THE HOSPITAL ENGINEER

THE JOURNAL OF THE INSTITUTE OF HOSPITAL ENGINEERING

VOL XXII No 3
MARCH 1968

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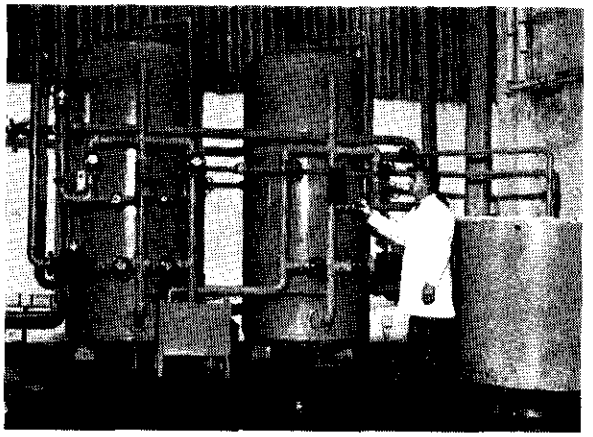

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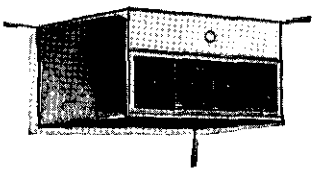

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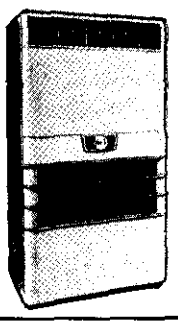

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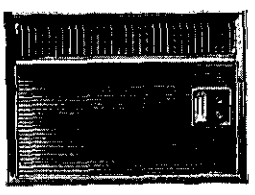

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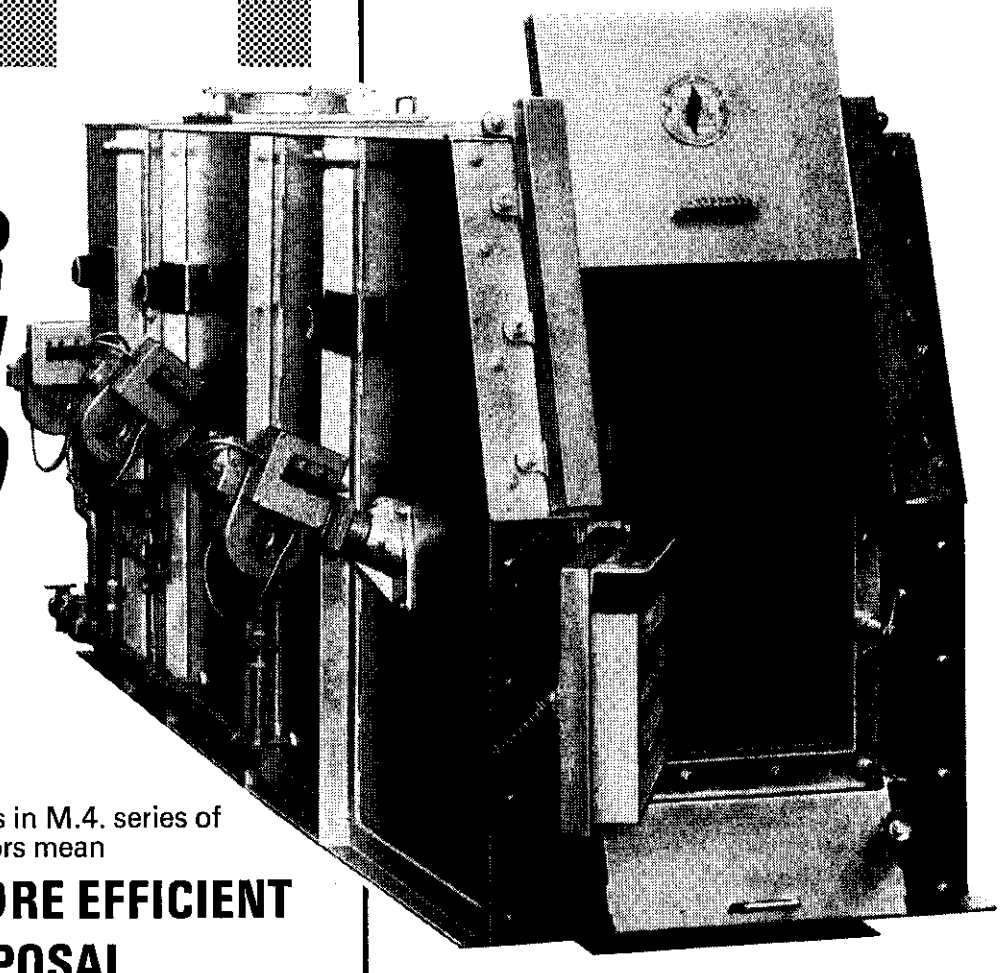

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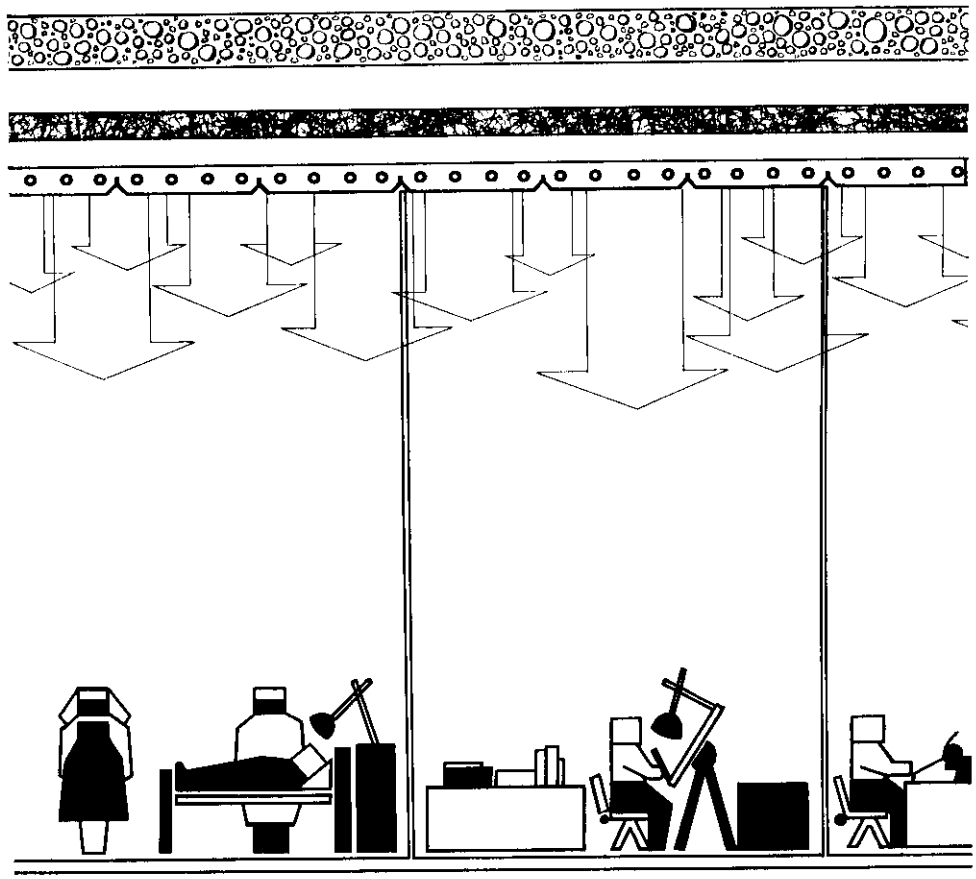

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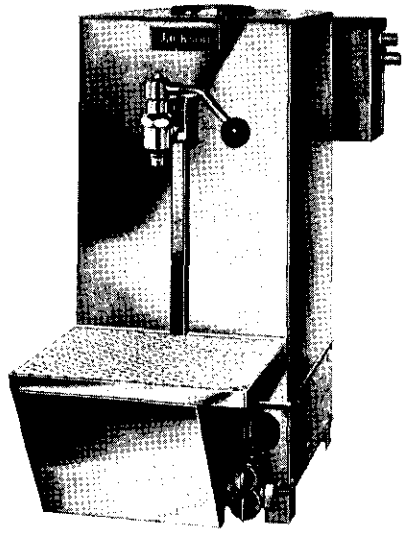

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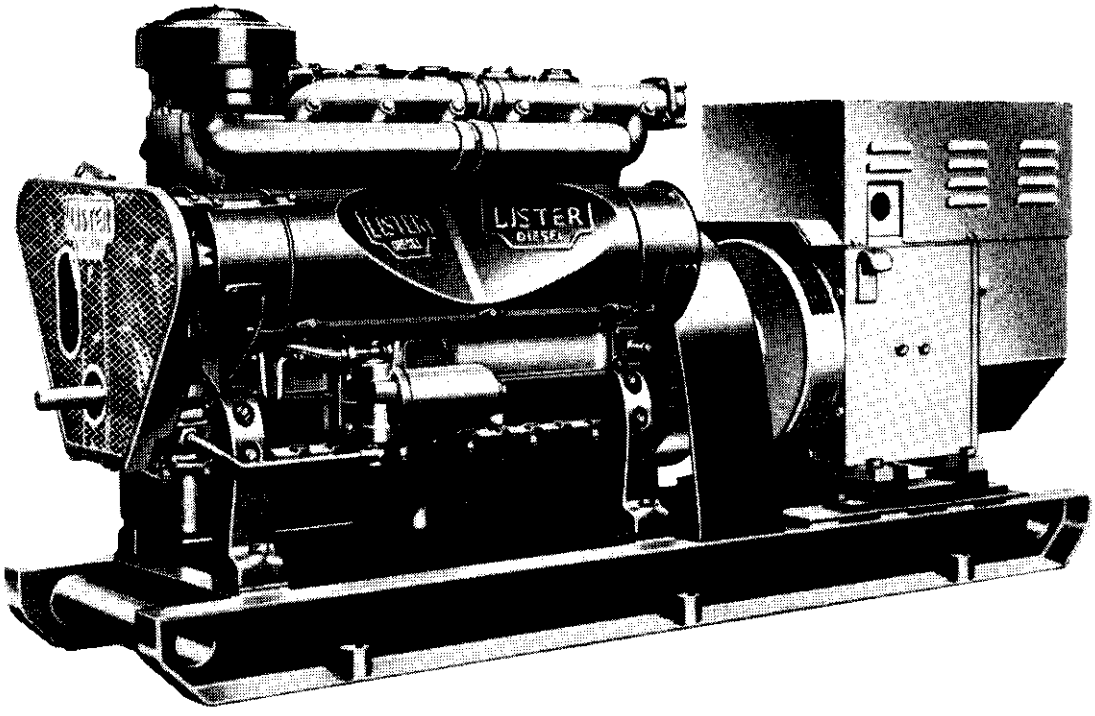

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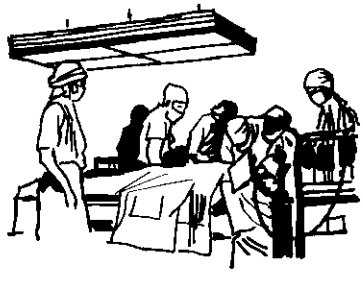

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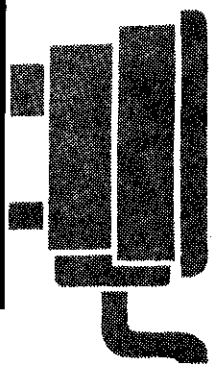

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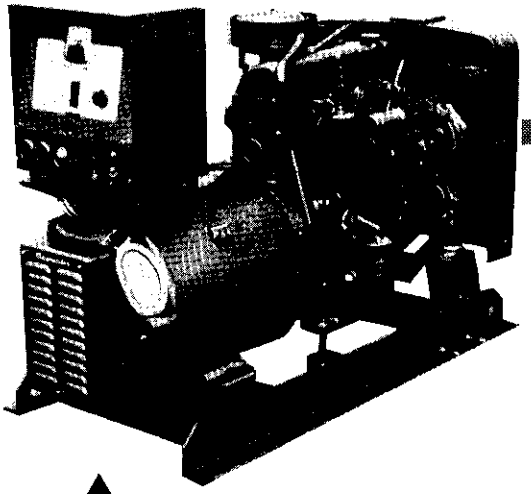

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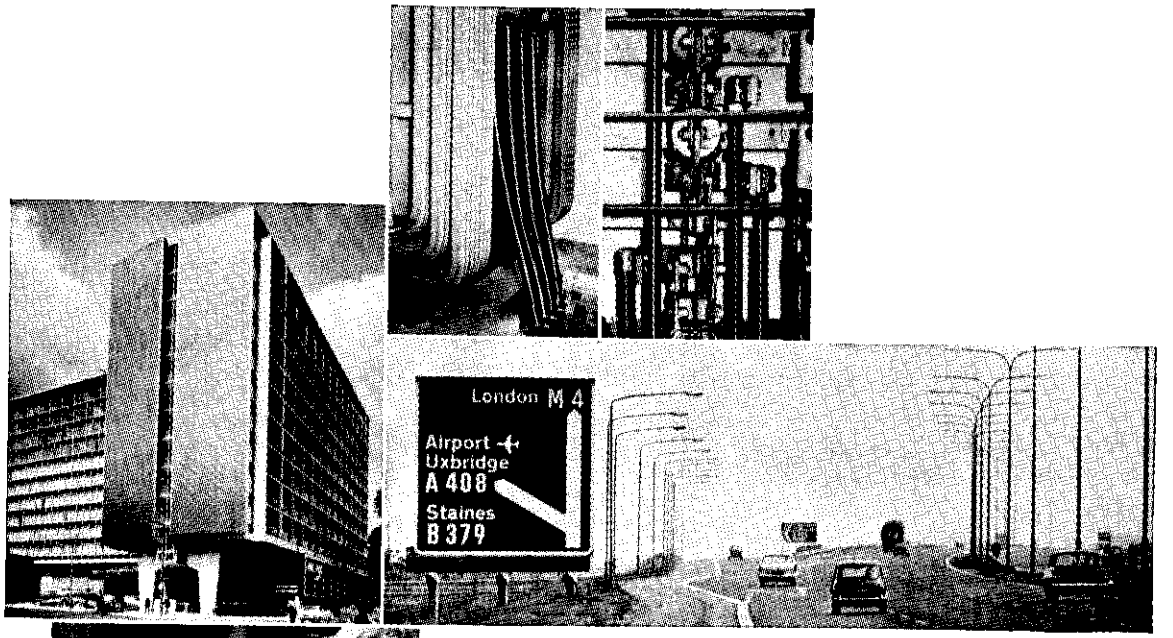

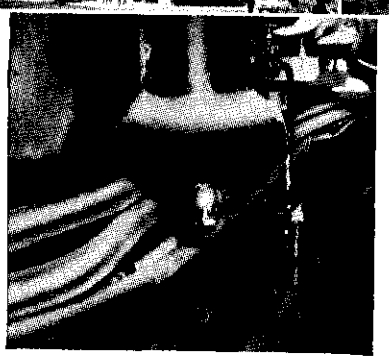

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We were the first to make Solidal cable in large quantities. Is this, however, our only yardstick for leadership? Never. Consider: AWCO Solidal cable with aluminium strip armour is light so that installation is easier and your costs are kept down. Also, AWCO Solidal cable meets the earthing requirements of the IEE Wiring Regulations without the need for additional earthing conductor. And another thing: a new extension to our factory in South Wales has doubled our Solidal cable capacity. You want Solidal cable, count on us to deliver.

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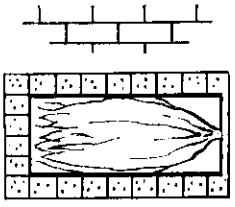

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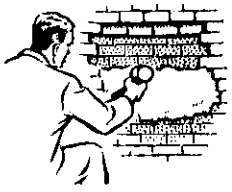
Repair damaged walls with HYBOND plastic refractory. Can be used for small gaps or the complete wall or arch. For extreme temperatures use HIGH ALUMINA PLASTIC. HYBOND is delivered in 90 lb. cartons sliced ready for ramming-in.



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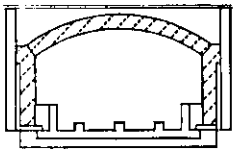
Avoid intricate brickwork and special shapes by lining with KAST-SET refractory concrete. Simply mix and pour. When an insulating refractory is required for furnaces use KAST-O-LITE. Monolithic linings are economical on fuel and simplify maintenance. A. P. Green refractory concretes are sold in 1 cwt. bags.



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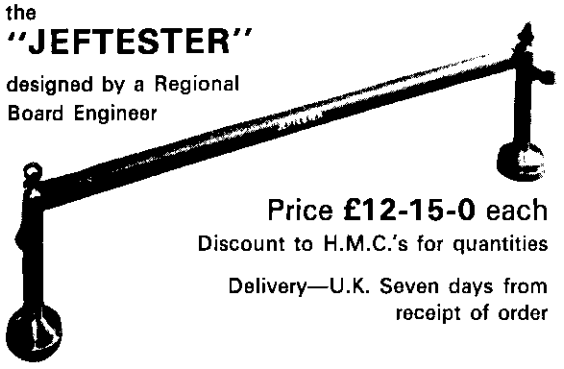

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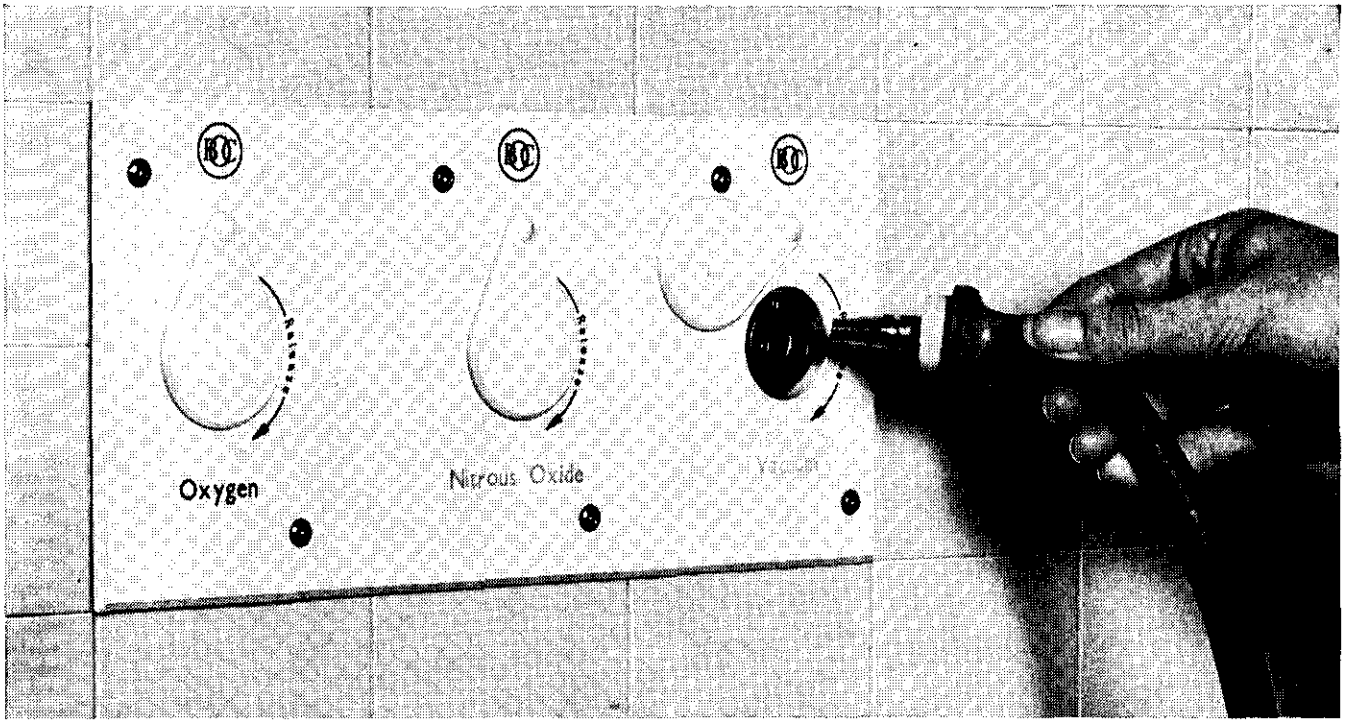
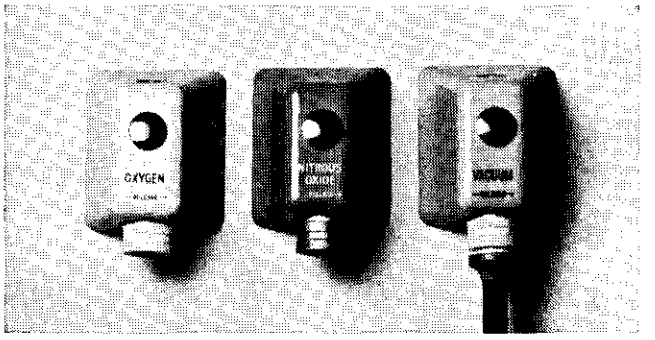


The new flush-fitting wall outlet with the new connector.

British Oxygen piped gas systems move with the times

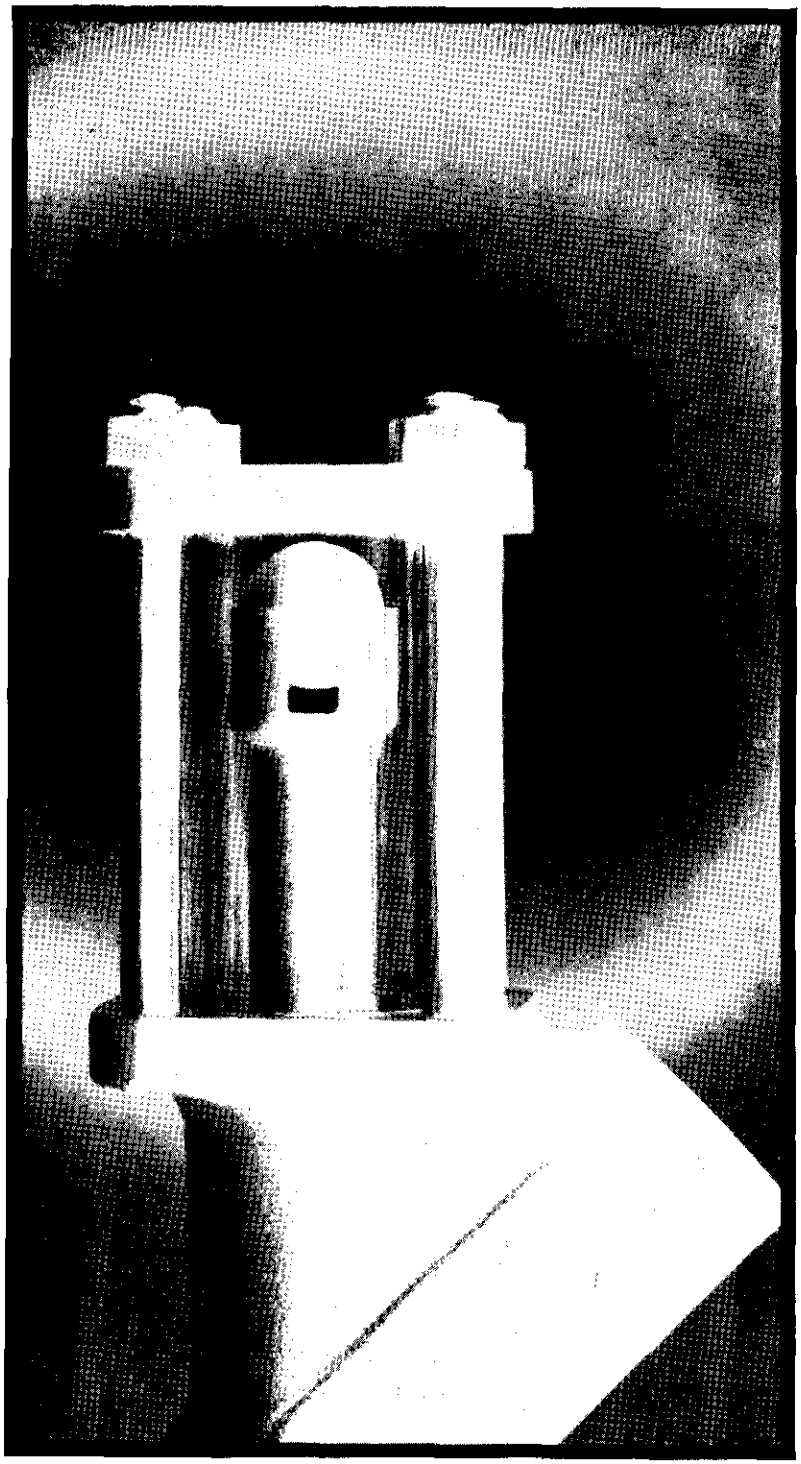
Over thirty years ago British Oxygen installed the first piped gas and vacuum system in British hospitals. There are now more than 40,000 British Oxygen outlet points in some 500 U.K. hospitals. Overseas British Oxygen associates have installed medical pipelines in over 700 hospitals.

British Oxygen move with the times. Outlet points can now be fitted flush with the wall; but the connectors for them will also fit the box-type outlets where these already exist. Equipment can, therefore, be moved from the old part of a hospital to a new extension, or from one hospital to another, without any need to change connections. This avoids the waste of precious time when a life may be at stake. British Oxygen's comprehensive service includes planning, supply, installation and maintenance. Service engineers are available at short notice and gas supplies can be obtained from 22 depots throughout the country. For full details of British Oxygen installations, please write to your nearest British Oxygen branch.



New connectors can be fitted into existing box-type outlets as well as into the new flush outlets. The connector for each service is so designed that it is impossible to connect it into any service other than the correct one.

THE BRITISH OXYGEN COMPANY LIMITED
Medical Department, Hammersmith House, London W.6.



This sight glass costs more than some, but you get a check for the balance

A sight glass after every steam trap is sound practice. How else can you see whether the trap is doing its job?
A check valve after a steam trap is absolutely essential if the outlet rises. How else can you prevent condensate flowing back into the system on shut-down?

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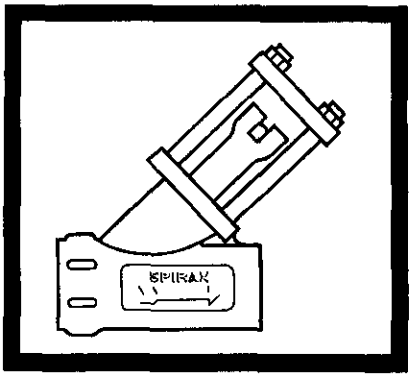

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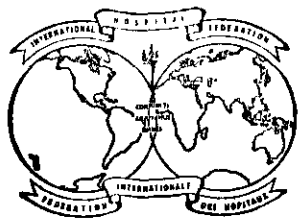

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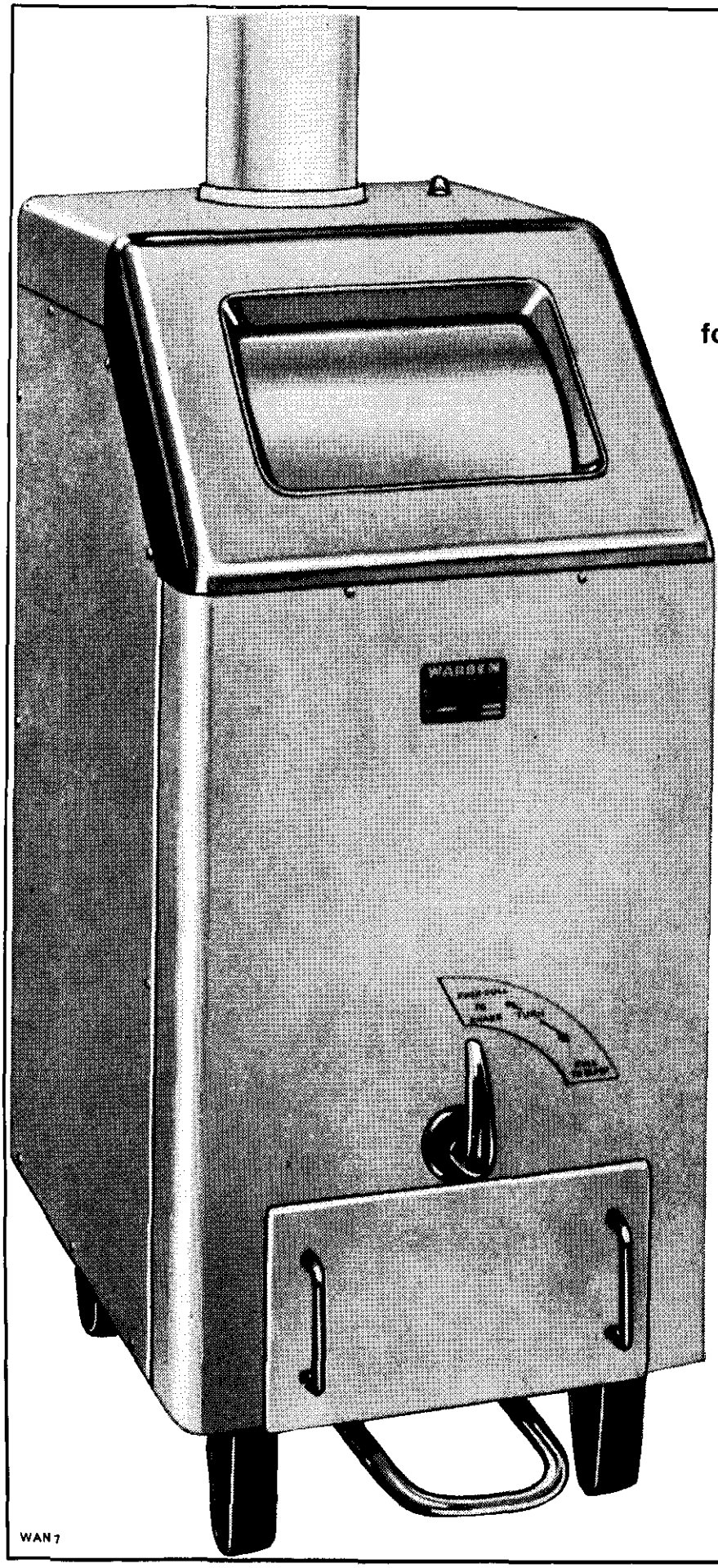

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VOL XXII No 3
MARCH 1968

Britain's adoption of the Metric System

By Col. J. S. VICKERS, B.Sc.Eng.London, C.Eng., M.I.E.E., A.M.B.I.M.
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The decision to change

In 1962 the British Standards Institution published a statement "Change to the Metric System?" which was circulated to all BSI Divisional Councils and Industry Standards Committees to canvass opinion among leading industrialists on the pros and cons of going metric. BSI's report on these consultations, published in 1963, showed there was a substantial majority view in industry that a change to the metric system was inevitable and that it should be introduced within the shortest practicable period.

During the following year, the FBI (now CBI) sought the opinions of its member firms and discovered that a majority, both in numbers and in total size, favoured adoption of the metric system in this country.

Accordingly, in February, 1965, the FBI wrote to the Government recommending that the change be made and, in May, 1965, Mr. Douglas Jay, the then President of the Board of Trade, announced in the House of Commons that the Government had been impressed with the case put to it by British industry and would encourage and assist industry in effecting the change. The hope was expressed that the change could be substantially complete in ten years (i.e. by 1975) and that the metric system would become the primary system of weights and measures for the country as a whole.

The reasons for the change

Although the decision to change is firm and irrevocable, it is as well to remember the reasons for it because, to some extent, they condition the way we shall effect the change.

Since more than half our food and nearly all our industrial raw materials are imported, it follows that, to balance our economy, a considerable proportion of our industrial production must be exported to pay for those imports.

At this moment, 85% of the world uses the metric system of measurement and the present trend is for the whole world to adopt that system. Some 55% of our exports go to metric countries and that proportion is clearly likely to increase until, in the not too far distant future, all our exports will go to metric countries.

In some of the most important sectors goods are not acceptable in metric countries unless they are designed and made in the metric system. We are thus faced with important instances where a product we normally make in the imperial system has to be appreciably modified in design at great expense, and finally manufactured using metric materials, tools and components. This duplication significantly increases the cost of production of what could otherwise be a "repeat" of an imperial product. It is known to have arisen in connection with such large and important items as steel rolling mill plants and ships, and the added costs in such cases have been enormous.

In other instances, whilst imperial-made goods are not totally unacceptable in a metric market, they are generally much more readily saleable if made in metric terms. Again, duplication arises in the course of design, production, sales propaganda, packing, marking, etc., and costs are materially inflated as a result.

Since 1865, when the metric system was made *permissible* in this country we have, in different fields, gone our separate ways in the use of measurement units. Most sciences use metric units and this has rubbed off on some

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of the science-based industries. We have thus been forced to duplicate in education and training, and some of the duplication already mentioned in respect of industry has been aggravated by our deliberate adoption of two systems within this country, quite apart from the duplication forced upon us by the demands of metric export customers.

We have grown up with this duplication and failed to regard it as inefficient and costly until lately, when our competitiveness in oversea markets has been seriously challenged, and the trend to metric on the part of our export customers has produced a situation which just has to be remedied if our economy is to remain viable. It is important to note that the metric system is being adopted by us simply because it is certain to become the only system in use throughout the world and it is therefore commercially imperative for us to use it. The intrinsic merits or de-merits of the system as compared with the imperial system are not at all relevant to this decision.

It is also worth mentioning that our going metric will prove a great advantage if we enter the Common Market. If, however, we do not join the Common Market the need to go metric is even more compelling. Whatever happens we must trade with its members and, since our remaining outside the Common Market would mean continuing a tariff barrier, we must remove any other trade barrier, and going metric removes a very serious one.

The role of Government

In early 1966 responsibility for metrication in industry passed from the Board of Trade to the Ministry of Technology, and a Standing Joint Committee of Metrication was set up to encourage and assist the operation and to review progress. The committee's membership includes representatives from the CBI, industrial firms, Government departments, the Trade Unions and BSI, and representatives from other organisations are from time to time co-opted as their specialist assistance proves to be required.

It was through this Committee that the Construction Industry's programme for the change, published in February, 1967, obtained Government endorsement with the result that the concerned Government ministries will provide powerful assistance to that industry by ensuring that Government contracts are to metric specifications in conformity with the industry's programme.

The role of BSI

Because the essential foundation for this change will be metric British Standards, and because it is a national institution with unique established communication with every sector of industry, BSI is regarded as the focal point for the change.

The task of co-ordinating action between the many interdependent sectors of the whole complex of British industry is a formidable one which can only be tackled by rationalising the problem. This has been done without, we believe, over-simplifying it, by first taking it for granted that every single sector of industry uses the products of the engineer manufacturer as some form of process plant. The textile manufacturer gets his looms from an engineer manufacturer. The manufacturer of chemicals looks to the engineer manufacturer for his process plant made up of pumps, motors, tanks, boilers, ovens, automatic weighing devices, etc.

On the other side of the engineer manufacturer is a whole series of supplying industries which provide him with his basic resources of production—his materials, tools, measuring equipment, and "bought-out" components.

Industry at large can thus be seen as three groups—the engineer manufacturer with, on one side, his customers for process plant and, on the other, his suppliers of the basic engineering commodities.

Few will dispute that the process of changing to the metric system will be more complex for the engineer manufacturer than for either his customers or his suppliers. A principle which has been reiterated is that there is no compulsion about this change. It is a purely voluntary thing, suggested by industry and endorsed by Government. It follows that economics alone will dictate the timing of the change and, since the engineer manufacturer seems to have the most complex task, it is logical to look to him in the first place to indicate when, and at what rate, the change should be effected.

BSI's Phase I task

Clearly the engineer designer requires to know what metric materials, tools and components are to be available to him for incorporation in his metric designs.

The production of these metric standards, together with others concerned with such fundamentals as limits and fits, tolerancing systems, drawing office practice, etc., are clearly BSI's first priority task. Of the 1,400 relevant standards, some 500 have been selected as being essential to an orderly and co-ordinated start to the change, and their production is referred to as Phase I Priority 1 of BSI's task, with 1968 as the target completion date. The balance of 900 are included in Phase I Priority 2, with 1970 as the target completion date. Details of progress in the Phase I Priority 1 task as at the end of August, 1967, are included in a BSI booklet "PD 6286—Metric Standards Published and in Progress".

In the course of producing metric standards for our basic materials, tools and components an opportunity for rationalization, which could not have occurred in any other way, is being seized. The aim is to reduce size and quality ranges to the essential minimum and this variety reduction should have a significant beneficial effect on the cost of production of these basic engineering commodities.

At the same time, the need for our British Standards to be compatible with those of oversea metric countries and international recommendations is fully recognised. Although our size and quality ranges may not be so

comprehensive as those of oversea metric countries, they will be compatible. In appropriate cases the restricted ranges recommended for UK practice will be shown as "1st Choice" and intermediate sizes and qualities will be shown as "2nd Choice" or even "2nd and 3rd Choices".

There is no doubt that this same variety reduction principle can with advantage be adopted in other fields such as proprietary components which are not the subject of national standards but which nevertheless could be considerably reduced in cost thereby.

BSI's Phase II task

By the end of 1968 we hope to have established what size and quality ranges of the basic engineering commodities will be available in a metric Britain. At that stage there is no doubt that many manufacturing engineers will be reluctant to plan to use such commodities until they are assured of their availability in the quantities they require. By the same token, the supplying industries will be reluctant to change to metric production until they are assured of a reasonable demand for metric commodities.

In an attempt to resolve this impasse, BSI, in April, 1967, launched an enquiry among a representative cross-section of engineering equipment manufacturers to discover what was the consensus of opinion as to the timing of the change.

In effect, manufacturers were asked to say when they would see it as economic to start metric production and over how many years the period of transition to substantially complete metric working would be spread. The questions were so framed as to enable the composite effect of differing programmes to be evaluated, so that the supplying industries could be informed of the date from which and the rate at which their customers' demands would change from imperial to metric. This investigation is known as Phase II of BSI's activity and has, of course, been concurrent with Phase I.

The most gratifying response to this by no means simple questionnaire is the clearest demonstration of the lively appreciation in industry of the vital necessity of securing co-ordination and concerted action in regard to the change.

A preliminary analysis of replies shows that most manufacturers envisage starting metric production in 1970, but the lengths of the transition periods to substantially complete metric production vary from three to five years depending on the nature of the product.

Once the approval of all sides of industry has been obtained, the programmes which emerge from this investigation will be widely publicised, and also sent through the Ministry of Technology to Government to ensure that the nationalised industries and Government procurement agencies will frame their specifications in metric terms in accordance with the agreed programmes.

It cannot be too strongly stressed that adherence to these programmes, which will have been suggested by a representative cross-section of engineer manufacturers, approved by an even bigger cross-section of their colleagues, and by the suppliers who are influenced by them, will be in the very best commercial interests of individual firms and of the national economy.

BSI's Phase III task

This consists of metrication of the remaining British Standards. As part of their answers to the Phase II questionnaire, respondents were invited to indicate standards which in their view should be given priority for metrication in this phase, and lists are accordingly being compiled.

SI Units

The system of units called SI (Système International) was recommended for universal adoption by the General Conference of Weights and Measures—a world body of which UK is a member—in 1960, and this recommendation was endorsed by the International Organisation for Standardisation (ISO) and the International Electrotechnical Commission (IEC) in 1962. Since then most of the major industrial countries of the world have indicated their intention to make SI the only legally accepted system, and many have indeed put the relevant measures on their Statute books already.

It is thus reasonable to assume that SI will become the universal system but it must be recognised that all concerned, including present metric countries, will require a transition period of some years. For these reasons it is now accepted that the UK, in changing to the metric system, should forthwith adopt SI, but it is also recognised that for a few years in documents of international significance it will be advisable to include, against all SI values, their equivalents in the currently familiar metric units.

What are the characteristics of SI which persuade even metric countries to adopt it in preference to their present system? We believe it is generally recognised that the systems of units in current use have to some extent grown haphazardly and in course of time have become adulterated in different ways in different countries to the detriment of international communications. There are indeed variations in the metric systems employed in present metric countries. Whereas any attempt to secure international unification of present systems would be hindered by the natural tendencies of individual countries to prefer their own particular idiosyncracies, the proposal that all should adopt a single "new" system is not beset with such difficulties.

Quite apart from offering a means of international unification of measurement practice, SI offers great simplicity compared with present systems, because it is a rationalised selection of known metric units which preserves the principle of coherence by deriving, from no more than six basic and arbitrarily defined units, units for all the quantities required by any science or technology. It thus provides, for the first time, a single system of units which bridges all sciences and technologies.

The principle of coherence ensures that the derived units are related to the basic units directly through scientific first principles and not through arbitrary conversion factors.

Thus the SI unit for all forms of energy is the Nm or "Joule"—the product of the coherent unit of force, the newton, and the basic unit of length, the metre. Compare this with our British Thermal Unit for heat energy which is related to the basic units of the foot, pound, second system through the arbitrary conversion 778 ft lbf = 1 Btu, or with the metric calorie which is related to the centimetre and gramme of the cgs system through the expression 1 calorie = $4{\cdot}1855 \times 10^7$ dyn cm or ergs. To make matters worse there are two other arbitrary definitions of the calorie for which the conversion factors are $4{\cdot}1868 \times 10^7$ and $4{\cdot}184 \times 10^7$.

In a similar way SI is simpler than the imperial system in that multiples and sub-multiples of units are explicit and do not bear peculiar names. Moreover, the relations between units and their multiples and sub-multiples are consistently powers of 10 whereas in the imperial system the relations are not consistent. Thus 1 km = 1000 metres and 1 metre = 1000 millimetres is much simpler and more consistent than 1 mile = 1760 yards and 1 yard = 36 inches.

Almost any example will show that the simple relations between SI units, requiring no irrational conversion factors, and the explicit nature of the multiples and sub-multiples which are separated from the basic units only by consistent powers of ten, make computations in SI units as much as six times shorter and easier than in imperial units, and hence very much less error-prone.

With all this, the ISO committee which has for the past two years been studying the practical application of SI units has been very realist in its approach. It has, for example, accepted as a principle that any non-SI unit which already enjoys international recognition and use shall not be lightly thrown away. Thus the duodecimal multiples of the second—the minute, hour, day, week, month and year—will continue in common use. Similarly, the 360° division of the circle and the sub-multiples, minute and second will be retained. This committee has also recommended that for even greater simplification, with few exceptions, only those unit multiples and sub-multiples which are separated by the factor 10^3 should be commonly used. Thus our multiples and sub-multiples will, in general, be confined to $10^{\pm 3n}$ where n is an integer.

If the obvious benefits of SI are to be had we must preserve its coherence, not from any academic or purist motives, but for the sake of preserving its utter simplicity.

Many of its derived units employ the coherent unit of force, the newton, which must therefore be recognised and accepted. For many of us this means abandoning a lifetime habit of using gravitational units of force, but if we are honest we shall admit that the coherent unit is the logical choice. It would certainly be foolish to sacrifice the great advantages of SI to die-hard conservatism. For the rising generation who have no bad habits to unlearn, SI is an incomparably simpler system. We ought to do all we can for the rising generation because they will all too shortly become the guardians of the purchasing powers of our pensions.

Let us approach this change in good heart. We are going metric to eliminate duplication and waste in our own national practices, and to make us more competitive in our all-important oversea markets. In the process we are to adopt a system of units which the whole world will soon be using and which is incomparably simpler than any existing system.

MINIATURE ENGINE FOR BODY IMPLANTS

A PROTOTYPE of a miniature engine which some day may be implanted in the human body to operate a heart assist device is being developed under a $182,000 contract from the National Heart Institute, U.S.A.

The engine, powered by electrically produced heat, will be packaged in a capsule about the size of a grapefruit and will be small enough for implantation in the abdominal cavity. It will create controlled mechanical power pulses which will be transmitted to an artificial heart assist pump by means of flexible tubes also implanted in the body.

The one-year programme calls for development of three models of the power source device. Two engines will be built as experimental prototypes and the third designed as an implantable experiment.

The engine will have only one major moving part: a lightweight oscillator operating at a selected frequency to produce variable gas pressure by alternately heating and cooling a fixed quantity of gas.

Heat to power the engine will be derived from a thermal reservoir located in the engine. An electric heating element, embedded in the reservoir, will heat a lithium compound in the reservoir, and the compound then will radiate a steady output of heat sufficient to operate the engine for a period of free-ranging activity by the patient.

Periodically, the heating element will be energized by a high frequency electrical power source placed briefly against the patient's abdomen. The energy will pass harmlessly and imperceptibly through the skin to recharge the element.

The potential advantages include adaptability to miniaturisation, high efficiency, low heat rejection, long life and safety. Minimisation of weight and size is essential because the device must be implanted within the body without impairing the function of body processes or preventing the rehabilitation of the patient to a normal level of activity.

Consumption of Nitrous Oxide in Hospitals

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Introduction

DURING the deliberations of a Working Party charged with the task of writing a Code of Practice for medical gas installations in hospitals, it became apparent that no information was available about the rate of consumption of nitrous oxide in hospitals. Such information is required to determine the capacity of manifolds so that cylinder replacements will be required at reasonable intervals. The following notes describe work done to provide suitable data and the results obtained.

Basic data

The British Oxygen Company Ltd. provided figures for the total quantities of Nitrous Oxide supplied to over 200 hospitals and for the quantities supplied for piped systems at these hospitals. The majority of these figures referred to the year ending 31st March 1967, the remainder to the year ending 31st December 1966.

It was found that the quantities supplied for piped systems represented from 1 to 100% of the total quantities supplied—a reflection of the fact that the coverage of piped systems varied considerably from hospital to hospital.

Analysis was therefore confined to the total quantities since these were a better measure of the hospitals' requirements.

The hospitals were classified according to the system of classification used in the Costing Returns (Table 1) in the light of information given in the 1967 Edition of the Hospitals Year Book. Nominal bed complement figures were taken from the same source. After rejection of certain hospitals because the data were incomplete, figures for 199 hospitals were available for analysis.

Analysis

The average consumption of nitrous oxide in *gallons* per bed for one year was calculated for each hospital. The arithmetic mean and the standard deviation of these average consumptions per bed per year were calculated for each class of hospital. These figures are listed in Table 2.

The differences between the classes of hospitals were then tested for statistical significance using the Variance ratio (F) test and Student's test at the 5% level in each case. It was found that the differences between certain classes were not significant at this level, thus allowing these classes to be combined. The combined classes, or groups, and the appropriate means and standard deviations of the average consumptions of the hospitals in them are shown in Table 3. Means and standard deviations are also given for those classes of hospitals which did not fall into one or other of the groups.

Type of Hospital	*Class Number*
Acute	1
Mainly Acute	2
Partly Acute	3
Mainly Long-Stay	4
Long-Stay	5
Chronic	6
Preconvalescent	7
Convalescent	8
Rehabilitation	9
Isolation	10
Maternity	11
Psychiatric (Mental Illness)	12
Psychiatric (Mental Subnormality) ...	13
Orthopaedic	14
Tuberculosis and Chest	15
Tuberculosis and Chest Isolation ...	16
Children's Acute	17
Eye	18
Other Hospitals	19

TABLE 1.
Classification of Hospitals. For Teaching hospitals the class number is followed by "T".

Linear regression analysis was then applied to the figures for individual hospitals in each of the groups A, B & C to evaluate the relationship (if any) between total consumption and nominal bed complement and between

Class Number	Number of Hospitals in class	Average Consumption of Nitrous Oxide (Gal./Bed/Year)	
		Mean	Standard Deviation
1 T	26	1,543	569
2 T	1	482	
11 T	2	1,130	433
17 T	3	2,351	1,276
19 T	5	1,514	532
1	100	917	512
2	26	603	339
3	8	417	259
4	2	180	18
5	1	108	
11	7	1,120	718
14	3	492	232
15	1	820	—
17	2	868	454
19	12	814	463

TABLE 2.
Means and Standard Deviations of average total consumptions of Nitrous Oxide in gallons per bed for one year according to class of Hospital.

Group	Class Numbers	Number of hospitals in Group and range of nominal bed complements	Average consumption of Nitrous Oxide (Gal./Bed/Year)	
			Mean	Standard Deviation
—	17 T	3 (191 to 341)	2,351	1,276
A	1T, 19T	31 (81 to 968)	1,538	564
B	1, 11, 11T, 15, 17, 19	124 (28 to 1,147)	920	522
C	2, 2T, 3, 14	38 (108 to 1,399)	552	321
—	4, 5	3 (204 to 441)	156	37

TABLE 3.
Means and Standard Deviations of average total consumptions of Nitrous Oxide in gallons per bed for one year according to grouped classes of hospital.

average consumption per bed and nominal bed complement. Better correlations were found between the total consumptions and the number of beds than between the average consumption per bed and the number of beds. A regression analysis was also carried out on the hospitals in group A to determine if a relationship of the form $y = ax^r$ might be more appropriate than the linear relationship already established between total consumption and nominal bed capacity, but this did not prove to be the case. The regression equations found are represented graphically in figures 1, 2 and 3 and are as follows.

Group A Hospitals.

y 2,038x — 220,000
95% confidence limits ± 674,000
range of validity $81 \leqslant x \leqslant 968$

Group B Hospitals.

y 674x + 50,000
95% confidence limits ± 323,000
range of validity $28 \leqslant x \leqslant 1{,}147$

Group C Hospitals.

y 284x + 101,000
95% confidence limits ± 301,000
range of validity $108 \leqslant x \leqslant 1{,}399$

Where y = total consumption of Nitrous Oxide in gallons per year

x = nominal bed complement

Interpretation of results

The interpretation of the regression equations is that the annual consumption of nitrous oxide in hospitals of the relevant class will, on average, be given by substituting the nominal bed complement in the regression equations. If a large number of individual hospitals are considered then 95% will have consumptions in the range defined by the confidence limits; $2\frac{1}{2}\%$ will have consumption greater than the upper limit and $2\frac{1}{2}\%$ will have consumptions less than the lower limit.

If a "maximum demand" figure is required for design purposes this may be obtained by using the upper confidence limit on the regression equation. The designer can be sure that designs based on such figures will prove adequate in at least $97\frac{1}{2}\%$ of all installations. On the other hand if an average figure is required, say for cost estimates for a group of hospitals, this may be obtained from the regression equation directly. The confidence limits would in this case indicate the range within which the costs would fall.

Worked example

A worked example will serve to illustrate the use of the regression equation and confidence limits. An acute hospital having 850 beds is to have a piped Nitrous Oxide installation served by a manifold having the usual arrangement of "duty" and "reserve" banks of cylinders. Portable cylinders will not normally be used. How many cylinders should there be on each bank if change-over is to occur at intervals of approximately 4 days? What

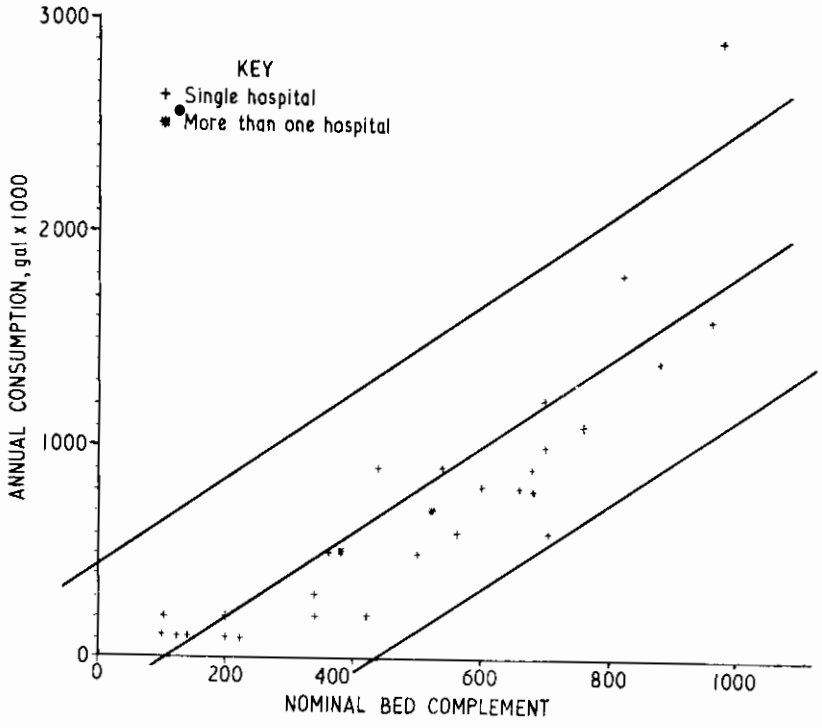

Fig. 1. Relationship between Nominal Bed Complement and Annual Consumption of Nitrous Oxide for hospitals in Group A.

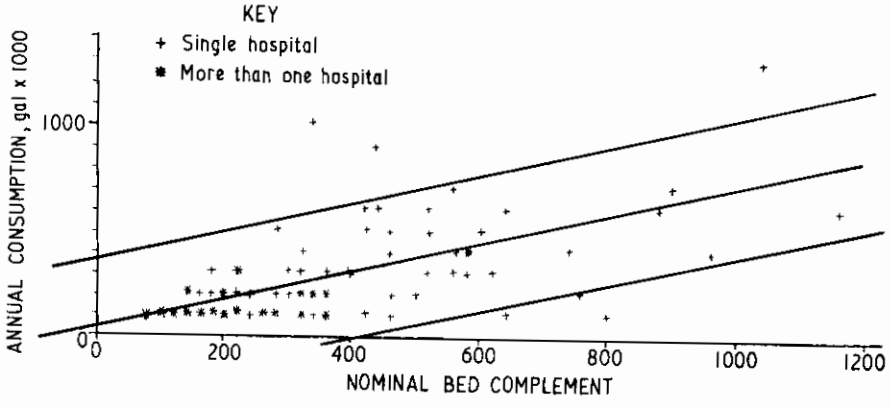

Fig. 2. Relationship between Nominal Bed Complement and Annual Consumption of Nitrous Oxide for hospitals in Group B.

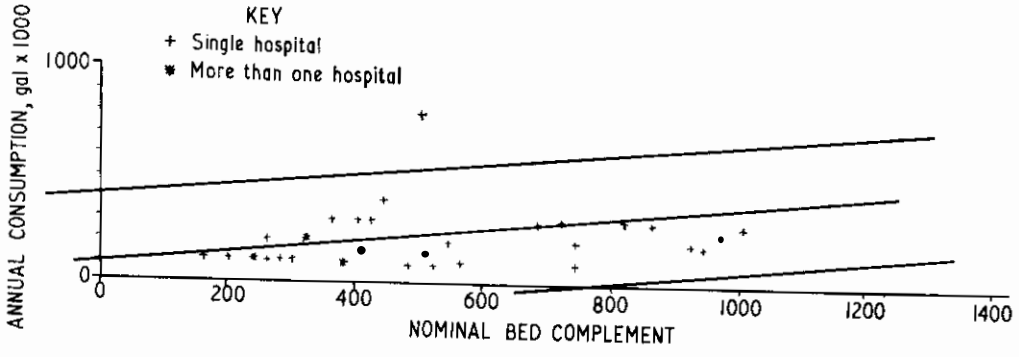

Fig. 3. Relationship between Nominal Bed Complement and Annual Consumption of Nitrous Oxide for hospitals in Group C.

will be the approximate annual cost of Nitrous Oxide? (Nitrous Oxide to be provided in 2,000 gallon cylinders at say £5 each*).

An acute hospital is in Group B and therefore the relevant equation is:

$$y = 674x + 50{,}000$$
with confidence limits ± 323,000

∴ Maximum annual consumption is
$674 \times 850 + 50{,}000 + 323{,}000$ gal.
945,900 gal.

∴ Maximum consumption in 4 days is

$$945{,}900 \times \frac{4}{365}$$

= 10,366 gal.

∴ Number of 2,000 gal. cylinders on each bank is

$$\frac{10{,}360}{2{,}000} = 5{\cdot}18$$

The nearest whole number of cylinders is 5 but one might have to choose between standard units having 4 and 6 cylinders.

Annual consumption (average) will be approximately

$674 \times 850 + 50{,}000$ gal.
622,900 gal.

∴ Annual cost will be approximately

$$£622{,}900 \times \frac{5}{2{,}000}$$

£1,556

Discussion

As in most engineering design problems, a certain amount of judgement and common sense must be used in applying the figures to individual hospitals. The first point to note is that the regression equation plus the confidence limit represents the greatest consumptions which are likely to occur in each class of hospital. This is the only basis on which a general design recommendation can be made but it may lead to designs which are unduly generous in some cases. Since the consequences of under-estimation are not serious (i.e. a more frequent changing of cylinder banks than expected), it may be considered reasonable to specify a somewhat smaller bank of cylinders than the results indicate in certain cases.

The basic data included Nitrous Oxide supplied in small cylinders as well as in cylinders for use on manifolds. Since such cylinders are not usually fully used there is more wastage of gas with them than with piped systems. The consumption figures will therefore be somewhat inflated above the requirements of fully piped hospitals. Unfortunately, there is no way of assessing the difference between the figures available and the true requirements. The regression equations will therefore over-estimate requirements by similar amounts. It is believed that this over-estimate may be in the order of 10%.

The original data referred to the year ending 31st March 1967. The regression equations thereore estimate consumptions for that year. It is probable that usage of Nitrous Oxide is increasing but no information is at present available to indicate the rate of increase. A margin for "growth" will therefore be advisable. Against this, however, must be set the possibilities of over-estimation mentioned above. It would seem reasonable to suggest that, in general, these over-estimations will balance the need for margins for growth, so that the estimates given may be used without adjustment in most cases.

The frequency of changing cylinder banks is a matter of choice according to local circumstances of space, storage available for cylinders, availability of personnel to change cylinders, and the frequency of delivery of cylinders by the gas supplier.

Strictly speaking, the regression equations are only applicable over the range of hospital bed complements included in the original data. Any extrapolation beyond this range should be done with caution.

In cases where the piped system is not designed to serve all areas where Nitrous Oxide is used, the nominal bed complement should be adjusted accordingly before entry into the regression equation. If in the example quoted above there were 400 surgical beds to be served by 2 suites of 3 operating theatres but only one suite was to be piped, it would be assumed that the installation was to serve only a half of the hospital. The number of beds to be entered in the regression equation would therefore be $\frac{1}{2} \times 850$ or 425. If it were expected that the piped system would eventually be extended to serve both suites, then it would be reasonable to install a manifold sized on the basis of the full bed complement.

Hospitals not covered by regression equations

There were insufficient hospitals in classes 17T, 4 and 5 to justify regression analyses. Design figures for maximum consumption in these hospitals may be estimated very approximately by adding the product of the average consumption per bed and the nominal bed complement to twice the standard deviation shown in Table 3. Similar qualifying remarks apply to such figures as those made above for figures obtained from the regression equations.

Acknowledgements

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*It should be noted that this price is hypothetical and that the price varies according to annual consumption.

An All-Electric Laundry

By GEO. W. MUIR, M.I.Mar.E. (Member)
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This Paper gives a brief description of an innovation of engineering interest.

WHEN the then-existing Lancashire and Galloway boilers, the Laundry plant and surrounding building were becoming uneconomical through age and/or beyond repair, a comprehensive survey was undertaken at the Maghull Homes for Epileptics, Maghull, Lancashire, to determine equipment replacement.

An average week's work, taken over a long period, was weighed and calculated and due allowances made for likely emergencies.

In selecting the necessary equipment to deal with the load, consideration was given to capability, safety, machine design and quality of manufacture, capital expenditure and probable running costs.

The most economical propositions were then presented.

After careful study of all possible projects, the Committee of the Maghull Homes for Epileptics authorised the installation of an all-electric laundry, now housed at their Chapel House Estate in a bright, modern, well-ventilated building of progressive-process design, together with an adjacent power sub-station.

Operational speed is considered of secondary importance as non-physical processes, under Staff supervision, provide pleasant interesting occupation for 25 female epileptic patients.

It was essential, however, that the complete laundry programme for the Nursing Staff and three hundred and fifty male and female epileptic patients should be completed in each working week of thirty hours.

A comparison was also made of the running costs between the then-existing and an estimation for the proposed scheme which would provide an indication of the yearly return for capital expenditure involved.

Planning for drainage from washing machines and hydro-extractors and for dry-floor surfaces were given special study.

Calculations of machine capacities, speed and numerical balance; power cable and switchgear loading and distribution; heated-water storage displacement, heating surfaces, circulation and thermal recovery and volumetric performance were determined by derivative variants. Without impairing efficiency, and obviating unnecessary initial and recurring costs, no machine was installed in capacity-excess of the absolute operational demand.

The plant for the new scheme is comprised of the undermentioned items:

5 Washing Machines, end-loading, manual control.
2 Hydro-Extractors, self-balancing.
2 Tumblers, end-loading.
2 Calenders, element bed-heated, single-roller, front load and return.
1 Clothes Press.
1 Starch Mixer.
2 Hot-water Storage Heaters.
1 Gravity Water Tank.
1 Water Softener Unit.
16 Hand Irons.
1 Weighing Machine.
2 Drying Chambers.

Electricity was chosen as the motive power because of its controllability and consistent uniformity in supply: characteristics which, in the case of a laundry, make electricity cheaper than steam. Electricity permits the heated-water temperature to be maintained thermostatically at off-peak rates, and, industrially, as requirements necessitate, any process can be immediately commenced or stopped without precost or follow-on expenditure. The production of steam, by hard fuel or oil, involves stoker or boiler attendants' labour charges, and when developed continue during gap-periods which are wasteful by BTU. losses.

Sequence speeds were so arranged that all processes under normal working conditions become functional without incurring machine time-lag. Incoming loads from the nine Homes are staggered on a day-to-day basis, maintaining an even work flow and allowing improved individual inspection and attention. Items arriving one day are, under expert supervision and by using balanced cleansing co-agents, returned to source the following day perfectly laundered, dried and aired. Exact costings are readily available and accurately recorded daily.

The new laundry has been in full use for three years with satisfactory results. Cleanliness and quietness are noticeable features. There are no fuel stocks, shaftings, boiler, chimney or humid atmospheres.

The running costs and savings are favourably comparable with those estimated.

What will really be the shape of Hospital Management in 1980?

By B. A. HERMON, A.M.I.Mech.E., M.I.H.V.E. (Member)

IN JUNE 1967 King Edward's Hospital Fund for London published the report of a Working Party set up jointly by the King's Fund and the Institute of Hospital Administrators. The report was given the title "The Shape of Hospital Management in 1980?"

In the preface of the report, it is made clear that the King's Fund and the IHA ". . . . . do not necessarily agree with all the views expressed" in it and that it should stimulate discussion which will help to advance thinking on the future patterns of management in the hospital service.

Mr. L. H. W. Paine of the Working Party is reported to have said in his address given to the Annual Meeting of the President and General Council of King's Fund on 27th July, 1967, that detailed research was not undertaken but that the long experience of its members was drawn upon.

Apart from fringe mention, the subject of maintenance was dismissed in the course of one paragraph which concluded that the maintenance department should not form a separate service under the control of a director.

In spite of what they say in paragraph 47, has the Working Party under-estimated the degree of responsibility carried by the maintenance engineer now and failed to forecast the degree of complexity and reliability required in 1980?

The capital value of the buildings, engineering services and furniture and equipment that go to make up a district general hospital today is around £7,000 per bed, i.e. some £5·5m for an 800 bed district general hospital. Many general hospital Group Engineers, as we know them today, are responsible for over 2,000 beds and, as admitted in the report, the tendency in 1980 will be for larger groups to be formed. Although they have not forecasted the degree of responsibility to be vested in a district board, it could well be around 4,000 to 5,000 beds. This means that the capital value of the engineer's responsibilities could be around £31m and no man can effectively maintain this amount of work without having a direct link with the general manager and without having a direct voice on the "Board of Directors". In industry, this man would almost certainly be a works director and would be a paid member of the board.

The more enlightened members of the medical profession will often admit that the life of the patient lies not only in their hands but very much in the hands of the engineer because, as the complexity increases, the chance of failure will also increase due to the number of mechanical, electrical and electronic components involved. The layman tends to under-estimate the possibilities of complete failure. The days have passed when the less sophisticated and more crudely constructed plant and equipment could be temporarily repaired with a nail and a piece of string! Slick and high powered management will therefore have to come from the engineer responsible for keeping the services in operation.

Maintenance in 1980 will almost certainly be managed by highly qualified men. These must be recruited and trained now but, unless they can see a structure which leads to director status and salary, the best and most suitable recruits will not be attracted. If these facts are not recognised by management and they fail to see the need for a separate arm for maintenance, then almost inevitably there will be a case for greater centralisation of engineering maintenance, possibly under the Regional Board or even under a national organisation, to give a service similar to that provided for other public buildings by the Ministry of Public Buildings and Works. Already the case is being made for the maintenance of some specialties to be dealt with at regional level, particularly where there are a number of small groups in which it would be uneconomical to employ specialists, and they have to rely entirely on contract labour.

The Ministry of Health and the Treasury must soon see the need for a closer link between capital and revenue expenditure. At present, a Management Committee can give a lower priority to maintenance than for other items and leave plant, services and buildings to run down such that they have to be replaced, in many cases, long before their full life expectancy has expired and this invariably creates an unwanted commitment on capital funds. If this vicious circle is to be tightened, it is apparent that the engineer at district level must either have a direct voice on the district board or make a direct appeal to a higher authority, but the latter could only work if maintenance is taken out of the hands of the district board altogether.

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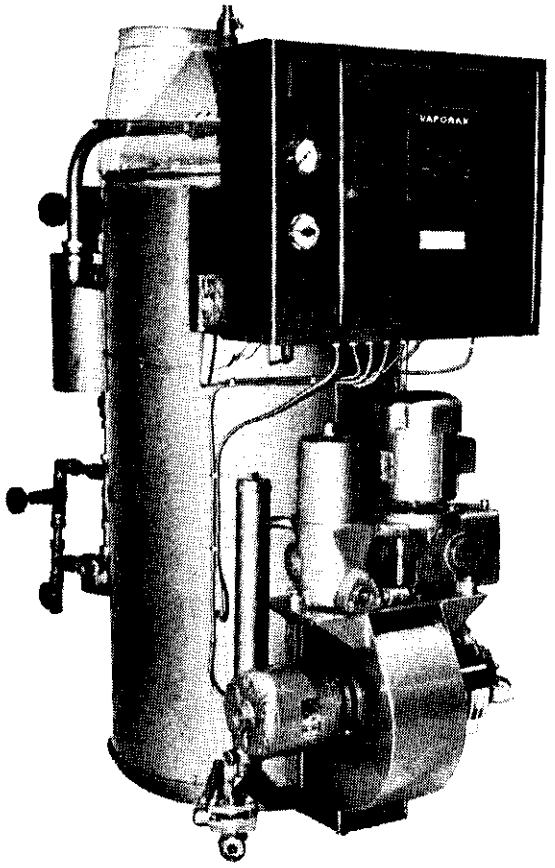

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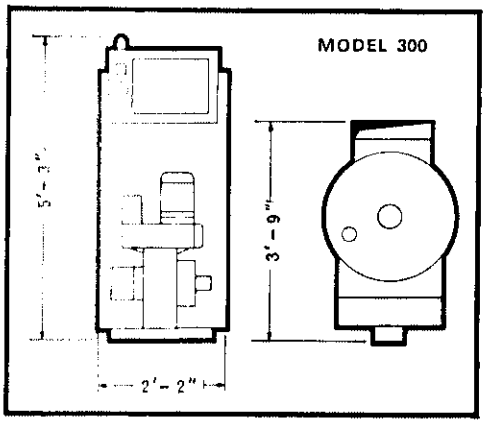

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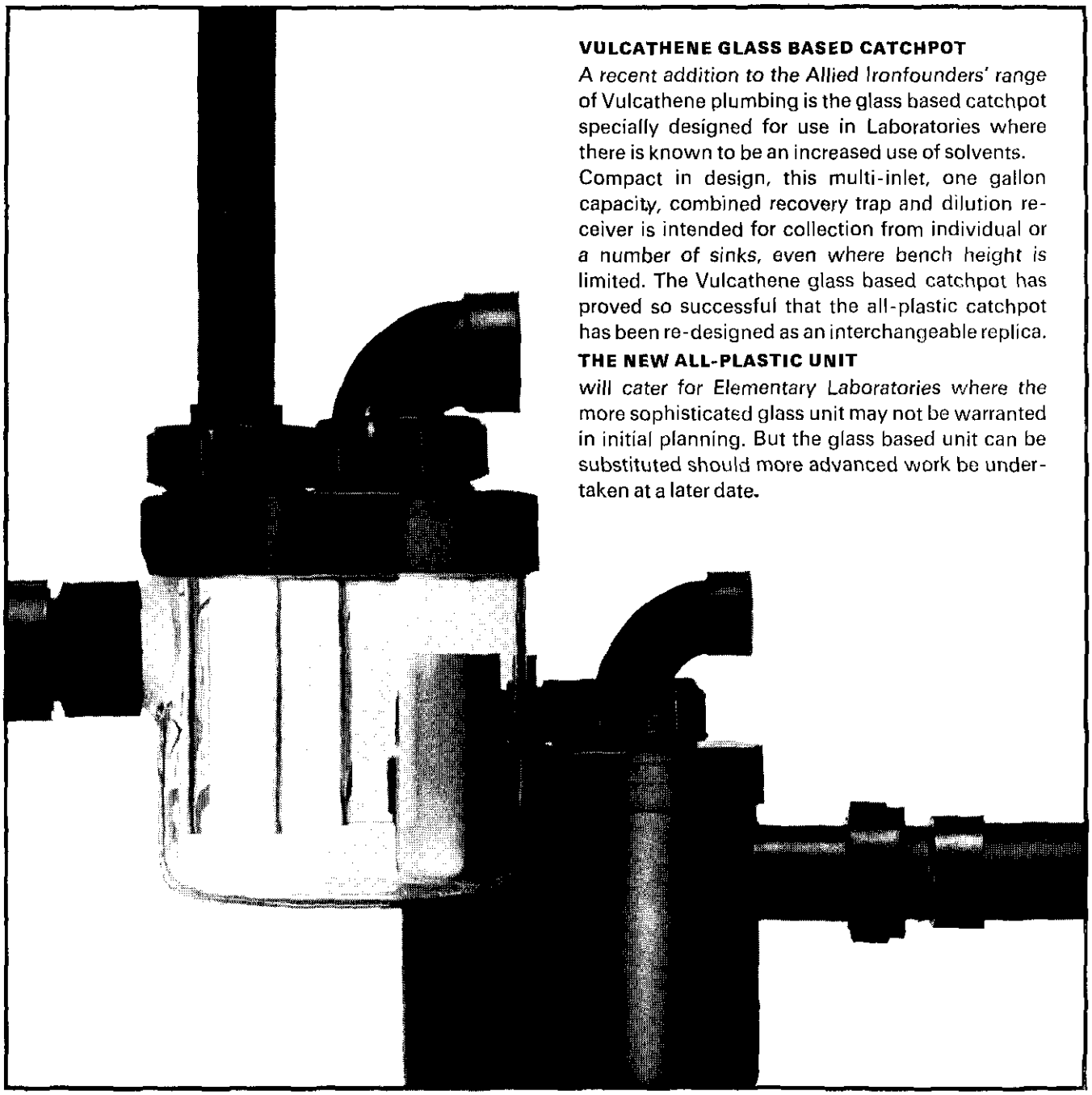

VULCATHENE GLASS BASED CATCHPOT

A recent addition to the Allied Ironfounders' range of Vulcathene plumbing is the glass based catchpot specially designed for use in Laboratories where there is known to be an increased use of solvents. Compact in design, this multi-inlet, one gallon capacity, combined recovery trap and dilution receiver is intended for collection from individual or a number of sinks, even where bench height is limited. The Vulcathene glass based catchpot has proved so successful that the all-plastic catchpot has been re-designed as an interchangeable replica.

THE NEW ALL-PLASTIC UNIT

will cater for Elementary Laboratories where the more sophisticated glass unit may not be warranted in initial planning. But the glass based unit can be substituted should more advanced work be undertaken at a later date.

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Vulcathene is a *complete* system of plumbing equipment covering pipes, fittings, valves and vessels, especially for use with liquids of a corrosive nature. Vulcathene is tough yet light in weight, is non-toxic, cannot rust, corrode or support bacterial growth. And installation and jointing are cheaper than with any other conventional plumbing material. We can send you a booklet that gives details of the complete Vulcathene range.

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The qualifications now required by Group and Hospital Engineers involve some seven years of study to degree level and include some 240 hours in Industrial Administration, including organisation and management, which provides the qualified engineer with a solid foundation upon which a more detailed training in hospital management can be built. The King's Fund should prepare the ground for what is more likely to happen in 1980 and, as a matter of urgency, divert some of their resources towards the management training of maintenance engineers, leaving the recently formed Advisory Committee for Hospital Engineering Training (ACHET) formed by the Ministry of Health to undertake, at least in the immediate future, the detailed technical training.

The Institute of Hospital Engineering can continue to play an extremely useful part in running the post-experience courses which have been so successful in recent years. The ACHET training centre could take over management training when it has established the technical courses.

The tendency towards centralisation may well be greater than forecast. Salaries and statistics are already being processed on RHB computers on simple information fed to them from HMCs and, as the central supplies organisations get under way, more revenue accounts may well be paid directly by RHB and the finance and statistical responsibilities at district level could possibly be reduced to within the capabilities of a man well below that envisaged for the post of director.

The report suggests that there will be a high proportion of staff employed by the district board but, in fact, the reverse may well be true due to this greater centralisation of supplies, finance and statistics. Some authorities are also advocating, and there are already examples of regional CSSDs, regional laundries under a general laundry manager and regional catering using deep frozen food and central preparation as many of the large catering firms do already because communication at off-peak times is much easier with the development of motorways and city ring roads.

There is a recommendation that the chairman of this high-powered district hospital board should be appointed for three years at a time but, apparently, allowing no stated time in which the effectiveness of the general manager and the service directors can be assessed. If the Working Party really want to see the organisation move on to industrial lines, the general manager and service directors should be on short-term contracts, say five years, so that they can be removed if they are not getting results, for it seems that the intention of the report is to lessen the real powers of committees and place practically all the power in the hands of the general manager. Should he and his service directors not, therefore, go the way of all managers who fail to manage in the industrial type of organisation?

The chairman of the Working Party in his opening remarks said:

> "Predicting the future is difficult and it is unlikely that what emerges as the pattern of administration in 1980 will follow exactly the pattern suggested . . ."

There is certainly room for a far wider discussion and more detailed consideration of future developments and it will be interesting to see what will really be the shape of hospital management in 1980.

NEW WING TO PETER PAN HOSPITAL

J. JARVIS & SONS LTD. are to begin construction this New Year of a wing to the Great Ormond Street Hospital for Sick Children, London, famous for its connection with J. M. Barrie who left it the royalties from his famous book "Peter Pan". The contract for the new wing is valued at £315,669 and is due for completion in mid-1969.

Architects Cusdin, Burden and Howitt have designed a four-storey building covering an oblong area of approximately 11,500 sq. ft. The new development will be joined to existing premises to form an unbroken block over 400 ft. long.

The building will be of reinforced concrete construction, with hollow-tile floor slabs supported on hollow columns.

An interesting feature of the new wing is the manner in which the architects have incorporated the service ducts into the physical structure of the building. They have achieved this by designing the columns as square tubes of concrete whose hollow cores provide voids in which electrical cables, ventilation ducts and plumbing pipes can be run between the floors. These vertical voids are linked at each floor by horizontal voids accommodated within the thickness of the floor slab, so that the structure itself provides a network of interconnected vertical and horizontal shafts for the concealment of piping, ductwork and cables. The necessity of suspended ceilings to conceal services is thus obviated. By integrating structure and services in this way, it is claimed, greater flexibility of service facilities can be provided than is possible under the accepted system and at no extra overall cost.

The new wing has been planned in two sections one of which forms an extension to the Out-Patient Department, with new Clinics for the departments of Physical and Psychological Medicine. The other section provides much-needed residential accommodation for the Hospital's Medical staff in the form of 1, 2 and 3-bedroom flats.

Water tanks and ventilating equipment are housed in a super-structure at roof level, and at ground floor level the building will incorporate a branch of Williams Deacons Bank, which had premises in one of the original Victorian houses that occupied the site.

The new building is finished externally as existing buildings, with aluminium windows and slate cills to match.

British Calibration Service

An important new aid to industry

BRITAIN'S new calibration service for instruments and other measuring devices, for which the first few laboratory approvals were announced last month, will help users as well as manufacturers of precision instruments in their fight for bigger export sales.

The instrument manufacturers have in recent years become particularly aware of the need for a service which can provide an independently authenticated calibration for any type of measuring instrument. It was largely as a result of their initiative through the Scientific Instrument Manufacturers' Association that the British Calibration Service (BCS) has come into being.

A BCS certificate with a new instrument will give its purchaser the assurance that when tested its calibration was in accordance with the performance claimed for it. This should greatly benefit instrument manufacturers who make use of BCS authentication—especially any company entering the field with a new type of instrument. For sales abroad, where many companies are less well known, the authority of an independent national service may be of crucial importance.

A firm using precision measuring instruments will not only have authoritative reports on the performance of new equipment, but will also be able to send each instrument to a BCS laboratory periodically for re-calibration and obtain each time a reliable account of its performance.

The consequences of having certified instruments on which a firm can rely may be very far-reaching. For example, it may be possible to liberalize designs to some extent, reducing the allowance for measurement uncertainties. Again, confidence in one's measurements can lead to reductions in scrap.

It is not too much to hope that the BCS will have the same potential effect on the British instrument industry as the tightening-up of inspection has had on the Japanese optical industry.

Heavy work load

Calibration may develop into surprisingly big business. From figures of home deliveries and imports it has been estimated that there is, for example, about £100m worth of electrical and electronic testing and measuring equipment (valued at its purchase price) at present in use in the UK. All this needs periodic recalibration if it is to be fully trusted. This task, if fully discharged, would require something like four million manhours annually, or, say, 2,000 operatives, plus supervisors, instructors, maintenance staff and storekeepers. An equally rough estimate of capital costs produced figures of £2-3m for laboratory space and £5-7m for laboratory equipment.

These figures, of course, cover only the calibration of users' testing and measuring equipment, not its use in production testing. Also they relate only to electrical and electronic equipment, so that there must be a substantial additional requirement for calibration of other types of measuring equipment, for example, that for engineering metrology and for measurements on fluids.

From this it can be seen that the potential national calibration task is considerable. One of the tasks facing BCS is to try to assess the adequacy of the resources available to meet this national requirement.

The demand for higher accuracy on many measurements is the main reason why calibration is assuming such great significance and why a national calibration service has become necessary. As greater accuracy becomes more difficult to measure, instruments themselves tend to become more complex and hence inherently less stable and more liable to failure or damage. At the same time precise measurements are becoming increasingly vital to many industrial operations and processes and very costly decisions are based on instrumental readings. Also, in many overseas markets the customer is unable to check the accuracy of instruments himself and is entirely in the hands of the supplier. For all these reasons it has become essential to provide an independent service that can authenticate laboratories offering regular calibration of instruments in service.

How the scheme works

Any established laboratory, in industry, research association, Government department or academic institution, can apply for approval by BCS. Many instrument firms will seek approval primarily so that they can offer a new instrument with a BCS certificate, but they will be expected also to accept their earlier models for recalibration, and since it is a public service they will be encouraged to accept for calibration other makes of instruments within the scope of their respective BCS approvals.

A laboratory's approval by BCS is for certain specified types of measurement. When applying for approval it has to state the types and ranges of measurement and the accuracy of measurement, expressed as an uncertainty, for which approval is sought. Guidance is provided on the way in which a laboratory may publicise its work and on the way BCS certificates may be reproduced, in order to ensure that the scope of a laboratory's approval is made clear to the users of the Service. A BCS laboratory provides an authenticated calibration service to its customers on a normal commercial basis. There is no BCS standard scale of charges for calibration work, but BCS headquarters is informed of the bases for charging used by the approved laboratories, and would enquire into any case of apparent gross disparity of charges for comparable work.

An approved laboratory is required to charge at the same rate, actually or notionally, for any "internal" work that it undertakes for another part of its own organisation, as for work undertaken for an external customer. This means that a small organization, unable to attend all the equipment needed for the calibration it requires, can get the work done at a cost comparable with that incurred by a larger and better equipped organization. It also ensures

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an equitable basis for that part of the fees paid by the laboratory which is related to the amount of calibration work carried out by the laboratory. These fees are intended to offset the cost of running the Service.

Role of the BCS headquarters organization

Planning and regulation of the Service is the responsibility of the BCS headquarters organization in the Ministry of Technology. The initial tasks of the headquarters staff have been to develop in full detail the procedures for operating the Service, taking into account the views and recommendations of its Advisory Council, and to establish with the advice of its Technical Panels the criteria for the approval of calibration laboratories.

The headquarters staff deals with applications for approval, and supervises the operations of approved laboratories to ensure that the requirements for approval continue to be met.

As the Service becomes fully established various other central services will be initiated to improve its usefulness and efficiency. For example, as calibration records accumulate it will become possible to analyse them with the aid of a computer to find how often each type of instrument ought to be recalibrated. The information thus obtained should result in maximum economy of calibration and may well also result in some re-evaluation of designs.

Requirements for new or improved national standards and measurement techniques will undoubtedly be disclosed by the work of the Technical Panels, and it will be their task, working through the Advisory Council, to try to ensure that adequate provision is made and work is started in good time to meet the needs of instrument makers and users.

Advisory Council and Technical Panels

To advise on the operation of the BCS, and particularly on the requirements which laboratories must meet in order to be approved, the Minister of Technology set up an Advisory Council on Calibration and Measurement, under the chairmanship of Mr. Maurice Banks. Its twenty members include the technical director of CBI, the director of BSI, the directors of NPL and NEL and other senior people from industry, academic life and Government service.

The Advisory Council agreed at its first meeting to set up Technical Panels each of which is related to an individual field of measurement. Four panels have been appointed so far, dealing with the following fields of measurement:

Electrical quantities at d.c. and low frequencies

Electrical quantities at high frequencies

Mechanical quantities

Fluids

The establishment of two further panels, to deal respectively with optical and thermal measurements, is currently in hand.

Each panel consists of a chairman who is also a member of the Advisory Council, and about eight to ten members. Every member has been selected for his expert knowledge in some part of the field covered by his panel, and it is part of the scheme that panel members take an active part in the investigation of laboratories and the supervision of those approved.

The official terms of reference of the Technical Panels show the breadth of their responsibility: "To examine and to report to the Council on all aspects of the establishment and operation of the comprehensive national calibration service for the classes of measurement allotted to the Panel, and on such other subjects, for instance education in measurement science, as the Council may deem to be relevant to the calibration service; also to take an active part in the establishment, operation and other associated activities of the calibration service by specifying technical requirements and by contributing or proposing members for inspection teams."

Calibrating the calibrators

The calibration work of a BCS approved laboratory is authenticated in relation to the quality of its staff, and the procedures it employs, and to the validity of the laboratory's calibration standards. This last aspect demands that there be an approved system for checking the calibration standards against others of higher quality, and that these higher standards be linked in a known way with the appropriate national and international standards. This is the concept known as "traceability."

Traceability means that every standard used for calibration has itself been calibrated against a standard of higher quality up to the level of the accepted national standard, which is usually the responsibility of a government laboratory.

Another important factor in traceability is that each calibration standard shall be re-calibrated often enough to ensure that it is unlikely to have moved outside known limits. The calibration of any instrument against a standard is strictly valid only at the time of calibration—after that its performance has to be inferred from the quality of the instrument and of the people who use it, and the environment in which it is used.

The first four approved laboratories

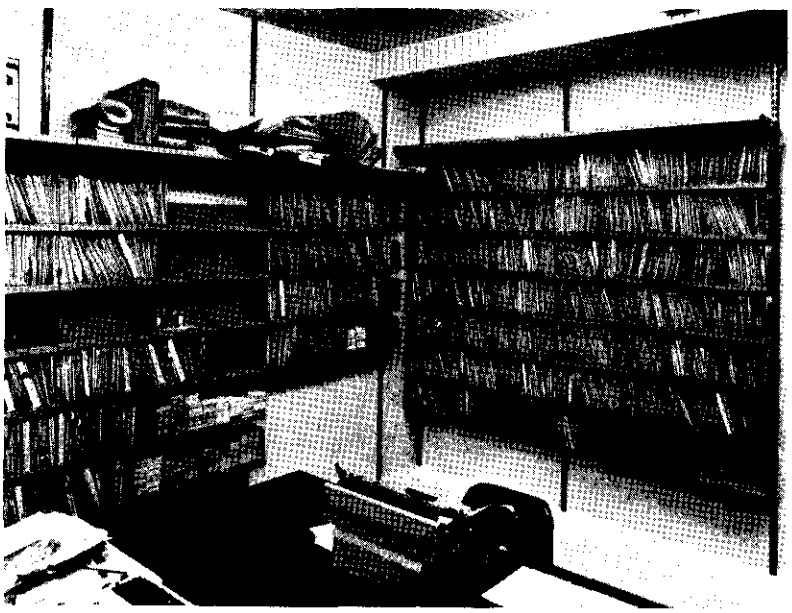
Three laboratories specializing in mechanical measurements and one in electrical measurements have so far been approved to operate within the British Calibration Service. Further announcements will be made as other laboratories gain approval. Approval is given in each case for a specified range of measurements, details of which can be obtained from either the approved laboratory or British Calibration Service headquarters.

The Coventry Gauge and Tool Co. Ltd. manufactures products in the precision measurement field ranging from slip gauges to sophisticated measuring machines. For many years its Fletchamstead Highway Laboratory in Coventry has provided a calibration service not only for the company's own products but also for a wide variety of measurement standards and gauges. The facilities have recently been improved to make more capacity available for calibration work under the BCS scheme over a wide range of measurements in engineering metrology.

One of the oldest manufacturers of gauges, Pitter Gauge and Tool Co. Ltd. of Woolwich, has been approved as a BCS laboratory offering length, angle and form measurements. The scope of the approval is sufficiently broad to meet a large proportion of the requirement for such calibrations.

In mechanical measurements, the Standards Laboratory of the English Electric Company Ltd., at Stafford, has a high reputation; this is especially in respect of lengths over 100 inches, due to the requirements of large electrical machines. The facilities have now been approved as a BCS laboratory and while it will continue to discharge its normal responsibilities for the Group, capacity has been made available for outside customers.

The Ferranti Ltd. calibration laboratories at Wythenshawe, near Manchester, have been granted BCS approval to undertake electrical measurements at d.c. and low frequencies for a wide range of parameters. Besides continuing to provide measurement and calibration facilities for those parts of the parent company within the Manchester area, the laboratories will now provide a service to other organizations.



LATERAL FILING FOR MEDICAL RECORD ENVELOPES

A new lateral filing system based on Spur adjustable shelving has been developed by Spur manufacturers, Savage & Parsons Ltd. of Watford, Hertfordshire.

Developed in conjunction with a medical group practice at Oxford for convenient and space-saving filing of N.H.S. medical record cards, the new system is expected to meet many other filing requirements.

It comprises standard Spur uprights, wall-mounted or free-standing double-sided units, into which L-section steel shelves are fitted at the required spacing.

CONVENIENT filing of large numbers of N.H.S. medical record envelopes without sacrifice of valuable floor space is one of the major problems for medical practitioners. The new doctors' clinics at East Oxford Health Centre (Cowley Road, Oxford) have solved this problem in consultation with Savage & Parsons Ltd., Watford, Herts, manufacturers of the Spur adjustable shelving system.

The clinics are twin practices with separate waiting and reception rooms, consulting rooms, and examination rooms, and a large modern treatment room shared by both groups.

In one group, Dr. M. J. V. Bull, with two partners, has a panel of 8,500 patients, while Dr. M. Stein heads the other group with a similar list.

When setting up the clinics, Dr. Bull asked for the assistance of the Spur advisory service in devising a specialised system for patients' record envelopes. It was essential that all envelopes should be readily accessible, clearly indexed in groups by sex and alphabetically, and while taking up a minimum of space, should be planned to allow considerable expansion.

The result of this consultation is a lateral filing system specially produced by Savage & Parsons, based on their divided shelving, and using standard wall-mounted, slotted uprights into which steel shelves 6 in. wide and one metre long are fitted at a vertical spacing of approximately nine inches. Metal dividers, four inches high, are then added at any required horizontal spacing, fitting into slots (which are at 5 cm. intervals) in the base and raised back of the shelf.

The four-inch high raised back of the shelf acts as a stop, ensuring that all envelopes are neatly aligned, and prevents any of them being pushed against the wall or slipping down behind the shelving. The leading edge of each shelf is a square profile, with a broad face for labelling strip if required. Dr. Bull, however, has chosen to index his records with alphabetical tags mounted on the dividing plates. Coloured, 6½ in. by 6½ in., melamine tracer cards are also provided for easy relocation of extracted envelopes.

In his group's reception room, 8,500 record envelopes are filed on 36 metres of divided shelving, at about 250 per metre. Spare capacity is allowed for by mounting the shelving on wall-mounted uprights 8 ft. 6 in. high, the top general-storage shelf being replaceable by lateral filing.

All Spur components used in this new lateral filing system are of steel, stove-enamelled in willow grey or white for long life and easy cleaning.

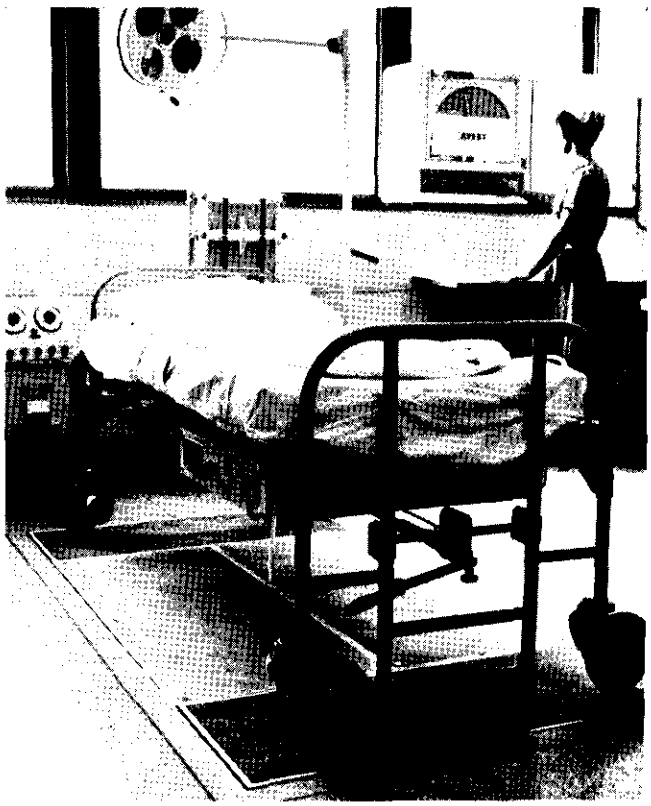
Maximum projection from the wall is only 6½ in., compared with up to two feet, plus extended space, for conventional filing cabinets, and at least 30 in. for cupboard systems.

ELECTRONIC WEIGHING MACHINE FOR ST. THOMAS' HOSPITAL

WHAT is thought to be the most advanced and accurate electronic weighing machine in Europe for medical purposes has been supplied by W. & T. Avery Ltd. to St. Thomas' Hospital, London. Used in the recently built intensive-care unit in the treatment of patients whose lives depend upon the aid of external mechanical or electrical equipment, the 200 kg.-capacity scale indicates loss or gain of weight during treatment to an accuracy of 20 gram (0·7 oz.). This extreme sensitivity is important in many intensive-care treatments. In blood dialysis, for example, the average amount of fluid —representing impurities—removed in each hour by the artificial kidney is only about 120 gram and this figure is critical. To eliminate the need for calculations, the machine displays the patient's basic weight separately from the minute-by-minute indication of weight change.

Before installing the new machine in September 1967, St. Thomas' Hospital employed ordinary bed scales for most weighing purposes but, although highly accurate, these could not be used in association with all designs of bed. One of the most attractive features of the electronic weigher, on the other hand, is its versatility. It will accept any type of bed, or any other piece of movable hospital equipment, having a wheelbase that will position the load-carrying wheels on the floor-level weighing platforms and can, in fact, be used in almost any medical function requiring precision weighing.

The intensive-care unit at St. Thomas' is one of the newest, and possibly most advanced, in the country. It is housed in the hospital's new block on the Thames Lambeth embankment and can accommodate up to ten patients at a time.



Patient's basic weight is indicated separately from minute-by-minute weight changes. An attractive feature of the machine is that it will accept any bed or equipment having a wheelbase that will position the wheels on the floor-level weighing platforms. It can, in fact, be used in almost any medical function requiring precision weighing.

"Light-heavy" indication

Sited in a special treatment room, the scale consists of two interconnected platforms, each mounted on two suitably rated load cells, and a servo dial indicator with a 120° segment chart reading "light" and "heavy" over a 4 kg. range each side of zero with minor divisions of 0·04 kg. (40 gram).

At floor level so that a bed can be pushed on, the platforms are each 3 ft. 6 in. x 18 in. and spaced to accept the wheels of a bed of nominal 6 ft. 6 in. wheelbase. An inactive platform is installed between them at the same level.

The indicator is equipped with a tare system, which is operated by five decade weight-setting switches to determine the weight of the patient, and a zero balance with a ±5 kg. range to cater for variations in the weight of different empty beds and fittings. Calibrated 0 to 199·9 kg. x 0·1 kg., the taring system is accurate to better than ±0·4 kg. (less than one lb.). Within the indicator, a back-balance circuit preset at 250 kg. and adjustable ±70 kg. compensates for the weights of the weighing structure and the empty bed and fittings.

Method of operation

The machine is used for general-duty medical weighing to high accuracies. This includes periodic weighing during treatment, weighing before and after treatment and continuous weighing during treatment. (A constant monitor of weight is maintained during haemodialysis, when the patient is connected to a kidney machine for a ten- to twelve-hour period of treatment.)

When the patient is placed on the bed the pointer moves from zero and the patient's basic weight is then established by setting the decade tare switches until the pointer zeroes again. His weight in kilogrammes is shown in apertures above the switches, the apertures reading from left to right in hundreds, tens, units and first and second places of decimals. Thereafter, any movement of the pointer from zero signifies a loss or gain in weight.

Electronic control circuits

Housed in the left-hand door of the shelf-mounted indicator cabinet together with the tare and zero balance controls, the dial indicator has an 18½-in. diameter reading line with chart figures and graduations in red on the "light" side of zero and in black on the "heavy" side. The right-hand door provides access to the preset calibration circuits

and stabilized-power-supply unit. A mains isolating switch and "supply-on" lamp are fitted to the same door. An incoming cable entry for the screened 240 V., single-phase, 50 c/s supply is provided in the base of the cabinet.

The four load cells, each mounted on a ball free-motion unit to eliminate non-vertical loading, are connected to a junction box beneath the inactive platform. A special cable —armoured to shield the circuit from local interference— transfers the load-cell signal from this box to the servo dial indicator, where it is amplified and applied to the control winding of the servo motor to drive the weigh pointer.

All exposed parts of the scale are finished in easily cleaned, hygienic materials. The indicator cabinet is in white stove enamel and the coverings on both active and inactive platforms are vinyl.

PRODUCTION LINE FOR STEEL CHIMNEYS

Certainly the first factory in England, probably in the world, and designed exclusively for the mass production of steel chimneys was officially opened by The Lord Margadale of Islay, at Woodlands Road, Mere, Wiltshire, on 8th February, 1968, for F. E. Beaumont Ltd.

The vast improvements in design and insulation techniques, largely pioneered by the company, have in recent years greatly increased the demand for their steel chimneys as the most economical types of chimney for all kinds of boiler and plant.

Despite increased production at the London factory it became evident two years ago that they would not cope with the ever growing demand unless further factory space and machinery were available.

In April, 1966, a partly constructed factory on a five acre site in Mere proved to be ideally suitable for requirements. The site was purchased, the design of the factory modified and new building work commenced in the late Autumn of 1966.

Meanwhile the design of the production line was proceeding. This was to be based solely on the line production of steel chimneys—parallel, coned, multiple coned, double skinned, multiple flue, etc., many of these designs being covered by the company's own British patents. Both England and the Continent were searched to ensure that the most advanced machinery available was obtained.

By August, 1967, the factory was completed and work on the office block commenced. Key employees were transferred from London and local labour was engaged to train in the new techniques.

A certain amount of pilot production has been possible and the factory is now ready to commence full scale production.

Included in the pilot production was the chimney for this factory. This is unique in that, in addition to having individual insulated chimneys to serve two boilers, it also incorporates the oil storage tank, the cold water storage tank and the hot water header tank together with all service pipes and fittings. Overall, the chimney is protected with a "Superclad" aluminium insulation for corrosion protection when in operation and as off-load insulation for the services.

An appreciable market is known to exist and Beaumont's hope to develop a significant contribution to the export trade.

THE HEVAC EXHIBITION

The fifth International Heating, Ventilating and Air Conditioning Exhibition will be held at Olympia, London from 22nd to 27th of April, 1968. It is claimed to be the largest specialist exhibition of its kind in the world.

There will be 250 firms from a dozen countries exhibiting covering a stand space of over 120,000 sq. ft. A wide range of equipment concerned with heating and ventilating can be seen, from industrial boilers and heat exchangers to domestic fittings.

Daily opening times are 10 a.m. to 6 p.m., but opening is extended to 9 p.m. on 23rd and 25th April. The last day closes at 4 p.m.

NAIRN FLOORING IN KENT CENTRE

More than 45,000 sq. ft. of welded vinyl flooring has been installed in the new Accident and Emergency Centre at Dartford District Hospital. Nairn Floors' Crestalux sheet has been laid in the wards and service rooms, and Nairn Crestaline sheet in the corridors and waiting areas.

Both Crestaline and Crestalux—two of the Nairn materials included in the Ministry of Health Compendium of Hospital Building Assemblies—are officially approved as suitable for use in hospitals, nursing homes and clinics because they are hygienic, durable, and easy to lay and to maintain. All the flooring at Dartford District Hospital has been welded to give a seamless surface.

The well-equipped Centre, which forms the first phase of the hospital's major redevelopment scheme, serves a wide area of North West Kent including sections of the A2 and A20 trunk roads and the motor-racing circuit at Brands Hatch. It comprises two operating theatres, a 22-bed accident ward and a smaller ward with room for six "short-stay" patients. The X-ray Unit includes Image Intensification equipment.

MOBILE MASS RADIOGRAPHY UNITS FOR TURKEY

A further two Watson Mass Radiography Units have been ordered by the Turkish V.S.D. organisation. Each unit consists of two vehicles, one carrying the control, camera and tubehead and the other carrying the cabin in dismantled form.

Other similar units are already operating in Turkey and are part of the Turkish government's campaign against T.B. The apparatus is easily set up and is capable of X-raying approximately 100 people per hour.

Use of vehicles such as Land Rovers enables the more difficult terrain to be safely negotiated, thus bringing the benefits of mass radiography to even the remotest villages.

These units feature the Watson-Odelca 70 mm. camera and Watson MX 4 Tubehead. Other similar units also manufactured by Watson & Sons (Electro-Medical) Ltd. of Wembley are now operating in Peru, Pakistan, India, South Africa, Kuwait, Sabah and Brunei.

B.S.I. News

Abstracts of information supplied by the British Standards Institution

BSI PUBLICATIONS

(*The B.S.I. Sales Office is now at Newton House, 101/113 Pentonville Road, London, N.1; Telephone* 01-278 2161, *Telex* 23218)

METRICATION

To help those now involved in making or planning the change to the metric system, code letters are being introduced in *B.S.I. News* to indicate standards published in metric units and those, such as glossaries, which are independent of any unit system.

The code letters are printed on the right hand side of the titles of relevant specifications, and have the following significance:

M Standards in which the requirements are specified only in metric units (in some instances, approximate imperial conversions are included).

M + I Standards in which the requirements are specified in both metric and inch units, either system being used exclusively to produce the required result.

N Standards which by their nature are independent of any system of units, e.g. colour codes and glossaries.

This coding will also be applied to British Standard Codes of Practice.

Standards not coded are still expressed in imperial units; they generally include approximate metric equivalents.

STANDARD BOOK NUMBERING

As the result of consultation with the Standard Book Numbering Agency, and in common with other British publishers, B.S.I. has agreed to allocate to each of its publications a Standard Book Number (SBN).

The numbers allocated to current publications will appear in *B.S.I. News* each month, and a complete list will be included in the 1969 B.S. Yearbook.

The SBN is distinct from the B.S. number. It should not be quoted or used in place of the B.S. number, and is primarily intended for catalogue purposes in the book trade, to aid greater efficiency and automation in ordering and stock control.

Purchasers are requested, when ordering standards from B.S.I. Sales Dept., to continue quoting the B.S. number.

NEW BRITISH STANDARDS

B.S. 4261 : 1968 Glossary of terms relating to timber preservation 10s. **N**

Terms relating to attack of timber by wood-destroying agencies and to processes for preservation against attack. General; attack by fungi; attack by insects and marine borers; preservative processes; terms associated with preservative treatments; miscellaneous. (SBN: 580 00008 7).

B.S. 4265 : 1968 Cartridge fuse links for miniature fuses 10s. **M**

Relates to miniature fuse links for protection of appliances at voltages of up to 250 V and of nominal dimensions 20 mm. x 5 mm. and 32 mm. x 6·3 mm. but, at present only includes standard data sheets for the 20 mm. x 5 mm. size. (SBN: 580 00035 4).

B.S. 4271 : 1968 Polytetrafluoroethylene (PTFE) rod 5s.

Composition, appearance and finish, internal defects, density, dimensions and tolerances, tensile properties, resistance to heat, dimensional stability and electrical properties. Three grades, each available in the dimensionally stable and 'as fabricated' form. (SBN: 580 00007 9).

B.S. 4272 : Anaesthetic and analgesic machines

4272 : Part 1 : 1968 Anaesthetic machines of the on-demand type supplied with nitrous oxide and oxygen from separate containers 5s. **M**

Basic requirements from the standpoint of performance and safety, for machines as used in dentistry and midwifery. An appendix gives recommendations for periodic field testing of apparatus. (SBN: 580 00004 4).

B.S. 4272 : Part 2 : 1968 Analgesic machines of the on-demand type supplied with pre-mixed nitrous oxide-oxygen from a single container 4s. **M**

Basic requirements for machines supplied with a 50/50 mixture by volume. One field of application will be the self-administration of analgesia in domiciliary obstetric practice. (SBN: 580 00005 2).

B.S. 4273 : 1968 Aluminium strip armoured PVC-insulated cables (with solid aluminium conductors) 10s.

Requirements and dimensions for single-core, twin, three-core and four-core 660/1100 V cables and single-core 1900/3300 V cables. (SBN: 580 00026 5).

B.S. 4275 : 1968 Recommendations for the selection, use and maintenance of respiratory protective equipment 8s. **M + I**

A simple guide to the use of respiratory protective equipment in industry and agriculture. Describes in general terms the various types and discusses the factors affecting choice of equipment. (SBN: 580 00044 3).

REVISED BRITISH STANDARDS

B.S. 143 & 1256 : 1968 Malleable cast iron and cast copper alloy screwed pipe fittings for steam, air, water, gas and oil 20s. **M + I**

Materials, tests and dimensions of plain and reinforced fittings suitable for working pressures of up to 200 lbf/in.^{2} (1·380 kN/m^2) for water and 150 lbf/in^2 (1·035 kN/m^2) for steam, air, gas and oil. (SBN: 580 0001 7).

B.S. 1440 : 1968 Endless V-belt drives, sections A, B, C, D, and E for industrial purposes 25s.

Moulded V-belts of rubber and rubberlike compounds and textile materials, and V-grooved pulleys, for power transmission. Dimensions and tolerances for belts and pulleys, materials for pulleys; recommendations for quarter-turn drives, belt tensioning, calculations of loads on shafts, and power application of V-belts, with tables of standard and higher horse-power ratings, and power correction factors. Does not apply to automotive V-belts drives, to industrial variable speed drives using pulleys with movable flanges, nor to V-belt drives complying with B.S. 3548, B.S. 3733 or B.S. 2790. (SNB: 580 00036 2).

B.S. 1703 : Refuse chutes

1703 : Part 2 : 1968 Chutes 5s.

Materials, finish, dimensions and design of chute, chute extension, shutter and ventilating flue. (SBN: 580 00003 6).

B.S. 1721 : 1968 Portable fire extinguishers of the halogenated hydrocarbon type 8s. **M**

Various types of halogenated hydrocarbon extinguisher additional to carbon tetrachloride and bromochloromethane extinguishers. (SBN: 580 00012 5).

B.S. 3207 : Mineral-insulated cables

3207 : Part 1 : 1968 Copper-sheathed cables with copper conductor 10s.

Requirements and dimensions for 250 V, 440 V and 660 V cables suitable for general use in electrical installations. (SBN: 580 00034 6).

AMENDMENT TO SPECIAL ISSUE

B.S. Handbook No. 18 : 1966

	Ref. No.
Metric standards for engineering Amendment No. 1	**PD 6287**

DIMENSIONAL COORDINATION IN BUILDING

The Ministry of Public Building and Works has recently issued its seventh statement in the Dimensional Coordination for Building series—*Recommended intermediate vertical controlling dimensions for education, health, housing and office buildings, and guidance on their application.** DC7, which should be read in conjunction with DC4 and DC6, concludes the series of public sector statements on controlling and intermediate controlling dimensions.

The next statement in the DC series, DC8, will outline future work on the dimensional performance of building components and assemblies.

*HMSO, price 6d.

WATER USED IN INDUSTRY

Two further parts in the revision of B.S. 2690 *Methods of testing water used in industry* have recently been published.

In Part 4 *Aluminium, calcium, magnesium and fluoride* one spectrophotometric method is given for aluminium, suitable for samples containing up to 20 microgrammes, and one spectrophotometric method for fluoride, for samples containing up to 30 microgrammes. A distillation procedure for determination of fluoride is also given for samples containing a high concentration of interfering ions.

Two visual titration methods are included for calcium and magnesium. In both, the total content of calcium plus magnesium is measured, and the calcium is determined separately. The magnesium content may be obtained either by difference or by subsequent titration. A spectrophotometric method is also given for calcium and magnesium, by which the contents of the two ions can be determined using the same sample.

In Part 5 *Alkalinity, acidity, pH value, and carbon dioxide* manual and automatic methods for alkalinity and acidity cover ranges of up to 50 milligrammes, in terms of calcium carbonate. Electrometric methods for determination of pH are given, with particular emphasis on the precautions to be taken with high purity waters.

Two methods are given for determination of carbon dioxide, one covering the range from 2 to 20 milligrammes of carbon dioxide (0·4 to 4 ppm), the other—more sensitive—covering up to one tenth of this range. Both methods involve de-gassing the sample and re-absorbing the carbon dioxide in standard alkali.

B.S. 2690 is being revised in separate parts to simplify future revision and to speed up the publication of new methods of analysis. Parts already published cover methods for the determination of copper and iron; dissolved oxygen, hydrazine and sulphate; and silica and phosphate.

[B.S. 2690: Parts 4 and 5, price 10s. each part.]

INSULATED FLEXIBLES FOR COIL LEADS

A new British Standard, B.S. 4195 *Insulated flexible cables and cords for coil-leads* recognises eight types of insulated conductors—according to material used for the insulation—for use as coil leads.

Requirements, types of insulation, voltage categories and dimensions for flexible cables and cords used for coil leads of cross-sectional area 0·003 in² and larger are given.

The conductors used for coil leads include some of the types referred to in B.S. 7*, and other cable specifications, as "flexible cables", "dynamo flexibles" and "flexible cords". For the purposes of this British Standard all the foregoing are referred to as coil leads, which are insulated flexible conductors connected directly and permanently to a coil winding, or other components of electrical apparatus, and usually connected to some sort of terminal.

[B.S. 4195, price 20s.]

COLD WATER STORAGE CISTERNS

A new British Standard, B.S. 4213, specifies *Polyolefin or olefin copolymer moulded cold water storage cisterns* for both industrial and domestic use.

Based on proposals made by the British Plastic Federation and the Thermoplastic Cold Water Storage Cistern Manufacturers' Association, it gives requirements for the composition of polythene and polypropylene materials, dimensions and mass (in metric and British units), configuration, softening point of material used for expansion cisterns, quality of finish, covers, and methods of test.

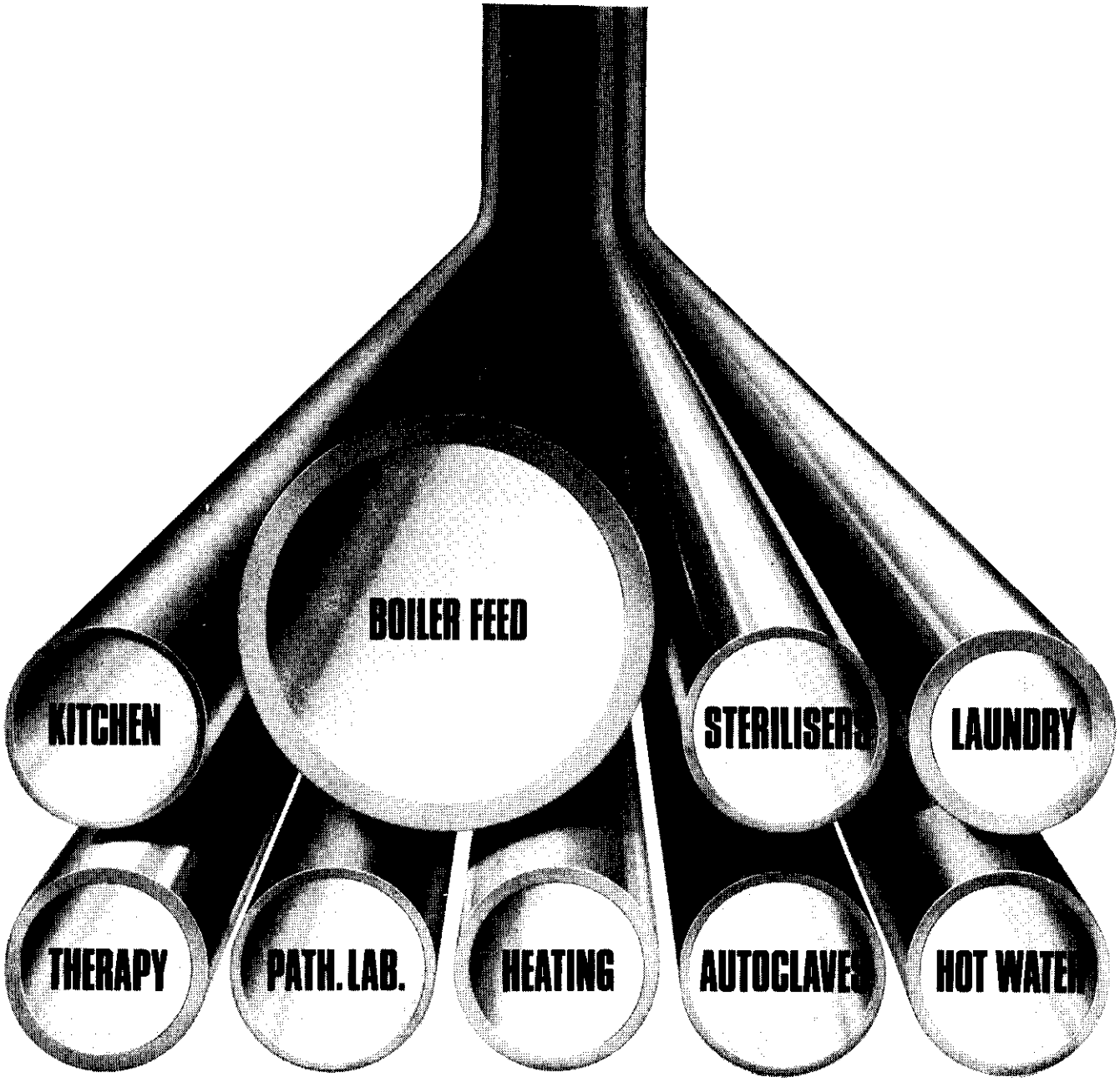
The methods of test, which will evaluate the properties of moulded cisterns made by any available process, cover deformation, deflection, fatigue, falling weight, tensile strength and elongation at break, reversion, sprue strain, and delamination.

Because slight changes in plumbing practice are necessary for the installation of thermoplastic cisterns as opposed to galvanized mild steel and asbestos cisterns, additional information is given in an appendix.

NEW LITERATURE

Evans Electroselenium Ltd., has started to produce a quarterly EEL Bulletin, a two colour, folded periodical.

The content of this periodical includes up-to-the-minute information on new and improved EEL instruments, together with news pertinent to their use. Any reader interested can obtain a free copy as published. Application should be made to The Editor, EEL Bulletin, Evans Electroselenium Ltd., Halstead, Essex.



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PERMUTIT
WATER TREATMENT

On the Market

A review of new equipment and materials and their development

GLASS FIBRE "BANTAM" COOLING TOWERS

Carter Thermal Engineering have announced the introduction of a new range of small cooling towers. These new G.F. Bantams, as they are called, are based upon the Bantam range introduced two years ago.

They are claimed to incorporate many additional advantages —the most important being that the shell and tank are made of glass fibre—thus eliminating corrosion or rotting and reducing maintenance to a minimum. Other notable features include Durapack plastic packing and a plastic water distribution system.

Included as standard on the G.F. Bantams are: anti-cavitation protection, outlet strainer, external motor lubrication points, external pre-wired terminal box and ball-valve oscillation protection. Two sizes (Nos. 4 and 6) are now available.

Price lists, performance details and dimensions are available on request from: Cooling Tower Division, Carter Thermal Engineering Ltd., Redhill Road, Birmingham, 25.

GENT PRODUCE NEW D.C. BELL

A D.C. bell has now been produced by **Gent & Co. Ltd.,** Faraday Works, Leicester, modelled on the now familiar A.C. type. Both are named the "Dome Bell". Identical in outward appearance to the Model 500 A.C., the D.C. bell is the Model 505 and again is available in 4 in. and 6 in. gong sizes. The voltage ranges are 6/12v., 12/24v., and 24/48v. When operated on the lowest voltage of the various ranges, it draws the minimum current consistent with satisfactory volume of sound, and, on the highest voltages, maximum volume of sound but with increased current consumption. These bells are specially suitable for fire alarms and burglar alarms, and the prices are from 43s. 8d. to 54s. 8d.

The 6 in. model "Dome Bell" in both A.C. and D.C. voltages can be recessed into panelling or wall by means of a special box, so that only the gong protrudes.

SLIMSEAL VALVES RANGE INCREASED

Serck Audco, of Newport, Shropshire, announce extensions to their range of low cost Slimseal wafer type butterfly valves. The existing range of 2 in.-6 in. nitrile rubber lined valves is extended to include sizes 8 in., 10 in. and 12 in.

These larger valves are gear operated and have replaceable components. The complete range is available fitted alternatively with pneumatic cylinder actuators.

Also introduced is a range of Slimseal valves sizes 2 in.-12 in. with white Neoprene rubber seats for handling potable water and other high purity services.

All Slimseal valves are extremely simple to install in the line (between BST "D", "E", "F", ASA 125 *or* DIN 2532 flanges) and no gaskets are needed.

They can be used for tight shut off or flow control on pressures to 150 lbf./in.^{2}

WATERLOO CHANGEOVER ALARM EQUIPMENT

An inexpensive kit of Fire Alarm Equipment has been designed by **Read & Campbell Ltd.,** Fire Protection Engineers of Horsham, Sussex. The system consists of Break Glass Contacts, Alarm Bells and the unique Changeover Unit, which enables the system, which is normally mains operated, to change over immediately to dry cell battery supply in the event of a power cut, thus ensuring an operative Fire Alarm System at all times. Ideally suited for smaller premises, up to six Break Glass Contact points with Alarm Bells can be used. The system is safe to operate and extremely simple to install and maintain. Full installation instructions and wiring diagram are supplied. Quotations for complete installations can be supplied without any obligation whatsoever. The system meets the requirements of the Local Authorities for safety.

Full information is available from Read & Campbell Ltd., Fire Alarm Division, 64 Wilton Road, London, S.W.1 (Tel.: 01-828 2602) or any Read & Campbell Branch Office.

NEW WALLWIN SEWAGE SUMP PUMP

This 3 in. automatic, non-chokeable pump will handle raw sewage from an isolated building, small club premises, single dwellings, etc.; where "lift" is required to discharge sewage into the local authority's sewer.

This pump has been manufactured on generously sturdy lines and is fitted with a 3 in. outlet and any solid freely entering the suction inlet will pass through the pump. The overall height of the standard pump is 5 ft. 6 in., it being designed to free stand in a sump approximately 4 ft. × 3 ft. × 3 ft. 9 in. deep. Special lengths to suit special applications.

The pump is manufactured by **Wallwin (Pumps) Ltd.,** Saltisford Ironworks, Warwick.

EFFICIENT SAMPLING OF FLUE GASES

Kent Controls Ltd. (George Kent Group) has introduced the Q.R.P. (quick response pump) system, a packaged high-speed system for the more efficient sampling of dirty industrial flue gases.

For many years, the sampling of such gases has meant major problems for the maintenance engineer—especially with the need for high speed of response in automatic combustion control systems.

The equipment comprises a probe, sample cabinet and a condensate trap. The sample gas-flow/water-flow ratio is high, consequently CO_2 absorption is low. Continuous gas cleaning and dirt disposal, without the use of filters, ensures reliable operation with minimal maintenance. A generous gas flow of 20 litres/minute gives a high speed of response—e.g. dead time for: 4 ft. probe, 15 ft. of pipe between probe and cabinet plus 50 ft. of sample pipe, is less than 2 seconds at 20 litres/minute.

Please refer enquiries to Peter S. Rogers, George Kent Ltd., Biscot Road, Luton.

PLIMBERDEC-DECAMEL DECORATIVE FACED CHIPBOARD

Consort Laminates Ltd., of 6 Regent Place, London, W.1, announce a further new product—Plimberdec. This is a prefabricated constructional board, $\frac{5}{8}$ in. thick, with standard ·050 in. Decamel bonded to either side of a 680 density wood chipboard core, the reverse side being in white. The board therefore presents an equally good surface on both sides, and the white balancer sheet provides a ready made backing for partitioning or shelving and applications where a lining material is required.

Plimberdec will be produced in fifteen colours and patterns in matt finish, 8 ft. × 4 ft. size boards.

Recommended retail price for Plimberdec is 6/– per sq. ft. with substantial discounts to trade users. Special terms exist for contract customers accepting 25 or more boards on direct consignment.

NEW RODENTICIDE FOR MOUSE CONTROL

The problem of mice in hospital buildings can now be overcome by an entirely new type of rodenticide known as Alphakil, developed by **Rentokil Laboratories Ltd.**

Approved under the Safety Precautions Scheme of the Ministry of Agriculture, Fisheries and Food for use by hospitals, local authorities and professional pest control organisations, the material is quick acting, safe and humane in action.

Alphakil is based on the narcotic alphachloralose and causes death by rapidly lowering the body temperature. Only one feed is necessary and the mice die within a few feet of the bait after losing consciousness. One teaspoonful is sufficient to kill ten mice at a cost of a little over a penny.

Alphakil has proved successful in overcoming colonies of mice resistant to warfarin which are now occurring in British hospitals and has been used by nearly one hundred local authorities.

Its humane action and safety are approved by the Universities Federation for Animal Welfare and it is widely used by Rentokil's Pest Control Division.

Hospital Supplies Officers can obtain 7 lb. tins of Alphakil direct from Rentokil Products Division, Felcourt, East Grinstead, Sussex.

NEW SCRUBBER-POLISHER

Latest addition to the Power-Clean range of floor cleaning equipment supplied by **Cleaning Equipment Supplies (Holborn) Ltd.** is the MWG Series of scrubber-polishers. There are two machines—MWG 13 and MWG 19.

Electrically operated, the MWG machine has its power supply located directly above the brush—MWG, in fact, stands for motor-weighted gear. Direct transmission has reduced working parts to a minimum.

There is a fully-adjustable handle, with finger-tip control switch, enabling the machine to be controlled from the most comfortable position. The handle is fixed to an aluminium casting. Two retractable 4 in. rubber wheels are fitted. The unit is lifetime lubricated.

The machine is silent in operation, powered by a capacitor-start motor designed to withstand shock loads. A 50 ft. flexible vinyl-covered cable is supplied. A brush for polishing or scrubbing is supplied with each unit.

The MWG 19 has a brush spread of 19 in.—13 in. for the MWG 13. For the larger machine, a $\frac{3}{4}$ h.p. motor is fitted, with a $\frac{1}{4}$ h.p. motor for the smaller. Speeds: MWG 19, 173 r.p.m., MWG 13, 173 r.p.m. The MWG 19 weighs 98 lbs. and the MWG 13 53 lbs. Price of the larger machine is £115 and the smaller £69 10s.

Various accessories are available, among them brushes for polishing, scrubbing and shampooing, lambswool polishing bonnet, shampoo adaptor for the carpet cleaning, etc. Further information from Cleaning Equipment Supplies Ltd., Fulwood House, Fulwood Place, London, W.C.1.

WATER TREATMENT PLANT

Humidair Consultants Ltd., of 63 Wiltshire Close, Draycott Avenue, London, S.W.3, announce that they have been granted the sole manufacturing and marketing rights for a new patented water treatment plant known as the Waterwitch. The unit is made entirely of plastic components and is a self contained and fully automatic unit measuring 6 ft. high x 1 ft. 6 in. square. This size of unit gives 300 gallons of "mineral free" water having removed all calcium and magnesium deposits, thus ensuring that the growth of "algae" and furring-up of equipment is eliminated. An automatic alarm signals when the unit has to be re-generated and each 300 gallons of water re-generation liquid costs less than a shilling, thus the cost per gallon of water is neglible. There are no moving parts such as pumps, no electrical connections, no storage problems and no appreciable loss of head.

RYMWAY REDUCE PRICE OF 6 in. PVC RAINWATER GUTTER

The Rymway Consortium announce a 22 per cent reduction in the Trade List Price of half-round Gutter for the Rymway 6 in. PVC Rainwater System. 6 ft. lengths of 6 in. PVC gutter now cost 16s. 9d. per length as compared to the previous price of 21s. 6d. per length. 12 ft. and 18 ft. gutter lengths now cost 33s. 6d. and 50s. 3d. per length respectively.

The Rymway 6 in. PVC Rainwater System is the large capacity counterpart to the Rymway 4 in. PVC Rainwater System. The 6 in. system is used where drainage of large roof areas is required. Roof areas of up to 1,400 square feet on either side of one downpipe can be drained with the 6 in. system.

Design of the larger system is on similar lines to that of the Rymway 4 in. System incorporating factory-fixed synthetic rubber sealing pads in all gutter fittings, with snap-action fixing of gutter and fittings. The downpipe (4 in. clear bore) is of the push-fit type with synthetic rubber sealing rings. Gutter fixing is by aluminium alloy fascia brackets and downpipes are secured by PVC brackets.

The Rymway 6 in. PVC Rainwater System is a product of the **Rymway Consortium,** comprising Redland Tiles Ltd., Reigate, Surrey; Yorkshire Imperial Plastics Ltd., Leeds; Muntz & Barwell Ltd., West Bromwich.

CORROSION-RESISTANT DRAIN PLUGS IN ICI PLASTICS

The Hydraulic Water Ram Co. Ltd. have now added to their range of products a new type of corrosion-resistant drain expansion plug. It is made from rubber and ICI plastics instead of rubber and metal.

The plugs, ranging in size from 2 in. x ½ in. to 6 in. x ½ in., can be used in the construction or repair of drains of all types, sealing off pipe ends permanently or temporarily. They can also be used in conjunction with pipe clearing kits.

The plates on either side of the expanding rubber ring in the centre of the plug are made of 'Kematal', ICI's acetal copolymer, with the central screw and nut made from 'Maranyl', ICI's nylon. These materials give the plug lightness, toughness, and complete freedom from all forms of corrosion. Plastic components are moulded by Tatra Plastics of Hertford.

The approximate retail price of the 'popular' sizes of plug are 11s. 8d. (4 in. size) and 18s. (6 in.). The Hydraulic Water Ram Co. are at 110, Cannon Street, London, E.C.4.

BRASS SHIM PACK

A comparative newcomer to the **James Walker** range of products is their Brass Shim Pack which has become deservedly popular because of the novel and practical presentation. The cardboard pack comprises 12 rectangular pieces of Brass Shim, each 6 in. x 12 in. in the following thicknesses.

·001 in.	·003 in.	·006 in.	·010 in.
·0015 in.	·004 in.	·007 in.	·012 in.
·002 in.	·005 in.	·008 in.	·015 in.

Each sheet has the appropriate thickness stamped on it to facilitate quick selection.

Further information from James Walker & Co. Ltd., Lion Works, Woking, Surrey.

ZEISS INTRODUCE NOVEL ILLUMINATOR ON NEW STANDARD MICROSCOPE

With the introduction of their Lucigen illuminator, **Carl Zeiss** of West Germany have adopted new principles of microscope illumination. This novel apparatus acts as both lamp and condenser and is the answer to the problem of how to provide easy foolproof operation on teaching microscopes.

Fitted to the new Zeiss Standard K Teaching and Laboratory Microscope or the Simplified KK 04, the Lucigen itself is extremely simple, yet highly efficient. A diffusing disc acts as light source beneath the specimen. A built-in 6 volt 5 watt low voltage lamp is filtered to approximate daylight. Two different brightnesses can be selected. Illuminating aperture and image contrast are quickly adapted to any objective by easy manipulation varying the distance of the light source from the specimen and to increase or reduce the source image in the back focal plane of the objective.

The intensity of light is sufficient for bright field illumination reaching apertures up to 1·3.

The two types of Carl Zeiss Microscopes, originally designed for ruggedness and easy handling with high optical performance are now even further simplified by the installation of the efficient Lucigen illuminator.

For further details please contact Degenhardt & Co. Ltd., Carl Zeiss House, 20-22 Mortimer Street, London, W.1.

NEW LIFT CONTROL SYSTEM

Whilst solid state switching has been available for lift operation for several years there have been problems involved in providing similar facilities for gearless lifts. Now a new solid state logic control system suitable for fast, gearless lifts has been developed and proved in actual installations by **Evans Lifts Ltd.,** Abbey Lane, Leicester, a member of the Harris & Sheldon Group.

As far as is known this is the first solid state power control system for gearless lifts that has been designed and applied in the U.K. The equipment is suitable for any Ward/Leonard control system or for any d.c. machine using a generator as the source of power.

In lift applications one of the main advantages is the 80 per cent saving of space in the control room, thereby reducing building costs. In addition, reliability is greatly increased—with no maintenance or adjustments required to the solid state equipment as there are no moving parts incorporated.

Improved control of the lift (or lifts) is an immediate benefit from greater accuracy of operation. This results in improved passenger comfort in the slowing speed prior to stopping and also gives accurate floor levelling and better speed control for smoother acceleration and deceleration.

A cost saving of 10 per cent over conventional methods is possible. The Company sees future cost savings in the lower cost of major equipment, perhaps through the simplification of generator design, and development is proceeding along these lines.

MIL HIGH PRESSURE HOT WATER CONTROL VALVE

Already used in very large numbers in steam, gas, and general water applications, the performance characteristics of the MIL Temperature Control Valve are ideal for closed circuit High Pressure Hot Water installations.

The features of the original design are retained, i.e. the flowing medium acts as a motoring force to position the main valve in accordance with requirements, as there is a pressure differential across a valve in nearly all High Pressure Hot Water circuits, often as much as 15 p.s.i. between the flow and return. This is more than enough to maintain positive operation of the main valve and bellows of the sensitive control valve, for pressure up to 250 p.s.i. and temperature of 0 to 180°C.

The basic valve is pilot operated by temperature or pressure signal. Dual relay and signal control operation are also available. It has a manganese body with stainless steel trim and is available in sizes from ½ in. to 2 in. flanged and ½ in. to 1½ in. screwed.

Further information from **Midland Industries Ltd.,** Heath Town Works, Wolverhampton, Staffordshire.

Notes for Members

NEW I.H.E. ADDRESS

The Institute of Hospital Engineering vacated its offices in Cleveland Square, Bayswater, W.2 on 7th March, 1968 and has moved to new headquarters at 20, Landport Terrace, Southport, Hampshire. Telephone No. Portsmouth 23186.

THE ANNUAL CONFERENCE

The 25th Annual Conference will be held in the Memorial Hall, City Hall, Sheffield, from 29th-31st May, 1968.

The Conference is arranged, primarily, for Members of the Institute of Hospital Engineering. There will not be a Registration Charge.

Visitors from other societies and from the Hospital Service are welcome to attend any technical session of the Conference. There will be no admission fee.

A Brochure giving places of interest and a list of hotels and guest houses can be provided on receipt of registration. It is regretted that the Institute cannot undertake to reserve accommodation.

The Annual Dinner will be held at the Grand Hotel, Sheffield, on the evening of Wednesday, 29th May.

Conference Programme

Wednesday, 29th May:

2.15 p.m. Official welcome by the Lord Mayor of Sheffield and Opening of the Conference by L. G. Northcroft, O.B.E., President of the Institute.

2.30 p.m. "Environmental Engineering" by E. R. Haynes, B.Sc.(Eng.), C.Eng., A.M.I.Mech.E., M.I.E.E., A.M.I.H.V.E., Senior Engineer, Ministry of Health; V. Franco, C.Eng., F.I.E.E., Engineer, Ministry of Health.

7.30 p.m. for 8 p.m. The Annual Dinner.

Thursday, 30th May:

10.30 a.m. "Applied Tribology" by J. C. Veale, M.Eng., C.Eng., M.I.Mech.E., M.I.C.E., F.Inst.F., F.I.Plant.E., Head of Department of Engineering, Bradford Technical College.

2.30 p.m. "Medical Electronics" by B. W. Watson, B.Sc., Ph.D., Head of Department of Medical Electronics, The Royal Hospital of St. Bartholomew, London.

Friday, 31st May:

10.30 a.m. "Oil-Fired Hot Water and Steam Boilers—Recent Developments" by E. B. Briggs, M.Inst.F., Shell-Mex and B.P. Ltd.

2.30 p.m. "Radiation Protection—What not to do and how not to do it" by S. B. Osborn, B.Sc., Ph.D., F.Inst.P., Director, Department of Medical Physics, King's College Hospital, London.

WEST OF SCOTLAND BRANCH

The first meeting of the West of Scotland Branch in 1968 was held on 25th January, in the Western Regional Hospital Board offices in Sauchiehall Street, Glasgow.

After welcoming members and guests, the Chairman introduced Dr. James Brown, Senior Lecturer in Mechanical Engineering at the University of Strathclyde, who read a paper "The Investigation of Vibration Problems in Industry". Dr. Brown covered many aspects of vibration problems and how to overcome them, illustrating techniques with the use of slides.

On the 16th February, a company of over one hundred enjoyed a night in the Whitehall Restaurant, Glasgow at the Branch Annual Dinner Dance.

The Branch were the guests of the Institute of Measurement and Control at the University of Strathclyde on 26th February. A paper was read by Dr. M. Telser, of Glasgow Royal Infirmary, entitled "Instrumentation in Intensive Care Units".

SOUTHERN BRANCH

A meeting of the Southern Branch was held on 20th January, 1968 in the Post-Graduate Medical Centre, Southampton General Hospital.

An open session began with a talk by Mr. G. L. Ridgway, Southern Area Manager of Dearborn Pittam Ltd., water treatment specialists, followed by a film on "foaming" inside a boiler taken by very high speed photography. The effects of this, and the methods that can be taken to counteract it, were fully explained. An interesting session was brought to a close by Mr. Ridgway answering the many questions asked.

With reference to Council, Mr. Fothergill reported that it had been agreed to cease circulating Council minutes to Branches. In future, Area Members should keep Branches informed of Council deliberations, but, to improve communications generally, the Secretary would arrange for a regular insertion in the domestic section of the JOURNAL items of particular interest and matters relating to Council decisions. Every member would thus receive this news direct.

Mr. E. C. Rogers was congratulated on being awarded a silver medal for his paper "Developments in Heating of Common Glass Houses".

YORKSHIRE BRANCH

The Yorkshire Branch held a meeting on 13th January, 1968 at Storthes Hall Hospital, near Huddersfield.

The Chairman introduced Mr. J. Clegg, Group Engineer, who spoke on the "Present Opportunity of the Hospital Engineer". Mr. Clegg began by referring to the Aberfan disaster and pointed out the large variety of occupations of those working in hospitals and that they were only there for the sake of the patient. For this purpose, all the people concerned were interdependent and good communications were, therefore, essential. It had struck the speaker that the Aberfan enquiry had shown that communications had

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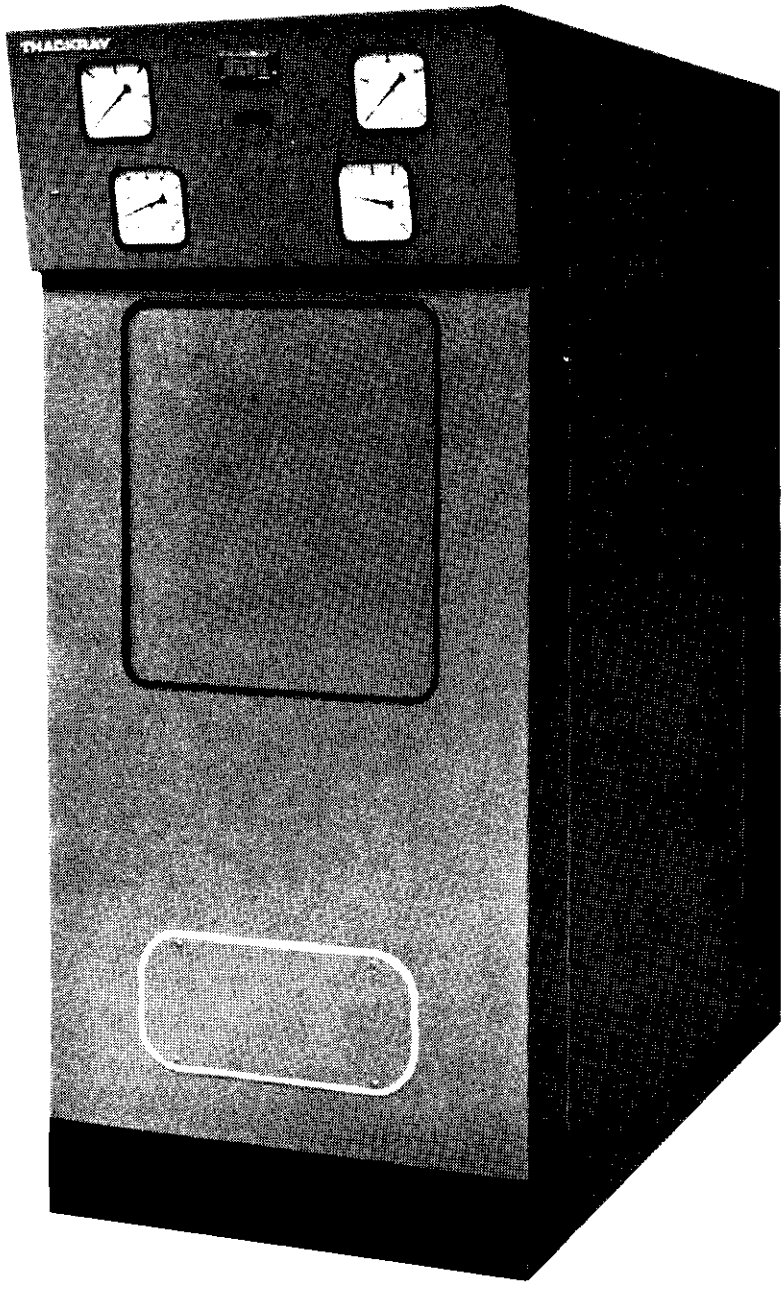

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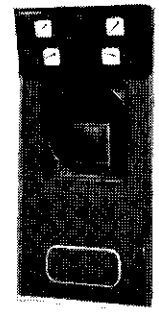

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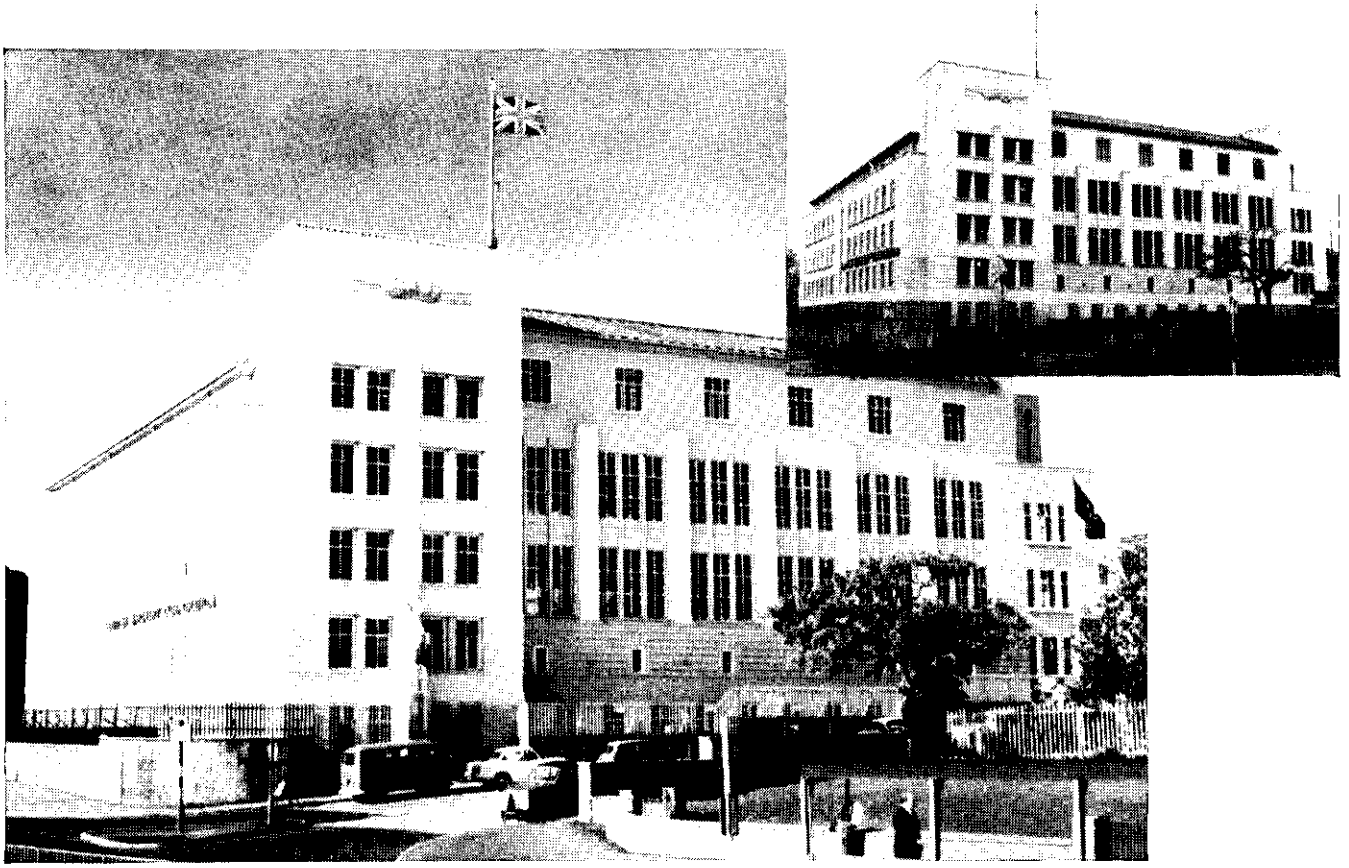

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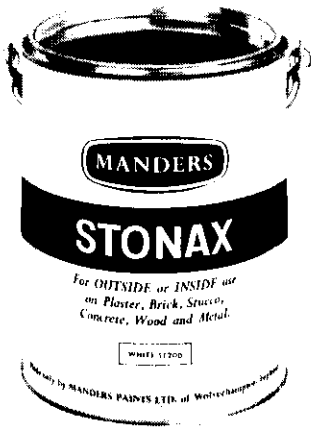

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R. 113

broken down and that there was a failure at all levels to understand and for responsibilities to be filled.

It was vital to be forward-looking, to be alert to the dangers that arise from lack of safety and from neglect. There was the obligation to comply with regulations correctly and the recommendations of Insurance Surveyors and professional bodies.

MIDLANDS BRANCH—FORTHCOMING EVENTS

The annual Five-Branch meeting will be held at the Radcliffe Infirmary, Oxford, on 4th May, 1968. The programme is as follows:

11.00 a.m. Assembly and coffee.

11.30 a.m. Film—"External Cardiac Massage".
Lunch.

2.00 p.m. Two papers—"Atomic Energy—A Further Review" by R. M. Longstaff, Industrial Liaison Officer, United Kingdom Atomic Energy Authority.

"Selling Maintenance" by M. Jarman, M.A., C.Eng., A.M.I.C.E., A.M.I.Mech.E.

All members and visitors will be welcome to attend this meeting but, in order that catering arrangements can be made, the Secretary of the Midlands Branch should be informed, particularly if lunch is required at the hospital. Please contact H. R. Martin, 3 Churchill Road, Halesowen, Worcs. Alternatively, the Hon. Secretary of any of the Branches concerned may be informed, if preferred. In any case, notice of attendance should be given as soon as possible.

PERSONAL

Mr. E. E. Bruce has been appointed Hospital Engineer at Severalls Hospital, Colchester.

Mr. E. Carder has been appointed Deputy Group Engineer to Coventry H.M.C. He was previously Hospital Engineer at Wexham Park Hospital, Slough.

Mr. G. Drennan has been appointed Group Engineer to Stockport and Buxton H.M.C. He was previously Deputy Group Engineer, United Manchester Hospitals.

Mr. K. J. Ellis has been appointed Deputy Group Engineer to Harlow H.M.C. He was previously Hospital Engineer at Herts. & Essex General Hospital.

Mr. P. E. James has become Deputy Group Engineer, Luton and Hitchin H.M.C. He was Hospital Engineer at Poole Hospital, Middlesbrough.

Mr. J. Lee, previously Hospital Engineer at St. Lawrence's Hospital, Caterham, has been appointed Deputy Group Engineer to Derby No. 1 H.M.C.

Mr. N. Longstaff has become Group Engineer to Wolverhampton H.M.C. He was previously Hospital Engineer to the Royal Hospital, Wolverhampton.

Mr. C. R. A. Meyer has been Group Engineer to Wansbeck H.M.C. He was previously Hospital Engineer at Northgate Hospital, Morpeth.

Mr. D. H. Prideaux has been appointed Group Engineer to Hailsham H.M.C.

Mr. K. W. Wilson has been appointed Regional Engineer to the Western R.H.B. Scotland. He moves from the position of Deputy Regional Engineer to Newcastle R.H.B.

"NEW TECHNOLOGY"

Members' attention is drawn to a publication New Technology which is a journal prepared and distributed monthly by the Ministry of Technology and the Central Office of Information. It is obtainable free of charge on application to the Central Office of Information, Hercules Road, Westminster Bridge Road, London, S.E.1.

The publication is of a topical nature, giving news of production, research and development.

SPECIAL COURSE—GAS FIRING DEVELOPMENTS IN INDUSTRIAL AND DOMESTIC HEAT GENERATION

A series of six weekly evening lectures will be held on Friday evenings commencing Friday, 26th April at 6.30 p.m.

Topics under discussion will be the future nature and availability of gas supplies, the combustion of high C.V. gas, and its application to industrial boilers and to heating systems.

The lectures will be given by specialists from industry and from research establishments, and opportunity will be given for discussion.

Further details may be obtained from: The Clerk to the Governors, Borough Polytechnic, London, S.E.1.

NEW CASHMORE HEADQUARTERS

John Cashmore Ltd., stockists of stainless steel, have moved their divisional headquarters to Upper Brook Street, Walsall, Staffordshire.

The adjoining warehouse is 90,000 sq. ft. in area, carries most of Cashmores' 2,500 tons of prime stainless steel sheet, plate, bar and tube.

E.S.I.-PITMAN AGREEMENT

Electro Scientific Industries of Portland, Oregon, U.S.A. and D. A. Pitman, of Weybridge, Surrey, England announce that the Pitman Company will represent E.S.I. in the United Kingdom for their complete range of precision laboratory standard measuring instrumentation.

PHOTO-ELECTRIC CELL OPERATED RELAYS

A new brochure containing details of their complete 1968 range of photo-electric equipment is available from Hird-Brown Ltd., Bolton, Lancs.

The brochure also contains general information on photo-electric equipment for automation, possible arrangements of photocells and relays.

The brochure is available on request.

EXPANDITE ANTI-CORROSION PRODUCTS

Following the re-organisation of the industrial divisions of the Burmah Group, Atlas Preservative Company Ltd. of Erith, Kent, have become sole distributors to industrial outlets in England and Wales for Galvafroid and other anti-corrosion products manufactured by Expandite Ltd.

Expandite Branches in Scotland and Northern Ireland will continue to serve industrial outlets in these areas.

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SITUATIONS VACANT

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ASSISTANT HOSPITAL ENGINEER

to assist in the operation and maintenance of engineering plant, services and equipment. Ideal experience for young qualified engineer seeking advancement. ONC (O2) engineering required and good practical training in the maintenance of mechanical and electrical services. Salary £934 rising to £1,189. Consideration will be given to the appointment on an abated scale of persons without these qualifications.

Applications with full details of training, qualifications and experience and the names of two referees to Hospital Secretary.

FARNBOROUGH HOSPITAL, FARNBOROUGH COMMON, ORPINGTON, KENT. BR6 8ND.

HOSPITAL ENGINEER

Applications are invited for the above post. Salary scale (25 points) £1,279-£1,492, plus £50 special responsibility allowance and £75 London Weighting allowance; an extra duty allowance of 6½ per cent of basic salary currently being paid.

Candidates must hold qualifications as in appropriate Whitley Council Circulars. They must have completed an apprenticeship in mechanical or electrical engineering, or have otherwise acquired a thorough practical training appropriate to the post; a wide practical experience in maintenance of hospital mechanical and electrical plant and control of staff is essential.

House available, if required, at a reasonable rental.

Applications, giving age, qualifications, previous experience and naming two referees, should be sent to the Hospital Secretary by 16th April.

DEPUTY GROUP ENGINEER
(over 24½ points) required

Applicants must have completed an apprenticeship in mechanical or electrical engineering or have otherwise acquired a thorough practical training, be experienced in management of mechanical and electrical engineering plant similar to that of modern hospitals, in control and deployment of maintenance and operational staff, and in preparation of maintenance estimates and reports and in carrying out directly or by contract small works of engineering construction or renewal.

The prescribed minimum qualifications are: Higher National Certificate or Higher National Diploma in Mechanical Engineering with endorsements in Industrial Organisation and Management and Principles of Electricity if not taken as a subject of course; or H.N.C. or H.N.D. in Electrical Engineering with endorsements in Industrial Organisation and Management and including (at SIII or O2 level or with endorsement in) Applied Heat and Applied Mechanics provided he has suitable practical experience in mechanical engineering; or City & Guilds Mechanical Engineering Technicians' Full Technological Certificate (Part III) which must include Plant Maintenance and Works Service.

Applications will be considered from persons with suitable experience who do not possess one of the full qualifications set out above.

Salary on scale commencing at £1,279 rising to maximum of £1,492 per annum plus allowance of £150 per annum for special responsibilities and London Weighting of £75 p.a. Salary scale increases to £1,370 rising to £1,605 p.a. on 1.9.68.

A gratuity of 6½% is at present payable for long hours worked. The basic salary scale will be abated by £200 per annum at all points in the case of the appointment of an applicant not possessing the full qualifications.

Written applications with details of education, training, past experience and names and addresses of three referees to the Group Secretary, Hillingdon Hospital, Uxbridge, Middlesex, by 17th April, 1968.

ROYAL EARLSWOOD HOSPITAL, REDHILL, SURREY

The present holder of the post having received promotion, an Assistant Engineer is required for duty at Farmfield Hospital, Horley, Surrey, a hospital for mentally sub-normal made patients having 174 beds. A modern oil-burning boiler house was recently installed. Detached house available for rental. Candidates must have served an engineering apprenticeship and hold a recognised qualification, Ordinary National Certificate in Engineering or equivalent. Salary scale £917 rising to £1,192 per annum. Applications giving full details of apprenticeship, service, etc., together with the names of two referees, to be sent immediately to The Group Secretary, Royal Earlswood Hospital, Redhill, Surrey.

FAIRFIELD HOSPITAL
STOTFOLD, HITCHIN, HERTS.

HOSPITAL ENGINEER

HOSPITAL ENGINEER required to be directly responsible to the Group Engineer. Applicants must have completed an apprenticeship in mechanical or electrical engineering or otherwise have acquired a thorough practical training and must possess a sound knowledge of the principles and practices as are appropriate to the responsibilities of the post.

Applicants must hold one of the following qualifications, or an equivalent qualification approved by the Ministry of Health or Secretary of State for Scotland:—

Higher National Certificate or Higher National Diploma in Mechanical Engineering with endorsements in Industrial Organisation and Management and Principles of Electricity or Electro-Technology, if this was not taken as a subject of the course; or

Higher National Certificate or Higher National Diploma in Electrical Engineering with endorsements in Industrial Organisation and Management and including (at S.III or O2 level, or with endorsement in) Applied Heat and Applied Mechanics, provided he has suitable practical experience in mechanical engineering; or

City and Guilds Mechanical Engineering Technicians' Full Technological Certificate (Part III) which must include Plant Maintenance and Works Service.

Salary (24½ points) £1,279—£1,492 plus £50 special responsibilities allowance.

Married accommodation available at a reasonable rental.

Applications would be considered from persons not having the above qualifications but the salary would be abated.

Applications, with full details and names and addresses of three referees, quoting reference E 7 to Group Secretary by 19th April, 1968.

GROUP ENGINEER

required. Post vacant July, 1968. Applicants must have wide experience in the management of mechanical and electrical engineering plant, preferably in the Hospital Service, *and* one of the following or an equivalent approved by the Minister of Health:—

(i) H.N.C. or H.N.D. in Mechanical Engineering with endorsements in Industrial O. & M. and Principles of Electricity or Elec.ro-Technology, if this was not taken as a subject of the course; or

(ii) H.N.C. or H.N.D. in Electrical Engineering with endorsements in Industrial O. & M. and including (at S.III or O.2 level, or with endorsement in) Applied Heat and Applied Mechanics, provided he has suitable practical experience in mechanical engineering; or

(iii) City and Guilds Mechanical Engineering Technicians' Full Technological Certificate (Part III) including Plant Maintenance and Works Service.

Salary scale: £1,613 to £1,910 per annum plus £100 per annum special responsibility allowance.

Application forms obtainable from the Group Secretary, Promenade Hospital, Southport, to whom they should be returned upon completion.

PRESTON AND CHORLEY HOSPITAL MANAGEMENT COMMITTEE

DEPUTY GROUP ENGINEER

Applications are invited for the post of Deputy Group Engineer who will be required to act for the Group Engineer over the whole range of his duties including responsibility for the operation, maintenance and co-ordination of all engineering services and engineering activities in the Group.

Applicants must have completed an apprenticeship in Mechanical or Electrical Engineering or have acquired a thorough practical training and have wide experience in the management of mechanical and electrical engineering plant similar to that of modern hospitals employing up-to-date methods of maintenance planning; control and deployment of maintenance and operational staff; preparation of maintenance estimates and of reports; carrying out by direct labour or contract of minor capital works. They must hold a H.N.C. or H.N.D. in Mechanical Engineering with endorsements in Industrial Administration and Principles of Electricity or Electro-Technology; or H.N.C. or H.N.D. in Electrical Engineering with endorsements in Industrial Administration and including (at S.III or O2 level, or with endorsement in) Applied Heat and Applied Mechanics, provided they have suitable practical experience in mechanical engineering; or City and Guilds Mechanical Engineering Technicians Full Technological Certificate (Part III) which must include Plant Maintenance and Works Service; or an approved equivalent qualification.

This post is particularly attractive and it offers a wide range of engineering experience and good prospects. The Group comprises ten hospitals (1,459 beds) including two general hospitals covering a full range of specialties. An additional 145 beds together with operating theatres are now being commissioned at Sharoe Green Hospital. In 1970 construction will begin of a large new hospital (1,100 beds) on the outskirts of Preston.

The salary scale is £1,279-£1,492 over five increments plus special responsibility allowance of £200 a year. The salary scale will be increased to £1,370-£1,605 with effect from 1st September, 1968.

Whitley Council conditions of service and National Health Service Superannuation apply.

Applications giving full personal details including qualifications, experience and naming three referees to the Group Secretary, Royal Infirmary, Preston, Lancs., PR1.6PS., by the 11th April, 1968.

LEEDS (A) GROUP HOSPITAL MANAGEMENT COMMITTEE

Applications are invited for the post of DEPUTY GROUP ENGINEER. The successful applicant will act as Hospital Engineer of St. James's Hospital, Leeds (1,354 beds) and be responsible to the Group Engineer, who is also based at the hospital. This is an attractive post as the hospital is going through a major redevelopment by the addition of modern buildings and associated engineering services. There is a wide range of plant and equipment and a system of planned preventive maintenance is being used on all new work. Experience required in the management of mechanical and electrical engineering plant and in the control and deployment of staff. Candidates must have completed a recognised apprenticeship in mechanical or electrical engineering, and hold one of the following or equivalent qualifications:—

Higher National Certificate or Higher National Diploma in Mechanical Engineering with endorsements in Industrial Organisation and Management and Principles of Electricity or Electro-Technology, if this was not taken as a subject of the course.

Higher National Certificate or Higher National Diploma in Electrical Engineering with endorsements in Industrial Organisation and Management, including Applied Heat and Applied Mechanics, provided he has suitable practical experience in mechanical engineering.

Salary Scale £1,279-£1,492—i.e. Hospital Engineer 24½ points and over—plus £175 for special responsibility units as applies to the Group Engineer.

Applications, stating age, qualifications, experience, together with the names of two referees, to be sent to the Group Secretary, Leeds (A) Group Hospital Management Committee, St. James's Hospital, Leeds, 9.

PARK PREWETT GROUP HOSPITAL MANAGEMENT COMMITTEE, NO. 9 BASINGSTOKE, HANTS

Applications are invited for the post of Assistant Engineer. The successful applicant will be required to assist the Engineer in the operation and maintenance of the engineering services at Park Prewett Hospital and to be responsible for the maintenance of engineering services for the General Hospitals in the Basingstoke area, which are administered by the Winchester Group Hospital Management Committee. Applicants must have completed an apprenticeship in mechanical or electrical engineering or have otherwise acquired a thorough practical training as appropriate and should hold the Ordinary National Certificate in Engineering or equivalent qualification.

Salary £917 rising to £1,270 per annum, plus extra duty allowance.

A house is available on the Hospital estate at a reasonable rental.

Applications should be sent to the Group Secretary, Park Prewett Hospital, Basingstoke, Hants., stating age, experience, etc., together with the names of three referees, not later than 10th April, 1968.

THE UNITED OXFORD HOSPITALS ASSISTANT SITE ENGINEER

Applications are invited for the post of Assistant Site Engineer for the first phase of a new hospital at Headington, Oxford, which will start on site in March, 1968. Applicants must:—

1. Have served an Apprenticeship in Mechanical Engineering.
2. Have 5 years experience supervising site installations employing trades associated with Mechanical Services.

Applicants must have experience in:—

Heating, ventilation, domestic services, air conditioning, boiler installations, site distribution, etc. (a knowledge of plumbing and drainage would be an advantage).

Salary according to experience will be on the appropriate point of the scale £1,100 x 60 (1) x 65 (4) x 70 (1)—£1,490.

Applications in writing, stating age, qualifications and experience, together with the names and addresses of 3 referees, should be sent to the House Governor, Radcliffe Infirmary, Oxford, by 4th May, 1968.

SIDCUP HOSPITAL MANAGEMENT COMMITTEE QUEEN MARY'S HOSPITAL, SIDCUP, KENT

Hospital Engineer required, to be responsible to Group Engineer, for the engineering services and building fabric at Queen Mary's, Cray Valley and Sidcup Cottage Hospitals. Salary scale £1,192 to £1,400 per annum, plus responsibility allowance of £75 per annum and London Weighting of £75 per annum. New hospital under construction; a house may be available at a reasonable rent.

Candidates must hold qualifications as in appropriate Whitley Council circulars. They must have completed an apprenticeship in mechanical or electrical engineering or have otherwise acquired a thorough practical training appropriate to the post. Wide practical experience in maintenance of hospital mechanical and electrical appliances and control of staff is essential.

Applications giving age, qualification, previous experience and naming three referees should be sent to the Group Secretary, Queen Mary's Hospital, Sidcup, Kent, as soon as possible.

NOTTINGHAM No. 1 HOSPITAL MANAGEMENT COMMITTEE DEPUTY GROUP ENGINEER

Applications are invited for the above new post. The successful candidate will be required to act for Group Engineer over whole range of his duties, which include responsibility for satisfactory operation, maintenance and co-ordination of all engineering services in the Group.

Applicants must have completed an apprenticeship in mechanical or electrical engineering or otherwise had thorough practical training and experience in the management of mechanical engineering plant. They must hold H.N.C. or H.N.D. in Mechanical Engineering with endorsements in Industrial Organisation and Principles of Electricity or Electro-Technology; or H.N.C. or H.N.D. in Electrical Engineering with endorsements in Industrial Organisation and Management and including (at S.III or O2 level, or with endorsement in) Applied Heat and Applied Mechanics.

Salary scale £1,279 to £1,492 (with increased scale £1,370 to £1,605 from 1st September, 1968) plus special responsibility allowance of £125 p.a.

Further information forms may be obtained from Group Secretary, General Hospital, Nottingham, by whom completed applications must be received as soon as possible.

BROOKWOOD HOSPITAL, KNAPHILL, WOKING, SURREY

Applications are invited for the appointment of HOSPITAL ENGINEER in this single Hospital Group (1,705 beds).

The successful candidate will be directly responsible to the Group Engineer and will be required to act for him over the whole range of his duties during his absence.

Applicants must have acquired a thorough practical training appropriate to the responsibilities and duties of the post and must hold one of the following qualifications or an approved equivalent:—

(1) Higher National Certificate or Higher National Diploma with endorsement in Industrial Organisation and Management and Principles of Electricity or Electro-Technology, if this was not taken as a subject of the course.

(2) Higher National Certificate or Higher National Diploma in Electrical Engineering with endorsements in Industrial Organisation and Management and including (at S.III or O2 level, or with endorsement in) Applied Heat and Applied Mechanics, provided he has suitable experience in Mechanical Engineering.

(3) City & Guilds Mechanical Engineering Technicians Full Technological Certificate (Part III) which must include Plant Maintenance and Works Service.

Salary Scale: £1,279-£1,492 per annum plus £50 per annum for special responsibility units. Salary to be abated by £200 p.a. if not in possession of approved qualifications.

Applications, giving details of age, training and qualifications, with names and addresses of three referees (one technical) to the Group Secretary at the above address not later than 26th April, 1968.

A house is available on the hospital estate at moderate rental.

CARDIFF HOSPITAL MANAGEMENT COMMITTEE

Applications are invited for the appointment of HOSPITAL ENGINEER to be responsible to the Group Engineer for the engineering services at St. David's Hospital. Salary scale £1,192-£1,400 (£1,270-£1,500 from September 1968), plus units responsibility allowance at present of £50 per annum.

Applicants must have completed an apprenticeship in Mechanical or Electrical Engineering or have otherwise acquired a thorough practical training as appropriate to the duties and responsibility of the post. Applicants must be in possession of H.N.C. or H.N.D. in Mechanical or Electrical Engineering with endorsement or an equivalent qualification approved by the Ministry of Health. They should also have a sound knowledge of the efficient operation of mechanical fired steam boiler plants and a wide experience of mechanical or electrical services, preferably in the Hospital Service.

Application giving age, qualifications, apprenticeship, present employment and experience, with the names and addresses of two referees to be sent to Group Secretary, Cardiff H.M.C., 44 Cathedral Road, Cardiff.

DERBY AREA NO. 4 HOSPITAL MANAGEMENT COMMITTEE

KINGSWAY HOSPITAL, DERBY

Applications are invited for the post of Hospital Engineer at the above hospital. The successful candidate will be directly responsible to the Group Engineer for the operation and maintenance of all engineering services at this hospital. Candidates must have completed an apprenticeship in mechanical or electrical engineering and must possess one of the following qualifications or an equivalent approved by the Ministry of Health:—

(a) City and Guilds Technicians Certificate (Part II) which must include Plant Maintenance and Works Service.

(b) City and Guilds Certificate in Plant Maintenance.

(c) Ministry of Transport First Class Certificate of Competency if it includes an O.N.C. or O.N.D. Certificate.

Salary Scale £1,192 to £1,400 (£1,270 to £1,500 with effect from 1st September, 1968) plus a special responsibility allowance of £50 per annum.

A house is available at a reasonable rent.

Applications stating age, qualifications, experience and the names and addresses of three referees should be sent to the Group Secretary at the above hospital to be received not later than Saturday, 20th April, 1968.

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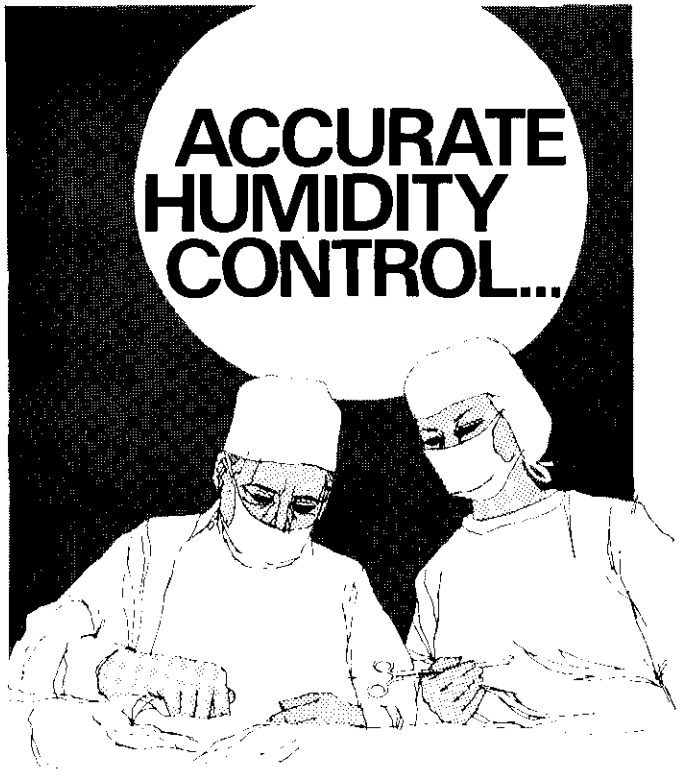

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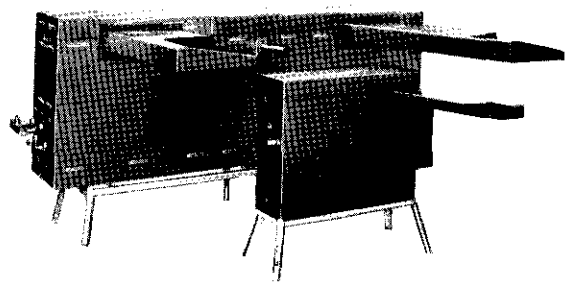

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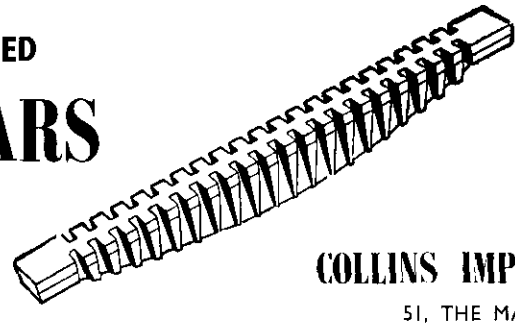

For all types of Boilers

Patents 207123
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DURABILITY
EFFICIENCY

AIR SPACE DESIGNED TO SUIT DRAUGHT AND FUEL

HEAT RESISTING METAL

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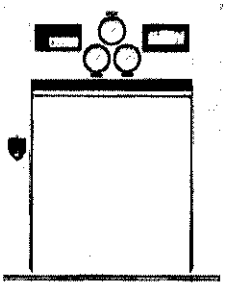

103 or 143

Hi-Speed Sterilizer for complete

safety

SAFETY through having a fully constrained sliding door, **SAFETY** through a built in air leak detecting device. **SAFETY** is the key word, the '103' and '143' are the safest sterilizers yet developed. Let us send you details.

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