1A [redacted]

Development Division
(Special Activities)

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Development Division
(Special Activities)

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[redacted] DD/OSA: mvp (8 July 63)

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