File 8 MGA

(U)(Gp-4) TEST REPORT

XB-70A

FLIGHT 1-2

(No. 1 Air Vehicle, No. 2 Flight)

5 October 1964

PREPARED BY

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XB-70 JOINT TEST FORCE (FTTB)
DEPUTY FOR SYSTEMS TEST
AIR FORCE FLIGHT TEST CENTER
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TABLE OF CONTENTS

		Page No.
I.	SUMMARY	1
II.	TEST LOG	2
III.	INSTRUMENTATION	9
IV.	DATA	11
V.	ENGINEERING COMMENTS	12
	1. Utility No. 1 Hydraulic System Failure	12
	2. Refueling Receptacle Failure	12
	3. Drag Chute	12
	4. Fuel Pumps	13
	5. Flaps	13
	6. Radio	13
	7. Paint	14
	8. Primary Pitch Trim	14
VI.	OBSERVATIONS AND COMMENTS BY THE COPILOT	15
	1. Pre-Flight Inspection and Engine Start	15
	2. Taxi	15
	3. The Delay	16
	4. Takeoff and Climb	17
	5. Level Off	17
	6. Gear and Flap Retraction	18
	7. Flutter Data	18
	8. The Emergency and Letdown	19
	9. The Landing	19
	10. Systems Operation	20
	a. Fuel System	20
	b. Hydraulics	21
	11. Cockpit Feel	22
	12. Cockpit Visibility	22
	13. Pilot Squawks	22
	14. Opinions and Conclusions	22
VII.	RECOMMENDATIONS	26

I. SUMMARY:

1. (U) The second flight of XB-70A No. 1 (Flight 1-2), conducted from 1617 to 1712 hours on 5 Oct 64, followed a 13 day lay-up for repair of landing gear bogie damage received during the first flight landing. Engine start was initially scheduled for 0630, but was delayed at approximately 0530 hours when the single point refueling receptacle poppet valve broke and had to be replaced. Engine start began at 1434 and was completed without delay. Taxi to the east end of the main Edwards AFB runway began at 1510. An 84 KIAS taxi run was made to the center taxiway for brake burn-in and chatter checks. The airplane was then taxied from the runway, following taxiways, to the west end of the runway (Runway 04) at 1536.

2. (C) Following a landing gear, tire, wheel, and brake inspection and about a twenty minute delay to replace a burned out landing gear position indicating bulb, a maximum afterburner thrust takeoff was accomplished. Lift-off speed was approximately 186 KIAS. Shortly after takeoff primary pitch trim was lost, but was recovered. This condition occurred several times during flight, but in each instance it was recovered. Power was reduced to military at 1621. Landing gear retraction was accomplished at 1633. Flaps were retracted at 1636. Airspeed and altitude were 250 KIAS and 12,000 feet.

3. (C) The airplane was then climbed to 16,000 feet altitude where flutter data were obtained at four speeds. A military power climb to 25,000 feet was accomplished and flutter data obtained at approximately 340 KIAS. While climbing near 28,000 feet, 350 KIAS and .87 Mach the utility No. 1 hydraulic system pump status indicators showed erratic system operation which was followed by loss of system pressure. The airplane was immediately decelerated to 260 knots where the landing gear was extended on an emergency system. The flaps were lowered and a descent to Edwards AFB accomplished.

4. (U) Landing was made on Rogers Dry Lake Runway 35 without incident; drag chutes were used, but only two of the main chutes developed properly. Roll-out continued for nearly five miles, since brakes were only lightly applied near the end of the roll.

5. (U) Following an inspection, the airplane was taxied to the runup area for shutdown. Shutdown was completed at 1740 hours. Total flight time was 55 minutes.

6. (U) The lake bed landing left the airplane dirty, but there was no damage or cut tires. During flight, a good deal of the white paint came off the forward fuselage, canard, verticals, and upper wing surfaces.

TEST LOG

FLIGHT NO. 1-2

5 OCT. 64

TAXI TEST PRIOR TO FLIGHT

1410 PILOT EXTERNAL & INTERNAL INSPECTION COMPLETE

1430 READY FOR ENGINE START
TOTAL FUEL 176,600#
EE BAY BELOW 60°F

1434 START #4 550° PEAK, EDV OK 2 GREENS
#2 COOL LOOP PUMP OK

1435½ START #3 600° PEAK EDV OK, 2 GREENS
#1 COOL LOOP PUMP OK

1436½ START #1 540° PEAK EDV OK, 2 GREENS

1438 START #2 690° PEAK EDV OK 2 GREENS

1439 START #6 650° " "

1440 START #5 550° " "

1441 No. 4 GEN ON EXT POWER OFF

1442 No 3 GEN ON - VOLTAGE CHECKS

1445 TIME HACK - C/N 3095

1448 P_1 205% 207 PSI P_2 202% 190 PSI
U_1 162% 190 PSI U_2 180% 180 PSI

1450 ADVANCE POWER EACH ENG. FOR HYD PUMP STAB CHECK
PUMPS VERY STEADY

1452 SUMP TANK 27,700 #2 TANK ON

1454 EMER. GEN ON OK, TO AUTO

1454 FLT. CONTROLS CHECKS -

1501 CLOSE COCKPIT DOOR (W/O GOING TO BYPASS ON GRND COOL)
AUX COOL & FANS ON

1502 STEERING CKS, BRAKES AUTO & NORM

1505 TIME HACK C/N 3596

1510 READY TO TAXI WIND 360°-020°/ 2-4 KT 94°F
A/C READS 92°F

1510½ TAXI OUT - LEFT TURN - A/C DOESN'T TURN AS WELL
WITH ADDED WT ON NOSE GEAR, FLAPS ARE DOWN.

1512½ #2 & 4 ADS VIB 20% ALL OTHERS LESS

1514½ 165,000# TOTAL #2 TANK 20,100#

FLIGHT NO. 1-2 CONT'D

1517 LINE UP ON RUNWAY 22. STOP FOR COCKPIT CHECK.

1518½ POWER ADVANCED TANK NO. 2 OFF.
TANK 3 28,900 NO. 4 ON

1519½ BRAKE RELEASE MAX 80 KTS. BRAKES & HYD. OK
BRAKING NOT AS GOOD AS PREVIOUS, SOME SMOKE
FROM RIGHT REAR BRAKE

1521½ RT TURN TO CENTER TAXIWAY

1522½ STOP FOR GEAR INSP. HOLDING LEFT BRAKE ONLY
RT BRAKE STILL SMOKING - EVIDENCE OF HYD FLUID ON
BRAKE - LITTLE HEAT

1527 ROLLING

1529 TURN ONTO PARKING RAMP

1530 TANK NO. 1 4300 + ON, FIRE DET TEST OK 3 TIMES SINCE PREFL

1532. LEFT TURN ON TO DIAGONAL TXWAY, EE 68-70°F.

1535 NO. 3 ABOVE LEVEL, NO. 1 WON'T COME ON, NO. 6 ON
PULLING ONTO RUNWAY.

1536 LINE UP ON RUNWAY, CHATTER ON STOP, RH BRAKE
STILL SMOKES A LITTLE.

FLIGHT NO. 1-2 CONT'D

5 OCT 64

1536 FLIGHT 1-2 IS CONTINUATION OF TAXI TEST
A/C LINED UP ON RUNWAY - WIND CALM
COPILOT TO EE BAY TO CK HYD LEVELS
TANKS 2, 4 & 6 AUTO

1537 RESET INSTR. DATA TRIM SHOT ON 20 OFF 30

1538½ FLUTTER PULSE

1540

U_1	169 %	177 PSI
U_2	203 %	173
P_1	203	210
P_2	200	205

1550 TANK 6L 35,650 AND FEEDING
6R 36,650 & HAS NOT INDICATED FEEDING.
6R WILL NOT TEST BELOW THIS LEVEL. COPILOT TO EE BAY TO CHECK 6R MODULE & CB.

1550 GREEN LIGHT IN LEFT GEAR INDICATOR WILL NOT TEST. BULB BURNED OUT. NO SPARES

1558 COPILOT RESET CB ON 6R MODULE INDICATION NOW 34,800# WORKING NOW.

1602 BULB FROM BUZZ CAUTION TRIED & TOO SMALL - IN HOLE BUT CAN'T HOLD IN - BULB LIGHTS OK.

1607 FOUND BULB IN CADS TEST BEHIND CAPSULE

1608½

U_2	203 %	172 PSI
U_1	175 %	172
P_2	202	210
P_1	203	210

1610 WINDS 270°/4 KT

1615½ ADVANCE POWER DATA ON CAM 2345

BRAKE REL. BASE
START ROTATION @ 170 KT ROTATE @ 176 KT
TAKE OFF 186 KT @ 6000 FT 254 KT

1618

#1	900° EGT	87 % NOZ POS.
2	870	84
3	900	82
4	905	85
5	870	-
6	880	84

FLIGHT NO 1-2 CONT'D

1618 LOST PRIMARY PITCH TRIM, DATA OFF C/N 2484

1619 NO 5 ENG 101% RPM ALL NOZ 81-84%
EE TEMP 98° NH_3 300 REFER ON, INTERV. TO 15 SEC.

1621 POWER TO MIL C/N 2618 CONT. @ C/N 2623
T/A 50° DATA OFF C/N 2637. 248 KT @ 11,960 FT.

CYCLED ALT ARM OFF & ARMED - PITCH TRIM NOW OK

1622 HOLDING 12,000' 250 KT FLAP IND BARBER POLE
INTERV. TO 60 SEC, CABIN ALT 8000 FT.

1624 AUX COOL OFF EE 98°
COPILOT TO EE BAY FOR HYD QUANT CHECK

1626

P_1	203%	210 PSI
P_2	203	208
U_1	186	168
U_2	203	169

AIRSPEED CHECK T-38 CHASE = 240 KT
B-70 250 KT @ 12,380 FT.

1629 CIRCUIT BREAKERS CHECKED OK - COPILOT TO COCKPIT.

1633 DATA ON C/N 3370 GEAR UP SELECTED
GOOD RETRACTION - NOSE UP FIRST THEN MAINS
INDICATES UP & LOCKED DATA OFF C/N 3430

1635 LEFT TURN - CHECK PRIMARY TRIM - OK

1636 DATA ON C/N 3532 FLAPS UP 255 KTS MASTER CAUTION
ON - RT FLAP LIGHT THEN LEFT THEN BOTH OUT.
DATA OFF C/N 3573.

1638 LOST RADIO TRANSMISSION FOR A SHORT TIME - TO VHF #1
SQUAWK IFF MODE 3 CODE 76
TOTAL FUEL 109,000# CLIMB TO 16,000 FT

1639 6L 10,900# 6R 10,500 - HAVE SLOWED DOWN

1640 C/N 3792 267 KT TRIM SHOT PULSE & LAT. PULSE.
C/N 3825 OFF 15820 FT, CLOUDS @ 16,000 FT MOD. TURB.

1641 6R 12,300# 6L 9,200# L TURN TOWARD HARPER LAKE

1643½ 286 KT .618 M C/N 3979 PITCH PULSE, ROLL PULSE
C/N 3996 OFF 16,000 FT

1644 NO. 3 TANK HOLDING AT 32,200#

1644½ C/N 4047 TRIM PITCH PULSE ROLL PULSE, LA INDICATES -4½°
.66 M, 326 KTS 16360 FT C/N 4072 OFF

FLIGHT NO. 1-2 CONT'D

1645½ TANK 6L 5600, 6R 8900

1646 C/N 4120 PITCH - ROLL 343KT 16,620 FT, .695M
LA INDICATES -4½°, C/N 4141 OFF; WING TIPS ARE STEADY
ABOVE .63 - .64M. TOTAL 100,000#

1647 TURN NORTH & MIL PWR CLIMB TO 25,000 FT. TOTAL 99,000#

1648 25-30° LEFT BANK 340 KTS, 22,100, HDG 280, CABIN 8-8500 FT
HIGHEST VIB #3 ENG 30%. TANK 6R 6900# 6L 3000#
TANK 3 32,300#

1649 ALL SYSTEMS LOOK GOOD

1651 C/N 4430 TRIM PITCH PULSE, ROLL 342 KT 25,090 FT
LA INDICATES 9½ TO +5, HEADED TO ISABELLA C/N 4457 OFF.

1652 TANK 6L 2700# 6R 1900# 4 - 27,500 (OSCILLATING)

1653 ISABELLA AHEAD 27,200 FT 347 KT .855M

1653 STATUS IND. #2 UTIL PUMP YELLOW, THEN #3 THEN #1
LOSING U#1 SYSTEM

1653½ DATA ON CONTINUOUS, LOWER GEAR HANDLE. GEAR
DOORS OPENED BUT CYCLE WAS NOT COMPLETED UNTIL
ELECT. EMER SWITCH SELECTED DOWN (EXACT TIME NOT KNOWN)

1654½ 260 KTS ALL DOORS OPEN, RT MAIN COMING DOWN. LEFT
MAIN STILL UP, NOSE 45°. ALL MOVING SLOWLY DOWN.

1656 ALL U, PUMP STATUS LIGHTS YELLOW U1 600 PSI.
U2 4000 PSI. TANK 6R 1400# 6L 2300#
TANK #6 OFF EMER CK LIST - PREPARE TO LAND

1658 WIND 300°/ 2KT. PLAN - LAND ON LAKE BED EAFS
NO. 3 TANK 29,400# TOT 86,000#

1659 C/N 4903 FLAPS DOWN C/N 4938 OFF

1703 ABEAM MOJAVE HEADING S. 7,500 FT

1706 TOTAL 80,600#

#4	27,500
#3	26,900
2	10,500
1	5,200
6L	2,200
6R	1,800
7L	0
7R	600
8L	1,000
8R	1,000

FLIGHT NO. 1-2 CONT'D

1707½ AUX COOL ON NH_3 300# WIND CALM
CHASE #1 228 KT CHASE #2 230 KT B-70 238 KT.

1708 TANK #4 ON U_1 = 100 PSI BRAKES IN AUTO, STEER-TO-LAND

1709 REFER OFF COPILOT TO EE BAY - SELECT MAN #2 GEAR POS.

1711 EMER GEN OFF No. 3 & 4 GENS - OK.

1711½ LAND - LAKE BED RNWY 35
CHUTE DEPLOYED 175 KTS JETTISONED 74 KT.

1720 GROUND INSPECTION - DECIDE TO TAXI IN - COPILOT TO
EE BAY FOR TAXI U_2 115% 175 PSI U_1 0-5% 42 PSI
P_1 203% 192 PSI P_2 200% 198 PSI
U_2 OSCILLATES 90-115% DURING TAXI IN.
TAXI IN @ 15-25 MPH

1726 TURN LEFT TO RUNWAY

1730 TURN TO TAXIWAY

1735 RT TURN TO RUN PAD SOME BRAKE CHATTER &
PITOT BOUNCE 3-4".

1737 No. 6 ENG SHUTDOWN
No. 1 " " FUEL TOT 66,500
No. 2 " " RADIOS OFF

1738 No. 3 " "
No. 5 FANS & AUX COOL OFF

1740 No. 4 " "

FUEL QUANTITY DATA
XB-70A 62-001

TEST FLIGHT 2 DATE 5 OCT '64

TIME	1420	1445	1500	1525	1548	1605
C/N		32375	—			
Xfer		NONE	2 ON	4 ON	6,42	6,42
Cond	PRIOR	All 6	PRIOR	CENTER	auto	auto
	STOP	RUNNING	TAXI	TAXIWAY		
1	2575	3200	3650	4300	4700	4800
2	29550	29550	25500	19100	19075	19000
3	32400	24000	25800	32800	32600	32500
4	35350	35375	35350	28200	27050	27100
6L	38200	38200	38250	38200	35800	33300
6R	36700	36675	36700	36700	36650	34050
7L	-400	-350	-300	-300	-250	-200
7R	+100	+125	175	200	350	450
8L	+775	+600	650	800	850	900
8R	+200	+150	175	200	200	100
Tot	177500	170000	170000	161250	158500	151500
LN_2	3/4	3/4-	23/32	23/32		
OAT	85	96	92	93 1/2		
NH_3	515	515	515	445		
H_2O	4200	4200	4200	4150		
LOX	17	17-	17-	16+		
		1452	1519	1527		
		#3	#2	#4		
		27700	OFF	OFF		
		TANK	#4	27000		
		2 TO	ON			
		ON.		1530		
				TANK		
				1 ON		
				NO TSKA		
				JUMP 1/1		
				OFF 1535		

FUEL QUANTITY DATA
XB-70A 62-001

TEST FLT V DATE

TIME	1738					
C/N						
Xfer						
Cond						
1	6350					
2	5175					
3	23350					
4	21000					
6L	1650					
6R	1300					
7L	0					
7R	750					
8L	1400					
8R	1000					
Tot	[illegible]					
LN_2	13/16					
OAT	94					
NH_3	210					
H_2O	3700					
LOX	15					

III. (U) INSTRUMENTATION:

1. Results of this flight indicate the air vehicle instrumentation system functioned extremely well as there were no major failures in either the analog or digital recording systems. Approximately 18 minutes of data was recorded during the period from engine start to touchdown. During post-flight activities digital recorder "B" failed to accept the transfer command and would not operate. This may have caused a potential loss of data had the recording time exceeded 24 minutes. This recorder has been replaced and the transfer from "A" to "B" recorder now occurs normally. The old recorder has been sent to Inglewood for service, however, the exact cause of failure has not as yet been determined.

2. From the 18 minutes of data acquired, North American Aviation (NAA), Inglewood has processed some 300 parameters with excellent results. Only a few isolated parameter failures have been noted. Some of these parameters, after careful analysis by NAA Instrumentation Engineers, did not actually fail. Apparent failure was caused by programming techniques used for these particular parameters. This too has been corrected with excellent results.

3. Again during this flight a 0.5° right angle of sideslip was recorded by both the analog and digital recording system as well as noted on the cockpit sideslip indicator during stable portions of the flight. NAA instrumentation engineers have carefully evaluated flight data and now feel that the nose boom alignment is possibly off center by this amount. This will be verified in the near future. Also during flight it was noted that the cockpit angle of attack indicators became erratic and evidenced hunting. Post-flight inspection revealed that the self-balancing potentiometer driving these indicators was faulty. The trouble has been corrected, however, it should be noted this malfunction had no effect on data recorded by the instrumentation system. Examination of this data parameter shows it to be good from takeoff through touchdown.

4. Air vehicle elapsed time data was good all the way. The time code generator was reset to zero time at approximately 1505 hours. Examination of air vehicle time and parset time, as recorded during flight, shows that real time correlation can be achieved by adding 15 hours, 17 minutes and 7 seconds to air vehicle time.

5. Quick Look digital oscillograph records provided by the Edwards Digital Data Processing Branch (FTTSD) still exhibit poor quality; however, they are still usable. The major deficiency in realizing the full benefit from the Quick Look records is in obtaining, from NAA, the "correct" scaling information by which to determine parameter values in engineering units. This, of course, is not an insurmountable problem and will be overcome with time. In reference to the quality of Edwards digital or PCM oscillograph records, the random addition of unwanted bits to the data words occur throughout the length of the record. This is true whether the oscillograph records are made from the air vehicle master tape or

from an FTTSD dub of this master tape. In an effort to isolate the problem area, arrangements were made to take the digital dub tape from Flight 1-2 to NAA for playback through the NAA Data Processing Station. The results are as follows:

a. The air vehicle master tape was first played back through the station and the data printed out looked very good. There was no evidence of random bits added to the data.

b. Next, the FTTSD dub of the air vehicle master tape was played back through the station and the random addition of various bits to the data was quite obvious.

c. As noted in the Flight 1-1 report (Par. III, 1), the Data Systems Division is making every possible effort to determine the source of the problem and implement corrective action.

6. Two of the four Supersonic Transport (SST) cameras functioned properly this flight. Both the vertical and nose gear cameras were OK. Film jammed in both main gear cameras and as a result yielded no photographic data.

IV. DATA: (U)

1. Landing:

a. Information regarding the Lakebed Runway 35 landing is tabulated below:

Distance	Remarks
0	Left main touchdown. Black tire marks on surface for 113 feet.
83 feet	Right main touchdown then lifts off and touches again. Black tire marks on second touchdown approximately 100 feet long. Lake hard - no ruts.
0.6 mile	Nose wheel touchdown. Black tire marks for 105 feet. Main wheel ruts about one-half inch deep. Location: Near intersection with Runway 07-25.
1.3 miles	Recovery of drag chute bags.
3.1 miles	Recovery of drag chute. One chute torn.
4.8 miles	Stop for inspection. Main wheel ruts approximately 7/8 to one inch deep - nose 3/4.
5.5 miles	Deepest ruts noted.
	Left Main - 1-3/8 inch
	Right Main - 1-1/2 inch
	Nose - 1-1/4 inch

b. Mileage figures were recorded by Joint Test Force (JTF) personnel immediately following the landing. Total ground roll from touchdown to stop at the engine runpad was approximately 8 miles.

V. ENGINEERING COMMENTS:

1. (U) Utility No. 1 Hydraulic System Failure:

a. Loss of fluid in flight from the No. 1 utility hydraulic system was a result of a crack in the furnace brazed fitting at the fuel transfer pump hydraulic motor manifold in lower left No. 6 tank. It was also found that a line block and bracket had not been installed, leaving approximately two and one-half feet of line leading to the pump unsupported. Inspection revealed that the line block and bracket are installed in lower right tank No. 6.

b. The engines driving Utility No. 1 system pumps were operated approximately 45 minutes after indication of loss of system pressure. Post-flight inspection showed that pump numbers 1 and 3 drive shafts sheared; No. 2 pump was not free to turn, but had not yet sheared the shaft. Pumps were replaced and the system flushed of contamination.

c. Normal landing gear extension was attempted with Utility No. 1 hydraulic system. Residual pressure in the system apparently started the extension cycle when the copilot put the gear handle to down. The gear doors opened and the gear was slowly extending when the electrical emergency extension system was selected. The cycle was completed, without incident, using the electrical emergency extension system. Electrical emergency uses Utility No. 2 system hydraulic pressure.

2. (U) Refueling Receptacle Failure:

a. After refueling the aircraft for this flight and when disconnecting the refueling nozzle, fuel gushed from the single point refueling receptacle. The aircraft was partially defueled and the receptacle removed. The three legs of the poppet retaining spider were failed and the spider, poppet and spring were lost in the fuel transfer lines. This receptacle, Parker Aircraft Corporation Part No. F61F0067, is mechanically the same as other Air Force equipment (Mil Spec M524484-2), but was modified with a high temperature seal for the B-70 application. A modified design is under consideration.

b. We understand that attempts to locate these parts will be made during Phase II proof loading layup. Although it does not seem a sanitary condition, we feel that planned checks to determine that the level control valves are properly closing after refueling should suffice for the next two flights.

3. (U) Drag Chute:

a. The copilot reported deploying the drag chute at touchdown and that it blossomed after nose wheel touchdown. This was verified from photo coverage. Only two of the main chutes blossomed. Initially the left chute was in a high position and the right chute was low. Shortly

after blossoming they leveled and the third chute remained low in the center not blossomed. This condition was similar to the first flight landing except that on the first landing the third chute eventually blossomed.

b. The release trajectory and clearance of the chute attaching trunion fitting cannot be determined from available film coverage, but it appeared that the trunion followed a near horizontal path to beyond the aft end of the aircraft.

4. (U) Fuel Pumps:

This flight was made with the No. 6 upper right fuel tank fuel transfer pump inoperative. When removed it was found that the hydraulic motor would not turn. During replacement of this pump it was found that mounting bolts for the upper inboard and outboard pumps were loose. Inspection of all pumps in tanks 6 left and right revealed several more bolts loose or completely out. A borescope inspection of one pump in tank No. 4 indicated that its mount bolts were tight. Where helicoils could be inspected with the pump removed, it was found that helicoils from which bolts had backed out were not the self-locking type. All bolts for tank No. 6 pumps have since been safety wired. One bolt in one pump in tank No. 7 was loose. All bolts in this tank have been safetied. Tank No. 8 was inspected through small access holes in the upper wing surface. Three bolts were loose, but only one in any single pump. These bolts were tightened, but could not be safetied because of inaccessibility. Inspection of tank No. 2 pump mounts revealed no loose bolts, but as a precautionary measure, the bolts were safetied.

5. Flaps:

a. (U) Flap Press Light:

Differential hydraulic system pressure sensing caused momentary Flap Pressure Caution Lights during flap movement. This condition is considered normal.

b. (U) Flap Position Indicator:

Continuous barberpole indication with the flaps down and the flaps selected down is an indicating system fault. The switches providing inputs to this indicator will be readjusted in an attempt to account for dynamic airframe loads. The indicator response will be evaluated during the next flight.

6. (U) Radio:

The initial radio transmission loss was caused by an electrical power interruption caused by selection of the emergency generator following the in-transit flap condition. A second radio transmission loss occurred during final approach when electrical power was switched from emergency back to normal. Electrical power discontinuities cause an

approximate 60 second drop-out in radio transmission from the ARC-50 UHF transmitter.

7. (U) Paint:

Aircraft metallic surfaces were covered with white high heat enamel No. 36W803 (formerly No. J63526), Rinshed-Mason Company, Anaheim, California, which peeled excessively during this flight after about 30 minutes of flight. Poor adhesive bonding of the enamel to the metal surfaces was the apparent cause of peeling. At some points around the peeled areas, the remaining enamel is presently not adhering to the skin, but is attached only cohesively. The enamel adhered to some surface panels better than others and this is partially attributed to varied degrees of aircraft skin surface preparation. A contributing factor that exaggerated the condition was the thickness of the paint film. Some film thickness measured as much as 10 mils instead of 1.2 to 2.2 mils as Process Specification LA 0108-027 prescribes. Enamel loss was greatest on some of the more flexible surface areas, indicating that in these areas, higher stresses were put on the enamel-metal bonds by vibration; however, no pertinent stress or air flow patterns can be discerned from enamel loss. Another possible factor of poor adhesion was introduced by additives to the enamel designed to change it from a gloss to a flat finish. The effects of these additives on the enamel bond and brittleness characteristics; and, in addition, the effect of low temperatures on the enamel are being investigated by North American Aviation Material and Process Laboratory in Los Angeles.

8. (U) Primary Pitch Trim:

On several occasions during this flight, primary pitch trim was lost but was regained without complication by turning off the standby pitch trim. The condition was investigated on the ground immediately after flight, but it could not be duplicated. Subsequently, all relays in the trim system that might contribute to the disengagement were replaced. One of the old relays tested bad (a short to the case) and could have caused disengagement. Several ground checks were made during pre-flight for Flight 1-3 and no further malfunction could be caused.

VI. OBSERVATIONS AND COMMENTS BY THE COPILOT:

1. (C) Pre-Flight Inspection and Engine Start:

At 1300 Mr. White (Al) initiated the cockpit checklist, Mr. Shepard (Van) started the EE bay inspection, and I started the external walkaround; fuel servicing was still under way at this time. By 1410, the inspections and refueling were complete, but hydraulic servicing was still in progress. Inspection of the inlet requires the pilot determine that the throat panels are wide open by checking their alignment with a black line on the floor of the inlet. This line is not present on 001. I was assured by Joe Casagrande that the panels were fixed in the full open position. At 1430, ready for engine start; fuel total was 176,000 lbs. Engine start was initiated at 1434 and was complete in 7 minutes. The start sequence and corresponding EGT's were as follows: 4 - 550°, 3 - 600°, 1 - 540°, 2 - 690°, 6 - 650° and 5 - 550°. Hydraulic pump status was normal. From 1450 to 1453 engine power was increased to 100% to check hydraulic pump stability with telemetry. Pump status indicators remained green and system pressures were very steady. At 1452, No. 3 tank fuel level was 27,700 lbs., and No. 2 tank was turned on. I completed a test full and empty of the fuel strips and discovered 6R would not drive empty. Al completed a check of the alternate throttle controls. At 1501, AUX COOL and FANS were turned on and the entry door was closed before Al called for it. I do not expect the door to be damaged by closing it with internal pressure on but I do fear someone will be injured since the door really slams closed. I depressed the crew air shutoff handle approximately 3/4 of an inch to sample the air and both Al and I were of the opinion that we were feeling cool air and not just a high flow of warm air coming from the outlet. The EE temperature was 66°. Time 1505, C/N was 3596. In the past 40 minutes, tank No. 1 had increased 1125 lbs. We both set 29.92 -- I noted Al's altimeter reading 2280 feet and my altimeter was 2260 feet. At 1510, we were ready to taxi, tower reported wind 360° to 020° at 2 to 4 knots, altimeter setting 30.02 and temperature 94° F. XB-70 indicated OAT (on total temp indicator) was 92° F. Al observed that his digital tape remaining indicator was 80%. We had not yet taken any data records.

2. (U) Taxi:

At 1510½, we started to taxi, steering was selected TAXI, ENGAGED and brakes were AUTO. Coming out of the runpad and turning left Al commented that it didn't turn too well. I could not feel any brake chatter in the turn. Proceeding to the runway I observed that all engine and ADS vibration levels were very low, the highest being No. 2 and No. 4 ADS which were both 20%. I had to repeat several voice transmissions to Max Wells in Building 3940 because of a cross-talk interference he was receiving when we transmitted. This cross-talk blocked out his reception of B-70 transmissions but did not affect our reception in the air vehicle. Mobilcom and a radio car following us reported they were not affected. Time 1517, we were lined up on runway 22, had completed cockpit checks and were ready for a taxi run. Edwards tower forwarded a turbulence

report from a C-141 stating there was light turbulence up to 20,000 feet, and later reported light turbulence over Mojave from 20,000 to 35,000 feet. With steering in TAKEOFF and LAND, time 1519, we started a taxi run to 84 KIAS and turned right on to the center taxiway. The chase helicopter reported some smoke coming from the left gear and Al commented that the brakes were not holding quite like he wanted them to. The radio car reported light smoke from the right gear but no cause for stopping on the runway. We held on the center taxiway while Mel Beach inspected the wheels, brakes, and tires. He reported some smoke coming from the new right aft brake, probably a little left-over fluid, but it did not show cause for concern. Time 1527, we continued taxiing north on the center taxiway and made a left turn on the ramp to the takeoff position. Up to this time I had checked the engine and ADS fire warning lights three times and they had been satisfactory. Time 1536, we were aligned with runway 04 and fuel tank switches 6, 4 and 2 were in automatic. Time 1537, Al reset instrumentation, took a data trim shot at C/N 20 and completed a flutter pulse. Mel Beach reinspected the gear, found no fluid leaks and reported all OK. Time 1540, I went to the EE bay to observe and record hydraulic fluid levels and head pressures. This was required because the cockpit hydraulic fluid level indicators were inoperative for this flight. I also checked all circuit breakers and they were in. The one light in the EE bay is located over the hydraulic panel. The fuel module and circuit breaker panels are dark and require a flashlight for inspection. Flood lights for these areas would be a valuable asset. The compartment door is particularly stubborn and difficult to open when coming from the EE bay to the forward cockpit --- it's a three-handed operation. Mel Beach recorded the elevons were even and 4 to 5 degrees or 8 to 10 inches trailing edge down. Al retrimmed to a 4 inch trailing edge down position. At 1548, I had returned from the EE bay and was strapped in.

3. (C) <u>The Delay:</u>

Time 1549, the LN_2 level was 11/16. At 1550, the checklist was completed and takeoff data reviewed --- rotate and refusal speed was 165 KIAS. I left the ground intercom switch on during flight so it would be hot and ready for my use in the EE bay. I noted tank 6L was reducing but 6R digital held at 36,650 lbs., and would not test empty. I went to the EE bay and found the 6R module circuit breaker switch in the off position. I believe it was 8L which was also off --- I turned them both on. With this the 6R digital indicator started reducing. Van had turned them all on, except 5, during his pre-flight. Time 1552, the green light for the right main gear had gone out and would not test. We did not see when it actually went out --- the red light in the handle was not on. Al's spare bulb holder did not contain the required G.E. 316 bulb and I had no luck finding one in the EE bay. Later, enroute to open the outside entrance door, I found a suitable bulb in the CADS test panel light which is located aft of the pilot's capsule. I found the bulb just as the high reach vehicle approached to give us many bulbs and tools and Al's comment at this point was, "All I can say is what a way to make a living." At 1602, I was back in the seat after having another struggle

with the EE bay door. Ammonia quantity was 340 lbs., at 1605. Between 1606 and 1610 we sorted out the gear indicator light trouble and I went to the EE bay for a final check on the hydraulic levels and head pressures (See Hydraulics in this Section). Max Wells reported we were looking very good on the TV monitor in Building 3940 but Al's reply was that we'd look lots better in the air. Tower reported the winds 270° at 4 knots and one of the chase troops chimed in "plus or minus 2 knots." At 1611, Al gave chase a 4 minute warning to take off.

4. (C) Takeoff and Climb:

At 1612, Al alerted SPORT 44, fuel totalizer was 151,000 lbs. At 1614, the tower reported winds at 320° and 6 knots, and as Al came up on power I turned the REFER and data on at C/N 2345. At 1616:35, with Mil power set, Al released brakes, we rolled and he slowly advanced power to Max afterburner. Nozzles opened from 60% to 80%, EGT's were OK and all rpms were 100% except No. 5 which was 101%. I estimated rotation started at 170 KIAS, nose up angle was fixed at 176 KIAS and we were off at 186 KIAS. Al asked me to take the throttles, since he was using both hands to control the pitching motion. One minute from brake release the fuel was 136,500. The cockpit motion was predominately in pitch where as on takeoff from Palmdale it was mostly directional. The turbulence and resultant rough ride gave us some good jolts, sharp edge movements, which I would estimate to one but not over one and one-half cps for a total of just over 1G peak-to-peak. It was more of an interesting and humorous ride --- certainly not frightening. What surprised me was that the directional movement which we had on first flight was not apparent --- maybe it was there but was overshadowed by the up and down type ride. Initial climb was 221 KIAS. When airborne about one minute the EGT's were 900°, 870°, 900°, 905°, 870° and 880°. Nozzles were 82, 84, 82, 85, 86 and 84. Chase reported gear and tires looked good. Al reported loss of primary pitch trim. Data was turned off continuous mode at C/N 2484, 4,400 feet at one minute and 55 seconds after brake release. Max suggested, and Al confirmed, he'd cycled the pitch trim switch twice without any luck. With pitch trim out and in turbulent air, he wanted both hands on the wheel. At 6,000 feet we indicated 254 KIAS and A8s were 81 to 84%. At 8,000 feet chase was 250 KIAS, our data was on 15 second interval, EE temperature 48° and ammonia 300 lbs. At C/N 2623, time 1620, I turned data on continuous before Al reduced power to 50° T/A. Data off 2637. Time 1621, C/N 2698, 248 KIAS, 11,960 feet. Al cycled alternate arm switch off and on and got pitch trim back OK. Chase 2, Don Sorlie in a T-38, reported fluid coming out of the forward portion of the right wing fold hinge. Fitz Fulton and Van Shepard, on our left in the TB-58, stated they thought it was vapor not fluid. Neither chase could see any leaks on top of the wing and concluded it was condensation, a vortex which formed just outboard of the wing fold bullet.

5. (C) Level Off:

Time 1622 to 1624, 12,000 feet, 250 KIAS, west of the lakebed. Flap indicator was barber pole, flaps visually checked down, and rapping

the panel did not change the indicator. Cabin pressure was 8,000 feet indicated. Intervalometer was changed from 15 to 60 seconds. AUX COOL was turned off with EE temperature of 48°. All vibration levels were low. 6R 19,000, 6L 17,200 and sump tape near high level. At 1625 I went to the EE bay to check hydraulic fluid levels and head pressures. Al commented on the fact there was quite a bit of pitch oscillation in turbulence after takeoff --- more so than on first flight. At 1626, chase No. 2 reported 240 KIAS and 12,200 feet and XB-70 read 250 KIAS 12,380 feet. I recorded fluid levels and head pressures (See Hydraulics Section), checked circuit breakers in, and returned to my seat at 1632.

6. (C) Gear and Flap Retraction:

Data continuous C/N 3370, time 1633:10, gear handle up 1633:30, red light came on in the handle and three green lights stayed on; the three green lights went out. Van reported the following: Doors opening, mains folding and rotating, gear coming up and looks good, nose gear coming up and locked, both mains going in the wheel wells and now clean at 1634:05. Red light in the handle went out when Van called gears in the well. A 35 second retraction by my time. Data off C/N 3430 at time 1634:30. Al checked primary trim was working OK before flap retraction. Time 1636, C/N 3532, data on at 255 KIAS, flap lever was placed up and during retraction the master caution light came on and was soon followed by the right then left flap pressure caution lights. Primary pressures were OK and soon both flap pressure lights went out. Data off C/N 3573. The emergency generator was in AUTO, not ON. Al turned it ON and we lost our UHF transmitter for one and one-half minutes. We continued to receive OK so I changed the IFF to squawk mode 3, code 76 to alert RAPCON to our radio difficulty.

7. (C) Flutter Data:

Time 1640:20, C/N 3792, 267 KIAS, 15,820 feet in a very slight climb, Al gave a pitch and roll pulse and data off C/N 3825. We were just barely beneath clouds at 16,000 feet and there was continuous light or moderate turbulence. Time 1642, 272 KIAS, T/A 36°, 98%, 700 to 840° EGT and A8s were 43 to 52%. Time 1643:30, C/N 3979, .618 Mach, 286 KIAS, at 16,000 feet, another pitch and roll pulse and data off C/N 3996. Time 1644:30, C/N 4047, .66 Mach, 326 KIAS, 16,360 feet, pitch and roll pulse and data off C/N 4072. I watched my tape angle of attack and it fluctuated from +5° to -4½°, leaving me with the impression it was erratic or there was lots of boom or vane movement. Time 1646, C/N 4120, 343 KIAS, 16,620 feet, .695 Mach, pitch and roll pulses and data off C/N 4141. My tape angle of attack was again reading -4½°. Time 1646:30 fuel total was 100,000 lbs., and at 1647 fuel was 99,000 lbs., total. Increased to Mil power, started a climbing left turn near Harpers Dry Lake to head for Lake Isabella. Van reported wing tips looked real steady over .63 or .64 Mach. Time 1648, we were in a 25 to 30° climbing left turn, cabin altitude 8,000 to 8,500, 340 KIAS, 22,100 feet on heading 280°. Highest indicated vibration was on engine No. 3 at 30%. All systems looked good. Time 1651, data on C/N 4430, 342 KIAS, 25,040 feet, my angle of attack was oscillating between -4½° and +5°, as Al

completed a pitch and roll pulse. Data off C/N 4457 as we continued toward Lake Isabella. There was some haze and a few clouds below and with the big black nose in the way I've yet to see Lake Isabella. At 25,000 feet and .8 Mach the forward visibility in the clean configuration is not better than fair and I tend to classify it poor until I get another look --- this look was mighty short as data taking, system monitoring and the soon to come emergency didn't allow me much time for looking outside.

8. (C) The Emergency and Letdown:

Time 1653, Lake Isabella was ahead, 27,200 feet, 347 KIAS and .855 Mach. At about 1655, cabin 8,500 feet, engine No. 2 utility status light came on momentarily and went out, No. 3 followed quickly, then engine No. 1 and No. 2 again. In less than 10 seconds engines Nos. 1, 2, and 3 utility pump status indicators were on and Al announced we were losing the utility No. 1 system. Max at Data Control came in immediately with "Gear down as soon as possible." We advanced engines Nos. 4, 5, and 6 to 99%, data on continuous and at 260 KIAS I put the gear handle down. Van reported doors opening, nose gear coming out first, followed by the right gear but the left remained up. I put the electrical emergency switch down, the nose gear went down, followed by the right gear and finally the left gear went into lock. From loss of U_1 to gear extended was 1 minute, 45 seconds. From handle down to gear down and locked was 55 seconds. Cockpit indications were three green gear lights and no red in the handle. Utility No. 1 pressure was 600 psi. The emergency procedure was reviewed as we started descent. Al announced our intention to land on the lakebed. Wind was 300° at 2 knots. Data on at C/N 4903, time 1659, and flaps were extended. Data off 4938. Al announced his desire to land on south lakebed runway 35 as we again reviewed the emergency procedure step-by-step. U_1 pressure dropped to 200 psi as we descended. Gear handle and electrical emergency switch were both down.

9. (C) The Landing:

The south lakebed runway was checked visually by car and the gear rechecked down by chase. Fuel total was 80,500 lbs., and I turned AUX COOL on. At 1703, we were heading 180° south of Mojave at 7,500 feet. General Branch reported wind was essentially calm on the south lakebed. Approach speed 197 KIAS, best flare 187 and minimum speed 170. Chase called he had 228 KIAS and XB-70 238 KIAS. Fitz announced we needed a new paint job --- we didn't understand at the time. Checklist was completed and I turned the REFER OFF as we turned on the base leg. On base leg, chase called 225 KIAS. I scurried to the EE bay, put the hydraulic manual handle to Utility No. 2 and was restrapped in the seat on final. Chase called height above the lakebed and Al greased it on the right side of long runway 35. Prior to touchdown, time 1710, I turned the SST gear cameras switch on and data on continuous. I deployed the chute at 175 KIAS and Al jettisoned it at 74 KIAS --- only two of the chutes fully developed. Data was turned off at C/N 5776 and time 1712. The wheels, tires and brakes were inspected and we were given clearance to taxi to the very distant runup pad. I remained in the EE bay monitoring U_2 fluid level while Al taxied in. We arrived at the runup pad at 1736, cut engines No. 6 and 1 at 1737 and cut the remaining engines at 1740:30.

10. Systems Operation:

a. (C) Fuel System:

Engines were started with all pump switches off and refueling valves in automatic. We used tank No. 3 to 27,700 lbs., by time 1452 when I turned No. 2 tank pump switch on. Prior to taxiing I recorded and reported that tank No. 1 had increased 1175 lbs., in 40 minutes. Totalizer was 170,000 lbs. Taxiing, at time 1514, No. 2 was 20,300 lbs., and the totalizer was 165,000 lbs. Time 1516, No. 2 was 19,600 lbs., and No. 3 29,000 lbs. At 1519 I turned No. 2 tank switch off at a tank level of 19,100 lbs., --- No. 3 was 28,400 and I turned No. 4 on. I turned No. 4 off at 1527 with a level of 27,000 lbs., and a totalizer of 160,000 lbs. At 1530, No. 1 level was 4,300 lbs., so I turned it's pump switch on. The sump was above low level so there was no transfer and I turned No. 1 off at 1535 --- level 4,500 lbs. At 1535 tank Nos. 6, 4 and 2 pump switches were placed in AUTO. Prior to takeoff 6R digital indicated no transfer and would not test empty. I went to the EE bay and found it's module circuit breaker off. It was turned on, along with 8L --- I believe, and at 1608 6L was 33,450 and 6R 34,100, indicating properly. Just prior to takeoff, time 1612, the following total and tank quantities were called to control: Totalizer 151,000, 1 - 4,800, 2 - 19,000, 3 - 32,500, 4 - 27,100, 6L - 31,750, 6R - 32,900, 7L minus 200, 7R - 450, 8L - 900, 8R - 700. At level off, time 1624, 6R was 19,000, 6L was 17,200 and the sump strip was maintaining high level. At approximately 1638 totalizer was 109,000 lbs.

Additional readings were recorded or called to control as follows:

Time	1640	6L - 10,900	6R - 10,500	
	1641	6L - 9,200	6R - 12,300	
	1645	6L - 5,600	6R - 8,900	
	1646	Totalizer 100,000 lbs		
	1647	Totalizer 99,000 lbs		
	1648	6L - 3,000	6R - 6,900	Sump 32,300
	1652	6L - 2,700	6R - 1,900	4 - 27,500 (oscillating)
	1657	6L - 2,300	6R - 1,400	(6 turned OFF now)
	1658	Sump 29,400	Totalizer 86,000	
	1705	Wide downwind to land on lakebed		
	1	5,200		
	2	10,500		
	3	29,600		
	4	27,500		
	6L	2,200		
	6R	1,800		
	7L	0		
	7R	600		
	8L	1,000		
	8R	1,000		
Added Total		79,400		
Totalizer		80,500		

Time 1707 No. 4 tank pump switch on

Time 1738 (Just prior to shutdown) Totalizer 66,500 lbs.

The fuel system performed satisfactorily after I reset the 6R tank module circuit breaker to ON prior to takeoff. It appeared that the minimum levels for tank 6L and 6R were 2,300 and 1,400 respectively. These high levels prevented tank No. 4 from feeding automatically.

b. (U) Hydraulics:

The cockpit fluid level indicators were inoperative for this flight. I obtained the following fluid level (FL) and head pressure (HP) readings from the EE bay indicators:

	SYSTEM							
	P_1		P_2		U_1		U_2	
Time and Condition	FL	HP	FL	HP	FL	HP	FL	HP
1448 Prior to taxi	205	207	202	190	162	190	180	180
1540 Prior to takeoff	203	210	200	205	170	177	203	175
1610 Prior to takeoff	203	210	202	210	175	172	203	172
1626 Prior to gear retraction	203	210	203	208	186	169	203	169
1720 After landing	203	192	200	198	0 to 5	42	90 to 115	175

I am of the opinion that had the cockpit indicators been operative and I had been selected on U_1, that we would have observed the drop in fluid level on that system before the pump status indicators went yellow.

I went to the EE bay to position the manual emergency handle in U_2 when we were on the base leg for the lakebed landing. Although the hydraulic panel is not uniformly lighted I could easily see that the U_1 position is on the right and the U_2 on the left. This is opposite to what I would expect the positions to be and if it isn't too difficult or unreasonable I would suggest reversing the positions on both air vehicle 1 and 2.

11. (C) Cockpit Feel:

Soon after breaking ground I could see we were in for a ride which was certainly different from the one experienced on first flight. This was a definite pitching motion, not the side-to-side shakes we experienced coming out of Palmdale. The directional movement did exist but was greatly masked by the very pronounced up and down seat jolting actions. These movements were sharp edge in nature, interesting and humorous rather than alarming, and after the first two or three cycles I was not at all concerned about their effects. I estimate the frequency at one to one and one-half cycles per second at 1G peak-to-peak. These motions were at their peak at 6,000 feet and had reduced significantly by the time we reached 12,000 feet. Turbulence was light and cockpit movements were small during the letdown and landing on the lakebed.

12. (U) Cockpit Visibility:

I do not think the forward visibility is very good even at .85 Mach with the gear up. What little time I found to look outside left me wanting and trying to see over and around the big black nose which is most prominent up front. I raised the seat until my helmet hit the top of the cockpit but this did not seem to help much. My cockpit duties prevented me from concentrating too long on this visibility subject but as of this writing I will have to classify the forward look from the cockpit during subsonic cruise as poor. The landing visibility appeared to be fair to good.

13. (U) Pilot Squawks:

a. Green light bulb burned out in right main landing gear indicator. No spare bulb in rack - CADS test light bulb used.

b. Primary pitch trim disengaged intermittently while taxiing and during takeoff.

c. Flap indicator was barber pole with flaps up.

d. Utility 1 hydraulic system failed in flight.

e. Tank 6R module circuit breaker switch popped off prior to takeoff.

f. Angle of attack is unreliable.

g. No. 2 engine reached 690° (first peak) at start.

14. Opinions and Conclusions:

a. (U) I logged an aircraft flight time of 55 minutes, from 1616:35 to 1711:30.

b. (C) The maximum altitude, speed and Mach, I observed was:

27,200 feet - 347 KIAS - .855 M.

c. (U) I observed the gross performance of the following systems as satisfactory:

Engines	Instrumentation
Fuel	Electrical
Landing Gear	Communications
Nose Wheel Steering	Fire Detector (Eng & ADS)
Brakes	IFF
Flaps	Environmental (ECS)

Airspeed, Altitude & Rate of Climb Tapes

d. (U) The hydraulic leak caused early termination of an otherwise successful flight.

e. (U) The floor of the engine inlet duct is not marked to permit the flight crew to determine throat panel position during pre-flight inspection.

f. (U) A hot start was logged against engine No. 2 --- first peak was 690°.

g. (U) Tank 6R module circuit breaker popped off, was reset prior to takeoff, and remained on for duration of the flight.

h. (U) Better coordination is needed to prevent injury of personnel and damage to equipment when opening and closing the external entrance door.

i. (U) Cross-talk interference was experienced in Building 3940 while the XB-70A was taxiing out. It was a nuisance but did not occur during the flight.

j. (U) Light to moderate turbulence was reported and experienced from surface to maximum altitude. Scattered to broken clouds and haze existed to 16,000 feet.

k. (U) The brakes did not chatter in turns but continued to shake the airplane violently below approximately 5 mph.

l. (U) The right green landing gear position warning light bulb burned out while taxiing out for takeoff and caused a delay until we replaced it with a similar bulb from the CADS test panel.

m. (U) Quick, accurate and easy determination of elevon pitch position was not possible. An elevon pitch position indicating device would be an important addition to the cockpit.

n. (U) Primary pitch trim disengaged while taxiing out and during the climb.

o. (U) Flap indicator went intermediate (barber pole) during flight with the flaps extended.

p. (U) Ground intercom switch was left on during the entire flight to insure it would be on for communication from the EE bay. The intercom volume level and background noise was not affected in this configuration.

q. (U) Pilots sideslip indicated 1/3 to 2/3 right sideslip (pointing to left side of instrument) when the ball of my turn and bank was centered.

r. (U) Yaw augmentation was operative but was not engaged.

s. (U) Highest vibration level, engine or ADS, I observed in flight was 30%.

t. (U) Angle of attack indicator was erratic. I noted it jump back and forth from +5 to -4½ degrees.

u. (U) Engine No. 5 indicated 101% rpm during takeoff and cruise.

v. (U) Tank 6 minimum level on this flight was not sufficiently low to permit tank 4 to come on automatically.

w. (U) Cockpit hydraulic fluid level gages were inoperative. I reported and recorded fluid levels and head pressure readings prior to, during, and after flight from the indicators on the hydraulic panel in the EE bay.

x. (U) EE bay lighting is inadequate. There is only one small light above the hydraulic servicing panel. Illumination of the circuit breaker panels and fuel modules is highly desirable.

y. (U) The entrance door to the EE bay is becoming more of a challenge than a compartment divider to me, especially when coming forward from the bay to the cockpit. Any modification, to reduce this operation from a three to a two-handed process, is warranted.

z. (U) Only two of the three drag chutes developed properly.

a. (U) For some reason, unknown to me, paint peeled off, blew off or popped off the fuselage and wings during flight.

b. (U) Ammonia level on letdown was 300 lbs., at shutdown the level was 210 lbs., and the ammonia-water caution light was on.

c. (U) I inspected the EE bay circuit breaker panel at time of shutdown and not one unflagged breaker was out.

d. (U) Post-flight visual inspection revealed no foreign object damage to engines.

e. (U) Cuts on tires, after extensive taxiing on runway and lakebed, were not deep enough to warrant any being changed.

f. (U) I turned the SST camera switch on just prior to touchdown, but post-flight inspection revealed they did not run.

g. (U) Al White, our controllers, the chase, and other support agencies responded in a tremendous way to the emergency -- my personal thanks and compliments to them -- one and all.

Joseph F. Cotton

JOSEPH F. COTTON
Colonel, USAF
XB-70A Test Director

VII. (U) RECOMMENDATIONS:

1. Provide a pitch elevon position indicator in the cockpit.

2. Revise the equipment bay door latch to permit easier exit from the bay.

3. Provide additional lighting in the equipment bay that will illuminate the circuit breaker panels and fuel modules.

4. Investigate and correct the failure of all three main drag chutes to blossom.

5. Provide markings in the inlets that provide evidence, during pre-flight, to the flight crew that the throat panels are properly positioned.

6. Increase the fuel tank No. 6 fuel level that will automatically switch tank No. 4 on.

7. Establish a clear cut procedure for opening and closing the crew entrance door. The present confusion can lead to serious injury to personnel.

8. Investigate methods of preventing brake chatter that occurs when stopping the airplane.