

## EQUIPMENT AND TEAM WORK

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It is said that Socrates was asked by one of his disciples whether the great teacher would advise him to marry. "Certainly" said Socrates "for if your wife should be a wise and good woman, you will be extremely happy: but if you should be unfortunate enough to have married a shrew, like my Xanthippe, why then, you will become a philosopher".

### INTEGRATION OF MILITARY AND SCIENTIFIC ASPECTS

The Soldier and his Equipment—his weapons, his vehicles and his kit—are wedded to each other. Believe me, this is not an *overdrawn analogy* but his equipment with which he goes to war and on which his morale (i.e. faith in victory for his cause) and even his life may depend *symbolises* for him the imagination, the creative effort and the caring the people behind him have put into it. The perfection of his equipment depends on the perfection of the organisation and the team work that is put into the making of this equipment: who the members of this team are and how they achieve this great object I am now going to tell you.

First of all the Soldier. Based on what he knows of his opponent, and the conditions under which he has to fight him—the terrain, the climatic condition and considerations of time and space, he has to state in clearly defined terms what he needs. He would naturally want his equipment to give its optimum performance, to be light and hard wearing, simple to maintain and service and he should also have as much of it as he is likely to require.

This is transformed for him into concrete shape by a host of scientists and technicians and he is allowed to judge whether it meets with his requirements. It would never be possible to find anything that suits every stipulation in every way but finally something that is realistically possible is shown to him; after all the snags are smoothed out and after it has been duly approved by him and sealed, it is put into production when once again he has to be satisfied that the standard of reliability and accuracy has been maintained before he can be fully confident of the equipment. However unnecessary in some cases, these processes may appear, they are absolutely essential; it would take an enormous long time if he could not define clearly what he wants in the language in which the scientist and the technician can understand: if these latter cannot convince the manufacturer as to the simplicity of production with the material that is easily available to him, it would be well nigh impossible to obtain satisfactory results if the members of the team do not have confidence and unity of purpose among themselves.

You have heard what the Defence Secretary said about the supersiliousness<sup>s</sup> of servicemen, who used to look down on the scientist and the technician in the past. Most of this has disappeared today (perhaps unfortunately, not altogether) due to the advent of a new type of military officer—the Service Technical Officer. Here we have some one who is not only a soldier but also something of a scientist and something of a technician in varying degrees of each, but most

of all a person who knows more about his equipment than the average officer : he should have a great fund of tact and acts as a cement between the front line soldier, the scientist and the technician.

The soldier will come to him and say " Friend, I need this and that, and such and such ". The Technical Staff Officer if he likes can turn round to him and say " Don't be a damned fool—this is too fantastic " but more usually he softens the blow and says " Perhaps this is what you want " or " this will approach nearest to your requirement ". He may then go to the scientist and say " Dr. Saheb, what do you think of this idea ? " The Dr. Saheb may say " This looks preposterous but let us go and see the designer who may laugh at us ". However, provided that the idea was not too fantastic, which it should not be if these three thought it worth while considering, something might be made which will be put up to the user. The designer himself who would be a practical engineer, should be able to put up a design to the manufacturer which is sufficiently flexible to be modified by the manufacturer after he has considered it from his point of view : here again the Inspector who seals the drawing will come to his help and give him advice from his experience of such stores.

### An example

I would like here to give a concrete example from a well known complicated equipment—a tank. (It is not a practical example from our point of view, I will admit—for straightaway the manufacturer will say " You've got a hope. I've neither the capacity nor the raw materials—" but the example will help). The user will say " I want fire power, protection and mobility "; and will proceed to define what targets he wants to engage (personnel—AT guns, thin skinned vehicles or other AFVs) and at what range : whether by direct fire or indirect against normal arty. targets and whether he wants to be able to fire on the move or in hull down position only : this will determine the weapons and the ammunition. He then will state what degree of protection he wants—armour thickness and distribution : and what degree of speed and mobility—road speed and cross country speed—transportation by rail and road : recovery on and off the battlefield. He will finally state the number of crew, internal and external communication.

His technical pal will then take out his slide rule and tables and work out the details asking himself if there is a gun or ammunition or a mounting and sights that will give him the fire power that is wanted— or if such a weapon is practicable. He will then turn his attention to the weight distribution of the tank, making sure that it will not get unduly heavy. From his experience he will allow 50% of the total weight for armour. It is to be noted that for power/weight ratio :

10 HP/ton will give an approx. speed of 15 m.p.h. and

20 HP/ton will give an approx. speed of 30 m.p.h.

The following are some of the criteria which have to be given much consideration :

- (i) Size of turret to accommodate the gun and the crew in the fighting chamber.
- (ii) Width, which will depend on the requirement of the loading gauge, rail and road (width/length) bridges of the terrain.

*(iii)* Steering ratio.

Length of track on ground and area of track contour—bearing power  
i.e. track pressure and so on.

From his experience he will know whether it is possible to get the power plant, or the turret ring of the size required and so on, and how long it would take ; and he can then advise his friend "You cannot have the best of everything—what are you prepared to sacrifice ? "

A technical specification is then prepared which is taken to the scientist—who does the exact calculations and adds anything to the requirements that is known : then to the designer who gives concrete shape—this time he will have a complete design team—each one a specialist in some particular field—armaments, turrets, power plant, tracks and suspensions, armour, wireless sets and accessories ; mock up and pilot models are produced—sometimes several—until the prototype emerges combining all the desired features. And then a batch is produced which goes through practical handling by the individual soldier—and the formation by senior officers, reliability trials by technical bodies.

After extensive trials like this, when the full effect of armoured units with the new tanks is achieved, the design is accepted—the Inspector or AHSP seals the drawings and production starts. The inspector and the manufacturers will have been brought into the picture quite early in the proceedings so that their planning can start. Quite lengthy and extensive preparations have to be made by both—so that they should be fully in the picture from the time the project has taken concrete shape : but the design should be as clear as possible—otherwise, once production starts it would be extremely difficult and expensive in time and material to effect a major change in design.

As the components start coming out of the production line, they have to be inspected individually and finally the assembly and the test on the test track.

**Organisation.**

The MGO gave a picture of the organisation prevailing now and he left out as I have done, a very important member of the team—Finance, who have to loosen their purse strings for the project. However, they come into it very early indeed.

I have drawn a broad picture with a very wide brush. What about the organisation ? The General Staff are the mouthpiece of the user and the General Staff Equipment Policy Sub-Committee in consultation with the MGO's Technical Directorate, formulates a qualitative requirement. This is discussed by the CGS' GS Equipment Policy Committee which has an AFA on it. This Committee gives it a priority over other projects. It is further considered by the Defence Science Policy Board and the Defence Science Advisory Committee and also at the New Weapons and Equipment Production and Supply Committee. The General Staff specification is then passed on to the MGO's Development Committee where the technical specification prepared by the DTD is discussed and this is passed on to the TDEs concerned to draw up the detailed specifications and to go on with the design. Money is granted from one of many sources depending on the nature of the project. After several efforts and numerous technical and general staff trials on the hand-made or

tool-room models one or more prototypes are ordered for user trials. And when the design is finally approved order is placed with the DGOF for mass manufacture. The store is introduced into the Service.

I have mentioned about the TDEs. These are many and varied and all over India. There is the TDE Weapons at Jubbulpore with sub-units at Kanpore, Cossipore, and Ishapore. There is the TDE Ammunition at Kirkee and Khamaria, and the proving establishment at Balasore. There is a laboratory at Kirkee for military explosives and a laboratory at Kanpur for general stores such as paints, fuels and other chemicals—and a metallurgical laboratory at Ishapore, a TDE for electronics at Dehra Dun and various other TDEs for general stores and clothing at other places.

These establishments come under the Directorate of Technical Development at Army Headquarters. Their activities are inter-related and they have to work in the closest co-operation with the Defence Science Organisation and the Ordnance Factories. The Defence Secretary mentioned the formation of the Defence Science Service. The civilian staff engaged in development work will now belong to this Service.

I have introduced you to the various groups of people who form links in the chain for development of a service store. The direction of the job of producing the desired equipment in the field at the right place and time and in sufficient numbers is left to comparatively few people. On the success of the policy and foresight of these individuals depends the chances of the troops having the right equipment at the right moment.

This brings me to the main idea of my talk—how can they work together as a team.

### **Team work**

Team work, they say, goes to the end of the earth but it starts with me and the fellow I do not get along with. If it breaks down there, it breaks down every where. It is all a question of ideology. Now what is an ideology? It needs three things—a philosophy, a passion and a plan. A common philosophy—acceptance of a common way of life—a passion to work together—to give one another their best—the finest leadership is to create leadership in others—as Dr. Kothari said, you can get anything done—provided you do not take the credit for it. No self praise and dispraise of others—but helping to make the other fellow great. And finally a plan: a distribution of duties and responsibilities.

Before a man can give his best to a cause, he has the right to ask himself why and wherefore? Quite often, the soldier in high places feels a pacifist—and why should not a scientist bemoan the need to give his best to produce a weapon? To the soldier, the most satisfying answer I know is given in the Geeta. I think I can tell the scientist that his doubts will vanish if he knows what he is fighting for—rather than what he is fighting against. What are the things that we value most for which we can give everything? When we have understood that, will come the nation which is strong in itself. This is the secret of team work and it is destroyed ever so easily when we quarrel among ourselves—carrying tales, pointing fingers and praising ourselves at the expense of other people.