CORRESPONDENCE

Manadon's New Degree in Naval Engineering

SIR,

I have read Captain Franklin's article on the new degree course (*J.N.E.*, Vol. 24, No. 2, p. 159) with appreciation but with some slight stirring of misgiving. When one considers the whole process of 'producing' Naval Engineer Officers there are, it seems to me, some important omissions in his description, and one rather dubious piece of policy making. It may be that the omissions are only from the article, and not from the course itself; perhaps they have been subsumed into 'General Naval Training' and 'Complementary Studies'. I would have felt immensely more reassured if they had been overtly mentioned in the text.

The first omission that worries me is concerned with motivation. Engineering is a hard option and the acquisition of the necessary academic foundation often comes with difficulty to the aspirant engineer who is naturally more interested in the application rather than the elegance of the techniques themselves (or he would wish to be a mathematician or a scientist). To carry him through three years of tough intellectual effort I believe the engineer officer of the future needs to have a fire lit in his belly at the start of the course, and that fire carefully nurtured thereafter. There is a whole strand of what one might call, without disparagement, Romantic Engineering which could fulfil this purpose. A review of the engineer's role in history; examination of some of the great engineering feats of the past and projects of the present; the engineer as innovator, creator, interpreter, entrepreneur; the engineer in Society; the interaction of man and machinery—all seem to be as fundamental to the foundation course of the whole engineer as many of the more esoteric studies in the syllabus. Such a strand is particularly suited to external lecturers and thus neatly adds to its own strength, for a powerful inspiration to any novice in the field is to see and hear distinguished engineers talk with concern, love and experience of our profession.

The second omission is that of some of the more practical, but common to all, facets of engineering. An example is Terotechnology, a field in which most naval engineers will spend the majority of their careers. Not to be lightly dismissed as a pseudo, trendy sub-subject, an organized study of the whole cost and process of ownership can help an engineer to think clearly about much of his life's work.

The third omission is not really an omission so much as a lack of emphasis. 'Only connect', said E. M. Forster, and at a recent Engineer Officers' Conference dinner Admiral Sir Peter White said much the same thing. Naval engineers, he considered, had the potential to influence the service more than any other group of officers, but too often threw away this opportunity through their inability to communicate their views with the right combination of fluency and persuasiveness. Will this situation be changed by submergence of 'clear expression' in Complementary Studies? Lastly, there is the matter of Design. It has been said that Design cannot be taught; Captain Franklin says that Design as a separate subject is not taught. However, what appears to be missing in the course he describes is the lack of any single unifying cement between the individual subjects. Design, a way of looking at things and techniques, an assessment of fitness for purpose within the economies of scarce resources, could be that cement—a common frame of reference within which all technical subjects can be correlated.

The education of our successors is, like most things, a matter of balance. No one doubts the importance of a sound academic base for an engineer, but that base alone is not enough without some of the more intangible assets which go to

make the rounded professional. The new naval engineering degree course seems a good opportunity to establish that balance. Before it is too firmly set in concrete, my guess is that many engineer officers would wish to contribute to the discussion—perhaps at a Fleet-wide conference at Manadon. Maybe, to paraphrase Clemenceau, naval engineering education is too important to be left to the educators.

(*Sgd.*) J. P. W. Middleton,
Commander, R.N.

SIR,

Thank you for giving me this opportunity to respond to Commander Middleton's letter on Manadon's New Degree in this issue of the Journal. Commander Middleton was kind enough to let me have a preview of his commentary and I will answer the points he made in some detail.

First, I should like to emphasize that Captain Franklin's article (*J.N.E.*, Vol. 24, No. 2, pp. 159–67) purposely concentrated on the academic side of the College's business and did not enlarge on the other elements of student life here. I believe that Manadon's strength lies in the fact that it is, first and foremost, a military establishment. It has, within it, both an excellent, degree awarding, engineering faculty and a very good applied engineering school. But the establishment is run by the Navy for the Navy. There is an excellent Divisional system run by experienced Naval Officers. So, all the time that a student is at Manadon, he is helped to develop his general Character and Leadership ability (the old-fashioned Officer-Like-Qualities) as well as his professional ability. We like to think of the students following a 'Manadon Tripos' with the three legs of the stool being Education, Training and Development. The full course, lasting upwards of four years, includes the degree as its principal element, a large input of practical engineering training (both during the degree and in the subsequent application courses) and most importantly, a continuous injection of Naval General Training. All these elements are integrated into a balanced package and Complementary Studies, which forms over 10 per cent. of the subject matter of the degree course, has a considerable overlap with the professional naval training programme.

I have mentioned this at length, because I feel that Commander Middleton may not have taken account of the wider aspects of Manadon's course in his letter. His criticisms, if I read him right, concern student motivation, practical engineering and unifying connections. Let me, then, take these points in order.

We are very much in accord with Commander Middleton over the overriding need for student motivation. Like him, we see this as a vital part of the education, training and development programme but with more *naval* emphasis than he has made. We develop student motivation in a number of ways—through the traditional Divisional Officer system, through Complementary Studies (which includes what Commander Middleton describes in his letter as 'Romantic Engineering') and a range of specialist lectures on naval engineering topics—but primarily and most importantly, through living within the naval ethos of the College. Indeed, we believe that compared with civilian universities and polytechnics, where the release rate of University Cadet Entries is often quite high, our record in this respect is particularly good. I should like to reassure Commander Middleton that in the move from conventional mechanical and electrical degrees at Manadon to the novel and unique B.Sc. in Naval Engineering, the need for adequate motivation was a paramount factor. We think we have achieved this in a most successful way.

The second point he has raised in his letter is that, in Manadon's new degree, some of the more practical facets of engineering may have been omitted. Here

again, I must reiterate what I said above about our Manadon Tripos—we have a considerable injection of practical work during the degree course, notably the 11-week workshops course, and a greater emphasis on this during application training. As far as engineering management subjects are concerned (such as Terotechnology which Commander Middleton specifically mentions) we can only touch lightly on these in passing—there just isn't time to undertake these in addition to all the necessary engineering fundamentals during the four-year course. However, there is no doubt about the value of engineering management subjects and we certainly cover as much of them as we are able to in Complementary Studies.

Lastly, I come to Commander Middleton's comments on 'the need to connect' and in particular the subject of Design. Here I have much sympathy with his view. In the planning of the new Degree, which took almost three years, a great deal of discussion took place over the role of Design Studies and their correct sequence and timing. After much heart-searching and under pressure of trying (unsuccessfully) to put the proverbial quart into a pint pot, it was decided to delay the study of Design as a separate topic until the Application Courses where the existing 'Design and Make' exercise could be expanded and given more depth. This decision was taken with reluctance but, in order to cope with the increased material resulting from the inclusion of both electrical and mechanical engineering elements for everybody during the first two years, something had to go; and incidentally there are strong independent arguments in favour of delaying the consideration of Design until after all the analytical work has been completed. As Commander Middleton observes, there is still some design left in the subjects of 'Engineering Drawing' and 'Engineering Materials and Design' but I agree these do not compensate fully for the omission of Design as a separate study in its own right.

I would not go so far as Commander Middleton, however, in seeing Design as a 'unifying cement' for the course. It rarely succeeds in being this in a conventional engineering degree where course objectives are far more oriented towards producing Designers *per se*. Here at Manadon, our aim is to produce fully-educated, trained, and developed Naval Engineer Officers who, in the first instance, will be appointed to ships at sea and only much later, if at all, will move into the Design field at Bath. Preparation for this is made at mid career level through Manadon's M.Sc. degree course in Marine Engineering—the old dagger course. But this is another story which must be left, perhaps, for another article later on!

Finally, I should like to use the courtesy of your columns to thank Commander Middleton for his constructive comments which have given us at Manadon considerable food for thought. We begin, next year, the design of our 1983 degree replacement and it will be then—the College's centenary year—that we can follow up his suggestion of a wider forum for discussion. Certainly we need to get as much informed opinion as possible—although in an area of such subjectivity (and our experience with the 1978 degree would support this) there are generally as many different opinions as there are advisers! The important thing, as always, is our product—the fully-trained Engineer Officer; and only time will test that. I believe that the product of the new degree course, having taken the appropriate application course and gained experience with the Fleet, will be seen to be of high quality. But there will almost certainly be a new or modified degree course in 1983 and this again will be designed with the greatest care, taking account of the best and most experienced advice possible.

(*Sgd.*) P. G. Hammersley,
Captain R.N.
R.N.E.C. Manadon.

Nothing New

SIR,

Having read with interest the highly relevant article on the Energy Crisis dated March 1928, reproduced in *J.N.E.*, Vol. 24, No. 3, I thought your readers might be interested in another instalment from the 'nothing new under the sun' saga.

The enclosed minute on noise reduction was addressed to D.N.C., Controller, A.C.N.S. by E.-in-C. on 27th August 1918.

(*Sgd.*) E. J. Macnair,
S.P.S.O., Ship Department.

The questions involved in reducing the noises transmitted from machinery have been under consideration and experiment for some time.

This Department[1] was closely associated with a Committee of the B.I.R.[2] in these matters and the items included:

(1) Reducing the noises themselves in the auxiliary engines.

(2) Reducing the transmission noises originating in the auxiliary engines by bedding the engines on mascolite in the manner which proved satisfactory in the Royal Yacht and in Repair Ships.

(3) Silencing the exhaust in the engines of Motor Launches.

(4) Reducing the noise transmitted through the propeller shaft of vessels by fitting insulating material in the couplings or through the medium of pneumatic pad couplings.

(5) Reducing the noise of vibration of propelling shafts by dynamically balancing propellers and reducing the clearances in the stern tube and bracket bearings.

For this purpose an apparatus for dynamic balancing has been obtained and installed at Devonport and the propellers of *Oberon* and P.C.43 have been dynamically balanced and fitted, but the results are not yet to hand.

(6) Fitting air bubble screens around the hulls.

An experimental apparatus has been tried on the Clyde in Patrol Vessel P.C.43 without success but this work is being continued at Messrs. Scotts with a view to improving the details of the apparatus and if improvements result, the apparatus can again be tried under sea going conditions.

It is understood that other Committees are also dealing with some of these questions but the scope of their duties is not known.

The question of jet propulsion has been under careful consideration during the war for another purpose, but it was not proceeded with as the efficiency of the system with modern improvements although it would be higher than when tried in the *Waterwitch* in 1866 and the 2nd class Torpedo Boat in 1883 was still much too low to be of practical value for the purpose then in view.

It is noted that the system is being again tried in two trawlers, but details of the arrangements have not been seen in this Department. The proposal to try out the system in these vessels is concurred in; the value of the deduction from the trials will depend largely upon the point whether opportunity has been taken of embodying the latest knowledge and experience in the designs. It would be interesting and valuable if the machinery drawings of these vessels could be referred to this Department.

If new vessels are to be designed for jet propulsion it is submitted that the machinery designs be worked at in this Department in conjunction with D.N.C. in the usual way.

References:
1. Engineer-in-Chief's Department.
2. Board of Invention and Research. Ed.

Future Prospects for Naval Propulsion Gas Turbines

SIR,

It was most heartening to read the article by Armstrong and Philpot in the December issue of the *Journal of Naval Engineering*. The gas turbine has come into its own so comparatively quickly in the Navy that probably few today can realize how difficult it was in the early days to get the crucial backing to take the initial steps.

Turning over old papers in the loft the other day I came across two newspaper clippings which I think shew clearly that the future of the gas turbine at sea was confidently visualized quite a long time ago. Although personally convinced of its potential, I would not claim any responsibility for the developments that followed.

The first clipping from the *Journal of Commerce and Shipping Telegraph* of Dec. 17th, 1945 concerns a special post-War reconstruction conference at Caxton Hall when I was Assistant E.-in-C. (Research and Development) and at which I had to speak.

The second is from the foreign language page of the *Jornal do Comércios* of Lisbon and was evidently the result of some remarks in a broadcast interview after the final trials of MGB 2009, *Grey Goose*, nearly ten years later.

On the same page, the paper mentions successful tests of 'airborne' television by the B.B.C. Much has happened in the twenty or so years since then.

(*Sgd.*) Iain Maclean,
Rear-Admiral.

From the *Journal of Commerce and Shipping Telegraph*. Monday, Dec. 17th, 1945

NEW AGE OF ENGINEERING

HELPED BY WAR EXPERIENCE NAVY WILL PLAY ITS PART

Speaking to a special post-War reconstruction conference of the Institution of Professional Civil Servants at the Caxton Hall, London, yesterday, Capt. (E) I.G. Maclean, O.B.E., R.N., Assistant Engineer-in-Chief (Research and Development) told of how the wheels of the Navy were kept turning during the War, often in the most adverse conditions, and how machinery was developed in spite of slender research facilities.

'Armed with our war experience, we stand on the threshold of a new engineering age' said Capt. Maclean. 'In the use of high temperatures and pressures and the development of the marine gas turbine, the Navy will play a leading part.'

'Because the engineer continues to produce results with inadequate facilities, outworn tools, and insufficient basic and applied research, there is a real danger of losing our engineering predominance.'

'The engineer has a great part to play in the future affairs of his country and the world. There is need for real foresight in making sure that this country has the engineering facilities she needs. We all remember the slogan "Give us the tools!" Let us see that we ourselves do not forget, nor in our post-War world neglect the engineer, the practical man who turns the dreams of the scientist and the research worker into the practical realms of everyday life . . .'

From the foreign language page *Jornal do Comércios,* Rue Dr. Luis de Almeida e Albuquerque, 5 Lisbon, Portugal.

DEMONSTRATION OF FIRST WARSHIP WITH GAS TURBINE ENGINES

Whining like a jet aircraft, the world's first warship to be powered by gas turbines was put through its paces in the English Channel recently. H.M.S. *Grey Goose*, once the terror of the E-Boats operated by the enemy during the War, has been fitted with two Rolls-Royce RM60 gas turbines. They represent a major advance in marine engineering, writes the L.P.S. shipping correspondent.

The problem of reversing with gas turbines has been overcome by means of Rotol controllable-pitch propellers.

After the demonstration of the vessel, Rear-Admiral Iain G. Maclean, Deputy Engineer-in-Chief of the Royal Navy, said that it was a milestone in naval history. 'It is clear', he added, 'that gas turbines will not be confined to coastal craft but will be employed in one form or another in many future warships.'

Fly Navy?—Then Dig This

SIR,

The article (*J.N.E.*, Vol. 24, No. 3, page 356) does not mention a natural fuel now being used in Brazil—alcohol. Produced from the waste products of sugar cane and manioc, it is added to all petrol used in the country at the rate of about 20 per cent., without apparent detriment to the performance. One manufacturer, Volkswagen, is ready to market a model wholly burning alcohol, when the Government agrees to the establishment of adequate supplies nationally and the subsidising of the manufacture. Some Post Office and other Government vehicles are already running on 100 per cent. alcohol. Some mods are needed, including pre-heating and, of course, the lower calorific value for volume means a larger tank for the same range.

Since only a very small percentage of Brazil's agricultural land is presently under cultivation, there is plenty of scope for expanding production, and, of course, it is unlike coal and oil—a renewable resource, given fertilizers and good husbandry. Present production cost is about 20 per cent. greater than imported petroleum, but that situation is not likely to exist much longer, and, besides, it has the great advantage that hard won foreign currency is not required.

(*Sgd.*) J. A. Stephenson,
Captain, R.N.
Naval Attaché, Brasilia.

The Paxman Valenta Diesel Engines

SIR,

I have reason to comment on a statement made by Mr. Clover regarding 'Oil Cushion Pistons' on page 244 in his article which appeared in Vol. 24, No. 3, the December 1978 issue of this *Journal*.

First of all, the invention and development of the technique of oil cushioned pistons were carried out by W. E. Elford and W. Fearson at the Admiralty Research Laboratory (now AMTE, Teddington) during the period 1958–1964. At no time was the Admiralty Oil Laboratory involved apart from being the Authority for the specification of the oil used in the crankcase.

Secondly, the A.R.L. solution and not the A.E.L. solution to reduce piston slap as referred to in paragraph 4 of this section dealing with oil cushion pistons was to provide taper faced rings ($1\frac{1}{2}^\circ$ taper for 5/6 of the width of the ring) straddling the gudgeon pin.

The Admiralty Engineering Laboratory entered the picture only when they provided a unit ASR-1 engine test facility at West Drayton for application of the technique. The signatory of this letter not only was responsible for the practical measurement of liner vibration (on detached duty from A.R.L. to West Drayton) but also was Officer-in-Charge of the noise trials in H.M.S. *Chailey* on Loch Goil (the year escapes me, but it was between 1964 and 1968). This ship had one YH engine fitted with standard pistons and the other YH engine fitted with oil cushioned pistons.

It was not until the preliminary work had come to a successful conclusion that the A.E.L. was supplied with a Ventura engine fitted with oil cushioned pistons for further development work. A.E.L. have since developed the application of the oil cushioned piston to many engines particularly submarine engines.

(*Sgd.*) R. E. Penfold,
Head of Mechanical Evaluation Section
NGTE (Cobham)
ex A.R.L., Teddington