(Gp-4) TEST REPORT

XB-70A

FLIGHT 1-13

(No. 1 Air Vehicle, No. 13 Flight)

16 June 1965

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XB-70 JOINT TEST FORCE (FTTB)

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TABLE OF CONTENTS

		Page No.
I.	SUMMARY	1
II.	TEST LOG	3
III.	DATA	11
	1. Fuel Data	11
	2. Hydraulic Quantity Log	12
IV.	ENGINEERING COMMENTS	14
	1. Structural Damage	14
	2. Hydraulic Leak	14
	3. Propulsion	14
	4. Brakes	14
	5. Landing	15
	6. Master Caution Light	15
V.	OBSERVATIONS AND COMMENTS BY THE COPILOT	16
	1. Preflight, Engine Start and Taxi	16
	2. Takeoff and Climb	17
	3. Started a Slow Climbing Turn	19
	4. Inlet Data Taken on Straightaway	20
	5. Stability and Control	20
	6. Deceleration and Descent	21
	7. The Landing	21
	8. Cabin Temperature Control	22
	9. The Inlet	22
	10. Maintenance Discrepancies	26
VI.	CONCLUSIONS	27
VII.	RECOMMENDATIONS	29
VIII.	NASA SUPERSONIC TRANSPORT TESTS AND INSTRUMENTATION SUMMARY	30
	1. Landing Gear Instrumentation and Cameras	30
	2. Cabin and Ballast Bay Microphones	30
	3. Velocity Acceleration Altitude (VGH) Recorder	30
	4. Sonic Boom	30
	5. Runway Noise	30

I. SUMMARY:

1. The thirteenth flight (Flt. 1-13) of the XB-70, 62-001 was scheduled four times (for 21 May, 24 May, 27 May and 16 June) before satisfactory completion on 16 June. The aircraft was not ready for flight due to uncompleted Flt. 1-12 repairs on 21 May and the 24 May schedule was cancelled on 22 May due to inoperative No. 3 fuel tank boost pumps and high No. 3 engine vibrations. Air Force Quality Assurance grounded the aircraft on 27 May for excessive fuel leaks. The engines were running preparatory to flight at the time of grounding.

2. Significant work during the lay-up period between Flts. 12 and 13 was as follows:

a. Replaced all engines.
b. Removed 2,000 pounds lead ballast from equipment bay.
c. Revision to pitch, roll and yaw augmentation power circuits to permit flight augmentation control system (FACS) disengagement without removing power from FACS electronics.
d. Relocation of air induction control system (AICS) caution lights on annunciator panel to provide better pilot and copilot view of them.
e. Left hand drag chute was removed leaving the center and right hand chutes.
f. A restrictor was added to the Primary One (P_1) flap control valve to prevent loss of P_1 flap operation.
g. Fuel transfer pumps in tank Nos. 1 and 4 were stabilized and flex lines added.
h. Fuel leaks repaired in tanks No. 1, 2, 3 and 4.
i. Bus tie switch added to copilot's console.
j. Revised shock position sensors installed.
k. Brake rotors of the 11 slot configuration added to both aft brakes.
l. Utility hydraulic electrical depressurizing valves (EDV's) were disconnected electrically which will permit the utility pumps to operate in the pumping mode during engine start.
m. Emergency descent control "potato" activated.
n. Trim for takeoff activated (5° trailing edge down elevator).
o. Speed stability activated.
p. Wing tip torque rods torque checked and x-rayed.

3. Crew for Flt. 1-13 was Mr. Al White, North American Aviation, Inc (NAA), pilot and Colonel Joseph F. Cotton, Air Force Flight Test Center (AFFTC), Copilot. Takeoff from Edwards AFB runway, at 522,100 pounds gross weight, occurred at 0706 PDT. A precautionary landing on Edwards lake bed runway 18 was at 0843 PDT. Total flight

time was one hour and thirty-seven minutes (1+37), total supersonic 1+15, total Mach (M) 2 or greater 0+50, and total above M 2.5 0+25. Maximum speed was M 2.6 at 65,000 feet, the highest altitude attained.

4. The aircraft preflight was satisfactory but during the "before engine start" inspection both bypass door open lights were noted to be inoperative. With the exception of a restart of No. 2 engine due to unsatisfactory P_2 pump status, engine start was satisfactory and was completed in twelve minutes. As on the previous flight, nose wheel steering during a turn to the right lacked the authority of a turn to the left. Moderate brake chatter was noted during taxi and when lining up on the runway for takeoff.

5. Takeoff rotation at 188 knots was followed by lift-off at between 205 and 210 knots, ground roll was 9,730 feet. Gear and flap retraction and wing tip fold were normal. Glare on the pilot's pressure suit visor was extremely bad during the M 0.95 climb to 32,000 feet. At 32,000 feet the aircraft was accelerated to 550 knots, the tips were folded full down and a climb to test altitude of 65,000 feet established. Occasional light turbulence was encountered which had a deteriorating effect on climb performance. Environmental data were recorded during the climb.

6. At M 2.6, 65,000 feet data were recorded with the shock position indicators at mid to top yellow, and the top and bottom of the green. Both shock position indicators were very unstable below the mid green position. A slow leak in the P_2 hydraulic system was noted during this period. Stability and control maneuvers were completed with the FACS ON and OFF and with the lateral bobweight free and locked. The P_2 hydraulic system level continued to drop and as a precaution, tests were discontinued and a descent and approach to a lake bed landing completed. Touchdown at 188 knots was uneventful.

II. (C) TEST LOG:

0559	Manual start engine No. 3; EGT - 550°C first peak - EDV at 34% - Idle - All O.K.
0601	Manual start engine No. 1; EGT - 460°C first peak - EDV at 35% - Idle - All O.K.
0602	Manual start engine No. 2; EDV at 34% - status lights went green again - shut engine down.
0605	Manual start engine No. 2; EGT - 510°C first peak - EDV at 34% - Idle - All O.K.
0607	Manual start engine No. 4; EGT - 550°C first peak - EDV at 35% - Idle - All O.K.
0608	Manual start engine No. 6; EGT - 480°C first peak - EDV at 33% - Idle - All O.K.
0609	Manual start engine No. 5; EGT - 500°C first peak - EDV at 34% - Idle - All O.K.
0611	Generator checks; Gyro heading 245° - 247° Aircraft heading is approximately 3° right of run pad heading.
0620	Flight control checks; trim for takeoff - O.K.
0625	Throats left 1.70 - right 1.68.
0627	Close cabin door.
0629	Service hydraulics; U_2 - 172; U_1 - 168.
0647	Start taxi; tank No. 1 - 31,800 lbs; tank No. 3 23,800 lbs; check feed on tank No. 6.
0649	Check brakes.
0650	For the last two flights the nose wheel steering does not seem to turn as far to the right as it does to the left in the taxi mode.
0652	Tank No. 6 feeding; Tank No. 6 right - 35,100 lbs; tank No. 8 right - 13,900 lbs; tank No. 6 left - 35,700 lbs; tank No. 8 left - 14,000 lbs.
0653	Tank No. 8 - On.
0655	Tank No. 8 left - 13,300 lbs; tank No. 8 right - 13,300 lbs; tank No. 8 - Off.
0657	Taxi into position and hold on runway 040.
0658	Brake chatter on stop. No chatter or skidding during taxi out. Inspect landing gear - all O.K.
0659	All tanks - AUTO.
0701	Reset data counter.
0703	Fuel tank reading (see fuel card) Total fuel 249,800 lbs.
0704	Come up on power - All 6 engines at Military - Engine No. 6 - high vibe light on - vibes are at 40 to 50%; engine No. 6 - Idle - increase to military again.

(C) Test Log (Cont'd)

0705	C/N 242; REFER - ON - COOL.
0706	Light afterburner engine Nos. 3 and 4; minimum afterburner instability engine No. 4, advance engine No. 4 throttle; engine No. 3 did not seem to light, 65 - 70° throttle angle afterburner light; light afterburner engines Nos. 2 and 5; light afterburner engine Nos. 1 and 6; brake release; maximum afterburner; master caution light - On; no other lights; all engines - 100%; EGT's and A_8's - good.
0707	Hydraulic pressure and quantity - good; gear camera - off; master caution light - no problem.
0708	Gear - up; 245 KIAS - 3 green lights.
0709	Flaps - up.
0710	Tank Nos. 2, 4 and 7 - off; tank No. 1 - on; tank Nos. 6 and 8 - AUTO; engine vibes - O.K.; ammonia - 520 lbs; water - 4,800 lbs; AUX COOL - off.
0711	C/N 605; wing tips to one-half.
0713	Windshield - up; all engine cooling doors closed at .93 Mach; total fuel 205,000 lbs; cabin record - ready; buzz occurred during the last part of the windshield up cycle. Cabin altitude - 6,500 feet; buzz standby selector - primary; bypass wheels checked forward in manual.
0714	Leveling at 32,000 feet; total fuel 202,000 lbs; augmentation - On; a little pitch pulse occurred as the augmentation came on. Throat wheels - manual.
0715	Engines and hydraulics - good; level at 32,000 feet; total temperature 34°F; Mach 1.04.
0717	Bypass aft to 200 square inches; standby secondary nozzle - 80,000 feet; rpm lockup - Auto; anti-collision light - off.
0719	Hydraulic quantities - O.K.; both primary hydraulic fluid levels over 200%; utilities holding 180% 1.2 Mach.
0720	Engines - good; 1.3 Mach.
0721	Tank No. 6 left - 2,900 lbs; tank No. 6 right - 2,200 lbs; total fuel 182,000 lbs.
0722	1.4 Mach; Data on C/N 1263; wing tips down to 65°; C/N 1290; tank No. 6 - off; tank No. 6 left - 2,000 lbs; tank No. 6 right - 1,700 lbs; data off C/N 1315; cabin record - Off.
0723	Bypass - aft to 400 square inches; altitude 35,500 feet; total temperature 119°F; 1.46 Mach; tank No. 8 - Auto.

(C) Test Log (Cont'd)

0724	Airspeed - 540 KIAS on tape - 534 KIAS on sensitive.
0725	550 KIAS - climbing - 1.55 Mach.
0726	A little piece of fuzz came off of the windshield. 1.6 Mach.
0728	1.7 Mach; crew shut off handle - full down; cabin air - Manual, full cold; water - On; pitot heat and windshield defog - Off; throats auto - left and right; going to 2.0 on the wheels.
0729	Throat - 1.67 left; 1.70 right; some air vehicle turbulence; engines - O.K.; EGT's - 860 to 870°C.
0730	Total fuel 151,000 lbs; 1.80 Mach.
0731	Total fuel 149,000 lbs; total temperature 202°F; 1.86 Mach; climbing through 45,800 feet; 547 KIAS.
0732	Closing throat now - 1.90 left, 1.86 right; bypass area - 430 square inches left, 400 square inches right; throat - 1.85 left, 1.88 right; air vehicle turbulence; 1.97 Mach; climbing, engine rpm's - all approximately 100%; pilot feels a little incipient vibration in the air vehicle occasionally.
0733	Mach 2.0; total temperature 235°F; 550 KIAS; 48,500 feet; wheels - aft; needles - crosshatch - bypass area 600 square inches left, 550 square inches right, needle - in the bottom of the red; bypass area 710 square inches left, 750 square inches right, needle in the top of the red; bypass area 820 square inches left, 850 square inches right, needle in the yellow; came to the top of the green, then the right needle dropped to the bottom of the white.
0734	The left needle is nervous in the crosshatch. Bypass area 1,050 square inches left, needle nervous in the white; bypass area 1,030 square inches right, needle steady in the bottom of the white.
0735	50,800 feet; 2.09 Mach; total temperature 263°F; throat 2.01 left, 2.03 right; come forward to top of the green. Throat - good. Hydraulics good. The left needle is nervous; however, it is better than it used to be. The right needle is good and steady. The right needle is the best needle.
0736	2.10 Mach; top of the green on the right index. Throat 2.02 left, 2.05 right; bypass area - 990 square inches left, 950 square inches right; maintain the top of the green during the acceleration.

(C) Test Log (Cont'd)

0737 Attitude gyro approximately 3° off; standby gyro O.K.; tank No. 8 - off; little turbulence.

0738 55,000 feet; 2.17 Mach; 550 KIAS (a little less) - throat 2.11 left, 2.13 right - needle in the top of the green; bypass area 850 square inches left, 820 square inches right; the needles look much better than before. Total fuel 127,000 lbs.

0741 Turbulent air is slowing the air vehicle down. Engines cut back to approximately 800°C EGT. Tank No. 1 - 300 lbs - Off; tank Nos. 4 and 7 - AUTO.

0742 Mach 2.3; throat 2.24 left, 2.26 right; engine rpm's 100%; 56,300 feet; total temperature 313°F:

Engine No.	1	2	3	4	5	6
EGT - °C	800	815	820	820	805	815
A_8 - %	87	90	92	94	92	95

Start to turn. Throat aft to update position 3.

0743 Hydraulic quantity has dropped a little. P_2 - 160%; leave selector on P_2. Top of the green - needles dancing; throat 1.15 in turn. Tank No. 4 coming down; tanks No. 2, 4 and 7 - AUTO.

0744 P_2 - 150%; total fuel - 114,000 lbs; top of the green in the turn. Bypass area - 700 square inches left, 670 square inches right; rpm's - 100%; EGT's - O.K.; increase cabin temperature - turn selector from the 12:00 to 1:00 o'clock position.

0745 Turbulence again; shock position drop to white, get in mid green; total fuel - 110,000 lbs; shock in yellow and stable; back off 20 square inches - shock in the bottom of the green.

0746 Mach 2.4; 58,000 feet; total temperature 350°F. Throat - 2.35 left, 2.36 right; needles nervous; bypass area 660 square inches left, 640 square inches right; run needles down to mid green; turn cabin temperature down - 12:30 o'clock position.

0747 Needles oscillating from mid green to yellow, hold in mid green; engine and ADS vibes - 20 to 30%; standby attitude indicator reads 30° bank, primary indicator on panel indicates 20° bank. Both needles dancing from the bottom of the yellow to mid green.

0748 Bypass area 660 square inches left, 640 square inches right; duct pressures stable.

(C) Test Log (Cont'd)

0749 Needles steady in the yellow - open bypass doors a little; bypass area 670 square inches left, 660 square inches right; take cockpit pictures.

0750 60,000 feet; 2.4 Mach; can't seem to accelerate in the turn. Shock looks good. Take more pictures; needles - bottom of the green to the white. Rpm's - 100%; A8's - 90 to 95%; EGT's all between minimum and maximum cut back.

0751 P_2 - steady; total fuel 97,000 lbs.

0752 520 KIAS; some turbulence; 10 to 15 KIAS off speed; there is a kick in the rudder pedals. Needles in the bottom of the green to the white. Pilot too hot, reduce cabin temperature.

0753 Shock position steady at top of green; throat 2.40 left, 2.41 right.

0754 Total fuel 91,500 lbs; TACAN - O.K.

0755 2.48 Mach - throat 2.44 left, 2.45 right; bypass area 580 square inches left, 560 square inches right; 2.5 Mach, 525 KIAS; 61,500 feet; total temperature 387°F.

0756 There is a high pitch frequency pulse or buzz in the rudder pedals. Needles at the top of the green. Bypass area 580 square inches left, 580 square inches right; P_2 - 145%; other hydraulics - good.

0757 Mach 2.52; total temperature 394°F; 62,700 feet; 550 KIAS; still climbing; some turbulence.

0758 Holding mid green; bypass area 530 square inches left, 530 square inches right. Throats holding good in AUTO.

0759 Tank No. 4 - 3,000 lbs going to 2,800 lbs.

0800 Mach 2.55; 515 KIAS; 63,400 feet; tank No. 4 - Off.

0801 Total fuel 75,000 lbs; 64,000 feet; 510 KIAS; Mach 2.54.

0802 Total temperature 429°F; 65,000 feet; needles - top of green; bypass area 480 square inches left, 480 square inches right. P_2 - 135%.

0803 Total temperature 426°F; 2.57 Mach; 495 KIAS; Mach number dropped .03, no change in bypass area. Cabin record - On.

0804

Engine No.	1	2	3	4	5	6
EGT - °C	805	815	820	820	805	815
A8 - %	97	89	90	91	91	95

2.58 Mach; C/N 3861 - data; left needle steady, right needle oscillating 1 needle width.

(C) Test Log (Cont'd)

0805	Bypass area 440 square inches left, 440 square inches right; Mach 2.6; throat 2.55; needles - mid yellow; data C/N 3928; go to the top of the green, open bypass doors approximately 20 square inches left and right. Throttle angle 93°.
0806	Top of the green, 2.59 Mach; throat 2.54 left, 2.55 right; bypass area 470 square inches left, 480 square inches right; P_2 - 125%; throttle angle 100°; go to bottom of the green for 10 seconds; C/N 3982 open bypass doors and go to top of the green. Control at the bottom of the green is nearly impossible because of needle oscillation.
0807	C/N 3998 data; data off C/N 4010; go to the cross-hatch area - bypass area 660 square inches causes slight rumble; go to low performance. Needle is at the bottom of the green. Throat 2.40 left, 2.37 right. Lost .03 Mach; going to maximum afterburner.
0808	Total fuel 63,000 lbs; data on C/N 4102; pitch augmentation off, controls are free; pullup C/N 4120; 300 to 400 feet below test altitude.
0809	Wind up turn to the right; Mach number dropped to 2.52.
0810	Mach 2.5; sideslip; yaw right; left shock went into the yellow; open the bypass doors; full rudder (1.5°) - back off - rudder release at C/N 4231; increase the bypass area 100 square inches.
0811	Data off C/N 4247; holding 2.5 Mach; data on C/N 4259; controls free; FACS - Off.
0812	Yaw maneuver; release; 1.35 left; recover; data off; total fuel 54,500 lbs; tank No. 2 - 200 lbs; tank No. 2 - Off; tank No. 7 - AUTO; bobweight - free; bobweight indicator stuck until panel was tapped. Turn right.
0813	Total fuel 52,000 lbs; 2.43 Mach; throttle angle 109°; P_2 - 100%.
0816	P_2 - 95%; FACS - On; bobweight - free; P_2 - 88% after roll out.
0817	Total fuel 45,000 lbs; sump tank at high level; P_2 - 90% bobweight - free; 2.4 Mach; 59,500 feet; data on C/N 4644; FACS - Off; bobweight free maneuver.
0818	Control free at C/N 4675; FACS - On; data off approximately C/N 4705; retard throttles; bobweight was locked.
0819	P_2 - 60%; military power; P_2 - 50% and dropping fast.

(C) Test Log (Cont'd)

0820	P_2 - 40%; P_2 - 30%; hydraulic pumps - O.K. Maintain needles in the bottom of the green. Mach 2.2; 56,000 feet; 520 KIAS; engines look good. P_2 holding 25 to 30%; hydraulic pumps - O.K.
0821	Mach 2.0; low performance on the duct; bypass area 1360 square inches left, 1380 square inches right.
0822	Mach 1.9; bypass wheels moved aft (needle to the crosshatch) then forward (needle in the green). Needle is in the crosshatch now; low performance; back to normal performance; throttle angle 40°; bypass area 800 square inches; engines - good; throat 1.7; 410 KIAS.
0823	Mach 1.7; holding needles in crosshatch; go to 700 square inches on bypass area; 51,000 feet; 1.65 Mach; throats 1.68; needles in the yellow; P_2 holding 35%.
0824	Water - Off; windshield defog and pitot heat - On; 1.6 Mach; throats - Off; P_2 holding 20%.
0825	Cabin altitude 7,000 feet; 1.4 Mach; C/N 5139; wing tips to 25°; bypass area going to 400 square inches.
0826	Rpm lockup - release; tank No. 7 - 2,900 lbs; LN_2 - 15/16; standby secondary nozzle - set at 40,000 feet; engines No. 3 and 4 at 87% rpm; throttle angle 40°.
0827	Bring engines No. 1, 2, 5 and 6 back slightly. 1.25 Mach; 42,500 feet; P_2 - 15%.
0828	Roll and yaw augmentation - Off; pitch augmentation is off. P_2 - 10%; 330 KIAS; C/N 5285; wing tips to 0°; Mach 1.0; bypass wheels full forward.
0829	Windshield - down; tank No. 7 holding 3,000 lbs; tank No. 7 - Off; tank fuel 37,000 lbs; standby secondary nozzle - set at field elevation; P_2 - 15% status - O.K.; pressures - O.K.; anti-collision - On; Mach .96.
0830	33,000 feet; P_2 - 0%.
0831	385 KIAS.
0832	Total fuel 36,000 lbs; sump tank 23,700 lbs; P_2 pressure steady at 3,750 psi.
0833	Cooling doors on engines No. 3 & 4 - Open; 270 KIAS.
0834	C/N 5625 - gear down; tape remaining analog - 0; gear doors closed; the left main gear light went out then came back on; all lights are on, moving the handle causes the left main gear green light to go on and off. All gear lights - green. U_1 - 105%.

(C) Test Log (Cont'd)

0835	Total fuel 35,000 lbs; tank No. 6 - On; flaps - down.
0837	Tank No. 6 - Off; AUX COOL - On; REFER - Off.
0838	Data - On; sump fuel low light - On.
0840	Land runway 180°; touchdown 181 KIAS; chute deployed 164 KIAS.
0841	Turn off runway; jettison chute at 78 KIAS.
0844	Shut down engines No. 6 & 5; P_2 status lights still green.
0845	Taxi on to ramp.
0847	Pilot's back window fogged up.
0849	Turn to run pad.
0852	Stop on pad.
	Shut down engines.
0853	Total fuel (See Fuel Card).

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III. (C) DATA:

1. (C) Fuel Data:

Time	0530	0634	0645	0703	0833	0853	
Event	Before Engine Start	End Tsfr #1 Tank Before Taxi	Before Taxi	All Auto On Runway	Prior to Lowering Gear	Park On Run Pad	
Tank*							
1	37.1	31.9	31.8	32.2	.4	.4	
2	29.4	29.5	29.3	29.3	.3	.3	
3	32.5	28.4	25.0	32.5	23.7	17.9	
4	37.3	37.3	37.2	37.2	.8	.6	
6L	38.4	38.4	38.3	34.6	1.6	2.4	
6R	38.3	38.2	38.2	34.2	.8	1.5	
7L	10.7	10.7	10.7	10.7	3.3	3.1	
7R	10.8	10.8	10.8	10.8	3.5	2.9	
8L	13.8	13.8	13.8	13.3	.3	.2	
8R	13.8	13.8	13.8	13.3	.2	.2	
Total	263.3	254.0	250.5	249.8	36.0	30.5	

* Fuel quantity times 1,000

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2. (U) Hydraulic Quantity Log:

	P_1		P_2		U_1		U_2	
Time	F.L.	H.P.	F.L.	H.P.	F.L.	H.P.	F.L.	H.P.
	%		%		%		%	
0629					168		172	
0638*	158	190	170	190	170	170	172	185
0716	200+		200+		180		180	
0742			160					
0744			150					
0756			145					
0803			135					
0805			125					
0810			100					
0816			88					
0817			90					
0819			50					
0820			30					
0823			35					
0825			20					
0827			15					
0828			10					
0829			15					
0830			0					
0834					105			
0850#	158	170	0	170	90	180	200	200

F.L. - Fluid Level % (full - 200%)

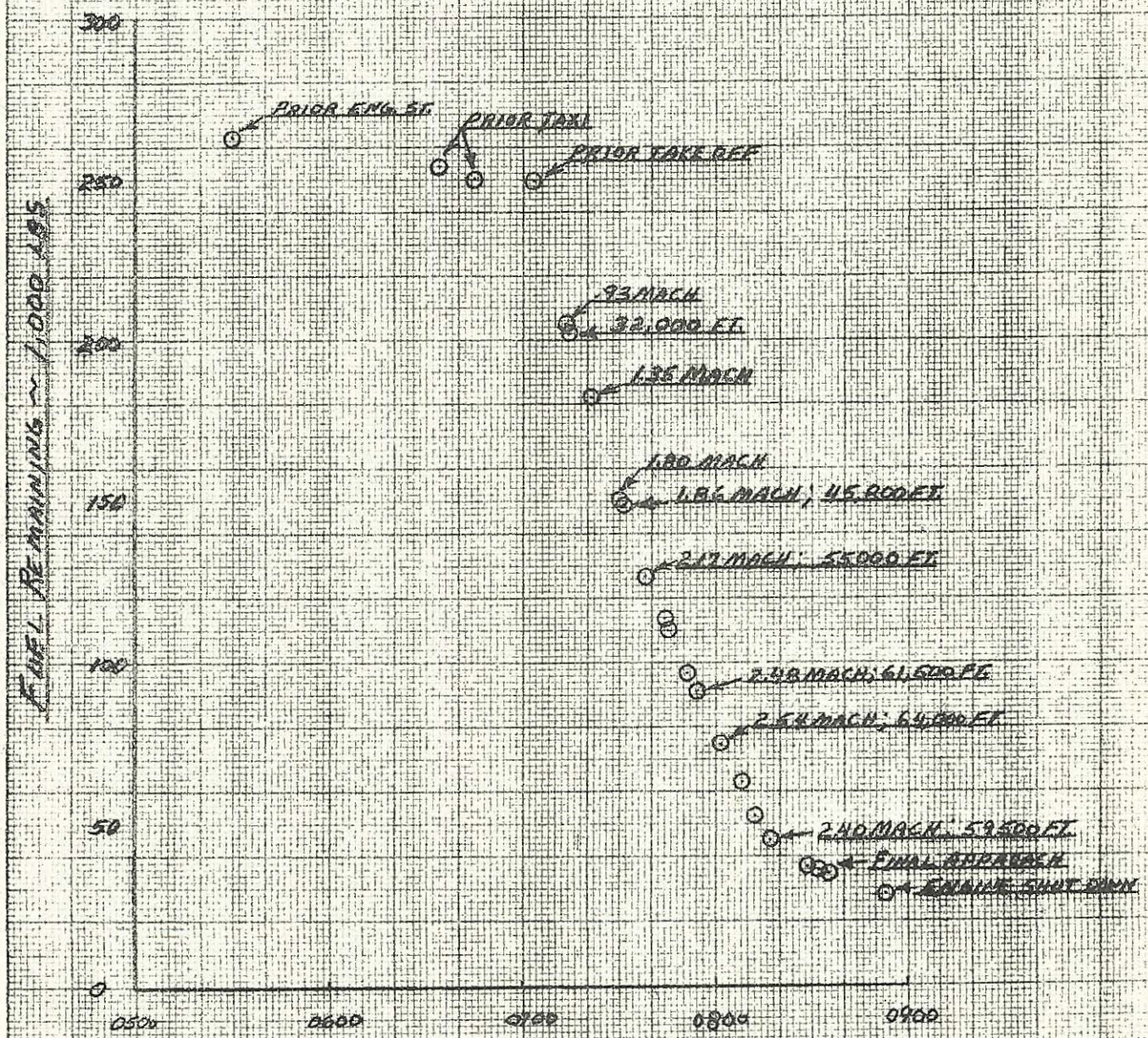
H.P. - Head Pressure, pounds per square inch

* After service; prior to taxi

Parked

FLT 1-13 [redacted]

TOTAL FUEL REMAINING VS TIME



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IV. (U) ENGINEERING COMMENTS:

1. Structural Damage:

Inspection of the aircraft following this flight indicated that buckling of the honeycomb face sheet had occurred at approximately fuselage station 1540 in the roof of the left inlet duct. The buckle extended from near the outboard duct wall to the movable ramp. A plug was removed from the panel between the boundary layer control duct trusses at stations 1530.5 and 1549.5 approximately 16 inches by 39 inches. Less extensive void areas existed fore and aft of these trusses which are being repaired by doubler and pin. This was done so that the truss attachments would not be disturbed. A one-sided plug repair will be made to close out the hole. When this plug was cut out it was found that the upper face sheet had separated from the core and was possibly due to poor bonding indicated by the lack of good braze fillets. The core remained attached to the lower face sheet which had buckled approximately one-half inch.

2. Hydraulic Leak:

a. Approximately 40 minutes after takeoff the copilot reported a drop in Primary 2 (P_2) hydraulic system to 160%. The quantity was monitored closely and at about 1:15, after takeoff, the quantity was 60% and appeared to be dropping faster. Deceleration and descent for landing was begun at that time. The quantity indicator was zero at time of landing. The primary pump on No. 6 engine was found to have a leak at the metal knife edge seal gasket at the pump end plate. The pump (S/N 114) had 30:12 hours.

b. No. 3 engine primary pump had a similar leak of much lower magnitude. This leak was recorded in the aircraft forms prior to the flight and did not get worse during the flight. The end plates were polished out and seals replaced.

3. Propulsion:

The propulsion system operated normally during the flight. The engine No. 6 high vibration light came on for a short time prior to flight; however, this problem did not occur during flight. A malfunction in the vibration indicating system was the probable cause of this indication.

4. Brakes:

Eleven slot rotors were installed in the two rear brakes prior to this flight. This configuration is intended to eliminate

a resonant condition in the landing gear which may cause chatter during braking. No specific brake tests were conducted. There was no chatter when braking during taxi out but chatter did occur when stopping the aircraft. The pilot commented that chatter was less than on some previous stops but was still unsatisfactory. There was also some chatter on the left gear when turning into the run pad (left turn) after the flight. Installation of 11 slot rotors in all four brakes may be required to test this configuration.

5. Landing:

A precautionary landing was made on lake bed runway 18. The landing was uneventful and the aircraft was taxiied to the run pad without stopping. The drag chute appeared to operate satisfactorily. This is the first attempted use with one drag chute deleted and relocation of the extraction lines on the deployment bags (CCP-5). Expected film coverage was not obtained because of the lake bed landing.

6. Master Caution Light:

The flickering master caution light during takeoff was caused by marginal 1 amp Cook relays in a hold circuit. This hold circuit was associated with the pitch aug, roll aug, and yaw aug 1 and 2 power circuits; and some relays in this circuit momentarily indicated a fault from vibration. After the flight, four of the eight relays in this circuit were tested and replaced.

V. (C) OBSERVATIONS AND COMMENTS BY THE COPILOT:

1. (C) Preflight, Engine Start and Taxi:

a. The pilot's preflight was started at Time (T) 0400 and in 45 minutes the external walkaround inspection and aircraft status briefings were complete. A fuel leak existed on the forward wall of the left wheel well but was within acceptable limits. The aircraft and maintenance records were in excellent condition. With maintenance checks in progress in the equipment bay and cockpit, the pilot internal inspection was delayed and was later completed by the ground maintenance crew after the pilots were suited up and seated in the capsules. This appears to be a very desirable procedure as it is time saving, reduces traffic and confusion in the aircraft, eliminates duplicate inspections, yet satisfies the check procedure in a timely and thorough manner.

b. Al and I had donned our pressure suits and were strapped in at T 0530. The before engine start inspection revealed that both bypass door open lights were inoperative. Throat bias was completed before engine start. The temperature at T 0545 was 53°F and the wind 210° at 6 knots. The manual engine start sequence was 3, 1, 2, 4, 6 and 5. The first engine was started at T 0559 and 12 minutes later they were all running. The first peak exhaust gas temperatures (EGT's) ranged from 460° to 550°C. No. 2 engine was shutdown and restarted when the primary hydraulic pump status went from yellow to green near 39% rpm during the acceleration to idle. As a result of the electrical depressurizing valves (EDV's) being electrically disconnected, the utility pump status indicators went green during start at rpms ranging from 2% to 12%. The primary 2 (P_2) hydraulic pressure gage had fluctuated from 4,000 to 5,500 repeatedly during preflight but after engine start it settled down and behaved normally. At T 0635 hydraulic service was complete and the tower reported an altimeter of 29.70, wind of 200° at 10 knots and a temperature of 52°F --- our aircraft total temperature (Tt) indicator showed 44°F. Tank No. 1 level was 31,800 pounds prior to taxi.

c. We started to taxi at T 0646 and received the usual pleasantly short ATC clearance which was as follows: "ATC clears 001 as filed, squawk mode 3 code 05, on mission frequency." This is certainly a refreshing experience when you consider exactly how complicated and detailed the route, altitudes and speeds for such a flight really are. Al commented that the nose wheel steering didn't turn the aircraft as well (as sharply) to the right as to the left --- this was also observed on the last flight. While taxiing, tank No. 3 was at 23,800 pounds when I turned tank No. 6

switch to AUTO and verified they would feed. Their levels were: 6R - 35,100 and 6L - 35,700 when I stopped transfer. Tanks 8L and 8R were each 13,300 pounds when I completed transfer to insure vent space. Although ground observers reported much less strut walk during the stop, I felt the airframe vibrations of at least moderate intensity when the brakes were applied during lineup for takeoff on runway 04. The new 11 slot rotors were in use in the rear brake positions but the brake selector switch was never moved from the normal (all brakes) position. At T 0659 I turned all fuel tank switches to AUTO. At T 0701 the data counter was reset, the LN_2 was full and the fuel totalizer was 249,800 pounds. With data on short interval, all engines were advanced to MIL and No. 6 engine vibration was observed at 40% to 50% as required engine data were taken at counter number (C/N) 242.

2. (C) Takeoff and Climb:

a. The throttles were set at 85% rpm and afterburner lights were in the order of 3 - 4, 2 - 5, and 1 - 6. No. 4 was a bit unstable in minimum afterburner (MIN AB) and it appeared No. 3 did not light off on the first attempt. At T 0706 the brakes were released (gross weight 522,100 lbs) and throttles were advanced to maximum afterburner (MAX AB). As planned, I turned the gear cameras on before rotation, which was near 188 KIAS, and A1 estimated us between 205 and 210 KIAS at lift-off.

b. Once airborne I turned the gear camera switch off. The master caution light came on but there was no apparent reason for it as the hydraulic status and annunciator panel lights were normal. Hydraulic pressures and quantities were O.K. and the gear was completely retracted by C/N 245. The flaps retracted normally and again the master caution light came on for no apparent reason. I turned fuel tank switches No. 2, 4 and 7 off, 1 on, and 6 and 8 were left in AUTO. A1 reported engine vibrations and electrics all O.K. The instrumentation interval was on short, not continuous, for the takeoff. A1 complained of the glare and less than desired vision through his pressure suit visor as we headed north for Trona Pass. The visor glare has become so objectionable that I had the visor up for the takeoff and initial climb. AUX COOL was turned off with ammonia at 520 pounds and water 4,800 pounds. Wing tips were selected half at 395 KIAS, T 0711, C/N 605. Both indicators went to the one-half position together and the chase reported they visually checked O.K. Fitz and Van called out "Searles Lake dead ahead" --- they had a 3° heading and A1 reported 7°. At 20,000 feet, .88 Mach and 420 KIAS the light rumble and buffet subsided and a smooth quiet climb was continued. Chase reported we were leaving heavy vapor trails. A1 looked forward

to the opportunity to raise the windshield as the glare in his visor continued to be very unpleasant. Shep reported all engine cooling doors closed at .93 Mach. At 27,000 feet fuel totalizer was 205,000 pounds. The cabin recorder switch was placed to READY and the windshield ramp was raised. During the last few inches of travel we heard a buzz which ceased once the windshield was up. We were near 30,000 feet and the cabin altitude was 6,500 feet.

c. Just north of Trona Pass we leveled at 32,000 feet with a fuel totalizer reading of 202,000 pounds. I completed the air induction control system (AICS) check list and Al turned the flight augmentation control system (FACS) on. T 0716 the Tt was 34°F and we went supersonic. With no radar track in Data Control the left turn to 45° at the southeast corner of YULETIDE was made on radar information from Federal Aviation Agency (FAA) and relayed to us by Data Control. Primary hydraulic fluid levels were 200% + and the utilities were near 180%. A heading correction to 63° was checked by the TB-58 who reported 57°. Wing tips were lowered to 65° at Mach 1.4 and C/N 1263. At T 0722 I turned tank No. 6 off at C/N 1290 with their quantities at 6L - 2,000 and 6R - 1,700. Tank No. 1 was on and tank No. 8 in AUTO. Bypass doors were opened from 200 square inches to 400 square inches over Indian Springs. Our heading was 45° and both chase aircraft reported 40°. Our altitude was 35,500 feet, Mach 1.46 and Tt of 119°F. The TB-58 Tt reported 50°C.

d. Speed was increased to 540 KIAS on the tape with both the sensitive indicator and TB-58 reading 534 KIAS. At T 0725, we were climbing at 550 KIAS, Mach 1.55 near 33,000 feet. We noticed a little piece of fuzz waving around from the lower edge of the center outer windshield --- it looked like fabric tape to me. At T 0726:30 and Mach 1.6 chase 2 (F-104) broke off and headed for Nellis. T 0729 we turned left toward Milford at 1.7 Mach when I pushed the crew air shutoff handle full down and selected manual full cold to obtain environmental control system (ECS) data. The check list items were completed and I placed the throat mode switches to AUTO. The throat Mach counters responded immediately to 1.7 left, 1.74 right and then 1.67 left and 1.7 right. It felt like we encountered some turbulence but to make sure I had a look at the engines. EGT's were 860° to 870°. At T 0730, Mach 1.75 the fuel totalizer was 151,000 pounds. T 0732, fuel totalizer 149,000 pounds, Tt 202°F, 1.86 Mach, 45,800 feet at 547 KIAS and we were 45 miles south of Milford. Throats were closing with 1.9 left and 1.86 right. I had not moved the bypass wheels since Mach 1.4 and the left was 430 square inches while the right was holding 400 square inches. At Mach 1.97 Al complained of his hands and legs being cold but we elected not to

change the manual temperature selector from the full cold position. Engine rpms were all 100% ± .3 as we felt occasional airframe vibration.

e. T 0734, we were indicating Mach 2.0, Tt 235°F, 48,500 feet and 550 KIAS when I began opening the bypass doors to start the inlet. (See Inlet Section of this report for specifics). T 0735, we passed 14 miles east of Milford --- engines and hydraulics looked good. At 50,800 feet, 2.09 Mach the Tt was 239°F. As Al turned to a 32° heading for Myton TACAN he reported a 3° error in wings level on his primary attitude indicator --- the standby attitude indicator appeared right on with his visual reference. T 0737, I turned tank No. 8 off. T 0739, 2.17 Mach at 55,000 feet --- a little below 550 KIAS. At 0741, radio communication with Data Control deteriorated and we changed frequency from 351.4 to 316.6. Turbulence could have been slowing our acceleration down some but I'd rather think throat schedule and aft shock positions were the main contributors. Engine EGT's were cut back to very near 800°C. Over Myton I turned tank No. 1 off - it had 300 pounds remaining, and engine rpms were all 100% ± .3, EGT's were 1 - 800, 2 - 815, 3 - 820, 4 - 820, 5 - 805 and 6 - 815.

3. (C) Started a Slow Climbing Turn:

a. We encountered some turbulence as the left turn was initiated about 30 nautical miles northeast of Myton and engine nozzles were 87, 90, 92, 94, 92 and 95. At Mach 2.3, 56,300 feet the Tt was 313°F. The glare from Al's helmet face plate was so bad he commented he could hardly see the instrument panel. At this time I noted P_2 hydraulic quantity was down to 160%. Near T 0746, I reported a total fuel of 110,000 pounds which was at least 15,000 pounds less than we had planned at the half way point in the turn to Malad City and Bonneville.

b. T 0747, Mach 2.4, 58,500 feet and Tt 350°F. The angle of yaw was zero in the turn. All engine and auxiliary drive subsystem (ADS) vibration levels were between 20% and 25%. Manual temperature selector was reduced to 10:30 position. Shock position needles were controlled in an oscillating mid green area. Standby attitude indicator was now 30° left bank and the primary was 20° left. At 60,000 feet in the left turn we failed to accelerate and with good shock position and control I proceeded to take some out of the cockpit pictures with a movie camera. It was easy to shoot with one eye and keep the other one on the shock position indicators. There had been no master caution light problems since the initial climb out. T 0751, nozzle positions were about 90% with No. 6 at 95%. P_2 hydraulic quantity gage was now holding steady --- no leakage indicated. At T 0752, the fuel totalizer

was 97,000 pounds. As we continued the left turn near Malad City the speed was 522 KIAS and we had experienced some turbulence. Al reported some kicking in the rudder pedals.

c. T 0754, over Malad City, 100 miles north of Bonneville the Mach was 2.45 as we rolled out on 175° heading. Fuel totalizer was 91,500 pounds. T 0756, Mach 2.5, 525 KIAS, 61,500 feet and Tt 387°F. As we passed Bonneville I recorded fuel totalizer at 85,000 pounds just 20,000 pounds short of planned. There was an occasional high frequency rudder buzz felt in the rudder pedals. P_2 hydraulic quantity was now down to 145%. T 0759, Mach 2.52, 550 KIAS, 62,700 feet, Tt 394° and some turbulence. T 0803, 2.56 Mach, 510 KIAS, 65,000 feet, Tt 428°F. There was a bit of bouncing around and we lost a little altitude. P_2 fluid level continued to drop slowly and was now 135%. T 0805, EGT's 805, 817, 820, 820, 805, 815 and A_8's 97, 89, 90, 91, 91, 95.

4. (C) Inlet Data Taken on Straight Away:

At T 0805, C/N 3864 between Mach 2.58 and 2.6 normal performance, auto throat data was taken with shock positions in mid to top yellow. At Mach 2.59 top of green shock data was recorded. P_2 hydraulic quantity was 125%. Bottom of green shock data was taken with throttle angle (T/A) 100°. We went to low performance on the inlet to get stability and control data. (See Inlet portion of this report for details).

5. (C) Stability and Control:

I controlled the shock position in the bottom of the green as Al turned pitch augmentation off --- we were 110 miles north of Needles. At C/N 4102, a pullup and release was completed. We noted a few small rivulets of fluid running up the center outside windshield near where the tape peeled off. A windup turn to the right caused us to lose speed down to 2.52 Mach. With full throttle Al applied full right rudder to 1-1/2° left sideslip and released at C/N 4231. All FACS were turned off to record data in a yaw maneuver. Al selected the bob weight to free but the indicator hung up at locked until I tapped it. The maneuvers and low performance inlet caused us to lose speed to 2.43 Mach. This wasn't entirely bad as the fuel totalizer was approaching 50,000 pounds and the P_2 fluid level was now down to 100%. We made a right turn for Edwards, Mach was 2.4 and P_2 quantity continued down --- now at 95%. With augmentation off and bob weight free a yaw maneuver was completed at Mach 2.4 and 59,500 feet. FACS were again turned on and the bob weight was locked.

6. (C) Deceleration and Descent:

Near T 0820 the P_2 fluid level seemed to drop faster and at 60% A1 set MIL power. The inlet was in low performance and I controlled the shock positions in the bottom of the green. Engines were looking O.K., P_2 fluid level was 30% as we passed through 56,000 feet at 520 KIAS and 2.2 Mach. We passed nearly directly over the base on a northwesterly heading. Winds on the surface were reported 210° at 14 to 18 knots. At Mach 1.9 I pulled the shocks in the XXXX and selected normal performance on the inlet. A1 set a T/A of 40° and continued descent at 410 KIAS. At 51,000 feet, Mach 1.65, the P_2 fluid level was 35% and appeared to be holding. We went north to Owens Lake and turned right for Edwards after receiving clearance through R 2505. At Mach 1.4, P_2 near 20%, C/N 5139, we raised the wing tips to half. The rpm lock up switch was selected to release and the bypass areas closed to 400 square inches. At Mach 1.25, 42,500 feet, P_2 was 15%, so, as suggested by Milt Loomis, A1 turned Roll and Yaw 2 augmentation off since they use the P_2 system. At 330 KIAS, C/N 5285, the wing tips were selected up and very near Mach 1.0 they indicated up. The bypass doors were closed and secured and the windshield was put down. Near Mach .98 the fuel totalizer was 37,000 pounds and P_2 fluid level at 15%. I tested the engine and ADS fire detection lights in light turbulence and they were O.K. Turning the anti-collision light on and off soon gets to the "ole" left arm --- sure wish it was in a handier location. Just below 33,000 feet, the P_2 quantity hit the empty mark. Although the P_2 hydraulic system pressure and status lights were still O.K., A1 decided to go straight in and land on lake bed runway 18. Wind was 210° at 12 knots. Fuel totalizer was 36,000 pounds and the sump level was 23,700 pounds. P_2 system pressure was 3,750 psi and all status indicators were green.

7. (C) The Landing:

Flare speed was 189 KIAS. At 270 KIAS, C/N 5623, the gear was extended and checked O.K. I noted the left main gear light came on green, went out for a second and came back on. I jiggled the gear handle and the light went off and on. Within a few seconds it went steady green and I couldn't get it to flicker again. After gear extension the Utility 1 (U_1) fluid level was 105%. At a fuel totalizer of 35,000 pounds I turned tank No. 6 pumps switch on for 2 minutes. The flaps extended normally. AUX COOL had been on 2 minutes so I turned the REFER OFF on the long final approach. At 235 KIAS the master caution light was triggered on by the sump low light near 21,000 pounds. Don Sorlie called out "50 feet" as A1 approached the flare on lake bed runway 18. I observed touchdown at 181 KIAS, chute deploy

at 164 KIAS and chute jettison at 78 KIAS. Landing was at T 0843. Taxiing in we shut down engines No. 5 and 6. The P_2 system pressure remained up until shutdown. As indicated, the leak was a slow one on the No. 6 engine primary hydraulic pump.

8. (U) Cabin Temperature Control:

a. At Mach 1.7 I pushed the crew air shutoff handle full down and went manual full cold on the temperature rheostat. At 1.97 Mach Al complained that his hands and legs were cold and to stop the cold air he had his vent shut off. At that time I did not change the temperature selector. About T 0741 I increased the manual temperature control knob from full cold to the 10 o'clock position. Later, near Mach 2.3, the cockpit was still cool so I increased the knob position to the 12:30 or 1:00 o'clock position. The cabin temperature started to increase after being at Mach 2.4 for a few minutes and at Al's request I moved the knob to the 10:30 position. It continued warm so I backed it off to, I think, the 9:00 o'clock position. Still at Mach 2.4 and some five minutes later it continued to be warm and I turned the selector to the first white mark above the minimum position. Just over 2.5 Mach at 64,000 feet, my helmet face plate fogged up a bit as a result of the cold air blowing on it from the outlet --- I went from half to full face plate heat. No further complaints or adjustments were made to the controls in flight. While taxiing on AUX COOL we both thought it was a bit on the warm side in the cockpit.

b. I guess if I were to summarize I'd say the 9:30 to 10:00 o'clock position would be a good one to try as a manual temperature selection on the next flight.

c. A numbering system for the selector positions would be a helpful idea.

9. (C) The Inlet:

a. During the inlet check prior to engine start, it was discovered that the bypass door open caution lights were inoperative. The throats were biased as follows:

	Left Throat	Right Throat
Manual Wheels Set	2.49	2.455
Electric Switches Set	2.4	2.4

Data were taken and the manual wheels rolled aft until the counters stopped --- at this point I marked the wheels with an orange grease pencil.

b. Near Mach Numbers 1.0 and 1.4 I opened the bypass areas to 200 and 400 respectively. At 1.7 Mach the throat mode switches were placed to AUTO and the counters responded immediately to 1.7L and 1.74R but soon changed to 1.67L and 1.7R. At 1.86 Mach the throat counters were 1.9L and 1.86R and although I had not moved (at least intentionally) the bypass wheels the areas were 430 square inches left and 400 square inches right.

c. At Mach 2.0, 48,500 feet, I increased the bypass areas until I observed the shock positions at the top of the red at 710 square inches left and 750 square inches right. In the yellow at 820L and 850R. Passing Milford I continued to increase the area to obtain XXXX and as the right shock position hit the top of the green area it dropped into the bottom of the white and the left needle started nervous oscillations in the XXXX area. The left needle fluctuated from XXXX to white at 1050 square inches and the right was steady at the bottom of the white at 1030 square inches. Near Mach 2.09 and 50,800 feet the auto throats were 2.01L and 2.03R. Data were taken as we accelerated slowly with the shock positions as settled as I could get them. It was impossible to stabilize the shock positions in the XXXX since the left needle oscillated nervously and the right bottomed out in the lower white. I closed the bypass areas to move the shock position indicators to the top of the green. The left needle was still nervous but much better than it had been on my previous flights. The right needle was steadier and could be controlled much easier. At Mach 2.10 the auto throats were 2.02L and 2.05R with bypass areas 990L and 950R holding shock position in the top of the green. I decided to try and hold the top of the green on shock position as the needles were more stable there. If I moved the shocks in mid green it would frequently drop low and oscillate wildly. Near Mach 2.17 and 55,000 feet the auto throats were 2.11L and 2.13R. Shock positions were at top of the green with areas 850L and 820R. The shock position needles were fairly steady in the top half of the green but if I didn't continue to close the bypass doors slowly the shocks would drift aft and eventually they would drop fast and dance around in the bottom of the white and near the XXXX area. At Mach 2.3 the auto throat positions were 2.24L and 2.26R as I set update position 3. In the left turn near 20° bank I held the shocks in the top of the green but the needles still danced around a bit. Bypass areas were 700L and 670R. The shock needles drifted forward and were steady in the yellow so I opened the bypass areas some 20 square inches and they dropped into the green.

d. At Mach 2.4 the auto throat positions were 2.35L and 2.36R. Bypass areas were 660L and 640R. The sideslip indicator was being held at zero yet the shock position needles were oscillating from green to yellow and I had to open the bypass to maintain an average of mid green. Both shock position needles continued to oscillate from bottom yellow to mid green with bypass areas 660L and 640R as we continued the turn at 2.4 Mach. Data Control reported duct pressures looked very stable with some oscillations at times. The shocks continued to creep forward and hold steady in the yellow so I opened the bypass to 670L and 660R. With one eye on the throat schedule and shock positions I used the other one to take some pictures with a movie camera. Rolling out for Bonneville over Malad City the Mach number was 2.45, throats were 2.45L and 2.41R. Shock positions were steady at the very top of the green. At Mach 2.48 the throats were 2.44L and 2.45R with bypass 580L and 560R.

e. At Mach 2.5 the bypass areas were both 580 square inches to hold the shock positions in the top of the green. Mach 2.52, 550 KIAS, 62,700 feet, the shock position needles were nervously dancing in mid green at 530L and 530R but they never got to the bottom of the green. The throats were holding like a charm in AUTO. We lost a bit of altitude after reaching Mach 2.58 and 65,000 feet so I maintained the shock in the top of the green with bypass areas 480L and 480R. I placed the manual throat wheels to the 2.3 position.

f. At Mach 2.58 the engine EGT's and A8's were recorded and data was turned on at C/N 3864, T 0805 to get mid yellow shock position data. Throats were 2.55L and 2.55R with bypass 440L and 440R. The left needle was very steady in the yellow but the right one oscillated about a needle width. A1 reduced throttle angle a small amount. Both shocks moved up near the bottom of the red. At 2.6 Mach the throats were 2.55L and R and bypass 440 square inches L & R. We took a good data run in the mid to top yellow. At C/N 3928, I opened bypass 20 square inches L & R to place shocks in top of the green. A1 called out a throttle angle at 93°, Mach 2.59, throats 2.54L and 2.55R. The bypass areas were 470L and 480R and the shock position needles were at the top of the green. A1 increased T/A to 100°. At C/N 3982, I opened the bypass to get bottom of the green data. Control in bottom of the green was nearly impossible because of heavy shock position needle oscillation. Data was turned off at C/N 4010. I opened the bypass areas to 560L & R to draw the shock aft to XXXX and on to 660L & R as we felt a little rumble and I went to LOW with the inlet performance switch. Without change of the bypass as the throats opened, the shock positions moved forward to the bottom of the green.

Throat schedule Mach was 2.40L and 2.37R. I controlled the shocks in the bottom of the green. During the 1-1/2° left sideslip (full right rudder) the left shock position needle went forward into the yellow and I opened the left bypass area 100 square inches to draw it back even with the right shock needle.

g. With P_2 fluid level dropping faster between the 80% and 50% values, we started a MIL power descent. I stayed in LOW performance and maintained the shock positions in the bottom of the green as we slowed and let down. At Mach 1.9, I opened the bypass areas to draw the shock positions in the XXXX and went back to normal performance on the inlet. I continued to control in the XXXX and the throats were 1.7 Mach. At Mach 1.7, I held the shocks in the XXXX in case of engine trouble and moved the throat wheels back to the orange wheel marks. (The ones I made when the counter stopped driving near 1.68 during the preflight bias). At Mach 1.6, I turned the throat switches off. At Mach 1.4, I closed the bypass doors to 400 square inches. At Mach 1.0, I closed the bypass doors all the way and turned the mode and standby switches to OFF. This brought to a close a very enjoyable and highly successful inflight experience with the inlet, its controls and indicators.

h. A summary of the inlet observations:

(1) The throat automatic control and counters gave an excellent performance.

(2) The left shock position needle oscillated more than the right one.

(3) Both shock position needles were very unstable below mid green.

(4) Control in XXXX was not possible due to oscillations of the needles and bottoming out in lower white to top of XXXX areas.

(5) Shift from NORMAL to LOW and back to NORMAL performance was completed with ease.

(6) Manual wheel control of the bypass doors may not be optimum but is considered satisfactory.

10. (U) Maintenance Discrepancies:

a. Left and right bypass door open lights did not operate.

b. No. 6 engine high vibration light came on the first time MIL power was set.

c. Master caution light came on twice during early portion of the flight with no apparent cause.

d. A piece of tape came off the lower right hand forward corner of the center outer windshield.

e. P_2 hydraulic quantity dropped to zero in flight.

f. Left aft pilot's side window fogged over after landing.

VI. (C) CONCLUSIONS:

1. (C) Flight 1-13 was successful. Stability and control, AICS and engine data were obtained. Maximum speed and altitude were Mach 2.6 and 65,000 feet. Maximum indicated total temperature was 429°F at 570 KIAS.

2. (U) Success of this flight gave no proof to substantiate the old adage of "Unlucky 13."

3. (U) The briefings, preflight inspection, maintenance records, aircraft condition, and all details of flight preparation were exceptional, comfortable and timely.

4. (U) Systems performing successfully were as follows:

Engines	Fire Detector (Eng. & ADS)
Fuel	IFF
Landing Gear	Environmental
Brakes	Flight Instruments
Flaps	Oxygen
Instrumentation	Wing Fold
Electrical	TACAN
Communication	AICS
Drag Chute	Nose Ramp

5. (U) Manual control of the fuel system and empty tank monitoring causes excessive workload for the copilot.

6. (U) Structural buckling of the honeycomb face sheet within the left inlet duct occurred in an area of poor bonding between the core and the face sheet.

7. (U) The flight was prematurely concluded and a lake bed landing made because of P_2 hydraulic fluid leakage.

8. (U) Cross-talk, poor radio reception, and radar plotting board failures were experienced in Data Control (Bldg 3940) for a large portion of the flight.

9. (U) Brake chatter, although somewhat reduced, was still objectionable.

10. (U) The nose wheel steering was not as effective when turning to the right as to the left.

11. (U) Glare caused by reflections on the pressure suit face plate severely restricted instrument panel and forward visibility when flying into the sun.

12. (U) The cockpit voice tape recorder was inoperative.

13. (U) The Cook 1 amp relays in the master caution light circuit were still unreliable.

14. (U) The anti-collision light switch is located too far aft to permit comfortable operation.

15. (U) Cockpit temperature rheostat positions are not identified. Accurate setting or recording of position is difficult.

16. (U) Drag chute (two 28 foot chutes) operation was satisfactory.

VII. (U) RECOMMENDATIONS:

1. Modify the cockpit tape recorder as necessary to provide good quality tapes and reliable operation.

2. Provide fuel tank empty caution lights to reduce copilot workload and protect fuel pumps from prolonged dry tank operations.

3. Determine the cause of the apparent lack of authority of the nose wheel steering during right turns.

4. Continue investigation to eliminate brake chatter.

5. Mark the cockpit temperature rheostat positions so that specific settings can be identified.

VIII. (U) NASA SUPERSONIC TRANSPORT TESTS AND INSTRUMENTATION SUMMARY:

1. Landing Gear Instrumentation and Cameras:

By NAA request the landing gear cameras were loaded with color film and used to record the lift-off. Rate of sink data was obtained for the nose gear and the left main gear; the right main gear arm; however, failed to unlock.

2. Cabin and Ballast Bay Microphones:

Internal noise data were recorded during the acceleration from Mach .95 to 1.4 at 32,000 feet. The cabin recorder was turned on when the aircraft reached Mach 2.6 at 65,000 feet and was left on for the remainder of the flight. This data has not yet been analyzed.

3. Velocity Acceleration Altitude (VGH) Recorder:

A good VGH record was obtained for the entire flight. A VGH recorder was installed in the B-58 chase aircraft prior to this flight to obtain comparative normal acceleration data during flight through turbulent air. Unfortunately the instrument in the B-58 did not get turned on.

4. Sonic Boom:

No sonic boom was recorded at the measurement site north of Edwards AFB because the XB-70 flew too far south of the station.

5. Runway Noise:

The engine noise during takeoff was recorded by seven microphones located adjacent to the EAFB runway.

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