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ELECTRONICS PRODUCTION INDUSTRIES

26 February 1948

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COLONEL CRANE: Gentlemen, today we continue in our study of the production problems in the various types of industry, this afternoon in the electronics industry. This is a field which is growing in complexity and in interest to all in the Armed Forces because of its implications as to the materiel which will be used by the Armed Forces in the future.

In introducing our speaker this afternoon I wish to make an acknowledgment to last year's class. During the field trip one group visited the Westinghouse plant at Baltimore and came back with such glowing reports of the effectiveness of the plant and the knowledge they had gained there that they insisted that the entire class should have the advantage of listening to our speaker in the following year.

It is a great pleasure and a great privilege to introduce to you the Manager of the Industrial Electronics Division of the Westinghouse Electric Company, Mr. C. J. Burnside. Mr. Burnside.

MR. BURNSIDE: Thank you, Colonel Crane. I am glad that you relieved me of the responsibility for coming over here and put it squarely on the shoulders of your compatriots of last year. Therefore I can give you no sympathy.

I am going to speak this afternoon as an individual, because I cannot speak for my company any more than you as colonels or majors or captains or commanders can speak for your Army or Navy. You can speak with authority about your battalion or your squadron. On that you are an expert. It is within similar limitations that I am qualified to speak from the experiences of the Industrial Electronics Division of Westinghouse.

My background is that of an industrialist, although my interest in electronics started down in Jefferson Barracks, Missouri, in 1918, when I joined the Army. I attended the Signal Corps Training School at Burlington, Vermont, and a similar school at Yale University, where I received a good start on my education under the Army's sponsorship. I was also bitten by the radio bug. As a well inoculated radio amateur I was mustered out when the shooting was all over.

It has been my pleasure to speak to two of these groups in the past. Let me say first of all that this is not going to be a lecture. I have a group of books here which will be left with you as references, but I don't propose to read them to you. So you can relax.

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As a war progresses, this becomes more and more difficult to do. Your Army and your Navy expand. You bring in a lot of inexperienced people, among them a generous sprinkling of lawyers, accountants, and various other experts. Each of them thinks he has a job to do, and usually he is pretty good in his particular line. But he does not always understand the problem. For every one of these people you inject into our relationship, we have a lawyer, or an accountant, or somebody, to hold hands with these experts turned military. That takes up manpower; and, while our people and yours are getting together, we lose valuable time.

Much of that is avoidable. Military contracts follow a standard form. Most of it we call "boilerplate." There are only two or three pages which really tell what you want and when you want it. The rest is mostly legal and contractual "abracadabra" that is put in because we have public laws that require it. In time we come to a mutual understanding on these standard contract sections. Some prove to be good and workable and are retained after fair trial; some prove unworkable and are discarded by mutual consent. But what really holds us up in getting production started is that you often inject new requirements that your own military group has never tried before. You are not quite sure how they will work. We do not know what they mean. We cannot start working together until we decide what they mean. This means delay.

I am not saying that all this can be avoided. I am sure some of the problems which arise in the procurement of military equipment, such as changes in public law and changes in economic conditions, present an ever-changing picture of the requirements. But these should not carry with them, as a sort of coattail ride, a whole mass of arbitrary and unnecessary restrictions in which you are not vitally interested.

I would like to suggest that we get industry and the Armed Forces together on these legal and business problems early enough to work them out beforehand. We badly need a standard procurement contract, with tested and mutually acceptable provisions in it; we need to agree on them while we have lots of time to do it; and then--this is the payoff--we need to stabilize our contract provisions and leave them alone.

You must be able to buy two different kinds of things. You must be able to buy material things, things that we can see and feel and count and weigh. These are relatively easy. The Army and Navy and the other government bureaus have been buying that sort of thing for a great many years. Your procurement system is based pretty much on the assumption that you are going to buy something that can be very readily and very carefully defined, and that can be defined in terms that most people can understand.

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The sales manager of a division like mine has the job of forecasting at the beginning of each month how much business his division is going to be called upon to do during the succeeding twelve months. That is pretty difficult in peace, when there are highly competitive conditions. But after a year or so of war, it was not a case of competing for jobs; it was a case of finding enough capacity anywhere to do the job. So I am assuming that by the time we got to 1940 everybody was sufficiently alarmed to realize that industry, at least the electronics industry, was certain to be loaded to capacity. So there was no reason, at that time, why the Army and the Navy should not have told industry just what it was going to be expected to do. We were not going to squabble about a little bit of business. The problem had become one of getting the job done.

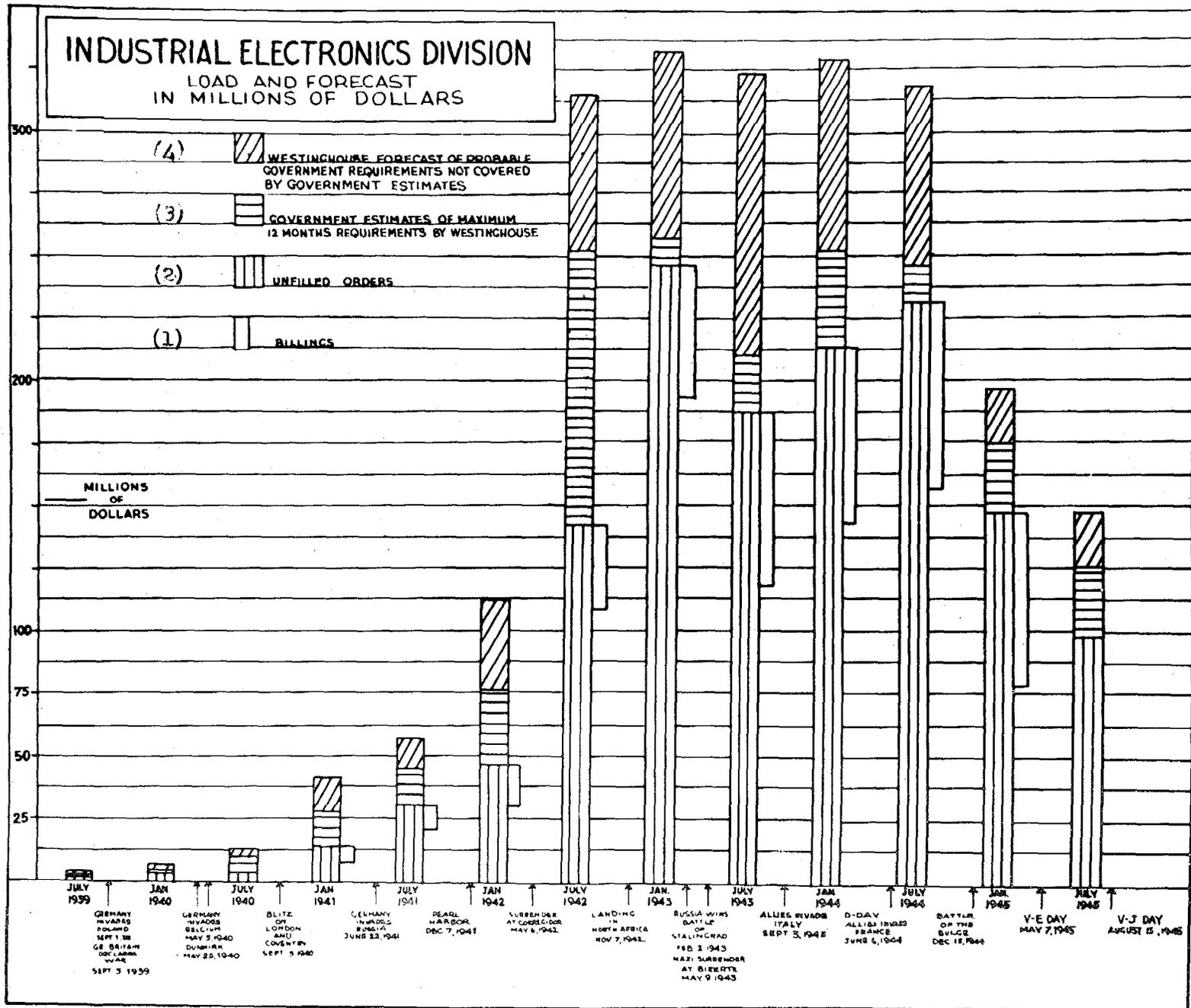
In 1940 I was sales manager of my division. I came down to Washington and talked to all the people I could reach in the Army and Navy and said, "What are you going to ask us to do?" They told me. For a while I took these estimates at face value. Then I began to learn a little about the game. I was not an old hand at guessing sales forecasts, but I began to find out that you would not always tell me what you thought you were going to need. You put in a little factor of conservatism because you didn't know how much money Congress was going to appropriate. You, in reality, told me what you thought you could buy with the funds which were made available. Of course, when emergency strikes, Congress will always appropriate enough money with which to defend the country. But until that happens, we have no way of knowing what the size of the job is to be.

On this chart (2) indicates the unfilled orders; the work contracted for and yet to be produced. Indicated by (3) is what I call identified negotiations; that is, the sum total of everything that I could learn from the Army and Navy procurement people as to what they were going to ask us to do for them in the next year. The area (4) represents, what one of my good Navy friends called the "Jesus factor." That is our estimate of how conservative your forecasters had been. You told us, "We are going to need ten million dollars worth of equipment from your company next year." In this case, we estimated that you probably would actually require thirty-five million. That is what we tried to prepare for.

Let us take a look at what happened in July of 1939. My division of our company had a backlog of a little less than two million dollars. At that time, the Army and Navy told us they were going to need about three-quarters of a million dollars of equipment in the next year, and we guessed another three-quarters of a million on top of that.

Now let us look here at July of 1940. Back here in January of 1940 we were plotting six months ahead. Here you have all that we had guessed, plus all the Army and Navy had guessed, which was already on the books as undelivered backlog. But we were still guessing in half-million-dollar-a-year figures. So we have a little bit of a yellow patch here and a little bit of a green patch.

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I put some interesting dates in here because I think they are very significant. Right at this point, Germany invaded Poland. This is September. Great Britain declared war on 3 September 1939.

Almost a year later we were at Dunkirk. "Germany invaded Belgium." The "phoney war" was over. You can see here immediately that the combined Army and Navy guess was that they were going to need quite a bit more-- three million dollars worth. In this case we guessed it would be about five millions in the next year. We guessed that probably the military estimators were being conservative by about two to one. Neither of us was very accurate.

Here we are six months later. The unfilled backlog now is more than the previous backlog plus the combined estimates for a full year. We have already gotten our year's business in six months, in spite of the fact that we have turned out more production than our total backlog of six months ago. Gross sales filled are indicated by (1).

And so it goes. Germany invades Russia 22 June 1941. Pearl Harbor was attacked 7 December 1941. Then things really began to go.

There is only one point to that story. No matter how much pressure you have, and no matter how much money you have, you cannot go out on the prairies and stake out a thousand acres of land and say, "Tomorrow I want in this spot a shop to turn out munitions." It doesn't work that way. Somebody has to know about your coming needs beforehand and start preparing in time. I think it was Mr. Knudsen who made the classic remark early in the war, when he was being high-pressured: "You have got to remember that with all of your remarkable medical knowledge, your fine hospitals, your expert obstetricians, it still takes nine months to do some things."

There is a minimum time required to prepare for these things, and the only way to do it is to estimate and forecast them ahead of time. I know that the estimate will not be absolutely accurate. But in industry we must plan and work toward specific goals, and we won't be any better prepared to fulfill your needs than the accuracy of your forecasting makes possible.

Your contract must be written in such a way that you are prepared to accept the best that is obtainable, even though that may be somewhat short of your maximum hopes. It is all right to write specifications and call for Army and Navy standard components, for example; but when you issue those specifications at the same time that you issue the component standards specifications, nobody has had time to start building the standard components. We can't buy your standard components until someone can set up to provide them. So during the period while industry is getting prepared to meet all these specifications, if you must have the equipment, the contract must make it possible for your field representatives to accept it after exercising reasonable judgment and determining that the best available alternate component has been used.

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108 of those particular large search radars available on Pearl Harbor Day. Nobody else had them in production at that time. I don't know of any other group that I have ever met in the Army or Navy with whom that procedure could have been used successfully. But Colonel Colton knew he had to have them. We believed in him and knew that we would make good on his part of the bargain, and he believed we would make good on ours; and we did.

That kind of arrangement is no longer possible. We have finally put enough formalities and technicalities into our contracts to delay the parade considerably. Let me hasten to add that I have no objection to formalities, so long as they do not delay the parade.

That job was done in record time because Colonel Colton knew just what he wanted, and because both the contractor and the contracting officer concentrated on a single objective. The contracting facilities of the future need to have some of that in them. I would venture to say that I am sure you have numerous people in your organization, and industry has numerous people who can help the people in your organization, to arrive at such a contract procedure. It is necessary, if you want to contract quickly.

Now, how to build quickly? Well, that just requires a good team, trained together and warmed up. If you were going to try to build a perfect baseball team, you would pick stars such as Bob Fellers and Joe DiMaggio. You could pick them out easily enough. But if you put them in the field without being warmed up, even against a second-rate team, they would probably be trimmed.

You need the best fellows you can get on the team. Every baseball coach knows that. But he also knows that ability alone is not sufficient. You take your team to Florida or somewhere else every spring for a month or two months, so they can get used to working together; so they will work as a team. So long as that team stays together, so long as it has been properly trained and it is not torn apart, depending upon how good the material was when you started, you will have a winning team. But if some of your star players get hurt, or are sold, and you substitute some second-string players for them, down goes your performance. It is the same thing exactly in manufacturing.

Our team consists of all our administrative people, our negotiating people, the engineers, the production planning group, the purchasing group, the manufacturing group, and the inspection group. There is a military counterpart of several of those elements on the team. Certainly inspection is one of them. That is the clean-up spot in the batting order. That is where home runs do the most good.

Now, you have to deliberately organize a good team of that kind. It is no different from any other in this game. You cannot take the players to play on some other team. You must keep the team intact.

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If we could finally get the story across to them so that they could understand it, we were ordinarily successful in saving the men. Sometimes we were defeated by personal factors. Sometimes we had to take the matter all the way to the White House if the need was critical. But all of that takes time; all of that takes the time of the administrative people, who should be directing the progress of your production, who should be speeding it along.

If there is some way we can eliminate such disruptions the next time we get into a pinch, if we ever do, we will have gained much. You cannot make key people overnight. You cannot make engineers, who can build the sort of electronic equipment that you want, overnight. It takes four years or five or six years of college and a lot of inspiration on the part of the men.

It takes not only experienced engineers. We had any number of engineers in our organization with twenty years experience who could prove beyond the shadow of a doubt that it was impractical to build the sort of radar equipment that you fellows wanted--and that we did build! It was necessary to get some young chap who was just brimming over with mathematics and excitement, who didn't know that it "couldn't be done." He was the fellow who turned the trick. It is the same kind of person you got to fly the fighter planes. In some way, this youth and skill factor must be recognized.

Often we had some foolish miscarriages of talent and enthusiasm. During the war, just about the time the buzz bombs began to fall on England, we were asked to provide a man to go over to England with the SCR-584 radar, and instruct a group of officers over there, and supervise the installation of this equipment along the Dover coast. I was asked to pick out the best man we had. He was to be of test caliber, not a design engineer. I brought a boy into the office. My boss said, "You can't send that boy over." He was just about eighteen; but he was tops in his job. He went to England and apparently did a very creditable job over there at D-day plus 1 or D-day plus 2.

He did the job he was called to do. We had loaned him to the Army for a period of six weeks. He stayed about four months, until the job was done. In the meantime, we had been getting cards from his draft board, "Where is this man?" We explained that we didn't know; that the Army had him some place.

Well, in due course that boy, Carl Duckett, came back. He was a man of officer caliber, if I ever saw one. The general in charge of this particular activity in England had asked that he be given a captaincy and assigned to his staff. Letters to that effect were sent back to the Chief Signal Officer here.

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willing to assume responsibility, and where he would stop. We had a long enough time to get acquainted and find out about those things. As a result, we had marvelous cooperation and marvelous results from the naval inspection office in our plant. I know that this was not the case in the plants of some of our major competitors, and I know equally well the reason why it was not. Unfortunately, they had some personnel who were not as well trained and not as experienced.

You need your best men there. Field inspection is no place to put your second-grade people. They are the fellows who have to supply the answer "now," not write a letter about it. You have production operation with undreds or thousands of people involved. You have your contracting officer on the other end, pressing for the equipment. Up comes the question, "Do we paint this black or white?" It does no good to write a letter about a thing of that kind. It must be decided then and there. A great majority of production questions can be decided, on the basis of common sense, right in the field.

You must arrange to give your field men the authority to say "yes" as well as "no." Everybody in the inspection service has the right to say "no" to any question. Very few of them have the right to say "yes."

I had that pointed out to me by one of your own Army people, General Colton. We had to have a plant in which to build some badly needed radars. We found such a plant in a community that had trained personnel unemployed and ready to go to work in this plant. But the CCC had its eye on the plant, and they decided that they needed this plant as a storage depot for excess materials. They made the first move, and it looked as if they were going to get it. So we started up through the ranks, trying to head off this waste of valuable facilities.

"No, no, no, no." But General Colton had to have the radar sets, so I finally went to him and told him the story. He said, "Mr. Burnside, you ought to know that out of every thousand people you meet in the government service, all have the right to say 'no', and only a few have the right to say 'yes.' You just haven't gone far enough to find the right man." Well, when we got to General Olmstead, the matter was straightened out with a snap of the finger.

All problems can't be taken to the General Olmsteads. But you do have skilled people in the field, if you will only give them the authority to say "yes," within definite limits. Any number of times, we brought questions down to Washington that had to be decided on the basis of some local condition; and after a meeting in the Bureau of Ships or in the Pentagon Building, we were told, "That is something the field people have to decide." That was very true. The only difficulty was that your people in the field hadn't been told that. They thought it had to be decided in Washington.

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The only alternative was this: We said, "Of course, there is one way out of this. You go back and get the Bureau to tell us that they don't need this equipment if we have to build it on Saturdays and Sunday." Of course, that was not the answer, and it couldn't be.

We had one outstanding incident with the Army that shows what happens when inspection service doesn't have the authority to say "yes." Your SCR-270 equipment was a radar system mounted on two trailers and a couple of trucks. It was about \$70,000 worth of radar equipment. The trucks were all GFE. We had to provide a place to store them, but we were not responsible for them. They were stored on a lot and carefully watched. But they were not our responsibility.

Now, we had a lot of trouble with those trucks. They got flat tires from being driven overland. Some of the fenders were mashed, where somebody had brushed against a corner post, and some other troubles. But in due course, the Signal Corps came in and got them fixed. But they were not our responsibility.

One fateful day, we had a train load of SCR-270's ready to ship. There were about sixteen cars in that train, on the only siding into our plant at Sunbury, Pennsylvania. That equipment was secret at the time, and there was an armed guard of several men, who had to ride that train wherever it was going. Everything had been tested; everything had been checked. The whole business was loaded and ready to go. The engine had just backed in to couple on the train, when the chief inspector, who was a young second lieutenant, came upon the scene. This was his first job. One of his inspectors had made a belated discovery--one of these trucks was minus a hub cap. Believe me, it was minus a hub cap! He decided the equipment being short a hub cap was not acceptable. He ordered the train held. There we stopped. That train sat there for twenty-four hours while we made a hub cap out of a piece of bar stock, because the instructions to which he was working said that the equipment "must be complete." They failed to say, "Use good judgment."

Now, he didn't know what to do. He was safe if he stuck by the book--so he stuck by the book. Here was a train load of this equipment, undoubtedly badly needed, and fifteen or twenty good men, the crew and the guard, and the whole siding into the plant taken up, so that we could get nothing else in or out; the whole thing tied up while we built a hub cap.

That, gentlemen, is inexcusable. In my opinion, it was not the second lieutenant's fault. He was neither experienced nor properly instructed. You "sent a boy to do a man's work." If you do that again, you will again have the same kind of trouble.

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