Interview with Joseph S. Algranti
3/15/68 and 3/28/68

I came to work for MSC in August 1962, shortly after it was determined that an independent Aircraft Operations Office was to be set up to support astronaut flight training at EAFB. Previously, I had been a research pilot for NACA at Lewis from 1951 through 1959, and with NASA at Langley from 1959 until my association with MSC.

I feel that I ended up at Houston due to my association with two men who were intimately associated with the early phases of the manned space flight program--Warren J. North and Walt Williams. I had flown with Warren for a number of years while we were both research pilots at Lewis, and after his tour at NASA Headquarters, he organized and was put in charge of what is now known as the Flight Crew Support Division, the functional organization responsible for all astronaut training programs.

Walt Williams was then Deputy Director of the Center, and previously had been Director of the Flight Research Center at Edwards Air Force Base. Astronaut flying at Langley during the Space Task Group period was a sort of catch-as-catch can operation and also fairly unsatisfactory for the military pilots assigned. After a short period, this became obvious and arrangements were made for the Mercury astronauts to fly with the 48th Fighter Interceptor Squadron at Langley Air Force Base. Being as the astronauts were military pilots and desirous of keeping their piloting skills intact, they had always expressed a desire to remain current in high performance aircraft. Initially, they flew F-102's and later transitioned to F-106's when they became the prime aircraft for the interceptor squadron at Langley. They

also flew T-33's with the base flight group at Langley.

With the move of the Space Task Group to Houston, a number of people at the Center served in a coordination role with both local Air Force reserve, the Air National Guard personnel at Ellington, and the Air Force Systems Command Headquarters people to set up a flight training operation for NASA astronauts. The problem in 1962 was minor compared to now. There were then only 6 active pilots, as Col Glenn had more or less decided to retire from the program and was not flying the Langley aircraft. Initially, arrangements were made in early 1962, to borrow four F-102 aircraft and two T-33 aircraft through Air Force Systems Command. These arrangements were worked out by Mr. North and D. Slayton and an Air Force Captain, Jim Brickel, attached to North's division at the time. I had made some trips through Houston during the summer of 1962 and discussed the operation with both Mr. North and Mr. Williams, and when it became obvious that NASA was going to set up an operation at their request, you might say I "volunteered" for the job.

The two T-33's had been assigned at Patrick AFB to support the Mercury pilots and were being maintained by the base flight group at Patrick. The T-33's were assigned, but because of the lack of facilities and maintenance people, were being held until NASA could set up a facility and develop a maintenance capability. Through a series of coordination meetings, the people at Kelly Air Force Base consented to get the program started by detailing a group of maintenance technicians from Kelly to EAFB until NASA could get a maintenance contractor on site. Also, facilities had to be provided, and we got these in September 1962, in the form of the Coast Guard hangar. We began a modification program on

hangar 276 to make it suitable and transferred the Patrick T-33's to Houston.

Our F-102's were at ~~Curran~~ AFB and our TF-102's were in the depot at Mobile. Through a series of ferry flights we finally assembled all of our astronaut airplanes at EAFB early in September 1962, and started operations.

At the time, we only had six Mercury pilots, and I had one quality control man, one secretary, and a 12-man contractor team. Our size and function was to be determined by the number of astronaut pilots to be supported, and with the selection of 9 additional astronauts in October 1962, we already had a shortage of aircraft. I arranged to borrow another T-33 from Langley, which had recently been retired. I had picked it up and ferried it back to Houston during Wally Schirra's Mercury flight. Later, more airplanes were added to our inventory to support pilots through various loan agreements with the USAF, and with the increasing number of pilots and flying hours logged, a major milestone was achieved when NASA finally began programming dollars for aircraft purchase and to support a sizeable operation that was beyond the scope of what was originally supported by the US Air Force Systems Command.

NASA Headquarters and MSC made the decision that to be suitable for astronaut training, an aircraft had to be supersonic, multi-place, and multi-engine, and in production. This immediately limited our choice of aircraft to the F-4 and the T-38, and for obvious economic reasons the T-38 was chosen. To start our program, the Air Force lent NASA 5 T-38 aircraft.

In early 1964, and with delivery of each of our new aircraft, our F-102's were returned to AF inventory. Also in 1963, NASA Headquarters decided that for flexibility in travel that the manned spaceflight centers needed some administrative transport aircraft and three Gulf Stream I aircraft were purchased - one for Houston, one for Marshall, and one for NASA Headquarters (which was based at Langley). Our aircraft designated NASA-2, was placed in service in April 1963, and added considerably to the workload and responsibilities of NASA personnel.

The original NASA T-38 purchase was for 15 aircraft, but as Headquarters began programming required crew members for Apollo flying, even in 1963 and 1964 it was obvious that the number of active astronauts in 1968 would be somewhere between 45 and 60, and the purchase of T-38's was increased to 25 airplanes to support this number of pilots. These predictions proved quite accurate. In 1964 it was proposed that simulated lunar landing training be provided in a dynamic free flight vehicle. The initial design and manufacturing work was immediately undertaken by Bell Aerosystems. This put an additional requirement on NASA-MSC aircraft operations as it meant that the astronaut pilots would have to have VTOL flight training as the lunar landing research vehicle was a jet VTOL aircraft. Arrangements were made to borrow a small Navy helicopter to support this program.

As the number of aircraft and astronauts continued to increase, additional research flying requirements developed in the field of the LM radar systems, which led to the acquisition of NASA 926 - a Convair 240-A that had been operated by Laboratory for Electronics under a Wright Patterson AFB lease-purchase plan. Later on this aircraft was converted to support

of the earth resources survey program and it was augmented in 1965 by the acquisition on loan from the Navy of the NP-3A NASA 927, a Lockheed Electra. These aircraft are mainly used in development of electronic systems for eventual spaceflight applications in advanced Apollo programs. The NASA MSC aircraft inventory tends to increase with the number of astronauts and at present we have 44 astronaut pilots, eleven scientist astronauts who are in flying school, eight NASA pilots in addition to myself. The Aircraft Operation Office is responsible for the administrative transport, the LM radar test aircraft, the Bell Training Helicopters, and the T-38 and T-33 astronaut aircraft. These aircraft all fly a very high number of hours and require extensive periodic maintenance. In addition, there is much routine maintenance test flying, ferry operations, and occasional test activity for modifications done in support of MSC-generated research programs. Our present maintenance contract is now manned to the level of about 200. We have 42 active vehicles including the lunar landing research vehicles and we are presently flying around 1,000 hours per month. To make the story complete, a detailed list of dates of acquisition and disposal of various aircraft should be compiled. A list of the various astronaut selection programs and the numbers should be correlated and various milestones in the operation documented. I don't have all of these at my finger tips but they are readily available in the Aircraft Operations Office records. Our contractor performs major modifications and extensive routine maintenance and is monitored by the Aircraft Quality Assurance Office under Mr. Dick Lucas, who presently has 23 research aircraft inspectors under his supervision. Our 8 NASA pilots (other than

myself) work under the direction of Mr. Bud Ream, also an ex-Langley and -Lewis Research pilot, and who transferred to MSC early in 1963.

Maintenance on MSC aircraft on the road is a very large problem with us. We have about 38 airplanes traveling constantly. They cover the entire United States and the earth resources airplane and the Gulfstream travel outside of the country. Our main concern of course is the astronaut aircraft and as a result of some recent military safety surveys, we have altered our turnaround procedures at Patrick and Los Angeles, our two main bases of operation. We do many things quite differently on our aircraft here than the ordinary military operation, and for this very reason and because we only dispatch aircraft in what we consider to be first class condition (especially in regard to tires and other components that suffer wear due to just the number of landings), we have done everything from just tire and wheel changes to complete engine changes in about every airport in the country. Our main lack of capability right now is an airplane to carry engines. Fortunately we can call on the Huntsville C-47, which will usually take care of our freight hauling requirements.

We have a small troubleshooting T-33 and T-38 specialty group under our maintenance contractor. They are ready to leave on short notice (about 2 hours) to take parts and go anywhere in the United States to repair one of our planes. We rarely let an airplane stay anywhere longer than a day or two if it suffers a breakdown. Our normal procedure, due to astronaut schedules, is to abandon the aircraft and allow our pilots to continue their trip on a commercial flight. After the aircraft is repaired, it is usually test flown at the facility where the

repair was made and then ferried back to Houston by a NASA-MSC pilot.

We have been short of space and suitable facilities from the day we were organized. I believe this wasn't the fault of bad planning or management but rather by virtue of the fact that our flying operation has grown faster (mainly due to the large number of astronauts that have been recruited) than anyone could have foreseen back when arrangements were being made for these facilities. One of our biggest problems at Ellington is the uncertain status of the base from a facilities viewpoint. It appears attractive that facilities on the base are scheduled to be closed, but as anybody close to the situation knows, Ellington has never actually closed, and in fact, now is assuming some increased active duty Air Force requirements. This situation puts the Aircraft Operations Office in the unenviable position of being an unwelcome tenant, in that we are competing for high bay hangar space with the actual owners of the base -- the US Air Force. Also, there simply is not enough office space for our personnel, no place for our contractor personnel to park their automobiles, ramp space is limited, and most important of all, there is a critical lack of high bay hangar space for aircraft maintenance. These problems are recognized by both NASA and the military as a result of recent safety surveys and action is now underway at NASA Headquarters to correct them.

You have asked for an evaluation of MSC aircraft in terms of suitability, reliability, cost, and problems of maintenance. I would like to speak first about the T-38's. It is a very reliable aircraft as far as the airframe goes, and relatively trouble free. The engines, however, both in our experience and that of the Air Force, have not reached the

stage of maturity that they should. As a result, it is necessary to compensate for this weakness by providing a large pool of spare engines. As far as suitability goes, our requirements called for a high-performance two-place jet-propelled aircraft, and, of course, the T-38 meets these adequately. From a cost effective standpoint, it is hard to beat the T-38. It's fast, reliable, and safe for the intended use. However, in our program it has developed that a great deal of flying is being done IFR across country which is OK in summer, but not in winter. For winter flying, the T-38 is definitely an unsuitable aircraft due to a total lack of protection against icing in the propulsion system. We are attempting to relieve this condition. A NASA sponsored Engineering Change Proposal has been authorized and all of our T-38 aircraft are being modified by mounting a heated engine inlet and an increased length engine front frame. These should solve the engine icing problem. There are other deficiencies in the aircraft system that are still unresolved. The wind screen is not suitable for high speed flight at low altitude. This is also recognized by the Air Force and there has been much coordinated effort by NASA and the T-38 SPO to get an ECP approved to alter the wind screen for all T-38's, both NASA and Air Force. Another problem area in the aircraft is that the egress system is not really up to the state-of-the-art. Again, there is no arresting gear compatibility. These areas of weakness are to be corrected in an Air Force-wide T-38 modification program. But funding and scheduling problems tend

to dictate that this program will take several years to correct, and from a cost effective standpoint, it appears that the aircraft is going to be much more expensive than originally anticipated due to the extent of the modifications. However, they are all quite necessary for long-term suitability in astronaut flying.

As far as the T-33's go, we still have ten of them. They are old and most of them have logged a very high number of hours of flying time. However, they are extremely reliable, they present no maintenance or supply problems, and in fact, after three years of T-38 flying, we still have more hours of T-33 flying overall than we have of T-38 flying. We have never had even an incident in our astronaut T-33 flying. However, it is a single-engine aircraft and as such has no redundancy in the propulsion system. Therefore, to conform with recommendations of recent safety surveys, we will probably gradually replace these aircraft, either with T-38's or other aircraft that meet the unpublished ground rules for astronaut flying. Maintenance-wise, the T-33's are relatively maintenance free. In the last two years, the only problem that I know of is leaking fuel cells and this is an Air Force-wide problem and in no way dangerous. It is more of a nuisance-type maintenance requirement. We have flown our Gulfstream 5,000 hours since its acquisition; it is an excellent airplane, very reliable, has very little airframe problems, and no engine maintenance problems. The Rolls Royce Dart Power Plants on the Gulfstream are by far the best engines, I or any of our maintenance personnel have ever been associated with. In 5,000 hours we have had absolutely no maintenance

trouble with them.

Our earth resources aircraft, in contrast, are rather old, one-of-a-kind aircraft. NASA acquired them from the Air Force and the Navy at no cost. They require considerable maintenance, but are very well-suited for the role in which we are using them. They have proven airframe-engine combinations and are quite suitable for extensive modifications. Our Convair is presently over-committed as far as weights and take-off performance requirements are concerned, and therefore, we are hoping to replace it shortly with a C-130 which will have much better payload range and reliability characteristics.

Like the earth resources aircraft, NASA obtained ~~a~~ helicopter from the ~~Army~~ Navy and another from the ~~Navy~~ Army at no cost. We more or less ran the time out on these aircraft and have since returned them. With the advent of serious astronaut participation in the LLRV program, we bought 3 off-the-shelf Bell Model 47 helicopters of a type we had previously leased at Edwards AFB. These vehicles have been trouble free, and we are getting good utilization out of them.

As far as our involvement in the earth resources program, our main responsibility is furnishing air crews, an aircraft, and a quality assurance and safety of flight surveillance of aircraft modifications. Test areas cover the entire United States and many overseas locations. We have flown many missions over Bermuda, Goose Bay, Labrador; Fort Churchill, Canada; and Point Barrow, Alaska in support of the US Geological Survey, the Naval Oceanographic Office, and the Department of Agriculture. Routine missions usually take about a week and ordinarily require an aircraft crew of about three personnel, but with the addition of equipment operators

and personnel from the Program Office and the experiment investigators the crew increases to about 10 in the Convair and 12 or 13 in the P-3. The aircraft are dispatched, the data gathered, and after the return to MSC the data is processed through our Computation and Analysis Division, reviewed by IESD for accuracy and then turned over by S&AD to the principal investigators. On the average, we fly about one flight every three weeks. We don't have enough personnel to support much more flying than this, which is only about 25% of the desired requirement of the using agencies. Our biggest problem in the Aircraft Operations Office is a lack of personnel and time allocated toward support of this program. Personnel from IESD install equipment on the aircraft, and check it out and calibrate it. Personnel from S&AD serve in the program management and mission manager areas. To support this program, I have about three quality assurance personnel assigned almost full-time in support of the Convair and P-3 -- two pilots assigned primarily with two backups, and I spend quite a bit of time myself in attending scheduling meetings and coordination meetings with both the S&AD personnel and the principal investigators usually from other US government agencies. Thus our commitment to this program is sizeable.

We fly an average of 100 to a 120 hours per month on the Gulfstream. It flys about 3 to 4 flights per week, usually as a transport for our top management people and our Program Office personnel. We don't ordinarily go to Los Angeles because there is good commercial service to that point, but we generally support trips to Huntsville on a regular basis, and to Washington, Bethpage, KSC, St. Louis, and various other locations. It is also used frequently in support of astronaut

training for geology field trips, survival training and similar types of operations. The Gulfstream I has proved to be very reliable and suitable for our operations, and its only problem is that it is a little slow for long range trips such as to Boston or Los Angeles, and in these cases most of our personnel prefer to use commercial air.

We have no responsibility for the operation of the Guppy aircraft; there are two of them and both are operated by Aerospace Lines, a private corporation, that is based presently in Van Nuys, California. The overall contract is handled by the transportation office at MSFC, and the requirements of the Apollo Program Office are coordinated in the Apollo Logistics Office usually by Mr. Ed Johnson. We usually furnish support personnel in case of maintenance problems at Ellington, and on one occasion we aided in an engine change. We also assist in loading, unloading, and tieing down the aircraft when it is here. It serves a useful and quite unique purpose. However, from a cost effectiveness standpoint, it is interesting to note that the cost of operation of the Guppy contract, is probably equivalent to the overall operation of the entire MSC fleet. Or to put it another way, the cost of two aircraft for hauling oversized vehicles approximately equals the cost of an inhouse contractor maintained effort involving some 40 aircraft.

We support the activities of Landing and Recovery occasionally, with helicopter support. However, the majority of this work is handled by Army helicopters out of Fort Hood and by C-119's from the Air Force Reserve

formerly at Ellington, and since that activity was phased out, I believe they are supported by the reserve wing at Kelly Air Force Base. Operations at El Centro for the Apollo Program are handled by NASA 928, a KC-133A on loan to MSC, but this aircraft is both operated and maintained under a contract to the McDonnell-Douglas Aircraft Corporation at Long Beach. Aircraft Operations is only responsible for serving as technical monitor on the maintenance and modification of this aircraft. As far as the actual conduct of the tests is concerned, they are monitored by people usually from the Structures and Mechanics Division as subystem managers to the Apollo Spacecraft Program Office. The Fort Hood drops are entirely an LRD operation. Although we are quite familiar with this program, our support has been limited to carrying people up to witness tests and to occasionally run critically needed parts up to Fort Hood to support the LOTV drop testing.

The zero-g flights are carried out in two modified KC-135 Air Force aircraft by the Air Force Flight Test Directorate at Wright Patterson AFB and are funded by the MSC Crew Systems Division. Both hardware checkout and crew training are conducted during weightless parabola flights. Again, Aircraft Operations' only responsibility in this area has been turnaround support, picking up of aircraft parts to support the KC-135's and an occasional pilot participation in flights for the purpose of observing the operation. These flights have been conducted for a number of years by these personnel. The aircraft has required extensive

modifications and extensive specialized maintenance which is beyond the capability of the Aircraft Operations Office as presently established.

We have had three aircraft accidents, unfortunately, and they have all been fatal. The first one was in October 1964, involving Capt Ted Freeman. This was caused by a collision with a large goose in the traffic pattern at Ellington. The previously mentioned deficiencies in the wind screen and canopy of the T-38 were a factor as they are not suitable for protection against bird strikes at high speed at low altitude. Even though these deficiencies have been a problem and have caused aircraft losses and pilot fatalities both in NASA and in the Air Force, there has been no real progress made toward making changes. A series of wind screen tests are currently being carried out by the Northrop Corporation and hopefully within a year, kits will be available to modify all the aircraft so they will be able to withstand a bird impact at the cruise speeds of the aircraft.

The investigation of this accident was thorough. On the board of investigation were Pete Conrad, Jim Lovell, and I. It took a significant amount of time to find the canopy and the bird as they were several miles from the scene where the aircraft crashed.

Our next accident was in February 1966, and involved the prime Gemini 9 crew, Elliot See and Charles Basset. I also participated in the extensive investigation of that accident. This accident was caused by a large combination of factors. It is presently being carried as a pilot factor accident, but there was mid-handling by control agencies, weather worse than ~~being~~ reported, marginal facilities being operated, etc., all of which contributed to the accident. The aircraft, however, I do not believe

contributed significantly as another T-38 was able to complete an approach successfully only minutes after the accident took place. Deficiencies in low speed handling of the T-38 are a well-known fact and they probably contributed to this accident. But these have been more or less accepted by the Air Force as being a training requirement for pilots graduating to the century series aircraft, which by virtue of their high speed performance usually have this characteristic. The fact that two well-qualified pilots allowed themselves to get into this position of no return is something of an enigma. Possibly the factor of crew involvement--that is Bassett in the rear seat flying with his spacecraft crew commander, might have delayed prompt action until the situation had deteriorated to the point where an accident was probably inevitable. In the S[redacted]-Bassett accident investigation, much credit should be given to the diligent effort of LtCdr[redacted] Al Bean, who served as the principal investigator.

Our third accident involved Major C. C. Williams in October 1967, and still has quite a bit of mystery attached to it. It now appears that in this almost brand new aircraft, either a tool or loose material was floating in the aileron control system and resulted in an uncontrollable rolling situation during the cruise portion of a flight from KSC to Ellington. It is unfortunate that Major Williams did not eject at an altitude from which he could have survived. This reluctance to eject [redacted] probably [redacted] a factor in not only this accident, but also Capt Freeman's. Our astronaut pilots have a lot of confidence in their own piloting abilities and probably attempt to salvage situations to a much greater degree than the average military pilot would. Flight testing has shown that uncontrollable roll rates do lessen as transonic

speeds are approached due to decreased aileron effectiveness, and this probably led to the false conclusion that control was being regained. I do not believe this accident has contributed to the loss of confidence in the T-38 systems. By more thorough inspections of new aircraft we hope to obviate this situation arising in the future.

Our fourth accident was a minor helicopter accident. It was strictly a case of running out of fuel on the end of a rather prolonged day, after much flying and resulted only in damage to the helicopter. It has since been repaired and transferred to another NASA Center. This accident was also in October of 1967, in fact, on Sunday, October 29. This involved Major ~~Engel~~, who, incidentally was working diligently on the accident board involving Major Williams' death at the time of his own accident in the helicopter.

The lunar landing vehicle ~~trainer~~ first flew in October 1964, the day before Capt Freemans' accident. A lengthy test program followed at Edwards on one vehicle, involving close to 200 flights. There were no major problems except in systems reliability, and the number one vehicle plus the parts for vehicle number two were assembled at Edwards AFB. Bud Ream ~~and I~~ were checked out in the vehicle in August and September 1966. The vehicle was then transferred to MSC, and in March 1967, was demonstrated to be flight worthy by Col E. E. ~~Glover~~, US Army, the final project pilot at Edwards. We NASA pilots were requalified and we also got initial flights off for Neal Armstrong and Major C. C. Williams who subsequently was lost in the T-38 accident. Because of a combination of technical problems, due to pyrotechnics time expiration and review of welding techniques, no subsequent LLRV flights were made throughout 1967. The number one vehicle was finally put back

into a flight status, flying recommenced in January 1968, and has since progressed at a fairly satisfactory rate. Since resumption of flying has gotten underway recently, Astronaut Anders ~~has~~ been checked out and Commander Conrad and several other potential LM crew members ~~are~~ ~~scheduled for~~ training.

The LLTV program, in the meantime, has suffered a number of technical slips, but it appears that number one LLTV will be ready for flight testing in late April 1968. Hopefully, the two LLTV's will be through flight tests and will be available for astronaut training in the summer of 1968. Our hopes are then to retire the LLRV's, as many systems and components have been improved in the manufacture and conception of the LLTV's. Our constraint now is that we only have one facility in being to handle these vehicles. They are complex, experimental aircraft that require a large quantity of unique GSE and due to astronaut commitments, just prior to lunar landing launch, it appears that an operational facility will have to be developed at KSC, so that lunar module training can be carried out just prior to lunar mission launch. This problem is still under study and will probably be resolved when we have a sufficient number of astronauts checked out and a better understanding as to what the real proficiency requirements are for flying and maintaining skills in simulated lunar landing trajectories.

Insofar as staffing is concerned, we have not really had any recruitment problem. Like most other elements of the Center we have had a problem in getting staffing authorization so that we have enough people to accomplish all of our assigned responsibilities effectively. We are presently supporting the tests of LM landing and rendezvous radar breadboard visual reference system for the Landing and Recovery

Division, operating the LLRV and providing quality assurance review of the LLTV ground tests, and operating two earth resources aircraft, 38 astronaut training vehicles of three types, and the MSC administrative transport. This is actually a wing-sized operation and our manning is minimal--barely the amount required to cover all of our areas. Because we have no operational requirements on any of our programs and have always placed safety as the first and foremost factor, many times we just do not meet schedules, or cannot provide aircraft, due to a shortage of personnel. This is no big problem in that the only time critical program that we have to support presently is the LLRV training in the lunar module landing and rendezvous radar tests. But as a result, astronaut training, operation of the Gulfstream, operation of the earth resources aircraft and modifications to the earth resources aircraft sometimes suffer considerable delays.