THE UNIT SYSTEM AND THE CONTROL OF MACHINERY IN WARSHIPS.

The Unit system was proposed by Engineer Rear Admiral W. R. Parnall as the result of experience during the war of 1914-18, and has been generally adopted in most of our subsequent warships where it was applicable. Experience of the war just ended has fully vindicated the essential soundness of this principle and has shown conclusively how necessary it is to implement this policy as meticulously as possible. The full realization of the Unit policy involves much more than the mere sub-division of the machinery installation into isolated and self-contained sections. It also requires the development and maintenance of a proper psychological attitude on the part of the officers as well as the training of key ratings suitable for the duties they must perform.

The complete physical separation of all parts of each Unit from those of any other is desirable as providing the only certain safeguard against contamination or inadvertent cross-connection. This question has received full consideration which resulted, however, in the decision that sufficient cross-connections must be provided to enable a damaged ship to proceed under her own power as long as one set of machinery and some boilers are available.

The separation of communications and control arrangements is not in itself a fundamental requirement of the Unit system. It must be appreciated, however, that so long as it is intact, the machinery of a warship must be capable of operation as required by the commanding officer even under conditions of heavy damage when communications and normal lighting may have failed and when movement from one compartment to another is impracticable. Such control as is then possible may well be very localised and it is evident, therefore, that Unit control is a condition likely to be enforced by circumstances in action.

It is widely agreed, and experience strongly supports this view, that personnel, whether officers or men, cannot be relied upon to take charge efficiently in emergency if they have been accustomed through long years of normal routine to work under strict control, a system which tends to stultify initiative. German experience well illustrates this aspect as they have judged it necessary to develop an extensive system of automatic controls, devised to take care of the complete lack of judgment and of initiative engendered by the iron discipline imposed in that Navy. This is the logical outcome of such a psychology, but complete reliance on (often delicate) automatic apparatus may well promote disaster under action conditions and is accordingly an undesirable policy. There is little doubt, however, that when a ship is heavily punished the average human mind is largely occupied by fear (or in securing its control) to the detriment of coherent thought and reasoning power. In such circumstances simple and localized issues constitute a sufficient task, while the efficient handling of more complex matters is likely to be beyond normal capability.

It has been decided for these reasons that not only shall Unit control be standardized in new construction but also that the arrangements shall be such as to minimize the degree of centralized control that can be exercised, thus ensuring, as far as is possible, that the former method shall be the normal day by day practice throughout the Fleet. Personnel of the necessary quality can only be obtained by rigorous training and by consistent cultivation of the appropriate attitude of mind.

There is a natural tendency on the part of all officers, who have been trained on other lines, to view apprehensively such decentralization of their personal responsibilities ; an attitude strengthened by the love of " engine driving " innate in every true engineer. Candid reflection cannot fail, however,

to convince even the most conservative officer that observation of a large number of detailed gauges and other instruments does not in fact appreciably strengthen his personal control of a complicated machinery installation situated in another compartment. Such observations, if the instruments are approximately correct, may reveal the general source of a difficulty but are unlikely to enable matters to be rectified confidently in an emergency. Emergencies must, in fact, be dealt with locally. Distant reading instruments are not essential for other purposes—rather they add little to peace of mind and tend towards ill-timed interference with the responsibility of subordinates, probably distracting their attention at a critical moment. It is of course necessary to have means available for drawing urgent attention to an obvious mistake ; this will be provided. A broadcasting system offers many advantages for communication between machinery compartments and for providing engineer officers with information, without undue interference with local personnel. Suitable and reliable apparatus appears to be available and is being tried.

The foregoing policy depends for its success upon the thorough and adequate training of the key ratings who will be in charge of the principal machinery compartments, and upon rigid insistence, by all officers, at all times, on the appropriate chain of responsibility. The importance, therefore, of training and of exercising extreme care in the selection of ratings for upgrading cannot be too highly stressed. Frequent visits of inspection to the machinery compartments are also of first importance to observe performance with the object of anticipating defects and troubles. Such factors constitute the true fundamental responsibility of the engineer officer in a modern warship since it is upon these that the reliable operation of the machinery chiefly depends.