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WARTIME ELECTRONICS PRODUCTION PROBLEMS

1 March 1948

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## WARTIME ELECTRONICS PRODUCTION PROBLEMS

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COLONEL CRANE: Last week we heard of production problems in the electronics industry from the point of view of industry. Our speaker this morning will present those problems from the military point of view. He needs no introduction to this audience by virtue of the fact that Mr. Burnside of Westinghouse talked at considerable length of the splendid work he had done in cooperation with Westinghouse in turning out radar equipment. Having been Chief of the Materials Branch, Chief of Signal Supply Services, and Chief of Engineering and Technical Services, successively, he is admirably qualified to discuss this subject, "Wartime Electronics Production Problems."

It is a great honor to present to the College Major General Roger B. Colton, retired, who is now Vice President of Federal Telephone and Radio Corporation. General Colton.

GENERAL COLTON: Colonel Crane, gentlemen: It has often been said that all you need to go into radio manufacturing is a chief engineer, a long bench, and a sales organization. That is pretty close to the truth if you are speaking of broadcast receivers. However, the electronics industry, as we knew it during the late war, consisted of telephone switch boards, wire, cable, gasoline engines, Diesel engines, electric motors, trailers, radio sets, flash lights, radar sets, storage batteries, dry cells, and a multitude of other items.

Modern military electronics equipment is full of gears, shafts, and rotating parts. Tolerances of five-thousandths of an inch are not uncommon, and oftentimes we use one ten-thousandths of an inch. Some electronic equipment weighs almost as much as a 16-inch gun and requires perhaps as much power to control.

In spite of its generalized character, there are, however, many items that are fairly peculiar to the electronics industry. These include certain types of resistors, condensers, vacuum tubes, certain magnetic materials, certain types of insulators, wire, cable and other items made especially for the electronics trade, and ordinarily purchased by electronic prime contractors as "components."

The bulk of the problems in manufacturing military electronics equipment, however, are not very different from those connected with the manufacturing of ordnance equipment. What makes the electronics industry is the know-how to use the items that are peculiar to it in combination

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Together with awards committees set up in parallel, these committees insured proper distribution of the production load and since each of the awards committees included a legal member we could be sure that all our contracts were made in accordance with the procurement regulations of the Under Secretary of War and the laws of Congress.

The Procurement Planning Section of the Signal Corps was early in the war renamed the "Resources Section," and continued to function actively throughout the war. It was customary to go over all equipments on the schedule with the chief of this section about once a month to check on the adequacy of sources and the steps to be taken to relieve future scarcities. The Procurement Planning or Resources Section was very active and contributed greatly to our production.

The point I wish to emphasize here is that the prewar procurement planning group fitted efficiently into our wartime operations, and so smoothly that most people failed to recognize it as the agency that had had a separate and detached existence in peacetime.

Before leaving the question of prewar procurement planning, I would like to invite your attention particularly to the prewar unwillingness of commercial concerns to furnish procurement planning information, and to the fact that at least one attempt was apparently made by the Department of Justice to use such information in connection with criminal prosecutions. This peacetime attitude on the part of industry and perhaps on the part of the Department of Justice must be overcome if procurement planning is to be most effective.

I would like also to comment on the matter of prewar circulation of specifications for criticism by industry by the Procurement Planning Section. In general, I believe that this is apt to be a waste of time. It is the function of our engineering and field test services to determine specifications. It is an expensive process, and industrial firms cannot be expected to furnish real studies without compensation.

As regards the allocation of facilities, I may remark that the allocation of facilities or prime contractors did not cause much difficulty, since the civilian electronics industry was quite a separate industry. However, prewar, and now again to a large extent, the commercial civilian electronics industry from a manufacturing viewpoint was largely a cutthroat business of buying components in the open market and assembling them. Therefore, since with the advent of war the open market ceased to exist, our chief problem became one of allocating trucks, trailers, motors, rubber, copper, steel, iron, bronze, machine tools, as well as crystals, capacitors, resistors, transformers, electric indicating instruments, vacuum tubes and the like, and later, labor to our prime contractors.

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efficiency by increasing production of equipment or efficiency of equipment, or both. If we had followed the prewar announced policy of severely restricting changes, we would have lost out, both on production and on combat efficiency.

The changes in requirements by the Commanding General of the Army Ground Forces and the Commanding General of the Army Air Force did cause much trouble in production. Up and down changes of 50 percent in a matter of a few months were too frequent. The effect of these changes on supply were not always understood by the subordinate agencies to which authority was delegated to make such changes. A brief course in each of our subordinate line schools would be very helpful in insuring such understanding in the future.

The spare parts problem was one of our very great difficulties. Since most of our equipment was new and relatively untried, there was no experience to go in determining the parts that would fail in the field. Early reports from the field were generally quite unreliable since American troops seemed to be obsessed with the desire to have large quantities of spare parts on hand, and they colored their reports accordingly. I am convinced that 80 percent of our spare parts were furnished needlessly. We tried to solve the problem by putting new equipment immediately on life tests, but this only helped. Standardization of components is one of the most important factors in electronics manufacture as well as in reducing spare parts trouble. However, it must be remembered that in peacetime there is only small use of high-grade electronic components. During the war, the Army-Navy Electronic Standard Agency grew out of the combined efforts of the War Production Board, the Army, and the Navy. It is now a permanent agency and it is important that it be well financed and strongly supported, since it does promote the use of high-grade standard components both in the military forces and in the applicable sections of civil industry.

Speaking now of our over-all problems as regards equipment that has long been in use, particularly equipment that has been tried in previous wars, our orthodox methods proved to be quite satisfactory and adequate.

As regards newly available equipment, early actual use in adequate quantities in the field is necessary in order that higher commanders be fully acquainted with its capabilities and limitations. I would like to emphasize that it is easier to teach the private, a little harder to teach the sergeant, and by the time you get up to the general, it takes a couple of years to teach the capabilities and limitations of radically new equipment. The reason for that is simple. The general uses new equipment in the mass. The private, the corporal, and the sergeant use it piece by piece. The general has to learn how equipment in quantity should be used in field operations, and he cannot fully learn this without having technically trained and equipped troops under his command.

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GENERAL COLTON: Well, if the situation is such that you can have the equipment designed by industry, I think on the whole, it is the most satisfactory method by which to obtain your equipment, since design and production are closely related. However, if you expect to keep good men in your laboratories you must give your government laboratories a reasonable amount of research and development work, since it is only by such work that your engineers can be properly trained for supervision of industry. To go into the war without an adequate number of high-grade engineers is to put yourself entirely in the hands of industry, and you have to take without reservation everything they tell you. While they are extremely good, I do not think it is wise to be without an adequate staff of good military engineers representing the government rather than industry. After all, industry's prime business is to study and fill for peacetime needs, while our business is war, which is quite different. I think a ratio of perhaps 25 percent for the military development work in the government institutions and 75 percent in industry is a pretty good ratio, and this is as great a ratio as industry likes, except in time of depression, when its members are greatly in need of business.

As regards development by superagencies such as the CSRD, it should be remembered that the organization of the CSRD in a preferred status diverted a large number of engineers from taking service in industry and the government laboratories. Also, I think you will recognize that the CSRD was an emergency agency, and if we can avoid it, we obviously should not deliberately let things come to such a pass that it will be necessary to organize an emergency agency to win a war. I believe the supervisory powers of the Research and Development Board should be utilized throughout peacetime in such a way that the next war President will find no room for an CSRD.

COLONEL CRANE: General Colton, on behalf of the College, I want to thank you for a most interesting and instructive talk. Thank you very much.

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