

ADDRESS -- COL. C. L. HARRISON,
Chief, Cincinnati Ordnance
District.

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Gentlemen:

General Williams has spoken of the necessity for the original formation of the districts. That necessity and the benefit *derived from* ~~of~~ them was shown over night. The minute we got on the job in 1918, the manufacturers were enthusiastic over us, and came to us with all kinds of questions, and instead of being held up for much needed money on their vouchers all during the war, in my district not a single payment was held up over twenty-four hours: often with incomplete papers. But in every case all papers were properly completed. They kept faith.

The districts are quite different in their work, organization and province. Take the Bridgeport District at one end with highly concentrated, fabricating, and on the other end the Cincinnati District with products of both the North and South bringing in complications, and also not developed in the Southern part industrially or from a manufacturing standpoint but with a great manufacturing potentiality. (NEW MATTER) ONE MAN DEVELOPED FROM THE RAW PERSONNEL IN THE SOUTH ONE OF THE BEST SHELL MACHINING WORKS IN THE COUNTRY. SO MUCH SO THAT WE RECOMMENDED SPECIAL RECOGNITION FOR HIM AND IF SUCH PLANTS WERE TO BE KEPT AS STANDBY SOURCES OF SHELLS THAT HIS BE ONE OF THEM. One who handles one district cannot necessarily handle another. From what General Williams said, he thinks I can handle Cincinnati, but I do not know what I would do at Bridgeport.

I am going to touch first on some of the difficulties

we had. The work was very intense from the start and continued so up through the Armistice. I think you all understand the reason for the district offices - the difficulty of clearing through Washington. Everything was held up on account of the very volume. The old arrangement of having everything cleared through Washington is analagous to a one-man organization in industry. That is effective if the organization is a small one and the business not overly large.

Take ^a ~~the~~ marble works for example,--the quarrying and selling organization of same. ~~It is not complicated and~~ There are few complications,--only a few lines to follow. The War Department can be operated exactly the same way in peace time, but the ultimate object of the War Department is not for times of peace but for times of war when the mass of work of all kinds suddenly increases tremendously and time is the essence.

I also make the comparison that all the work we are doing is the creation of an insurance policy against war, but in considering it at all, it must be looked at from the standpoint of a major emergency.

The one-man organization, if large and functions complicated, is impossible. If you will excuse me for being a little personal I will give as an example ^{etc} what happened in a car works of which I later became receiver. The president of that works insisted upon giving out every bit of stationery used, and bossing the man with the wheelbarrow, ^{etc} The inevitable result was that they got in trouble. The same thing would apply in the centralized War Department in case of a major emergency. It simply can not be done.

A centralized or one-man organization could be likened to a pyramid standing on an apex. It is resting on a small base or ^{equivalent to} an organization chart upside down. That illustration, by the way, was taken from an article by one of our good manufacturers during the war,--the National Cash Register Company of Dayton.

The decentralization is analagous to a well organized large corporation. It is the only effective organization for a large body. For example, the General Motors and United States Steel Corporations, with various subsidiaries which act as independent units but come together for a general conference and action on general policies.

The work that we are doing in the field is voluntary on the part of everybody except the executive assistants. Therefore, the chiefs must have some influence and standing in their communities and should have the magnetism that makes men willing and anxious to take part in the work.

I have found it also a great advantage to be able to work harder than anybody else in the organization and be willing to tackle any question, no matter how new or complicated. As to the functions of the districts in an emergency, time is the essence, as is the case all up and down the line. Very large quantities of special material are required. There is always a lack of industrial familiarity with Ordnance material itself. It is necessary to mostly use existing equipment for production. It is necessary, therefore, to promptly select the industry with a view as to the plant equipment, geographical location, personnel, morale and special refer-

ences to the labor market, transportation facilities, raw materials, etc.

As an example, take the contract for 155 MM Howitzer gun carriages, which was put in a plant that had been manufacturing safes. When I first visited it they had accumulated some machinery, but when they started all they had was a little half-worn out machinery and a rather poor building. Someone who had to do with the placing of that contract told me there had been a beautiful list of machinery and equipment on paper. The contract was placed in good faith, but it was a mistake. That contract would never have been placed by any of us in the field in that factory.

The manufacture of gun carriages is a very fine piece of fabricating of structural material both in assembly and machinery. I would have put it if possible in a car works for the reason that the manufacture of steel cars is about as fine structural assembly as I know of, and the standard of accuracy is high. This principle is illustrated by the fact that railroad and street cars can not be turned out economically in the same shop. One will be too good or the other not good enough.

I do not speak critically of the placing of this particular order with the Safe Co. It was undoubtedly done conscientiously with the information at hand.

In the new program we are following, there will be some square pegs in round holes, but I think they will be fewer. In fact I know it. Another example of contracts wrongly given in good faith was that which we call the "pie plate" case. A concern in

Indiana who had been making wooden ware got a contract for machining 4.7 shells. They made a great mistake in equipping with too light machinery as we immediately discovered on a brief inspection. They, too, were acting in good faith, but did not have the know-how. That is a matter we will have to know,--the equipment in a factory, what machinery would have to be used, etc., and check the same up for the purpose to which it is to be applied.

That brings another subject up. Each district organizes in its own way. I have right along side of me a consulting board consisting of engineers, and if any problem comes up that one or more of those engineers can not at least make a good start on, I would like to know what it is. They can cover practically every branch of manufacture.

The lack of complete survey of facilities and personnel was very clearly shown in two other contracts, also at Indianapolis. They were making rifle grenades. One was as fine a factory as one would wish, with splendid machinery, room, light and good labor market. A casual inspection showed that they did not have a proper conception of the necessary "flow of material". They fell down absolutely. I went to the other which was a little dark factory, many years old,--dirty, material scattered all over the place; they turned out the rifle grenades desired in the quantities desired, and made money. The other went into the hands of a receiver and liquidated with their capital practically dissipated.

The necessity of knowing more than the physical plan and seeing the mere statement of a concern before letting the contract is very important. I have had experience in just that in connection with business. The first thing I look at in a factory is the morale.

By walking through it you can pick up a whole lot,--you can see the team work, etc. I would hesitate to put a Government contract in a factory without morale among the men unless there were means of overcoming that and improving the condition. The personnel from top down is a matter that should be looked into very carefully, and there are other means of looking into the resources and the probable success in the operation of a contract.

All this means that the district organization must take a great deal of responsibility because, as I see it, in the absence of other information from Washington, the district's recommendation for a contract is final. It also means that the district must be very jealous of interference. There are always some persons, officers or civilians, who want to "snoop around" in the district and we chiefs have to be very high-handed about it. I have a case now. Someone has been through some of the Ordnance factories doing something. I have not found out yet what. I always insist that they must report to headquarters, stating their errand before visiting a plant doing ordnance work.

The specific allocation of plants to the different departments is going to be of greatest advantage and lessen the difficulties. It will mean no bidding between departments and no bidding by cost plus contractors. In peace time planning much preliminary work can be accomplished at little expense to the service. Information as to requirements may and must be disseminated. A nucleus in the organization should be kept in training; a tentative contract should be awarded. No matter how complete the plan now, new and unforeseen problems arise. I have, in handling my organization, this in mind and when definite plans are made, I have always said "It is all right

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to plan that way, but bear in mind that in case of war it will not always be according to pre-arranged program. Be ready to jump anywhere."

An instance of this was the tanks during the last war. We had to jump into it,--an entirely new product. A change in hand grenades was another. They were changed after manufacturing started. The trigger apparatus would not work.

The district organization must always be capable of readjustment to meet new conditions arising. It must be resourceful, and initiative must be encouraged, permitted and developed. I have ^a created personnel with just this in mind and continually harp upon it.

Taking up the co-operation of headquarters with districts, this means a definite line of responsibility and correspondence. Having ample authority limited by possible interference with the general program and a complete organization in skeleton, of course, at this time. The having of authority but with the knowledge on the part of our superior that this authority will be used with good judgment.

On Engineering, co-operation with headquarters, a direct line for receipt of information in new design and change of design. These should be kept at a minimum and have reference to existing facilities and interchangeability with previous or parallel product. It is somewhat analagous to "service" in automobile parts or machine tool parts. A complete unit of war material is rarely made by one plant although it should be in one contract.

Referring to existing facilities, the "mule" of the next war in my opinion will be mainly the Fordson tractor. It is commercial and can be very readily adapted for a great many purposes of war and can be readily changed to some extent for some uses other

than original intention. I have not discussed this with General Williams; it is just my own theory. This is used as an example of possible adaptation.

See Addenda A

We had a great deal of difficulty regarding tolerances in some respects. I will illustrate that with gun carriage spades. The tolerances on the spade was very small and fine. As I see it, it does not make much difference. The object is to get material that will function and not with a satin finish. During the war General Williams gave us these specific instructions,--"to get shells that will shoot. I do not care about the finish". To give an example on interchangeability, the transmission on the six-ton tank, the Renault type tank,- the parts were assembled from many sources. My recollection is that we adopted a selective assembly so that the whole unit would work, but that every cog from one transmission would not take the place of a corresponding cog ^{in another.} The replacement of a complete component is easier than assembling a part of it. This was all approved, by the way. The replacement of some parts is a factory job. Take for example the plates on the gun carriage. It would be practically impossible to replace one of the plates, made of toughest alloy steel in the field.

There are certain requirements from the district offices. Co-operation is the first one. I think the districts should be rated as offices are, insofar as the ^{practice} ~~custom~~ will apply. We must realize that we are big cogs in a big wheel, not independent units. We have to have sense and ability,--horse sense and somewhat specialized ability all through the organization. We must have a spirit of being willing to work wherever we are put and use our authority with

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discretion.

I have turned down applications for commissions from ~~in-a~~
~~number of~~ ^{number of} ~~numerable~~ reserve officers because they wanted a higher position
than I had a place for, and were not willing to take what I had
to offer.

In 1918 each district was organized in accordance with
the ideas of the respective heads. I organized with a whole lot
of young fellows who knew nothing about the job,--no more than I
did, and that was nothing. We learned together and became a pret-
ty good district before the end. The only order I ever gave to a
man coming into my organization was, "There is your job. Go to it."
That is the only one I ever got from General Tripp.

The importance, especially at the top, of keeping the
picture of a job in mind, not losing the perspective by grinding
on the details, is great. //

When my executive assistant came out to Cincinnati he had
had a considerable training on technical matters, but none on the
details of this district job. So for the first two months I scarce-
ly gave him an assignment, but had him come into my office and we
talked by the hour as to the planning, size and scope of the job
we were undertaking. He runs it now when I am very busy. The fi-
nal result of all that is, my executive assistant does all the work
and I get all the credit.

It is a mistake, in my opinion, to over-man, and over-
specialize. I was shown, with pride, by another district their or-
ganization chart. I made up my mind then that they were over-manned
and ran the details down to too fine a point. They had an assign-
ment for every little thing. I think it a mistake, but that chief

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is running that job. One reason is that any extensive and detailed plan made will be busted because new things will come up and changes be made early in the proceedings. My idea is to organize for the main positions only, and have a reservoir of reserve officers and civilians to pick from and put in any place needed, but with a nucleus of personnel for everything and ready to do any task. It is necessary to know men and how to size them up, in substance, to be good soldiers and play the game.

This last principle should exist from top down, and to cooperate and help other districts. One new chief spent about a week with me. We never discussed a single contract or product, but talked about the general plan and picture. He has started very successfully. On the other hand, we must not be unduly interfered with. Washington should lay down the job to be done and leave it to the districts to accomplish it in their own way. The man at the head of the district is or should be such that undue interference and direction as to details will diminish his effectiveness and take his attention from the main job.

We passed a claim, carefully investigated, and knew the contractor intimately. Tried the case in cold blood and made the award, not at all to the satisfaction of claimant. The first thing I knew the contractor was sent a contract to sign for six hundred dollars instead of twenty thousand. He came in to ascertain what this meant. By the time I got the answer I was in the south. It was far from satisfactory to me. The Washington body went direct instead of through my office. I wired my office not to pass any more claims as long as that order stood. My usefulness was gone

if this principle prevailed. The matter was settled to the satisfaction of all and I have ^{not} had a claim reversed.

The head man must always hold his perspective. On the main ordnance work I declined to go into a single detailed contract unless there was something special that needed me. On claims I would not do it unless there was some great complication or important general question up.

The job of a district chief is a civilian job, a plain business proposition. It is necessary, of course, to have the uniform for a great many functions, but I hope that in the final result the military end will not unduly dominate,--that is, I hope it will not go too far, for even with the proper backing, from Washington, such as we get from Gen. Williams, the district chief, in uniform, will be liable to continual interference and trouble and they tell me it is very risky for a man in uniform to tell the Secretary of War where to get off, as I had to do in one case in 1919.

In spite of the best laid plans a great many regulations must be busted, looking to the accomplishment of the main end,--namely getting out munitions, and getting them to the front. In production the district office must be the only point of contact with the manufacturer. The one and only source to which manufacturers can look for authoritative information. The contrary brings confusion and the evading of responsibility. It is very important to have industrial diplomacy. As an example, we have been surveying plants for the past two years. An officer from another department came in to survey for his department. He went out to survey plants. He did not do it with diplomacy, and was turned down at times until we told him how. Being an entirely voluntary matter upon the part of the manufacturers

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~~facturers~~, it must be done diplomatically and properly, and with non-interference with ^{their} ~~labor~~ ^{and routine} as well by other governmental departments.

Inspection. A careful consideration of the tolerances and limits as applied to war material produced with peace time equipment. Most industrial plants have neither equipment or personnel comparable to arsenals. Tolerances should be as broad as possible consistent with proper functionings. Instructions to districts should not be arbitrary, but complete information should be given the Inspection manager as to reasons for certain tolerances. Important to have discretionary authority in the District office. We have to use this sometimes at any rate. In the six-ton tanks my inspection manager and I put on a brace that was very important and simply advised Washington as to what we had done and all was satisfactory.

I will not touch very much on finance but it is important to keep the finance affairs in the Ordnance Department so that it will be handled in the districts and manufacturers paid promptly. The manufacturers during the war kept faith. My finance manager ran a great many risks of going to jail, as did I, but the manufacturers kept faith. We paid them money often on incomplete papers but there was no trouble whatever. The honesty of the manufacturers stands out. That was shown particularly during the claims. What made the settlement of those claims possible was that over ninety-five percent of the claims were honestly presented.

See Addenda B

The question of decentralizing the department becomes analagous to a well-organized large corporation such as General

Motors Corporation, or the United States Steel Corporation. Such decentralization requires very accurate and definite allocation of responsibility to those in charge of the various functions. With this responsibility must be given ample authority to carry out the policies for which ^{each unit} ~~one~~ is responsible.

This presents the problem of functional organization, and means the plans of the organization must be well thought out functionally so that there is no conflict of authority or divided responsibility. My office chart has many blank spaces indicating a function but not a man. In a manufacturing operation and plan a complete chart should be devised by a competent person, either from theory or practice, showing in detail all operations necessary. That, of course, refers to new material or very complicated material. It would be a big help if this were properly and completely worked out. The arsenals, I believe, are forbidden to make time studies. However, a digest of their practice or a summary should be made and approved. A completed article should be supplied, such that can be easily dissembled when a part of an operation fails or precedes that of some other contractor.

Below is a memorandum from my assistant.

"During the last war many new devices were developed, such as tanks, gas, etc., which had not been anticipated, and these new devices contributed heavily toward success. Undoubtedly in a new war the same situation will prevail and it will become necessary to invent, design and produce new items of Ordnance at a time when most plants will be filled up with pre-established items.

"The development of new devices in an already over-crowded plant is extremely difficult and tends strongly to slow up the whole organization. One change may throw all out of gear.

"It seems to me there should be planned engineering laboratories, to be manned by the highest type of engineers, designers, etc., to develop and bring up to the point of quantity production, insofar as making samples and laying out of processes is concerned, of all new devices.

"There are in existence now a number of plants, well equipped for this type of development work, which could be allocated ahead of time.

"The whole idea is to speed up a turning out of new devices and to prevent this development work from interfering with regular production."

We had an engineering laboratory of just that type during the war, working mostly on automobile work. The General Motors has, I think, a laboratory of just that type ready to do almost anything in Dayton. How it could be financed by and for the Government, I do not know. It would be of the greatest importance to be able to work out in laboratories and in the arsenals a great many of the new articles to be produced and minimize the experimental work in factories that are, or are to produce. The arsenals are pushed to the limit as it is, in time of war.

"The standardization of the material needed for different departments." I have been talking about that for five years. The most outstanding example I know is a trailer. It is used by all departments. I happened to know a good deal about that because the concern furnishing most of these trailers got into financial trouble and

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I helped them out, so got quite intimate with their work. They have been critical from the start of the numerous standards. The requirements as to tread, the wheel at the hub must be 58". If tread below varies a small fraction it is rejected, although it will work as well as if tire tread were exact. These articles are used by the Air Service, Ordnance, Navy Yard, Marine Corps, Signal Corps, Quartermaster Corps, etc. The reason I bring this up is that there is now an inquiry from the Navy. The letter was referred to me and I hope to take it up and get some standardization. It would be a matter of great economy and speed if all trailers of similar capacity were confined to one main model, with some modifications, and to one chassis.

The practical way to accomplish this is for an important product, to call a manufacturer in and consult on designs and minimize specialties. The American Society of Mechanical Engineers has asked for just such a job. In the trailers, for instance, there are only about two manufactures to be considered. The particular one I am speaking of is still working on army standards. My first criticism when I went in to help was that their product was too good. This very fact illustrates the matter of adoption of type so far as possible to commercial design and commercial practice. They are making it on Army standards and it is impossible to change to lower standards because it would mean changing the entire type and design. To start with commercial standards and change to Army standards is about equally hard. This company also illustrates the necessity for intelligent tests for acceptance; that is, a test not by one officer of one branch and then one from another department, but a test by a board which would after accepting it, make it adaptable by all the departments. I think this is actually being done. I hope so.

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If there could be some means of providing that, after the original check of a contract upon completion, any further check or auditing should not be at the expense of the contractor himself, it would be well. There would be a great deal of money saved. Our experience shows that the contractor is put to a great deal of expense in checking alongside of the Government. Until the sadnesses of the post-war experiences are forgotten, the cost of that extra checking is going to be in the bill, whether recited or not.

Machine Tools. As it happens, Cincinnati is practically the center of the world for machine tools. An exemption of the necessary key men from draft must be made, and in order to get a line on this I am about to start on the survey of the personnel necessary in the machine tool plants in the district and the same thing may follow all over the country. That brings again the matter of co-operation between the designing departments in Washington and the manufacturer. The designing should make possible the manufacturing in quantity. Many steel castings on one contract of which I had charge developed flaws. Rejections were many, resulting in extra cost and delay. Had they been designed properly at the start all that extra expense and delay would have been avoided. Therefore, I think that not only more manufacturers should be brought in for consultation, but also machine tool men, in order that the product may be adapted for quantity and economy in so far as the experience of these men could help on both matters.

I find that manufacturers of all kinds are ready to co-operate

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and have just learned that the machine tool men are to be at the next Army Ordnance Association Meeting at Aberdeen. This should result in assistance and better understanding for both them and the Department. The more complete the design and the better tested in advance, the less swapping of horses in midstream and the less changing of design. I, myself, suggested this invitation to the Machine Tool Men and for the above reason.

I hope I have not bored you with my disjointed talk, and if any one wishes to ask any questions I shall try to answer.

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OPEN DISCUSSION FOLLOWING ADDRESS.

Ques. You speak of industrial diplomacy and said you told another officer how to make a survey. What do you mean by that?

Answ. When I want to make a survey, I have my executive assistant write a letter in advance, asking when it would be convenient for him to call, at the request of the chief, to make a survey for the Ordnance Department. I have had but one refusal to co-operate and set a time. The refusal of that one organization was due to a misunderstanding, and after I had written a personal letter, the refusal was withdrawn. The other man, when he started to make his survey, simply went direct to the plant. They asked who he was and what he wanted. He said "I am Major So and So", without any explanation as to his authority or errand. He was turned down. As soon as we found out how he did it, we told him to write a letter in advance, saying he would like to survey the plant and ask for a time convenient to the company. That is an actual example.

Ques. I would like to ask if you lay emphasis on organization over equipment or equipment over organization, in connection with arranging for orders in the factories.

Answ. You give one man a splendid plant and no organization or morale, and give another man a good organization and no plant; the latter will get the plant and beat the former out. I think in many cases organization is the most important. In very complicated manufacturing you are no where of course, without functioning equipment.

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What would be the advantage or disadvantage of the selection of a civilian War Department chief to coordinate the activities of the various procurement chiefs in the procurement districts.

answ.

I am afraid it would result in trouble right away. The requisites for the district chiefs are such that if given a superior in the field there would be differences. The existing contact with Washington is sufficient. I had that thought and dismissed it after about seven minutes discussion with General Williams. I do not think it would accomplish anything and I do not see just where such representation would function. Coordination can be brought about naturally by the use of a little tact. → One of the main

answ. General Williams

things is "What is this man going to do? What authority is he going to have? Is he going to be able to give orders to each one of the heads of the various procurement districts? If he does give those orders, what kind of orders? Where will he get his information?"

The basic information upon which Colonel Harrison works the Cincinnati District, as chief, must come from the Chief of Ordnance. That is the only place he can get it. Are you going to create a system whereby you will have many channels? We in the Ordnance Department say a straight line always.

a. A rather interesting incident.

Word came to us directly and thru the War Industries Board that a greater capacity was needed for the rough machining of 155 MM recuperator forgings, and at about the same time representatives of the Bedford Stone Club, an association of stone men within fifty miles of Bedford, Indiana, called with a request that they be given some war work or be allowed to continue their own. The whole region was in distress.

An expert machine man was sent. He showed them how to adapt their planers to the planing of steel, and in three months the capacity for this rough machining was greater than needed.

b. An example illustrating the necessity of having payment in hands of the Ordnance Department, the District office of which places the orders, is as follows:

Imagine the result if the purchasing agent for Ford could not settle the terms on which payment should be made and could not approve final payment. He would be at a great disadvantage and his efficiency would be lessened.