

INTERVIEW WITH MARTIN L. RAINES

October 23, 1968

32
24
32-5
In 1959 I was assigned to the Ballistic Missile Agency as Deputy Chief of Industrial Operations Division. Our job really was a procurement function plus taking an R&D product, supervising certain industrial changes and modifications to it, testing and checking it out and getting it ready for operation in the field by Army or Air Force troops. At that time we were working on the Redstone and Jupiter Missile systems. While on leave in Kentucky I got a call from the Agency and was told that there was going to be a program known as Project Mercury and it was going to need three liaison people from the various services--one from the Air Force, one from the Army, and one from the Navy. They wanted me to come back from leave and report to Langley Field, Virginia where this project was being organized. I went to Langley, arriving sometime between Christmas and New Years. I made a quick survey of what was going to be required. That short trip was followed by a permanent move in the early part of January to Langley Field.

24
Dr. Gilruth then was the Director of STB and Charlie Donlan was his Deputy. My job was basically to be the interface between the Army Ballistic Missile Agency headed by General Mader^e, and Dr. Gilruth and to provide the interface required in putting the capsule on the Redstone Missile for the first suborbital flight. This soon became an interface between Dr. Gilruth and Dr. von Braun as Mader^e was more directly interested in weapon systems. During that initial period it was primarily a matter of defining what these interfaces were going to be, what sort of abort systems we would have, what was the capability of the Redstone Missile, things of

this general nature. While I had been at the Army Ballistic Missile Agency, I had been chairman of what we called the Redstone Missiles System Reliability Working Group and since my liaison activities didn't take up my full time, I did provide some assistance with the people who were getting a reliability and quality assurance program started in Project Mercury at that time.

In addition to providing the Redstone system, the Army was testing various pyrotechnic devices to be used in the spacecraft and the launch support systems. In particular, Frankfurt Arsenal provided test programs and testing facilities for some of the pyrotechnic devices to be ~~checked~~ ^{used}.

73 As far as the interfaces between the Army Ballistic Missile Agency and STG, I always found them to be extremely cordial. Dr. von Braun had a deep personal interest in the project. He brought on board a man who had done considerable work in manned flight in the V-1 program in Germany, and was put in charge of such activity back at Marshall. Wernher was particularly interested in the Mercury Program and made several trips to Langley while I was there. Whatever it was the STG needed or wanted, he leaned over backwards to provide. The first time the original seven astronauts visited Huntsville, he had a party at his house in the mountains and took all of them to take a look at the telescope he had set up as part of a scientific effort in Huntsville. He got them all to take a look at some of the places he was saying they might visit at some future date. There was a very close and cordial working relationship between the whole group.

About the fall of that year, NASA made a proposal to the DOD to take over a major portion of its Army Ballistic Missile Agency which would be integrated into NASA. This was turned down largely due to the opposition

23
of General Maderis who still had a number of rather significant programs that he wanted to complete. It would take the heart out of the Army Ballistic Missile Agency if the Development Operation Division was transferred to NASA, as it had about 2000 ABMA's key people and was headed up by von Braun. The following year, the proposal was renewed and the Army concurred. Von Braun's group was separated from AMBA. It then became a peculiar situation for me--an Army officer providing liaison between two elements that belonged to NASA. While everybody was very cordial, the only way I could get anything done was by persuasion, as there was no line of authority or control. It seemed to me I was a fifth wheel. Also, most of the interface problems had been resolved, and while we hadn't had any manned flights at that stage, it seemed things were well under control. Maderis recognized the somewhat awkward position I was in, and he arranged for me to go to Kwajalein ~~Roswell~~ to work on the Nike Zeus Program. I departed in the summer, July 1960. I didn't have any further direct contact with STG or any of the members except while I was at Kwajalein. John Glenn's flight was going to go over and I made some inquiries to make sure we didn't have our high powered Nike Zeus radar turned on looking at him as we might pop some of the pyrotechnics. I contacted people in the STG to make sure when he was coming so I could insure a radar blackout while he was overhead. I didn't have any further contact until August 1964, when I got a call from Paul Purser. He wanted to know if I would be interested in coming back to work for NASA. I had just moved to Washington for the Army War College and had bought a new home there. I didn't want to get involved in another move so my initial reaction was no. He made it clear this was going to be a civilian assignment and that I would have to retire in order to accept it. I wrestled

with this a good while and finally decided the Apollo program was too much to resist. After discussions with him, George Low, and Dr. Gilruth, I went to White Sands as manager of operations. There had been some problems there which I attribute to personality clashes. They had a three headed administrative arrangement that was a monster--one man was assigned as a manager, but had only administrative responsibilities and reported to Hjernevik. Another man was in charge of launch activities and reported directly to the Apollo Spacecraft Program Office. The third was in charge of the propulsion development activities and reported to Mr. Thibodaux, Chief, Propulsion and Power Division. A situation like that creates all kinds of problems. With three people all trying to run the same job things aren't likely to go smoothly and they didn't. Each of these people would come to Houston from time to time complaining about the other two. That would get their respective division chiefs or directors involved in internal discussions of both technical and administrative problems. Dr. Gilruth thought his top management people were spending too much time trying to solve the problems at White Sands. He decided an outsider would probably do a better job of running the operation than one of the three. I replaced the man who ostensibly was the manager, and he went to the Cape at his own request. White Sands Test Facilities was reorganized and put under the management of a single manager so people no longer reported to several bosses in Houston. The position of manager was ~~elaborated~~ ^{elevated} in stature by having it report directly to the Center Director instead of through ~~some~~ ^{an} Assistant Director. Mr. Henry van Goey was retained in charge of the launch activities and did an excellent job. The launch activities programs went so well that at its completion he was offered the position of the NASA manager

at Vandenburg and that's where he is today. The other one of the original three, Mr. Billy R. Gantz, remained to run the propulsion development activities, and within the last year was promoted to assistant manager. He is acting manager now while I am on detail here in Houston. It was just a matter of getting all the people to work together, and making sure everybody knew his complaints would be heard and that everyone would get a fair shake.

In January 15, 1966, while we were having a review at WSTF for Mr. Low, who was then Deputy Director of the Center we suggested that we be allowed to undertake a flammability test program. Mr. Low approved this on January 15, 1966 and we were in the process of fabricating test chambers for this work when the unfortunate fire occurred on SC-012. We were in a position to rapidly complete preparations on those chambers and began providing test data in support of the SC-012 investigation. Since then we have been assigned responsibility for testing non-metallic materials in oxygen enriched atmospheres and have done a sizeable amount of the total test program accomplished to date.

WSTF has ^{hulk of the} ~~We've~~ done the qualification and certification tests on the ascent and descent propulsion systems of the lunar module and have done the same type of testing for the service module propulsion system. The peak number of people we had at White Sands was approximately 1300 which included Civil Service and contractor personnel. We have presently around 1150 and our plans are to further reduce that at the end of this FY so that White Sands will operate on the same basis as Tullahoma, ^{The Air Force has at Tenn.} with the prime contractors sending their equipment and ^{engineering} liaison people to work with us, but the support contractor will actually conduct the test under the surveillance of ^{NASA} Civil

Service people stationed there.

We had a spare test chamber--we had actually ^{a total of} three; one for the descent stage of the lunar module and one for the ascent stage of the lunar module and a spare. The spare was there because we weren't sure whether or not we would have explosions, fires, etc., which might damage the equipment and we fortunately did not have anything other than one small fire. We didn't have any other use for this ^{spare chamber} ~~facility~~ and we took it to another test area, mounted a group of vacuum pumps in it and found we could pull the chamber down to about 250,000' altitude. We then fired engines in it for short durations, from which we got information on start transients of the engines. We have a filter test program which is now going on there to examine filters used in the spacecraft system to make sure they are qualified and will do the job they are supposed to do. The lunar module descent engine gas sampling and analysis program system was also set up at the lab following a study that showed the exhaust gas products from the LM descent engine as it is coming down to the lunar surface will cause contamination over a considerable area. The investigators wanted information that would characterize the exhaust gas products so that they would know what contaminants were present and in what quantities. This data will be used by the principal investigators when the lunar surface samples are being analyzed. To build the rocket test stand needed to gather the data, we went to some contractors but they wanted over a million dollars for the work and so we did it ourselves at a cost of only around \$75,000.

Another test program at WSTF is the active seismic experiment subsystem. It is a test unit that is going to be left on the lunar surface. A year later it will throw out a series of grenades. Those grenades will explode

when they touch the surface of the moon. A seismograph then records the data. Based on this type of data it will be possible to estimate the thickness of the crust of the moon. We looked for an area which would be similar to what we believed the moon's surface is like. It had to be away from any other kind of seismic disturbances which would normally be encountered in a more heavily populated area. The Range was an excellent location for such proof testing.

369 On the range itself, we have a number of test programs. One is commonly known as the Pearl Program--that stands for a Program for Evaluating Apollo Rendezvous and Landing Radars. Because of the excellent instrumentation available on the range, we are in a position to have aerial fly-bys, make determinations as to precisely what the radars are reading, and then utilizing the optical instrumentation of the range see how accurate the reading really was. We use a T-33 and SH-3A helicopter in this program.

405 We also have been doing experiments for other NASA Centers one of which is the Hirewimp Program--the High Resolution Wind Measurement Program. It's designed to measure high altitude winds to see what we can learn about the various types of turbulence encountered in upper altitudes and use that information in the design of future spacecraft and boosters. These tests are conducted for the Aerospace Environment Office at Marshall Space Flight Center.

369 There is also a radar target scattering testing facility, which is known as Rat-Scat. This is to compare the measured command module and service module radar cross section with the calculated cross section at various attitudes so we can perform direct skin tracking on the spacecraft.

The planetary entry parachute program, PEPP, is basically a Langley

operation. This is one of the few programs conducted primarily for IRC.

405 We do some weather computations for IRC and if they have hardware problems we provide support. It's another of the interface services of the range which we provide.

369 405 Another area where we have done some interesting work is called a remote medical system. Out in New Mexico where population is sparse and there is a low density of doctors, we are trying to use aerospace technology in terms of employing sensing devices, computers, display techniques, etc. People when they are ill can be taken in to remote stations out in the boondocks. Their baseline medical information will be computerized and sent back to the hospital in Las Cruces. Sensing devices can be installed on them if necessary by the nurse or aide man at the remote station. They get the information that's relayed by RF on the microwave transmitters back to the doctor where treatment can be prescribed. The Department of Interior, which has helicopters available for fire fighting, etc., can assist in rescue work to bring these people back where they can get good medical care. This has been approved by the governor of New Mexico and there will be a presentation to the Under Secretary of Health, Education, and Welfare in the near future. Support of such programs are ~~It's an~~ important step for NASA in terms of showing something that is a useful spinoff of space technology. There is also a possibility that there will be an application of this system in the AID (Agency for International Development) ~~aid~~ program for South America and other backward regions where there is even more desperate need than we have in the U.S.

369 There are many other smaller tests run at WSTF because we have an excellent laboratory, and when people get into a bind and need the specialized techniques we have developed at White Sands we try to make them available.

White Sands recognizes its role as a support activity and that's what it has to sell. Just because it's ^a government ^{installation} doesn't mean it doesn't have to sell something. If an organization's services are no better than those of anybody else, people aren't going to use them. Everybody at White Sands has turned to and is aggressively trying to do for the Center that which needs to be done--better, faster, and cheaper than any ^{one} ~~body~~ else. As long as WSTF people can keep that attitude, we will have a viable organization there despite what happens to the space program.

371 The Apollo special task team which was set up last year was headed by Dr. Rees. I knew Rees back in my Huntsville days. He has been the deputy under von Braun since the old ABMA days so I've worked with him since about 1956. Mr. Webb asked him to take on a job working for George Low and looking at manufacturing, design, engineering, quality control, reliability techniques, etc., at NR. Dr. Rees agreed and it was first thought he was going to come to MSC and station himself here. He however, decided that the best place for him was at NR, ^{Downey, Calif.} In conjunction with Low he set up what was initially known as the Rees Team and later and officially as the Apollo Special Task Team. It was formed in November 1967. He had his first meeting here with Low, Ikeinknecht, and me. After we finished he outlined what he was planning on doing and how he was approaching it with Dr. Gilruth. Dr. Gilruth heartily endorsed the approach and the task. The team included Ed Smylie who is now acting chief of CSD, Dick McSheehy, P&PD, Milt Kingsley, IESD, Phil Glynn, SMD, and myself. ^{while not a full time assignee,} Aaron Cohen, [#] ASPO, [^] assisted the team ^{greatly.} The team's activities went on from the latter part of November until May 30, 1968. Some effort did continue in the configuration management area for an additional two ^{to} three months. What the team did was go through all the poten-

tial problem areas, identify the problem, and indicate ^{them} to NR management.
~~what the problems were.~~ We assigned a NASA man to work with NR, and NR
 assigned a man to supervise the corrective action. Weekly meetings were
 held at which status reports were issued and an attempt was made to close
 these items out. The investigation included not only the prime contractor
 but also the subcontractors. Numerous visits made to places like Northrop
 Ventura on the parachute system; Dalmo Victor in San Francisco on the S-
 band steerable antenna, Rocketdyne on engines, etc. In December 1967 Rees
 visited Bethpage to give George Low an assessment of what he saw and what
 he felt about the Grumman work. It was a hot and heavy assignment for about
 a seven month period. About two weeks before it ended, I was called in to
 talk with Mr. Hjernevik, and he informed me that Dr. Gilruth wanted me to
 come to Houston and take over the reliability, quality assurance and flight
 safety effort. Max Faget wanted Aleck Bond back as he was contemplating a
 reorganization of E&D and wanted Aleck to run about three divisions. With
 the phasing down of the amount of work which was going on at White Sands,
^{what was considered as a} and ~~the~~ demonstrated fact that I wasn't really needed at White Sands, be-
 cause I'd been gone for seven months and everything was still operating
 effectively, the end result was I was detailed to this job for a period of
 six months. I ^{accepted the} ~~took a~~ detail for two reasons--first I hated to separate the
 umbilical with White Sands for I really like it there and think ^{the installation} ~~it~~ has a
 great future ^{within NASA.} Secondly, ~~other people had already served in this job before~~
~~me and I wanted to make sure (as I guess Dr. Gilruth did also) that I was~~ ^{could}
~~going to contribute something useful,~~ ^{to the program.}