

modern military operations is largely the result on the one hand, of the perfection of functional control secured through the General Staff and on the other, of two elements of mechanical equipment, the gasoline engine as applied to transportation, and the telephone and telegraph as employed in intercommunication. It is one of the aims of this manual to indicate how these same highly developed means of intercommunication may be applied at small expense to the operation of directing forest protection forces.

Functions of Protection Force.

A careful analysis of the operations involved in the protection of forests from fire reveals the fact that a fire-control force exercises four principal functions. These may be called Prevention, Detection, Suppression, and Supervision. In an unspecialized staff, each member of the staff exercises all four functions. Naturally there is no organized staff so completely unspecialized that there is absolutely no differentiation of functions performed by different members, but nearly all of the forest protection forces of Canada are so little specialized that the overwhelming majority of the staff actually does have all these functions to perform. As in other industries so in forest protection, non-specialization means independence of action and lack of close co-operation. Thus we find that practically all fire rangers employed in Canadian forests are independent units, each supreme in his own district, performing individually all functions of fire control, and neither assisting nor receiving assistance from any other unit.

Specialization Important

Where specialization has been adopted, however, the whole organization is radically different. Specialization is the basis of modern industry, and the gain in efficiency that resulted from the industrial revolution is no more striking than is the improvement that results from the adoption of similar specialization in forest protection. Obviously, no other result could reasonably be anticipated.

Specialization in forest protection is secured by employing separate units to perform each of the distinct functions revealed by the analysis of the operations of forest protection. It is neither possible, nor necessary, to differentiate functions absolutely in all cases, but instead of each member of the control force performing all functions each is given one as a primary function and exercises the

others only to a very minor degree, if at all.

Prevention of Fire.

The function of Prevention, as the name would indicate, includes all those activities whose aim is to ensure that fires do not start in the forest. Statistics of the causes of forest fires, upon which all prevention plans must be based, show that for the eastern

Modern Forest Protection Methods.

THE Forestry Branch of the Department of the Interior, Ottawa, has issued an important work dealing with forest protection. Its author is Mr. W. N. Millar, formerly one of the inspectors of the Forestry Branch, and now associate professor of forestry in the Faculty of Forestry, University of Toronto. The work is called "Methods of Communication Adapted to Forest Protection" and it deals with the construction and use of telephones in forest reserves and national forests. A part of the book is devoted to semaphores, heliographs, flags, lanterns, etc., and there is also a code of signals. The book is of great value to all charged with forest administration but the chief interest to the layman and to those interested as Canadians in the protection of our forests is the insight it gives into modern methods of fighting forest fires. Forest fire-fighting has advanced possibly, more rapidly than city-fire-fighting in the past ten years, and in order to show why the forest engineer now demands rapid methods of communication, Professor Millar in the first chapter of his work explains the layout of a modern fire-fighting force. Extracts from this chapter are given herewith.

part of the country human agencies are responsible for at least 95 per cent of forest fires, while in the West about 80 per cent are thus caused. This difference is due to the lightning-caused fires which are relatively more numerous in the mountainous regions of the West. Fires due to human causes may be considered almost wholly preventable, and a forest protection staff must be prepared to

make an exhaustive study of the cause of the fires with which it has to deal and to apply the necessary remedies. Prevention of forest fires involves a whole host of considerations mostly beyond the range of this discussion and even in actual application largely beyond the influence of the direct control forces in the woods. Certain preventive measures, however, belong primarily to the woods staff. Such, for instance, are advice and warning to forest travellers and tourists. This is of very great importance in many forested regions of Canada. A specialized forest protection force will have certain of its members specifically assigned to this duty wherever the directive staff determines, as a result of a careful study of fire records, that such preventive measures are needed.

Keeping Watch on Tourists

In maintaining this observation of tourists and other travellers a well-developed system of communication by which the patrol force is kept constantly informed of the entrance of parties into the forest and of their movements while there is of immense value. By means of it every person in the force is enabled to contribute indirectly to the prevention work and to assume this as a secondary function without in any way interfering with whatever happens to be his primary function.

Similarly, the supervision of "clearing" fires employed by settlers, an extremely frequent cause of disastrous forest fires, is preventive in nature, and many other activities of this kind must be provided for, according to local conditions. In all cases, however, it is necessary to emphasize that the fundamental basis for scientific and effective prevention work is an accurate knowledge of fire causes in any given region. This is best secured by rigid investigation of all fires that occur and the accumulation of statistics of causes over a period of years.

Detection of Fire.

The method of performing the function of Detection has to some degree become a distinctive characteristic of a specialized staff. In the usual type of organization with little or no internal co-operation or interdependence of units, each ranger must depend upon himself alone to detect and locate all fires in his district. To accomplish this he adopts various methods according to the nature of the country and forest, the causes of fires, and his own energy, experience, and ingenuity. To some extent the

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