

Reel 13 is in response to EH tape and letters of  
approximately 1/23/65

VB to EH: (February 5, 1965)

- 1) WORK NOTES
- 2) RUTHERFORD
- 3) VB's FIRST TRIP  
TO ENGLAND & RUSSIA

This is a lot of comments in response to your reel which I have just gone over completely and with some comments in regard to your January 23 letter. Now first let me make a few comments on the reel itself -- the technical aspects. I had no difficulty whatever as far as your start and stop acoustimat is concerned. That doesn't bother a bit. At times the volume was just a little too far set up and your words became a little bit muddled by reason of overloading of your amplifier. But that was the only difficulty and as a matter of fact, the fact that you spoke slowly is not bad at all because it enables me to take notes.

You certainly covered the waterfront and you've given me enough stuff here to make four Bush Book Jrs. if it was ever written. And, of course, naturally some of it interested me very much more than other parts. I think in this reel I want to pin down first a bit about the interview with Rutherford and see if we can get some of this straightened out because a bit of it is a confused thing in my mind.

The first time I went to England was, I think, when I went over in the fall of 1927 on a technical mission and went to Russia with L. K. Marshall and, incidentally,

with his wife. Having gotten into Russia and had an interesting experience, we had a lot of trouble getting out. I think I've spun this yarn to you including the business of getting across the Polish frontier at five o'clock on a cold winter morning. If I haven't [JK NOTES: VB HASN'T] , I certainly ought to spin that yarn because it was quite an episode taking it all around. And it has a very interesting part in connection with my relations with

[JK NOTES: SOUNDS LIKE MUDENBERG ?] who later became a professor at Harvard and so on.

The second time I went to England, and I'm pretty sure this was the second time, was when I was invited by Cambridge University to come over and give a lecture, and I gave a lecture on the differential analyzer. It hence must have been somewhat late in the 20's or early in the 30's, and I think we can pin down the date probably from some of my records somewhere even though I can't do it offhand. I was lecturing on the Differential Analyzer and there were other American lecturers at the same time. One of them was Den Hartog [?] ; the other I'm pretty sure was Von Carman.

I went over with Phoeb; we went to Manchester -- joined the Hartrys there. Phoeb got a dose of flu or something of the sort on the boat, and I got her into a rest home with a very fine old Scottish physician. Hartry and I started for Cambridge in his automobile which had an engine in it about as big as a coffee grinder. We got stuck on the

- 1) VB's FIRST TRIP TO RUSSIA & DIFFICULTY GETTING OUT
- 2) VB GOES TO CAMBRIDGE UNIVERSITY IN ENGLAND TO LECTURE

road and so forth but we finally got there.

I was the guest of the Master of Trinity House and I gave my lecture. The interesting thing about this was that Carman lectured at about the same time. He had a room full of enthusiastic people listening to his exposition of some of the mathematics of turbulence in connection with airplane operations. On the other hand, speaking on the differential analyzer I had a handful of people only.

I did have enthusiasm, however, from Hartry at Manchester who later went to Cambridge and who became a very great friend of mine, and from some others. For example, we visited Bragg who was doing some very interesting work with the differential analyzer and we had a good chat with Cockcroft and so on. I think it was this time that Cockcroft took me in to see Levin [?]. The reason that I tie it up with the First War was that I think Cockcroft in introducing me said something about the differential analyzer and also said something about my work on submarine detection during the First War.

Whatever it was, this launched Rutherford into a bit of a tirade in which he told me in some detail that there was no science in America and we were generally a pretty dumb crowd. When we emerged, Cockcroft felt quite embarrassed and of course I laughed it off and said it was quite amusing or something to that effect. It was Rutherford all over, and I don't think it represented the general opinion of British

- 1) VB LECTURES AT  
CAMBRIDGE ON THE  
DIFFERENTIAL ANALYZER
- 2) RUTHERFORD'S ATTACK  
ON AMERICAN SCIENCE

scientists. But there wasn't any doubt that the British scientists felt quite rightly that America was way behind in its basic science -- its fundamental science -- and it certainly was.

While Rutherford was originally a chemist, there isn't any doubt that he was a great physicist in many ways, and I can see well enough how he thought he could fire off at will at a young American engineer, which he certainly did.

Now this brings up the question of whether I've ever spun the yarn to you about my experiences in the First War with submarine detection. I built apparatus for detecting submarines and we actually got it into use. There were a good many people who were trying to do this job of detecting submarines which would sit on the bottom and thumb their noses at the searching ship on the surface. An obvious way to go about it was by magnetic detection. I chose to go about it by a magnetic bridge balance affair and what I did was decidedly crude from present day standpoint.

[X-REF BACK TO PP. 28, 565-567]

These were the days when there wasn't any such thing as an electric filter known about generally and I finally obtained filters from the Bell Laboratories. [X-REF BACK TO PP. 565, 566] They

- 1) RUTHERFORD's ATTACK ON AMERICAN SCIENCE
- 2) VB's FIRST WORLD WAR EXPERIENCES WITH ANTISUB DEVICES

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made them for me which was very decent of them.  
But I had a very unusual experience with Pupin  
which I might recite from which I concluded  
either he did not know how a filter worked or  
that he chose to try to deceive me when I was  
working on a war effort.

- 1) WW I
- 2) ANTISUB DEVICES

We got some sets into the North Sea just  
before the war ended but of course they never  
detected any German submarines. But if I haven't  
spun some of this yarn it's worth spinning.

[AM TO ALL: DON'T BE ALARMED AT THE  
LARGE WHITE SPACES ON SOME PAGES OF THIS REEL:  
I AM COPYING FROM LARGE TYPE WITH WIDER LINE  
SPACING AND THERE ARE NO COMMENTS OR CORRECTIONS  
FROM EITHER VB OR EH TO INCORPORATE IN THE BODY;  
UNLESS I LEAVE SOME BLANK SPACES WE'LL HAVE  
TROUBLE WITH THE CROSS REFERENCING.]

For example, there's a little story here that Campbell was the fellow who really did the job on the electric filter. When the Bell System published his collected works I wrote a foreword. In it I said nothing about Pupin and they urged me to do so. I said I wasn't writing about Pupin; I was writing about Campbell. I told them finally that they could do one of two things: they could either print my foreword as it stood without changing a word or they could throw it out the window. So they printed it as it stood, but Colpitts wrote an introduction to follow my foreword in which he gave a lot of credit to Pupin. The Bell System haven't bought Pupin's patents. [JK NOTES: ? THEY DID.]

[X-REF BACK TO P. 566]

It's an interesting thing that having had this little episode, I later was on the Board of A.T.& T., and I was in a position to kid some of my friends about the way they behaved in the Bell System with relation to Pupin. That's all

1) VB WRITES FORWARD  
FOR CAMPBELL OF  
BELL LABS

2) PUPIN

off the beaten track as far as this part is concerned, and I mention all of this just so we can perhaps follow up on some of these things; and where I've just mentioned a situation, I can enlarge on it any time you would like to have me do so.

1) POST WW I SCIENCE  
IN BRITAIN, FRANCE  
AND U.S.

After the First War and for a long period after that, the British were highly active (and so were the French) on theoretical physics. The theoretical physics that were used in connection with atomic energy had its roots in all of this work by Rutherford and J. J. Thompson and Perls [Peierls ?] and Cockcroft and a host of others in Britain and with some interesting figures in France. In comparison with this, there was in the United States very little really basic science indeed by comparison. We had Millikan and Arthur Compton and they did good work, but we didn't have the galaxy that Britain had. The difference in this was the difference in the national attitude. [X-REF BACK TO P. 297] The British

people and the British government were interested in fundamental science as they had been ever since the founding of the Royal Society. It got support and it got acclaim and so on. In this country we were more interested -- far more interested -- in practical results. So that, as I said a minute ago, the electric filter which is a very practical device and which makes long distance telephony possible appeared in this country. We were on the applied end of it primarily, and this continued right up to the time when the great burst of science, fundamental science, in this country occurred after the Second War.

In connection with this the British regarded their engineers somewhat as second class citizens. The engineer didn't quite belong to the elite any more than the businessman was really accepted in the top British circles. [X-REF BACK TO P. 57] Britain had

- 1) POST WW I SCIENCE  
IN BRITAIN & U.S.
- 2) BRITISH ATTITUDE  
TOWARD ENGINEERS

a self perpetuating system of government where the Prime Ministers came out primarily of Oxford and Cambridge where class closely knit maintained its eminence and its prerogatives by very subtle means that were in general necessary and laudable but which had side effects that were not of this nature at all. Britain suffered greatly by reason of the fact that it did not further engineering at the same time that it furthered science. Today the situation is quite different. Britain or the men who govern Britain realize that they have been backward in this regard and they intend to do something about it.

Now the best example of this that I can give: yesterday I was in a meeting with Jim Killian. He's just come back from England. There he'd been in conference with their top people in regard to their program of really boosting their engineering schools and raising their standards. And the new Churchill

- 1) BRITISH ATTITUDE  
TOWARD ENGINEERS
- 2) KILLIAN'S RECENT  
VISIT TO ENGLAND

School is the one that MIT has been most closely associated with. But Jim told not only about his conference with the Prime Minister but also how he went down to Chequers with Wilson. While they were discussing this affair, Wilson said to him that of course he hadn't really become acquainted with Chequers yet; he'd only been down there once or twice, hardly had time to look around. And he said to Jim, "Wouldn't you like to walk around with me when I look over the place a bit?" which they did together.

Now this is a very different thing from what possibly could have happened between the wars. The men who were prime ministers at that time didn't understand engineering and they had some contempt for it. And today we have an altered situation with the British thoroughly alert. This will have its results.

- 1) KILLIAN's RECENT VISIT TO CHEQUERS WITH WILSON
- 2) CHANGE IN BRITISH ATTITUDE TOWARD ENGINEERS

Unfortunately, of course, the things that plague Britain today need prompt solutions and a solution through increasing the power of British engineering is not going to work in time to solve the immediate problem. Now don't misunderstand me. Between the wars there were good engineers in Britain, and I saw something of some of them. But by comparison and in general, they were thoroughly behind the times.

Oh in passing you mentioned my article in the Atlantic [JK NOTES: WE HAVE IT] I looked for a copy and didn't find but one which I think I ought to keep, and since the magazine will be out in a very short time, I haven't bothered to send it to you.

Now when you were talking about Churchill and incidentally about his apparent arrogance when he was young and so forth, you mentioned Gallipoli. I think one of the best things to look up in connection with that Gallipoli affair is the book by Lord Fisher called Memories and Records. It's a two volume affair. It's a strange bloomin'

- 1) CHANGE IN BRITISH  
ATTITUDE TOWARD  
ENGINEERS
- 2) CHURCHILL AT  
GALLIPOLI

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book, but the first volume tells about Fisher's connection with this whole thing and his connection with Churchill in that whole connection. It's got some very interesting comments in it about the position that a military or naval officer was in in the presence of his civilian chief when an important thing was being discussed. I haven't got time to send this to you before I light out for Florida but if you'd like to have it, I'll send it when I get back. It's quite an interesting set of memoirs, very different from the usual treatment of the autobiography.

- 1) LORD FISHER'S BOOK
- 2) CHURCHILL

I was really fascinated by your yarn about the time that Churchill was at the Union Club in New York. That must have been quite a show, and I'd like to have been there. But the fact that you

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found that Churchill was manifestly disquieted  
by the reaction to his Fulton speech is  
interesting. I suppose he was and that he  
was capable of that.

- 1) CHURCHILL IN  
NEW YORK
- 2) EISENHOWER'S  
TRIBUTE TO  
CHURCHILL

I think the finest tribute to Churchill  
in the last few days has been Eisenhower's  
speech in London. It raised Eisenhower greatly  
in my estimation.

\* \* \*

[THE REMAINDER OF SIDE "A" WAS DEVOTED TO  
BUSH BOOK JUNIOR MATERIAL, AND WAS TAKEN  
OFF SEPARATELY.]

END SIDE "A"

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Reel 13-B: Amrad and Comment on NBC White Paper:  
The Decision to Drop the Bomb  
Dated 1/20/65

This is not an answer to a question.

In fact I haven't had any questions for a couple of weeks and I half suspect that you've probably run out of them. On the other hand what it is is just a record of a party that occurred yesterday. This was a reunion of the old Amrad crowd, and we haven't gotten together for something like forty years. It was held out at the home of Jimmy Jenks in Winchester, and it was a group of fellows who worked for the Amrad Company in the early days with their wives.

Now let me give a little more history of the Amrad Company. As I told you, it was American Radio and Research Company founded by a fellow by the name of Harold Power who was the wireless operator on Morgan's yacht, [X-REF BACK TO P. 558] and he was backed by Morgan and set this show up. He was there yesterday. I haven't seen him since he left when the company went busted. He looked exactly as he did in those days. I would have thought he might have been a little embarrassed because it was his bad management that put the company out of existence

1) AMRAD REUNION

2) HAROLD POWER

finally and it was merely a case of a chap who bit off more than he could chew. We talk about opportunities in this country. We seldom talk about the opportunities that are too large.

That's what Harold Power had. He was suddenly set up in business with plenty of money to start it and he did some things that were excellent but he had no background in management whatever. He didn't know anything about control of manufacturing or accounting or anything of the sort. Hence the company blew up after a while. I think quite a piece could be written about the chaps who suddenly get thrust into positions that are beyond their capabilities. It makes rather a sad story.

In the case of Harold Power, I never had much confidence in him anyway. There were a good many rumors that went around in regard to his operation being somewhat on the wrong side of legality. But I never took much stock in these. He was a promoter, and he had no great depth at any point. But as far as I know, he operated in a legal manner.

- 1) AMRAD REUNION
- 2) HAROLD POWER

The company nevertheless did some things. It was the first company to do radio broadcasting in spite of all the claims of KDKA. [X-REF BACK TO P. 558] In fact, the reason that it did the broadcasting was that it was selling equipment to radio amateurs, and it put up a tower and it started broadcasting music and little speeches in order to give the ham something to listen to. This was done for quite a while before KDKA came on the scene.

There's the usual story about the chap who was giving a kiddie story, a bedtime story, and forgot to turn off the microphone. I suppose this story is told about every broadcaster at some time. I think it was true in this case. I've forgotten the guy's name, but the story was that he finished his bedtime story, put his microphone down on the table and said, "I guess that will hold you little bastards for another twenty-four hours," and then turned the microphone off. There were numerous protests from mothers and so on.

Well the company did something else. For there Al Spencer worked at the bench. [X-REF BACK TO P. 561] He invented the snapping thermostat, the story of which I've told, which gave

- 1) AMRAD REUNION
- 2) AMRAD's RADIO BROADCASTING (Repeat)

rise to the Spencer Thermostat Company which is now a division of Texas Instruments.

There, also, C. G. Smith invented some gaseous conduction tubes. He was well ahead of the game on it. He was ahead of General Electric and Westinghouse and RCA in getting into gaseous conduction tubes. They were used as B eliminators because in those days, of course, all tubes had to have DC on their filament and plate. It filled quite a need.

When the company went busted, Marshall and his group picked up the patents. This was the beginning of the Raytheon Company. At first called American Appliance Company -- it went through many vicissitudes. But the thing that really gave it a start was C.G.'s inventions.

[X-REF BACK TO P. 559]

He was there yesterday, and we talked about the time that I hired him. We both remembered it clearly. I was looking for a chap in the laboratory, and the patent attorney of the company sent this chap out, and I talked to him one afternoon. He was not particularly a prepossessing fellow. I told him about a puzzle

- 1) AMRAD REUNION
- 2) AL SPENCER
- 3) C. G. SMITH

we were working on -- a new kind of a tachometer I believe it was. And we had no solution for it. We were just puzzling about it. I told him about it to see what kind of a reaction I'd get. I got no reaction whatever at the moment. But the next day he came to see me and he had a nice solution to the problem, and I hired him of course on the spot.

He was a very versatile chap. He made all kinds of queer inventions. Some of them were good and some of them were not. I got caught on one where I should have known better. He got out, after he was with Raytheon, a scheme for a refrigerator which was a beautiful thing with no moving parts. Its operation depended merely upon what constants could be obtained in a gaseous system, and it depended on a rather obscure physical principle. We did a lot of work on it before we found that theoretically it was a beautiful thing, practically it didn't come within the range of economic construction and so on. But in general he had many many bright ideas.

- 1) AMRAD REUNION
- 2) VB HIRES  
C. G. SMITH

We talked yesterday about the time that a young chap in the lab, a fellow by the name of Wilson, thought that he made an invention that I really had made, but about which I didn't tell him. Then how later we found out that, as a matter of fact, a chap named Nicholson in the Bell Laboratories had made that same invention before either one of us thought of it. I could tell that story and there's an interesting bit of psychology involved. So I had a good time with C.G. who looks the same as he did thirty years ago. He has not, however, produced a really important invention in the last thirty years although he produced some very interesting things before that.

The man who had the party was Jimmy Jenks, and I hired Jenks in that laboratory way back there. And he left later and went with the Sanborn Instrument Company and became its president. When Sanborn got to be old (he was my professor at Tufts by the way), he had no dependents and he gave all of his stock to employees. He owned the entire company and he gave the whole

- 1) AMRAD REUNION
- 2) C. G. SMITH
- 3) JIMMY JENKS
- 4) SANBORN INSTRUMENT  
COMPANY

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thing away. Of course he gave Jenks a good slug of it so Jenks is pretty well off today because he made a success of the company afterwards.

Sanborn merely made a contract with the company under which he was given what amounted to a pension which gave him the money he wanted to live on and his tastes were moderate. It's the kind of thing that one reads about but seldom sees first glance.

I saw another chap yesterday. And I never would have known him -- George Naley. [sp.?] He was the fellow who went on the camping trip with me where we started the machine for Phoeb's uncle up in Montpelier and shot cows by dropping apples down the exhaust pipe. And we had a good time talking about that. [X-REF BACK TO P. 644]

- 1) AMRAD REUNION
- 2) JIMMY JENKS AT  
THE SANBORN INSTRUMENT  
COMPANY
- 3) GEORGE NALEY WHO  
HELPED ON UNCLE  
WALT'S APPLE GUN

I also saw Woodhull [sp.?] who was one of the engineers way back in the early days. He and I were working together one night on some apparatus when I got a good shock. It knocked me over although it didn't knock me out. He wasted no time, but picked me up and lugged me out the door and dumped me on the grass where he started artificial respiration. He got going so fast at it that I couldn't get a word in to tell him that I was all right breathing without his help. He did exactly the right thing at the right time and did it in a hurry. All of this brought back a lot of memories of the old days.

Amrad was a crude affair. It never should have been allowed to go bad. If Power had merely had some business experience or if he had had the sense to get proper managers around him to run it, he would have been all right.

- 1) AMRAD REUNION
- 2) WOODHULL GIVES VB  
ARTIFICIAL  
RESPIRATION

My first association with the company was when I left MIT with my doctorate and had gone to work as a professor at Tufts. I promptly got a consulting arrangement with the company which brought me in more money than Tufts was paying me, and cheered us up greatly when we needed cash badly. I went on from there to operating their laboratory. And, as I've told, during the First War we developed submarine detection apparatus which was all right. It was crude but it worked and we got it into use just as the war ended. [X-REF BACK TO PP. 557-558]

That was the last little preliminary story to get in a few names and so forth. I'll now turn to your questions when I get them.

- 1) AMRAD REUNION
- 2) REPEAT OF VB's  
FIRST DAYS  
WITH AMRAD

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This part of the film is concerned with the old story of why we dropped the bomb and that sort of thing. I have before me the script of the TV show and we've had some correspondence on this whole affair.

There are in fact several questions on which I might well comment further than I have thus far. One of them is the point of view of the British early and the Einstein letter. Another is my conversations with Stimson. And then I have a number of comments on the matter of the planning of the invasion.

It's a little startling to find again in this TV show the assertion that the Einstein letter to Roosevelt started this whole show going. This letter was prompted by the group in Chicago -- Szilard and so forth. Presumably they were the only group that really understood this thing and realized that something could be done and so forth. [X-REF BACK TO PP. 125, 553, 623-624]

- 1) WHY WE DROPPED  
THE BOMB
- 2) EINSTEIN LETTER  
TO ROOSEVELT

Now there are a good many answers to this and of course answers make no effect whatever after such a myth gets going. But I thought of one more. The British had plans. Reading over some of early British accounts and some of the histories that they've written up, in particular the biography of Tizard that has just appeared and some of the discussions of Tizard versus Cherwell and so on, it's quite apparent that before we had an interchange with Britain the British had already realized that an A-bomb was possible. In fact they had some plans moving on it quite early.

Now they had two errors in this thing. One, they were altogether too sanguine about time schedules. They completely underestimated the amount of work that will [would?] be necessary to put the thing into practical form. Second, they thought of it entirely as a scientific job. Now, the British have suffered, and they still suffer

1) WHY WE DROPPED  
THE BOMB

2) BRITISH PLANS  
FOR MAKING BOMBS

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from the fact that they really have no great appreciation of engineering. This goes very deep, and I can give one anecdote that illustrates it pretty well, I think.

Some time before the war, Prince Philip came over to this country and he paid a visit to the National Academy of Sciences. Bronk, who was then President of the Academy, hastily tried to get a group together to greet him because his visit was unexpected. I hustled down to the Academy, and before the others arrived, the Prince and Bronk and I had a very nice discussion up to a point. That point occurred when something brought out that I was an engineer rather than a scientist. I've forgotten exactly how it occurred. It was something that we were discussing that was evidently engineering. I made a remark to the effect that of course the Prince had paid much attention to engineering himself so he was well able to appreciate the importance of this and, in connection with that remark, that I was an engineer.

- 1) BRITISH ATTITUDE  
TOWARD ENGINEERING
- 2) PRINCE PHILIP'S  
VISIT TO U.S.A.

Whereupon the whole atmosphere changed. It became cold. The Prince said nothing that was offensive of course, but the attitude changed.

Now I think this was revealing. To the British for a long time -- and they haven't quite recovered from it yet -- the engineer was a kind of second class citizen compared to the scientist. This cost them a great deal over the years and it's one of the things that's costing them a great deal today. Before Britain can really get out of its present troubles, it's got to remove the last vestiges of its artificial class distinctions in industry.

To get back to the early days, the British not only thought they could do this job themselves and produce a bomb and that it was primarily a scientific job, but they also thought that they did not need any help from the United States in order to do it. Or at least some of them thought so. There's a strange circumstance here. The British initially thought they didn't need the Americans. And later on, were quite annoyed when the Americans felt that they didn't need the British in every last angle of the subject, which of course came up when I was talking to Churchill at Downing Street.

- 1) PRINCE PHILIP'S  
VISIT TO U.S.A.
- 2) BRITISH DISDAIN  
FOR ENGINEERING  
HURTS BOMB PLANS

We have a strange affair here. It's not the kind of thing that one wants to emphasize because ultimately we had excellent collaboration. But there isn't any doubt that back when the war started in Europe and before we were getting into it here, the British had some contempt for American science and it showed.

On the decision about which this whole TV show is concerned, as I look back on it, there never was any question in the minds of the people who really understood the situation about what the decision would be. Now when I say "the men who thoroughly understood the thing," this doesn't extend too far. For example, the group in Chicago that protested really had not the background to understand the whole affair. For one thing they could not possibly know about the fire raids on Japan, unless the transmission of information was quite improper. That is, they weren't entitled to know under the rules that were then laid down. They did not know, for example, of the plans for the invasion of Japan or of the estimates of casualties that were likely to be involved in such an affair. Since they didn't know, they couldn't possibly make a judgment with all of the facts and relationships in mind.

- 1) WHY WE DROPPED  
THE BOMB
- 2) BRITISH CONTEMPT  
FOR AMERICAN SCIENCE  
EARLY IN WWII
- 3) THE "CHICAGO GROUP"  
NOT WELL-INFORMED

The Interim Committee did one very good thing. It brought into the affair people, Oppenheimer particularly, who then could understand these things I've just recited and an understanding of which was necessary for proper judgment. And it's to be noted that as soon as they saw the whole thing they agreed on a decision unanimously and recommended it to the President. No other judgment was possible under the circumstances.

Now before the Interim Committee was convened, Conant and I and of course Groves had talks with Stimson. And we went into the thing from every angle. Stimson was a very thoughtful fellow. And we discussed with him all angles of the affair -- the position of Russia, what Russia was likely to do after the war, the necessity for invasion, and the terrible nature of the fire raids and all the rest. I think none of us had any doubt that if we could get the bomb we ought to drop it. Of course that was the final decision. But the decision was pretty well fixed, I think, in Stimson's mind before the convening of the Interim Committee.

This committee was brought together in order that there might be various new points of view brought to bear on this thing. I think it

- 1) WHY WE DROPPED  
THE BOMB
- 2) ROLE OF THE  
INTERIM COMMITTEE

was quite honestly an attempt to get fresh ideas and fresh analysis -- not merely a matter of building up a record. The Interim Committee worked harmoniously and again went into everything with great care. Its decision, as I've said, was unanimous.

Now we've come to a point which is a very much tougher one from my point of view. This was the question of how it was possible for the Joint Chiefs to plan and launch a program of invasion of Japan when it was almost obvious, I think, that with a naval blockade of Japan, with the fire raids, with the mounting bombing attack, Japan could not possibly hold out more than a few months. The decision to launch an attack under those circumstances -- an invasion which involved hundreds of thousands of casualties -- is an extraordinary thing. It seems to me that in order to understand this, one's got to go back a long ways in order to try to get a grasp of the military mind under such circumstances.

One can think for example of why the British attacked at Bunker Hill in the open with the Redcoats and so forth, or worst yet, when Packingham [Parkingham ?] sent his men in the open

- 1) WWII
- 2) INTERIM COMMITTEE
- 3) JOINT CHIEFS PLAN  
INVASION OF JAPAN

against the riflemen behind the cotton bales in New Orleans. There are plenty of illustrations from history of this thing.

One thing is the military man has to make very tough decisions. When he's in the field, as Bradley brings out, every decision that he makes means lives. And it means sacrificing the lives of not only the men under him but some of his friends. He has to school himself through the years to be able to make that sort of a decision without question and on the spot and under sometimes the worst possible circumstances.

I've recited the times that there was a gulf between the military men and the civilian scientists and engineers at the beginning of the war. [X-REF BACK TO PP. 407-408] Before the end of the war this gulf had been bridged and there was not only good collaboration, there were friendships formed and so on. Part of this was due to the fact that military men found out that scientists and engineers were neither long-haired freaks nor salesmen. Part of it also was due to the fact that the civilians began to grasp the

- 1) DIFFICULTY OF MILITARY DECISIONS IN THE FIELD
- 2) GOOD RELATIONS BETWEEN SCIENTISTS & THE MILITARY BY END OF WWII

qualities of the good military officer. One of those qualities was undoubtedly the ability to make decisions. This is part of the thing; there's no doubt about that. But also there is in the background a bunch of military myths. One of these is the myth that a battle is never won without going on the attack. Another one is that no country is ever really subdued unless it's occupied. Finally we have the myth that only the infantry on the ground can put in the final decision. These things have been ingrained so much into the military training, into the military schooling, into their attitude of mind, into their traditions, that they become almost automatic.

1) MILITARY MYTHS

With these things it is possible to see how a group of very top military men sitting in the Pentagon, the Joint Chiefs, could analyze the

situation as far as Japan is concerned, and come to a decision such as they came to. While one can understand it, one certainly can't condone it. I think it was one of the worst decisions in recent history. And, if you please, it made the use of the A-bomb inevitable.

The big question now is this: why is it that I didn't protest vigorously against the invasion decision. In order to understand this we have to go back on quite a number of things. When the war began there was a great gulf between the civilian and the military -- the civilian scientists and engineers and the military. This went so far that the Navy objected to turning over to my organization, NDRC at that time, the information, about antisubmarine warfare for example, that was utterly necessary for the civilian groups to go to work on developing weapons. There was a stiff session in the Navy Department where Admiral Stark and four or five of the other admirals and I met. [X-REF BACK TO P. 428] They stated in no uncertain terms

- 1) WHY WE DROPPED THE BOMB
- 2) PROBLEMS BETWEEN MILITARY & CIVILIANS (SCIENTISTS) AT START OF WWII
- 3) ADMIRAL STARK

that they were responsible for the confidential information, that they were not going to give it out and so forth. I replied that they had orders from the Commander in Chief to do so, and that I wanted to know whether they were going to follow those orders. Admiral Stark ruled in my favor and we got our information although pretty grudgingly at first.

As you know, at that time the Navy was taking the view that they didn't need any help on antisubmarine warfare. They had the whole thing in hand and under control anyway. Now this improved as the war went on and it became a pretty good relationship toward the end of the war. Nevertheless it never progressed to the point where the scientists were really brought into military planning at the top levels. They were to some extent at the lower levels. For example, Palmer Putnam out in the East sat in

- 1) WWII
- 2) NAVY RELUCTANTLY GIVES NDRC NEEDED INFORMATION IN EARLY DAYS OF WWII
- 3) SCIENTISTS NOT IN ON TOP LEVEL MILITARY PLANNING
- 4) PALMER PUTNAM

staff conferences where new plans for making landings on hostile coasts were discussed. He was there working on tactics rather than strategy of course. But not at the top levels.

- 1) WWII
- 2) PALMER PUTNAM IN  
LOW LEVEL MILITARY  
CONFERENCES
- 3) RESEARCH & DEVELOPMENT  
BOARD OF JOINT CHIEFS

I was Chairman of the Research and Development Board of the Joint Chiefs of Staff. This was mostly shadow boxing. We really had no authority whatever over anything. It merely formed a forum where we could have reasonable discussions. Fortunately I usually had pretty good officers detailed to this. Some excellent ones such as Admiral Lee. Our discussions were helpful, but we had no authority whatever. If we were not unanimous on any point, the only thing we could do was refer it to the Joint Chiefs and they'd divide on exactly the same basis and there would be no decision. [X-REF BACK TO PP. 64 & 357]

Of course I always could appeal to the President because I reported to the President. But I never did. If I had, it would have destroyed the development of cordial relationships as they actually developed. So we were barred from real discussion of top line strategical matters. I sat with the Joint Chiefs a few times, notably at the time that the decision was made to introduce the proximity fuze into Europe. But I was more of a witness, not a planner. On such things as the development of rockets, I was before the Joint Chiefs and not with the Joint Chiefs.

On the matter of the plans for the invasion of Japan I was most certainly on the outside. In addition to this, I also did not know about those plans sufficiently. There was no reason to communicate them to me and they were not communicated to me officially. I knew about them, of course. I couldn't help knowing about them because men in the Office of the Field Service were all over the place, among other places on MacArthur's staff. I couldn't help knowing what was going on, but I didn't know officially. To enter into this would have revealed that I had information that I was not supposed to have.

- 1) VB & THE  
JOINT CHIEFS
- 2) BACK TO PLANS FOR  
INVASION OF JAPAN

There was another point here, and it's a very interesting one indeed. I could have talked to Stimson but I did not on this thing. I had to be exceedingly careful not to go over the heads of the military to the Secretary. If I had done so, we wouldn't have gotten anywhere. I think I've related to you conversations with Stimson, notably the one in which he invited me to bring things to him and I replied that I thought I could lick his Army singlehanded. [X-REF BACK TO P. 711] But I didn't appeal to the Secretary. On a thing of this sort, I couldn't go to the Secretary and argue it.

There was another point in here that was a good one, and that was this. At the time that I knew about these invasion plans, I just sat back and said to myself this was utterly absurd under the circumstances. Now it may be that there are factors here that I don't understand, that maybe if I understood the whole thing, this would make more sense. I haven't got the

- 1) VB WOULD NOT GO OVER MILITARY TO STIMSON
- 2) VB THOUGHT PLANS FOR INVASION OF JAPAN SENSELESS

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access to information from intelligence that the Joint Chiefs have. I might possibly be mistaken. But from the way it looks to me, this program makes no sense whatever.

- 1) WWII
- 2) VB SUSPECTS THE JAPAN INVASION PLANS ARE A BLUFF

Having said this to myself, the next question that immediately arises is, Is it genuine? Is it possible that the Joint Chiefs are putting on a gigantic bluff, that they're getting the invasion plans in shape, they're getting the transports actually moving -- concentration of troops and so forth -- with the full knowledge that Japan will know all about this? And of this added factor -- the imminence of an overwhelming invasion in the light of their suffering under the blockade and bombardment may turn the tide and cause them to negotiate for peace with the idea if this happens well and good. If it doesn't happen, then for one reason or another, the invasion will be delayed until Japan folds.

I don't think I mentioned this to anyone.

It may have come up in a conversation somewhere.

I hardly would have dared to mention such an idea.

But if this was the plan it was held exceedingly closely and at the very top echelons and should have been, of course. After the war was over I again wondered whether someone, Truman or someone else, might not come out and say, "Well we really put up a fine bluff on the Japanese." But no one said so.

I finally have to conclude today that the plans for the invasion were genuine. It was intended to carry them through and carry them through to the finish. And this most certainly made no sense whatever. Of course I always had the thought at that time that while I wasn't dead sure that the bomb would go off on the first test, that none of us could possibly be sure of it. I knew that the group that was working on it was pretty uniformly optimistic about it, that they

1) WWII

2) VB DECIDES JAPAN  
INVASION PLANS ARE  
GENUINE BUT FOOLISH

were a very sound group and hence that the chances were very strong that we would get a successful test. And I knew that if we did, and if we put bombs on Japan, the war was most certainly over. I was pretty sure that this could come before any invasion.

There's a broader question than this. How do we avoid this sort of thing of planning in ignorance, planning by a group that does not fully understand. This becomes very important when warfare is no longer a matter of masses of men and simple weapons, but has become almost entirely a technical affair.

We have in the background instances where the civilian authority has interfered with military planning and they have not been reassuring by any manner of means. The greatest example of course is Hitler. But even Churchill, who was a very canny individual in many ways and who had had contact with the military all his life, interfered at the Dardanelles. And the

- 1) WWII
- 2) CHANCES JUDGED GOOD FOR SUCCESSFUL TEST BY A-BOMB PEOPLE
- 3) HOW MAY WE AVOID MILITARY PLANNING IN IGNORANCE
- 4) CHURCHILL AT DARDANELLES

general experience has been that when civilians get into the thing, it doesn't go to well. So that's not the answer. The answer, therefore, ought to be that within the military structure itself men who have a thorough scientific and technical grasp shall go right to the top and be present among the military planners at the very top.

In the Air Force this occurs to some extent because in the Air Force, as it has developed so rapidly and technically, inevitably all of the officers have been immersed in technical things throughout their careers. Even this can be a little misleading because as they get higher up, the contact lessens and also their technical and scientific contacts are limited to a certain range of subjects. An example of this is after the war high officers in the Air Force and very competent ones, Arnold and Spaatz, were sure that we would have intercontinental ballistic

- 1) NEED FOR SCIENTIFIC AND TECHNICAL GRASP IN TOP MILITARY
- 2) THE AIR FORCE -- ARNOLD & SPAATZ

missiles within two or three years. Their argument was perfectly simple. During the war the Germans shot a ballistic missile for a couple of hundred miles. Certainly within two or three years the Americans would be able to shoot one a couple of thousand miles.

- 1) NEED FOR SCIENTIFIC AND TECHNICAL GRASP IN TOP MILITARY
- 2) INTERCONTINENTAL BALLISTIC MISSILES

When I brought out in the Joint New Weapons Committee that there were tough unsolved problems before that job could be done, the general attitude was but then we overcome problems. [?] Of course a military man in high command is very used to telling his subordinates never mind the obstacles, we're going to get this thing done. He has to do that. He wouldn't be a good leader if he didn't do it. But when he does the same thing in technical scientific areas he can be very wrong indeed. As we know, the solving of the problems of the intercontinental ballistic missiles just had to wait until the digital computer had developed fully and until inertial guidance came across. Otherwise even if we shot

a missile two thousand miles we couldn't have guided it so that it wouldn't have been of any use whatever.

1) THE NAVY -- THE  
TECHNICAL OFFICER  
A 2nd CLASS CITIZEN

In the Navy we have the exact opposite. The Army's somewhere intermediate. In the Navy the technical officer is sort of a second class citizen. I know because I was one once. I was a lieutenant commander for engineering duties only. I was in the Reserves of course. The engineering-duties-only officers are barred from the chain to high command, and I think they still are. They're the men who initially were the naval constructors. They were supposed to be engineers to design ships. They did not have the training and the sea experience and all the rest that has to go in the Navy view with the high command. So that men with real technical background in the Navy can't get to the top.

What do we do? Well we probably do nothing in time of peace. But there's a lesson here. The military is up against this. If we get into another war, even if it's a conventional war without A-weapons, another thing such as Korea, we may find that a vigorous President would take over on strategic planning which might indeed be just the wrong thing to do. The protection that the military has against this happening is to make their own planning adequate. The only way they can do that is to see that men in their officers' ranks who have thorough grounding in science and thorough understanding of it have the opportunity to get to the councils where the great strategic plans are made. It's not good enough to bring them in as witnesses. They've got to be a part of the planning cadre itself.

Another aspect of this whole affair which is rather an illuminating one occurred in connection with antisubmarine warfare. The book by McGeorge Bundy on Stimson gives the story pretty well. There was a great controversy between Stimson and King on the question of convoying versus hunter-killer groups.

[X-REF BACK TO P. 468]

- 1) NEED FOR SCIENTIFIC AND TECHNICAL GRASP IN TOP MILITARY
- 2) NEED FOR UNIFIED PLANNING
- 3) STIMSON vs. KING ON ANTISUB WARFARE

Now Stimson was involved all right because the Air Force was doing antisubmarine work as well as the Navy. We note two things here. First there was no provision for unified planning. There was no use putting such a question into the Joint Chiefs because they would never resolve differences between two services. We had no such thing as unified planning. We didn't have it after the war through all our vicissitudes until McNamara has really made the Joint Chiefs function.

At the time that Eisenhower was present, he knew full well that the unification had not gotten to the point of really joint planning, but he didn't interfere because he wouldn't interfere with his old military associates. [X-REF BACK TO PP. 593 & 704] At the time of the war, the Navy made its plans, the Army made its plans, and there was no way of coordinating these except by action of the President. This particular decision was not made by the President. Whether he thought it was better to let them fight it out at the lower level I don't know.

- 1) NEED FOR UNIFIED PLANNING
- 2) EISENHOWER BEFORE JOINT CHIEFS  
(Repeat)

It went on between King and Stimson. King was committed to the convoy system. He continued the convoy system and did nothing about hunter-killer groups until long after the British had done so and had outperformed us quite considerably as a result.

Now how was King getting his information? This was a highly technical matter. He was getting advice from his naval officers. To a certain extent those naval officers were getting advice from my people who were in touch with antisubmarine devices at various echelons. But some of the opinions that were important got to King third-hand. King made the decisions. He made the decisions in spite of the fact that he could not possibly understand fully the technical things involved. This was the system and it cost us quite a lot.

I think really the only time that King really listened to civilian advice on any such matter was the time when I tackled him on the proximity fuze affair, and I had to batter my way in to get the guy to listen at all. [X-REF BACK TO PP. 192-193 & 443-444] Now this system is no good. I think the British performed much better on this than we did on the whole.

- 1) STIMSON vs. KING ON ANTISUB WARFARE
- 2) KING & THE PROXIMITY FUZE

I attended a meeting of the Antisubmarine Committee of the British Cabinet held in the Cabinet room of 10 Downing Street, and presided over by Churchill. While there were twenty people there and the First Lord of the Admiralty and what have you, his scientific advisors, his technical advisors, notably Cherwell, were sitting at the table and giving him advice firsthand.

[X-REF BACK TO PP. 428-429 & 452D & 746]

More than that, I was there. Churchill had not only his own technical advisors on this but he invited me, a technical advisor from an ally. And with me was Harrington and Admiral Stark.

I didn't have very much to say anyway except a few words on the prospect of American antisubmarine weapons. But the point is that this was a situation where Churchill was going to make final decisions, it's true, some of them. The First Lord of the Admiralty was going to make others. But the technical people were right there and they were able to argue if they wished. While they did not make the final decisions and should not, they were heard at the top echelons. Now we didn't have that same thing over here.

1) ANTISUB COMMITTEE  
CABINET MEETING AT  
TEN DOWNING STREET

I worked with the Joint Chiefs at times it's true. I was a part of their organization. Occasionally I sat with them, but very rarely indeed. The atmosphere was quite different. I was not sitting in while they were discussing a major matter of policy or strategy where I could interpose technical points. I was there as a sort of a witness. When they made real decisions they made them with the absence of everybody except themselves. As far as I know they didn't even have subordinate officers at the times when they made real decisions. Of course, in addition, we have to say that those decisions were limited to the things where they were unanimous. They did not resolve in the Joint Chiefs points where there was difference of opinion. Those had to go to the President for decision if they went at all, if they got decided at all. I think the President refrained from making such decisions.

1) OMNIPOTENCE OF  
JOINT CHIEFS IN  
DECISION-MAKING

In general he shied away from imposing his judgment on the Joint Chiefs. What he didn't do was force the Joint Chiefs to really function.

1) HARRY HOPKINS

This situation in this country would have been much worse if it hadn't been for Harry Hopkins who, I think, was a great man in a strange way. It's remarkable that he and I got along so well together because our backgrounds were so different. Part of this was due to the fact that I really admired the man. I admired him because of his utter loyalty to his chief [X-REF BACK TO P. 397] , his unselfishness and his good sense.

He went around with the Joint Chiefs, with the Secretaries and so forth and as far as I know he never transmitted an order from Roosevelt to them. Certainly not on important things. His attitude when I happened to hear him operating was that he was looking into something because his chief needed to be informed of it. But in the process of listening he pretty much got the boys together and I think he accomplished a great deal in this way.

You shouldn't be misled by this remark.

There was a gulf between Churchill and British science, but it didn't occur between Churchill and Cherwell. It occurred between Cherwell and the great group of British scientists. [X-REF BACK TO PP. 724-725] There isn't any doubt that Churchill brought Cherwell in right along for scientific technical advice, but he did not get the consensus of opinion of British scientists.

- 1) GULF BETWEEN  
CHERWELL & THE  
BRITISH SCIENTISTS
- 2) TENDENCY AMONG  
MILITARY TO BE  
REACTIONARY OR  
OVERLY OPTIMISTIC

The old adage that a little knowledge is a dangerous thing ought to have added to it that this is dangerous in a man in a position of great authority. There seems to be a tendency among military men, some of them, to be either reactionary or on the contrary to be overly optimistic about technical progress. This is not a general thing of course, but it blossoms out in strange ways and under great difficulties.

I suppose the greatest example of reactionary attitude among military men came in the First World War. The machine gun had appeared

and it rendered the old tactics utterly absurd, and forced a stalemate. Military men continued this stalemate in France for years. They put on attacks that cost hundreds of thousands of casualties and gained a few yards of worthless ground. The sacrifices made were quite absurd and taken on the basis that one must attack, that nothing is ever won without going on the attack.

Now the tank appeared and the tank was quite capable of breaking the stalemate. It didn't require any scientific innovation, it didn't require any great technical progress. What it required was merely careful design, development and manufacture. And it actually appeared on the front, but in such small quantities and under such conditions that it was not used. Yet it could have broken the stalemate. This I think was the classic example of reactionary attitude.

We didn't get away from this in the Second World War entirely. I think the best example I have is Admiral Leahy. Leahy said time after time to the President that rockets were of no use in warfare, [X-REF BACK TO PP. 161-162]

- 1) REACTIONARY TENDENCY  
IN THE MILITARY
- 2) WW I--MACHINE GUN
- 3) WW I--TANK
- 4) WWII--ROCKETS &  
ADMIRAL LEAHY

that it had been shown for years that this was true. That rockets had been used for hundreds of years in various ways. They never had been any good and any time spent on them was wasted. He actually wanted to see to it that all development of rockets was stopped. So we had to make a motion picture to convince him. It took quite a lot of trouble to make this but this pictured some guided missiles such as we had at that time, the beach tank rockets which were pretty spectacular when they went off and every other kind of a rocket that was under development and some of them in use.

I sat aside of Leahy when we showed this film to the Joint Chiefs. When we had finished he turned to me and said, "I didn't know that rockets had developed to this extent." He didn't know it but it didn't prevent him from opposing the development and ridiculing it. I think that's probably fairly typical of Leahy.

- 1) REACTIONARY TENDENCY  
IN THE MILITARY
- 2) WWII--ROCKETS &  
ADMIRAL LEAHY

I saw him again under a circumstance that reflected some of the same point of view when the release of the Smyth Report was to be made. Truman had a conference on it and Conant, Groves and I testified that there was nothing in the Smyth Report that wasn't already known to the Russians. That, therefore, its issuance would not help the Russians but would help our scientists generally. [X-REF BACK TO PP. 270-271] Leahy argued against the release of the Report. He didn't know any more about the technical matters involved than a child. That didn't prevent him from having positive opinions on it.

I think probably dressing a man in a fine uniform, surrounding him entirely by young men who have to pay deference to him, giving him the type of control that a military man has, acts upon some types of minds to produce just what we saw here.

- 1) REACTIONARY TENDENCY  
IN THE MILITARY
- 2) ADMIRAL LEAHY &  
THE SMYTH REPORT

Now I said that we also get the other aspect of it. And I've given you an instance of that when Air Force officers thought that inter-continental ballistic missiles could be developed in a year or two whereas it was a ten or fifteen year job. Anyone who understood development would know that it was.

I can give another example and that's recent within the last few years -- military statements about space. Some of this, of course, is put forward because it helps to get appropriations, and I think a good many men who have spoken on this have had their tongue in their cheek. But we've heard some of the most absurd things possible. One is that we ought to establish a military station on the moon. What for? Presumably to shoot missiles at the enemy. In other words, we're going to shoot a missile 200,000 miles after having lugged it out there at great difficulty and expense instead of keeping the missile home and shooting it 2,000 miles.

The other proposal is for a platform in space, and presumably this platform is going to have military equipment aboard to defend itself

- 1) OVER-OPTIMISM  
IN THE MILITARY
- 2) A MILITARY STATION  
ON THE MOON
- 3) A SPACE PLATFORM

and all the rest of it. Among other things the matter with this idea is that such a platform, after it's been around the earth a few times [will have] a completely predictable path so that it is from that standpoint about as easy to shoot down as anything that can be imagined. If we had such a platform in space and if we got into war with Russia, I haven't the slightest doubt that one of the first things the Russians would do is launch a missile at it with an atomic warhead and bring it down. Even if that wasn't true, what could you do on a platform of that sort? Again, shoot missiles from there?

These absurdities are advanced in all apparent seriousness and part of it is due to the fact that men in high places feel that unless they take an extreme optimistic view on missiles and so forth, they will be regarded as reactionaries. I had a taste of that because back in the early days of guided missiles I was insisting that they were not around the corner, that the only

- 1) OVER-OPTIMISM  
IN THE MILITARY
- 2) A SPACE PLATFORM
- 3) EARLY DAYS OF  
GUIDED MISSILES

sensible thing to do was to tackle the remaining tough problems that hadn't been solved -- attack them in the laboratories and keep away from building hardware with its great expense until the problem of guidance was solved and [the] problem of reentry. Because I took that point of view I was regarded as being a reactionary in certain circles. Hence the same thing applies to military men. They whoop it up for some new thing because they don't want to be regarded as hidebound.

There is a problem here and I think we're gradually overcoming it. The entrance of scientists into government on a broad scale, not on the narrow scale on which it occurred during the war but on a very broad basis -- not really employees and so forth in the bureaus but directly beside the President and with great influence. This has changed the affair. With the group of

- 1) EARLY DAYS OF GUIDED MISSILES
- 2) SCIENTISTS TODAY IN HIGHER LEVELS OF GOVERNMENT

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men who serve now in the White House, a military man would hardly care to get into discussion with them on a scientific matter and be dogmatic. I think the atmosphere is likely to be a whole lot better in the future than it has been in the past.

1) SCIENTISTS TODAY  
IN HIGHER LEVELS  
OF GOVERNMENT

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END OF REEL #13