CORRESPONDENCE

SIR,

Shock Testing of Pressure Gauges

Having been on the receiving end of ADSPEC 1001 I have read Lieutenant-Commander McCandlish's article (Vol. 12, No. 3) on ' Type Testing of Pressure Gauges ' with great interest.

On page 448 it is stated without qualification that with the standard shock testing machine the mean retardation applied on impact is 75g. I would be very interested to know how this has been measured in view of the fact that I have established by high-speed photographic means (3,500 frames/sec—incorporating a 1/100 sec. time base) that the primary retardation applied by a shock machine conforming in all respects to that specified by ADSPEC 1001 (Modified) is of the order of 230g while the secondary shock caused by the cage hitting the anvil after rebound is approximately 160g.

The above figures were calculated on the assumption that the retardations are steady, but plotting the ' time/travel ' curve of the cage after impact shows that this is by no means a fair assumption and in fact the initial retardation is greatly in excess of 230g.

With regard to the general specification of the shock testing machine, this is still, in my opinion, too open. In my experiments I have been able to prove conclusively that variations even in the ' stiffness ' of the concrete floor on which the machine is specified to be mounted can cause variation in retardation loadings from 100-250g.

I submit, if consistent results are to be obtained and if instruments under Type Test are not to be subjected to retardations far in excess of the values laid down in B.R.2002/58 (*Memorandum on Shock*), that the Admiralty should specify a ' shock signature ' for the machine and that an approved means of calibration and adjustment be incorporated in the relevant part of ADSPEC 1001.

(*Sgd.*) A. B. DICKIE,
Commander, *R.N.*(*Rtd.*)

Reply by D.M.E.

It is with very considerable interest that Commander Dickie's letter is read, in particular the quoted figures for the primary and secondary shock he has measured.

In replying to the queries concerning the shock testing of pressure gauges, it should first be mentioned that the falling-weight type machine used was designed to reproduce damage to a pressure gauge similar to that which occurred during actual underwater shock trials. The figure of 75g is the ' equivalent constant retardation required to bring the object to rest in the same time interval as occurs during shock ', and has been established over a large number of tests in past years.

It is well known that actual shock consists of primary and secondary shocks of considerably greater value than the equivalent constant retardation. There can also be superimposed upon the primary and secondary shock instantaneous accelerations greater than 1,000g.

Attempts have been made at the Admiralty Engineering Laboratory to obtain an accurate shock characteristic of this shock test using high ' g ' accelerometers connected through to cathode ray oscilloscopes. These measurements are not yet complete, but it has been established that the primary shock is about 220g, a measurement comparing well with that of Commander Dickie at 230g.

As regards the specification of the shock testing machine it is considered that the general construction is adequately covered and that the machine is generally robust enough to withstand the physical damage involved. The machine at the A.E.L. has now been used some 5,000 times, and it is considered that the test has been constant throughout. Regarding the floor support, ' stiffness ' of concrete floors would appear to be a very loose description. More correctly, the floor should be ' massive enough ' to absorb the shock.

SIR,

Birdseed for Gas Turbines

Lieutenant-Commander C. B. Williams' article ' Birdseed for Gas Turbines ', in Vol. 12, No. 2, reminds me of a somewhat similar process which I met when investigating the problems of radiological decontamination of aircraft and their engines.

In certain circumstances aircraft jet engines can get badly contaminated internally, for instance in the compressor, and must be stripped to achieve full decontamination. To shift some of the more firmly attached particles a ' soft grit blast ' is necessary which will knock them off without appreciably altering the dimensions of the affected component.

On enquiring further into soft grit blasting techniques and materials I found that the Americans usually use ground apricot seed whereas the British equivalent is pulverised prune stones.

I feel sure our material must have a far greater potential purgative effect!

(*Sgd.*) J. M. LEFEAUX,
Commander, R.N.

SIR,

' Motors and Motoring ' by Professor H. J. Spooner

That article in the December number of the *Journal of Naval Engineering* on H. J. Spooner's book, *Motors and Motoring*, rang a very familiar bell. I was a student at the Polytechnic School of Engineering from 1905 to 1907, during which time Motor Engineering was added to the curriculum. With another senior student and the new instructor I took part in reconditioning their first car, an incredibly ancient Panhard of, I should guess, about 1892 vintage.

The four cylinder engine (German Daimler) originally had hot tube ignition, but this had been altered to electric. There was a low tension distributor and four trembler coils, one to each cylinder. The differential gear was on the cross shaft, from which chains drove the rear wheels. There were four speeds forward and reverse. There were two crown wheels, opposite handed, and the whole differential assembly slid to engage one or the other, with a sort of marine engine multi-disc thrust block linked to the reverse gear lever. Needless to say, this gave a lot of trouble, as did the leather faced cone clutch.

There was a combined centrifugal governor and accelerator pedal controlled throttle, and hand ignition control. After we had stripped all down, and made various replacement parts in the engineering workshop and re-assembled it, it actually worked. I shall never forget the thrill of driving that heap of rotating scrap iron round the Outer Circle in Regent's Park! In constant fear of the Police, as I had no driving licence ; though my fellow student, E. D. Suggate, owned a motor bicycle, and had one. Later the Poly acquired a modern light car, an eight horse-power Rover.

Professor Spooner was quite a character. Allowing for the very limited resources and facilities available, the standard was not too bad. He was—above all—a practical engineer, not merely a teacher of the mechanical sciences, and a real motoring pioneer, with much touring experience in the very early days. I remember that petrol cost ninepence a gallon, and I think that income tax was about ninepence in the pound! I remember him with some affection, in spite of the deplorable state of the machine tools in the workshop, which prevented any serious precision work. This was probably due to lack of funds.

(*Sgd.*) HUGH CLAUSEN

SIR,

Diesel Engine Policy

I am not very happy about some of the inferences which can be drawn from the statement of ' Departmental Policy for Diesel Engines ' in Commander J. S. W. Bath's article in the December *Journal* (Vol. 12, No. 3).

I am surprised that the ' overall policy is one of consolidation. . . new designs will only be undertaken when very significant gains in performance can be expected . . . etc.,' especially when read in conjunction with his later remark that ' the majority of A.S.R. engines now in use are obsolete commercially.'

The design for the A.S.R.1 was prepared in the early 'forties, the unit was running in 1946, the first V.16 was coming on test in 1948, and production drawings were put in hand by M.E.D. Chatham in the same year. The first production engine must have gone into service circa 1950.

Fifteen years would seem to be a very good service life for any design, so it is devoutly to be hoped that the design for the A.S.R.1, Mk. 2 is now well in hand and the development programmed for the first of the next generation of engines to come into service in 1965. Any tardier programme will surely be justly deemed unprogressive and dilatory.

I think that ' the feeling that it would be better to use commercial marine Diesel engines in non-combatant vessels ' is a dangerous one, which should be resisted. Fundamentally, because it tends towards a repetition of the mistake made in the 'thirties, of moulding a policy to suit the needs of a peace-time navy, and not the needs of a navy at war. The duties of non-combatant craft in war-time are often quite essential to the execution of warlike operations, and the craft may fetch up in any part of the world, far from their peace-time base. Their operational availability must fall if they do not fit into the scheme of war-time logistic planning. Additionally, one of the main attractions of the A.S.R. plan was that it provided a basis for rapidly expanding production when needed. To be successful in this respect, there must always be the largest possible peace-time production. It seems unwise to whittle away the foundations of the war-time expansion plan for reasons of peace-time expediency or convenience.

(*Sgd.*) J. H. MIDDLETON,
Commander, R.N. (*Rtd.*)

Reply by D.M.E.

This is a period when rapid advances in Diesel engine design and performance are taking place and D.M.E. intends to take advantage of improvements as they become available. It is necessary to keep a balance however between technical advance and standardization. There are advantages in both.

Perusal of Commander Bath's article will show that a Mk. II A.S.R.1 is under consideration for submarine propulsion and also that a possible replacement for the A.S.R.1 exists in the Paxman Ventura. A Mk. II Paxman YHA is going into service now in H.M.S. *Eagle* and the G.P. frigates, and the Foden Mk. IV is being tested to determine its suitability as a replacement for the Mk. I. All the above engines are suitable for 2/1 supercharge, with appropriate improvement in power/weight ratio, and all have been designed to run 10,000 hours between major overhauls. It is also intended that modifications be incorporated where necessary in existing A.S.R.1, Paxman and Foden engines, to enable them to run 10,000 hours between major overhauls and to extend their top-overhaul periods.

The advantage of using commercial marine Diesel engines in non-combatant vessels is the great saving of cost which can sometimes be effected by buying complete vessels off the shelf. However, it is the intention that a very clear advantage over a standard Diesel engine must be established before a commercial equivalent is introduced.

SIR,

Reduction of Fire Risk in H.M. Ships and Establishments

In order to reduce the fire risk in H.M. ships and shore establishments I would like to propose the introduction and manufacture of a light metal container, with a lid operated by a foot press pedal, to replace the original waste paper basket.

This, in the event of any waste material in the container becoming ignited, would confine the fire to the container, prevent the fire from spreading and thus reduce the risk of a more serious fire.

The cost of these metal containers might possibly be less than the original basket type but even if it were greater, this would surely be offset by the amount saved by the reduction of serious fires.

The containers would be in the same colour as the existing filing cabinets or in a variety of shades to match office colour schemes.

(*Sgd.*) E. CLARK,
Petty Officer Engineering Mechanic

Reply by D.M.E.

For the past year or so D. of S. have ceased to purchase the wicker type waste paper basket. As these become worn they are being replaced by a metal type container, Patt. E4/9472, in ships and establishments.

The metal containers are not fitted with a pedal operated lid. It is thought that this would not be convenient for use from an office chair.

SIR,

Type Testing of Pressure Gauges

The article on pressure gauge testing in the December, 1960, issue of the *Journal* has been studied with interest in H.M.S. *Hartland Point*. This Escort Maintenance Ship is equipped with a deadweight tester made by the Barnet Instrument Company. This is generally similar to the Budenberg machine illustrated in the article, but it has two ranges : 0-400 lb/sq in., adjustable in 1 lb/sq in. steps, and 400-8,000 lb/sq in., adjustable in 20 lb/sq in. steps.

This tester is in frequent use. Generally speaking the defects found in the gauges are not those described in the article and are of a kind which the type-testing prodecure is unlikely to produce.

Many gauges in the engine and boiler rooms are subject to high frequency vibration or pulsation with a very small amplitude around the normal gauge reading. Examples of this are :

(*a*) Gauges secured to vibrating panels (they should not be, but often are), and

(*b*) Gauges connected to systems, such as turbo feed pump discharges, which have high frequency pressure pulsations.

The result of the above is very rapid wear of one or two teeth of the rack and pinion. This renders the gauge useless, even though it may be perfectly sound for all pressures except those over the small range of normal readings. The high frequency movement also causes wear of the linkage bearings and pins. Less frequently the inertia effect results in fatigue fracture of the needle or loosening it on its spindle.

It is strongly recommended that the Endurance Test of gauges should include a few hundred hours of cyclic pressure pulsation with an amplitude of, say, five per cent of maximum pressure range and a frequency of about 600 cycles per minute.

(*Sgd.*) M. J. HODGSON,
Commander, R.N.