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Abstract COMMANDER, AIR DEFENSE COMMAND; RECALLS BEING MEMBER OF ADVANCED ECHELON TO ENGLAND IN 1942 TO PREPARE FOR LATER COMBAT UNITS AND PLAN COOPERATION WITH BRITISH; DEVELOPMENT OF P-51 AS LONG-RANGE ESCORT; DISCUSSES OPINIONS OF GEN CARL A. SPAATZ AND GEN IRA C. EAKER ON USE OF FLYING FORTRESSES WITHOUT FIGHTER ESCORT; U.S. LAG IN FIGHTER PRODUCTION; FALLACY OF BOMBER INVINCIBILITY AND NEED FOR AIR SUPERIORITY; DIVERSION OF STRATEGIC AIR POWER TO TACTICAL USE; BALL-BEARNING CONTROVERSY; WEATHER PROBLEMS; EAKER'S IDEA OF STRATEGIC BOMBING OF GERMANY FROM MEDITERRANEAN; OPERATION STRANGLE AND DEFEAT OF ITALY; AIR FORCE BOMBING OF MONTE CASSINO; DEVELOPMENT OF STRATEGIC AIR DEFENSE AFTER WORLD WAR II; DEFENSE AGAINST ICBM'S; FIGHTER INTERCEPTORS; F-15, F-4, F-12; RADAR COVERAGE IN U.S. AIR DEFENSE; PERSONAL ROLE IN INITIAL OPERATION OF SEMIAUTOMATIC GROUND ENVIRONMENT (SAGE); USE OF COMPUTERS IN AIR DEFENSE; AND EXPERIENCE WITH GROUND OBSERVER CORPS.

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U. S. Air Force
Oral History Interview

Lt Gen Arthur C. Agan

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~~CONFIDENTIAL~~

DEPARTMENT OF THE AIR FORCE

HEADQUARTERS AEROSPACE DEFENSE COMMAND

PETERSON AIR FORCE BASE, COLORADO 80914

REPLY TO ATTN OF: HO

15 May 1979

SUBJECT: Downgrading of Lt Gen Agan's Interview Paper, Feb 1970

TO: AFSHRC/HO

Subject report has been downgraded to Unclassified. Authority for downgrading is attached letter from ADCOM/DOY.

JOHN W. DENNISON
Historian

1 Atch
Letter, ADCOM/DOY,
11 May 79

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NOH
cy to HOL
(NOA)

FROM: ADCOM/DOY 11 May 1979

SUBJ: Downgrading of Lt Gen Age's Interview Paper, Feb 1970 (DO Memo 15 Dec 78)

TO: ADCOM/~~DOE~~ HC

Subject historical paper has been reviewed. Although there is included considerable general information about air defense capabilities as late as the 1960's, it is our opinion that the information is not specific or current enough to warrant classification. We recommend that it be declassified.

Lyle L. Knudsen

LYLE L. KNUDSEN
Deputy Director, Systems Evaluation
DCS/Operations

UNITED STATES AIR FORCE

ORAL HISTORY PROGRAM

Interview

of

Lt Gen Arthur C. Agan

By

Dr. Denys Volan

Date **February 1970**

Location **Colorado Springs**
Colorado

NOTE: Only minor corrections and emendations have been made to this transcript. Moreover, the reader should bear in mind that he is reading a transcript of the spoken rather than the written word.

[redacted]

THE FOLLOWING TRANSCRIPT OF THREE INTERVIEWS BETWEEN MYSELF AND DR. DENYS VOLAN IS APPROVED FOR USE BY THE OFFICE OF AIR FORCE HISTORY FOR HISTORICAL PURPOSES, SUBJECT TO CORRECTIONS INDICATED IN MY HANDWRITING.

2 March 1970
Date

Arthur C. Agan
ARTHUR C. AGAN
Lieutenant General, USAF Retired

[redacted]

THREE INTERVIEWS WITH LIEUTENANT GENERAL ARTHUR C. AGAN, COMMANDER OF THE AEROSPACE DEFENSE COMMAND, COLORADO SPRINGS, COLORADO, CONDUCTED BY DR. DENYS VOLAN, ADC COMMAND HISTORIAN, DURING FEBRUARY 1970.

Q. In February 1942 you were among the very first USAF personnel to go to England, arriving several months before the first combat aircraft. According to General Eaker, the purpose of the advance echelon was to pave the way logistically for the coming of combat units and to understudy the British. Would you like to comment on this experience? How successful was the effort? What major problems were encountered?

A. It was true, that to prepare logistically, that is to acquire bases from the British, to arrange the logistics for getting fuel, for getting aircraft repair depots, for getting munitions depots, was a major part of the effort. Since I was Chief of Tactical Operations for the Eighth Air Force, my specific work was a little different. Mine was much involved with: How would we really operate with the British? Under what kind of schemes will we be functioning in order to use our aircraft in support of the basic war effort? My personal interest was in the fighter area, as well as the bomber area, because in tactical operations I had both fighter and bomber aircraft to consider. I got into the matter of how the bombers were to be used. When we came to England, we had the idea that our bombers would be used in daylight. The British were bombing at night; they had long since ceased bombing in daylight. It was our idea that we would bomb in daylight to get greater bombing accuracy. We also believed that by bombing in daylight fewer missions would be required to achieve our objectives.

As the time approached for the use of bombers in daylight in Germany, it was clear that we would run into the problem of the German fighters. Hence, we had to begin planning fighter escort for our bombers. One of my specific tasks was to figure out how to use fighters in escort of these bombers in the daytime. Hence, I went on some bomber missions after we got them. One of the important things which I think really should be known, and that was interesting to me, was that in England, under their scheme's control of the military forces, the British Admiralty was in charge of strategy. Any target that was struck outside of Britain, in previous days, had to be struck by Naval forces; and it was a natural thing that strategy became the purview of the Admiralty. This hung over enough such that when we did first begin our bombings--if you recall in history--our targets were the submarine pens at La Pallice, St. Nazaire, and so on, day after day, after day, literally, as I recall, for a year or year and a half. There was then put together a document before the Casablanca Conference called the Combined Bomber Offensive. This was an examination of the strategy for defeating Germany in the war which looked to a new concept--one which I think was the greatest advancement in strategy in 200 years or more. The basic change in strategy was that in previous times the objective in warfare had been the destruction of the will of an army in the field (or naval task force) to resist, and most objectives were at that level. Beginning in a

document called AWPD-1 and AWPD-42 (War Department basic plans), several Air Force people, like Generals Fred Anderson, Pre Cabell, Haywood Hansell, Ira Eaker, and others, had the basic thought that it would be a valid strategy to strike the ability of a nation to wage war at the source of that ability. Once the ability to build the weapons of modern war was destroyed, then the nation's ability to resist would fall, and the nation would be defeated. The will would fall when the ability was destroyed so that the ability to fight, the ability to build the weapons of the war, was the strategic objective, rather than the will of the people. This basic thought was behind the Combined Bomber Offensive. The Combined Bomber Offensive plan was written by about five officers: Generals Pre Cabell and Haywood Hansell; Colonel Dick Hughes, a very interesting and intelligent fellow who had graduated from Sandhurst and had spent 17 years in the British Indian Army; an Air Commodore named Sinclair from the RAF; and myself. We literally went about looking at all the industries in Germany, and the contribution of each towards sustaining the German production capability. We looked at their factories, at those things which were most dangerous to us, like the fighters. It was very interesting--the fighters were not originally the objective. The original objective was to cripple the nation. We considered many target systems like transportation, electric power, fuel, basic heavy industry which produced arms such as tanks, guns, ammunition, and things of this sort. We then set up a total

target system, we figured out how many of these there were, and which were the most critical. We got assistance from wherever we wanted it in the United States or in England. For instance, if the target was a munitions factory, a railroad system, or an electric power system, we called in men who were the best experts in those areas to tell us where the most vulnerable points were in radios, electric power, shipping, oil, and so on. We looked within systems for vulnerable points. Then we looked at systems to determine which would cripple most effectively, whether a single one was a limiting factor sufficient to cripple the German war making capability, the amount of that system that would have to be destroyed--the percent we would have to destroy, and keep destroyed (which we learned later that not only did the system have to be knocked out, it had to be kept knocked out) in order to fatally weaken Germany. We also considered what percent of the system had to be knocked out and kept out for how long a time to attain the desired effect. After we had finished the document, we briefed Air Chief Marshal Sir Arthur "Ginger" Harris, who was AOC-in-C, British Bomber Command, Generals Eaker and Spaatz, and Prime Minister Churchill. Then the document was taken to the States. The basic paper--the essence understanding of it--was taken by Jimmy Doolittle to Casablanca. Then we really started getting a redirection. An interesting point which is often overlooked, I think, was the fact that the need for redirection was really because control of strategy was in the hands of the Admiralty, and they did not agree with our strategy, because they already had a strategy.

When the wisdom of our strategy was shown to enough people we were authorized to go ahead with it. The reason was that it was a pure, air strategy with a basic belief that a war could be won with aircraft. And I believe it was. The best evidence I know is that when General Eisenhower was briefing his troops before they went ashore, one of the things he told them was, "if you see any aeroplanes in the air, they'll be ours." When we had objectives, such as "get the oil", "get the transportation", "get the electric power", and so on, this was a combined effort of British and the Americans. The Americans flew in the day, the British at night. The Americans flew with fighter escort, the British with only limited night fighter escort, most of the time using cover of darkness. But we went after target systems. In the old British Fighter Command, we had halls of photographs of each of these towns, each of these objectives. They were literally burning them out. From more photographs of specific factories, we would decide whether we had plucked out the objective or not. Sort of a stiletto versus a shotgun approach.

Now I must say that this is a complex subject. There are many facts involved. I would never be the one to say that we were very bright people; that we wrote a plan; that we were technically and operationally very brilliant; that our plan was sound; and we executed it with perfection. I don't believe that's true. There were some very glum days. We had to change objectives from some of the basic targets that we wanted to strike at such as transportation, oil, munitions, to the

German fighter force. Then, you will recall the raids against Schweinfurt and Regensburg--we're talking about ball bearing factories and aircraft engine factories--all designed really to stop fighter production. The fact is, that our bombers couldn't really go deep in Germany until they had full fighter escort, and effective fighter escort that could take on the German air force. I also think the real turning point that made it possible was when they unleashed the fighters, and let us go chase fighters instead of just sticking too close to the bombers. When General Doolittle finally came back up from Africa and was again in Eighth Air Force, he said, "all right, get those fighters wherever they are. When you see 'em, go after 'em all the way." We literally ran them out of the skies, and then our bombers could go in and complete their work with accuracy.

Now, one interesting thing was that before we got full fighter escort there was serious consideration of giving it up. There were many that just felt we were never really going to be able to carry out that which we so desired, to knock Germany out with bombers--daylight bombers. The British were always leaning on us to go to night bombing in order to survive. As a matter of fact, time and time again they would. We went so far as to get some B-17s to England, put flame dampeners on the engines and flash hiders on the guns like the British had. Some were convinced that we really were going to have to go to night bombing. Our loss rates were horrible. We had a replacement rate, at one stage, on B-24s of 20% per month on aircraft,

and 25% per month on crews; on B-17s, 15% per month on aircraft and 20% per month on crews. Now both of those were well over 100% per year replacement rates required, because of the losses we were taking. We would go to Germany--and by the way, you should look at the record on that--it was a good while before we really went to Germany. We went to France and to the Lowlands. We would go to the Continent approximately eight times per month. The weather was bad sometimes, but I know that many times, the reason we didn't go any more was because we couldn't stand the losses. We had horrendous losses in the early days of the daylight bombing effort until we really got the fighters, then we were able to do it. Once we unleashed the fighters, then we really dominated the skies.

Now, I was in the Air Fighting Development Unit in England, which was another interesting facet of this business. It was the business of AFDU to look to our fighter aircraft and the enemy fighter aircraft. In fact, we would steal German airplanes, get them over, examine their full capabilities from an engineering viewpoint, figure their total performance, and then go out and fly them to see what the performance actually was. Then a group of fighter pilots--we had South Africans, Australians, Englishmen, Americans, and Canadians, the guys who had been the real keen fighter people--would then sit down and figure how to use each aircraft against another. Then, as the British say, we would push out tactical paper--telling a fellow where he had the advantage and where the other guy was

at the disadvantage. From this, we learned quite a lot--in our fighter forces. Of course, I think we taught a lot, too. The British fighters, aircraft like the Spitfire, were very agile but very short range. When we came up with the idea of hanging external tanks on our fighters so we could go all the way with bombers, they said, "Fellows, you'll never make it. If you get a round of Hun tracer ammunition through those tanks that are filled with fumes and gas, they will explode and blow your wing off." They just thought we were stupid to try. We took some airplanes, took them down to Eglin (I didn't, the fellows who were there--we brought the suggestion up)--set them up down in flight altitude on the ground there with the engines running full and used German tracer ammunition, German high-explosive incendiaries, and fired them through it. It didn't blow up--the wing didn't come off. Then we went ahead with the escort fighters. There is a lot of good history on this which you could get from people who were actually doing this in the 8th Fighter Command wings at the time (which I wasn't) and in the fighter groups. But I thought that there again was a very interesting facet, where our original ideas altered as we learned. We then sought higher altitudes, of course, with our aircraft, and there's a lot of good history on that. We obtained sleeves on the propellers on the P-47s, improvement of the turbines on the old P-38s, and the geared superchargers on the P-51s, and so on. We began to get those in order to get more altitude, more power, and more agility with an airplane that was quite a bit heavier and larger than the German ones, in order that we could get the range and the ability to fight without always having the German fighters above us with the sun behind them.

Q. The British, as I understand it, requested the P-51. We developed the aircraft for them. When was the very beginning of our awareness that the P-51 could be used for long-range escort?

A. Well, let me say a little about that. You know we ought to get all the truth that we can on these things. The British did want P-51s. And we did sell them some, but the truth is that the P-51 that we sold them, that they wanted, was an aircraft which was good at low altitude and not really good at high altitude. We were interested in high altitude to get up with our bombers. Now I don't know what went on in the negotiations between the governments, in the effort to get the P-51s, I do know that all the fighter people and myself were hollering for more and better fighters for years and long before the war. I was a test pilot in '39 when they were coming up with the B-17 with 30-caliber guns. You may say I'm a biased fighter pilot, and I'll accept all those words, but to me I know what I can do with a fighter against another guy's bomber, I know that it is not a feasible thing to ask a bomber to go in daylight--in those days and the performance of aircraft--to go against the target defended by enemy fighters and expect it to survive. It was simply clear that we needed good fighters and plenty of them if we were going to attack the targets that we sought to attack. I believe we were late in going ahead and getting the fighters. I don't think we really did it until it became clear that we were not going to be able to do it otherwise. I believe that there are a lot of people that believe that the

Flying Fortress was truly a fortress, I never did.

Q. What about General Spaatz and General Eaker, were they really firmly convinced that the Fortress could do it by itself, or did they adhere to the principle of fighter escort from the beginning?

A. I would believe that those two generals were pretty wise and broadminded on this subject. General Eaker especially understands fighters and especially understands the need. He knows what you can do with a fighter, and he always did. I think there were a lot of people in the plans area at home that could see the trouble and the expense of it and many who in thinking could see that this objective of knocking a nation's ability to wage war out at its source was a good and solid one, but they just didn't want to believe, maybe, or just didn't really see the facts or recognize as vividly as some others that it was a very laudable objective, but an unattainable one in the minds of some of the rest of us. I was convinced from the beginning that we were going into the bomber thing too strongly without proper consideration of fighter escort--that if you are going against a capable fighter, any fighter pilot knows he can get that bomber.

Q. How do you account for the fact that we did lag so far behind in fighter development?

A. Well, now I'll tell you why. For the same reasons that we are doing the same thing right now. You just reach a time, that the farther away you get from war the more difficult it is to recall the hard facts of it. The offense thinking is sort of clear in everyone's mind. Now, in all the fights I've

been mixed up in the other guy swung at me and I sort of believe that that's a fact of life that it will occur. Look at what the nation's doing today. It will go flat out for offensive forces, and will simply say--I don't know why--and will come up with the conclusion that the enemy isn't going to strike us. Now the F-15 is on the books; I know the whole story of that because I'm the guy who got it on the books. There was a lot of hard study, and it was very difficult to get that point over that you really had to have an air-to-air fighter. Sort of the same philosophy when we went to North Vietnam. The rule was that every fighter had to have a bomb on it. When you get a fighter with a bomb on it, it's a bomber, not a fighter. You know, if the pilot must cruise sub-sonically he may as well give up. It seems to me that the idea of offensive would carry through, because as soon as you take a fighter and hang a big, heavy load of bombers on him and send him in to face the enemy--for that time he is a bomber, not a fighter. It's a peculiar turn of mind to me, that a bomber pilot will think offensively, and yet when he goes into any enemy target that is defended he is the most defensive guy I can think of. Now, if you want to be offensive in hauling bombs, the thing to do is to go in there bristling. That means, "I'll take on anyone." To do that I should go escorted with fighters that can take on anything the enemy wants to send up. The offensive thinking fails to complete the circle of thinking. It goes off into

some sine wave, offensive-offensive-offensive, and neglects the realities of life that although one might like to be offensive in every way, it is not going to be possible against capable enemies. Our whole national strategy right now is just fraught with it. What's happening in the Aerospace Defense Command is a good example of it. We are busy building up TAC now, but the kind of TAC we were building up before the F-15 got on the books. Look at the TAC forces today. Name me the TAC airplane that doesn't drop a bomb. The only thing you can name is a transport or a Recce airplane. I hope we can make the F-15 a pure air-to-air fighter and let the rest of them drop the bombs. All the others are sort of oriented toward support of the Army, which is fine, but you have to win air superiority first. I get very disturbed about war games that "assume" air superiority. I think you've got to win it. You've got to win the right to be offensive.

Q. We were beginning, just before the war, to drop the emphasis on bomber invincibility and recognize the need for air superiority. We were quite late in getting started, don't you believe?

A. It's tough to really get minds turned around enough that they are willing to put the money on it and really go after it. Now we had some real good fighter people around that were pushing all the time and thank goodness we had them, and many more I could name, that were just great people. They really carried the day when they got the opportunity. They were good fighter people. When they got the opportunity they were pushing all

the time, and when they were heard, they were able to do the work.

Q. You were concerned primarily with tactical operations of the British-based forces between February 1942 and January 1944. Up to 50% of our strategic air power was diverted to tactical use in the European theater in World War II. Had this diversion not occurred, do you think that the Germans would have collapsed earlier?

A. I would be very hesitant to answer that question "yes" or "no". The problem is you must look to the criticality of a situation in determining where the air power should go. You must look to opportunities and put the force where that opportunity shows you can do the most telling thing for the total effort. Some things were done in terms of diverting forces which were done out of necessity. It's true, heavy bombers were used in pure tactical support in Europe after we got ashore, when the Army got in serious trouble; it was either that or get pushed back. We could have hurried the destruction of their ability to wage war, if those weapons had been put on the strategic targets. An example is bombing fighter bases--Romilly Sur-Seine, and I could name others, where we actually went in with B-17s against fighter bases, which I think is almost a ridiculous thing. You just can never really get them that way. You can get some, but you can never really do the job that way. They are just too agile. Going after the ball bearing factories, the fighter factories, and so on, was not the thing you wanted to do most, but it was a necessity. Right then, I think, we were really up against this: Could we survive with enough machines

and keep the pressure in the strategic effort? You had to make a decision. When we were losing as heavily as we were, you were up against a proposition "how long can I stand it"? People like General Spaatz and General Eaker certainly made some courageous decisions. They would hang on--General Eaker would hang on no matter what--to try to carry out that strategic operation. Then, when you've got Allies on the ground that were literally losing on the ground, and they had to have the effort, you just had to divert--just as we did to the fighter force. So it's sort of a matter again--as you noticed pretty early when I said, "please don't misread me in saying, because I was mixed up in the early plans, that we wrote a beautiful plan and we did a perfect and beautiful job in carrying it out," because war isn't like that. We had some horrible times when it looked like we just were never going to be able to complete the job--even during daylight bombing when it looked like we were never really going to be able to get enough of those strategic targets and keep them out long enough. I had to keep track of them week-by-week. I wrote the reports that came back, and then month-by-month summaries. I will say that when we got all through with it, it came out surprisingly close to the plans.

Q. How about ball bearings? That has been a subject of great controversy. In the official history of the Air Force it is stated that this was a planning mistake. How do you feel about that?

A. When you're going after ball bearings you are two or three steps or abstractions from the problem. If the problem is a Focke-Wulf 190 attacking a bomber and a factory builds ball bearings that have to be moved to some engine company that puts them in an engine that must be moved to some fighter factory where it is put in a fighter that must go to a training base, get fueled, gets a guy who's trained and then get in the air at the right time to get up and knock down a bomber. You are several steps between the production of a ball bearing and the knocking down of a bomber. We worried a great deal about how many ball bearings there were; what was the possibility of their getting them in any other way, and in numbers to keep the engines coming, and so on. This is one of the kinds of things about which we had people come over from the United States, who ran ball bearing factories and who did engines, to give us expert advice on really how it would work out. It was an abstraction and several steps remote from the actual act. I took the plan for Regensburg and Schweinfurt from London up to a Brigadier General named LeMay, who said, "Can you do it?" So I'm pretty familiar with the operational side of those two. Early I was in on the planning of these as one of the kinds of target. I would, unless I had done much more detailed study, be hard put to say it was or wasn't a wise thing. I would caution anyone that attempts to do it to recognize that this was a dynamic situation. It was going on every day, literally hourly, with everyone struggling on both sides with action/

counteraction. You must get in that context when deciding whether it was or wasn't wise. I'd be hard pressed, again, without that kind of research, to say "Yes" or "No" that it was or wasn't wise.

Q. Would you like to say a few words about oil? We did change the priorities on oil from a relatively low priority to a very high priority.

A. Yes. That was done when it looked like they were really having problems with oil. We set priorities on oil and the transport of oil simultaneously. That's what Ploesti and so on were all about. I think oil was a valid target. Again, I must keep making the point that you really must know the facts of the case thoroughly. That doesn't mean just how much oil he has. You must know the total functions involved in getting oil. You must look to the dynamics of it, such as how much is consumed, how much is constantly moving, what might you be able to achieve over what kind of time span, and sustained for what kind of period. In these things, you know, one of the things which gave us great difficulty and could have been a defeating factor was when we were doing visual daylight bombing and got into some targets like oil where you could figure that you had to knock out so much of it, you had to get that which was in motion, and you had to get at the production, you were involved in a dynamic problem. When the weather impaired your ability to get back to a given target area for several days, you could lose in 12 hours something which may have taken you weeks and many aircraft

and many deaths to win because you weren't able to keep up with consistency. That was always a very bothersome kind of thing when you undertook a set of targets like oil. Can you get enough? Can you get the key things? Can you keep them down for long enough?

Q. I have a question concerning weather. Was there a general defeatist attitude in Eighth Air Force planning circles about weather--the fact that weather was spoiling our strategic bombing effort?

A. For a while, because so many times you would go over and you would just think you had it made, and you could be impaired on a day when you had broken clouds--cumulus clouds. I don't know anyone that had a defeatist attitude, I never really saw that. We thought we might have gotten beaten a few times, but everyone I knew was going to try to the last. I don't know of anyone who had the attitude we were defeated--let's quit, and walk off. We were going to find a way to beat it, I'll give you an example. Out at Eighth Bomber Command I saw a device that some young weather officer had put together which was very interesting, and I think later was used quite a bit. Through making sheets of plexiglas and drawing on these, the clouds at various levels were indicated. He could expect, say, .4 clouds at 10 to 12 thousand feet, .5 to .6 clouds from 4 to 7 thousand feet and maybe high cirrus somewhere else, he would put these in in the different layers in a big 8 x 10 foot training device he made himself. Well, then if you could get a properly scaled position above this, so you were in a relative

position of a bomber and look down at the angle you had to look down with a bombsight, you would see that these clouds at different altitudes reduced your chances of seeing a target for long enough to do a bomb run on it by quite a bit. When there was not a layer of clouds, a single one, that was nearly as impairing, as several layers of less dense clouds. The kind of weather over Europe, which we called diffused clouds, with murky visibility, was something which none of us were really accustomed to. We just had to learn it. We made a lot of mistakes, early, like not training at high enough altitudes. We would have bomber outfits come over there that had completed their training at 10 to 12 thousand feet. We would push them up to 25,000 feet immediately, and everything went to pot. Their guns froze up, the airplanes wouldn't perform, there were all kinds of problems with aircraft and personal equipment and so on, that we'd just never had before. And the bombing accuracy was very bad on occasion. I know one outfit that had 165 ft CEP, trained down at Tampa somewhere, got over there and they had 1500 ft, after the first year; the first year, it was nearer 2500 ft. See, that's the difference in when you're bombing, and when you're getting shot at and trying to take evasive action with impairment of weather, fighters coming in, and so on.

Q. How would you generally describe precision in our bombing effort, in the first two years while you were in Europe?

A. Early, it was extremely poor. I believe this was mostly due to the combat environment which was all around. That was

being attacked by fighters, flack all around. The fact is that when you made a bad run--you'd made a bad run, you couldn't call it off and come back again.

Q. Do you think that General Eaker's reports to General Arnold perhaps over-emphasized the accuracy of the bombing?

A. As an aide to General Eaker, I wrote a lot of the reports, and I would say that they clearly were written on the optimistic side. I think they clearly were. It was real tough for him to keep support enough at home when things were difficult in the bombing campaign. General LeMay made a major change, you know, in the bombing techniques. You know that story--what happened on that? ["No evasion--direct runs over the target--"] That's right, when he pulled them in tight, and drove right over the target. That made a whale of a difference in bombing accuracy, plus reduced our losses, and that made a difference in a lot of people's philosophy. He designed the box formation that pulled them in tight, kept them there, and concentrated their fire power. When he was a Wing Commander out there his outfit always looked different than anybody else's, he was in there tight. The enemy came into him, you got lots of gunfire back, and he drove straight over targets. That made a great difference in bombing accuracy, and decided to attack other formations.

Q. We seem to have abandoned the idea of daylight pinpoint bombing over Japan. Would we have done this over Germany if the British had not been accomplishing the night saturation bombing mission?

A. Some people wanted to do it. We went so far as to put flame dampeners and flash hiders on some B-17s. My belief is that that would have set us back years. Now you can say that we weren't real accurate in the early part of the war and I'll

sure say we weren't. Not within ten - twenty times as accurate as we had been back in the States, but we were still ~~so~~ much more accurate than the British were with their night bombing. I think it was the key to success of the bombing campaign. We did some very good bombing on occasion, too. In fact, I would say most of the time we did effective bombing.

Q. Did General Eisenhower fire General Eaker by sending him to the Mediterranean and bringing in Jimmy Doolittle?

A. I wouldn't know about that--I was in a different level, and I don't know. I think he wanted a change in the way of looking at things, and I'd just be guessing.

Q. A personal question--were you sorry to leave the Eighth Air Force just at the time it was reaching a critical period of its buildup?

A. I wanted to get in a tactical outfit--that was my problem. If I could have gotten out of the headquarters in any way, I would have done it, and I did. I got a fighter outfit.

Q. Would you care to comment on the submarine pen effort? Was it our doing or was it the British who insisted on it because of their preoccupation with the sea?

A. My view is that the whole idea, early, was because of the Admiralty and ~~that~~ they had charge of strategy. You had to get it turned around from a sea strategy to an air strategy if you were ever going to carry out that strategic objective of ~~bombing~~ destroying a nation's ~~out to destroy at~~ ability to wage war by bombing & the source its ability to wage war.- its industry and war making Potential.

Q. And related to that question which I just asked about submarines--you said that one of the reasons we did so much of the small scale bombing was to cut our losses

because we were doing so badly in large scale bombing at the beginning of the war. It wasn't entirely because we wanted to cut our losses that we were preoccupied with things like submarines?

A. No, no, because you know we went to Lille, to the railway yards, and a few things like that, but we went to these targets largely because they were the targets that were specified by the combined staff. And let's face it, you know, we were just building our forces up and needed some opportunity to go to targets that were not so heavily defended, that were not right in the heart of the real tough targets. Why, you were taking many people and many fighter-bomber squadrons and groups over that were on their first mission and as the British would say, you know, we thought they needed to get blooded, they needed the combat experience and I think it served that purpose. We were just convinced that as soon as we could get our strength that we ought to start striking--breaking the industrial potential of Germany.

Q. Moving into the Mediterranean with generally related topics, did General Eaker have any reservations about tactical bombing detracting from the strategic bombing in Pointblank?

A. He was a strong supporter of strategic bombing. He believed thoroughly in the combined bomber picture as an objective and believed thoroughly in the strategy of bombing Germany out as a nation.

Q. Did we make a mistake in setting up a bombing operation over Germany from the Mediterranean? Shouldn't we have concentrated it all in Britain the way the British wanted us to do? Why did we send General Eaker to bomb Germany from and Italy and North Africa?

A. I think there were a couple of reasons. Several. You know you can say the British wanted us to bomb from up there, but you were really almost running into an air base problem and a weather problem which you didn't have to any extent from the south. It split their fighter forces. There is sort of another interesting angle to this, you know. Churchill's ideas of the "soft underbelly", you've probably read of his ideas on this. They even got the invasion craft together with the idea of going into the "soft underbelly". There were great differences over whether we should go into Southern France, or whether we should go in through Greece, in the Lake Balaton area. That was what Churchill really wanted to do, and there were some major differences over that. What Churchill had in mind all along--was going in to strike at the back door and middle of Germany, sort of up through Austria and not around through France. And this went on right up to the final decision of "Operation Shingle"--because that's when they first started moving resources, even British resources to the south. I wrote a paper called, "Air Participation in Operation Shingle", that's around somewhere, showing what we did there. We had put B-17s and B-24s, you know, on Anzio, that was over the hills and stuff, between Anzio and Rome. Now, I'd say the reason was to split the effort, give the Germans a third front, really.

Q. You accompanied General Eaker to Italy in January 1944. At this point the tempo of the tactical air war in Italy increased. Do you feel that Operation STRANGLE, March-May 1944, was a decisive factor in the defeat of the German army in Italy?

A. Yes, I sure do. I think that was a successful interdiction campaign.

Q. There was a controversy going on at that time over whether you should hit railroads or bridges and you chose bridges, and that turned out to be very effective.

A. Oh yes, it sure was. We used fighters up and down the railroads with random strikes but rather than cut railroads as such, we really went to the bridges and the reason for that was the difficulty in repair, the time required for repair and the difficulty of building alternate routes around, so we sort of looked for choke points. And the medium bombers did most of that work, you know, the B-26s, and the B-25s.

Q. Closely related to that, the latest volume of the Army History which just came out a few weeks ago, by Martin Blumenson, Salerno to Cassino, had a rather mean attack upon the Air Force's bombardment of Monte Cassino--to the effect that it was worthless because we just converted it to rubble, and the Germans used the rubble better than the old buildings for defensive positions. Would you like to comment on that?

A. Well, you must begin by saying that the Army fought to get us to attack Monte Cassino. ["General Freyburg, specifically?"] I don't know who specifically, or how we got started bombing the Cassino, but while we were bombing the Cassino, that's when we really got Operation STRANGLE started. And it was doing its work all the time we were bombing the Cassino--but man, we put a lot of bombs on that Cassino, and they kept shooting at us. I went on two tank operations up there with a New Zealand tank regiment, so if you're talking about a guy getting a few artillery pieces when he has the high ground,

and it really was the high ground there, where he had access down to it, and holding you off--there was a big open valley to the south and then the valley sort of swings around and going to the north, up toward Rome, its clear, you know--big wide open area--with hills on both sides so they sort of dominated in two directions and the high mountains in the other two directions. It was a beautiful position from which to do just what they did, and they did it. They did a very effective job. We went the other side of the mountain--we were next to the beach and the land is pretty limited between the beach and the mountains, you know, it puts you in a vulnerable spot in there--you really are in a choke point. That was the reason we wanted to get into this wider travelling which was just to the west of the Monte Cassino where you could head north. I know--there's a lot of controversy over whether we did too much there--the Army put us on it. They kept shooting out of it, and they kept hollering, "get 'em, get 'em, get 'em". ["They thought that we could do it entirely by air power whereas they failed to follow up--"] Many, many times. And you should have seen the air guys when they'd get there. They'd get all planned to make their move, you know, they go out and if they got shot at a couple of times, they'd quit. It was tough, from an Army viewpoint because they had to kind of come down and across a lower area and then up again. So they were pretty much out in a vulnerable area and took a pounding for a considerable

time. But going to the other problem--how did you get behind it, because there were mountains to the north, to the west, to the northwest, in that whole quadrant. About the only thing you could do is to come across in front of it and weave around to the west and then north, and he had a great promontory from which he could put fire down on you--and you were sort of beneath his fire for a considerable area. It was a tough spot--I went over it, and I was on the ground, as I say, in tanks and stuff--out underneath there, and it's mean when you're looking up there at that guy and you know he's going to be trained on you for a long time.

Q. Would you make any general observation about the unwiseness of using strategic bombardment on a tactical position--Cassino being an example of such a situation?

A. Well, my belief really, is, that we spoiled the Army in too many places in Africa--that they got to where they just figured out their job was just occupying territory, and when they ran up against one that was really tough--where they were really going to have to fight their way through it, I believe that if there was any place that we made the mistake of pulling strategic bombers off of strategic targets to hit a tactical one, the Cassino was it.

Q. If the Germans had not pulled so much of their fighter force to the eastern front, what would the situation have been like? Would we have done as well in our bombing effort?

A. Well, there's another question, you know. Did you ever read that little book called, "Flieger Bomber?" Very interesting.

It was in relation to what happened with ME-263s. If they had really gone out to get a good jet fighter and had gotten it earlier, that too would have made a whale of a difference. ["And the V2."] V-2, yes, yes. ["They were the missiles that could have won that war."] Yes, sure they could have. Of course it was real critical--there were some very critical times, but if--if--if, you know.

Q. What experience with fighters did you have before you took over the First Fighter Group?

A. Well, I went through flying school in attack aviation, and then whenever I got a chance I got over into the fighter business like at Barksdale, when I was in 3rd Attack, I went over and checked out in the P-6 and the P-26. But you see, that was really a fairly limited time because you're talking about from '39 to '41, and then I went to the 8th Air Force. For a couple of years I was in Attack at the time and I didn't have much fighter experience then, just what I could sort of purloin. And then in England I was in the Air Fighting Development Unit and I was interested in fighters and the tactics side of it there in 8th Air Force. I flew all of those British airplanes and the German Focke-Wulf 190s and so on, when I was in AFDU. I was trying to get out into a fighting unit and finally got in--First. Command of the First Fighter Group.

Q. You were Deputy for Administration and Personnel with General Stratemeyer's ADC and perhaps your specific job interest was not in planning or operations, but perhaps some of this might be familiar to you. General Saville's role in getting postwar air defense moving. Would you elaborate on that?

A. I don't know a lot of particulars. I know he was there. I know he was pushing hard to get air defense going. He was interested both in tactical aviation and air defense as was Bruce Holloway at the time (Jake Smart was the DO and Bruce Holloway was an assistant there. George Brown was an assistant there). General Saville was sort of in and out as I remember it and I wasn't right in on the specifics of what he was doing at the time. I was Assistant Chief of Staff, Personnel, so I knew generally what was going on and I was interested, but I wasn't into it deeply.

Q. I have a related question concerning General Saville, and that is Plan Supremacy. Do you recall that? It was the first big major plan drawn up by Headquarters USAF for postwar air defense and involved something like 300 prime radar stations. It was shot down by the 80th Congress and the Permanent System replaced it.

A. I'm afraid I can't help a lot. Maybe Jake Smart can. He was the DO there then. He's coming in. I'm making a trip with him in a few days, so if you want to talk with him I'm sure he would--he's in Washington now, with NASA, you know.

Q. Would you happen to know what the attitude of the Air Staff was toward the Air Defense Command. ADC seemed to be the very bottom of the totem pole so far as air staff was concerned back in the 1946-1949 period.

A. I think the Air Force has had the basic tendency to always be offense-minded first. It is tactical air-minded when it has to be to support the Army, and airlift has come to be a part of that. Air defense is something which, in the minds of the Air Force, in general, comes after these other things. It

goes with an idea that says a good offense is better than a defense. And this is a cliché. It's a laudable objective and it is often not a practical basis for structuring forces. I believe we suffered from that same thing right after World War II, that we did before World War II. Just as I said earlier, when we had great support for the bombers and a real fight to get the fighters to make it possible for the bombers to go to Europe, and that same thing raised itself again just as it is the current thought today. Now, I think really that the Summer Study Group of 1949--you know, it was sort of a general thought that air defense is so difficult and will be so expensive that you know it's hardly worth trying to do. It's hardly feasible to do. The Summer Study Group of 1949 said now there is a way, there are things you can do that can give you a reasonable defense against bombers. ["There was a similar Summer Study Group in '52, was there an earlier one?"] Yes, they did take a look, then, and then they said later, now let's put the systems together. In 1949 they considered such things as B-47s patrolling the DEW Line--things like that.

Q. Would you have any comment to make about the Army and antiaircraft in this general period? Army was beating the drum pretty desperately to avoid being sucked into the Air Force at the time. Would you care to comment on that?

A. I don't, really. I don't really have anything positive and constructive.

Q. Now, this was a period of time in which the Air Staff thought that since the country didn't have any regular forces to speak of, we ought to use augmentation

forces--National Guard, and those of other commands. Do you have any memories of that hassle?

A. Oh yes, I remember the sort of generalized ideas that folks were having that this would be the way to do air defense because it was going to be at home and so on. I believe that most of these were in the minds of folks who had not thoroughly studied the requirements of a defense. If you were going to do things, such as go into radar-equipped aircraft, which were quite new in those days, you were going to have to have people whose task it was to learn systems well and to maintain them well. Now, we must also recall that during this time we really had no all-weather capability to amount to anything, with the exception of some P-82s and 61s and 82s--and very few of those. When I was the Wing Commander of the 33rd Fighter Wing, I had F-84s, and F-86s, none of which had an all-weather capability.

Q. In March 1948, something most unusual happened, and we've never been able, quite, to get down to the bottom of it. It seems that a crisis arose over Berlin, and all of a sudden ADC got very excited and we threw up an air defense system of sorts up in the Northwest and got some SAC fighter bombers to double in brass for interceptors, and the radars kept on falling down because there was nobody around who knew how to operate them. This was at the very beginning of the Lashup system, before we actually drew up a plan to get the radars and fighters out of mothballs. Do you recall that exercise?

A. I certainly do not. I don't know anything about that. No, in '48 I was still at Mitchel. No, I didn't know what that was all about.

Q. How about the argument concerning whether we ought to deploy the radars that we had in World War II, which we had mothballed during the war--whether we ought to bring them out and use them or whether we would just wait

until we got better postwar equipment. Another position was taken against putting out the radars altogether for manned bomber defense in favor of guided missile defense or nothing. Do you recall any debate or argument on that?

A. Oh yes, I sure do. Yes, and there was a book, I believe in 1949 called Bomarc in Defense of the United States, which depicted 4400 Bomarcs with their own radar and their own automated control system. There was a very vigorous effort to sell that as the total defense of the United States--about the last of 1948 and first of 1949 I think. I recall General Fred Smith--I think he was out here as Vice Commander--said that the Bomarc will be a part of the total system or there will be no Bomarc. That kind of cut off this idea--because he said that there would be manned interceptors, that they were essential for identification, that we needed the flexibility of manned aircraft, and that we dared not put all of our resources into a missile system. I think General Fred Smith had a lot to do with going for a force mixed with missiles and interceptors.

Q. What about defense against ICBMs in those days? Was there serious consideration given to that question?

A. Very little, in my estimation. I think far too little over the last twenty years, because I've made concerted efforts over the last ten or twelve years and you continually get the answer that it's too difficult, too expensive--sort of the same things that you got in the early days about defense against manned bombers.

Q. Would you care to comment on each type of fighter interceptor we've had in the air defense systems; its merits and its defects based on your own personal experience?

A. Well, that gets you back to the P-80s, then 84s, then 86s. None of these were true interceptors. They were "day" only. Let's go back to the P-80. For that day, a pretty good little fighter. Sort of limited by today's standards, but a pretty good little fighter for that time. Strictly a gun fighter, with no all-weather capability. Against the kind of threat that we expected then, which was probably a Russian BULL--which was their version of the B-29--in daylight--we could have done a fair job at short range from the fighter bases--I would say 150 miles. Now the 84B, as of that time. Again, strictly a gun airplane, with better range than the P-80, a fairly heavy airplane, thrust-to-weight ratio which made it less than an agile fighter, and many maintenance problems at that time. We had a very difficult time keeping the airplanes operational. Then I went to F-86A--a very fine, agile airplane. Again, a gun fighter, with no radar, fairly good range, about like the 84. A very fine airplane as an air-to-air fighter for that day. If we could have gotten at a BULL, we wouldn't have had any problems at all shooting them down in daylight, even with no all-weather capability. Now, from there our first all-weather air defense airplane was the old F-94, which was a blown-up P-80, firing rockets. We had the kind of maintenance problems you would expect on a new machine like that.

The radar was fairly simple and fairly effective against the kinds of targets that we had then. If you had a non-jamming target within the performance envelope that an old F-94 could deal with,--the old airplane could do a good job. Now, the next move was the F-86D. Here was an airplane with a bit more complex fire control system, in that the radar attempted to give you more help than the one in the 94. Now, in the process of coordinating an engine with an afterburner to get the added speed and performance that you needed, it did make a pretty heavy airplane for its wing, and you really did knock down the manueverability over the old F-86A. And in so doing you were getting an afterburner and a full, more automated control over the engine. Ended up with a thing called an IEC (Integrated Electronic Control) which was fairly complex--and which gave us all kinds of problems. We had fairly extensive maintenance problems with the old F-86D when we first got them, and we did pretty much throughout the time we had them. The airplane was better, would go to altitude--wouldn't stay there if you lost your afterburner, and the afterburner required so much fuel that if you really used the afterburner you were fairly short range. Because the airplane was heavier, I thought it was a fairly poor aircraft for performance as a fighter. But it did have rockets that were carried internally on a little elevator that dropped down when getting ready to fire; here again, automatic signals, and so on. But it did bring us into the era of more automaticity. Now at

about the same time we got the old F-89 which was a larger airplane, a heavier airplane, a very easy airplane to fly because of the decelerons, and so on. Flying-characteristics wise--quite an old woman's airplane. The early ones, had the rockets in the wing tips, and could carry a real good-size load of rockets, with the result that you had an airplane with a real good kill capability, and when you got those why you could fire an MB-1 with them and you really had a pretty good kill capability. Its performance against a BULL was pretty good, but as soon as you started considering anything like a BISON, you really did have a whale of a performance problem. If you got in front of the bomber stream you were alright, but if he turned much, you were just out of business, after a while. I thought the old 89 did yeoman service over a considerable period. You could keep it running pretty well, maintain it pretty well, it had a good kill capability, but it was lacking in the kind of fighter maueverability that we like to have in a fighter. The real next step, was into delta wing airplanes like the F-102. You know the F-102 was never really intended to be; the airplane that we were after was the 106. The fire control system was a couple of years or more behind times, and the engine was behind times, and in an airplane called the XP-92 we had run into the aerodynamic problem of the skin friction on a long straight fuselage. In the meantime, the engine was built that they conceived of building in the first

place, with the higher thrust and the good afterburner system for the 106. And the fire control system was coming along, and the coke-bottle aerodynamics scheme was conceived. The 102 was a good, safe airplane that flew well, the best flying airplane we had up to that time and it had a pretty good fire control system. We had both missiles and rockets, a pretty good kill capability, but no atomic capability. Now I think the F-102 did real good service for its time. It had the speed and acceleration to get out and to get in front of the targets, and enough added performance with the afterburner to do some positioning when you needed to. And I think it served a useful purpose. It is still a good airplane for many kinds of things. If you don't have to go too high to attack a target that's too fast, and when you do not need the atomic capability, it still serves well in the National Guard. Then we got the 106. We had our first squadron at McGuire when I was sector commander. A very complex airplane. A very fine performing airplane. From a flying viewpoint, the best performing all-weather fighter we ever had, by all odds. Rather than being just an interceptor or a fire control system--it was an integrated weapons system. Conceptually, a very fine interceptor. We have had massive maintenance problems. In the first year and a half or two years, we ran like a 55% in-commission rate. We had a horrible time really getting the bugs out of the system. Our problems were electronics. The airframe and the

engine generally performed excellently, but the fire control system and the integration of it all to include communications, navigation equipment, which were all tied into an integrated system with a digital computer in the form of a drum, just gave you all kinds of problems because if one thing would go wrong, it could knock the whole system out. Even the communications. It was actually pretty dangerous in the early days, if you did go out in any kind of weather you could lose all your navigational capability and your communications. We have been about ten years, really getting reliability out of the communications and navigation system. Because it does have an atomic weapon and two kinds of missiles, when the aircraft is performing correctly, it is a fine weapons system for the time. Against the kind of threat we see today, it has just two major deficiencies; no ability to see beneath it to deal with low-altitude target, and it should have greater range, but it is a very fine weapons system. After that, we sought the F-108 because it was clear that we did need those two things. By then it was clear since we had a capability to kill targets at high altitudes, and our own bomber forces had gone to low altitudes, there was a tactical advantage in low altitude bomber tactics. We also sought a system that would give us a 1,000-mile radius of action, the ability to kill targets at a reasonable range from the launching aircraft. This was sort of a basic specification for the F-108. In

US To knock down bombers before they could launch Air to surface missiles;

1959 the F-108 was cancelled and we learned about another airplane. I got called in--sat down with a couple of engineers for three weeks to see if this could be an interceptor and ended up saying, "yes", because it did have the radius of action, it would accept the ASG-18 fire control system, and (as it was then called) the GAR-9 missile. We sought to get twelve airplanes. This gave us the ability to reach the range we wanted to reach, to knock bombers down, and the bombs in them, far enough so that the bombs could never reach our shores with a dead man's fuse. It had the ability to see low so that low-altitude was no advantage to the enemy. It could get them at any altitude. It had an all-altitude fire control and missile system, and the ability to deal with an incoming aircraft that might use an in air-to-surface missile. The story of that one is it's still on the books but this year, because of economy, it looks like the chances are poor of getting aircraft.

Q. What killed the F-108?

A. Dollars. And there was a choice of whether the F-108 or the B-70 would be cancelled. General White chose to cancel the F-108. I'll let all my prejudices out. I personally think there again is good evidence of the fact that we are overwhelmingly offensive-minded. I'm a believer in offense, and I believe that it's a great idea to kill enemy airplanes on the ground with your missiles and your bombers, when you

can pull it off, but the most dangerous weapon is the one that's airborne and headed for you, and you'd better be able to deal with that one. Hence, I think you need a balanced offense and defense, always. One of the principles of war is security. And if you're going to really get involved in a fight with another force you should assure the security of your own forces. And that you do through defense.

Q. You touched rather briefly on the origin of the F-12, saying that you were called in to discuss its interception capability. Would you care to expand a little more on that? The F-12 seems to have come as a complete surprise to the Air Force when it was announced that it was the interceptor--the IMI--which we were looking for.

A. Well, I really don't think we should. The Air Force classification was such that I would be very cautious unless I went into all the clearance business. Another point is, you know, that when I briefed this, I think in the minds of the folks involved, the SR-71 was born. The idea was turned around--the idea was now that the B-70 was seen to be a great strike-Recce aircraft.

Q. You have been an ardent champion of guns on aircraft. Would you go back a little bit and assess the gun-missile relationship over the years?

A. Well, my thoughts run like this: I look to the kind of ordinance you need on an airplane, to the essential elements for success in an encounter. I'll go back to my days in the Air Fighting Development Unit, the old AFDU. We figured, after all of our studies of air-to-air fighting, that 85% of the

fellows who were shot down, never saw the fellow who shot him down. You know this great idea of a lot of dogfights and so on, sure that happened, but it's still true that 85% of the guys shot down never saw the guy that shot him down. "How can this be true?" The single factor making for success of a fighter pilot is a good pair of eyes, and the ability to use them. I don't mean just 20/15 vision, I mean a dexterity, a knack for seeing, so that he is never surprised, he surprises the other guy. Sort of related to this kind of thing is the range at which you can destroy another aircraft. Surprise is a major principle of war. So you're always seeking to surprise the other guy, catch him off balance, if possible, thwart his effort ~~of~~ destroying him before he can become aware of the situation enough to avoid you or counter you. Now, sort of another thing you seek in the ability to do this, is to stay out of his range, to kill him as early as possible. I want something that I can stand off at a goodly range, fire at the guy, and destroy him. The problem of the gun is, the bullets won't reach that far and there is a distance at which you could reach, but you can't hit, because of ballistics problems in the air. Its difficulty is getting rounds of ammunition in to the proper place on an aircraft. Then the guided missile comes into existence. Now, we end up with a fire control system so I detect the aircraft that I want to destroy far enough away so I can get a missile off on the way and destroy the guy before he can ever see me. And that is sort of the reasoning behind the fire control

system and the missile. Now, as these began to evolve--first we used rockets, you'll remember, before we came to the guided missiles--to get better range, and heavy killability in fewer individual missiles, individual items of ordnance. Now, as we moved into fire control systems for the missiles, we said well, I want to be able to get this guy with a guided missile, but I know that there are problems with doing this successfully and having my equipment operate enough of the time with perfection that I can really expect to do it. This being true I'd better get something so I can still knock the other airplane down if that radar and radar missile failed to function either because of their own malfunction or because the other guy counters me, but then see how our own missile performs. Now, and for a long time we had aircraft that just had rockets and missiles, rockets and radar missiles, then we got radar missiles and IR missiles, a pretty good combination like in the 102. You still have the problem that your fire control system radar must function to fire the radar missile, you need it badly with regard to the IR missiles, to get them off, and we had the automatic fire with ease, and a manual backup kind of fire. Now, it is absolutely true that during ~~an aero~~ the early 1950's ~~affair~~ when we were much concerned about enemy bomber attacks, we talked ramming. Ramming was an accepted tactic and if your fire control system and your radar missiles didn't function and your IR missiles didn't function, and that guy was heading

for New York, you ought to ram him. Try to hit a wing or tail or something so that you might survive, but stop that bomber. Now, during all this time I was fighting for a manual release capability for an MB-1, for instance. I figured if I could get range into it by any means, ~~and~~ so that as an interceptor pilot I'm not helpless if I get out there and my fire control system and my missiles don't function properly. And we do have some capability in this area now. Now, I still believe that the one thing I want an interceptor pilot to have is the ability to knock the enemy airplane down with reliability, with absolute certainty, so that once he gets out there and he finds this aircraft, and if he has problems with his automatic systems and with his radar missiles and his IR missiles, then he can still close and destroy that bomber. And for that reason, I think we ought to have a gun; something that is absolutely reliable that the guy can use for a kill. Now I think sort of the same thing applies to air-to-air encounters, but different sort of levels of automaticity and distances of at which you want to fire. But that is the reason I would want a gun for an air defense interceptor. I don't want the guy to come home, see, until he has met and gotten what he went out after.

Q. How about your relationship with the F-15?

A. I'm the guy who got [the F-15] ~~it~~ on the books, and I got the gun in the F-4, too. I was in the Air Staff, as Director of Plans,

and then Assistant for Plans and Operations. We, in my mind, were very deficient in air fighter capability; the ability to win air superiority. And I could see the number of fighters that the Russians were building and nations around the world buying fighters from various countries, and we were buying aircraft that were heavier, that were leaning toward or almost completely, fighter-bombers, rather than air-to-air fighters, and because so much of the total capacity aircraft went into bombing, it just had limited capability as an air-to-air fighter. I first started fighting for the gun in the F-4 because of the same rationale I just went over. I wanted that guy to have an ability to kill that airplane, regardless. Especially for use in Europe where I feel that our opportunities to slide nicely down an LOP with a fire control and missile system would sort of be minimal. You may be lucky enough to do that some time, but I think with as many aircraft opposing as many aircraft that there will be a lot more short-range fighting and identification problems, and so on, you are going to end up with you pretty close together, and so I fought to get a gun in the F-4.

Now there's an interesting issue in the scrap that went on between Systems Analysis and the Air Force over there. I did have a friend in Doc Cheatham, down in DDR&E, who helped me get the money to put an M-61 gun in an F-4. It was an RF-4, a reconnaissance version and we did that out at Nellis--

and fired that and showed it was feasible, and then went to try and miniaturize the fire control system, so you could have both the fire control system and the gun, and General Goldsworthy was a big help in that, a fellow who is now the DCS Materiel. He could see it all the way and he helped me all the way in trying to get this over. We did have to prove the needs to Systems Analysis, so I got hold of some of my old fighter friends and got a paper put together with, oh, people like Harry Thyng, "Gabby" Gabreski, and those characters. And then set about writing a computer program for an air fighter. And I told Enthoven a couple of years before--the trouble with him and me is that he didn't understand an air fight and I didn't know how to tell it to him in numbers, but I was going to learn to do it, and we did. After an occasion where Systems Analysis had written a paper for Secretary McNamara to sign, saying "No" to the gun in the F-4 and by a rationale that I thought absolutely faulty. ~~The paper was so poor, actually,~~ and that Secretary Zuckert asked for an apology and got it, over the fact that ~~how poorly~~ they had ~~re~~presented the facts on this issue in a faulty way and reached wrong conclusions. Well, this ended up in an effort where there was Enthoven, Cheatham, a guy named Russ Murray, from the Defense Department and then Gordon Graham from TAC, ~~Al~~ Jack CATTON Chatmore was from Requirements, ~~itself~~, and I was the principal Air Force guy. And We spent 3 1/2 months--we sort of headed the evaluation and then they had a lot of people doing the evaluation of

the thing. They looked to the force structure for the future. Well out of that--and that's a long story, we got the F-4E, and the FX, which has turned into the F-15. But we convinced them that you had to have an air-fighting airplane. Once they got that on the books then the F-15 began.

Q. Now, capping the whole story of fighter development since the end of World War II, would you say, generally speaking, this time--as opposed to the situation preceeding the beginning of World War II--we were on top of the problem? In other words, these fighters which you have just enumerated were capable or commensurate to the challenge, that the Russians presented. Would you say that?

A. When we get the F-15 I would say that. I think that we currently are going to be deficient in interceptors but I think that when we get the F-15 we will be in a good position compared to Russian fighters for air superiority.

Q. Would you say we have been generally successful in our fighter development vis-a-vis the threat since 1945?

A. Yeah, yeah! I would say Korea proved that the F-86 was an aircraft equal to the task--at that time. And equal to the best the Russians had. I thought the little F-104 thing out in China was a pretty good example, that we were equal to the task. I believe that the Russian had moved ahead in fighters, had built more than we, more models, and I think we've sort of been through a period when we were lucky we didn't get mixed up in a deal where we had to do an air-to-air fight with them. That's the reason I thought the F-4E

was urgent, because it was the only gun airplane with adequate performance to sort of deal with them. Now, if we get the F-15 in time, I believe we will be alright.

Q. May I just twist the question slightly to make it the fighter vis-a-vis the bomber, over the years?

A. Well, the interceptor is what you're saying, instead of fighter bomber interceptors versus bombers or fighters versus bombers. I sometimes say fighter-killers versus bomber-killers. Now, I say for the bomber-killer aircraft that the F-106 is equal to the task of dealing with any airplane he has, if he doesn't go to low altitude, if he doesn't use an air-to-surface missile. I believe that the use of low altitude with our not having a fire control system and missile with a low-altitude capability impairs the ability of the 106 to do its job. And I believe that the use of an air-to-surface missile makes it impossible for the 106 to get at the bomber in time, so I believe we have been deficient since the advent of low-altitude tactics and the air-to-surface missile. I further believe that if he improves in the performance of his bomber, we will be in a far worse position than we are now as a potential for doing it. I have been fighting for an aircraft that has low-altitude capability, and enough radius of action to deal with the airplane before he can release an air-to-surface missile, with enough speed to deal with his bomber in case he goes supersonic. Also, there's sort of another simple fact there--the F-12 is the first airplane to get its best miles per pound

of fuel at its maximum speed. Usually, you know, to go fast really costs you fuel. You go a lot farther if you go slower. In the F-12 you can go farther if you can cruise at Mach 3.2. It really is a major breakthrough in aircraft.

Q. We have been talking about quality versus the threat--what about quantity?

A. Quality and quantity are directly related. I have said that for the threat that we were looking at in 1962 that we had to have a minimum of 212 F-12s backed up by two-to-four hundred F-102s and F-101s. Well now, you need this if you're going to deal with 600 incoming bombers. The size of the threat has slid down. Depends on whether you believe in heavy bombers only and if you are talking heavy bombers in numbers from 110 to 140 reaching us. I still believe you need for that a minimum of 144 F-12s and you still ought to be backed up by at least 200 F-106s, and sort of my reasoning for that is a lot of the day to day identification interception you do with the 106s. You'd have your F-12s deal with the far out targets, expend their ordnance there and get on back and get another load to go out and let the 106s meet those they miss. So you sort of carry out the concept that we seek, which is to increase the severity of the attack the closer that the bomber gets toward the U.S. For that reason, those are the kinds of numbers I would talk about. Now, earlier we had to have more because we had aircraft which were poorer in kill capability and poorer in radius of action. So once the airplane got in

close you had to just get at him with as many as you could because it was critical to get a kill then. It was much closer to bomb-release line. But the 106 with its supersonic tanks now, you have pretty fair radius of action. Makes a real useful airplane. The farthest back I have ever come is when the postulators say, you know, well you're really going to get 110 to 120 heavies and no mediums sort of. The farthest back I have ever come is 54 F-12s and 200 F-106s.

Q. Since we are on the subject of numbers, would you care to say something about the apparent disparity between the intelligence system at topmost level and ADC's version of what really constitutes a threat--a question of intent versus capability?

A. Well, in the first place I will say that the military guy has to deal with capabilities. It takes years to build capability, and the intent can change in a matter of minutes. I've seen it change, so if I am to do my job for the country to provide the security from attack that is my job, I have to seek the ability to deal with this capability. Put on the negative side, I would feel I had not done my job and I would feel that destructive criticism or whatever else completely justified if it turned out that the weapons were used and I were to stand on the premise, "but I didn't think you intended to use them." So I must take my position based on the weapons he has--on the capability and not on intentions. It is interesting that the intelligence estimates that the bomber threat will decrease each year have been incorrect. They continually project the decrease in bomber strength--and he keeps holding on to them.

It is the economic way for him to deliver destructive power, and he just holds on to them. Which is the reason that I have never gone--it makes me nervous to think about 54 F-12s and 200 106s. I think you need--as I said before--at least 144 F-12s and your 200 106s, for today. You know you really break that down to its simplest factors, and even at 144, you'd be lucky if you got 101, really, for you're almost talking about like 100% success if you are going to try to get them as early as possible. Even if you're talking about only 120 bombers coming, heavies, but I think you'll get mediums too, I think if he ever decides to strike, he's going to hit us with all he can get here, so I must fight for enough and the quality. Now you notice that these numbers are way down from previous estimates, because the airplanes are more capable. An F-12 is equal to about 4 1/2 F-4s for one mission.

Q. Has the air defense team been truly an effective team over the years--the ground and the air--in terms of command?

A. I believe yes. I believe that there are kinds of things within the ground environment, particularly, where I would like to have operated differently. I know a lot of nonrated people who are very good at the control business, very good controllers--some very good battle commanders. I, for instance, for years have wanted to get a warrant officer program for controllers. They would be sort of nonrated people. I hadn't tried that again since about six months

ago and I tried it again. Because I have long believed that if you keep a man long enough in a position like that to where he can really become skilled, there is a lot of the work in ground control where you can use nonrated people very well indeed. You asked me specifically about the command positions. Alright, that's sort of the problem that creates. If you put a lot of nonrated people into the control side of things you run into the problem of career development, and the fact that they should be able to look forward to rising to higher grade and higher positions which includes command positions. Now, and I don't think that it is precluded that a commander of a BUIC, for instance, may be a nonrated officer. In fact, I specifically have changed the specification in this command right now. I did this four months ago, so that we could have a nonrated officer in command of a BUIC. I happened to know a couple of guys that I would put in such a slot. I think as a sort of generality, you do need a rated guy to understand the air battle thoroughly, and that is the reason that we have had to basically end up with rated people in those command positions. I see no reason that an RO who has participated in the back seat of a lot of these interceptors--well, you say rated, I don't think the guy necessarily has to be a pilot--couldn't be a very good commander and in fact I have proposed a career development thing which would do just that, which would move ROs from positions like squadron ROs, as the next job he gets above being

a flight RO and a squadron RO, to Sector or Division, and then to Air Force level. So that the guy could have career development. He could be senior weapons director, for instance. He would make an excellent one, if he has done his earlier years in the back seat of an interceptor he can be a very capable fellow and very well suited.

Q. When you first got an area air defense job, for example, at 32nd Air Division in 1951, did you find that you at the beginning perhaps, were a square peg in a round hole, that you had to master the problem of what the radar could do for you in the air battle? And do you think this has been a problem for commanders throughout the years? Let me go back to another aspect of your career, when you took over the New York Air Defense Sector, you, I believe, went all out in an effort to master the problem of computerization of the air battle.

A. Yes, and I went through the school at IBM and MIT and studied pretty hard. And sort of let me tell you why and my philosophy on this. I think that any weapon you are given you must sort of learn how to field strip it in the rain. I won't have a weapon that I do not believe that I can understand and that my people cannot learn to understand how to maintain and operate it. Now I sort of looked at radar that way. You know, it's a device which has certain utility in the mission that was assigned in the command, so I felt it was my business to learn the specifics of radar. I guess a modern example today is the FPS-85 which I have fought to have 100% Blue Suit, and with AFSC I have finally established my position that all new space equipments shall be completely Blue Suit maintained and operated. To me, you can look at the weapons of war, a radar

looked like a very complex device at one time. It isn't really. Today it should not be considered a very complex device. It is fairly simple, actually. You learn how to understand them just like automobiles, airplanes, and other things; and as we move ahead and as technology more and more is in the forefront of military operations, if new equipment, new technology can give you an edge over the enemy, you should exploit the capability of technology. I think that the military force which more thoroughly understands how to use the devices which technology has produced has the greatest potential for success in war.

Now there is another side to it from my viewpoint. I think what I try to do in getting my people into new equipments is the best retention thing I have. If I take these bright young officers and airmen and put them right on to equipments where they will have to learn all the time, I do a lot better job of retaining them in the service than if I make them cooks and drivers. It's just like I tell headquarters, you know, I'll be glad to hire cooks and drivers. I'd lot have qualified people rather hire cooks and drivers and run the equipment, because if I don't we'll be doing the other thing, all of our people in the uniform will be the cooks and drivers and we'll be and maintainers hiring the equipment operators. And I have seen this happen time and again. So you say what did I do in regard to radar and and what do I think others should do? Get in and learn the computers equipment.

Q. How effective has our radar coverage been over the years, and has it been adequate for the mission of air defense?

A. You'd have to go right through a time scale, all the way from the time that we had one radar, one EPS-5 at Santini at Mitchel Field, or across from Mitchel Field, to the time when we had triple coverage and coverage down to 2,000 feet. At that time we did have good radar coverage. The gap filler was a very controversial thing, as you know, because you did get clutter from them and some believe you got no help from them. They did make a contribution, I think, in that they did give you notice that there were other targets in the area, and they did cause the enemy to know that he could be seen at low altitude and would have to develop his attack tactics accordingly. So I think during the time that we had triple coverage with radar and coverage down to 2,000 feet, we had good radar coverage. I think the controversy is true today where we have essentially single radar coverage at 10,000 feet and none in the center of the country. Now the reason I say you have to answer that question based on time scale is that at the time we really had triple coverage and coverage down to 2,000 feet, the Russian had shown some low-altitude capability. Now it appears possibly more ability to refuel and come down to low altitude. Again, seeing this, my solution to this one was to go for AWACS in 1959. To take that radar cone, put it in an airplane and turn it downward instead of putting it on the ground and turning it upwards. So I went out in 59 and

talked to Alan Punkett at Hughes, and said, "look, you've got the only clutter rejection radar that the world's ever built and you've built the only phased-array, you've built more airborne radars than anybody else in the world, can you put all those together in a big airplane?" And he scratched his head and eventually said, "yep", he thought he could. Then I got some other technical assistance on it before I would ever go in for an AWACS, because I'm a great believer that we must watch postulating, especially postulating progress and technology to defeat an enemy. If you postulate a capability with equipments, I believe you must be very certain that the kind of capability you postulate is feasible, and in the time span you are talking about. It was my conclusion that AWACS clearly was, so I started pushing for it. And that would be the answer to our low-altitude problem. Had we gone for AWACS, installed it then, we'd have them in inventory now. We wouldn't have the problem of dealing with low-altitude attacks.

Q. Have we had a high-altitude problem?

A. Practically never, after we got a radar coverage. The FPS-20 radar which was sort of our key equipment until about 1955, 56 or 58--somewhere in there, was a good 60,000 foot radar and no one could do much with that. It is true that your coverage is not complete at high altitude, just like it isn't at low altitude, but within 60,000 it was fairly complete, actually.

Q. What about our interception capability at high altitude, has it been a problem over the years?

A. I think the high altitude has definitely been a problem. In fact I was at the fighter symposium when we presented just this problem. It sort of runs back through the airplanes. The F-94 had sort of a limited altitude capability. The airplane was pretty heavy for the power it had. The F-89 never really had very good high altitude capability. The F-86D had a considerably larger fuselage and made a heavier aircraft ~~and~~ put on essentially the same wings. Get the F-86D at high altitudes, you cut the afterburner off, and you essentially dropped, and I mean like from 45,000 feet to 25,000 feet. It just wouldn't fly up there, really practically. Now if the enemy were to get at the high altitude and stay there and cruise there, you did have a problem. Hence, we came up with snap-up. And snap-up was our answer to dealing with the high-altitude target. We came up with the snap-up concept really because the interceptor would not fly with facility at those high altitudes. Now you could get the airplane up there and fly straight and level, which is what the bomber did, but if you must do maneuvering to get into position to fire at those altitudes, then it was quite difficult with the interceptors we had. We did have a deficiency in the ability of our aircraft at high altitudes. Snap-up enabled you to fire upward far enough that you did have a first-attack capability. You did not have a re-attack capability. Snap-up had one other feature that was helpful

and that was that from beneath an aircraft simply presents a much better radar target than from head-on. And you try it with the radar and look at that thing head-on and the profile is fairly small, and you turn it up and look at the flat surface of the wing, you've got a real good radar target. And I believe that snap-up was a good practical manuever, especially with MB-1s--with the atomic weapons. Re-attack was essentially nonexistent--because of our aircraft performance, the limited performance of the interceptors.

Q. In May 1955 at Tushino Air Show, the Russians showed that they had jet bombers, and that they had good ones. What was the reaction in the air defense business, in the Air Staff, to this problem? There is some indication in General Partridge's testimony before Congress that we were surprised.

A. I believe we were. And we were behind. Now, some of us had for a long time been inclined to move toward an aircraft of the performance of the F-106, and we discussed earlier how the 102 came into being as an airplane that really wasn't intended--it was the 106 we were after. So if you kind of look at when we established requirements and when we should have acquired the aircraft based on when the requirements were put together, the requirement on the F-106, really the basic description of that airplane came about in about 1947. Now if you look at the requirement for the F-108 which was the long-range interceptor,--talking about a Mach 3 with 1,000 mile radius of action aircraft with a fire control system like the ASG-18 fire control system, the ideas concerning this

really came into being in about 1954 - 55, really. That's about the time there were a lot of us who thought the bomber was coming, you know. Not based just on mere image, of our own bomber capability, but on some facts. And we established the requirement--in fact we had two, we had the long-range manned interceptor, and we had the intermediate-range manned interceptor and as you know we had it fairly well on the books, mocked up and so on, and we were on the way to building a stainless steel honeycomb Mach 3 airplane when the F-108 was cancelled in 1959. So I think it sort of depends on who is stating requirements and who is surprised. I think the people who were putting the money on the line weren't convinced enough to put the money on the line, I'll put it that way, to put a high priority on it.

Q. You might recall something called the Master Air Defense Plan, the MAD Plan, which was drawn up by OSD people, [Gen Agan] "Yes, I do", Mr. McElroy wanted Congress to put its feet to the fire, if you recall that episode, well during that year 1959 or very early 1960 there was a lot of things going on at the Air Staff level that has never gotten out in the open record. For example, General Howell Estes was in charge of a high-powered group in the Pentagon who convinced General White, Chief of Staff at the time, to take a real hard examination of the air defense system and they came out with some very remarkable conclusions that changed the whole course of air defense history. Can you throw some light into those goings-on?

A. No, I'm afraid I can't. I don't know the specifics of what went on with that group.

Q. The outcome of it was the cancellation of the 108 and the beginning of the decline in defense against the manned bomber, which has been continuous since. This

is the big watershed in air defense history, we go up to about February 1960 and then all the way down from that point on.

A. Yes, and cost--you see--sort of a priority in costs. One of the things that hurt air defense a great deal was the cost of the maintenance of the control~~ler plan~~ment. And the technology was such that the only way one could expect it to have enough interceptors controlled against the number of bombers one could expect to attack given areas, was to have ~~sort of~~ a thorough ground environment and control capability enough to accept sizeable attacks wherever the enemy might choose to put them. The result was highly expensive maintenance costs of ground environment in terms of maintaining radars, control facilities, and the communications to tie them together. This was another reason that I was for getting into AWACS so you could reduce the number of people involved in control and get the ability to control and move the air battle out farther. Now, it's kind of interesting that one of the things that always reinforced this, and it is an anomaly to me, that in the Air Force we can believe certain things so very strongly and not accept the obvious response to those facts which are essential on our part. I am talking about bomber-fighter/ Now General LeMay always said, when he was running SAC, that for the air defense system that we had in the United States, when we had a good system, ~~when we had all of our~~ having a complete control environment/and ~~so on, and when we had~~ Texas Towers and picket vessels, AEW aircraft off of our coasts 24 hours, ~~and so on.~~ a day ~~As a~~

commander of our bomber forces, he said, I would never try to penetrate those. Now, he said, what I would really do is to penetrate the center of the United States from the north with a concentrated stream of bombers and then attack all of my targets standing up from the center of the United States and get them from behind. This is the kind of thing that if you accept that it is a feasible and efficient method for an enemy to attack us--sort of supports what we had in the center of the country. Frankly, it used to bother me that we had so much, that we had the amount that we did have in the way of coverage right in the middle of the country. You know one would think that, "gee, I should be able to take care of them farther out," which again has always been my idea to range farther. I see long-range interceptors with an airborne warning system so I can actually get into his attack earlier and avoid the short-range, defensive thing where you are at a disadvantage in terms of time and urgency of knocking an aircraft down before it can do its damage. But it was interesting that at about the time that everybody said it cost too much, it's too thorough a defense, General LeMay would say time and again, "the way to do it, is to go right through the middle," you know, and fan out. So if you were to do as we eventually did when we cut back, look at us today--we have nothing in the center.

Q. The Ground Observer Corps, would you comment at all on your experience with that?

A. The Ground Observer Corps really was our early gap filler. I know there is a great deal of controversy of the actual usefulness of the Ground Observer Corps. The British used it very effectively, I think, possibly I can answer your question this way. I had a commander once who had a division up at Duluth--Sector then--had already begun taking some gap-fillers out. A big exercise was coming and he alerted every element of his command, no matter where they were within his command and actually got hold of police and fire departments in those northern states. And he would sort-of bring them up to alert and said, "Call in any aircraft you see." He did better in his exercise than anyone else. So the fact is, that there is some practical usefulness to it. I believe that the practical usefulness has to be associated with a good plan that says, alright we'll get up more of a state of readiness, and not just be sitting on it without notice. It is a very expensive thing to have all the phones, systems, etc., that were in. I believe you'd be better off with good radar coverage.

Q. Do you recall in this period of 1955 to 1958 any debates at all concerning whether we should keep GOC or phase it out?

A. Oh, I'm sure there was a lot going on. In those days I wasn't in the headquarters so I really don't know the particulars of what went on, but you could tell from the reactions of a lot of people that were in the Ground Observer Corps that it was a controversial issue. As sector and division

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commander, I was often asked about the value of it. I said unless you have radar it is a valuable thing to have. I'd rather have good radar coverage--that was my response.

Q. But did you need a 24-hour COG capability? Couldn't it be alerted soon enough in time of crisis?

A. Depending upon how fast you could get it up, really, you know. If you are talking about times of two hours and so on to get it up, in those days that was too long. You've got to remember the timing. You're talking about a time before the ballistic missile threat was a primary threat. Obviously when you could expect the first wave to come from bombers, you got a lot more notice on bomber attacks. The old DEW Line and the extensions of the DEW were all built around the fact that you did need warning. If you had those warnings, then I believe you could wait to get your continental coverage up a couple of hours. In an era when we didn't have early warning, you did have to keep them up, or have them on something like 20 to 30 minutes. In an era when you had warning, warning which was far enough out that you could expect two hours, then you could drop them down to two hours.

Q. General Freddy Smith was "Mister" GOC. He supported this operation all the way. Could you throw any light on his motivations, especially for keeping his 24-hour Skywatch operation so long against the will of FCDA and the Civil Defense people?

A. I can't really shed any light. That was going on in headquarters up there when I was down below.

Q. Would you wish to say something about height-finding?

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A. Well, yes, here again you have to walk through the years to look at the facts. If you walk through the years from guns, to rockets, to guided missiles, to MB-1s, you have different requirements for height data and accuracy of height data. If you follow this through step by step, you come to the reasons for our wanting an AWACS and a F-108 or F-12 type aircraft. One of the major factors is because you can see a wide range of altitude and use your kill weapons at a wide range of altitude.

Now in the early days when you were shooting, say, 2.75 inch rockets, to get an interceptor to hit a bomber with 2.75 rockets, you essentially had to be co-altitude in the first place, because the accuracy and the total kill weight that ~~they~~ fighters carried wasn't sufficient to get ~~him~~ a bomber, unless you really got several rockets into him, and because the type of fire control systems we had had to have a more or less orderly attack profile, like sliding down a line of position to get the interceptor into the exact correct position to fire. You needed the altitude of the bomber accurately in order that you could get the interceptor into the correct position to fire. When you got guided missiles it was a little bit less important, but not much. You can come right to what kind of accuracy an ~~IGM~~ AIM has. And this is much of our reason for wanting to get a missile like the GAR 9 (now the AIM 47), which ~~can follow, can~~ can attack fire from the deck to 100,000 feet. Then height becomes less critical.

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Now, how well did we do in height determination? I would say fairly poorly. The height determination was on the order of 2500 feet. It is some better today, but not a whole lot. But it is not so important today because the interceptor is almost at the altitude we're talking about, can fly better at altitude, and the range of the fire control and missile systems are wider, so really, you're sort of moving your weapons system to within the range of the ability of varied equipments to handle the problems. It has evolved that our poor height accuracy has become a less critical detrimental factor through the years.

Q. Often, people call us and ask us what was the apogee of air defense. It is an extremely difficult question to answer and we tend to go toward the quantitative, to say that at this point we had the most radars, most bombers, the most interceptors, and so forth. I gather from what you have been saying about the very close interrelationship between qualitative and quantitative progress that it would be false to say that at this point this was our apogee because we had more things.

A. Yes, it certainly would be false. Now that's an interesting thing I've fooled around with over the years. Radar is sort of a little different matter than the weapons when you start talking quantity. And the reason is, the quasi-optical nature of radar. Now if you are expecting low-altitude attack and if you are going to have enough cover to really protect yourself from low-altitude attack, then because of that sort of limitation in physics with regard to radar, numbers were a very accurate guide over what kind of coverage you have. The only real improvement in radar, over the years,

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has been ECCM. Otherwise, the requirements in numbers and location has remained about the same because the increase in power, mostly was for the purpose of burning through a jamming bomber. We didn't gain enough range to fool with, you know. So it comes down to the fact that numbers was a pretty good measure. But you should be careful about the ECCM qualities in any given attack's success--I really ought to talk about this in three parts--radar, communications and control centers, and interceptors. Now, I think in the interceptor area, one needs to be most cautious about using numbers to guage capability. And I've actually put pencil to pad a few times on this. If I talk about gun interceptors and the numbers of these I would have to have to knock down the number of bombers we're talking about--Fire control systems and rockets, which is the next step--that's another given area where you had interceptors which essentially fired one load of rockets, and where the interceptor had to be essentially co-altitude and very carefully controlled down to that firing point, because it had to be at the exact correct firing point, with all of the analog data, the motion data correct at that time, you know. The rate data had to be right, as well as the amount of position data. If I moved to the next step, where I had an interceptor with a fire control system that could range a bit farther and a missile where the kill potential of each was greater, so that I actually had two or three kill passes, each with a pretty good probability of kill, then I can start

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comparing numbers. If I get a gun interceptor, a rocket interceptor, and they have a limited fire control; and an interceptor with a fairly good fire control system with two or three kill loads aboard, I can then begin equating fairly well to numbers. And we certainly do not need to go one for one when you're talking about an F-86D versus the F-102 for instance. As a matter of fact, to give you my view on numbers, I think an F-12 is worth, in kill potential, 4 1/2 F-106s. That's sort of the number that I came up with. So you can translate the facts that make me conclude that back through the other interceptors and come to values. I would use caution about numbers if I'm just talking quantities.

Q. Would you care to hazard a statement about how good we have been over the years against the manned bomber?

A. Well, again I've got to go back to specifics in time. I've kind of done this previously, too, to see, really, how well we compare. I guess, we were probably best, relative to the threat--about in early 1960 would be my guess.

Q. How good against the threat?

A. Well, I've heard General Partridge sort of refuse to answer this one time and again. I can sort of tell you some of my guesses--and they vary with time. I think we achieved a position where we could have been fairly sure of getting 75 to 80 percent of the incoming bombers. Frankly, you know, I've got some specifics on this, that I briefed the Stennis Committee people and others, and I did just this, I took the

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quantities, then I took our relative kill capabilities over the years. So we've sort of gone like from 75 to 80 percent down to 10 to 17-18 percent, and then I projected where we were going to go with the cut they were proposing--with the system they were proposing, and where they could go with another system. But always over a range. I would not go to specific nunbers, I'd go over a range. The reason for that is the enemy has the initiative. The nature of the attack, and alternately--if you want to use percentage numbers--by percentage success rate against the enemy, by the difference in his attack (which he would be postulating to use in one or another situation.) You know there is one chart which I call the intestine. Because that is what it looked like. I started out with the numbers that we had and then I showed a range of guesses on capability, depending on how many interceptors we had, over the years, and how it has come down to where I believe it is and where it could go.

Q. I'd like to ask a question at this time concerning SAGE--your role in the initial operation of SAGE of the New York Air Defense Sector and subsequently. I won't ask a specific question, just let you go ahead and talk freely about it.

A. Well, my first involvement with SAGE was when I was in command of the 26th Air Division, which was then manual, and we had the task of getting prepared to operate the first SAGE direction center and to phase the additional ones in. Now one of the interesting things I learned very soon was that there was a very clear, positive, well engineered, plan or

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scheme for a complete SAGE environment. We were then in a manual environment, but no one had done a thing about how you operate one SAGE direction center and then a second, and so on, when they were sort of in a sea of manuals. The first job we had at the 26th Air Division was working out a plan such that from the manual environment we could tell to that one SAGE direction center and have it do actual control and from that direction center cross-tell to all the manual environment around it. Since the SAGE system was semi-automatic and most of its telling was automatic, we had to work out buffer schemes so that all of the cross-telling from SAGE into the manual environment was ~~sort of~~ re-translated into the kind of manual tell scheme that we had been using previously, and be sent by teletype to those elements in the manual system which required cross-tell or a passing of tracks and passing of targets, and so on. This turned out to be a very interesting if fairly complex scheme. Once we developed it for the first direction center, then that scheme was essentially repeated the rest of the way across the country. And the more SAGE you got, and the less of the manual environment there was backing it up, the problem became successively easier, successively less complex. In the original first SAGE direction center we had many, many problems during the first year. No one had ever operated a computer data handling device of any sort before in real time, where the computer was actually running 24 hours a day, solving problems as there

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was actual dynamic movement of things. In using computers up to that time, one would take facts, put them in a program and into a data handling device (a computer of sorts); it would solve a problem and give them an answer. The SAGE system was a continuous process of feeding in live information to a data device which had a program previously written. The device then presented pictures, worked out solutions which were presented to people who made the decisions, and who then used the device in actually carrying out their decisions, by issuing orders to an interceptor and following it through data link to a course computed by the data handling device based on the previous program. You also had the problem of computer reliability, early. I think that we really made pretty good progress for that year. There were times when we were doing quite poorly but IBM really did put their best engineers in to help work out the bugs in the system.

I think as a data handling device the FSQ-7 worked very well indeed. After 8 to 10 months we actually had real good tactical information, at times. Now there were a lot of interesting things ~~sort of in the total system~~ that came up. One of our more bothersome ones was a thing which we called multiple registration. Now this was simply the fact that if I had five radars looking at a single target, instead of getting a single point on my scope I got five and we really had to do some work--MIT did, IBM did. One of the problems was we did not know with adequate accuracy the geographical location of radars. So when you related them one to another and were to

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take a look at a target, say 150 to 200 miles away that maybe five radars were seeing, the inaccuracy in the positioning of the radar was such that you'd get a little bit different position relatively. There were other errors, small ones, but enough that you would get several indications on the scope instead of a single one for a target--such as, the electrical relating of the position of the antennae, with such things as simple as their registration of true north. So we began a program of boresighting on the sun every morning, which we still do, but that evolved because we found that the azimuthal errors of pointing a radar were not finite enough part of the time. There were other errors in moving the data from the antennae through a receiver. And again, due to very slight mechanical inaccuracies in the positioning of the antenna ~~you might get a vertical plane~~--you would get a slight movement in radar boresight and have different position between the registration of a given target by several radars. This type of error came to be known as a columnation error; we were able to work out schemes for each radar. This sort of washed these errors out and in a few months we pretty much had found how to solve this one. One of our big problems was the one that was common to the Air Force then--I think still is--although they do better now than in former years--and that is simply that we didn't have good technical data. We were maintaining radar transmitting equipments--so called FST-2s--literally on line drawings which we got from MIT and copied on a copying machine, instead of technical orders. We

got some help from people from MIT and some from the manufacturer ~~on these~~ to try to help our people learn how to interpret these line drawings, but that was literally all we had. We just did not have any technical data. I thought IBM did an outstanding job in terms of staying with us--they didn't just sell us a piece of equipment and walk off--and when we would get problems they would have their local engineers and then they'd go right to the best people they had in their staff at Kingston, N.Y. to give us the help we needed. During this time we also were in the learning process with regard to computer programming. Now no one had ever really used a real-time program before. No one had ever programmed some of the kinds of things we were doing such as ~~the facts of~~ solving an intercept problem in real time with a computer when the program had to be written for that dynamic solution and then the real-time data put to that program and then to the arithmethical unit to literally arithmetically solve the problems that were put to it and put forth these solutions back literally in milliseconds--thousands of a second. SDC were learning, like all the rest of us, and they had some bright young fellows and we sort of gradually worked these kinds of program problems out together. I thought that really if one were to look at the total scope of the task undertaken in SAGE--I once heard a fellow put it this way which I thought was fairly accurate--that what we have done to the Air Defense system is the equivalent of laying a man out on the table and trying to keep him alive while we used the scalpel and took

out his nervous system and put another one in. We are lucky if we don't end up with a cadaver. General Morris Nelson used to say that, and that is really about what it amounted to, one way of thinking about it. A lot of people did a lot of good work in that whole thing, I think. I thought that our people really rose to an occasion--to the challenge of putting in a system like SAGE. It was by any man's standards, a tremendous advance in the air defense art--certainly, in the use of data-handling devices.

Q. Would you say that it was the greatest single advance in the postwar era in the state of our air defenses? Prior to SAGE, the techniques were not too vastly different from those that had been used in World War II?

A. That's quite right, and there were some schemes brought forward that gave some help but really SAGE was a real order of magnitude improvement in the total thing--and I thought, quite a valorous attempt to try to move as far ahead as we moved, and I really think that it came off exceptionally well. Now, an interesting thing to consider is the concept of SAGE, when the concept was put in and what followed. It is very easy <u>now</u> to throw rocks at the concept on such things as vulnerability. You really need to recall that when SAGE was put in there was no such thing as ICBM. Our leading scientists at the time were saying, "they will never be able to build an~~other~~ intercontinental ballistic missile with sufficient accuracy to be practical." And it was under that kind of premise that SAGE was built. Now as the advent of the ICBM

came to be accepted as a real possibility, other proposals were made to improve the SAGE capability and you were aware of the Super Combat Control Center concept. These were to have been hardened centers; unfortunately, the degree of hardness sought at the time would not have been enough if that system had been put in, but it would have lasted longer, and if the ICBM were to have had the accuracy that our best scientists predicted at the time, and if atomic weapons had had the power that our people were predicting at the time, the Super Combat Center would have been a viable military concept. Because two major things changed. The ICBM was far more accurate, became far more accurate, than any estimate. And second, there were major advancements in the yield and the control of yield in various of the types of effects it could release. We went through hydrogen bombs with various kinds of schemes for boosting and so on, which gave it thousands of times greater capability than anyone at that time predicted.

Q. You had considerable problems other than getting the computers actually to work in the programs at New York. You had BOMARC and the F-106 and Data Link converging at the same time.

A. Yes, BOMARC-A. Again, you kind of need to get back to the time of the weapons system. BOMARC-A was a liquid fuel system and the BOMARC-A radar was limited for that time period. Now, when you really get down to it, the BOMARC-A was sort of the best that the state of the art could produce, when it was first conceived and built. Solid fuel rockets and control

over solid fuel rockets was a kind of thing which in the estimates of engineers at the time, just wasn't here yet, just wasn't really a practicality yet. Well, so BOMARC-A came into being and because of the problems we had with the cryogenic fuels, the problems we had with things like extremely high helium pressures, with the electronics of the day, which were not as reliable as the sorts of things we have now, we really had extensive maintenance and reliability problems with BOMARC-A. A very difficult system to maintain safely--we had horrible problems with leaking of helium and some of the other fuels were so dangerous to handle and to keep contained that it was a difficult system to keep operational. Now when BOMARC-B came along with ~~post~~ Monopulse-doppler radar and solid fuel, except for the ramjets, we had a very viable system. Now, you need to think about ramjets too, and that's one thing BOMARC-A did, you know. NACA estimate on the viability of ramjet was pressed to the limit in BOMARC-A. No one has ever really operated ramjets with the kind of reliabilities we were looking for, and pretty much had, with the BOMARC-A, so that the only real problem we had with the ramjets--was the original lining--and we got that one solved, and then there was blowout at pushover point. That was solved simply by making the BOMARC at the end of its vertical flight turn on its back and then roll back around, and--you watch them fight it in. That was exactly what happened. But basically, ramjet worked well. It was the ~~sort of~~ liquid fuel part of BOMARC that gave us the most problems. Now, I don't

know whether you know the story of the four failures down at Eglin, when we had all the press down there. You know I got called in with "Randy" Holzapple, who was with ASD at the time, and a guy named Warren, who was the opposite number for AFLC, at the time, and myself, right after that. And we reported to General LeMay once a month as we tried to get BOMARC-A fixed--that was the order--"get it fixed", and we learned there again, some kinds of things that we need to remember to avoid the errors in the future in the Air Force, and that was in the realm of technical data, again, and requiring contractors to record the configurations of their ~~schemes~~ splices. We found, for instance, when we went down to Eglin-Nine ~~at~~ Hurlburt, that the electronic launch equipment vans which were essential to check the missile out before firing, had no two of them that were configured identically. And you asked Boeing how they were configured, and they couldn't tell you. They simply didn't have all the specifics ~~on the~~ relations on how they were put together weapons system. I later learned one interesting thing there, which somebody--and I think in the Air Force now, in contracting--I hope they are still doing it, for a while they were after this came out--and that is, that when you order a weapons system like that, and if it is ~~questioning~~ pushing the state of the art, and you do a Category I and II test on it, so you know as you start to really see that you're going to develop a weapons system--is that the contract includes a requirement that certain individuals, engineers and managers by name, remain on the project. Because I think one of the

most damaging things that caused our problems with BOMARC was DINOSAUR. DINOSAUR came along at about this time and here was a thing that was going to sit on the tip of a rocket and go out to space and come back, It was very glamorous and fascinating to the scientists and engineers, and the development was out at Boeing. So I know for a fact that a lot of their better people, because they figured they'ver already got BOMARC ~~knocked~~, "let's move on to new and bigger things", and they moved them on to DINOSAUR. And one of the things I had to do was to get one guy specifically back on the program because he was the only one that really knew about these electronic launch equipment vans and so on. I believe that now most of the time the Air Force does require the contractor to say, "These are the key engineers and people that will be on the scheme until it is proved." So that is one lesson we really ought to put down, and the other is technical data and clear descriptions of the configurations.

Q. Did we press too hard back in those days? I notice, observing your policies in the staff here, your philosophy is to insist that we get a good machine before we actually buy it.

A. I think you can do both. I believe that we maybe hadn't learned enough as to exactly how to contract for these things then, that we were moving into systems that were new. I believe that in many kinds of systems that we can move--you see there are some cliches that go along with this thing--like "concurrency." In that day and time concurrency was "word of the day", you know. You developed and produced concurrently,

and then you modified, and we did get systems, where you did have problems and you did have major modification programs, but that was done under the policy of concurrency which said, "we need the system so badly, so quickly, that we will accept the best we can get and then modify them to make them whatever they really must be. Seems now we sort of tend to go to the opposite extreme, which is why you hear words like "prototype", and "fly before buy", and so on. In other words, build-test articles, completely test them, and so on. All I can say about that is, it may depend on how lucky you are. If you don't have a war you are all right, or if the other man doesn't beat you technologically while you're taking your time to develop. So it's these things that must be balanced. I would not say that the policy of concurrency, at the time it was the policy, was the wrong policy; nor that prototype is the right policy now. Especially at a time when the Russian has just passed us, in my estimation, in terms of the strategic offensive missile force which he has. I could say that as far as I'm concerned, the scheme we've been following is much more wrong than a system which made us spend a little extra money to get the system working. I didn't say anything about the F-106. The 106 was a real problem. Again, you've got to look back and see what you did. You had the first airplane as highly automated as the F-106 was. You had the most capable airplane of its time and it did have problems--I would say 90% electronic--with the MA-1 fire control system. I think that

we probably learned a lot about design in that one because too much of it was tied together such that you had to have successful functioning of too many pieces of equipment in order for the system to be operable at all. It was a great system but we had a horrible time with the maintenance of it. Again, I think, we did have the problem of technical data and of learning specifically how to make such a scheme operate. I'll never forget when I had F-102s, the 106 man came in to brief me, and I was having a time making the 102s and the data link really work. And he told me how great this 106 was going to be, and I said just go away--wait until I try to get the 102 fixed and then you can come back when I get the 106s and tell me how much more reliable it is going to be. It turned out to be far less reliable than the 102 was, but again, the most advanced, highly automated system of the day.

Q. About automation, generally, would you say that we'd gone too far in that, that it's proving to be a detriment in the air defense business today?

A. Well, I think there's a little on both sides of that one. I do not believe you should automate anything where you do not gain a major advantage through making it automated. I believe you should never automate for convenience, that reliability should be high on the list of tests by which you judge any equipment that's to be automated. Now a piece of equipment that is automated to a highly sophisticated degree when it operates, but reduces its own availability because of the unreliability of its sophisticated equipment, may end up being a detriment rather than a help. Now, in the F-12, I mocked

up the cockpit in that one, and the one thing I had been pressing for ten years on the F-12 is "let's make it reliable." Let's don't automate anything that we do not have to automate in order to gain a major advantage. So the kind of the measure I would put to it is if I don't have to automate it to give me major improvement in using it as a weapon, I wouldn't automate it. Never automate for convenience, but automate for necessity and tactical advantage.

Q. Would you care to say something about the DEW Line? Now a couple of years back Secretary McNamara answered a question put to him by one of the members of the legislature, "why did we have the DEW Line?" He said, "I don't know, that was before my time." Would you care to comment on the DEW Line in the history of air defense?

A. The DEW Line came about to give us the opportunity to do two things. One, to alert the entire nation, our defense system and our offense system, ~~for its viability and for its preparation for attack,~~ and the national command authorities so they could begin deciding what they intended to do against the threat of an attack; and to give us the tactical advantage of being able to get our entire system in a high state of alert and to actually get aircraft airborne to meet an incoming attack. Now there is one other thing that is attributed to the DEW Line which, I believe, is a valid kind of thing to attribute to it, and that is that it is a so-called bomber hold-back line. That no bomber dared penetrate beyond that line when the fact of causing an awareness that an attack was in progress would be to his detriment. When he might give

that kind of warning. Hence you are able to hold the bombers back behind that line until they are really ready for attack. This deters reconnaissance, decreases surprise and gives a tactical advantage to the defending force.

Q. Do you think, doing it all over again, if you had the chance to call the shots you would have built the DEW Line or recommended it?

A. I certainly would have built the DEW Line. I couldn't answer as positively about all the elements of its extensions and the off-shore. Now if I were to run through each of the reasons I gave in support of the DEW Line and to test each of them against each of the kinds of warnings that we had, and the cost of them, I don't know whether I could answer as quickly and firmly. Some of them I think would be--like the DEW extensions clear over to England. Again, you know, what you really must do, ~~and~~ I heard a fellow in Congress say ~~this~~, that ~~sort of~~ caused me to think and to respect ~~it~~, ~~where~~ some of the members of that ~~committee, and there's a good point~~, were being very critical of the position that the Air Force ~~took~~ in the days of seeking a strong offensive and defensive capability, and just really pressing the Secretary and the Chief on this, and this wise old gent who had been there for a ~~good~~ time, said, "wait a minute, these fellows were doing what we wanted them to do at that time, that was the mood of the country, that was our insistence that we have a strong offensive capability and it was at our insistence that we be

defended", which I thought was a very honest and straightforward thing for him to do, and it was exactly right if you put yourself back into that position. The entire nation--you mentioned the Ground Observer Corps the other day--people were straining to have an opportunity to participate in that kind of thing because the mood of the nation was, "we will be defended."

Q. You don't think that is the mood today, and should be?

A. I certainly think it is not, and I think we are in the most vulnerable position we have been ever in our history--since we won our independence. This country may have had some times in the past when it was at peril, at sea, within its borders, and its own civil war, when we first fought for our own own independence; but not since we fought for our own independence have we ever before been in the position that we can be struck seriously in the United States. And never before this year have we been in a position that we could be meted out more damage in the U. S. than we could mete out to the man who did it.

Q. As a Commander of ADC, what is the greatest pleasure that you had in the job, and what do you think is your best contribution that you personally have made, and conversely, what is your biggest disappointment?

A. I'd have to think about that a little bit. I don't know that I've made a whole great contribution. I guess my greatest disappointment was not succeeding in selling the so-called "air defense concept" that went in in the Continental Air

Defense Study of 1962. I guess the reason it disappointed me--maybe I was just a country boy and didn't understand all the inner workings--but when I was asked to come in and head that study--I flew in one Sunday night in an old T-33, and it started running through my mind, what the problems had been with the Secretary of Defense the Administration had at that time, on previous studies. And it occurred to me that all studies I had seen previously had been faulted on one or another: one, when you get all through with the study they'd say, "but I don't believe your threat--I don't buy your threat." Second, was that, "your methodology is faulty. I don't accept your method of studying, evaluating and putting numbers to this military problem." So I got to figuring how I could avoid that. Dave Burchinal was the Plans and Ops guy at the time--and a great fellow, by the way, I think--I think one of the best minds we've got, and I'd like to see him in a higher position than he is. I went in to Dave the next morning, and I said, "Dave, is it practical, or is it feasible for me to ask Secretary McNamara to sign off on my threat and my methodology before I start?" He said, "well, you can try," and so I said, "that's all I want. If you will agree to let me try," and I did. And he agreed. He didn't personally sign it, Secretary Hitch signed for him, and he got the approval of ~~the~~ Secretary. It said on the paper that he got the approval of the Secretary, he agreed to my threat and he agreed to my methodology, and when I got

the results of the study are honest, competent

all through with the study, they didn't follow what ~~that kind~~ study of an effort showed should be done. And that's real querulous to a fellow who tries to play the game straight. Old "Butch" Blanchard, just before he died, said, you know he was the Vice Chief and I was the Plans and Ops guy, this was several years later--he said that the CAD Study was the only one that has ever gone down there and they have never really been able to fault. They didn't do it. I've come to believe that the reasons were really in the realm of reasons behind the reasons, not on the face of it, which again is kind of difficult for a country boy who believed that if you know what you're doing, if a man says something, you believe that facts are a certain way, that things happen in accordance with the way you work the problem if you work it right. Oh, I guess that was the beginning of an awakening, maybe; and I think maybe an element--a small element, of the beginning of a change in the way of doing business in this country, where we began operating on handling things from an executive branch with a back-of-the hand to the Congress, where, you know, we managed the facts that people got. Out of all of this came a thing called "the credibility gap" which certainly is not for publication, but in my view is 1000% deserved. And I can give you some more specifics to prove that.

You see, I believe in the fundamentals of the country, but there are some essential elements to its being successful. One is an informed public, who knows exactly what the facts

are, because I think Americans will face any facts if they believe they're being given the facts and the straight deal. I think that's part of what is the matter with the young folks--during the time that they were growing up there was a credibility gap, and they came to doubt that older generation. Any guy who would study some facts and look at things logically found trouble in following the logic of the Establishment. The beginning of the core of a problem. They've got to have an accurately informed public, they've got to have people who are willing to give and not just take--patriots, and we've got them, and we can have them if we give them the facts. They've got to have real participation in the Government, with the dedication to make it work and with an awareness that it is the--at least the best hope this world has seen thus far, for man to live as a creature of dignity in his maker's image, as it says in our Constitution, and that's a worthy cause. But inherent in this--it all comes back to one thing--sort of clear honesty in facing all things and letting the folks have the facts, and believing enough in the system to let folks have the facts. An American is not a guy to be managed and to have his ideas managed--and out of all this, to me, is the root of a lot of the confused and disillusioned people and ideas which are born of disillusion and distrust. As you can see, a few of those things really bothered me. I like to believe that we are sort of moving away from that era, maybe it is just liking to believe it, but I'm going to keep

on liking to believe it, and scrapping to make it that way.

Q. The other part of the question--what you believe is your best contribution--you said it is hard to tell. Perhaps I might hazard a guess. I would say that you have typified and personified the integration of every aspect of air defense and tied it all together in one package. Do you agree with me?

A. I would guess, maybe. Because that is something I believe in, you know, that--well, I think about it this way. If you really work the system, if you really tromp around where everybody is working (which I've tried to do). I've tried to never have an outfit I didn't get to--in this job I've missed a few, but not many, and you sort of look at every element of how it gets put together, you can't miss the awareness that it is a total entity. That's one reason I fly--get out and do intercepts, because I can sort of tell by the way that guy handles me how well he is doing his work and how well the system is put together. I can sort of tell by the quality of the communications that come to me. I used to fly around and one of the things I do is just listen to the communications. Because if an outfit is proud, you know, and I can go right to the Com Section--and I used to go down to it--I'd go tell the old Master Sergeant in charge of that Comm Section, "You know, I can hear you 100 miles farther than any other guy." Just to try to get the word around that that guy--every guy--in the system is important--and knitting it together so they are all a part of it. And I really think this, you know, I think maybe a Sector (Division now) can be the most

satisfying job a young officer can have. And the reason for it is that it is really knit together, you know. That it's a thing which enables you to have sufficient proximity while at the same time giving each enough elbow room to be an entity on his own, have pride in his own work, to know that he is making a contribution and can be identified as an entity and each guy in it that he is really making a contribution. Because that's where happiness comes from, you know. It's not the money you make. It's my theory ~~on~~ that what makes for good morale is a guy with a job to do that he can see is a worthwhile job, where he can see that he is making a worthwhile, valid contribution to the worthwhile job. And this will do more for morale than to run hot and cold blondes in front of them all day long--because that's not the kind of thing that builds ~~sort of~~ solid morale. One of the things I had most fun with is being able to go down and talk with a non-com in a radar shop or at a radar site or in the back of a fire control systems shop, and I like to know enough about his work so that I know what he is doing. Because to me, that's a lot better for me to talk specifics to him about his job than to say, "Sergeant, you've done a great job," and he knows cockeyed good and well I don't have a clue as to what he does. I'm sort of a "field-strip-it-in-the-rain" sort of a guy. I figured whatever system you get--if you're going to do as well with it as the country has a right to expect--you've got to study

enough to know really what the fundamental elements of its functions are, and I kind of have problems trying to be a big policy guy only, and dealing with my people on a separate sphere basis. It seems to me that the common sphere of understanding that is healthiest is that of an understanding of the particulars of the job and a common dedication to it. The one other little thing is I'm not much of a guy for Brownie points systems, and the problem I have with this is, if I establish the standards and train my whole command to the standards, and I undershot in my estimate of what the standards should be, I may do the greatest disservice. So what I try to shoot for is to be the best we can possibly be with what we've got. What if I set up a standard and the enemy is just a little better than that standard. So I always try to shoot for us to be the best we can possibly be with what we have on our hands. That is the way I like to be. And I guess the whole thing is fun to me--the technical side of it and working with people.