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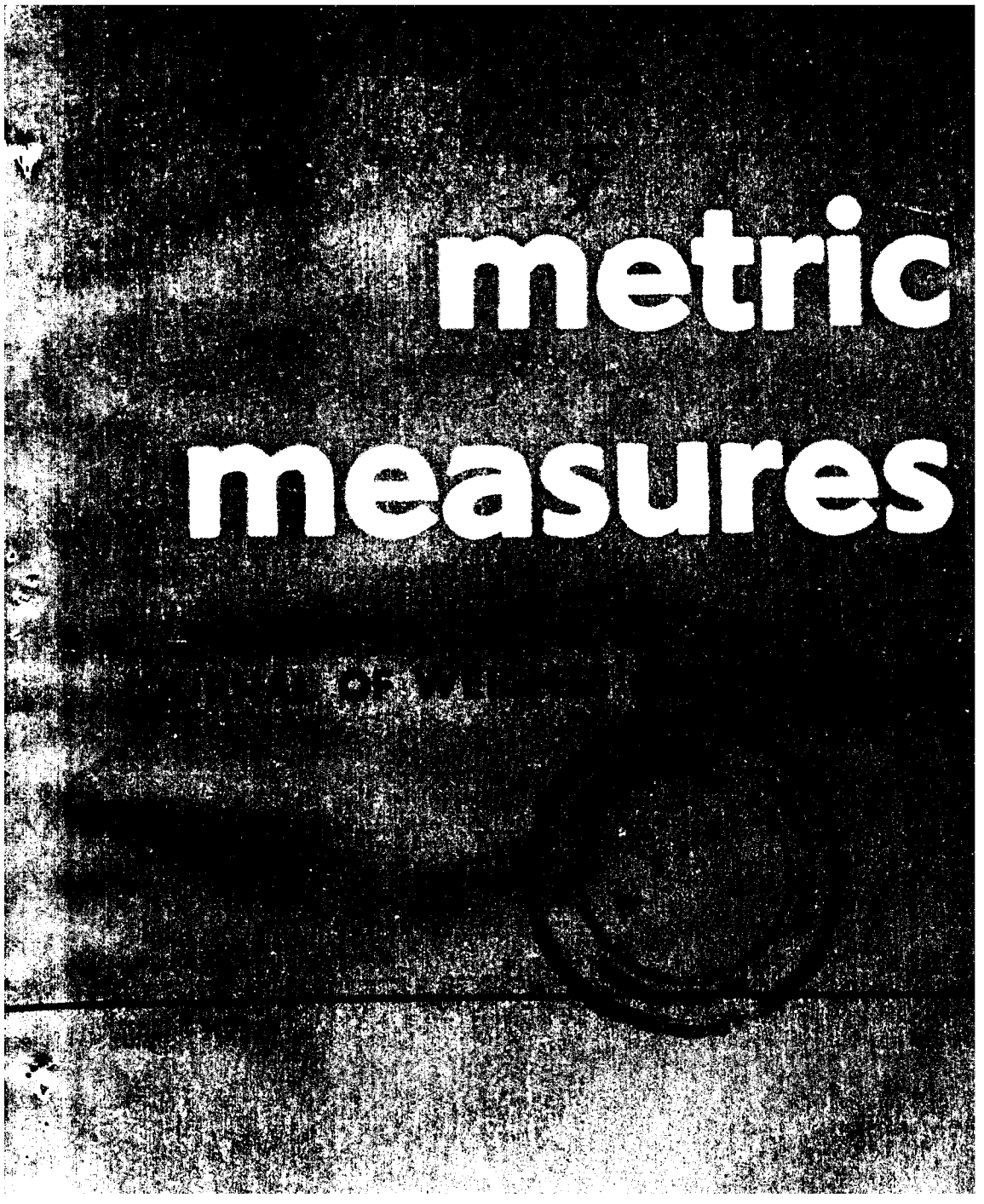
# Metric Measures

VOL. 4 July-1961 NO-4


metric
measures

# CONVERSION TABLE FOR PRICES

(Conversion Factor used: 1 Liquid Seer = ·937 Litre)

| nP/L Sr | nP/l | nP/L Sr | nP/l | nP/L Sr | nP/l |
|---|---|---|---|---|---|
| 1 | 1 | 21 | 22 | 41 | 44 |
| 2 | 2 | 22 | 23 | 42 | 45 |
| 3 | 3 | 23 | 24 | 43 | 46 |
| 4 | 4 | 24 | 25 | 44 | 47 |
| 5 | 5 | 25 | 26 | 45 | 48 |
| 6 | 6 | 26 | 27 | 46 | 49 |
| 7 | 7 | 27 | 28 | 47 | 50 |
| 8 | 9 | 28 | 29 | 48 | 51 |
| 9 | 10 | 29 | 30 | 49 | 52 |
| 10 | 11 | 30 | 31 | 50 | 53 |
| 11 | 12 | 31 | 32 | 51 | 54 |
| 12 | 13 | 32 | 33 | 52 | 55 |
| 13 | 14 | 33 | 34 | 53 | 57 |
| 14 | 15 | 34 | 35 | 54 | 58 |
| 15 | 16 | 35 | 36 | 55 | 59 |
| 16 | 17 | 36 | 37 | 56 | 60 |
| 17 | 18 | 37 | 38 | 57 | 61 |
| 18 | 19 | 38 | 39 | 58 | 62 |
| 19 | 20 | 39 | 41 | 59 | 63 |
| 20 | 21 | 40 | 42 | 60 | 64 |
| 21 | 22 | 41 | 43 | 61 | 65 |
| 22 | 23 | 42 | 44 | 62 | 66 |
| 23 | 24 | 43 | 45 | 63 | 67 |
| 24 | 25 | 44 | 46 | 64 | 68 |
| 25 | 26 | 45 | 47 | 65 | 69 |
| 26 | 27 | 46 | 48 | 66 | 70 |
| 27 | 28 | 47 | 49 | 67 | 71 |
| 28 | 29 | 48 | 50 | 68 | 73 |
| 29 | 30 | 49 | 51 | 69 | 74 |
| 30 | 31 | 50 | 52 | 70 | 75 |
| 31 | 32 | 51 | 53 | 71 | 76 |
| 32 | 33 | 52 | 54 | 72 | 77 |
| 33 | 34 | 53 | 55 | 73 | 78 |
| 34 | 35 | 54 | 57 | 74 | 79 |
| 35 | 36 | 55 | 58 | 75 | 80 |
| 36 | 37 | 56 | 59 | 76 | 81 |
| 37 | 38 | 57 | 60 | 77 | 82 |
| 38 | 39 | 58 | 61 | 78 | 83 |
| 39 | 41 | 59 | 62 | 79 | 84 |
| 40 | 42 | 60 | 63 | 80 | 85 |
| 41 | 43 | 61 | 64 | 81 | 86 |
| 42 | 44 | 62 | 65 | 82 | 87 |
| 43 | 45 | 63 | 66 | 83 | 89 |
| 44 | 46 | 64 | 67 | 84 | 90 |
| 45 | 47 | 65 | 68 | 85 | 91 |
| 46 | 48 | 66 | 69 | 86 | 92 |
| 47 | 49 | 67 | 70 | 87 | 93 |
| 48 | 50 | 68 | 71 | 88 | 94 |
| 49 | 51 | 69 | 73 | 89 | 95 |
| 50 | 52 | 70 | 74 | 90 | 96 |
| 51 | 53 | 71 | 75 | 91 | 97 |
| 52 | 54 | 72 | 76 | 92 | 98 |
| 53 | 55 | 73 | 77 | 93 | 99 |
| 54 | 57 | 74 | 78 | 94 | 100 |
| 55 | 58 | 75 | 79 | 95 | 101 |
| 56 | 59 | 76 | 80 | 96 | 102 |
| 57 | 60 | 77 | 81 | 97 | 103 |
| 58 | 61 | 78 | 82 | 98 | 105 |
| 59 | 62 | 79 | 83 | 99 | 106 |
| 60 | 63 | 80 | 84 | 100 | 107 |

NAYE PAISE PER LIQUID SEER TO NAYE PAISE PER LITRE

| Rs/L Sr | Rs/l | Rs/L Sr | Rs/l | Rs/L Sr | Rs/l |
|---|---|---|---|---|---|
| 1 | 1·07 | 11 | 11·74 | 31 | 33·08 |
| 2 | 2·13 | 12 | 12·80 | 32 | 34·14 |
| 3 | 3·20 | 13 | 13·87 | 33 | 35·21 |
| 4 | 4·27 | 14 | 14·94 | 34 | 36·28 |
| 5 | 5·34 | 15 | 16·01 | 35 | 37·35 |
| 6 | 6·40 | 16 | 17·07 | 36 | 38·41 |
| 7 | 7·47 | 17 | 18·14 | 37 | 39·48 |
| 8 | 8·54 | 18 | 19·21 | 38 | 40·55 |
| 9 | 9·60 | 19 | 20·27 | 39 | 41·61 |
| 10 | 10·67 | 20 | 21·34 | 40 | 42·68 |
| 21 | 22·41 | 41 | 43·75 | | |
| 22 | 23·47 | 42 | 44·81 | | |
| 23 | 24·54 | 43 | 45·88 | | |
| 24 | 25·61 | 44 | 46·95 | | |
| 25 | 26·68 | 45 | 48·02 | | |
| 26 | 27·74 | 46 | 49·08 | | |
| 27 | 28·81 | 47 | 50·15 | | |
| 28 | 29·88 | 48 | 51·22 | | |
| 29 | 30·94 | 49 | 52·28 | | |
| 30 | 32·01 | 50 | 53·35 | | |

RUPEES PER LIQUID SEER TO RUPEES PER LITRE





# metric measures

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STANDING METRIC COMMITTE

MINISTRY OF COMMERCE AND INDUSTR

Vol. 4 JULY 1961 (ASHADHA 1883) No. 4

CONTENTS



*Cover design by R. Sarangan*

# metric measures

METRIC MEASURES is published every two months.

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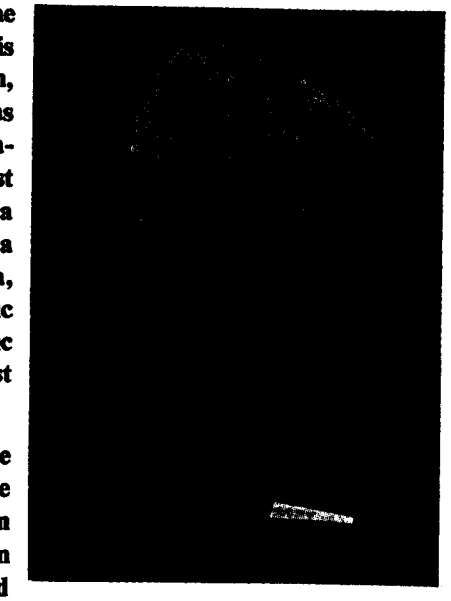
## OBITUARY

### Dr. K. S. Krishnan



**We learn with deep sorrow, of the passing away, on June 14, 1961, at his residence in Delhi, of Dr. K. S. Krishnan, noted scientist and scholar. Death was sudden. Dr. Krishnan worked in his laboratory, and on his literary pursuits to the last day of his life. The premature death of a man of his eminence would be felt as a serious national loss in any country. In India, which is beginning to build up scientific services, and establish traditions of scientific research, it is a tragedy of the first magnitude.**

**2. Born on December 4, 1898, in the village of Watrap near Srivilliputtur in the district of Ramnad, Madras, Kariamanikkam Srinivasa Krishnan, had his schooling in Watrap and Srivilliputtur. Later he studied in the American College, Madurai and the Christian College, Madras, an institution which in our time has produced stalwarts in many fields, politics, administration and science. He worked under Prof. C.V. Raman whom he assisted in researches leading to the discovery of Raman Effect. He taught, and guided research in the Universities of Dacca, Calcutta, and Allahabad. In 1947 he became the first Director of the National Physical Laboratory. The Laboratory is today a monument to his inspiring leadership, industry and zeal.**

**3. Dr. Krishnan was one of the principal architects of the reform of weights and measures, and has been closely associated with it throughout. When the Joint Select Committee of Parliament was discussing legislation to adopt the metric system, a few members felt misgivings on certain provisions of the Bill. Dr. Krishnan's gentle persuasiveness, thorough grasp of detail and ability to explain technical points with lucidity, helped to dispel their doubts and apprehensions. The Bill received unanimous support from the Committee. In the National Physical Laboratory, Dr. Krishnan organised a Weights and Measures Division to take charge of the National Prototypes of the Metre and the Kilogramme, and to verify standard weights and measures for the State Governments. He represented the Government of India at International Conferences on Weights and Measures. One of the last International Conferences he attended was the 11th General Conference on Weights and Measures on 11 & 12 October 1960 at Sevres, Paris. This Conference approved a new definition of the 'Metre'. Dr. Krishnan made significant contribution to the discussions on the subject. He was in the Editorial Board of 'Metric Measures' and represented the Ministry of Scientific Research and Cultural Affairs on the Standing Metric Committee.**

# Designs for Kilometre Stones

THE metric system of weights and measures has already been adopted on the Indian Railways in their day-to-day work. Thus freight charges are in Rupees and naye Paise and kilograms and quintals. Passenger fares are being charged in terms of distance travelled in kilometres. Telegraph poles which upto a year back used to show the distance in miles now also show kilometres and new kilometre stones are being fixed along the 57,000 kilometres of rail routes in the country.

Road transport, like the Railways has also to charge for luggage, goods and fares in terms of distance. Thus the roads also would have to be marked in kilometres if metric system has to be adopted. Some steps have already been taken in this direction. For example, the Motor Vehicles (Second Amendment) Act, 1960, (No. 51 of 1960) has been passed. This Act now requires that all data connected with motor transport should be indicated in metric units. Distance also has, therefore, to be expressed in kilometres. Notifications issued by the Government of India prescribe that metric units be used in the Motor transport industry from 1 January 1961 with a period of transition of 1 year. This means that the use of metric system becomes compulsory from 1 January 1962.

There are various kinds of roads in India : national highways, State highways, district roads, village roads, and so on. On all these roads distances are now shown in miles. Often a national highway was marked with many small villages and towns as the starting points. You travelled, say, 200 miles on a national highway and suddenly for no apparent cause the milestones began showing 1, 2, 3 and so on. The opportunity provided by the need to set up new distance marks, therefore, be taken to rationalize the distance indications on all national highways. It follows also that uniform stones should be fixed on all roads—national as well as others.

**Magnitude of Task**

The magnitude of the task will be clear when it is realized that roads under the control of the Centre have a length of over 21,000 kilometres. The States have metal roads over 2,02,000 kilometres long and kutcha roads running 4,00,000 kilometres. Union territories have 1,300 kilometres of metal roads and about 7,800 kilometres of kutcha roads. Appendixes 1 and 2 give statewise distribution of national and State highways respectively.

In order to achieve uniformity in the design and fixing of kilometre stones, the Ministry of Transport and Communications, in consultation with the Indian Roads Congress, on which are represented the State's Public Works Departments, have now evolved specifications for kilometre stones to be fixed on national highways, State roads, major district roads, village roads etc.

**Designs**

Plate I shows the type design for ordinary kilometre stone on national highways, State highways and major district roads.





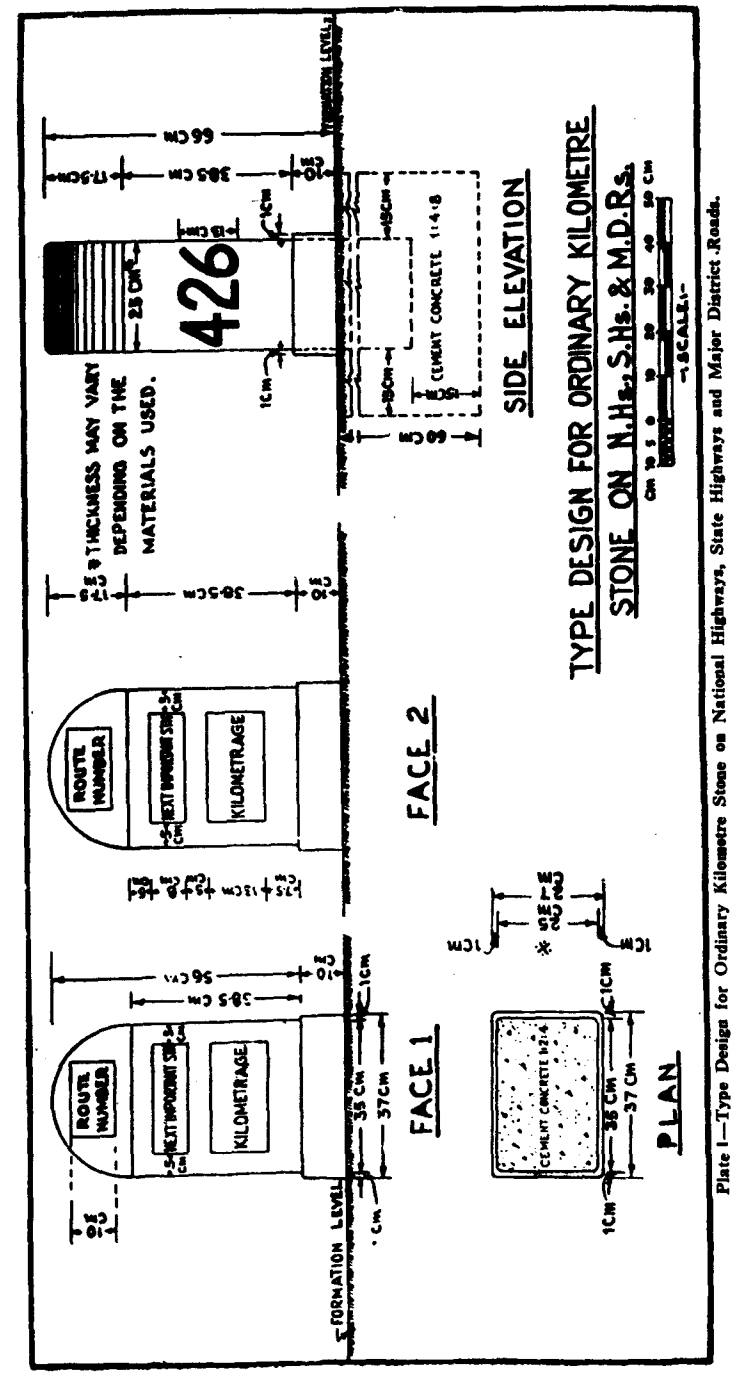



Plate I—Type Design for Ordinary Kilometre Stone on National Highways, State Highways and Major District Roads.

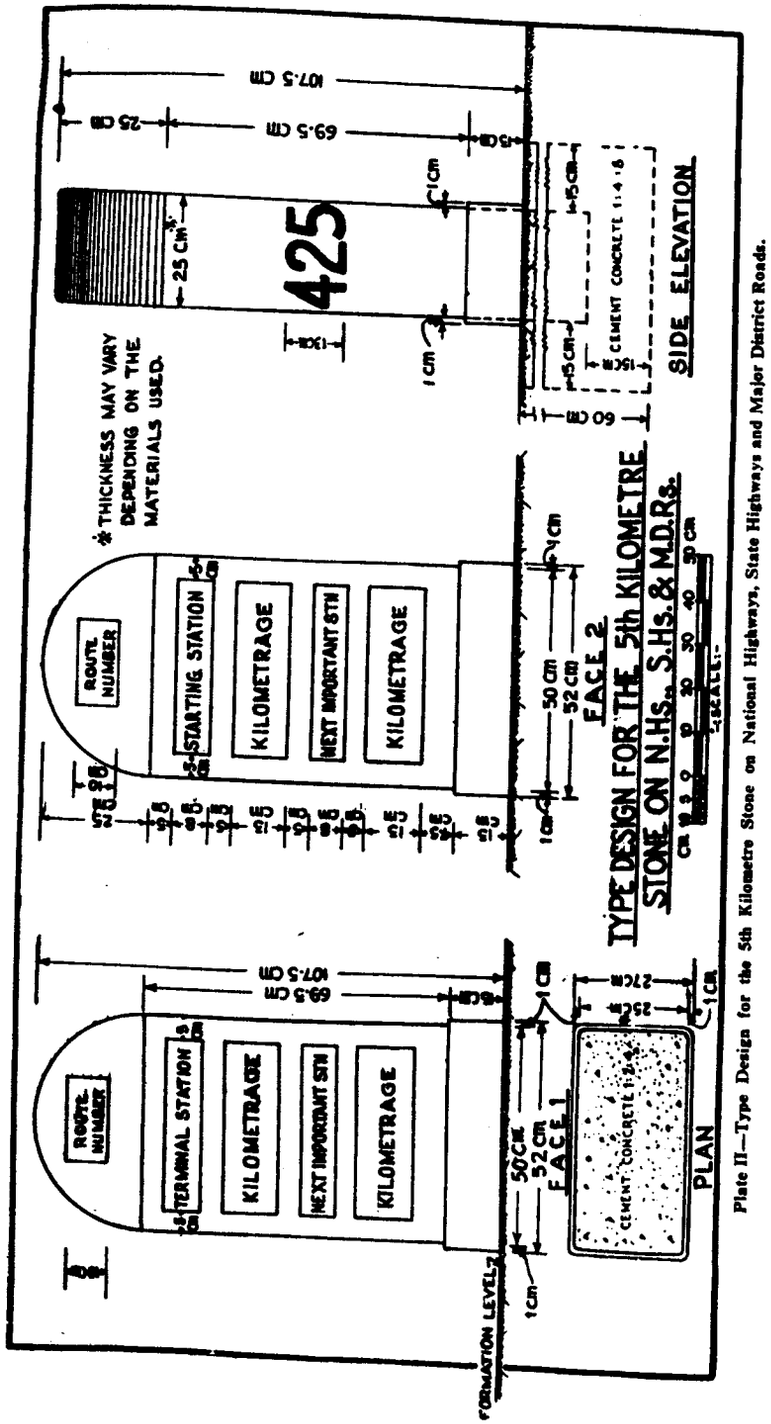



Plate II—Type Design for the 5th Kilometre Stone on National Highways, State Highways and Major District Roads.



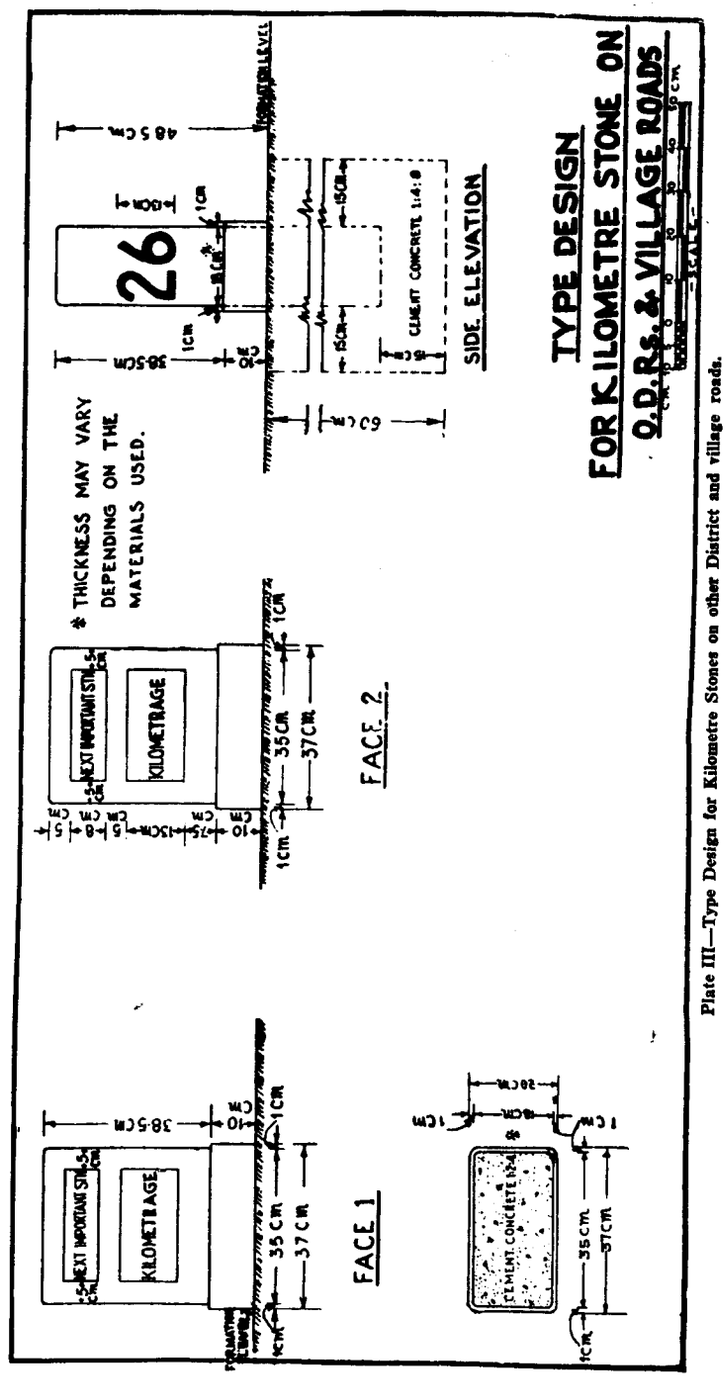
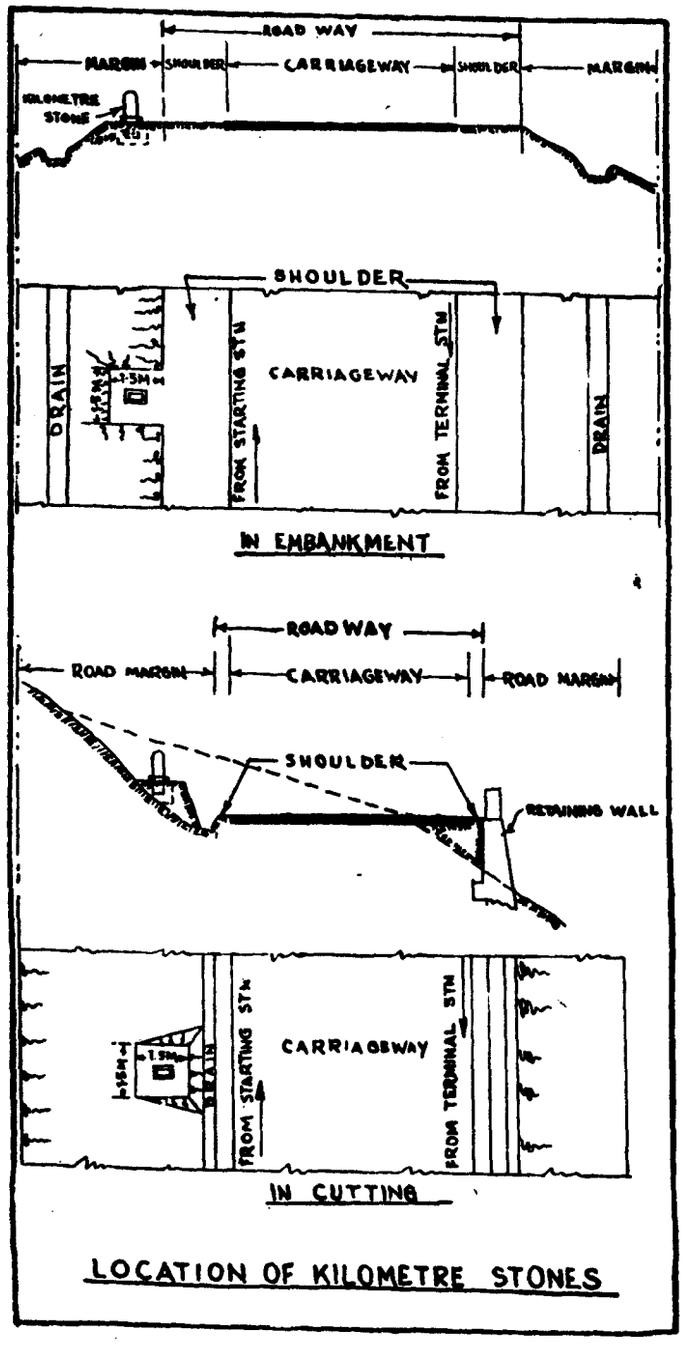



Plate III—Type Design for Kilometre Stones on other District and village roads.




LOCATION OF KILOMETRE STONES



Besides prescribing dimensions, the specification gives details of lettering, scripts, inscriptions colour schemes etc.

**Inscriptions**

One of the important provisions is that kilometres may be made of suitable locally available material. The sizes of letters, numerals and edge clearances have been indicated.

Place names would normally be inscribed in different scripts in the following order, normally only one script being used in any one kilometre stone :

| *Km No.* | *Script for Place Names* |
|---|---|
| 0 | Roman |
| 1 | Hindi (Devnagari Script) |
| 2 | Local Language |
| 3 | Hindi (Devnagari Script) |
| 4 | Local Language |
| 5 | Roman. |

and so on repeated in the same order.

The numerals should in every case be inscribed in the international form of Indian numerals *i.e.*, 1, 2, 3 and so on ; *local or Devnagri numerals should not be used.* (*vide* article under 343 (*i*) of the Constitution of India.)

On kilometre stones fixed on other district roads and village roads the inscription may be in the national language, *i.e.*, Hindi in Devnagri script, or the script of the recognised regional language, at the discretion of the local Road Authority. Inscription in the Roman script is not necessary unless such a road leads to a place of tourist or archaeological interest.

Ordinary kilometre stones (*See* Plate I) would indicate the name and distance of the next (intermediate) important town only, whereas every 5th kilometre stone (*See* Plate II) would show the name and distance of the terminal or the starting station also inscribed above those of the intermediate towns.

On the side of a kilometre stone facing the carriageway the number of kilometre stone would be inscribed (without the name of any place). In the case of thin stones made of R.C.C. or any other material the digits may be inscribed one below the other, thus :

4
2
6

The design specification also lays down the shape and spacing of letters in the Roman script and of numerals.

On kilometre stones, which are inscribed in a script other than Roman, the style of lettering would be the one in general use.

**Colour Scheme**

So far as the colour is concerned, the specification prescribes that the background colour should be white with black letters and numerals for names of stations and distances. The semi-circular portions of the kilometre stones on national high ways, State highways and major district roads should be painted canary yellow, brilliant green and white respectively. The route number to be written on the semi-circular portion would be in black on the canary yellow and white background. This would enable easy recognition of the different types of roads.

The stones would be fixed at right angles to the centre line of the carriageway, and on the side of the road other than that on which milestones exist. On new roads they would be located on the left-hand side of the road as one proceeds from the Station from which the kilometre count commences.

*Note*: Particulars regarding recommendations (*i*) size of letters and numerals and edge clearances (*ii*) script of the inscriptions (*iii*) sequence of inscription (*iv*) the shape and shaping of letters, (*v*) colour (*vi*) orientation, etc. are given in a booklet "Type Design for Highway Kilometre Stones" issued by the Indian Roads Congress and copies of which can be had on payment of the Rs. 0.75 plus postage, etc. from the Secretary, Indian Roads Congress, Jamnagar House, Mansingh Road, New Delhi-11.

**APPENDIX-I**

**Distribution of National Highways* among States and Union Territories**

| Serial No. | Name of the State or Union Territory | Length of N.H. in kilo-metres as on 31-3-59 |
|---|---|---|
| 1 | Andhra Pradesh .. .. .. | 2,173 |
| 2 | Assam .. .. .. .. | 1,163 |
| 3 | Bihar .. .. .. .. | 1321 |
| 4 | Gujerat .. .. .. .. | }3,474 |
| 5 | Maharashtra .. .. .. | |
| 6 | Jammu & Kashmir .. .. | 544 |
| 7 | Kerala .. .. .. .. | 404 |
| 8 | Madhya Pradesh .. .. | 2,216 |
| 9 | Madras .. .. .. .. | 1,659 |
| 10 | Mysore .. .. .. .. | 858 |
| 11 | Orissa .. .. .. .. | 1,369 |
| 12 | Punjab .. .. .. .. | 1,225 |
| 13 | Rajasthan .. .. .. | 697 |
| 14 | Uttar Pradesh .. .. .. | 2,250 |
| 15 | West Bengal .. .. .. | 1,196 |
| | | 20,549 |
| | **Total for States** .. .. | 20,549 |
| **UNION TERRITORIES** | | |
| 1 | Delhi .. .. .. .. | 71 |
| 2 | Himachal Pradesh .. .. | 319 |
| 3 | Manipur .. .. .. .. | 224 |
| 4 | Naga Hills Tuensang Area .. | 111 |
| 5 | Sikkim .. .. .. .. | 63 |
| | **Total for Union Territories** .. | 788 |
| | **GRAND TOTAL** .. .. | 21,337 |

**Figures do not include length within Municipal limits, missing links and roads under construction.*

**Source** : *Basic Road Statistics-tenth* (1959) *Supplement—Table J-111* (10).

**APPENDIX-II**

**Length of State Roads* as on 31-3-1959**

| Serial No. | Name of the State or Union Territory | Length of metalled Roads in Km. | Length of Kaccha Roads in Km. |
|---|---|---|---|
| 1 | Andhra Pradesh | 25,471 | 21,746 |
| 2 | Assam .. .. | 1,689 | 25,450 |
| 3 | Bihar .. .. | 10,295 | 54,666 |
| 4 | Gujerat .. .. | 30,876 | 35,331 |
| 5 | Maharashtra .. | | |
| 6 | Jammu & Kashmir | 961 | 7,187 |
| 7 | Kerala .. .. | 8,669 | 9,563 |
| 8 | Madhya Pradesh .. | 17,853 | 18,546 |
| 9 | Madras .. .. | 26,775 | 17,561 |
| 10 | Mysore .. .. | 25,978 | 31,163 |
| 11 | Orissa .. .. | 5,740 | 22,664 |
| 12 | Punjab .. .. | 7,908 | 22,808 |
| 13 | Rajasthan .. | 12,269 | 33,824 |
| 14 | Uttar Pradesh .. | 18,453 | 67,218 |
| 15 | West Bengal .. | 9,266 | 32,356 |
| | **Total for States** .. | 2,02,203 | 4,00,083 |
| | **UNION TERRITORIES** | 1,328 | 7,788 |
| | **GRAND TOTAL** .. | 203,531 | 407,871 |

*These refer to extra Municipal roads maintained by P.W.D., Local Bodies and those constructed in C.D. & N.E.S. Blocks but exclude National Highways.

*Source* : Basic Roads Statistics—tenth (1959) Supplement—Table J-III (5) & J-III 10).

# Metric System & Clothing Trade

**GUY KNOCHE**
French Economic & Technical Bulletin,
France

THE decimal metric system which is in general use in Europe is applied throughout the clothing industry. However, certain problems arise in this field and are solved in a particular way.

**Size Fittings**

A single measurement is obviously insufficient for determining the size of a garment. In a general way, the clothing industry produces ready-to-wear garments, alterations being made by the retailer, for every human being has his own dimensional characteristics and two men of the same height, for instance, will not necessarily both have arms or legs of the same length. As a result, the average general measurements of individuals have been established and ready-made garments are altered on sale so as to fit the buyer as well as possible.

Some of the numerous elements which must be known to ensure that a ready-made garment will hang well have been listed. And the averages deduced by comparing these elements on a large number of individuals have enabled a coherent set of measurements to be drawn up : a given waist measurement is usually matched by a given arm length, a given bust measurement, a given shoulder-to-shoulder breadth, etc.

Each set of measurements has been given a number (from 36 to 54), which is only a size reference and corresponds to an average The lowest numbers represent the smallest sizes, the highest numbers the largest sizes. According to the part of the body measured, a given element increases more or less steeply according to whether it is a part of the body subject to considerable variations (hips, for instance) or only to small variations (length of back or length of shoulders). In extreme sizes one of the elements may even remain unchanged. This, as we shall see, is the case with women's sleeve lengths.

The following table shows the principal basic measurements used in women's clothing manufacture for each so-called 'standard size'.

**TABLE 1**

**Principal Basic Measurements in Women's Clothing**
*(Sizes are given in centimetres)*

| Size Fitting Number | Bust | Waist | Hips | Shoulder Breadth back | Length Back | Shoulder Length | Sleeve Length |
|---|---|---|---|---|---|---|---|
| 36 | 80 | 60 | 85 | 35 | 108 | 11 | 6 |
| 38 | 82 | 63 | 88 | 35·5 | 108 | 11·5 | 6 |
| 40 | 85 | 66 | 92 | 36 | 108 | 12 | 6 |
| 42 | 88 | 69 | 96 | 36·5 | 110 | 12·5 | 6 |
| 44 | 92 | 72 | 100 | 37 | 110 | 13 | 6 |
| 46 | 96 | 76 | 104 | 37·5 | 112 | 13·5 | 6 |
| 48 | 100 | 80 | 109 | 38 | 112 | 14 | 6 |
| 50 | 104 | 85 | 114 | 38·5 | 115 | 14·5 | 6 |
| 52 | 108 | 90 | 119 | 39 | 115 | 15 | 6 |
| 54 | 112 | 95 | 124 | 39·5 | 115 | 15·5 | 6 |

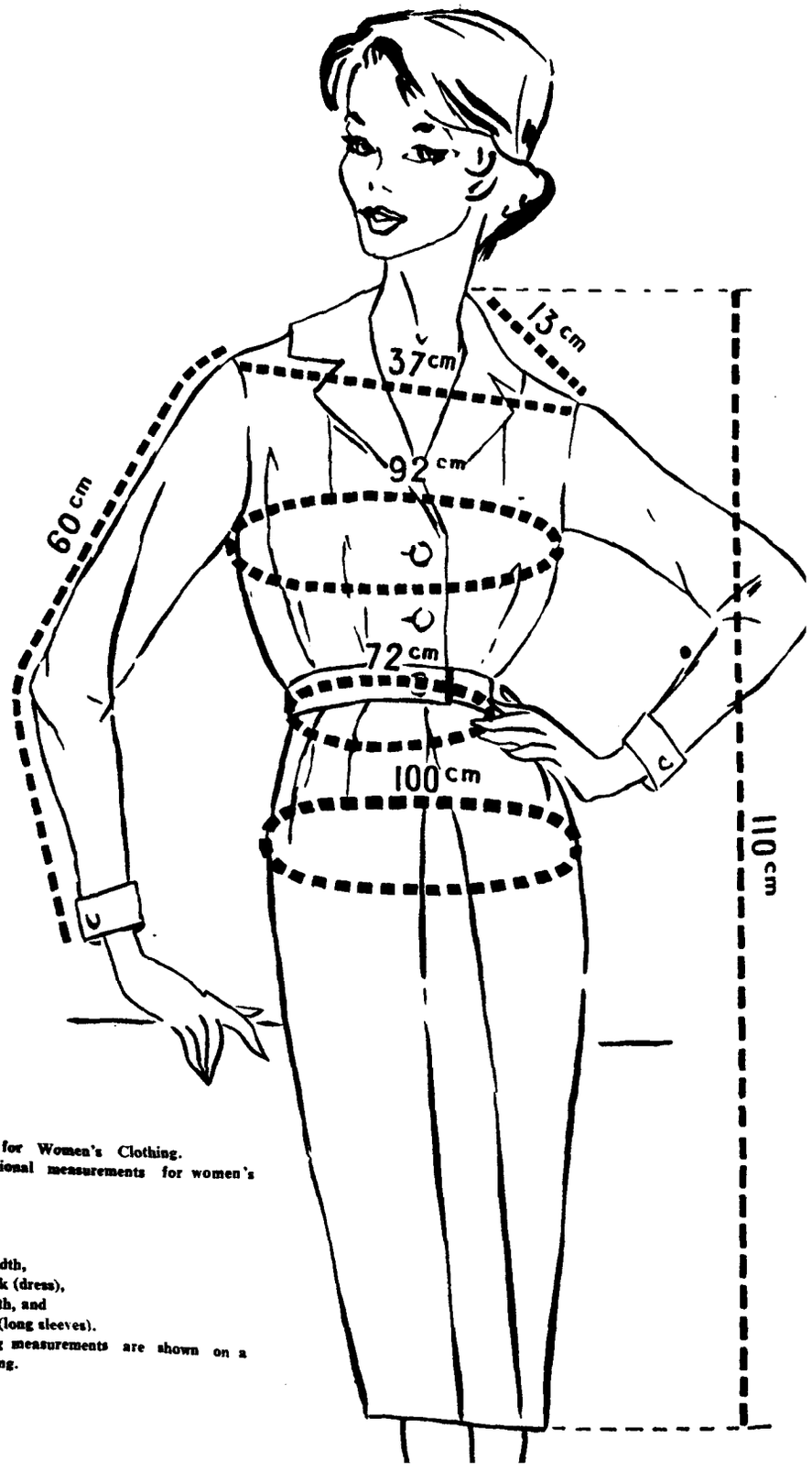



Fig. 1—Measurements for Women's Clothing.
The seven traditional measurements for women's clothing are:
(1) Bust,
(2) Waist,
(3) Hips,
(4) Shoulder breadth,
(5) Length of back (dress),
(6) Shoulder length, and
(7) Sleeve length (long sleeves).
The seven foregoing measurements are shown on a dress for '44' size-fitting.

This table requires an explanation. We see that the sleeve length does not change, as it is one of the easiest elements to alter. It is also one of those which vary most in women whose other measurements would be fairly similar. Three elements, on the contrary, are fundamental and difficult to alter. They are those for which measurements vary to the greatest extent from one size to another,—bust, waist, and hips. Other measurements do not vary very much. For instance, back shoulder-to-shoulder breadth and shoulder length only increase by 0·5 cm (5 milli metres) from one size to another, while only 4 different measurements are found in length at back for 11 different sizes, *i.e.*, 108 cm for size fittings 36, 38 and 40; 110 cm for size fittings 42 and 44 (the most usual in France); 112 cm for size fittings 46 and 48; 115 cm for outsizes 50 to 54.

The above table, therefore, shows the measurements in centimetres corresponding to the size fittings of a very large number of women's ready-to-wear garments.

In Figure 1 and 2 are shown the principal measurements of women's clothes and the pattern of the dress.

**Shoes**

In some other sectors of the clothing industry a special terminology has been adopted. One of these sectors is the boot and shoe trade where sizes in France are defined by "pointures". The 'pointure' unit is approximately 22 centimetres. It is divided into 33 points (hence the term 'pointure') each of which is, therefore, about 6·6 millimetres long. For adults sizes, this basic figure of 33 (which corresponds to the smallest normal size) is increased by additional points according to the length of the shoe. For children whose 'pointure' is less than these 33 points (*i.e.*, whose foot is less than 22 centimetres long), sizes are given by age—1 year, 2 years, etc.

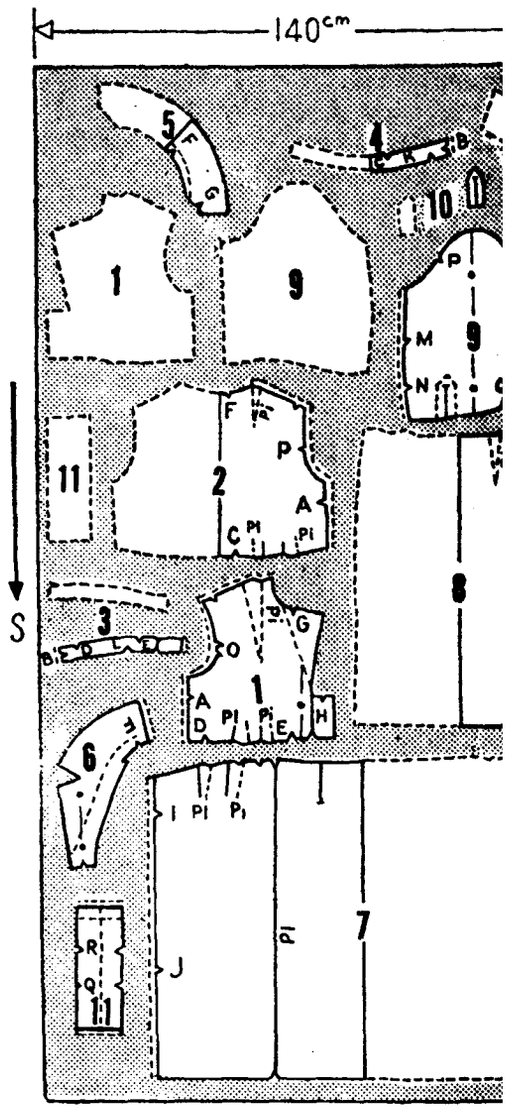



Fig. 2—Pattern of Dress Shown in Fig. 1.
Drawings of the various pieces cut out of a 2.50 m length of wo fabrics, width 140 cm.
(1) Front of bodice (2 pieces:right half and left half)
(2) Back of bodice (cut in one piece)
(3) Belt, front
(4) Belt, back
(5) Collar lining
(6) Collar facing (2 pieces)
(7) Front of skirt
(8) Back of skirt
(9) Sleeve (2 pieces)
(10) Cuff facing (2 pieces)
(11) Cuff (2 pieces)
(S) Way of fabric
(Pl) Pleats
(Pi) Darts
Letters A to R indicate places where several pieces are t assembled.

'ointures' below 33 also exist for little boys' id little girls' shoes. Adding or subtracting one unit to or from 33 means manufacturing a shoe measuring 6·6 millimetres more or ss than size 33. Women's shoe fittings nge on an average from 35 to 42 (*i.e.*, from )+2 to 33+9, or 22 cm+6·6 mm×2 and 2cm+6·6×9). Men's fittings range from ) to 46.

The following table is based on this system size fittings :

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| ointure' | 20 | 30 | 36 | 38 | 40 | 42 | 43 | 54 |
| ngth n cm | 13·4 | 20 | 24 | 25·3 | 26·6 | 28 | 28·6 | 29·3 |

A difference of 6·6 mm in length (corresponding to one 'pointure') is too much in me cases to ensure perfect fit of a shoe id for several years now French manufacturs have made more and more half-sizes, educing the difference to 3·3 mm from one pe of shoe to another. Likewise, as foot idth is not strictly proportional to length, oes of 2 or 3 different widths are now made each 'pointure'.

### oves

The glove industry also uses 'pointures'. ength of the hand is measured from the bend f the wrist to the tip of the middle finger. is expressed in 'pouces' (an old French unit f measurement) of 27 mm. For instance, love fitting 7-1/2 corresponds to gloves whose ngth, measured as above, is 27 mm×7·5= 0·25 cm, or approximately 20 cm.

### cks and Stockings

Like shoes, socks and stockings are sized 'pointures', supplemented in the case of ockings by an additional dimension corresponding to length of leg,—'small women', arge women', etc.

### len's Clothing

Although men, like women, buy their eady-to-wear suits by size fittings, for shirts the metric system is reverted to. Shirt fittings are shown by numbers, which are the size neck expressed in centimetres.

Examples of the cut and patterns of shirts, trousers and jackets are given in Fig. 3 to 5.

On the other hand in the case of hats, sizes are given in 'hatter's points' corresponding to head measurement. Each point represents 2 centimetres, point zero corresponding to a 47 centimetres head size. The following table is thus obtained :

| | *Hatter's Points* | *Head Size in cm* |
|---|---|---|
| Children | ½ | 48 |
| | 1 | 49 |
| | 1½ | 50 |
| | 2 | 51 |
| | 2½ | 52 |
| | 3 | 53 |
| Youths | 3½ | 54 |
| Men | 4 | 55 |
| | 4½ | 56 |
| | 5 | 57 |
| | 5½ | 58 |
| | 6 | 59 |
| | 6 1/2 | 60 |

Beret sizes, on the contrary, are expressed in centimetres.

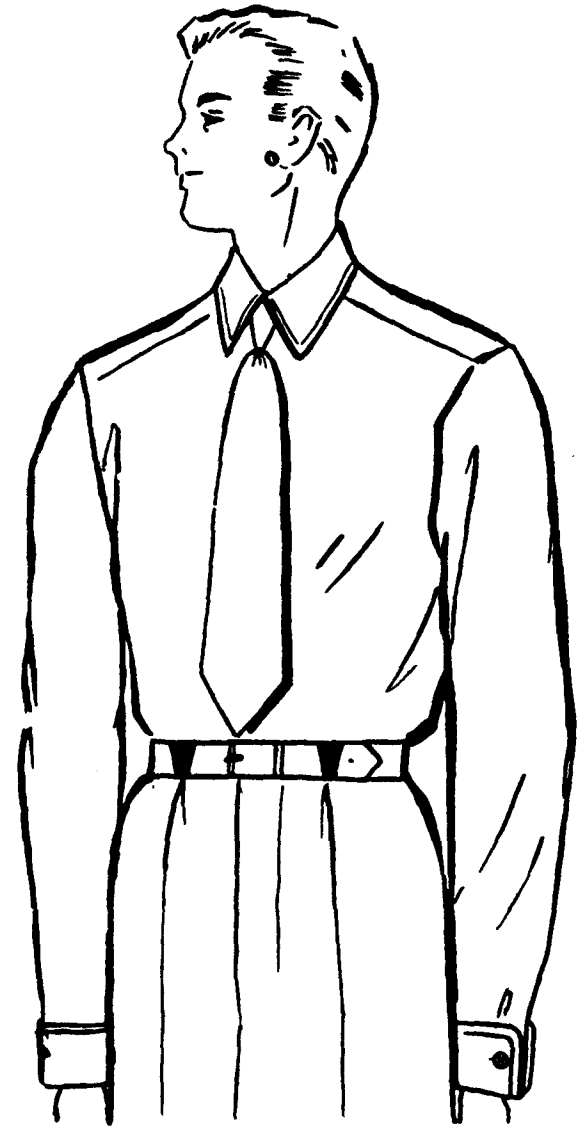
Finally, for ancillary items of clothing—braids, ribbons and hat brims—the width is expressed in 'lines', an old French unit of measurement corresponding to 2·2558 millimetres. Thus, a '4 lines' ribbon will be a little less than 1 centimetre wide (9·0232 mm).

Metrologists regret the absence of a totally unified system of measurement. It must be recognized, however, that in the ready-to-wear clothing trade, the system of size fittings facilitates mass production, as a whole set of measurements is involved and not a single one

(*Continued on page* 30)







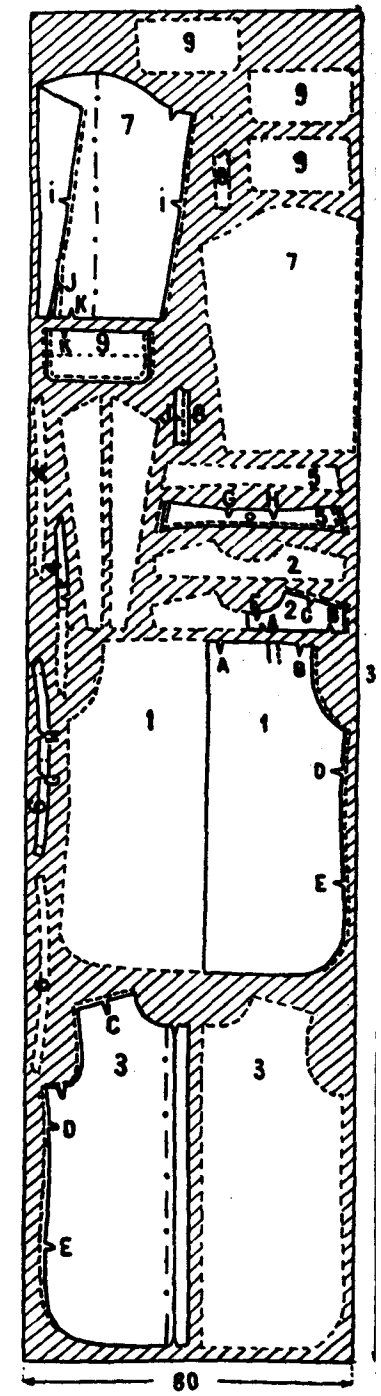



Fig. 3—*Shirt*—Size 44—Collar size 38.
Material required: 3.15 m, 80 cm wide.
Cutting-out details:
(1) Back
(2) Yoke (top of back) (4 pieces)
(3) Front (2 pieces)
(4) Shirt neck band (4 pieces)
(5) Collar (2 pieces)
(6) Collar band (2 pieces)
(7) Sleeve (2 pieces)
(8) Sleeve tab (2 pieces)
(9) Cuff (4 pieces).

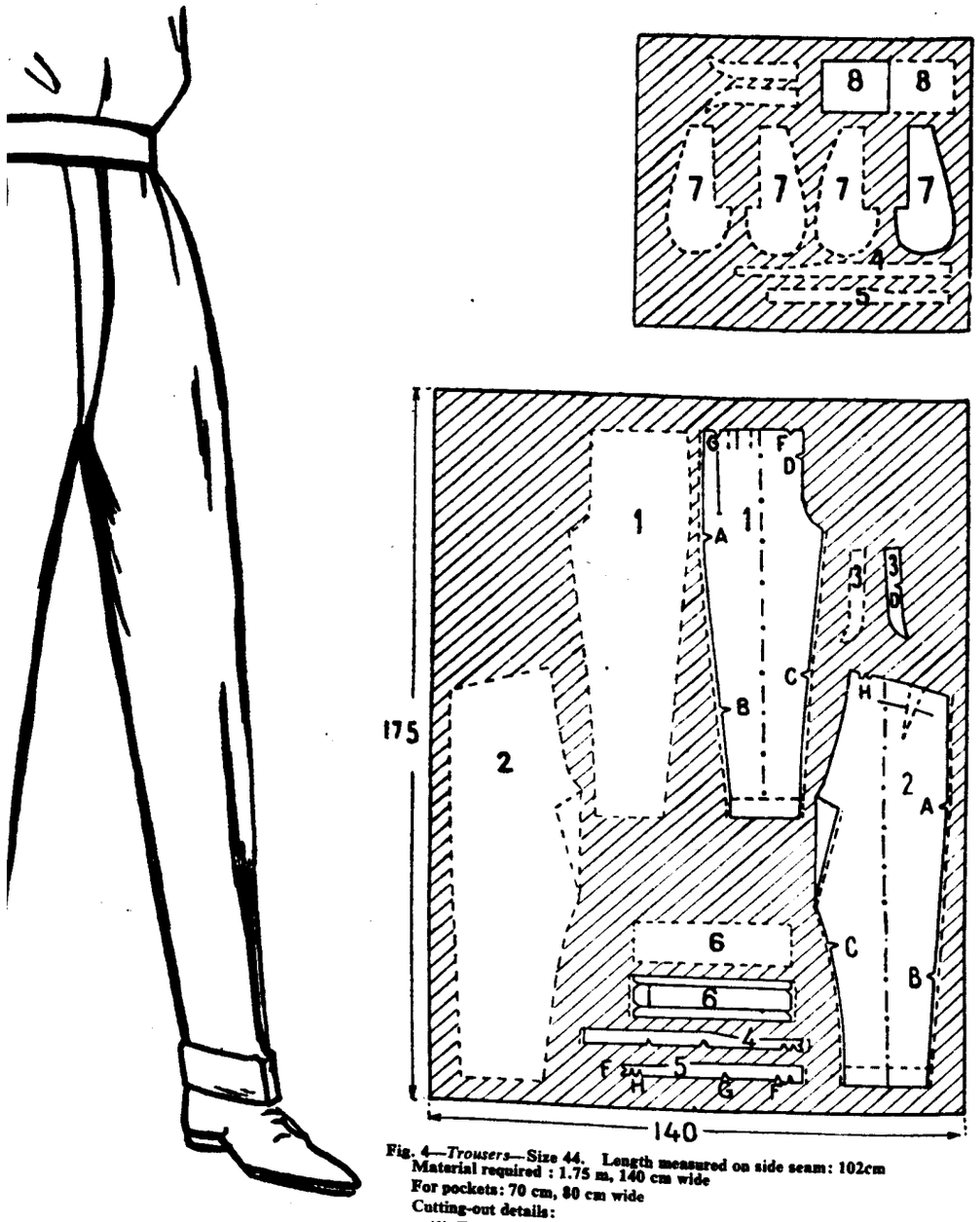
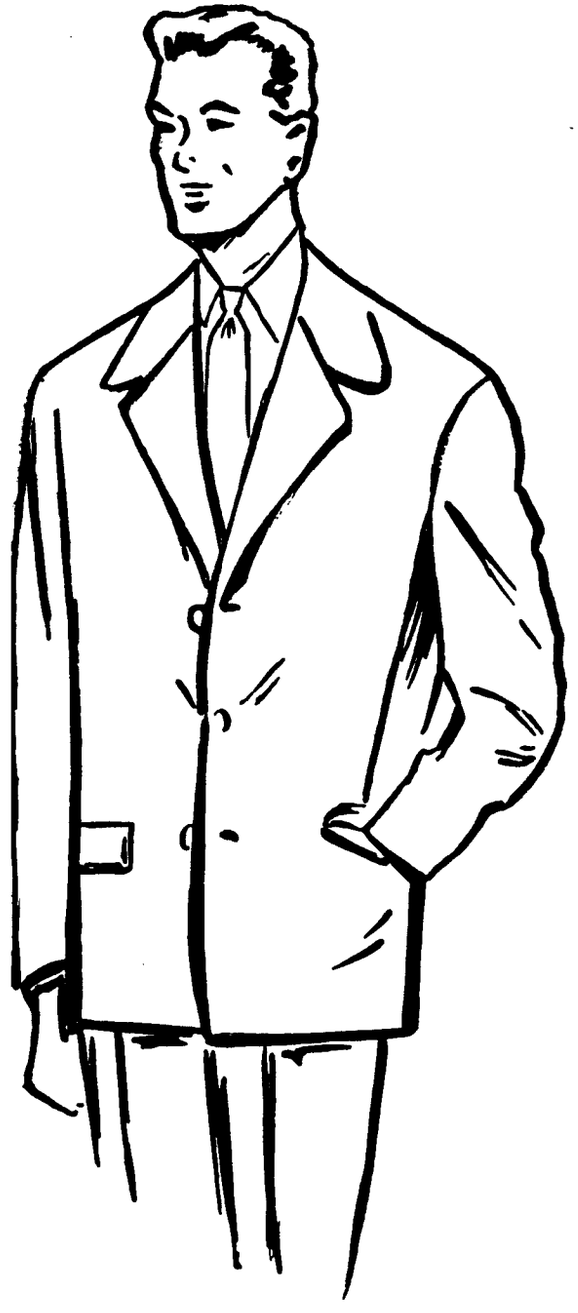



Fig. 4—*Trousers*—Size 44. Length measured on side seam: 102cm
Material required : 1.75 m, 140 cm wide
For pockets: 70 cm, 80 cm wide
Cutting-out details:

(1) Front (2 pieces)
(2) Back (2 pieces)
(3) Tab (2 pieces)
(4) Belt, left side
(5) Belt, right side
(6) Cuff (2 pieces)
(7) Pocket (4 times)
(8) Revolver pocket (2 pieces)

For the lining, pieces No. 3, 4 and 5 must also be marked out twice on the material for pockets and lining.



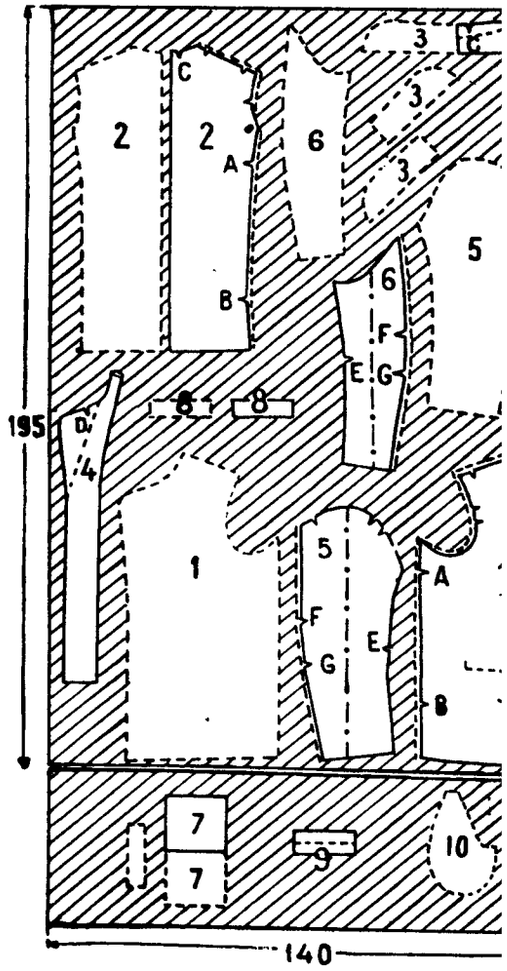



Fig. 5—Jacket—Size 44.
Material required (not including lining):
1.95 m, 140 cm wide.
Cutting-out details:

(1) Front (2 pieces)
(2) Back (2 pieces)
(3) Collar (4 pieces)
(4) Lapels (2 pieces)
(5) Top sleeve (2 pieces)
(6) Under-sleeve (2 pieces)
(7) Straight-cut pocket (2 pieces)
(8) Flap of straight-cut pocket (2 pieces)
(9) Flap of bias-cut pocket (2 pieces)
(10) Bias-cut pocket (2 pieces).

# Thinking in Tens*

**J. B. S. Haldane**
Professor

FROM October 1, 1958, we have started using the metric system for practical urposes. I have no doubt that this is a wise hange. We must certainly abolish many f our old weights and measures, for the ry good reason that a seer, for example, not the same weight throughout India. nd we had much better adopt a planned stem rather than the unplanned system of rds, pounds, acres, and so on still current the USA and England. Such a change is t very serious for ordinary people. It is fficult for managers of factories. But it ll cause far less trouble now than it would ve done if postponed for another twenty ars when our industries will be more veloped.

I dare say some people are asking 'why py other nations, why not devise our own dian system ?' The answer to them is nple. The metric system was not invented India, but it is the natural development of as which were invented in India. Once u learn to think in powers of ten you will turally want a measure which is a thousand es the measure used in buying cloth or asuring a house, namely, the metre, and other which is a thousandth part of it. d it is reasonable to have simple connecns between measures of length, area, lume and weight. But why think in tens? me traditional measure systems, both Indian and European, are arranged so that one unit is two, four, eight, or sixteen times the unit of which it is a multiple. The answer is that India has imposed the decimal system of arithmetic on the world and must take the consequences. Until seven hundred years or so ago we often used the scale of sixty in Europe. But as early as the Yajurveda, India had words for powers of ten up to at least a hundred million, and in classical Sanskrit these go up to the mahaksauhini, which is twenty three tens multiplied together. This is in fact quite a useful number in modern science. A gram of hydrogen contains just over six mahaksauhini of atoms. The ancient Greeks, on the other hand, had no names for powers of ten above ten thousand.

India imposed the decimal system of arithmetic on the world after inventing the symbol for zero which made it possible to represent any number with ten symbols. No doubt the inventors of this system were helped by the fact that in Devanagari and related scripts the meaning of a symbol may depend on its position in the word. The Romans had the same idea. For example in their system I meant one, and V five, while VI meant five plus one, or six and IV five minus one, or four. But this proved much less fruitful than the Indian idea that I may mean one, ten, a hundred or even a mahaksauhini according to its position.

*Reproduced with permission from the '*Hindu*', Madras.



### Aryabhata's System

The great Aryabhata invented a system in which the consonants represented the numbers from 1 to 25, and the multiples of ten from 30 to 100, while the vowels, including of course the cerebral R, and dipthongs, gave powers of a hundred. Thus *ga* means three, *gi* three hundred, and so on, up to *gau* which signifies three multiplied by ten to the power of sixteen. This system sufficed for all the numbers which an astronomer needed fourteen centuries ago and, could still be useful. For example, the speed of light is very nearly *ge* centimetres per second. However modern astronomers need numbers ever larger than *hau* which was Aryabhata's largest.

Aryabhata is perhaps born again as my former colleague Professor C. W. Allen, of University College, London, who has invented the convenient word *dex*, meaning decimal exponent, for a ratio expressed as a power of ten. For example, the ratio of the distance which a flash of light traverses in a second to a metre is about eight and a half dex. For this distance is three hundred million metres.

### Dex and the World

When we look at the world from this point of view, the interval between a human height and the diameter of an atom is about ten dex, and another four must be added to get down to the diameter of an atomic nucleus. The interval between a human height and the largest distance yet measured with anything approaching accuracy is twenty four and a half dex. So man is one of the smaller features of the universe. The whole range of measurement, whether of distance or time, is about forty dex, or a little less. One might think that the range of masses would be a hundred and twenty dex. And so it would b if it were not for the fact that the larger th volume we study the less is the density matter in it. Atomic nuclei are very dens but even in the heaviest substances the only occupy a tiny fraction of the whol space. Stars, such as the earth or the su are moderately dense, but again the distanc between them are enormous. So the rang from the lightest particle yet weighed, namel an electron, and all the matter whose existenc is known, is about eighty dex. These figur give us the present range of science. C course, it may be extended in future. I as is not impossible, the human mind consis of finer sorts of matter than have yet bee investigated by physicists, which was th teaching of the Sankhya and other ancie Indian philosophies, the scale may be extend ed downwards.

### Learning Science

One minor advantage of the metric syste is that it will make it easier for Indians t learn science. In the first place the metr system is always used in scientific wor And secondly the time wasted in learnin about piculs, furlongs, and the like can b spent in learning how to deal with decimal which are needed in all scientific work.

We still cling to old-fashioned measures time. And I think this is inevitable for som generations. The metre is defined as th distance between two marks on a bar of met in Paris. You cannot keep a standard piec of time one minute long. The day is not a goo enough standard. It certainly varies i length, and is lengthening at present. Som physicists hope to replace the earth as a cloc based on atomic vibrations. There is a re difficulty here, for people will certainl continue to use the day as a unit, even thoug its length is increasing. I think, howeve that thirty years or so hence we shall h

g/m²
cm²
hm²

ble to make proposals for a simpler and more scientific system of measuring time. However, that may be, the adoption of the metric system is not only a step in the emancipation of India, it is a step in the conquest of the world by the idea of thinking powers of ten, which originated in India. This is perhaps the only kind of conquest worth making. I hople that cricket and football in India 'will survive when the British dominion in India shall have long ceased to exist, and when the sources which it once yielded of wealth and power are lost to remembrance'. The quotation by the way, is from Warren Hastings, who may have been a cruel ruler, but was not such a fool as to ignore the lesson of history that empires are more ephemeral than ideas. So with the adoption of the metric system in India the ideas of Aryabhata, after conquering Europe, are returning in triumph to their native land.

# Abbreviations For Engineering Units

**J. K. VARSHNEYA**
Deputy Director (Metric),
National Buildings Organisation,
New Delhi

THE Standards of Weights and Measures Act, 1956, lays down a period of 10 years for the complete change-over to the metric system in all spheres of activities. During the transition period we are slowly changing over to the metric system; but it appears that enough attention is not being given to the correct and uniform usage of the abbreviations. It is not very uncommon to see abbreviation of kilometre as "Km" instead of "m" and of millimetre as "MM" in place of "mm". This article describes the abbreviations for metric engineering units based on international recommendations by ISO (International Standardization Organisation) and IEC (International Electrotechnical Commission) for guidance.*

**TABLE-1**

**Abbreviations for Prefixes of Sub-multiples and Multiples of Metric Units**

| Prefix | Numerical value | Abbreviation |
|---|---|---|
| pico | $10^{-12}$ | p |
| nano | $10^{-9}$ | n |
| micro | $10^{-6}$ | u |
| milli | $10^{-3}$ | m |
| centi | $10^{-2}$ | c |
| deci | $10^{-1}$ | d |
| deca | 10 | dk |
| hecto | $10^{2}$ | h |
| kilo | $10^{3}$ | k |
| mega | $10^{6}$ | M |
| giga | $10^{9}$ | G |
| tera | $10^{12}$ | T |

*For inter-relationship amongst various metric units and comprehensive conversion tables refer *Handbook for Building Engineers in Metric System*—under preparation—compiled and edited by J. K. Varshneya to be published by National Buildings Organisation, 11-A, Janpath, New Delhi.



**TABLE 2**

**Abbreviations for Metric Engineering Units**

**(1) Length**

| | |
|---|---|
| millimetre | mm |
| centimetre | cm |
| metre | m |
| kilometre | km |
| $10^{-6}$ m or micron | μm or μ |
| nautical mile (international) | (n mile) |

**(2) Area**

| | |
|---|---|
| square millimetre | $mm^2$ |
| square centimetre | $cm^2$ |
| square metre | $m^2$ |
| hectare | ha |
| square kilometre | $km^2$ |

**(3) Volume**

| | |
|---|---|
| cubic millimetre | $mm^3$ |
| cubic centimetre | $cm^3$ |
| cubic metre | $m^3$ |

**(4) Capacity**

| | |
|---|---|
| millilitre | ml |
| litre | l |
| kilolitre | kl |

**(5) Time**

| | |
|---|---|
| second | s |
| minute | min |
| hour | h |
| day | d |
| year | a |

**(6) Velocity**

**(a) Velocity Rotation**

| | |
|---|---|
| radian per second | rad/s |
| degree per second | °/s |
| revolution per minute | rpm |
| revolution per second | rps |

**(b) Linear Velocity**

| | |
|---|---|
| metre per second | m/s |
| kilometre per hour | km/h |
| nautical mile (international) per hour or international knot | kn |

**(c) Angular Velocity**

| | |
|---|---|
| reciprocal second's | $s^{-1}$ |

**(7) Acceleration**

**(a) Angular acceleration**

| | |
|---|---|
| reciprocal second squared | $s^{-2}$ |
| revolution per second per second | $rev/s^2$ |

**(b) Linear Acceleration**

| | |
|---|---|
| Gal—1 gal=1 cm/s² | $cm/s^2$ |
| metre per second per second | $m/s^2$ |

**(8) Mass**

| | |
|---|---|
| microgram | μg |
| milligram | mg |
| gram | g |
| kilogram | kg |
| quintal | q |
| tonne | t |
| carat | c |

**(9) Density**

**(a) Linear Density**

| | |
|---|---|
| kilogram per metre | kg/m |

**(b) Density (Mass/Volume)**

| | |
|---|---|
| gram per cubic centimetre | $g/cm^3$ |
| gram per millilitre | g/ml |
| kilogram per cubic metre | $kg./m^3$ |

**(10) Moment of Inertia**

**(a) Dynamic**

| | |
|---|---|
| kilogram metre squared | kg. $m^2$ |

**(b) Geometrical**

| | |
|---|---|
| centimetre⁴ | $m^4$ |
| metre⁴ | $m^4$ |

**(11) Section Modulus**

| | |
|---|---|
| centimetre cubed | $cm^3$ |
| metre cubed | $m^3$ |

**(12) Bending Moment**

| | |
|---|---|
| kilogram force metre | kg f m |
| kilogram force centimetre | kg f cm |

**(13) Momentum**

| | |
|---|---|
| kilogram metre per second | kg. m/s |

**(14) Moment of Momentum**

| | |
|---|---|
| kilogram metre squared per second | kg. $m^2/s$ |

**(15) Stress and Pressure**

| | |
|---|---|
| kilogram force per square metre | kg f/ |
| Newton per square metre $N/m^2$ | |
| kilogram force per square centimetre | kg f/cr |
| kilogram force per square millimetre | kg f/mr |
| tonne per force square metre | $t/m^2$ |

**(16) Work and Energy**

| | |
|---|---|
| Joule | J |
| kilowatt hour | kwh |
| kilogram force metre | kg f m |

**(17) Power**

| | |
|---|---|
| Watt | W |
| Kilowatt | KW |
| kilogram force metre per second | kgfm/s |

**(18) Fuel Consumption (Volume/Length) of Automobiles**

| | |
|---|---|
| litre per kilometre | l/km |

**(19) Fuel Consumption (Length/Volume) of Automobiles**

| | |
|---|---|
| kilometre per litre | km/l |

**(20) Temperature**

| | |
|---|---|
| degree Centigrade (Scale) | °C |
| degree Centigrade (Interval) | deg C |

**(21) Quantity of heat**

| | |
|---|---|
| calorie | cal |
| kilocalorie | kcal |

**(22) Calorific Value**

| | |
|---|---|
| Joule per gram | J/g |
| calorie per gram | cal/g |

**(23) Heat Flow Rate**

| | |
|---|---|
| calorie per second | cal/s |
| kilocalorie per hour | kcal/h |

**(24) Density of Heat Flow Rate**

| | |
|---|---|
| calorie per square centimetre second | $cal/cm^2$ s |
| kilocalorie per square metre hour | $kcal/m^2$ h |

**(25) Thermal Conductivity**

| | |
|---|---|
| calorie per second centimetre degree C | cal/(s. cm. deg C) |
| kilocalorie per hour metre degree C | kcal/(h.m. deg C) |

**(26) Thermal Conductance**

| | |
|---|---|
| calorie per square centimetre second degree C | $cal/cm^2$ s deg C |
| kilocalorie per square metre hour degree C | $kcal/m^2$ h deg C |

**(27) Specific Heat**

| | |
|---|---|
| joule per gram degree C | J/g deg C |
| calorie per gram degree C | cal/g deg C |

**(28) Luminous flux**

| | |
|---|---|
| lumen | lm |

**(29) Illumination**

| | |
|---|---|
| lux | lx |
| phot | phot |

**(30) Brightness**

| | |
|---|---|
| Lambert | L |
| stilb | sb |

**(31) Intensity of a Luminous Source**

| | |
|---|---|
| Candela | cd |

**(32) Luminous Efficiency**

| | |
|---|---|
| lumen per watt | lm/W |

**(33) Sound Power Level**

| | |
|---|---|
| decibel | db |

**(34) Sound Pressure Level**

| | |
|---|---|
| decibel | db |

TABLE 3

**Symbols and Abbreviations for Practical Electrical Quantities and Units**

| Quantity | Symbol | Practical Unit | Abbreviation of Practical Unit |
|---|---|---|---|
| Electromotive force | E | volt | V |
| Resistance | R | ohm | Ω |
| Current | I | ampere | A |
| Quantity of Electricity | Q | coulomb | C |
| Capacitance | C | farad | F |
| Inductance | L | henry | H |
| Energy | W | joule | J |
| Power | P | watt | W |

*Note* :

(1) *Abbreviations should be written without full stop e.g. for centimetre write cm and not cm.*

(2) *Do not add 's' after abbreviation to signify plural number; e.g. for* 10 *kilograms, write* 10 *kg and not* 10 *kgs.*



# *News & Views*

**Recent Notifications**

*Amendment of Indian Power Alcohol Rules*, 1950. No. S. O. 2693, dated 7th November 1960.

In pursuance of the provisions contained in Rule 9 of the Indian Power, Alcohol Rules, 1950, the Central Government hereby makes the following amendments in the Notification of the Government of India in the Ministry of Commerce and Industry No. SRO 1601 dated 17th September, 1952, namely:—

In the said Notification,—

(1) in paragraph 1, for the second sentence, the following sentence shall be substituted, namely:—

"The rate of such handling charges shall be 10 nP. (ten naye paise only) per litre until further orders."

(2) for the words, figures and brackets "As. -/14/- (annas fourteen only) per bulk gallon", the figures, words and brackets 19 nP. (Naye Paise nineteen only) per litre" shall be substituted.

No. S.O. 689, dated 21st March 1961.

In pursuance of the provisions of Rule 9 of the Indian Power Alcohol Rules, 1950 the Central Government hereby makes the following further amendment in the notification of the Government of India in the Ministry of Commerce and Industry No. SRO 1601 dated the 17th September, 1952, namely:—

In the said Notification as amended in this Ministry's Notification No. S. O. 2693, dated the 7th November, 1960, 'for th figures, words and brackets "19 nP. (Nay Paise nineteen only) per litre", the word figures and brackets "Rs. 19.25 (Rupee nineteen and Naye Paise twenty five only per hectolitre (100 litres)" shall be substitu ted.'

*Introduction of Capacity Measures in U.P. & M.* No. 984, dated 28th April 1961.

In exercise of the powers conferred by sub section (3) of section 1 of the Standards o Weights and Measures Act, 1956 (89 o 1956), the Central Government hereb appoints the first day of May 1961 as the dat on which the provisions of the said Act in s far as they relate to units of capacity sha come into force in the areas specified i column 2 of the Table below in the Stat specified in corresponding entry in column thereof:—

TABLE

| State | Areas in which Metric Units of Capacity are introduced |
|---|---|
| Uttar Pradesh | Municipal areas of Meeru Agra, Lucknow, Bareilly Moradabad, Varanas Kanpur, Jhansi, Allahaba and Gorakhpur. |
| Madhya Pradesh | Districts of Bhopal, Indor Gwalior and Jabbalpu Market areas notifie under the Central Pro vinces and Berar Agri cultural Produce Marke Act, 1935 (XXIX of 1935 the Central Provinc and Berar Cotton Marke Act, 1932 (IX of 1932 and the Madhya Bhara Agricultural Produce Mar kets Act, 1952 (17 of 1952) |

No. S. O. 985, dated 28th April 1961.

In exercise of the powers conferred by section 14 of the Standards of Weights and Measures Act, 1956 (89 of 1956), the Central Government hereby permits, in respect of the areas referred to in the Notification of the Government of India, in the Ministry of Commerce and Industry S. O. No. 984 dated the 28th April, 1961, the continuance of the use for a period of one year from the 1st day of May, 1961 of any unit of capacity which immediately before that date was in use in respect of the said areas.

No. S. O. 1219, dated 30th May 1961.

In exercise of the powers conferred by sub-section (3) of section 1 of the Standards of Weights and Measures Act, 1956 (89 of 1956), the Central Government hereby appoints the 1st day of June, 1961 as the date on which the provisions of the said Act shall come into force in the whole of India except the States of Orissa and Bihar in respect of :—

(*a*) undertakings engaged in the manufacture of alcohol in so far as they undertake the sale of alcohol,

and

(*b*) Departments of Government in so far as they undertake the levy of duties of excise on alcohol.

No. S.O. 1220, dated 30th May 1961.

In exercise of the powers conferred by section 14 of the Standards of Weights and Measures Act, 1956 (89 of 1956), the Central Government hereby permits, in respect of the undertakings and departments of Government referred to in the notification of the Government of India in the Ministry of Commerce and Industry, S. O. 1219, dated the 30th May 1961 the continuance of the use, for a period not exceeding one year from the 1st day of April 1961, of any weight or measure which, immediately before that day was in use in respect of the said undertakings or departments of Government.

No. S. O. 1221, dated 30th May 1961.

In exercise of the powers conferred by sub-section (3) of section 1 of the Standards of Weights and Measures Act, 1956 (89 of 1956), the Central Government hereby appoints the 1st day of June, 1961 as the date on which the provisions of the said Act shall come into force in the State of Bihar in respect of:—

(*a*) departments of Government in so far as they undertake the regulation and control of the import, transportation, manufacture, possession or sale of liquids consisting of or containing alcohol and the levy of excise duties on such liquids; and

(*b*) undertakings engaged in the import, export, transportation, manufacture, possession or sale of such liquids.

No. S.O. 1222, dated 30th May 1961.

In exercise of the powers conferred by section 14 of the Standards of Weights and Measures Act, 1956 (89 of 1956), the Central Government hereby permits, in respect of the departments of Government and the undertakings referred to in the notification of the Government of India in the Ministry of Commerce and Industry S.O. 1221, dated 30th May 1961, the continuance of the use, for a period not exceeding one year from the 1st day of June 1961, of any weight or measure which, immediately before that day, was in use in respect of the said undertakings and the departments of Government.

No. S.O. 1223. dated 30th May 1961.

In exercise of the powers conferred by sub-section (3) of section 1 of the Standards of Weights and Measures Act, 1956 (89 of 1956), the Central Government hereby appoints the first day of June, 1961 as the date on which the provisions of the said Act shall come into force in the State of Orissa in respect of:—

(*a*) undertakings engaged in the manufacture or sale of alcohol, and

(*b*) departments of Government in so far as they undertake the levy of duties of excise on alcohol.



S.O. 1224, dated 30th May 1961.

In exercise of the powers conferred by section 14 of the Standards of Weights and Measures Act, 1956 (89 of 1956), the Central Government hereby permits, in respect of the undertakings and the departments of Government referred to in the notification of the Government of India in the Ministry of Commerce and Industry S.O. 1223 dated the 30th May 1961, the continuance of the use, for a period not exceeding one year from the first day of June, 1961, of any weight or measure which, immediately before that day, was in use in respect of the said undertakings or the departments of Government.

**Petroleum Industry**

No. S. O. 471, dated 25th February 1961.

In exercise of the powers conferred by section 14 of the Standards of Weights and Measures Act, 1956 (89 of 1956), the Central Government hereby makes the following amendment in the Notification of the Government of India in the Ministry of Commerce and Industry No. S. O. 479, dated the 18th February 1960 relating to the permission of the continuance of the use of any weight or measure which, immediately before the 1st March, 1960 as was in use in respect of crude petroleum and petroleum products, namely:—

In the said Notification, for the words "a period of one year", the words, "for a period of two years" shall be substituted.

(The original notification No. S. O. 4 dated 18th February 1960 appeared in M 1960 issue of *Metric Measures*)

**Railways Adopt Metric Paper Sizes**

The Railway Board has informed all t General Managers of the Indian Railwa that the sizes of publications printed a used by the Railways would now be chang over to the metric paper sizes, as sho below:—

(1) A-4 (210×297 mm)
(2) A-5 (148×210 mm)
(3) A-6 (105×148 mm)

The Railway Board has also instruct that the change over of the publications in metric sizes should be done as early possible and in any case not later tha January 1963.

So far as time-tables are concerned, it necessary to effect the change-over in a the Railways at the same time so as to pr duce a uniform time-table. It has, therefor been suggested that the October 1962 issu should be printed in size A-5 (148×210 m

Regarding other publications, the chang over would be so programmed that th stock of existing sizes of paper would b utilized without wastage. The existing siz of publications which are to be changed t A-4, A-5 and A-6 are as follows:

A-4 .. Crown Folio, Royal Quarto, Foolsc Folio, Demy Quarto, Imperial Quar and similar sizes.

A-5 .. Crown Quarto, Royal Octavo, Foolsc Quarto, Demy Octavo, Imperial Octa and similar sizes.

A-6 .. Crown Octavo, Royal 16 mo, Foolsc Octavo, Demy 16 mo, Imperial 16 m and similar sizes.

It is expected that other Central and Stat Departments would also follow the Railways

**Packages for Lac and Lac Products**

It is understood that the Indian Lac Cess Committee has suggested the following metric sizes for packing shellac, seedlac etc., for internal transactions:—

Shellac, Sticklac and Buttonlac –50 kg.
Seedlac, Kirilac, Refuselac etc. –75 kg.

So far as export is concerned, the present 164 pounds pack equivalent to 74.40 kilogram would continue for the time being.

**Weights and Measures in Sudan**

The Sudan had a weights and measures system based upon the Egyptian system. Separate system existed nearly for every class of trade. In order to rationalise these various systems, the Government in 1955, passed a Weights and Measures Ordinance which sought to replace the existing systems by the metric system. Although many Government Departments and private traders have adopted the metric system, the tranditional system is to remain permissive for a certain period and will be replaced by the new system gradually.

In 1957, certain traditional measures such as Rotl and Oke were declared illegal and were replaced by litres and kilograms respectively. The Government also announced that as from 1 January 1958, the old heaped measure of capacity (dry) would become illegal and would be replaced by cylindrical measures. The Standards Section of the Ministry of Commerce Industries and Supply, gives every encouragement and assistance to traders and all concerned to adopt the metric system.

**Redetermination of Half-Life of Carbon 14**

A more accurate value for the half-life of carbon 14—important in geological and archeological dating—has recently been obtained by the National Bureau of Standards, USA. The new value is 5,760 years with an overall probable error of 1 per cent, and is about 4 per cent greater than the previously adopted value of 5,568 years.

The redertermined value is not inconsistent with the value of 5,900±250 years obtained at the NBS in 1953. The value of 5,568 years that has been in use was somewhat arbitrarily chosen. Because of the wide range in measured values of the half-life of carbon 14—from 4,700 to 7,200 years—the above weighted average of three selected values determined by gas counting and by mass spectrometric analysis was tentatively adopted for the purpose of radiocarbon dating of archeological samples. The present measurements have led to the conclusion that the spread in the values obtained previously may have arisen almost entirely from absorption effects.

In performing the redetermination, the research workers quantitatively diluted high specific activity carbon dioxide for counting in compensated internal gas counters in the Geiger and proportional regions. Mass spectrometric analyses of parts of the undiluted gas sample were made to determine the isotopic abundance of carbon 14, which was found to be approximately 44 atoms per cent. Intercomparative measurements of the isotopic abundance were also carried out with the United Kingdom Atomic Energy Authority.

(From *NBS Technical News Bulletin*, February 1961)

**International Exhibition and Congress on Measurement Techniques**

An international exhibition devoted to measurement, control, regulation and automation was held in Paris from 9 May to 17 May 1961. It was organised by the Mesucora Association (which groups the various professional bodies relating to the sectors concerned.) and exhibited instruments from all the important countries in the world. It





is understood that some 700 firms displayed the latest theoretical and experimental apparatus and equipment, methods and materials for measurement, control regulation and automation together with their industrial applications.

Equipment exhibited included that required for measurement and telemeasurement of weights, masses, pressures, work, time energy, electrical and optical properties, etc.

Simultaneously, an International Congress was arranged with the collaboration of the scientific associations concerned. The general theme of the Congress was 'Recent advances in the field of measurement, Control and Automatic Regulation obtained by the interaction of mechanical, electrical, electronic and nuclear techniques'.

Among the subjects for the International Congress were new factors in measurement instrumentation, the application of new measuring procedures, the measurement of the physical properties of material quality control in industrial production, tl recording and exploiting of measureme data, servo systems and their compone element, industrial applications of autom tion and measurement in the field of nucle energy.

**Use of Metric Steel Sections**

It is understood that the steel mills in Ind have started rolling of steel in metric section Inch sections have now been large replaced by corresponding metric section Consumers of steel sections have been advise that all future planning must be based o metric sections as far as possible. Eve projects relating to the expansion of existir undertakings during the Third Five Ye Plan, would base their expansion progran mes on metric sections. If this is not don the project authorities will find themselv in difficulty as inch sections may not b easily available in the quantity required.

## CORRECTION

On pages 30 and 31 of March 1961 issue under "News & Views–Working Standard Length Measures" the following corrections may be made :—

Item (12)—the words "with slight taper" may be deleted

Item (14)—the words "right through, on the under side" may be deleted.

## CORRIGENDUM

In regard to the list of Controllers appearing on page 31 of January issue of Metric Measures, the following corrections may be made :—

(8) MADRAS
Shri S. A. Sundrarajan,
Controller of Weights and Measures,
19-A, Woods Road, Mount Road,
Madras-2

(10) MYSORE
Shri Muhammad Sami Uddin, I.A.S.,
Joint Secretary to Government, Food & Civil Supplies Dept.
& Controller of Weights and Measures,
Uttar Pradesh, Lucknow.

# *Standards News*

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

**Sixth Indian Standards Convention**

**The Sixth Indian Standards Convention will be held at Kanpur from 25-31 December 1961.**

The following nine technical Sessions will be held :—

S-1 Productivity is Building Design and Construction.

S-2 Review of Indian Experience with Certification Marking

S-3 Packaging

S-4 Company Standardisation Practices.

S-5 Introduction of Metric System in Engineering Industries.

S-6 Adoption of Universal Count System in Textiles.

S-7 Housing and Preservation of Documents.

S-8 Safe Use of Electricity in the Home.

S-9 Non-Destructive Testing Metals.

The three main Sessions of direct interest from the point of view of the adoption f the metric system are S-3 Packaging, -5 Introduction of Metric System in ngineering Industries, and S-6 Adoption f Universal Count System in Textiles. hese are further sub-divided as follows :—

**S-3 Packaging**

The following topics will illustrate the scope of the Sessions :

(*i*) Standardisation of packages and packaging materials, such as containers, boxes, crates, bags, etc.

(*ii*) Standardisation of packaging devices and equipment, such as fastenings and closures, productive wrappings, etc.

(*iii*) Rationalization of packages and packaging materials with a view to conserving the raw materials and promoting their economic use.

(*iv*) Codes of practices for packaging to ensure safety in transport and handling and protection against corrosion, rot and fire hazard of the materials packed.

(*v*) Methods for the evaluation of packages and packaging materials for the purposes they are intended.

(*vi*) Marking and labelling, handling instructions, warning against dangerous contents, etc.

**S-5 Introduction of Metric System in Engineering Industries**

Problems which may arise in changing designs and drawings and adapting existing machinery to produce in metric terms, with suggested solutions for such problems. The need for immediate planning and programming to carry out the changeover in design and manufacture.

The following topics will illustrate the scope :

(*i*) Procedure to be followed in changing drawings.

(*ii*) Review of Indian Standards in metric system published or under preparations.

(*iii*) Utilization of existing machinery to produce in metric terms.

(*iv*) Requirements of metric gauges and instruments, their production and supply.

(*v*) Organizational planning and programming for the changeover in production.

(*vi*) Training of workers at various levels to think and work in metric terms.

(*vii*) Review of progress made by individual firms.

**S-6 Adoption of Universal Count System in Textiles.**

The following topics are suggested to illustrate the scope of the Session :

(*i*) Need for and desirability of adopting a universal count system.

(*ii*) Introduction of Universal count system in (*a*) Cotton, (*b*) Wool, (*c*) Silk, (*d*) jute, (*e*) Man-made fibre, and (*f*) other sectors of textile industry.

(*iii*) Problems that may be created by the changeover to universal count system and their solution.

(*iv*) How would the adoption of universal count system affect textile testing procedures.

**Draft Indian Standards Specifications for Nickel Silver Sheet and Strip for General Purposes and Copper Tubes for General Purposes (Doc: SMDC 11/232: DOC:SMDC 11/209)**

The Indian Standards Institution has prepared draft Specifications for Nickel Silver Sheet and Strip for General Purpose Doc : SMDC 11(232) and Copper Tube for General Purposes, Doc: SMDC 11(209

The nickel silvers are a family of alloy composed of copper, nickel and zinc. A major property of these allows is their colou which ranges from a soft ivory to silver white, depending on the nickel conten These alloys have been used for centurie under a variety of names, the most commo being German silver. However, they ar known as nickel silvers in modern com mercial practice. With the exception c cupro-nickles, these are the only alloys c copper that are white.

The draft standard for copper tube for general purposes covers two grades o copper used for manufacturing copper tube required for general purposes. For eac application, the user will have to select th composition grade required and specif the outside diameter, thickness of wall an length of tubes.

**Draft Indian Standards Specification for Dial Gauge (Doc: EDC 43 (499):**

The Indian Standards Institution ha prepared a draft specification for dia gauges.

The draft standard deals with commonly used dial gauges of unit of measuremen 0·01 mm and also gives information o high accuracy dial gauges required in th inspection of machine tools.

**Indian Standard Specifications for Metric Scales fo use with Drafting Machines (IS: 1482—1960)**

The latest edition to the series of Indian Standard Specifications on metric scale being prepared by ISI in connection with the changeover to the metric system i IS : 1482—1960 Specification for Metri Scales for Use with Drafting Machines Other standards published in the serie

## KERALA (5)

In the November 1959, March and November 1960 and January, 1961 issues of *Metric Measures* lists of licensed manufacturers, dealers and repairers of weights and measures in Kerala State were published. The following is a list of manufacturers, dealers and repairers subsequently licensed by the Government of Kerala under the Kerala Weights and Measures (Enforcement) Act, 1958.

### Manufacturers

| Sl. No. | Name and address of Manufacturer | Details of articles manufactured. |
|---|---|---|
| (1) | Jayaraj Foundry & Engineering Works, Maller Road, Tellicherry. | Cast Iron Weights. |
| (2) | Jupitor Engineers, Metind Nagar, Shoranur .. .. .. | Weights. |
| (3) | Shanker paint & oil Mills (P) Ltd., 4, Cullen Road, Alleppey | Weights. |
| (4) | Narayana Engineering Industries (Private) Ltd., Shoranur | Cast Iron Weights. |

### Dealers

| Sl. No. | Name and Address of Dealer | Details of Articles Sold |
|---|---|---|
| (1) | K.K. Abdul Kadir, Merchant, Municipal Market, Ernakulam | Weights. |
| (2) | M. Aboobacker, Hardware Merchant, Main Road, Tellicherry. | Weights, Measures, Weighing & Measuring Instruments. |
| (3) | P. Aboobacker Sons, Hardware Merchants, Camp Bazaar, Cannanore. | Weights, Measures, & Weighing Instruments. |
| (4) | Associated Traders Private Ltd., 4, Cullen Road, Alleppey | Weights, Measures, Weighing & Measuring Instruments. |
| (5) | A. P. Balan, Chirakkara, Tellicherry .. .. .. .. | Weights & Measures. |
| (6) | A. Ganapathy Nayak, General Merchant, Court Road, Kasargod. | Weights & Measures. |
| (7) | Haji P. K. Kassim, Hardware Merchant, Robinson Road, Calicut. | Weights. |
| (8) | Haridas Purushothaman & Co., Merchants, 4/6 Bazaar Road, Mattancherry, Cochin. | Weighing Instruments. |
| (9) | A. Janardhana Kini, General Merchant, Kizhakkenada, Haripad P.O., Alleppey Dt. | Weights & Measures. |
| 10) | Joseph Rodrigues & Sons, Metal Merchants, Kasargod | Weights, Measures & Measuring Instruments. |
| 11) | Kerala Traders, Main Road, Near Police Station, Tellicherry | Weights, Measures & Weighing Instruments. |
| 12) | Krishna Genreral Stores, Hardware Merchants, Tirur | Weights. |
| 13) | N. Krishna Kini, Logams Road, Tellicherry .. .. .. | Weights, Measures, Weighing & Measuring Instruments. |
| 14) | C. Kunhamoo & Co., Main Road, Tellicherry .. .. | Weights, Measures & Weighing Instruments. |
| 15) | P. Meera Sahib, Rasheedia Stores, Nedumangaud .. .. | Weights & Measures. |
| 16) | Mooken Devassy Ouseph & Sons, Burmah Shell "A" Agents Mattancherry, Cochin-2. | Weights, Measures, Weighing & Measuring Instruments. |
| 17) | C.V. Murugesan, Mahalakshmi G.S. Tools Stores, Mullackal, Alleppey. | Weights & Measures. |



### Dealers (*Contd.*)

| Serial No. | Name and Address of Dealer | Details of Articles Sold |
|---|---|---|
| (18) | G.S. Pai & Co., Jewellers, Broadway Ernakulam .. .. | Bullion weights. |
| (19) | C.J. Palu & Bros., Chiriankandath, High Road, Trichur | Weights, Measures, Weighing & Measuring Instruments. |
| (20) | K. Ramchandra Krishna Pai & Bros., Hardware & General Merchants, Kottacherry, Kanhangaud. | Weights & Measures. |
| (21) | N. Ramaswamy Achari, Jyothi Jewellery Mart. Broadway, Ernakulam-1. | Bullion Weights. |
| (22) | A. Shihabudeen Kunju, Hardware Merchant, Akbar Stores, Main Road, Kayamjulam. | Weights & Measures. |
| (23) | T.K. Soopy & K. Moosa, Stationery Merchants, Villiappally, Kozhikode Dist. | Weights. |
| (24) | K.N. Sreedharan Nair, T.C. 23/749, Perunthanni, Trivandrum-8. | Weights & Measures. |
| (25) | H. Subraya Nayak, Proprietor, Ramnath Stores Hardware Merchants, Hosdrug P.O., Kanhangaud. | Weights & Measures. |
| (26) | Tholath Ipe Ittoop, Hardware Merchant, Ponnani, Palghat District. | Weights, Measures, Weighing & Measuring Instruments. |
| (27) | Varkey Yohannan & Bros, Merchants, Ittyappara, Ranni, Quilon Dist. | Weights, Measures, Weighing & Measuring Instruments. |
| (28) | K.K. Varughese, Hardware Merchant, Mallappally West, Alleppey Dist. | Weights & Measures. |
| (29) | Vettoor Scales Servicing Co., M.L. Road, Kottayam .. | Weights, Measures & Weighing Instruments. |

### Repairers

| Sl. No. | Name and Address of Repairer | Details of Articles Repaired |
|---|---|---|
| (1) | P. Antony, Balance Repairer, Thengana, Perumpanchi P.O. Changanacherry. | Platform Balances. |
| (2) | Avery Co. of India (P) Ltd., 110, Silk Street, Calicut. | Weighing Instruments and Weights. |
| (3) | Avery Co. of India (P) Ltd., 6/78, Kalvetty Road, Cochin-1 | Weighing Instruments and Weights. |
| (4) | M.S. Damodaran, Manjumal House, Near Pandarachira, Palluruthy P.O. Ernakulam Dt. | Weighing Instruments. |
| (5) | T. P. Gopalan, Metal Works, Prabha Sadanam Paingana Mundakayam. | Weights & Weighing Instruments. |
| (6) | T.M. Hameed, Balance Repairer, Manglavu Parambil, Market, Changanacherry. | Weights, Measures, Weighing & Measuring Instruments. |
| (7) | P.K. Jalaludeen, Thattakattu Thekkethil Veedu, Padanayarkulangara North, Karunagapally. | Weights, Measures, Weighing & Measuring Instruments. |
| (8) | C.P. Janardhanan, Kallil Veedu, Moondalam Moodu, Quilon. | Weights, Measures, Weighing & Measuring Instruments. |
| (9) | G. Raman Achari, Kuttithekkethil, Padanayarkulangara North, Karunagappally. | Weights, Measures, Weighing & Measuring Instruments. |
| (10) | E. Ramon Menon, M.A., (Retd., Professor in physics, Maharajh's College), Eladath House, 70 ft. Road, Ernakulam. | Weighing Instruments. |
| (11) | Scales & Services, 'Sreevilas", New Road Calicut-6 .. .. | Weighing Scales. |
| (12) | Scales & Services, Catholic Syrian Bank Buildings, Market Road, Cochin-2. | Weighing Instruments. |
| (13) | K.P. Varughese, Mill View Estate, Nedumkayom, Punallur | Weights, Measures, Weighing & Measuring Instruments. |
| (14) | N. Vasudevan, Kizhakkekalluvila Veedu, Cherupoika, Karmpumpuzha P. O. Kottarakara. | Weights, Measures, Weighing & Measuring Instruments. |
| (15) | Vetor Scales & Servicing Co., M. L. Road, Kottayam .. | Weights, Measures & Platform Balances. |
| (16) | William Goodacre & Sons Ltd., PB. No. 6, Alleppey .. | Weighing Instruments. |

## PUNJAB (10)

In the July and September 1959, March, May, July, September and November 1960 and March and May 1961 issues of *Metric Measures* lists of Manufacturers, dealers and repairers of Weights and Measures in Punjab State were published. The following is a list of manufacturers, dealers and repairers subsequently licensed by the Government of Punjab under the Punjab Weights and Measures (Enforcement) Act, 1958.

### Manufacturers

| Serial No. | Name and address of Manufacturer | Details of Articles Manufactured |
|---|---|---|
| (1) | R.K. Gupta Metal Works, Bahadurgarh .. .. .. | Cast iron Weights<br>100 g to 50 kg |
| (2) | Parkash Foundry Works & Iron Mills, G.T. Road, Phagwara | Cast Iron Weights<br>100 g to 50 kg |
| (3) | Raj Mechanical Industries, Madhopur, Ludhiana .. .. | Yard Measures. |
| (4) | Raj Industries, G.T. Road, Rajpura .. .. .. .. | Cast Iron Weights<br>100 g to 50 kg |
| (5) | Tulsi Ram Pyare Lal Jain, Guru Nanak Street, Patiala .. | Litre Measures<br>5 litre to 100 ml |

### Dealers

| Serial No. | Name and address of Dealer | Details of Articles Sold |
|---|---|---|
| (1) | Arjan Dass Charanjit Lal, Raman, District Bhatinda .. | Weights, Measures, Weighing and Measuring Instruments. |
| (2) | Attar Singh Gurmukh Singh, G.T. Road, Ludhiana .. | Weights, Measures, Weighing and Measuring Instruments. |
| (3) | Balak Ram Milkhi Ram, Jaitu .. .. .. .. | Weights, Measures, Weighing and Measuring Instruments. |
| (4) | British India Chemical Works, Ambala Cantt. .. .. | Weights, Measures, Beam Scales and Measuring Instruments. |
| (5) | Hans Raj Mangat Rai, Faridkot .. .. .. .. | Weights, Measures, Weighing and Measuring Instruments. |
| (6) | Haryana Foundry Private Ltd., Rohtak .. .. .. | Cast Iron Weights 100 g to 50 kg and Brass weights 10g-50g. |
| (7) | Hoshiar Singh Tara Chand, Bahadurgarh .. .. .. | Weights, Measures, Weighing and Measuring Instruments. |
| (8) | Jagat Singh & Sons, Ambala Cantt. .. .. .. .. | Measures. |
| (9) | Kabli Mal Najran Parshad, Grain Market, Ambala City .. | Weights, Measures, Weighing and Measuring Instruments. |
| (10) | Karnail Singh Saggu, Railway Road, Kokapura .. .. | Weights, Measures, Weighing and Measuring Instruments. |
| (11) | Kesho Ram Deokinandan, Bichla Bazar, Bhiwani .. .. | Weights, Measures, Weighing and Measuring Instruments. |
| (12) | Kirpa Ram Sohana Mal, Railway Road, Kaithal .. .. | Weights, Measures, Beam Scale and Measuring Instruments. |
| (13) | Madan Gopal Kashmiri Lal, Gidarbha .. .. .. | Weights, Measures and Beam Scales. |
| (14) | Mansa Ram Jagan Nath, Rampur Phul Mandi .. .. | Weights, Measures, Weighing and Measuring Instruments. |



### Dealers

| Sl. No. | Name and Address of Dealer | Details of Articles Sold |
|---|---|---|
| (15) | Mohan Lal Brij Lal, Mandi Dabwali .. .. .. .. | Weights, Measures, Weighing and Measuring Instruments. |
| (16) | Mool Chand Bahadur Chand, Iron Merchants, Tarauri .. | Weights, Measures and Beam Scales. |
| (17) | Motu Ram Sadhu Ram, Iron Merchant, Bhiwani .. .. | Weights, Measures, Weighing and Measuring Instruments. |
| (18) | National Metal Works, Ambala Cantt. .. .. | Cast Iron Weights.<br>100 g to 50 kg<br>Brass Weights.<br>10 g to 50 g. |
| (19) | Naurata Ram Mukandi Lal, Iron Merchants, Jakhal Mandi, Hissar. | Weights, Measures, Weighing and Measuring Instruments. |
| (20) | Puran Chand Langa & Brothers, Baijnath Pehru Mal Mehar Chand Kulu. | Weights, Measures and Beam Scales. |
| (21) | Raja Ram Mithan Lal, Malout Mandi .. .. .. | Weights, Measures, Weighing and Measuring Instruments. |
| (22) | Ramji Dass Banarsi Dass, Bernala .. .. .. .. | Weights, Measures, Weighing and Measuring Instruments. |
| (23) | Sangat Singh Roshan Lal, Iron Merchants, Kapurthala .. | Weights, Measures, and Beam Scales. |
| (24) | Sansar Engineering Co., Aliwal Road, Batala .. .. .. | Cast Iron Weights.<br>100 g to 50 g. |
| (25) | Sham Brothers, 5196 Gali Alam Chand, Ambala City .. | Brass weights 10 g to 50 g. |
| (26) | Sh. Ram Parkash Sharma, Utensil Dealer, Batala .. .. | Weights, Measures, and Beam Scales. |
| (27) | Siri Ram Ram Partap Sirsa, Hissar .. .. .. | Weights, Measures, Weighing and Measuring Instruments. |
| (28) | Sis Ram Ram Niwas, Gohana Mandi .. .. .. | Weights, Measures, and Beam Scales. |
| (29) | Sukhoo Ram Hans Raj, Abohar .. .. .. .. | Weights, Measures, Weighing and Measuring Instruments. |
| (30) | Walati Ram Jharu Mal, Mandi Gobindgarh .. .. .. | Weights, Measures, Weighing and Measuring Instruments. |

### Repairers

| Serial No. | Name and Address of Repairer | Details of Articles Repaired |
|---|---|---|
| (1) | Lachhman Dass, Islam Ganj, Ludhiana .. .. .. | Weights, Measures of length and capacity. |
| (2) | Marchu Ram Khajana Ram, Hata Beni Parshad, Kalka, Distt. Ambala. | Weights. |
| (3) | Sagan Lal Sethi, Mistri, Abohar .. .. .. .. | Weights, Measures of length and capacity. |

## TRIPURA (4)

In the March and November 1960, and March 1961 issues of *Matric Measures* lists of licensed dealers of Weights and Measures in the Union Territory of Tripura were published. The list of dealers appearing therein are obsolete as the validity of all

licenses issued during the year 1960-61 expired on 31-3-61. The following are the lists of Manufacturers, dealers and repairers licensed during the current financial year.

## Manufacturer

| Serial No. | Name and Address of Manufacturer | Details of Articles manufactured |
|---|---|---|
| (1) | Sri Was Dev, Prop. National Mechanical Works, Kashaari Patti, Agartala. | Weights and Capacity Measures, |

## Dealers

| Serial No. | Name and Address of Dealer | Details of Articles Sold |
|---|---|---|
| (1) | Das Gupta & Sons, Mogra Road, Agartala .. .. | Weights, Measures, Weighing and Measuring Instruments. |
| (2) | Kamal Stores Supply, Sakuntala Road, Agartala .. .. | Weights. |
| (3) | Paresh Ch. Kar & Co., Central Road, Agartala .. .. | Weights, Measures, Weighing and Measuring Instruments. |
| (4) | Parimal Aluminium Stores, Mogra Road, Agartala .. | Weights, Measures, Weighing and Measuring Instruments. |
| (5) | Tripura Central Marketing Cooperative Society Ltd., Mogra Road, Agartala. | Weights, Measures, Weighing and Measuring Instruments. |

## ADDENDUM

In the Vol. 3, November 1960 (No. 5) issue of *Metric Measures* on page 35 under Dealers of Maharashtra State, please add the following as: item 163A,

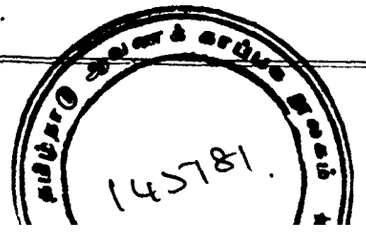
| | |
|---|---|
| Saran & Co., Liberty Building, Residency Rd., Sadar, Nagpur-1. | Weights, Measures and Scales. |

JL
X:5e m2,

## CORRECTION

In the Vol. 3, No. 6—November issue of *Metric Measures* under Maharashtra State, on page 31 :

For the item (49), Gourhar Soni etc., please read Gourkar & Sons, Wani, Dist. Yeotmal.




**Conversion Table : Liquid seer to Litre**
**Conversion factor used:—1 L. Seer = ·937 litres**

| L. Seer | Litres | Millilitres (to nearest ml |
|---|---|---|
| 1/64 | — | 15 |
| 1/32 | — | 29 |
| 1/16 | — | 59 |
| 1/8 | — | 117 |
| 1/4 | — | 234 |
| 1/2 | — | 469 |
| | | (to nearest 10 ml) |
| 1 | — | 940 |
| 2 | 1 | 870 |
| 3 | 2 | 810 |
| 4 | 3 | 750 |
| 5 | 4 | 690 |
| 6 | 5 | 620 |
| 7 | 6 | 560 |
| 8 | 7 | 500 |
| 9 | 8 | 430 |
| 10 | 9 | 370 |
| 20 | 18 | 740 |
| 30 | 28 | 110 |
| 40 | 37 | 480 |
| | (to nearest litre) | |
| 50 | 47 | |
| 60 | 56 | |
| 70 | 66 | |
| 80 | 75 | |
| 90 | 84 | |
| 100 | 94 | |

| Litres | L. Seer | Tolas (to neare 5 tola) |
|---|---|---|
| 1 | 1 | 5 |
| 2 | 2 | 10 |
| 3 | 3 | 15 |
| 4 | 4 | 20 |
| 5 | 5 | 25 |
| 6 | 6 | 30 |
| 7 | 7 | 40 |
| 8 | 8 | 45 |
| 9 | 9 | 50 |
| 10 | 10 | 55 |

| Litres | L. Seer | Tolas (to neare 5 tola) |
|---|---|---|
| 20 | 21 | 30 |
| 30 | 32 | — |
| 40 | 42 | 50 |
| 50 | 53 | 30 |
| 60 | 64 | — |
| 70 | 74 | 60 |
| 80 | 85 | 30 |
| 90 | 96 | — |
| 100 | 106 | 60 |

**Conversion Table : Litre to Liquid Seer**
**Conversion factor : 1 litre = 1·067 liquid seer**

| Millilitres | L. Seer | Tolas (to nearest tola) |
|---|---|---|
| 10 | — | 1 |
| 20 | — | 2 |
| 30 | — | 3 |
| 40 | — | 3 |
| 50 | — | 4 |
| 60 | — | 5 |
| 70 | — | 6 |
| 80 | — | 7 |
| 90 | — | 8 |
| 100 | — | 9 |

| Millilitres | L. Seer | Tolas (to nearest tola ) |
|---|---|---|
| 200 | — | 17 |
| 300 | — | 26 |
| 400 | — | 34 |
| 500 | — | 43 |
| 600 | — | 51 |
| 700 | — | 60 |
| 800 | — | 68 |
| 900 | — | 77 |
| 1000 | 1 | 5 |

# WINNER OF Rs. 7,500 PRIZE

*Shri Laxmi Narain of Teliwara, Delhi won the first prize of Rs. 7,500 on a Prize Bond of Rs. 5 in the second draw held on 1st December, 1960.*

Buy Government of India Prize Bonds and take YOUR CHANCE TO WIN A PRIZE. Your principal will be returned intact on 1st April, 1965.

## GOVERNMENT OF INDIA

# PRIZE BONDS 1965

**Bonds sold up to 30th June, 1961 will participate in the draw due on 1st September, 1961 and every quarter thereafter until 1st March, 1965.**

## *NATIONAL SAVINGS ORGANIZATION*

DA 61/35

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