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PREPARATION FOR THE PRODUCTION AND MAINTENANCE OF MECHANICAL EQUIPMENT

26 February 1947

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PREPARATION FOR THE PRODUCTION AND MAINTENANCE OF MECHANICAL EQUIPMENT

26 February 1947

GENERAL McKINLEY:

Gentlemen, this morning we are particularly fortunate in having with us Mr. K. T. Keller. As you know, he is one of America's great industrialists. He probably did more in this war than any other single person in bringing about the present friendly relationship between the Armed Forces and Industry.

Mr. Keller came up the hard way. He started off as an apprentice in industry. Through the great worth that he displayed in the many companies with which he has been associated, he has finally reached the top. He is now head of the Chrysler Corporation.

This morning Mr. Keller will speak on "Preparation for the Production and Maintenance of Mechanical Equipment."

I take extreme pleasure in introducing Mr. K. T. Keller.

MR. KELLER:

Gentlemen, I always get a laugh out of that "hard way" business. To me the only things that are hard are the ones where you can't get enough facts to make a decision.

To be invited to talk before the student body and faculty of this College of the Armed Forces is an honor and a privilege. Having had several previous opportunities to talk here in Washington to similar groups, I look forward to an interesting time and am happy to be here.

Then too, having gotten over the feeling of strangeness by the many contacts I have had with the men in uniform, I am confident of a fair hearing even when the points discussed may have controversial aspects.

I believe that today there exist some differences of viewpoint on the best methods of coordinating the armed forces and their automotive suppliers in the matter of repair parts and field service.

Believing such situations are made worse by avoiding them, I have the temerity to talk to you today on this subject in the hope that our experiences may contribute to the formation by the Armed Services of their new approach to this phase of operations, specifically in the selection, training and control of the people who will be engaged in it.

Whatever may be accomplished by our diplomatic and political leaders to better relations among nations, it is clear that the future of our own country will rest finally on the quality of its defensive preparedness. That in turn depends, more than ever before, on mutual understanding between the military forces and industry.

We all know that time available for preparing grows shorter as the striking power of weapons, in terms of power, distance and time, increases. We all know that we cannot count ever again on two years in which to turn our thinking around, after the initial explosion of war takes place.

So, the importance of our military leaders having an easy and assured understanding of the industrial potential is infinitely higher today than it was even in the twenties and thirties. I do not think of this understanding in terms of statistical totals, which change so quickly and so radically. I think of it in terms of your having in the back of your minds a grasp of the way in which industrial organizations, large and small, approach their problems and solve them; what they can do and what they cannot.

The production record of the past war has been taken apart and studied minutely. I am sure fair-minded students of that record will come out with the conclusion that the central attitude for getting results from industry should be: "give them the job and clear the way." That is an overly simple statement, of course, but it indicates the line of maximum return for effort, around which whatever structure of control is necessary should be built.

In past talks before the Army Industrial College, which preceded the present organization, I have sought to demonstrate from the experience of the company I know best, which is the Chrysler Corporation, how such an industry as ours takes on jobs and handles them; what types of resources in the way of equipment, brains and brawn we bring to these jobs, and the kinds of procedures by which the two quantities, the task and the resources, are meshed to turn out the results sought.

It is my belief that in addition to these subjects covered in earlier discussions, we need to move further to a field in which military and industrial operation need to blend better than they have yet done. It is an area that concerns the immediate future quite as much as a speculative date which we hope is very far off.

Military operations are now so completely mechanized and motorized that war is a matter of manning machines, and of employing the industrial potential to its utmost. Even the infantryman back of a Garand rifle is a machine operator.

Machines wear, machines break down. They always will, no matter how excellently they may be designed and made. Military usage of machines is many times as destructive as peacetime use because emergency is the rule, and prudent conduct must continually yield to drastic action.

In the war which is just behind us, this factor was an every day limitation on the production of the country. It lengthened the time it took to organize campaigns at distant places, and limited the effective force which could be put into any given field, all because of the proportion of energies and facilities that had to be concentrated on keeping military mechanical and motorized equipment supplied with replacement parts and facilities for repair.

This, of course, always will be a limiting factor, but the opportunity to step up the percentage of equipment actually in shape for use, impresses me more and more as one of the keys to making full use of our industrial potential.

The word that covers that problem is maintenance. Maintenance involves spare parts, distribution organization and repair system. Industry lives with that problem in peacetime, even if on a different scale, because the maker of any mechanical item has a practical business responsibility to see that his product gives satisfaction. When the user is convinced he made a good buy, he will return, when it is time, to buy from the same maker.

I am personally most familiar with the maintenance problem of land transport, whether in war or peace, so whatever application our experience may have to other mechanical products, I want to concentrate here specifically on land transport.

Land transport, including combat vehicles, is a critical military factor. It has absorbed, and undoubtedly will in the future absorb, a very high percentage of the industrial potential.

Among the 35 or more principal military products Chrysler made during the war, tanks and trucks occupied a major place.

We made or rebuilt more than 25,000 tanks.

The spare parts we produced for these tanks amounted to 3,126 carloads, or between thirty and fifty train loads. They cost almost a quarter of a billion dollars.

We built 388,515 army trucks, command cars and ambulances of various designs. These were accompanied by production, packaging and shipment of more than 500 million pounds of extra parts. More than 1,700 people were employed exclusively in weatherproofing and packaging these replacement items. Their cost at the factory amounted roughly to $500 per truck built; the full cost can be measured only in terms of time, equipment and

space withheld from the production and shipment of more trucks or other war items.

Every other manufacturer of military vehicles was engaged in a similar program. Literally mountains of carefully packed and marked boxes were shipped to all parts of the globe, just for trucks.

Had the result been full utilization of these parts and a high degree of efficiency in keeping the vehicles in top condition, nothing more would have to be said.

But that is not the word that came back from the combat theatres. Today it is one of the major concerns of the responsible authorities to work out techniques which will yield a much higher return for the effort. A spectacular transport job was obtained by our forces, we know, but it leaned dangerously upon the traditional main force and awkwardness -- individual resourcefulness and effort -- rather than resting on a well-grooved, clicking routine.

The automobile industry's opportunity to contribute to solution of the military problem during the war was extremely limited for two commanding reasons:

First, while an automobile manufacturer ships cars and trucks all over the globe, and provides for their repair and maintenance, he always has a concurrent opportunity to estimate the needs of any given area and make provision accordingly. Military requirements imposed secrecy on all the factors of intended utilization. The producer during the war did not know whether his trucks were headed for mud or sand; for a probable holding position or a rapid advance. Nor did he know too much about the emergency practices which might be employed for repair in the field.

Second, loss in transit, violent destruction, or destruction through exposure to the elements are negligible factors in civilian operation, which gives no guide whatever to the hazards of ship sinkings, and other war wastages.

Only the military could assume responsibility for the necessary computations and planning. Even though the war is behind us and its experiences are now a relatively open book for analysis, this fact cannot change. It is an important one to keep in mind.

A further aspect of the problem is that, in obtaining the necessary volume of trucks, the services called on virtually all available production sources, and even after extended modifications and re-design, they had to accept a wide variety of designs, each utilizing a considerable variety of parts.

This is not entirely a new problem, since a casual examination of the large car and truck fleet organizations maintained by private companies shows that a great many of them diversify their purchases among several manufacturers. Many of these fleet operators have the maintenance done in their own shops and so must keep up with the parts needs of quite a variety of makes and models. But their experience also is limited, in that preparation for the unexpected need not be made on anything like the scale encountered by an army operating all over the globe.

The natural reaction of military men to the welter of parts numbers in which they were compelled to flounder has been a great desire for a standardized set of military vehicles with a high degree of interchangeability of parts and components. A minimum demand has been for a master numbering system by which identical parts numbered differently for different makes could be quickly used wherever applicable.

There is a great deal of merit to this, even though it is a certainty that in an emergency all productive facilities will again be called upon. There is no conceivable justification, over the long run, for having in hand a piece that would fit any one of three different trucks and not being able to use it because it is numbered only for one. Some industry-ordnance work is under way on this problem and it is my hope that a good result will come out of it.

But the problem is deeper and broader. I have emphasized that industry's own experience does not give us the means to solve it, yet that same experience studied from the standpoint of the operating philosophy and methods by which similar problems have been attacked, may yield a good deal to solution by military organizations of their problems.

Chrysler Corporation dates only from 1925. Since that time it has produced a total of 11 million vehicles. Of these, according to the latest available registration figures, more than 6 million are in operation today in the United States. A very considerable number are over 15 years old. We endeavor to see that, to the maximum possible, repair parts are available for a few more than 800 separate models. These contain a total of 1,600 variations which affect parts.

In addition to the Chrysler-made cars and trucks in this country, there are perhaps a million more abroad. These have their special differences, such as right-hand drives and other adaptations to local practice and laws.

Casual observation will show the evolution and change of these products over the years. The public is broadly conscious of model change, but it does not see the engineering progress that never stops. We are incorporating changes that involve better performance, longer life, or economy either in manufacture or operation, in a continuous stream. The breaking point for each is recorded effective a given serial number whether the model is changed or not. Individual changes made over the

years run into the millions, and the number of separate parts resulting from these is in the hundreds of thousands.

Services must catch up to these changes, and it must catch up all along a front made up of some 10,000 dealer establishments. While preparing for the new, this field organization must remain mobilized for the old.

It would be the easiest thing in the world to get ourselves barricaded behind walls of obsolete and obsolescent parts, piled up in dead storage and relatively useless to owners of our cars.

It would also be quite easy to standardize, in the sense that to keep down part numbers, changes would be forbidden except for grudgingly allowed extreme necessities.

Neither happens, because we work at all times under the most vigorous discipline, imposed by competition and by the demand on the part of the owners of our business that we show a return on their investment. It is our aim to make each section of the business earn its share, and that goes for the parts business as well. To earn its share it must be effective and economical.

We have found that it cannot be run as a sideline. In the pinches a sideline is pushed aside to favor the principal objective on which men and organizations are working.

So it was a foregone conclusion with us that the several problems of maintenance should be put in the hands of organizations within the company that would have no other responsibility.

We have found that the problems break down into three broad groupings: procurement and distribution; field service; parts application engineering.

The first of these is the most voluminous job and involves by far the largest organization. Our parts division draws upon all the car and truck production plants, additional plants of our own which manufacture replacement items for models no longer on our assembly lines, and the several hundred suppliers from whom we buy components for our vehicles.

As I described its organization and plan of operation, I am sure you will note the essential dissimilarity between the civilian and the military problems. We know where our vehicle population resides, and however many individuals may suddenly move elsewhere, mass migrations of civilian cars and trucks across a continent or an ocean just don't happen. So we can work, all the way up to and including our "front lines" with a structure of permanent storages. The military purpose being mobility, its supply system must be on a mobile basis in which much of our detail operation has no application.

Our parts division operates a warehousing and distribution system consisting of a base storage plant at Marysville, Michigan, and regional plants and depots to serve outlying zones of the country. In all, these plants are shipping an average of about 50,000 line items a day. Their operations are interconnected by teletype system, and central running inventory controls are maintained to reveal at all times the stock position on more than 111,000 active service parts. The records on each part number show in detail the trend of demand for each one, so that future supply may be planned on a thoroughly realistic basis. A detailed technical record of each part is kept permanently, and the tooling for its production is kept subject to control of the organization responsible for parts supply.

The foregoing is the readily controllable part of the business. It is all under direct jurisdiction of the parts management. To be effective for the six million vehicles that will use them, the parts have to leave our own organization and come into the hands of our 10,000 dealer service outlets which are all independent businesses, and an additional number of service garages. The parts move in some cases directly from the parts organization, in others through establishments performing a wholesale function for a local area.

At all these points, it is essential to keep the supply in balance with needs, and to have the method of storage lend itself to immediate use and a ready analysis of the adequacy of stock. The pieces must remain in good condition, and it is obviously to our interest as well as that of vehicle owners that the stock be efficiently managed.

So despite the fact that the car manufacturing divisions maintain the line contact with the dealer organizations handling their products, our parts division, having to care for the vehicle owner's repair requirements, maintains a separate field force of its own which has the sole responsibility of keeping track of the parts situation among these same dealers and in the field organization behind them. This force advises dealers on effective merchandising methods, installation of inventory controls and balanced ordering, and generally exercises a continuous educational as well as a surveying function.

The parts procurement problem at parts division headquarters begins with the introduction of a new or changed item. and ends only when cars using that item have disappeared from actual use. With each engineering change or new model, the parts division must plan the field supply concurrently with the production line changes, so that new model and the types of parts required for its maintenance reach the field at the same time.

It has to order quantities mainly on the basis of past experience with similar items, and with regard to the prospective volume in which the new model is to be marketed.

As a given car model nears the end of its production run, the parts division must carefully review and plan methods for obtaining future supplies, whether by securing a run big enough to cover all-time requirements or by providing a production source separate from the plants and machines devoted to current model output.

This is a specialized business requiring expert analysis and cool-headed judgment, and personnel whose experience and training makes them intimately familiar with its possibilities.

The second separate organization concerned with maintenance is the Field Service Division. As a new car or truck design is created, this group determines how various service operations are to be performed most efficiently; obtains specially designed tools for doing these if necessary, and then schools the service organizations of our dealers in what to look for and how to handle it. Not all service outlets are equipped to handle all types of repair operations. Many smaller ones handle the simple operations only and refer complex jobs elsewhere. The Field Service Division matches its training of these different "echelons" to their resources and to the work they are expected to perform.

New things show up over a car's life and the division is constantly engaged in securing diagnosis, and cure, to fit the circumstances. Again we find that making this subject the single responsibility of a specialized staff organization yields that close attention and zeal which is required for full efficiency.

If we stopped there, we would still be a long way from a satisfactory degree of efficiency in our parts supply system, and all of the thousands of stock points, in trying to be prepared for the possible calls on behalf of 800 different models would still be burdened with huge stores of pieces for which there might be need just once in a blue moon.

What we do is to maintain, in an organization known as Service Engineering, an active study and sponsorship of interchangeability. This is a part of our General Engineering Division, but its function too is distinct and specialized.

Our objective is to secure interchangeability of parts and part assemblies without standardization. Service Engineering can never set aside an imporvement. It has no veto power over new designs; at the most it can call for consideration of alternate methods for obtaining a desired improvement without loss of interchangeability.

Its greatest opportunity for service is to consolidate groups of similar parts, to obtain a broad range of application over past models. The result of its operations has been great simplification of stock, reduction of inventory, and improvement of parts availability.

Many of the parts numbers that can be consolidated involve relatively simple matters: a steering column jacket tube will serve many models if it is supplied maximum length, with instructions for cutting off at the right point for each model. The same could be done with many exhaust pipes. The extra operation at time of service is not an important matter.

A new clutch housing may be put in production with different location of tapped holes for the studs fastening to the transmission case. By adding an extra hole in manufacture of the part for service, it would be made to fit a series of the old models, as well as the new.

A considerable run of consolidations occur when a part such as a shock absorber is replaced by a better mechanism, or a value is replaced by one made of better steel. So long as the fit remains unchanged, the new item supersedes the previous numbers.

Other parts, such as a new steering arm might be, will adapt to some older models if supplied with a bushing. In that case all of the new arms made for service are supplied with a bushing. In that case all of the new arms made for service are supplied with a bushing, with instructions to remove it for application to the newer models.

At one time we had over 200 separate starter and ground cables. For production runs that involve hundreds of thousands of an item, the cost factor dictates that such a cable be of the exact length required. Such economy is completely lost in service, where instead substitution of 12 lengths usable over the 200 applications proves an infinitely greater saving.

This does create a number of service parts different from those used in original production where an extra inch of metal, or the operation of boring additional unnecessary holes would constitute waste, building up the cost of the final product.

But the cumulative effect of such a policy is shown by examination of the numbers of parts that need no longer be stocked. Of the many hundreds of categories that have been consolidated, selection of a random 20 will show that 5,000 items originally made are now being replaced with a stock of only 2,200 items. Another dozen groups of parts shows 1,584 items taking the place of an original 3,531. The aggregate effect, over all the types of parts that must be handled, lifts a tremendous burden from the business without any reduction in satisfaction given to the operator of the vehicle.

Most important of all, this program does not lay a restraining hand on the engineers who are seeking to produce an improved vehicle, nor does it prevent a manufacturing change which will step up mechanical efficiency. The process of evolution is undisturbed by any vested interest in what has gone before.

I have described this maintenance structure and the method of its operation in some detail because I believe a major purpose of this school to be imparting familiarity with industry and industrial method. Manufacturing is not just making things; it inevitably carries with it a host of attendant functions which must be organized and executed with the same degree of precision that goes into machining peices of metal or any other product.

A full understanding of industrial operation requires some grasp of these subsidiary activities, and in fact I believe they highlight the essential principle of modern industrial approach, which is the subdivision of problems into activities which are neither too large not too complex for one man to direct well, and the placement of responsibility with the authority to carry through on that one function all the way down the line.

This subdivision implies something more, however, and that is studied care in selection and development of men who are to bear the specialized responsibilities. From the stage of getting a function organized, on throughout its operation, a system of delegated responsibility would break down if persons who did not have a deep-seated "know-how" of the subject were to be put in key positions in the line of command.

We in industry do not consider half a lifetime of practical schooling in a speciality too long, and we count the strength of an organization not in its charted structure, but in the intelligence and knowledge of its managerial personnel.

These human resources always will be the key to successful operation, far outweighing the mechanical facilities one may have at one's command.

In so far as what I have said here today has a bearing on solution of the military maintenance problem, I must point out again that I would expect any effort by any military organization to lift our system and apply it blue-print wise to its own activity, to wind up in a considerable mess. The physical requirements are too essentially different.

I would be the last to predict just how much would come of a military study, comparable to that of our Service Engineering, of the many separate makes of transport equipment it may have to service. But it should be made, and there is not within private industry any mechanism or organization for bringing about, with full respect for quality of performance, a simplified universal servicing program. Nor will there be any such so long as we keep in industry the competitive system to which our civilization, and our armed forces themselves, owe so much.

It seems perfectly clear to me that there exists a challenging opportunity in this field.

I firmly believe that an organization which places on the job qualified individulas, with facilities for accurate analysis of the problem, and with authority to bring about simplifications limited to service and without control over the evolution of future mechanical design, should advance by great strides the art of getting the most out of the enormous stream of mechanical equipment which American industry can pour out for the defense of the country if, and when, ever again we are threatened.

So, let me conclude this by making a specific recommendation:

There should be created in the Armed Forces distinct organization to specialize wholly in maintenance of mechanical and motorized equipment. These should be directed by persons qualified by experience and perspective in this phase of the work as distinct from design, procurement and operation.

Under such conditions I am sure that peacetime maintenance will become a laboratory and proving ground, out of which effective wartime operating methods and training techniques will be evolved.

DISCUSSION

A STUDENT:

I would like to ask if there is a place in factories for armed services personnel to learn the details of equipment, particularly during a war emergency, and if that is an effective way of training?

MR. KELLER:

Details of what kind of equipment?

A STUDENT:

To learn how a tank or truck is constructed, and then go out in the field and handle maintenance problems.

MR. KELLER:

Yes, we did just that. We persuaded Ordnance at one time to send the men who were being prepared for tank maintenance to Detroit. The program we outlined to Ordnance at that time, and which they thought was a good idea, was that they had a lot of men who had special training in tearing down transmissions and some men who knew how the guns should be mounted, but the thing which makes a vehicle work is tying together these different skills. You might have an engine overhauled in beautiful shape, you might have the transmission in beautiful shape, you might have a fine drive, but if you fall down on the interconnecting of these components you can get into a lot of trouble with the performance of the tank.

They sent to school right at the Tank Arsenal men who had graduated from the detail schools all down the line. These men were formed into groups of four or five and were furnished all the parts for a tank. They proceeded to put the tank together and give it the same inspection that the new tanks we were building had to go through, and then the tanks were shipped to the combat theaters. We felt that this school worked out very well in developing the art of maintenance.

The idea that I was specifically covering in my lecture this morning is the art of having all the necessary parts available and of having an engineering service that will study your problems in the Army or in the Navy; then you do your own engineering on where your parts can be combined and correlated, and thus cut down the amount of service parts that you would have to carry.

I think that the problem of putting men into the plants to get service experience will never be a very effective means of building a thoroughly trained service organization. You don't have the volume of stuff to work on that you have in the Army. You don't have the kind of accidents and the kind of things that happen around a plant that you do in the Army. It is all right to get basic, fundamental knowledge on what makes an engine function, but the art of tearing down and putting them together comes only by experience, and it is the peacetime activities of the Army in looking after its own vehicles and studying that problem which should be used as a school to develop your leadership. If you develop good leadership and well trained men, you will bring the rest around quite rapidly when an emergency arrives provided you don't divert your good men to some other activity.

A STUDENT:

Does your parts organization wait until they recieve an order from the dealers or do they forward parts to the dealers prior to receiving an order?

MR. KELLER:

No, we never send anything without an order. We like to get our money, you see. We find it easy to get the order. It is sometimes easier to get an order than it is to get parts together, but we normally do stock for our own account. We figure about 20 percent of our car population will be on the Pacific Coast, and when we lay out the parts requirements for a model we send 20 percent to the Pacific Coast and store them there. In that way they are close to where they will be used and we can ship from there. We first ship from the factory to the four different zone warehouses. Their stocks are divided up in proportion to the population of cars in the different territories.

A STUDENT:

Do you think we might receive opposition from some industries if we try to get standard numbers, standard parts, and interchangeability?

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MR. KELLER:

Yes, you will receive a great deal of opposition on that. That is the thing I tried to point out; I don't believe you will ever get interchangeability that will last very long. I have seen a lot of programs for interchangeability go by the board with waves of something new coming along, more efficient, doing a better job. What are you going to do? Are you going to hold down a progressive engineer because you can't move the whole mass of people along? I think you run a distinct risk of throttling development of the things you need in the Army if you try to standardize all the different corporations on using certain definite parts which Ordnance wants to put into a vehicle, even though that part might be the best functioning one.

Very often there are a number of things besides size that control these factors. Take the gyro-compass. You couldn't hope to standardize the ball bearing in a gyro-compass, even though the dimensions seemed to be quite similar, and you wouldn't use a gyro-compass ball bearing in a tank even though it could be installed as far as clearance was concerned. It is hard to put on drawings. You wouldn't want to put a gyro-compass ball bearing into a truck even though it had the same dimensions. That is why I tried to point out the desirability of having people in the Army to study where interchangeability can be effected. We in industry do that function of standardization after these things go into production. It is remarkable th number of things that can be standardized.

A VISITOR:

In preparing for mobilization, it is recognized that you had to have many additional machine tools and other productive equipment to meet the problem. It is also recognized that you wouldn't require all of those for your peacetime operations. Does Chrysler Corporation have any recommendation with respect to what should be done with those surplus items, as to whether they should be stored, and, if stored, do you have any recommendations as to how we should retain them in reserve?

MR. KELLER:

You are talking about machine tools now?

A VISITOR:

Machine tools and other productive equipment necessary to meet your parts requirements and end items?

MR. KELLER:

Well, of course, by and large, the big problem has always been machine tools. I would like to broaden that to include steam hammers, upsetters, and that sort of thing. You can't very well maintain a heat

treating furnace. You know they go to the devil right away in use. Of course, they go to the devil just as fast if you don't use them, but efficient manufacturing means that you have got to get the right tool--within certain limitations--used on the operation which you want to perform. You can't afford to use a 25,000-pound steam hammer on a 5,000-pound steam-hammer job. No industry could maintain itself with equipment that did not fit its operations. Machine tools as a whole, standing idle, without being carefully taken care of, deteriorate very fast.

I have always felt that the thing to do is to make it possible to get out of circulation, if you please, the 25, 30, and 40-year-old tools that we have in this country, and to get these new ones put into operation.

I think very often you look at the big plants of the country, such as General Electric, General Motors, Chrysler, and Westinghouse, and you are prone to think of them as having all the big machine tools. There are a great many machine tools in much smaller places. A lot of heavy machine tools are used in railroad maintenance and repair. Some of them are older than Job and ought to be thrown out.

I think wherever a modern tool is in the national production stream the easier the job will be for the Government to get modern stuff made, regardless of where the machine is. Therefore, I would like to see all this fine wartime equipment not shipped out of this country or given away by lend lease, but in some way gotten into the hands of people that will put it into productive use, whether or not it will fit exactly. I know that is a difficult thing to do. Handling Government property is a hell of a job because you always have politics, you have people lying to you, and all kinds of other schemes. The fellow that handles it, if something slips, gets his head cut off. I think the problem is a human one rather than one of machines, or a physical one.

I tried to buy some of these machines. We had a devil of a time. We finally got them. I think they charged us too much for them, because the ones I wanted the Treasury won't let me write off. We have to carry them on the books and depreciate them at seven percent a year.

If we could only get rid of the type of thinking that a mechanic had toward his job, there would be a lot of things that Government could do in cooperation with industry that would keep machine tool equipment right up to the handle and keep the machine tool producing companies producing. I would like to throw out a lot of machines if I could write them off, but you can't carry the old and the new and make money on both of them.

A STUDENT:

I would like to pose a further hypothetical question. Should one of your zone depots be destroyed, do you have an estimate of how long it would take for the depot to reach 50 percent of its present efficiency?

MR. KELLER:

It wouldn't bother us at all if the depot were destroyed so far as giving immediate service. What we would feel would be the loss of that percentage of stock. As cars get older the real problem is to secure parts. If we have radiators in production coming down the line with expert tools and well-trained, very highly specialized workmen, we roll them out fast; when that line is once discontinued and isn't there, and those people aren't available for producing radiators, your cost of procurement will run as high as 10 or 15 times as much to get that radiator. It could cost five times what we were selling it for to get a radiator. For that reason we practice what we call "all-time requirements", where the tooling facilities and the cost of setting up make it desirable to do that. In other words, we buy enough to last us as long as we will have any cars running, to the best of our guessing and knowledge, and then we plus that a little bit. We have mountains of that stuff in our storehouses. We have done quite well on that. In the long run it pays to make a little more stuff when you have the facilities operating instead of making items when it is very difficult to get them made.

If one of our plants burned down, we would lose that percentage of the stock that was there. That would give us a real problem of setting up manufacturing when the time came to make it. In the meantime we redistribute the surplus.

GENERAL McKINLEY:

Could you tell us what percentage of the normal car you go all the way on in making parts? Is it 5 percent, 50 percent, 25 percent?

MR. KELLER:

There isn't any standard on that. Take fenders. We don't hope to carry more than a six-months stock of fenders. They take up too much room. It is much better for us to keep only a six-months supply. We have a separate plant that does nothing but make service fenders. We have a great big die storage. On the other hand, steering spindles don't take up very much room. We make 150,000 of them.

GENERAL McKINLEY:

There is no rule, and no percentage?

MR. KELLER:

No rule.

A STUDENT:

Is statistical information or are state registers available to you to determine how many old models and so forth are in existence?

MR. KELLER:

Yes, we have that, and of course we have the shipping record at the time we produced them. Inasmuch as we are only servicing our own product, we know pretty well what we have.

A STUDENT:

Does the service policy of other automobile companies pretty much follow that of Chrysler?

MR. KELLER:

I don't know. I haven't worked for another company since 1926. That is 21 years. Some of the things I brought to Chrysler I picked up in the 16 years I worked with General Motors. How far they have drifted away from what I learned, I don't know.

A STUDENT:

I would like to ask what you would do about an item made by another manufacturer when you run out of that item. Say the item is a Chrysler carburetor. Secondly, I would like to know what you do about disposing of those items, say, for a 1928 model? Whether, if you have a large stock of carburetors, you would ultimately declare them surplus and sell them or continue to hang on to them?

MR. KELLER:

I will tell you how we handle that. We try to get at this problem of carburators for a 1930 model before we sell the last one we have on hand. Now there is another peculiar thing that happens in the automobile business and that is what is known as cannibalization. When a car gets old, things like carburetors don't wear out. They don't involve a service problem. On the other hand, ball bearings do, because a ball bearing gets a lot of use. You don't take a ball bearing out of a car after 15 years'use and put it in another car, but with carburetors you can.

We find we can very often make a small adapter and adapt some modern carburetor that is in production and put it in some older model. The carburetor from the older model is put in surplus stock. We continually build a reserve dollar-wise to take care of that. Then when we feel that we have too much on hand, that the demand hasn't been as great as we expected, we take that item out of active storage, box it, put it into dead storage, and write it off. We don't throw it away just then and there, but put it in a sort of bonded warehouse, dead storage. If there are no calls for it for three or four years, we scrap it. If there are calls, we place it back in stock and charge it into the parts organization. We have to do that to make the bookkeeping honest.

A STUDENT:

We are in manpower studies now. Could you give us a brief summary of your relationship with labor?

MR. KELLER:

Our relationship with labor is that it is continually going on. It is a good bit like the relationship with your wife and family.

A STUDENT:

Could you make a statement about the productivity of the present labor force compared to the period before the war?

MR. KELLER:

That is a complex thing. I know there are a lot of people who think that can be arrived at by reading a table of some kind, but you want to remember this, that productivity is tied up intimately with the experience and ability of people. In our post-war organization we didn't get over 20 percent of the people with skill back into the production line. A great many of them went into the armed services; men who were working on machines were stepped up by some process into tool makers; some went into business; some died; women have filled in; women have gone out; and 80 percent of our working force after the war is made up of people who have no experience on the job in automobile plants.

Any statement on productivity must give some realistic thought to the fact that you have to train those people today. I would like to say that our productivity has been improving right along as people become more familiar with their jobs, have been more constantly on them, and have learned to do them better. We had that same problem during the war.

GENERAL McKINLEY:

Thank you very much. We earnestly appreciate your coming to the College and giving so generously of your time.

(5 March 1947--350)E