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about MSC Guidance & Control; NASA and MSC Politics and personality conflicts.
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Interview with Robert G. Chilton
3/20/68

I was working at Langley at the time that the initial three conceptual studies on manned reentry systems were conducted within Langley. Matthews headed one, Faget headed one, and I forget who had the third (Becker). Essentially the difference between the last two was in design (non-lifting body vs lifting body) and Matthews had the compromise configuration. Those studies were done within the framework of existing organizations. Matthews was then my assistant branch chief in the Stability and Control Branch of Flight Research Division. Hewitt Phillips was branch chief.

The real beginning of STG was when Matthews and Faget put together a few of their people, actually just 10 in the beginning. Matthews asked me to start spending half of my time each day in the work area set aside for that purpose. wind tunnels (unitary plan wind tunnel). Matthews asked me to work on the autopilot specifications for the Mercury capsule. We refined the work statement for that part of the contract, and we came to know Andy Meyer and a few other people who were being drawn in from Lewis Research Lab in Cleveland. Sequentially the next thing that happened was when the group had grown to about 35 people, the orders were cut which separated them from Langley. The organization chart only showed Gilruth and Donlon as being in charge.

When we were organized some months later (after the award to McDonnell) there were three major elements - one under Faget, the Engineering function; one under Matthews, the operational function; and the other under Charlie Zimmerman which was sort of a contract management function. I was placed in Faget's organization. Matthews wanted the trajectory calculation ability in his area, and a fairly hot debate developed between Matthews and Faget over this point.

Matthews eventually prevailed and Johnny Mayer and a few other people became part of Operations. I was to stay with Faget. Max felt that he should retain or develop a certain amount of trajectory calculation ability within his division and he wanted me to do that. I proceeded to build that competence around Jack Funk. I was a branch chief under Faget, at the time in charge of the Control Dynamics Branch.

To my way of thinking, that was the beginning of the struggle which is still going on where the operations people want to have independent capability in all technical areas that affect operations. This tendency is one of the predominant influences on the character of our organization. It has been perpetuated through Williams and Kraft. They want to run their own house and be free of dependence on anyone else. They don't want to be dependent on any one else for success; they want to have the means to insure that success. This is a rather selfish attitude and not necessarily in the best interest of the overall organization. The Center has suffered some as a result of this attitude, but Flight Operations has been successful and you can't argue with success. Max fought the attitude a long time, but he finally decided it was not fruitful. He now goes out of his way to avoid appearing to interfere. This attempt at self-sufficiency peaked during the period just before Williams left the Center. Elms was brought in and I guess that alienated Williams somewhat. He took the position according to what Kraft told me, that he would build his own center within the Center.

Another dispute that came up in those early days involved the amount of support that Max's organization should give to Kraft in the Flight Control area. That too had a major bearing on the future relations between the two organizations. Kraft always felt that Max abandoned

Mercury and Max always felt that Kraft was asking for the unreasonable. From where I sat, I could see ~~merits~~ truth in both positions. The things Kraft's people were asking for didn't seem to make sense technically in terms of downrange controllers and the need for our engineering people in those roles. I think operations people have discovered since then that the solution that evolved was superior.

Charlie Zimmerman left the contract management group and Jim Chamberlin took that over after serving several months as an assistant to Gilruth. Chamberlin had come from AVRO in Canada with about 30 other people. It was then, as now, difficult to delineate the responsibilities between the Project Office guy who is supposed to get something done and the engineering type who has most of the experience and background in design. It's a real problem that the Center has struggled with--how to most effectively bring the engineering people into the spacecraft preparation and checkout and operations aspects in such a way that their knowledge is an asset and still meet the commitments of the program. To do, everyone assumes he has to have things under his control.

Primarily through the efforts of Tom Chambers, one of my section chiefs and one of the former AVRO people, we supported the flight phase of Mercury as well as we could with what we had. During that time period we began to develop modest laboratory facilities. It was some time before we had permanent quarters in the northeast building, which Kimbell Johnson once told me was the birthplace of Lewis Research Center, and the first engine lab at Langley. There we had an area where we could put up benches and do a little hardware work. During that period,

we obtained our first analog computer which we used in Mercury to iterate some of the entry control problems. Prior to this we were completely dependent on Langley's facilities and support.

We were the technical monitors for the guidance and control aspect of the McDonnell effort. Funk supported the Little Joe flight tests at Wallops Island.

It turned out there was a group under Al Kehlet in Aleck Bond's area which got very much involved in this type of work too, and pretty soon Funk worked himself out of a job there and began working with Bob Piland, who had just come back from a Washington assignment and was beginning work on a Lunar Landing Program. This was also true for the rest of my branch, from the time Piland rejoined the Division. I left the details of Mercury support to Tom Chambers. I concentrated on working with Piland on mission ground rules and on presentations to other NASA Centers. Jack Funk occupied his group with developing the analytical tools for lunar mission work. He did an outstanding job with a very small group of mostly untrained engineers, and developed high competence within his group. They were able to crank out mission studies and reentry studies as well as answering some of the most knotty questions concerning the lunar mission. As a result we were able to pin down some of the early answers with regard to L/D and other considerations.

During that time period Walt Williams was brought into the organization. I gathered the impression that when Williams made his appearance on the scene, Matthews personal fortunes went into a decline. Williams didn't appear to appreciate Matthews' capabilities. It wasn't any of my business, but I did regret to see it.

We got deeper and deeper into Apollo. I went on a tour of the Centers to solicit support. I participated with Piland and Charlie Donlon in the briefings held in Washington. Somewhere along in there, the President came out and established a lunar landing as a national goal. Concepts of a manned lunar landing started modestly. At first we were going to fly around the moon and come back. I argued with Piland that we ought to at least say we would ~~circumnavigate~~ orbit the moon, for otherwise there wasn't sufficient challenge to justify the expense. The problem was that there was no booster available then that had that extra energy required to enter a lunar orbit. We didn't have the temerity at that time to suggest actually landing on the moon. That came a few months later, with the President's announcement.

We became a part of Goddard and I came to know Harry Goett personally and thought a lot of him. I had heard of him a lot back in NACA days and I knew of his work at Ames. When I got to know him better, I found that he was a tremendous person. He would have been a much easier man to work for in an engineering organization than Dr. Gilruth. Although I admire Dr. Gilruth very much, I have always felt like he tends to permit the perpetuation of this business of playing one group off against another. I may be wrong in that regard, but it always has appeared to me that he has never made any effort to delineate the functional responsibility between subordinate elements, and I believe that's very important. However, I realize there is another school of thought which says there are other benefits if you don't do so. If that does have merit, it must be an extravagant method of doing business. I used to think myself--Gee it would be nice if they would make Dr. Gilruth director of Goddard and let Harry Goett work at the lower level for I felt Gilruth deserved the higher office anyway.

During that time period, Donlon set up the lunar mission study contracts with Convair, Martin, and GE. Simultaneously, almost, the question of guidance and control came up for consideration by STG management. Charlie Donlon got the word from Dr. Seamans that the Instrumentation Laboratory at MIT had completed a Mars Mission study for the Air Force. It was a very comprehensive piece of work on how one would send an unmanned capsule to Mars, take some photographs, return, reenter the Earth's atmosphere, and be recovered. It was a highly sophisticated study, but nothing came of it, but MIT felt that NASA should at least evaluate their work. I think they were given a NASA Headquarters contract to refine and reorient that study toward the JPL Mars mission. JPL was given the job of evaluating the contribution made thereby and needless to say, JPL felt its own success-oriented approach toward getting Mars-type data involving radio guidance and no necessity for earth return and recovery was superior. MIT felt the odds were stacked against them in that JPL's work constituted a competing approach. As I recall, Dr. Seamans asked Donlon if there wasn't something that MIT could do to help our organization get started in the Apollo Program, and offered to allocate $100,000 in Headquarters funding to get MIT started in some kind of a study or a supporting role. Donlon got together with Harry Goett, some representatives from MIT, and me. We met in Goett's quarters and drew up a $100,000 contract with MIT to do preliminary design studies on what the guidance system for an Apollo mission should be. That activity was pretty much in parallel with the general contractor studies that were studying the entire program. I turned over to Dick Carley one of my section heads, the responsibility for supporting Piland's studies in the guidance and control area, and I concentrated on working

out the relationships between us and MIT.

Somewhere along the line, Armour Company, who built the inertial guidance system for the Atlas "D", made a presentation to Headquarters and advanced the concept that the guidance system could be provided government furnished. The Armour Company pointed out that sometimes the guidance system was the responsibility of the prime contractor and other times it was similar to the engine in an airplane--the government provided the engine, and the contractor would just integrate it into the airframe.

I was directed by Faget that it should be NASA's position that we would actually give the design responsibility to MIT Instrumentation Laboratory for this guidance system, and that it would not be included in the prime contractor's responsibility. I boned up on how MIT had supported the Navy Special Projects Office on the Polaris. I tried to understand the relationship between the university and the industrial contractor, and the relationship between the government, MIT, and the contractor. I assumed that was the model we were supposed to follow. I had a lot of help from Bob Piland's office, which was at that time in Faget's organization, and Bill Petynia was assigned by Piland to work with me.

In line with this thought that the guidance and control system in Apollo was going to be one of the most complex technical area, I had an interesting conference with Faget about the time that he was being made an assistant director. There was considerable speculation and rumor that the existing divisions were going to become directorates.

By that time, Max had two groups in the electronics field--my own, which was the Control Dynamics Branch, and an Electronics and Communications Branch which was the predecessor of Ralph Sawyer's division. It was obvious that a decision was pending just how to organize these elements in an expanded function. I told Max I thought the guidance and control business was so complex that it required a much higher level of management attention in order to get necessary support. By that time, the Crew Systems Division had been created under Stan White, and it was obvious that becoming a division made a big difference in the amount of support that could be obtained, and that had a direct bearing on how effective an organization could be. I was convinced if the guidance and control functions were to be properly attended to in Apollo, it would be important to combine the guidance and control work with the electronics and communications work; although my interest in the electronics and communications was minimal. My recommendation to Max was that he combine Ralph's operation and mine and make it into a division - an overall electronics division, and I told him furthermore that in my opinion there was only 1 man that could swing the management of such a division and that was Chuck Matthews. I asked him if he would try to influence management into that way of thinking. Max's response was that he could not suggest that Chuck diminish his position in the organization. I asked to be allowed to talk to him, and Max agreed. So one night I went over to his house and laid the whole thing out for him the same way I had for Max. Chuck was very interested. He had always been guidance and control oriented from the beginning of his NACA experience. Although he was noncommittal he said he thought it was a useful suggestion and he would think about it.

Chuck did indeed become a division chief under Max but they perverted my suggestion, in my opinion. I think they made a mistake, and I think Max's organization still suffers from that mistake today. What they did was create the Spacecraft Technology Division with Chuck as its head. It contained my Control Dynamics Branch, the propulsion work under Dave Hammock, the structures group under Bob Vale, and a design branch under Owen Maynard. Ralph Sawyer's branch instead of being integrated with ours, became part of Aleck Bond's division. The break between the work under Sawyer and that under me, if anything, accentuated and it opened the door later (temporarily as it turned out) for the abortive creation of other directorates. Barry Graves came in and Sawyer was actually working for Barry, but we were still working for Max. Later Barry's and Max's organizations had a shotgun wedding so the two functions were once again back together under Max.

Now there are three electronic-oriented divisions (counting Vavra's). I still think that they should be in a separate directorate, and I would pick now Chris Kraft to head up that directorate. Kraft has a background somewhat like Matthews had in those days, with an appreciation for these functions and also the necessary amount of aggressiveness. What the Center needs is more concentration on the functional elements. Max does the best he can but he has such a large group and has two strikes against him any time he tries to get additional support.

Even though I wasn't a part of the organization that Bob Piland headed and which became EXPO, Piland depended on me for this relationship between MIT and the industrial contracts. We had reached the point where

we were selecting the industrial contractors to support MIT, that is to build the hardware that MIT had designed when Charlie Frick came onboard as the Program Manager. Very shortly thereafter, he hired Dave Gilbert to be his guidance and control man. So this responsibility passed from me to Dave and it passed in the very midst of the evaluation of the proposals. Though Dave and I got along well from the beginning, there was an immediate clash between Charlie Frick and me. Frick and I had our first blow up during the source evaluation. I was the first Chairman of the Board; I resigned but was prevailed upon to assume the chairmanship. When the Board presented its findings to Mr. Webb (and somehow those weren't satisfactory) the Board was sent back. I was then removed and Bob Piland became the chairman. I continued to serve on it and ultimately the A-C Electronics Division was selected as the integrating contractor to build the inertial platforms and Raytheon and Kollsman were selected to build the computer and optics respectively.

This event coincided with the move from Langley to Houston. I was among the last of my branch to officially transfer from Langley to Houston.

Al Kehlet, my assistant branch chief, and I had made a trip to Houston in 1961, 2 weeks after the hurricane. Barney Goodwin had his operation in what had been a store in the Gulfgate Shopping Center. Marty Byrnes took Kehlet and me on a tour of the buildings that he had selected and Al and I picked the Rich Bldg., primarily because of the opportunity it afforded for our computer laboratory and other electronic labs.

Then we made a tour of the Houston environs, just the two of us. We drove down what's now NASA Road 1. Actually I didn't form any negative opinion with regard to the hurricane because it seemed quite apparent to me that the land which Marty Byrnes pointed out as the future site had escaped the flood. Of course, as we drove on down in front of the West Ranch water had come up to the foot of the stone wall and it had washed out the road embankment. There were also some pretty good sized ships washed completely across the road. We drove up along the shore of the Bay toward LaPorte and although there was considerable damage there, it really wasn't too much different from what we had seen in Virginia on several occasions. We didn't go to Galveston. There, I understand, the big topic of conversation was how many rattlesnakes had been flushed out. Kehlet took pictures of every undesirable feature he could spot on the landscape and immediately decided he wasn't coming to Texas no matter what.

The next important era in guidance and control occurred during our stay in the Rick Bldg. We then worked for Chuck Matthews as a branch in the Spacecraft Technology Division. We were supposed to be supporting Dave Gilbert in ASPO in matters pertaining to the program and we had a charter under E&D to build a guidance and control facility at the permanent site. We took great comfort in reading a news release which Gilruth quoted as saying we were going to build the finest manned spacecraft center one could want. My mission changed from the Apollo guidance function to building a guidance and control facility. I left it pretty much to Don Cheatham who was now in the Branch, to make sure we had good programs, particularly in the simulation area. The simulation aspect was especially important

as we had to establish all the early control and guidance requirements, and the operational concept of how one actually lands on the moon, docks, etc. Don did an excellent job. Jack Funk's section continued to extend its capability in mission planning and became the major source of data. I have often wondered whether Faget was actually aware of this - of how fine a job Jack was doing. This was the period in which the decision was made to rely on the lunar orbit rendezvous technique instead of the direct flight. NA-R, it seemed to us, had been lobbying very strongly in Washington against the idea of a lunar orbit rendezvous. Jack Funk was obliged to do one study after another and feed the data directly to Eldon Hall in NASA Headquarters, who would then rebut the points that NA-R would make up there. It appeared to us that NA-R had a thesis to prove and they would even distort their calculations in order to come up with the answers they wanted. Jack showed that we did have operational flexibility in contract to NA-R's ~~contractor~~ contention that the lunar orbit mode was operationally constrained (limited), ~~that we were working in blind alleys~~.

During the time I was working with MIT, I had two or three of the fellows in the branch putting together rough requirements for buildings and facilities. In those days it was hard to visualize just what was going to be in Houston anyway. We were to have a building which was to be called the Spacecraft Technology Building, to house those functions within Mathew's Division. This building (we are now in (16)) was not well designed, as there was too much inside office space. A prime corner room had nothing but transformers in it. It happened that The budget provided for a duplicate of the A-frame construction at Langley which they called the Lunar Landing Research

Facilities. Although it was in the budget as a proposed item, somewhere along the line, someone at Headquarters came down, talked with Faget and Matthews, and decided that MSC shouldn't try to build one. Max and Chuck directed me to follow up with the idea of taking that line item and warping it around so it represented a lunar landing simulation facility. From that I continued to warp it until it came out as a manned spaceflight control and simulation facility which was sold to Congress and resulted in our building the annex, Building 16A. We made up for the deficiencies in Building 16 by careful planning. Being encouraged by Gilruth's statement that we ought to have a fine facility, we tried to plan what we thought was a proper guidance and control facility. We attempted to avoid duplicating existing Air Force facilities, such as complex sled tracks for the evaluation of inertial systems to give acceleration experience, or precision centrifuges. I think we followed a very conservative approach and responsible course in making up for those early deficiencies.

In late 1962 or early 1963, the Center decided to create a new directorate and brought in G. Barry Graves to head it. It was clear to most of us that there was a conflict between Barry's operation including IESD and Max's. In about a year, however, the two directorates were merged and Barry became assistant to Max. Max told me then that I should expect Barry to be interested in our operation, but Barry never got a hold of things. He was disillusioned and soon went back to Langley.

I think Max was then moving on a course which would have made me a division chief of the Guidance and Control Division. I never encouraged

him in this, fortunately. Joe Shea at this time took over ASPO. I had had a run in with Shea early in the program. When he was then in Washington, and one of the first things he did was to tell Charlie Frick that he ought to take MIT out of the main line, make them consultants to NASA, and give A-C the program responsibility. Bob Piland called me up at MIT one day while I was holding a monthly review there. Frick also had just come to MSC. Piland told me that this fellow Shea had made the suggestion to Frick, and Frick wanted to have a meeting with Dr. Draper, head of the Instrumentation Laboratory. Could I bring about such a meeting? According to Piland, Shea didn't want to be involved in this meeting. Piland confided to me that he didn't take kindly to such arrangements, for if a man is that perturbed, he should be willing to stand up and be counted. Apparently the reason for Shea's attitude was that he had been at MIT and didn't want to compromise his relationships with Draper. ~~Not knowing all this, I came back from my phone call.~~ Before asking the people at MIT to see if Draper could come to Washington on a certain day, I was introduced by Milt Tracer at MIT to a man named Dick Hayes who is now the Assistant Director at ERC, who then worked for Shea, and who had just come to Boston to observe our meeting. Dick told me he worked for Shea and I had never heard of Shea before and I said oh - your boss just threw a glitch in our operations here. Piland hadn't told me then that Shea didn't want to be identified. Hayes reported that back to Shea and John Disher told me later that Shea was furious when he heard that MIT was aware that he had

prompted the meeting and made some remarks that NASA should work together as a team. I'd never heard of Shea, and as far as I was concerned, he wasn't on the team. I later came to admire Shea, maybe begrudgeingly, I'm not sure, but I think he did a real good job of shaping the program. I don't think they could have followed Frick with anybody better than Shea. He had a tough time and I think he worked very hard under very trying circumstances. So, although I came to alter my opinion of him, I doubt he ever altered his of me.

When he came down here, one of the first things he did, was to recognize that the guidance and control was a critical part of Apollo and that the separation of function between ASPO and E&D was not likely to result in maximum support. Max told me once that Shea had made the inference that he had someone in mind who would be a good man to head up this division and that therefore I should not expect to inherit it. My reaction to that was that I thought he should be granted that right, although I did have some trepidations as to who he might have in mind.

I had known Cliff Duncan sometime earlier, as he had been DOD representative on the guidance and control research advisory committee on which I also was a member. So when I learned that it was Cliff that he was going to try to interest in coming down on a Navy assignment, my relief was boundless. I had a chance meeting with Cliff before he made up his mind, and revealed to him that I was aware of the offer, and urged him to take the job.

That marked the beginning of a new era, because Cliff's becoming head of the Guidance and Control Division, coincided with the move to

the Clear Lake Site. In fact Cliff never located himself in the Rich Bldg., he made his office down here. Just prior to Cliff's coming, the subsystem management concept had been instituted. The subsystem management responsibility for the autopilots and the stabilization control systems were ours. We also inherited a handful of ASPO people. They had been taken away from Dave Gilbert and placed in our organization. Dave Gilbert, Paul Ebersole, and that part of Dave's Branch which was responsible for the government contract stayed in ASPO. It wasn't until Cliff came that Shea gave Cliff this responsibility as well. When he gave us the responsibility for this government-furnished equipment (which in a way then made our division different from the other E&D divisions) Shea from then on treated Duncan as though he was one of his own division chiefs, and Cliff attended every ASPO staff meeting and he did indeed wear two hats. Today, all division chiefs are being moved in that direction, a very healthy thing as far as I am concerned. Shea was fairly ruthless, he gave Dave Gilbert his walking papers, but we thought a lot of Dave. Faget encouraged us to take him into our organization which we did and there he became a branch chief. Cliff once confided in me that he believed Shea never forgave him for hiring Dave after he had given him his walking papers. Shea who didn't think Dave was competent, was capable of extremely strong prejudice and bias.

During that period when Cliff and I were members of ~~that committee~~ the Aeronautics Advisory Committee on Guidance and Control ~~of national experts in guidance and control~~, and just prior to Cliff's coming to MSC, the committee was asked to review an OART study put together to sell Congress on the plan to establish the Electronics Research Center in Boston. Congress had rejected the study, and the people who

had worked on it now brought it to our committee and asked us to critique it, which we proceeded to do. It came in for a lot of criticism. The people who put together this study had presumably gone through an exercise to see whether NASA should a) reorient some of its existing centers toward heavier emphasis in the electronics area, b) ~~to~~ build a whole new center, or c) perhaps enter into cooperative efforts with DOD. The conclusion of the study was to build a whole new center. The Marshall representative on the committee, Dr. Haussermann, was extremely bitter over the NASA policy position that declared such a Center was required, and viewed it as endangering Marshall's position. I was suspicious that ERC would not content itself with being a pure research facility, but would want to get involved in systems development. I was aware of a disquieting parallel in England where the Royal Air Force established a central guidance lab which provided systems to all the field operational elements. I thought that would be too great a risk, as I didn't have that much confidence in the people doing the planning. Cliff, as the DOD representative, pointed out that the paper was weak as it neglected to mention a great many DOD facilities that had similar capabilities. The Navy representative, Waterman, was also critical. We were also sarcastic over the fact that they had not come to our committee during the exploratory phases, instead of making a gesture to satisfy Congress. The OART representatives took our comments, refined the document a good bit, and eventually Congress agreed to establish ERC.

I wrote a memo to Gilruth to report what went on at this meeting,

and I made the point that I felt that if ERC were established it would jeopardize the best interests of such centers as ours because sooner or later ERC would attempt to duplicate MSC's functional responsibility for electronic systems development. I got a phone call from Paul saying he was sending the memo back to me and wanted me to burn it. He didn't want it in MSC's files and I should shoot the secretary who typed it. Although the suggestion had its amusing aspect, I was chagrined over the fact that our management could be that fearful about a piece of internal correspondence. I felt it my duty to report what happened and make the necessary evaluation of the implications to MSC. I thought it was rather chicken of the management to take such a cowardly attitude. In informal discussions with Faget and Vavra on this subject, they were upset that MSC Management adopted such a head-in-the-sand attitude. They thought it was a big mistake that NASA was committing, but of course NASA went ahead and built ERC anyway.

As another interesting sidelight, Cliff once told me that when the members of the committee turned in their written critiques when it was announced that Cliff was going to come down here and head up the Guidance and Control Division, someone in OART had the nerve to call him and ask him that since he was going to become part of the team, would he reconsider some of his critique comments? Would he perhaps be willing to soften some of them? He also was considerably disillusioned but declined to take advantage of the offer.

NASA had become so big that we should have expected the development of some of the characteristics that we used to deplore among the older government agencies, particularly in the days when we were NACA and thought we were so elite. I think we have lost some of the integrity we had

in those days.

For the next 3 years Shea was Apollo Program Manager and Dr. Duncan was the chief of the Guidance and Control Division. I was his deputy. Ultimately, we brought Don Cheatham in as assistant chief and got another assistant chief, Bob Gardiner. We had a top heavy organization but we justified it to Civil Service Commission on the basis of our complex responsibilities. Bob, incidentally, worked for NACA in PARD and left there about 1956 to go with Thompson Products. There he came to the conclusion that he was becoming more and more sales oriented and less technically oriented, and decided he would get out. He talked it over with Max, and Max brought him into our organization at MSC. That was a good move as he was a strong right arm to Cliff in the G&N contract management area.

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Shea was ever watchful in our operation and kept Cliff jumping. Shea treated him as if he were one of his own division chiefs, and in fact he expected more of him than our functional responsibilities called for. He even expected him to monitor the radar work, and actually that was Sawyer's responsibility.

After he had been at MSC about 3 years, Cliff began to receive many highly tempting offers from industry. He began to look for some rationale that would enable him to justify going to industry. He confided to me that he was interested in getting back into DOD ultimately, perhaps as deputy director for research and development. However, no one he knew had ever got into such positions without having had a responsible position in industry. Hence, his interest in going to industry was as an

interim step toward getting back to the Pentagon. He was called several times by different people to try to entice him into different positions. I decided to follow another one of these marriage brokerage deals and I took the risk of imposing on my relationship with Max. I told Max ~~once~~ that the Center was in danger of loosing Cliff because his job wasn't big enough for him. As a matter of fact, Cliff told me once that his boss in the Pentagon was mad at him when he left DOD, because he was only going to be a division chief at MSC. I told Max that the Center was going to loose Cliff unless his responsibilities were broadened and I told him that I felt the Center ought to divide up his (Max's) empire. I recommended that Cliff be made an assistant director over our division, Sawyer's, and Vavra's and any other associated technology area, even Computation and Analysis. Interestingly enough, Shea used to chide Cliff continually about the number of Guidance and Control Divisions at MSC--in the flight crew area, MPAD area of FOD, etc. But Shea never took it upon himself to try to rectify these problems. In fact, Shea's guiding principles were that the Center's organization was unimportant--he didn't believe in organizations, only in people getting things done.

Max reacted to my recommendation in a peculiar way -- he thought I had made some good points, but interesting enough he said that the biggest obstacle to keeping Cliff through such a reorganization was that the Center was fighting a desparate battle with headquarters, to prevent what he called the proliferation of responsibility in the Center. Headquarters was trying to enforce upon the Center the creation of a

Science Directorate. He couldn't very well oppose Headquarters and at the same time recommend a directorate for Cliff. Of course in rapidfire order we had a Medical Directorate and a Science and Applications Directorate, but no directorate for Cliff. Cliff got an offer to become the Vice President in charge of Research and Development for Bell Electronics Company, a tremendous job and he decided to take it. Shea was put out with him, for he thought he was leaving too soon. Actually Cliff gave both Max and Shea several months notice that he was likely to take such a step and then when he made his decision he told them again he decided that after SC 012, he would leave. From that point things went so fast that Cliff really didn't understand what was going on. He is a very patriotic and dedicated guy and they got to him where it hurt. Shea tried to talk him out of leaving, saying it was to Cliff's best interest to wait until Apollo had been successfully completed, and then he could command any job he wanted. That was the wrong approach to Cliff. Cliff also had the feeling that Gilruth was put out with Cliff for wanting to leave. When Elms heard about it (Shea told him), he attempted to get Cliff to come to ERC. He kept arguing with Cliff all day and literally wore him down insisting that it was the patriotic thing to do, it was where duty called, it could help cement relationships between ERC and MIT, etc. He even promised to go to Seamans or even Webb and they would guarantee that Cliff wouldn't lose professionally by giving up this offer to go with Bell. Even Gilruth put in his 2¢ worth - like that's right, that would be a good thing to do - we wouldn't lose you on that basis. They just wore

him down and the ridiculous thing to me was that here was this Center aiding and abetting ERC efforts to steal him away from us. They wouldn't lift a finger to keep him here.

Cliff's greatest strength was in his ability to work with other people. He would never have the problem that ~~Vavra~~ Barry Goldwater had, for example, for nobody would suspect Cliff of self-interest. He engendered trust and he could have built a strong organization. But they sold him short here. It so happened that the Apollo fire occurred at the same time. The disposition of the management of our division was left floating for months. Cliff kept urging Max to do something and nothing was done. Shea was not readily available to offer recommendations. I recommended to Faget that the division be split into two parts; let Gardiner take half of it into ASPO and I would have the other half in E&D and would support Gardiner. After Shea left, it was the apparent desire of the Center to have E&D become more and more responsible to the Program Office, and that killed my suggestion. Gardiner was so strong in the program, he was a natural choice for Chief of the Division, ~~as~~ and I didn't want it. He has more rough spots than Cliff in his personality. But Cliff's administration of the division wasn't free of problems either. Actually, Cliff would have been a much better assistant director than a division chief. He was much better at the big picture than at the details.