INTERNAL LETTER

North American Aviation, Inc.

Date · 18 October 1965

TO · Roy Ferren
Address · Dept. 186, Bldg. 2
Los Angeles

FROM · A. S. White
Address · Dept. 186, Bldg. 2
Los Angeles

Phone · 3548

Subject · XB-70A Flight Report

Enclosed is the pilot's flight report for XB-70A flight No. 1-17.

A. S. White
Chief Test Pilot

ASW:jau

cc: Distribution List

PILOT'S FLIGHT REPORT

AIR VEHICLE XB-70A #1 (001) PILOT A. S. White

FLIGHT NO. 1-17 COPILOT Col. J. Cotton

DATE OF TEST 14 October 1965 FLIGHT TIME 1:47

CHASE AIRCRAFT AND PILOTS

Chase 1	-	TB-58 #662	-	Lt. Col. Fulton/V. Shepard
Chase 2	-	F-104 #315	-	Maj. Sorlie/DeLong (NAA Photo)
Chase 3	-	F-104 #817	-	Capt. McClay
Chase 4	-	T-38 #197	-	Capt. Livingston/Sgt. Lyons (AF Photo)
Rescue	-	C-130 #132	-	Col. O'Neal/Capt. Stroup
Helicopter		UH-1 #6100	-	Capt. Broughton

PURPOSE OF FLIGHT

1. To achieve Mach 3 at 70,000 ft.
2. Performance at 34,000 ft.

1.0 PREFLIGHT AND ENGINE START

The preflight and engine start phases were normal and satisfactory. The engines were started beginning at 0800. After engaging the nosewheel steering prior to taxi, it was discovered that the nosegear steering bushing was cracked. The bushing was examined by Landing Gear engineers and cleared for flight.

Because of the wind direction (220° 15-20 knots), the airplane was taxied to Runway 22. During the taxi-out, the brake chatter was moderate. During the stop on the runway, the brake chatter was light.

2.0 TAKEOFF AND CLIMB

The brakes were released at 0906 and max A/B selected immediately thereafter. Acceleration was good. The airplane was rotated at 195 KIAS and came off the ground at 210 KIAS. The hydraulics system and electrical system were checked and found satisfactory and the gear and flaps were raised. The wingtips were lowered to the one-half position at 320 KIAS and the climb continued to 32,000 ft. where the airplane leveled off for the acceleration. The nose ramp was raised after leveling off and prior to going supersonic.

At 1.25 Mn, 32,000 ft., a pitch damper caution light came on. The pitch augmentation power switch was turned off for approximately 10 seconds, then turned on and the damper re-engaged. Pitch augmentation was satisfactory for the remainder of the flight.

The tips were lowered to the full down position at 1.3 Mn and the climb was resumed upon reaching 575 KIAS.

The airplane was climbing and accelerating rather rapidly due to the cold temperature aloft. Just above Mach 2 the LEFT UNSTART light came on. The copilot switched the throat controls to manual and set the bypass doors for a restart. At 2.3 Mn everything looked satisfactory and the copilot went back to the automatic throat. The LEFT UNSTART light came on again. The airplane speed was maintained between 2.2 and 2.3 Mn at approximately a 70-degree throttle angle while an attempt was made to determine the cause for the unstart light. At one time when the light came on the pilots felt an airplane response which was interpreted as an unstart in the duct. Each of the other times when the unstart light came on there was no airplane transient. It was concluded that the unstart light was a malfunction in the light system and the acceleration and climb was resumed. During the time that the unstart light was coming on intermittently, the SET NOZ ALT light and CADS were flickering on and off, in turn causing the MASTER CAUTION light to flicker.

3.0 MACH 3 AT 70,000 FT.

The airplane was then climbed to 70,000 ft. and Mach 3 indicated. Just as the airplane reached Mach 3 a slight nose-up trim change occurred followed immediately by a nose-down trim change. This nose-down trim change was accentuated by the control motion used to counteract the nose-up trim change. The altitude immediately began to decrease and the Mach meter increased abruptly to 3.04 and the indicated airspeed increased from 514 to 530. The pilot attributed the trim changes to the action of the shock wave crossing the leading edge of the wing, which may or may not be the case. Since the airplane was descending into an area where the duct pressure limit could be exceeded, the throttles were reduced to a 90-degree throttle angle and the climb re-established towards 70,000 ft. The Mach meter peaked out at 3.04 on the pilot's side instantaneously and then decreased back to 3.0. As the airplane climbed back towards 70,000 ft., the indicated airspeed was decreasing; and at an altitude just above 69,500 ft., a loud bang and a very abrupt airplane disturbance occurred. Neither pilot could determine the cause for this disturbance and the pilot made the decision to decelerate. The reason behind this decision was that the pilot felt that the airplane may have sustained damage in exceeding the duct pressure limit envelope.

The normal deceleration was made back to 34,000 ft. and .9 Mn where a speed power point was accomplished with the wingtips at one-half and the windshield down. At the conclusion of this speed power point one of the chase airplanes caught up with the XB-70 and reported that a piece of skin was missing from the leading edge of the left-hand wing just out board from the mouth of the duct. It was decided at this time to abort the remainder of the mission and return to base.

4.0 APPROACH AND LANDING

The descent, approach, and landing were routine. The landing was made without the benefit of chase altitude callouts. The air was lightly turbulent and the wind was 15-20 knots and in line with the runway. After lowering the nosewheel, the drag chutes were deployed. All three chutes blossomed almost simultaneously, and it was not necessary to use brakes until the drag chute was jettisoned and the airplane was approaching the turn off onto the taxiway. During the taxi in, brake chatter was negligible.

5.0 SUMMARY

On this flight the XB-70 proved its capability of attaining Mach 3 at 70,000 ft!

There are two areas that need to be studied in the Mach number range above 2.8. First, the airplane buffets slightly all the way up to Mach 3. This sounds like the noise associated with driving at high speed in an automobile with a window open and can be felt in the airplane as a very light buffeting. The impression is that it might be an aerodynamic phenomenon around the cabin area. Secondly, upon reaching Mach 3, a very slight nose-up trim change occurred as if the shock wave was affecting the longitudinal trim of the airplane. Just after passing Mach 3, the longitudinal trim change appeared to go in the opposite direction causing the airplane to go nose down. The data in this area should be studied carefully so that the pilots can anticipate the trim change on subsequent flights.

The maximum safe Mach indicator is detrimental to the operation at Mach 3 rather than beneficial. This indicator should be indicative of the maximum allowable Mach number or maximum allowable total temperature, whichever is lower on any particular flight. In its present status it indicates Mach 3 unless the airplane is temperature limited; and therefore, in order to attain true Mach 3, the pilot has to violate a red line.

6.0 DISCREPANCIES

1. Inner windshield hazy.
2. Tank #6 tested 2 per cent on empty on #1 probe.
3. LH throat gear box (ind) sticky.
4. Standby indicator erroneous in roll.
5. LH unstart light on intermittently during flight.
6. NH_3 - H_2O light on during latter part of flight (NH_3 470, H_2O 1250)
7. P_1 pressure read 3350-3400 during latter portion of flight.
8. Aft engine cooling door closed on #6 engine bay at low speed.
9. Skin missing on left-hand leading edge.
10. Flap pressure caution light on after raising flaps (after landing).

11. Nosewheel door cracked open after landing
12. #6 engine hung up on shut down.
13. LH throat wheel at 2.45 when indicated at 2.40 Mach.
14. SET NOZ ALT and Air Data flickering at 2.2 and 2.3 Mach.
15. Pitch damper disengaged during flight. When recycled, it remained on.

A. S. White
Aircraft Commander

FTTP 66-8-7

INTERNAL LETTER

North American Aviation, Inc.

Date · 11 August 1966 (Revised)

TO · Roy Ferren
Address · Dept. 186, Bldg. 2
Los Angeles

FROM · A. S. White
Address · Dept. 186, Bldg. 2
Los Angeles

Phone · 3548

Subject · Pilot's Summary Report - XB-70A

The purpose of this report is to summarize pilot opinion of flying the XB-70A. In reading this report, consideration should be given to the fact that the combination of this airplane's size, weight, and speed ranges compares to no other airplane in existence; and that the program is primarily a research program in which, to this point in time, the ground rules have allowed only those changes which were necessary to safely accomplish the objectives. In the normal sequence of development of an operational airplane, many of the opinions and recommendations expressed herein would have been made after the initial airworthiness flights. They are presented now, for the record, and for consideration if improvements can be made for the follow-on program.

In general terms, the XB-70A is an interesting airplane to fly. It has some peculiarities due to the size, weight, and configuration that are different from most other airplanes. The movable wingtips introduce some new characteristics in this airplane that have not been experienced before, such as the wide variations in directional stability, roll power, and dihedral effect.

The airplane has a tremendous performance capability and is a thrill to fly from that standpoint, but this capability combined with the fact that the airplane is climbed and cruised very near the boundary of the allowable flight envelope make it possible for the airplane to get out of the envelope quicker and easier than any other airplane this pilot has flown. The duct pressure limits and the low allowable G aggravate the recovery. All this adds to the pressure on the pilot by requiring greater concentration on his part. This is acceptable in a research program of this nature, but would certainly not be acceptable in an operational vehicle. The potential for a great airplane is here, but some refinements are required.

More specifically, the pilot's opinions and recommendations are as follows:

GROUND HANDLING

Taxiing the airplane is not a difficult operation. Turns from one narrow taxiway to another narrow taxiway can be made with acceptable accuracy. However, parking the airplane in a precise location is difficult because of the restricted visibility, configuration of the airplane, and lack of repeatability of the nosewheel steering system; i.e., the nosewheel steering rate varies with the load on the nosewheel so that full rudder pedal application does not consistently give the same turning rate. Ground observers are required for parking, but their inputs are sometimes valueless due to the steering system's inability to follow their directions. Cooper Rating of 3.5.

Originally, the braking system was unsatisfactory at very low speeds. With development, the system has become marginally satisfactory. The airplane can be stopped without brake chatter as long as the pilot anticipates far enough in advance and applies the very light braking to make the stop. If an abrupt stop is required at low speeds, heavy brake chatter will result. Cooper Rating of 4.5.

IN-FLIGHT HANDLING QUALITIES

Low Speed

The pitch control in low-speed flight regime is very good. Some lack in airplane response can be detected during abrupt pitch maneuvers; however, the response is satisfactory in all of the normal maneuvers used in flying the airplane. The long period of the short-period oscillation is different from most other airplanes, but does not cause difficulty in controlling the airplane. The damping in pitch is good in the subsonic flight regime. Cooper Rating of 2.5.

The main difficulty in flying the XB-70 arises from a combination of characteristics in the lateral-directional sense. These characteristics are: First, that the period of the short-period oscillation is very long as compared to most other airplanes. Secondly, the side force per degree of sideslip is low in this airplane. This combination makes it difficult for the pilot to sense inadvertent sideslips. In addition to these characteristics, the airplane has a marked positive dihedral effect (particularly Ship No. 2) and it has excessive adverse yaw due to aileron. Considering these four characteristics together, it can be seen that an inadvertent sideslip can occur without the pilot being aware of it if, for instance, he is busy with other systems' operations. When this sideslip occurs, the airplane rolls due to the dihedral effect. Instinctive reaction of the pilot is to counteract the roll with aileron; however, the aileron input tends to increase the sideslip because of the high adverse yaw due to aileron. This increased sideslip causes more roll away from the aileron input and aggravates the situation. The solution is that the pilot must fly the sideslip or yaw indicator religiously throughout the flight regime. This general characteristic of the XB-70 is most predominant with the wingtips up. Cooper Rating of 4.5.

Placing the wingtips in the one-half position reduces the tendency for the situation explained in the previous paragraph to occur. The tendency is reduced because lowering the wingtips reduces the roll power by approximately fifty per cent, therefore reducing the yaw due to aileron. In addition, the tips-down configuration reduces the positive dihedral effect. Cooper Rating of 4.

The longitudinal trim system is very good. Cooper Rating of 2.

The lateral trim system is also very good, except that the primary lateral trim control is difficult to operate with a high degree of accuracy when the pilot is wearing heavy gloves. Cooper Rating of 3.

The directional trim system is very good after the gear has been retracted. It is too sensitive with the gear down, which causes the pilot to overcontrol when attempting to trim out directionally. Occasionally a pilot will encounter some difficulty when engaging the nosewheel steering system due to his inability to find the neutral directional trim position. For instance, the pilot may trim out directionally prior to putting the gear down; however, the trim system may not be exactly centered at this time. When the gear is lowered, this minor out-of-trim condition is amplified by a ratio of four to one, but still might not be detectable by feel to the pilot in turbulence. After landing, when the rudders are released and the nosewheel steering is engaged, an abrupt transient in the steering system may be encountered. It is recommended that consideration be given to reducing the directional trim rate and incorporating a rudder position indicator. Cooper Rating of 3.

The compatibility of the roll and pitch force gradients is satisfactory in this pilot's opinion; however, due to the large differences in the moments of inertia, the airplane responds much quicker in roll than it does in pitch or yaw. This is not considered to be a discrepancy against the airplane, but a characteristic of a very long, narrow configuration. It requires some getting used to by the pilots in order not to overcontrol in roll, particularly with tips up. This pilot does not believe that a change should be made in the response characteristics, but would like to see something done to reduce the adverse yaw due to aileron. This would eliminate the primary objectionable characteristic in the airplane. If the pilots did not have to be concerned about generating yaw with the aileron inputs, the fighter-like roll response of this airplane would not be objectionable. Control force compatibility--Cooper Rating of 3.

The trim change while operating the landing gear is negligible. The trim change while operating the wingtips is small and occurs at such a slow rate that it is hardly noticeable to the pilot since he takes care of it in the normal trimming of the airplane. The trim change due to operation of the flaps is large, but easily manageable with the trim system. Although the trim system will take care of the trim change, when the flaps are lowered the control column moves very near the forward end of its travel leaving very little usable down elevon for maneuvering, go-around, or flying in turbulent air. This could be extremely hazardous in the instance where the CG was farther aft than normal. It is recommended that design change be made whereby more down elevon control is made available with flaps down.

The airplane experiences moderate buffet at low speeds with the gear and flaps down. There is a minor change in the buffet level as the gear and flaps are raised. Some buffet persists and a high aerodynamic noise level exists until the airplane accelerates to .87 Mn or above, at which time the buffet completely disappears and the noise level is reduced to at least half of the low-speed level.

High Speed

Pitch control during the transonic accelerations and low supersonic speed ranges is very good. Above Mach 2 it becomes evident that there is some deterioration in the effectiveness of the pitch control. At speeds above 2.5 Mn, the force level required to maneuver the airplane is excessive due to the deterioration of effectiveness and due to the action of the "q" bellows. Cooper Rating of 3.5.

The directional control is adequate to take care of three engines out on one side condition, but is much less effective in producing yaw than the ailerons. Considering the capability of the rudders alone, they are considered adequate. Cooper Rating of 3. However, the powerful capability of the ailerons in producing yaw is considered the most objectionable characteristic in the airplane. Cooper Rating of 4.5.

The roll response of the airplane in the supersonic flight regime is good. The roll response does not seem to deteriorate at the same rate as pitch response, and therefore there is less compatibility in the response of the airplane between Mach 2 and 2.7 than in other areas. As the airplane approaches Mach 3, the roll response deteriorates somewhat and the yaw due to aileron input is reduced; therefore the handling qualities of the airplane in roll are better at Mach 3 than at any other supersonic speed. Cooper Rating for the roll control system is 3.5.

Although there are minor differences in the flight characteristics between 1.4 and Mach 3 with all augmentation off, the general characteristics are the same. The short-period oscillations in pitch and yaw are four to six seconds in length and the damping in pitch and yaw is relatively poor. The airplane can be flown at all speeds with the augmentation off, except that extreme care must be used in the use of ailerons because of the strong tendency to excite lateral-directional oscillations with the ailerons. This is due to a high roll rate in the unaugmented case and due to the excessive level of yaw due to aileron. When the pilots leave the ailerons alone, the yawing oscillations will damp. Unaugmented supersonic flight--Cooper Rating of 5.

VISIBILITY

The visibility is satisfactory with the windshield down. Although some forward visibility is lost after the rotation for takeoff and during the initial part of the climbout, the remainder of the subsonic flight is satisfactory. The visibility for landing is considered good. This pilot is not aware of any loss of runway visibility during the approach, flare, and touchdown. Cooper Rating of 3.

Visibility with the windshield in the up position is unsatisfactory. The pilot cannot see the horizon ahead and must make the flight almost entirely with reference to the instruments. Considering the poor quality of the pitch attitude indicating system and the poor quality of the heading information, precise heading, climb schedule, and altitude flying are extremely difficult. In addition, images of light-colored ground such as snow and sandy desert areas reflect badly in the windshield during turns, at times causing vertigo. Cooper Rating with the windshield up--5.

UNSTARTS

The inadvertent inlet unstarts encountered in the flight test program have varied in intensity from mild to severe. They are breath-taking, to say the least. In the case of a severe unstart, they jar the airplane rather violently and are followed by heavy buffeting, intense aerodynamic noise, and minor trim changes. At Mach 3, the primary trim change is in roll, but usually does not persist since the other inlet will normally unstart within a few seconds. If the inlet system does not effect an immediate restart, the inlet will go into buzz. The buzz cycle is immediately recognizable to the pilot since it is an almost purely lateral oscillation at about the natural frequency of the fuselage. If it is not corrected, it builds up in intensity to a very disturbing--if not destructive--magnitude. In spite of the severity of the transients caused by inlet unstarts, airplane control is considered good.

LANDING

The XB-70 is not a difficult airplane to land. Some care must be used due to the distance between the pilot and the main gear and due to the crew station height above the main gear at touchdown. Because of these dimensions, it is not hard to undershoot the runway; but after some practice, all the pilots are able to make satisfactory landings without external assistance from the chase aircraft.

The wing of the XB-70 experiences a strong ground effect in the proximity of the runway which helps considerably in making relatively smooth landings. The secret to a good landing, like in most airplanes, is a good stabilized approach using a rather low rate of descent (two to three degrees glide slope).

Crosswind landings in the XB-70 are not as difficult as was predicted. The relatively shallow bank angle per degree of sideslip makes the wing-down technique rather easy to use with the XB-70.

Landing in turbulent air requires additional pilot concentration, primarily due to the previously mentioned relationship between inadvertent sideslip, dihedral effect, and yaw due to aileron. The pilot is required to watch the yaw indicator very closely in making an approach so as not to get into this inadvertent sideslip condition close to the ground. Landing Cooper Rating--3.5.

COCKPIT CONTROLS, COCKPIT LAYOUT, AND SYSTEMS OPERATION

Capsule

The pressure seals in the capsule doors have been torn loose many times when the pilots enter the capsules. Entering the capsule, particularly when the pilot is wearing a pressure suit, is very difficult due to the lack of space. The seals should be guarded so that they are not damaged in this way.

The original installation of the capsule handgrip seat pins included a lanyard and a take-up reel which were installed behind the pilot's shoulder. A large percentage of the time the take-up reel did not operate; and when it did operate, the pin was extremely hard to reach to reinstall after flight. A temporary fix was made by cutting the lanyard, thereby eliminating the take-up reel. This works satisfactorily, except for the minor inconvenience of not having a place to stow the pin.

The emergency parachute and riser cutter handles and the hinge split handle are difficult to see when encapsulated. When the pilot raises his head to see these handles with his helmet on, he must raise his helmet with his hand in order to see past the brow of the helmet. This is particularly true when the pilot is wearing a pressure suit and would be aggravated under the dynamic conditions encountered after ejection.

The pressurization and capsule oxygen gages are particularly hard to see once in the capsule.

The safety belt is almost impossible to adjust after it has been fastened.

The seal deflate button is very difficult to actuate due to its location when the pilot is wearing a pressure suit.

The hot mike interphone capability during encapsulation is operable only after the capsule doors are closed. It appears wise after the recent ejection to actuate the hot mike in another way in addition to the door closure. It should be connected to the handgrips so when an encapsulation is made, the hot mike interphone is available even if the doors are not closed.

The manual impact attenuator inflation device is extremely difficult to get to while encapsulated. It is recommended that some thought be given to relocating this device between the pilot's knees for easier access.

The Secondary Nozzle Rheostat

This rheostat is in a poor location considering the number of times it is used during the flight. It would be desirable to move it forward in the area near the oxygen and visor heater switches.

Hydraulic Pump Status Indicators

The hydraulic pump status indicators have become almost useless in view of the number of times that the pump status indicators show yellow with the pump operating properly.

Nosewheel Steering System

The nosewheel steering engage button ideally should be mounted on the control wheel. Originally this was not done because of lack of space on the wheel. The pilots believed that the augmentation disengage switch should have the priority location on the control wheel. The experience gained in the flight test program indicates that it would now be satisfactory to move the augmentation disengage switch to the same area as the augmentation engage button on the console and put the nosewheel steering engage switch on the control wheel.

TACAN

The TACAN instrumentation on the XB-70 is only marginally satisfactory. Early in the program the pilots were requested to list the minimum equipment with which they could accomplish the mission, and one TACAN set was suggested for navigation. Experience has now shown that without radar tracking and the occasional assistance of the FAA centers, some of the missions would have been extremely difficult to complete satisfactorily due to the quality of this equipment and installation.

Attitude and Heading Information

The attitude and heading information presented to the pilot are marginally satisfactory. This adds to the pilot's difficulty in navigating the airplane. In view of the above two conditions, it is highly desirable to have a more reliable navigation system. An inertial platform is highly recommended.

AICS Controls

The AICS controls were satisfactory for the development stages, although the controls in Ship #1 are minimum satisfactory. It is highly recommended that this system be reviewed for future use.

Flaps

The flap system is marginally satisfactory. Because of a design problem, the flaps have to be raised for the taxi and lowered just prior to takeoff in order to ensure that they will retract in flight. Occasionally they have not extended for landing, and occasionally they will not retract after landing. The result is that the pilots have lost confidence in the flap system. It is recommended that a design change be made to eliminate the necessity of the intricate procedure that is now required to operate the flap system.

Map Case

The map case is almost inaccessible to the pilots. In most cases the pilot would have to get out of his seat to get the equipment out of the map case. Although the map case is of little use to the pilots, it is the only place in the cockpit that extra material can be stored. Check lists and pilots' data cards must be strapped to the pilots' legs to be of any use. Some consideration should be given to a more convenient stowage space for let-down charts, handbook, and additional maps--particularly if this airplane is to be used for cross-country work in the future.

Wingtip Selector Switch

If the flaps are lowered for the landing prior to raising the wingtips to the up position, it is possible to lose control of the airplane. It is recommended that a safety device be installed to prevent lowering the flaps when the tips are not in the up position.

SUMMARY

The XB-70 has proven itself to be a very remarkable airplane. It has accomplished every milestone that was set down for it. No aerodynamic changes were required in order to achieve the objectives; but in spite of its tremendous performance, the XB-70 is an unfinished airplane. It was operated in a completely new speed and altitude range, but with off-the-sheld navigation equipment and flight instrumentation that is obsolete for this type of flight operation. This pilot believes that with normal development, including some aerodynamic refinement, some system changes, and better instruments and navigational equipment, this would be a truly outstanding airplane.

A. S. White
Chief Test Pilot

ASW:jau

cc: Swanson, Stroh, Spivak, Stacey, Schoch, Shepard, Ince, Kemp, Rogerson, Peterson, Fero, Melton, Matteson

B-70

Flight Log for XB-70A, Nr. 2, Jul 65-Jun 66

Flt Nr.	Date	Pilot	Co-Pilot	S.Sonic Hours	Flight Hours	Maximum Altitude	Maximum MPH
1	17 Jul 65	Mr Al White	Col Joseph Cotton	:21	1:13	42,000	935
2	10 Aug 65	Cotton	White	:31	1:27	41,000	950
3	18 Aug 65	Mr Van Shepard	White	:44	1:58	46,000	950
4	20 Aug 65	Fulton	White	:41	2:04	42,000	950
5	17 Sep 65	White	Fulton	1:00	1:55	50,500	1200
6	29 Sep 65	White	Shepard	:32	1:44	54,000	1460
7	5 Oct 65	White	Shepard	:31	1:40	55,000	1520
8	11 Oct 65	White	Shepard	1:18	1:55	57,500	1550
9	16 Oct 65	White	Fulton	1:12	1:43	59,500	1600
10	26 Oct 65	White	Fulton	1:11	2:07	59,000	1620
11	2 Nov 65	White	Cotton	1:20	1:54	59,000	1610
12	29 Nov 65	White	Fulton	--	2:19	15,200	370
13	1 Dec 65	White	Fulton	1:24	2:02	64,000	1765
14	3 Dec 65	White	Cotton	1:14	1:55	69,000	1900
15	11 Dec 65	White	Shepard	1:16	2:03	70,600	1940

Flt Nr.	Date	Pilot	Co-Pilot	S.Sonic Hours	Flight Hours	Maximum Altitude	Maximum MPH
16	21 Dec 65	White	Cotton	1:20	1:49	72,000	1945
17	3 Jan 66	White	Cotton	1:22	1:52	72,000	2010
18	12 Jan 66	White	Cotton	1:24	1:48	72,000	2020
19	7 Feb 66	Shepard	Cotton	1:03	2:11	42,000	960
20	9 Feb 66	White	Cotton	1:09	1:49	70,800	2000
21	16 Feb 66	White	Cotton	:02	3:06	32,000	720
22	17 Feb 66	White	Cotton	1:23	1:47	73,000	2000
23	10 Mar 66	White	Fulton	1:25	1:56	67,000	1820
24	15 Mar 66	White	Fulton	1:33	1:59	69,500	1880
25	17 Mar 66	Fulton	White	1:27	1:52	70,350	1880
26	19 Mar 66	White	Shepard	1:30	1:57	74,000	1930
27	24 Mar 66	Fulton	White	:47	1:32	64,000	1600
28	26 Mar 66	Cotton	White	--	3:09	36,000	--
29	29 Mar 66	Shepard	White	1:25	1:51	48,000	1090
30	31 Mar 66	Shepard	White	1:20	2:10	72,000	1950
31	4 Apr 66	Cotton	White	1:30	1:57	73,000	1940

Flt Nr.	Date	Pilot	Co-Pilot	S.Sonic Hours	Flight Hours	Maximum Altitude	Maximum MPH
32	8 Apr 66	Fulton	White	1:09	2:05	73,000	2000
33	12 Apr 66	White	Cotton	1:17	1:49	72,800	2000
34	16 Apr 66	White	Cotton	1:03	2:01	71,000	2000
35	23 Apr 66	White	Cotton	1:22	2:01	66,000	1800
36	26 Apr 66	Fulton	Cotton	1:17	2:05	65,500	1760
37	30 Apr 66	White	Cotton	--	2:16	16,000	--
38	16 May 66	White	Cotton	1:11	2:09	65,000	1800
39	19 May 66	White	Cotton	1:31	1:59	72,500	2000
40	22 May 66	Fulton	Cotton	:25	2:22	36,500	960
41	25 May 66	Shepard	Cotton	:49	2:23	42,000	1065
42	27 May 66	Shepard	Cotton	1:17	2:08	62,000	1640
43	31 May 66	Shepard	Fulton	1:12	2:02	57,000	1455
44	4 Jun 66	Shepard	Cotton	1:20	2:05	70,000	1930
45	6 Jun 66	Shepard	Cotton	1:15	2:00	72,000	2000
46	8 Jun 66	White	Maj Cross	:14	2:13	32,000	940

Mid-Air Collision - Aircraft crashed