BMN
Building Metrication News

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This section appears in the second and fourth issues of 'Building' each month, and gives current news and information on metrication, as well as providing a forum in which the ramifications of the change to metric can be freely discussed. It is published in association with the Modular Society.

CONTENTS

The chicken and the egg—again

One cannot but feel sympathetic to any organisation which is facing up to the problems of metric change; problems of retraining, availability of components, rising costs and so on. When the organisation is the GLC the magnitude of the exercise is formidable. But nevertheless the GLC request for *urgent discussions* with the Ministry of Housing at this time does appear to be a little odd. One wonders what form of communication exists between the largest housing authority and the Ministry responsible. The GLC say in their Press notice that they wish to discuss 'relaxation of certain directions contained in the Ministry Circular on Local Authority House Building until the technical and financial aspects of the changeover have been thoroughly analysed through selected "pilot" schemes.' If the directions referred to are the mandatory requirements which we have already criticised in BMN as being inappropriate, certainly at this time, then we can appreciate the problem. But the Ministry circular was published right at the beginning of 1968. Why then has the GLC left it until now to seek these urgent discussions?

The lack of availability of metric components is a well worn scapegoat, an excuse rather than a reason for putting off the inevitable day of change. In fact, the BSI programme has never shown that such components would be available early on. It would be interesting to know which are the components that are giving rise to concern? How many components that the GLC use are to national standards and how many are in fact designed as standards for GLC use only?

There is an implication in the GLC notice that the Council is waiting for industry to produce the components first. Unfortunately, we have the inevitable chicken and egg situation when industry can ill-afford to change until the market is known and the designer does not wish to change until the availability of components is assured. Someone in fact has to cut through this vicious circle. The GLC, due to its size and experience, is just the type of organisation to give a positive lead. One would like to hear of an objective programme of change from the GLC and to feel that they were giving this lead, which smaller offices are unable to do. It is a pity that, to all outward appearances, they are dragging their feet.

How deep?

It would be to everyone's advantage if SI units and dimensional co-ordination were applied consistently, at least until they are well understood. But one can only be consistent if one adopts an agreed standard. Furthermore it is not sufficient for one person in an office to know which these standards are, such as the metrication officer. Everyone needs to know, from the boss to the youngest typist who will have to interpret his handwriting. Currently there are quite a lot of people (not those who read BMN of course) who think they know all the answers, but who in fact have not done their homework. Other members of the office attend the committee meetings, the seminars, symposia and lectures, they just get on with the job and it is assumed that they know all, which is a bit unfair. When half way through a project things begin to go wrong, it may well be because time has not been spent reading up one or two fairly basic booklets.

There are three publications which are of particular value which really ought to be mandatory reading. First PD 6031—Use of the metric system in the construction industry. Second MPBW Going Metric No. 2—Dimensional Co-ordination (which includes most of what needs to be known about BSs 4011 and 4330); and last, the recently revised BS 1192—Building Drawing Practice.

Metrication Overseer

Although it may have arrived late (and still incomplete) on the scene, our best hope of making a relatively smooth changeover to metric is still going to depend a good deal on the guidance coming from the Metrication Board. And as Director and chief executive of the Board, Gordon Bowen is obviously a key figure in the overall national operation.

So far appointments to the Board have been made piecemeal: in January Lord Ritchie Calder became chairman, in early February Bowen full-time director and at end-February the Earl of Bessborough deputy chairman. Bowen himself is very conscious of the delay but as a man who knows the workings of Government he understands the reasons behind it. The announcement by the Minister of Technology last July of the Government intention to form the Board was the prelude to a great deal of discussion—what size should it be? What would be its relationship with Government? Should it be attached to the Ministry of Technology or be a separate body? All this, says Bowen, is a necessary preliminary to establishing the type of organisation to be set up. Finding the right complement to fill the Board has proved equally difficult but an announcement of the Board's composition now seems imminent.

Bowen himself looks very much the man for the job. Born in 1910, he went to Liverpool University from 1928 to 1932 where he gained a 1st class Honours degree in Geography and a Diploma in Education with distinction. After a spell of teaching at Glasgow and California Universities, he went to the Board of Trade in 1941 as a Principal, and his subsequent career, with the Board and later the Ministry of Technology, embraced economics, finance and international relations. His closest involvement with the building industry came after the war when he was put in charge of industrial reconstruction. With a shortage of available resources all building then required a licence, and it was his job to assess the priorities for commercial and industrial developments. 'This was broadly broken down into three sectors—restoration of bomb damage, normal expansion and factories for producing new products, such as synthetic fibres and electronics, which had been developed during the war. On the whole it was a very successful exercise.'

Another interesting project in which he was involved prior to his appointment to the Metrication Board was the development of an overseas policy on technology. 'Some of this work is now beginning to bear fruit as we are establishing closer links with the Six. Co-operation over computers is one of the plums.'

Bowen has liked working in Government. 'It gives you a sense of serving society usefully. Also you are usually working with colleagues with similar motivations and the atmosphere is pretty congenial. Then there is the excitement of seeing policies shaped and coming to fruition.'

This, in fact, is what his new job has to offer—a well defined task within a definite time limit.

Preliminary discussions

So far he has been occupied in exploring the ground. 'It is a process of informal discussion with the Ministries concerned and with the representatives of industry. The problem has yet to be covered in depth—this is a task for the future.'

Even so he already shows a very impressive grasp of the complexities involved and has a very clear idea of what is going to be required. He readily concedes that the building industry has been pressing for the formation of the Board for very good reasons. 'It's alright for individual firms or industries to set up metric programmes but sooner or later they come up against the need for others, travelling along the same road, to have similar programmes.' He sees it as a central function of the Board to ensure that these different programmes mesh.

The recent GLC misgivings about the speed of the change offer a useful illustration of the way the Board will work. 'Our mandate is not to concern ourselves with the GLC's decision making but with the situation they have identified. What components are not available? If any elements are not there we have to get in touch with the relevant association and see what is happening, why the unavailability? What can we do to help?

'The Metrication Board is an overseer planning body. We advise but it is industry that has to take the action.'

Board composition

Bowen thinks that the Board will need around 16 members to do its job with the maximum effect. He visualises them operating through a number of steering committees, co-opting people from industry who will be au fait with the problems that crop up and know who to look to to overcome them.

Through the work of the steering committees the Board will be able to assess how things are developing, and this will enable them to make recommendations to the Government and industry and also to check whether they themselves are on the right road. From this springboard they should be able to direct their publicity to the best possible effect. This, Bowen sees as being one of the most important aspects of the Board. With his commonsense approach he outlines different media to suit different sectors—conferences and seminars for the highly informed; pamphlets, posters and supplements in trade journals for industry; press, radio, television and exhibitions for the public. 'Many of these elements in publicising metric will be done by individual sections and companies. What the Board has to ensure is that it is all adequate. Where no one has a vested interest in putting over metric, such as in the public sector, the Board will probably have to play a direct role.'

What he is especially anxious to do is to give momentum to the metric change. 'Unless this is done we will be stuck with the chicken and egg problem with everyone waiting for someone else to make the first move.' The Board, he thinks, can help make the breakthrough in two ways: first by pressing industry to get on with the job of working out their own programmes; second by publicising the sectors where advances are being made so that people do not feel isolated. One stick with which to beat the suppliers (not Bowen's phrase) has been the determination of Government departments to push through metric building projects. 'Suppliers who do not change to metric quickly enough are in danger of being left behind. There is not likely to be much in big Government tenders for them.'

Costs

Another discovery Bowen has made in his preliminary discussions is that, whilst a programme has been laid down for the change, most people seem convinced that the quicker they can do it, the lower will be the cost. This, says Bowen, is about the only aspect of costs that one can be certain of. Otherwise calculating metric costs in the aggregate is an impossible task, even for individual firms. 'Many of the changes that will be made cannot be attributed directly to metric. New building techniques, for instance, may be stimulated by metric but are really the direct result of dimensional coordination which the building industry has chosen to adopt. Again, plant replacement may be speeded up by going metric but would have to be undertaken some time anyway. The decision to go metric has already been made,' says Bowen. 'If we are to get on as quickly as possible, it seems rather pointless to employ a cost accountant to cost a decision.'

Advantages

It goes without saying that Bowen is pro-metrication but he backs his support of the change with some fairly solid reasons. He lists four main advantages:—

1. it is a much more logical, simple and intelligible system
2. it offers a big saving in education and time
3. it will compel everyone to think about the way they are doing things and provide a stimulus to change—'the construction industry's adoption of dimensional coordination is a very good example'
4. exporting industries will have their

task simplified in selling their products since they will be talking on the same wavelength as foreign countries; and this will be more important as collaboration with the continent grows.
Bowen also makes the point that researchers are working more and more in metric units and this makes it difficult to liase with users bred on imperial.
Will the overall metric change be made within the timetable? Bowen is surprisingly optimistic—he thinks it will be done substantially before 1975. 'Once people become involved they seem to have an urge to get it done.' For the building industry he thinks the situation is rather better than is generally supposed. He does not expect the change to be made without a hitch and he readily agrees that things may be tough for a couple of years. 'But once through this period, it will be worth all the pain and the cost.

Letters

Design of timber components

Sir,—In the article on Design of Timber Components Using SI ('Building', 25 April) I notice that a capital K has been used in the abbreviation of kilo Newtons per square metre. I have been informed, and read, that a capital K is the abbreviation for degrees Kelvin and the small k is the abbreviation for kilos. Further, great emphasis has been placed upon the need to use the correct abbreviations when writing metric. Would you please clarify the position.

R. J. B. CURNOW [MBldgSI],
36 Grenville Estate, Troon,
Camborne, Cornwall

[Your information is correct. The symbol for the kilo is a small k and this should have been used in our article.]

Metrication Index

An index of references to metrication published in 'Building,' but not in BMN, since 2 May.

A plastics based industrialised building system has been developed in Holland. It is based on a modular grid of 1.20 m. (2 May, p. 131.)

MHLG consideration is being given to proposals by the National Building Agency to make metric house shells mandatory for use as a condition for granting loan and subsidy grants by local authorities. (2 May, p. 68.)

Additional building costs caused by the change to metric will, in certain circumstances, be met by the Ministry of Public Building and Works on its new contracts. (9 May, p. 92.)

GLC concerned over cost implications of change to metric on its housing projects and asks for urgent talks with MHLG. (9 May, p. 92.)

Ireland prepares for the metric changeover. (16 May, p. 139.)

The BMN monthly check list

A handy and up-to-date reference for designers of important news, publications and decisions published in BMN since 25 April.

Metric Building Regulations: Some confusion is anticipated between the use of metric dimensions and the imperial Building Regulations during the transitional period of the changeover. Until a metric version of the Regulations is brought out, it will be necessary for local authorities to take a reasonable view in their interpretations, and this has been discussed by the Construction Industry Metric Change Liaison Group and the Ministry of Housing and Local Government. ('Building,' 9 May, p. 159.)

Plasterboard: Plasterboard in metric sizes will be available from British Gypsum Ltd. as from 1 April 1970. ('Building,' 9 May, p. 156.)

Examinations: City and Guilds examinations in the construction field are to be based on SI units from the summer of 1970. Other courses will be metricated by 1972. ('Building,' 9 May, p. 156.)

Plastics industry: Metrication Policy Committee has been established by the British Plastics Federation to deal with all matters relating to the industry's changeover. ('Building,' 25 April, p. 146.)

Concrete units: A range of autoclaved aerated concrete components will be available from Durox Building Units Ltd. as from 1 September 1969. ('Building,' 25 April, p. 146.)

Ready mixed concrete: British Ready Mixed Concrete Association has decided that its members should change over simultaneously to metric system of units and to decimal currency for deliveries as from 31 December 1970. ('Building,' 25 April, p. 146.)

Publications

The SMM in metric

A publication on the SMM has been produced by the National Building Agency as an aid for quantity surveyors during the change to metric. It shows, by comparison, changes that have been made in converting the Standard Method of Measurement from imperial to metric. The comparison and notes were prepared for use in the NBA's quantity surveying group who are working on pilot metric housing projects.
While imperial aids are to be discouraged when working in metric, difficulties will be created during the initial period of change by the lack of reference to a known scale of values. This particularly applies where more than one unit of measurement is involved. The majority of those items concerned with measurement rules and limits are included but it is not intended as a substitute for the SMM itself. Where a conversion is other than a substitute on the basis that 300 mm is equivalent to 12in. it is noted and the extent of the change indicated.
'The SMM in metric—a comparison with imperial' can be obtained price 3s. 6d., post free, from the Publication Department of the NBA, NBA House, Arundel-street, London, WC2.

Pvc asbestos floor tiles

A revised version of BS 3260, Pvc (Vinyl) Asbestos Floor Tiles, retains the 9 x 9in. tile of the 1960 publication, but two metric sizes with a corresponding range of metric thicknesses have been added—225 x 225 mm and 300 x 300 mm. The opportunity has also been taken to introduce SI units.
The 300 x 300 mm size tiles meet the requirement of basic spaces for dimensional co-ordination, but since tiles are usually cut and fitted on site, dimensional co-ordination has not been given primary consideration, says BSI.

Building drawing

The re-written BS 1192, Recommendations for building drawing practice, is now available to architects, designers and students. It has been brought up to date in the light of current practice and complies with recommendations associated with metric change.
The standard opens with a classification of types of drawings and other items such as bills of quantities and contract documents. Size of drawing sheets is dealt with in a section describing standard sizes, folding, and sizes of envelopes. Guidance on the selection and preparation of drawing materials and methods of reproduction is given in appendices and these should prove of particular interest to students.
Recommendations are given for dimensions of drawings, preferred scales for different types of drawing and referencing of structural members. Illustrations describe the main types of drawing.
The comment draft dealt with modular co-ordination in an appendix. This has now been removed and its fundamentals integrated into the main text. This new version of BS 1192 incorporates the ideas of many individuals and groups of users, but BSI is encouraging comments on its application as experience is gained. Further improvements may then be incorporated.
Copies of British Standard 1192 may be obtained from the BSI Sales Branch at 101/113 Pentonville-road, London, N1. Price is 24s.

News from the industry

NFBTE conference

John Silkin's first public engagement as the new Minister of Public Building and Works was to open the well attended Metrication Conference at the Royal Garden Hotel on 2 May. Among the speakers was perhaps a now familiar face from his own department, H. Glover, Under-Secretary of the Research and Development section. Mr. Glover said that people were under a misconception when they said that the Government should deal with metric as they had with decimal currency, i.e., to give a date beyond which the alternative would not be legal. There was no general legal requirement at the present time but an Act of 1897 gave permission for anyone to use metric. One of the first tasks the Government had to take up was the introduction of enabling legislation. So far the MPBW had unearthed about 400 acts which will need amending.

It was the Government's task, went on Mr. Glover, to clear the way. It was industry's job to implement. However, Government departments were giving an impetus to the metric changeover by making design in metric compulsory in the public sector. He said it was recognised that metric may impose additional initial cost but it was difficult to estimate how much. The MPBW would consider each job on its merits and would revise internal cost estimates accordingly. There would not, however, be an across the board increase in cost limits.

From the architects point of view, G. Grenfell Baines thought that the change to metric should be disregarded in costing jobs. Costs should be accepted as training and education. Ultimately, of course, they would fall on the client but how much would depend on the efficiency of the change.

For the contractor, A. S. Ellett, chairman of the NFBTE metric sub-committee, gave a long list of additional costs and headaches that would be created by the metric change, against which there was the gain of variety reduction. However, these difficulties could be mitigated if everybody played their part: the architect by understanding the programme and working to it; the manufacturer by giving as much advance notice as possible—18 months is a minimum—on changes in his materials; and the contractor by not playing King Canute but going along with the tide of change. Philip Dunstone, who was down to talk about costs, gave an impressive review of the changes that would be accelerated by the adoption of metric. Standardisation he said was the keynote to future development. If we were to cope with our building programme and reduce site labour, industrialised building had to increase. We should be standardising drawings and specifications and notation in Bills. We also needed to have a fresh look at communications to see if they could be improved. The metric change overlay and interacted with all these points although dimensional co-ordination, fully and properly applied, could bring about advantages even without going metric.

Block problems

Some of the problems for concrete blockmakers in changing to metric were outlined by J. R. Purvis, technical director of Thermalite Ytong Ltd., at a meeting of the construction industry section, the Gloucestershire and South Worcestershire Productivity Association last month. The current 18 x 9in. block gives, approximately a unit of 450 x 225 mm. To conform with BS 4011, some makers are thinking in terms of a 400 x 200 block and, indeed, a 600 x 200 block is a possibility. The floor to ceiling height is variable and it may be that a 100 mm block will be required. It would seem, said Mr. Purvis, that the industry may end up with five or six sizes against the current three sizes and this will inevitably increase costs. 'One of the problems is that it is by no means certain that the Continent will move from their metric system to the SI system and, as we now export imperial size blocks which meet their requirements, the change to SI can bring, in its train, export problems and increased costs. The cost of changing machinery for, say, a 450 x 200 mm block could be of the order of £350 000. Another problem is the thickness which now varies between 2in. and 12in. and could become 80, 90 or 100 mm but to meet 2in. and up to 3½in. it would probably have to be 50, 60 or 70 mm. Thickness, therefore, is probably the biggest problem the industry is facing.

Studying cases

The first of a series of seminars under the title 'Metric and the architect' was held at the RIBA on 1 May. These seminars are aimed specifically at metrication advisers in practices, the advance guard of the change into metric. The form of this, and subsequent meetings, is that two contrasting projects in metric are presented for discussion—in this instance a public sector repetitive housing scheme and a private sector one-off factory.

By deliberately selecting diverse case studies it is hoped that a wide spectrum of experience will be covered. Even so the conclusions drawn from the four syndicates into which participants were split had a fairly uniform pattern. These could be summarised as follows:—

1. A prime requirement is to be au fait with the new terminology.
2. the checking of drawings and specifications should be a special task to avoid unnecessary errors.
3. architects will be taking more responsibility in the building programme. It will be up to them to see that materials specified are available.
4. to ensure consistency there should be only one man in each office to answer queries on metric.
5. the publication of information on metric projects would be very useful.
6. there is a profusion of documents currently existing and it would help if a short list of essential publications could be produced.
7. a list of available metric components is needed.
8. architects should know the preferred sizes of BS 4011 and build up their vocabulary of dimensions from this. Visual aids would be very useful.
9. each office should select a pilot project for purposes of training staff.
10. there is a need for a simplified guide on dimensional co-ordination.
11. in the transitional period it will be necessary to identify which components are essential and which aren't.
12. there is a feeling that architects will be called upon to do more work which may be unremunerated.

Metric and the architect

The RIBA will be holding a further five one-day seminars for metrication advisers in practices as a follow-up to the seminar 'Metric and the architect' held at the institute on 1 May. As in the first seminar, two contrasting case studies of metric projects will be presented for discussion and appraisal at each meeting, which are to be held on the following dates: 18 July, 2 October, 17 December, 26 February 1970 and 20 May 1970.

Essentially these seminars aim at giving the architect insights into the operational aspects of designing and building in metric terms, and are designed to provide original feedback and comments on projects which are either in the design stage or have been completed.

All the seminars will take place at the institute and will be limited to 50. Tickets will cost £2 10s. including lunch, and all necessary material for the course. Details and application forms will be available one month in advance of each seminar from: PSD, The Royal Institute of British Architects, 66 Portland-place, London, W1N 4AD.

End of speakers' panel

Now that the first key date in the metric programme has been passed, The Building Centre Trust feels there is no longer the need for the lecture service it set up jointly with BSI in June 1967. The service has therefore been dropped from the beginning of this month although the Trust will continue to put speakers in touch with organisations which request speakers.

Since it set up its panel of speakers, the Trust has organised nearly 700 lectures throughout Britain to explain the implications of the change. The audience over these past two years has reached well over 100 000 people.

Mobile information centre

An information centre, with particular emphasis on metrication, is incorporated in Trainex, a mobile exhibition display in a six-coach train that is currently embarking on a six-week tour of provisional centres.

The information section, which has been set up by CIRIA, is linked with the BRS, MPBW, TRADA and three Building Centres, as well as the Information Office at 'Building.' This will enable the rapid answering of inquiries, especially on developments in metric.

Trainex, which is sponsored by The Builder Ltd., will be visiting Birmingham on 27 May where it will be opened by Lady Dartmouth. Subsequently the exhibition will move on to Manchester, Liverpool, Edinburgh, Newcastle, Middlesbrough, Leeds, Derby and London. It was opened in London by John Silkin, Minister of Public Building and Works, on 13 May.

Portable exhibition

A portable metric exhibition has been devised and produced by John Laing Research & Development Ltd. to help their staff absorb the changeover to metric measurement. Made in lightweight materials, it can easily be carried and put up by two people in two hours.

The exhibition is to tour regional offices of the Laing Group throughout the country. It shows the development and current usage of the metric system by 85% of the world population. There are samples of new currency, and a section showing everyday items in metric measurements. Replicas of the exhibition can be made available to outside organisations.

Management course

A 'Metrication for Management' course syllabus for large and large/medium firms will be published by the Construction Industry Training Board in June. A similar syllabus designed especially for medium/small and small firms will be produced at a later date.

The purpose of the course is to alert management and technical staff to possible pitfalls which was arise from unsuspected detailed implications of the changeover and the effect these will have upon estimating and costing criteria. The course stresses that it is a changeover rather than a conversion to metric, since the sizes of components may change.

The introduction will cover a brief resumé of basic metric knowledge and will be followed by the broad implications of the change. Detailed implications as they will affect industry, the individual company, and liaison between contractors, designers and suppliers, will all be covered.

The course will deal with the principles and application of dimensional co-ordination and will stress that it is the key to greater economy in building. Finally a section will be devoted to the organisation of retraining. Hints on presentation of the course will be included. The course material will be updated as more information becomes available from BSI and other official sources.

The course, which will be of one day's duration, will include visual aids, exercises, and hand-out material. It is hoped it will be put on in colleges, and by firms as an in-company course. Participants should include company directors, contract managers, project planners, work study officers, estimators, surveyors, purchasing officers, site engineers, sales and marketing staff, plant engineers, safety officers, legal officers, company secretaries and accountants and personnel and training officers—in fact all managerial and technical staff.

The course will be eligible for grant as set out in CITB's Metrigrant booklet, but grants will be applicable only if the courses are run as advised. Also, when this course syllabus is published and the companion course for smaller firms is ready, CITB will not pay grants for any other courses which cover the same ground.

This 'Metrication for Management' course is in addition to the retraining aids already produced by the Board. These aids consist of seven self-teaching aids, course material for supervisors, two reference cards, conversion tables for site staff and instructional posters.

Also published with these re-training aids are two administration guides which are most important reading to get the best out of the aids.

Ordnance survey maps

The first Ordnance Survey maps to be based completely on metric measurements will be published in the autumn of this year. The changeover will be gradual and at this stage will be limited to the large-scale OS Maps, including the six-inch-to-the-mile series. Metrication of the popular one-inch and smaller scale maps is still under study.

For many years the Ordnance Survey has used a metric grid on its maps; the sizes of the map sheets themselves have been based on this grid and correspond to metric dimensions on the ground. The scales of most of the maps series are already in decimal form (eg, 1 : 2 500, 1 : 25 000); the only exceptions being the one-inch and the six-inch maps.

The changes which are now being introduced are as follows:

1 : 1 250 and 1 : 2 500 Scales: On new and revised sheets heights of bench marks will be shown to two decimal places of a metre and of spot heights to one decimal place. The markings of administrative boundaries will be shown in metres to two decimal places. On the 1 : 2 500 maps, areas of parcels of land will be given in hectares to three decimal places and also in acres as hitherto. The first metric maps at these scales will appear in October 1969 but it will be many years before all 1 : 1 250 and 1 : 2 500 maps (there are some 150 000 of them) are converted to metric form.

Six-inch and 1 : 25 000 Scales: The six-inch (1 : 10 560) scale will be replaced by the 1 : 10 000 with metric contours. The contour interval will be 10 metres in the more mountainous areas and 5 metres in the remainder of the country. The first sheets at the 1 : 10 000 scale will be published in December 1969, but it will be many years before the country is covered with a homogeneous series at this scale. When, in about 1965, the present Provisional series has been replaced over the whole country by Regular sheets at the 1 : 10 560 or 1 : 10 000 scale, the map will still exist in three forms:

1) 1 : 10 000 scale with metric contours at 5 metre or 10 metre interval. (68%).

2) 1 : 10 000 scale with 25ft. contours labelled with the equivalent metric values. (22%).

3) 1 : 10 560 with 25ft. contours. (10%).

These will eventually be converted to 1 : 10 000, but in order to minimise inconvenience while this situation continues, the Ordnance Survey will supply reductions of the 1 : 10 000 map to 1 : 10 560 and enlargements of the 1 : 10 560 to 1 : 10 000 for limited areas on request. These reductions or enlargements will be in a single colour.

Publication of the 1 : 25 000 map with metric contours will follow the 1 : 10 000. The contour interval will be consistent over the whole of the 1 : 25 000 sheet.

Bench Mark Lists: The height of the bench marks will be given in metres and in feet in bench mark lists.

Identification of Metric Sheets: All metric sheets will carry the BSI metric symbol and also a prominent marginal note 'Heights in metres'.

ISO multi-modules

ISO Recommendation No. 1411, Modular Co-ordination : Horizontal Multi-Modules, has now been published, but it is not to be issued as a British Standard. The recommendation defines a multi-module as a multiple of the basic module of 100 mm—the latter being standardised internationally (in ISO R 1410) as the agreed basis for buildings and their components constructed on the principles of modular co-ordination. ISO R 1411 specifies values of 300 mm and 600 mm for applications to the construction of buildings of all types though it is mainly intended for dwellings. At this stage UK feels that to specify these two values without defining the type of construction and type of component to which they apply is far from satisfactory, and consequently UK has voted against the recommendation.

BSI proposes to publish recommendations on basic spaces for groups of related components within the next few months. More draft ISO recommendations based on the latter are to be submitted by UK.

Sink sizes

The Metal Sink Manufacturers' Association has written to the British Woodwork Manufacturers' Association supporting BWMA's proposals for sink sizes and, in particular, that there should be only one standard metric dimension from back to front of 600 mm.

BUILDING 23 MAY 1969
BMN Building Metrication News

Metrication the computer and SI

This series of conversion tables, compiled by R.M.E. Diamant and B.A.L. Hart appears in this section periodically. They are to be used like logarithmic tables, using a ruler to ensure clear distinction of the horizontal lines. The tables have been set with the help of the English Electric KD9F computer at the University of Salford

Table 16

Kilojoules per kilogramme to Btu/pound

lkJ/kg = 0.4299226 Btu/lb

Note: diff signifies units of ten so that the reading for any number required is taken at the intersection of the horizontal one hundred unit line and the vertical ten unit column.

diff	0	10	20	30	40	50	60	70	80	90
kJ/kg					BThU/lb					
0		4.3	8.6	12.9	17.2	21.5	25.8	30.1	34.4	38.7
100	43.0	47.3	51.6	55.9	60.2	64.5	68.8	73.1	77.4	81.7
200	86.0	90.3	94.6	98.9	103.2	107.5	111.8	116.1	120.4	124.7
300	129.0	133.3	137.6	141.9	146.2	150.5	154.8	159.1	163.4	167.7
400	172.0	176.3	180.6	184.9	189.2	193.5	197.8	202.1	206.4	210.7
500	215.0	219.3	223.6	227.9	232.2	236.5	240.8	245.1	249.4	253.7
600	258.0	262.3	266.6	270.9	275.2	279.4	283.7	288.0	292.3	296.6
700	300.9	305.2	309.5	313.8	318.1	322.4	326.7	331.0	335.3	339.6
800	343.9	348.2	352.5	356.8	361.1	365.4	369.7	374.0	378.3	382.6
900	386.9	391.2	395.5	399.8	404.1	408.4	412.7	417.0	421.3	425.6
1000	429.9	434.2	438.5	442.8	447.1	451.4	455.7	460.0	464.3	468.6
1100	472.9	477.2	481.5	485.8	490.1	494.4	498.7	503.0	507.3	511.6
1200	515.9	520.2	524.5	528.8	533.1	537.4	541.7	546.0	550.3	554.6
1300	558.9	563.2	567.5	571.8	576.1	580.4	584.7	589.0	593.3	597.6
1400	601.9	606.2	610.5	614.8	619.1	623.4	627.7	632.0	636.3	640.6
1500	644.9	649.2	653.5	657.8	662.1	666.4	670.7	675.0	679.3	683.6
1600	687.9	692.2	696.5	700.8	705.1	709.4	713.7	718.0	722.3	726.6
1700	730.9	735.2	739.5	743.8	748.1	752.4	756.7	761.0	765.3	769.6
1800	773.9	778.2	782.5	786.8	791.1	795.4	799.7	804.0	808.3	812.6
1900	816.9	821.2	825.5	829.8	834.0	838.3	842.6	846.9	851.2	855.5
2000	859.8	864.1	868.4	872.7	877.0	881.3	885.6	889.9	894.2	898.5
2100	902.8	907.1	911.4	915.7	920.0	924.3	928.6	932.9	937.2	941.5
2200	945.8	950.1	954.4	958.7	963.0	967.3	971.6	975.9	980.2	984.5
2300	988.8	993.1	997.4	1001.7	1006.0	1010.3	1014.6	1018.9	1023.2	1027.5
2400	1031.8	1036.1	1040.4	1044.7	1049.0	1053.3	1057.6	1061.9	1066.2	1070.5
2500	1074.8	1079.1	1083.4	1087.7	1092.0	1096.3	1100.6	1104.9	1109.2	1113.5
2600	1117.8	1122.1	1126.4	1130.7	1135.0	1139.3	1143.6	1147.9	1152.2	1156.5
2700	1160.8	1165.1	1169.4	1173.7	1178.0	1182.3	1186.6	1190.9	1195.2	1199.5
2800	1203.8	1208.1	1212.4	1216.7	1221.0	1225.3	1229.6	1233.9	1238.2	1242.5
2900	1246.8	1251.1	1255.4	1259.7	1264.0	1268.3	1272.6	1276.9	1281.2	1285.5
3000	1289.8	1294.1	1298.4	1302.7	1307.0	1311.3	1315.6	1319.9	1324.2	1328.5
3100	1332.8	1337.1	1341.4	1345.7	1350.0	1354.3	1358.6	1362.9	1367.2	1371.5
3200	1375.8	1380.1	1384.4	1388.7	1392.9	1397.2	1401.5	1405.8	1410.1	1414.4
3300	1418.7	1423.0	1427.3	1431.6	1435.9	1440.2	1444.5	1448.8	1453.1	1457.4
3400	1461.7	1466.0	1470.3	1474.6	1478.9	1483.2	1487.5	1491.8	1496.1	1500.4
3500	1504.7	1509.0	1513.3	1517.6	1521.9	1526.2	1530.5	1534.8	1539.1	1543.4
3600	1547.7	1552.0	1556.3	1560.6	1564.9	1569.2	1573.5	1577.8	1582.1	1586.4
3700	1590.7	1595.0	1599.3	1603.6	1607.9	1612.2	1616.5	1620.8	1625.1	1629.4
3800	1633.7	1638.0	1642.3	1646.6	1650.9	1655.2	1659.5	1663.8	1668.1	1672.4
3900	1676.7	1681.0	1685.3	1689.6	1693.9	1698.2	1702.5	1706.8	1711.1	1715.4
4000	1719.7	1724.0	1728.3	1732.6	1736.9	1741.2	1745.5	1749.8	1754.1	1758.4
4100	1762.7	1767.0	1771.3	1775.6	1779.9	1784.2	1788.5	1792.8	1797.1	1801.4
4200	1805.7	1810.0	1814.3	1818.6	1822.9	1827.2	1831.5	1835.8	1840.1	1844.4
4300	1848.7	1853.0	1857.3	1861.6	1865.9	1870.2	1874.5	1878.8	1883.1	1887.4
4400	1891.7	1896.0	1900.3	1904.6	1908.9	1913.2	1917.5	1921.8	1926.1	1930.4
4500	1934.7	1939.0	1943.3	1947.5	1951.8	1956.1	1960.4	1964.7	1969.0	1973.3
4600	1977.6	1981.9	1986.2	1990.5	1994.8	1999.1	2003.4	2007.7	2012.0	2016.3
4700	2020.6	2024.9	2029.2	2033.5	2037.8	2042.1	2046.4	2050.7	2055.0	2059.3
4800	2063.6	2067.9	2072.2	2076.5	2080.8	2085.1	2089.4	2093.7	2098.0	2102.3
4900	2106.6	2110.9	2115.2	2119.5	2123.8	2128.1	2132.4	2136.7	2141.0	2145.3
5000	2149.6	2153.9	2158.2	2162.5	2166.8	2171.1	2175.4	2179.7	2184.0	2188.3

Table 16. Kilojoules per kilogramme to Btu/pound. This table to be used for the calculation of the calorific value of solid fuel, the sensible heat content of solids and liquids and similar problems.