Building Metrication News

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This section appears in the fourth issue 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

METRIC MONTH

All in the Swim

The Government's acceptance, announced in the House last month, of the main recommendations* of the Standing Joint Committee on Metrication will put an end to the uncertainty surrounding its metric intentions. The end of 1975 is now recognised as the target date when the country as a whole—including the retail sector—will aim to go metric, whilst the programme towards this end will be supervised by a Metrication Board who will act as a central planning agency.

So the Government have come down in favour of 'an orderly change within a definite time limit,' a quote which, as well as symbolising their action also indicates how belated it has been since it is taken from the report of the Hodgson Committee, a committee on Weights and Measures that as long ago as 1950 recommended the abolition of the imperial system and its replacement by metric.

The choice of 1975 as the target date was predictable. In fact it was recognised, when the Government first made their statement in 1965 about implementing the change to metric, that a time span of about 10 years would be needed for the overall transition to the new system. It ties in also with the recently announced programme for the engineering industry. Some flexibility is being provided, however, by treating the terminal date as a guide line, for although it is hoped that, in general, the adoption of metric will be completed by 1975, it is acknowledged that individual sectors will vary in their timing: some may require a longer, some a shorter period to make the change.

The building industry, of course, should have realised its metric programme by 1972. Difficulties could occur where we rely on other industries for our materials but it seems likely that the weight of consumer demand will automatically encourage earlier conversion to metric in those sectors involved—for instance, although the time span for the engineering industry's metric programme is 1970-75, it is anticipated that for certain basic engineering commodities there will be a 15-20% swing from imperial to metric in 1970. This problem of synchronisation will also be the concern of the Metrication Board whose job will be to see that, in their progress towards metric, each section, as far as possible, dovetails with the others.

*Change to the Metric System in the United Kingdom: Report by the Standing Joint Committee on Metrication. HMSO, price 2s. 3d.

Metrication Board

On the need for a central Metrication Board the Report is quite emphatic. Whilst it acknowledges the work of the British Standards Institute and the Ministry of Technology in co-ordinating the industrial sectors that are already involved in metric, it considers that only a Metrication Board can properly guide the country as a whole towards the metric system. There will, in fact, be a number of issues arising which can only be dealt with by a high powered central body—the knitting together of all Government departments involved, the requirements of education, the need for enabling legislation to allow metric units to be used, are all matters needing central direction.

The initial task of the Board (whose members will represent the interests of industry and commerce, Government, education and consumers) will be to make a sector by sector appraisal before detailed programmes are drawn up. Each sector will have its own organisation but the Board will be responsible for overall planning to ensure that each step towards metric is co-ordinated. The pressing need for such a policy has been pointed out at various times by the BSI, the CBI, the Construction Industry Metric Liaison Group and Building Metrication News, amongst others, and it is hoped that, now the Government have agreed the principle, the Board will be set up as soon as possible.

Costs and Benefits

What the final margin between costs and benefits will be, and even on what side it will fall, the SJCM is unable to predict. Apparently at one time it did consider drawing up a balance sheet but the idea was abandoned as impracticable since, even for a single industrial concern, it found it was not possible to quantify the factors involved. Other countries have met with the same difficulties and various researches carried out to find a solution have had to be discarded. The only study that appears to have a degree of validity in its findings is that undertaken by an American university. This concluded that, over a certain period, the benefits of going metric are in inverse ratio to the time taken. This is supported in some of the findings of the Report: where the two systems—imperial and metric—are operating in parallel it leads to waste of time (learning at school) and waste of money (through increased manufacturing and operating costs in industry).

Since the last lingering doubt that we might still withdraw from the metric path has now been dispelled, and since also the Government has made it clear that the costs of going metric must lie where they fall (i.e. there is unlikely to be any compensation for an increase in costs), the sooner the change is made the better (and cheaper) it will be for everybody.

Grid Drafting

The purpose of this article, by Eric Corker, DipArch, ARIBA, is to review the factors which influence choice in the selection of gridded papers for drafting purposes. It is particularly relevant to those offices about to go metric.

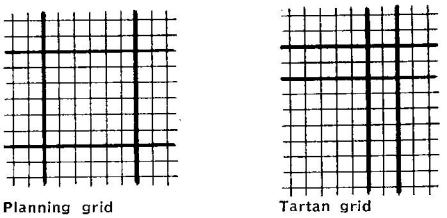


Fig. 2. Various grids (above and below) are selected intervals of the Basic Module Grid.

Grids and Modular Co-ordination

Grids have always been an integral part of the application of modular co-ordination. The fundamental principle of this application is that there is only one grid which is rectangular, is three dimensional and has its lines (or planes) spaced one module apart, see Fig. 1. All other grids are selected intervals of the Basic Module Grid and employed for specific (and limited) purposes, see Fig. 2.

Where the purpose of a grid is to aid the planning and layout of the spaces of a building, grids usually come within the range of from three to 12 times the Basic Module, see Fig. 3. The Basic Module in the metric context is internationally accepted as 100mm. and was recommended in 'Modular Co-ordination' EPA Project 174, Second Report OEEC Paris 1961.

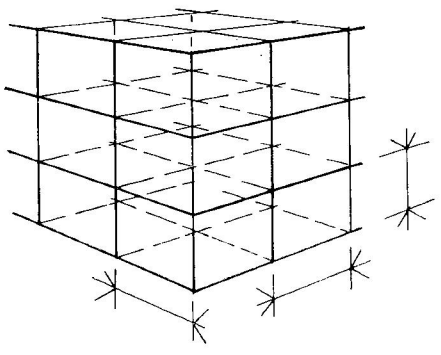
The choice of size of the planning grid will depend upon the convenience required of it. For example, it might be that a frequently occurring space dimension dictates this choice (such as 8 x the Basic Module which coincides with the widths of a single bed, a bath, a door set and a minimum corridor); alternatively, it might be that the designer wants a paper grid which coincides with the way linear dimensions are measured (for example three or six times the Basic Module approximate to one or two feet respectively—a very familiar measure to designers brought up in the UK and North America).

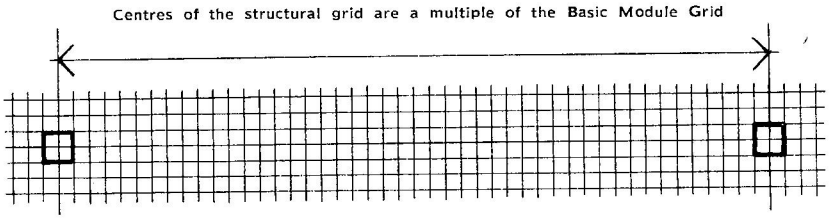
It is sometimes convenient to use a planning grid size for the sizing of components but restraint has to be exercised when extending the use of the planning grid in this way because it can easily lead to it being considered as the Basic Module; the employment of more than one Basic Module is a contradiction which will rapidly lead to confusion. The resolution is to relate both the planning grid size and component sizes independently to the Basic Module grid, and not try to identify them with each other. There are two main advantages to be gained by the use of grid drafting methods:

i) Designing may be carried out freehand yet with complete dimensional precision.

ii) Drawings superimposed on grids need fewer dimensions figured on them because the grid provides a readily understandable reference for dimensions; although there is a speed advantage in saving drafting time, the greater advantage is that drawings are less cluttered up by dimension lines and figures.

Fig. 1, Basic Module Grid. Each side, as marked by arrows, is 1M (M=100mm.).





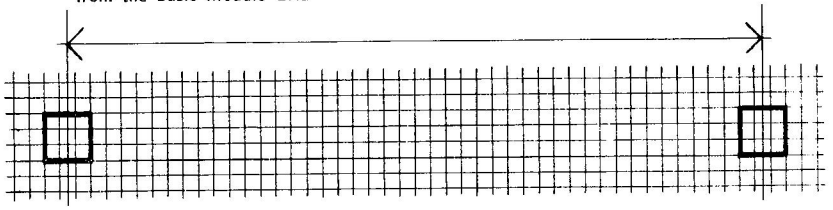
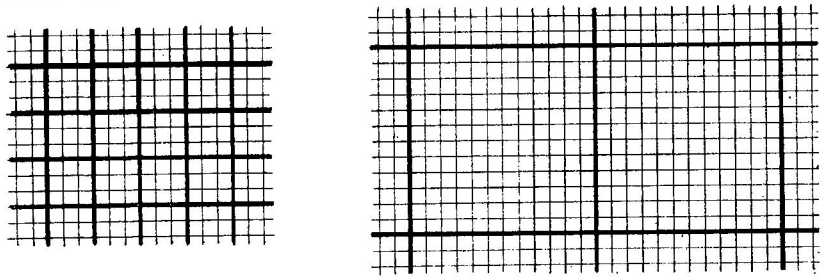


Fig. 3. Planning grid sizes most commonly used are between 3 and 12 times the Basic Module Grid.



The Size of the Paper Grid

The choice of size for the spacing of the lines of a grid as they appear actually on the paper depends largely on conformity with two requirements:

i) The building dimensions which need to be represented on the drawing; most commonly, this will be the planning grid and/or the Basic Module gride. In addition, when drawing large scale details, it would be useful if the smaller units of linear measure were also registered: in metric building this is likely to be 10mm. (i.e., 1 centimetre).

ii) The scale of the drawing.

The paper grid size (P), the building dimension (B) and the scale of the drawing (S) are related in a simple manner to one another:

$P = B \times S$ Thus the size of the paper grid necessary to register a 300mm. planning grid at a scale of 1/50 is $B \times S = 300\text{mm.} \times 1/50 = 6\text{mm.}$ See Fig. 4. This close inter-relation shows that one condition cannot be changed without affecting the others and helps to explain why it is difficult to design a single paper grid which would satisfy every possible requirement.

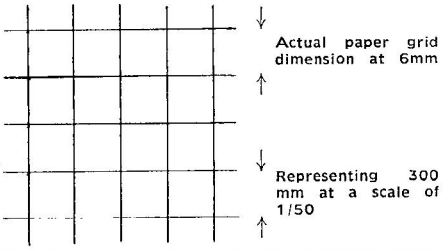


Fig. 4. Example of relationship between paper grid, planning grid and scale of drawing.

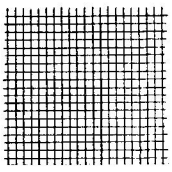


Fig. 5. A 1mm. x 1mm. paper grid.

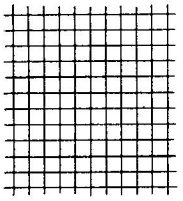


Fig. 6. A 2mm. x 2mm. paper grid.

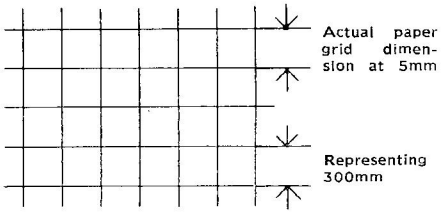


Fig. 7. If each grid line of a 5mm. paper grid is made to represent 300mm., then the scale of the drawing would be 5/300=1/60.

The head British Standard for the change to metric in the Construction Industry in the UK is BS 4011 'Recommendations for the Co-ordination of Dimensions in Building; Basic Sizes for Components and Assemblies.' This establishes that the dimensions should, as a first preference, be in multiples of 300mm.; if this is not suitable, multiples of the second preference of 100mm. (i.e., the Basic Module) may be used.

These two dimensions of 300mm. and 100mm. are, therefore, of prime importance when assessing which paper grid size to use. It is interesting to note in passing that although the construction industry of the UK is going metric, it is not wholly going decimal insofar as the metre is not considered to be of any great importance as a preferred dimension (although it will be used as a unit measure, both linear and for areas).

The second requirement to settling the size of a paper grid is in relation to the scale of the drawing; a range of scales suitable for various purposes is recommended by the BSI and is set out in PD 6031 'A Guide for the Use of the Metric System in the Construction Industry.' These are:

1/500 Sketch plans
1/200 Sketch schemes and
1/100 general location
1/50 drawings
1/20 Components and
1/10 detail assembly
1/5 drawings
1/1

It may be questioned whether this range of scales is the most suitable, even though it is similar to Continental practice and is analagous to the scales popularly used at present in the UK; fascinating as such an inquiry may be, it is too large and complex a subject to be pursued here.

By applying the measurements of the preferred sizes (ie 300mm., 100mm. and 10mm.) to the recommended range of scales, it is now possible to show the paper grid sizes which result in combining the dual requirements.

Inspection of table one shows that 3, 6 and 15mm. paper grid sizes are needed to register a planning grid size of 300mm. at scales of 1/100, 1/50 and 1/20 respectively; that 1, 2, 5 and 10mm. paper grid sizes are needed to register the basic module of 100mm. at scales of 1/100, 1/50, 1/20 and 1/10 respectively; and that 1 and 2mm. paper grid sizes are needed to register 10mm. at scales of 1/10 and 1/5 respectively.

TABLE 1

Scales (S)	Preferred sizes (B)	Resultant paper grid sizes (P) P = S × B
1/500	1 metre	1/500 × 1 m = 2mm
1/200	600 mm	1/200 × 600 mm = 3 mm
	1200 mm	1/200 × 1200 mm = 6 mm
1/100	100 mm	1/100 × 100 mm = 1 mm
	300 mm	1/100 × 300 mm = 3 mm
	600 mm	1/100 × 600 mm = 6mm
1/50	100 mm	1/50 × 100 mm = 2 mm
	300 mm	1/50 × 300 mm = 6 mm
	600 mm	1/50 × 600 mm = 12 mm
1/20	100 mm	1/20 × 100 mm = 5 mm
	300 mm	1/20 × 300 mm = 15 mm
1/10	10 mm	1/10 × 10 mm = 1 mm
	100 mm	1/10 × 100 mm = 10 mm
	300 mm	1/10 × 300 mm = 30 mm
1/5	10 mm	1/5 × 10 mm = 2 mm
	100 mm	1/5 × 100 mm = 20 mm
	300 mm	1/5 × 300 mm = 60 mm

Although a 1mm. x 1mm. paper grid size would provide registration for all the conditions above, such a grid is a little beyond the limits of fineness that could reasonably be used without undue eye strain, see Fig. 5. 2mm. is probably the closest acceptable spacing, see Fig. 6. However, even at 2mm. spacing, a whole page of such a grid is rather confusing and some device would be necessary to provide a much larger interval for ease of counting; this aspect is discussed below.

It is possible to reverse the procedure and start with a paper grid size based on what may be considered to be a visually pleasant and 'open' spacing. This paper grid is then made to represent whatever building dimension needs to be registered. Thus if a 5mm. paper grid size is used and this is to represent a 300mm. planning grid then the resultant scale of the drawing would be the paper grid size divided by the planning grid size, ie 5/300=1/60. The use of this rather unfamiliar scale may or may not be important, but drawings would not of course be to one of the BSI range of recommended scales.

Form of Gridded Paper

There are a number of factors to be considered when deciding precisely what is to be used as a vehicle for the grid.

1 Type of paper. Cartridge Paper: This provides a pleasant surface to draw on and is economical but it cannot be used for tracing and it will require a reflex type of printer to make copies.

Tracing Paper: As its name implies, it can, of course, be used for tracing and is easy to print copies; plastic and linen would have similar advantages. If the grid is printed in a blue ink, it can disappear on copies when prints are taken and this facility can be useful. The grid can be printed on the reverse side of tracing paper and still be equally visible; the advantage of doing this is that erasing on the top surface does not damage the grid lines.

Detail Paper: A good surface to draw on, economical and can be used for tracing if the underlying image is sufficiently strong. It is not easy to get prints from many detail papers, but there are now some available that can be satisfactorily printed through, even though they appear to the eye to be opaque.

Backing Sheets: In conjunction with plain tracing paper, a gridded backing sheet will provide dimensional guidance for drafting. It is particularly useful when the design of the building calls for neutral zones, but it does mean that there is the extra chore of drawing in all the grid lines for the finished drawing.

2. Size of Paper: The international series of 'A' sized papers is now generally accepted as the range from which sizes of drawings will be selected; a useful variation is to use one of the 'A' series (particularly A4) and extend its width horizontally. Many offices have plain standard size drawing paper with their name panels printed on. However, it does not necessarily follow that a size which has proved perfectly satisfactory in an imperial measure context will automatically continue to be as convenient in a metric gridded form.

This is because in the larger sizes (A0, A1 and A2) a grid printed on paper is difficult to align exactly with any and

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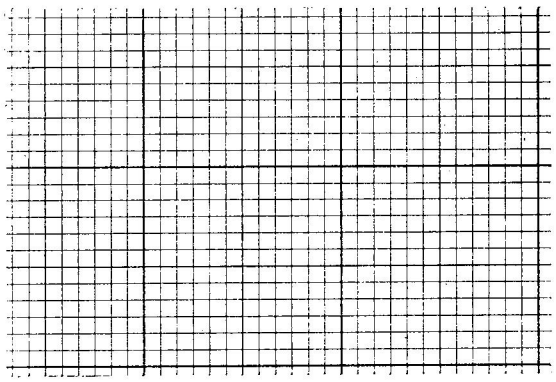
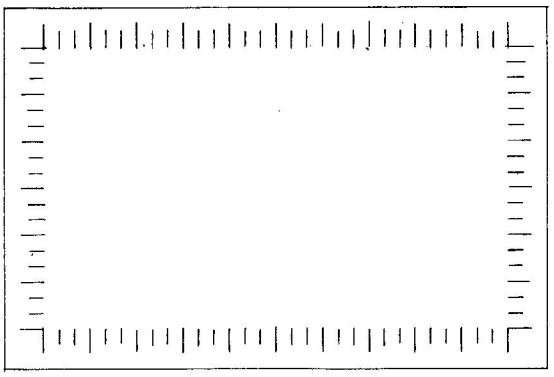


Fig. 8, left, showing typical graph paper.

Fig. 9, right, edge marked paper to act as a measuring scale for set squares and tee squares.



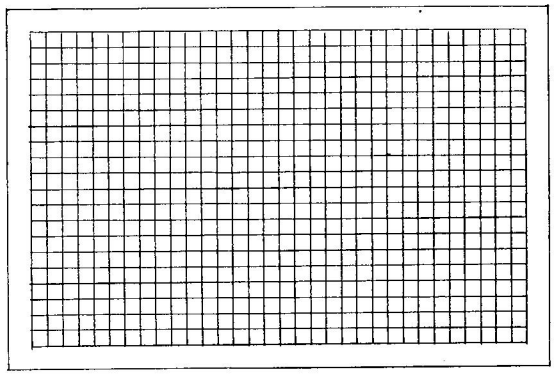
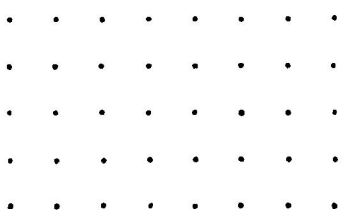


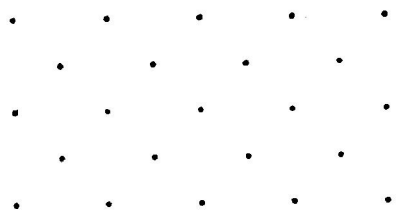
Fig. 10, left, ordinary square gridded paper.

Fig. 11, below, paper marked out with small squares or dots. If every other one is omitted (right), the pattern is made more 'open' without loss of facilities.

'Square' dotted pattern



'Diagonal' dotted pattern



every set square and tee square that an office might use; and even the smallest discrepancy is very noticeable. If the office has a policy of producing drawings freehand, this objection would not apply.

Any such discrepancy will not be so objectionable on smaller sheets of paper (ie A3 and A4). These smaller sizes are very suitable for freehand sketch designing purposes.

Rolls of gridded paper would leave the options open for the choice of paper sizes but paper in this form cannot then have pre-printed name panels.

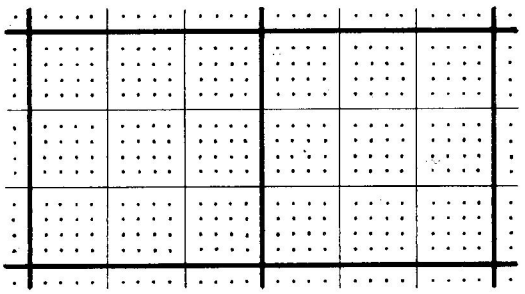


Fig. 12, a combination of dots and lines in two thicknesses can satisfy more than one particular set of requirements of scale and building dimension.

Design of the Paper Grid

There are a number of ways in which grid aids to drafting may be provided; these are reviewed briefly below (although not all are available commercially).

1. Graph papers are the only commercially produced gridded papers which have been available until quite recently, see Fig. 8. Although some of them may be suitable when designing buildings and building components, it is not always possible to get the right type of paper, ink, grid size and size of sheet all in a convenient combination.

2. Sheets of paper printed with marks at suitable intervals around the edges. This device acts as a dimension marker (and is virtually a built-in scale rule for the set square and the tee square, see Fig. 9).

3. Sheets or rolls of specially printed paper with suitably spaced grid lines. If all the grid lines are required on the prints from the final drawing, this paper can effect great savings in drafting time, both because it reduces the need to use the scale rule and also because it reduces or eliminates the need to figure in dimensions. It is especially useful for freehand work but it may be difficult to align on large sheets of paper when using set squares and tee squares, see Fig. 10.

4. Sheets or rolls of paper printed with dots or crosses. These may be located where lines would have crossed if the paper had been gridded; to create a more 'open' texture, every other one may be omitted which makes a diagonal pattern, yet which does not lose the facility to pick up the required intervals. The diagonal pattern has a particular appeal where it is felt that the presence of a square grid inhibits the sense of freedom in design, see Fig. 11.

5. Sheets or rolls of paper printed with a pattern of lines and dots combined. The dots may be spaced close together to register small dimensions, and the grid lines at wider spacing to register the larger building dimensions; by using two thicknesses of lines, the pattern may be made to extend its use even further. Careful selection can make one design suitable for more than one set of requirements of scale and building dimensions, see Fig. 12.

6. Sheets or rolls of paper printed with lines at 30 deg. (in two directions) can provide a grid framework for setting up three-dimensional sketches in isometric projection. Although this type of paper usually has vertical lines also, this is not necessary for the purpose of setting up

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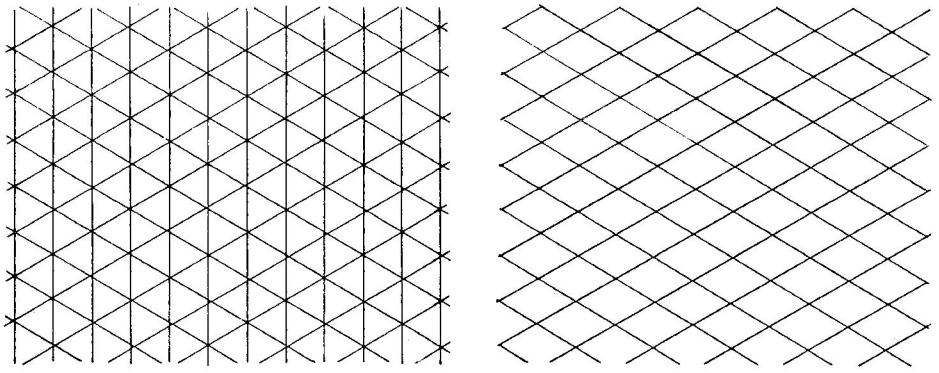


Fig. 13. Paper with lines at 30° to provide a framework for isometric drawings. The vertical lines are not important for vertical dimensions since the intersection of the 30° lines marks the vertical interval automatically.

an isometric drawing as the intersection of the 30 deg. lines marks the vertical intervals, see Fig. 13.

Conclusion

In addition to the familiar advantages of speed in drawing and in the reduction of the need to figure in dimensions, gridded paper can be of considerable assistance to designers when changing to metric. In fact, changing to designing in metric dimensions in the construction industry has been made relatively simple because of the choice of the first and second preferences for sizes as set down in BS 4011. These preferences are 300mm. and 100mm. which are slightly smaller than 1ft. and 4in. respectively, see Fig. 14. Where offices have already been using gridded paper for the 1ft. 4in. situation, the change merely means the use of a slightly different sized paper grid. Only a few suitable gridded papers are commercially available yet, and there is not a generally accepted concensus of what may be considered good practice. Some experiment will be necessary to discover where and in what manner the use of gridded paper will be beneficial; what is 'suitable' could vary between different offices because of differences in policies, conditions and personal preferences on drawing production. The following is a short check list of what appears at this present time to be the more important considerations to be weighed.

1 Drawing Policy: The case for quick freehand sketching to a small scale on gridded paper with a high degree of dimensional precision is self-evident. It is, however, less obvious whether this technique can be extended to the production of all contract drawings; some offices are reported to have adopted this technique but little has been published on its success and benefits.

The use of set squares and tee squares with large sheets of gridded paper is not satisfactory because even though the grid may have been printed perfectly accurately, subsequent movement in the paper and the impossibility of guaranteeing that every set square and tee square is exactly accurate produces unacceptable discrepancies between the drawn and printed lines. Small discrepancies can be accommodated when using a sheet of plain tracing paper over a printed backing sheet but if, on the finished drawing, the grid is to replace figured in dimension lines then each grid line will have to be drawn in separately; this reduces a considerable part of the economic benefit of using a printed gridded paper.

2 Scales: The acceptance of the BSI recommended scales will simplify this particular choice; even so, it may be that some of the scales in this range are used more frequently than others and in any given office it would be as well to ensure that these preferred scales are catered for first. Scales other than those in the BSI scale may prove to be useful eventually but so little is known and agreed that it is likely to be a considerable time before their value can be clearly demonstrated.

3 Paper Size: Once the scales to be used have been decided, study of the overall dimensions of the types of buildings which are normally dealt with in any particular office will indicate the sizes of paper which will be most useful; for the most part, one or more of the 'A' series will be suitable. The method of folding, filing and production of copies should also be taken into account and decisions made on whether the paper is needed in sheets, pads and/or rolls.

4 Type of Paper: Cartridge, detail and tracing papers are the main possibilities. The method of making copies will largely determine which is required; if copies are made by a reflex process, cartridge or detail paper may be used. Otherwise it will be necessary to use tracing paper (or plastic or linen). There are now available some detail papers which although they look opaque can nevertheless be printed through quite easily (almost as clearly as tracing paper).

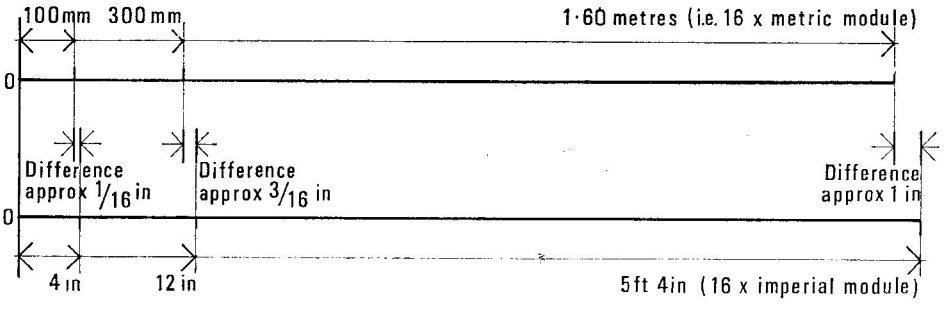
5 Pattern and Size of Grid: Personal preference is really the only guide here. Either the intervals can be very close for a high degree of precision (but at the possible cost of increasing the obtrusiveness of the grid) or the grid can be 'open' (but at the possible loss of precision). Combinations of dots and lines can provide a means of compromise between these two extremes.

A diagonal pattern of dots can satisfy the need of designers who do not wish to be trammelled by the squareness of a grid.

6 Procedure: Gridded paper in A4 or A3 sized pads is extremely useful in any office for the purpose of rapidly producing in freehand dimensional precise sketch designs. The form of paper and grid patterns necessary for the production of contract drawings has to be related to the policy of individual offices and further consideration is needed to compare the value of the various possible grid patterns, paper sizes and types of paper. A simple way to experiment is to draw the grid pattern on a backing sheet and use plain tracing paper over it.

It is hoped that offices experienced in the use of grids for drawing will make their conclusions known to 'Building.

Fig. 14. The actual difference in linear measure when the imperial Basic Module of 4in. is taken as an analogue of the metric Basic Module.



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Metric Bibliography
Part II: Societies, Associations, etc

This second list of metric publications, compiled by Sylvia Locke, is concerned with those issued from non-official sources such as societies, associations and trade journals.

The assistance of the Librarians of the Ministry of Housing and Local Government and the Royal Institute of British Architects is gratefully acknowledged.

General

Of interest to building contractors.

1 *The change to metric. A guide to building contractors.* NFBTE, May 1968. Introduces the change to metric and the BSI programme, with notes on what will be affected, what work has been done, and suggestions for the first steps to be taken by contractors.

Of interest to manufacturers and contractors.

2 *Change to the metric system. Programme for equipment required by members of EEUA (1967).* Engineering Equipment Users Association, 1967.
A programme for basic engineering equipment is set out as a bar chart with notes. Based on the BSI programme and including equipment used in the construction industry.

3 *Metrication in the United Kingdom.* The Institution of Production Engineers, January 1967.
A detailed consideration of the implication of the change to metric to producers of basic sheet, plate, rolled and extruded sections and fixings, with a diagram of a proposed programme for the change.

4 *Metric change. The progress of the BSI metric change programme for the building industry.* In two parts by John Brunton, Building Management and Technology, May and June 1968. (Institute of Building.)
A summing up of the history and progress of the change to date, with a simple illustrated introduction to a method of determining the size of components and their fit together.

Of interest to all members of the construction industry.

5 *Building Metrication News.* 'Building' in association with the Modular Society.
A monthly supplement which started in September 1967 and maintains a constant review of the change to metric. It includes reports on progress and problems from the different sectors of the construction industry, lists and data sheets on metric equipment and components, and important draft British Standards.

6 *Metrication of timber* by G. B. Crow. RIBA Journal, May 1968.
The development of standardisation in timber sizes in the international field and the present position on metric sizes.

Of interest to quantity surveyors

7 *Metric guide.* RICS, March 1968.
Describes the programme for the change to metric, the metric units to be used, some conversion factors and with fully detailed examples argues the merits of alternative methods of notation.

Of interest to engineers and architects.

8 *Metrication* by F. Wally. Proceedings of the Institution of Civil Engineers, May 1968.
Reproduces the BSI programme for the change together with a useful table of proposed SI units with their symbols and conversion factors. Brief notes advise on surveying and discuss the problem of the use of the Newton.

9 *Metrication of force, stress and loading in structural engineering.* The Structural Engineer, May 1968.
Discusses the choice of units to be used and gives the arguments in favour of SI units, in particular the Newton, with an example of a calculation for a simply supported concrete beam using SI units. The equivalent calculations in approximate British units is set alongside, step by step, for ease of comparison.

10 *An introduction to the metric system.* Central Electrictiy Generating Board, December 1967.
A description of the SI units with an outline programme for new CEGB projects with some additional details for operating staff and those designing and constructing new power stations.

Guides

Of interest to members of the design team.

1 *A) Metric conversion tables; B) Metric modular conversion tables.* RIBA Journal, January 1966.
A table of metric equivalents for values up to an inch followed by a table of equivalents from 1in. to 21ft. relating the British to the metric module.

2 *Metric conversion factors.* Construction Industry Research and Information Association, 1968.
A small booklet listing conversion factors for SI units and British units given to up to nine decimal places.

3 *Metric system and British equivalent* by John Brook (E. & F. N. Spon Ltd.), 1967.
A small pocket book with a series of tables giving equivalents of millimetres from 1 to 1000 and metres from 1 to 100 in decimals and fractions of an inch, to six places of decimals. A table also gives fractions of an inch from 1/64 to 1in. in decimals of an inch and millimetre equivalents.

Of interest to quantity surveyors and those working out costs.

4 *Metric conversion tables.* RICS, 1968.
Lists conversions of currency, weight, linear, square and cubic dimensions followed by detailed tables of the equivalents in decimal currency per linear, square and cubic metre for the traditional shillings and pence per square foot, cubic yard, etc.

Of interest to the design team, in particular architects.

5 *The red book. Annual report of the Architects Benevolent Society 1967-68.* Architects Benevolent Society, 1968.
Includes a 23-page section, Going Metric, which introduces the programme for the change, with many sketches, the units, work on dimensional co-ordination, some comparative dimensions and three tables of metric equivalents from 1/32in. to 50ft.

6 *The architect and the change to metric.* RIBA Journal, March 1968 (reprint).
Shows how the change will affect the architect at each stage of the design and construction of a building.

7 *The AJ metric handbook* by Leslie Fairweather and Jan A. Sliwa (The Architectural Press Ltd.), 1968.
A great deal of factual information given in metric units and grouped in 22 sections. Three sections cover anthropometric and circulation data, 13 sections give information on different building types and the remaining sections include data on structural and services engineering with worked examples of calculations.

Of interest to architects and services engineers.

8 *Imperial/Metric (SI) conversion scales.* College of Architecture and Advanced Technology, The Polytechnic, Regent-street, London, W1.
Four A4 sheets illustrating a series of conversion scales for heat, light and mechanics.

9 *Change to metric. Reference manual.* The Institution of Heating and Ventilating Engineers, 1968.
Some general notes include exact definitions of some basic SI units, and are followed by recommended metric units with the relevant conversion factors tabled in detail on the facing page. Other useful tables include airflow velocities, and consumption and storage capacities for water. Appendices give worked examples including calculations for heat transmission and airflow.

(concluded on page 111)

(continued from page 108)

10 *The IES Code. Recommendations for lighting building interiors.* The Illuminating Engineering Society, March 1968.
A guide to the principles of designing a well lit building cross referenced to recommendations on methods of implementing them. Supporting tables and schedules include recommended minimum service values of illumination for different activities, some daylight factors, approximate reflectance for some colours and materials and a glossary of terms.

11 *Evaluation of discomfort glare: The IES glare index system for artificial lighting installations.* IES Technical Report No. 10. The Illuminating Engineering Society.
The glare index for an installation can be calculated by following the method given with the necessary tables, graphs, etc., for the calculation procedure, which is explained in detail.

Of interest to the construction industry.

12 *The AJ guide to the building regulations.* The Architects Journal, 3, 10, 17, and 24 July 1968.
The guide takes each regulation in turn, including amendments, and gives a working explanation with diagrams, graphs, etc., using the metric equivalent for each dimension, etc.

Dimensional Co-ordination

Of interest to members of the design team and component manufacturers.

1 *Component co-ordination and the change to metric. What the official agencies are doing* by Roman Grunberg. The Architects Journal, 15 May 1968.
Argues the case for combining the change to metric with dimensional co-ordination in the construction industry, and outlines the work of the government departments, the British Standards Institution and other official organisations with a diagram to illustrate how the work is co-ordinated.

2 *Modular primer* by Eric Corker and A. Diprose (Modular Society), 1963.
An exposition of modular co-ordination based on the 4in./10cm. module, demonstrating the use of grids in the design of buildings for the positioning of components and illustrated with examples.

3 *The co-ordination of dimensions for building* by Bruce Martin, RIBA, 1968.
A brief history of dimensional co-ordination and a description of the present state of development in the United Kingdom. A clear, simple illustrated exposition of the principles of modular co-ordination, and methods of applying it to the design and sizing of components.

4 *ISO paper sizes.* Confederation of British Industry. February 1968.
Sets out the advantages of using ISO paper sizes and describes the A sizes. It advises on office stationery and equipment and promotes the use of A sizes for drawing office materials and equipment.

Other Publications Using Metric Units

1 *A) Standard form of contract. Local authorities edition with quantities.* 1963 edition (July 1968 revision).
B) Standard form of contract. Private edition with quantities. 1963 edition (July 1968 revision) Joint Contracts Tribunal.
Clause 12(1) has been revised to refer to the Standard Method of Measurement 5th edition (metric) as well as the imperial version.

Of interest to the design team.

2 *Designing for the disabled.* 2nd edition, revised and expanded with 281 diagrams by Selwyn Goldsmith. RIBA 1967.
Gives advice on the design of buildings which may be used by handicapped people: Anthropometric data and dimensions of equipment, etc., is collected under a section on ancillary data. Recommendations on building elements and finishes, services installations, and the design of general spaces are given in three sections and three further sections cover advice on public and semi-public building, including shops and offices, and local authority housing built specifically for disabled people. Metric equivalents are given for all British dimensions.

Of interest to quality surveyors.

3 *Standard method of measurement of building works. Fifth edition metric.* RICS and the NFBTE, July 1968.
An edition of the SMM which, identical in other respects with the 'imperial' fifth edition, gives all units in rounded metric sizes and indicates which units of measurement are to be used.

4 *Code for the measurement of building works in small dwellings. Second edition, metric.* RICS and the NFBTE, July 1968.
An edition of the code which indicates which metric units of measurement are to be used and gives in metric units the very few dimensions referred to.

PUBLICATIONS

Standard Method of Measurement

To each his own, and the publication, which quantity surveyors have been awaiting with mixed feelings, the Metric Edition of the Standard Method of Measurement of Building Works, has now arrived on the mat, with a good thump.
The Committee responsible for the conversion, and they emphasise that it is but a conversion and not a revision, must be congratulated on their workmanlike production. Sensibly realising that the metric conversion will have to run in double harness with the original imperial version for many years, they have not generally 'rounded off' in their conversions, but tried to help estimators by making them as nearly as possible the equivalent to their imperial predecessors. Thus a small pipe does not exceed 55mm. and a large one 110. Fifty and 100mm. would exclude 2in. and 4in. pipes. Sectional areas of reinforced concrete beams, etc. are classified as not exceeding 0.05 sq.m., over 0.05 to 0.10, and over 0.10, the square inch equivalents being about 78 and 155. To correspond with the old 'not exceeding 48in.,' I would have thought 0.025sq.m. (about 40in.) nearer. Fortunately, the metre lends itself to round figure equivalents of those multiples of lineal feet, five, ten, fifteen and so on, so familiar to us in the past. In metres, it is 1.5, 3, 4.5 and so on. Again 6in. practically equals 150 linear mm., 12 with 300, etc. One can almost hear the late Sir Winston saying, with insular relish, sufficient to send Le Général into a huff for a month, 'How highly accommodating of the metah !'
One or two changes of method, all in my opinion improvements, have taken place. Carpentry timbers will now all be in lineal metres, and all doors enumerated. We shall take off to the nearest 10mm., or two places of decimals, nearly three times more accurately than we do at the moment. Already I have heard someone use that taboo word, and mutter, 'Why can't they say nearest centimetre?' Widths of finishings and paintwork previously given as 3, 6, 9, and 12in. will be reduced to three stages, 100, 200 and 300mm.
A booklet of Notes on the new Edition, together with three appendices of imperial and metric comparisons are most useful. The second appendix giving a visual scale of comparisons of lineal, square and cubic inches to millimetres, and lineal feet to lineal metres is almost inspirational in its clarity.
The biggest gain, so very obvious, is that we shall no longer bill sometimes in feet and sometimes in yards. Everything will be metres, except for weight in kilogrammes. Finally, in descriptions, it will still be quite permissible to give sizes in imperial units. All in all, I do not think quantity surveyors are in for such a rough ride as they perhaps at one time thought, and anyway, by and large, they pride themselves on their agile minds. I think, perhaps, our brethren, the estimators, architects and engineers, may have a more difficult road to hoe.

J. C. CORDER

METRICATION INDEX

An index of references to metrication published in 'Building' since Building Metrication News last appeared.

Anthony Wedgwood Benn, Minister of Technology, announces the setting up of an overall Metrication Board to co-ordinate the metric changeover. The guideline date for the country to go metric is 1975 (2 August, p 52 and 72).

The 1969 Building Exhibition at the Olympia will be all-metric and the theme will be metrication (2 August, p 52 and 72).

NEWS FROM THE INDUSTRY

Scotland's Pilot Scheme

Further information has been issued on Scotland's first metric housing project, which is to begin shortly at South Queensferry in West Lothian. The pilot scheme is being planned jointly by the Scottish Local Authorities Special Housing Group (SLASH)—not CLASP as mentioned in last month's issue of BMN—and the National Building Agency as part of a housing development being carried out at North Scotstoun, South Queensferry, by the Scottish Special Housing Association.

The SLASH group, who are the largest housing consortium in Britain, say in their annual report that the Queensferry project will provide practical experience in the use of metric standards. The information gathered in the project will be passed on to the 33 members of the group, who include all the largest housing authorities and new towns in Scotland, and used by them when the building industry goes over to metric standards.

Mr. P. H. Stringer, leader of the SLASH Research Unit, described the project as 'a test bed' which would enable housing authorities to avoid the pitfalls and get the best results out of the changeover to metric standards.

'This changeover,' he said, 'presents the building industry in this country with a wonderful opportunity to jettison its old fashioned craft-orientated ways and move into the modern technological age.'

The Queensferry scheme is part of a larger research project being carried out by SLASH with the aim of:

1) Speeding the rate of house production; and

2) Making houses more economical to build.

The group are confident that these aims can be achieved, on the one hand by the greater standardisation of components, and on the other by the work which the Research Unit is carrying out in establishing a bank of house plans.

Already a breakthrough has been achieved with agreement among the group members for a drastic reduction in the range of materials and components used in their house-building programmes. This will enable manufacturers and material suppliers to organise longer production runs with a subsequent saving in costs and improved quality.

Member authorities will also benefit greatly from the setting up of the bank of house plans. These are to be classified into ranges in accordance with the appropriate housing requirements and site influences. They will allow for the variety required to avoid monotony and yet bring about the variety reduction so necessary if the rate of house building in Scotland is to be increased.

The SLASH consortium represents three-quarters of the housing market in Scotland with an annual building programme of more than 20,000 houses.

Progress by Functional Groups

At a meeting of the Glasgow Regional Group of The Modular Society, the method of working of the Functional Group Panels at BSI and progress on their programmes was examined from the evidence of the papers they have issued. Whilst the general picture is one of hard work it was questioned whether progress was rapid enough. The provision of a modular conceptual framework, clearly stated, within which some components might be allowed to find their own level by natural selection might, it was felt, in the end be a more realistic method than the enormous job now being undertaken. Concern was expressed at the poor response from manufacturers and trade associations to the questionnaires sent out by the FGPs. It appears that a large proportion of the component manufacturing industry is not aware of the change.

BSI at Bristol

The BSI will be exhibiting at the coming Ministry of Public Building and Works Exhibition to be held at Bristol from 12 September. The display will concentrate entirely on the metric changeover which BSI is co-ordinating in the industry. The latest progress in the functional group panels now laying the structure for dimensional co-ordination, the publication of important key documents and information on the steps to 1972 will be shown.

Displays will also clarify the participation of industry and Government in BSI's work and the people most actively concerned brought into emphasis. BSI technical staff will be staffing the stand.

The display is regarded as important in view of the imminence of the starting date—1 January 1969—for metric drawings and contracts.

COMING EVENTS

THURSDAY, 26 SEPTEMBER

Change to the Metric System in the Construction industry—No. 2: a follow-up four-day course at the University of Bristol to be held in October, 1967. It is intended to review the position after 12 months and to deal more fully with the more complicated problems which the change will cause in relationship to building regulations, structural calculations, heat, light and sound, and the building material manufacturer, as well as giving an appraisal of recent developments in dimensional co-ordination Ends on Sunday, 29 September. Fee for the course is £10 10s. Applications to the Department of Extra-Mural Studies, 20a Berkeley-square, Bristol 8.