

AUTOMATIC AND REMOTE CONTROL POLICY IN H. M. SHIPS

BY

COMMANDER B. V. W. TYLER, R.N., M.A.

Since Commander E. Tyrrell wrote his article, 'The Automatic and Remote Control of Steam Turbine Machinery' in the *Journal of Naval Engineering* (Vol. 9, No. 1), the policy on the fitting of this type of equipment in H.M. ships has changed considerably. This brief article is intended to indicate the recent trends in the policy governing the fitting of this type of equipment.

Automatic and remote control arrangements are being incorporated in the design of all new construction ships as well as ships being modernized or converted for operation with the Fleet. The reasons for the introduction of this somewhat complex equipment can be summarized as follows:—

- (i) To provide a centralized watchkeeping position in a machinery control room, or other protected position, within the gas citadel of the ship in order to maintain effective and continuous control over the main and auxiliary machinery during any form of atomic warfare. This is the most compelling of the reasons.
- (ii) To ensure the correct operation of the machinery throughout its power range thus giving greater efficiency and reducing maintenance.
- (iii) To provide improved conditions of watchkeeping for the Engineering Department personnel.
- (iv) To reduce the number of Engineering Department personnel involved in watchkeeping duties thus making the maximum number available for maintenance work on other items of machinery.

The degree to which automatic and remote controls are being fitted in the various Classes of ship varies, depending to a very great extent on the likely future role of the ship concerned, thus making it impossible to give a general statement on the policy being adopted.

In new construction (*Tribal* and *County* Class), machinery controls rooms are being provided as the *normal* control position for all machinery during both auxiliary and main steaming and includes the control of the main machinery over the whole range of power both ahead and astern by using:—

- (i) Automatic equipment with its associate monitoring instruments and warning devices
- (ii) Remote operating equipment with the instruments necessary to provide full control where fully automatic control is inappropriate.

The necessity for watchkeepers to be stationed permanently in machinery compartments will be affected by the fitting of automatic and remote controls and monitoring devices. Existing regulations may have to be reviewed in the various Classes of ships depending on the reliability of operation achieved by good design, manufacture and maintenance of this equipment. It is envisaged, however, that the number of permanent watchkeepers will be greatly reduced, the main watchkeeping tasks being performed in the machinery control rooms with only periodic inspections of the machinery in the machinery compartments.

To give one example of the wide application of automatic and remote control equipment in new construction, the following controls, the majority of which

are pneumatically operated, are being fitted in the *County* Class Guided Missile destroyers :—

- (a) Automatic control for boilers, F.F.O. temperature, steam temperature, lubricating oil temperature, and exhaust pressure
- (b) Remote servo control from the machinery control room for steam turbine ahead nozzle valves and astern manoeuvring valves, gas turbine throttles, turning gear clutch (electric), main and auxiliary feed check valves, stand-by feed pump throttle and feed discharge valves, soot-blowers with automatic sequential operation, F.F.O. service pump (electric), F.F.O. spill diverting valves and supply change-over valves
- (c) Remote servo controls from the gas turbine control room for gas turbine starting, gas turbine main synchronizing clutch, and gas turbine fluid clutches
- (d) Automatic 'cut-in' arrangements are also provided for lubricating oil pumps and extraction pumps
- (e) Gas turbine generator warning and automatic shut-down arrangements
- (f) Automatic arrangements on evaporators for steam supply, dump valve, and over pressure trip valve on heating elements.

In modernizations and conversions it is not always possible to achieve the high degree of control as in new construction but each ship is treated on its own merits according to the Board Requirements. Where full protection for personnel and manoeuvrability of the ships machinery is necessary, as in atomic warfare, sufficient automatic and remote control of essential machinery is fitted and is operable from either a control room or a centralized watchkeeping position. In these ships it is envisaged that the equipment should be used whenever steam is raised, with watchkeepers in the appropriate machinery spaces. The equipment would then be operated from the local control panel, thus enabling the engineering personnel to become familiar with the equipment both from the operation and maintenance points of view. This will also ensure that the equipment can be used for the function for which it is basically fitted, that is, control from the remote position which would, in general, only be used for exercise and emergency purposes in peace-time.

One example of a modernization is H.M.S. *Belfast* in which local manual control of the main engines only is possible but with automatic control for boilers, F.F.O. temperature, lubricating oil temperature and exhaust pressure. The boiler controls may be operated from the local boiler room panel or a remote boiler control panel in each engine room. There are no remote servo controls, but all turbo and Diesel generators are fitted with warning and shut down panels.

Ships fitted with automatic and remote control equipment are now going into service and descriptions of the types of equipment and automatic control systems fitted to achieve the desired degree of control in the various Classes of ship will be the subject of further articles in the *Journal*, the first two of which follow this introductory article.
