CORRESPONDENCE

SIR,

'Puddings and Pies'

My congratulations and thanks to you and all those whose thought and time have gone to make the December *Journal*, Vol. 16, No. 1, such a veritable Christmas feast. This *Journal* is not only stuffed with plums but flowing with the distilled essence of a vintage crop of 'articulate engineers'. High time—and long may this be so.

(*Sgd.*) J. G. LITTLE,
Captain, R.N. (*Rtd.*)

SIR,

An Automatic Boiler Control System

Having read the above article in Vol. 15, No. 3 of the *Journal* with great interest, I should like to make one or two comments which I feel sure will be of interest to those who from time to time may have dealings with A.E.I. controls.

Hunting the Hunt

The closed exhaust system in H.M.S. *Eagle* was never satisfactorily controlled until:

(*a*) The sensing point for the pressure transmitter was moved. The old sensing point was near the inlet to the evaporators just after an acute bend and near the supplementary valve. It was proved by the use of an electronic measuring device that an oscillating pressure wave was set up at this point when the evaporators were in use. The new sensing point is on a straight length of pipe in the same compartment. The worst place to have the sensing point was found to be near the inlet to the feed heater.

(*b*) The pressure transmitter was modified. The 1 to 1 pressure transmitter was tested by the Admiralty Engineering Laboratory who found that after a step change in input, the output hunted for a considerable time afterwards. A.E.L. then modified the transmitter and no further hunting has been experienced in the system. If H.M.S. *Tiger* had had this modified transmitter, the defective governor would not have caused the closed exhaust pressure to hunt and much time and trouble-shooting would have been saved.

Master Controller Feed Back

With the feed back to the master controller in its present position, i.e. before the load limiting relays, there is a great chance of lifting the safety valves. If too much steam is being removed from the boiler, e.g., when going astern, the limiting relay will operate but the master controller will 'saturate' to 25 lb/sq in. output. When the astern movement is completed, the master controller will have to de-saturate, which takes considerable time during which the safety valves may lift.

If the feed back was from after the limiting relays, the master controller would not saturate and the possibility of safety valves lifting would be greatly reduced.

Supply Controller Feed Back

An ordinary A.E.I. controller has two needle valves and the action of these is very easily understood. The setting up of the process under control is also very simple, but in FIG. 3 (Vol. 15, No. 3, p. 466) an inverse derivative unit is inserted which makes the setting up of the system much more difficult because there are what may be called two integral time settings, one on the controller and the other on the inverse derivative unit. Also, the slightest fault in the system could cause this loop to hunt. If the feed back to the supply controller was fed back from after the inverse derivative unit (in this case it would have to be after the in/out switch), and the integral time valve is wide open (i.e. fastest integral time), then we get back to an ordinary controller where:—

(*a*) The proportional band is set on the proportional band needle valve but is then multiplied by six by the inverse derivative unit, and

(*b*) The integral time is set on the inverse derivative needle valve.

R.D.L. Transmitter

The R.D.L. transmitters in H.M.S. *Eagle* have been modified to be very much more sensitive without hunting.

(*Sgd.*) R. APPLEBY,
Engine Room Artificer.

SIR,

Operation and Maintenance of Automatic Boiler Control System

The article by Lieutenant Middleton on the above subject in the June, 1965, *Journal* highlighted all the problems raised when boiler controls were introduced. I would like to add some comments on how they were overcome during H.M.S. *Blake's* commission.

The system as fitted had four steps from hand control to full automatic and the change-over switches were both marked auto/remote manual. To obviate confusion between the two kinds of remote manual the terms 'Secondary' and 'Primary' were introduced, the sequence of setting the system to work being hand, secondary, primary and auto. The watchkeepers then had no difficulty in achieving the correct method of change-over.

The problem of steaming in hand control and maintaining the correct supply/spill pressure relationship and RDL value without reference to graphs or tables when, say, the air pressure failed, was overcome by fitting an additional scale to the standard pressure gauges in the fuel systems and the RDL manometer. This scale was graduated in percentage boiler output, and it was only necessary for the watchkeeper to select the same percentage for each pressure to obtain optimum conditions in the furnace. The percentage values were taken from the pneumatic gauges in the control system. Check calibration of the standard gauges is needed more frequently than usual to ensure consistency. This method was used with success on the few occasions hand steaming was required, including a lengthy manœuvring spell when entering Grand Harbour. It is not always appreciated that frequent practice in changing over from auto and steaming in hand is required.

A principal fault in the original system was the inability to steam at low auxiliary powers without making continuous white smoke. Originally the minimum blower speed mechanical stop was set with both blowers running, so that with only one blower in use its minimum speed was more than double that with two running. This was cured by fitting an additional pneumatic stop. The mechanical stop was set with one blower running and a limiting relay fitted in the RDL controller output to limit the signal when two blowers were in use. A change-over cock was fitted to select one or two blowers. This resulted in a much closer control when steaming auxiliary and introduced a margin for trimming down the blower speed, further reducing the auxiliary load.

I agree entirely with Lieutenant Middleton that care of the mechanical parts of the system pays high dividends in trouble-free operation of the control system.

(*Sgd.*) T. D. C. SMITH,
Engineer Lieutenant, R.N.

SIR,

Getting 'With It'

Judging from the outstanding December, 1965, issue of this *Journal*, we really seem to have decided to get with it. For anyone trying to see beyond the day-to-day tangle all those thoughts on quality, availability, and especially on Systems Analysis (learn a new skill!), made splendid reading: it was like being treated to a grand vision. Its concepts have a magnificent sweep to them but, to be honest, they are elusively abstract to grasp and difficult to relate convincingly to the disorderly diversity of the marine engineer's real world.

Sir, I am sure your erudite contributors are absolutely right, but are there not two considerable obstacles yet to be reckoned with before their ideas can come to much? Firstly, they assume changes in naval engineers' professional (and personal) aims and attitudes so large as to amount to a managerial revolution. Secondly I feel that they have glossed over the disparity between today's rather homespun basis for decisions, mainly piecemeal and patchy facts bolstered by knowledge and experience, with the kind of complicated, and probably automated, information service which seems to be necessary if the exercise of these fine concepts is going to tell us any more about our business than we know now.

'Tantalised'