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metric measures

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was easily solved by including lessons in metric system in the regular syllabus for training. But for old hands, familiar with the FPS system ever since their employment, and not always possessing adequate academic qualifications, the problem was different. For them a simple but comprehensive course in metric system was carefully drawn. About 700 employees received training in batches of 20 per week. The training included both theoretical and practical classes and covered 2½ hours per day for the duration of one week.

Simultaneously with the above, a booklet was prepared containing various useful tables to serve as ready reckoners from the FPS to the metric system and *vice versa*. Care was taken to make all these tables to suit the exact requirements of ranges and types of conversions required for field use on daily routine basis. In addition, various wall charts were prepared and distributed for exhibition on shop floor depicting essential features of metric measurements. Popular lectures were arranged whenever possible and articles on the metric system with pictorial presentations were published from time to time in the house journals both in Hindi and English. All these activities helped to create an atmosphere in which the minds of the workers got prepared to accept easily the impending change-over to the new system.

Stage 2 : Preparation of Equipment and Methods

Having prepared the ground for the change-over, the next objective was to take stock of everything—what we had and what we wanted. This stage was, therefore, really a stage for preparation of equipment and development methods. The activities at this stage were mostly concerned with supervisory staff and higher management, in fixing policies and laying down of procedures and manufacturing codes. The costs and performances without losing any bearings on past performances recorded in the FPS system. This double reporting system was continued for enough time, and when the concerned personnel were acquainted thoroughly with metric figures, the corresponding FPS figures were dropped out.

Stage 3 : Full Adoption

Rolling of Metric Sections of Materials in the Mills

Implementation of the metric system could not be taken as complete unless goods were actually manufactured and sold in terms of metric standards. For the new rolling mills under the TMP expansion of TISCO, it was decided that all their products would be rolled in metric sections from the very beginning. There was also no difficulty in switching over to rolling of metric sections in the Sheet Mills and Plate Mills where any new flat products conforming to metric sizes could be easily taken care of, as and when necessary. But the real difficulty was with the Rail and Structural Mill and old Merchant Mill where there were already large outstanding tonnages on order in B.S. section and a large stock of rolls to suit B.S. sections. These costly rolls were procured through considerable expenditure of foreign exchange and, therefore, these could not be discarded before they actually played out their full lives, without incurring heavy losses. Detailed statistics were, therefore, collected for each B.S. section with outstanding tonnage on order and when these quantities were set against expected roll life of existing stock of rolls, it was possible to draw a programme indicating when these mills could be made ready to take up the metric sections.

At the same time the specifications of metric sizes of materials to be rolled were drawn up in consultation with the Sales

Division and the Government Authorities. A booklet was also published by the Sales Office indicating proposed metric sections to be rolled in each mill and booking of orders for metric sections started accordingly. The customers were also informed about the alternative sizes in metric sections that could be supplied in lieu of outstanding quantities in B.S. sections and in many cases these offers were readily accepted. At present all products excepting a few typical cases like rails, angles, beams of certain dimensions, tees etc. are being rolled and supplied only in metric dimensions. For all quantitative measurements, however, the metric system is now invariably followed right through booking of orders, plant production, scheduling and sales of all materials.

The above synopsis gives a broad outline of how the problem of switching over to the metric system was tackled by the organisation within the short stipulated time. Various other incidental points such as the effect of change-over to metric system in the preparation and sales of canteen products, dairy farm goods, changes in stock accounting systems of thousands of different materials (solids, liquids and gases), disposal of bye-products, etc. also arose. To tackle these at short notice, the office of the Secretary, Metric Committee was always kept alert. The success achieved in effecting the smooth change-over to the metric system within such a short time can mainly be attributed to the determination of the Management and the personnel concerned to make it work.

Produce More Goods
Reduce Your Needs

Your Discipline is
India's Strength

Maps and Metric System

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IN the article published in the *Metric Measures,* May 1958, the procedure connected with the switch-over to the metric system had been discussed. Since then, the Survey of India has made steady progress which is listed below. The progress would have been considerable but for the fact that the major potential had to be diverted to project and other development surveys.

Topographical Maps

(1) *1 : 50,000 Series with Contours at 20 metres Interval*

The total number of maps in this series is about 5,200 which cover the whole of India. Fresh surveys are necessary to produce this map cover as the contour interval is substantially different and the scale larger than that of the existing map cover, which is also very much out of date. The number of maps published so far and those surveyed and under drawing on this scale is about 500. Concurrently, a larger number of maps are also under survey in metric terms.

(2) *1 : 100,000 Series with Contour Interval of 50 metres*

This series is compiled from 1:50,000 survey maps. It is at present in abeyance as its maintenance is not absolutely essential while the time and labour involved would be more gainfully applied to the production of other smaller scale series.

(3) *1: 250,000 Series with Contours at 100 metres Interval*

The total number of maps comprising this series is about 400. Each of the maps is normally based on the larger scale component maps of the area, such as 1:50,000 and 1 : 100,000 where they exist. The progress on this series is primarily dependent upon the progress of 1 : 50,000 map series mentioned in (1) above. The number of maps published so far or under drawing on 1:250,000 scale is about 60.

Geographical and General Maps of India

(1) *1 : 1,000,000 Carte Internationale due Monde Series*

This map series covering India consists of 30 maps as part of the I/M (International Map) of the World. Steady progress on this series has been maintained and to date 3 sheets have been published and 25 are in hand. Some minor changes in the specifications were introduced at the 1962 Boon Conference and these will be incorporated in future editions.

(2) *1: 1,000,000 Charts for the International Civil Aviation Organisation (I.C.A.O.)*

This is a comparatively recent commitment for the Survey of India, flowing from the decisions reached at the International Civil Aviation Organisation (I.C.A.O.) Conference held at Brussels in April 1948, in which India was represented. India has

to produce 23 charts of the World Aeronautical Series on the I/M scale covering her territory. Of these 11 charts have been published and 12 are in hand or under publication. The main task now will be to keep these charts up-to-date.

(3) 1 : 2,000,000 Southern Asia Series

The series consists of 24 maps. The scale of the maps is metric but contours and heights are in feet except for a few sheets which have contours in metres. Conversion to metric as well as a general revision of the series have been taken up. Bringing them up-to-date will take some years.

(4) 40-Mile Map of India

The metric scale adopted for this map is 1:2,500,000. Owing to certain considerations, it has been decided to recompile this map on an improved and more suitable projection. The recompilation work will be taken up shortly.

(5) 40-Mile Road Map of India

The new edition of this map on metric scales (1:2,500,000) was published in 1961. Its second edition is in hand.

(6) 67-Mile Railway Map of India

The metric scale adopted for this map is 1:3,500,000. The new edition of the map has already been fair drawn and will be published shortly.

(7) 70-Mile Political Map of India

The proposed metric scale for this map is 1:4,000,000. Owing to considerable changes in the States and other administrative boundaries, it is intended to recompile this map afresh. As an interim measure, first edition of this map in metric system will be published on 1/4,500,000 scale.

(8) 70-Mile Physical Map of India

The metric scale and the present state of the map are the same as for the 70-Mile Political Map of India mentioned in item (7) above.

(9) 128-Mile Map of India

The new edition of this map is being compiled on scale 1:8,000,000 and it will be published shortly.

(10) 192-Mile Map of India

The compilation of this map on metric scale 1:12,000,000 is in hand. Its publication may take another year.

(11) 250-Mile Map of India

New edition of this map in metric terms on scale 1:16,000,000 was published in 1961.

(12) 1 : 1,000,000 State Maps

The adoption of metric system does not affect the specifications of State Maps to any degree since their scale, etc. is already in metric terms. A number of State maps are at various stages of maping and printing.

(13) School Atlas

A School Atlas in metric terms has already been published.* Its second edition is under preparation.

Guide Maps

Delhi Guide Map

The new edition of the map in metric terms on scale 1:20,000 was published in 1961. A few other maps of this category are also being progressed but it may not be possible to convert all these maps to the metric system in the near future. Most of these maps will require to be surveyed *de novo*.

Conversion of Departmental Books and Pamphlets etc. to Metric Terms

The trigonometrical and levelling, etc. data which form the framework and basis of survey and map-making have been hitherto

*A review of the *School Atlas* appeared in *Metric Measures*, Vol. 5, July 1962, p. 23.

in the FP system, and so were the ancillary departmental books of instructions, mathematical tables and computational forms for working out the data. Since the introduction of the metric system, substantial progress has been made for converting them to metric terms. Pending complete finalisation, however, conversion factors to render the existing values to metric values have been worked out for day-to-day use. The new editions of books and pamphlets, etc., with data in metric terms, either already published or in the course of being published are given below :

(i) The Departmental book of instructions on cartography (Topo Hand-Book Chapter VI) revised to metric terms, is under printing.

(ii) Auxiliary Tables, Part II, containing logarithmic tables, etc. have been printed off. Other tables are nearing completion.

(iii) Survey of India Metric Conversion Tables for Lengths and Areas have been printed.

(iv) Conversion of levelling pamphlets, showing heights of bench-marks, is in progress.

(v) The Indian Tide Tables and Tide Tables relating to Kandla, Bombay and Rangoon for 1963 in metric terms have been printed.

(vi) The Tide Gauge Diagrams in metric terms have been printed and brought into use with effect from 1-1-1962.

(vii) Grid Pamphlets containing co-ordinates and heights in metric terms are being steadily progressed.

(viii) Re-casting of computational forms in metric terms is also in progress.

Procurement of Instruments etc. in Metric Terms

Replacement of instruments by those in the metric system involves difficulties both financial and technical. Draft specifications for various instruments are under preparation which will be processed by the Indian Standards Institution. Comments on various other instruments which are in the offing have already been furnished to them. 'Geodetic Levels' have been procured for use with level staves which are in metric terms.

Project Maps

The working group on Co-ordinated Study of Surveys, set up by the Technical Committee on Land, Natural Resources of the Planning Commission, has recommended that the scales to be adopted for these maps should be 1/2,000, 1/5,000, 1/10,000 or 1/25,000 as in the case of cadastral and forest maps so that the same map may serve a variety of needs and extra cost and labour involved in preparing different maps for different needs is reduced to the minimum. In rare cases where maps on 1/15,000 or 1/20,000 are required for planning or development, procedure decided for forest maps may be adopted *i.e.* the photographic enlargements of specified areas could be made from 1/25,000 surveys. The accuracy in that case would be limited to that of 1/25,000 scale but more space on paper would be available for work. Contour vals may be 1, 2.5, 5 or 10 metres according to the nature of the country, scale adopted or purpose of the project.

The metric system will be introduced in all future project surveys unless any indentor specifically asks for surveys in the FP system.

From the foregoing it will be seen that in the course of the next few years we would be well on the way to accomplishing a major portion of the task of conversion of maps, departmental books and instruments to the metric terms.

Definitions of Certain Metric Units

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THE Eleventh General Conference of
and Measures, held at Paris in
0, has ratified the adoption of
System of Units (abbreviated
ternational use. This system of
s of 6 basic units, 2 supple-
:s and 28 derived units. The
the SI are that the unit of
ıic temperature is degree Kelvin
f force is newton (N) and of
and quantity of heat the joule

:tric system of weights and
re are three other units of force
: (dyn), sthene (sn), and kilo-
kgf). In practical civil engi-
vever, the following units for
force and quantity of heat are
nly used :

ure—degree Centigrade (°C.)
—kilogram-force (kfg.)
of heat—calorie (cal)

e gives the latest definitions of 13 of the most commonly used units as accepted by various international organisations. These units are commonly used in civil engineering and the architectural professions.

(1) Length

The fundamental unit of length in the metric system is the metre. The Eleventh General Conference of Weights and Measures has defined metre as the length equal to 1 650 763.73 wave lengths in vacuum of the radiation corresponding to the transition between the levels $2p_{10}$ and $5d_5$ of the atom of krypton 86.

1 nautical mile (international) = 1852 metres
1 micron = 10^{-6} metre

(2) Area

1 Are = 100 square metres

(3) Capacity

The fundamental unit of capacity in the metric system is the litre. This is defined as the volume occupied by the mass of one kilogram of pure air-free water at the temperature of its maximum density (4° Centigrade) and under normal atmospheric pressure. (*See* also *Metric Measures*, March 1963, pp 3-10.)

(4) Mass

The fundamental unit of mass in the metric system is the kilogram. This is defined in terms of the platinum-iridium international prototype kilogram kept at the International Bureau of Weights and Measures.

1 carat = 200 milligrams
1 quintal = 100 kilograms
1 tonne = 1.100 kilograms

(5) Time

The fundamental unit of time in the metric system is the second. The Eleventh General Conference of Weights and Measures has ratified the following definition of second :

> The second is the fraction 1/31 556 925.974 7 of the tropical year for 1900 January 0 at 12 hours ephemeris time.

(6) Acceleration

The standard acceleration of free fall (g_n), usually called 'standard gravity' is 980.665 cm/s² (exactly). The standard value is now recognised as a conventional numerical value and should not be associated with any geographical location.

(7) Force

(a) The dyne, newton and sthene are the units of force in the metric system. These units are defined as follows :

(i) *Dyne (dyn)*—The dyne is that force, which when applied to a body having a mass of one gram, gives it an acceleration of one centimetre per second per second.

(ii) *Newton (N)*—The newton is that force which, when applied to a body having a mass of one kilogram, gives it an acceleration of one metre per second per second.

(iii) *Sthene (sn)*—The sthene is that force which, when applied to a body having a mass of one tonne, gives it an acceleration of one metre per second per second.

(b) The technical unit of force in the metric system is kilogram-force which is defined as follows :

Kilogram Force (kgf)—The kilogram force is that force which, when applied to a body having a mass of one kilogram, gives it an acceleration of 9.806 65 metres per second per second.

The principal conversion factors are :

1 newton = 10^5 dynes (exactly)
1 sthene = 10^8 dynes (exactly)
1 kilogram-force = 980 665 dynes (exactly)

(8) Work and Energy

The units of work and energy in the metric system are erg and joule. They are defined as follows :

(a) *Erg*—The erg is the work done when the point of application of a force of one dyne is displaced through a distance of one centimetre in the direction of the force.
(1 erg = 1 dyn cm = 10^{-7} Joule)

(b) *Joule (J)*—The joule is the work done when the point of application of a force of one newton is displaced through a distance of one metre in the direction of the force.

(9) Quantity of Heat

The fundamental unit of quantity of heat in the metric system is the calorie. The calorie is the quantity of heat required to raise the temperature of one gram of air-free water through one degree Centigrade at a constant pressure of 1 normal atmosphere.

(10) Luminous Flux

The unit of measurement of luminous flux in the metric system is the lumen, and is defined as the luminous flux emitted within unit solid angle (one steradian) by a point source having a uniform intensity of one candela.

Definition adopted by the 9th General Conference on Weights and Measures (1948).

(11) Illumination

The units of measurement of illumination in metric system are :

lux =one lumen per square metre
phot =one lumen per square centimetre
1 phot $=10^4$ lux

(12) Intensity of a Source

The intensity of a source in any given direction is measured by the luminous flux emitted per unit solid angle in that direction.

The unit of measurement of intensity in the metric system is the candela. The magnitude of candela is such that the luminance of a full radiator at the temperature of solidification of platinum is 60 candelas per square centimetre. Definition adopted by the 9th General Conference on Weights and Measures (1948).

(13) Brightness

The brightness of a surface is defined as the luminous intensity of unit area. The international unit of brightness is the stilb, a stilb being defined as a luminance of one candela per cm^2. The other unit is Lambert which is defined as the brightness of a perfectly diffusing surface giving out one lumen per square centimetre.

1 stilb=3.141 6 lambert
1 lambert=0.318 3 stilb

Training and Education of Engineers

THE Seventh Indian Standards Convention was held in Calcutta from 23 January to 2 February 1963.

One of the sessions was devoted to 'Training and Education of Engineers in Metric System'. It was presided over by Dr. T. Sen, Rector, Jadavpur University. In all 16 papers were presented and the discussion was spread over the whole of 31 January 1963.

The following sixteen papers came up for discussion :

Doc: No.	Title	Author
S—9/1	Some Suggestions in Speeding Up Adoption of Metric System in Engineering Institutions.	K. N. Sundaram Ministry of Scientific Research and Cultural Affairs, New Delhi
S —9 2	Textbooks in Metric System—Some Suggestions	N. H. Mohile The Concrete Association of India, Bombay
S—9 3	MKSA System of Electrical Units	R. K. Tandan National Physical Laboratory, New Delhi
S—9/4	Standardization in the Adoption of Metric System in Technical Education	Prof. V. V. L. Rao Department of Technical Education, Andhra Pradesh

Doc: No.	Title	Author
S—9/5	Training in Metric System with special Reference to Electricity and Magnetism	Prof. P. Venkatramaiah Engineering College, Anantapur
S—9/6	Introduction of Metric System in Engineering Institutions	B. Dash Sharma Delhi Polytechnic, Delhi
S—9/7	Introduction of Metric System in Engineering Drawing Classes	Prof. Indu Bhushan Banaras Hindu University, Varanasi
S—9/8	Training and Education of Civil Engineers in Metric System	J. K. Varshneya National Buildings Organisation, New Delhi
S—9/9	Young Engineers' Training in Metric System for Modern Industry	N. V. Meswani The Premier Automobiles Limited, Bombay
S—9/10	Interconversion of Inch and Metric Sizes	N. Subrahmanyam Cooper Engineering Ltd., Satara Road, Maharashtra
S—9/11	Application of Alignment Charts to Conversion Problems	V. S. Tulpule Laxminarayan Institute of Technolog Nagpur
S—9/12	Running an Industry in Metric Terms—Conclusions from Eight Years of Practical Experience	K. H. Martin Motor Industries Co. Ltd., Bangalore
S—9/13	Switching Over to Metric System in Design Offices and Research Laboratories	J. Walter Public Works Department, Madras
S—9/14	Metric System and the Structural Engineer	N. M. Thadani Sahu Cement Service, New Delhi
S—9/15	Problems of Conversion to Metric System Related to Vehicles	Lt. Col. A. Y. Moghe Technical Development Establishment (Vehicles), Ahmednagar
S—9/16	Conversion of FPS Drawings to Metric System on Railways	K. S. Krishnan Research, Designs and Standards Organ tion, Simla

For convenience of discussion the papers were divided into 4 groups as follows :

Group 1—Papers 1 and 2.
Group 2—Papers 3, 4, 5 and 6.
Group 3—Papers 7, 8, 9, 10, 11 and 16.
Group 4—Papers 12, 13, 14 and 15.

Group 1 Papers

Shri Sundaram, while presenting his paper, pointed out that a 3 year programme of change-over in engineering colleges had already been laid down and was being followed up. The recalibration of instruments in colleges was proceeding apace with suitable financial help from the Central Government. Staff of technical colleges is being encouraged either to write original textbooks in the metric system to suit Indian needs or to translate better known textbooks from French, German or Russian into English for use in India. Textbook writers were being provided with stenographic and other necessary help. Arrangements were also being made to publish the approved textbooks, if necessary, through Government agencies.

Shri Mohile said that textbooks on building and engineering materials were now being written by Indian authors. Their conversion to metric units would not present difficulties. Textbooks on structural designs were, however, mostly written by English or American authors. In their case, translations would have to be undertaken. Such translations should preferably be done by engineers.

In the discussion that followed it was pointed out that the difficulty of getting accustomed to metric units after having used FPS units for some time was exaggerated. Students trained fully in the FPS system were able to adjust themselves to work with the metric system easily if they used it constantly. This had been proved in the case of students who had gone for training in engineering subjects to countries using the metric system. Similarly personnel employed in factories working on the metric system also adapted themselves quickly to the change. It was a matter of environment and necessity.

Students who came as freshers into colleges were new to the subject and could adjust themselves to any system of units. Their training, therefore, would be simplified very much if they could be provided with textbooks written fully in terms of the metric system. Teachers would have to rewrite their lecture notes. It is the teachers that might feel some difficulty.

It was also desirable that technological organizations should write Handbooks dealing with their fields in the metric system for use by practising engineers. An instance was the preparation of the 'Handbook for Building Engineers in the Metric System' by the National Buildings Organization.

Group 2 Papers

Prof. V. V. L. Rao presented all the papers in the absence of authors. He made a strong plea for the adoption of the Rationalized MKSA units in place of the large number of systems which were used in teaching engineering subjects. So far as electrical engineering was concerned, he pointed out that many textbooks in English using RMKSA system were now available. There should, therefore, be no difficulty in teaching, particularly as the units used in electrical technology were already metric. On an enquiry, it was pointed out that the ISI was now using only absolute units for all purposes in preference to gravitational units. It was felt that the use of absolute units in teaching would also be beneficial.

(It may be noted that the 11th General Conference of Weights and Measures adopted in October 1960 the 'System International' (SI) which defines over 20 units which are recommended for all scientific and technical work. See *Metric Measures*, Vol. 4, No. 5, 1961, pp. 23-24 for the text of the resolution.—*Editor*)

Group 3 Papers

Prof. Indu Bhushan in his paper pointed out that a special metric scale with ½, ¼ and ⅛ metric scale on one side and inch on the other side was being used for making reduced drawings. Preferred dimensions evolved by him were also used.

Shri J. K. Varshneya gave information which a civil engineer would require in changing over to the metric system. The appropriate use of abbreviations, metric building products, unit weight of building materials, floor loads on buildings, surveying, drawing, hydraulic formulae, codes, handbooks, as also curricula, textbooks, lecture notes were all dealt with by the author. He suggested refresher courses for practising engineers.

Shri N. V. Meswani in his paper indicated that the basic idea behind training should be to make the trainee think in the metric system. Continuous thinking and working in the metric system was the best way to achieve lasting results and overcome problems.

Shri N. Subrahmanyam discussed certain problems of inch-millimetre conversions involving interchangeability.

Shri V. S. Tulpule in his paper dealt with the use of an alignment chart he had devised for conversion of a large number of FPS units to metric units. A card with a moving curser could be devised for use in laboratories.

Shri K. S. Krishnan explained the tremendous amount of work done by the Railways in converting some 60,000 drawings. The precautions taken to ensure that the inch and metric drawings did not get mixed up were outlined. The procedure followed for conversion of drawings was discussed fully. All part drawings for new items or modified part drawings, whenever made, were now done in the metric system only.

During the discussion it was stressed that both the systems of units need not be taught side by side. Scales in metric system alone should be used. The Survey of India and the ISI had recommended scales to be used for various purposes. In the field of fasteners, some firms had already started production of metric bolts and nuts and these should be available shortly.

Group 4 Papers

Shri K. H. Martin in his paper pointed out that as his firm was already working in metric system problems of conversion were rare. There were problems of purchasing as metric dimensioned materials were not yet freely available. Skilled personnel had to be trained to work in metric system. After training, however, the workers found that it was easier to use the metric system.

Shri J. Walter presented tables of data required by the civil engineer. Tables included typical design dimensions adopted in various projects in Madras State, and conversion tables for soil, concrete and hydraulic laboratories.

Shri N. M. Thadani suggested that in structural design what is needed is not exact conversion but rationalization of the values into suitable whole numbers. He made a strong appeal to engineers to get used to the 'feel' of the new metric units.

Lt. Col. A. Y. Moghe discussed in his paper the problems of conversion likely to be experienced by the automobile industry. He pointed out that co-ordinated action should be taken to solve the problems. ISI had to play an important role in this work.

From the discussion it was clear that there was a demand from practising engineers for metric handbooks. For example, it was pointed out that the Central Water and Power Commission as also the Transport Department should bring out their own Handbooks written fully in the metric system and rational units.

The point that was repeatedly stressed throughout the discussions was that it was essential that engineers should think in terms of metric units. Unless they visualized their work in metric units, they would always be faced with difficulties. Constant practice and availability of reference books in metric units would go a long way towards the practising engineer getting the 'feel' of metric units. The future generation of engineers should be fully conversant only with the metric usage and not burdened with conversion problems in their college careers.

Summing up the discussion. Dr. Sen said that thinking in metric terms was essential for all. The tools, books, instruments should all be metric. Teachers have to get to know the metric usage and orient themselves to the new units.

The session concluded at 5.30 p.m. with a vote of thanks to the Chair.

Conversion of Yarn Count to Metric System

(In the January 1963 issue of *Metric Measures*, page 16, a note was published on the adoption in India of the French Count number for cotton textiles. In implementation of the recommendations, the Textile Commissioner has written to all the textile mills in the country bringing to their notice the recommendations made by the Conference. With the letter was also circulated a note explaining the various points arising out of the adoption of the French count in the cotton mill industry. The text of the note is published below.

—*Editor*)

AS mills are aware, the fineness of cotton yarn is now being expressed in the English (FPS) system. Under this system, the fineness of yarn is expressed in terms of the English cotton count. The count of a particular yarn is said to be 'X' if 'X' hanks (each of 840 yards) of that yarn together weigh 1 lb. To illustrate, 1 lb. of yarn of 40s count will measure 40×840 yards. The system is thus an indirect one since the count measures the length per unit weight. Thus, finer the yarn higher is the count number and coarser the yarn, lower is the count number.

As regards sales of yarn and cloth, manner of marking and the form of package practised at present are as under :

Yarn is generally sold in bales of hank yarn or in cases of cone yarn except for sales in loose packages of beams and pirns. A bale of yarn generally contains 40 bundles making a bale weight of 400 lb for counts lower than 60s and 200 lb for counts 60s and finer.

The bundle weight is maintained at 10 lb for counts less than 60s and 5 lb for counts 60s and finer. The method of bundling for counts lower than 60s is that, 10 hanks each of 840 yards are packed together and made into a 'knot' and bundle is made of as many knots as is the count of that yarn. As regards counts 60s and finer, the bundle will be made by packing as many knots as is equivalent to half that count number. There is thus a direct relationship between the count of yarn and the number of knots in the bundle. The Trade and the Weavers are fully aware of this relationship and make use of the same while making their purchase. Mills are also stamping on every bundle, the count and the bundle weight along with the other markings like name of mill. As regards cone yarn, each case contains nearly 100 cones weighing together about 200 lb. Each cone is wrapped in paper and the count is stamped along with other details on the wrapper. The case also bears these markings.

In regard to the description of cloth, mills are now specifying the warp and the weft counts, reed and pick per inch and the dimensional and other descriptive particulars. Dimensional particulars *viz.* the length and width are being expressed in terms of metres and centimetres, since 1 April 1961.

The question of implementation of the metric system for expressing the fineness of cotton yarn has been engaging the attention of the concerned interests for sometime now and it has been decided that the same may be expressed in terms of the 'French Count'. Under this system, the count number of particular quality of yarn will be 'X' if 'X' hanks (each of 1 000 metres) together weigh 0.5 kg. The correspondence between the English Count and the French Count thus works out to :

English Count×0.847=French Count.

A table is attached herewith showing the French Count corresponding to various English Counts ranging from ls to 140s. It will be seen therefrom that there is a close direct relationship between the English Count and the French Count, the French Count, of a particular yarn being however always less than its corresponding English Count. The aspect of the count number increasing with the fineness of yarn is thus maintained under the French Count system also.

It has also been decided that, with effect from 1 April 1963, mills should stamp yarn bundles in terms of French Count expressed to the first decimal place as indicated in column (3) of the table referred to above. Mills should also stamp the corresponding English Count within brackets. The weight of the yarn bundle namely 10 lb or 5 lb, as the case may be, will be stamped only in terms of the corresponding equivalent weight in the metric system *viz.* 4.54 kg or 2.27 kg. Stamping relating to count and weight will with effect from 1 April 1963 be as under :

For example, Count : 33.9 F.C. (40s) : 50.8 F.C. (60s)

Weight : 4.54 kg : 2.27 kg.

From 1 October 1963, mills will have to reel yarn exclusively in hanks of 1 000 metres and make 'knots' of 10 hanks each of 1 000 metres. The weight of the bundle will then exactly be 5 kg or 2.5 kg depending on whether the French Count is lower than 50.8 or whether the French Count is 50.8 and over.

As regards constructional and dimensional particulars of cloth, dimensional particulars are already being expressed in the metric system. In regard to particulars of warp and weft counts only, it is necessary for mills to specify from 1 April 1963 these counts in the French Count system in addition to specifying the corresponding English Counts in brackets.

All the records in the several departments of the mills, as also the returns submitted to this Office (Textile Commissioner's Office) and other Government agencies should be maintained in the metric system from 1-4-1963 and the counts of yarn should be recorded in the French Count system, the corresponding English Counts being also shown in brackets.

TABLE OF CONVERSION OF FRENCH COUNT

English Cotton Count	Equivalent French Count	Rounde Frenc Coun
(1)	(2)	(3)
1	0·85	0·8
1½	1·27	1·3
2	1·69	1·7
4	3·39	3·4
5	4·23	4·2

TABLE OF CONVERSION OF FRENCH COUNT

English Cotton Count	Equivalent French Count	Rounded French Count
(1)	(2)	(3)
6	5·08	5·1
8	6·77	6·8
10	8·47	8·5
12	10·16	10·2
14	11·85	11·8
16	13·55	13·5
18	15·24	15·2
20	16·93	16·9
22	18·63	18·6
24	20·32	20·3
26	22·01	22·0
28	23·71	23·7
30	25·40	25·4
32	27·09	27·1
34	28·79	28·8
36	30·48	30·5
40	33·87	33·9
44	37·25	37·2
50	42·33	42·3
60	50·80	50·8
64	54·19	54.2
70	59·27	59·3
72	60·96	61·0
80	67·74	67·7
84	71·12	71·1
100	84·67	84·7
110	93·14	93·1
120	101·60	101·6
140	118·54	118·5

Note : French Count = English Count × 0·8467

News & Views

Recent Notifications

Secondary Units of Length, Area, Volume, Mass and Capacity

The text of this notification was published on page 25 of the March 1963 issue of *Metric Measures*. The number and date of the notification could not be included.

These are No. S.O. 543 dated 15th February 1963.

International Organisation of Legal Metrology (O.I.M.L.)

Inspector-General M. Maurice Jacob has retired from the office of Chief of the Belgian Metrological Service on reaching the age limit. He has also retired from the Presidentship of the International Committee of Legal Metrology, which he held from the inception of the International Organisation for Legal Metrology in 1956. Recently the Government of Belgium conferred on M. Jacob the title of Commander of the Order of Leopold I.

Dr. Josef Stulla-Gotz, Privy Councillor, Director of the Austrian Metrology Service, is now the new President of the International Committee of Legal Metrology.

The Bulletin of the International Organisation for Legal Metrology would now be available to institutions, enterprises and persons interested in problems of legal metrology. The annual subscription is 40 new Francs (French) payable by bank cheque to the following address :

The International Bureau of Legal Metrology,
9, Avenue Franco-Russe,
Paris-VII,
France

The membership of the O.I.M.L. is now 34. The members are :

Australia	Japan
Austria	Lebanon
Belgium	Monaco
Bulgaria	Morocco
Cuba	Netherlands
Czechoslovakia	Norway
Denmark	Poland
Dominican Republic	Rumania
Finland	Sweden
France & Overseas Countries	Switzerland
Germany	Tunisia
Guiana	Spain
Hungary	United Arab Republic
India	United Kingdom
Indonesia	U.S.S.R.
Iran	Venezuela
Italy	Yugoslavia

Third International Measurement Conference

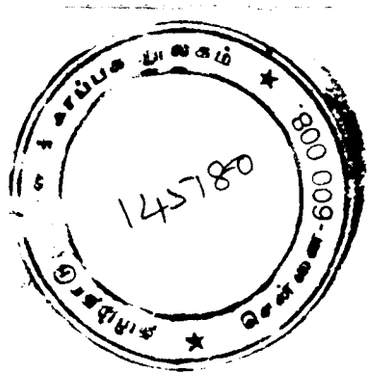
The Third International Measurement Conference (IMEKO 1964) will be held in Stockholm during April 1964 jointly with the Sixth Instruments and Measurements Conference. The main purpose of the conference will be to discuss scientific achievements in the fields of measurement and instrumentation. In addition to a plenary session there will be five scientific sessions devoted to the following general subjects : Fundamental problems of metrology; Theory and practice of instrument design; Technology and organization in instrument manufacture; General electronics as applied to measurements and instruments; and border questions of measurement and automation. Discussions at six specialized sections will be on instruments and methods relating to measurement of geometrical and mechanical quantities, including geodetic measurements; thermal quantities; physico-chemical measurements; measurement of electrical and magnetic quantities, measurements in radio engineering; and measurement of radioactive reduction. Abstracts (150—250 words) of papers intended for presentation at the conference should reach the IMEKO Secretariat, Budapest 5, P.O Box 3, accompanied by an application form for lecturers obtainable from the Secretaria by 31 January 1963.

(*Journal of Scientific & Industrial Research* Vol. 22, 1963, p. 4.)

Volume of Timber Logs

There were a number of enquiries regarding the publication of the Indian Standard for the measurement of the volume of timber.

The Indian Standards Institution has now published Indian Standard for Tables for Volume of Round Timber Logs (IS:2184—1962). A short note on the subject appears under *Standards News* in this issue.



Book Review

TRAINING IN METRIC SYSTEM FOR ENGINEERING INDUSTRY : Ministry of Commerce and Industry, available from the Manager of Publications, Ministry of Works, Housing and Rehabilitation, Old Secretariat, Delhi-6; price : Rs. 1·45 nP.; pp. 86; 1963.

The introduction of metric system in engineering industries is an arduous task and has to be planned carefully and systematically. One of the first requisites is the availability of metric standards for the various raw materials and practices. The Indian Standards Institution has made considerable progress in meeting the demand for these. The Industry then has to adopt these standards and use them in their design so as to produce commodities which are entirely in the metric system. In preparing new designs the engineer will need much technical information and data for his work.

The present pamphlet, as described in the Foreword, 'presents some material which may be found helpful in planning a co-ordinated change-over in the engineering industry.' It includes papers which reflect the thinking of the Engineering Sub-committee of the Standing Metric Committee and the Indian Standards Institution, which devoted a special session to this subject at the ISI Convention held in Kanpur in December 1961.

The pamphlet is divided into 7 sections. The first section is the Foreword. The second consists of extracts from the speech delivered by Shri K. V. Venkatachalam, Chairman of the session *Introduction of Metric System in Engineering Industries* at the ISI Convention. The third section deals with the important steps in planning the change-over to metric system in design and manufacture in engineering industries. The fourth and the largest section pertains to *Notes for Training in Metric System for Engineering Industries*. The *Notes* are intended to serve as a source of information for personnel engaged in engineering drawings and design offices and toolrooms. As such this section is very comprehensive and further subdivided into 7 chapters relating the basic units, conversion of standard features, rules for rounding off numerical values, methods for precise conversion of dimensions to ensure interchangeability, limits and fits, screw threads and modules and diametral pitches of cylindrical gears for general engineering. This section contains 23 extremely useful tables and deals with fundamental information which will undoubtedly be useful for reference. Sections 6 and 7 consist of the texts of the articles *Utilisation of Present and Future Machine Tools for Production in Metric and Inch Terms* by M. W. Lalchandani, (Jyoti Limited, Baroda), and *Introduction of Metric System in Indian Telephone Industries Ltd.* by D. A. Chelliah (Indian Telephone Industries Ltd., Bangalore), which illustrate the experiences of the two engineering concerns in their change-over to the metric system.

The pamphlet is a *must* for all engineering personnel, and particularly to those who are working in mechanical engineering industries.

METRIC DEEPIKA: (Anglo-Malayalam Quarterly) published by the Department of Weights and Measures, Kerala, price : single copy—50 nP. (Annual Rs. 2)

We had an occasion to refer to the publication of the English-Malayalam quarterly *Metric Deepika* in the March 1963 issue of *Metric Measures*.

The first issue of this magazine which runs into 64 pages is extremely informative. The issue contains messages from Shri V. V. Giri, Governor of Kerala; Shri Manubhai Shah, Minister of International Trade; Shri R. Sankar, Chief Minister of Kerala; Shri P. T. Chacko, Minister for Home Affairs, Kerala; Shri K. Chandrasekharan, B.A., B.L., Member, Legislative Assembly, Kerala.

The opening article by Shri K. V. Venkatachalam, Joint Secretary, Ministry of Commerce and Industry, New Delhi, indicates what is effective enforcement. The second by Shri K. S. Menon, the former Controller of Weights and Measures, Kerala, indicates the progress of enforcement in all fields in that State. Shri T. P. Krishnan Nayar has contributed an interesting piece on how *satyam* and *dharmam* can be maintained through weights and measures. Shri G. Venkateswaran, Assistant Director, Ministry of Commerce and Industry, has shown how the public can co-operate in the change-over to the metric system. Shri T. Ravindran Thampi has reviewed the reform of weights and measures. The picture feature explaining the new weights and measures and useful conversion tables form an important part of the first issue. There is also a section on the directions to be observed by importers of weights and measures from other States. Requirements of cloth for various types of apparel are prominently tabulated. Other features provide information on the various aspects of the reform and the help being rendered to the manufacturers of weights and measures. The issue is rounded off with a list of manufacturers.

The first issue, therefore, is particularly interesting. We are sure that the magazine will contribute to a better understanding of the metric reform which so fundamentally touches the life of every man, woman and child in the country. We wish it success.

(1) NEW STEAM TABLES (IN METRIC UNITS) WITH LOGARITHMIC AND TRIGONOMETRIC TABLES (2) ENTHALPY-ENTROPY CHART FOR STEAM UP TO 700°C and 300 ATA: (1) A. S. Dighe, Lecturer, Mechanical Engineering Department, Victoria Jubilee Technical Institute, Bombay; published by the Educational Publishing Co., 17, Benham Hall Lane, Girgaon, Bombay-4; price 75 nP.; 1962; pp., 28.

(2) Edited by A. S. Dighe, published by the Educational Publishing Co., price : Rs. 1.25; chart 60×40 cm.

Steam tables and charts are essential reference works for an engineer. Till now these had been based on the British system. With the metric change-over, we have now to use tables and charts based on the metric system.

So far as is known, this is the first attempt made to fulfil the need for these tables and charts in the metric system. Shri Dighe has rendered useful service in the field of engineering education and practice.

The tables under review are based on the data of Prof. M. P. Wukalowitsch. These tables give the properties of 1 kg of dry and saturated steam at different temperatures and pressures.

The steam tables are based on the technical atmosphere, called *ata*, which is defined as 1 kg/cm². The physical atmosphere which is equal to 1.033 kilograms per square centimetre is referred to in the tables. This basic departure should be noted while using the tables. Also for the units of

power and energy the unit called Watt is now being preferred to either the metric or the British Horse Power.

Besides the steam tables, the booklet also contains tables for logarithms, antilogarithms, natural sines, natural tangents, logarithmic sines, logarithmic tangents, squares, square roots and reciprocals. The utility of the booklet is enhanced by these tables. A table for cubes and cube roots should also have been introduced, as volume calculations are also useful.

Enthalpy Entropy Chart which is based on the values given by Prof. Wukalowitsch, is a large chart (60 × 40 cm) and easy to read. The tables and charts together fulfil a long-felt need of the engineering students and the practising engineer.

Standards News

(Indian Standards which have a particular bearing on the change-over to the metric system are indcated here. Copies would be available from the Indian Standards Institution, Manak Bhavan, 9, Mathura Road, New Delhi or their Branch offices at Bombay, Calcutta, Madras and Kanpur.)

Indian Standard for Dimensions for Screw Threads for General Purposes (Diameter Range 1.6 to 39 mm) (IS : 1362—1962)

The Indian Standards Institution has published the first revision of the Indian Standard Dimensions for Screw Threads for General Purposes (Diameter Range 1.6 to 39 mm) IS : 1362—1962). This standard deals with basic and design profiles as well as dimensions, allowances, tolerances and designations for screw threads for screws, bolts and nuts of nominal diameter range 1.6 to 39 mm, intended for general purposes. The pitch diameter combinations, that is coarse and fine, covered in this standard are those specified in IS : 1330—1958 General Plan for Metric Screw Threads with ISO Profile (Diameter Range 0.25 to 300 mm). This standard specifies tolerances only for the three standard tolerance classes, 7hn, 8dN for bolt threads and 7HN, 8HN and 9HN for the nut threads.

This Indian Standard was originally issued in 1959 specifying dimensions and tolerances for screw threads for general engineering purposes in the diameter range 0.25 to 39 mm. Subsequently, the International Organization for Standardization issued a new proposal. Accordingly, IS : 1362—1959 has been revised, and some of the main modifications in this revised standard are as follows:

(a) An allowance has been provided on the bolt threads for classes 8 and 9 [normal (medium) and coarse];

(b) Tolerances have been modified ; and

(c) Tolerances for screw threads of diameter below 1.6 mm have not been included as it has been felt that these require further investigations and also there is no urgent need for their specification.

Price : Rs. 5·00.

Indian Standard for Dimensions for Steel Plate, Sheet and Strip for Structural and General Engineering Purposes (IS : 1730—1961)

The Indian Standards Institution has published Indian Standard Dimensions for Steel Plate, Sheet and Strip for Structural and General Engineering Purposes (IS: 1730—1961). This standard specifies nominal dimensions for steel plate, sheet and strip for structural and general engineering purposes; and also includes structural properties of the sections as calculated on the nominal dimensions.

In the standardization of dimensions, the following aspects have been kept in view :

(a) Taking maximum possible advantage of the inherent system.

(b) Keeping the range and gradation of sizes sufficient to meet consumer requirements efficiently and economically.

(c) Making the change-over of Indian industry to the metric system as easy as possible.

(d) Ensuring that the standards do not impose difficulties on the producers by prescribing too many standardized sizes.

Metric system has been adopted in India and all quantities and dimensions in this standard have been given in this system.

Price : Rs. 6·00.

Indian Standard for Rivets for General Purposes (Below 12 mm Diameter) (IS : 2155—1962)

The Indian Standards Institution has published an Indian Standard Specification for Rivets for General Purposes (Below 12 mm Diameter) (IS : 2155—1962), which prescribes the requirements for mild steel and high tensile steel rivets, below 12 mm in diameter for general purposes.

This Standard, which is one of a series of Indian Standards being prepared by the Institution on metric screw threads and fasteners, deals with mild steel and high tensile steel rivets of smaller sizes for general purposes. Rivets of diameter range 12 to 48 mm have been covered in IS : 1929—1962 Specifications for Rivets for General Purposes (12 to 48 mm Diameter).

Price : Rs. 2·00.

Indian Standard for Method for Calculation of Bulk Quantities of Petroleum and Liquid Petroleum Products (IS : 2164—1961)

The Indian Standards Institution has published an Indian Standard Method for Calculation of Bulk Quantities of Petroleum and Liquid Petroleum Products (IS : 2164—1961). This Standard prescribes methods of calculations, normal and special, of bulk quantities of petroleum and liquid petroleum products.

The Indian Standards on tank calibration, gauging, sampling, temperature measurement, determination of density have laid down procedures which, when followed, allowed the volume, temperature and density of a bulk quantity of oil to be determined with considerable precision.

The methods of calculation given in this Standard have, therefore, been drawn up to give the maximum possible accuracy in the final calculated quantities compatible with the precision of the physical measurements.

For large quantities, namely, supplies made by tanker, pipeline, transfer from a shore tank into a ship, barges, etc. It is essential that the methods specified in this Standard should be used for accurate assessment. However, for small quantities, namely, supplies made in barrels, tank lorries and rail tank wagons of which a very large number of despatches are made

daily, a short method has been given in appendix to the Standard.

Price : Rs. 6·00.

Indian Standard for Heavy-Duty Burnt Clay Building Bricks (IS : 2180—1962)

The Indian Standards Institution has published an Indian Standard Specification for Heavy-Duty Burnt Clay Building Bricks (IS : 2180—1962), which specifies dimensions, quality and strength of heavy duty burnt clay building bricks.

Heavy-duty bricks (also known as 'engineering-bricks') are required for masonry in heavy engineering works, such as bridge structure, industrial foundations, multi-storeyed buildings, etc. In view of the large number of such works being undertaken in the Third Five Year Plan and also subsequently, a need for manufacture of heavy duty bricks on larger scale has been felt.

Investigation conducted in the Central Building Research Institute also reveals the possibility of making heavy-duty bricks from alluvial soils, thus reducing the problem of procurement of the raw material. In referring to 'clay' in these Standards the term is deemed to include all alluvial or similar type of soils.

Metric system has been adopted in India and all quantities and dimensions in this Standard have been given in this system.

Price : Rs. 1·50.

Indian Standard for Tables for Volume of Round Timber Logs (IS : 2184—1962)

The Indian Standards Institution has published Indian Standard Tables for Volume of Round Timber Logs (IS : 2184—1962). This Standard furnishes tables for cubic contents of round timber logs of midgirths from 10 cm to 260 cm in steps of 2 cm. The following lengths of logs have been covered:

Midgirth	Length Covered	Table No.
cm	cm	
10 to 20	30 to 1 200 in steps of 15 cm ..	1
22 to 36	30 to 1 200 in steps of 10 cm ..	2
38 to 260	30 to 1 225 in steps of 5 cm	3 to 114

The tables given in this Standard relate to the cubic contents of round timber logs and are based on the quarter girth formula for volume used in current trade practices in this country. These tables are not meant to serve as a standard code of practice for measuring the true volume in logs. The volumes obtained from these tables generally fall short of the true volume and, therefore, it is proposed to formulate a separate Indian Standard for true volume of timbers in due course.

Metric system has been adopted in India and all quantities and dimensions in this Standard have been given in this system. This Standard has been brought out primarily to facilitate the adoption of metric units in due time by the timber trade and industry in the country.

Price : 10·00.

Indian Standard for Burnt-Clay Perforated Building Bricks (IS : 2222—1962)

The Indian Standards Institution has published an Indian Standard Specification for Burnt-Clay Perforated Building Bricks (IS : 2222—1962) which specifies dimensions, quality and strength, and methods of sampling and tests for vertically perforated burnt-clay building bricks for use in walls and partitions.

As a result of the extensive programme of building construction undertaken in this country, the need for increased supply of bricks is keenly felt by the building trade, and while the brick industry steps up its production to meet this growing demand, it is but appropriate that improved and special types of bricks are also introduced for use by builders in addition to the common bricks. This Standard lays down the essential requirements regarding dimensions, strength, percentage of water absorption, etc. of perforated brick and is intended to serve as a guide for control of its quality in manufacture and use.

Metric system has been adopted in India and all quantities and dimensions in this Standard have been given in this system.

Price : Rs. 2·00.

Indian Standard for Straightedges for Drawing Office Use (IS : 2233—1962)

The Indian Standards Institution has published an Indian Standard Specification for Straightedges for Drawing Office Use (IS: 2233—1962), which covers the requirements of straightedges in five sizes of 2 000, 1 500, 1 000, 750 and 500 mm.

Straightedge is a drawing instrument used by draughtsmen, cartographers, surveyors and engineers to draw straight lines with a high degree of accuracy on plans, drawing and maps.

Price: Re. 1·00

Controllers in States & Union Territories

In the November 1961 issue of *Metric Measures* a list of Controllers in the States and Union Territories was published for the guidance of the general public. Since then, many changes have taken place in the list published and an up-to-date list is, therefore, published below.

(1) ANDHRA PRADESH
Shri B. L. Oates,
Controller of Weights and Measures,
Chirag Ali Lane,
Hyderabad (Deccan).

(2) ASSAM
Shri Giridhor Sharma,
Controller of Weights and Measures,
Government of Assam,
Gauhati.

(3) BIHAR
Shri V. N. Singh,
Controller of Weights and Measures,
Government of Bihar,
Patna.

(4) GUJARAT
Dr. C. B. Patel,
Director of Industries,
Government of Gujarat,
New Civil Hospital, Block No. B-4,
Asarva, Ahmedabad.

(5) JAMMU & KASHMIR
Dr. Nasir Ali Agha,
Controller of Weights & Measures,
Government of Jammu & Kashmir,
Jammu/Srinagar.

(6) KERALA
Shri Rama Varma Thampuran,
Controller of Weights & Measures,
T.C. No. 478/479, Opposite Women's and Children's Hospital,
Thycaud, Trivandrum-14.

(7) MADHYA PRADESH
Shri S. N. Sihno,
Controller of Weights and Measures,
Government of Madhya Pradesh,
Deria Sadan, Malaviya Nagar,
Bhopal.

(8) MADRAS
Shri A. Krishnaswamy,
Controller of Weights and Measures,
No. 37, Spur Tank Road, Chetput,
Madras-31.

(9) MAHARASHTRA
Shri V. M. Pednekar,
Deputy Director of Industries (Metric) and Deputy Controller of Weights and Measures, Maharashtra State, Old Customs House Yard, Fort, Bombay-1.

(10) MYSORE
Shri R. Bharaniah,
Chief Marketing Officer and Controller of Weights & Measures, P.B. No. 30, Ali Askar Road, Bangalore.

(11) ORISSA
Shri R. N. Dwivedi,
Joint Director of Marketing and Ex-Officio Controller of Weights and Measures, Govt. of Orissa,
Bhubaneshwar.

(12) PUNJAB
Shri Kanwar Jit Singh,
Controller of Weights and Measures,
Government of Punjab,
Ambala Cantt.

(13) RAJASTHAN
Shri K. N. Mathur,
Controller of Weights and Measures,
Government of Rajasthan,
Industries & Supplies Department,
Jaipur.

(14) UTTAR PRADESH
Shri G. P. Mital,
Controller of Weights & Measures,
Government of Uttar Pradesh,
Issue Office Building,
7, Walaqadar Road, (Chaulakhi),
Lucknow.

(15) WEST BENGAL
Shri Sukhamoy Banerjee,
Controller of Weights and Measures,
Government of West Bengal,
45, Ganesh Chandra Avenue,
3rd Floor, Calcutta-13.

(16) ANDAMAN AND NICOBAR ISLANDS
Shri R. Ramakrishnan,
Supply Officer and Controller of Weights and Measures,
Andaman & Nicobar Islands Administration,
Port Blair.

(17) DELHI
Shri H. L. Mehandru,
Controller of Weights and Measures,
Bhagirath Palace,
Chandni Chowk,
Delhi.

(18) HIMACHAL PRADESH
Shri N. C. Kaushal,
Superintendent of Weights and Measures,
Industries Department,
Himachal Pradesh Administration,
Simla-4.

(19) LACCADIVE, MINICOY AND AMINDIVI ISLANDS
Shri U. Radhakrishna Panicker,
Controller of Weights and Measures, and Secretary to the Administrator, Laccadive, Minicoy & Amindivi Islands,
Kozhikode (Calicut).

(20) MANIPUR
Shri Ch. Pratap Singh,
Controller of Weights and Measures,
Manipur Administration,
Imphal.

(21) PONDICHERRY
Shri J. Arlanda,
Controller of Weights and Measures,
Government of Pondicherry,
Weights and Measures Department,
Pondicherry.

(22) TRIPURA
Shri P. R. Purohit,
Superintendent of Weights and Measures,
Tripura Administration,
Agartala.

Licensed Manufacturers and Repairers

[*Metric Measures* had been publishing in the past a series of lists of licensed manufacturers, dealers and repairers of weights and measures, weighing and measuring instruments licensed by the Governments in the various States and Union Territories under the Weights and Measures (Enforcement) Acts. To economise on paper, it is possible only to publish lists of licensed manufacturers and repairers.

A new feature of statistics of verification and licences issued is also being published in *Metric Measures*.

—*Editor*]

STATISTICS OF VERIFICATION OF WEIGHTS ETC. AND LICENSEES

Sl. No.	States/Union Territories	Period	Weights	Capacity measures	Length measures	Weighing Instruments	Measuring Instruments	Total number of		
								Manufacturers	Dealers	Repairers
								[As on last day of column (2)]		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
(1)	Andhra Pradesh	Apr-May '62	2,78,450	40,851	5,054	2,912	117	64	109	21
(2)	Assam ..	April '62 to 31 Jan. '63	3,80,087	19,410	3,617	444	52	13	156	13
(3)	Bihar ..	—	—	—	—	—	—	—	—	—
(4)	Gujarat ..	1 April to 30 Nov.	5,59,708	54,133	12,724	80,743	513	108	581	141
(5)	Kerala ..	1 April to 31 July '62	—	—	—	—	—	73	459	162
(6)	Jammu & Kashmir	1 April to 30 Nov. '62	120	395	—	3	—	1	—	—
(7)	Madhya Pradesh	—	—	—	—	—	—	—	—	—
(8)	Madras ..	—	—	—	—	—	—	—	—	—
(9)	Mysore ..	1 April to 30 Nov. '62	4,81,354	1,05,253	1,037	59,674	8,420	126	493	92
(10)	Maharashtra	—	—	—	—	—	—	—	—	—
(11)	Orissa ..	1 April to 30 Nov. '62	—	—	—	—	—	11	75	4
(12)	Punjab ..	1 April to Nov. '62	6,73,338	26,755	14,474	57,421	375	4	21	19
(13)	Rajasthan ..	—	—	—	—	—	—	—	—	—
(14)	Uttar Pradesh	1 April to 31 May '62	5,34,506	7,951	4,702	907	113	3	99	18
(15)	West Bengal ..	April '62 to Jan. '63	20,03,339	12,762	2,061	88,041	—	116	684	80
(16)	Andaman & Nicobar Island	—	—	—	—	—	—	—	—	—

Sl. No.	States/Union Territories	Period	Weights	Capacity measures	Length measures	Weighing Instruments	Measuring Instruments	Total Number of Manufacturers [As on last day of column (2)]	Dealers	Repairers
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
(17)	Delhi ..	1 April to 31 Jan. '63	1,81,952	14,668	7,641	16,562	359	26	72	18
(18)	Himachal Pradesh	1 April to 30 Nov. '62	42,103	3,793	1,832	7,169	—	1	24	11
(19)	L.M.A. Island	—	—	—	—	—	—	—	—	—
(20)	Manipur ..	1 April to 31 Mar. '63	9,035	2,029	81	213	—	—	—	—
(21)	Pondicherry ..	1 April to 31 Jan. '63	23,815	13,712	667	1,377	11	5	29	3
(22)	Tripura ..	April '62 to Jan. '63	5,326	1,545	—	—	8	2	49	1

ASSAM

List of manufacturers and repairers licensed from 1 December 1962 to 31 January 1963

Dass Metal Crafts,
P.O. Dhubri.

ORISSA

List of manufacturers and repairers licensed in Orissa state during 1 April 62 to 31 November 1962.

MANUFACTURERS

(1) Agarwal Tin Manufacturing Co. and Engineering Works, Sultanganj, Agra.
(2) Associated Industrial Corporation, 81, North Vijainagar, Agra.
(3) Balanga Iron Works Limited, Balasore.
(4) Bharati Scales and Engineering Co., 4/1, Haldaspara Lane, Khurat, Howrah, West Bengal.
(5) New Orissa Engineering Works, Khetrajpur, Sambalpur.
(6) Oriental Metal Pressing Works Private Ltd., Post Box No. 6556, 131, Worli, Bombay-18.
(7) Raiz and Brothers, Sadar Bazar, New Delhi.
(8) Rourkela Machine Tools Ltd., Rourkela-4.
(9) Satish Chandra Das and Co., 113, Khaengrapatti Street, Calcutta.
(10) Standard Steel and Iron Foundry, Laxmi Mills Jeoni Mandi, Agra.
(11) D. L. Vaid, 215-A, Ripon Road, Bombay-2.

REPAIRERS

(1) Avery Company of India (P) Ltd., Calcutta-3.
(2) Hadusubudhi and Brothers, Bigbazar, Berhampur.
(3) Orissa Agricultural Industries, Firm Road, Sambalpur.
(4) Raghunath Rath, Proprietor, Engineering Stores, Station Road, Berhampur.

PONDICHERRY

List of manufacturers and repairers licensed in Pondicherry during 1 April 1962 to 31 January 1963.

Sl. No.	Name and Address of the Manufacturer	Details of Articles Manufactured
(1)	Honesty Engineers & Contractors, 3, Bis, Rue Surcouf, Pondicherry.	All Kinds of weights, weighing and measuring instruments.
(2)	Kannan M., 9/63, Vazhakulam, Pondicherry.	All types of capacity measures.
(3)	Latchumnan V., North Boulvard, Pondicherry.	All types of capacity measures.
(4)	Raja Engineering Enterprises, West Boulvard, Pondicherry.	All types of weights and measures.
(5)	V. P. Raju Achari, 81 B, Bharathi Street, Pondicherry.	Bullion weights only.
(6)	Swamy Foundry, 232 Bis, West Boulvard, Pondicherry.	All types of weights and measures.
(7)	Tamilarasan Industry, North Boulvard, Pondicherry.	All types of capacity measures.

REPAIRERS

(1) Avery & Co., of India (P) Ltd., Madras-1.
(2) Everest Scales Services 2, Jubillee Market, Tiruvarur.
(3) Honesty Engineers & Contractors, 3 bis Rue Sourcouf, Pondicherry.
(4) Thiyagaraja Engineering Works, Market, Karaikal.

TRIPURA

List of the manufacturers and repairers licensed in Tripura from 1 April to 31 May 1962.

MANUFACTURERS

(1) National Mechanical Works, Kasaripatti, Agartala, Tripura.
(2) Rajdeep Trading Co., 7 Colonal Bari Road, Agartala, Tripura.

REPAIRER

(1) Was Dev, National Mechanical Works, Kasaripatti, Agartala, Tripura.

CONVERSION TABLE FOR PRICES

Square Foot to Square Metre

Conversion Factor : 1 sq. metre (m^2) = 10·7639 sq. feet

nP/sq. ft.	Rs/m^2	nP/sq. ft.	Rs./m^2
1	0·11	49	5·27
2	0·22	50	5·38
3	0·32	51	5·49
4	0·43	52	5·60
5	0·54	53	5·70
6	0·65	54	5·81
7	0·75	55	5·92
8	0·86	56	6·03
9	0·97	57	6·14
10	1·08	58	6·24
11	1·18	59	6·35
12	1·29	60	6·46
13	1·40	61	6·57
14	1·51	62	6·67
15	1·61	63	6·78
16	1·72	64	6·89
17	1·83	65	7·00
18	1·94	66	7·10
19	2·05	67	7·21
20	2·15	68	7·32
21	2·26	69	7·43
22	2·37	70	7·53
23	2·48	71	7·64
24	2·58	72	7·75
25	2·69	73	7·86
26	2·80	74	7·97
27	2·91	75	8·07
28	3·01	76	8·18
29	3·12	77	8·29
30	3·23	78	8·40
31	3·34	79	8·50
32	3·44	80	8·61
33	3·55	81	8·72
34	3·66	82	8·83
35	3·77	83	8·93
36	3·88	84	9·04
37	3·98	85	9·15
38	4·09	86	9·26
39	4·20	87	9·36
40	4·31	88	9·47
41	4·41	89	9·58
42	4·52	90	9·69
43	4·63	91	9·80
44	4·74	92	9·90
45	4·84	93	10·01
46	4·95	94	10·12
47	5·06	95	10·23
48	5·17	96	10·33

Conversion Table for Prices—*contd.*

nP/sq. ft.	Rs/m^2	Rs./sq ft.	Rs./m^3
97	10·44	10	107·64
98	10·55	11	118·40
99	10·66	12	129·17
100	10·76	13	139·93
		14	150·69
Rs/sq. ft.	Rs./m^2	15	161·46
		16	172·22
1	10·76	17	182·99
2	21·53	18	193·75
3	32·29	19	204·51
4	43·06	20	215·28
5	53·82	21	226·04
6	64·58	22	236·81
7	75·35	23	247·57
8	86·11	24	258·33
9	96·88	25	269·10

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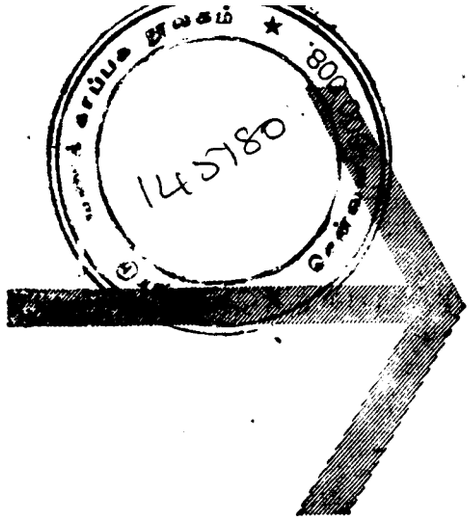

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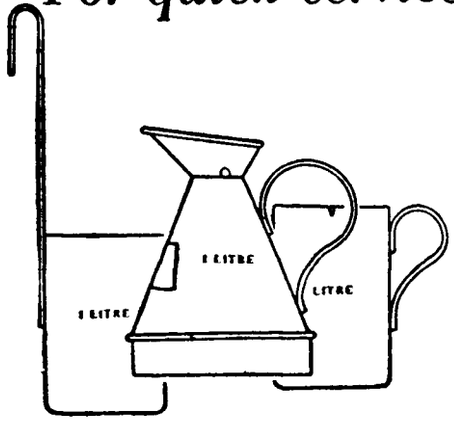

METRIC UNITS

in Round Figures

DA 62/819