

metric measures

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1

TABLE A

(Factor used : 1 kg.—1·0717 seers)

Ruppes per seer to Ruppes per kg

[illegible]

TABLE B

(Factor used : 1 kg—1.0717 seers)

Naye Paise per seer to Naye Paise per kg

[illegible]

P. 719

metric measures

(JOURNAL OF WEIGHTS AND MEASURES)
STANDING METRIC COMMITTEE
MINISTRY OF COMMERCE AND INDUSTRY

Vol. 3 JANUARY 1960 (PAUSA 1881) No. 1

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Cover design by R. Sarangan

Annual Subscription Rs. 2.00

Single Copy 40 nP

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N 60-3

METRIC MEASURES is published every two months.

METRIC MEASURES provides information to the general public on the administrative, commercial, educational, industrial, historical and other aspects of weights and measures, with particular reference to the introduction of the metric system in India.

Contributions for publication should be sent to the Editor, METRIC MEASURES, Standing Metric Committee, Ministry of Commerce & Industry, Udyog Bhavan, New Delhi.

Enquiries regarding subscriptions and supply of copies should be addressed to the Business Manager, Publications Division, Ministry of Information and Broadcasting, Old Secretariat, Delhi-8.

Articles published in the Journal may be reproduced. Credit line should read: METRIC MEASURES.

The opinions expressed by authors are not necessarily those of the Government.

My Experiences in Enforcement of Weights & Measures

H. L. MEHANDRU

Controller of Weights and Measures,
Delhi

EXPERIENCE is a word that usually receives mixed reception: the agreeable part is recalled and cherished with delight, the bitter part remembered with distaste. The emphasis put on the cheerful often throws into the background the unpalatable, jeopardizing thereby a balanced view. This is one of the dangers lurking in the recital of one's experiences. Even then it is worth the trouble because the future takes shape out of the past and the present.

We may then consider the experiences right from the creation of the Weights and Measures Organization in Delhi, through its evolution, growth and development to its present size.

Early Conditions

Fraudulent practices, dishonest dealings, clever tricks and subterfuges and subtle manoeuvrings with weights and measures and weighing and measuring instruments were very common in Delhi prior to 1952 or so. As in other States of India the multiplicity and complexity of the systems of weights and measures made confusion worse confounded and profitable to the dishonest traders. To mention only a few instances of malpractices, it has since been found by the Weights and Measures Organization that

certain bullion tola weights bearing the denomination of 20 tolas actually weighed 25 tolas. It is evident that such weights were kept by the traders for making purchases from the rustics and ignorant villagers.

Petrol dealers tampered with the adjusting mechanism of the pumps to effect short deliveries to the extent of 4 to 6 oz of petrol per gallon. Wooden beams having unequal arms or having pans of unequal weights were palmed off on the public. There had been instances when magnet pieces were placed beneath the iron goods pans of the beam scales to effect short weight. The cutting of the wooden beams at one corner, cording of the beams horizontally on one side and vertically on the other, hollowing the wooden beam on one side and filling it with lead on the other were other glaring but constantly practiced devices. Grooves in the bearings of large size beam scales were also detected. Removeable parts of platform weighing machines and also their loose weights were used by the traders to their own advantage. And the indifferent readings of weights recorded by the none-too-dependable person weighing machines made many a man fly to his physician. In fact, those were the days of a son receiving a lecture from



Fig. 1—A Collection of Seized Weights and Measures. These were used for Deceiving the Public by Giving Short Weight or Measures.

his father; a husband submitting to the admonition of his wife for having failed to 'forearm' himself against deceits of the traders, though 'forewarned' by the clever wife.

It may be interesting to examine the extent to which short and fraudulent weights and scales were found in the markets and the malpractices on the part of the traders detected. The following statement shows the shortages in certain cases:

Sl. No.	Type of Weight or Measure	Deficiency	Percentage of Shortage
Cast Iron Weights			
(1)	5 seers	14 oz	8.75
(2)	2½ seers	8 oz	10
(3)	20 seers (stone weight)	2 seers	10
(4)	½ seer	1/2 oz	3
(5)	¼ seer	½ oz & ½ dram	7
Bullion Tola Weights			
(6)	5 tolas	15 grains	1.6
(7)	4 tolas	10 grains	1.4
(8)	3 tolas	7 1/2 grains	1.4
(9)	40 tolas	78 grains	1.0
Milk measures			
(10)	½ seer	1 oz & ½ dram	25

MY EXPERIENCES IN ENFORCEMENT OF WEIGHTS & MEASURES



Fig. 2—A Beam Scale which is Balanced with 2 Seers Weight in One Pan and 1 1/2 Seers in the Other. Another Instance of Giving Short Weight.

in an accurate condition, besides guaranteeing that their nature and construction do not provide an opportunity for fraud by the user.

In short, the ultimate objective was to evolve order out of chaos.

Steps for Enforcement

For the enforcement of the Act in Delhi, it was necessary to have properly trained staff. I was deputed late in 1949 for training to Bombay where the Bombay Weights and Measures Act had been in force since 1935 and considerable experience of enforcement gathered. Soon after my return the necessary Rules were framed under the Orissa Weights and Measures Act, 1943, and promulgated by the Delhi Administration in September 1952. These Rules had been drafted in such a way that they were easy to understand, easy to apply and commensurate with the 'climate' of Delhi. The necessary laboratory equipment was subsequently set up and stamping work was undertaken from 15 April 1953 with the help of one Inspector and two Sub-Inspectors and a few hands in the Office.

The Organization had under its purview 22,000 shops covering the following areas :

- (1) Areas within the jurisdiction of Delhi Municipal Committee, Delhi.
- (2) Areas within the jurisdiction of New Delhi Municipal Committee, New Delhi.
- (3) Areas within the jurisdiction of Notified Area Committee, Fort, Delhi.
- (4) Areas within the jurisdiction of Delhi Municipal Committee, Civil Lines, Delhi.

The completion of the census work in respect of these 22,000 shops, as also factories under the Factories Act 1948, Railways within the meaning of Indian Railways Act, 1890, Municipal Posts and petrol companies using weights and measures and weighing and measuring instruments for trade purposes was an arduous task and required considerable persuasion, patience, pains and perseverance on the part of the staff, particularly

Creation of Weights and Measures Organization

The situation, evidently, was riddled with plenty of abuses and their remedy lay only in the creation of a Government Weights and Measures Organization. This actually came into existence in 1952, although the Orissa Weights and Measures Act, 1943, with modifications, was extended to Delhi in 1949.

The underlying principles of the Act were:

- (1) To ensure transactions in trade in terms of uniform weights and measures and to inculcate and foster the use of standard weights and scales.
- (2) To eradicate the unscrupulous use of short and fraudulent weights, measures, scales etc. and to ensure the public a fair deal when purchasing or selling by weight or measure.
- (3) To provide control over all weighing and measuring equipment in use for trade so as to ensure that these conform to the standards and are kept

when we keep in mind the suspicion lurking in the minds of the people. The work, however, made the traders conscious that the time had come for them to wean themselves away from old ways of thinking and action.

In order to cultivate and give an impetus to industries in Delhi and to create self sufficiency, it was considered desirable to register only local manufacturers, repairers and dealers in weights and measures. After scrutiny of cases, as many as 117 dealers, 30 manufacturers, and 17 repairers in weights and measures were registered.

Difficulties and Solutions

To start with, the staff employed for verification and stamping of weights and measures was inadequate and the stamping work suffered. This provided an opportunity to the manufacturers to exploit the public by raising the prices of stamped weights and measures. Due to the abnormal rise of prices, the Organization experienced heavy weather as the public was reluctant to purchase weights and measures at the higher prices. As there was no statutory provision in the Act for the fixation of prices, the only course left was to open negotiations with the manufacturers and dealers. Through a series of meetings with the manufacturers and dealers, and after working out the break-up of cost of production, the prices were brought down to a reasonable level, allowing 6.25 percent profit to the manufacturers and the same percentage to the dealers.

Another difficulty was that the manufacturers of yard measures, finding no scope in the manufacture of these measures, curtailed the production. They were subsequently assisted by granting quotas of iron squares for the manufacture of yard measures with a view to compensate them against the rising price of iron and steel in the market.

Persistent but sympathetic and dispassionate espousal of the cause disarmed the people of their prejudices and predilections. The inevitable result was that the work in the laboratory became too heavy and the inadequacy of resources in man and material was evident and subsequently two sub-offices were opened to meet the growing demands of the local trade.

Modifications and Improvements

It may be useful to record the modifications and improvements introduced. While the Delhi Weights and Measures Rules, 1952, were being framed for the implementation of the Orissa Weights and Measures Act, 1943, the people were informed about the various ways and means used by traders to dupe the public by giving short weight. The provisions made in the Rules to eliminate these practices were fully explained to the public. For instance, to facilitate differentiation between weights of smaller denomination, weights under 1/4 lb and 1/8 seer were required to be made of brass while weights above these were to be made of cast iron. All weights in the seer-series were to be circular in shape and all weights in the pound series were to be square. As flat, circular and knobbed rati weights could not be manufactured according to specifications, flat and square rati weights were permitted to be manufactured. For the convenience of cloth dealers who complained of inconvenience experienced in the use of yard measures graduated in inches—accustomed as they were to use the yard measures graduated in girahs—the manufacturers of yard measures were asked to provide cross-marks on the 9th, 18th and 27th inch which corresponded with the existing 4th, 8th and 12th girahs. This satisfied the traders in the beginning and with the passage of time they got familiar with the use of yard measures with inches.

Another modification was the introduction of milk measures with long horizontal handles affixed to their walls for measuring out hot and boiling milk. Further, to facilitate quicker and larger delivery of milk by the milkmen to the 'halwais' and milk depots, milk measures of standard specification and larger capacities ranging from 5 seers to 20 seers were introduced.

It may be worthwhile to mention here a peculiar problem which at length proved to be a storm in the tea cup. Large quantities of milk are supplied from milk dairies to milk depots after weighing on machines calibrated in the units of mass but distributed at the milk depots by volume. As the specifications for capacity measures used for milk and similar liquids were laid down in terms of air-free distilled water as the standard liquid, the previously weighed milk when measured in terms of volume actually came out to be less. To illustrate, 40 seers (by weight) of milk weighed at the dairy actually measured about 39 seers in terms of volume at the retailer's end. A hue and cry was raised that the milk measures prescribed by the Government were bigger in size. This was understandable, for few people knew that this variation arose due to the difference in the specific gravities of milk and water, milk being heavier. Accordingly, on the basis of experiments and analysis, *the weighing machines were calibrated in terms of volume*. The milk dairies had to weigh 41 seers of milk to be distributed as 40 seers of milk in terms of volume, thus avoiding loss to the retailers.

Paint and varnish dealers were advised to take up the use of Imperial standard gallon measure in place of the O.M. gallon. Local packers were asked to see that their packings contained net quantities as indicated on the labels. They were also instructed to write the word 'fluid' in the case of

liquid commodities when these were intended to be given by volume so that the distinction between weight and volume would be clear to the intending purchaser.

The use of wooden beam scales was totally prohibited and iron beams having an indicator in the centre were introduced. The beam scales were divided into four different classes, depending upon the use to which they were put. The complaint of the fruit and vegetable wholesale dealers and traders that the pointed indicators of the beam scales pricked their hands was genuine and was promptly attended to by requiring the manufacture of beams with rounded indicators.

The enforcement of the Act created good will in our foreign trade also. As a result of a number of complaints received from Afghan traders that the kirana merchants in Delhi realized 43 to 44 seers of dry-fruits to a maund from them, the Act was amended to provide legal action against a person demanding or causing to be demanded an excess quantity of commodity than purported.

Functions of the 'Eyes and Ears'

Here a short account of the Inspectors duties in the laboratory and the field may not be out of place. Under the statutory obligations of the Act, all weights, measures weighing and measuring instruments used by the local traders require verification and stamping at least once in every two years and those used by the factories registered under the Factories Act, 1948, have to be verified and stamped at least once in every twelve months. The period of verification and stamping under the Act helps in making up the losses and defects in weights and measures that may accrue due to wear and tear in the normal course of business.



Fig. 3—The Author Verifying A Commercial Weight Against a Working Standard Weight in the Laboratory.

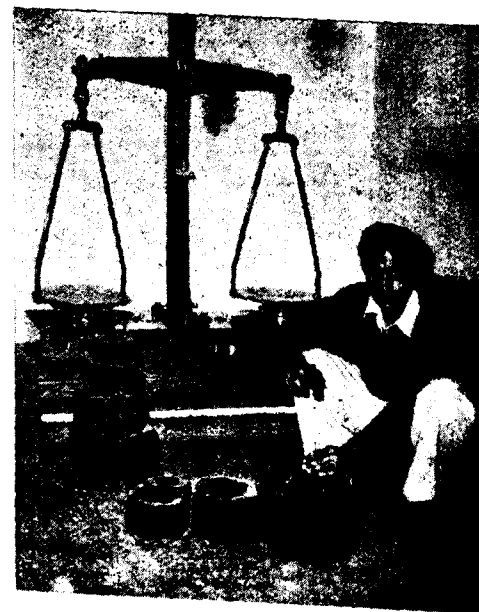


Fig. 4—The Stamping of Verified Commercial Weights.

In the laboratory, the work is planned on scientific and systematic lines. A specific number of registered manufacturers and repairers are under the charge of an Inspector or Sub-Inspector who is responsible for testing, verification and stamping of the goods brought by the manufacturers and repairers in response to traders' requirements necessitated by the advance notices served on them by the Inspectors. Each repairer or manufacturer gets two turns in a week so as to ensure him a sound and speedy delivery and disposal of his goods, and avoiding undue hardship to him as well as to his customers. Weighing machines, such as weighbridges, platform machines, dead-weight machines etc., are verified and stamped *in situ*. Work of testing petrol pumps and oil-filling machines and calibration of oil tanks and lorries is also carried out *in situ* by the Inspector or Sub-Inspector concerned. The returns of the verification and stamping work done by the Inspectors are submitted every week.

The Inspector or Sub-Inspector carries out day-to-day checking in his respective sub-zone (each sub-zone consists of about 3,000 shops) and maintains as much personal contact with and concern about the traders' difficulties, grievances, lapses and omissions as possible. 'Eyes and ears' as they are of this Organization, the Inspectors and Sub-Inspectors maintain a daily diary recording their day-to-day work and observations. The Inspector or Sub-Inspector, whenever he is assigned a sub-zone, is provided with a list of prosecution cases made out in that particular zone during the previous 3 or 4 years. This list acts as a guide for him to mould his approach into moderation towards those who are not habitual offenders and severity towards those who develop a habit of indulging in deceit and dishonesty and wilful omissions.

Frequent raids by a number of Inspectors are organized in different areas to detect infringements of the Act and the Rules. The raids are almost in the nature of miniature blitzkriegs: a particular area is covered

by 4 or 5 Inspectors, each occupying a strategic position and each swooping down upon the offenders at a mutually agreed fixed time. It may be observed here that the continuous use of unstamped and unauthorized weights and scales by hawkers and squatters necessitated all the more the organization of such raids, because by no other means could it be implanted effectively in their minds that to deliver short by weight or measure is a crime and a social evil.

Metric System and Steps Towards its Adoption

The advent of the metric system brought in its wake a general invigoration of the Weights and Measures Organization, besides solving a multitude of problems created by the existence of too many systems of weights and measures. As a logical conclusion the Rajasthan Weights and Measures (Enforcement) Act, 1958, prescribing the metric system, was introduced in the Union Territory of Delhi and the Delhi Weights and Measures Rules, 1959, were framed under this Act.

As many as 9 licences to manufacturers, 17 to repairers and 54 to dealers have been issued under the above Act. Verification and stamping of metric weights and weighing instruments have also been taken in hand and steady progress maintained. Since the enforcement of the Act, the number of metric weights and weighing instruments verified has been on a rapid increase, and the demand for them in the market is also growing day by day.

The United Chamber of Trade Associations, Delhi have been contacted and the representatives of different Trade Associations have been requested to make the best use of the transition period, as a hurried change-over towards the end of the transition period would create confusion and difficulty in day-to-day transactions. The members of

the Chamber desired that the adjoining districts of Alwar, Rohtak, Bulandshehr and Karnal should also go metric, so that the traders engaged in the distribution trade may not have any difficulty in carrying out transactions in these places. The Government of India have been accordingly requested to take necessary measures. It is expected that this demand would be met with in April 1960 when it is intended to introduce metric weights all over the country.

In order to prepare the public for the change-over and to educate them in the new reform, a Metric Publicity Week and Seminar were organized in September 1958 by the Metric Publicity Committee. A detailed account of these has already appeared in *Metric Measures* (November 1958).

As a result of the Seminar and group meetings of Trade Associations, the traders have begun to appreciate that the new system is simpler and easier and initial difficulties would be overcome in the course of time through practical experience. In order to maintain the tempo created by the Metric Publicity Week and Seminar, demonstration sets of weights, visual publicity charts and conversion tables have been supplied to various Trade Associations for display at conspicuous sites.

The Individual Approach

What constitutes the best individual psychological approach to the education and publicity for the metric system depends upon the Inspector or Sub-Inspector and the intuitive or acquired understanding of human nature he brings to that approach. A liberal disposition and an amicable temperament, besides the courage and determination to act, are the essence of any approach.

It is a patent fact that traders are usually not interested and are unmoved by noble

talk and so-called academic 'diversions' of the men in charge of publicity and education. To strike a responsive chord, a personal touch is needed—the 'sensitive barometers' should elaborate on what the traders need and want, interspersed with particular instances, rather than giving a general dissertation which may include the history of the metric system. Nor should the talk smack of pedantism. It should rather be in the spirit: 'Man must be taught as if you taught him not, and things unknown proposed as things forgot'. Equally good is the need of methods of commonsense. There is no reason why one should talk of the 50 kilogram weight while addressing bullion merchants or of denominations below 100 grams while instructing wholesale vegetable dealers or coal dealers.

Thus the personality of the individual carries some 'weight' in the successful implementation of any programme. 'How' you implement is as significant as 'what' you implement, i.e. how best to make people law-abiding and prevail upon them to accept and assimilate the new concept.

Whatever the situation, a sense of pro-

portion and poise has always to be maintained. Any impulsive action definitely alienates and scares people. A little thought, a sympathetic view, a genuine understanding of the other person's attitudes, problems and difficulties go a long way in soothing tempers. There are some situations that can be easily managed by ready wit and humour, as for example:

To escape prosecution, a trader tried to overwhelm me with hospitality bordering on cheap flattery. Every few minutes he assured me rather artfully that the hospitality was not for the authority I represented but was just a token of the respect of one human being for another. I pointed to a man passing that way and said, good-humouredly, "I admire your spirit. Would you not like to serve a bit of this token to that man? After all, he is also a human being."

The trader was disarmed of his clever trickery.

To sum up: Firm, but balanced, mature and benevolent and not arrogant, callow and malevolent should be the keynote of every approach; it should be constructive and corrective.



Universal Yarn Numbering System

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THE systems employed at present for expressing fineness of yarn are numerous as can be seen from the list recorded in Appendices A and B. These could be broadly classified into two groups: (1) indirect systems and (2) direct systems. In the former, the unit is expressed as the length of the material per specified weight. For example, the cotton count is the number of hanks, each 840 yards, in one pound of the yarn. In this system the larger number would represent a finer material. On the other hand, in the direct system, the fineness is measured by the weight of the material of a specified length. Hence a larger figure would correspond to a coarser material. An example of this is the 'denier' (weight in g of 9 000 metres) employed for silk and man-made fibres.

The systems falling under the indirect category are given in Appendix A and those under the direct category in Appendix B. It will be noted from the tables given there that for the same material different countries have adopted different units of measurement. Sometimes, even within the same country different units exist for the same commodity. Occasionally both the indirect and direct systems are used for the same purpose. Further, the units employed for yarns are entirely different from those used

for fibres. Thus, there exists a great deal of confusion, and comparison becomes extremely difficult, if not impossible.

Necessity of a Universal System

In order to overcome the confusion of having different systems, it is necessary to have a common system which could be employed for all types of fibres and yarns alike. It should be simple and scientific. Taking all these facts into consideration the Textile Technical Committee of the International Organization for Standardization (ISO) agreed to have a universal numbering system for textile materials which should be direct, decimal and based on metric units. Later on, it was resolved to express the fineness (or linear density) of a yarn, regardless of the fibre used, in terms of a new unit (named *tex*) which is the weight in grams of a kilometre of yarn or other material. A thousandth part of this unit (*millitex*) could be used for the purpose of denoting the fineness of extremely fine fibres like cotton, silk etc.

Advantages of the New System

The advantages of employing the *tex* system of numbering textiles are:

(1) The confusion caused by having a bewildering system of units to express the fineness of yarn is avoided by having

one system for all types of textiles. This would also enable one to compare easily yarns manufactured from such diverse fibres as jute and cotton.

(2) The fineness of fibres and yarns could also be easily compared, so that the ratio between the two directly gives the number of fibres per cross-section of the yarn.

(3) The use of the same system for drawing slivers, rovings etc., would clearly show the relationships between the interim processes in the manufacture of yarn than when different systems are used.

(4) It also simplifies calculations required for the manufacture of fancy yarns, the weight of yarn needed for weaving a particular type of cloth etc.

(5) The tenacity of yarns or even fabrics is more easily compared with that of the component fibres or yarns.

(6) It would be easier to carry out calculations in the new system than in any other system which makes use of fractions.

(7) The fineness of fibres or yarns could be easily determined by weighing them directly in an ordinary balance.

Inter-relationships Between Present and Proposed Units

It is likely that most of the countries in the world would be changing over to the new universal system within a decade or so. India, as it is well-known by now, has adopted the metric system from 1 October 1958. The change-over from the present to the new system would be by stages during which time the public will gradually assimilate the new units. It is, therefore, essential to know how the measures of fineness employed at present are related to the tex values. Further as a

consequence of this change in the system of numbering yarns, there would be changes in the expressions for tenacity and the twist factors of the yarn also; and similar inter-relationships have to be worked out in their cases as well.

To be brief, this article deals with only three characteristics: fineness or linear density, tenacity and twist factor. For the same reason, only the terms used in the case of cotton will be dealt with here. This topic is treated in greater detail in one of the Bulletins (Series B. 67) issued by the Technological Laboratory at Matunga, Bombay.

(1) Fineness or Linear Density

This property is indicated by the English cotton count (usually abbreviated to count) for cotton which has already been defined. The tex number (t) is related to this measure in the following manner:

$$t = \frac{590.5}{C} \dots\dots\dots (1)$$

Thus the tex number of a yarn is obtained by dividing 590.5 by its count. An approximate value could be readily obtained by dividing 600 by the count. It would also be noted that as the value of the count increases, that of tex decreases and vice versa. The usual range of counts (6s to 100s) in the case of cotton yarns is covered by the numbers 100 to 6 in the tex system. It would, of course, take a fairly long time before the workers and the public get accustomed to these new numbers, where the higher values are associated with coarser yarns. In course of time, however, the tex figures would become acceptable and only yarns of certain specified values of tex would be spun. Using the equation (1), Table 1 has been drawn up to give the values of tex corresponding to some values of count.

UNIVERSAL YARN NUMBERING SYSTEM

TABLE 1
VALUES OF TEX CORRESPONDING TO
DIFFERENT VALUES OF COUNT

Counts	Tex	Counts	Tex
6	98.4	30	19.7
8	73.8	32	18.5
10	59.1	34	17.4
12	49.2	36	16.4
14	42.2	38	15.5
16	36.9	40	14.8
18	32.8	44	13.4
20	29.5	50	11.8
22	26.8	60	9.8
24	24.6	80	7.4
26	22.7	100	5.9
28	21.1	—	—

(2) Tenacity

The real or intrinsic strength of a material cannot be judged merely on the basis of its breaking strength alone. Some kind of allowance has to be made for its cross-sectional area. It is for this reason that in engineering practice, the strength of a material is always expressed in terms of weight per unit area such as lb/sq. in or kg/mm². As it is very difficult to determine the cross-sectional area of textile fibres or yarns, the linear density or (1/length per unit weight) is used instead. Therefore, the expression for tenacity assumes either of the forms: (strength/weight per unit length) or (strength X length per unit weight). The latter is employed at present in the expression 'Count Strength Product (C.S.P.)' as a measure of tenacity for cotton yarn. It is determined by finding what is called the lea strength of the yarn. This is obtained by breaking a lea of 120 yards of yarn, consisting of 80 continuous loops, each of a girth of

54 in. on a lea tester. The lea strength recorded in pounds multiplied by the count of the yarn gives Count Strength Product (C.S.P.).

It is proposed in the new system that the metric skein strength should be determined by breaking a skein of 100 metres consisting of continuous 100 loops, each a metre in girth. The breaking strength recorded in grams divided by the tex number of the yarn gives the yarn-strength index as defined at the Technological Laboratory. In a recent investigation carried out here comparative tests were made by both these methods stated above and the results have been published in the September 1959 issue of the *Indian Cotton Growing Review*.

The important points are summarized below:

(i) A new Yarn-Strength Index (Y.S.I.) has been defined as the breaking strength in grams of a metric skein of yarn consisting of 100 loops, each one metre in length, divided by the tex number of the single yarn. The Yarn-Strength Index divided by 200, gives the tenacity in grams per tex.

(ii) The value obtained for the Yarn-Strength Index has been found, for all practical purposes, to be numerically equal to the Count Strength Product of the same material, determined by the present procedure.

(iii) The coincidence is very helpful for easy change-over from the present system to the metric system. It is, therefore, recommended that the Indian Standards Institution and the International Organization for Standardization may consider this index and advocate it for universal adoption.

(iv) Even though the agreement between the Index and Count Strength Product is

close, where greater accuracy is needed certain correction factors have to be applied. The values of the Yarn-Strength Index equivalent to some values of Count Strength Product based on this investigation will be found in Table 2 which have been worked out from the regression equation :

$$(\text{Yarn Strength Index}) = 0.9352 (\text{Count Strength Product}) + 137.09 \dots \dots \dots (II)$$

TABLE 2

THE VALUES OF YARN STRENGTH INDEX (AND GRAMS PER TEX) EQUIVALENT TO THE VARIOUS VALUES OF COUNT STRENGTH PRODUCT BASED ON THE INVESTIGATION CARRIED OUT AT THE TECHNOLOGICAL LABORATORY

Count-Strength Product (Strength Index of the Lea is given in lb.) of the Lea	Yarn-Strength Index of the Metric Skein in Terms of g/tex (Y.S.I.)	Tenacity of the Metric Skein in Terms of g/tex
1000	1072	5.36
1100	1166	5.83
1200	1295	6.30
1300	1353	6.76
1400	1446	7.23
1500	1540	7.70
1600	1633	8.17
1700	1727	8.63
1800	1820	9.10
1900	1914	9.57
2000	2007	10.04
2100	2101	10.51
2200	2195	10.97

(3) Twist Multiplier (or Twist Factor)

It is well-known that twist has to be inserted in a yarn to give it the required strength. The amount of twist is generally regulated according to the purpose which the yarn is expected to serve. In the case of cotton yarns, generally speaking, the greater the number of twists per unit length, the higher will be the strength up to a certain limit, beyond which the strength diminishes with the increase in twist. At present, the

amount of twist is technically assessed by the number of turns per inch (T.P.I.). The required number of turns is determined by employing what is known as the twist multiplier (T.M.), which is equivalent to T.P.I. $\sqrt{C}$, i.e. $T.P.I. = T.M. \sqrt{C}$ where 'C' is the count spun. For the same purpose in the new system, the twist factor (T.F.) is used. This is given by the expression:

$$\text{Turns per mm (T.P.M.)} \times \sqrt{\text{tex}} \text{ i.e. } T.P.M. = \frac{T.F.}{\sqrt{\text{tex}}}$$

It could be proved that:

$$T.F. = 0.9567 T.M. \dots \dots \dots (III)$$

The values of T.F. corresponding to the usual values of T. M. are given in Table 3.

TABLE 3

THE VALUES OF THE TWIST FACTORS (T.F.) CORRESPONDING TO THE NORMAL VALUES OF THE TWIST MULTIPLIERS (T.M.)

T. M.	T. F.
3½	3.11
3½	3.35
3½	3.59
4	3.83
4½	4.07
4½	4.31
4½	4.54
5	4.78
5½	5.02
5½	5.26

Why Introduction of New System should be Smooth

From the foregoing it will be noted that in the new universal yarn numbering system, the Count (C), the Count Strength Product (C.S.P.) and the Twist Multiplier (T.M.) will be replaced by the tex (t), Yarn Strength Index (Y.S.I.) and the Twist Factor (T. F.) respectively. Since

$$t = \frac{600}{C}, \text{ C.S.P.} = \text{Y.S.I. and } T.M. = T.F. \text{ Second Stage}$$

approximately, the relationships between the new and the old measures are very simple. Consequently, the introduction of the tex system could be very smooth indeed. Further, it will be rendered even more smooth by the proposal of introducing the new system only by stages, each stage covering an appreciable length of time to make the change introduced familiar to all. The stages might be something like the following :

First Stage

The use of the existing count system should be continued but in all cases of quotation, order, manufacture, delivery etc., the new tex value, inserted in brackets, should be given after the value for the count : e.g. 30's counts (19.7 tex).

The manufacture should be changed over to the new numbering system, tex, and the equivalent count value should be given in brackets : e.g. 48 tex (12.3 counts).

Third Stage

Only the tex value should be retained and the count shown in brackets should be dropped : e.g. 48 tex (12.3 counts) should become 48 tex.

In view of the intrinsic advantages of the new system, already enumerated, and in view of its contemplated introduction in a number of easy stages, it is hoped that the Indian industry will adopt the new system as early as possible. There is practically no difficulty to make a start with the first stage immediately.

APPENDIX A

Yarn Numbering Systems

LENGTH PER UNIT WEIGHT SYSTEMS (INDIRECT)

Sl. No. (1)	Name of System (2)	Applied to (3)	Unit of Existing Yarn Number			Remarks (7)
			English (4)	Metric (5)	Others (6)	
(1)	English Cotton (British)	Cotton	840 yd/lb			
(2)		Cotton (Bump yarn)	yd $\left(\frac{16 \text{ yd}}{\text{lb}} \right)$ oz			
(3)	French No. (Continental)	Cotton		km 0.5 kg		This unit is about 0.85 cotton count.
(4)	Catalonian (Cotton)	Cotton			500 canas 1 libra cal	This unit is about 1.04 counts (cotton).
(5)	English Linen	Linen (Wet Spun) Hemp Ramie Silk Noils	300 yd/lb			

APPENDIX A—(contd.)

(1)	(2)	(3)	(4)	(5)	(6)	(7)
(6) Silk Count		Silk	1000 yd/lb			For spun silk and spun rayon staple, English cotton system is used.
7) Silk Ounce		Rew Silk	1000 yd/lb			
(8) Yorkshire Ounce		Thrown Silk	$\frac{\text{yd}}{\text{oz}} \left(\frac{16 \text{ yd}}{\text{lb}} \right)$			For silk noils, English linen system is used.
9) Alloa		Wool	$\frac{11520 \text{ yd}}{24 \text{ lbs}} \left(\frac{480 \text{ yd}}{\text{lb}} \right)$			
0) American Cut		Wool	300 yd/lb			
(11) American Wool Number (American Run)		Wool	$\frac{100 \text{ yd}}{\text{oz}} \left(\frac{1600 \text{ yd}}{\text{lb}} \right)$			
(12) Dewsbury		Wool	yd/oz (16 yd/lb)			
(13) Galashielt		Wool	$\frac{300 \text{ yd}}{24 \text{ oz}} \left(\frac{200 \text{ yd}}{\text{lb}} \right)$			
(14) Hawick		Wool	$\frac{300 \text{ yd}}{26 \text{ oz}} \left(\frac{185 \text{ yd}}{\text{lb}} \right)$			
(15) Irish		Wool	$\frac{\text{yd}}{.25 \text{ oz}} \left(\frac{64 \text{ yd}}{\text{lb}} \right)$			
(16) Typp		Wool	1000 yd/lb			
(17) Western England		Wool	320 yd/lb			
(18) Woollen Yarn Count		Wool	$\frac{\text{yd}}{.5 \text{ oz}} \left(\frac{32 \text{ yd}}{\text{lb}} \right)$			
(19) Yorkshire		Wool	256 yd/lb			
(20) English Worsted		Worsted	560 yd/lb			
(21) American		Asbestos	100 yd/lb			
(22) British		Asbestos	50 yd/lb			
(23) American and British	(U.S.A.)	Glass	100 yd/lb			
(24) Metric		All kinds Except Silk & Man-made Fibres	km/kg			This unit is about 1.7 counts (cotton).
(25) Numero en Puntos						1320 m/1 libra de Alcoy This unit is about 1.65 counts (cotton).

UNIVERSAL YARN NUMBERING SYSTEM

APPENDIX B

Yarn Numbering Systems

WEIGHT PER UNIT LENGTH SYSTEMS (DIRECT)

Sl. No. (1)	Name of System (2)	Applied to (3)	Unit of Existing Yarn Number			Remarks (7)
			English (4)	Metric (5)	Others (6)	
(1) Scottish Titre		Linen (Dry spun)	lb 14400 yds			Jute (grist)
		Hemp Jute				
(2) Denier		Silk		$\frac{.05 \text{ g}}{450} \left(\frac{\text{g}}{9000 \text{ m}} \right)$		Applied also to man-made fibres.
(3) Legal Titre		Silk		$\frac{\text{g}}{1000 \text{ m}}$		Do.
(4) —		Silk	$\frac{\text{dr}}{1000 \text{ yd}} \left(\frac{\text{lb}}{256000 \text{ yd}} \right)$			
(5) Aberdeen		Wool	1b/14400 yd			
(6) American Grain		Wool	grain /20yd			
(7) Catalonic Woollen Yarn Titre		Wool		$\frac{\text{g}}{504 \text{ m}}$		
(8) Halifax (Rural)		Wool	$\frac{\text{dr}/80 \text{ yd}}{20480 \text{ yd}} \left(\frac{\text{lb}}{20480 \text{ yd}} \right)$			
(9) Numero en Cuartos de Onza		—			$\frac{1/4 \text{ onza}}{500 \text{ canas}} \left(\frac{.0933 \text{ g}}{\text{km}} \right)$	
(10) Integral (Canada)		—	grain			
(11) American		—	$\frac{100 \text{ yd grain}}{100 \text{ or } 120 \text{ yd}}$			
(12) Poumar		—	$\frac{\text{lb}}{1,000,000 \text{ yd}}$			
(13) Grex		General		$\frac{\text{g}}{10 \text{ km}}$		
(14) Tex (gk)		General		$\frac{\text{g}}{\text{km}}$		

Conversion to Metric System in Machine Tool Industry

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It is pertinent to ask the question : what does the conversion to the metric system in industry mean ? Is it enough to convert inch dimensions into millimetres and pounds into kilograms and keep the sizes of raw materials, products and tools the same as they were before ? Legally speaking : 'Yes'. The Government of India's decision relates only to the units of measurement and not to the products to be manufactured, nor to the tools to be used. A product can be of any size as long as its dimensions are expressed in millimetres even if they run into a number of decimal places. But the question is whether it is logical and in consonance with the spirit of the Government's decision to do so. The metric system has been adopted for its scientific basis and simplicity. That purpose will be nullified if millimetre dimensions running into several decimal places obtained by conversion of existing round inch values, are used instead of suitable round numbers in millimetres. Therefore, it will be appropriate to change the sizes of the tools and products to round numbers of standard metric dimensions if we have to derive the full advantage of metric system. As such instead of using the dimension

7.9375 mm which is the conversion of 5/16 in, it will be preferable to change the size to 8 mm which is a round as well as a preferred dimension. Before leaving off the discussion of this basic principle, let us consider the arguments put forward against the necessity of changing sizes while changing over to the metric system of measurements :

Interconversion

Argument

Even if sizes are changed to round numbers in millimetres none of their limiting values obtained from allowances and tolerances will be in round number of millimetres. The resolution proposed by the Standing Committee for the Study of Scientific Principles of Standardization (STACO) of the International Organization for Standardization (ISO) and approved by the ISO Council in July 1956 reads as follows :

'Round numbers are of value as a simple means of designing products. In international standardization it is important to adopt such a system of designation that the characteristics of international functional interchangeability are not obscured. In some

cases, however, by making use of round numbers, functionally interchangeable products may be designated by metric values in inch value which are not identical'.

Thus it is possible to express existing round inch dimensions in round mm dimensions by prescribing allowances and tolerances in such a manner that the limiting values remain unchanged i.e. there is no change in the size of the product due to conversion to metric system.

Example

$$(1 + 0.016) \text{ inch} = (25 + 0.4) \text{ mm.}$$

One inch diameter shaft having a tolerance of 0.016 in can be called 25 mm diameter shaft having tolerance of +0.8 mm. By +0.4 mm

doing this the product remains unchanged and the nominal sizes in mm and inch are also in round numbers.

Answer

This principle may be valid for internationally standardized world unitary features but to follow it for all other features will create great confusion. This is because the system of allowances and tolerances will then have to be a special one having a correction factor first, to bring round millimetre dimensions to exact inch equivalent and, secondly, such parts though having nominal metric dimensions will not interchange with parts from metric countries similarly designated. Thereby we shall be having a third standard neither fully agreeing with inch countries nor with other metric countries. Therefore, it will be preferable to change the sizes of the products and tools in conformity with other metric countries while changing over to metric system.

Preferred Numbers

Argument

It is also argued that the present world trend is any way for preferred numbers which are not whole round numbers. (e.g. R. 20 Series : 1, 1.12, 1.25, 1.40, 1.60, 1.80, 2, 2.4, 2.5, 2.80, 3.15, 3.55, 4, 4.5, 5, 5.6, 6.3, 7.10, 8, 9, 10). So why insist on round numbers in mm and what is the harm if non-round mm dimensions as obtained by conversion from round inch sizes are adopted?

Answer

Preferred numbers are more rounded than inch series converted into mm. Secondly, there is also an Ra series which has more rounded values. (e.g. Ra 20 series: 1, 1.1, 1.2, 1.4, 1.6, 1.8, 2.0, 2.2, 2.5, 2.8, 3.0, 3.5, 4, 4.5, 5.0, 5.5, 6, 7, 8, 9, 10).

Steps for Change-over

We may turn to the steps that should be taken to effect the 'metric' change-over. In order to change over completely to the metric system in conformity with the law and spirit of the Government's decision, the following actions will have to be taken :

(1) Preparation of tables and charts of conversion from inch/lb to the metric system, (including formulae) and giving them wide publicity.

(2) Training personnel in the metric system and in the methods to be followed for change-over to it.

(3) To begin with, lay down exact metric equivalents side by side with the in/lb values in the existing specifications.

(4) Start recording measurements in the metric system with the help of conversion tables along with the in/lb measurements as obtained from existing in/lb instruments.

(5) Machine tools designed in the inch system and ready for sale should be fitted

receipt of metric measuring scales and instruments and raw material and tools of proper metric standard) should be completely in metric system suitable for manufacture with the help of metric materials and tooling.

For example see Fig 2.

(10) Machine tools already designed in the inch system should be completely redesigned in the metric system if there are repeat orders.

Import

countries can supply gear train for cutting inch threads.

(8) Procure all the raw materials and tools of metric standard (*i.e.* having nominal dimensions in round mm as used in other metric countries) as early as possible.

(9) All new final stage designs and drawings (*i.e.* those to be executed after the

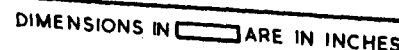


Fig 1

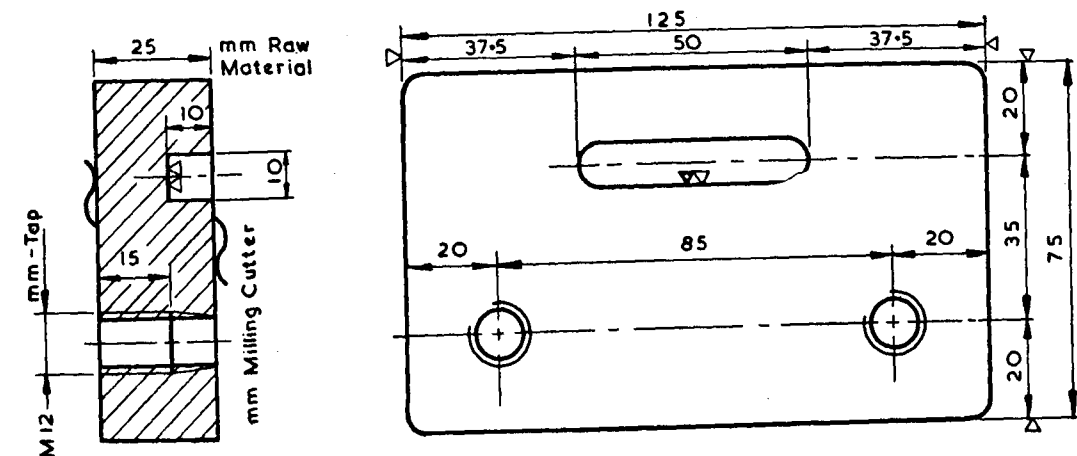


Fig 2

of change gears to cut inch threads as well. This may prove to be foresight as these countries themselves may one day adopt the metric system for its obvious advantages. Even the American Army seems to be thinking of changing over to the metric system.

Of course, if other countries demand that they want machines basically designed in the inch system only and if we are keenly interested in exporting them, then we shall have to produce machines designed in inch system for that purpose.

Maintenance

Manufacture of basically inch designed parts (of course, expressed in exact metric equivalents) will have to continue for some time for the purpose of replacement of parts belonging to existing machinery which is mostly in the inch system and for inch designed machinery which may be imported from inch countries in the near future.

Export

There will be no difficulty in exporting to metric countries machines which are designed in the metric system and are capable of giving metric results. But difficulty may arise while exporting machine-tools to inch countries which happen to be our neighbouring countries and probable customers.

These customers may be advised to buy basically metric designed machines fitted with inch scales and dials and a set

Suggested Action

We may now consider action on the 10 points suggested earlier. There is not much

difficulty in implementing the first five of the ten items as the cost involved will be very small and not really great effort is required to train the personnel in metric system which is so easy to use.

The main difficulty may have to be faced in implementing 6 and 8 on which depend action on items 7, 9 and 10. To implement items 6 and 8, i.e. to procure metric scales and instruments and raw materials and tools of metric standards involves considerable expenditure and may create problems of foreign exchange. Even after overcoming these two hurdles the question of availability

of stores and time required to get them still remains.

Therefore, a complete change-over to the metric system in the machine tool industry is essentially a financial proposition involving foreign exchange and has to be solved at the national level.

If due to the present financial and foreign exchange position in India and the large number of huge projects in hand, it is not possible to allot the necessary foreign exchange for the change-over the completion of this essential reform may take considerably longer than was thought possible earlier.

* * *

Teaching of Metric System in Secondary Schools

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THE present curriculum of mathematics in the Higher Secondary Schools is divided into two parts :

- (1) Core mathematics : Common to all students.
- (2) Additional mathematics : Depending on the individual's choice of the subject.

Core Mathematics

The study of this part is compulsory for all students and it sets the limits of attainment in the subject taking into consideration the social needs of an average boy. The basic knowledge of this branch of mathematics is essential not only to help him to earn his livelihood but also for an intelligent grasp of the life around him. It requires that the child should be properly equipped :

- (1) with computational ability which would help him in his calculations of weights, measures and currency;
- (2) knowledge of those essentials which help him in integrating his intellectual pursuits in the subject with other branches of studies;
- (3) appreciation of the vast mathematical terminology we use in everyday life.

This knowledge is the prerequisite for all boys whether they leave school immediately after the secondary stage or continue their studies further. This is the knowledge which must be imparted to all the students, and the curriculum has to be revised to suit this requirement and make possible more learning in the same period at school. There could be many ways of achieving this. One of them is suggested here.

Present Curriculum and Growing Needs

The present curriculum in mathematics is dominated by fractions in almost all topics in some measure, due to the needs of daily transactions. For example, fractions such as $\frac{1}{2}$, $\frac{1}{3}$, $\frac{1}{5}$, $\frac{1}{8}$, $\frac{1}{12}$, $\frac{1}{16}$, and $\frac{1}{40}$ are necessary for conversions of older types of weights, measures and currency.

Due to this the emphasis is not only on the teaching of above fractions, but cumbersome fractions also enter into the child's education in the belief that : (1) it might facilitate his learning and develop speed and (2) it would enhance the prestige of the subject in cultivating the desired formal discipline.

This practice, however, precluded to a great extent the possibilities of learning in-

tensively as well as extensively certain extremely useful topics like logarithms, approximation by aliquot parts, density, specific gravity, map reading, graphical representations and statistical methods.

Again, the treatment of topics like practice, simple interest and compound interest, profit and loss, percentages is now divided into different compartments with strong barriers of rigid formulae separating each one of them.

It is well-known that considerable time is devoted to fractions right from V standard to the highest form of the high school. Fractions particularly of the large and awkward variety, creep into almost all questions, increase work and often bore the students. Indeed, there has all along been a theoretical treatment of fractional rendering and fractions like $\frac{8}{17}$, $\frac{9}{23}$, $\frac{29}{108}$ have been freely used in textbooks.

It is difficult to imagine how the student reacts to such values. He is also not aware whether at any stage in his life he would be required to use such relations and in what manner.

Even then, considering from a purely theoretical approach, such fractions lend themselves easily to decimal treatment to a fair degree of accuracy.

It is also not very uncommon to see boys of 8-11 years confused with examples like the ones given below:

Arrange in ascending and descending order:

$\frac{15}{16}$, $\frac{18}{19}$, $\frac{89}{97}$, and $\frac{279}{298}$.

In what conceivable manner the child could quickly find their Least Common Multiple and after having found a common denominator, work out divisions and multiplications into factors in the denominator and numerator and arrange the terms in the given order is difficult to understand. And in

many cases the approach being conventional and stereotyped the student is confused.

Again, if rendered in decimals, the working of this example is more clear and brief e.g.

$$\begin{array}{rcl} \frac{15}{16} & = & 0.9375 \\ \frac{18}{19} & = & 0.9474 \\ \frac{89}{97} & = & 0.9175 \\ \frac{279}{298} & = & 0.9362 \end{array}$$

and the result follows without much trouble.

Need for Teaching Decimals

The need for an exhaustive treatment of decimals because of their inherent practical use, the clarity they afford in thinking and the greater ease and facility to which they easily lend themselves, as shown above, would thus be clear. The facts also bring out that our present curriculum falls short of these demands, more so because of the latest reforms in currency, weights and measures.

No child can be taught in isolation of its environments and the new currency and weights and measures are already on the horizon of his environments. Moreover, the reform cannot get deeply rooted into the life of a nation if we have different systems of weights and measures, one taught in the school and the other used outside. The child must constantly think in and live with new coins, weights and measures. All the inhibitions caused by the old tables of weight and measures and currency with which the students have gained familiarity through tradition and constant use must go.

It may again be stressed that (1) decimals, (2) dependent topics like approximations and logarithms which facilitate working and increase speed, and (3) auxiliary topics like map reading, practice in decimals etc. the utility of which in the present times has increased and which now do not find a place in the present syllabus should be included in the new syllabus. We may now examine the usefulness of each of the topics.

TEACHING OF METRIC SYSTEM IN SECONDARY SCHOOLS

Decimals

Decimal treatment will help to a great degree in the integration of the syllabus. While elementary knowledge in topics like practice, percentages, profit and loss, simple and compound interest etc. could with profit be imparted at the earlier stages, difficult and inverse sums should be postponed to higher forms.

The examples dealt with here are for boys in higher forms, and show how integration would be possible.

Need for Elimination of Practice (Simple or Compound) From the Syllabus.

Find the cost of 2 tons, 0 Cwt, 61 $\frac{3}{8}$ lb at £11 8 sh 9 $\frac{3}{4}$ d per ton.

Here £11 8 sh 9 $\frac{3}{4}$ d = £11.440625 and 2 tons 0 cwt 61 $\frac{3}{8}$ lb. = 2.0274 tons.

Working

$$\begin{array}{r} 12 \text{ } 9.75 \\ \quad \cdot 8125 \\ 20 \text{ } 8.8125 \\ \quad \cdot 440625 \\ \hline 14 \text{ } 61.375 \text{ lb} \\ 2 \text{ } 4.384 \\ 4 \text{ } 2.193 \\ 20 \text{ } .548 \\ \quad \cdot 0274 \\ \hline 11.441 \\ \times 2.027 \\ \hline 80 \text{ } 087 \\ 228 \text{ } 82 \\ 22882 \text{ } 0 \\ \hline 23.190907 = \text{£}23.191 \\ \quad \times 20 \\ \hline 3.82 \text{ sh} \\ \times 12 \\ \hline 9.84 \text{ d} \end{array}$$

Ans: £23 3 sh 10 d.

The question would have been difficult if done with the conventional approach of compound practice rendering 61 $\frac{3}{8}$ lb into aliquot parts. The example is sufficient proof

in itself to show that the decimal system of money, weights and measures does away with the teaching of 'practice' as a method separate in itself. This simplicity is seen in the following example:

Find the cost of 49 kg 4 dag 5 g at Rs. 17.35 per kg.

$$\begin{array}{r} 49 \text{ kg } 4 \text{ dag } 5 \text{ g} = 49.045 \\ \text{and Rs. } 17.35 = 17.35 \\ 49.045 \\ \times 17.35 \\ \hline 245225 \\ 147135 \\ 343315 \\ 49045 \\ \hline 850.93075 \end{array}$$

Rs. 850.93 only.

Need for Teaching Approximation

The population of England and Wales was 29,002,525 in 1891 and 32,577,843 in 1901; that of Scotland was 4,025,647 in 1891 and 4,472,103 in 1901. Find out which of the populations was increasing at the greater proportional rate during 1891-1901.

Increase in population in England and Wales

$$\begin{array}{r} = 3,575,318 \\ \therefore \text{Percent increase} = \frac{3,575,318 \times 100}{29,002,525} \\ = \frac{3,575,318 \times 100}{29,002,500} \\ = \frac{35753}{2900} \\ = \frac{357.5}{29} \\ = 12.3 \text{ percent} \end{array}$$

Increase in population in Scotland = 446,456

$$\begin{array}{r} \therefore \text{Percent increase} = \frac{446,456 \times 100}{4,025,647} \\ = \frac{446,456}{4,025.647} \\ = \frac{446,400}{4,020} \\ = \frac{446}{40} \\ = 11.15 \text{ percent} \end{array}$$

The answer is obviously that of England and Wales.

If it had been done in fractions and the questions solved with exact promptitude, it would have created many difficulties for the student.

Treatment of Profit and Loss, Simple Interest

Take another example which we shall solve with decimals without bringing in any fractions.

A sells an article to B at a gain of 10 percent; B sells it to C at a loss of 7 1/2 percent; C disposes of it at a loss of 2 percent. If the prime cost to the manufacturer was Rs. 6.375 find to the nearest pP the price obtained by C.

A buys for Rs. 6.375 and sells it at a gain of 10 percent.

$$\begin{aligned}\text{Cost price of B} &= \text{Rs. } 6.375 + 0.6375 \\ &= \text{Rs. } 7.0125\end{aligned}$$

$$\begin{aligned}\text{B sells it at a gain of } 7\frac{1}{2}\% &= 7.0125 \\ 5\% &= 0.3506 \\ 2\frac{1}{2}\% &= 0.1753 \\ \hline &\text{Rs. } 7.5384\end{aligned}$$

∴ The cost price of C = Rs. 7.5384

C sells it at a loss of 2%
C's selling price = 7.5384

$$\begin{aligned}2\% &= 1/50 = 0.1508 \\ &= 7.388 \text{ to three decimal places} \\ &= \text{Rs. } 7.39\end{aligned}$$

In fractions in the last step the selling price of C
= $51/8 \times 110/100 \times 215/200 \times 98/100$
= $51 \times 11 \times 43 \times 49$ (a tedious factor)
= $80 \times 40 \times 50$

From the above example the superiority of the decimal system over fractions would be realized.

Logarithms

Example like:

- (1) Amount = Rs. 273.60 x (1.04)³
- (2) Amount = 500 x (1.03)¹⁸
- (3) 1 metre = 39.370 113 inches.
= 1.093 614 yards.
- (4) Render 749.36 metres into yards

lead to a discussion of logarithms and approximation.

Though it must be very strongly advocated that sums involving approximations of incommensurate relations like $1/73 = 0.013986$ (correct to 5 significant figures), $22/7 = 3.1416$ (correct to 5 significant figures), 1 metre =

1.093 614 yards (correct to 7 significant figures), should be avoided at the earlier stage, where simple questions involving simple calculations, sums promoting understanding of methods etc. should be set. But in the two highest forms the student should be introduced to such topics as approximations by aliquot parts and logarithms which would help him when he may have to use this knowledge in finding coefficient of expansion or contraction, specific gravity, density etc. up to a fair degree of approximation. Decimal reckoning correct to 5 or 6 significant figures is, in fact, required in scientific instruments demanding a fairly high degree of precision and which are used at an advanced stage of learning.

It is only when topics like specific gravity and density etc. have been introduced in lessons in general science that a sprinkling of these questions in arithmetic will enable the child to understand the close relation between the two subjects and thus make the study more interesting.

If he employs simple methods of multiplication and division such simplifications tend to be exhausting. That is why there is a great need for learning topics that facilitate computation.

A few illustrations may make the point clear.

The retail list price of a bicycle is Rs. 239. The wholesale dealer allows a discount of 6 percent for each and still makes a profit of 14 percent on his outlay. The manufacturers' price to the wholesale dealer is 26 percent higher than the original price at which it was sold to the wholesale dealer.

Find the original cost price of the bicycle.

Approach

$$\begin{aligned}\text{Market retail price of the bicycle} &= \text{Rs. } 239 \\ \text{Discount} &= \text{Rs. } 6\% \\ \therefore \text{Price after deducting the discount} &= \text{Rs. } 224.66 \\ &= 14.34 \\ &= 224.66\end{aligned}$$

TEACHING OF METRIC SYSTEM IN SECONDARY SCHOOLS

$$\begin{aligned}\therefore \text{Cost price of the wholesale dealer} &= \text{Rs. } 224.66 \\ \text{Cost price of the manufacturer} &= \text{Rs. } 224.66 \\ &= 1.14 \times 1.26 \\ &= \log 224.66 - \log 1.14 - \log 1.26 \\ &= 2.3514 - 0.0569 - 0.1004 = 2.1941 \\ \text{Antilog} &= 156.4 \text{ or price is Rs. } 156.40 \text{ only.}\end{aligned}$$

A comparative solution with the help of fractions will establish the superiority of the above approach over the conventional fractional approach.

$$\begin{aligned}\text{Market price of the bicycle} &= \text{Rs. } 239 \\ \text{discount} &= 6\% \\ &= \frac{239 \times 94}{100} \\ \text{Actual price of the bicycle} &= \text{Rs. } \frac{11233}{50}\end{aligned}$$

$$\begin{aligned}\therefore \text{Cost price of the wholesale dealer} &= \text{Rs. } \frac{11233}{50} \times \frac{100}{114}\end{aligned}$$

$$\begin{aligned}\therefore \text{Cost price of the manufacturer} &= \frac{11233}{50} \times \frac{100}{114} \times \frac{100}{126} \\ &= \frac{561650}{3591}\end{aligned}$$

(not an easy fraction to handle. After a long division it gives the answer as Rs. 156.40).

It is not necessary to give the complete theory of logarithm tables. What is required is that the child should be taught how to use the tables correctly. For the inquisitive boys, the following explanation is extremely useful in making them understand how the tables were built up. This should come after the boys have gained an idea of 'indices and surds.'

$$\begin{aligned}10^0 &= 1 & \log 1 &= 0 \\ 10^{1/2} &= 3.162 & \log 3.162 &= 1/2 = 0.5 \\ 10^{1/4} &= (10^{1/2})^{1/2} = \sqrt{3.162} \\ &= 1.779 \\ \log 1.779 &= 1/4 = 0.25 \\ (10)^{3/4} &= 10^{1/2 + 1/4} = 10^{1/2} \times 10^{1/4} \\ &= (3.162) (1.779) \\ &= 5.625 \\ \log 5.625 &= 3/4 = 0.75\end{aligned}$$

$$\begin{aligned}(10)^1 &= 10 & \text{or } \log 10 &= 1 \\ (10)^{-1} &= 1/10 = 0.1 & \text{or } \log 0.1 &= -1 \\ (10)^{-0.5} &= 10^{-1/2} = 1/10^{1/2} \\ &= \frac{1}{\sqrt{10}} \times \frac{\sqrt{10}}{\sqrt{10}} = \frac{\sqrt{10}}{10} \\ &= \frac{3.162}{10} = 0.3162 \\ \log 0.3162 &= -0.5\end{aligned}$$

Thus a table could be constructed as follows:

log x	0.1	0.3162	1	1.779	3.162	5.625	10
x	-1	-0.5	0	0.25	0.50	0.75	1

Further the characteristics of a log can always be found by inspection.

A number which has two digits in its integral part such as 32.49 is greater than 10¹ and less than 10². Its logarithm lies between 1 & 2 and may be written as

1 + fractional part

Thus

$$\begin{aligned}0.03249 &= 10^{-2} \times 3.249 = 2.5117 \\ 0.3249 &= 10^{-1} \times 3.249 = 1.5117 \\ 3.249 &= 10^0 \times 3.249 = 0.5117 \\ 32.49 &= 10^1 \times 3.249 = 1.5117 \\ 324.9 &= 10^2 \times 3.249 = 2.5117\end{aligned}$$

Approximation by Aliquot Parts

Transform 5 ft. 3 in. into metres.

$$\begin{aligned}\frac{1 \text{ inch}}{1 \text{ cm}} &= 2.54 \text{ cm} = (10/4 + 4/100) \text{ cm} \\ 63 \text{ inches} &= 63(10/4 + 4/100) \text{ cm} \\ &= 157.5 + 2.52 \text{ cm} \\ &= 160.02 \text{ cm} \\ &= 1.6 \text{ metres}\end{aligned}$$

For converting yards into metres use the multiplier (1 - 1/10 + 1/70). Change 3 650 yards into metres. Since 1 yard = 0.9144
= 1 - 1/10 + 1/70 correct to 3 decimal places.

$$\therefore 3650 \text{ yards} = 3650 (1 - 1/10 + 1/70) \text{ metres}$$

$$= 3\ 650 - 365 \div 52 \cdot 143 \text{ metres}$$

$$= 333\ 7 \cdot 143 \text{ metres}$$

Similarly

$$1 \text{ metre} = (1 + 1/12 + 1/96) \text{ yards.}$$

$$1 \text{ kg} = 1 \cdot 0717 \text{ seers}$$

$$= 1 + \frac{7}{100} + \frac{1}{1000} + \frac{7}{10000} \text{ seers}$$

$$= 1 + \frac{1}{1000} + 7 \left(\frac{1}{100} + \frac{1}{10000} \right) \text{ seers}$$

$$1 \text{ kg} = 2 \cdot 2046 \text{ lb.}$$

$$= 2 + \frac{2}{10} + \frac{0}{100} + \frac{4}{1000} + \frac{6}{10000} \text{ lb.}$$

$$= 2 + \frac{1}{5} + \frac{0}{100} + \frac{5}{1000} + \frac{4}{10000} \text{ lb.}$$

$$= 2 + \frac{1}{5} + \frac{1}{200} + \frac{1}{2500} \text{ lb.}$$

$$= 2 + \frac{1}{5} + \frac{1}{200} \left(1 - \frac{1}{10} \right) \text{ lb. approx.}$$

Such approximations facilitate simplifications to a fair degree and give results to a sufficient degree of accuracy.

Map Reading

The increased importance of map reading in the present context of studies needs hardly to be stressed and along with map reading, co-ordinate reading of a specific place, finding the representative fraction, finding the area of a certain portion, drawing a certain portion over a graph paper are points which could be systematically introduced from the early stages. The subject is interesting and provides considerable scope for practical and outdoor work.

Often the sketch of a certain area is provided to the student with certain data given on it. The boys are asked to find the distance between two known places, the type of landscape and if the distance is given how to find the scale etc. They enjoy learning a topic which is both informative and instructive.

* * *

Metric System in Buildings, Architecture and Town Planning

A Conference on adoption of metric system in building, architecture and town planning, convened by the Ministry of Works, Housing & Supply was held in New Delhi on the 2 and 3 September 1959. It was inaugurated by Shri K. C. Reddy, Minister for Works, Housing and Supply and was presided over by Shri M. R. Sachdev, Secretary, Ministry of Works, Housing & Supply. It was attended by representatives of State Governments, Central Ministries and other technical organisations. It adopted the following resolutions:

(1) This Conference resolves that all standards for materials should be as per Indian Standard specifications already published. Wherever difficulties are met with in following these specifications, they may be referred to the Indian Standards Institution (ISI) with the necessary experimental or other data to enable the ISI to come to suitable conclusions.

(2) This Conference recommends the adoption of the principle of modular co-ordination of dimensions in the building industry based on a 10 cm module as outlined by the ISI. In this context the Conference notes certain difficulties expressed by some members in regard to brick dimensions specified in the Indian Standard specification and suggests that these difficulties be referred to ISI for consideration with such experimental and other data as may be available.

(3) The Conference recommends that the following measures should be taken by the organizations concerned, for promoting the manufacture of building materials according to metric standards:

(a) As far as possible an immediate beginning should be made to place orders for materials in metric sizes.

(b) Specific dates should be fixed for the commencement of use of materials according to metric standards.

(4) The Conference notes that there will not be any serious difficulty in procuring the necessary architectural and engineering scales and other measuring instruments, except in the case of steel tapes which will have to be imported until the manufacturing capacity is developed in the country.

In order that all purchases of new scales and equipment by universities and technological institutions are made conforming to metric standards, the Conference recommends that the University Grants Commission may be requested to stipulate suitable conditions while sanctioning grants.

(5) The Conference recommends the adoption of IS:1200—1958 Code of Measurement of Building Works by all construction departments with such minor modifications as may be necessary to suit local conditions.

(6) The Conference recommends the preparation of a comprehensive Handbook for Building Engineers in the Metric System

by the National Buildings Organization so that this would serve as a reference book. Every endeavour should be made to complete this book within a year. Further, the ISI should be requested to expedite publication of its Handbooks on structural steel design.

(7) (a) The Conference recommends that from April 1960, the State Governments should encourage the submission of drawings with applications for issue of controlled materials in the metric system.

(b) The Conference recommends that the Central Government should request the State Governments to advise the Local Bodies under them to revise their bye-laws introducing the metric system, on the lines of IS: 1256—1957. From April 1962 they should insist on submission of drawings for new buildings in the metric system. Drawings prepared in the metric system from an earlier date should also be accepted.

(8) Phased Programme for the Conversion :

This Conference adopts the following phased programme for the introduction of the metric system in the building industry, architecture and town planning.

In drawing up this phased programme the Conference has taken the following factors into consideration:

(i) Preparation of drawings and designs of buildings in the metric system should precede construction work.

(ii) The programme should stimulate production of building materials to metric standards.

(iii) As a complete change-over from a predetermined date is not possible any programme must provide for the co-existence of the two systems during the transitional period ensuring a smooth change-over.

(iv) The time and work involved in revising the specifications, analysis, and schedule of rates by various public works departments.

(v) Availability of necessary scales, measuring aids, design tables, codes of practice, loading standards and completion of metric standards for all building materials.

(vi) The co-operation of private bodies and manufacturers will be forth-coming.

The programme envisages three stages:

The first stage provides for the preparation of surveys and drawings in the metric system and preparation of only the bills of quantities and rates in metric units. The tendering, and payment in respect of these works will also be in metric system. The specifications will, however, remain as at present in the foot-pound system. The only change at this stage will be the use of metric size bricks.

Examples :

Description of the Item	Quantity	Unit	Rate	Amount
1½" thick cement concrete flooring of 1 : 2 : 4 cement with ½" ballast finished smooth with neat cement.	X sq metres	sq metre	Rs. 4.00	Rs. 4 X

In the second stage, all materials for which standards exist as on 1 April 1960, will be introduced in the specifications and the analysis of rates for these items will accordingly be modified. The remaining items will continue to exist in the present system. The estimating, tendering, measurement and payment will be done in metric units as in stage I. At this stage specifications for works, such as R.C.C., structural steel work, timber work, doors & windows will be completely in the metric system.

METRIC SYSTEM IN BUILDINGS, ARCHITECTURE AND TOWN PLANNING

Example

Description of the Item	Quantity	Unit	Rate	Amount
38 mm thick cement concrete flooring of 1 : 2 : 4 cement concrete using 15 mm ballast, finished smooth with neat cement.	X sq metres	Sq metre	Rs. 4.00	Rs. 4.X

In the third stage the remaining items of works will be put in the metric system and the entire specifications, analysis of rates etc., will all be in the metric system.

The Conference recommends the adoption of the following schedule for the introduction of the above three stages:

First stage: Commences 1 April 1960

This presupposes that metric scales, measuring tapes, chains, etc., will be available and procured by the concerned department by this date.

(A) All surveys, drawings and designs for new projects and buildings will be prepared in the metric system.

(B) The bills of quantities for the above works will be worked out in metric units, keeping the same nomenclature of items as at present except in regard to bricks. For this purpose schedule and specifications for brickwork items alone will have to be revised and equivalent rates for metric units will be worked out for other items.

Note—It is expected that the drawings will take about three months and estimating and tendering another 3 months and actual procurement of bricks to new sizes will start from the burning season of 1960, i.e., September 1960.

Second Stage : Commences between 1 April 1960 & 1 April 1962

(A) The nomenclature of such of those items for which standards have been prescrib-

ed as on 1 April 1960, will be changed as for metric standards and the rates also worked on the basis of new nomenclature and corresponding analysis. At this stage the following materials are expected to be available in the metric system:

Cement, stone aggregates and sand, concrete products, like tiles, etc.

Steel

Timber

Doors and windows

Sheets and wires

Third Stage : Commences 1 April 1963

This stage presumes that metric standards for all other materials required by the building industry will be ready and materials to these standards would be procurable.

The entire nomenclature will be brought to the metric standards, analysis of rates revised and schedules completely put in the metric system.

Note—The introduction of third stage on 1 April 1963, provides for a three year period during which any remaining transitional difficulties will be resolved and by 1966 the building industry will be brought entirely into the metric system.

The Conference intends that this time Schedule should apply to all construction agencies in the public sector. The private sector should also follow the same schedule and wherever feasible hasten the introduction of the metric system in their respective fields of operation.

In the case of departments which are considering revision of rates to account for fluctuations in prices, the programme for such revision may be suitably modified to fit in the phased programme for the introduction of the metric system.

Actions to be Taken by Various Agencies

(i) Standard specifications for scales and other measuring aids should be issued by

the ISI as soon as possible, preferably by the end of 1959 and the Ministry of Commerce and Industry should take all the necessary steps to see that scales are available for the consumers in adequate quantities by the end of 1959. To achieve this, it is necessary that the indenting departments should place indents for their requirements with the manufacturers as early as possible.

(ii) For structural design the following aids will be necessary by April 1960. The position regarding these is given below:

- | | |
|--|---|
| (a) Structural tables | Already available. |
| (b) R.C.C. Tables | Preparation of this should be entrusted to the Concrete Association of India. |
| (c) Conversion tables and codes. | Already available. |
| (d) Strength, properties of materials, in the metric system. | Already available. |
| (e) Basic design standards like loading standards. | Should be made available in the metric system by the ISI. |
| (f) Unit weights of materials | Should be made available in the metric system by the ISI. |

(iii) Fixing of metric standards for materials not already covered by Indian Standards should be completed by the ISI by 1 April 1962.

(9) The Conference recommends the setting up of a separate cell under an officer not below the rank of Executive Engineer in each of the public works and other departments, to undertake the revision of specifications, schedules of rates for works and for preparation of Handbooks, modifications of type designs and drawings etc.

(10) The Conference notes the progress made by the Central P.W.D. in the revision of the specifications and the schedule of rates in the metric system and resolves to request the Chief Engineer, Central P.W.D., to circulate copies of the revised specifications and schedules to the State P.W.Ds, and other concerned Central Government Departments as and when they become available.

(11) The Conference also notes the useful work done, by the Indian Standards Institution, in laying standards in metric units for building materials and codes of practice for various items of construction and hopes that the remaining work will also be completed expeditiously.

News & Views

Change in Date for Adoption of Metric System in Collection of Customs Duties

In view of the representations received from the trade and other interests concerned, the Government of India have decided to introduce the metric system in the levy and collection of customs duties and duties of Central Excise from August 1960. It was announced earlier that this change-over would take place on 1 April 1960 (See *Metric Measures*, November, 1959, p. 24).

The exact date on which the new system is to be introduced is to be announced later.

New Zealand Committee Votes for Decimal Coinage

It is understood that a decimal coinage Committee set up in 1957 to investigate the problems of decimal currency has made a favourable report to the New Zealand Government.

In the report tabled in the House of Representatives on 14 October 1959, the committee says the only significant disadvantage of the decimal scheme is that it has less divisibility than the present one.

It says that if decimal coinage is adopted in New Zealand, an immediate inquiry should then be held on the advisability of switching to decimal weights and measures.

The committee makes no recommendation regarding names for new units to replace existing pounds, shilling and pence but recommends that notes and coins under the new system be issued initially as follows:

Notes : 100 units equivalent to £50; 20 units (£10); ten units (£5); two units (£1) and one unit (10/).

Silver Coins : 25 units (2/6); 20 units (2/), ten units (1/); five units (6d); 2½ units (3d).

Bronze Coins : one unit (1·2d); ½ unit (0·6d).

The Committee recommends the date for the change-over should be 3½ years after the adoption of the report by the Government. To prepare for the transition, there should be a two-year preparatory period followed by 18 months for completion of machine conversions.

The Committee says costs of the change-over for machines would be about £NZ 3,500,000, if a partial conversion was adopted and £NZ 4,500,000 for a full conversion.

The Committee suggests a completely new upper unit name should be adopted distinctively associated with New Zealand.

Suggestions received by the committee were NZ dollar, zeal, kiwi, tui and fern.

Suggestions for the lower unit were penny, cent, new penny, and decimal penny, which could later be abridged to decipen.

Recalibration of Spring Balances

The following two firms:

- (1) Misrilal Motilal,
71, Sarang Street,
Bombay-3.
- (2) Multan Engineering Works,
1773, Mir Jumla, Lal Kuan,
Delhi.

have informed us that they would be able to recalibrate dials of spring balances in the metric system. Those interested may direct their enquiries to these two firms.

Licensed Manufacturers, Dealers and Repairers of Weights and Measures (5)

Metric Measures has been publishing lists of manufacturers, dealers and repairers of weights and measures and weighing and measuring instruments licensed by the various States and Union Territories under their respective Weights and Measures (Enforcement) Acts. This is the fifth list in the series. The first list appeared in the issue of March 1959. Steps are being taken for licensing manufacturers, dealers and repairers in all States and further lists of licensees would be published in *Metric Measures* as this work progresses.

The number in brackets against the name of the State or Union Territory indicates the instalment number of the list for that State or Union Territory. The issues of *Metric Measures* in which previous lists appear are also indicated suitably.

ANDHRA PRADESH (2)

The first list appeared in the July 1959 issue of *Metric Measures*.

Manufacturers

Sl. No.	Name and Address of Manufacturer	Details of Articles Manufactured
(1)	Asiatic Machinery Corporation (P) Ltd., 10/1, Kailash Ch. Chandra Lane, P.O. Santragachi, Howrah, West Bengal.	Weighing Machines, Platform Machines & Weigh-bridges.
(2)	Bharat National Foundry, Motia Khan, New Delhi	Cast Iron Weights.
(3)	Central Metal Works, Manufacturers of Measures, Feelkhana Camp, Hyderabad Dn.	Measures.
(4)	Deccan Porcelain & Enamel Works Ltd., Manufacturers of Weights, Mushirabad, Hyderabad Dn.	Cast Iron Weights.
(5)	Hercules Engineering Works, Udhogynagar, Sion, Bombay-22.	Counter Scale, Spring Balances, Dry and Liquid Measures.
(6)	Jivan Nagji & Sons, Manufacturers of Scales, Savarkondla (Saurashtra).	Beam Scales.
(7)	Luhar Jiva Gopal, Manufacturers of Scales, Savarkondla (Saurashtra).	Scales.
(8)	Luhar Kanji Ranchod Sidhupura, Manufacturers of Scales, Savarkondla (Saurashtra).	Beam Scales.
(9)	Luhar Karsan Ramji & Sons, Manufacturers of Scales, Savarkondla (Saurashtra).	Beam Scales.

LICENSED MANUFACTURERS, DEALERS AND REPAIRERS OF WEIGHTS AND MEASURES (5)

Manufacturers (contd.)

Sl. No.	Name and Address of Manufacturer	Details of Articles manufactured
(10)	Luhar Kohdanatha, Manufacturers of Scales, Savarkondla (Saurashtra).	Beam Scales.
(11)	Luharmulji Narayan, Manufacturers of Scales, Savarkondla (Saurashtra).	Beam Scales.
(12)	Misrilal Motilal, Topkhana Road, Osman Gunj, Hyderabad	Brass Weights, Linear Measures and Weighing Instruments.
(13)	K. Narayana & Sons, Manufacturers of Scales, Dowlaiswaram	Beam Scales.
(14)	Oriental Metal Pressing Works, Private Ltd., Worli, Bombay-18	Weighing and Measuring Instruments.
(15)	Standard Mechanical & Iron Works, etha Street, Patel Compound, Lamington Road, Bombay-8.	Weights, Measures and Scales.
(16)	Swamy Engineering Works, Manufacturers of Scales, Dowlaiswaram.	Beam Scales.

Dealers

Sl. No.	Name and Address of Dealer	Details of Articles Sold
(1)	Central Metal Works, 15-1-457, Feelkhana Camp, Hyderabad Deccan.	Weights, Measures and Weighing and Measuring Instruments.
(2)	S. Chenniah, Gunj Bhongir	Weights, Measures and Weighing and Measuring Instruments.
(3)	Deccan Porcelain and Enamel Works, Mushirabad, Hyderabad Deccan.	Weights, Measures and Weighing and Measuring Instruments.
(4)	I.A.E.C. Hyderabad Ltd., Gunfoundry, Hyderabad	Weights, Measures and Weighing and Measuring Instruments.
(5)	K. B. Jaggiar, General Merchant, Karimnagar	Weights, Measures and Weighing and Measuring Instruments.
(6)	J. Joseph, Mandi Bazar, Warangal	Weights, Measures and Weighing and Measuring Instruments.
(7)	K. Krishnamurthy, General Merchant, Beet Bazar, Warangal	Weights, Measures and Weighing and Measuring Instruments.
(8)	M. Mahboob Ali, Sardar Road, Sadasivepet	Weights, Measures and Weighing and Measuring Instruments.
(9)	Majestic Metal Works, Mittikasher Begum Bazar, Hyderabad	Weights, Measures and Weighing and Measuring Instruments.
(10)	Md. Taqi Hussain, Peddapalli & Siddipet	Weights, Measures and Weighing and Measuring Instruments.
(11)	Mohammed Yousuf & Bros., Mandi Bazar, Warangal	Weights, Measures and Weighing and Measuring Instruments.
(12)	Paramount Scale Centre, 22-8-430, Purani Haveli, Hyderabad	Weights, Measures and Weighing and Measuring Instruments.

Dealers (contd.)

Sl. No.	Name and Address of Dealer	Details of Articles Sold
(13)	Safe Scale Co., Miralam Mandi, Hyderabad	Weights, Measures and Weighing and Measuring Instruments.
(14)	M. A. Sattar Tarkari Bazar, Taluq Tandur, District Hyderabad	Weights, Measures and Weighing and Measuring Instruments.
(15)	Scales Adjusting Services, Topkhana Road, Opp. Osmangunj, Hyderabad.	Weights, Measures and Weighing and Measuring Instruments.
(16)	T. Suryanarayan Rao, Main Bazar, Mangalgiri, District Guntur.	Weights, Measures and Weighing and Measuring Instruments.

Repairers

Sl. No.	Name and Address of Repairer	Details of Articles Repaired
(1)	Bharat Scale Repairing Shop, Mandi Bazar, Warangal ..	Weights, Measures and Weighing and Measuring Instruments.
(2)	Burmah Shell, Co., Sarojini Devi Road, Secunderabad ..	Weights, Measures and Weighing and Measuring Instruments.
(3)	Deccan Scale Centre, Barkatpura, Hyderabad	Weights, Measures and Weighing and Measuring Instruments.
(4)	K. Krishnamurthy, General Merchant, Warangal	Weights, Measures and Weighing and Measuring Instruments.
(5)	M. Mahboob Ali, Sardar Road, Sadasivepet	Weights, Measures and Weighing and Measuring Instruments.
(6)	Majestic Metal Works, Gandhi Chowk, Nizamabad	Weights, Measures and Weighing and Measuring Instruments.
(7)	Pershad Scale Co., 15-5-393, Akbarja Bazar, Hyderabad Deccan.	Weights, Measures and Weighing and Measuring Instruments.
(8)	M. A. Sattar, Tarkari Bazar, Tandur, District Hyderabad	Weights, Measures and Weighing and Measuring Instruments.

BOMBAY (4)

In the March, July and September 1959 issues of *Metric Measures* lists of licensed manufacturers, dealers and repairers of weights and measures in Bombay State were published. The following is a list of manufacturers, dealers and repairers subsequently licensed by the Government of Bombay under the Bombay Weights and Measures (Enforcement) Act, 1958. Including this list, 22 manufacturers, 160 dealers and 52 repairers have been licensed in Bombay State.

Manufacturers

Sl. No.	Name and Address of Manufacturer	Details of Articles Manufactured
(1)	Asiatic Machinery Corporation, Pvt. Ltd., Kailash Chandra Lane, Howrah.	10/1, Weighing Instruments.
(2)	Bharat National Foundry, Motia Khan, New Delhi ..	Weights.
(3)	Shri Krishna Company, 733, Shukrawar Peth, Poona 2 ..	Weights.
(4)	Luhar Mulji Naran, Manibhai Road, Savarkundla (Saurashtra).	Weighing Instruments.
(5)	Noble Scale Repairing Works, Gheekanta Road, Bhutni Ambli, Ahmedabad.	Weights.
(6)	Ravi Engineering Company, 81/1, Rajpur Road, Dehra Dun ..	Weighing Instruments.

Dealers

Sl. No.	Name and Address of Dealer	Details of Articles Sold
(1)	Abdulkadar Abdulhusen Rangwala, 1166, Bangudi Bazar, Pankornaka, Ahmedabad.	Weights.
(2)	Akbarali Abdulali Vadgumwala, Near Vohra Musafirkhana, Library Deesa, Dist. Sabarkantha.	Weights.
(3)	Akbarali Mohammedali, Gujri Bazar, Rajkot	Weights, Measures and Weighing Instruments.
(4)	Ambalal Shamaldas Shah, Pattaya Bazar, Kapadwanj, Dist. Kaira.	Weights, Measures and Weighing Instruments.
(5)	Anantrai Hirachand Doshi, Savarkundla	Weights, Measures and Weighing Instruments.
(6)	Associated Scales Industries, Station Road, Savarkundla ..	Weights, Measures and Weighing and Measuring Instruments.
(7)	Bansilal & Co., Main Road, Nasik City	Weights, Measures and Weighing Instruments.
(8)	B.A. Brothers, 176, Kazi Syed Street, Dhoble Building, Mandvi Koliwada.	Weights, Measures and Weighing Instruments.
(9)	Chandrakant Dada Lodage, Block No. 181, Jaysingpur, Gandhi Road, Jaysinghpur, Tal : Shirol, Dist. Kolhapur.	Weights, Measures and Weighing Instruments.
(10)	Chaturbhai N. Patel, Kandvav, Kapadwanj, Dist. Kaira ..	Weights, Measures and Weighing Instruments.
(11)	C & G Chokshi Haveli Street, Rajkot	Weights, Measures and Weighing and Measuring Instruments.
(12)	Continental Impex Co., 421, Himalaya House, 4th Floor, Palton Road, Bombay-1.	Weights, Measures and Weighing Instruments.
(13)	Damjibhai Narayanbhai Luhar, Manilal Chanilal's Madh, Kothariwala, Idar, District Sabarkantha.	Weights and Weighing Instruments.
(14)	Dinanath Rao, Dealer, Weights and Measures, Chowk Bazar, Nanded, Central Railway (Dist. Nanded).	Weights.
(15)	Gokuldas & Co., Shrirampur, Dist. Ahmednagar, At & Post Shrirampur.	Weights, Measures and Weighing Instruments.
(16)	Gold Star Engineering Co., Noble Chamber, 3rd Floor, 21-B, Parai Bazar Street, Fort, Bombay-1.	Weights, Measures and Weighing Instruments.
(17)	Haji Bane Khan Dawoodkhan, 2532, Mahatma Gandhi Road, Ahmedabad.	Weights, Measures and Weighing Instruments.
(18)	Ibrahim Abdul Kayum, Lokhand Bazar, Bhavnagar ..	Weights, Measures and Weighing Instruments.
(19)	Ishwarlal Gopalji Bhujwala, Panchnath Road, Rajkot ..	Weights, Measures and Weighing and Measuring Instruments.
(20)	Jaihind Iron Works, Bazar, Dehgam, Dist. Ahmedabad ..	Weights.
(21)	F. Jamaludeen & Bros., Vadgumwala, Bazar, New Dessa, Dist. Banaskantha.	Weights.

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Dealers—(contd.)

Sl. No.	Name and Address of Dealer	Details of Articles Sold
(22)	Jashbhai Chaturbhai Patel, Manordasni Khadki, Nadiad..	Weights and Weighing Instruments.
(23)	Kamlesh Iron and Steel Works, Bharat Khand Cotton Mills, Compound, Naorda Road, Block No. 35/2, Ahmedabad-11.	Weights.
(24)	Kantilal Bhogilal & Co., Near Kandvav, Kapadwanj ..	Weights, Measures and Weighing Instruments.
(25)	Kurban Husain Lehari, 153, Bhavani Peth, Jalgaon, District East Khandesh.	Weights, Measures and Weighing Instruments.
(26)	Laxmanbhai Purushottamdas & Co., Lal Darwaja, Visnagar..	C.I. Weights and Weighing Instruments.
(27)	D. S. Luhar & Bros. Co., Opp. Padsha Pole, Relief Road, Ahmedabad.	Weights and Weighing Instruments.
(28)	Madha Manji & Co., Savarkundla	Weights and Measures and Weighing and Measuring Instruments.
(29)	Maganlal Amtharam Patel, 1177, Pankornaka, Ahmedabad-1	Weights.
(30)	V. K. Makwana & Co., BH 207, Nava Bazar, Baroda..	Weights, Measures and Weighing Instruments.
(31)	H. S. Maner, 1642, C. Shivajee Road, Kolhapur	Weights, Measures and Weighing Instruments.
(32)	Mechanical Supplying Syndicate, Panchal Blocks, Gheekanta Road, Ahmedabad.	Weights.
(33)	Mistri Jivraj Karsanji and Bros., Hathibhai Street, Savarkundla.	Weighing Instruments.
(34)	Motabhai Alibhai & Co., Lokhand Bazar, Viramgam, District Ahmedabad.	Weights.
(35)	Muzfer Stores, Hardware Merchants, District S. Satara ..	Weights, Measures and Weighing Instruments.
(36)	Nandlal Damodardas Mistry, Near River Bank Parma, Botad	Weights, Measures and Weighing Instruments.
(37)	Narandas Ranchhoddas Patel, Pankornaka, Ahmedabad-1.	Weights.
(38)	National Metal and Measures Stores, 2760, Pankornaka, Ahmedabad-1.	Weights.
(39)	Natvarlal L. Kanthawala, Prop: Bhagodaya Scale, Repairing Works, K—3, 1093/66, Pirmashah Roja, Near Regal Cinema, Ahmedabad-1	Weights.
(40)	Pandurang Workshop, 1309, Tanga Stand, Pandharpur	Weights, Measures, Weighing Instruments.
(41)	I. G. Patel, 1147/1, Pankernaka, Ahmedabad-1	Weights.
(42)	M. K. Patel & Co., 1169/1, Pankornaka, Ahmedabad-1 ..	Weights.
(43)	Patel Kachrabhai Mohanlal, 1169/1, Pankornaka, Ahmedabad	Weights.
(44)	Popatlal Laxmichand Doshi, Vadali, A.P. Railway, District Sabarkantha.	Weights.

LICENSED MANUFACTURERS, DEALERS AND REPAIRERS OF WEIGHTS & MEASURES (5)

Dealers—(contd.)

Sl. No.	Name and Address of Dealer	Details of Articles Sold
(45)	Pratapmal Sampatlal, Loha Bazar, Pandit Nehru Road, Jalna	Weights, Measures and Weighing Instruments.
(46)	Ramanlal Keshavlal Shah, Juna Bazar, Idar, Dist. Sabarkantha	Weights.
(47)	Safuddin Rajabali, Bazar, Dehgam, (A.P. Railway)	Weights and Weighing Instruments.
(48)	H. G. Sakriwala & Sons, Bazar Peth, Sakri, Dist. West Khandesh.	Weights, Measures and Weighing Instruments.
(49)	Salebhai Abdulhusen Lokhandwala, 3749, Pankornaka, Ahmedabad-1	Weights.
(50)	A. Salehbhai & Co., Outside Golwadi Gate, Viramgam, Dist. Ahmedabad.	Weights.
(51)	Shah Bhogilal Pevchand, New Vasant Market, Manak Chowk, Ahmedabad-1	Weights and Weighing Instruments.
(52)	Shah Moulding Works, Sir Chinubhai Baronate Compound, Shahpur, Ahmedabad.	Weights.
(53)	Shankerlal Shivlal Thakkar, Near Office of the Jr. I.I. Talod Dn. Talod.	Weights.
(54)	Sheth Haji Usmanbhai Ahmedbhai, Juna Bazar, Himatnagar	Weights.
(55)	Shirde Stores, Kopergaon, Shivaji Road, At & Post Kopergaon, Dist. Ahmednagar.	Weights, Measures and Weighing Instruments.
(56)	Tarmohamad Ibrahim Memon, Kansara Bazar, Petlad	Weights, Measures and Weighing Instruments.
(57)	Umedram Ranchhoddas Patel, 1167, Pankurenaka, Ahmedabad	Weights.
(58)	Usmanbhai & Jamalbhai Vadnagri, Azad Chowk, Juna Bazar, Himatnagar, Dist. Sabarkantha.	Weights.
(59)	Vishwanath G. Sable & Co., No. 21, Somwar Peth, Malegaon, Dist. Nasik.	Weights, Measures and Weighing Instruments.
(60)	Vithaldas Venichand Panchal, At-Post-Dehgam, Station Road, Dist. Ahmedabad.	Weights & Weighing Instruments.

Repairers

Sl. No.	Name and Address of Repairers	Details of Articles repaired
(1)	D. H. Baganikar, Karal Chowki, Namdeo Mandir, Sangli	Weights, Measures & Weighing Instruments.
(2)	Bansilal & Co., Main Road, Nasik	Weights, Measures and Weighing Instruments.
(3)	Bharat Scale Repairing Works, Khargate, Bhavnagar	Weights, Measures and Weighing Instruments.

Repairers (contd.)

Sl. No.	Name and Address of Repairers	Details of Articles repaired
(4)	Chaturbhai N. Patel, Kandvav, Kapadwanj, Dist. Kaira	Weights, Measures and Weighing Instruments.
(5)	Durlabhji Devshi & Bros., Gujri Bazar, Rajkot	Weights, Measures and Weighing Instruments.
(6)	B. T. Ghatge, Hattimahal Road, Medhe Bldg., Kolhapur	Weights, Measures and Weighing Instruments.
(7)	Gold Star Engineering Co., Sherir Baug, 'L' Block, Shop No. 10, Babula Tank Road, Opp. J.J. Hospital, Gate No. 5, Bombay-9	Weights, Measures and Weighing Instruments.
(8)	Hassanali Amiji & Bros., Gujri Bazar, Rajkot	Weights, Measures and Weighing Instruments.
(9)	Ishwerlal Gopalji Bhujwala, Panchnath Road, Rajkot	Weights, Measures and Weighing Instruments.
(10)	M. G. Kotekar, Somwar Peth, Hattimahal Road, 'C' Ward, Kolhapur.	Weights, Measures and Weighing Instruments.
(11)	D. S. Luhar & Bros. & Co., Opp. Padsha Pole, Relief Road, Allahabad.	Weights.
(12)	V. K. Makwana & Co., Nava Bazar, Baroda	Weights, Measures and Weighing Instruments.
(13)	Moolji Lakshmidas & Co., 350, Samuel Street, Bombay-3	Weights, Measures and Weighing Instruments.
(14)	National Scale Co., Gokuldas Pasta Road, Dadar, Bombay-14	Weights, Measures and Weighing Instruments.
(15)	Natverlal L. Kantawala, K-3, 1093/Piramshah Roja, Near Royal Cinema, Ahmedabad-I.	Weights.
(16)	Ostwal Brothers, 134, Vakhar Bhag, Sangli	Weights, Measures and Weighing Instruments.
(17)	Pandurang Workshop, 1309, Tanga Stand, Pandharpur	Weights, Measures and Weighing Instruments.
(18)	J. M. Parbatani Kantawalla, 3, Gokuldas Pasta Road, Dadar, Bombay-14.	Weights, Measures and Weighing Instruments.
(19)	H. Z. Parbatani, Kantawalla, Gokuldas Pasta Road, Dadar, Bombay-14.	Weights, Measures and Weighing Instruments.
(20)	G. H. Samel & Co., 162, Hill Road, Bandra, Bombay-20	Weights, Measures and Weighing Instruments.
(21)	Shankarlal Shival Thakkar, Near the Office of the Jr. Inds. Insp. Talod Dn., Talod.	Weights.

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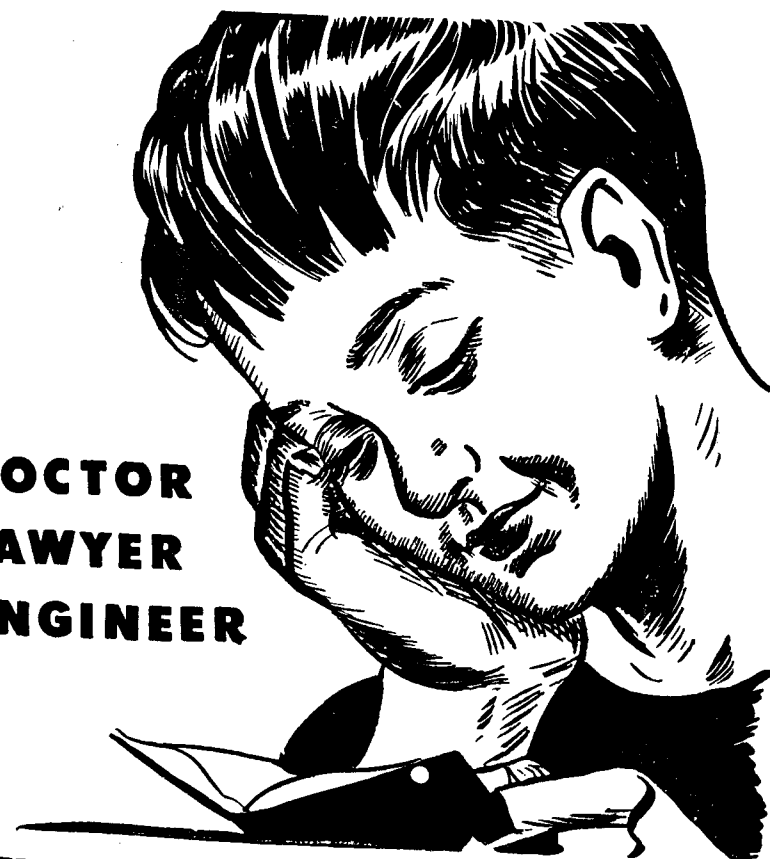
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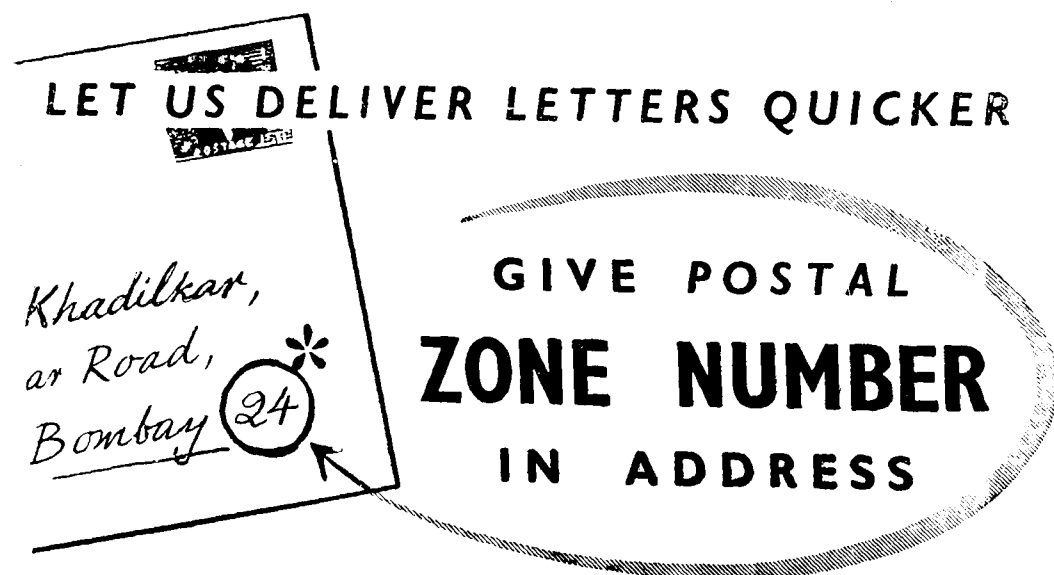
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metric measures

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metric measures

(JOURNAL OF WEIGHTS AND MEASURES)
STANDING METRIC COMMITTEE
MINISTRY OF COMMERCE AND INDUSTRY

Vol. 3 MARCH 1960 (PHALGUNA 1881) No. 2

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Cover design by R. Sarangan

Annual Subscription Rs. 2.00

Single Copy 40 nP

metric measures

METRIC MEASURES is published every two months.

METRIC MEASURES provides information to the general public on the administrative, commercial, educational, industrial, historical and other aspects of weights and measures, with particular reference to the introduction of the metric system in India.

Contributions for publication should be sent to the Editor, METRIC MEASURES, Standing Metric Committee, Ministry of Commerce & Industry, Udyog Bhavan, New Delhi.

Enquiries regarding subscriptions and supply of copies should be addressed to the Business Manager, Publications Division, Ministry of Information and Broadcasting, Old Secretariat, Delhi-8.

Articles published in the Journal may be reproduced. Credit line should read: METRIC MEASURES.

The opinions expressed by authors are not necessarily those of the Government.

Forty Years of Metric Reform in the USSR

G. D. BOURDOUN

Vice-President of the Committee of Standards, Measures and Measuring Instruments at the Council of Ministers of the USSR, Moscow

I

The Metric Reform

FROM 1 January 1919 the USSR introduced the international metric decimal system of weights and measures.

The metric reform was successfully carried out in the USSR in a historically short period. The introduction of complete uniformity of measures and the conversion of all kinds of measures into the more perfect metric units based upon the decimal system played a positive role in the development of science and engineering in the USSR.

In 40 years since the introduction of the metric system, the State Service of Measures and Measuring Instruments of the USSR has developed considerably. The aim of this service is to provide all branches of the national economy with uniform and correct measures and measuring instruments and control of their proper application.

Historical Background

In the second half of the 19th century, the Russian Academy of Sciences was the first to raise the question of the convocation of an International Commission on Weights

and Measures as a result of which the Metric Convention and the International Prototypes of the metric units have been established. Russia was one of the 17 countries which signed the Metric Convention (Convention du Metre) in 1875. However, before the Great October Socialist Revolution old measures were in use in Russia, the metric system being allowed as an optional system.

The historic transition to the metric system was carried out in accordance with the Decree of the Council of People's Commissars (14 September 1918), which stated that :

- (1) The international metric system of weights and measures with decimal subdivisions and multiples shall be taken as the basis for all measurements;
- (2) The copy of the International Metre bearing No. 28, and the copy of the International Kilogramme, with No. 12, made of platinum-iridium, which had been transferred to Russia by the First International Conference of Weights and Measures held in Paris in 1889, and kept in the Central Chamber of Weights and Measures, shall be taken as the standards for the basic units of the metric system;
- (3) All Soviet organizations and institutions shall, beginning with 1 January 1919, introduce the international metric system;
- (4) The use of non-metric measures and weights shall be prohibited beginning from 1 January 1924.

Furthermore, in a number of clauses of this Decree, practical arrangements for introducing the metric system were prescribed.

The Decree provided a period of 5 years for the completion of all the preparatory work with a view to complete transition to the metric system throughout the country. However, 2 years before the given term elapsed it became evident that it would be impossible in reality to fulfil the directives of the Decree. The Council of People's Commissars, by an additional Decree of 29 May 1922, therefore, prolonged this term by 3 years *i.e.* expiring on 1 January 1927.

Preparatory Work

The Central Metric Commission was attached early in its activities to the People's Commissariat of Trade and Industry. Later, by a decision of the Council of People's Commissars, the administration of the Council of Labour and Defence was entrusted with the realization of the programme stated briefly in the Decree of 14 September 1918, and further developed in a detailed plan.

During the first years of its work the Central Metric Commission concentrated its attention on introducing into common practice the usual metric measures such as weights, measures of length and capacity or volume. For this purpose it was necessary to design simple types of instruments and give necessary technical instructions to factories and shops manufacturing and distributing measuring instruments.

In the initial stages of the reform the conversion of old Russian measures and measuring instruments into metric measures and instruments was permitted. This decision accelerated the introduction of the metric system in our country giving the population an opportunity of practical acquaintance with the new system. When the manufacture of metric measures was sufficiently organized

in the USSR, this temporary decision was withdrawn (9 January 1925).

Besides the above arrangements, much work was carried out to propagate knowledge of the metric system by publishing elementary diagrams of instruments, tables showing corresponding Russian and metric measures, engineering rules, etc. In 1923 the Central Chamber of Weights and Measures completed the publication of 'Conversion Tables of Russian and Metric Measures', calculated with metrological accuracy. Many proceedings, pamphlets and articles concerning the metric system were published in the various languages used in the USSR. About 30 publications of the Central Chamber of Weights and Measures deal with problems concerning the introduction of the new system of measures in the country.

The dissemination of metric measures took a short period.

Energetic action by the Central Metric Commission, the Central Chamber of Weights and Measures and Local Verification Chambers resulted in the employment of metric measures amounting to about half the total number of old measures two years prior to the date fixed by the Decree. As the population had become accustomed to the new system, further propagation of the system did not meet any obstacles.

In Engineering and Industry

Besides introducing measuring instruments into common use, work on enforcing the metric system in all fields of engineering and national economy was also carried out.

For this purpose the Central Metric Commission, exercising its legal right to issue obligatory decrees for enforcing the metric system of weights and measures, published rules for the following: measurement of water in litres and gas in cubic metres, introduction of the metric system of measures

in the wine industry for filling bottles; determination of the area of buildings in metric measures; unification of abbreviations employed for designating metric units in printing; adoption of metric measures in industry, trade, transport, etc.

In March 1928 the Council of People's Commissars of the USSR considered a report on the activity of the Central Metric Commission in the Council of Labour and Defence concerning introduction of the metric system of measures and weights. The decision of the Government of the USSR concerning this matter stated that the metric system was becoming current in various fields of national economy, social and cultural life of the Soviet Union and that it greatly saved labour and facilitated the rationalization of the national economy.

In the decision summarizing the activity of the Central Metric Commission for introducing the metric system, the Council of People's Commissars of the USSR:

- (1) Approved the activity of the Commission;
- (2) Entrusted the Commission with the adoption of a three-year working plan, agreed upon by other related Departments, for the final establishment of the metric system in the USSR and the arrangements necessary for implementing this plan;
- (3) Decided to entrust State bodies, enterprises, co-operative and public organizations with the fulfilment of this plan, liquidating the Central Metric Commission with effect from 1 October 1928.

II

Control of Weights & Measures

State Service of Measures and Measuring Instruments

The State Service of Measures and Measuring Instruments deals not only with measures and instruments used in trade,

but also with the various measures and measuring instruments used in all branches of national economy for the control of technological processes and production quality. Accordingly, means of measurements used for electrical and radio measurements, measurements of dimensions in machine building industry, measurement of mass, pressure, force, velocity, liquid and gas flow, temperature and other units of great importance for national economy are under the supervision of the State Service of Measures and Measuring Instruments.

In the USSR the State Service of Measures and Measuring Instruments is under the direction of the Committee of Standards, Measures and Measuring Instruments at the Council of Ministers of the USSR. Metrological institutes spread over the whole territory of the country and charged with the realization of the scientific research work in the field of metrology, State testing laboratories in the field of measuring techniques carrying out the verification of measuring instruments used in the national economy, controlling the quality of manufacturing and repair of measures and measuring instruments and their proper utilization are under the authority of the Committee.

The Committee publishes a monthly journal of science and engineering, (*Izmeritel'naja Tekhnika—Measurement Techniques*), dealing with the problems of pure and applied metrology, organization and techniques of verification, operation of measures and measuring instruments and also instrument making industry.

All-Union Mendeleev Research Institute of Metrology

All Union Mendeleev Research Institute of Metrology (VNIIM), located in Leningrad, is organized on the basis of the Central Chamber of Weights and Measures, created

by the great Russian scientist D.I. Mendeleev in 1893.

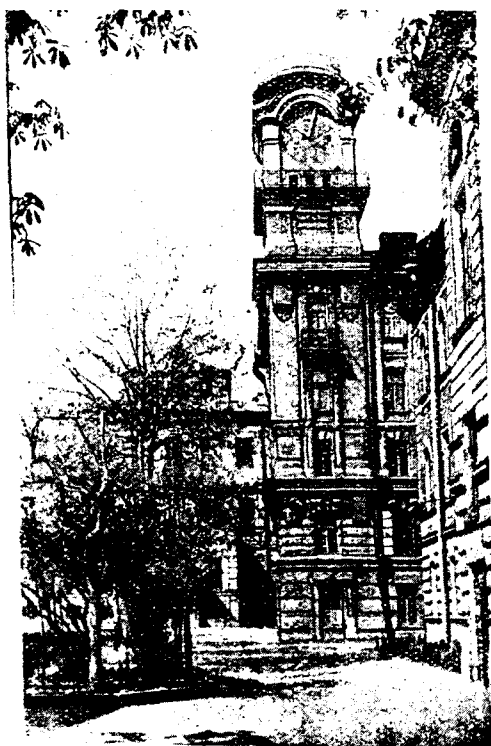


Fig. 1—All Union Mendeleev Research Institute of Metrology, Leningrad.

At present VNIIM is one of the important research institutions of the USSR having at its disposal research and testing laboratories, a designing bureau and experimental factory 'Etalon'.

VNIIM is the custodian of the national standards of the USSR. Research work on preserving and maintaining the standards, observing their conditions and developing new standards and on other metrological subjects is carried out in the various laboratories of the VNIIM. Since the Soviets came into power the Institute has issued about 100 volumes of its proceedings comprising several hundreds of scientific articles in the field of metrology.

All-Union Research Institute of the Committee of Standards, Measures and Measuring Instruments

All-Union Research Institute of the Committee of Standards, Measures and Measuring Instruments (VNIIC) in Moscow, besides undertaking research work in the field of metrology and certification of standard instruments of attached laboratories, also carries out State testing of models of measuring instruments designed and manufactured by the industry. On the basis of the results of the tests, enterprises are given permission for serial (large-scale) production of measuring instruments.

State Institutes of Measures and Measuring Instruments

The State Institutes of Measures and Measuring Instruments in Kharkov, Sverdlovsk and Novosibirsk keep the working standards and verify secondary standards and measuring instruments for the Committee's laboratories and industry. They also carry out scientific research work in some branches of measurement techniques and supervise the working conditions of measures and measuring instruments used in industry and trade.

Before the Great October Socialist Revolution the verification organization of this country consisted of 25 verification chambers, directed by the Central Chamber of Weights and Measures. In 1924 there were in the USSR 34 verification chambers. In 1927 their number increased to 82 and at present there are 130 State control laboratories of measurement techniques with more than 100 permanent departments.

Among the working measures and measuring instruments subject to obligatory verification at intervals fixed by the committee are :

Weights and balances (except analytical and microanalytical balances); bar type measures of length (commercial metres); electric meters; oil meters; meters for alcohol,

water, milk; gas meters; petrol and oil distribution pumps; automatic and semi-automatic devices and dosimeters for kerosene, vodka, beer and milk; medical, veterinary and incubator thermometers; kilometres counters (taximeters); blood pressure gauges; differential pressure type flow meters; metallic hydrometers for alcohol etc.

In addition, secondary standard measures and measuring instruments which serve as the basis for accurately imparting the real value of the units of measurement to working measures and measuring instruments are also subject to obligatory verification.

The majority of working measures and measuring instruments which are used in the national economy (electrical instruments, pressure and vacuum measuring instruments, general purpose measuring instruments, optical-mechanical instruments, radio-technical instruments and others) are subject to verification by the users themselves. In case it is not possible for the users to carry out this verification, the instruments are sent for verification to the Committee's representative agencies.

State verification of measures and measuring instruments is carried out in accordance with the special instructions developed by the Research Institutions of the Committee.

State verification of measures and measuring instruments which are in use is carried out :

- (1) In State testing laboratories of measurement techniques or in their permanent departments;
- (2) At the premises of the enterprises, institutions and organizations which use measures and measuring instruments by sending State inspectors according to the demand of the organizations;
- (3) By sending mobile verification laboratories to different districts;
- (4) By creating temporary centres in rural districts and towns where there are no permanent verification agencies.

The aim of the inspection carried out by verification agencies of the State Service of

Measures and Measuring Instruments is to ensure accuracy, good working conditions and proper use of measures and measuring instruments in the national economy. The inspection covers the following points :

- (1) Control of technical conditions and accuracy of measures and measuring instruments and the use of appropriate methods of measurement;
- (2) Control of appropriate use of measures and measuring instruments in accordance with the prescribed limits of accuracy and ranges of measurements;
- (3) Control of observance of the dates fixed for submitting measures and measuring instruments to State verification and dates fixed for the verification carried out by enterprises themselves;
- (4) Observance of the State decrees of the USSR on measures and measuring instruments, and also rules and instructions of the State Service of Measures and Measuring Instruments.

In case inaccurate, damaged or improperly used measures and measuring instruments are revealed, the Act provides instructions for their correction and these instructions are obligatory.

The scope, order and terms of inspection of measures and measuring instruments are determined by the chiefs of the local verification agencies of the State Service taking into account proper technical conditions of measures and measuring instruments in the region served by this verification agency.

Along with the work carried out by the agencies of the Service of Measures and Measuring Instruments in accordance with State Decree of the USSR all the enterprises, organizations and agencies which have measures and measuring instruments are obliged to carry out the verification in due time, to observe the proper use of measures and measuring instruments, to withdraw from use inaccurate and non-verified measures and measuring instruments and those which need repairs.

Special bodies (measurement laboratories, control verification centres, measuring instruments production shops and others) which are called Production Supervision Agencies carry out in practice the supervision of proper technical conditions and proper use of measures and measuring instruments used by enterprises, organizations and agencies.

The organizational structure of the Production Supervision Agencies depends upon various conditions such as the number of measuring instruments at the disposal of the enterprise, operating conditions, i.e. frequency of their use, classes of accuracy according to which the enterprise works, availability of premises which meet the re-

quirements for verification of measures and measuring instruments, skill of the personnel and so on.

All the Production Supervision Agencies work under the control of different institutions of the State Service of Measures and Measuring Instruments.

The above system of organization for State and Departmental supervision of measures and measuring instruments, the implementation of the metric system of measures and the development of scientific research on precise measurements in various fields of science and industry, create the necessary pre-requisites for further technical progress of the national economy of the USSR.



Railway Commercial Departments go Metric from April

The Commercial Departments of the Indian Railways will go over to the metric system of weights and measures with effect from 1 April, 1960.

From that date, passenger fare tables will give fares in terms of kilometres instead of miles, one kilometre being equal to about 0.62 mile.

The passenger fares tax, instead of being based on the distance zones of upto 15, 30 and 500 miles will now be based on distance zones of 25, 49 and 805 kilometres.

The unit of weight for purposes of freight charges, for goods, parcels and other traffic, will be a quintal (100 kilograms), one quintal being equivalent to about two maunds and 27 seers.

The rates for coal will similarly be notified per 'metric tonne' instead of per ton as at present, the 'metric tonne' representing the weight of 1,000 kilograms, equal to approximately 0.98 ton.

The senders of consignments can, however, if they so desire, show the weight of consignments in the forwarding notes in the existing units i.e. tons, maunds and seers. The charges will be invoiced by the Railway staff after converting the weights into metric units.

The change-over to the metric system of weights and measures is expected to result in slight variations in fares and freight due to rounding off. The variations, which will be upward or downward, are inescapable and have been kept down to the minimum.

Printed passenger fare tables and freight rate tables, giving rates and fares for different distances in kilometres, are expected to be available for sale early in March 1960.

Distances on the mileage posts along the Railway track are being changed over gradually to kilometres.

Also, markings on wagons are being changed to metric units.

Fixing of Ceiling Prices of Weights in Delhi

H. L. MEHANDRU

Controller of Weights & Measures,
Delhi

THERE will be no two opinions that a fair fixation of ceiling prices of the new metric weights based on mutual agreement between the manufacturers, dealers and the Government administration, is a necessity for the trading public in Delhi as in any other place. This is especially so when there is no legal provision empowering the Administration to fix the prices under the Rajasthan Weights and Measures (Enforcement) Act, 1958 as extended to the Union Territory of Delhi. A fair settlement not only contributes towards dispelling fear and mistrust about the metric reform, but also creates confidence in the public. Such a settlement required a study of errors and lapses of the past with a view to avoid them in future or to prevent a repetition of the bitter memories of 1953 which saw prices of weights and measures soaring high.

Under the circumstances, personal contacts established with the manufacturers in a spirit of co-operation for ironing out differences by proper analysis led to useful results.

Price Fixation Committee

The series of meetings of the two-man Technical Committee comprising of Shri K. Srinivasa Rao, Development Officer (Metric), representing the Ministry of Commerce

and Industry, Government of India and the author acting as Convener, led to very useful results. The formation of this Committee was the result of a meeting of manufacturers called by the Director of Industries and Labour, Delhi, in August 1959 in connection with the working out of the break-up of the cost of commercial metric weights.

The first meeting of the Technical Committee was held on 22 September 1959. Representatives of nine manufacturing concerns of cast iron weights in Delhi and New Delhi were present at the meeting.

The urgent need to work out a suitable price structure was emphasized in the meeting in view of the suspicion lurking in the minds of the trading public. A scrutiny of the various factors of production such as cost of raw materials, cost of labour in various departments, services like coke and electricity, machinery costs, overheads etc. was made to arrive at the total cost. The break-up costs submitted by all the manufacturers were examined separately and the manufacturers were given an opportunity to revise their figures, wherever necessary. This was in their own interest in view of the fact that manufacturers from outside Delhi would also be in a position to push weights into the Delhi

market by complying with certain obligations under the Act and the Rules.

Ceiling Prices Fixed

The break-ups from the manufacturers were analysed on the above basis and it was unanimously agreed that a profit of 6½ percent may be allowed at the manufacturers' end and the same at the dealers' end. The prices of the cast iron weights were then worked out for each piece separately as shown in Annexure A.

One set comprising six cast iron weights from 2 kg to 100 g with one spare 200 g weight was accepted at Rs. 6.50 per set.

The second meeting of the Technical Committee for weights held on 29 September 1959, fixed the prices of metric brass and bullion weights. Annexure B gives the prices fixed for flat cylindrical bullion weights after considering the various factors involved in their production.

The price of a set of stamped brass weights (non-bullion) from 1 kg to 1 g with one spare weight each of 2 g, 20 g and 200 g in each set was worked out by the Committee at Rs. 25.00 at the dealer's end. It may be stated here that the demand for this set of weights is very small. Accordingly, the manufacturers have been allowed a reasonable profit on this set.

The price of a complete set of flat cylindrical bullion weights from 1 kg to 1 g was worked out at Rs. 30.00. The prices were derived as shown in Annexure B.

The price of a set of stamped brass weights normally required by the traders in conjunction with the cast iron weights and consisting of 50 g, 20 g and 10 g, with one spare weight of 20 g in each set, was worked out by the Committee at Rs. 2.00 per set.

The price of a set of stamped bullion milligrams weights from 500 mg to 1 mg

(200 mg, 20 mg and 2 mg weights to be two in each set) was worked out at Rs. 6.00 per set at dealers' end.

The fixation of prices of bullion weights (cylindrical with knob) was not taken up as the demand for them is too meagre to warrant active consideration.

Provision for Future Variation

Provision is preventing. An important factor in any agreement is the provision it contains for compensating for any upward or downward trends in the prices of the raw materials in the future. That means the ceiling price is based on the present prices of raw materials and other related factors. In other words, the price may have to be revised to provide for cost increase or decrease arising from such factors as Government legislation, prices of raw materials, freight charges and wage bill, which vary from State to State.

The manufacturers were assured of all help from the authorities for an adequate supply of raw materials to them at reasonable cost.

Condition of Licence

The main provision for sustaining this mutually agreed price structure is that henceforth it will be a condition attached to the licence of a manufacturer or a dealer to abide by the prices. This step was necessary as there was no provision about the fixation of price in the Rajasthan Weights and Measures (Enforcement) Act, 1958. The opportunity that has been afforded to the manufacturers outside Delhi enabling them to push their weights in Delhi through licensed dealers in Delhi is bound to arrest any tendency of the local manufacturers towards 'monopolistic' hold over the local market.

It is hoped that this agreement and arrangement arrived at in a spirit of reasonableness would ensure justice to everyone.

FIXING OF CEILING PRICES OF WEIGHTS IN DELHI

ANNEXURE A

Break-up of Cost of Cast Iron Weights

Denomination/Head of Cost	50 kg	20 kg	10 kg	5 kg	2 kg	1 kg	500 g	200 g	100 g
	(Rs.)	(Rs.)	(Rs.)	(Rs.)	(Rs.)	(Rs.)	(Rs.)	(Rs.)	(Rs.)
(1) Cost of Pig Iron & Cast Iron	12.56	5.00	2.50	1.37	0.68	0.31	0.25	0.16	0.04
(2) Hard Coke	1.50	0.75	0.37	0.31	0.10	0.06	0.06	0.03	0.02
(3) Moulding Charges ..	2.50	1.25	0.62	0.31	0.10	0.06	0.06	0.05	0.02
(4) Fitter's Charges ..	0.50	0.18	0.09	0.09	0.05	0.06	0.06	0.04	0.02
(5) Molasses & Sand ..	1.00	0.50	0.25	0.15	0.09	0.06	0.06	0.05	0.01
(6) Chipping Charges ..	0.25	0.12	0.12	0.12	0.05	0.06	0.05	0.04	0.01
(7) Lead Charges	0.63	0.31	0.25	0.15	0.09	0.06	0.05	0.06	0.02
(8) Stamping Charges ..	0.50	0.50	0.50	0.50	0.50	0.50	0.15	0.15	0.15
(9) Cartage to & From Controller's Office ..	0.75	0.33	0.25	0.10	0.05	0.06	0.07	0.03	0.01
(10) Round Handle ..	1.00	0.50	0.31	0.17	0.00	0.00	0.00	0.00	0.00
(11) Painting Charges ..	0.50	0.25	0.25	0.12	0.06	0.03	0.03	0.03	0.01
(12) Rejection	0.31	0.25	0.09	0.15	0.08	0.04	0.03	0.02	0.01
(13) Manufacturer's Profit ..	1.25	0.74	0.45	0.18	0.12	0.09	0.06	0.04	0.01
(14) Dealer's Discount ..	1.75	0.82	0.45	0.28	0.18	0.11	0.07	0.05	0.02
(15) TOTAL PRICE ..	25.00	11.50	6.50	4.00	2.15	1.50	1.00	0.75	0.35

ANNEXURE B

Break-up of Cost of Flat Cylindrical Bullion Weights Bullion Metric Weights (Flat) from 1 kg to 1 g (Weights of 200 g, 20 g & 2 g to be two in each set)

Serial No.	Head of Cost	Rs.
(1) Cost of Brass 3 sr. 2 ch. (Rs. 3.75 per sr.)		11.75
(2) Casting Charges		1.50
(3) Expenditure Towards Coal, Oil, Sand & Molasses, and Crucibles		1.37
(4) Filing Charges		0.37
(5) Scraping Charges		1.50
(6) Lead		0.62
(7) Testing, Adjustment & Stamping of Denominations, Manufacturer's Name etc.		1.25
(8) Verification & Stamping Fee		7.00
(9) Scraping and Rejection in Testing etc. & Expenses for Carriage		0.75
(10) Overhead Expenses, Depreciation in Machinery & Casting & Rental Value of the Premises		0.50
(11) Manufacturer's Profit @ 6½ %		1.64
(12) Dealer's Commission @ 6½ %		1.75
	Total Cost ..	30.00

Metric Monsoon

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INDIA is the best example of a monsoon country. The advent of the rains every year fairly regularly is a feature of the climate of the country. Naturally many facts about the monsoon are widely known. We may try to list a few of these. The annual rainfall steadily decreases from East to West as one travels across North India. In the Khasi Hills in Assam we have Cherrapunji with an average annual rainfall of over 1000 cm; the rainfall steadily decreases to an average annual rainfall of less than 12.5 cm in the extreme northwest. This is more clearly brought out by the normals of the annual rainfall in each of the political divisions of the Union shown in Table 1.

TABLE 1
NORMAL ANNUAL RAINFALL OF THE MAIN
POLITICAL DIVISIONS OF INDIA
(1951)

Political Division	Annual Rainfall in mm
Assam	2,508.0
West Bengal	1,713.7
Orissa	1,476.5

Bihar	1,276.1
Uttar Pradesh	992.9
Punjab	611.4
Rajasthan	529.1
Madhya Bharat, Bhopal and Vindhya Pradesh	961.9
Madhya Pradesh	1,252.2
Bombay	1,127.8
Hyderabad	905.0
Madras	1,349.8
Mysore	922.0

The steady decrease mentioned above can be clearly seen from the figures shown in Table 1 which also shows the changed pattern of the rainfall variation in the Peninsular India. A more graphic picture of the distribution of the annual rainfall amounts can be obtained from the isohyets drawn on the annual map of India shown in Fig. 1.

METRIC MONSOON

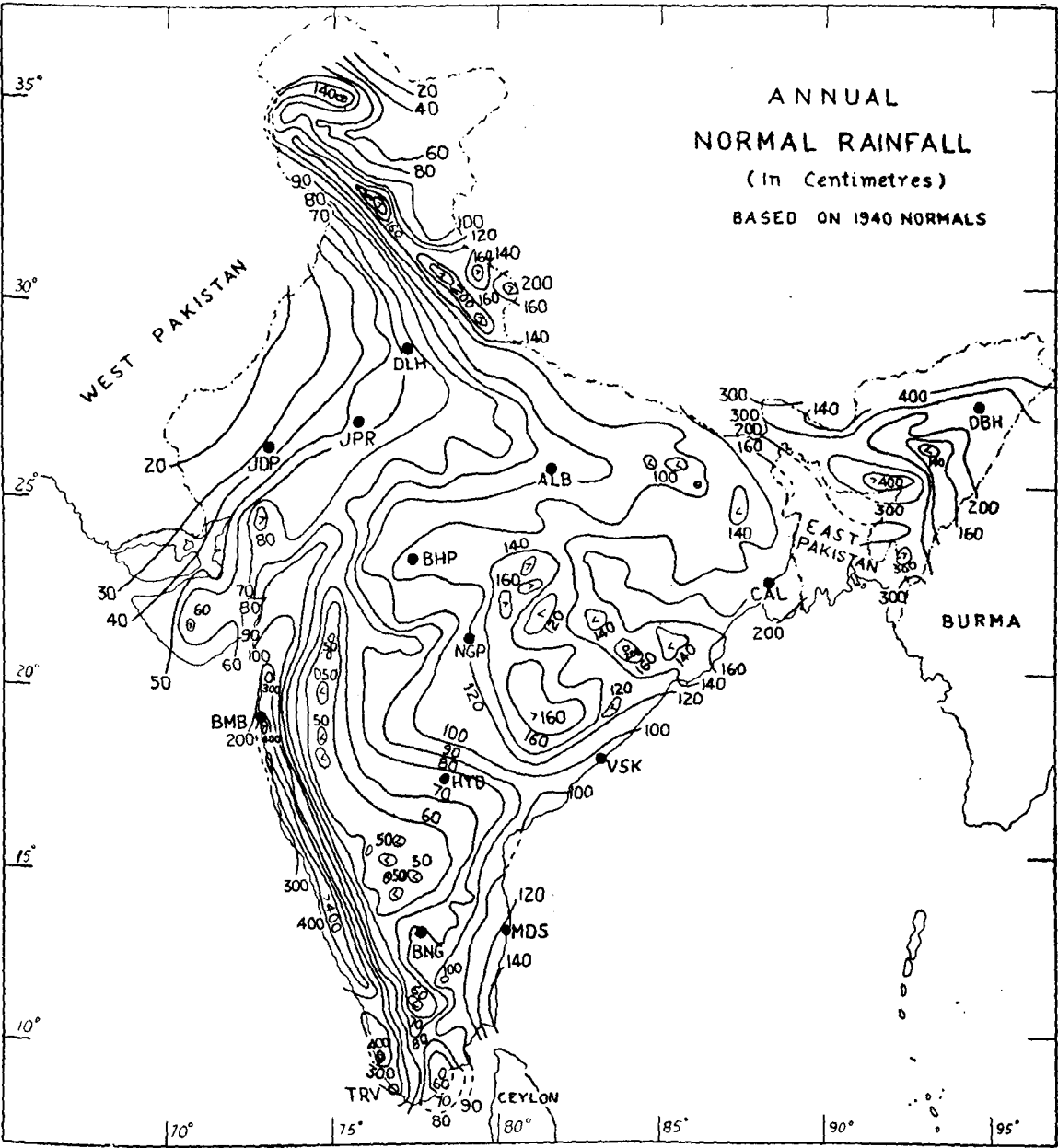


Fig. 1—Annual Normal Rainfall—in Centimetres

It is fairly well known that a line joining the places Visakhapatnam, Bangalore and Mangalore divides the Peninsula very roughly into portions which are markedly different in their seasonal rainfall behaviour. Also that winter rainfall and snowfall over the Himalayas, particularly in Kashmir, and in Northern India, especially in the Punjab plains, is caused by the so-called western disturbances.

Variations in Rainfall

Despite the regularity of the monsoons, one notices considerable variations in the rainfall over the country from year to year. The variations may be temporal, such as the early arrival of the rains, late withdrawal, early withdrawal, prolonged or intermittent interruptions in the rains, etc., or spatial variations in the amounts of annual or seasonal rainfall over different parts of the country during the same year. It is not at all uncommon to find years during which contiguous or nearby divisions have received very different amounts of rainfall with the result that one division has well above and the other markedly below the average amounts of rainfall. Specific examples are not quoted here, because examples of such years are quite numerous. Therefore, keeping these variations in view, one has to stretch one's perspective in terms of the extent of the periods of record of rainfall and take a large number of years to be able to get any idea of the average rainfall. It is only then that the irregularities are smoothed out. However, one must remember that the picture so obtained may vary considerably from the picture obtained in any particular year.

It may be of interest to mention here that according to the latest recommendation of the Climatological Commission of

the World Meteorological Organization (W.M.O.) based on a decision of the International Meteorological Organization (I.M.O.) meeting at Warsaw in 1935, rainfall normals for international use are to be based as far as possible on 30 years' data from 1901 to 1930 (*Recommendation 15(CC1-I) I Session, Washington, 1953*). Data for other periods, either longer or shorter, will be used for working out 'averages'. Of course, option is given to the different member nations to name their years for the national normals. The map in Fig. 1 showing the annual rainfall in India has been drawn on the basis of 1940 normals (or 'averages' according to the W.M.O. definition). Most of the stations, which include meteorological observatories as well as large number of raingauge stations maintained by the State authorities, have rainfall records for period 1891—1940 or even longer.

An examination of the annual rainfall map (Fig. 1) will show that in some parts of the country the space variation of rainfall is exceptionally large. The seasonal rainfall also confirms this. As an illustration, let us consider the rainfall at the following pairs of stations.

Bhagmandala and Mercara, two places separated by a straight distance of 24 km have an annual rainfall of 6 219 and 3 237 mm respectively. The rainfall for each of the months June to September, given in Table 2, shows similar differences. Another pair, as an example, is Gaganbavada and Kolhapur, separated by a direct distance of 66 km. The annual rainfall figures are 6 064 and 1 032 mm respectively. The monthly figures can be seen in Table 2. These examples are rather on the extreme side as will be seen from the rainfall map (Fig. 1) in which extensive areas with nearly equal rainfall can also be seen.

TABLE 2
RAINFALL AT NEIGHBOURING PLACES

Places	Distance apart [in km]	Rainfall in mm				
		June	July	August	September	Annual
Bhagmandala & Mercara	24	1,348.0	2,204.5	1,269.7	487.9	6 219
Gaganbavada & Kolhapur	66	1,200.1	2,177.8	1,594.6	745.7	6 064
		160.5	334.0	186.9	105.2	1 032

If instead of taking seasonal or monthly rainfall we consider shorter periods of, say, a day or so, the space variations are still more striking. The effect is noticeably different from area to area and the part of the season and, of course, depends on the nature of the precipitation i.e. showery type or continuous heavy rain or intermittent rain from extensive cloud layers. Generally speaking, we may say that when the main contribution to the rainfall amount is from showery type of precipitation, the variations are more pronounced. The 24 hours' rainfall on 20 July 1959, a date chosen at random, recorded at Amausi (Lucknow) was 91 mm while that in the city was 36 mm. The two raingauges are separated by a distance of approximately 10 km.

In Fig. 2 is shown the 24 hours' rainfall occurring on 3 October 1955 at Bombay and its immediate neighbourhood. Isohyets have been drawn on the map at intervals of 20 mm. The map shows clearly how the short period rainfall is localized even within this restricted area.

In order to illustrate this point further, we have examined 24 hours' rainfall recorded at Safdarjung (aerodrome) and that recorded at the Delhi University raingauge for the period

1952—1954, confining only to the months June to October. The two raingauges are separated by a straight distance of approximately 11 km. Only days on which rainfall amounts equal to or in excess of 0.3 mm occurred at both the places were counted. A scatter diagram was prepared with these pairs of rainfall values. The scatter of the points in the

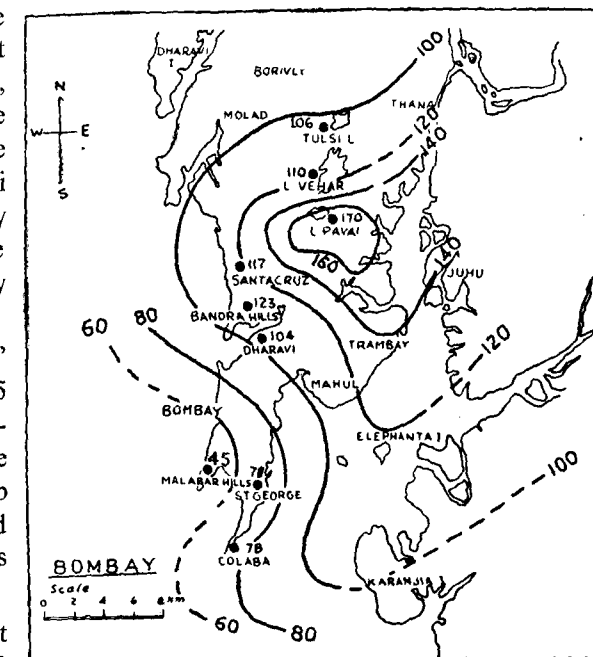


Fig 2. 24 hrs rainfall (in mm) ending 0030 hrs on 3-10-1955 and isohyets.

diagram (Fig. 3) clearly shows how different the rainfalls at the two places were during the same 24 hour-period, from which one infers how localized the rainfall can be. A large number of studies with rainfall data from other parts of India show the same thing. The effect becomes more marked as the amount of the rainfall increases.

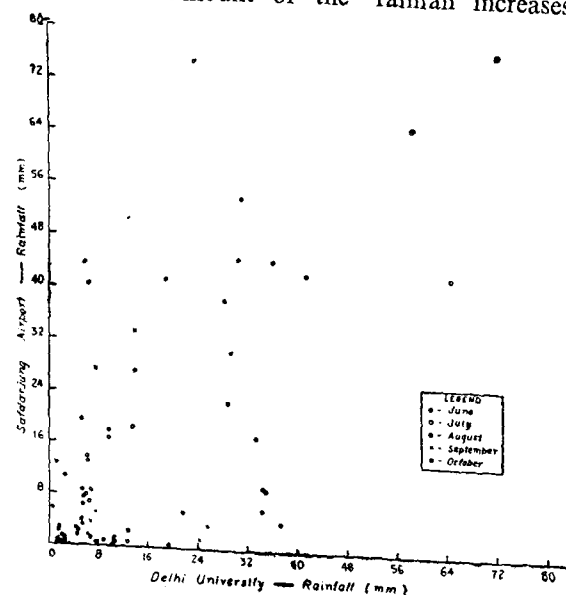


Fig. 3—Scatter Diagram of Rainfall in Delhi University and Salda-jung Airport.

It will not be necessary to labour the point further because in cases of showery type of precipitation the active rain centre

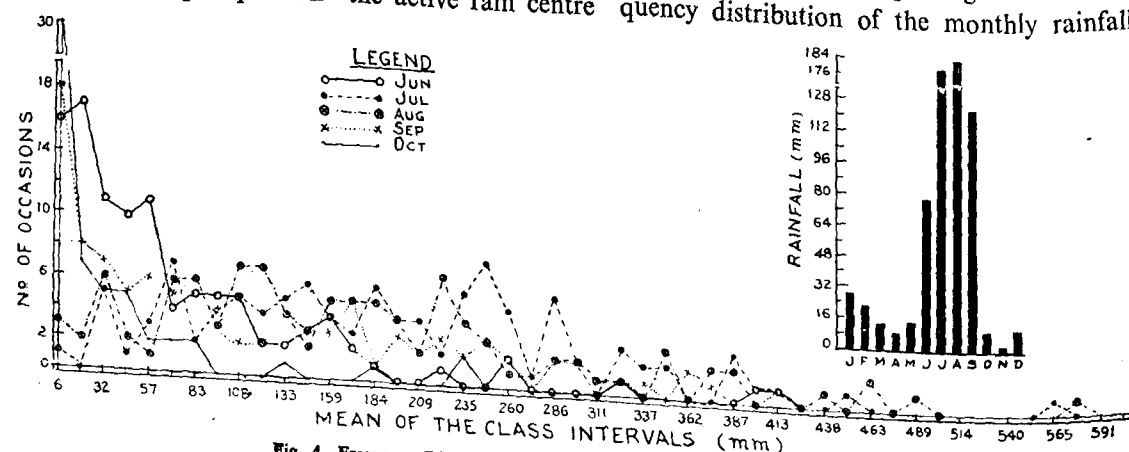


Fig. 4—Frequency Distribution of Rainfall in Delhi for June to October.

is limited in its lateral dimensions and passes through a life cycle of very roughly half an hour to three hours duration during which the rainfall intensity waxes to its maximum and wanes to its minimum or its cessation. From the above it is easy to see why in such cases the record of a very large number of years has to be considered, so that all random and irregular variations are smoothened out from the averages as far as possible.

Temporal Variations

A reference was made to temporal variations of rainfall in India. If we consider the rainfall at one place over a large number of years we shall find that the annual rainfall recorded varies from year to year. This is noticed even after all variations on account of changes in exposure of the raingauge etc. have either been eliminated or accounted for. This effect is more clearly seen if we consider the rainfall at one station for different months instead of the year as a whole. The rainfall records at Delhi for the period 1844 to 1855 and 1859 to 1957 i.e. 111 years, were examined and the monthly rainfall each year for the principal rainy months i.e. June to October were classified within specified rainfall intervals. Fig. 4 gives the frequency distribution of the monthly rainfall

for each of these months. In the inset The frequency distribution curves clearly the normal monthly rainfall of Delhi show the wide variations of the monthly rainfall from one year to another.

Fig. 5— DATES OF ONSET OF S.W. MONSOON

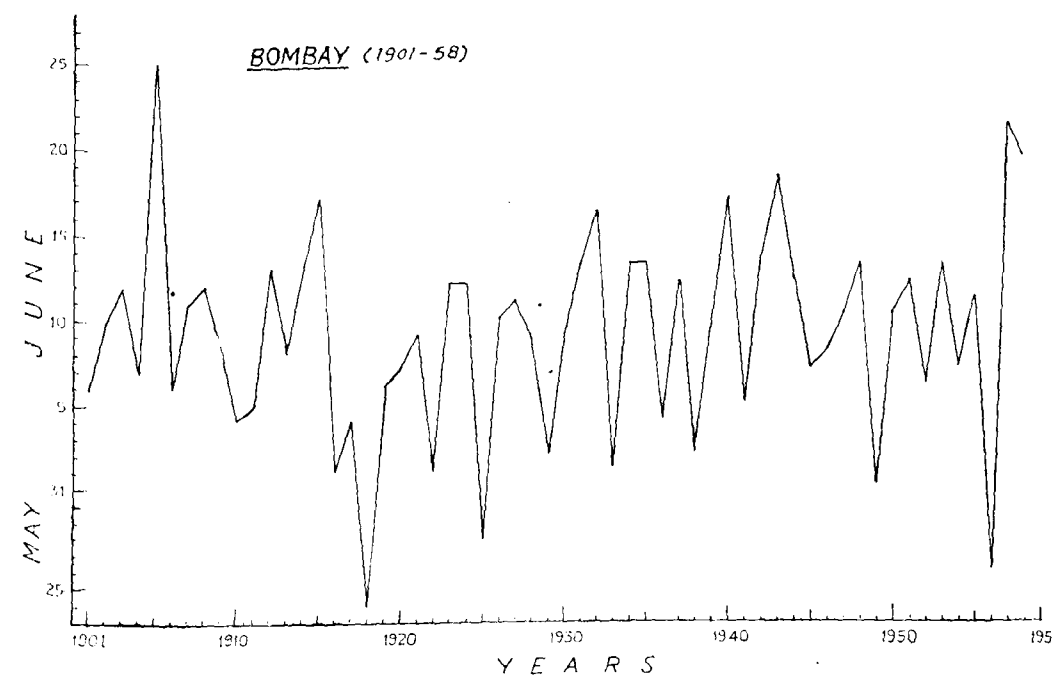
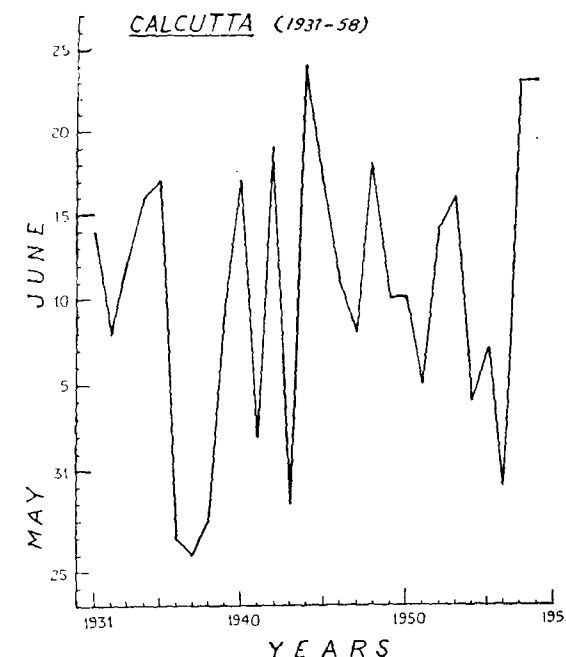


Fig. 5—Dates of Onset of Southwest Monsoon in Calcutta and Bombay.

Onset of Southwest Monsoon—Criteria

Another aspect of the southwest monsoon which attracts a great deal of public attention is the date of onset of the monsoon. The India Meteorological Department has published maps showing the normal dates of onset and withdrawal of the southwest monsoon over India. These maps have been prepared on the basis of five-day normals of accumulated rainfall of stations grouped into areas of about 2 degrees of latitude squares. The middle date of the five-day period showing the characteristic monsoon rise in the rainfall curve is taken as the date of onset of the monsoon. The onset of the monsoon even at the coastal stations of India is not quite sharp on many occasions. The monsoon rain often merges with the pre-monsoon thundershowers. The criterion of a rainy day *i.e.* day with rainfall greater than 2.5 mm in use in the India Meteorological Department is not of any help in deciding on the date because the rainfall amounts caused by pre-monsoon thundershower activity is often much greater than this amount. Also no criteria on the basis of persistence of rainfall of general validity can be worked out. However, once the monsoon has set in over an area the thunderstorm activity decreases considerably and the spatial distribution of the rainfall becomes

wider. At coastal stations there is a change in the nature of cloudiness as well as the state of the sea.

The southwest monsoon sets in over the West Coast with a relatively sharper beginning than over the Bengal area. Therefore, the dates of the onset in respect of Bombay can be worked out with greater confidence. In Fig. 5 the dates of onset of the southwest monsoon from the year 1901 to 1958 at Bombay (an area of radius 150 to 250 km around Bombay) are shown. The dates of onset of southwest monsoon at Calcutta for the year 1931–58 are also shown for comparison in the same figure.

Although precipitation occurs outside the southwest monsoon season in parts of North India and in the extreme southern parts of the Peninsula, the total amount of water involved in this precipitation is of an extremely lower order of magnitude compared with that of the southwest monsoon. Even the duration of the rain, notwithstanding the persistent foggy and cloudy conditions in Northwest and North India, are considerably shorter as will be seen from the following figures of the normal number of rainy days during the periods June–September and November through February at a few places in North India.

TABLE 3

NUMBER OF RAINY DAYS DURING JUNE TO SEPTEMBER AND NOVEMBER TO FEBRUARY AT SOME SELECTED STATIONS

Season	No. of Rainy Days at					
	Ludhiana	Simla	Bareilly	Calcutta	Gauhati	Dibrugarh
Southwest Monsoon June–September	23.0	58.5	37.3	61.9	52.4	75.0
Winter November–February ..	7.2	14.0	5.1	4.0	5.4	13.8

METRIC MONSOON

Northeast Monsoon

In South India the so-called northeast monsoon gives rainfall during the winter months. An examination of the distribution of the rainfall through the different months clearly shows the different nature of the distribution of precipitation. Fig. 6 gives the monthly rainfall at Kodaikanal and Nagpur (outside the sphere of northeast monsoon) for showing the difference.

If in the above description of the rainfall in India the aspect of the variability of the rainfall appears to have been overstressed, the justification lies in the fact that this aspect is not sufficiently widely recognized. Also because it is precisely these minor and peculiar variations, together with the violent departures, that are to a great extent at the root of the anxieties and despairs in the hearts of hundreds of millions of inhabitants of this subcontinent of ours.

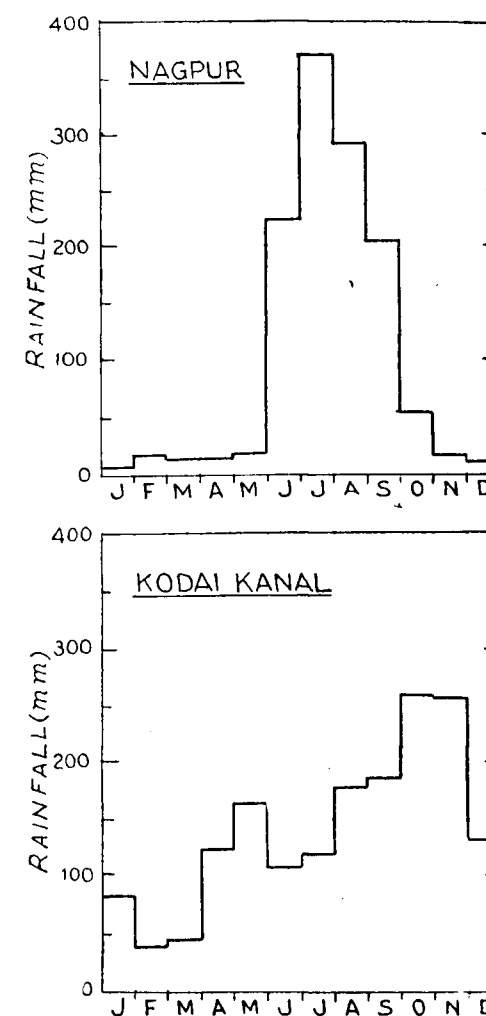


FIG. 6.

Fig. 6—Monthly Rainfall at Kodaikanal and Nagpur.

Abbreviations for Metric Units

IN the July 1958 issue of *Metric Measures* (p 21) an article on the above subject was published. Since then the Government of India have notified the secondary units of weights and measures and the State Governments have published Weights and Measures (Enforcement) Rules in which the abbreviations for the legalized primary and secondary units are given.

Units Defined by Central Act

The units defined by the Standards of Weights and Measures Act, 1956, are :

Length	—metre
Mass	—kilogram
Area	—square metre
Volume	—cubic metre
Capacity	—litre
Time	—second
Electric	
Current	—ampere
Luminous	
Intensity	—candela
Temperature	—°C

Secondary Units Centrally Notified

Under Section 12 of the Standards of Weights and Measures Act, 1956 the following secondary units were notified by the Central Government :

(1) Secondary Units in Relation to Metre

Micron	=	10 ⁻⁶ metre
Millimetre	=	10 ⁻³ metre
Centimetre	=	10 ⁻² metre
Kilometre	=	10 ³ metres

(2) Secondary Units in Relation to Kilogram

Milligram	=	10 ⁻⁶ kilogram
Gram	=	10 ⁻³ kilogram
Quintal	=	10 ² kilograms
Tonne	=	10 ³ kilograms

(3) Secondary Units in Relation to Litre

Millilitre	=	10 ⁻³ litre
Kilolitre	=	10 ³ litres

Abbreviations Prescribed by States

The Weights and Measures (Enforcement) Rules prepared by the State Governments require that if the denomination or capacity is not given in full, the following abbreviations only should be used for markings on weights, measures and weighing and measuring instruments, as also for indicating the contents of various packages etc. As these abbreviations are based on international practices approved by the International Bureau of Weights and Measures and the International Organization for Standardization, they may be taken as being universally accepted and used for other purposes such as scientific publications, statistical data, teaching in schools, colleges and technical institutions i.e. wherever abbreviations have to be used. The principles of abbreviation explained in the July 1958 issue remain unchanged. The approved abbreviations are :

(1) Decimal Multiples and Submultiples

Prefix	Value in Terms of Unit	Abbreviation
kilo	.. 1 000	k
centi	.. 0·01(10 ⁻²)	c
milli	.. 0·001(10 ⁻³)	m
micro	.. 0·000 001(10 ⁻⁶)	μ

ABBREVIATIONS FOR METRIC UNITS

(2) Weights

Denomination	Value	Abbreviation
tonne	.. 1 000 kg	t
quintal	.. 100 kg	q
kilogram	1 kg	kg
gram	.. 1 g	g
milligram	.. 1 mg	mg
carat	.. 200 mg	c

(3) Capacity

Denomination	Value	Abbreviation
kilolitre	.. 1 000 l	kl
litre	.. 1 l	l
millilitre	.. 1 ml	ml

(4) Volume

Denomination	Value	Abbreviation
cubic metre	.. m ³	m ³ or cu m*
cubic centi-		
metre	cm	cm ³ or cu cm*
cubic milli-		
metre	.. mm	mm ³ or cu mm*

(5) Length

Denomination	Value	Abbreviation
kilometre	.. 1000 m	km
metre	.. 1 m	m
centimetre	1 cm	cm
millimetre	.. 1 mm	mm
micron	.. 1/1000 mm or 10 ⁻³ mm.	μm

(6) Areas

Denomination	Value	Abbreviation
square kilo-	.. 1,000,000 m ²	km ² or sq km*
metre		
square metre	1 m ²	m ² or sq m*
square centi-	.. 1 cm ²	cm ² or sq cm*
metre		
square milli-	.. 1 mm ²	mm ² or sq mm*
metre		

*Both these abbreviations are current, but the first set should preferably be used. The former abbreviation is used more commonly internationally than the latter.

It will be noticed that units like hectogram, decametre, centilitre, decimetre are not recognized by law in India for general use, because such units and abbreviations are rarely, if at all ever, required for use in transactions. They are mainly useful in schools for teaching the decimal gradations of the metric system.

Rules for Abbreviations

If the following rules are applied the correct use of abbreviations would be ensured :

(1) Do not make any change, such as addition of 's' to indicate plurality e.g. write 1 kg, 10 kg, 20 g, 5 g, 10 t, 20 ml, 27 l, 165 km, 2 mm, 100 cm³, 66 km².

(2) Do not capitalize the abbreviations. For example, do not write 1 Kg, 2 Kg, 20 MM, 50 MM; the right way is to write 1 kg, 2 kg, 20 mm, 50 mm, etc.

The following examples of the titles of some International Recommendations issued by the International Organization for Standardization may serve for guidance :

- ISO RECOMMENDATION R-74
IMAGE PRODUCED BY CAMERA
APERTURE AND PROJECTED
IMAGE AREA FOR 8 mm FILMS.
- ISO RECOMMENDATION R-71
PHOTOGRAPHIC SOUND RE-
CORD ON 16 mm PRINTS.
- ISO RECOMMENDATION R-41
COVERS FOR DECK OPENINGS
FOR 220 mm PUMPS.

(3) Do not use any other abbreviations except those given above.

The adoption of the above abbreviations, not only in commercial transactions but in all spheres where their use is required would ensure uniformity of understanding all over India and confer on us the fullest benefits of the metric system in this sphere.

Pricing Units for Wholesale and Retail Trade

At a meeting held in Udyog Bhavan, New Delhi on 27 January 1960, the metric pricing units to be used in the wholesale and retail trade were considered. The recommendations made are given in Annexure 1 and Annexure 2. The meeting was presided over by Shri K. V. Venkatachalam, Joint Secretary, Ministry of Commerce & Industry, New Delhi and was attended by representatives of the Directorate of Marketing and Inspection, Nagpur, Directorate of Storage and Inspection, Ministry of Food and Agriculture, New Delhi, Federation of Indian Chambers of Commerce & Industry, New Delhi, Jute Commissioner, Calcutta, Indian Standards Institution, New Delhi.

The proposals made earlier by the Ministry of Commerce and Industry were circulated for views to all trade and industry associations, State Governments, Central Ministries, State Marketing Officers, Controllers of Weights and Measures and others interested in the subject. The comments received were discussed.

Units for Pricing

One of the important questions raised at the meeting was about the feasibility of adopting 50 kilograms as a unit for wholesale pricing. The general opinion was that fractional units are not usually used in trade. Moreover, even if a unit of 50 kg was accepted it could only be for a short while in the

immediate future and again the change to one quintal would have to be made. That would mean double hardship. In view of the long-term interest it was thought undesirable to recommend 50 kg as a unit for pricing. The transitional difficulty of using a unit which was about 2½ times the maund could be overcome by emphasizing that fact. For some time to come the prices should be quoted in both the present unit and the recommended metric unit so as to get accustomed to the significance of the new unit.

In order to avoid confusion between the various 'tons' it was recommended that the term 'metric tonne' may be used for some time.

Containers

As for the contents of jute packages, it was decided that the Jute Commissioner should consult the organizations directly concerned with packing such as Agricultural Marketing Adviser, Food Ministry, Federation of All India Foodgrains Dealers' Association and the like. The metal containers for wholesale and retail trade were already being standardized by the Indian Standards Institution and paper packages would present little difficulty in changing over.

Annexure 1 and Annexure 2 give the summaries of the representative recommendations.

PRICING UNITS FOR WHOLESALE AND RETAIL TRADE

ANNEXURE 1 Metric Pricing Units for Wholesale Transactions

Serial No.	Commodity	Metric Unit
(1) Gold		1 gram (g)
(2) Grocery	Cardamoms, pickles and jams, dry mangoes.	
Confectionery	Biscuits, sweetmeats.	
Textiles & Textile Fibres	Cotton yarn, damaged and seconds cloth, (fents, rags, chindies etc.), raw silk, rayon, silk yarn, raw wool, wool manufacturers (when sold by weight).	
Paints & Chemicals	Paints (if sold by weight), indigo, liquid chlorine.	1 kilogram (kg)
Hides, Skins & Leather	Raw hides, leather (hides and skins)	
Metals	Silver, aluminium sheets, strips and circles, copper and brass wires and utensils.	
Miscellaneous	Tea, meat, camphor tablets, senna leaves, mica.	
(3) Grains and Pulses	Rice, wheat, bajri, jowar, arhar, moong, masur, gram.	
Spices	Black pepper, mustard, chillies, cloves, dhania, dalchini, malethi, turmeric, betelnuts, dry ginger.	
Plantation Products	Coffee, rubber, cashewnuts, cashew kernels, tobacco (raw and manufactured)	
Forest Products	Lac and lac products, gum benjamin and gum arabic, myrobalans, galnuts, soapnuts, avaram bark, konnam bark.	
Textiles & Textile Fibres	Raw cotton, raw jute, raw hemp, coir yarn.	
Oils, Oilseeds & Oilcakes	Vegetable oils like groundnut, linseed, castor, gingelly, mustard, coconut, etc. oilseeds like groundnut, gingelly, rapeseed, copra etc. groundnut cake, castor cake, sesamum cake, coconut cake.	1 quintal (q) (100 kilograms)
Non-Ferrous Metals	Aluminium: ingots, bars, blocks, slabs, billets. Lead: ingots, sheets and strips. Copper: Ingots, blooms, slabs, cakes, tiles, bricks, billets, blisterbars and wirebars, rods, sections and pipes, plates sheets and strips, circles. Brass: ingots, rods, sections pipes, sheets, strips, circles. Zinc: ingots, sheets, strips. Tin: blocks.	
Chemicals:	Caustic soda, bleaching powder, glycerine, soaps, paper, salt.	

Serial No.	Commodity	Metric Unit
Others		
	Sugar, gur, ice, fish, sugarcane, vegetables, tamarind etc.	1 quintal (q)
(4) Minerals	Iron ore, manganese ore, bauxite, coal.	} one metric tonne (t) (1,000 kilograms)
Iron & Steel	Pig iron and iron & steel manufacturers, semis (billets for re-rolling etc).	
(5)	Cotton cloth (mill and handloom, silk and rayon manufactures, woollen cloth.	
(6)	Jute carpets, coir mats and mattings, sheet glass etc.	1 metre (m)
(7)	Timber	one square metre (m ²)
(8)	Paints (when sold by measure), spirits.	one cubic metre (m ³) one litre (l)

ANNEXURE 2

Pricing Units for Retail Trade

For adopting the metric system in retail trade, it is necessary to determine appropriate units in which retail prices may be expressed. The following general principles will be useful :

Weights

- (1) In place of the present units of seer, pound, rattal, viss etc. use the kilogram.
- (2) In place of the tola, use the gram.
- (3) In place of maund or corresponding unit, use the quintal i.e. 100 kg.

Capacity Measures

- (1) In place of seer or gallon or other corresponding measure use the litre.

Length Measures

- (1) Use the metre in place of yard or foot and the centimetre in place of inch.

The following units of prices are suggested for commodities which figure prominently in retail trade.

Units for Retail Trade

Serial No.	Commodity	Metric Unit for Use
(1)	Foodgrains, cereals, pulses, spices, ghee, bread, vegetables, meat, fish, sweetmeats, etc.	1 kg
(2)	Oil for cooking	1 kg or 1 litre depending upon prevalent practice.
(3)	Fruits	1 kg or number depending upon prevalent practice.
(4)	Tea, coffee, sugar, salt etc.	1 kg
(5)	Milk	1 kg
(6)	Cloth and related materials	1 metre
(7)	Prepackaged materials	1 litre
		Preferably in packages of sizes corresponding to the prescribed commercial weights and measures.

Metric System In ISI Convention

THE 5th Indian Standards Convention was held in Hyderabad recently. One of the Sessions, (T4), held on 1 January 1960, was devoted to the 'Preparation of Standards in Terms of Metric Units'. Six papers dealing with the various aspects of the subject were discussed.

Chairman's Speech

The Chairman, Shri S. L. Kirloskar, in his address said that standards were essential for the proper development of industries. Standardization usually followed established industrial practice but in view of the change-over to the metric system in India, metric standards had to be made available sufficiently well before actual production could start. The Indian Standards Institution (ISI) had, therefore, the important responsibility of making available the required standards in the metric system.

In fulfilment of this responsibility the ISI had already prepared metric standards for weights and measures, weighing instruments, raw materials etc. But this was only the beginning and much more had to be done and done expeditiously to cater to the needs of the change-over.

He expressed the view that the problems connected with the change-over were complex, and it may not be possible to lay down a uniform procedure to be followed by different industries though some of the questions involved may be common. He urged that in the process of change-over we should follow, as far as possible, the recommendations made by the International Organization for Standardization (ISO) as also the

standards already published by a number of metric countries, with due modifications to suit Indian conditions.

He then called upon each author to give a brief review of his paper before throwing it open for discussion.

First Paper

A Code for Conversion of Mechanical Drawings with Working Tolerances for Metric Working: Shri K. L. Puri, Inspectorate of Electronic Equipment, Ministry of Defence (CGDP), Bangalore.

The author said that the code he proposed would reduce metric conversion of mechanical drawings to a routine.

In the discussion that followed it was stressed that although the code might not be useful for precision conversion involving interchangeability, it might be used for coarse work.

Expressing his views as a manufacturer, Shri Kirloskar stated that mathematical conversion of existing inch drawings to metric units would not only be a waste of effort but was also likely to lead to confusion in production units. He added that although the Government have decided to change over to the metric system of weights and measures, in the first place a period of change-over had been provided and secondly, by the nature of things, both the systems were bound to continue side by side for some time. Hence, wherever present production is based on inch designs, no purpose would be served by trying to convert them into metric units. Of course, where development to existing inch design or entirely new designs are being evolved, metric unit should be used.

Second Paper

Availability of Indian Standards in and the Pace of Change-over to the Metric System: Lt. Col. R. Janardhanam, Research and Development Organization, Ministry of Defence.

The author, introducing the paper, expressed his dissatisfaction at the slow pace of introduction of the metric system in the country and felt that the pace should be accelerated, if necessary, by force.

During the discussion, the reasons for the apparent slowness of change-over were explained. Once these were overcome, particularly in the procurement of equipment for inspectors, setting up of enforcement organizations and the like, the pace would be accelerated. It was possible that by 1963, the date mentioned by the author for a full change-over, the objective might have been achieved. The year 1960 might see the compulsory adoption of metric weights and measures in a number of areas in the country, in many major industries, and Government departments. The impact on the general public would be substantial.

The representative of the Posts & Telegraphs Department also explained how the P & T were working towards the adoption of the metric system in 1960.

The consensus of opinion was that the pace of change-over was not at all slow.

Third Paper

The Skein Strength of Cotton Yarn in Metric System: R. L. N. Iyenger, V. V. Gupte, Hari Rao Navkal and V. N. Modale, Technological Laboratory of the Indian Central Cotton Committee, Bombay.

Dr. Iyengar said that a new yarn strength index had been defined in the paper. The value of this index was practically equal to the count strength product used at present. The author recommended the new method for universal adoption.

In the discussion it was brought out that the relationship could not be worked out by mere mathematical conversion because of the many variables that go into the determination.

Fourth Paper

Draft Indian Standard Guide for Specifying Metric Values in Standards: Indian Standards Institution, New Delhi.

It was explained that the guide was a Draft Indian Standard proposed by the ISI Directorate. Delegates were requested to send their comments.

Fifth Paper

Essential Characteristics of Engineering Standards: K. S. Namdev Rao, Hindustan Machine Tools Ltd., Bangalore.

The author stressed the importance of standardization of definitions and designations as variations in these gave rise to difficulties in the procurement of the correct type of material.

Sixth Paper

Procedure to be Followed For a Smooth Change-over: Hermann Schmitz, Oberingenieur.

The author said that in order to make the change-over economical, modifications and alterations of technical documents, tools, machines, etc. should be done rationally. He urged that the problems of change-over should be entrusted to the standards departments of companies.

Civil Engineers' Problems

Shri Nadirshah suggested that the ISI should take the following steps for the benefit of the civil engineers:

- (1) Evolve an efficient and quick procedure for making civil engineers think in metric terms.
- (2) Prepare specimen calculations for designing of engineering structural components such as beams, straps, columns in metric terms.
- (3) Prepare drawings of typical structures in metric units.

Conclusion

In his concluding remarks the Chairman stressed the need for evolving new metric designs. The earliest opportunity should be taken to change old designs to new metric units. He emphasized that it was necessary to build up 'metric psychology' in the country and start thinking in metric terms instead of converting old units into new every time we came across them.

News & Views

Metric System for UK ?

It is understood that the British Association for the Advancement of Science is likely to recommend the adoption of decimal coinage and the metric system of weights and measures.

This will be in a report which is being compiled on the advantages and drawbacks of changing over and which is expected to be published in February or March.

Among those who have experimented with the rival systems are businessmen approached by the Eastern Regional Board for Industry. They reported that an experiment showed that the decimal system made it easier to carry out office calculations. Staff made only half the usual number of mistakes and cut the time needed by 30 percent.

Groups of children were put to work on sums involving money. When handling the decimal method, they made 60 percent fewer errors. It also resulted in the problem being solved in less than half the usual time.

Contents of Packages

The Director of Industries, Delhi, has warned the manufacturers of tinned products and traders dealing in packed commodities to declare the net weight of the contents of each package. Otherwise they would be liable to legal action under the Rajasthan Weights and Measures (Enforcement) Act, as extended to the Territory of Delhi.

It had been found that many of the traders dealing in packed commodities did not declare the net weight of the contents on their

packages. Section 14 of the Act made the sale of packages without declaration an offence.

It may be mentioned that similar legal provisions exist in the Enforcement Acts of other States and will be enforced in a like manner in the near future.

Second Conference of Controllers of Weights & Measures

The Second Conference of Controllers of Weights and Measures of the States and Union Territories in India is scheduled to be held from 7-10 March 1960 at Rajgir, Bihar. The Conference will review the progress in implementing the metric system of weights, the organizational aspects of enforcement, publicity, the arrangement to be made for making available commercial weights, the extension of the metric commercial weights to the whole country and other topics. There will also be a symposium on 'Enforcement of weights and measures, with reference to the law, procedure for enforcement and the special difficulties experienced in the situation of this country'.

It will be recalled that the first Conference of Controllers of Weights and Measures was held in September 1959.

Metric System in Drugs & Fertilizers Industries

The Government of India have recently issued notifications for the drugs and fertilizers industries.

According to the notification for drugs, S.O. 2558, dated 5th November 1959, the metric weights and measures will be introduced

from 1 April 1960 'in respect of factories engaged in the manufacture of drugs, in so far as they undertake the sale of drugs or purchase of materials'. The period of change-over will be one year according to notification No. S.O. 2559.

Two notifications S.O. 125 and S.O. 126, dated 31 December 1959 deal with the fertilizers industry. According to S.O. 125, from 1 April 1960 the metric units of mass shall come into force in respect of transactions involving sale and purchase of fertilizers. The period of change-over is one year according to S.O. 126.

Change-over to Metric Weights

In Delhi important local trade associations were approached to convene meetings of their members to decide the dates for the change-over to metric weights. The following trade associations have agreed to the change-over on the dates shown against each of them.

(1) *All Delhi Sarrafa Association, Delhi.*

They have inaugurated from 7 January 1960, but they will use metric weights along with old weights from 1 April 1960, if rates from Bombay and Calcutta are quoted in grams earlier.

(2) *Delhi Milk & Sweets Merchants Association, Delhi.*
1 March 1960.

(3) *Delhi Fruit and Vegetable Merchants' Union, Delhi.*
1 April 1960.

(4) *Federation of Sadar Bazar Trade Associations, Delhi.*
1 April 1960.

(5) *Delhi Glass & Paint Merchants' Association, Delhi.*
1 April 1960.

(6) *Grain Merchants' Association, Delhi.*
1 July 1960.

(7) *Kirana Committee, Delhi.*

1 July 1960.

In Madras, jaggery dealers of Tiruvannamalai and Tirupattur taluks of North Arcot District and the co-operative stores of Vellore town have already begun selling in terms of kilogram weights.

Recently the cashewnut trade of South Arcot district also announced the change-over to metric weights.

Metric system in Cement Industry

The Government of India have decided, in consultation with manufacturers and the State Trading Corporation that metric system of weights should be adopted fully for the sale of cement from 1 July 1960. From that date, cement will be packed in bags of 50 kg. net weight.

The price of cement is at present controlled by the Government of India under the Cement Control Order, 1958 and is for a British ton. The ex-works prices payable by the S.T.C. to the producers and the selling price for a metric tonne of cement will be notified in due course.

Metric system was introduced in the cement industry from 1 October 1958, but in order to give time to the cement producers to prepare themselves for the change-over, it had been decided that both the existing as well as the metric system of weights might be allowed to be used up to a maximum period of two years from that date. This period has also been utilized to familiarize the consumers with metric weights. The weights on cement bags at present are indicated both according to British and metric system.

Book Review

METRIC PADDHATI VYAVAHAR MARG-DARSHAK (*Marathi*)—by Shri R. G. Ukekar, publisher Mrs. Lila Ukekar, Kurha (Achalpur), pp 64, October 1959, price Re. 1.00.

This book has been published for the use of students, teachers and the common man in understanding the change-over to decimal coinage and the metric system of weights and measures. It has been written in simple language. The printing has also been done in large type which facilitates quick reading.

There is a definite necessity for the publication of books or booklets in regional languages explaining the metric system in simple language to students and the general public. Unfortunately, very few such books have so far come out. It is hoped that similar books in the regional languages would also be published in large numbers in the near future when the necessity for such literature will be greatly felt.

The book has been divided into 10 chapters. The first 4 chapters deal with the conversion of old and the new coins. The author has given certain formulae which could be used for the conversion of the old into new coins and *vice versa*. He has also set exercises for readers and given the answers at the end of the book. The remaining chapters deal with metric weights and measures. Here also the author has given many exercises in the conversion of metric

into other units and *vice versa*. At the end of the book pictures of the new weights have been printed. Inclusion of pictures of capacity and length measures also would have been appropriate.

One of the common misconcepts about capacity measures is also reflected in this book. Ordinarily the unit of capacity measure is defined as the volume occupied by a certain weight of pure water, say one kilogram or one seer, under certain conditions. This does not mean that one seer of milk by measure will also weigh one seer. Therefore, the exercises on conversion of capacities to weights, become erroneous unless the specific gravity of the material is also stated.

For the measurement of land areas, the unit of *are*, i.e. 100 m² is usually used. Its higher and lower denominations are the hectare and centiare. The hectare is equal to 100 metre × 100 metre i. e. 10,000 m² and the centiare is equal to 1 metre × 1 metre = 1 m².

The book also includes conversion tables which would be useful to the readers.

Excepting the above points, the book is useful as additional reading for students of higher classes and will prove informative for the teachers. Such efforts deserve to be emulated all over India.

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.)

Brass Sheet and Strip for the Manufacture of Utensils (IS : 422—1959)

The standard covers the requirements for the two different grades of brass sheet and a strip, suitable for the manufacture of household utensils and general brass hollow ware.

Price: Rs. 2.00

Equivalent Metric Units for Scales, Dimensions and Quantities in General Construction Work (IS: 965—1958)

This standard lays down equivalent metric units for the various dimensional values met with in general construction work and at present expressed in the foot-pound (fps) system.

Price: Rs. 5.00

Hot Rolled Mild Steel and Medium Tensile Steel Deformed Bars for Concrete Reinforcement (IS : 1139—1959)

The standard covers the requirements and the methods of test for hot rolled mild steel and medium tensile steel deformed bars for concrete reinforcement.

Price: Rs. 2.50

Steel Tubes for Structural Purposes (IS : 1161—1958)

Indian Standards Institution has published a specification for Steel Tubes for Structural Purposes (IS:1161—1958), which covers the requirements for plain carbon steel tubes for structural purposes, not exceeding 150 mm (or 6 in.) nominal bore.

The specification prescribes standard sizes, weights and properties of structural steel tubes and lays down mechanical tests and specific requirements for hot finished welded steel tubes, hot finished seamless steel tubes, electric resistance or induction butt welded steel tubes.

Price: Rs. 3.00

Mild Steel Tubes and Tubulars (IS : 1239—1958)

The standard covers the requirements of welded and seamless, screwed and socketed mild steel tubes and tubulars and of plain end steel tubes of nominal bores ranging from 6 to 150 mm (or $\frac{1}{8}$ to 6 in.). Three grades of thicknesses have been included in this standard.

Price: Rs. 4.00

Cold Rolled Mild Steel Butt Hinges (IS : 1341—1959)

The standard lays down the requirements regarding material dimensions, manufacture and finish of cold rolled mild steel butt hinges.

Price: Rs. 2.00

Steelyards (IS : 1439—1959)

The Indian Standards Institution has published an Indian Standard Specification for Steelyards (IS: 1439—1959). The standard covers the requirements for steelyards. The standard is one of a series of Indian Standards on commercial weighing instruments being prepared at the instance of the Standing Metric Committee, Government

STANDARDS NEWS

of India, in connection with the introduction of metric system of weights and measures in the country.

Price : Rs. 1.50

Draft Indian Standard for Steel Wire for Manufacture of Machine Screws [DOC : SMDC 5(72)]

While recommending the continuance of the protection to the machine screw industry, the Tariff Commission had recommended, *inter alia*, that the Indian Standards Institution should give high priority to the formulation of standards for iron or steel rods and wire for the machine screw industry.

The Institution has accordingly drafted a specification for Steel Wire for Manufacture of Machine Screw [Doc: SMDC 5 (72)] which covers the requirements for cold drawn mild steel and free cutting mild steel wire suitable for the manufacture of machine screws supplied in the $\frac{1}{4}$ hard and $1\frac{1}{2}$ hard conditions.

Draft Indian Standard for Hard-drawn Steel Wire Fabric for Concrete Reinforcement [DOC : BDC 2(438)]

Steel wire fabric is being extensively used in the country as reinforcement in reinforced concrete work; and there exists a great potential for its further development and use. With a view to covering the requirements and methods of tests for electrically welded hard-drawn steel wire fabric, the Indian Standards Institution has drafted a specification for hard-drawn steel wire fabric for concrete reinforcement [Doc: BDC 2 (438)] which covers the require-

ments and the methods of test for hard-drawn steel wire fabric for concrete reinforcement, consisting of hard-drawn steel wire with cross wires electrically welded to them.

It is expected that the standard would help consumers to determine and the manufacturer to produce the correct quality of the welded fabric.

Draft Indian Standard Rules for Rounding off Numerical Values [DOC : EDC 1(531)]

The Indian Standards Institution has drafted an Indian Standard Rules for Rounding off Numerical Values [Doc: EDC 1(531)] which prescribes rules for rounding off numerical values for the purposes of reporting results of a test, an analysis, a measurement or a calculation, and thus assisting in drafting specifications. It also makes recommendations as to the number of figures that should be retained in course of computation.

This standard was originally issued in 1949 with a view to promoting the adoption of a uniform procedure in rounding off numerical values. However, the rules given referred only to unit fineness of rounding and in course of years the need was felt to prescribe rules for rounding off numerical values to fineness of rounding other than unity. Moreover, the discussion on the number of figures to be retained as given in the earlier version required further elucidation. The present revision is expected to fulfil these needs.

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Licensed Manufacturers, Dealers and Repairers of Weights and Measures (6)

Metric Measures has been publishing lists of manufacturers, dealers and repairers of weights and measures, weighing and measuring instruments licensed by the various States and Union Territories under their respective Weights and Measures (Enforcement) Acts. This is the sixth list in the series. The first list appeared in the March 1959 issue.

Steps are being taken for licensing manufacturers, dealers and repairers in all States and further lists of licensees would be published in *Metric Measures* as this work progresses.

The number in brackets against the name of the State or Union Territory indicates the instalment number of the list for that State or Union Territory. The issues of *Metric Measures* in which previous lists appear are also indicated suitably.

An analysis of the licensees, including the present list, shows that the total number of licensees in 8 States and 2 Union Territories is 161 manufacturers, 604 dealers and 111 repairers. The details of published information are as follows:

Serial No.	State/Union Territory								Licensees		
									Manufacturers	Dealers	Repairers
(1)	Andhra Pradesh	..	..	..	..	..	..	..	25	25	16
(2)	Bombay	..	..	..	..	..	..	..	23	160	52
(3)	Delhi	..	..	..	..	..	..	..	12	54	17
(4)	Kerala	..	..	..	..	..	..	..	4	56	0
(5)	Madras	..	..	..	..	..	..	..	38	74	14
(6)	Mysore	..	..	..	..	..	..	..	9	67	0
(7)	Orissa	..	..	..	..	..	..	..	4	5	0
(8)	Punjab	..	..	..	..	..	..	..	11	155	3
(9)	Tripura	..	..	..	..	..	..	..	0	8	0
(10)	West Bengal	..	..	..	..	..	..	..	35	0	9
									161	604	111

LICENSED MANUFACTURERS, DEALERS & REPAIRERS OF WEIGHTS & MEASURES (6)

DELHI (3)

In the July and September 1959 issues of *Metric Measures* lists of licensed manufacturers, dealers and repairers of weights and measures in Delhi area were published. The following is a list of manufacturers and repairers subsequently licensed by the Delhi Administration.

Manufacturers

Sl. No.	Name and Address of Manufacturer	Details of Articles Manufactured
(1)	Adarsh Engineering Works, 16/2522, Gali No. 8, Beadon Pura Karol Bagh, New Delhi.	Beam Scales, Class 'D'.
(2)	Northern Scales Co., Khanna Talkies Building, New Delhi	Person Weighing Machines.
(3)	Paul Engineering Works, 38, Motia Khan, Jhandewala Road, New Delhi.	Cast Iron Weights.
(4)	Sh. Mohd Afaq, 1362, Haveli Kalu Khawas, Chitli Kabar, Delhi.	Bullion & Brass Weights.
(5)	Sultan Khan Nasim Khan, X/1491, Chitli Kabar, Mohalla Suiwalan, Gali Kotana, Delhi.	Bullion & Brass Weights.

Repairers

Sl. No.	Name and Address of Repairer	Details of Articles Repaired
(1)	Tirlik Singh Vig & Sons, 63, Ghaffaar Market, Karol Bagh, New Delhi.	Cast Iron and Brass Weights and Beam Scales Class C & D.

KERALA (2)

In the November 1959 issue of *Metric Measures* a list of licensed manufacturers and dealers of weights and measures in Kerala State was published. The following is a list of manufacturers and dealers subsequently licensed by the Government of Kerala.

Manufacturers

Sl. No.	Name and Address of Manufacturer	Details of Articles Manufactured
(1)	Brite Engineering Co., Peroorkada, Trivandrum-5	Cast Iron, Brass and Sheet Metal Weights and Capacity Measures.
(2)	Metal Industries, Shoranur	Weights.
(3)	Mighty Scale Co., Kuranchery, Minalur Post, Wadakkancherry.	Platform Machines.

Dealers

Sl. No.	Name and Address of Dealer	Details of Articles Sold
(1)	P.V. Aipoo & Sons, Alwaye	Weighing Instruments.
(2)	C.V. Antony, Proprietor, Varuthunny & Sons, Hardware Merchant, P.O. Road, Trichur.	Weights.
(3)	P. Bhaskara Menon, The Kerala Stores, Market Road, Irinjalakuda.	Weights and Measures.
(4)	Central Scales & Service House No. 202/6, Palai Bazaar, Meenachil Taluk.	Weights, Measures and Weighing Instruments.
(5)	K.B. Chandran Kaliappan Sons, Hardware & Vessel Merchant, Wadakkancherry.	Weights and Measures.
(6)	Chandy Devassy & Sons, High Road, Trichur	Weights and Measures.
(7)	Chittilapilly Chennu & Sons, Merchants, Wadakkanchery ..	Weights and Measures.
(8)	Das Brothers, Hardware Merchants, Muvattupuzha ..	Weights and Measures.
(9)	M. Dasappa Kamath & Sons, Near Town Bus Stand, Talikar Ward, Cannanore.	Weights, Measures, Weighing and Measuring Instruments.
(10)	T.H. Ebrahim Karim & Co., Muvattupuzha	Weights.
(11)	Francis Chandy, High Road, Trichur	Weights, Measures and Weighing Instruments.
(12)	K. Gopala Pillai, Hardware Merchants, Punaloor	Weights and Measures.
(13)	N. Gopala Pillai, Hardware Merchants, Mukkada Bazar, Quilon.	Weights, Measures, Weighing and Measuring Instruments.
(14)	K. Gopalakrishnan, Hardware Merchant, R.S. Road, Ottapalam.	Weights, Measures, Weighing and Instruments.
(15)	Indo Mercantile Industries, 2/27, Irinjalakuda	Weights and Measures.
(16)	P. K. Joseph, Hardware Merchant, High Road, Trichur ..	Weights and Weighing Instruments.
(17)	K.S. & Co. Hardware Merchants, Mukkada, Quilon ..	Weights and Weighing Instruments.
(18)	T.A. Kochappu, J. I. Varkey and Family, Irinjalakuda ..	Weights and Measures.
(19)	C.K. Kochittyathi & Sons, Hospital Road, Ernakulam ..	Weights and Measures.
(20)	P.C. Kunju Vareed, Iron and Stationery Merchant, Market Road, Chalakudy.	Weights, Measures, Weighing and Measuring Instruments.
(21)	M.L. Lonappan, Hardware Merchant, Trichur	Weights and Measures.
(22)	N.A. Lonappan & Sons, Hardware Merchants, High Road, Trichur.	Weights and Measures.
(23)	M. Maitheen Kunju, Chunkasseri & Co., Karunagapally	Weights, Measures and Weighing Instruments.
(24)	The Money's Corporation (Private) Ltd., Sreekanteswaram, Trivandrum-1.	Weights, Measures, Weighing Instruments and Platform Machines.
(25)	Multipurpose Co-operative Society Ltd., No. 3456, Kadakal, Kottarakara.	Weights and Weighing Instruments.

Dealers (contd.)

Sl. No.	Name and Address of Dealer	Details of Articles Sold
(26)	V.N. Nambissan, Fair Price Shop, Ottapalam, Palghat ..	Weights and Measures.
(27)	R. Ponnaiah Chettiar & Sons, Hardware Merchants, Punaloor.	Weights, Measures and Weighing Instruments.
(28)	K.V. Poulo & Sons, General Merchants, Angamally	Weights and Measures.
(29)	Quilon Agencies, Musaliar Buildings, Chinnakada, Quilon	Weights, Measures, Weighing and Measuring Instruments.
(30)	K. M. Radhakrishna Chetty & Bros., Palayam Road, Calicut-1	Weights and Weighing Instruments.
(31)	C.S. Ramakrishnan Iyer, Hardware Merchant, Perintalmanna	Weights and Measures.
(32)	K.A. Rappai, Hardware Merchant, Post Office Road, Trichur	Weights and Measures.
(33)	Scales and Services Markets Road, Cochin	Weights and Weighing Instruments.
(34)	C.M. Syed, Chakkungal, Hardware Merchant, Muvattupuzha	Weights.
(35)	Tholath Ipe Ittoop, Hardware Merchant, Kunnankulam ..	Weights, Measures and Weighing Instruments.
(36)	Trichur Hardware Stores, Post Office Road, Trichur ..	Weights and Measures.
(37)	Vadakkithalakkal Kunju, Vareed Chummer, People's Stores Hardware Merchant, Kunnankulam.	Weights, Measures and Weighing Instruments.
(38)	T.V. Vanchi Aiyar & Bros., Merchant, Market Road, Chalakudy.	Weights, Measures, Weighing and Measuring Instruments.
(39)	P.I.C. Vareed, Kottungal, Chowghat	Weights and Measures.
(40)	T.P. Virupakshi Chettiar, Hardware Merchant, Big Bazar, Palghat.	Weights, Measures, Weighing and Measuring Instruments.

MADRAS (2)

In the November 1959 issue of *Metric Measures* a list of licensed manufacturers and dealers and repairers in Madras State was published. The following is a list of manufacturers, dealers and repairers subsequently licensed by the Government of Madras under the Madras Weights and Measures (Enforcement) Act, 1958.

Manufacturers

Sl. No.	Name and Address of Manufacturer	Details of Articles Manufactured
(1)	British and Eastern Engineering Co., 16, General Patters Road, Madras-2.	Weights and Measures.
(2)	Industrial Machine Tools Co., 25, P.P.V. Nandavan Street, Virudhunagar.	Weights and Measures.
(3)	J.B. Industries, 31, Palam Station Road, Sellur, Madurai	Weights and Measures.
(4)	Kaka Indian Foundry, Tiruthangal, Sivakasi	Weights and Measures.
(5)	Metric Scale Industries and Engineering Works, 16, East Mada Street, Villivakkam.	Weights and Measures.
(6)	Srinivasa Foundry, 127, Agraharam Street, Erode	Weights.
(7)	Venugopal M. Santhiapet, Gudiatnam	Weights.

Dealers

Sl. No.	Name and Address of Dealer	Details of Articles Sold
(1)	O.K. Abdul Ghani Rowthar, Hardware Merchant, Vridhachalam.	Weights and Measures.
(2)	E.A. Alimohammed & Co., 340-42, Rosappachetty Street, Madras-3.	Weights and Measures.
(3)	K.P. Arunachalam & Company, Netaji Chowk, Santhapet, Gudiatham.	Weights and Measures.
(4)	Ayya Nadar V.A. & Sons, 30, Elukadal Agraharam, Madurai-1.	Weights and Measures.
(5)	Ayyaswamy, Bell Studio, 21, Asiliaman Koil Street, Tiruvannamalai.	Weights and Measures.
(6)	Desi S. Jaya Trading Co., 129-B, Car Street, Tiruvannamalai.	Weights and Measures.
(7)	Gordon Woodraff & Company (Madras) Private Ltd., 1/21, North Beach Road, Madras-1.	Weights and Measures.
(8)	Hateembhai, 37/38, Rasappa Chetty Street, Madras-3	Weights and Measures.
(9)	Janakiraman Pillai, V.G. 29, Govindappa Naick Street, Madras.	Weights and Measures.
(10)	Kanak Machinery Mart, 158, Broadway, Madras-1	Weights and Measures.
(11)	M.N.D. Kasiraja Nadar & Co., 373-375, Big Bazar, Virudhunagar.	Weights and Measures.
(12)	Kausal S.N., Standard Steel Iron Foundry, 1836-A, Jeoni Mondi, Laxmi Mills Buildings, Agra.	Weights and Measures.
(13)	Krishnamoorthy Nadar P., East Vanniya Street, V. Marudur, Villupuram.	Weights and Measures.
(14)	P.S. Krishnaswamy Naidu, 48, Kannambadi Street, Vaniyambadi.	Weights and Measures.
(15)	E.A. Lakshmana Nadar & Bros., 90, East Masi Street, Madurai.	Weights and Measures.
(16)	Lakshmipathy Chetty & Sons, 229-230, Bazaar Street, Villupuram.	Weights and Measures.
(17)	K.S. Narasimmalu Naidu, 112, Bazaar Street, Villupuram	Weights and Measures.
(18)	Natesan C. Subramaniaswamy Koil Street, Tittagudi	Weights and Measures.
(19)	Pandi Nadar & Co., Hardware & Paint Merchants, 87, East Masi Street, Madurai.	Weights and Measures.
(20)	V.A. Ponnaiyappa Nadar & Co., 247, East Masi Street, Madurai.	Weights and Measures.
(21)	N. Ponnuswamy Udayar & Sons, Bazaar Street, Ulundurpet.	Weights and Measures.
(22)	Ramakrishnan, 33/2, Katpadi Road, Vellore	Weights and Measures.
(23)	T.S.G. Ramanathan Chettiar, Hardware Merchant, Penadam, Vridhachalam.	Weights and Measures.

Dealers (contd.)

Sl. No.	Name and Address of Dealer	Details of Articles Sold
(24)	Royal Hardware Mart, 30, Devaraja Mudali Street, Madras-1	Weights and Measures.
(25)	P.S. Seshachalam, 26, N.N.S. Bose Road, Main Bazaar Road, Saidapet, Vellore.	Weights and Measures.
(26)	Shaik Abdul Khadar V.M. Old Iron Merchant, 224, Tham-buchetty Street, Madras-1.	Weights and Measures.
(27)	V.A.S. Shanmugasundara Nadar & Sons, 43, Amman Sannidhi Street, Madurai.	Weights and Measures.
(28)	D.K. Srinivasan, 200, Main Bazaar Road, Saidapet, Vellore	Weights and Measures.
(29)	T. S. Swaminathan, 34, Then Mathathi Street, Tiruvannamalai	Weights and Measures.
(30)	V. Thangayel Chettiar 13-A, South Kottai Street, Vridhachalam.	Weights and Measures.
(31)	K. Venkatesan Chettiar, Pakkiri palayam Street, Pudupet P.O. Panruti.	Weights and Measures.

Repairers

Sl. No.	Name and Address of Repairer	Details of Articles repaired
(1)	Bharat Mechanical Engineering Works, Keelayar, Tirukoilur.	Weights and Measures.
(2)	Gordon Woodraff & Co. (Madras) Private Ltd., 1/21, North Beach Road, Madras.	Weights and Measures.
(3)	Industrial Machine Tools Company, Post Box No. 44, 25, P.P.V. Nandavan Street, Virudhunagar.	Weights and Measures.
(4)	Messeys, 4-B, 4-C, North Railway Terminus Road, Royapuram, Madras.	Weights and Measures.

MYSORE (1)

Manufacturers

Sl. No.	Name and Address of Manufacturer	Details of Articles Manufactured
(1)	Annapurna Cooker Company, Basavangudi, Bangalore-4 ..	Brass Weights.
(2)	Bharat Iron Works, Dharwar Road, Belgaum	Cast Iron Weights.
(3)	Machinery and Foundry Works (P) Ltd., Tumkur Road, Yeshwanthpur, Bangalore.	Cast Iron & Brass Weights.
(4)	P.M. Madurai Mudaliar & Sons, Jolly Mohalla, Bangalore-2.	Cast Iron Weights.
(5)	A.A. Maniya, Raviwarpet, Belgaum	Cast Iron Weights.
(6)	Metro Malleable Manufacturer (P) Ltd., Silver Jubilee Park Road, Bangalore.	Cast Iron Weights.
(7)	Sunrise Industries, 5th Main Road, Srirampuram, Bangalore-2.	Cast Iron Weights.
<i>Outside Manufacturers Authorised to sell Weights in Mysore State through their Agent in Mysore State.</i>		
(8)	Avery Company (P) Ltd., Alipur, Calcutta	Cast Iron & Brass Weights.
(9)	S.K. Industries, Hyderabad	Cast Iron Weights.

Dealers

Sl. No.	Name and Address of Dealer	Details of Articles Sold
(1)	Abdul Salam Badal, No. 2-1-93 Mylapur Gate Street, Yadgir.	Weights and Measures and Weighing and Measuring Instruments.
(2)	H.P. Anantharajaiah, General Merchant, Gendhi Bazaar, Hassan.	Weights, Measures and Weighing Instruments.
(3)	Arasikere Taluk, Agricultural Produce Market Committee, Arasikere.	Weights, Measures and Weighing Instruments.
(4)	Avery Company of India Private Limited, 7, Sri Ramakrishna Buildings, 1, Narasimha Raja Road, Bangalore.	Weights, Measures and Weighing Instruments.
(5)	N.S. Baitmangalkar & Co., 66, Vivekanand Asok Nagar, Hubli.	Weights, Measures and Weighing Instruments.
(6)	Belagur Venkanna Sons, Gandhi Bazaar, Shimoga	Weights, Measures and Weighing Instruments.
(7)	A.I. Beleri, Wakil Chawal, Gadag Dist. Dharwar	Weights, Measures and Weighing Instruments.
(8)	Bidar Weights and Measures Dealing & Repairing Co., Near Kunni Chabutra Bidar.	Weights and Measures and Weighing and Measuring Instruments.
(9)	H.A. Bommannaiah & Sons, Brass & Copper Merchants, Gandhi Bazaar, Hassan.	Weights, Measures, and Weighing Instruments.
(10)	Chandra Stores, Stationery and Government Book Seller, Main Road, Ramanagaram.	Weights and Measures and Weighing and Measuring Instruments.
(11)	Denova Traders, 49, Central Street, Bangalore-1	Weights, Measures and Weighing Instruments.
(12)	General Investment & Commercial Corporation Private Ltd., Sree Ramakrishna Building, Post Box No. 25, Udipi (S. Kanara).	Weights, Measures and Weighing Instruments.
(13)	C.R. Gurusiddappa, Iron, Hardware & Paint Merchant, Mandipet, Tumkur.	Weights, Measures and Weighing Instruments.
(14)	S.V. Halavaggli, Tea Merchant, Eastern Gadag, Namjash Road, Gadag.	Weights, and Measures and Weighing and Measuring Instruments.
(15)	N.R. Haranath, Areca Commission Agent, S.P. Mukharji Road, Shimoga.	Weights, Measures and Weighing Instruments.
(16)	K.Y. Iron Stores, Mandipet Tumkur (Mysore Dist.)	Weights, Measures and Weighing Instruments.
(17)	C.R. Kappanna & Sons, General Merchants, Tiptur	Weights, Measures and Weighing Instruments.
(18)	Karnatak Traders, 99, B. Osman Khan Road, Bangalore-2.	Weights, Measures and Weighing Instruments.
(19)	Kasi Puttaswamy Setty & Sons, Iron & General Merchants, Arasikere (Hassan Dist.).	Weights, Measures and Weighing Instruments.
(20)	M.R. Krishnappa, Proprietor, Majdoor Stores, Bazaar Street, Mandya.	Weights, and Measures and Weighing and Measuring Instruments.
(21)	Lakshmi Iron Mart (Regd.), Stock Holders of Iron and Steel, Car Street, Bellary-2.	Weights, Measures and Weighing Instruments.

Dealers (contd.)

Sl. No.	Name and Address of Dealer	Details of Articles Sold
(22)	Machinery and Foundary (P) Ltd., Tumkur Road, Yeshwanthapuram, Bangalore-3.	Weights, Measures and Weighing and Measuring Instruments.
(23)	S.M. Mahboob Beig Sheib, Nallogadda, Bangalore Road, Door No. 27, Wend XVI B.P. Bellary-2.	Weights and Measures and Weighing and Measuring Instruments.
(24)	Mahavir Cottage Industries, No. 365/6 Nazarbad, Mysore.	Weights, Measures and Weighing Instruments.
(25)	Metro Malleable Manufactures (P) Ltd., Silver Jubilee Park Road, Bangalore-2.	Weights, Measures and Weighing Instruments.
(26)	Misquita Motor Service, Misquita (Prop.), Hampankatta, Mangalore-1.	Weights and Measures and Weighing and Measuring Instruments.
(27)	Misrilal Motilal, Saraf Bazaar, Gulbarga	Weights, Measures and Weighing Instruments.
(28)	A.R. Mohamed Ameer, Iron Merchant, 623, Soji Street, Mysore.	Weights and Measures and Weighing and Measuring Instruments.
(29)	Mohamed Amir Ali Maniyar, Ganj Road, Gulbarga	Weights, Measures and Weighing Instruments.
(30)	Murigappa Channabasappa, Belluli, Murigappa Street, Davanagere City.	Weights, Measures and Weighing Instruments.
(31)	Mysah Traders, Silver Jubilee Park Road, Bangalore-2	Weights, Measures and Weighing Instruments.
(32)	L. Nagappa & Sons, General Merchant, Hunsur, Mysore State.	Weights and Measures and Weighing and Measuring Instruments.
(33)	A. Nagappa Setty & Bros. Hardware & General Merchant, B.H. Road, Bhadravatti.	Weights and Measures and Weighing and Measuring Instruments.
(34)	National Engineering & Sale Corporation, Golikatta Bazaar, Bunder, Mangalore.	Weights, Measures and Weighing Instruments.
(35)	Prabaker Stores, Prop. H.V. Prabhakar, Jayanagar, Shimoga	Weights and Measures and Weighing and Measuring Instruments.
(36)	Radha Krishna & Bros., Nehru Ganj, Post Box 27, Gulbarga	Weights, Measures and Weighing Instruments.
(37)	Rahman Stores, Channagiri Road, Bhadravatti	Weights and Measures and Weighing and Measuring Instruments.
(38)	Raja Lakshmi Street, Bazaar Street, Kanakapur	Weights and Measures and Weighing and Measuring Instruments.
(39)	M.N. Raman, 8/1, Jummamasjid Road, Bangalore	Weights, Measures and Weighing Instruments.
(40)	Ranganatha Hall, Proprietor Sree H.V. Lakshmana Setty, Gandhi Bazaar, Hassan.	Weights, Measures and Weighing Instruments.
(41)	K.A. Ranganathan & Co. 2847, III Cross, Chamundipuram, Mysore.	Weights, Measures and Weighing Instruments.
(42)	H.R. Rao, Old Contractor, Farm Road, Raichur	Weights, Measures and Weighing Instruments.

Dealers (contd.)

Sl. No.	Name and Address of Dealer	Details of Articles Sold
(43)	N. Rayappa & Sons, Brass & Copper Merchants, Chickpet, Tumkur.	Weights, Measures and Weighing Instruments.
(44)	Rekha Industries & Traders, Santhakatte, Suratkai, South Kanara District.	Weights and Measures and Weighing and Measuring Instruments.
(45)	S. Revanaradhya & Sons, Hardware & General Merchants, Mandipet, Post Box No. 15, Tumkur.	Weights and Measures and Weighing and Measuring Instruments.
(46)	Saifoo & Company, 14, A Old Bambo Bazar Road, Bangalore	Weights and Measures and Weighing and Measuring Instruments.
(47)	Salebe Omar C/o Patel Cycle Taxi Attar Bazar, Gulbarga ..	Weights and Measures and Weighing and Measuring Instruments.
(48)	Shaik Budhan Sahib, Dealer in Weights, Raichur	Weights, Measures and Weighing Instruments.
(49)	T. Shivaram, T. 43, Sanjeevappa Lane, Avenue Road, Cross, Bangalore.	Weights, Measures and Weighing Instruments.
(50)	H.V. Sreeranga Setty & Sons, Gupta Stores, Hassan ..	Weights, Measures and Weighing Instruments.
(51)	M.S. Srinivas Company Prop: M.S. Srinivas H Jayachamara-jendra Road, Bangalore.	Weights and Measures and Weighing and Measuring Instruments.
(52)	C. Subba Batta & Sons, General Merchants, Koppa, Kadur.	Weights and Measures and Weighing and Measuring Instruments.
(53)	H.K. Subbaraya Setty, General Merchant, Ganesh Temple Street, Hunsur.	Weights, Measures and Weighing Instruments.
(54)	'Suresh Mart' Proprietor, Sri Surappa Setty P.S. Arsikere.	Weights, Measures, and Weighing Instruments.
(55)	Swamy Stores, C/o Sharda Press, Nehru Building, Shimoga	Weights, Measures and Weighing Instruments.
(56)	H. Tulasi Ram, Dealers of Weights & Measures, Farm Road, Raichur.	Weights, Measures and Weighing Instruments.
(57)	Uboroi Limited No. 2, Commercial Street, Bangalore-1 (Branch).	Weights, Measures and Weighing Instruments.
(58)	Uboroi Trading Company, 11 Mission Compound, Bangalore-2.	Weights, Measures and Weighing Instruments.
(59)	Vattam Narayanapah Chetty & Sons, Sabhapati Well Street, Bellary.	Weights, Measures, and Weighing Instruments.
(60)	S. Veerappa Shastri & Sons, General Merchants, Shikaripur Shimoga Dist.	Weights, Measures and Weighing Instruments.
(61)	K. Venkatachalappa, Sole Proprietor, P.O. Box No. 20, Sagar.	Weights, Measures and Weighing Instruments.
(62)	P. Venkatappa Setty & Sons, Hardware & Paint Merchants, Arasikere.	Weights, Measures and Weighing Instruments.
(63)	K.S. Venkataramana Setty & Sons, Hardware Merchants, Gandhi Bazar, Shimoga.	Weights, Measures and Weighing Instruments.

LICENSED MANUFACTURERS, DEALERS & REPAIRERS OF WEIGHTS & MEASURES (6)

Dealers (contd.)

Sl. No.	Name and Address of Dealer	Details of Articles Sold
(64)	C. Venkata Ramanna Setty & Sons, Hardware Merchant, Arsikere.	Weights, Measures and Weighing Instruments.
(65)	P.V. Venugopal Mudaliar & Sons, 538, Lalbagh Fort Road, Viswesapuram, Bangalore-4.	Weights, Measures and Weighing Instruments.
(66)	Vrijakal Laljee, Hardware Merchant, Asoka Road, Mysore	Weights and Measures and Weighing and Measuring Instruments.
(67)	Yankappa, Contractor, Weights and Measures, No. 6-1-31 Mohalla Timmapur Pet, Near Hanuman Talkies, Raichur Distt.	Weights and Measures and Weighing and Measuring Instruments.

ORISSA (1)

Manufacturers

Sl. No.	Name and Address of Manufacturer	Details of Articles Manufactured
(1)	Bharat National Foundry, Motiakhan, New Delhi-1 ..	Cast Iron Weights.
(2)	Bihar Agricultural Industries, Cantt. Road, Khagaul (Patna).	Brass and Cast Iron Weights.
(3)	National Industrial Co-operative Corporation, Jatni, Orissa.	Cast Iron Weights.
(4)	Riaz and Brothers, 134-138, Near Post Office, Sadar Bazar, Delhi-6.	Brass and Bullion Weights.

Dealers

Sl. No.	Name and Address of Dealer	Details of Articles Sold
(1)	Bhagwanram Ramrajram, College Square, Cuttack-3, Orissa	Weights.
(2)	Bhuramal Rungta, Khetrajpur, Sambalpur.	Weights.
(3)	Hadu Subudhi & Brother, Big Bazar, Berampur, Ganjam	Weights.
(4)	Nanagaram Agarwalla, Khetrajpur, Sambalpur	Weights.
(5)	Orissa State Co-operative Marketing Society Ltd., Buxi-bazar, Cuttack-1.	Weights.

PUNJAB (3)

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

Manufacturers

Sl. No.	Name and Address of Manufacturer	Details of Articles Manufactured
(1)	Jainko Industries, Spatu Road, Ambala City	Spring balances, Dial type 100 kg capacity.
(2)	Sehgal Foundry Works, Jhajjar Road, Rohtak	Cast Iron Weights 20 kg to 100 g (20, 10, 5, 2 kg, 500, 200, 100 g).
(3)	Sikand Saini & Company, Weavers Colony, Panipat	Brass Weights 20 g and 50 g Cast Iron Weights, 50, 20, 10, 5, 2 & 1, kg Brass Weights, 50 and 20 g.

Dealers

Sl. No.	Name and Address of Dealer	Details of Articles Sold
(1)	Agricultural Industries (Regd.) Batala	Their own manufactured products.
(2)	Ajudhia Parshad Dalip Singh, Jhajjar (Rohtak)	Weights, Measures, Weighing and Measuring Instruments.
(3)	Bashesar Dass Nand Kishore, Sarafan Bazar, Ambala City	Weights, Measures, Weighing and Measuring Instruments.
(4)	Bhawani Sahai Bishambar Dayal, Rewari	Weights, Measures, Weighing and Measuring Instruments.
(5)	Bhim Sen Satish Kumar, Andulu Gate, Near Post Office, Raikot.	Weights, Measures, Weighing and Measuring Instruments.
(6)	Bindra Ban Mam Raj, Bandsi Gate, Hansi	Weights, Measures, Weighing and Measuring Instruments.
(7)	Brij Kishore Raj Kishore, District Karnal	Weights, Measures, Weighing and Measuring Instruments.
(8)	Chanan Ram Hari Ram, Saban Bazar, Ludhiana	Weights, Measures, Weighing and Measuring Instruments.
(9)	Chandu Lal Ram Dhari, Gohana Mandi	Weights, Measures, Weighing and Measuring Instruments.
(10)	Charanji Lall Bhagwan Dutt, Rewari	Weights, Measures, Weighing and Measuring Instruments.
(11)	Data Ram Ram Gopal, Giddarbha	Weights, Measures, Weighing and Measuring Instruments.
(12)	Devi Pershad & Sons, Narwana Mandi	Weights, Measures, Weighing and Measuring Instruments.

Dealers (contd.)

Sl. No.	Name and Address of Dealer	Details of Articles Sold
(13)	Dewan Chand & Company, Iron Merchants, Nabha	Weights, Measures, Weighing and Measuring Instruments.
(14)	Dewat Ram Jai Bhagwan, Iron Merchants, Pundri	Weights, Measures, Weighing and Measuring Instruments.
(15)	Dharam Singh & Sons, Tehsil Bazar, Tarn Taran	Weights, Measures, Weighing and Measuring Instruments.
(16)	Dula Ram Ram Nath, Shahbad Markanda	Weights, Measures, Weighing and Measuring Instruments.
(17)	Eleka Industries, Rainak Bazar, Jullundur	Brass Weights Iron Beam Scales Class B 100 kg
(18)	Ganpat Ram Harbans Lal, Railway Road, Karnal	Weights, Measures, Weighing and Measuring Instruments.
(19)	Gupta Iron Stores, Main Bazar, Kangra	Weights, Measures, Weighing and Measuring Instruments.
(20)	Hans Raj Tej Paul, Jindal, Malerkotla	Weights, Measures, Weighing and Measuring Instruments.
(21)	Hargopal Harji Ram, Saddar Bazar, Bhatinda	Weights, Measures, Weighing and Measuring Instruments.
(22)	Harphool Mal Puran Chand, Gohana Mandi	Weights, Measures, Weighing and Measuring Instruments.
(23)	Hukam Chand of M/s Tilak Iron and Hardware Merchants, Karnal.	Weights, Measures, Weighing and Measuring Instruments.
(24)	Ichhroo Mal Karam Chand, Katra Hari Singh, Amritsar	Brass Weights 1 kg to 1 g.
(25)	Jiwan Dass Jetha Nand of Hind Hardware Stores, Nangal Township.	Weights, Measures, Weighing and Measuring Instruments.
(26)	Kahan Chand & Sons, Railway Road, Tarn Taran	Weights, Measures, Weighing and Measuring Instruments.
(27)	Kushan Singh Gian Chand, Jaura Gate, Jullundur City	Weights, Measures, Weighing and Measuring Instruments.
(28)	Kidar Nath and Sons, Ambala Cantt.	Weights, Measures, Weighing and Measuring Instruments.
(29)	Khiali Ram Mam Chand, Jind	Weights, Measures, Weighing and Measuring Instruments.
(30)	Kishan Chand Balwant Rai, G.T. Road, Mandi	Weights, Measures, Weighing and Measuring Instruments.
(31)	Kishan Chand Ram Kumar, Iron Merchants, Charkhi Dadri	Weights Measures, Weighing and Measuring Instruments.
(32)	Kishore Chand Sudershan Lall, Pathankote	Weights, Measures, Weighing and Measuring Instruments.
(33)	Krishana Foundry Works, Ambala City	Cast Iron Weights, 50 kg to 100 g, Brass Weights 50 g, and 2 g.

Dealers (contd.)

Sl. No.	Name and Address of Dealer	Details of Articles Sold
(34)	Lal Chand Mehar Chand, Bazar Kathian, Amritsar	Weights, Measures, Weighing and Measuring Instruments.
(35)	Maghi Mal Mathra Dass, G.T. Road, Khanna	Weights, Measures, Weighing and Measuring Instruments.
(36)	Mahabir Parshad Bimal Parshad, Railway Road, Rohtak	Weights, Measures, Weighing and Measuring Instruments.
(37)	Mathra Dass Kedar Nath, Rupar	Weights, Measures, Weighing and Measuring Instruments.
(38)	Milkhi Mal Kheta Ram, Lajpat Rai Road, Jagraon	Weights, Measures, Weighing and Measuring Instruments.
(39)	Mohan Lal Shive Nath Rai, Samalkha	Weights, Measures, Weighing and Measuring Instruments.
(40)	Munshi Lal Kewal Ram, Chaura Bazar, Karnal	Weights, Measures, Weighing and Measuring Instruments.
(41)	Musadi Lal Mool Chand, Kosli (Distt. Rohtak)	Weights, Measures, Weighing and Measuring Instruments.
(42)	Panna Lal & Sons, Main Bazar, Dera Bassi	Weights, Measures, Weighing and Measuring Instruments.
(43)	Phool Chand Amritsaria Mal, Lajpat Rai Road, Jagraon	Weights, Measures, Weighing and Measuring Instruments.
(44)	Phuman Ram Chandan Lal, Main Bazar, Kharar	Weights, Measures, Weighing and Measuring Instruments.
(45)	Prithi Chand Munna Lal, Narwana Mandi	Weights, Measures, Weighing and Measuring Instruments.
(46)	Raj Kumar Swatantar Kumar, Patiala	Weights, Measures, Weighing and Measuring Instruments.
(47)	Rama Iron Store, Bogpur	Weights, Measures, Weighing and Measuring Instruments.
(48)	Ram Saran Dass Molu Ram, Lohakatli, Bhiwani	Weights, Measures, Weighing and Measuring Instruments.
(49)	Rameshwar Dass Lokhmi Chand, Market Bazar, Loharu	Weights, Measures, Weighing and Measuring Instruments.
(50)	Ramji Dass Ram Chander Dass, Bilaspur (District Ambala)	Weights, Measures, Weighing and Measuring Instruments.
(51)	Rati Ram Kewal Ram, Gharaunda Mandi	Weights, Measures, Weighing and Measuring Instruments.
(52)	Rup Chand Des Raj, Dhuri	Weights, Measures, Weighing and Measuring Instruments.
(53)	Sant Lal Inder Sain, 31, Lower Bazar, Simla	Weights, Measures, Weighing and Measuring Instruments.
(54)	Sant Lal Punnur Ram, Ladwa	Weights, Measures, Weighing and Measuring Instruments.

Dealers (contd.)

Sl. No.	Name and Address of Dealer	Details of Articles Sold
(55)	Sat Parkash Ved Parkash, Sunam Mandi	Weights, Measures, Weighing and Measuring Instruments.
(56)	Sat Paul Kewal Krishan Gulati, Phillaur	Weights, Measures, Weighing and Measuring Instruments.
(57)	Sawmi Ram Jai Ram, Brass & Utensil & Hardware Merchants, Main Bazar, Kangra.	Weights, Measures, Weighing and Measuring Instruments.
(58)	Sesh Ram Behari Lall, Iron & Steel Stockists, Palampur	Weights, Measures, Weighing and Measuring Instruments.
(59)	Shamboo Ram Mohat Ram, Samana Mandi	Weights, Measures, Weighing and Measuring Instruments.
(60)	Shankar Dass Amar Singh, Railway Road, Rohtak	Weights, Measures, Weighing and Measuring Instruments.
(61)	Sher Singh Sant Singh, Kaithal	Weights, Measures, Weighing and Measuring Instruments.
(62)	Shiboo Mal Radha Mall, Grain Markets, Malerkotla	Weights, Measures, Weighing and Measuring Instruments.
(63)	Sita Ram Murli Dhar, Rori Bazar, Sirsa	Weights, Measures, Weighing and Measuring Instruments.
(64)	Sobti Iron Works, Railway Road, Nakodar	Weights, Measures, Weighing and Measuring Instruments.
(65)	Som Dutt Shiv Kumar, Azad Chowk, Narnaul	Weights, Measures, Weighing and Measuring Instruments.
(66)	Subhash Machinery Stores, Rohtak	Weights, Measures, Weighing and Measuring Instruments.
(67)	Sunder Dass Madan Gopal, Bazar Kaserian, Jullundur	Weights, Measures, Weighing and Measuring Instruments.
(68)	Swadeshi Iron & Trunk Stores, G. T. Road, Karnal	Weights, Measures, Weighing and Measuring Instruments.
(69)	Swaraj Foundry & Engineering Works, Batala	Cast Iron Weights 50 kg to 100 g.
(70)	Tilak Ram Ram Kishan, Giddarbha	Weights, Measures, Weighing and Measuring Instruments.
(71)	Tulsi Ram Ram Chander, Chaura Bazar, Karnal	Weights, Measures, Weighing and Measuring Instruments.
(72)	Vasdev Rangi Ram, Lehra Gaga	Weights, Measures, Weighing and Measuring Instruments.
(73)	Vidya Prakash Om Prakash, Lamba Bazar, Noor Mahal	Weights, Measures, Weighing and Measuring Instruments.

Repairers

Sl. No.	Name and Address of Repairer	Details of Articles Repaired
(1)	Gurcharan Singh, Railway Bazar, Jagadhari	Weights—Cast Iron & Brass, Measures of Length & Capacity.
(2)	Jai Parshad Gupta, House No. 2641, Vengali Mohalla, Ambala Cantt.	Weights—Cast Iron & Brass, Measures of Length & Capacity.
(3)	Nathu Ram, House No. 3213/2, Ashoka High School, Katcha Bazar, Ambala Cantt.	Weights—Cast Iron & Brass, Measures of Length & Capacity.

TRIPURA (1)

Dealers

Sl. No.	Name and Address of Dealer	Details of Articles Sold
(1)	Banerjee & Co. Motor Stand Road & Central Road Junction, Agartala.	Weights & Measures.
(2)	Shree Bhandar, Central Road, Agartala	Weights & Measures.
(3)	Das Gupta & Sons, Mogra Road, Agartala	Weights & Measures.
(4)	Shree Durga Bhandar, 99, Bat-tala Road, Agartala	Weights & Measures.
(5)	Ghatak Brothers, 18, Hariganga Basak Road, Agartala	Weights & Measures.
(6)	Paresh Chandra Kar & Co., 34/1, Central Road, Agartala	Weights & Measures.
(7)	Parimal Aluminium Stores, Mogra Road, Agartala	Weights & Measures.
(8)	Tripura Paint & Hardware Stores, 58/2, Central Road, Agartala.	Weights & Measures.

WEST BENGAL (1)

Manufacturers

Sl. No.	Name and Address of Manufacturer	Details of Articles Manufactured
(1)	Asiatic Machinery Corporation (Private) Ltd., Factory & Office: 10/1, Kailash Chandra Lane, Satragachi, Howrah.	Weighing Instruments other than Beam Scales.
(2)	Avenue Weighing Scales Company, Factory & Office: 135, Netaji Subhas Road, Howrah.	Weighing Instruments excluding Beam Scales.
(3)	Avery Company of India Private Ltd., Factory: Hide Road Extension, Alipore and Office: 28/2, Waterloo Street, Calcutta-1.	Weighing Instruments including Beam Scales.
(4)	Bengal Chemical & Pharmaceutical Works Ltd., Factory : 164, Maniktolla Main Road, Calcutta—Office: 6, Ganesh Chandra Avenue, Calcutta-13.	Precision Balances & Metallic Volume Measures.
(5)	Bharat Weighing Scales & Engineering Syndicate, Factory & Office : 75/1, Kalachand Nandy Lane, Howrah.	Weighing Instruments including Beam Scales.
(6)	Bharati Scales & Engineering Company, Factory & Office : 4/1, Haldar Para Lane, Howrah.	Weighing Instruments including Beam Scales.
(7)	Calcutta Balance and Weight Works, Factory & Office : 197, Maharaj Nanda Kumar Road, (S), Baranagar, Calcutta-36.	Beam Scales.
(8)	S. C. Das & Sons, Factory 30, Atulkrishna Bose Lane, Calcutta-36. Office : 67, Khangrapatti Street, Calcutta-7.	Beam Scales.
(9)	Dass & Co., Factory & Office: 42, Pramanick Ghat Road, Calcutta-36.	Beam Scales.
(10)	H. P. Dass & Co., Factory & Office: 22 Srigopal Mullick Road, Aridaha, 24=Parganas.	Beam Scales.
(11)	D. C. De & Sons, Factory & Office: 150, Narasinghdutta Road, Howrah.	Cast Iron Weights.

LICENSED MANUFACTURERS, DEALERS & REPAIRERS OF WEIGHTS & MEASURES (6)

Manufacturers (contd.)

Sl. No.	Name and Address of Manufacturer	Details of Articles Manufactured
(12)	Dragon Iron Works, Factory & Office: 31, Kissenlal Burman Road, Howrah.	Cast Iron Weights.
(13)	East India Engineering & Agency Co., Factory & Office: 63/1, Benaras Road, North Bantra, Howrah.	Cast Iron Weights.
(14)	East India Metal Company (Private) Ltd., Factory-P 85, Benaras Road, Howrah—Office : 4A, Durgacharan Chatterjee Lane, Calcutta-3.	Cast Iron Weights.
(15)	A.C. Ghosh, Factory & Office: 114, Makarda Road, Howrah	Cast Iron Weights.
(16)	Girish Chandra Gosh, Factory : 37, Barrackpore Trunk Road, Cossipore, Calcutta-2, Office : 58 Clive Street, Calcutta-7.	Beam Scales & Counter Scales.
(17)	Guchait & Sons (Private) Ltd., Factory & Office : 2, Madhusudhan Pal Chowdhury Road, Howrah.	Weighing Instruments excluding beam Scales and Cast Iron Weights.
(18)	Howrah Engineering & Galvanising Works, Office & Factory: 68, Benaras Road, North Bantra, Howrah.	Cast Iron Weights.
(19)	India Die Casting Co. Private Ltd., Factory : P. 2, Taratolla Road, Paharpur, Calcutta-24. Office : 178, Mahatma Gandhi Road, Calcutta-7.	Cast Iron Weights.
(20)	India Machinery Company Ltd., Factory: Dasnagar, Howrah, Office : 29, Strand Road, Calcutta.	Weighing Instruments including Beam Scales & Cast Iron Weights.
(21)	Lakshmi Foundry Works (Private) Ltd., Factory & Office : 67, Benaras Road, Howrah.	Cast Iron Weights.
(22)	Laxmi Scale Works, Factory & Office : 4, Chandi Charan Banerjee Lane, Calcutta-35.	Beam Scales.
(23)	Luxmi Engineering Co. (Private) Ltd., Factory & Office : 123 Narasingh Dutta Road, Howrah.	Cast Iron Weights.
(24)	Nabakumar Routh, Factory-P 33, Benaras Road, Howrah, Office : 78 Netaji Subhas Road, Calcutta.	Beam Scales and Cast Iron Weights.
(25)	Nagendra Nath Karmakar, S/o Wooma Ch. Karmakar, Props: Sri Gajendra Nath Karmakar & Sri Gouri Charan Karmakar Workshop: 16 & 17, Narikeldanga Main Road, Calcutta-11, Office : 213, Harrison Road, Calcutta-7.	Beam Scales and Counter Scales.
(26)	Nagendra Nath Karmakar, S/o Wooma Chran Karmakar, Props : Sri Makhan Lal Karmakar & Sons, Factory : 16 & 17, Narikeldanga Main Road, Calcutta, Office : 208, Mahatma Gandhi Road, Calcutta-7.	Beam Scales and Counter Scales.
(27)	Panchkari Ghosh & Sons Private Ltd., Factory & Office : 166, Bellilias Road, Howrah.	Cast Iron Weights.
(28)	K. C. Samanta & Co., Factory & Office : 19, Atulkrishna Bose Lane, Calcutta-36.	Beam Scales.
(29)	D. Saroj & Co., Factory & Office : 16, Biswas Nursery Lane, Bellaghata, Calcutta-10.	Beam Scales.

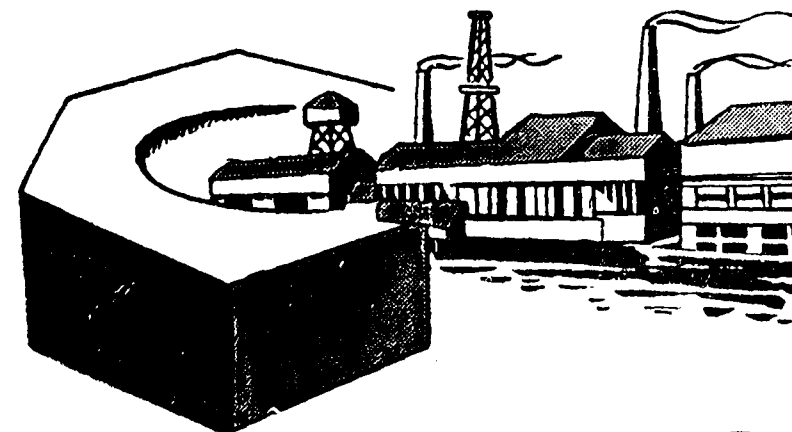
Manufacturers (contd.)

Sl. No.	Name and Address of Manufacturer	Details of Articles Manufactured
(30)	Satis Chandra Das & Co., Factory : 25/A & 23/1, Ratan Babu Road, Calcutta-2, Office : 113, Khangrapatti Street, Calcutta-36.	Beam Scales and Brass Weights.
(31)	W. B. Scales Co., Factory & Office : 10, Kailas Chandra Lane, Satragachi, Howrah.	Weighing Instruments other than Beam Scales.
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(34)	Wooma Churan Kurmakar, Factory : 23 B, Narikeldanga Main Road, Calcutta. Office : 58 Clive Street, Calcutta.	Beam Scales and Counter Scales.
(35)	Wooma Churan Karmakar, Factory & Office : 23/C, Narikeldanga Main Road, Calcutta-11.	Beam Scales.

Repairers

Sl. No.	Name and address of Repairer	Details of Articles Repaired
(1)	Avenue Weighing Scales Co., Workshop & Office : 135, Netaji Subhas Road, Howrah.	Weighing Instruments & Counter Scales including Beam Scales.
(2)	Bengal Chemical and Pharmaceutical Works Ltd., Workshop : 164, Manicktalla Main Road, Calcutta-11. Regd. Head Office : 6, Ganesh Chandra Avenue, Calcutta-13.	Beam Scales including Precision Balances, Weights, Measures and Measuring Instruments.
(3)	Calcutta Machine Manufacturing Co., Workshop & Office : 26, Barwaritala Road, Calcutta-10.	Weighing Instruments including Beam Scales and Counter Scales.
(4)	Girish Chandra Ghosh, Workshop : 37, Barrackpur Trunk Road, Calcutta-2. Office : 58, Clive Street, Calcutta-7.	Beam Scales, Counter Scales and Cast Iron Weights.
(5)	Hindustan Scales Corporation, Workshop : 66/1, Kantapukur 3rd bylane, Howrah. Office : 56 Netaji Subhas Road, Calcutta-1.	Weighing Instruments including Beam Scales and Counter Scales.
(6)	Jatindra Nath Ghose, Workshop : 37, Barrackpur Trunk Road, Calcutta-2. Office : 58, Clive Street, Calcutta-7.	Beam Scales, Counter Scales and Cast Iron Weights.
(7)	Naba Kumar Routh, Workshop : B33, Benaras Road, Howrah, Office : 78, Netaji Subhas Road, Calcutta-7.	Beam Scales and Cast Iron Weights.
(8)	Satish Chandra Das & Co., Workshop : 25A & 23/1, Ratan Babu Road, Calcutta-2. Office : 113, Khongrapati Street, Calcutta-7.	Beam Scales and Brass Weights.
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CONVERSION TABLES OF PRICES FOR WEIGHTS

TABLE A

(Factor used : 1 kg.=2.20462 lb)

Rupees per lb to Rupees per kg.

Rs./lb.	0	1	2	3	4	5	6	7	8	9
	Rs/kg	Rs/kg	Rs/kg	Rs/kg	Rs/kg	Rs/kg	Rs/kg	Rs/kg	Rs/kg	Rs/kg
0	0	2.20	4.41	6.61	8.82	11.02	13.23	15.43	17.64	19.84
10	22.05	24.25	26.46	28.66	30.86	33.07	35.27	37.48	39.68	41.89
20	44.09	46.30	48.50	50.71	52.91	55.12	57.32	59.52	61.73	63.93
30	66.14	68.34	70.55	72.75	74.96	77.16	79.37	81.57	83.78	85.98
40	88.18	90.39	92.59	94.80	97.00	99.21	101.41	103.62	105.82	108.03
50	110.23	..	..	..	..	..	..	..	..	..

TABLE B

(Factor used : 1 kg.=2.20462 lb)

Naye Paise per lb to Rupees & nP. per kg

nP/lb.	0	1	2	3	4	5	6	7	8	9
	Rs/kg	Rs/kg	Rs/kg	Rs/kg	Rs/kg	Rs/kg	Rs/kg	Rs/kg	Rs/kg	Rs/kg
0	0	0.02	0.04	0.07	0.09	0.11	0.13	0.15	0.18	0.20
10	0.22	0.24	0.26	0.29	0.31	0.33	0.35	0.37	0.40	0.42
20	0.44	0.46	0.49	0.51	0.53	0.55	0.57	0.60	0.62	0.64
30	0.66	0.68	0.71	0.73	0.75	0.77	0.79	0.82	0.84	0.86
40	0.88	0.90	0.93	0.95	0.97	0.99	1.01	1.04	1.06	1.08
50	1.10	1.12	1.15	1.17	1.19	1.21	1.23	1.26	1.28	1.30
60	1.32	1.34	1.37	1.39	1.41	1.43	1.46	1.48	1.50	1.52
70	1.54	1.57	1.59	1.61	1.63	1.65	1.68	1.70	1.72	1.74
80	1.76	1.79	1.81	1.83	1.85	1.87	1.90	1.92	1.94	1.96
90	1.98	2.01	2.03	2.05	2.07	2.09	2.12	2.14	2.16	2.18
100	2.20	..	..	..	..	..	..	..	..	..

Published by the Director, Publications Division, Ministry of Information and Broadcasting, Delhi and
printed by the Manager, Government of India Press, Faridabad

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metric measures

THE PUBLICATIONS DIVISION

metric measures

(JOURNAL OF WEIGHTS AND MEASURES)
STANDING METRIC COMMITTEE
MINISTRY OF COMMERCE AND INDUSTRY

Vol. 3 MAY 1960 (VAISAKHA 1882) No. 3

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Cover design by R. Surangan

Annual Subscription Rs. 2.00

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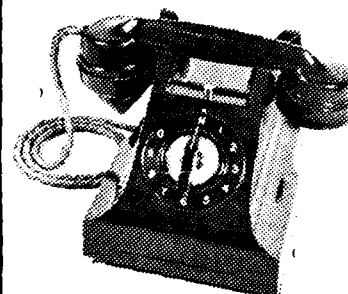
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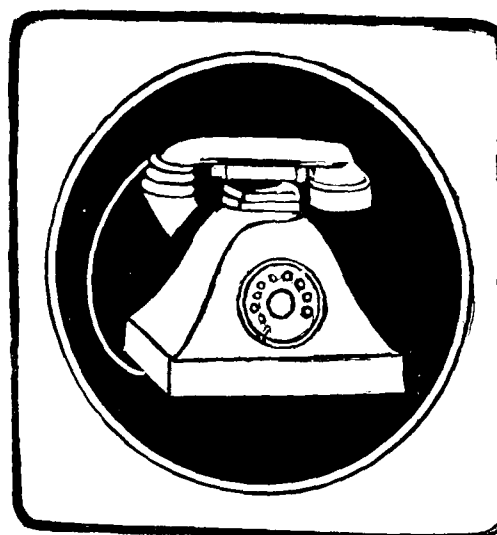
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Contributions for publication should be sent to the Editor, METRIC MEASURES, Standing Metric Committee, Ministry of Commerce & Industry, Udyog Bhavan, New Delhi.

Enquiries regarding subscriptions and supply of copies should be addressed to the Business Manager, Publications Division, Ministry of Information and Broadcasting, Old Secretariat, Delhi-8.

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Does Metric System Make Possible Economic Production ?

HERMANN SCHMITZ*

Oberingenieur,
Allgemeine Elektrizitäts Gesellschaft (AEG), Essen,
West Germany

THE joy and satisfaction with which the European metric countries have received the news of India's decision to adopt the metric system can hardly be exaggerated. The metric world block is thereby further strengthened and it is to be hoped that other countries will also follow India's example. England and the U.S.A. have already recognized the great advantages of the metric decimal system (see Report of the 'Committee on Weights and Measures Legislation, London, H.M. Stationery Office, 1951'). However, they have not taken any decision regarding the introduction of the metric system in practice; it is assumed that the advanced stage of industrialization in these countries stands as an obstacle. The unfortunate fact, therefore, remains that interrelations between countries are made difficult by the co-existence of several sys-

tems, and this state of affairs will presumably go on for a considerable time.

Comparison of the Systems

Physical quantities, such as measures, weights, etc. are designated by the product of the unit and the numerical value. A value by itself cannot represent a physical quantity; for example, the statement: 'the body has a weight equal to 50' has no meaning. To this numerical value the unit must be attributed, for example, 'kg'. The choice of the physical units is optional and it is necessary to specify the units to be used for measurements. The choice must be limited to a few basic units from which all the other units should be derived.

The question of physical and technical units obviously transcended the national scope so much so that the International Metric Convention was created in 1875. Today this Convention consists of 36 countries. At the same time the 'Bureau International des Poids et Mesures' was also formed. This Bureau is the trustee for the original standards of length and weight. The last plenary meeting for weights and measures which was held in

*Dr. Hermann Schmitz, Head of the Standards Department of AEG's Turbine Factory in Essen was deputed to India for 4 months from November 1959 by the West German Government under the Indo-German Exchange Programme. He worked in collaboration with the Indian Standards Institution and visited a number of factories in Calcutta, Bombay, Madras and other places and discussed problems of change-over to the metric system, particularly the conversion of engineering drawings and designs. His views would be of interest to Indian industries.

—Editor

1954 recommended the following basic units as the international system of units:

for length	metre
for mass	kilogram
for time	second
for electrical current	ampere
for temperature	degree Kelvin
for light intensity	candela

Despite the activities of the Metric Convention—which also includes the U.K. and the U.S.A. as members—we still have a long way to go to achieve unity regarding units. It is true that the ampere and volt are universally used and the same unit of time is also used, but for length, mass and temperature there are a medley of units in existence.

The 'metre' and 'kilogram' are defined as international basic units. On the other hand the so-called Imperial system of weights and measures is nothing but a heterogeneous collection of separate units which originated independently of each other and the system into which they were welded is not, therefore, homogeneous.

The 'yard', for example, was defined in the 12th century as the distance between the 'tip of the nose of His Majesty Henry I of England and the tip of the thumb of his outstretched hand'. In the 16th century the 'foot' was defined as 'the average tread of 16 men'. The legal 'rod' was 16½ feet and the foot was divided into 12 inches. The difficulties of the inch system will become apparent only when we consider how the units in the two systems are subdivided. In the metric system we have the decimal subdivision, for example: 1 metre=10 decimetres=100 centimetres=1,000 millimetres. On the other hand, the Imperial system requires mental acrobatics, for example, 1 mile=8 furlongs=320 rods=1,760 yards=5,280 feet=63, 360 inches.

In the case of weights the confusion is still worse. Besides the officially recognized

metric weights system there are also 5 Imperial weight systems.

Further trouble is caused by the fact that certain English and American units, though having the same name, are different. For example, the yard does not have the same value on both sides of the Atlantic ocean, the American gallon is about 20 percent less than the Imperial gallon and the English ton is 10 percent heavier than the American ton.

Units and measures are not only important for science but they form an inseparable part and parcel of industrial production. The quality of industrial products depends to a large extent on the stage of development of measuring techniques. Measuring plays an important role even in daily life. When we pay money for an article we like to know its correctly measured value. It has been universally recognized that the State must assume the task and responsibility of ensuring that the *possibility* for correct measurement is available and that the articles *are* correctly measured.

According to the Imperial system it is *possible* to measure correctly. However, as we have seen above, this requires plenty of mental acrobatics and arithmetic tables. Thus, for example, the requirements of the industry for units for precision measuring methods can no longer be met by dividing the inch into 64 parts. The consequence is that the inch has to be divided decimally so much so that two different systems appear in one numerical value.

Naturally, the correct application of any measuring system and its understanding is only a question of being accustomed to the system concerned. Only thus can those who are accustomed to the metric system understand that it is possible to achieve high precision in industrial production with the inch system.

DOES METRIC SYSTEM MAKE POSSIBLE ECONOMIC PRODUCTION ?

When the metric system with its precisely defined basic units and its logical decimal structure has taken root in India, it will be evident to all how difficult every operation had been to them before.

Metric System for Mechanical Engineering

The change of units naturally entails certain difficulties with regard to change in ideas, values and also change in the industrial production.

Teaching in schools is absolutely necessary; but first of all the teachers must readjust their ideas and become accustomed to the metric system. Textbooks are the most important means for education in the metric system. Merely using textbooks from metric countries such as Germany, France and Italy will not be sufficient nor will superficial conversion tables alone be of any use. The textbooks must be suitable for Indian conditions; they must illustrate the advantages of the metric system and make it easy for the student to readjust himself to this system.

The conversion of basic units like the yard or the inch to the metric system presents no difficulty because only a *single* value has to be converted. It is, however, more difficult when we come to compound units; for example, *pressure* is expressed as $kg/cm^2=1 \text{ atmosphere}$ in the metric system whereas in the Imperial system it is $lb/sq. in$; *tensile strength* or *yield strength* is given in kg/mm^2 in metric system and in $tons/sq. inch$ in the Imperial system.

The difficulty here is not only in the conversion of a more complicated value, but the engineer is accustomed only to the values expressed in the inch system. A value in the metric system does not convey to him the precise technical significance. Tables with vivid schematic representations are in my opinion essential for this education.

This process of re-education will extend over a considerable period of time. If one starts only with this re-education, the danger will be that the young men after finishing their education will feel like fish out of water when they come in contact with daily life and enter into industrial production where the change-over has not yet been effected. Therefore, the education of the young men in the metric system and the change-over to the metric system must proceed side by side.

It appears to me of the utmost importance that the change-over should have its starting point in the manufacturing concerns; here, sufficient experience is available with regard to the units (weights and measures) whose application in daily practice must be thoroughly understood from the point of view of calculations and measuring techniques. If the change-over is first effected in the manufacturing concerns, the factory workers will imbibe the metric system, and will impress those who surround them and those who come into contact with them in the home as well as in society circles, with the advantages of the metric system.

It would be very complicated to enter into details regarding the implications of a change-over in all the branches of industry; we shall, therefore, confine ourselves to mechanical engineering and the supplying industries connected with it.

What is Economical Production ?

If one wishes to know whether the mere adoption of the metric system will guarantee economical production, it must first of all be clearly understood what is meant by *economical production*.

Drawings serve as the language in a manufacturing concern; they form the basis of a smooth production process, they guarantee the functional quality of the manufactured article. The clearer, more

precise and more comprehensive the drawing is, the easier will it be for the worker in the factory to produce according to the drawing. It is not sufficient for the designer to ensure that his designs are functionally satisfactory. A good working design should not only be functionally perfect, but it must also keep the material, equipment, cost and time to a minimum. For this the designer must have a good knowledge of the material to be used and he must also have a good knowledge of the methods and processes of production.

Naturally the designer cannot be omniscient. Standards and standard specifications are, therefore, an important help for him in his highly responsible work. First of all there are the national standards which constitute the basis for an understanding and co-operation between the various branches of industry (materials, accessories, etc.). The national standard, by itself, will not guarantee economical production for a particular manufacturing concern. It is absolutely necessary that a special department should be set up in the factory in order to examine the relevant national standards and if necessary revise them

according to the economical requirements of the factory; or even set up special standards on the basis of these national standards. Thus, apart from the designing office, we have the standards department under an experienced standards engineer.

The standards which are of great importance for obtaining a good design and which have to be prepared by the standards department for the requirements of the factory concerned, can be divided into the following groups:

(1) Basic Standards

It is not quite easy to give an exact definition of basic standards since they form the basis of all design and standardization work, and the limits of applicability thus depend on the branch of the industry concerned. Some of the most important basic standards in mechanical engineering are standards for limits and fits (round and flat fits), thread profile, thread dimension and thread tolerances, gear profiles, dimensions and tolerances for gears, connecting dimensions for coupling, piping flanges, etc. This may be illustrated by an example. Figure 1 represents a flange and the associated basic standards.

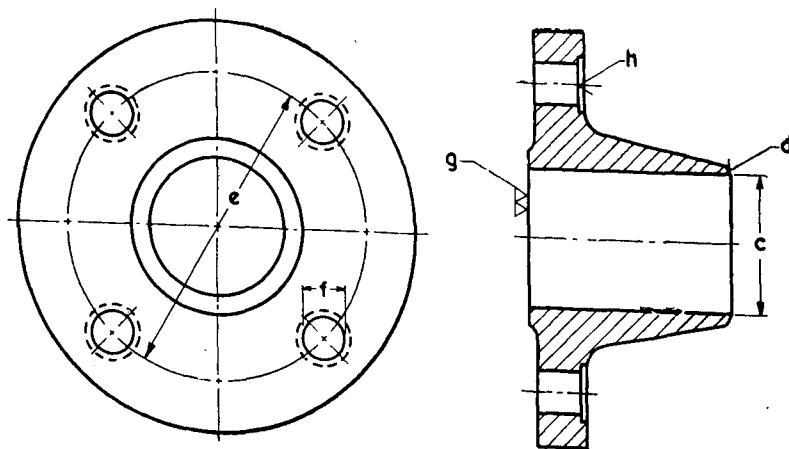


Fig. 1—Flange and Basic Standards

DOES METRIC SYSTEM MAKE POSSIBLE ECONOMIC PRODUCTION?

The following basic standards are necessary for the manufacture of this item:

- (a) calculation standard for flanges,
- (b) nominal pressure for determining the constructional dimension of the flanges,
- (c) nominal widths,
- (d) form of welded joint for pipe connection,
- (e) bolt hole circle diameter and number of bolt holes,
- (f) through holes for screws,
- (g) surface finish, and
- (h) counterboring and countersinking for nut seating.

It may be asked, why have so many basic standards when the finished product itself is in any case standardized? The answer is that these standards are not only meant for flanges but also for valves, slide valves, pipes, gaskets, etc. These standards further form the basis for a co-ordination, among others, between the work of the various standards committees. They are also the basis for the possibility of an obligatory deviation (necessitated by factory conditions) from the standard of the finished products, where, however, the connecting dimensions, for example, correspond to the basic standards. The scope of basic standards also includes the choice from national standards according to the factory conditions in order to limit the equipment and also for economical store keeping.

(2) Standards for a Uniform Interpretation of Drawings, Designations and Other Technical Data

Under this category may be included especially the drawing standards prepared at the national level. It must be possible to manufacture the parts represented, dimensioned or otherwise characterized and indicated on the drawing, either in one's own factory or if necessary outside. The drawing must be clearly understandable so that the

planning office can easily carry out their work according to this drawing, and the worker in the workshop can also work according to this drawing.

Figures 2—6 are examples of correct and wrong representation. They show the importance of following a standard practice in drawing.

(3) Standards for Delivery Conditions, Test and Acceptance

These standards specify the quality of the products required by the consumer and contain methods of test and acceptance. The designer can give in his drawing the reference to these standards, thereby making clear his requirement regarding quality. Thus, the drawings need not be encumbered with detailed explanation, text etc.

(4) Standards for Materials

An absolutely necessary requirement for the designer is the standards containing conventional designations, properties of strength and chemical composition of the materials. Other similar properties of the materials, such as weldability, high temperature stability, brittleness, bendability are also of great value.

National standards specify the materials which are being or are to be produced in the country. The task of the individual manufacturing concern is to choose the material best suited for its own purposes. In order to be economical in store-keeping it is necessary to have only a few qualities of the materials.

(5) Standards for Semi-finished Products

When a finished product is manufactured, the designer must know what semi-finished product is to be used. He would, therefore, be required to give the desired basic materials in the part list, for example, round material, rolled or forged, forged bushing,

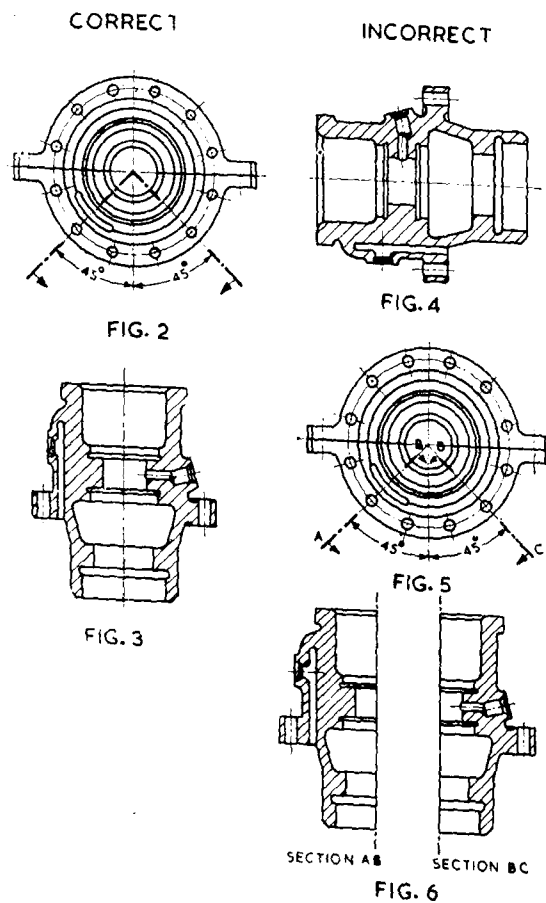


Fig. 2 to 6—Representation of Section

The standard for the representation of section is IS : 696 (see figs. 2—6). The direction of view is represented by an arrow. The line of cut is represented by a thick dot-dash line and designated by capital letters.

If it is necessary to show the position of bores, channels, etc., the angle must be shown in addition to the cut (see fig. 2). If the position of the cut is clear from the figures, the line of cut may be omitted.

The line of cut need not be designated by letters—if only one section is represented, if both the perspectives represented are designated as sections, or if the section is represented according to IS : 696 with the same scale as the perspective.

The example shows a part with fitting for pressurized oil and leak-gas exhaust. Figure 3 conforms to IS : 696 whereas figure 4 is not correct, but turned by 90 degrees. Figures 5 and 6 are correct; however, the sectional representation is separated and has no common middle line. This may lead to errors.

etc. He has to make his choice on the basis of the standards for semi-finished products, which have to represent, for the factory concerned, a selection from the national standards for keeping the stock to a minimum.

(6) Standards of Finished Products

These are of great help to the designer since he does not have to design the finished products himself. They merely have to be indicated in the part list by their full designation. The standard of finished product also guarantees the best design and the national standard guarantees that standardized parts would be available. It would be uneconomical if a machine factory has to produce their own screws, washers, nuts and locking plates. The standardized and, therefore, commercially popular tools such as drills, screw taps, milling cutters, etc. can be procured at a cheaper rate from factories which are specially set up to produce these tools.

These are the main groups of standards which may be supplemented in a particular factory with the factory standards.

To give a further instance of economical production, we may mention the importance of limitation of types. The cost of switch-over from one type to another is possibly the main concern of the factory manager. Unfortunately, there are certain customers who are not satisfied to limit their choice to standard products. They, therefore, place orders for special types of products. For instance, in a factory of cutter tools 80 percent of the orders were for non-standardized designs. These orders, however, represented only 10 percent of the returns. Educating the consumer by demanding higher prices for non-standardized products and refusing orders in cases where the manufacture according to the

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Special order is uneconomical is the only way to limit the number of types.

A lot more could be said about setting up, implementation and the economical results of standards, but that would be a divergence from our subject. It may be merely stated here that standardization is indispensable for a good design and economical production.

Change-over in Factories

Up to now we have elaborated the theme that drawings and standards are the basis of an economical production. We shall now discuss the question as to whether a mere change and conversion of a drawing (prepared in the Imperial system) to the metric system will guarantee an economical production.

From the comparison between the two systems given at the very beginning of the article, it may be gathered how much more advantageous and comprehensive the metric system is.

Unfortunately, the view has often been put forward that in order to render universal satisfaction and guarantee interchangeability a mere conversion of inch values into metric values would suffice. It is wrong to countenance such compromises which do no justice to the metric system, whose advantages are thereby thrown away, because the converted values will have to be expressed up to one hundredth or even one thousandth of a millimetre. Let us assume, for example, that a worker places an order for a drill by stating its outside diameter as 15.875 mm

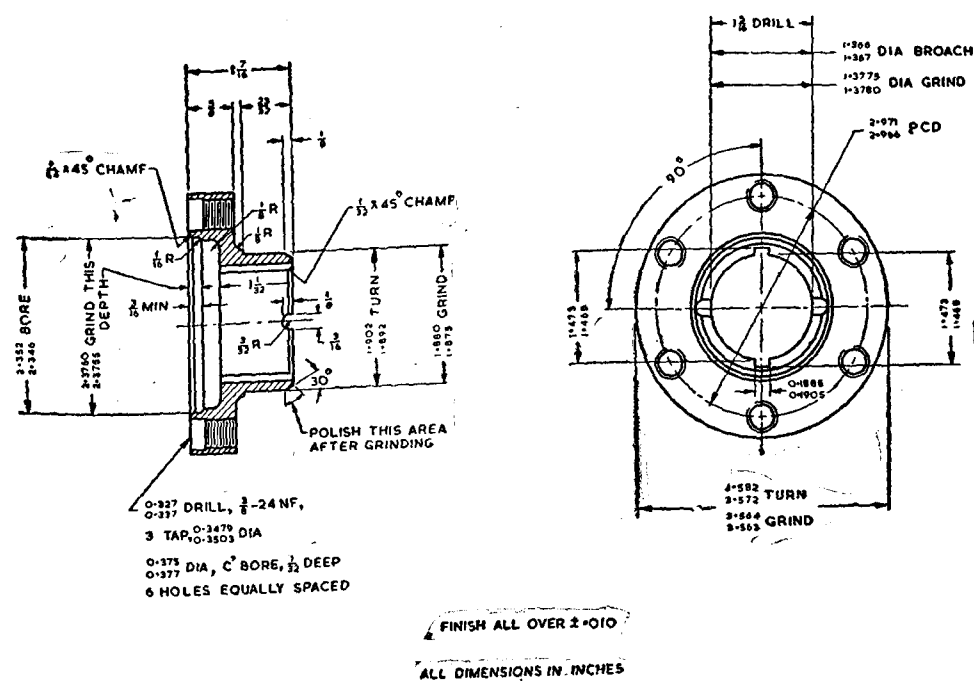


Fig. 7—Main Drive Flange—American Drawing in original Inch System

(instead of 5/16 in). Now, it is not only cumbersome to express this value orally, but to write down the three unnecessary digits takes time and may lead to errors. Such a conversion to the metric system in a way ensures economical production and entails only needless expense.

The following drawings show two ways of conversion.

Figure 7 shows an American drawing in the original inch system. Figure 8 shows the same drawing converted into the metric

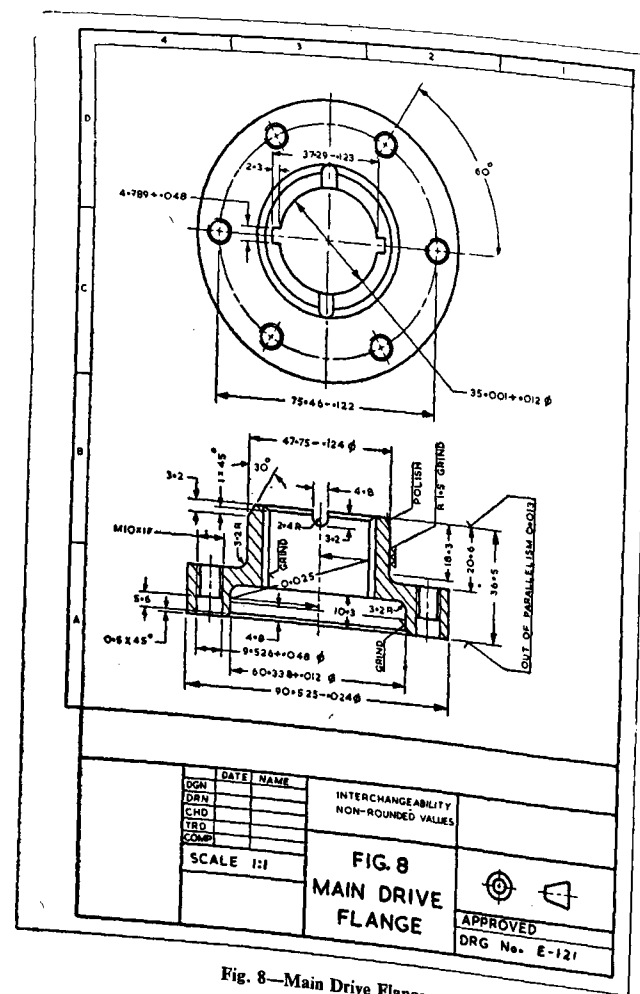


Fig. 8—Main Drive Flange

system in such a way that interchangeability is assured. (Certain German basic standards for surface finish, material and deviations of dimensions without tolerance specification were taken into consideration).

Figure 9 represents the same part, no longer interchangeable but in correct metric values. Metric thread is used as well as the German basic standards on limits and fits, deviation of form and position, etc.

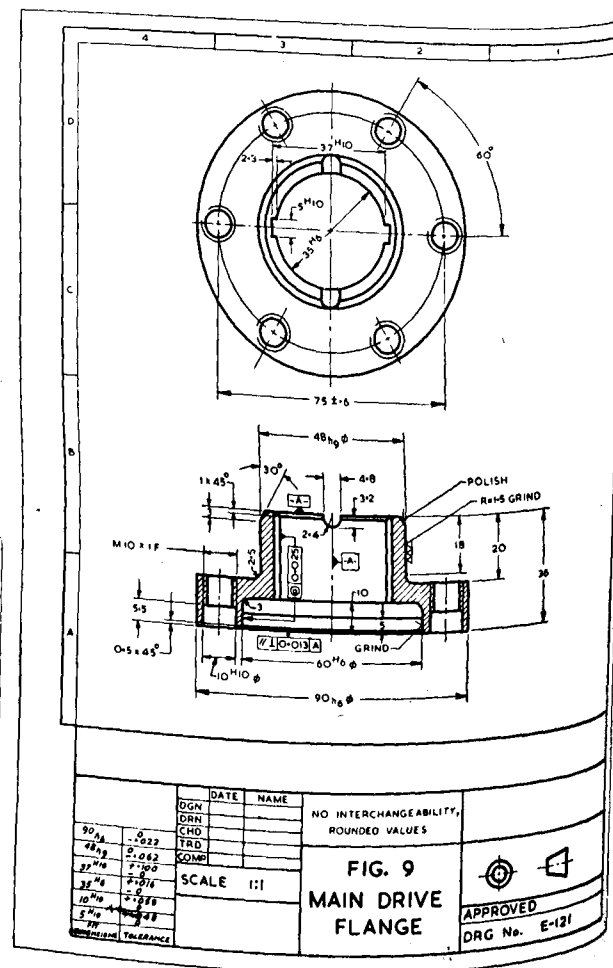


Fig. 9—Main Drive Flange

DOES METRIC SYSTEM MAKE POSSIBLE ECONOMIC PRODUCTION?

Now, many may ask why a drawing should be converted to the correct metric system with straight dimensions, etc.? Are not the disadvantages of non-interchangeability so great that one has to expect dislocation of the manufacture and considerable expense?

The manufacturers of products with long working life may ask what about the supply of spare parts and repairs? For example, a factory which has manufactured more than 20,000 stationary single cylinder Diesel engines in the inch system will have to continue to manufacture the old parts as spare parts, if the inter-changeability with the new metric parts is no longer ensured. Thus the variety of types will increase.

These are pertinent questions which serve to show how deep one has to go into these problems in order to make practical suggestions to the manufacturer. Naturally the solution for the different branches of industry would appear different.

It may, therefore, be stated that a mere conversion to the metric units will not guarantee economical production. Adopting the true metric system forms the only basis for this.

The Indian machine industries manufacture majority of their products under licences and according to foreign drawings. It even happens that a factory has licence contracts not only with different firms of a foreign country but with different firms of different foreign countries. It is, therefore, hardly to be expected that these foreign drawings can guarantee economical production since Indian standards of the group mentioned earlier are not used, not to mention company selections and standards of the local industry. The drawings must,

therefore, be revised to suit conditions in India regarding available parts, semifinished products etc., and the possibilities for economical production existing in a factory; in revising, functional qualities such as efficiency, strength, manipulatability etc. should not be affected.

The metric system can be introduced along with the revision of the drawings. For this change-over it is necessary to have suitable standards which specify what metric values should be adopted to replace the old inch values. The most important bases for economical production are, as already mentioned, selection from national standards, setting up dimensional standards (for example, standards for thread diameter, bore diameter, selection of fits, etc.) as well as company standards for semifinished products and finished products.

Certain company standards from Germany which can also be used for the industry here, may be given as examples.

Table 1 shows a conversion table from Whitworth to metric threads. Besides the conversion of threads, such items as the old core areas, through holes, widths over flats as well as their new values which again correspond to the values from the national standards are given.

Table 2 shows a selection for fit holes with H 7 tolerance. For making those fit holes 3 different tools (drill, special drill and reamer) as well as a limit gauge are needed. Since such tools are expensive, preferred nominal diameter must be specified apart from a selection of fits, (for example, use of basic hole) for each factory, and the drawings must be changed according to these values.

Table 1—CONVERSION TABLE—WHITWORTH THREAD TO METRIC THREAD

Thread Whitworth	Metric	Major Dia	Minor Dia	Core Area cm ²	Depth of Thread	Pitch Dia	Pitch	Core Drill Dia	Through Hole Dia	Width Across Flats
1/2"	M 12	12 12.700	9.726 9.990	0.743 0.784	1.137 1.355	10.863 11.345	1.75 2.117	10	14 15	19 22
5/8"	M 16	16 15.876	13.402 12.918	1.41 1.311	1.299 1.479	14.701 14.397	2 2.309	13.75	18 18	24 27
3/4"	M 20	20 19.051	16.752 15.798	2.20 1.960	1.624 1.627	18.376 17.424	2.5 2.540	17.25	23 22	30 32
7/8"	M 24	24 22.226	20.102 18.611	3.17 2.720	1.949 1.807	22.051 20.419	3 2.822	20.75	27 25	36 36
1"	M 27	27 25.401	23.102 21.335	4.19 3.575	1.949 2.033	25.051 23.368	3 3.175	23.75	30 28	41 41
1 1/8"	M 30	30 28.576	25.454 23.929	5.09 4.497	2.273 2.324	27.727 26.253	3.5 3.629	26	33 32	46 46
1 1/4"	M 33	33 31.751	28.454 27.104	6.36 5.770	2.273 2.324	30.727 29.428	3.5 3.629	29	36 35	50 50
1 1/2"	M 36	36 34.926	30.804 29.505	7.45 6.837	2.598 2.711	33.402 32.215	4 4.233	31.5	39 38	55 55
1 3/4"	M 39	39 38.101	33.804 32.680	8.97 8.388	2.598 2.711	36.402 35.391	4 4.233	34.5	42 42	60 60
1 7/8"	M 45	45 44.452	39.154 37.946	12.04 11.310	2.923 3.253	42.077 41.199	4.5 5.08	40	48 48	70 70
2"	M 52	52 50.802	45.504 43.573	16.26 14.912	3.248 3.614	48.752 47.187	5 5.645	46.25	56 55	80 80
2 1/4"	M 56	56 57.152	48.856 49.020	18.75 18.873	3.572 4.066	52.428 53.086	5.5 6.35	50	61 62	85 85

The conversion to the metric system is one of the main tasks of the company standards department, a task whose importance should not be underestimated. Whereas at the national level, the conversion is done under the authority of the Indian Standards Institution, in the factory this task must be entrusted to the standards department. The question of the most economical change-over for a particular factory must be understood and tackled here. The 'how' of the change-over should be determined. In the above mentioned example of the Diesel

engines, the dimensions for pistons, connecting rods, crank shafts—also supplied as spares—may even now be in the metric system and only the outside diameter of the cylinder sleeves and bearing bushes need have the inch dimensions. Thus only these bushes have to be manufactured and stored in two systems. By correctly studying the problem it is possible, in changing over, to limit the number of types to a minimum.

Conclusion

We can say that the conversion represents

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TABLE 2
Selection of Fit Holes with H 7 Tolerance

Nominal Diameter	
3	42
4	45
5	46
6	47
7	48
8	50
9	52
10	55
11	60
12	62
13	65
14	68
15	70
16	75
17	78
18	80
20	82
21	85
22	90
23	92
24	95
25	98
26	100
27	105
28	110
30	118
32	125
34	
35	
38	
40	

a national revolution in the Indian industry. Not only should the change-over to the metric system be undertaken, but the production data must enable optimum co-operation to be achieved between the various branches of the industry and the basis for an economical production must be ensured. Thus will it be possible to draw economical advantage from the change-over. Even if the change-over to the metric system appears at the moment to be difficult and costly, it is nevertheless the most economical in the long run. If, however, the metric system is spoilt by direct conversion from inch values, the result will be even economically disadvantageous. This point can hardly be overemphasised. Setting up of standards departments in factories is essential for a smooth change-over. The cost of setting up and running such a department will be more than offset by the economical effects always resulting from a good working of the standards department.

If the questions dealt with above, unfortunately in too brief a manner, are properly integrated and handled, economical success in industry will be assured.

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A Suggested Scheme of Studies in Mathematics for Primary Classes

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IN view of the introduction of the metric system in our country it has become necessary to revise the mathematics syllabus which has so far been in use in our schools in the primary classes. This attempt at revising this syllabus has been prompted by the articles of Guy Knoche, which have appeared in these pages.

There are no two opinions about the need of imparting knowledge of the basic elements of arithmetic to children during the first six or seven years of their going to school. For this reason arithmetic must occupy a very important place in the time-table and at least four hours a week must be allotted to it. It is on this understanding that the present syllabus has been prepared. The syllabus has to be drawn up in such a way that there is room for gradual progress and for the fulfilment of the various purposes of teaching arithmetic. These purposes may be reduced to the following:

- (1) To train the mind through accurate solution of difficult problems.
- (2) To develop ability to do intricate processes in computation.

- (3) To master and understand those arithmetical processes which are required for common activities of every day life and to carry them through with speed and accuracy.

Little children love to observe and compare and even question. Hence in the *first* standard progress should be very gradual. The danger of allowing ideas to become too abstract for their age should be carefully avoided. The emphasis, according to experts in this field, should be on practical work and visualization with the help of apparatus, on the use of terminology taken from their day-to-day vocabulary and on the presentation of factual data. All this is a continuation of the pre-primary or Montessori stage, except that at the end of the year the child will be familiar with the first hundred numbers. This stage being the pure memory stage, tables of addition, subtraction and multiplication also form an important feature.

The calculation stage commences in the *second* standard. A number of concepts have also to be acquired: the concept of unit, of length, of weight, of capacity, of time, of lines. The child is gradually introduced in

a concrete way to the metric system. The decimal point, however, and decimal numbers are avoided as being still too abstract.

In the *third* standard the foundations laid in the *second* standard are strengthened through revision. But the syllabus is not restricted to revision only. New concepts of time, of angles, of space are placed before the child. At this stage the child has reached an age when he will welcome problems from his daily life and around his centres of interest, especially around his home, his neighbourhood, his town.

In the *fourth* standard the pupil is prepared to acquire the concepts of abstract and decimal numbers. He can also absorb the notion of fraction, of average, of areas, and volumes. Further progress in the mastery of these basic concepts, so essential to the pupil in making the practical applications he will be called upon to do once he leaves the primary classes behind, is made in the *fifth* and *sixth* standards. Column graphs, simple equations, factors, percentages, are so many mathematical tools added to the pupil's collection with which to face his secondary education. It is also time to initiate him into the units of other systems, as for example, the British system.

Standard First

Number Study.—Counting, understanding and reading of numbers through concrete experiences from 1 to 5, then from 5 to 10 and finally from 10 to 100. Writing numbers in figures from 1 to 10, then from 10 to 100. Use of the abacus and the hundred-squares board. Meaning of ordinals.

The Four Operations.—Grouping of objects into sets as an introduction to addition and subtraction. Number combinations first within the limits of 10, then of 100. Tables of addition and subtraction (e.g. $1+2=3$; $6-2=4$). Concrete exercises in addition,

comparison, subtraction of two-figure number within the limits of 100. Multiplication tables of 2 and 5 up to 2×10 and 5×10 .

Money.—Recognition of current coins: from 1 nP to 100 nP.

NOTE—In this standard arithmetic learning should be related to everyday living. Stress should be laid on the child's experiences of the size and shape of an object, an oral addition and subtraction of objects (apples, pencils, coins...) first up to 10, then up to 100.

Standard Second

Number Study.—Formation of numbers from 1 to 100. Counting, reading and understanding of numbers up to hundreds of thousands. Counting in twos, tens, fives and fours (note the order!).

The Four Operations.—Extension of addition and subtraction (with carrying). Mental addition and subtraction of one-figure numbers. Tables of multiplication and division at least up to 10×10 and $10 \div 10$. (The following order of tables is recommended: 2, 5, 10, 3, 6, 4, 8, 9, 7). Multiplication and division by not more than two-figure numbers.

Metric System.—Study of the standard units of the metric system without using the decimal point.

Money.—Simple shopping sums using Indian money only and round centres of interest.

Time.—Meaning and use of the terms: minute, hour, day. Telling the time.

Measurement.—Measuring experiences with centimetres and metres. Study of lines.

NOTE—Everyday life should continue to be the basis of arithmetic. Stress to be laid on simple experiences, especially those round centres of interest such as sports, pets, school activities and so on. Concrete experiences in cutting, pasting, weighing, measuring and so on.

Standard Third

Number Study.—Revision and extension of numeration and notation up to six-figure numbers.

The Four Operations.—Revision and extension of addition and subtraction. More difficult examples. Simple problems taken from daily life and centres of interest. Revision of multiplication and division (by not more than two-figure numbers). Simple Problems.

Metric System.—Revision of standard units in simple problems.

Time.—Extension of notions about time, month, day.

Measurement.—Introduction to the study of right angles, squared-off surfaces and cubes. Ideas of space. Comparison of lengths.

Elementary Aspects of Economic life.—Buying and selling, profit and loss, earnings, savings, expenses, time and speed.

NOTE—Free practice in oral and written exercises bearing on subjects of practical use in everyday life, as indicated above, is recommended throughout.

Standard Fourth

Number Study.—Extension of numbers up to millions and down to thousandths.

The Four Operations.—Extension of multiplication and division to three-figure numbers as multipliers and divisors. Tests of divisibility by 2, 3, 5 and 11. Checking answers by casting off nines.

Decimal System.—Changing of units. The four operations. Application to the metric system. Decimal fractions (addition and subtraction).

Fractions.—Common fractions introduced through the decimal system.

Unitary Method.—Simple examples in direct proportion.

Average.—Introduction to the concept of average.

Measurement.—Recognition of simple geometrical figures. Surface units and volumetric units. The circle, the cone, the cylinder. Construction of perpendiculars, squares, rectangles, regular triangles, and regular hexagons. Use of pair of compasses and of squared paper. Comparing areas.

Elementary Aspects of Economic Life.—The post office, camping, different means of travel and so on.

NOTE—Free practice in oral and written exercises as recommended in the previous standard should continue in this standard as well.

Standard Fifth

The Four Operations.—Extension of multiplication and division to more than three-figure numbers as multipliers and divisors. Multiplication and division by factors. Prime factors. Divisibility by 3, 4, 6, 8, 9. H.C.F. and L.C.M. by factors.

The Decimal System.—Revision and extension of work, especially in units of length and longitudinal measurement.

Fractions.—Extension of previous work to half, fourth, third, sixth, fifth, tenth. Reduction to the lowest terms. Comparison of fractions. Proper, improper and mixed fractions. The four operations.

Time.—Second, year. Simple problems. Compound addition, subtraction, multiplication and division of units of time.

Measurement.—Angles and measurement of angles with a protractor. The Mariner's compass. The triangle and its construction. Reading and construction of column graphs. Circumference of circle, surface of circle, lateral surface of cylinder.

Generalized Arithmetic.—Concrete, easy and direct problems using letters for numbers. Introduction to simple equations.

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Elementary Aspects of Economic Life.—Ways of making a living, taxes, cost of operating a home and so on.

NOTE—Revision of the unitary method and of the elementary aspects of economic life as indicated in the previous standards should be carried on, in this standard. The Indian metric units should be used throughout.

Standard Sixth

British Units.—Study of the British units of length, weights and measures and money. Extension of compound additions, etc., to these units.

Decimal System.—Simple problems on the four operations. Reduction of decimals to fractions. Approximate results.

Fractions.—Combined operations, including the 'of' operation. Reduction of fractions to decimals. Introduction to ratio, proportion and partnership. Introduction to percentages, with and without regard to time.

Unitary Method.—Extension to fractional method and to direct and inverse proportion.

Measurement.—Scales, scale drawing and finding distances on maps. Areas of rectangular surfaces only, such as floor, room, door, window, wall, field, etc. Use of graph paper. Breaking up of simple figures into triangles, rectangles, lateral surfaces of simple geometrical figures. Practical ideas on volumes: the cube, the rectangular parallelepiped, the straight prism and the cylinder. Correspondence of volume, capacity and weight in the metric system. Extension of construction: e.g. bisecting an angle, drawing various circles connected with the triangle, demonstrating angle-sum property of the triangle, and the congruence of triangles. Continuous graphs, as exhibiting to the eye a series of values for comparison.

Generalized Arithmetic.—Extension of oral and written work in symbolic expressions. Problems connected with such expressions. Simple equations, formulae, substitution.

NOTE—Simple, well-graded and concrete examples and problems drawn from everyday life should be set throughout. Revision of matter learnt in the previous standards should be insisted upon.

CORRECTION

In the article "Conversion to Metric System in Machine Tool Industry" by Shri R.M. Apte, Assistant Works Manager (Design), Machine Tool Prototype Factory (Ministry of Defence), Ambarnath, appearing in the January 1960 issue, the following technical errors may be corrected:—

On page 18, para 3 the first and second lines may be corrected to read as 'Round numbers are of value as a simple means of designating products'.

On page 19, for lines 3-4 from the top read; 'may be designated by metric values or inch values which are not identical'.

On page 19, 'Example', may be corrected to read as $(1 + 0.016) \text{ inch} = (25 + 0.4) \text{ mm}$

Metric System in Railways

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THE Commercial Departments of the Indian Railways have switched over to the metric system of weights and measures from 1 April 1960. These departments are responsible for all work connected with the weighing and measurement of goods tendered for despatch, fixation of rates and fares according to distance and the realization of the charges due to the Railways for the carriage of goods and passengers. From 1 April 1960, the units of weight and distance are as under :

Unit of Weight

(1) The unit of weight in the case of general merchandise is one quintal (100 kilograms) which is equal to 2.67923 maunds. Fractions of a quintal will be charged in units of 10 kilograms in the case of goods traffic and in units of 5 kilograms in the case of parcels traffic.

(2) The unit of weight in the case of coal is one tonne (1,000 kilograms) which is equal to 0.9842 ton. Fractions of a tonne will be charged in units of 200 kilograms.

Unit of Distance

(1) The unit of distance is a kilometre which is equal to 0.62137 mile. Fraction of a kilometre will be taken as one kilometre.

The Commercial Departments come into direct contact not only with the trade and industry but also the large body of travelling public. Consequently, the decision to change over to the metric system will affect the large clientele of the Railways.

Also, unless the Railways change over to the metric system, there will be no inclination or even inducement for the trade and commerce to think in terms of metric units, much less to adopt the metric system. From that point of view, the decision of the Railways should be a very welcome step.

Compilation of New Distance Tables

The change-over was not a simple process just involving a few decisions of equivalents and notification thereof. Before the change-over could be effected, it became necessary for the Civil Engineering Branch of the Railways to work out the actual distances in metric units between adjacent stations on the Indian Railways and furnish the distances to the Commercial Department. There are about 8,000 stations.

After the initial task of working out the distances between the adjacent stations had

been completed by the Civil Engineering Branch, the Commercial Department had to undertake the compilation of distance tables showing the distance between each pair of stations on a Railway and junction kilometre tables showing the distance between each station and junction with other Railways. The former is intended for the calculation of the charges due in respect of traffic passing locally over that Railway and the latter for the calculation of charges for through traffic between two or more Railways. Each Railway has on an average 1,000 stations and from each station the Railway had to calculate the distance to every other station and to each junction with the adjacent Railway. In other words, calculation of distances for all possible combinations as above between 1,000 stations was involved over each Railway. The number of computations was thus of the order of 5,00,000. Having made the computations each Railway had to print and publish local distance tables showing the distance from each station to every other station on that Railway. Further, the distance from each station to each junction for booking through traffic to another Railway had also to be printed and published.

The calculations and the printing of these distance tables running into several hundreds of pages, had to be arranged by the Railways at short notice, particularly at a time when the Railway presses were busy with the printing of time-tables and other Railway publications.

Recalibration of Weighing Machines

Recalibration of the weighbridges and weighing machines in the metric units and the stencilling of tare weight, carrying capacity, floor area etc., on each wagon in new units had also to be arranged.

There are about 400 weighbridges and 8,000 weighing machines on the Indian Rail-

ways which have so long recorded the weight in the foot-pound system and which will have to be recalibrated in metric units. Some of the weighing machines only could be recalibrated so far with dual marking in the foot-pound system and the metric units. In respect of weighbridges and other weighing machines, recalibration will be done in the course of time. Till then, the Railway staff will actually make the weighment in maunds and seers but invoice the consignments in metric units with the help of conversion tables.

Rates and Fares

The rates and fares prescribed and published in terms of the maund and the mile had to be converted into metric units and renotified. As has been earlier stated, this was not a simple matter. There are certain rules of rounding off which are a basic part of the rules for charging. While care had to be taken to ensure, on the one hand that there was no appreciable increase in the rates and fares charged between specific points or for specific commodities so that the public can have no cause for complaint that the introduction of the metric system has served as an opportunity for the Railways to increase the rates and fares, it had naturally to be ensured at the same time that the Railways do not stand to lose by this change-over.

For example, in calculating passenger fares or freights between any two stations, the existing practice is to take any fraction of a mile as one mile. With the introduction of the metric system, any fraction of a kilometre will be taken as one kilometre. A kilometre being a smaller unit than a mile, the Railways would lose if the basis of rate or fare is converted into exact equivalents. Similarly, in respect of the amount, fractions are rounded off to one anna at present. Under the proposed system, fractions will be rounded off to 5 nP., which again is a smaller

unit than one anna and will, if unadjusted, result in loss to the Railways.

The adoption of the exact equivalent bases of rates and fares, it was estimated, would result in an annual loss of revenue to the Railways of about Rs. one crore. To avoid such a loss, slight adjustments in the rates bases had to be made. The contemplated rate bases had to be tested as to their exact effects. For this purpose, the Railway staff had to make enormous calculations. In respect of passenger fares alone about 1 lakh of calculations had to be undertaken. Similar is the case of the rates for goods, parcels and other traffic.

After the completion of these calculations, different calculated ready fare and freight tables running into about 400 pages (as distinct from the distance tables earlier referred to) had also to be printed—and in record time.

All these items involved hard and accurate work on the part of a large number of staff both in the office of the Railway Board and in the offices of the Railways. In the Railway Board's office alone, the number of man-days involved was about 2,000 and on each Rail-

way the number of man-days involved was about 8,000.

In view of the various units involved and the difference between the units, it was impossible to work out the rates and fares in the new units which will not affect at least some people. But, as the Railway Minister mentioned in his budget speech, care has been taken to ensure that these variations are kept down to the minimum.

While those in whose case the rates have been reduced might welcome it, there is likely to be some criticism from others in whose case the rates have been increased. They are likely to ask as to what the necessity was for introducing the metric system. The answer is simple. The Standards of Weights and Measures Act was passed in 1956 and unless important wings of Government take action to implement it, there will be little inclination for the private sector to adopt this system. In the long run, the benefits of the metric system are unquestionable, and there can be no doubt that the effort that has been put in and the cost that has been incurred in effecting the change, are an insignificant price to pay for the advantages that will accrue.

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Controllers' Conference, Symposium & Visits

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CONTROLLERS' CONFERENCE

The Second Conference of Controllers of Weights and Measures in the States and Union Territories was held on 7 and 8 March 1960, at Rajgir, in Bihar. It was inaugurated by Shri B.C. Patel, Minister for Agriculture, Supply and Health, Bihar. Besides the Controllers, representatives of the Indian Standards Institution, Government of India Mint, Bombay, National Physical Laboratory and the Ministries of Steel Mines and Fuels, Information and Broadcasting, Commerce and Industry attended it.

Minister's Opening Remarks

Inaugurating the Conference, Shri B.C. Patel, said that the Conference would deliberate over the complex problems of one of the most important reforms which we have undertaken to accomplish by 1966. It looked rather strange that we are adopting after centuries what was our own. The onerous responsibility of enforcing weights and measures dwelt on the State Governments and consequently on the State Controllers of Weights and Measures.

He said that we should not remain satisfied with notifying areas and industries. From the Inspector's level to the national level we must plan thoroughly for supply of commercial weights, train the personnel,

appoint them well in time and equip them with weights, balances and other necessary equipment. Simultaneously, publicity measures should be undertaken and the masses should be educated. He said that as in all planning, in the introduction of the metric system, there were processes which were interlinked and there should be no time lag between them. Careful co-ordination in planning and execution between these stages was necessary. For instance, we should not be satisfied merely with placing the demand for commercial weights, but should ensure supply of the raw materials, especially pig iron, to the manufacturers. Again, if the supply of commercial weights was taken care of, but the Inspectors were not supplied with working standard weights and balances, then the commercial weights could not be verified, stamped and sold, and the very purpose of the Act would be defeated.

He then reviewed the Organisation of Weights and Measures in Bihar and said that arrangements were made for educating the masses through extensive publicity and propaganda work. The State Department of Education was also taking up the work of changing the syllabus with a view to incorporating in the curriculum the use of the metric system. Arrangements were being also made for training courses to educate Government servants. In rural areas, the services of the Gram Panchayat and Village Level Workers were being utilized.

He then referred to the sugar industry which occupied an important place in the State of Bihar. For weighment of cane, the industry made use of weighbridges through which they bought cane from about 5 lakh growers. Some 8 sugar factories in the State had changed over to the new system up to the 1959 season, the rest would change-over shortly.

He wished the Conference success.

Shri K.V. Venkatachalam, Joint Secretary, Ministry of Commerce and Industry, while thanking the Minister for inaugurating the Conference, said that a symbolic beginning had been made in October 1958 to permit metric weights in certain restricted areas and trades. The idea was to bring the concept of the metric system to the notice of the people and trade and use the transition period to make the public familiar with the new concept. Experience has shown that mere talking did not carry us very far. Certain amount of actual use, if necessary certain compulsive processes would be required for that purpose. Such compulsion would come through the adoption of the metric system in their commercial transactions by the Railways from 1 April 1960, as also when Customs and Central Excise Department, Ports and Shipping and the Posts and Telegraphs Department change over later this year. Most of the major industries like textiles, jute, coal, engineering, cement, sugar, petroleum and the like would be changing over before the end of the year.

In view of all these, 1960 would be a crucial year in the change-over to the metric system. It was, therefore, necessary that the public should be brought into it more effectively than was the case in the past.

The primary purpose of the Conference, apart from devising solutions for the various problems that had arisen, would be to find

ways and means to get across the metric idea to the public during this year and assess what measures were necessary to make the public take to it without much hardship. During the next few months, the publicity and educative processes would have to be stepped up and concentrated.

The Conference then discussed the various items of the agenda. The important recommendations are given below:

(1) Extension of Weights to the Whole Country

It was agreed that metric weights should be made legally permissible in the rest of the country from 1 April 1960. The period of transition should be two years.

(The effect of this recommendation which has now resulted in the issue of a Notification (*see News & Views*) is to bring in the use of metric weights in remaining parts of the country not notified earlier. So far as metric weights are concerned, they will become compulsory in all transactions by 1 October 1960 in the areas already notified in October 1958 and by 1 April 1962 in the rest of the country, as now notified. As a result, all the industries and trades which use weights would be covered by the new Notification and no separate Notifications may be issued for any further industries permitting the use of metric weights—*Editor*.)

(2) Introduction of Capacity Measures

It was recommended that capacity measures should be introduced all over the country on a fixed date. Although no date was fixed, it was generally agreed that the date should not be later than 1 April 1961.

So far as the petroleum industry is concerned, the use of capacity measures has been allowed from 1 March 1960 and in Delhi, they have been allowed for general use from 1 April 1960 (*see News & Views*).

(3) Compulsory Use of Weights in Areas Notified

In the industries and areas already notified on 1 October 1958, metric weights would be made compulsory from 1 October 1960.

In order to enforce this decision, the Conference considered that the equipment, organization and personnel were sufficient for the purpose and there would be no difficulty in the compulsory introduction of metric weights.

In order to utilize the remaining period most usefully, the Controllers of Weights and Measures had been meeting Associations of wholesale traders and fixing dates for the change-over to metric weights well in advance of 1 October 1960. It is being ensured that the wholesalers purchase the weights without delay. The Inspectors of Weights and Measures have been in turn contacting retail traders and their Associations and fixing up suitable dates for the complete change-over. The efforts would be intensified. This would ensure that there would not be a last minute rush on the manufacturers of weights during September and October 1960 and avoid dislocation at the eleventh hour.

(4) Pricing Units for Trade

The metric units for the quotation of prices for wholesale and retail transactions were accepted.

Wherever statutory recognition of these units was possible, it would be examined.

(These units have been published in the March 1960 issue of *Metric Measures*, page 22).

(5) Permissible Errors for Petrol Dispensing Pumps

It was agreed that the errors for petrol dispensing pumps should be checked for deliveries of 2, 5, 10 and 20 litres and the permissible error should be a maximum of half the tolerances prescribed for metric conical measures.

(6) Quota for Brass Weights

It was agreed that the State Directors of Industries should recognize the manufacture of weights for allocating quota of brass. The Controllers should indicate to the State Directors of Industries the minimum quota of brass required for the manufacture of brass weights.

(7) Inspectors' and Precision Balances

At the first Controllers' Conference, it was decided that the manufacture of Inspectors' and precision balances should be encouraged in the country. A committee was set up with the Assistant Director, National Physical Laboratory, as Convener.

The Convener gave a report on the steps taken and said that two or three firms were already preparing test sets of balances. The firm of Sable's Scales Manufacturing Company (Private) Ltd., Bombay, would also be increasing their production in the near future. It was felt that the future production in the country may be enough to meet the demands of Inspectors' balances.

The question of manufacture of precision balances was under consideration and one firm had already carried out preliminary work in this connection.

(8) Marking of Contents on Packages

One of the provisions of the State Acts relates to the marking on the containers the weight or volume of the contents of sealed packages. It was recommended that this provision should be brought to the notice of the general public.

(9) Specifications for Measures for Hot Milk

In the halwai trade in certain parts of the country, it is necessary to use measures with long handles to measure out hot and boiling milk. It was agreed that the specifications for capacity measures should be suitably amended to cover this requirement.

The Conference concluded at 1 p.m. on 8 March 1960.

II SYMPOSIUM

A symposium on 'Enforcement of weights and measures with special reference to the law, procedures for enforcement and special difficulties experienced in the situation of this country' was held on 9 March 1960 at Rajgir, Bihar, along with the 2nd Conference of Controllers. An exhibition of weights and measures was also held on the occasion. The symposium was presided over by Shri S.V. Sohoni, Commissioner, Patna Division. The Controllers of Weights and Measures of the various States gave a short account of the work they were doing and the progress made.

Shri M. Srikishen Pillay, (Andhra Pradesh), said that considerable publicity had been carried out among all sections of the people. The next step would be to bring the metric commercial weights into use in trade.

Shri V.N. Singh, (Bihar), said that one of the most important tasks was to teach the metric system to children in schools. The masses would adapt themselves to the reform. This was evident from the experience of 8 sugar factories which had already changed over to the metric system and where the illiterate cane growers, who supplied cane to these factories, had become accustomed to it. Inspectors should reach the masses and educate them in the metric system.

Shri V.M. Pednekar, (Bombay), said that the old weights and measures were being enforced legally for the last 25 years. Nevertheless, all sections of the public welcomed the reform. He said that it was necessary to seek the co-operation of traders for smooth implementation of the reform. He pleaded for patience, discretion and tact in implementation in the early stages of the reform.

Shri H.L. Mehandru, (Delhi), said that Delhi had taken steps to persuade traders to change over on specified dates well before October 1960. This was arranged at meetings of representatives and members of the Association of various trades. Steps had been taken to ensure that the traders purchased metric weights at the earliest opportunity.

Shri Qazi Ghulam Rasul, (Jammu & Kashmir), said that the Standards of Weights and Measures Act, 1956, was being extended to Jammu and Kashmir. A Bill to enforce the metric system was being drafted. An organization for enforcement of weights and measures was being established.

Shri T.P.K. Nayar, (Kerala), said that people were willing to change as soon as weights were available. To ensure supply of weights, a number of manufacturers had been licensed. He suggested that tables for the conversion of prices from present units to metric units should be published for the convenience of trade.

Shri R.R. Visuvasam, (Madras), said that the people in Madras were taking to the metric system with greater enthusiasm than was anticipated. He was of the opinion that the reform should be completed as quickly as possible.

Shri C.A. Jamakhandimath, (Mysore), said that sale of their products in markets was an important operation for the farmers. The 'khandies' in use in different parts of Mysore were different. Moreover, the weights in the rest of India were also different from those of Mysore. As a result, trade was hampered and co-operative societies found difficulties in comparing rates in important marketing centres. The adoption of metric system and the acceptance of uniform pricing units for commodities would facilitate trade.

CONTROLLERS' CONFERENCE, SYMPOSIUM & VISITS

Shri R.N. Dwivedi, (Orissa), said that metric weights were being enforced in mandies and there was very little opposition to them. He stressed the need for a quick change-over because the existence of many systems side by side created confusion.

Shri Kanwarjit Singh, (Punjab), urged enforcement of the metric system scientifically and democratically.

Shri K.N. Mathur, (Rajasthan), said that the general tendency of traders everywhere was to wait and see. It was, therefore, necessary to be firm in the enforcement of weights and measures, so that this 'wait and see' policy was not encouraged.

Shri B.B.K. Dev Verman, (Tripura), said that Tripura had an organization for enforcement, but weights from Bihar took up to one month to reach Tripura.

Shri J.B. Sen, (West Bengal), said that the three essentials for implementation were availability of weights, possession of necessary equipment and setting up of an adequate organization. West Bengal had licensed a number of manufacturers and were getting the necessary equipment. An enforcement organization had been set up and was being strengthened.

Representatives of certain industries present addressed the meeting.

Shri S.M. Dutt of Burmah-Shell gave an indication of how the change-over would be carried out by April 1960 in the petroleum trade.

Shri R.R. Jain of Hasanpur Sugar Factory said there were 22 sugar mills in Bihar and quite a few of them had already adopted the metric system. The mills were anxious to use decimal coinage and the metric system. However, there should not be unnecessary compulsion.

Shri R.N. Sharma of Behata Sugar Factory said that it was good that the metric

system would be applied from the Himalayas to Kanya Kumari, but it should be implemented with understanding and tact. Inspectors should go to the villages and explain the purposes of the reform patiently and sympathetically to the villagers. If this was done, he felt people would happily adopt it even in advance of the date fixed. The cane growers around his factory were becoming familiar with the metric system.

Shri C.N. Sharma, Cane Inspector, Muzaffarpur, felt that the Weights and Measures Enforcement Rules and the Bihar Sugar Factories Control Rules should be aligned to remove contradictions.

Shri S.N. Pandey, Weights and Measures Inspector, Gaya, said that the first essential for the success of the reform was that the people should start thinking in the metric system.

Shri K.V. Venkatachalam, Joint Secretary, Ministry of Commerce and Industry, summing up the discussion, said that India had arrived at the stage where opposition to the metric system was fast disappearing. It was now necessary that metric weights should come into day-to-day use. It was important to adhere to the dates announced for the change-over. In order to make the best use of the time left before the use of metric weights became compulsory, careful planning and implementation were necessary. He suggested meetings of wholesale dealers to fix dates for the various trades. Later the Inspectors should ensure that the traders concerned order weights and are helped to obtain supplies of stamped weights. The Inspectors should contact traders, particularly, retailers. This would ensure a steady flow of stamped weights to traders and avoid last minute rush.

In conclusion, Shri S.V. Sohoni, Commissioner, Patna Division, said that the reform should be carried to the villages

through Panchayats, Block Development organizations and the like. He stressed that the question of postponement should not at all be considered. People had a store of commonsense and their adaptability to new conditions was remarkable. In the light of these, the success of the reform was assured.

With a vote of thanks to the Chair, the Symposium concluded at 1 p.m.

III VISITS

An instructive part of the programme was the visits arranged by the Controller of Weights and Measures, Bihar.

On arrival in Patna on 6 March 1960, the delegates paid a visit to the Training Centre for Inspectors of Weights and Measures in Patna. This Centre has so far trained 48 persons: 4 from West Bengal, 2 from Tripura, 1 from Assam and the rest from Bihar. The Centre is well equipped for imparting instruction in the principles and practice of verification of weighing and measuring instruments and so on. The syllabus is so designed that variation in the educational background of the trainee is not a handicap to him in learning his job.

At Khagaul, Bihar Agricultural Industries have undertaken a programme of manufacture of metric weights, both cast iron and brass. The concern is supplying weights to far off places like Tripura. The firm was among the first to produce metric weights and their workmanship is good.

Visits in Rajgir

On the evening of 6 March 1960, the party proceeded to Rajgir, where the Controllers' Conference and the Symposium took place. The Controller of Weights and Measures in Bihar, Shri V.N. Singh, had informed the

delegates that the markets in Rajgir and nearby places had changed over to metric weights completely. It was a pleasant surprise to find that metric weights were being used in the village shops, while the seer weights had been voluntarily discarded by some traders. The traders, mainly village folk, did not have any difficulty in quoting prices and weighing materials in kilograms and grams. Actually, when asked to convert prices from the kilogram basis to the seer basis many of them could do it easily. Even the customers were able to make their purchases with the new weights. It appeared that as long as both the seer and kilogram weights were used side by side, there was no occasion for the use of the kilogram weights because, the customer always thought and purchased in terms of seers and chhataks. But when the exclusive use of only the kilogram and gram weights was brought in, the situation changed radically and rapidly.

Visits to Sugar Factories

After the Conference and the Symposium, the delegates proceeded to visit two sugar factories near Muzaffarpur. The factories had adopted the metric system in the purchase of sugar cane.

At the Motipur Sugar Factory, about 15 miles from Muzaffarpur, which was working partially, the machine for the weighment of cane carts and cane waggons has been calibrated only in the metric system. The use of seer system had been completely done away with.

The second factory was the Champaran Sugar Company Ltd., at Chakia. The delegates visited their cane weighment section before going through the factory. The weighbridge for the weighment of cane carts was calibrated only in the metric system in terms of kilograms. A row of carts loaded with cane had either been weighed earlier or were to be weighed. The invoices given

to the cartmen were made out in terms of quintals and kilograms and the prices given per quintal. The conversion factor for maunds to kilograms was merely rubber stamped on the invoice. When questioned about weight of their carts and cane as indicated on the invoice, the cartmen quoted it correctly in terms of quintals and kilograms. They do not convert these metric figures into maunds and seers and they could easily understand the relation between the quintal and the kilogram. Many of the cartmen said that they found it more convenient to calculate in terms of the metric system and the decimal coinage than in the older systems of maund and rupees, annas and pies.

Many cartmen had brought cane from cane growers for sale to the factory. These cartmen on return, quoted the weight of the cane in maunds to the grower and got their hire charges accurately.

Commonsense of Common People

What impressed most was that here was the so called common man, illiterate but not ignorant, in whose name the metric reform is often opposed by the educated, but who,

if properly trained, could pick up the use of the metric system, metric nomenclature, magnitudes of the various units and use of all these without getting into difficulty. Within the space of one sugar season, normally 4 to 5 months, they had got accustomed to the new system and had begun to like it more than the old system. The adoption of the new weights to the exclusion of the old did not lead to any instance of misunderstanding between the growers and the factories. This great result has been obtained by the co-operative effort of the factories, the Publicity and the Weights and Measures Departments of the Government of Bihar. The example deserves to be emulated elsewhere.

The visits were instructive because they shook the commonly held belief that the common man would find great difficulty in adopting the metric system. They also showed that the so-called common man in India has a good deal of commonsense and can adapt himself easily to reforms which are in his own interest, as in the case of metric system and the decimal coinage, if given the right lead at the right time.

* * *

News & Views

Recent Notifications

The Government of India have recently issued the following notifications to bring in the use of metric weights and measures in certain spheres of activities :

(1) Tea Industry

No. S.O. 421 dated : the 10th February 1960.

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 March, 1960, as the date on which the provisions of the said Act shall come into force in respect of tea factories in so far as they undertake the sale of manufactured tea or make payments to labourers for plucking tea leaves.

No. S.O. 424 dated : the 10th February 1960.

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 class of undertaking referred in the notification of the Government of India in the Ministry of Commerce and Industry, Notification No. S.O. 421 dated the 10th February 1960, the continuance of the use, for a period of one year from the 1st day of March, 1960, of any weight or measure which, immediately before that day, was in use in respect of the said class of undertaking.

No. S.O. 422 dated : the 10th February 1960.

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 April, 1960, as the date on which the provisions of the said Act shall come into force in respect of the classes of undertakings specified below to the extent specified therein :

(1) The Tea Board in so far it undertakes the licensing of areas to be grown with tea, grant licences for exporting manufactured tea, or keep statistics and accounts relating to the production and marketing of tea.

(2) The Calcutta Tea Traders Association and the Cochin Tea Traders Association in so far as they regulate auctions in manufactured tea.

No. S.O. 423 dated : the 10th February 1960.

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 classes of undertakings referred in the notification of the Government of India in the Ministry of Commerce and Industry, Notification No. S.O. 422 dated the 10th February 1960, the continuance of the use, for a period of one year from the 1st day of April 1960 of any weight or measure which, immediately before that day, was in use in respect of the said classes of undertakings.

(2) Petroleum Industry

No. S.O. 478 dated : the 18th February 1960.

In exercise of the powers conferred by sub-section (3) of section 1 of the Standards of

NEWS & VIEWS

Weights and Measures Act, 1956 (89 of 1956), the Central Government hereby appoints the 1st day of March, 1960 as the date on which the provisions of the said Act shall come into force in respect of crude petroleum and petroleum products, produced, manufactured, distributed, bought or sold, whether by a producer, manufacturer or distributor of crude petroleum or petroleum products or by an agent, dealer or retailer engaged in buying and selling crude petroleum or petroleum products.

No. S.O. 479 dated : the 18th February 1960.

In exercise of the powers conferred by sub-section (1) of section 14 of the Standards of Weights and Measures Act, 1956 (89 of 1956), the Central Government hereby permits the continuance of the use in respect of crude petroleum and petroleum products referred to in the Notification of the Government of India in the Ministry of Commerce and Industry No. 478 dated the 18th day of February, 1960, for a period of one year from the 1st day of March 1960, of any weight or measure which, immediately before that date, was in use in respect of crude petroleum and petroleum products aforesaid.

(3) Railways

No. S.O. 553 dated : the 25th February 1960.

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 April, 1960, as the date on which the provisions of the said Act shall come into force in respect of the Indian Railways in so far as they undertake the transport of passengers, animals or goods.

(4) Capacity Measures in Delhi

No. S.O. 801 dated : the 14th March 1960.

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 April, 1960 as the date on which the provisions of the said Act in so far as they relate to units of capacity shall come into force in respect of transactions involving sale and purchase of goods in the Union Territory of Delhi.

No. S.O. 802 dated : the 14th March 1960.

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 transactions involving sale and purchase of goods in the Union Territory of Delhi referred to in the notification of the Government of India in the Ministry of Commerce and Industry S.O. No. 801 dated 14th March, 1960 the continuance of the use, for a period of one year from the 1st day of April, 1960 of any units of capacity which, immediately before that day, were in use in respect of the Union Territory of Delhi.

(5) Extension of Weights to the Entire Country

No. S.O. 839 dated : the 31st March 1960.

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 April, 1960 as the date on which the provisions of the said Act in so far as they relate to units of mass, shall come into force in respect of transactions involving sale and purchase of goods in the whole of India except the State of Jammu and Kashmir and except in those areas in which, or in those classes of undertakings or those classes of goods in respect of which, the said provisions have already come into force.

No. S.O. 840 dated : the 31st March 1960.

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 relation to transactions referred to in the Notification of the Government of India in the Ministry of Commerce and Industry S.O. No. 839 dated 31st March 1960 the continuance of the use for a period of two years from the 1st day of April, 1960 of any weight which immediately before that date was in use in relation to such transactions.

Metric System and Decimal Coinage for Pakistan

It is learnt that the Pakistan Government has decided to introduce decimal coinage in that country from January 1961. It appears that the value of rupee would remain unchanged. It is further understood that the metric system of weights and measures would also be introduced there early in 1961.

Metric System in Shipping

The Government of India have decided to introduce the metric system of weights and measures on the commercial side of shipping and at the major ports of Bombay, Calcutta, Madras, Cochin, Kandla and Vizagapatnam from August 1960. This is meant to synchronize with the change-over in the levy and collection of Customs duties and duties of Central Excise.

The exact date on which the new system is to be introduced would be announced later.

Sale of Paints by Volume

It is well known that the sale of liquid paints by weights has led to malpractices. In 1953, the Paints and Allied Products Sectional Committee of the Indian Standards Institution recommended that Government purchasing agencies should buy liquid paints only by volume. This recommendation has now been accepted by the Paint Panel of the Development Council for Oil-based and Plastics Industries, at its 6th meeting on 1 March 1960. The State Government have

the power under their respective Weights and Measures (Enforcement) Acts to enforce sale of paint by volume. Steps to issue notifications to cover sale of paint by volume are being taken. The Indian Standards Institution has already laid down standards for the packing of paints in containers of 4 litres, 2 litres, 1 litre, 500 ml, 200 ml, 100 ml and 50 ml. As reported earlier, the paint industry will begin its change-over on 1 April 1960, with a change-over period of one year.

Adoption of Metric Weights in Bombay State

It is understood that the Poona Grain and Grocery Merchants' Association have resolved in their meeting on 21 December 1959, to adopt the metric weights with effect from 28 March 1960 which coincides with the beginning of the new year. They have requested all the wholesale and retail traders to adopt metric system on the same day so as to have uniformity of adoption.

Sale of Salt by Weight in Madras

It is understood that the sale of salt in the districts of Madras, Chingleput, North Arcot and South Arcot will be by weight from 1 October 1960.

The Salt Experts Committee appointed by the Government of India in 1949 suggested that with a view to improve the quality of the salt produced in the State, the sale of salt, both wholesale and retail, should be by weight only and not by measure. In view of the change-over to the metric system, the Government of Madras have now taken the decision to introduce the sale of salt by weight in the four districts in which metric weights were introduced from 1 October 1958. This is being done under the powers conferred by section 8 of the Madras Weights and Measures (Enforcement) Act, 1958 (Madras Act XX of 1958). The Controller of Weights and Measures has been put in charge of the enforcement of sale of salt by weight.

Licensed Manufacturers, Dealers and Repairers of Weights and Measures (7)

Metric Measures has been publishing a series of lists of 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 in their respective jurisdiction. This is the seventh list. The first list appeared in the March 1959 issue.

Progressively steps are being taken for licensing manufacturers, dealers and repairers in all States and further lists of licensees would be published in *Metric Measures* as this work progresses.

The number in brackets against the name of the State or Union Territory indicates the particular instalment number of the list for that State or Union Territory. The issues of *Metric Measures* in which previous lists appear are also shown suitably.

An analysis of the licensees, including the present list, shows that the total number of licensees in 9 States and 2 Union Territories is 174 manufacturers, 723 dealers and 126 repairers. The details of published information are as follows:—

Sl. No.	State/Union Territory	Licensees		
		Manu- facturers	Dealers	Repa- rers
		25	25	16
(1)	Andhra Pradesh	23	160	52
(2)	Bombay	13	59	18
(3)	Delhi	4	74	0
(4)	Kerala	38	74	14
(5)	Madras	10	0	0
(6)	Madhya Pradesh	9	106	8
(7)	Mysore	4	5	0
(8)	Orissa	13	212	9
(9)	Punjab	0	8	0
(10)	Tripura	35	0	9
(11)	West Bengal	174	723	126

DELHI (4)

In the July and September 1959 and March 1960 issues of *Metric Measures* lists of licensed manufacturers, dealers and repairers of weights and measures in Delhi area were published. The following is a list of manufacturers, dealers and repairers subsequently licensed by the Delhi Administration.

Manufacturer

Sl. No.	Name and Address of Manufacturer	Details of Articles Manufactured
(1)	Indian Kanta Works, 8170, Chemni Mill, Bara Hindu Rao, Delhi.	Beam Scales Class C & D of capacities 10 kg & above.

Dealers

Sl. No.	Name and Address of Dealer	Details of Articles Sold
(1)	Banarsi Dass Mahabir Pd. 1075, Gali Raja Uggur Sain, Bazar Sita Ram, Delhi.	Weights, Measures, Weighing and Measuring Instruments.
(2)	Das Mal Bhagat Ram, Iron, Steel and Hardware Merchants, 5058, Sirkiwala, Delhi.	Weights, Measures, Weighing and Measuring Instruments.
(3)	Lakshmi Chand Radha Kishan, 6524, Fatehpuri, Delhi	Weights, Measures, Weighing and Measuring Instruments.
(4)	Munna Lal Ram Dyal, Iron and Hardware Merchants, 19, Chawri Bazar, Delhi.	Weights, Measures, Weighing and Measuring Instruments.
(5)	Radha Kishan Ram Kumar, 247, Subhash Nagar, Nangal Ray, Central Jail, Delhi-Cantt. Road.	Weights, Measures, Weighing and Measuring Instruments.
(6)	Tara Chand Rameshwar Dass, Bichhal Barton Store, II/109, Sadar Bazar, Delhi-Cantt.	Weights, Measures, Weighing and Measuring Instruments.

N.B.—The license issued to H. C. Sen & Co. Fountain, Delhi (item 39 of page 39 appearing in November 1959 issue) has since been cancelled by Delhi Administration.

Repairer

Sl. No.	Name and Address of Repairer	Details of Articles Repaired
(1)	Banarsi Dass Mahabir Pd. 1075, Gali Raja Uggur Sain, Bazar Sita Ram, Delhi.	Beam Scales (Class B, C, & D) and Weights.

KERALA (3)

In the November 1959 and March 1960 issues of *Metric Measures* lists of licensed manufacturers and dealers of weights and measures in Kerala State were published.

LICENSED MANUFACTURERS, DEALERS & REPAIRERS OF WEIGHTS & MEASURES (7)

The following is a list of dealers subsequently licensed by the Government of Kerala under the Kerala Weights and Measures (Enforcement) Act, 1958.

Dealers

Sl. No.	Name and Address of Dealer	Details of Articles Sold
(1)	A.M. Ali Haji Bismilla, Hardware Stores, Big Bazaar, Palghat.	Weights, Measures and Weighing Instruments.
(2)	V. Gandhi, Vasavi Hardware Mart, G.B. Road, Palghat	Weights Measures and Weighing Instruments.
(3)	A.N. Guna Shenoy & Sons, Hardware Merchants, Thirunakara Market, Kottayam.	Weights, Measures, Weighing and Measuring Instruments.
(4)	Hajee M. Kunhahamed, General Hardware Merchant, Perinthalmanna-Nilambur Road, Perinthalmanna Town, Palghat.	Weights, Measures, Weighing and Measuring Instruments.
(5)	S. Ibrahim & Co., 31/1834, Jooins Buildings, Chalai Bazaar, Trivandrum.	Weights.
(6)	A.G. Krishna Shenoy, Hardware Merchant, Kalarikal Bazaar, Kottayam.	Weights, Measures and Weighing Instruments.
(7)	T.P. Lonappan, Industrial Training Corporation, Chittur, Palghat.	Weights, Measures and Weighing Instruments.
(8)	K.P.G. Menon, Construction House, Ottapalam, Palghat	Weights and Measures.
(9)	C.A. Muthuswamy Pillay, Hardware Merchant, Chittur, Cochin.	Weights and Measures.
(10)	A.A. Narayana Mannadiar, A.N. Annamala Mannadiar & Sons, General & Hardware Merchants, Koduvayur, Dist. Palghat.	Weights, Measures, Weighing and Measuring Instruments.
(11)	Padinjarakara Ponnen Kurien & Sons, Ltd., P.B. No. 22, Kottayam.	Weights, Measures, Weighing and Measuring Instruments.
(12)	R. Parvatham Chetty, 28, Bazar, Munnar High Range, Kerala.	Weights, Weighing and Measuring Instruments.
(13)	V.V. Rangaswamy Iyer, General Merchant, Vadakkancherry, Dist. Palghat.	Weights, Measures and Weighing Instruments.
(14)	T.P. Rathnasabhapathi Chettiar's Sons, Big Bazaar, Palghat	Weights, Measures and Weighing Instruments.
(15)	C.S. Sankaranarayanan, Hardware Merchant, Kollengode P.O. Palghat Dist.	Weights and Measures.
(16)	C.N. Subbiah Chettiar, Hardware Merchant, Chittur, Palghat.	Weights, Measures and Weighing Instruments.
(17)	K. Thanulingam Pillai, Proprietor M/s K.S.T. Subbiah Pillai & Sons, Chalai, Trivandrum.	Weights & Measures.
(18)	N.M. Varoo, Hardware Merchant, Thathamangalam, Dist. Palghat.	Weights, Measures and Weighing Instruments.

MADHYA PRADESH (1)**Manufacturers**

Sl. No.	Name and Address of Manufacturer	Details of Articles Manufactured
(1)	Bhopal Auto Repairing Works, Motia Park, Bhopal	Weights, Measures, Weighing and Measuring Instruments.
(2)	Central India Chemicals (P) Ltd. Sehore	Weights, Measures, Weighing and Measuring Instruments.
(3)	Dalvi Industries Kampoo Gwalior, Gwalior	Weights, Measures, Weighing and Measuring Instruments.
(4)	Gangwal Industries, Gangwal Bhavan, Lashkar, Gwalior	Weights, Measures, Weighing and Measuring Instruments.
(5)	General Manager, Gwalior Engineering Works Kampoo Kothi, Lashkar, Gwalior.	Weights, Measures, Weighing and Measuring Instruments.
(6)	General Manager, The Bhandari Iron and Steel Co. (P) Ltd., 5/8 Silnath Camp, Indore.	Weights, Measures, Weighing and Measuring Instruments.
(7)	The Manager, Simplex Engineering and Foundry Works, Madan Mahal Nagpur Road, Jabalpur.	Weights, Measures, Weighing and Measuring Instruments.
(8)	Patel Industries & Engineering Works, 1 Silnath Camp, Indore City.	Weights, Measures, Weighing and Measuring Instruments.
(9)	Proprietor Swastic Engineering and Scientific Co. Swastic House Jawarganj, Jabalpur.	Weights, Measures, Weighing and Measuring Instruments.
(10)	Tambat Nib Factory Maharani Laxmibai Road, Lashkar, Gwalior.	Weights, Measures, Weighing and Measuring Instruments.

MYSORE (2)

In the March 1960 issue of *Metric Measures* a list of licensed manufacturers and dealers of weights and measures in Mysore State was published. The following is a list of dealers and repairers subsequently licensed by the Government of Mysore under the Mysore Weights and Measures (Enforcement) Act, 1958.

Dealers

Sl. No.	Name and Address of Dealer	Details of Articles Sold
(1)	Abdul Gafoor, Stamp Vendor, Srirangapatna	Weights, Measures and Weighing and Measuring Instruments.
(2)	Ajjampur Bhogappa Setty & Sons, General Merchants Davenagere City.	Weights, Measures and Weighing and Measuring Instruments.
(3)	V.S. Akkasligar, Prop. Nageswar Repairing Works, Ron District, Dharwar.	Weights, Measures and Weighing and Measuring Instruments.
(4)	Annapurna Cooker Co., No. 36, Kankanhally Road, Bangalore.	Weights, Measures and Weighing and Measuring Instruments.

LICENSED MANUFACTURERS, DEALERS & REPAIRERS OF WEIGHTS & MEASURES (7)**Dealers (Contd.)**

Sl. No.	Name and Address of Dealer	Details of Articles Sold
(5)	Asia Engineering Corporation, P.O. Box 13.A. Bruce Street, Fort, Bombay—C/o Best & Co. (P) Ltd., George Oakes Buildings, S Sri Narsimharaja Square, Bangalore.	Weights, Measures and Weighing and Measuring Instruments.
(6)	Basappa Channabassappa Chandrapattan, Hardware & Stationery Merchant, Byadgi.	Weights, Measures and Weighing and Measuring Instruments.
(7)	Best Co. Private Ltd., George Oakes Buildings, Bangalore	Weights, Measures and Weighing and Measuring Instruments.
(8)	Bhoopalam, Virupaksha Setty & Sons, Importers & Exporters, Arsikere.	Weights, Measures and Weighing and Measuring Instruments.
(9)	Bidar Iron Works, M. Bidar Prop. M.A. Jabbar, Khuni Chabutra Bidar, Bidar District.	Weights, Measures and Weighing and Measuring Instruments.
(10)	Calcutta Machine Tools Corporation, No. 64, Silver Jubilee Park Road, Bangalore.	Weights, Measures and Weighing and Measuring Instruments.
(11)	R.K. Dhupatane, Jainpeth, Bagalkot, Dist. Bijapur ..	Weights, Measures and Weighing and Measuring Instruments.
(12)	Durgoji, Narayana Rao, C/o Vittala Rao, Merchant, Harihar Town, Chitradurga Dist.	Weights, Measures and Weighing and Measuring Instruments.
(13)	B.R. Gunde, Motor Mechanic, Station Road, Haveri, Dharwar District.	Weights, Measures and Weighing and Measuring Instruments.
(14)	C.S. Herur, General Merchant, Haveri	Weights, Measures and Weighing and Measuring Instruments.
(15)	Hiralal & Sons, Raviwarpeth, Shop No. 681, Belgaum ..	Weights, Measures and Weighing and Measuring Instruments.
(16)	V.C. Jakkappaavar, Hardware Merchant, Bazar Road, Bailhongal, Belgaum Dist.	Weights, Measures and Weighing and Measuring Instruments.
(17)	Kadur Taluk Agricultural Produce Cooperative Marketing Society Ltd., Kadur.	Weights, Measures and Weighing and Measuring Instruments.
(18)	Kalappa Bharmapa Kudachi, Raviwarpeth, Shop No. 834, Belgaum.	Weights, Measures and Weighing and Measuring Instruments.
(19)	Krishna Rao S/o Mohanlal, Pootani Galli, Gulbarga	Weights, Measures and Weighing and Measuring Instruments.
(20)	Mithal Balwant, Harwadkhar, Raviwarpeth, Belgaum ..	Weights, Measures and Weighing and Measuring Instruments.
(21)	Nagaraj S. Khodanpur, Prop. The Oriental Scale Co., Menasikai Galli, Hubli.	Weights, Measures and Weighing and Measuring Instruments.
(22)	K.H. Nara, Hardware Merchant, Bagalkot Dist., Bijapur	Weights, Measures and Weighing and Measuring Instruments.
(23)	Narayan Devendra Dhaval, 378 Dalalpeth, Nipani	Weights, Measures and Weighing and Measuring Instruments.
(24)	Narayana Setty & Sons, Hardware Merchants, Gandhi Bazaar, Shimoga.	Weights, Measures and Weighing and Measuring Instruments.
(25)	G.K. Narayana Setty & Sons, Merchants, Santhepet, Tiptur (Branch) Arsikere	Weights, Measures and Weighing and Measuring Instruments.

Dealers (Contd.)

Sl. No.	Name and Address of Dealer	Details of Articles Sold
(26)	B. G. Oswal, Stationery Hardware Merchant, Bagawadi, Bijapur District.	Weights, Measures and Weighing and Measuring Instruments.
(27)	Pai & Company (Regd.), 901, Bunder Road, Honavar, N.K. District.	Weights, Measures and Weighing and Measuring Instruments.
(28)	Prabhakara Hardware Stores, Ragipet, Bangalore-2	Weights, Measures and Weighing and Measuring Instruments.
(29)	S.V. Rathnaswamy & Sons, Merchants & Burmah-Shell Agents Chickmagalur P.O.	Weights, Measures, Weighing and Measuring Instruments.
(30)	Regal Stores, Hardware Merchant, Opposite New Chitra Talkies, Mangalore-3.	Weights, Measures, Weighing and Measuring Instruments.
(31)	Sangameshwar, Repairing Works, Station Road, Gadag	Weights, Measures, Weighing and Measuring Instruments.
(32)	P.N. Satyanarayana, Merchant, Big Bazar Kolar	Weights, Measures, Weighing and Measuring Instruments.
(33)	D.M. Shaha, Hardware Merchant, Gandhi Road, Haveri, Dharwar Dist.	Weights, Measures, Weighing and Measuring Instruments.
(34)	Shriven & Co., 25, Surveyor Street, Basavangudi, Bangalore-4	Weights, Measures, Weighing and Measuring Instruments.
(35)	Siddalingayya, Basayya Balulmath, Hardware Merchant, Bagalkot.	Weights, Measures, Weighing and Measuring Instruments.
(36)	S.R. Sriranga Setty, Jeweller Chowk, Mercare, Coorg ..	Weights, Measures, Weighing and Measuring Instruments.
(37)	Subbarayappa & Sons, General & Hardware Merchant, Chintamani.	Weights, Measures, Weighing and Measuring Instruments.
(38)	V.R. Venkata Ram, Satyanarayana Book Stores, Main Road, Srirangapatna.	Weights, Measures, Weighing and Measuring Instruments.
(39)	B.T. Yendigeri, Stationery Merchant, Kerur, Bijapur District	Weights, Measures, Weighing and Measuring Instruments.

Repairers

Sl. No.	Name and Address of Repairer	Details of Articles Repaired
(1)	Amarappa Angadi, Repairer of Weights & Measurers, Koppal.	Weights, Measures and Weighing Instruments.
(2)	Annapurna Cooker Co., No. 37, Kankanahally Road, Bangalore-4.	Weights, Measures and Weighing Instruments.
(3)	Bidar Weights and Measures Dealing and Repairing Company near Khuni Chabutra Bidar.	Weights, Measures and Weighing Instruments.
(4)	Karnatak Weights and Measures Adjusting Works, Abdul Salam Badal Mailapur Gate, Yadgiri, District Gulbarga.	Weights, Measures and Weighing Instruments.

LICENSED MANUFACTURERS, DEALERS & REPAIRERS OF WEIGHTS & MEASURES (7)

Repairers (Contd.)

Sl. No.	Name and Address of Repairer	Details of Articles Repaired
(5)	National Engineering Sales Corporation, Golikatta Bazaar Bunder, Mangalore.	Weights, Measures and Weighing Instruments.
(6)	OM Scale Repairing, Prop., H.R. Rao, Barun Qila, No. 3-4-020, Raichur.	Weights, Measures and Weighing Instruments.
(7)	Radhakrishna and Brother, Nehru Gunj, Mujguri Road, Gulbarga.	Weights, Measures and Weighing Instruments.
(8)	Shekarappa Andanappa Gugri, Repairer in Weights and Measures, Koppal	Weights, Measures and Weighing Instruments.

PUNJAB (4)

In the July and September 1959 and March 1960 issues of *Metric Measures* lists of licensed manufacturers, dealers and repairers of weights and measures in the 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

Sl. No.	Name and Address of Manufacturer	Details of Articles Manufactured
(1)	Avon Scales Company, Amritsar	Weighing Platform Machines of type 1001 and 1002 of 300 kg and 200 kg Capacity
(2)	Indian Weighing Machines, Hide Market, Amritsar ..	Platform Weighing Machines.

Dealers

Sl. No.	Name and Address of Dealer	Details of Articles Sold
(1)	Aggarwal Iron & Hardware Stores, Shahbad, Dist. Karnal ...	Weights, Measures, Weighing and Measuring Instruments.
(2)	Atma Ram Ram Saroop, Handiaya Bazar, Barnala	Weights, Measures, Weighing and Measuring Instruments.
(3)	Bachan Singh Badan Singh, Kharar, Dist. Ambala	Weights, Measures, Weighing and Measuring Instruments.
(4)	Balha Ram Ram Rang, Karnal	Weights, Measures, Weighing and Measuring Instruments.
(5)	Bashambar Datt Sagar Chand, Iron Merchants, Mukerian ..	Weights, Measures, Weighing and Measuring Instruments.

Dealers (contd.)

Sl. No.	Name and Address of Dealer	Details of Articles Sold
(6)	Bashesar Parshad, Rameshwar Dayal, Safidon	Weights, Measures, Weighing and Measuring Instruments.
(7)	Benarsi Dass Dewan Chand, Patiala	Weights, Measures, Weighing and Measuring Instruments.
(8)	Beni Parshad Paduman Kumar, Iron Merchants, Gandhi Chowk, Kalka.	Weights, Measures, Weighing and Measuring Instruments.
(9)	Bharat Iron Trading Company, Rly. Road, Pathankote ..	Weights, Measures, Weighing and Measuring Instruments.
(10)	Bhoja Ram Bham Ram, Abohar	Weights, Measures, Weighing and Measuring Instruments.
(11)	Dalip Singh and Sons, Deharaha	Weights, Measures, Weighing and Measuring Instruments.
(12)	Daya Ram Moti Ram, Utensil Merchants, Abohar, Patiala ..	Weights, Measures, Weighing and Measuring Instruments.
(13)	Daya Ram Payare Lal, Iron Merchants, Abohar, Patiala ..	Weights, Measures, Weighing and Measuring Instruments.
(14)	Devi Dayal, Railway Road, Patti, Dist. Amritsar ..	Weights, Measures, Weighing and Measuring Instruments.
(15)	Gupta Hardware Stores, Chowk Sudan, Jullundur City ..	Weights, Measures, Weighing and Measuring Instruments.
(16)	Gupta Iron Stores, Sadar Bazar, Nabha, District Patiala ..	Weights, Measures, Weighing and Measuring Instruments.
(17)	Hargolal & Sons, Ambala Cantt.	Weights, Measures, Weighing and Measuring Instruments.
(18)	Jai Parkash Satya Dev, Chhoti Mandi, Kaithal	Weights, Measures, Weighing and Measuring Instruments.
(19)	Jangi Ram Bhola Ram, Iron Merchants, Narnaul	Weights, Measures, Weighing and Measuring Instruments.
(20)	Joti Ram Bhika Ram, Iron Merchants, Sunam	Weights, Measures, Weighing and Measuring Instruments.
(21)	Kalu Ram Shubh Karan, Hansi	Weights, Measures, Weighing and Measuring Instruments.
(22)	Karam Chand Som Nath, Amritsar	Weights, Measures, Weighing and Measuring Instruments.
(23)	Kataria B. D. & Sons, Ludhiana	Weights, Measures, Weighing and Measuring Instruments.
(24)	Kishore Chand Lachhman Dass, Muktsar, Dist. Ferozepore	Weights, Measures, Weighing and Measuring Instruments.
(25)	Krishna Machinery Stores, Rohtak	Weights, Measures, Weighing and Measuring Instruments.
(26)	Lakhi Ram Radha Sham, Lotwali Bazar, Dharamsala, Dist. Kangra.	Weights, Measures, Weighing and Measuring Instruments.

Dealers (contd.)

Sl. No.	Name and Address of Dealer	Details of Articles Sold
(27)	Madan Gopal Amrit Lal, Kacheri Road, Moga, Dist. Ferozepore.	Weights, Measures, Weighing and Measuring Instruments.
(28)	Mangal Chand Parshotam Dass, Iron Merchants, Abohar Mandi.	Weights, Measures, Weighing and Measuring Instruments.
(29)	Mani Ram Dogra & Sons, Kotwali Bazar, Dharamsala, Kangra Dist.	Weights, Measures, Weighing and Measuring Instruments.
(30)	Milkhi Ram Charanji Lal, Jandiala	Weights, Measures, Weighing and Measuring Instruments.
(31)	Mohindera Brothers Kacheri Road, Ludhiana	Weights, Measures, Weighing and Measuring Instruments.
(32)	Munshi Ram Jado Ram, Brass Ware Merchants, Jagadhri ..	Weights, Measures, Weighing and Measuring Instruments.
(33)	Munshi Ram Surrinder Kumar, Moga	Weights, Measures, Weighing and Measuring Instruments.
(34)	Munshi Singh Dharm Singh, Guru Har Sahai	Weights, Measures, Weighing and Measuring Instruments.
(35)	Nanha Mal Puran Chand, Iron Merchants, Kurukshetra ..	Weights, Measures, Weighing and Measuring Instruments.
(36)	Natha Mal Ram Singh, Shahkote	Weights, Measures, Weighing and Measuring Instruments.
(37)	National Tape Company, 198-Ikbal Road, Ludhiana ..	Weights, Measures, Weighing and Measuring Instruments.
(38)	Nirmal Singh Prem Singh, Malout Mandi, Dist. Ferozepur	Weights, Measures, Weighing and Measuring Instruments.
(39)	Pt. Charan Dass, Katra Hari Singh, Amritsar	Weights, Measures, Weighing and Measuring Instruments.
(40)	Piara Lal Prem Chand, Iron & Metal Merchants, Sadhaura ..	Weights, Measures, Weighing and Measuring Instruments.
(41)	Prem Nath Aggarwal and Sons, Chaura Bazar, Karnal ..	Weights, Measures, Weighing and Measuring Instruments.
(42)	Raj Kumar Kashmiri Lal, Iron Merchants, Abohar ..	Weights, Measures, Weighing and Measuring Instruments.
(43)	Rajasthan Machinery Stores, Narnaul	Weights, Measures, Weighing and Measuring Instruments.
(44)	Ram Chand Chhaju Ram Iron Merchants, Nabha (Patiala)	Weights, Measures, Weighing and Measuring Instruments.
(45)	Ram Lal Brij Lal, Dhuri, District Sangrur	Weights, Measures, Weighing and Measuring Instruments.
(46)	Ram Sukh Dass & Sons, Paints & Hardware Merchants, 46, Lower Bazar, Simla.	Weights, Measures, Weighing and Measuring Instruments.
(47)	Ramgopal Ramesh Chander, Iron Merchants, Hoshiarpur ..	Weights, Measures, Weighing and Measuring Instruments.

Dealers (concl'd.)

Sl. No.	Name and Address of Dealer	Details of Articles Sold
(48)	Rup Chand Dharm Pal, Iron Merchants, Samana Mandi (Patiala).	Weights, Measures, Weighing and Measuring Instruments.
(49)	Sat Parkash Singhal and Bros. Samrala	Weights, Measures, Weighing and Measuring Instruments.
(50)	Sikand Saini & Company, Weavers Colony, Panipat	Cast iron Weights 50, 20, 10, 5, 2, & 1 kg. 500, 200, 100 g. Brass Weights 50 & 20 g.
(51)	Sloke Chand Mittar Sain, Iron Merchants, Safidon	Weights, Measures, Weighing and Measuring Instruments.
(52)	Standard Sheet Metal Works, Saddar Bazar, Ambala Cantt.	Weights, Measures, Weighing and Measuring Instruments
(53)	Tara Chand Waliati Ram, Ludhiana	Weights, Measures, Weighing and Measuring Instruments.
(54)	Tulsi Dass Nagin Chand, Chaura Bazar, Ludhiana	Weights, Measures, Weighing and Measuring Instruments.
(55)	Tulsi Dass Ukam Chand, Ludhiana	Weights, Measures, Weighing and Measuring Instruments.
(56)	Udmi Ram Bhim Sain, Iron Merchants, Abohar	Weights, Measures, Weighing and Measuring Instruments.
(57)	Ved Parkash, S/o Pt. Som Datt, Gemetry Road, Putlighar, Amritsar.	Weights, Measures, Weighing and Measuring Instruments.

Repairers

Sl. No.	Name and Address of Repairer	Details of Articles Repaired
(1)	Agricultural Industries (Regd.), G.T. Road, Batala	Weights and Measures of Length and Capacity.
(2)	Avon Scales Company, Sultanwigh Road, Amritsar	Weights, Measures, Weighing and Measuring Instruments.
(3)	Balbir Singh & Sons, Kikar Bazar, Bhatinda	Weights (Cast Iron & Brass) Measures of Length and Capacity.
(4)	Chander Bhan (Mistri), S/o Shri Sheo Lal, Azad Chowk, Narnaul.	Weights (Cast Iron & Brass) Measures of Length and Capacity.
(5)	Khem Ram Ram Chander, Charkhi Dadri	Weights, Measures of Length and Capacity.
(6)	Krishna Foundry Works, Ambala City.. .. .	Weights (C.I.S. Brass) Measures of Length & Capacity.

our METRIC SYSTEM weights & measures

Second to none

MANUFACTURERS
National Metal Industries
Parel Village Road, Parel
BOMBAY 12.
Phone: 62400

SOLE DISTRIBUTORS
Manubhai Mulchand & Co.
Behind Mumbadevi P. O.
BOMBAY 2
Phone: 71534
Gram: MANMUL

OUR SMALL WEIGHTS
from 1 gram. to 50 grams
will be supplied in an
unbreakable plastic container

CONVERSION TABLES OF PRICES FOR WEIGHTS

TABLE A

(Factor used : 1 kg. = 2.20462 lb)

Rupees per lb to Rupees per kg.

Rs./lb.	0	1	2	3	4	5	6	7	8	9
	Rs/kg	Rs/kg	Rs/kg	Rs/kg	Rs/kg	Rs/kg	Rs/kg	Rs/kg	Rs/kg	Rs/kg
0	0	2.20	4.41	6.61	8.82	11.02	13.23	15.43	17.64	19.84
10	22.05	24.25	26.46	28.66	30.86	33.07	35.27	37.48	39.68	41.89
20	44.09	46.30	48.50	50.71	52.91	55.12	57.32	59.52	61.73	63.93
30	66.14	68.34	70.55	72.75	74.96	77.16	79.37	81.57	83.78	85.98
40	88.18	90.39	92.59	94.80	97.00	99.21	101.41	103.62	105.82	108.03
50	110.23	..	..	..	..	..	..	..	..	..

TABLE B

(Factor used : 1 kg = 2.20462 lb)

Naye Paise per lb to Rupees & nP. per kg

nP/lb.	0	1	2	3	4	5	6	7	8	9
	Rs/kg	Rs/kg	Rs/kg	Rs/kg	Rs/kg	Rs/kg	Rs/kg	Rs/kg	Rs/kg	Rs/kg
0	0	0.02	0.04	0.07	0.09	0.11	0.13	0.15	0.18	0.20
10	0.22	0.24	0.26	0.29	0.31	0.33	0.35	0.37	0.40	0.42
20	0.44	0.46	0.49	0.51	0.53	0.55	0.57	0.60	0.62	0.64
30	0.66	0.68	0.71	0.73	0.75	0.77	0.79	0.82	0.84	0.86
40	0.88	0.90	0.93	0.95	0.97	0.99	1.01	1.04	1.06	1.08
50	1.10	1.12	1.15	1.17	1.19	1.21	1.23	1.26	1.28	1.30
60	1.32	1.34	1.37	1.39	1.41	1.43	1.46	1.48	1.50	1.52
70	1.54	1.57	1.59	1.61	1.63	1.65	1.68	1.70	1.72	1.74
80	1.76	1.79	1.81	1.83	1.85	1.87	1.90	1.92	1.94	1.96
90	1.98	2.01	2.03	2.05	2.07	2.09	2.12	2.14	2.16	2.18
100	2.20	..	..	..	..	..	..	..	..	..

Published by the Director, Publications Division, Ministry of Information and Broadcasting, Delhi and
printed by the Manager, Government of India Press, Faridabad

RN 977/58.

metric measures

THE PUBLICATIONS DIVISION

SIMPLE CONVERSION TABLES

I. WEIGHTS

Tons to Metric Tonnes
Tons
Metric Tonnes

1	2	3	4	5	6	7	8	9	10
1.02	2.03	3.05	4.06	5.08	6.10	7.11	8.13	9.14	10.16

Pounds(av) to Kilograms
Pounds
Kilograms

1	2	3	4	5	6	7	8	9	10
0.45	0.91	1.36	1.81	2.27	2.72	3.18	3.63	4.08	4.54

Tolas to Grams
Tolas
Grams

1	2	3	4	5	6	7	8	9	10
11.66	23.33	34.99	46.66	58.32	69.98	81.65	93.31	104.97	116.64

Seers to Kilograms
Seers
Kilograms

1	2	3	4	5	6	7	8	9	10
0.93	1.87	2.80	3.73	4.67	5.60	6.53	7.46	8.40	9.33

Maunds to Quintals
Maunds
Quintals

1	2	3	4	5	6	7	8	9	10
0.37	0.75	1.12	1.49	1.87	2.24	2.61	2.99	3.36	3.73

II. LENGTH

Miles to Kilometres
Miles
Kilometres

1	2	3	4	5	6	7	8	9	10
1.61	3.22	4.83	6.44	8.05	9.66	11.27	12.87	14.48	16.09

Yards to Metres
Yards
Metres

1	2	3	4	5	6	7	8	9	10
0.91	1.83	2.74	3.66	4.57	5.49	6.40	7.32	8.23	9.14

Inches to Millimetres
Inches
Millimetres

1	2	3	4	5	6	7	8	9	10	11	12
25.40	50.80	76.20	101.60	127.00	152.40	177.80	203.20	228.60	254.00	279.40	304.80

III. AREA

Acres to Hectares
Acres
Hectares

1	2	3	4	5	6	7	8	9	10
0.40	0.81	1.21	1.62	2.02	2.43	2.83	3.24	3.64	4.05

Square Yards to Square Metres
Square Yards
Square Metres

1	2	3	4	5	6	7	8	9	10
0.84	1.67	2.51	3.34	4.18	5.02	5.85	6.69	7.53	8.36

IV. CAPACITY

Gallons (Imperial) to Litres
Gallons
Litres

1	2	3	4	5	6	7	8	9	10
4.55	9.09	13.64	18.18	22.73	27.28	31.82	36.37	40.91	45.46

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metric measures

(JOURNAL OF WEIGHTS AND MEASURES)
STANDING METRIC COMMITTEE
MINISTRY OF COMMERCE AND INDUSTRY

Vol. 3 JULY 1960 (ASHADHA 1882) No. 4

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Cover design by R. Sarangan

metric measures

METRIC MEASURES is published every two months.

METRIC MEASURES provides information to the general public on the administrative, commercial, educational, industrial, historical and other aspects of weights and measures, with particular reference to the introduction of the metric system in India.

Contributions for publication should be sent to the Editor, METRIC MEASURES, Standing Metric Committee, Ministry of Commerce & Industry, Udyog Bhavan, New Delhi.

Enquiries regarding subscriptions and supply of copies should be addressed to the Business Manager, Publications Division, Ministry of Information and Broadcasting, Old Secretariat, Delhi-8.

Articles published in the Journal may be reproduced. Credit line should read: METRIC MEASURES.

The opinions expressed by authors are not necessarily those of the Government.

Significance of October 1960

IT has been announced that use of metric weights would become compulsory from 1 October 1960 in the areas, industries and Government Departments notified earlier, where the two year transition period comes to an end. There have been many enquiries as to how this change-over would affect the industries and trades situated in notified and other areas. The effect could be considered under the following categories:

- (1) the meaning of compulsory, change-over in notified areas;
- (2) position of traders in other areas who sell their products in the areas notified;
- (3) the meaning of the change-over in notified industries; and
- (4) position of industries situated in areas not notified.

Areas

About two years back certain industrially and commercially important areas such as divisions, districts, cities and towns covering some 10 percent of the total population of India, were selected for the introduction of metric weights from 1 October 1958. In these areas all the commercial transactions which involve use of weights would be carried out with metric weights only from October 1960. Those who do not do so would expose themselves to prosecution.

In order to avoid large scale prosecution, the Controllers and Inspectors of Weights

and Measures in the various areas have been persuading the wholesale and retail traders and their associations to purchase weights and change over to the metric system on an agreed date before October 1960, so as to avoid last minute rush for weights which may lead to confusion. The response to these approaches by Government authorities has been very favourable, although in some cases the dates have not been strictly adhered to for some reason or another. It is in the interest of traders and the general public that the metric change-over should take place in a planned manner so that everybody is aware of what is happening in this field and get himself accustomed to the new system.

Many people in the areas which are to change-over have expressed the fear that their trade with other areas would be affected by this change as they purchase their materials from non-notified areas where the metric system may not come in use upto 1 April 1962, in accordance with the latest Notification which makes use of metric system optional in the rest of India from 1 April 1960. This would mean, they argue, that they would have to purchase in terms of maund or hundredweight and sell in metric units. This is true to a certain extent, but as a result of the Notification permitting use of metric weights there should be little difficulty in quoting and selling in metric units throughout India.

Traders from non-notified areas who want to sell their products in the notified areas would do so only in terms of the metric system. Therefore, it is not only the traders and the public in the notified areas who should be getting acquainted with the meaning of the change-over, but also those who trade with these areas.

Industries

According to the Notification issued some two years back industries such as, engineering, coffee, salt, textiles, etc. will be going over compulsory to metric weights and measures from 1 October 1960 for purchase and sale of materials in their transactions. It must be emphasized here that the entire notified industry, wherever it is located in the country, would change over to the metric system. Thus, for example, the salt industry is spread all over India and in some parts it is concentrated in non-notified areas. However, for the purchase of raw materials and sale of salt, this industry will quote prices and deliver salt only in terms of metric weights from October 1960 or earlier if they so desire. Quotation in maund units and delivery in these units would be illegal. This also means that even though a trader in a non-notified area may sell salt in the trade in that area by the seer, he would have to purchase it in metric units from the producers.

There is also the case of non-notified industries which are situated in notified areas. For example, for the vegetable oil industry the period of transition is upto 1-4-1962 when metric weights will become compulsory in the rest of India. However, if a factory producing and selling vegetable oils is situated in an area or a city, already notified, for example, Bombay, Delhi or Calcutta, it will be compulsory for that industry to quote and sell its

products in metric weights only, whether this transaction is with the notified or non-notified areas.

Similarly, any industry situated in a non-notified area, but having trade relations with a notified area, will have to sell its products in the notified areas only in metric units. For example, in making packages to be sold in notified areas, they have to indicate the contents in terms of metric units. It must be made clear, however, that this does not mean that the contents of the package should be changed over immediately. The industry may continue to mark the packages as at present but indicate the contents in metric units. For example, a 1 lb package may be marked 454 grams, for the time being. When, however, the proper packages or containers are available the industry could change over to rational metric packages e.g. 500 g.

Those who market ready-made packages have to remember that under the provisions of the State Acts, it will be necessary to mark the net contents of the packages sold in the areas or by industries changing over from October 1960. Even a small retail packer who sells daily requirements in sealed packages by weight would be required to observe this legal provision.

Many notified industries fear that they have to get their weighing instruments recalibrated in terms of the metric system before 1 October 1960. It is realized that the number of weighing instruments in use is extremely large and the number of repairers who can competently undertake the job of recalibration is very small. The Governments of the States have, therefore, provided in the Rules that as every machine cannot be recalibrated immediately, the users could continue to employ them by reference to conversion tables for the time

being, the machines being recalibrated in due course, though not necessarily before October 1960.

Other Important Factors

The Railways have gone over fully to the metric system in their commercial transactions from April 1960. It is expected that this would serve as an incentive to the traders to change over to the metric system at the earliest possible opportunity. Another important change is in the petro-

leum industry. It may also be remembered that no advantage will be gained by a last minute change-over to the metric system. Another point which the industries should note, wherever they are situated, is that sometime in August, the Customs and Excise Department and the Shipping industry will change over to the metric system. In the light of these events, it is expected that the pace of adoption of the metric system in trade and industries would be quickened.

Oil Companies Go Metric

T. R. Rao

Burmah-Shell Oil Storage &
Distributing Co. of India Ltd.,
Bombay

THE marketing oil companies in India adopted the metric system for the distribution and sales of petroleum products on 1 April 1960. This event marked an important step in the phased implementation of the metric system, as capacity measures (litres) were introduced in all parts of India for the first time. Amongst the oil refineries, only Assam Oil Company changed over on 1 April, the others electing to synchronize their change-over with the Central Excise Department who are expected to adopt the metric system for the levy of taxes in August this year.

Educational Programme and Staff Training

Education of staff being an essential prerequisite in any kind of reform, staff training at all levels was started long before the date of change-over. This was carried out in the form of lectures and circulars explaining the fundamentals of the metric system and

how it affected the oil companies' business. Drawings and property inventories were prepared in dual units. For the benefit of customers petroleum containers were marked in dual units. Nearer the date of change-over field staff were trained in the conversion of equipment from gallon to litre measurement.

Publicity Campaign

The implementation was preceded by a well organized publicity campaign which was directed mainly towards petrol and H.S.D. filling stations where the impact of the change-over was first felt. Hoardings and stickers at filling stations boldly displayed the relationship between gallons and litres. Illustrated booklets and circulars explaining the new system were distributed in advance to agents, dealers and other interested parties. Great pains were taken by the oil companies to explain the method of calculating prices in

the new units to their agents and dealers. Price lists were posted at all sales points. This proved invaluable in winning the confidence of customers who were prone to think that advantage would be taken of the change-over to raise prices. Conversion cards were distributed to customers and ready reckoners, which facilitated quick conversions, were supplied for internal use and to important customers. Some of the oil companies came out with announcements about the introduction of the metric system in the newspapers on 1 April.

As a result of this publicity campaign the change-over was smooth and market reaction was favourable.

Oil Industry Metric Committee

Finding that they had many problems in common in connection with the implementation of the metric system, the oil companies set up an Oil Industry Metric Committee, whose main function was to discuss problems of common interest pertaining to metric conversion and to 'liaise' with Government Departments and other bodies. The O.I.M.C. rendered excellent service during the change-over.

Physical Conversion

(1) Dispensing Pumps

The conversion of these pumps to litre measurement was one of the most difficult jobs in the change-over programme. There are over 12,000 pumps scattered all over the country and some are located at remote upcountry stations. They are of various makes and models requiring different types of conversion kits most of which had to be imported. The conversion of these pumps was carefully programmed in consultation with the O.I.M.C. Pump conversion was started in the last week of March and a good number of pumps were dispensing in litres in the main cities on 1 April.

(2) Calibration Tables for Oil Storage Tanks

A calibration table for a storage tank

shows the quantity of oil in the tank for varying depths. In the Imperial system the depths or 'dips' are shown in feet and inches and the quantities in gallons; in the metric system the dips are in centimetres and the quantities in litres. The dips are measured with weighted graduated steel tapes which are lowered to the bottom of the tank and the depth of oil is read off the tape.

Metric calibration tables were required for all storage tanks. This presented no great problem as far as upcountry depot and filling station tanks were concerned as the work was handled by the oil companies themselves. However, in the case of main installation and terminal tanks used for the storage of bonded stocks on which customs and excise duties have to be paid, the calibration tables are normally prepared by Government agencies e.g. Central or State P.W.D. and the Mercantile Marine Department. The calibration of a large number of tanks within a limited period presented a problem to the Departments concerned. The oil companies were, therefore, called upon to assist in the work and it is hoped that all tables will be completed by August 1960 when the Customs and Central Excise Departments change over to the metric system.

(3) Calibration of Railway Tank Wagons

There are about 7,000 tank wagons used for petroleum products and they required to be physically calibrated. For various reasons it has not been possible to prepare metric calibration tables for many of them. For the present the final loading gallonages are converted to litres using statutory conversion factors.

(4) Tank Lorries and Tank Carts

The calibration of tank lorries and tank carts presented no difficulty as they are fewer in number than tank wagons and easier to calibrate, but the work was hampered owing to the delay in obtaining the necessary litre check measures.

OIL COMPANIES GO METRIC

(5) Bulk Meters and Filling Machines

These are being gradually converted for litre measurement. Some delay is being experienced in the case of some of the meters as conversion parts have to be imported from the United States.

(6) Weighing Machines

Only machines required for weighing product were converted. Machines used in stores continue to read in Imperial units as the purchase of stores continues in these units.

(7) Liquid Capacity Measures and Containers

The ISI standards for liquid capacity measures and small packs have been adopted and are gradually replacing the old measures and packs. The denominations are as follows:

Liquid Measures	.. 20, 10, 5, 2 and 1 litres, 500, 200 and 100 millilitres.
Small Packs	.. 5 litres, 1 litre, 500 ml and 250 ml for liquids; 2 kg and 500 g for solids.

Existing large containers are being used with their capacities marked in metric units. For example 44/45 gallon barrels are being filled to a capacity of 200/205 litres, 5-gallon drums to 23 litres and 2-gallon cans to 9 litres.

Special consideration was given to the 4-gallon tin used mainly for kerosine. Over a lakh of these tins are produced daily in India. After great deliberation, the oil companies decided that as a temporary measure this tin should continue to be filled to a capacity of 4 gallons (18.184 litres) and not to 18 litres as recommended by the ISI with a view to conserving tinplate, foreign exchange on tinplate, and better utilization of box wagons. The matter will come up for review shortly when it will be decided finally whether to fill the tin to 18 litres or, if possible, to 18.50 litres.

Calculation of Bulk Quantities

The oil companies have adopted 15° C as the standard reference temperature for oil measurement as proposed by the ISI. ASTM/IP Petroleum Measurement Tables (Metric Edition) are being used for bulk oil calculations. Centigrade thermometers and density hydrometers calibrated at 15° C are being used to facilitate these calculations. It is hoped that the Central Board of Revenue will adopt this method of measurement for the calculation of oil quantities for assessing customs and excise duties on petroleum products when they change over to the metric system in August next.

Sales and Accounting

The oil companies changed over to the new system completely on 1 April for distribution, sales and accounting. Dual accounts are being maintained only in respect of transactions involving payment of customs and excise duties which are based on the old units at present.

Price Conversion

A great deal of thought was given by the O.I.M.C. to the question of prices in metric units. As prices in metric units had to be calculated by converting existing prices using statutory conversion factors as provided for in the Standards of Weights and Measures Act, 1956, it was important to ensure that the loss or gain to buyer or seller resulting from rounding off prices to the nearest nP was kept to a minimum. After careful consideration it was decided, with the approval of Government, that for all products for which a ceiling price had been established or for which a contract price existed, prices in metric units would be calculated on the basis of 1,000 litres or 1,000 kg. This basis of calculation ensures that the loss or gain by conversion is limited to a maximum of half nP per kilolitre or a metric tonne.

Rate Cards

The preparation of thousands of rate cards showing the various components of the price build-up for each product and each destination station all in terms of metric units presented a colossal task to the oil companies. This work had to be completed in a short time and was hampered by the delay in receiving junction kilometre tables from the Railways. Oil company staff had to work extremely hard in order to complete the work in time.

Conclusion

The oil companies were faced with the enormous task of gearing their entire distribution network to the new system within a limited period of time. With careful planning and by visualizing the difficulties and problems which were expected to crop up, they have been able to implement the scheme successfully without disruption of supplies and causing little inconvenience to their customers.

Metric System in French Railways, Posts & Taxes

GUY KNOCHÉ

French Economic and Technical Bulletin,
France

I METRIC SYSTEM IN RAIL TRANSPORT

OWING to the diversity of its traffic, the Société Nationale des Chemins de Fer Français (National Society of French Railways) has established two separate tariffs, one for passengers and the other for freight.

Passengers

Passenger fares are calculated on a single basis, the distance to be covered. Nevertheless, as a few kilometres make a comparatively greater difference on short distances, three scales have been established according to whether the distance covered is less than 50 kilometres, between 50 and 200 kilometres or over 200 kilometres. In the first case, distance is charged per block of 2 kilometres, in the second per block of 5 km

and in the third per block of 10 km. The distance charged for is always for the mean distance of the block. Thus a passenger travelling 55.6 km is classified in the block between 55 and 59 km and pays for 57 km (mean distance of the block applicable to the length of his journey). On the other hand, a passenger travelling 59 km also pays for 57 km. Once the distance to be charged for has been determined, a kilometric rate is applied which is 6.80 francs per km for the second class. Therefore, a second class passenger travelling a distance of 248 km (block between 240 and 249 km) pays for a distance of 244.5 km the sum of :

$244.5 \times 6.80 = 1\,662.60$ francs, rounded off to 1 660 francs.

However, special rates are charged for short distances where traffic is very heavy, as in the case of the Paris suburbs.

Freight

The problem of freight charges is more complex. For small parcels weighing less than 50 kilograms, the rate is determined according to a tariff which takes into account the geographical departments of origin and destination without considering the cities themselves. A double entry table enables the correct tariff zone to be located without difficulty. For instance, between the geographical departments of 'Nord' and 'Alpes Maritimes' a parcel must travel over the whole of France and the maximum rate (for Zone 20) is chargeable. On the other hand, if the parcel is going from the department of 'Nord', only to the neighbouring department of 'Pas-de-Calais', the rate applicable is that for Zone 1. In the first instance, the charge for a parcel weighing 30 to 40 kg is 1 767 francs, in the second instance, only 518 francs.

Lastly, for parcels over 50 kg, tariffs have been established according to weight and distance, by fractions of 60 kg or, in extreme cases, by complete truckloads of 3 to 5 tonnes. These are special tariffs reserved for industrial concerns.

On the whole this system does not give rise to difficulty in operation. Tariffs are naturally established according to the metric system (weight in kg or tonnes, distances in km when actual distance is considered, or tariff zone in other instances) and are applied in all the railway stations of the French Rail network where the clerks in the various departments concerned have no trouble in using them.

II METRIC SYSTEM IN POSTAL SERVICES

The French postal system comprises two large branches: domestic and foreign.

But whatever be the basic rate adopted in working out scales of charges, the metric system is in use. The main question is the determination of the unit of weight, which by the way, cannot be made with complete freedom since France adheres to the International Postal Convention.

Domestic Postage Rates

An ordinary letter weighing less than 20 grams must bear a 25 franc stamp. This is the minimum postage, the maximum (300 francs) is reached with a letter weighing 2 000 grams *i.e.* 2 kg. Between these two extreme weights there is a graduated schedule of weights with corresponding progressive rates, as shown in the following table:

Less than 20 grams	..	25 francs
From 20 to 50 grams		45 francs
From 50 to 100 grams		65 francs
From 100 to 200 grams		85 francs
From 200 to 300 grams		110 francs
From 300 to 500 grams		150 francs
From 500 to 1,000 grams		200 francs
From 1,000 to 1,500 grams		250 francs
From 1,500 to 2,000 grams		300 francs

An important point is that the rate remains unchanged whatever the distance to be covered within the postal area of metropolitan France. For instance, a letter posted in Paris and weighing less than 20 grams must be franked with a 25 franc stamp whether it is to be delivered in Versailles (20 kilometres from Paris) or in Marseilles, 800 kilometres from its mailing point.

This also applies to other objects sent through the post, whether post cards, samples, small packets weighing not more than 3 kilograms, newspapers etc.

Foreign Postal Rates

The same principle is applied to the franking of letters or objects for foreign countries. The rate is, of course, higher (50 francs for a letter weighing less than 20

grams) and rises progressively, by units of 20 grams, from 20 to 200 grams. Above 200 grams and upto 2 kilograms, the rate is uniformly fixed at 30 francs per 20 grams.

The postage on a letter weighing 365 grams sent to New Delhi will, therefore, be 320 francs (the rate applying to a letter of 200 grams) *plus* postage on the weight comprised between 200 and 365 grams, *i.e.* 165 grams or 9 fractions of 20 grams (165 being between 160, that is 8 times 20, and 180, or 9 times 20), which makes 9 times 30 francs, or 270 francs. Therefore, the total postage to be paid on the letter weighing 365 grams is 590 francs (320 francs for the first 200 grams *plus* 270 for the additional 165 grams).

Additional Airmail Charge

However, connections between Paris and New Delhi by sea are comparatively slow and if the matter is urgent the sender may prefer to send his letter by airmail. In that case, he must pay an extra charge which is calculated by fractions of 5 to 20 grams, according to the distance between countries. The concept of weight still remains an essential basis. In France, the charge on letters airmailed to the Indian Union is 50 francs per 5 grams. This means that a letter weighing 365 grams will have to be franked as follows: 590 francs representing the normal postage, *plus* $\frac{365 \times 50}{5} = 3\ 650$ francs extra postage.

Therefore, the metric weight unit, taken as a basis for all postal operations, makes it easy to determine the cost of postage.

III METRIC SYSTEM IN TAX SYSTEM

As at present organized, France's tax revenue comes from four broad sources of

receipt: recording dues, stamp duty, indirect and direct taxation.

Recording Dues and Stamp Duty

Recording dues are either fixed or proportional. The stamp duty is a fixed amount which varies according to the nature of the transaction. Thus a receipt for a sum of 15 000 francs is not valid unless it is made out on a sheet of paper bearing a 135 franc stamp.

Indirect Taxes

Indirect taxes yield, according to some experts, 75 percent of the total from all tax sources. These comprise of tax on accrued value, services rendered, local taxes, parafiscal taxes, specific taxes etc. These various taxes are generally expressed in percentages, but in certain cases they are fixed amounts.

Direct Taxes

Direct taxes, the most tangible burden felt by individual taxpayers as they are levied directly on income, are essentially of two categories: a progressive surtax (assessed on all income according to a certain progressive percentage) and a proportional tax, assessed only on income from certain sources. These direct taxes are expressed as a percentage of the taxable income which is calculated on the basis of the actual income less certain expenses allowed in connection with the business or profession.

Percentage System

To sum up, apart from certain fixed dues, the French tax system is essentially based on the concept of percentage. This is a simplification which avoids the use of numerous different schedules of scales which it would be extremely complicated to apply. Thanks to the metric system, this percentage

calculation can be made without the slightest difficulty. For the technicians in charge of operating the French tax system, this is considerable simplification which the metric

system alone makes feasible. And owing to the inherent complexity of all tax systems, such unification in methods of collection is indispensable.

Indian Geodetic System and Foot-Metre Ratio

J. C. BHATTACHARJI,

Dehra Dun

THE object of geodetic surveying is the precise measurement of widely separated positions of points lying on the earth's surface. These points known as 'geodetic stations' form the framework of cadastral, topographical, hydrographic, engineering and other similar surveys.

For a country like India which is fairly open and undulating, the best method to be adopted is triangulation. But, when a country or an area happens to be very flat or very narrow or covered with forests, the primary traverse is the real answer, especially if triangulation is considered extremely costly.

'Triangulation is the method of location of a point from two others of known distance apart, given the angles of the triangle formed by the three points. By repeated application of the principle, if a series of points form the apices of a chain or network of connected triangles of which the angles are measured, the lengths of all the unknown sides and the relative positions of the points may be computed when the length of one of the sides or the base, is known. The geodetic positions and the azimuths of all

the lines can be computed if the latitude and longitude of one station and the azimuth of the base are observed' (Ref. 1). But the main difficulty with triangulation is that it tends to accumulate errors of scale and azimuth, as each side derives its scale and azimuth from the preceding side. Hence, although a single base normally suffices for computation, the accumulation of error in scale requires to be controlled by additional bases, and that in azimuth also by astronomical observations at regular intervals.

The geodetic system of surveying in India is known as the Indian triangulation and consists of networks of triangulated series covering nearly the whole of India including Burma and Pakistan.

The old base-lines of the Indian triangulation were measured during 1831-69 and their lengths expressed in terms of the Indian foot or tenths of the Indian standard known as 'Indian 10-foot Bar A', at 62°F, as the latter was used for the standardization of the compensated bars employed for the measurement of the base-lines. The measurement

of the new base-lines carried out after 1930 was by means of invar wires duly compared with the metre standard for base-measurement, instead of the Indian 10-foot Bar A which had become practically obsolete by then. The lengths of the new base-lines, which are in terms of the International Metre, have to be reduced to the Indian foot before comparing them with the old base-lines for inclusion in the Indian triangulation. It is, therefore, necessary to establish the actual length of the Indian 10-foot Bar A at 62°F in terms of the International Metre, so that the Indian triangulation system becomes self-consistent and comparable to geodetic systems of other countries.

Historical

The earliest comparison of the Indian 10-foot Bar A in terms of the International Metre Standard was made only in 1906-07. Prior to that in 1865 Captain Clarke (Ref. 2) had made comparisons of the Imperial Standard Yard with the Indian 10-foot Bars Is and IB which were later compared with the Indian 10-foot Bar A in 1867.

The Imperial Standard Yard was, however, compared with the International Metre Standard as early as 1894 and again in 1922, 1932 and 1947.

These comparisons would thus enable us to extrapolate the length of the Imperial Standard Yard in terms of the International Metre provided the rate of change of length of the Imperial Standard Yard after and before 1894 is assumed to remain practically constant.

The length of the Indian 10-foot Bar A at 62°F in that case would reduce to 3.047 984 1 metres (International Standard) which was accepted by Brigadier Bomford (Ref. 3) as the most probable value for the Indian foot-metre ratio while reducing the lengths of the Indian new base-lines to Indian foot.

But recent investigations of J.S. Clarke, (Ref. 4), however, show that the rate of change of length of the Imperial Standard Yard after and before 1894 was not actually constant, for the results of measurements made in 1864 on some of the old Toise standards clearly indicate that the Imperial Standard Yard had shortened before 1894 rather more rapidly than it has since that date. The five different values of the yard-metre ratio as obtained by J.S. Clarke for the year 1865, are 0.914 400 2, 0.914 400 3, 0.914 401 5, 0.914 406 0 and 0.914 404 0, the mean value being $0.914\ 402\ 4 \pm 9.10^{-7}$.

Now according to the results of comparisons carried out in 1865-67, the length of the Indian 10-foot Bar A at 62°F is found to be equal to 3.333 318 86 yards (Imperial Standard). Hence the mean length of the Indian 10-foot Bar A at 62°F reduced to the year 1865, finally becomes $3.047\ 995 \pm 3.10^{-6}$ metres (International Standard) which is practically identical with the corresponding value of 3.047 996 metres (International Standard) obtained in 1906-07.

This shows that the length of the Indian 10-foot Bar A had remained practically constant during 1865-1907 and may be expected to have remained so in the period 1831-69 as well. The most probable value of the foot-metre ratio to be adopted for conversion of International Metre measure into Indian foot measure, thus works out to be $0.304\ 799\ 5 \pm 3.10^{-6}$.

Effect of Error in Previous Foot-Metre Ratio

This foot-metre ratio differs from Brig. Bomford's accepted figure by 0.000 001 09. Consequently a scale error of 3.6×10^{-6} is introduced in the lengths of all the new base-lines measured after 1930, because of using Brig. Bomford's less accurate value of the foot-metre ratio while converting to Indian foot. The Indian triangulation net as

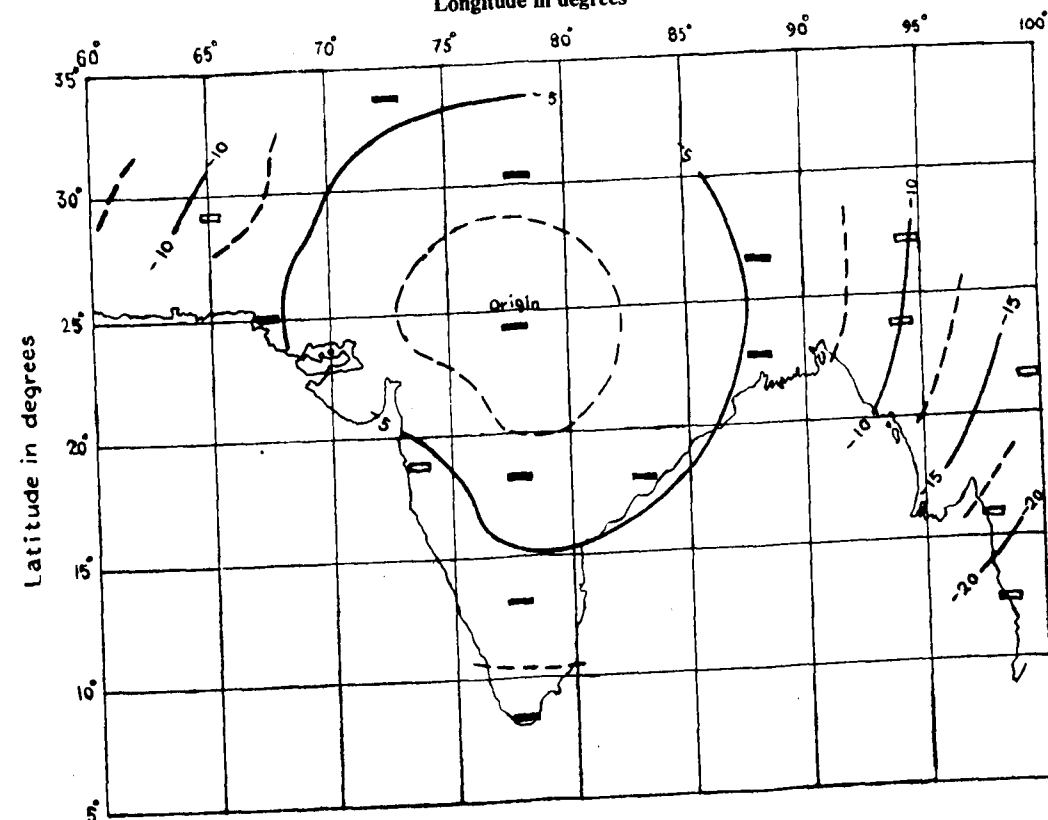
adjusted in 1937 by Brig. Bomford has thus lost its self-consistency of scale—the old and the new base-lines not being identical.

The small positional error due to this scale error, though calculable and systematic, has to be considered only when extreme accuracy is needed for precise geodetic investigations. Even then one can actually read off these scale corrections from a correction chart designed for the purpose and apply them to the positional values obtained after the 1937 adjustment. As a result the Indian triangulation becomes not only self-consistent but with the knowledge of the

length of the Indian 10-foot Bar A at 62°F now available may also be safely used for any study of the shape of the earth.

For topographical purposes, on the other hand, much less precise data is needed in practice and the effect of the scale error in the new base-lines is considered negligible. Even the 1937 adjustment corrections, though quite substantial are not large enough to affect the topographical surveying significantly and have, therefore, been completely ignored in topographical works. As such all the present Indian triangulation pamphlet values may be considered sufficiently

CHART
Showing correction to position in feet of
Indian Triangulation after 1937 adjustment.
Longitude in degrees



REFERENCES

Old base-lines.....
New base-lines.....

accurate and continued to be used as before for topographical purposes without applying corrections for either scale error in the new base-lines or the 1937 triangulation adjustment.

Adoption of International Foot-Metre Ratio in the Indian Geodetic System

With the introduction of the metric system of weights and measures in India, it is necessary to relate satisfactorily the existing fundamental units of Indian measures to their metric equivalents prescribed in the Standards of Weights and Measures Act, 1956. This Act defines the foot as :

1 foot = 0.304 8 metre (exact).

The above definition is not only very simple in application, e.g., 1 foot = 0.3 metre + 0.3 metre $\times$ 0.016 and extremely close to the old Indian foot-metre ratio, differing by 1.7×10^{-6} only, but is also in complete agreement with the technical definition of the International Yard accepted in July 1959 by the National Standard Laboratories of the British Commonwealth countries and USA.

The only difficulty in accepting the new legal foot-metre ratio : 0.304 8 (exact), in preference to the existing Indian foot-metre ratio : 0.304 799 5 is that these are not exactly identical. As the existing Indian foot-metre ratio is less than the new legal ratio by 1.7×10^{-6} all the Indian base-lines have to be increased by this amount to adjust the Indian triangulation system to the new ratio. The effect of the scale error in all the base-lines though negligible for topographical purposes, is significant for precise scientific investigations. It is systematic and becomes substantial at great distances from the origin of survey. But this may advantageously be combined with

that due to the previous scale error of 3.6×10^{-6} in the new base-lines and given in the form of a single correction chart. The combined correction is generally within 10 feet, though in areas at considerable distances from the origin of survey it may be even 20 feet.

Conclusion

We can easily adopt the legal foot-metre ratio : 0.304 8 (exact) in preference to the existing old Indian foot-metre ratio : 0.304 799 5 in the Indian triangulation by a declaration only to that effect.

In cases of extreme accuracy, however, the corrections given in the adjoining chart can be incorporated in the 1937 adjustment of the Indian triangulation. In this manner the entire system of precise measurements, both the past and present, employed in Indian triangulation as a whole, may be straightaway brought to a uniform system of measures in conformity with both the Indian Standards of Weights and Measures Act, 1956 and the recent international agreement on the definition of the yard.

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Peering Into The Mind of A Child*

WHEN does a child start to 'think'? At what age can he understand such ideas as length and number? When is he capable of what is called 'scientific thought'?

Educators and parents the world over would be extremely interested in knowing the answers to such questions. Today, they are being sought in Switzerland at the Institute for the Sciences of Education in Geneva. The Institute was founded in 1912 and attached to the University of Geneva in 1929, but its origins go even further back. In 1901, at the dawn of the new century, the

Medical Society of Geneva heard a daring proposal by Edouard Claparede, the future co-founder of the Institute along with Pierre Bovet. Claparede called for nothing less than a school 'made to measure' for children. Into his startled audience, he dropped this bombshell : 'We now pay more attention to children's feet than we do to their minds.'

Five years later, Claparede was to state : 'It is just as important for the educator to know the laws of the mind and its growth as it is for the horticulturist to know the biology of plants or the doctor to know the



Fig. 1—Professor Jean Piaget, Co-Director of the Institute for the Sciences of Education and Director of the International Bureau of Education, Geneva. Prof. Piaget, who is a Swiss, was formerly a member of the Executive Board of Unesco.



Fig. 2—HOW DO YOU THINK I SEE THIS LANDSCAPE? An educational researcher puts the above question to a child who must select the drawing corresponding to what she believes the experimenter sees from his position opposite her. Thus she shows her capacity for judging how perspective varies according to the position of the observer.

physiology of organs'. It was on this principle that the Institute started a laboratory in which experimental psychology is applied to education. For the past thirty years, both at Geneva and at Neuchatel, this work has been carried on by Prof. Jean Piaget,

*Reproduced with permission from *The UNESCO Courier*, July-August 1959. Photographs WHO—Eric Schwab.

leading figure in psychological research which has a bearing on education.

Prof. Piaget's studies had previously shown that the development of a child's thought processes can be compared to a ladder. The child goes from one step or level to another. At each level, corresponding to a certain age, there is an equilibrium in thinking.

Then, two years ago, a special section of the Institute was created to study how the child passes from one stage to another. This study, directed by Dr. Barbel Inhelder, professor at the Institute of Child Psychology,

They come from all social classes, have average intelligence test ratings and have experienced no special difficulties in school.

They Have it All Taped

Some fifty tests based on special observation techniques developed by Prof. Piaget over the years are used with these children. In addition, the research workers have at their disposal an experimental psychology laboratory set up by the state of Geneva and provided with ultra-modern equipment through a grant from an American foundation.

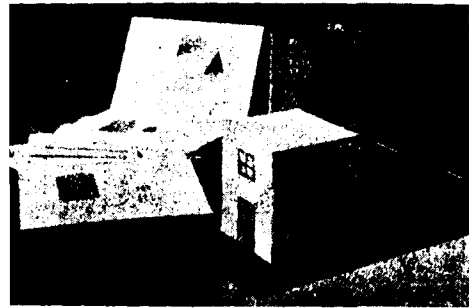


Fig. 3-4—Close-up of experimental equipment used for the test. Using a variety of similar experiments, researchers at the Institute for the Sciences of Education in Geneva study the development of a child's thought processes.

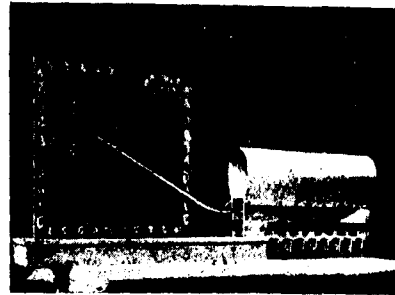


Fig. 5—Covered wagon-like apparatus is used to test girl's ability to understand the law of falling bodies along an inclined plane. Angle of chute (shaft of "covered wagon") is altered and child is asked to judge how far object will fall each time.

Dr. Gerald Noeltig, is based upon a long-term experiment. Twenty children, divided into four age groups, have been selected from Geneva schools for study.



Fig. 6—Study of the concept of size. The object is to measure the height of a tower standing on a stool. The child is asked to build a tower the same height on the ground.

In this laboratory, each conversation between the scientist and a child is recorded on tape. At key points in the interview, a motion picture camera comes into play. The result is that the Institute has been able to 'produce' records and a film on each child, showing the changes in his social behaviour and the way his mind works at various stages of growth over the years. These experiments have already shown that the child first groups familiar objects or even geometrical elements into 'logical classes' between the ages of four and seven. By pouring liquids from one glass to another, for example, he grasps the idea of a quantity which does not vary even if its appearance changes.

He understands concepts of length and number between the ages of five and seven. Weight and volume come later—between



Fig. 7—The concept of volume. Child must construct houses with identical volumes on islands with different surface areas.

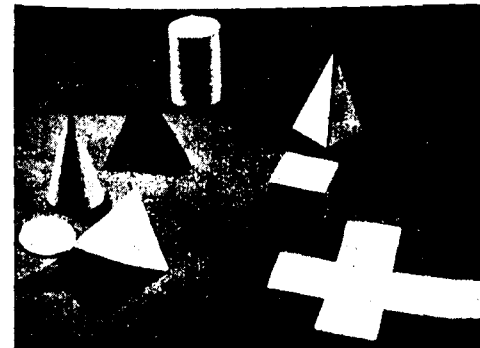


Fig. 8-9—Representation in two and three dimensions. Child draws on a plain sheet the opened-out surface of a geometrical solid she is shown.

nine and twelve—and now the framework of his thought processes has been erected. At the age of ten, he begins to experiment and then, research shows, he is capable of scientific thinking at twelve when he starts formulating theories and searching for proofs.

As is often the case in science, the answers to the first questions have now raised new ones. For example, scientists now wonder if this development is the result of mental and nervous 'maturing' or whether it is the fruit of education and just plain practice. Professor Piaget has already shown that ex-

ternal and internal factors always interact—that is, you cannot separate them. How this 'interaction' takes place is yet to be answered. There is also an even bigger question: how is the young child's mind, concentrated on the present and on what he can see and touch, transformed into the mind of the adolescent conscious of the world and capable of co-operating with his fellow men?

This is pure research at present, but Prof. Piaget and the Swiss scientists working with him believe that its results may represent a valuable contribution to education.



Will UK Go Metric?*

It would be recollected that the British Association for the Advancement of Science and the Association of British Chambers of Commerce had each set up a Committee to enquire into the possibility of change-over to the decimal coinage and the metric system in the UK and its cost. Their report has now been published, and is a joint report of the two committees.

Fruit of the Collaboration of the two Committees

The terms of reference of the Committee were to report on the practicability, implications and consequences and the cost of change-over to the metric system and decimal coinage in the UK, and examination of the possibility of rationalization or decimalization of present units of weights and measures.

Questionnaires were issued to trade and other commercial associations, individual firms, Government Departments, local authorities, public utilities and nationalized industries, British Trade Commissioners Overseas, learned societies, professional institutions, educational authorities and the like. The answers were analysed, and on their basis conclusions drawn and recommendations made.

The report is divided into four parts: the first part deals with decimal coinage,

the second with the metric system, the third with the possibilities of rationalization and decimalization of the Imperial system and the fourth with the educational aspects.

Decimal Coinage

As regards decimal coinage, the Committee examined the world trends and the advantages and the disadvantages that may be gained by the change-over to the decimal system. The problems of machine conversions and the impact on general public, industry and commerce have been analysed. Various systems of decimal coinage such as the pound/cent/fraction system, the pound-mil system (£1=1000 mils), the ten shilling : cent system (10 shillings=100 cents), the shilling : decime system (1 shilling=10 cents), the 8/4 d : 1d system and 4/2 d : 1/2 d system have been examined.

The Committee has concluded that although some did not express much dissatisfaction with the present system of coinage, there was a strong case for the adoption of decimal coinage. In decimalizing the coinage, the general opinion was that the pound should be retained as the major unit. The transitional cost of a change would be heavy, but would not be too large in relation to the resources of the country and the long-term benefits expected.

It was also seen that the question of decimal coinage has to be examined independently of the change-over to the metric system of weights and measures. In any case,

WILL UK GO METRIC?

decimalization of coinage should precede the adoption of the metric system. The Committee recommended that the Government should take an early decision for or against the principle of the adoption of a decimal coinage as the longer the delay the heavier would be the transitional costs. They have also recommended that if it is decided to adopt decimal coinage, three years, notice should be given for preparation.

Metric System

As regards adoption of the metric system, the Committee examined the extent of the present use of the metric system in the UK and found that it was not largely used except in certain industries such as optical, drugs and scientific instruments, in firms which specialize in export and the like.

Some 84 per cent of those who answered the questionnaire were in favour of the principle of the adoption of the metric system. There was a definite opinion that if the UK has to adopt the metric system, it should be done in full consultation with the Commonwealth and the United States of America.

Transitional costs in some sectors of industry, for example, engineering would be heavy but the financial gains were difficult to assess. If the metric system is to be adopted a long transitional time would be desirable to lower transitional costs and it should be phased with obsolescence. It was further noticed that the educational benefits were real though they could not be measured in terms of money. The total saving for children of age group 7-11 years would be 5 per cent if in teaching only the metric system is used.

Based on the above findings, the Committee has recommended that in view of the trend towards greater and greater use of the metric system in the world as also in the UK, a close watch should be kept on the world situation. This could be done by a regular

two-yearly review by the Board of Trade in consultation with industry and commerce and in collaboration with its counterparts in the Commonwealth countries and the USA.

The Committee recommended that in these reviews 'particular note should be taken of trends in Japan and India and in the under-developed countries of Asia and Africa'. The object of the reviews should be to study 'world developments in the usage of both metric and non-metric systems together with the progress in adoption of metric and non-metric standards, to publish such information and to determine any joint action' that may be necessary. Although the metric system is legal in England, the change-over on a voluntary basis may be slow. The two yearly review should, therefore, indicate what 'stimulus might be given to more rapid change-over to the metric system in the UK. The reviews should also indicate in what sections of the industry and commerce metric usage could be introduced with most benefits and the least transitional dislocations'. About international standardization, the Committee feels that although a common standard is ideal, in cases where this is unattainable attempts should be made to secure international acceptance of standards on both metric and inch/pound systems. The British Standards Institution should publish further metric standards to facilitate manufacture in metric dimensions for export.

Improving the Imperial System

Under this Section, the Committee has considered the decimalization and rationalization of the inch/pound system, as for example, the decimalized inch, decimalized foot, decimalized mile and the use of the cental of 100 pounds and the ton of 2,000 pounds. The Committee feels that such decimalization of the inch/pound units may find increased usage in some specialized trades and in engineering, but it is unlikely

*Review of the Report: DECIMAL COINAGE AND THE METRIC SYSTEM : SHOULD BRITAIN CHANGE ? (English)—published by Butterworths Scientific Publications, Ltd., 88 Kingsway, London, W.C. 2, pp 107, price 7s. 6 d.

that a coherent system could be evolved in this way. They recommended that further study should be given to the problem of the rationalization and decimalization of the inch/pound system on its merits for each industry. Some advantages may be obtained in this process in certain industries. They have further recommended that the Government Departments and the nationalized industries should examine the possibility of eliminating the units of weights between ton and pound or alternatively to use the cental (100 lb) and the short ton of 2,000 lb. The abolition of the apothecaries, troy and pennyweight systems and the rod, pole or perch of 5 1/2 yards and the corresponding square measure of 30 1/4 yards is recommended.

Educational

So far as educational aspects of the decimalization are concerned, the Committee's findings are extremely interesting. In the tests carried out, it was found that an office group tested showed a saving of time up to 30 percent in solving 'money sums' with errors reduced by 50 percent when using decimals. Tests were also made at two schools. For children of average age 9 years, 4 months, the time saved by using decimals and reduction in errors were each 40 percent. It is estimated that in the age group 7-11, there would be saving of 10 to 20 percent of mathematics time and up to 5 per cent of total teaching time. For the age group 11 to 13 the saving, though smaller

than for age group 7-11, would still be significant and for ages over 13 there would be some saving though not large. Science teaching would be simplified.

The replies received have refuted the argument that the study of the Imperial system produces 'valuable mental skills' and is 'stimulating to the number sense of children'. It is seen that many of these skills are required simply because of the system in use. Anyhow, a reorganization of the syllabus could take care of this point.

The Committee recommended that 'even if no action is taken on decimal coinage or the metric system, much greater emphasis should be placed immediately on the teaching and use of decimals and the metric system in the educational curriculum at the earliest stages. This would not only promote 'decimal thinking' at an earlier age than at present, but would be of value to entrants into industry and commerce where the practical use of decimals is increasing. It must also be remembered that should positive action be taken on the adoption of decimal coinage or the metric system, one of the earliest steps to be taken would be a revision of the educational approach.'

The last recommendation regarding education is of particular significance to India immediately as we have already adopted the decimal coinage and will go over substantially to the metric system during 1960-61. A delay in the change of the syllabus of schools would mean a wastage of national effort of students as well as teachers.

News & Views

11th General Conference of Weights & Measures

It is understood that the 11th General Conference of Weights and Measures would be held from 11 to 12 October 1960 in Paris.

Among the subjects proposed to be discussed at the Conference are:

A change in the definition of the metre as proposed by the International Committee on Weights and Measures.

(In the November 1959 issue of *Metric Measures*, M. Henri Moreau has given the background of this change.)

(2) Another proposal recommends a change in the definition of the second.

(In the article 'New Astronomical Definition of Unit of Time' appearing in *Metric Measures*, September 1959, M.A. Danjon, President of the Consultative Committee for the Definition of Second, which has been responsible for defining the second for international use, has discussed in detail the background of the change.)

(3) It is also proposed to discuss the creation of a laboratory within the Bureau, which would consist of three sections: (i) dosimetry of X-rays and 'gamma-rays' (ii) absolute measurement of activity, and (iii) measurement of flux of neutrons.

The International Committee has proposed that the member States should make a special contribution of 1,395,000 gold francs for the building of the laboratory and for its equipment and materials.

Other important points for discussion

are the absolute determination of gravity and standard atmosphere, and examination of the proposal to name the system of units proposed by the International Committee in 1956 and 1958, 'the International System of Units', use of the abbreviation 'SI' for this system to be adopted in all the languages, list of supplementary and derived units, inclusion of the prefixes tera, giga, nano and pico. It is also proposed to amend the Metre Convention and its regulations to enable the extension of activities of the Bureau to newer fields of standards of measurements.

Metric Bottles for Alcoholic Liquors

In a meeting of the Panel for Metric Glass Containers for Alcohol, CDC 10:3:1 of the Indian Standards Institution, it was agreed that the bottles for both India made foreign liquors and country spirits should have the nominal capacities of 750 ml, 500 ml and 250 ml and the tolerances on each capacity would be ± 7 ml, ± 5 ml and ± 3 ml respectively. It is expected that the Panel's recommendations, after duly consulting all the interests, would be finalized before 1 October 1960, leaving a period of 6 months for the production of the new bottles to metric specifications before 1 April 1961, the date set for the introduction of the metric system in the alcohol industry. The period between October and April 1961 would be utilised in making the bottles available to packers.

weights began in Poona when traders in brass and copper vessels adopted them from 1 December 1959. It was then taken up by wholesale traders who brought it into use from 28 March 1960. The Fair Price Shops and the Agricultural Produce Market Committee have already changed over to metric weights from 28 April 1960. It appears that the new State of Maharashtra have changed over substantially to the metric system, as all the licensed Fair Price Shops get their quota from the Government godowns in metric weights only and they have to sell it to the customers in metric units.

Exhibitions and Melas

The metric system was one of the attractions at the stall put up by the Weights

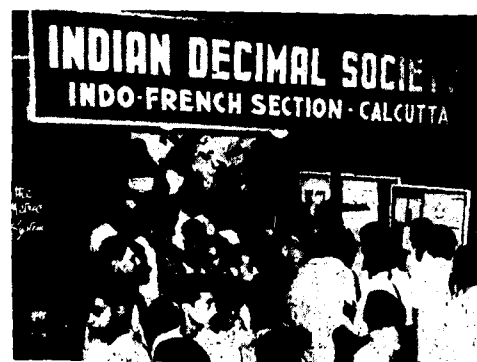


and Measures Department of Tripura, in the Annual Mela-cum-Exhibition at



visited the stall during the 10 days of the Mela. Literature on metric system was distributed among the visitors and the system was explained.

The Indo-French Section of the Indian Decimal Society participated in the Calcutta Industry Fair which concluded recently. The French weights and the old Indian weights were on view. Over 20,000 persons visited



the stall and acquainted themselves with metric weights and measures. A number of tables and other literature, pamphlets, rules for students marked in inches and centimetres were given to the visitors.

Metric System in the Jute Trade and Industry

The jute trade and industry were first to adopt the metric system in India. It was adopted on an optional basis for two years from 1 July 1958, and the transition period would expire on 30 June 1960. It will become compulsory from 1 July 1960. The maund and the seer of the weight would be replaced by the kilogram, and the yard and the inch of the measurement would be replaced by the metre.

The compulsory change-over to the metric system from 1 July 1960 would replace kutcha bales of $1\frac{1}{2}$ mds., $3\frac{1}{2}$ mds., and 4 mds. by bales of 70, 130 and 150 kilograms respectively. The existing measure of pucca bales would continue for one more month and could be offered in bales of

1960 they would be replaced by bales of 180 kilograms.

After the change-over, it would become obligatory for all concerned in the jute trade and the industry to use only metric units in all of their transactions, and a contravention in this respect would be considered penal under the law. The use of maunds in offers and counter-offers would, therefore, come to an end, and the raw jute will be offered per 100 kg. Similarly, hessian cloth now being sold or bought per 100 yards would be sold or bought per 100 metres. The sale or purchase of sackings would, however, not be affected, as they are being bought and sold in numbers i.e. per 100 bags.

The Railways have also adopted the metric system from 1 April 1960 and the

RUM

owers and dealers in the upcountry are becoming conversant with the metric system, but their inconvenience arising out of this first compulsory change-over might need careful watch and a special effort to minimize it.

The change-over from July might prove the year 1960 to be a crucial year for the jute and the jute goods trade. Similar has been the consideration of the Government for the metric system as a whole, since the compulsory change-over would affect a number of trades and industries from 1 October 1960. Under the circumstances, the jute trade and the industry have really shown wisdom in adopting the change-over before it becomes compulsory for other trades and industries.

(From *The Jute Trade*, Vol. VII, No. 11, 1 June 1960)

Readers' Forum

Conversion Made Easy

Dear Sir,

Here is a simple, readily usable method of finding the approximate equivalent price of a commodity per kilogram when its price per pound is given.

Method: Convert the given price to naye paise, multiply this by two and add one-tenth of this value (corrected to the next higher integer) to the value already obtained. The figure thus obtained is the price per kilogram in naye paise.

For example: If the price of a commodity is (1) 50 nP, (2) 88 nP and (3) Rs. 1.25, find the price per kilogram.

(1) $50 \times 2 + \frac{50 \times 2}{10} = 100 + 10 =$	110 nP
	Rs. 1.10
(2) $88 \times 2 + \frac{88 \times 2}{10} = 176 + 18 =$	194 nP
	Rs. 1.94
(3) $125 \times 2 = 250$ $\frac{250 + 250}{10} = 250 + 25 =$	275 nP
	Rs. 2.75

It will be observed on testing that in some cases there is a slight difference between the actual value obtained by using the factor $1 \text{ kg} = 2.20462 \text{ lb}$ and the

approximate values obtained by the above method. These differences are of the following order:

Price of Commodity	Maximum differences Observed
Upto Rs. 3	1 nP
Above Rs. 3 and upto Rs. 5	2 nP
Above 5 and upto Rs. 7	3 nP
Above Rs. 7 and upto Rs. 9	4 nP
and so on.	

In day-to-day transactions we usually deal with commodities priced less than Rs. 3.00 per lb. As the maximum difference between the correct value and value obtained by the method suggested is only 1 naya paisa, this method may be useful for spot mental conversions.

G. VENKATESWARAN
Assistant Director (Weights & Measures)
New Delhi

Metric Measure of Fuel Consumption in Motor Vehicles

Dear Sir,

The oil industry in India has shown exemplary promptitude in adopting the metric system from 1 April 1960. While getting familiar with the new measures and prices, the motoring public, by now, may have discovered that the checking of fuel consumption in litres presents certain problems.

The present practice of measuring fuel consumption is in terms of miles per gallon. It gives a convenient indication and a natural trend would be to convert it to miles per litre or perhaps miles per 5 or 10 litres. There would be no problem if

such conversions conveniently served the purpose, but unfortunately they do not. The litre being a small measure and moreover not a simple sub-multiple of a gallon, converted values in miles per litre come out too small to be useful and, on top of it, they have to be expressed in decimal fractions to maintain a fair degree of accuracy. For example, 15 miles per gallon correspond to 3.3 miles per litre and 25 miles per gallon to 5.5 miles per litre. Few would be interested to check consumption for a run of 3.3 or 5.5 miles, particularly when miles are divided into 8 furlongs and no roads are marked in tenths of a mile. Neither is it easy to manipulate such figures to estimate the fuel requirement for a comparatively longer run.

In Continental countries, fuel consumption is normally measured in terms of litres per 100 kilometres, which would appear to offer solutions to both the problems. Expressing in this manner, 15 miles per gallon would correspond to 30 litres per 100 miles and 25 miles per gallon to 18 litres per 100 miles. Conversion error involved in this case is 1 percent which is much less than the accuracy of measurement. Both the mileage and the consumption in litres attain reasonable magnitudes. If one has to estimate fuel requirement for small fractions of 100 miles, it would present no major difficulty, for example 18 litres per 100 miles means 9 litres for 50 miles, 4.6 litres for 25 miles, 1.8 or nearly 2 litres for 10 miles, and so on. As Indian manufacturers of motor cars begin to fit their vehicles with kilometre speedometers, it would be easy to change over finally to litres per 100 kilometres.

There is much to commend in this Continental practice for general acceptance in India. For convenience, a ready reckoner

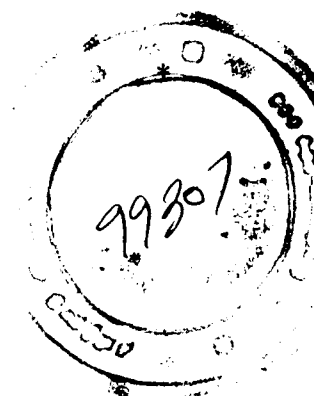
READERS' FORUM

to convert values from miles per gallon is given below:

Miles per gallon	Litres per 100 miles	Litres per 100 kilometres	Miles per gallon	Litres per 100 miles	Litres per 100 kilometres
10	45	28	26	17	11
12	38	24	27	17	10
14	32	20	28	16	10
16	28	18	29	16	10
18	25	16	30	15	9
20	23	14	32	14	9
21	22	13	34	13	8
22	21	13	36	13	8
23	20	12	38	12	7
24	19	12	40	11	7
25	18	11	45	10	6
			50	9	6
			55	8	5
			60	8	5

S. K. SEN

Deputy Director (Metric Cell),
Indian Standards Institution,
New Delhi



Handwritten notes: 5L, X: 5e m2, N58, N60-3

Book Review

METRIC TABLES OF WEIGHTS & MEASURES (English)—by U. Vasudeva Mallya, Publisher U. Vasudeva Mallya, Udipi, South Kanara, p. 76, First Edition, 1959.
Price: Rs. 2-50.

The need for different types of conversion tables for use during the transition period cannot be over-stressed. The Indian Standards Institution has done pioneering work in this sphere. However, different tables have to be devised for various regions of the country in view of the variety of weights and measures in the country. A set of tables which covers these variations is welcome.

The book under review, 'Metric Tables of Weights & Measures', contains, besides the usual conversion tables for length, area, volume, capacity and weights, such unusual tables as the conversion of tolas, vals, grains, sovereigns, thukas, addas etc. into the corresponding metric weights and their value at Rupee 1 per tola, Rupee 1 per sovereign and Rupee 1 per gram. The author has also given special tables for gold weights in grains as also in kilograms, grams, milligrams and indicated their value.

Tables for the conversion of pounds of 40 tolas to grams and kilograms and seers of 24 tolas to grams and kilograms are welcome. As is well known the seer of 24 tolas is very common in South India and this particular set of tables will be useful there.

A table has been included for the conversion of litres to tolas and its decimal fractions. By definition capacity is the volume occupied by a certain weight of water. The same conversion factor as for weights may not necessarily apply in this case because of differences in the temperatures of definition and other allied factors. An exact conversion factor for litres to tolas has not yet been worked out. As a result the litre to tola tables given would be useful for judging how much a litre is in terms of tolas, though it may not be possible to use them for accurate conversions. To make tables doubly useful in South India, the author has included tables for Madras grain measures, Kanara grain measures, liquid measures etc.

One point which has apparently gone unnoticed is that of abbreviations. For example, decametre and hectometre are abbreviated as 'Dm' and 'Hm', whereas they should be 'dam' and 'hm'. The author has also given the current paper sizes but not of the 'A—series' which is to come into use in India in the near future.

On the whole, the book will be useful in day-to-day transactions everywhere, particularly in South India.

METRIC PADDHATI—Bi-monthly Bengali journal published by the Government of West Bengal.

The West Bengal Government has launched a Bengali bi-monthly magazine called *Metric Paddhati* from January 1960.

BOOK REVIEW

The first issue opens with an article by Sri Bhupati Majumdar, Minister-in-charge, Commerce and Industries Department and Tribal Welfare Department, Government of West Bengal. It also contains articles by Richard Vieweg, P.N. Nayer, M.L. Madan, N.K. Mukherjee and Phanindra Nath Seth. Some of the articles have been translated from *Metric Measures*. A review of the West Bengal Standards of Weights and Measures (Enforcement) Act as also a list of licensed manufacturers, dealers and repairers licensed under the Act have been included.

The second issue contains articles by V.M. Pednekar, Nanda Kumar Mukherjee, Tripti Seth, B.C. Kundu, B.B. Roy, S. Kushary and Phanindra Nath Seth.

The journal is well produced and its annual subscription is Rs. 2.00 and each issue is priced as 40 nP.

The West Bengal Government deserves congratulations for bringing out the Bengali magazine to enable propagation of the metric system among the largest section of Bengal's population. It is hoped that the magazine will serve as a forum for the exchange of views by the various interests in trade, commerce and industry, education and other fields. Other States should also bring out their own magazines, so that the metric system gets the widest publicity in a short time and reaches every person in the State. The effort deserves emulation.

TELEPHONE BRAND



METRIC WEIGHTS

Manufacturer : N. K. ROUTH

78, Netaji Subhas Road, Calcutta-7.

Telegram: 'NILKAMA'

Phone: 33-5134

Licensed Manufacturers, Dealers and Repairers of Weights and Measures(8)

Metric Measures has been publishing a series of lists of 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) Act in their respective jurisdiction. This is the eighth list. The first list appeared in the March 1959 issue.

Progressively steps are being taken for licensing manufacturers, dealers and repairers in all States and further lists of licensees would be published in *Metric Measures* as this work progresses.

The number in brackets against the name of the State or Union Territory indicates the particular instalment number of the list for that State or Union Territory. The issues of *Metric Measures* in which previous lists appear are also shown suitably.

An analysis of the licensees, including the present list, shows that the total number of licensees in 12 States and 2 Union Territories is 242 manufacturers, 972 dealers and 184 repairers. The details of published information are as follows:

Sl. No.	State/Union Territory	Licensees		
		Manufacturers	Dealers	Repairers
(1)	Andhra Pradesh	25	25	16
(2)	Bihar	20	69	34
(3)	Bombay	23	160	52
(4)	Delhi	13	59	18
(5)	Kerala	4	74	0
(6)	Madhya Pradesh	13	84	0
(7)	Madras	38	74	14
(8)	Mysore	9	106	8
(9)	Orissa	6	11	0
(10)	Punjab	13	222	12
(11)	Rajasthan	16	69	18
(12)	Tripura	0	8	0
(13)	Uttar Pradesh	22	2	1
(14)	West Bengal	40	9	11
		242	972	184

LICENSED MANUFACTURERS, DEALERS & REPAIRERS OF WEIGHTS & MEASURES (8)

BIHAR (1)

Manufacturers

Sl. No.	Name and Address of Manufacturer	Details of Articles Manufactured
(1)	Asiatic Machinery Corporation, 10, Kailash Chandra Lane, Santragachi (Howrah).	Heavy type of Weighing Machine.
(2)	Avery Company of India Private Ltd., Avery House, 28/2, Waterloo Street, P.O. Box No. 377, Calcutta-1.	Heavy type of Weighing Machine.
(3)	Avenue Weighing Scales, 135 Netajee Subhas Road, Howrah.	Heavy type of Weighing Machine.
(4)	Bankipore Iron Works, Mithapore, Patna	Cast Iron Weights.
(5)	Bharti Weighing Scales, 4/1, Haldarpara Lane, Khurut (Howrah).	Heavy type of Weighing Machine.
(6)	Bharat Weighing Scale and Engineering Syndicate, 75-1, Kalachand Nandy Lane, Howrah.	Heavy type of Weighing Machine.
(7)	Bihar Agricultural Industries, Cantt. Road, Dinapore ..	Cast Iron Weights.
(8)	Chouthi Charan Karmokar, Vill-Jaipur (Bhagalpur) ..	Scales.
(9)	H.P. Das & Co., 22, Srigopal Ariada (24 Parganas) ..	Bullion Weights.
(10)	Girish Chandra Ghosh, 58, Clive Street, Calcutta ..	Scales.
(11)	India Machinery Co. Ltd., 29, Strand Road, Calcutta ..	Heavy type of Weighing Machine.
(12)	Jaiswal Trading Co., Dhanbad	Cast Iron Weights.
(13)	A.M. Master & Co., Janjika Street, Bombay	Bullion Weights.
(14)	Nagendra Nath Karmokar, C/o Wooma Charan Karmokar, 208, Harrison Road, Calcutta.	Scales.
(15)	Patra Nirman Sadan, Siwan	Bullion Weights.
(16)	Saple's Scales Manufacturing (Private) Ltd., Donimic House, 196-98, Girgaon Road, Bombay-4.	Bullion Weights.
(17)	Satish Chandra Dass & Co., 25/A, Ratan Babu Road, Cossipur, Calcutta.	Bullion Weights.
(18)	W.B. Scales and Co., 10, Kailashchandra Lane, Santragachi, Howrah.	Heavy type of Weighing Machine.
(19)	Umesh Chandra Karmoker, C/o Girish Chandra Ghose, 58, Clive Street, Calcutta.	Scales.
(20)	Wooma Charan Karmokar, 23, Narikeldanga, Calcutta ..	Scales.

Dealers

Sl. No.	Name and Address of Dealer	Details of Articles Sold
<i>Patna Division</i>		
(1)	Asiatic Machinery Corporation (P) Ltd., 10/1 Kailash Chandra Lane (Howrah).	Weights, Measures and Weighing and Measuring Instruments.

Dealers (contd.)

Sl. No.	Name and Address of Dealer	Details of Articles Sold
(2)	Asok Kumar, Boaring Works, G.T. Road, Shahabad	Weights, Measures and Weighing and Measuring Instruments.
(3)	Avery Company India Private Ltd., Avery House, 28/2, Waterloo Street, Calcutta.	Weights, Measures and Weighing and Measuring Instruments.
(4)	Bandhu Ram Lachmi Narain, Station Road, Patna Junction.	Weights, Measures and Weighing and Measuring Instruments.
(5)	Bandhu Ram Lachminarain, Chowk, Patna City	Weights, Measures and Weighing and Measuring Instruments.
(6)	Behar Scientific Corporation, Bankipore (Patna)	Weights, Measures and Weighing and Measuring Instruments.
(7)	Bihar Agriculture Industries, Cantt. Road, Khagaul (Dinapur).	Weights, Measures and Weighing and Measuring Instruments.
(8)	Central Hardware Stores, Gaya	Weights, Measures and Weighing and Measuring Instruments.
(9)	Hiraman Sahu Lato Sahu, Nawadah (Gaya)	Weights, Measures and Weighing and Measuring Instruments.
(10)	India Machinery Co. Ltd., 29, Strand Road, Calcutta ..	Weights, Measures and Weighing and Measuring Instruments.
(11)	Jagdish Pd., Iron Works, Tekari Road, Gaya	Weights, Measures and Weighing and Measuring Instruments.
(12)	Kaloo Ram Sitaram, Gola Road, Dinapore	Weights, Measures and Weighing and Measuring Instruments.
(13)	Kamala Kant Gupta, Hasua Bazar, Gaya	Weights, Measures and Weighing and Measuring Instruments.
(14)	Mahabir Hardware Stores, Patna city	Weights, Measure and Weighing and Measuring Instruments.
(15)	Matuk Ram & Co., 16/ Anugrah Road, Gaya	Weights, Measures and Weighing and Measuring Instruments.
(16)	R.N. Mehra, Dinapore	Weights, Measures and Weighing and Measuring Instruments.
(17)	Nageshwar Mistry, Chowk, Arrah	Weights, Measures and Weighing and Measuring Instruments.
(18)	Narayandas and Sons, Pachim Darbaza, Gulzarbagh ..	Weights, Measures and Weighing and Measuring Instruments.
(19)	Nathun Ram, Kaburddinganj, Beharshariff	Weights, Measures and Weighing and Measuring Instruments.
(20)	Sheokumar Pd., Barh (Patna)	Weights, Measures and Weighing and Measuring Instruments.
(21)	Shohan Lall Narangi Lall, Ramna, Gaya	Weights, Measures and Weighing and Measuring Instruments.
(22)	Sundar Cottage Industries, Hari Mandir Gaw, Patna City	Weights, Measures and Weighing and Measuring Instruments.

Dealers (contd.)

Sl. No.	Name and Address of Dealer	Details of Articles Sold
(23)	Suresh Mistri, Sohsarai, Beharshariff (Patna)	Weights, Measures and Weighing and Measuring Instruments.
(24)	Triloki Chand Nathuni Ram, Aurangabad, Gaya	Weights, Measures and Weighing and Measuring Instruments.
<i>Muzaffarpur Division</i>		
(25)	Agarawalla Stores, Sariyaganj, Muzaffarpur	Weights, Measures and Weighing and Measuring Instruments.
(26)	Badri Singh Ram Lochan Singh, Jainagar, Darbhanga	Weights, Measures and Weighing and Measuring Instruments.
(27)	Bajinath Pd. Gupta, Kachhari Road, Chapra	Weights, Measures and Weighing and Measuring Instruments.
(28)	Bhagwan Sah & Co., Muzaffarpur	Weights, Measures and Weighing and Measuring Instruments.
(29)	Chandumall Bajinath, Henry Bazar, Motihari	Weights, Measures and Weighing and Measuring Instruments.
(30)	Devi Pd. Kijaribal, Goghardiha, Darbhanga	Weights, Measures and Weighing and Measuring Instruments.
(31)	Dhurb Narain Bishwanath, Gudri Bazar, Madhubani (Darbhanga).	Weights, Measures and Weighing and Measuring Instruments.
(32)	Khublal Sah Mathura Sah, Sitamarhi	Weights, Measures and Weighing and Measuring Instruments.
(33)	Mahabir Mahto, Barabazar, Darbhanga	Weights, Measures and Weighing and Measuring Instruments.
(34)	Patra Nirman Sadan, Kesara Bazar, Saran	Weights, Measures and Weighing and Measuring Instruments.
(35)	Rajendra Pd. Chowdhary, Sariyaganj, Muzaffarpur ..	Weights, Measures and Weighing and Measuring Instruments.
(36)	Ramchandra Bhagwandass Co., Sariyaganj, Muzaffarpur..	Weights, Measures and Weighing and Measuring Instruments.
(37)	Ram Lakhan Pd. Jaiswal, Gopalganj, Saran	Weights, Measures and Weighing and Measuring Instruments.
(38)	Ram Sagar Sharma, Hajipur (Muzaffarpur)	Weights, Measures and Weighing and Measuring Instruments.
(39)	Shamlall, Hajipur (Muzaffarpur)	Weights, Measures and Weighing and Measuring Instruments.
(40)	Sheotahal Sah Luxmi Pd., Janakpur Road, Muzaffarpur ..	Weights, Measures and Weighing and Measuring Instruments.
(41)	Shivbalak Ram Deo Narain Ram, Raxaul, Champaran ..	Weights, Measures and Weighing and Measuring Instruments.
(42)	Sitaram Biswanath, Samastipur (Darbhanga)	Weights, Measures and Weighing and Measuring Instruments.

Dealers (contd.)

Sl. No.	Name and Address of Dealer	Details of Articles Sold
(43)	Sonalall Jagarnath Pd., Sariyaganj, Muzaffarpur	Weights, Measures and Weighing and Measuring Instruments.
(44)	R.B. Tunki Sah, Baidnath, Sariyaganj, Muzaffarpur	Weights, Measures and Weighing and Measuring Instruments.
(45)	Yogendra Pd., Bettiah, Champaran	Weights, Measures and Weighing and Measuring Instruments.
<i>Bhagalpur Division</i>		
(46)	Abinath Mistri, Dumka, Deoghar	Weights, Measures and Weighing and Measuring Instruments.
(47)	Ashoke Kumar, Begusarai((Monghyr)	Weights, Measures and Weighing and Measuring Instruments.
(48)	Bajinath Trading Co., Deoghar (Santhal Parganas)	Weights, Measures and Weighing and Measuring Instruments.
(49)	Dwarka Pd. Gobind Ram, Khagaria, Monghyr	Weights, Measures and Weighing and Measuring Instruments.
(50)	Ganesh Trading & Co., Banmankhi (Purnea)	Weights, Measures and Weighing and Measuring Instruments.
(51)	Ghose & Sons, Katihar (Purnea)	Weights, Measures and Weighing and Measuring Instruments.
(52)	M. L. Goil, Forbesganj (Purnea)	Weights, Measures and Weighing and Measuring Instruments.
(53)	Jethumall Ganesh Narain, Araria (Purnea)	Weights, Measures and Weighing and Measuring Instruments.
(54)	Munshi Lall Arya, Nehru Chowk, Kaswa (Purnea)	Weights, Measures and Weighing and Measuring Instruments.
(55)	Nanhu Ram Bajinath, Bara Bazar, Katihar (Purnea)	Weights, Measures and Weighing and Measuring Instruments.
(56)	Rameshwar Pd., Purabsarai, Monghyr	Weights, Measures and Weighing and Measuring Instruments.
(57)	Ram Chandra Bhagwan Dass, Sujaganj, Bhagalpur	Weights, Measures and Weighing and Measuring Instruments.
(58)	Satya Narain Mahabir Pd., Dumka, Deoghar	Weights, Measures and Weighing and Measuring Instruments.
(59)	Sheodutta Rai, Khetap, Lohapatti, Bhagalpur	Weights, Measures and Weighing and Measuring Instruments.
(60)	Sheodutt Roy Khaitan, Lohapapar, Bhagalpur	Weights, Measures and Weighing and Measuring Instruments.
<i>Ranchi Division</i>		
(61)	Basista Narain Tewari, Jumarhi Tellaiya, Hazaribagh	Weights, Measures and Weighing and Measuring Instruments.
(62)	Bharat Dubey, Candwa, Latihar, Palamau	Weights, Measures and Weighing and Measuring Instruments.

Dealers (contd.)

Sl. No.	Name and Address of Dealer	Details of Articles Sold
(63)	Biswanath Pd., 29, Dalda Road, Jamshedpur	Weights, Measures and Weighing and Measuring Instruments.
(64)	Braj Bilas Pd., Bisun Mandir Road, Daltonganj	Weights, Measures and Weighing and Measuring Instruments.
(65)	Jadulal Gupta, Upper Bazar, Ranchi	Weights, Measures and Weighing and Measuring Instruments.
(66)	Lakshman Ram, Rani Mohalla, Garhwa, Dhalbhum	Weights, Measures and Weighing and Measuring Instruments.
(67)	Madan Lal Budha, Main Road, Ranchi	Weights, Measures and Weighing and Measuring Instruments.
(68)	Parmanand Singh, Jhumari Telaiya, Hazaribagh	Weights, Measures and Weighing and Measuring Instruments.
(69)	Radhe Shyam Bhagwan Dass, Jugbai, Tatanagar (Singhbhum)	Weights, Measures and Weighing and Measuring Instruments.

Repairers

Sl. No.	Name and Address of Repairer	Details of Articles Repaired
(1)	Avery Co., (India) Ltd., Waterloo Street, Calcutta	Platform Scales and Weighbridges
(2)	Avenue Weighing Scales Co., Netajee Subhas Road, Howrah	Platform Scales and Weighbridges
(3)	Belsund Sugar Co. Ltd., Rigba, Muzaffarpur	Platform Scales and Weighbridges
(4)	Bharat Weighing Scales and Engineering Syndicate 75/1, Kalachand Nandy Lane, Howrah	Platform Scales and Weighbridges
(5)	Bharat Sugar Mill Ltd., Sindwalia, Saran	Platform Scales and Weighbridges
(6)	Bihar Sugar Works, Pachrukhi Saran	Platform Scales and Weighbridges
(7)	Biswas & Co., Main Road, Ranchi	Scales and Weights.
(8)	Canpore Sugar Works Ltd., Marhowrah, Saran	Platform Scales and Weighbridges
(9)	Champaran Sugar Co., Barachakia, Motihari	Platform Scales and Weighbridges.
(10)	Champaran Sugar Co., Ltd., Bettiah, Champaran	Platform Scales and Weighbridges.
(11)	Chauthi Charan Karmkar, Jaipur, Bhagalpore	Scales and Weights.
(12)	Hanuman Sugar Mills, Motihari, Champaran	Platform Scales and Weighbridges.
(13)	Hindusthan Scales Corporation, 71, Netajee Subhas Road, Calcutta.	Platform Scales and Weighbridges.
(14)	India Machinery Co., Dasnagar, Howrah	Platform Scales and Weighbridges.
(15)	Machine Sugar Mill, Warsaliganj, Gaya	Platform Scales and Weighbridges.
(16)	B.K.G.S. Mills Ltd., Lauriya, Champaran	Platform Scales and Weighbridges.

Repairers (contd.)

Sl. No.	Name and Address of Repairer	Details of Articles Repaired
(17)	S.K.G.S. Mills Ltd., Mirganj, Saran	Platform Scales and Weighbridges.
(18)	Motipur Sugar Factory, Motipur, Muzaffarpur	Platform Scales and Weighbridges.
(19)	New Savan Sugar Factory, Siwan, Saran.	Platform Scales and Weighbridges.
(20)	New India Sugar Mills, Hassanpur, Darbhanga	Platform Scales and Weighbridges.
(21)	New Swadeshi Sugar Mills, Narkatiaganj, Champaran	Platform Scales and Weighbridges.
(22)	Patra Nirman Sadan, Kesra Bazar, Siwan	Scales and Weights.
(23)	Punjab Flour Mills, Motihari, Champaran	Scales and Weights.
(24)	Rohtas Industries Ltd., Dalmianagar, Dehri (Shahabad)	Platform Scales and Weighbridges.
(25)	Rayam Sugar Co. Ltd., Rayam, Darbhanga	Platform Scales and Weighbridges.
(26)	Samastipur Central Sugar Co., Samastipur, Darbhanga	Platform Scales and Weighbridges.
(27)	Sasamusa Sugar Works(P), Sasamusa, Saran	Platform Scales and Weighbridges.
(28)	Sakari Sugar Works, Sakari, Darbhanga	Platform Scales and Weighbridges.
(29)	W.B. Scales & Co., 10/1, Kailashchandra Lane, Howrah	Platform Scales and Weighbridges.
(30)	Sitalpore Sugar Works Ltd., Goraul, Muzaffarpur	Platform Scales and Weighbridges.
(31)	M.P. Sugar Mills Co. (P) Ltd., Majhoulia, Champaran	Platform Scales and Weighbridges.
(32)	S.K.G. Sugar Ltd., Guraru, Gaya	Platform Scales and Weighbridges.
(33)	Sugauli Sugar Works (P) Ltd., Sugauli, Motihari	Platform Scales and Weighbridges.
(34)	Universal Scale Manufacture Co., Muradpore, Patna	Scales and Weights.

MADHYA PRADESH (2)

In the May 1960 issue of *Metric Measures* a list of manufacturers of weights and measures in Madhya Pradesh State was published. The following is a list of manufacturers and dealers subsequently licensed under the Madhya Pradesh Weights and Measures (Enforcement) Act, 1958.

Manufacturers

Sl. No.	Name and Address of Manufacturer	Details of Articles Manufactured
(1)	Guru Nanak Factory, Lashkar, Gwalior	Cast Iron Weights.
(2)	National Engineering Works, Sinda-ki-Chhawani, Lashkar, Gwalior.	Cast Iron Weights.
(3)	Weights & Measures Manufacturing Society, Lashkar, Gwalior.	Cast Iron Weights.

Dealers

Sl. No.	Name and Address of Dealer	Details of Articles Sold
<i>Indore Division</i>		
(1)	Abdul Tayab M. Hasanbhoy & Co. Siyaganj, Indore	Weights and Measures.
(2)	Ali Hussain Abdul Ali, 64, Hathi Pala Road, Indore	Weights and Measures.
(3)	F.H. Barkah Ali, 20, Kasera Bazar, Indore	Weights and Measures.
(4)	Bhana Mal & Co. Ltd., Siya Ganj, Indore	Weights and Measures.
(5)	Dinesh Industries, 81, Siya Ganj, Indore	Weights and Measures.
(6)	Esoofally Dawoodbhoy & Co., Indore	Weights and Measures.
(7)	Faizullahbhai Moosakhanji, 10, Siyaganj, Indore	Weights and Measures.
(8)	A. Ibrahim & Go., Ghadiwala, 20/3, Siyaganj, Indore	Weights and Measures.
(9)	T. Ibrahim & Sons, Siya Ganj, Indore	Weights and Measures.
(10)	Indore Grammodityog Sahkari Samiti, Gandhi Bhawan, Indore.	Weights and Measures.
(11)	Indore Nagarnivasi Sahakari Sanstha (Ltd.) 17, Krina Pura, Indore.	Weights and Measures.
(12)	Indore Iron Steel Trunk Factory, Siyaganj, Indore	Weights and Measures.
(13)	Indore Iron Works, 40, Lohar Patti, Malhariganj, Indore	Weights and Measures.
(14)	Kahandelwal Traders, 26, Siya Ganj, Indore	Weights and Measures.
(15)	Kamsuddin, Mhow	Weights.
(16)	Kapoor Hardware & Paint Mart, 45, Ranipura, Indore	Weights and Measures.
(17)	Krishna Iron & Hardware Mart, Siya Ganj, Indore	Weights.
(18)	M.H. Lakhandala, 20/10, Siya Ganj, Indore	Weights and Measures.
(19)	Laxmi Lock House, Siya Ganj, Indore	Weights and Measures.
(20)	M.P. Small Scale Industries, Cooperative Society Ltd., 16, Siyaganj, Indore.	Weights and Measures.
(21)	Mhow Iron Industries, Mhow	Weights and Measures.
(22)	J.K. Mistry & Bros., 24, New Dewa Road, Indore	Weights and Measures.
(23)	H. Muhammad Hussain & H.M. Ibrahim & Co., 22, Siyaganj, Indore.	Weights and Measures.
(24)	Patel Industries & Engineering Works, 1, Silnath Camp, Indore.	Weights and Measures.
(25)	Radha Krishan Chogalal, Mhow Cantonment	Weights and Measures.
(26)	Rajni Tea House Bajani Gate Market, Indore	Weights and Measures.
(27)	N.A. Shinde, 15, Yaswant Road, Indore	Weights and Measures.
(28)	Umbrella Trunk Mfg & Co., 80, Siyaganj, Indore	Weights and Measures.
(29)	Vinay Pustak Bhandar, Sitalmata Road, Indore	Weights.
(30)	N.M. Yusufal, H.M. Abdulali, 86, Siyaganj, Indore	Weights and Measures.

Dealers (contd.)

Sl. No.	Name and Address of Dealer	Details of Articles Sold
<i>Jabalpur Division</i>		
(1)	Akbar Ali Muradali, Naya Bazar, Damoh	Weights and Measures.
(2)	Arun Iron and Steel, Jabalpur	Weights and Measures.
(3)	Devkirte Hardware Stores, Khurai, Dist. Sagar	Weights and Measures.
(4)	Gopikrishna Rathe, Main Road, Chhindwara	Weight and Measures.
(5)	Guru Nanak Hardware Stores, Guruduvara, Marhatal, Jabalpur.	Weights and Measures.
(6)	Hari Prasad Mohanlal, Jaihind Stores, Murwara, Katni, Dist. Jabalpur.	Weights and Measures.
(7)	Jai Hind Stores, Railway Road, Katni (Dist. Jabalpur)	Weights and Measures.
(8)	Kamal Narain, Sausar, District Chhindwara	Weights and Measures.
(9)	A.N. Kamruddin and Sons, Damoh	Weights and Measures.
(10)	Kanchadilal Saraf, Rahti, District Sagar	Weights and Measures.
(11)	Kashmir Hardware Stores, Gol Bazar, Katni	Weights and Measures.
(12)	Khan Sahib M. Hassanjee & Sons, Chhindwara	Weights and Measures.
(13)	Mahabir Iron Stores, Pandhurna, Tahsil Sausar, Dist. Chhindwara.	Weights and Measures.
(14)	Mohammadali Badruddin, Chhindwara	Weights and Measures.
(15)	Nand Kishore Jain, Bara Bazar, Hatta, District Damoh	Weights and Measures.
(16)	Parmanik Co. Jawaharganj, Jabalpur	Weights and Measures.
(17)	Pishori Lal Suri, Ranghi, Jabalpur	Weights and Measures.
(18)	Regional Cooperative Society, Sihora, Dist. Jabalpur.	Weights and Measures.
(19)	Singhi Hukumchand Singhaliya, Patan (Jabalpur)	Weights and Measures.
(20)	Swastik Hardware Mart, 524-1, Marhatal, Jabalpur	Weights and Measures.
(21)	Yusufali M. Mohammadali & Sons, Katra Bazar, Sagar	Weights and Measures.
<i>Bhopal Division</i>		
(1)	Ashtra Cooperative Marketing Society Ltd. Ashtra, District Sehore.	Weights and Measures.
(2)	Bhai Umar Adaji, Jummerati Bazar, Bhopal	Weights and Measures.
(3)	Chairman, Marketing Society, Bhopal	Weights and Measures.
(4)	Fakir Brothers, 5, Hamidia Road, Bhopal	Weights.

Dealers (contd.)

Sl. No.	Name and Address of Dealer	Details of Articles Sold
(5)	Fakirchand Shrikishan Das, General Cloth Merchants, Ashta, District Sehore.	Weights and Measures.
(6)	Ifran General Trading Stores, Jummerati Bazar, Bhopal	Weights and Measures.
(7)	Kanhaiyalal Bhutai, Gandhi Chowk, Ashta, Dist. Sehore	Weights and Measures.
(8)	Kashiva and Company, 5, Bal Bihar, Hamidia Road, Bhopal	Weights and Measures.
(9)	Mughal Hussain Imdad Ali, Loha Bazar, Bhopal	Weights and Measures.
(10)	Munawar Mohamad Khan, Anwar Ganj, Bhopal	Weights and Measures.
(11)	Nutan Traders, Itwara, Bhopal	Weights and Measures.
(12)	Sagarmal Banwat, Gandhi Chowk, Ashta, Dist. Sehore	Weights and Measures.
(13)	D.S. Saxena, Daya Kuteer, Naimalpura, Idgah Hill, Bhopal.	Weights and Measures.
(14)	J.P. Vasistha, Manager, Cooperative Society, Ashta, District Sehore.	Weights.

Dealers

Sl. No.	Name and Address of Dealer	Details of Articles Sold
<i>Gwalior Division</i>		
(1)	Agarwal Iron & Steel Trading Co., Lohia Bazar, Lashkar, (Gwalior)	Weights and Measures.
(2)	Amarnath Premnath, Naya Bazar, Lashkar	Weights and Measures.
(3)	Dayaram Mannu Lal, Lohia Bazar, Lashkar	Weights and Measures.
(4)	Deshri Mal Pahari Mal, Lohia Bazar, Lashkar	Weights and Measures.
(5)	Dinanath Badriprasad, Lohia Bazar, Lashkar	Weights and Measures.
(6)	Ghasi Ram Baiz Nath, Lohia Bazar, Lashkar	Weights and Measures.
(7)	Gopilal Chhoteylal, Lohia Bazar, Lashkar	Weights and Measures.
(8)	Govind Dass Mannulal, Iron Merchant, Dabra Mandi, Dabra, Gwalior.	Weights and Measures.
(9)	Jankiprasad Laxmi Narain, Iron Merchant, Bhomdar, Gwalior.	Weights and Measures.
(10)	Kalloomal Ram Bharose, Lohia Bazar, Lashkar	Weights and Measures.
(11)	Kunjilal Piyare, Iron Merchant, Morar, Gwalior	Weights and Measures.
(12)	Lallimal Beharilal, Lohia Bazar, Lashkar	Weights and Measures.

Dealers (contd.)

Sl. No.	Name and Address of Dealer	Details of Articles Sold
(13)	Lallimal Mohan Lal, Lohia Bazar, Lashkar	Weights and Measures.
(14)	Mukesh & Co., Madhoganj, Lashkar, Gwalior	Weights and Measures.
(15)	Narain Dass Mangal Dass, Inderganj, Lashkar	Weights and Measures.
(16)	Niraj & Co., Daulatganj, Lashkar, Gwalior	Weights and Measures.
(17)	Phoolchand Hirachand Kothari, Lohia Bazar, Lashkar, Gwalior.	Weights and Measures.
(18)	Prakash Iron Stores, Lohia Bazar, Lashkar	Weights and Measures.
(19)	Tulsiram Bhagwandass, Lohiya Baazar, Lashkar	Weights and Measures.

ORISSA (2)

In the March 1960 issue of *Metric Measures* a list of licensed manufacturers and repairers of weights and measures in Orissa State was published. The following is a list of manufacturers, dealers and repairers subsequently licensed by the Government of Orissa under the Orissa Weights and Measures (Enforcement) Act, 1958.

Manufacturers

Sl. No.	Name and Address of Manufacturer	Details of Articles Manufactured
(1)	B.C. Iron Foundry, Sultanganj, Agra	Cast Iron Weights
(2)	Krishna Iron Foundry, Free Ganj, Agra	Cast Iron Weights.

Dealers

Sl. No.	Name and Address of Dealers	Details of Articles Sold
(1)	Behari Mishra, Grand Road, Puri	Cast Iron Weights.
(2)	Dwarka Prasad Sharma, Lion's Gate, Puri	Cast Iron Weights.
(3)	Mishra & Partner, Ranihat, Cuttack	Cast Iron Weights.

Dealers (contd.)

Sl. No.	Name and Address of Dealer	Details of Articles Sold
(4)	Monilal Doshi, Mltigak Bazar, Balasore	Cast Iron Weights.
(5)	Muralidhar Gopikissen (P) Ltd., P.B. No. 8, Balasore	Cast Iron Weights.
(6)	R. Rath, Proprietor, Engineering Stores, Bejipur, Berham-pur.	Cast Iron Weights.

PUNJAB (5)

In the July and September 1959, March 1960 and May 1960 issues of 'Metric Measures' lists of licensed manufacturers, dealers and repairers of weights and measures in the 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.

Repairers

Sl. No.	Name and Address of Repairer	Details of Articles Repaired
(1)	Jagan Nath S/o Shri Sant Ram, Ambha Bhawan Road, Hoshiarpur.	Weights and Measures of length and capacity.
(2)	Puran Chand Sikander Pal, Karnal	Weights and Measures of length and capacity.
(3)	Ram Kishan Daya Nand, Jhajjar Road, Rohtak	Weights and Measures of length and capacity.

Dealers

Sl. No.	Name and Address of Dealer	Details of Articles Sold
(1)	Basant Rai Nathu Mal, Morinda Railway Road, Morinda.	Weights, Measures, Weighing and Measuring Instruments.
(2)	Bhag Chand Harbilas Rai, Iron Merchants, Goniana Mandi	Weights, Measures, Weighing and Measuring Instruments.

Dealers (contd.)

Sl. No.	Name and Address of Dealer	Details of Articles Sold
(3)	Haryana Co-operative Stores, Ltd., Sonapat, Dist. Rohtak	Weights, Measures, Weighing and Measuring Instruments.
(4)	Indian Weighing Machines, Hide Market, Amritsar	Plantform weighing machines upto 8 mds. capacity (loose weights).
(5)	Jesa Ram Vishan Narain, 37/22-D, Chandigarh	Weights, Measures, Weighing and Measuring Instruments.
(6)	Jainko Industries, Spatu Road, Ambala City	Spring balances dial type 100 kg Capacity.
(7)	Kastur Chand Suraj Bhan, Katra Nauhrian, Patiala	Weights, Measures, Weighing and Measuring Instruments.
(8)	National Tape Company, 188-Ikbal Ganj, Ludhiana	Measuring tapes.
(9)	Nathu Ram Singala, Iron Merchants, Goniana Mandi	Weights, Measures, Weighing and Measuring Instruments.
(10)	Rakha Ram Hira Lal, Iron Merchants, Jagraon	Weights, Measures, Weighing and Measuring Instruments.

RAJASTHAN (1)

Manufacturers

Sl. No.	Name and Address of Manufacturer	Details of Articles Manufactured
(1)	M. C. Bhargava, Kucheri Road, Ajmer	Weights, Measures and Weighing Instruments.
(2)	Calebs Scale Manufacturers & Repairers, Sardarpura, Near Panna Niwas, Jodhpur.	Counter Machines.
(3)	Chand Iron Foundry, Jaipur Road, Ajmer	Cast Iron Kilogram Weights.
(4)	Gopal Industries, Shahpura Mohalla, Beawar	Cast Iron Kilogram Weights.
(5)	Hassanali Alliji, Kapasanwale, Police Choki, Bora Wadi, Udaipur.	Capacity Measures.
(6)	Krishna Industries, Raghunath Bhawan, Ajmer	Weights, Measures and Weighing Instruments.
(7)	Mahesh Metal Works, Madanganj, Kishangarh	Capacity Measures.
(8)	Modern Scale Manufacturers & Repairers, Near Panna Niwas Jodhpur.	Counter Machines.
(9)	Mundra Metal Works (P) Ltd., Bikaner	Brass and Cast Iron Weights.

Manufacturers (contd.)

Sl. No.	Name and Address of Manufacturer	Details of Articles Manufactured
(10)	Om Prakash Gupta & Co., Rampura Bazar, Kotah	Length Measures.
(11)	Rajasthan Engineering Works, Amber	Weights.
(12)	Rajasthan Industries, Behind Power House, Jodhpur	Cast Iron kilogram Weights.
(13)	Rajasthan Truck Co. Srijiki Mori, Tripolia Bazar, Jaipur	Weights Measures and Weighing Instruments.
(14)	Ramesh Iron Foundry, Mal Godam Road, Bharatpur	Brass & Cast Iron kilogram Weights.
(15)	Shanuram Chandra Prakash, Adarsh Nagar, Jaipur	Bullion Brass Weights.
(16)	Swastic Iron & Metal Works, Bhim Gunj Mandi, Kotah	Bullion & Cast Iron & kilogram Weights.

Dealers

Sl. No.	Name and Address of Dealer	Details of Articles Sold
(1)	Abdul Salam Abdul Rehman, General Merchants, Opposite Srijiki Mori, Tripolia Bazar, Jaipur.	Weighing and Weighing Instruments.
(2)	Ahsan Hussan M. Abdul Hussain, Rampura Bazar, Kotah	Weights, Measures and Weighing Instruments.
(3)	Akbar Ali Taiyyabali, Mandikinal, Udaipur	Weights, Measures and Weighing Instruments.
(4)	Ali Mohd. & Co., Mochibazar, Girwa, Udaipur	Weights, Measures and Weighing Instruments.
(5)	Ali Mohd. Hussainji, Chabra (Kota) Rashoolji Mohd. Ali, Chabra Kotah.	Weights and Weighing Instruments.
(6)	Arhatmal & Sons, Mirchi Bazar, Jodhpur	Weights, Measurement Weighing Instruments.
(7)	Arora Crockery & Metal Co., Station Road, Jodhpur	Weights.
(8)	Asanand Jugal Kishore, Gopalji Ka Rasta, Jaipur	Weights & Weighing Instruments.
(9)	Badri Narain Omkarmal, Naya Bazar, Ajmer	Tape Measures.
(10)	Baldev Kani Ram, Tripolia Bazar, Jaipur	Weights, Measures and Weighing Instruments.
(11)	Bansilal & Sons, Tobacco Bazar, Jodhpur	Weights, Measures and Weighing Instruments.
(12)	Bhanamal & Co., Madanganj, Kishangarh, Ajmer	Weights, Measures and Weighing Instruments.
(13)	Bhanamal & Co. (P) Ltd., Tripolia Bazar, Jaipur	Weights, Measures and Weighing Instruments.

Dealers (contd.)

Sl. No.	Name and Address of Dealer	Details of Articles Sold
(14)	Chopra Bros. Tripolia, Jodhpur	Weights, Measures and Weighing Instruments.
(15)	Faiz Mohd. Khan, Chandi Ki Taksal, Jaipur	Weights and Weighing Instruments.
(16)	Gagandas & Sons, Darga Bazar, Ajmer	Weights and Weighing Instruments.
(17)	Gallula Lohiya, Opposite Nawab's Hawali, Tripolia Bazar, Jaipur.	Weights, Measures and Weighing Instruments.
(18)	Ganesh Das Samir Mal, Chandpole Bazar, Jaipur	Weights, Measures and Weighing Instruments.
(19)	Girdhari Lal Mangilal, Pali Bazar, Beawar	Weights, Measures and Weighing Instruments.
(20)	Gulab Bohara & Sons, Outside Hati pole, Udaipur	Weights, Measures and Weighing Instruments.
(21)	Haji Aabid Hussain, M. Nazirji Mandi Ki Nal, Dhanmandhi, Udaipur.	Weights, Measures and Weighing Instruments.
(22)	Hanuman Dass & Co., Vaido Ka Chowk, Bikaner	Weights, Measures and Weighing Instruments.
(23)	Hassan Bhai M. Rahmatullaji, Bhadur Bazar, Kotah	Weights, Measures and Weighing Instruments.
(24)	Her Pd. Gupta, Nataniyan Ka Rasta, Jaipur	Weights, Measures, and Weighing Instruments.
(25)	Hussain Ali Yoosafali, Fatehnagar, Tehsil Mavli, Udaipur	Weights, Measures and Weighing Instruments.
(26)	Isaji Aliji, Clock Tower, Udaipur	Weights, Measures and Weighing Instruments.
(27)	Ismail Hassanji, Sangod, Kotah	Weights.
(28)	Jamuna Lal Shankarlal Loheya, Tripolia Bazar, Jaipur	Weights, Measures and Weighing Instruments.
(29)	Jamuna Metal Works, Chandi Ki Taksal, Jaipur	Weights.
(30)	Jeevanali Gulam Hussain, inside Surajpore, Udaipur	Weights, Measures and Weighing Instruments.
(31)	Kalyan Tin Factory, Iron Merchants, Cinema Road, Ajmer	Weights, Measures and Weighing Instruments.
(32)	Khatri Gangaram Mancharam, Kandoi Bazar, Jodhpur	Weights.
(33)	Kewalram Govindram, Sabjimandi Road, Kotah	Weights, Measures and Weighing Instruments.
(34)	Ladu Ram Ram Niwas, Naya Bazar, Ajmer	Tape Measures.
(35)	Lal Chand Tirathdas Kapoor, Naya Bazar, Ajmer	Weights, Measures and Weighing Instruments.
(36)	Madan Mohan Laxmi Kant, Loha Street, Beawar	Weights, Measures and Weighing Instruments.

Dealers (contd.)

Sl. No.	Name and Address of Dealer	Details of Articles Sold
(37)	Madanlal Laxmilal, Sadar Bazar, Vijai Nagar, Ajmer	Weights, Measures and Weighing Instruments.
(38)	Mangaldas Wadhmal, Srinagar Road, Ajmer	Weights, Measures and Weighing Instruments.
(39)	Manpasand, Ghana Kothi, Bastiyan Ka Bas, Shahpura, Jodhpur.	Weights, Measures and Weighing Instruments.
(40)	Malwa Iron stores, Naya Bazar, Ajmer	Weights and Weighing Instruments.
(41)	Mohd. Ali & Co., Chabrha, Kotah	Weights and Weighing Instruments.
(42)	Mohd. Bux & Sons, Ghas Mandi, Jodhpur	Weights and Weighing Instruments.
(43)	Mohd. Ismail, Lohar Mohalla, Beawar	Weights, Measures and Weighing Instruments.
(44)	M.K.M. Mussa Bhai, Bhadur Bazar, Kotah	Weights and Weighing Instruments.
(45)	Narain Das Mangaldas, Ladpura, Kotah	Weights, Measures and Weighing Instruments.
(46)	Narsingdas Mitthaldas, Tripolia Bazar, Jaipur	Weights, Measures and Weighing Instruments.
(47)	Nathmal Madan Gopal, Naya Bazar, Ajmer	Weights, Measures and Weighing Instruments.
(48)	Om Prakash & Co., Rampura Bazar, Kotah	Weights, Measures and Weighing Instruments.
(49)	Poonam Chand, Proprietor M/s. Man Mohan Raj Kunj, Tripolia, Jodhpur	Weights, Measures and Weighing Instruments.
(50)	Prakash Distributors & Co., K.E.M. Road, Bikaner	Weights and Weighing Instruments.
(51)	Prahladass Mohanlal, Tripolia Bazar, Jaipur	Weights.
(52)	Prathviraj Mathur, Khatriyon Ki Kothi, Girdhi Kot, Jodhpur	Weights and Counter Machines.
(53)	Prem Sukhdas Ram Deo Khatri, New Circular Market, Bikaner.	Weights, Measures and Weighing Instruments.
(54)	Quadarji Rasiaji Clock Tower, Udaipur	Weights, Measures and Weighing Instruments.
(55)	Rajabali Daoodji & Sons, Clock Tower, Udaipur	Weights, Measures and Weighing Instruments.
(56)	Rajabali Quadar Ji, Nathdwara, Udaipur	Weights, Measures and Weighing Instruments.
(57)	Rajasthan Trunk Co., Sriji Ki Mori, Jaipur	Weights, Measures and Weighing Instruments.
(58)	Rashoolji Mohd. Ali, Chabra, Kotah	Weights and Weighing Instruments.
(59)	Roop Chand Buddalal, Rampura Bazar, Kotah	Weights, Measures and Weighing Instruments.
(60)	Sadique Bhai Ahmed Bhai, Tobacco Bazar, Jodhpur	Weights, Measures and Weighing Instruments.

Dealers (contd.)

Sl. No.	Name and Address of Dealer	Details of Articles Sold
(61)	Sardar Ram Singh, Sanghi Building, Naya Pura, Kotah	Weights, Measures and Weighing Instruments.
(62)	Shib Chand Arora & Sons, K.E.M. Road, Bikaner ..	Weights, Measures and Weighing Instruments.
(63)	Shiv Ram c/o Sukh Deo, Iron and Hardware Syndicate, Govind Rajaji Ka Rasta, Jaipur.	Weights.
(64)	Sindh Hardware and Iron Merchant, Naya Bazar, Ajmer	Weights, Measures and Weighing Instruments.
(65)	Sunder Das Kanhyalal, Katla Bazar, Jodhpur	Weights, Measures and Weighing Instruments.
(66)	Surajmal Chaganlal, Dhanji Road, Bikaner	Weights, Measures and Weighing Instruments.
(67)	Vijai Kumar Varma c/o Shri Gayatri Petrol House, Pushkar	Weights, Measures and Weighing Instruments.
(68)	Vishamber Dyal Badri Pd., Sansar Villa, M.I. Road, Jaipur	Weights, Measures and Weighing Instruments.
(69)	Vyas Bros. K.E.M. Road, Bikaner	Weights, Measures and Weighing Instruments.

Repairers

Sl. No.	Name and Address of Repairers	Details of Articles Repaired
(1)	Abdul Rehman Mistri, Teh Girwa, Udaipur	Weights, Measures and Weighing Instruments.
(2)	Advin Johnson, House No. 182 A, Christian Colony, Anasagar, Ajmer.	Weights, Measures and Weighing Instruments.
(3)	Calebs Scale Manufacturers & Repairers, Sardar Pura, Jodhpur.	Weights and Weighing Instruments.
(4)	Faiz Mohd. Khan, Chandi Ki Taksal, Jaipur	Weights, Measures and Weighing Instruments.
(5)	Jamna Metal Works, Chandi Ki Taksal, Jaipur	Weights, Measures and Weighing Instruments.
(6)	Kistoorji Dhanji, Laxmi Mills, Chawl, Beawar	Weights, Measures and Weighing Instruments.
(7)	Krishna Industries, Raghunath Bhavan, Ajmer	Weights, Measures and Weighing Instruments.
(8)	Man Pasand, Ghana Kothi, Bhishtiyon Ka Bas, Shahpura, Jodhpur.	Weights, Measures and Weighing Instruments.
(9)	Mangaldas Vadumal, Srinagar,	Weights, Measures and Weighing Instruments.
(10)	Modern Scale Manufacturer & Repairers, Near Panna Niwas, Jodhpur.	Weights and Weighing Instruments.

Repairers (contd.)

Sl. No.	Name and Address of Repairers	Details of Articles Repaired
(11)	Mohd. Ismail, Loharon Ka Mohalla, Beawar	Weights, Measures and Weighing Instruments.
(12)	Mundra Metal Works (P) Ltd., Bikaner	Weights, Measures and Weighing Instruments.
(13)	Narain Das Mangaldass, Ladpura, Kotah	Weights, Measures and Weighing and Measuring Instruments.
(14)	Rajah Ali Ibraheem Ji, Rampura Bazar, Kotah	Weights, Measures and Weighing and Measuring Instruments.
(15)	Rajasthan Trunk Co. Sriji Ki Mori, Tripolia Bazar, Jaipur	Weights, Measures and Weighing and Measuring Instruments.
(16)	Saffuddin Balbir Ali, Hathipole, Udaipur	Weights, Measures and Weighing and Measuring Instruments.
(17)	Shankarlal, New Well, Bikaner	Weights, Measures and Weighing and Measuring Instruments.

UTTAR PRADESH (1)

Manufacturers

Sl. No.	Name and Address of Manufacturer	Details of Articles Manufactured
(1)	Agra Steel & Iron Foundry, Jawaharnagar, Agra	Metric Weights of Brass & Bronze and Cast Iron of all denominations.
(2)	Bansal Iron Foundry, Belanganj, Agra	All kinds of Cast Iron & Brass Metric Weights.
(3)	Devi Sahai Gopal Dass, Iron Foundry, Chhippitola, Agra	Full set of Cast Iron Metric Weights.
(4)	District Cooperative Federation Ltd., Nehru Road, Meerut	Full sets of Cast Iron and Brass Weights.
(5)	Gulabchand Chhotay Lal, Freeganj, Agra	Cast Iron and Brass Commercial Metric Weights of different denominations.
(6)	Indian Casting Co., near Billochpura Railway Station, Agra	Cast Iron Metric Weights.
(7)	Indian Iron Foundry, Sultan Ganj, Agra	Cast Iron Metric Weights.
(8)	Jagdamba Iron Foundry, Pathwari, Belanganj, Agra ..	Cast Iron Metric Weights.
(9)	Kashi Iron Foundry, Freeganj Road, Agra	Cast Iron Metric Weights.
(10)	Krishna Iron Foundry, Freeganj, Agra	Cast Iron Metric Weights.

Manufacturers (contd.)

Sl. No.	Name and Address of Manufacturer	Details of Articles Manufactured
(11)	Mallo Mal Ram Prasad, 1105, Lane Gaushala, Agra ..	Metric Weights of Cast Iron and Brass.
(12)	Narain Singh Babu Lal, Iron Foundry, Behind Loha Mandi, Agra.	Cast Iron Metric Weights.
(13)	Nav Prabhat Engineering Works, Maina Gate, Pathwari, Agra.	Metric Weights of Brass, Bronze and Cast Iron of all denominations.
(14)	Prakash Engineering Co. & Rolling Mills, Freeganj, Agra ..	Full set of Metric Weights.
(15)	Prabhat Iron Foundry, Freeganj, Agra	Cast Iron Metric Weights of all denominations.
(16)	Panchool Gopal Karmokar and Bros., Badshahi Naka, Kanpur.	Metric Weights of Cast Iron and Brass Weights, Weighing and Measuring Instruments.
(17)	Rajendra Sanitary Filling, Agra	Metric Bullion Weights.
(18)	S.K. Iron Foundry & Engineering Co., Rambagh, Agra ..	Full set of Cast Metric Weights.
(19)	Standard Steel & Iron Foundry, Jevni Mandi, Agra ..	Cast Iron Metric Weights of all denominations.
(20)	Standard Engineering Corporation, Belanganj, Agra ..	Metric Weights and Measures of Cast Iron, Brass and Bronze.
(21)	Society Iron Industries, Kalianpur, Kanpur	Metric Weights of Cast Iron and Brass Weights, Weighing and Measuring Instruments.
(22)	U.P. Iron Foundry, Belanganj, Agra	Metric Weights of Brass and Bronze and Cast Iron of all denominations.

Dealers

Sl. No.	Name and Address of Dealer	Details of Articles Sold
(1)	Panchoo Gopal Karmokar and Bros., Badshahi Naka, Kanpur.	Weights, Measures and Weighing and Measuring Instruments.
(2)	Society Iron Industries Office, 59/51A, Birhana Road, Kanpur	Weights, Measures and Weighing and Measuring Instruments.

Repairers

Sl. No.	Name and Address of Repairer	Details of Articles Repaired
(1)	Panchoo Gopal Karmokar & Bros., Badshahi Naka, Kanpur.	Repairing of Weights and Weighing Instruments.

WEST BENGAL (2)

In the March 1960 issue of *Metric Measures* a list of licensed manufacturers, and repairers of weights and measures in West Bengal State was published. The following is a list of manufacturers, dealers and repairers subsequently licensed by the Government of West Bengal under the West Bengal Weights and Measures (Enforcement) Act 1958.

Manufacturers

Sl. No.	Name and Address of Manufacturer	Details of Articles Manufactured
(1)	K.P. Dass & Co. (P) Ltd., 43, Circular Road, Howrah (Office & Factory).	Weights.
(2)	Eastern Scientific Works, 98, Ram Dhang Road, Salkia, Howrah (Office & Factory).	Precision & other Balances.
(3)	Ganga Iron Works (P) Ltd., 58, Clive Street, Calcutta, (Office) & 94 'O' Road, Belgachia, P.O. Dasnagar, Howrah (Factory).	Cast Iron Weights.
(4)	Kundu Sett & Co., P.O. Santragachi, P Ramrajatola, Howrah (Office & Factory).	Cast Iron Weights.
(5)	Scientia Industries (India) (P) Ltd. 34, Banerjee Bagan Lane, Salkia, Howrah (Office & Factory).	Precision Balances, Beam Scales—Class 'A' & 'B' Counter Scales, Brass weights & Sheet metal weights.

Dealers

Sl. No.	Name and Address of Dealer	Details of Articles Sold
(1)	Bengal Chemical & Pharmaceutical Works Ltd., 6, Ganesh Avenue, Calcutta-13, (Office) & 164, Manicktala Main Road, Calcutta-11 (Factory).	Precision Balances and Metallic Volume Measures & Other balances.
(2)	Das Brothers, 57, Clive Street, (New No. 167, Netaji Subhas Road), First Floor, Room No. 75, Calcutta-7.	Cast Iron Weights.
(3)	Dhirendra Nath Ghosh, 58, Clive Street, Calcutta	Beam Scales & Cast Iron Weights.
(4)	Girish Chandra Ghosh, 58, Clive Street, Calcutta-7	Weights, Beam Scales & Counter Scales.
(5)	"Jatindranath Ghosh, 58, Clive Street, Calcutta-7 (Office & Factory).	Beam Scales & Cast Iron Weights.
(6)	Lauha Bipani, 161, Netaji Subhas Road (Old 58, Clive Street), Calcutta-7.	Cast Iron Weights.
(7)	Nagendranath Karmakar, S/o Uooma Ch Karmakar, 208, Mahatma Gandhi Road, Calcutta-7, (Office) & 16 & 17, Narkeldanga Main Road, Calcutta-21 (Factory).	Beam Scales, Counter Scales and Weights.
(8)	Narendranath Chowdhury & Co., 161, Netaji Subhas Road, (Old 58, Clive Street), Calcutta-7	Cast Iron and Brass Weights & Beam Scales.
(9)	Novelty Hardware Stores, 2, Moharshi Debendra Road, Calcutta-7.	Beam Scales & Cast Iron Weights.

ers

Name and Address of Repairer	Details of Articles Repaired
lagendra Nath Karmakar, S/o Uooma Charan Karmakar, 16 & 17, Narkeldanga Main Road, Calcutta-7 (Office & Factory).	Beam Scales, Counter Scales & Brass & Cast Iron Weights.
lew Bengal Scale Co., 48, Fakir Chand Ghosh Lane, (Cir- cular Road) Howrah, (Office & Factory).	Weighing Instruments.

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will be supplied in an
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P. 723 P. 719

metric measures

(JOURNAL OF WEIGHTS AND MEASURES)
STANDING METRIC COMMITTEE
MINISTRY OF COMMERCE AND INDUSTRY

Vol. 3 SEPTEMBER 1960 (BHADRA 1882) No. 5

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Cover design by R. Sarangan

Annual Subscription Rs. 2.00

Single Copy 40 nP

SIMPLE CONVERSION TABLES

I. WEIGHTS

Tons to Metric Tonnes
Tons
Metric Tonnes

1	2	3	4	5	6	7	8	9	10
1.02	2.03	3.05	4.06	5.08	6.10	7.11	8.13	9.14	10.16

Pounds(av) to Kilograms
Pounds
Kilograms

1	2	3	4	5	6	7	8	9	10
0.45	0.91	1.36	1.81	2.27	2.72	3.18	3.63	4.08	4.54

Tolas to Grams
Tolas
Grams

1	2	3	4	5	6	7	8	9	10
11.66	23.33	34.99	46.66	58.32	69.98	81.65	93.31	104.97	116.64

Seers to Kilograms
Seers
Kilograms

1	2	3	4	5	6	7	8	9	10
0.93	1.87	2.80	3.73	4.67	5.60	6.53	7.46	8.40	9.33

Maunds to Quintals
Maunds
Quintals

1	2	3	4	5	6	7	8	9	10
0.37	0.75	1.12	1.49	1.87	2.24	2.61	2.99	3.36	3.73

II. LENGTH

Miles to Kilometres
Miles
Kilometres

1	2	3	4	5	6	7	8	9	10
1.61	3.22	4.83	6.44	8.05	9.66	11.27	12.87	14.48	16.09

Yards to Metres
Yards
Metres

1	2	3	4	5	6	7	8	9	10
0.91	1.83	2.74	3.66	4.57	5.49	6.40	7.32	8.23	9.14

Inches to Millimetres
Inches
Millimetres

1	2	3	4	5	6	7	8	9	10	11	12
25.40	50.80	76.20	101.60	127.00	152.40	177.80	203.20	228.60	254.00	279.40	304.80

III. AREA

Acres to Hectares
Acres
Hectares

1	2	3	4	5	6	7	8	9	10
0.40	0.81	1.21	1.62	2.02	2.43	2.83	3.24	3.64	4.05

Square Yards to Square Metres
Square Yards
Square Metres

1	2	3	4	5	6	7	8	9	10
0.84	1.67	2.51	3.34	4.18	5.02	5.85	6.69	7.53	8.36

V. CAPACITY
Gallons (Imperial) to Litres
Gallons
Litres

1	2	3	4	5	6	7	8	9	10
4.55	9.09	13.64	18.18	22.73	27.28	31.82	36.37	40.91	45.46

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CONVERSION TABLES OF PRICES FOR WEIGHTS

TABLE A

(Factor used : 1 kg. = 2.20462 lb)
Rupees per lb to Rupees per kg.

Rs./lb.	0	1	2	3	4	5	6	7	8	9
	Rs/kg	Rs/kg	Rs/kg	Rs/kg	Rs/kg	Rs/kg	Rs/kg	Rs/kg	Rs/kg	Rs/kg
0	0	2.20	4.41	6.61	8.82	11.02	13.23	15.43	17.64	19.84
10	22.05	24.25	26.46	28.66	30.86	33.07	35.27	37.48	39.68	41.89
20	44.09	46.30	48.50	50.71	52.91	55.12	57.32	59.52	61.73	63.93
30	66.14	68.34	70.55	72.75	74.96	77.16	79.37	81.57	83.78	85.98
40	88.18	90.39	92.59	94.80	97.00	99.21	101.41	103.62	105.82	108.03
50	110.23	..	..	..	..	..	..	..	..	..

TABLE B

(Factor used : 1 kg = 2.20462 lb)
Naye Paise per lb to Rupees & nP. per kg.

nP/lb.	0	1	2	3	4	5	6	7	8	9
	Rs/kg	Rs/kg	Rs/kg	Rs/kg	Rs/kg	Rs/kg	Rs/kg	Rs/kg	Rs/kg	Rs/kg
0	0	0.02	0.04	0.07	0.09	0.11	0.13	0.15	0.18	0.20
10	0.22	0.24	0.26	0.29	0.31	0.33	0.35	0.37	0.40	0.42
20	0.44	0.46	0.49	0.51	0.53	0.55	0.57	0.60	0.62	0.64
30	0.66	0.68	0.71	0.73	0.75	0.77	0.79	0.82	0.84	0.86
40	0.88	0.90	0.93	0.95	0.97	0.99	1.01	1.04	1.06	1.08
50	1.10	1.12	1.15	1.17	1.19	1.21	1.23	1.26	1.28	1.30
60	1.32	1.34	1.37	1.39	1.41	1.43	1.46	1.48	1.50	1.52
70	1.54	1.57	1.59	1.61	1.63	1.65	1.68	1.70	1.72	1.74
80	1.76	1.79	1.81	1.83	1.85	1.87	1.90	1.92	1.94	1.96
90	1.98	2.01	2.03	2.05	2.07	2.09	2.12	2.14	2.16	2.18
100	2.20	..	..	..	..	..	..	..	..	..

Published by the Director, Publications Division, Ministry of Information and Broadcasting, Delhi and
printed by the Manager, Government of India Press, Faridabad
RN 977/58.

P. 723

P. 719

SEPTEMBER 1960

NO. 5



JOURNAL OF WEIGHTS AND MEASURES

40 NAYE PAISE

metric measures

METRIC MEASURES is published every two months.

METRIC MEASURES provides information to the general public on the administrative, commercial, educational, industrial, historical and other aspects of weights and measures, with particular reference to the introduction of the metric system in India.

Contributions for publication should be sent to the Editor, METRIC MEASURES, Standing Metric Committee, Ministry of Commerce & Industry, Udyog Bhavan, New Delhi.

Enquiries regarding subscriptions and supply of copies should be addressed to the Business Manager, Publications Division, Ministry of Information and Broadcasting, Old Secretariat, Delhi-8.

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Public Preparation for Change-over

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THE first of October 1960 will be a landmark in the introduction of metric weights and measures in India. The use of metric weights will become compulsory on that day in certain notified areas, industries and trades and regulated markets all over the country. The notified areas would comprise over 10 percent of the total area of the country. The industries and trades would include practically all the organized industries and trades. The effect of the change-over to metric weights would thus be felt by a substantial portion of the country's population.

No Dearth of Weights

Every possible step has been taken to make the change-over smooth and effective. The necessary laws have been enacted. Organizations for the effective enforcement of weights and measures have been set up in the States and Union Territories. Even Tripura and Manipur, places which are remote and accessible with difficulty, are prepared for the compulsory enforcement from 1-10-1960.

Adequate number of manufacturers, dealers and repairers of weights and measures have been licensed by the States and Union Territories. In fact some 300 manufacturers, over 1,000 dealers and some 200 repairers have already been licensed. The total capa-

city of the licensed manufacturers is so large that there should be no shortage of weights if the purchase of weights is discreetly spread over a few months. To achieve this, Controllers of Weights and Measures in the States and Union Territories have already approached organized wholesale dealers in the notified areas and prevailed upon them to purchase metric weights. The retail dealers have been persuaded to follow suit. Efforts have been intensified to ensure that all traders in the areas have acquired metric weights well in advance of 1 October 1960.

From about the middle of 1958, an extensive publicity campaign is being carried out in urban and rural areas through documentary films, seminars, newspaper advertisements, posters, pamphlets, magazines, wide distribution of conversion tables, demonstrations of the use of weights in community development blocks, melas, exhibitions and markets. The rural, children's and women's programmes of the various stations of All India Radio have also been imparting information about the metric system. At meetings of Panchayats in villages, the metric system is explained. From about the beginning of April of this year, this publicity programme has been intensified.

Hand-bills and slides emphasizing the compulsory nature of the change-over in the specified areas from 1-10-1960 are being brought

out in the principal regional languages and distributed extensively. Press notes and advertisements stressing the extent of the switch-over are also being issued in the newspapers in the States. It is expected that this programme of publicity coupled with that undertaken by associations of trades would make it easy for the public to get ready for the change-over on the 1st of October 1960.

Early Change-over Beneficial

In certain areas, traders have wisely started using metric weights without waiting for 1 October 1960 when it becomes compulsory by law. Instances of such change-over are the wholesale foodgrain and kirana dealers in Delhi and Poona, a number of co-operative stores and the meat trade in Madras, coal dealers in Ajmer and Fair Price Shops in some cities. It is expected that more and more markets would take to the use of metric weights as the 'D-day' approaches. Traders have been supplied with tables for converting prices of commodities from old units to metric units. Thus, so far as traders are concerned, they have generally been getting ready for the change-over.

Public to Prepare for Change-over

It is now necessary that the general public should prepare itself for the change-over. It has been the experience in many cities that when traders started weighing out commodities in metric weights, customers expressed preference for the old weights. This resistance to new weights on the part of the public is only natural, but is being slowly overcome. In any case after September 1960, the people in the notified areas would have to make their purchases in terms of metric weights. It would be illegal to carry on transactions in terms of old weights. The seller would expose himself to legal action if he does so. The

people should, therefore, get acquainted with the new weights in terms of the old so that they could adjust their requirements of provisions and other stores according to new weights.

Avoiding Confusion

If people are to get acquainted with the new weights by 1 October, it is necessary that some of the important trades which satisfy their daily needs should start using these weights well before that date. The earlier this is done, the less will be the confusion on 'D-day' and the more smooth and orderly the change-over. Some people and traders are known to be averse to a change-over earlier than October 1960 because they have somehow the impression that the Government will postpone the compulsory introduction of the new metric weights. There is no basis for any such impression. The difficulties of transition are not going to be solved by postponement, which would only create confusion and uncertainty about Government's intention in the public mind. The 'D-day' will be the 1st of October 1960 and *there will be no postponement.*

The traders would be well advised, therefore, to buy metric weights well before October 1960 when there would inevitably be a run on the available stocks of these weights. It would also be in their own interests to exhibit these weights in their shops and begin using them in transactions early, so that their customers may become familiar with them. Tables for converting weights, or prices from the present units to metric units, have been produced by Government and copies may be had from the Controllers of Weights and Measures or Directors of Publicity. Controllers will also give the trading community advice and all possible assistance in meeting their difficulties.

Getting Ready for Change-over

WITH the approach of 1 October 1960, the day fixed for the compulsory adoption of metric weights in trade and commerce in a number of areas and industries, the traders and the general public have been getting ready for the change-over. At this stage, even at the cost of repetition, certain fundamental information needs to be presented for ready reference. In this article, an attempt is made to fulfil this need, to the extent possible.

Areas and Industries Covered

It will be recollected that some two years back certain areas and industries were allowed to use old and new metric weights side by side for two years. This period of simultaneous use would end on 1 October 1960 and then would begin the legal compulsion to use only metric weights. It is, therefore, desirable to review now the areas, Government Departments and industries that have to go over to metric weights (and also measures in certain cases). A list of these is given in three parts in Appendix 1 to this article. In these areas use of the old weights would become illegal. The general and trading public in and around and trading with these areas and those who work in or have dealings with the notified industries should note that transactions would have to be entered into using metric weights. An article 'Significance of October 1960' about the meaning of the change-over in areas and industries was published on page 3 of the July 1960 issue of *Metric Measures*.

The implications should be closely noted by those concerned.

It should be mentioned here that even before October 1960, certain industries and Government and private undertakings have already changed over to the use of metric weights and measures. Examples are the Railways which changed over in their Commercial Departments to the use of metric weights and measures from 1 April 1960. The petroleum industry also has changed over in the distribution of its products. The jute industry has changed over for the purchase of raw jute and sale of manufactured jute from 1 July 1960.

In order to make the change really effective, it is necessary that sufficient sets of weights should be made available to traders. A large number of manufacturers have been licensed to produce various types of metric weights required for day-to-day use. Some of the manufacturers have taken up the work vigorously and have large stocks of stamped weights ready for delivery at short notice. In order that too large a stock should not lie idle with the manufacturers and hamper production, steps have been taken to ensure that the wholesale and retail traders purchase sets of weights well in advance of October 1960. As a result there should be a continuous flow of weights from the foundries and workshops to the traders.

It may be mentioned that traders who put off purchase of weights till the last moment

may be doing some harm to their own business through confusion and customers' criticism. The traders and general public should together get acquainted with the new weights without delay.

Units for Wholesale and Retail Trade

One of the steps in any transaction is to determine the price of a commodity in terms of a recognized unit. For example, we now use the seer for retail sale of rice, but the maund for wholesale. In India hundreds of such units are in vogue in different parts of the country and through the manipulation of their contents the general public is often hoodwinked about actuality. The great merit of the metric system is that it would unify the practices by making only one well-defined unit applicable for the entire trade in a commodity all over India. For example, salt would be quoted in retail by the kilogram all over India not in terms of locally used weights. A list of metric units for pricing recommended by the Ministry of Commerce and Industry for wholesale and retail trades all over India was published in *Metric Measures*, March 1960 issue. For ready reference these are reproduced separately in 2 parts in Appendix 2 to this article. The list does not and cannot cover each and every commodity. The general principles on which the units for wholesale and retail pricing have been derived may, however, serve as a guide for selecting the correct unit for commodities not covered. The principles are :

Weights

- (1) In place of the tola, use the gram (g).
- (2) In place of the seer, pound, rathal, rattal, viss etc., use the kilogram (kg).
- (3) In place of the maund, hundredweight, palla, khandi, 500 lb, 100 lb, 56 lb, candy, etc., use the quintal (q). The quintal is equal to 100 kg.
- (4) In place of the long or short ton, use the metric tonne (t). The tonne is 1,000 kg.

Length Measures

- (5) In place of the inch, use the centimetre (cm).
- (6) In place of the foot and yard, use the metre (m).
- (7) In place of the mile, use the kilometre (km).

Square Measures

- (8) In place of square inch, use the square centimetre (cm²).
- (9) In place of the square foot or square yard, use the square metre (m²).

Cubic Measures

- (10) In place of the cubic inch, use the cubic centimetre (cm³).
- (11) In place of the cubic foot and the cubic yard, use the cubic metre (m³).

Capacity Measures

- (12) In place of the seer, gallon, padi, edangali, etc., use the litre (l).

Price Conversions

The conversion of existing prices of various commodities in terms of metric units is another important problem. Having selected the new metric units, the prices have to be fixed in the new units in such a manner that there is neither reduction nor enhancement merely on account of their conversion from the old to the new system. If prices change due to other factors, that is not the fault of the metric system. To facilitate the purchaser's work, price conversion tables in terms of the more common units of trade are necessary. *Metric Measures* has been publishing price conversion tables from Rupees and naye Paise per seer and pound to Rupees and naye Paise per kilogram in earlier issues. In Appendix 3, besides these two tables, those for price conversion from maund and hundredweight to quintal (100 kg) are also given. These two tables would be required very often by the wholesale trade.

Special tables giving conversions of prices of gold from the tola basis to the one gram basis and for silver from the 100 tola basis to the one kilogram basis have also been included in Appendix 3. These tables are

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now being used by the Bombay Bullion Association. It should be noted that the Association is using one gram as the unit for gold and not ten grams.

In using these conversion tables, one important limitation should be constantly remembered. These are for ordinary transactions and not for extremely large transactions where even the difference of a 0.1 nP would make a large difference in the ultimate payment. For such transactions other more accurate tables or conversion factors should be used.

The tables are a help to develop familiarity with the new metric units. It is likely that the converted value may work out to an odd figure. For example, a commodity selling at Re. 1.00 per seer would be selling at Rs. 1.07 per kilogram and this metric price is a little awkward to use. Such inconveniences would have to be borne in the beginning. As soon as people can work out their requirements in metric terms, the pricing also would settle down to rational decimal coinage. Once the great advantage of decimal coinage and metric units in pricing is realized, the process of rationalized pricing would be expedited. But in the ultimate analysis that depends on the trade and the people.

Packaging

Another question of prime importance concerns packaging. From October it would be legally required that all packages sold by weight or measure should have their net contents marked on them.

For packing it would normally be a great advantage in making up, weighing and mar-

keting commodities if the contents of packages could proceed in the same steps as standard commercial weights and measures. For commodities sold by weight the contents could be selected from the denominations of weights which run in the 5, 2, 1 series as follows : 50 kg, 20 kg, 10 kg, 5 kg, 2 kg, 1 kg, 500 g, 200 g, 100 g, and so on to 1 mg. In cases where containers have been standardized, they should be used.

Blind conversion of old weights to metric weights in packages can only result in confusion. Tins are today available in the market marked '227 grams' or '228 ml'. These descriptions would be incomprehensible even to the packer himself, but he would still insist on giving them because 227 grams is 1/2 lb, and 228 ml is 8 fl. oz. This metric description is as intelligible as one showing that a package contains, 1 lb, 2 oz, 1 dram and 10 grains or 2.386 lb of material.

Unless packers change over to rational metric packages of the type suggested above or now standardized, they cannot be said to have really changed over to metric weights and measures.

No Extension of Transition Period

It is hoped that the information collected for ready reference in this article would be useful in the change-over. It should be remembered that metric weights would have to be used compulsorily from 1 October 1960 in the specified areas and industries. *There is no question of extension.* The earlier everybody prepares for the change, the easier will be the transition from the old confusion to the new uniformity and facility.

APPENDIX 2

Part 1

Metric Pricing Units for Wholesale Transactions

Serial No.	Commodity	Metric Unit
(1) Gold		1 gram (g)
(2) Grocery	Cardamoms, pickles and jams, dry mangoes.	1 kilogram (kg)
Confectionery	Biscuits, sweets.	
Textile & Textile Fibres	Cotton yarn, damaged and seconds cloth (fents, rags, chindies etc.), raw silk, rayon, silk yarn, raw wool, wool manufactures (when sold by weight).	
Paints & Chemicals	Paints (if sold by weight), indigo, liquid chlorine.	
Hides, Skins & Leather	Raw hides, leather (hides and skins).	
Metals	Silver, aluminium sheets, strips and circles, copper and brass wire and utensils.	
Miscellaneous	Tea, meat, camphor tablets, senna leaves, mica.	
(3) Grains and Pulses	Rice, wheat, bajra, jowar, arhar, moong, masur, gram.	
Spices	Black pepper, mustard, chillies, cloves, dhania, dalcchini, malethi, turmeric, betelnuts, dry ginger.	
Plantation Products	Coffee, rubber, cashewnuts, cashew kernels, tobacco (raw and manufactured).	
Forest Products	Lac and lac products, gum benjamin and gum arabic, myrobalans, galnuts, soapnuts, avaram bark, konnam bark.	1 quintal (q) (100 kilograms)
Textile & Textile Fibres	Raw cotton, raw jute, raw hemp, coir yarn.	
Oils, Oilseeds & Oilcakes	Vegetable oils like groundnut, linseed, castor, gingelly, mustard, coconut, etc. oilseeds like groundnut, gingelly, rapeseed, copra etc. groundnut cake, castor cake, sesamum cake, coconut cake.	
Non-Ferrous Metals	Aluminium: ingots, bars, blocks, slabs, billets.	
	Lead: ingots, sheets and strips.	
	Copper: Ingots, blooms, slabs, cakes, tiles, bricks, billets, blisterbars and wirebars, rods, sections and pipes, plates, sheets and strips, circles.	

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Serial No.	Commodity	Metric Unit
	Brass: ingots, rods, sections, pipes, sheets, strips, circles.	1 quintal (q) (100 kilograms)
	Zinc: ingots, sheets, strips.	
	Tin: blocks.	
Chemicals	Caustic soda, bleaching powder, glycerine, soaps, paper, salt.	
Others	Sugar, gur, ice, fish, sugarcane, vegetables, tamarind etc.	
(4) Minerals	Iron ore, manganese ore, bauxite, coal.	one metric tonne (t) (1,000 kilograms)
Iron & Steel	Pig iron and iron & steel manufactures, semis (billets for rerolling etc.).	1 metre (m)
(5) Cotton cloth (mill and handloom), silk and rayon manufactures, woollen cloth		one square metre (m ²)
(6) Jute carpets, coir mats and mattings, sheet glass etc.		one cubic metre (m ³)
(7) Timber.		one litre (l)
(8) Paints (when sold by measure), spirits.		

Part 2

Metric Pricing Units for Retail Trade

Serial No.	Commodity	Metric Unit for Use
(1) Foodgrains, cereals, pulses, spices, ghee, bread, vegetables, meat, fish, sweetmeats, tea, coffee, sugar, salt etc.		1 kg
(2) Oil for cooking		1 kg or 1 litre depending upon prevalent practice.
(3) Fruits		1 kg or number depending upon prevalent practice.
(4) Milk		1 litre
(5) Cloth and related materials		1 metre
(6) Prepackaged materials		Preferably in packages of sizes corresponding to the prescribed commercial weights and measures.

APPENDIX 3

Part 1

Conversion of Prices from Seer to Kilogram (kg)

TABLE A

(Factor used : 1 kg = 1.0717 seers)

Naye Paise per seer to Naye Paise per kg

nP/Seer	0	1	2	3	4	5	6	7	8	9
	nP/kg	nP/kg	nP/kg	nP/kg	nP/kg	nP/kg	nP/kg	nP/kg	nP/kg	nP/kg
0	0	1	2	3	4	5	6	8	9	10
10	11	12	13	14	15	16	17	18	19	20
20	21	23	24	25	26	27	28	29	30	31
30	32	33	34	35	36	38	39	40	41	42
40	43	44	45	46	47	48	49	50	51	53
50	54	55	56	57	58	59	60	61	62	63
60	64	65	66	68	69	70	71	72	73	74
70	75	76	77	78	79	80	81	83	84	85
80	86	87	88	89	90	91	92	93	94	95
90	96	98	99	100	101	102	103	104	105	106
100	107	..	..	..	..	..	..	..	..	..

TABLE B

(Factor used : 1 kg = 1.0717 seers)

Rupees per seer to Rupees and Naye Paise per kg

Rs/Seer	0	1	2	3	4	5	6	7	8	9
	Rs/kg	Rs/kg	Rs/kg	Rs/kg	Rs/kg	Rs/kg	Rs/kg	Rs/kg	Rs/kg	Rs/kg
0	0	1.07	2.14	3.22	4.29	5.36	6.43	7.50	8.57	9.65
10	10.72	11.79	12.86	13.93	15.00	16.08	17.15	18.22	19.29	20.36
20	21.43	22.51	23.58	24.65	25.72	26.79	27.86	28.94	30.01	31.08
30	32.15	33.22	34.29	35.37	36.44	37.51	38.58	39.65	40.72	41.80
40	42.87	43.94	45.01	46.08	47.15	48.23	49.30	50.37	51.44	52.51
50	53.58	..	..	..	..	..	..	..	..	..

How to use the Tables:

Suppose a commodity is priced at Rs. 1.25 per seer. To find the price per kilogram look up Table B against Rs. 1/seer. The value is Rs. 1.07/kg. Look up Table A against 25nP/seer. The value is 27 nP/kg. Add up the two (Rs. 1.07 + 0.27 = Rs. 1.34). The price per kilogram (kg) is, therefore, Rs. 1.34.

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Part 2

TABLE A

Conversion of Prices from Maund to Quintal (100 kg)

(Factor used : 1 quintal = 2.6792269 maunds)

Naye Paise per maund to Rupees and Naye Paise per quintal

nP/Md	0	1	2	3	4	5	6	7	8	9
	Rs/q	Rs/q	Rs/q	Rs/q	Rs/q	Rs/q	Rs/q	Rs/q	Rs/q	Ra/q
0	0	0.03	0.05	0.08	0.11	0.13	0.16	0.19	0.21	0.24
10	0.27	0.29	0.32	0.35	0.38	0.40	0.43	0.46	0.48	0.51
20	0.54	0.56	0.59	0.62	0.64	0.67	0.70	0.72	0.75	0.78
30	0.80	0.83	0.86	0.88	0.91	0.94	0.96	0.99	1.02	1.04
40	1.07	1.10	1.13	1.15	1.18	1.21	1.23	1.26	1.29	1.31
50	1.34	1.37	1.39	1.42	1.45	1.47	1.50	1.53	1.55	1.58
60	1.61	1.63	1.66	1.69	1.71	1.74	1.77	1.80	1.82	1.85
70	1.88	1.90	1.93	1.96	1.98	2.01	2.04	2.06	2.09	2.12
80	2.14	2.17	2.20	2.22	2.25	2.28	2.30	2.33	2.36	2.38
90	2.41	2.44	2.46	2.49	2.52	2.55	2.57	2.60	2.63	2.65
100	2.68	..	..	..	..	..	..	..	..	..

TABLE B

(Factor used : 1 quintal = 2.6792269 maunds)

Rupees per maund to Rupees and Naye Paise per quintal (q)

Rs/Md	0	1	2	3	4	5	6	7	8	9
	Rs/q	Rs/q	Rs/q	Rs/q	Rs/q	Rs/q	Rs/q	Rs/q	Rs/q	Rs/q
0	0	2.68	5.36	8.04	10.72	13.40	16.08	18.75	21.43	24.11
10	26.79	29.47	32.15	34.83	37.51	40.19	42.87	45.55	48.23	50.91
20	53.58	56.26	58.94	61.62	64.30	66.98	69.66	72.34	75.02	77.70
30	80.38	83.06	85.74	88.41	91.09	93.77	96.45	99.13	101.81	104.49
40	107.17	109.85	112.53	115.21	117.89	120.57	123.24	125.92	128.60	131.28
50	133.96	136.64	139.32	142.00	144.68	147.36	150.04	152.72	155.40	158.07
60	160.75	163.43	166.11	168.79	171.47	174.15	176.83	179.51	182.19	184.87
70	187.55	190.23	192.90	195.58	198.26	200.94	203.62	206.30	208.98	211.66
80	214.34	217.02	219.70	222.38	225.06	227.73	230.41	233.09	235.77	238.45
90	241.13	243.81	246.49	249.17	251.85	254.53	257.21	259.89	262.56	265.24
100	267.92	..	..	..	..	..	..	..	..	..

How to use the Tables:

Suppose a commodity is priced at Rs. 30.50 per maund. To find the price per quintal look up Table B against Rs. 30/maund. The value is Rs. 80.38/(q). Look up Table A against 50 nP/maund. The value is 1.34/(q). Add up the two (Rs. 80.38 + 1.34 = Rs. 81.72). The price per quintal (q) is, therefore, Rs. 81.72.

Part 3

TABLE A

Conversion of Prices from Pound to Kilogram (kg)

(Factor used : 1 kg = 2.20462 lb)

Naye Paise per lb to Rupees & nP per kg

nP/lb	0	1	2	3	4	5	6	7	8	9
	Rs/kg	Rs/kg	Rs/kg	Rs/kg	Rs/kg	Rs/kg	Rs/kg	Rs/kg	Rs/kg	Rs/kg
0	0	0.02	0.04	0.07	0.09	0.11	0.13	0.15	0.18	0.20
10	0.22	0.24	0.26	0.29	0.31	0.33	0.35	0.37	0.40	0.42
20	0.44	0.46	0.49	0.51	0.53	0.55	0.57	0.60	0.62	0.64
30	0.66	0.68	0.71	0.73	0.75	0.77	0.79	0.82	0.84	0.86
40	0.88	0.90	0.93	0.95	0.97	0.99	1.01	1.04	1.06	1.08
50	1.10	1.12	1.15	1.17	1.19	1.21	1.23	1.26	1.28	1.30
60	1.32	1.34	1.37	1.39	1.41	1.43	1.46	1.48	1.50	1.52
70	1.54	1.57	1.59	1.61	1.63	1.65	1.68	1.70	1.72	1.74
80	1.76	1.79	1.81	1.83	1.85	1.87	1.90	1.92	1.94	1.96
90	1.98	2.01	2.03	2.05	2.07	2.09	2.12	2.14	2.16	2.18
100	2.20	..	..	..	..	..	..	..	..	..

TABLE B

(Factor used : 1 kg = 2.20462 lb)

Rupees per lb to Rupees and Naye Paise per kg

Rs/lb.	0	1	2	3	4	5	6	7	8	9
	Rs/kg	Rs/kg	Rs/kg	Rs/kg	Rs/kg	Rs/kg	Rs/kg	Rs/kg	Rs/kg	Rs/kg
0	0	2.20	4.41	6.61	8.82	11.02	13.23	15.43	17.64	19.84
10	22.05	24.25	26.46	28.66	30.86	33.07	35.27	37.48	39.68	41.89
20	44.09	46.30	48.50	50.71	52.91	55.12	57.32	59.52	61.73	63.93
30	66.14	68.34	70.55	72.75	74.96	77.16	79.37	81.57	83.78	85.98
40	88.18	90.39	92.59	94.80	97.00	99.21	101.41	103.62	105.82	108.03
50	110.23	..	..	..	..	..	..	..	..	..

How to use the Tables :

Suppose a commodity is priced at Rs. 2.30 per pound. To find the price per kilogram look up Table B against Rs. 2/pound. The value is Rs. 4.41/kg. Look up Table A against 30 nP/lb. The value is 1.10 nP/kg. Add up the two (Rs. 4.41 + 1.10 = Rs. 5.51). The price per kilogram (kg) is, therefore, Rs. 5.51.

Part 4

TABLE A

Conversion of Prices from Hundredweight to Quintal

(Factor used : 1 quintal = 1.9684109 cwt)

(Naye Paise per hundredweight (cwt) to Rupees and Naye Paise per quintal (q))

nP/cwt	0	1	2	3	4	5	6	7	8	9
	Rs/q	Rs/q	Rs/q	Rs/q	Rs/q	Rs/q	Rs/q	Rs/q	Rs/q	Rs/q
0	0	0.02	0.04	0.06	0.08	0.10	0.12	0.14	0.16	0.18
10	0.20	0.22	0.24	0.26	0.28	0.30	0.31	0.33	0.35	0.37
20	0.39	0.41	0.43	0.45	0.47	0.49	0.51	0.53	0.55	0.57
30	0.59	0.61	0.63	0.65	0.67	0.69	0.71	0.73	0.75	0.77
40	0.79	0.81	0.83	0.85	0.87	0.89	0.91	0.93	0.94	0.96
50	0.98	1.00	1.02	1.04	1.06	1.08	1.10	1.12	1.14	1.16
60	1.18	1.20	1.22	1.24	1.26	1.28	1.30	1.32	1.34	1.36
70	1.38	1.40	1.42	1.44	1.46	1.48	1.50	1.52	1.54	1.56
80	1.57	1.59	1.61	1.63	1.65	1.67	1.69	1.71	1.73	1.75
90	1.77	1.79	1.81	1.83	1.85	1.87	1.89	1.91	1.93	1.95
100	1.97	..	..	..	..	..	..	..	..	..

TABLE B

(Factor used : 1 quintal = 1.9684109 cwt)

Rupees per Hundredweight (cwt) to Rupees and Naye Paise per quintal (q)

Rs/cwt	0	1	2	3	4	5	6	7	8	9
	Rs/q	Rs/q	Rs/q	Rs/q	Rs/q	Rs/q	Rs/q	Rs/q	Rs/q	Rs/q
0	0	1.97	3.94	5.91	7.87	9.84	11.81	13.78	15.75	17.72
10	19.68	21.65	23.62	25.59	27.56	29.53	31.49	33.46	35.43	37.40
20	39.37	41.34	43.31	45.27	47.24	49.21	51.18	53.15	55.12	57.08
30	59.05	61.02	62.99	64.96	66.93	68.89	70.86	72.83	74.80	76.77
40	78.74	80.70	82.67	84.64	86.61	88.58	90.55	92.52	94.48	96.45
50	98.42	100.39	102.36	104.33	106.29	108.26	110.23	112.20	114.17	116.14
60	118.10	120.07	122.04	124.01	125.98	127.95	129.92	131.88	133.85	135.82
70	137.79	139.76	141.73	143.69	145.66	147.63	149.60	151.57	153.54	155.50
80	157.47	159.44	161.41	163.38	165.35	167.31	169.28	171.25	173.22	175.19
90	177.16	179.13	181.09	183.06	185.03	187.00	188.97	190.94	192.90	194.87
100	196.84	..	..	..	..	..	..	..	..	..

How to use the Tables :

Suppose a commodity is priced at Rs. 75.85 per hundredweight. To find the price per quintal look up Table B against Rs. 75/cwt. The value is Rs. 147.63 nP/(q). Look up Table A against 85 nP/cwt. The value is 1.67 nP/(q). Add up the two (Rs. 147.63 + 1.67 = Rs. 149.30). The price per quintal (q) is, therefore, Rs. 149.30.

Guide to Change-over

H. L. MEHANDRU

Controller of Weights and Measures,
Delhi

THE first day of October 1960 would be looked upon as the 'day of days' by those who wish the metric reform to succeed. People who have grown up with the old weights may find difficulties of adjustments as they will have to break away from those weights and adapt themselves to new ideas. It is another thing that the new ideas are simple and easy to learn and use and would lead to important beneficial effects on the life of the people in the future.

Work During Transition Period

The success of a tremendous and far-reaching reform that the adoption of the metric system is would be assured when people are convinced that their real interests are served and they would not have to suffer hardships and inconveniences. This means drawing up a balance-sheet setting out the demands made on the people and the rights and benefits flowing to them from the change-over. The approach to the people in Delhi has, therefore, been simple, direct and persuasive but firm. The assessment of the progress made in the areas covered under the Orissa Weights and Measures Act, 1943, which has been in force in Delhi since October 1952 and in the areas that have been brought under Rajasthan Weights and Measures (Enforcement) Act,

1958, can now be made when the transition period is coming to an end.

In the old areas the following steps were taken:

- (1) Approaching the United Chamber of Trade Associations for lending its support to establish intimate touch with the wholesale trade associations of Delhi.
- (2) Holding series of meetings with the various local wholesale trade associations to bring home to them the urgent need for a timely switch-over.
- (3) Organizing meetings of the associations of local retail traders to give them necessary training and education to accept and assimilate the new concept.
- (4) Discouraging stamping of manufacturers' and repairers' goods under the old Act, and stamping of beam scales conforming to the proposed leading dimensions as laid down by the Indian Standards Institution in its draft specifications.
- (5) Ensuring the supply of stamped commercial metric weights at reasonable prices.

This integrated programme created the tempo needed for preparing the trading community for the change-over and led the local wholesale trade to fix up dates for the adoption of metric weights in their respective trades. While some of the associations have purchased metric weights, there are others who have completely gone

metric. Kirana Committee of Delhi have even started quoting rates in metric units through the daily press.

The new areas including important trading centres such as Shahadra, Narela, Mehrauli and Delhi Cantonment had so far not been covered. A beginning had to be made on a clean slate. The trade census work in these areas was not confined to mere collection of data viz., name, address and trade but was designed to understand the trader's receptivity to the metric system, his difficulties, his reaction to the change-over and his immediate requirements.

These areas are kept in touch with developments through frequent personal meetings, and sufficient dealers of weights and measures from the area have been licensed to minimize hardship. Traders are being told to provide themselves with authorized standard equipment only. This programme has ensured that the new areas do not lag behind.

Useful Hints to General Public

The metric reform is being carried out to give a 'fair deal' to the common man. The many subterfuges to which he has been treated so long have to be eradicated. The Weights and Measures Organization does help him to achieve this end. But he should himself be aware of the right way to proceed in his transactions. It is with this intention of helping the common man that the following paragraphs have been written. It is hoped that if these instructions are vigilantly followed, the purchaser may be assured of correct weighment.*

(1) *There will be compulsory enforcement of metric weights from 1 October 1960: the use of old seer and pound series weights will be illegal from that date.*

*See 'Illustrations' at the centre (Fig. 8-15) for pictures showing the various points mentioned in the article—Editor

(2) Check that the trader is using weights and weighing instruments duly verified and stamped by the Weights and Measures Organization. (Fig 8-11) under the statutory obligations of the Act, the weights and scales used in the bullion trade are required to be re-verified and re-stamped once in a year and those in other trades once in two years. Unverified and unstamped weights and scales and weighing machines constitute violation of the provisions of the Act and the Enforcement Rules.

(3) See that the beam scale is permanently suspended from a stand, the pointer of the beam is in the centre when the pans are empty. Make sure that the pans are supported by metallic chains or slings attached to the end knife-edges and that there is a perceptible distance between the floor and the pans to allow free movement of the pans (Fig 12-13).

(4) Look for a proper display of the certificate issued against the verified and stamped weights, measures and weighing instruments at some conspicuous part of trader's premises (Fig 14).

(5) A weighing instrument e.g. a beam scale is designed and constructed to weigh commodities up to a certain limit which is marked on the beam in case of beam scale and at a suitable place on other weighing instruments. Any disregard of this limit will lead to an error in the weighment besides subjecting the instrument to damaging mechanical stresses and strains. Insist on following the limit (Fig 15).

(6) Carefully watch for any material which may be sticking beneath the pans. Do not allow the traders to weigh out in a jerky manner.

(7) Politely insist that the trader should maintain his weights and weighing instruments free of dirt and dust.

* (8) Ask for prices of commodities only in terms of the new metric unit. The following units are recommended for use:

- (a) In place of the tola, use the gram.
- (b) In place of the seer, pound, 100 tolas etc., use the kilogram.
- (c) In place of maund or hundredweight, use the quintal, i.e. 100 kg.

Effecting Conversions

It will be in the interest of the general public to insist on demanding a commodity

*See the article 'Getting Ready for Change-over' (pp 5-17) in this issue for full information on trading units—Editor.

in terms of convenient denominations of weights in the metric series instead of converting every time the old units into new. This saves the odd handling of new weights and irksome calculations involved in inter-conversions. For example, to weigh $\frac{1}{2}$ seer using the new weights, one has to use five weights in all (200g, 20g, 10g, 2g, 1g). Table I gives comparative data that may prove useful in the initial stages. One cannot, however, over stress the need for cultivating the 'metric psychology'.

TABLE I
COMPARATIVE ASSESSMENT

Metric Series	Seer Series	Metric Series in Sexcess (+) or short (—)
50 g	1 chhatak = 58 g	(—) 8 masha = 8 g (approx.)
100 g	2 chhataks = 117 g	(—) $1\frac{1}{2}$ tola = 17 g (approx.)
200 g	3 chhataks = 175 g	(+) 2 tola, 1 masha = 25 g (approx.)
250 g	4 chhataks = 233 g	(+) $1\frac{1}{2}$ tola = 17 g (approx.)
350 g	6 chhataks = 350 g	
400 g	7 chhataks = 408 g	(—) 8 masha = 8 g (approx.)
500 g	8 chhataks = 467 g	(+) 3 tola = 33 g (approx.)
600 g	10 chhataks = 583 g	(+) $1\frac{1}{2}$ tola = 17 g (approx.)
700 g	12 chhataks = 700 g	
1 kg	1 seer	(+) 6 tola (approx.)
2 kg	2 seer	(+) 11 tola (approx.)
5 kg	5 seer	(+) 6 chhataks (approx.)
10 kg	10 seer	(+) 12 chhataks (approx.)
20 kg	20 seer	(+) $1\frac{1}{2}$ seers (approx.)

ILLUSTRATIONS



Fig. 1—For producing cast iron weights, a metallic or wooden pattern of the weight is prepared which is then placed in the moulding box and a sand cast got ready. Picture shows moulding boxes arranged, after duly drying, for receiving the molten metal.

Fig. 1-7 Courtesy National Metal Industries, Bombay. Note the large number of weights at every stage of the process.

Fig. 8-16 Photographs by Shri Kundan Lal.

The pictures show how cast iron weights are manufactured and then stamped. The mode of correct weighment and other matters of interest are also shown.



Fig. 2—The metal, a mixture of pig iron and scrap, is melted in a cupola or a furnace and carried in a ladle to the moulding boxes in which it is carefully poured through specially made holes.



Fig. 3—After the metal has cooled and solidified, the moulding boxes are opened and the rough cast weights are taken out. It is necessary to chip off protruding edges and surplus metal from the castings before they are taken up for finishing. The picture shows fitters chipping off the excess metal.

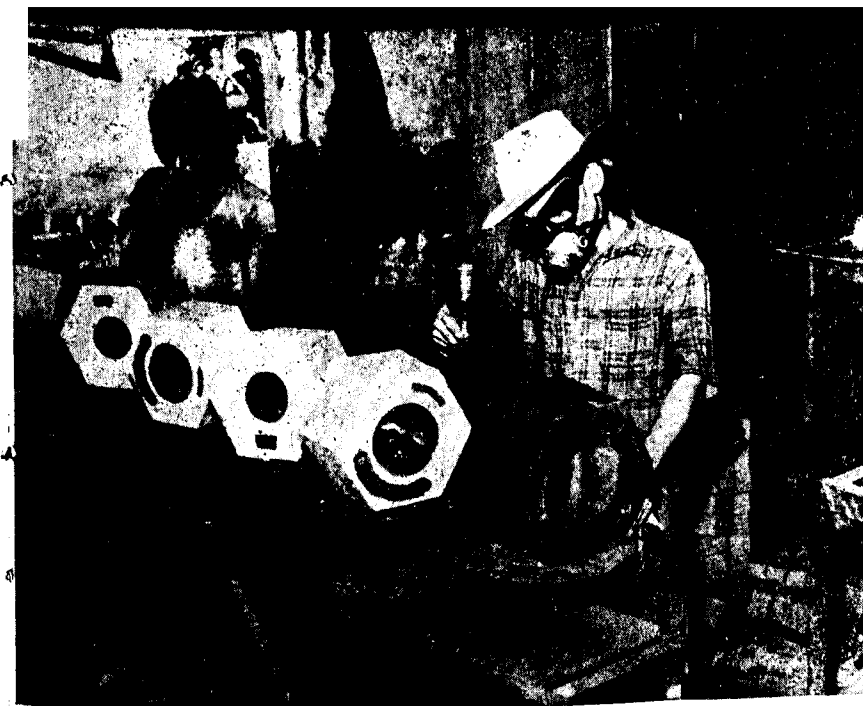
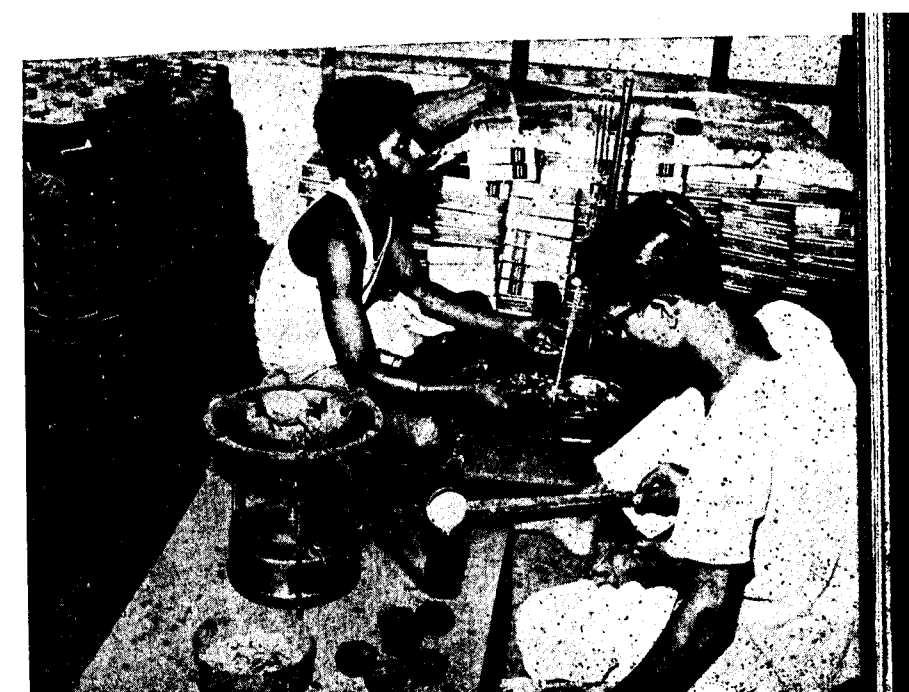


Fig. 5—After the weights are finished, they are given a coat of black protective paint. Here we see spray painting being carried out.



Fig. 4—The rough edges are then smoothed out by grinding and the surfaces are machined. At this stage it is ensured that the weight is lighter than its nominal value.

Fig. 6—On finishing and painting the weights are adjusted to their full value by means of lead. The finished weight and the necessary amount of lead are balanced against a correct weight. The lead is melted and poured into the loading hole provided at the bottom of weight. The loading hole is larger at the bottom and smaller at the mouth i.e. it tapers. This ensures that the lead which receives the Inspector's stamp does not fall out when the weight is in use.



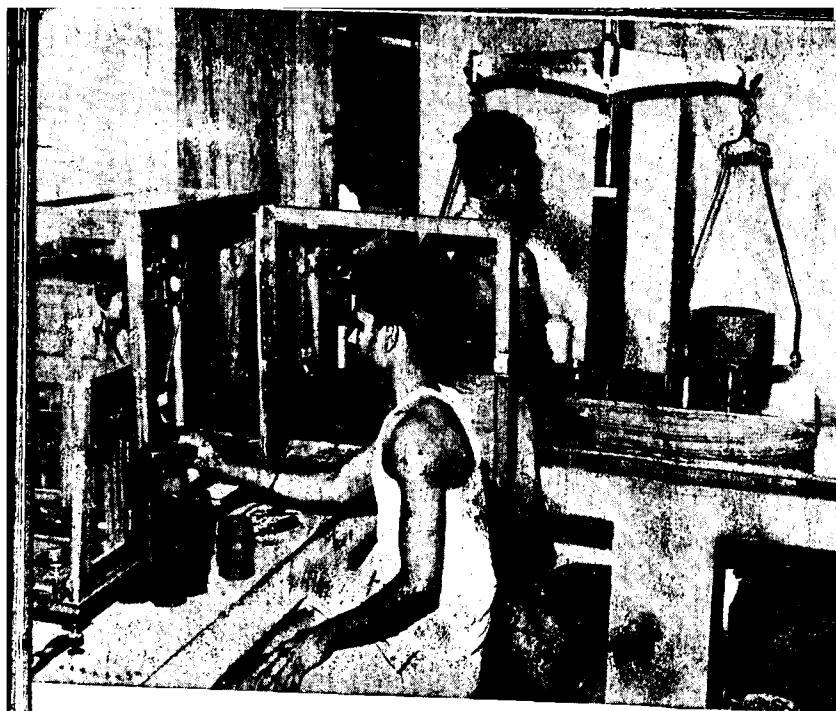


Fig. 7—The weights are then adjusted further by comparison against standard weights in more accurate balances. After these adjustments, the weights are ready for stamping by the Weights and Measures Organization.

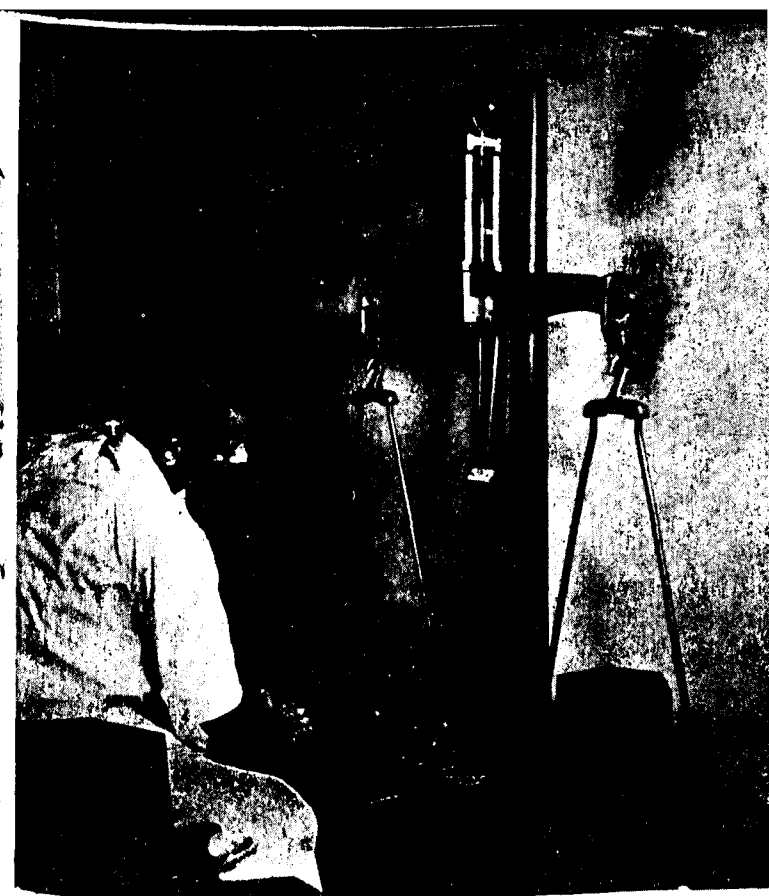


Fig. 9—The working standard weight is then removed and the weight to be stamped is placed in the pan on the right of the Inspector. A weight equivalent to half the prescribed tolerance is placed on the counterpoise on the left. If the weight is too heavy or too light it is readjusted by the manufacturer. If it passes, it is stamped.

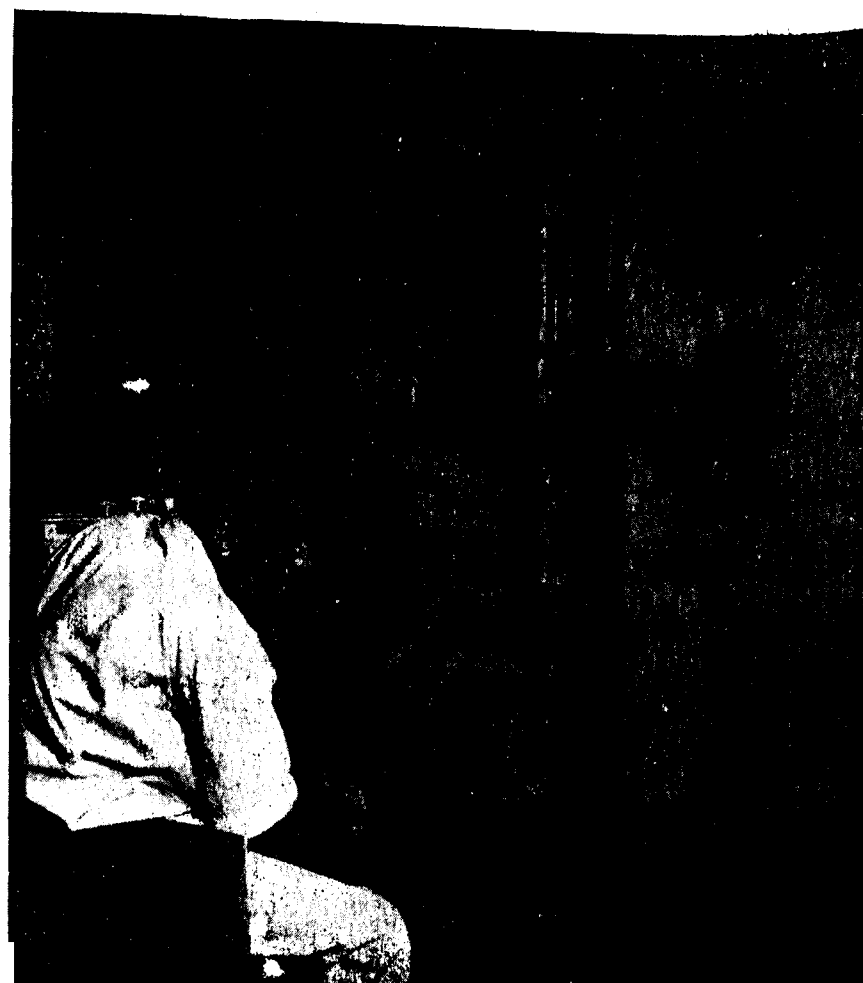


Fig. 8—In the office of the Weights and Measures Organization, a counterpoise weight, kept in the pan to the left of the Inspector, is adjusted accurately against a working standard weight (right pan).



Fig. 10—The passed weights are stamped with the year, the quarter of year, the name of the State and the number assigned to the Inspector who carried out the comparison. The picture shows a row of approved weights being stamped.

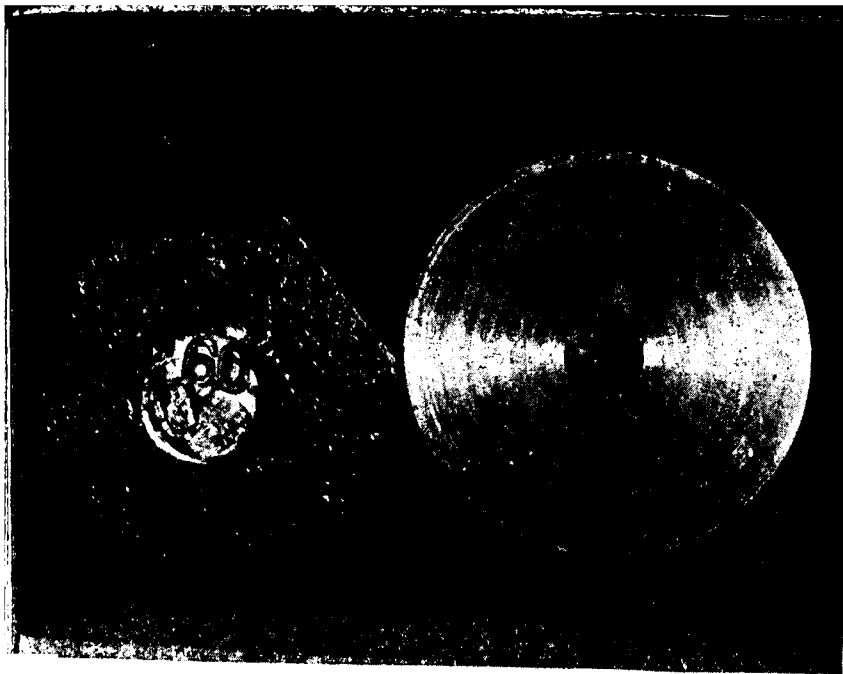


Fig. 11—This picture shows two Weights verified and stamped by the Weights and Measures Organization. The year and the quarter can be easily seen.

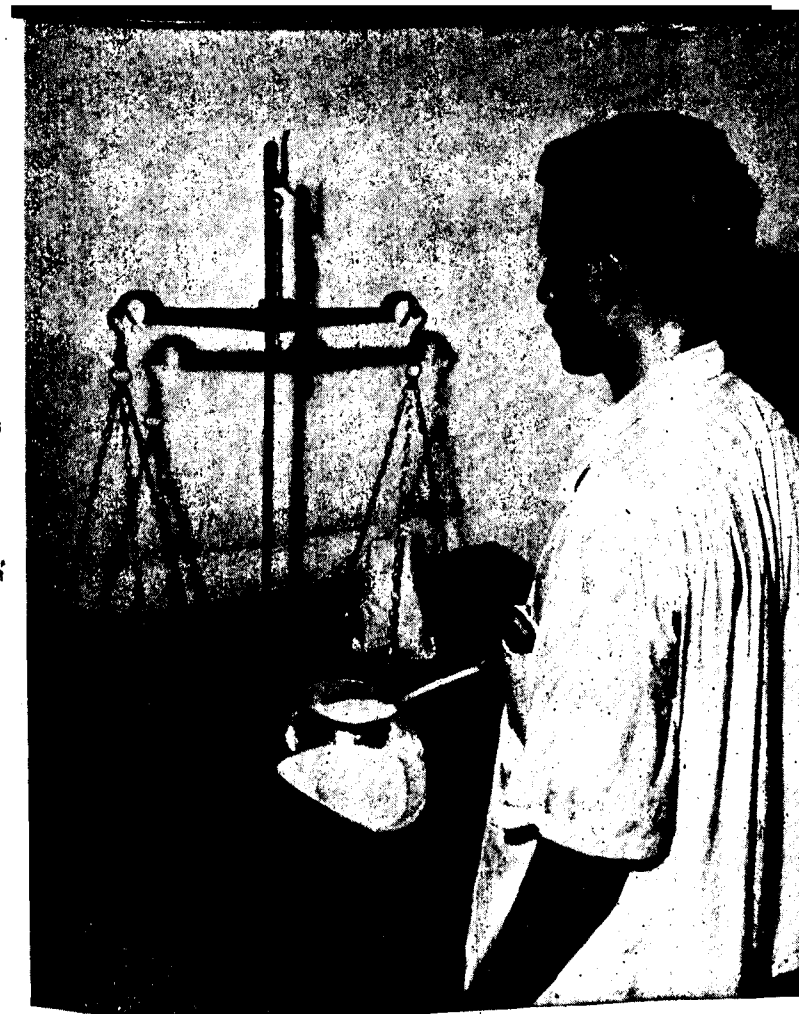


Fig. 13—The picture shows a Class C beam scale being used for weighing sugar. The weighing should be done without undue touching of the pans and beam by the trader.

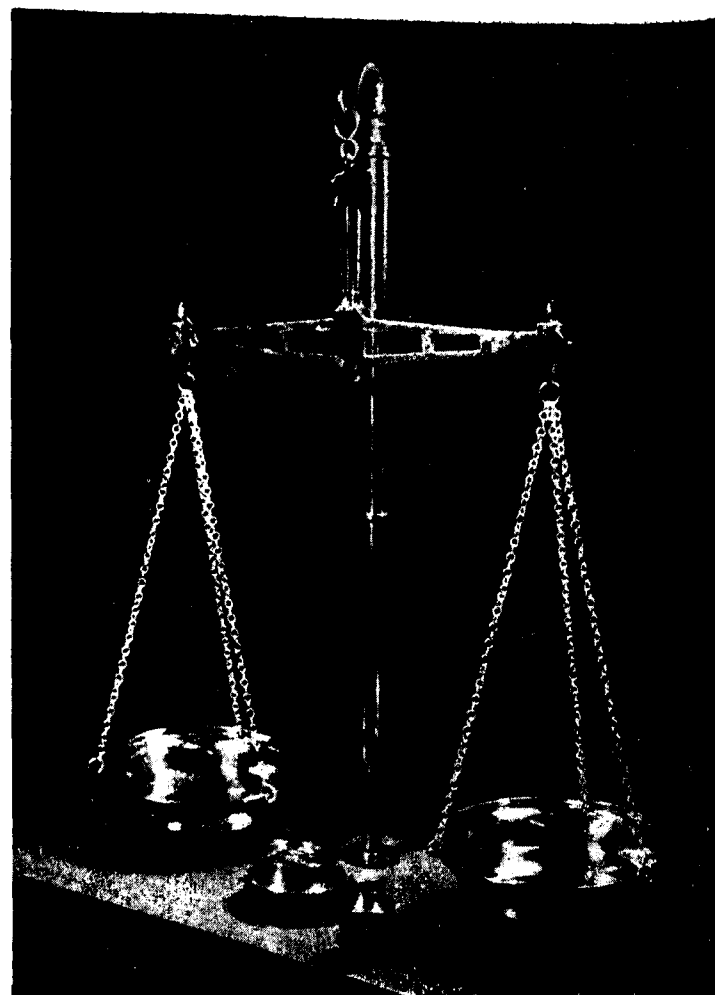


Fig. 12—Shows a Class B beam scale which has been suspended from a stand. Note that there is a perceptible distance between the base and the pans. The pointer is in the centre when pans are empty. The pans are suspended by chains. In the foreground are seen the two types of weights which will be used for weighing bullion.

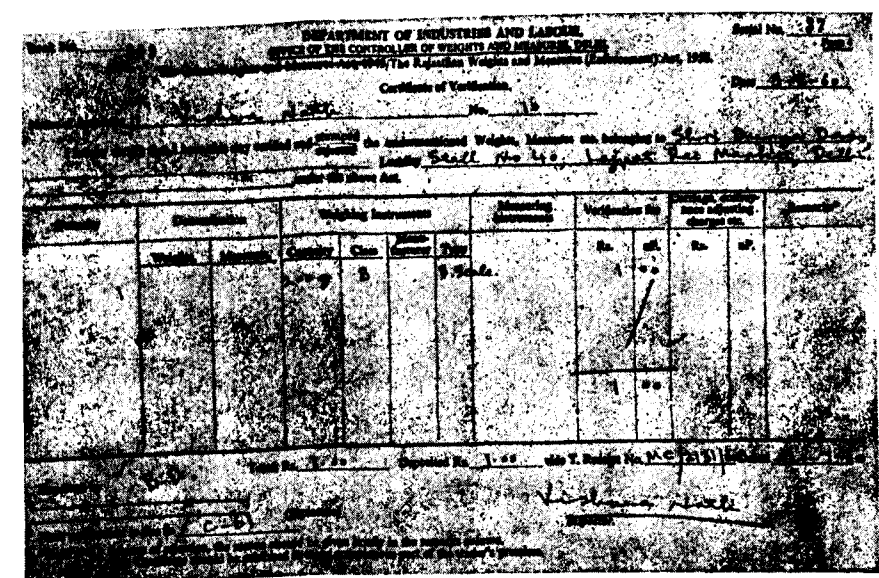


Fig. 14—Shows a typical certificate of verification which should be displayed at some prominent place on the trader's premises. The certificate in this case is for a Class B beam scale of capacity 200 grams. Verification of the scale will be due after one year.

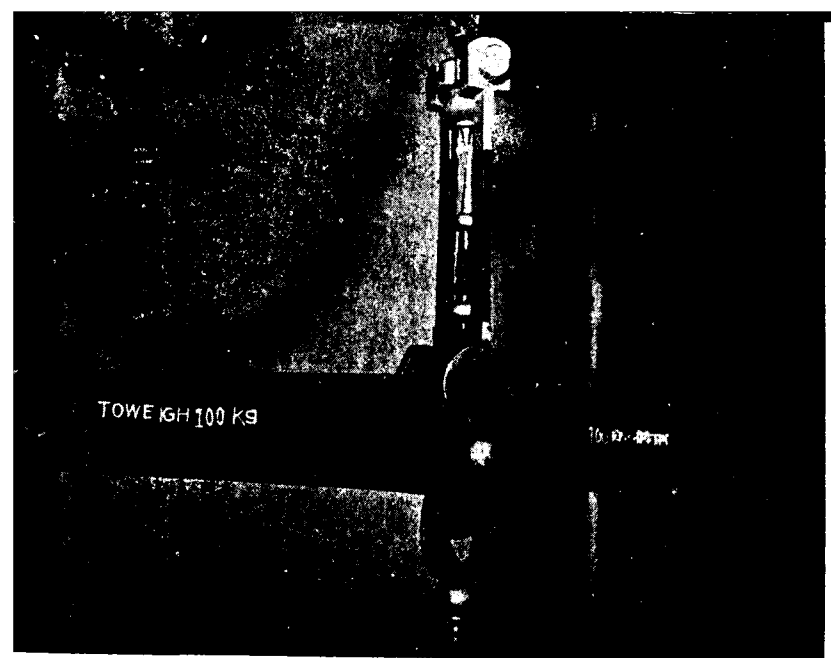


Fig. 15—The beam scale bears the legend 'To Weigh 100 kg' and '100 किलो के लिये'। If weighment in excess of the prescribed limit is carried out on a weighing instrument, it is not only liable to give wrong indications of weights, but also injure the instrument itself.

Fig. 16—The distribution of petrol and petroleum products is being now carried out in metric units. The picture shows conical capacity measures being stamped in the Working Standards Laboratory in Delhi.



GUIDE TO CHANGE-OVER

Traders have been supplied with approved conversion tables. The purchaser should observe that the conversion charts—of prices and units—are available with the trader and are exhibited prominently by the trader for ready reference.

For quick and rough calculations the two tables given below, followed by relevant explanations and hints to obtain confirmation of a fair deal may be useful.

TABLE II
SIMPLIFIED PRICE CONVERSION
IN NAYE PAISE

Price nP/Seer	Increase over nP/Seer	Price nP/kg
1 to 6	0 nP	1 to 6
7 to 20	add 1 nP	8 to 21
21 to 34	add 2 nP	23 to 36
35 to 48	add 3 nP	38 to 51
49 to 62	add 4 nP	53 to 66
63 to 76	add 5 nP	68 to 81
77 to 90	add 6 nP	83 to 96
91 to 100	add 7 nP	98 to 107

Explanation of Table II

The vertical column in the middle gives the amount to be added to the price in nP per seer to obtain the price in nP per kilogram. Actually the figures 7, 21, 35, 49, 63, 77, 91, etc. are in arithmetical progression with the common difference of 14 and represent the stepwise increase from 1 nP to 2 nP and 3 nP and so on. These terms can be easily committed to memory.

A still easier method of calculating the price in nP per kg, from the given price in nP per seer is to divide the price in nP per seer by 14 and add just the quotient to the price in nP per seer, if the remainder is in the range 0 to 6; add 1 more nP, besides the quotient, if the remainder falls in the range 7 to 13. For example, a commodity priced at 47 nP per seer will cost 50 nP per kg; the quotient on dividing by 14 is three and the remainder five (in the range

0 to 6). Whereas, a commodity costing 50 nP per seer, costs 54 nP per kg as the remainder is 8 and one more nP is to be added to the quotient which is 3.

TABLE III
SIMPLIFIED PRICE CONVERSION
IN RUPEES

Price Rs/Seer	No. of nP to be Added over And Above 7% Increase to Get Price Rs/kg
3 to 8	1 nP
9 to 14	2 nP
15 to 20	3 nP
21 to 26	4 nP
27 to 32	5 nP
33 to 38	6 nP
39 to 44	7 nP

Explanation of Table III

From Table II, it is seen that in the price conversion from nP per seer to nP per kg, there is a general increase of 7 percent i.e. a commodity costing 100 nP per seer costs 107 nP per kg. Table III lists the extra increase required to be made in the calculated price in Rupees per kg over and above 7 percent increase in the price in Rupees per seer. In the range Rs. 3 to 8, the increase is one nP besides the usual 7 percent.

This extra increase can, however, be easily worked out by dividing the price in Rupees per seer by six, and adding the quotient (in nP) to the 7 percent increased price, if the remainder falls in the range 0 to 2 and one nP more, besides the quotient, if the remainder is in the range 3 to 5. For example, if the commodity costs Rs. 10 per seer, the price in Rs. per kg will be Rs. 10.70 nP+2 nP=10.72 nP, since on dividing 10 by 6, the remainder is 4 and hence one more nP has to be added to the quotient which is one.

Packages

It has been made compulsory to declare the net weight or volume of the contents on packages. Section 14 of the Act makes the sale of packages without this declaration an offence and any infringement of this should be brought to the notice of the

Weights and Measures Organization of the area. In packaging it is safer to follow the denominations of weights in the series 5, 2, 1 or use standard packages now being made in metric sizes.*

Politeness Pays

It may happen sometimes that the action taken against some offenders by the Inspector of Weights and Measures to meet the ends

*See article 'Getting Ready for Change-over' (pp 5-17) in this issue for more information on packages—Editor.

of justice may move the susceptibilities of certain persons. In such cases it would not be the right course to intervene with the Inspector's work. Such intervention can often be interpreted as obstruction of a public servant in the performance of his duties which is an offence under the law. The best way to ventilate any grievance is to lodge a complaint with the Weights and Measures Organization. Courtesy and politeness always pay rich dividends.

CORRECTION

In the January 1960 issue of *Metric Measures* the following corrections may be noted in the article 'The Universal Yarn Numbering System' by Harirao Navkal and R.L.N. Iyengar.

- (1) Page 12: The Symbol (I) should be given by the side of equation given in column 2.
- (2) In Table 2, the value for Yarn Strength Index given against a Count Strength Product of 1200 should be changed from 1295 to 1259.

Apology to Readers

Due to shortage of the usual imitation art paper, white printing paper has been used for this issue of *Metric Measures*. For illustrations, 'a centre-spread' of art paper is used. It is realized that cross references from the article to illustrations may be necessary and the inconvenience caused to readers is regretted. It is hoped to revert to the usual high quality paper as soon as conditions permit.

News & Views

Recent Notifications

(1) Woollen Industry

No. S.O. 1678, dated 2nd June 1960.

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 October, 1960, as the date on which the provisions of the said Act shall come into force in respect of woollen mills in so far as they undertake the purchase of raw wool and sale of woollen products.

(2) Ports and Shipping

No. S.O. 1898, dated 1st August 1960.

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 August, 1960, as the date on which the provisions of the said Act shall come into force, in respect of the classes of undertakings specified below to the extent specified therein:—

(1) Ports in respect of transactions involving the levy (i) of shipping charges for services rendered, and (ii) of Port dues on ships and on goods landed or shipped through the Docks, Jetties, Bunders and Inland and wharves;

(2) Shipping industry in respect of transactions involving the levy of freight on cargo.

No. S.O. 1899, dated 1st August 1960.

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 classes of undertakings referred to in the notification of the Government of India in the Ministry of Commerce and Industry S.O. No. 1898, dated the 1st August 1960, the continuance of the use, for a period of six months from the first day of August, 1960 of any weight or measure which, immediately before that day, was in use in respect of the said classes of undertakings.

Third Meeting of the International Committee on Legal Metrology

This meeting was held in Paris from 4 to 8 April 1960, in the Office of the International Bureau of Legal Metrology, 9, Avenue Franco-Russe, under the Chairmanship of M.M. Jacob (Belgium).

After examining the question of new members and ratifications, the Committee took note of the draft of a Convention with the French Government on the subject of privileges and facilities that the various Governments are to accord to the Organization.

The Committee examined the position of the International Bureau from the point of view of personnel, equipment and finances. It was decided to nominate the

Director as full time and to confirm his Assistant in the functions.

After approving the balance-sheet for the previous period and the budget for the next, the Committee examined the state of relations with concerned international unions, and also took cognisance of the progress of the preparation of directives to be followed for the creation of services of Legal Metrology particularly in the new countries.

It gave instructions regarding documentation to be established by the Bureau and the publication of a Bulletin of the International Organization of Legal Metrology.

It examined the progress of the work of the various Secretariat reporters. It reviewed the list of these Secretariats, their terms of reference and the collaborating countries.

It noted the interest taken by the technical meeting organized at Braunschweig in May 1960, for the study of various problems relating to weighing.

Lastly the Committee decided that the next International Conference on Legal Metrology should be held in Vienna in June 1962 at the same time as the fourth meeting of the Committee. It appointed M. Stulla Gotz (Austria) to the Counsel of the President to ensure necessary liaison for the next meeting. Among others, it has designated M.M. Honti (Hungary) to be a member of the Counsel with a view to reinforcing the representation of small countries. The Counsel of the President also met for examining the important measures, the execution of which devolves on the President.

Metric Taxi Rate in Bombay

Revised taxi rates in terms of metric units and decimal coinage have come into effect from 1 August 1960 in Greater Bombay. The small taxi charge is 30 nP per kilometre

and large taxi 40 nP. The minimum rate will be 50 and 66 nP respectively. For small taxis, the rate after the first 50 nP will be 10 nP for every $\frac{1}{3}$ of a kilometre or its part and for large taxis 13 nP, 13 nP and 14 nP for every $\frac{1}{3}$ of a kilometre in that order or its part.

Considering the rising prices of supplies, spare parts etc. and the demand to increase taxi rates in Bombay and also in view of the charge-over to the metric system and the decimal coinage, the taxi rates have been revised. The present taximeters will be changed to suit the new system and a transition period of 1 year has been given for the change-over. For helping the general public, taxi drivers have been supplied with the new tariff cards which have also been published in the newspapers for general information.

Weights and Measures in Israel

The Annual Report of the Weights and Measures Section of the Ministry of Commerce and Industry, State of Israel, for the period 1959-60 shows that during this period 84,123 weights, 1,200 measures of capacity, 936 measures of length and 17,994 weighing machines were verified and re-verified. Of these 26,322 weights, 612 measures of capacity, 235 measures of length and 5,950 weighing machines were new and offered for their first verification. Most of the new instruments verified, except measuring pumps, were produced locally.

The decline in the number of newly produced weights from 34,000 to 26,000 during the year was attributed to the continued increase in the use of self-indicating scales which accounted for a large share of the new production.

The revenue collected amounted to 39,472 Israel Pounds for 104,892 instruments: the average per instrument worked out to 37.6 Agorot,

BOOK REVIEW

During the year 4,153 weights, 4 measures of capacity and 767 weighing machines belonging to the various Ministries were examined by the Section. Most of the instruments belonged to the Ministry of Posts. Their examination was carried out on the request of that Ministry and covered all the post offices in the country.

An interesting point relates to prosecutions. During the year 325 cases were taken up and convictions were obtained in 324 cases. The total fine charged was 13,805 Israel Pounds. Out of 725 instruments involved in offences, 253 were false instruments, 241 non-reverified and 220 not offered for reverification. The charges

relating to false instruments concerned mainly wrongly balanced self-indicating scales.

The Report shows a decline in the number of cases brought to court over the previous year. This is attributed to certain changes in the methods of work. One of the changes was to alter every two years the design of the verification stamp. Another was to issue uniform and well-defined instructions about the evaluation of negative results of inspection and of the steps—cautioning or prosecution—to be taken in these cases. A third was to subdivide various operational areas into small and suitable geographical units.

Book Review

INTERNATIONAL PAPER SIZES (English)—A Pamphlet issued by the British Federation of Master Printers, 11 Bedford Row, London W. C. 1, pp. 12, Price : 2s 6d + postage.

The British Federation of Master Printers have been publishing a series of informative pamphlets entitled 'Production Aids for the Printing Industry'. The Pamphlet under review, 'International Paper Sizes', is the second in the series.

It explains the theory of the international sizes, their uses, tolerances, advantages and other connected matters.

Till now the printing industry had not paid much attention to economy in the use of paper. The paper sizes available varied too much. The nomenclature of paper sizes added to the confusion as one name denoted two or more sizes, as for example, post, small post, large post, pinched post; demy, small demy, large demy, ledger demy.

Further, sheet sizes in one ream often differed from another in the same consignment, with disconcerting results on production, while the number of sheets in a so-called 'ream' have been equally vague.

The 'new outlook' should consider keener competition which makes economy of time and material essential, the need for planned sizes in conjunction with selected machine paper sizes, the economic use of paper-making materials, economy in production of printing and processing machines, filing cabinets, filing materials and so on. Further, a series of paper sizes based on a logical series with well established substance ratios, would simplify making, ordering and storage.

The Pamphlet lucidly explains the principles on which the A-series and other series of paper sizes have been derived. The principal size in the A-series is a rectangle with an

area of one square metre, the ratio of the two sides being $1 : \sqrt{2}$. The proportion $1 : \sqrt{2}$ has a geometrical relationship inasmuch as the side and the diagonal of a square are in this proportion. On solving the equation $X \times Y = 1$ and $X : Y = 1 : \sqrt{2}$, the basic size, A0, works out to be 841×1189 millimetres. The dimensions are of the trimmed or finished sizes. A noteworthy feature is that if the sheet is doubled or halved, the shorter and longer sides are still in the ratio of $1 : \sqrt{2}$. This is an advantage 'in the preparation of copy as any size in the series can be obtained from one copy by enlargement or reduction'.

The series then proceeds to smaller sizes A1, A2, A3, A4, A5, etc., A1 being half of A0, and A2 half of A1 and so on. The size A4 is usually used for business correspondence, magazines, letterheads and for many other applications. It has dimensions of 210×297 mm. For cheques, tickets, labels, etc. 'long sizes', like one-third A4 (99×210 mm), one-quarter A4 (74×210 mm), or one-eighth A4 (37×210 mm) are useful. One of the major advantages of the new sizes is that they do away with terms such as folio, quarto and the like.

In addition to the A-series, 3 other series namely, B, C and D were originally devised for international paper sizes. Of these D is now obsolete, B is usually used for posters, wall charts and similar items where the difference in sizes of the large sheets in the A sizes represented too big a jump. It is also used for envelopes. The basic size of the B series, B0 is 1000×1414 millimetres. The C sizes, (C0= 917×1297 mm), are now looked upon as useful for envelopes or folders for enclosing A series stationery.

The system of expressing substance is interesting. It is known as grams per square metre or g.s.m. The weight in grams of a square metre of paper is taken as its basis.

The system covers the requirements of the paper and board industry. Among the advantages of the g.s.m. system, the Pamphlet lists :

- (1) Calculations are unnecessary.
- (2) The g.s.m. figure for any one kind of paper is the same whether the paper concerned consists of one sheet, a ream, a reel, or even a fragment.
- (3) Substance is more accurately expressed in g.s.m. than in lb. per ream.
- (4) Applies equally to board as it does to paper.
- (5) Makes possible simpler paper balances, as only one scale is required.
- (6) Its use would bring British printers in line with printers in many other countries and would assist exporters'.

As already reported in *Metric Measures*, A-sizes of paper are being adopted widely both by Government Departments and private industries in U.K.

This Pamphlet, which is extremely well printed and well illustrated with line drawings, would be of particular interest in this country in view of the contemplated change-over to the international paper sizes. Plans for their introduction in various Government stationery items are underway and already a change-over is being effected to the g.s.m. method of expressing substance.

It is expected that in the near future in India the change-over to the new sizes of paper would begin in Government and private publications, stationery and other items where paper is used.

The Director, The British Federation of Master Printers, 11 Bedford Row, London, W.C. 1, would be willing to make this Pamphlet available in India, provided they receive the cost of the Pamphlet, namely 2s. 6d. + postal charges with the order. By the cheapest route the entire cost would come to 3 Shillings.

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.

Limits and Fits for Engineering (IS : 919-1959)

The Indian Standards Institution has recently published IS : 919-1959 Recommendations for Limits and Fits for Engineering, which makes recommendations relating to limits of size of parts or components and to fits constituted by their assembly.

For the sake of simplicity, and in view of the particular importance of cylindrical parts with circular section, only these are referred to explicitly. It should be clearly understood, however, that recommendations for this type of component apply equally well to other sections; in particular, the general term 'hole' or 'shaft' can be taken as referring to the space containing or contained by two parallel faces or tangent planes of any part, such as the width of a slot, the thickness of a key, etc.

Price: Rs. 10.00

Thickness of Sheet and Diameters of Wires (IS : 1137-1959)

The Indian Standards Institution has recently published IS : 1137-1959 Thickness of Sheet and Diameters of Wire which lays down the basic thicknesses of sheet and diameters of wire in millimetres.

Up till now, in trade and technology, the sizes of sheet and wire were expressed in terms of the various sheet and wire gauges

used in the countries following the fps system of weights and measures, for example BG (Birmingham Gauge), SWG (Standard Wire Gauge), etc. The decision of the Government of India to adopt the metric system of weights and measures makes it essential that the sizes of metal products should be standardized in metric units. Accordingly the following aspects were kept in view while undertaking this work :

- (1) Maximum possible advantage should be derived from the inherent qualities of metric system by the adoption of preferred numbers for the selection of sizes.
- (2) International co-ordination should be achieved to as great an extent as possible.

Price : Re. 1.00

Counter Machines (IS : 1434-1959)

The Indian Standard Specification for Counter Machines (IS : 1434-1959) is one of a series of Indian Standards on commercial weighing instruments, being prepared by ISI at the instance of Standing Metric Committee, Government of India, in connection with the introduction of metric system of weights and measures in the country.

Price : Rs. 1.50

Crane Weighing Machines (IS : 1438-1960)

The Indian Standard Specification for Crane Weighing Machines (IS : 1438-1960) published recently by ISI belongs to a series of Indian Standards on commercial weighing

instruments being prepared at the instance of the Standing Metric Committee, Government of India, in connection with the introduction of metric system of weights and measures in the country.

In determining the limits for sensitiveness and greatest error, due consideration was given to the views of manufacturers and testing organizations, prevalent rules and regulations pertaining to weights and measures in India and the practices current in various metric countries. It is to be pointed out that the values for sensitiveness and greatest error specified in this standard are for new machines only.

Price : Rs. 1.50

Metric Scales and Metric Surveying Chains (IS : 1491-1959 and IS : 1492-1959)

The Indian Standards Institution has published two specifications covering metric scales for architectural purposes and metric surveying chains. The specifications belong to the respective series of standards on metric scales and metric surveying instruments being prepared by the Institution in connection with the change-over to the metric system.

(1) *Metric Scales*—The Indian Standard Specification for Metric Scales for Architectural Purposes (IS : 1491-1959) covers the requirements for metric scales, made of varnished cardboard or of plastic material, used by architects, engineers and surveyors.

The scales specified in this standard are based on the reduction scales recommended for general engineering purposes in IS : 696-1955 Code of Practice for General Engineering Drawings. In addition, scales of 1:500 and 1:1000, used mostly for preparation of drawings for construction of roads, bridges and railways, have been included. A set of paper scales will, therefore, comprise of six different pieces of scales with which architects, engineers and surveyors are mostly concerned.

(2) *Surveying Chains*—The Indian Standard Specification for Metric Surveying Chains (IS : 1492-1959) is one of a series of Indian Standards on surveying instruments. The standard covers the requirements for link type surveying chains of 20 m and 30 m lengths, used in land measurement.

Although the chains are supposed to stand an amount of rough use it is important that they are handled carefully. The chains are liable to appreciable alterations in length and, therefore, require to be compared at fairly frequent intervals, with a standard measure of length such as a steel band.

Price : Rs. 1.50 each

Schedule of Unit Weights of Building Materials (DOC : BDC 1(341))

The Indian Standards Institution has prepared a draft schedule of Unit of Weights of Building Materials. [Doc : BDC 1(341)]. A knowledge of unit weights of building materials is essential in building design, i.e. for the calculation of loads coming on structural members, lateral pressures in retaining structures, etc. Indian Standard Specifications have already been issued for some of the building materials and when such materials are used it becomes necessary to know their unit weights. This schedule has been prepared to fulfil this objective.

The draft is divided into three parts, namely Part I Building Materials, Part II Building Parts or Components, and Part III Stores and Miscellaneous Materials.

Glass Liquor Bottles [Doc. : CDC 10 (1215)].

The Indian Standards Institution has prepared a draft specification for Glass Liquor Bottles [Doc : CDC 10 (1215)] which prescribes the requirements and methods of test for glass liquor bottles of three nominal capacities, namely, 250 ml, 500 ml and 750 ml. It covers bottles used for 'country' liquors as well as 'foreign' liquors.

STANDARDS NEWS

The formulation of this standard has been taken up at the instance of the Sub-Committee on the Adoption of Metric System in Alcohol Industry working under the Standing Metric Committee, Ministry of Commerce and Industry, Government of India, New Delhi. In view of the decision of this Industry to change over to the metric system from April 1961, a high priority has been given to this work and it is hoped to finalize the standard by September 1960 so that the glass industry will be able to supply bottles to the liquor industry in time.

Draft Specification for Reamers [EDC 45(518)]

The Indian Standards Institution has prepared the Draft Specification for Reamers [Doc : EDC 45 (518)] which will be circulated shortly to the interests concerned for their critical comments and suggestions for improvement.

This draft standard forms part of a series of Indian Standards for Small Tools which the Institution is preparing in connection with the change-over to the metric system.

TELEPHONE BRAND



METRIC WEIGHTS

Manufacturer : N. K. ROUTH

78, Netaji Subhas Road, Calcutta-7.

Telegram: 'NILKAMA'

Phone: 33-5134

Licensed Manufacturers, Dealers and Repairers of Weights and Measures (9)

Metric Measures has been publishing a series of lists of 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) Act in their respective jurisdiction. This is the ninth list. The first list appeared in the March 1959 issue.

Progressively steps are being taken for licensing manufacturers, dealers and repairers in all States and further lists of licensees would be published in *Metric Measures* as this work progresses.

The number in brackets against the name of the State or Union Territory indicates the particular instalment number of the list for that State or Union Territory. The issues of *Metric Measures* in which previous lists appear are also shown suitably.

An analysis of the licensees, including the present list, shows that the total number of licensees in 12 States and 2 Union Territories is 289 manufacturers, 1076 dealers and 212 repairers. The details of published information are as follows :

Sl. No.	State/Union Territory	Licensees		
		Manufacturers	Dealers	Repairers
(1)	Andhra Pradesh	25	25	16
(2)	Bihar	20	69	34
(3)	Bombay	23	160	52
(4)	Delhi	21	73	18
(5)	Kerala	4	74	0
(6)	Madhya Pradesh	13	84	0
(7)	Madras	52	112	23
(8)	Mysore	9	106	8
(9)	Orissa	6	11	0
(10)	Punjab	14	248	17
(11)	Rajasthan	16	69	18
(12)	Tripura	0	8	0
(13)	Uttar Pradesh	46	28	15
(14)	West Bengal	40	9	11
		289	1,076	212

LICENSED MANUFACTURERS, DEALERS & REPAIRERS OF WEIGHTS & MEASURES (9)

DELHI (5)

In the July and September 1959 and March and May 1960 issues of *Metric Measures* lists of licensed manufacturers, dealers and repairers of weights and measures in Delhi area were published. The following is a list of manufacturers, and dealers subsequently licensed by the Delhi Administration.

Manufacturers

Sl. No.	Name and Address of Manufacturer	Details of Articles Manufactured
(1)	Benarsi Dass Mahabir Pershad, Gali Raja Uggar Sain, Bazar Sita Ram, Delhi.	Brass Weights.
(2)	Brij Lal, 10/26, Old Rajinder Nagar, New Delhi	Bullion Brass Weights.
(3)	A. K. Corporation (P) Ltd., F-18, Najaf Garh Road, D.L.F. Area, Delhi.	Conical Capacity Measures.
(4)	Delhi Tin Workshop, 2931, Hamilton Road, Kashmere Gate, Delhi.	Conical Capacity Measures.
(5)	Dyal Singh and Sons (Regd.), 117, Kamla Market, New Delhi.	Conical Capacity Measures.
(6)	Mohd. Amin Mohd. Yamin, 30, North Gate, Jama Masjid, Delhi.	Beam Scales Class B.
(7)	Moudgil Metal Industries, 2020, Chapperwala Kuan, Karol Bagh, New Delhi.	Brass Weights.
(8)	Swinder Singh Batra, Gur-ki-Mandi, Delhi	Beam Scales Class C & D.

Dealers

Sl. No.	Name and Address of Dealer	Details of Articles Sold
(1)	Aneja Bartan Stores, 1531, Nai Sarak, Delhi	Weights, Measures, Weighing and Measuring Instruments.
(2)	Bidani Stores, Fateh Puri, Delhi	Weights, Measures, Weighing and Measuring Instruments.
(3)	Indian Kanta Works, 8170, Chimni Mill, Bara Hindu Rao, Delhi.	Weights, Measures, Weighing and Measuring Instruments.
(4)	Kidar Nath & Sons, A/883, Mehrauli, Delhi	Weights, Measures, Weighing and Measuring Instruments.
(5)	Khushi Ram Girdhari Lal, 1644, Lal Kuan, Delhi	Weights, Measures, Weighing and Measuring Instruments.
(6)	Larson & Toubro Ltd., 1, Ansari Road, Darya Ganj, Delhi.	Weights, Measures, Weighing and Measuring Instruments.
(7)	Malik & Brothers, 29, Northern gate, Jama Masjid, Delhi	Bullion Weights and Beam Scales of Class B & C.

Dealers (contd.)

Sl. No.	Name and Address of Dealer	Details of Articles Sold
(8)	Pal Engineering Works, 38, Motia Khan, Jhandawala Road, New Delhi.	Weights.
(9)	Pokhar Das Daulat Ram, Lal Kuan, Delhi	Weights, Measures, Weighing and Measuring Instruments.
(10)	Ram Chand Prem Parkash, 1643, Lal Kuan, Delhi	Weights, Measures, Weighing and Measuring Instruments.
(11)	Shiv Lal Makhan Lal Jain, 378, Main Bazar, Najaf Garh, Delhi.	Weights, Measures, Weighing and Measuring Instruments.
(12)	Sohan Lal Chadha & Sons, 1/1, West Patel Nagar, Opp. Taxi Stand, New Delhi.	Weights, Measures, Weighing and Measuring Instruments.
(13)	Valcum Trading Co. Private Ltd., Indra Palace, Connaught Place, New Delhi.	Weights, Measures, Weighing and Measuring Instruments.
(14)	Ved Sarup Berry, 1, U. B. Jawahar Nagar, Delhi	Weights, Measures, Weighing and Measuring Instruments.

MADRAS (3)

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

Manufacturers

Sl. No.	Name and Address of Manufacturer	Details of Articles Manufactured
(1)	Arkay Engineering Company, 38, Errabalu Chetty Street, Madras-1.	Weights and Measures.
(2)	T. D. Balraj, C/o Sri K. R. Naidu, 19, Rasappa Chetty Street, Madras-1.	Weights and Measures.
(3)	Coimbatore Engineering Foundry, 17, Thiruchandur Road, Palayamkottai, Tirunelveli.	Weights and Measures.
(4)	R. Gopal, Gopal Tinker Works, 89, Linchi Chetty Street, Madras-1.	Weights and Measures.
(5)	Jayabarath Engineering Works, 2/27, Meerah Sahib Street, Mount Road, Madras-2.	Weights and Measures.
(6)	Jeevanlal (1929) Ltd., P. B. No. 1339, 127, Mint Street, Madras-1.	Weights and Measures.
(7)	V. K. Kannappan, Hormes Industrial Works, Vellore, North Arcot District.	Weights and Measures.

LICENSED MANUFACTURERS, DEALERS & REPAIRERS OF WEIGHTS & MEASURES (9)

Manufacturers (contd.)

Sl. No.	Name and Address of Manufacturer	Details of Articles Manufactured
(8)	Krishna Engineering Works ((Kanchee), Nellukara Street, Kancheepuram.	Weights and Measures.
(9)	P. C. Mohanalingam 43-B, Hoodwharf Waltax Road, Madras-1.	Weights and Measures.
(10)	G. M. Parthasarathy Naidu & Sons, 3, Ritchie Street, Mount Road, Madras-2.	Weights and Measures.
(11)	A. M. L. Swamy, Proprietor, Ravi Industries, 11-A, Muthukumaraswamy Naicker Road, Alandur, Madras-16.	Weights and Measures.
(12)	Seshasayee Industries Ltd., Sarakuppam, Vadalur P. O., South Arcot District.	Weights and Measures.
(13)	R. T. Thandavam, Uma & Company, 10, Muthiah Mudaly Street, Old Washermanpet, Madras-21.	Weights and Measures.
(14)	S. M. Thandavamoorthy Naicker, Manufacturers of Weights and Measures, 61, Chinnamman Koil Street, Chingleput.	Weights and Measures.

Dealers

Sl. No.	Name and Address of Dealer	Details of Articles Sold
(1)	Abbas & Co., 187, N.S.C. Bose Road, Madras-1	Weights, Measures, Weighing and Measuring Instruments.
(2)	Arcot Dorairajan, Sheffield Scale Company, 38, Broadway, Madras-1.	Weights, Measures, Weighing and Measuring Instruments.
(3)	R. Arkka Keerthi, General Merchant, Villupuram Road, Gingee.	Weights, Measures, Weighing and Measuring Instruments.
(4)	B. Aruldoss, Government Book Seller, Pondy Road, Villupuram.	Weights, Measures, Weighing and Measuring Instruments.
(5)	R. Arunachalaya, Iron Wares and Iron Merchants, 42, Venkataramana Iyer Street, Pollachi.	Weights, Measures, Weighing and Measuring Instruments.
(6)	Asia Engineering Corporation, Fort, Bombay Madras Representative, Shri A. Gurunath 15, Stringers Street, Madras-1.	Weights, Measures, Weighing and Measuring Instruments.
(7)	T. D. Balraj, C/o, K. R. Naidu, 19, Rasappa Chetty Street, Madras-3.	Weights, Measures, Weighing and Measuring Instruments.
(8)	Chingam Co-operative Marketing Society Ltd., Chingam P.O.	Weights, Measures, Weighing and Measuring Instruments.
(9)	P. A. Devarajulu Chettiar, Bazar Street, Karunguli	Weights, Measures, Weighing and Measuring Instruments.
(10)	M. J. Doraiswamy Naidu & Sons, S/o M. Jagannathan Naidu, Iron Merchant, 62, Bazaar Street, Madurantakam.	Weights, Measures, Weighing and Measuring Instruments.
(11)	Garlick & Private Ltd., 26, Errabalu Chetty Street, Madras-1.	Weights, Measures, Weighing and Measuring Instruments.

Dealers (contd.)

Sl. No.	Name and Address of Dealer	Details of Articles Sold
(12)	R. Gopal, Gopal Tinker Works, 29, Linghi Chetty Street, Madras-1.	Weights Measures, Weighing and Measuring Instruments.
(13)	D. M. Hassan & Company, Hardware and Machinery Merchant, 8, Sembudoss Street, Madras-1.	Weights, Measures, Weighing and Measuring Instruments.
(14)	Ibrahim Agencies, 10, Jones Street, Madras-1	Weights, Measures, Weighing and Measuring Instruments.
(15)	Jangama Corporation, "Sunny Villa", Pallavaram P.O., Madras.	Weights, Measures, Weighing and Measuring Instruments.
(16)	Jeevanlal (1929) Ltd., P.B. No. 389, 127, Mint Street, Madras-1.	Weights, Measures, Weighing and Measuring Instruments.
(17)	Jupiter Agencies, 84, Chinnakkadi Street, Palani	Weights, Measures, Weighing and Measuring Instruments.
(18)	V. K. Kannappan, Hermes Industrial Works, Vellore, North Arcot District.	Weights, Measures, Weighing and Measuring Instruments.
(19)	Kilburn & Coy. (Private) Ltd., 32/33, Linghi Chetty Street, Madras-1.	Weights, Measures, Weighing and Measuring Instruments.
(20)	C. Manickam Chetty, Iron Merchant, Shevapat, Salem	Weights, Measures, Weighing and Measuring Instruments.
(21)	P. C. Mohanalingam, 43-B, Hoodwharf, Waltax Road, Madras-1.	Weights, Measures, Weighing and Measuring Instruments.
(22)	Murugesu Mudaliar, 123, Raja Street, Big Kancheepuram	Weights, Measures, Weighing and Measuring Instruments.
(23)	Nadar Timber Trading Coy., Timber, Tiles, Paint and Hardware Merchants, Madurantakam.	Weights, Measures, Weighing and Measuring Instruments.
(24)	Nanasuba & Coy. (Private) Ltd., 82, Royapettah High Road, Madras-4.	Weights, Measures, Weighing and Measuring Instruments.
(25)	K. Narayanaswamy, 24, Tindivanam Road, Tiruvannamalai	Weights, Measures, Weighing and Measuring Instruments.
(26)	R. Pandurangam, 68, Mundy Street, Arni, North Arcot District.	Weights, Measures, Weighing and Measuring Instruments.
(27)	R. Periaswamy Chettiar, Shri Poomagal Rice Mills, Madurantakam.	Weights, Measures, Weighing and Measuring Instruments.
(28)	K. Ramchandran, Hardware Merchant, Shevapat, Salem	Weights, Measures, Weighing and Measuring Instruments.
(29)	R. Radhakrishnan, Proprietor, Dhanalakshmi Stores, W-5-65, Near Perumal Koll, Tirukoilur.	Weights, Measures, Weighing and Measuring Instruments.
(30)	K. P. Ramanathan, 9, Zinnah Road, III, Bazaar Street, Tirupattur, North Arcot District.	Weights, Measures, Weighing and Measuring Instruments.
(31)	V. A. M. Rathinam & Bros., 44, Amman Sannathi, Madurai	Weights, Measures, Weighing and Measuring Instruments.

LICENSED MANUFACTURERS, DEALERS & REPAIRERS OF WEIGHTS & MEASURES (9)

Dealers (contd.)

Sl. No.	Name and Address of Dealer	Details of Articles Repaired
(32)	E. A. Sabiwala, M/s. France Machine Tools Corporation, 23, Broadway, Madras-1.	Weights, Measures, Weighing and Measuring Instruments.
(33)	V. Sankaralingam, 308, Main Bazar, Vellore, North Arcot Dist.	Weights, Measures, Weighing and Measuring Instruments.
(34)	R. Sriramulu, Proprietor, B. Rajagopal Naidu & Sons, Hardware Merchant, 63 & 64, Lawrence Road, Tiruppapuliyur.	Weights, Measures, Weighing and Measuring Instruments.
(35)	K. P. A. Sundararaj, S/o K. A. Annamalai Chettiar, 40, Chetty Street, Tirupattur, North Arcot Dist.	Weights, Measures, Weighing and Measuring Instruments.
(36)	A. M. Swamy, Proprietor, Ravi Industries, 11-A, Muthukumaraswamy Nayagar Road, Alandur, Madras-16.	Weights, Measures, Weighing and Measuring Instruments.
(37)	R. T. Thandavam, Proprietor, Uma & Coy., 10, Muthiah Mudaly Street, Old Washermanpet, Madras-21.	Weights, Measures, Weighing and Measuring Instruments.
(38)	Unicorn Private Ltd., 29, Mount Road, Madras-2	Weights, Measures, Weighing and Measuring Instruments.

Repairers

Serial No.	Name and address of Repairer	Details of Articles Sold
(1)	Arcot Dorairajan, Sheffield Scales Company, 38, Broadway	Weights, Measures, Weighing and Measuring Instruments.
(2)	Arkay Engineering Company, 38, Erabalu Chetty Street, Madras-1.	Weights, Measures, Weighing and Measuring Instruments.
(3)	R. Gopal, Gopal Tinker Works, 89, Linghi Chetty Street, Madras-1.	Weights, Measures, Weighing and Measuring Instruments.
(4)	Kilburn & Company (Private) Ltd., 32-33, Linghi Chetty Street, Post Box No. 1700, Madras-1.	Weights, Measures, Weighing and Measuring Instruments.
(5)	A. S. S. Moorthy, 10, M. K. Naicker Road, Alundoor, Madras-16.	Weights, Measures, Weighing and Measuring Instruments.
(6)	M. Motilal, 11, Baker's Street, Choolai, Madras-7	Weights, Measures, Weighing and Measuring Instruments.
(7)	Kum. T. S. Santha, 1/49, Kodambakkam High Road, T. Nagar, Madras-17.	Weights, Measures, Weighing and Measuring Instruments.
(8)	R. T. Thandavam, Proprietor, Uma & Company, 10, Muthiah Mudaly Street, Madras-21.	Weights, Measures, Weighing and Measuring Instruments.
(9)	Unicorn Private Ltd., 29, Mount Road, Madras-2	Weights, Measures, Weighing and Measuring Instruments.

PUNJAB (6)

In the July and September 1959, March, May and July 1960 issues of *Metric Measures* lists of manufacturers, dealers and repairers of weights and measures in the Punjab State were published. The following is a list of manufacturers and 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)	Bawa Iron and Steel Works, Ltd., Industrial Area, Sonapat	Weights 100, 200 and 500 grams and 1, 2, 5, 10, 20 and 50 kg.

Dealers

Serial No.	Name and Address of Dealer	Details of Articles Sold
(1)	Amar Singh Harbans Singh, Chaura Bazar, Karnal	Weights, Measures, Weighing and Measuring Instruments.
(2)	Amritsaria Ram Sharma, Dabbi Bazar, (Sarafa), Hoshiarpur	Weights, Measures, Weighing and Measuring Instruments.
(3)	Asoka Industries, Railway Road, Batala	Weights, Measures, Weighing and Measuring Instruments.
(4)	Atma Ram Kasturi Lal, Lehra Gaga	Weights, Measures, Weighing and Measuring Instruments.
(5)	Bashamber Dass, Faqir Chand, Dhariwal, Dist. Hoshiarpur	Weights, Measures, Weighing and Measuring Instruments.
(6)	Bhim Sain Hukam Chand, Iron Merchants, Alwalpur, Distt. Jullundur.	Weights, Measures, Weighing and Measuring Instruments.
(7)	Chandan Lal Shiv Dutta, Julana Mandi, Dist. Sangrur ..	Weights, Measures, Weighing and Measuring Instruments.
(8)	Daulat Ram Raj Kumar, Goniana Mandi, Distt. Bhatinda	Weights, Measures, Weighing and Measuring Instruments.
(9)	Devinder Brothers, Chandigarh	Weights, Measures, Weighing and Measuring Instruments.
(10)	Hans Raj Om Parkash, Mandi Dabwali	Weights, Measures, Weighing and Measuring Instruments.
(11)	Haveli Singh Ujagar Singh, Chowk Sujan, Jullundur ..	Weights, Measures, Weighing and Measuring Instruments.
(12)	Iron & Steel Dealers' Association, Rampura Phul, Dist. Bhatinda.	Weights, Measures, Weighing and Measuring Instruments.
(13)	Jagan Nath Gorakh Nath, Nabha Gate, Sangrur	Weights, Measures, Weighing and Measuring Instruments.

LICENSED MANUFACTURERS, DEALERS & REPAIRERS OF WEIGHTS & MEASURES (9)**Dealers (contd.)**

Serial No.	Name and Address of Dealer	Details of Articles Sold
(14)	Jumana Dass, Shopkeeper, Railway Road, Near Arya Samaj Mandir, Hissar.	Weights, Measures, Weighing and Measuring Instruments.
(15)	Kewal Singh Harnam Singh, Pehwa (Karnal)	Weights, Measures, Weighing and Measuring Instruments.
(16)	Kidar Nath Ram Chander, Chaura Bazar, (Karnal)	Weights, Measures, Weighing and Measuring Instruments.
(17)	Maman Chand Vijay Kumar, Brassware Merchants, Budlada Mandi (Bhatinda).	Weights, Measures, Weighing and Measuring Instruments.
(18)	Piara Lal Aggarwal s/o Katra Ram, Iron and Hardware Merchants, Grain Markets, N. Mandi, Bassi.	Weights, Measures, Weighing and Measuring Instruments.
(19)	Premnath Aggarwal & Sons, Chaura Bazar, Karnal ..	Weights, Measures, Weighing and Measuring Instruments.
(20)	Punjab National Iron Works, Fenton Ganj, Jullundur City	Weights, Measures and Beam Scales.
(21)	Ram Lal Harbans Lal Moga, (Ferozepur)	Weights, Measures, Weighing and Measuring Instruments.
(22)	Ram Om Prakash, Maur Mandi, Dist. Bhatinda	Weights, Measures, Weighing and Measuring Instruments.
(23)	Ramesh Chander Chunni Lal, Subzi Mandi, Thanesar City Dist. Karnal.	Weights, Measures, Weighing and Measuring Instruments.
(24)	Rulia Ram Vijaya Kumar, Rajya Mandi, Dist. Amritsar ..	Weights, Measures, Weighing and Measuring Instruments.
(25)	Shiv Narain Hukam Chand, Iron Merchants, Moti Chawk, Rewari.	Weights, Measures, Weighing and Measuring Instruments.
(26)	Sumer Chand Naresh Chand, Radaur, Dist. Karnal	Weights, Measures, Weighing and Measuring Instruments.

Repairers

Serial No.	Name and Address of Repairer	Details of Articles Repaired
(1)	Bhiwani Foundry Works, Bichla Bazar, Bhiwani	Weights & Measures of Length and Capacity.
(2)	Gian Chand Mistry, Near Jaboo Khana, Shalamar Bagh Road, Kapurthala.	Cast Iron & Brass Weights and Measures of Length and Capacity.
(3)	Pirdan Mistri, "Tohanawala", Gali Chhabil Dass, Hissar ..	Weights & Measures of Length and Capacity.
(4)	Som Nath & Sons, Iron Merchants, Mandi Gurdaspur ..	Weights & Measures of Length and Capacity.
(5)	Swaraj Foundry & Engineering Works, G. T. Road, Batala	Weights & Measures of Length and Capacity.

UTTAR PRADESH (2)

In the July 1960 issue of *Metric Measures* a list of manufacturers, dealers and repairers of weights and measures in Uttar Pradesh State was published. The following is a list of manufacturers, dealers and repairers subsequently licensed by the Government of Uttar Pradesh under the Uttar Pradesh Weights and Measures (Enforcement) Act, 1959.

Manufacturers

Serial No.	Name and Address of Manufacturer	Details of Articles Manufactured
(1)	Agarwal Tin Mfg. Co. and Engineering Works, Sultanganj, Agra.	Weights.
(2)	Avery Co. of India Private Ltd., 63/2 Mahatma Gandhi Road, Kanpur.	Cast Iron & Brass Weights and Beam Scales.
(3)	Brij Behari Lal Triloki Nath, Iron Foundry and Engineering Works, 84/7 Factory Area, Kanpur.	Cast Iron Weights.
(4)	Ganesh Das Ram Gopal & Sons, Mahatma Gandhi Marg, Lucknow.	Weights and Measures.
(5)	Gopal Industries, 3681, Sultanganj, Agra	Brass Weights from 1g to 50g.
(6)	Harnarain Jagan Nath Foundry, 125, Fazalganj, Kalpi Road, Kanpur.	Cast Iron Weights.
(7)	Indian Engineering Co., Maldhia, Varanasi	Cast Iron and Brass Weights.
(8)	B. C. Iron Foundry, Sultanganj, Agra	Cast iron Weights.
(9)	Kashi Iron Foundry, Near Goodshed, Varanasi Cantt. ..	Cast Iron and Brass Weights.
(10)	Krishna Engineering Works, Shivpuri, Varanasi	Weights.
(11)	Mahalakshmi Metal Works, Lal Daraja, Farrukhabad ..	Weights.
(12)	Mazdoor Iron Foundry, Nehru Road, Jamuna Kinara, Agra	Cast Iron and Brass Weights.
(13)	Mechanical Corporation Private Ltd., Sarojini Nagar, Lucknow.	Weights and Measures.
(14)	Misra Engineering Co., Murarkha Mills, Gorakhpur ..	Weights, Measures and Weighing and Measuring Instruments.
(15)	Nagarkar Engineering Works, Venus Cinema Compound, Gorakhpur.	Weights.
(16)	National Malleable Casting, Assi, Varanasi	Cast Iron & Brass Weights.
(17)	Nirmal Engineering Corporation, Golghar, Gorakhpur ..	Weights.
(18)	Post War Industrial Institute, Sarojini Nagar, Lucknow ..	Weights and Measures.
(19)	Purshottamdas Chunnilal, Murasan Gate, Hathras ..	Cast Iron & Brass Weights & Measures.
(20)	Raj Iron Foundry, Sultanganj, Agra	Cast Iron Weights.
(21)	Raman Iron Foundry & Steel Rolling Mills, Delhi Daraja, Mathura.	Cast Iron & Brass Weights.

Manufacturers (contd.)

Serial No.	Name and Address of Manufacturer	Details of Articles Manufactured
(22)	Ramkrishna Iron Foundry, Sultanganj, Agra	Weights.
(23)	Randhir Singh, Khubchand Iron Foundry, Masta Ki Bagichi, Jeoni Mandi, Agra.	Cast Iron Weights.
(24)	Sheo Rice and Flour Mills, P.O. Risia, Dist. Bahraich ..	Cast Iron Weights from 50 kg to 1 kg and Brass Weights from 20 kg to 1 g.

Dealers

Serial No.	Name and Address of Dealer	Details of Articles Sold
(1)	Abdul Azim, Jhwaitola, Abdul Azim Road, Lucknow ..	Weights and Measures.
(2)	Anant Das, Dewan Bazar, Gorakhpur	Weights and Measures.
(3)	Anil Kumar Agarwal, Iron Stores, 16 Latouche Road, Lucknow.	Weights and Measures.
(4)	Avery and Co. of India Private, Ltd., 63/2, M.G. Road, Kanpur.	Weights and Measures, Weighing and Measuring Instruments.
(5)	Badri Prasad Agarwal, Ghasiari Mandi, Lucknow	Weighing and Weights Instruments.
(6)	Brij Behari Lal Triloki Nath, Hatia Lohai, Kanpur	Weights and Measures.
(7)	Ganeshi Lal Bishambhar Dayal, Narhi Bazar, Lucknow ..	Weights and Weighing Instruments.
(8)	Hari Krishna Lal Agarwal, 148/1, Makhania Nahal, Sadar Bazar, Lucknow.	Weights and Weighing Instruments.
(9)	Harnarain Jagan Nath, Iron Foundry, Hatia, Kanpur ..	Weights and Weighing Instruments.
(10)	B.C. Iron Foundry, Sultanganj, Agra	Weights.
(11)	Jugal Kishore Agarwal, Ghasiari Mandi, Lucknow ..	Weights, Measures, Weighing and Measuring Instruments.
(12)	Madan Mohan, Ismailpur, Gorakhpur	Weights, Measures, Weighing and Measuring Instruments.
(13)	Mahalakshmi Metal Works, Lal Daraja, Farrukhabad ..	Weights and Measures.
(14)	Misra Engineering Co., Murarkha Mills, Gorakhpur ..	Weights, Measures, Weighing and Measuring Instruments.
(15)	Mohan Lal Rajwani, 44, Park Road, Narahi Bazar, Lucknow	Weights, Measures, Weighing and Measuring Instruments.
(16)	Munna Lal Birendra Kumar Bhedawan, Near Police Station, Lucknow.	Weights and Measures.
(17)	Nagarkar Engineering Works, Venus Cinema, Compound, Gorakhpur.	Weights and Measures.
(18)	National Malleable Casting, Assi, Varanasi	Cast Iron & Brass Weights.

Dealers (contd.)

Sl. No.	Name and Address of Repairer	Details of Articles repaired
(19)	Normal Engineering Corporation, Golghar, Gorakhpur ..	Weights and Measures.
(20)	Puttan Lal Gupta, Durbijaiganj, Lucknow	Weights, Measures, Weighing and Measuring Instruments.
(21)	Pyare Lal Gupta, Narahi Bazar, Lucknow .. .	Weights and Weighing Instruments.
(22)	Raj Iron Foundry, Sultanganj, Agra .. .	Weights.
(23)	K.C. Scientific Emporium, 44-B, Cantt Road, Lucknow ..	Weights & Measuring Instruments.
(24)	Sheo Narain Lakhani Lal Agarwal, Makhania Mohal, Sadar Bazar, Lucknow.	Weights and Weighing Instruments.
(25)	Subol Chand Das "Shree Bhawan" Narahi Bazar, Lucknow	Weights, Weighing and Measuring Instruments.
(26)	Wadhuram Uttamchand, Qr. No. 65, Krishna Colony, Agra	Weights and Scales.

Repairers

Serial No.	Name and Address of Repairer	Details of Articles Repaired
(1)	Abdul Azim, Jhawaitola, Audul Azim Road, Lucknow ..	Weights, Measures, Weighing and Measuring Instruments.
(2)	Avery Co. of India Private Ltd., 63/2, M.G. Road, Kanpur ..	Weights, Balances and Weighing Machines.
(3)	Brij Behari Lal Triloki Nath, Iron Foundry, 84/7 Factory Area, Kanpur.	Weights and Measures.
(4)	Harnarain Jagannath Iron Foundry, 125, Fazalganj, Kalpi Road, Kanpur.	Weights and Measures.
(5)	B.C. Iron Foundry, Sultanganj, Agra .. .	Weights.
(6)	Mahalakshmi Metal Works, Lal Daraja, Farrukhabad ..	Weights and Measures.
(7)	Mathura Prasad & Sons, Fatehganj, Lucknow .. .	Weights, Measures, Weighing and Measuring Instruments.
(8)	Misra Engineering Company, Murarka Mills, Gorakhpur ..	Weights, Measures, Weighing and Measuring Instruments.
(9)	Nagarkar Engineering Works, Venus Cinema Compound, Gorakhpur.	Weights and Measures.
(10)	National Malleable Casting, Assi, Varanasi .. .	Weights.
(11)	Nirmal Engineering Corporation, Golghar, Gorakhpur ..	Weights and Measures.
(12)	Raj Iron Foundry, Sultanganj, Agra .. .	Weights.
(13)	Ram Rattan Dhiman, Lakshmiji Sugar Mills, Mohali, Dist. Sitapur.	Weights, Measures, Weighing and Measuring Instruments.
(14)	K.C. Scientific Emporium, 448 Cantonment Road, Lucknow	Weights, Measures, Weighing and Measuring Instruments.

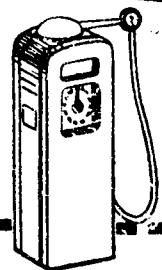
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BOMBAY 2
Phone: 71534
Gram: MANMUL

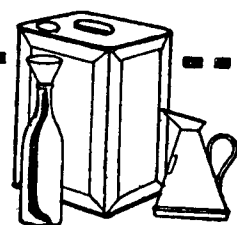
OUR SMALL WEIGHTS
from 1 gram. to 50 grams
will be supplied in an
unbreakable plastic container



PETROL

KEROSENE

**NOW SOLD IN
LITRES**



Petroleum industry has changed over to Metric System. Petrol and Kerosene are now sold in litres.

Prices of these will not be affected by the change-over.

Gallon	Litre	Gallon	Litre	Litre	Gallon	Litre	Gallon
1----	4.55	20----	90.9	1----	0.22	20----	4.4
2----	9.1	30----	136.4	2----	0.44	30----	6.6
3----	13.6	40----	181.8	3----	0.66	40----	8.8
4----	18.2	50----	227.3	4----	0.88	50----	11.0
5----	22.7	60----	272.8	5----	1.10	60----	13.2
6----	27.3	70----	318.2	6----	1.32	70----	15.4
7----	31.8	80----	363.7	7----	1.54	80----	17.6
8----	36.4	90----	409.1	8----	1.76	90----	19.8
9----	40.9	100----	454.6	9----	1.98	100----	22.0
10----	45.5			10----	2.20		

**1 GALLON =
4½ LITRES
approx.**

METRIC SYSTEM

FOR SIMPLICITY & UNIFORMITY

Issued by Government of India

DA 44/3

Published by the Director, Publications Division, Ministry of Information and Broadcasting, Delhi and printed by the Manager, Government of India Press, Faridabad
Registered with the Registrar of Newspapers for India under No. 977/58.

metric measures

THE PUBLICATIONS DIVISION

CONVERSION TABLE FOR PRICES
(Seer To Kilogram)

(Conversion Factor used: 1 kg=1.0717 Seers)

NAYE PAISE PER SEER TO NAYE PAISE PER KILOGRAM		RUPEES PER SEER TO RUPEES PER KILOGRAM	
nP/Seer nP/kg	nP/Seer nP/kg	Rs/Seer Rs/kg	Rs/Seer Rs/kg
1	21	1	11
2	22	2	12
3	23	3	13
4	24	4	14
5	25	5	15
6	26	6	16
7	27	7	17
8	28	8	18
9	29	9	19
10	30	10	20
11	31	11	21
12	32	12	22
13	33	13	23
14	34	14	24
15	35	15	25
16	36	16	26
17	37	17	27
18	38	18	28
19	39	19	29
20	40	20	30
81	61	31	21
82	62	32	22
83	63	33	23
84	64	34	24
85	65	35	25
86	66	36	26
87	67	37	27
88	68	38	28
89	69	39	29
90	70	40	30
91	71	41	31
92	72	42	32
93	73	43	33
94	74	44	34
95	75	45	35
96	76	46	36
97	77	47	37
98	78	48	38
99	79	49	39
100	80	50	40
101	81	51	41
102	82	52	42
103	83	53	43
104	84	54	44
105	85	55	45
106	86	56	46
107	87	57	47
108	88	58	48
109	89	59	49
110	90	60	50
111	91	61	51
112	92	62	52
113	93	63	53
114	94	64	54
115	95	65	55
116	96	66	56
117	97	67	57
118	98	68	58
119	99	69	59
120	100	70	60
121	101	71	61
122	102	72	62
123	103	73	63
124	104	74	64
125	105	75	65
126	106	76	66
127	107	77	67
128	108	78	68
129	109	79	69
130	110	80	70
131	111	81	71
132	112	82	72
133	113	83	73
134	114	84	74
135	115	85	75
136	116	86	76
137	117	87	77
138	118	88	78
139	119	89	79
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141	121	91	81
142	122	92	82
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159	139	109	99
160	140	110	100
161	141	111	101
162	142	112	102
163	143	113	103
164	144	114	104
165	145	115	105
166	146	116	106
167	147	117	107
168	148	118	108
169	149	119	109
170	150	120	110
171	151	121	111
172	152	122	112
173	153	123	113
174	154	124	114
175	155	125	115
176	156	126	116
177	157	127	117
178	158	128	118
179	159	129	119
180	160	130	120
181	161	131	121
182	162	132	122
183	163	133	123
184	164	134	124
185	165	135	125
186	166	136	126
187	167	137	127
188	168	138	128
189	169	139	129
190	170	140	130
191	171	141	131
192	172	142	132
193	173	143	133
194	174	144	134
195	175	145	135
196	176	146	136
197	177	147	137
198	178	148	138
199	179	149	139
200	180	150	140

1 Seer=80 Tolas : 1 Kilogram=1,000 Grams

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P. 726
metric
measures

(JOURNAL OF WEIGHTS AND MEASURES)

STANDING METRIC COMMITTEE
MINISTRY OF COMMERCE AND INDUSTRY

Vol. 3 NOVEMBER 1960 (KARTIKA 1882) No. 6

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Cover design by R. Sarangan

Annual Subscription Rs. 2.00

Single Copy 40 nP

metric measures

METRIC MEASURES is published every two months.

METRIC MEASURES provides information to the general public on the administrative, commercial, educational, industrial, historical and other aspects of weights and measures, with particular reference to the introduction of the metric system in India.

Contributions for publication should be sent to the Editor, METRIC MEASURES, Standing Metric Committee, Ministry of Commerce & Industry, Udyog Bhavan, New Delhi.

Enquiries regarding subscriptions and supply of copies should be addressed to the Business Manager, Publications Division, Ministry of Information and Broadcasting, Old Secretariat, Delhi-8.

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The opinions expressed by authors are not necessarily those of the Government.

Trading Units Used in France

GUY KNOCHE

French Economic & Technical Bulletin,
France

(In the following account, M. Knoche has given a very general survey of the metric units normally used for packaging in wholesale and retail trade in France. An account of the units recommended for use in India has been given in the March 1960 issue of 'Metric Measures', on pp. 22-24—Editor).

Fuels.

Paraffin (Lamp Oil)

Packed in 100 litre drums for delivery to retailers, but is sold to consumers per litre.

Diesel Oil

Diesel oil is normally delivered to pumping stations by road-tankers (capacity 5,000 to 10,000 litres). It is sold to the public by 5 litre units. Price charged per litre.

Electricity

The production and consumption unit is the kilowatt-hour (Kwh). Bills are made out in francs per Kwh.

Coal

Coal is delivered in tonnes, by wagons, barges or trucks; coal is sold by retailers either by the tonne or packed in bags of 50 kg or 5 kg. Price is charged per tonne or per bag (for the 5 kg bags).

Chemicals

Caustic Soda

This product being dangerous to handle is often packed directly by the manufacturer

in 1 kg cans for direct retail sale. Prices are charged according to the number of cans delivered.

Sulphuric Acid

It is delivered in special 20 litre carbuoys and retailed per litre.

Chloride of Lime and Bleaching Fluid (Eau de Javel)

Chloride of lime, for which the wholesale unit is the tonne, is hardly ever sold in the retail trade, while bleaching fluid (known as Eau de Javel) on the contrary, is traditionally sold in litre or double-litre i.e. 2 litre bottles. For the past few years, manufacturers have been supplying concentrated bleaching fluid (liquid form) in hermetically sealed plastic containers each containing the necessary quantity for one litre.

Paint

Paint is packed at the factory in 5 or 2 kg cans, or in 1 kg tins. Certain paints (enamel, varnish, etc.) are even packed in smaller tins, the size of which is indicated by volume (1/20 for 1/20th litre) or by numbers.

Laundry Soap (Savon de Marseille)

Wholesale trade is carried out in cartons of 12 cakes, each weighing 400 g. Retail sale is per cake or sometimes in cartons containing 2 cakes packed directly by the manufacturers.

Toilet Soap

Wholesalers sell it by the dozen. It is resold to consumers by the unit or in the case of certain brands, pre-packed by the manufacturer in boxes of two, three or six cakes.

Ammonium Sulphate

It is sold in 50 kg bags, packed directly at the factory.

Glycerine

Sold in 20 litre carbuoys. Packed by the retailer in pharmaceutical bottles of 10 or 20 cubic centimetres.

Matches

These are packed directly by the Service d'Exploitation Industrielle des Tabacs et Allumettes (SEITA) in flat booklets containing about twenty matches each or in boxes containing from 50 to 500 according to size. They are delivered to retailers in packets containing 10 boxes (whatever the size) or in packings containing 100 booklets. Sold by retailers per booklet or box.

Paper

The price for paper in sheets, of whatever size, is charged per ream of 500 sheets. For paper in rolls, the price is charged per kg, the average weight of a roll being 200 to 300 kg. Writing paper is also sold in reams of 500 sheets.

Cement

Cement is sold by the 50 kg bag packed at the factory. Some manufacturers sell bags of 20 or even 10 kg.

Infants' Milk Foods

It is packed by the manufacturer, and is sold in tins of 300 g or 1 kg.

Buttons

Buttons are sold to retailers on cards of one dozen. Retailled in the same form, the haberdasher generally purchasing a dozen cards at a time (i.e. 12 dozen buttons=144=

one gross). Certain particularly expensive buttons are sold per piece.

Liquid Pharmaceutical Preparations

These are packed at the manufacturing laboratory. Retailers sell them in bottles of 10, 15, 20, 25 cm³ or in larger bottles of 250 to 300 cm³. The latter is particularly the case for syrups.

Ordinary Inks

These are packed by the manufacturer and are sold in litres or bottles containing 1/10 or 1/20 litre i.e. 100 or 50 ml.

Glass and Ceramics

Pottery, Coffee Sets

These are sold per set (a set generally comprises 12 saucers, 12 cups, one kettle, one sugar pot and one milk jug). It is called the '27 piece' set.

Tiles

Tiles are sold per 100 as a rule directly by the manufacturer to the builder-user.

Window Glass

Wholesale and retail price is charged per square metre. Special unit prices are quoted for sizes exceeding current dimensions (for instance, for shop windows).

Drinking Glasses

Normally sold per dozen. Some retailers sell per piece in the case of standard models. Eight-glass sets (for cocktails or port wine).

Plantation Productions

Tea

Packed by wholesalers in packets of 50 or 100 grams. Sold per packet by retailer who purchase from wholesalers per kg. (Cartons of 10 for the 100 g packets and of 20 for the 50 g packets).

Coffee

Coffee is purchased in bags of 100 kg (quintal) by the wholesaler who, after roasting the coffee, packs it in 250 g packets or else

TRADING UNITS USED IN FRANCE

delivers it to the retailer in 25 kg bags. In the latter case, the retailer himself packs it in 250 g packets or exceptionally, in 500 g or 1 kg packets. Price is charged per kg.

Rubber

Retail sale of rubber is carried out only in the form of manufactured products. Wholesale price is charged per kg.

Tobacco

Tobacco is purchased per kg from the producer. It is processed and packed by SEITA. It is sold to the public in packets of 20 (sometime 10) cigarettes, or 40 g of tobacco (certain brands of tobacco are sold in packets of 33 grams). The price is charged per packet and varies according to quality.

Building Timber

Wholesale price is per tonne, retail price according to amount of preparation undergone by undressed timber.

Joinery Timber

Price is charged per tonne or per square metre according to species of timber.

Walnuts

Walnuts are purchased wholesale in 50 kg bags. They are sold to consumers in 1 kg bags or in bulk. Price is quoted on per kg basis.

Cotton, Silk, Jute

Cotton Fibre

Cotton is sold to the spinning-mills in bales of 378 pounds (imported from countries where the Anglo-Saxon system of units is in use).

Cotton Yarn

Cotton yarn is delivered to weavers in packages for which the price varies according to the yarn count. The (French) count is equal to the number of thousands of metres per 500 grams.

Fabrics (Textiles)

The sale units for wholesale trade is per 50 metre pieces (width variable according to materials: 120 cm for cotton fabrics, 140 or 90 cm for woollen fabrics, etc.). Retail sale is per metre.

Cotton Seed

The wholesale purchase is usually done in bags, and the price charged is per kg. No retail sale is usually necessary.

Jute

The price is per bale of 182 kg. No retail.

Jute Products

Whether for fabrics or carpets, the price varies according to packing. For jute yarns, the price is fixed in terms of length expressed in leas of 274 metres (300 yards).

Raw Silk

The wholesale price is fixed per kg. Retail price (sewing silk) per 5 g skein.

Hides and Skins

Raw Skins

The price is fixed according to size. There is usually no retail sale. If exceptionally there is one, the price is charged per skin.

Hides

These are sold by weight (in kg).

Minerals and Metals

Iron Ore

Iron ore is sold wholesale to the iron and steel industry per tonne. There is no retail sale.

Mica

Wholesale trade is by weight according to quality. Retail sale is in standardized sheets and is chargeable per unit.

Manganese Ore

The wholesale rate is per tonne. There is no retail sale.

Iron and Steel

These are sold per tonne. Retail sale is

of finished products only, and, in general, by length (per metre).

Agricultural Products

Wheat

Wheat is purchased from the producer per quintal and is retailed per kg. Flour is also delivered to bakers in bags of 100 kg.

Maize

The trade practice is the same as for wheat.

Dried Vegetables and Pulses

These commodities are sold in the wholesale trade in bulk or in 100 kg bags. Retail sale is in 500 g packages. Canneries also sell them ready cooked in cans described as 4/4, 1/2, or 1/4 according to size.*

Pepper

Pepper is purchased by retailers per kg in

the form of packages generally weighing 25 or 50 g which are sold per unit to consumers.

Milk

Milk is sold by the producer in 20 litre cans. Retailers sell it either in bulk (using special 1 litre, 1/2 or 1/4 litre bottles) or else packed in strictly hermetically sealed and water-proofed cartons containing 1/2 litre. Price is charged per litre.

Bullion

Gold

The wholesale price is quoted per kg (sold in ingots); retail price (in the jewellery trade) is per gram.

Silver

The practice is the same as for gold.

*NOTE: We have received information that wheat and maize are packed in jute bags to contain 100 Kg of total material. The dimensions of the bag are 130×70 cm (51¼"×27¼").

Although there is no specified standard for packing of dried vegetables and pulses, normally deliveries are made in jute bags, the total weight being 100 kg and the weight of the bag 1 kg. The dimensions of the bag are 120×72 cm (47¼"×28¼").

For flour, jute bags are used and contain a total weight of 100 kg. They are designated as DC 525.

The standard quality of the bags, for example, sold by the well known French manufacturer, Ets. Saint-Freres is CS 425 i. e. 425 grams of linen per square metre.

Metric System in Steel Industry

S. C. MUKHERJEE

Deputy Iron & Steel Controller,
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It is now some four years since the Standards of Weights and Measures Act, 1956, was entered in the Statute Book. In June 1958, it was notified that the Act shall come into force in respect of iron and steel factories from 1st October 1958. The lawmakers, however, knew full well that the revolutionary changes envisaged under the Act could not be brought about in four months. Simultaneously, therefore, a notification was issued permitting the continuance of the use of the old standards up to 30 September 1960. The long period of two years allowed for a gradual switch-over to the new standards is now over. It is but natural, therefore, that one should like to know how the steel industry has prepared itself for the new system. The answer, in short, is that considerable progress has been achieved in certain fields but quite a lot of ground yet remains to be covered.

At the outset, however, it is necessary to explain briefly the problem involved. It is broadly two-fold—first, the use of metric standard weights and measures in purchase of raw materials and sale of finished products; secondly, to produce iron and steel in metric or millimetre sections.

Purchase and Sale of Materials

The first problem is quite simple. It involves mainly re-calibration of the weighing

machines and some mechanical adjustments of the various sections of the steel mills. Even if such changes were to take some time, as it would, being to some extent dependent on the corresponding change-over in other branches of the engineering industries, the problem could be tackled by mere arithmetical conversion. Such conversion, no doubt, involves a lot of labour and time but the difficulties are not insuperable. Soon after the Government decision to apply the metric system to the steel industry was announced, the Steel Control communicated the decision to the steel mills. They were requested 'to confirm that action is being taken to implement the transition to the metric system as early as possible within the permitted period'. In November 1958, the Price Circular of steel materials was re-issued in the Gazette of India giving the price in decimal coinage and in metric tonnes. All the steel mills showed keenness to adopt the new system as early as possible, but actual progress was rather slow. In February 1959, the three major producers—Tatas, Indian Iron and Mysore Iron & Steel Works—were asked to intimate the progress. It was seen that none of them were procuring raw materials in metric standards; only Mysore Works reported that they were issuing tenders and bills in metric system by converting F.P.S. units. One

practical difficulty was the delay in introduction of the system by the Railways. With the Railways finally changing over to the metric system from 1 April 1960, this hurdle was removed. It can be confidently stated that from 1 October 1960, the steel industry has adopted the metric system of weights and measures in sale and purchase of materials.

Production of Steel Sections

The second problem, *i.e.*, producing steel only in metric sections, is a little more complicated. Here again the steel industry's efforts have been praiseworthy. The Indian Standards Institution has already prescribed the new metric sections for most of the categories of steel and the steel works have accepted them. They are in fact keen on switching over to the new sections as early as possible. The three new steel plants in the public sector will produce steel in metric sections from the very beginning. They are already rolling out steel billets in metric sections which are being sold without any difficulty. Similarly the private sector steel plants have formulated plans for gradual change-over to metric sections. Both Tatas and Indian Iron are already producing several sections of steel in metric standards. In December 1958, Tatas commissioned a completely new mill with a capacity of 20,000 tons a month, which is producing metric sections of structurals and rounds. Indian Iron and Steel Company also have already successfully rolled some rounds and structural sections according to metric standards.

Mere readiness of the producers to switch over to metric standards is, however, not enough. The consumers have also to be ready to utilize them. Thanks to sizeable imports of steel in metric sizes during the last 5 or 6 years, these are no longer unfamiliar to the consumers in India. Pressed by heavy demands of steel for the execution of the Second Five-year

Plan Projects, steel had to be imported from all available sources. Sizeable quantities came from the Continent and the Soviet Union. The entire supplies from Russia and a good bit of the Continental steel were offered in metric sizes. Out of sheer necessity, Government of India accepted the materials. There was some initial consumer resistance but through education and propaganda, reinforced by pressing and urgent necessity, the materials were gradually accepted. In the process, our engineers became familiar with these sections.

The part played by the Indian Standards Institution in this connection, deserves mention. The Institution adopted the metric system for Indian Standard specifications for steel from the very beginning. In the process of finalizing these standards, the Institution had to consult producers, technicians and consumers of steel and this in turn helped a great deal in giving wide publicity to the metric sections of steel, their properties and uses. Tatas and Indian Iron and Steel Company have also published useful brochures about metric sections to be rolled by them and several circulars on the subject have been issued by the Steel Control urging consumers to switch over to metric sections of steel.

Consumers of Steel

All this publicity and propaganda have been quite effective in bringing about public consciousness. Metric sections already being produced in the country and imported from abroad are being utilized by essential consumers. Unfortunately the biggest consumer of steel in India, the Railways, are not yet ready to accept metric sections for all their requirements. They are, of course, now accepting quite a substantial quantity but it would take

them a little more time to switch over completely to the new system.

This problem was discussed at a meeting convened by the Tata Iron and Steel Company in July 1960. The meeting was attended by the representatives of the producers, big engineering concerns and Government Departments. The representatives of the Railways and the Directorate General of Supplies and Disposals strongly objected to the complete switch-over to the metric system of steel sections from 1 October 1960. They explained that a change-over to the metric system needed complete re-designing of the Railway bridges, structures, etc., and in spite of the fact that the Central Government had allowed two years for transition to the new system, they were not yet in a position to accept metric sections for all their requirements. From the producers' angle also complete switch-over to the metric system at this stage would entail some financial loss. All the producers have got 'rolls' for the British sections which could not be conveniently adjusted for producing metric sections. Such 'rolls' will have to be scrapped in spite of the fact that many of them are yet capable of turning out large quantities of British sections.

Both in the interest of consumers and producers, therefore, the production of steel in British sections will have to continue for some time after 1 October 1960.

Legal Position

A question was raised whether this would be permissible under the law or whether the law would be required to be amended. It is understood that there is no objection to the production of steel according to the existing British Standards and the requirements of law would be met if such sections were described in terms of metric units, *i.e.* millimetres

instead of inches and kilograms per metre in place of pounds per foot.

The problem of expressing British standard sections in terms of metric units of weights and measures is not, however, very simple. There is likely to be confusion if each producer starts expressing British standard sections produced by them by using the standard conversion table published by the Indian Standards Institution. The same section produced by two producers may be expressed in different metric units if the degree of accuracy adopted by them varies. The problem might be solved by the Steel Control by issuing a circular giving a standard conversion for each British measure normally in use by the steel industry. Even then the difficulty of the consumers who have to use these steel sections may not be solved.

For an engineer constructing a bridge, a joist of the size $24'' \times 7\frac{1}{2}''$ has a meaning which is quite different from its mere physical dimensions. He knows its strength, its elongation and many other physical properties which are essential to enable him to determine its usefulness for a particular structure. If instead of a $24'' \times 7\frac{1}{2}''$ joist, he comes across a 610 mm $\times$ 190 mm joist, he would not be quite sure whether this is the exact British standard section which he has so long been using in the structures erected by him. A joist of 610 mm $\times$ 190 mm., although it might arithmetically correspond to a $24'' \times 7\frac{1}{2}''$ joist, may have quite different properties. The difficulty of using British standard sections expressed in metric units would, therefore, remain unless the engineer is definitely told that this particular section is actually the old British standard section with which he was familiar.

It has been suggested that producers should be permitted to indicate British units in their invoices and other documents so long as they have to continue to produce the old British

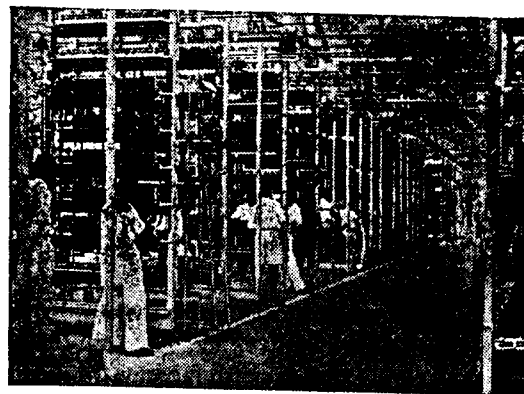
standard sections. It is understood that this would not be objectionable in law.*

Change in Railway Designs

The question may be asked as to how long the steel industry should continue to produce materials according to British standards. The question can be answered only by the Railways who are the biggest consumers of steel. Once the Railways agree to change their designs to suit the metric sections others will follow suit. A suggestion was made to

the Railways that they should be able to complete alterations in their designs within a period of a year. At one time it was understood that this was possible. Recently, however, the Railway Board have communicated to the Ministry of Commerce and Industry their inability to do so. In the recent discussions with representatives of Tatas and Indian Iron as well as Steel Control it was decided that after Railways had indicated the extent of their future requirements of British standard sections, a joint meeting would be convened to decide how long the Indian steel industry should continue to produce F.P.S. sections. There is no doubt, however, that the Railway Board also is very keen on switching over to the metric sections as early as possible. It is hoped that the period of transition would not be very long.

**(This conclusion is in line with Indian Standard : 787-1956 Inter-Conversion of Values from One System of Units to Another. In this Standard it has been pointed out that any dimensions used for designating an article could be regarded as its name and should not be converted until new standards for the same article have been laid down and a new designation assigned to it.—Editor)*



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Weighment of Sugarcane in Metric System

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THE Government of India have issued a Notification stating that from 1 November 1959, the provisions of the Standards of Weights and Measures Act, 1956, relating to the units of mass shall come into force in respect of sugar factories insofar as they undertake the purchase of sugarcane or the sale of sugar. (S.O. 414-415 dated 31 January 1959).

Cultivators' Difficulties

As a result of this Notification, the factories will have to maintain the weights of cane purchased and sugar sales in the metric system. Since the purchase of cane is made from individual cultivators, a very large majority of whom is illiterate, the new system of weights and measures is bound to be looked upon with suspicion by them and considerable time and energy will have to be tactfully used, until the cultivators become conversant with the system. The sugar industry is one wherein the purchase of raw materials (sugarcane) has to be made from a large number of people, but the sale of the finished product is made to a small number of wholesale dealers. There is, however, one redeeming feature, and that is that the cultivator, even though illiterate,

is still smart and shrewd enough to know that his cart when filled upto a certain height with cane fetches him a certain amount of money and he will quickly get used to the new system of weights and measures, if he finds that under this system he still gets the same amount as he was getting under the old system. His suspicion would be removed and, in a short time, he would become conversant with terms like kilos and quintals, as he is now with seers and maunds.

Perhaps, for at least a year or two it may be necessary to write the weighment slips in both the systems i.e. in kilograms and in maunds and seers, so that the cultivator knows the relations between the two and becomes familiar with the metric system by the time of its full adoption for all commodities.

We can assume, therefore, that so far as the cultivators are concerned, the problem will not be very serious.

Simple Tables Necessary

Most factories have several 3-ton capacity weighbridges for weighing bullock carts, a few 12-ton weighbridges for trucks and lorries and at least one weighbridge for

wagons. All these weighbridges are calibrated to give the weight in maunds and seers, as in most of the factories in North India the weighment is done in these units. In some factories in South India they use pounds, hundredweights and tons as standard units, and so the weighbridges are calibrated in these units. If, therefore, weighment of the cane is to be made in metric units, all these weighbridges have to be converted into metric scales. To do this all over the country before 1 November 1959 was next to impossible. The only alternative, therefore, was that the factories should be permitted to weigh on their existing weighbridges and record the weights in their normal calibrated units and these units could be converted into the metric units by means of conversion tables. This arrangement has been permitted by the Government of India to continue for some time. But later on the factories will have to convert all the weighbridges to give the weights in metric system directly.

Conversion tables have been already published by the Indian Standards Institution. Conversion table 83 of IS: 786—1956 (Indian Standard Conversion Factors and Conversion Table) covers the range from one seer to a thousand seers and is correct upto three places of decimals. Table 16 of IS: 1020—1957 (Indian Standard Conversion Tables for Ordinary Use) gives conversion of maunds to quintals and covers the range from 1 maund and 1,000 maunds and reads up to the second place of decimals.

In cane weighment the accuracy legally required in Uttar Pradesh is upto 5 seers. Calculations to the second or third places of decimals are not, therefore, necessary for purchase of cane.

When the weighment is made in maunds, the use of these tables can only be made

after the maunds have been converted into seers and the seers in the weighment of cane have been added to these. Thus a weight of 15 maunds 13 seers will first have to be converted to 613 seers and this total will have to be converted into kilograms. Thus for every cart weighed three calculations have to be made before conversion into metric units is possible. One can imagine the difficulties that will be experienced by the factories which have to weigh more than a thousand carts or so every day and how essential it would be for them to engage additional staff. In addition, there is the possibility of errors creeping into the calculations.

Simple Tables Proposed

We tried to adopt the metric system in our factory in the 1958-59 season only, just to acquaint ourselves with the difficulties likely to be encountered and to find out solutions for them. Instead of educating the cultivators to the metric system by weighing in maunds and seers and then converting these weights on paper we decided to weigh the carts themselves into the metric system and show the cultivators the relation between the two systems with the help of the conversion of metric weights into their usual weights of maunds and seers. With this idea in view we removed the old weighbridge which was calibrated in maunds and seers and installed in its place one reading in kilograms. For a few days the cultivators were suspicious but by suitable propaganda and discussion we got over their prejudices and within a week most of the cultivators became fully conversant and began to talk in terms of kilos.

Our greatest difficulty was in the use of the existing conversion tables. However we proceeded, we still required two or three different steps of calculations before conversion could be completed. We, therefore,

made up tables of our own which convert directly the weight in maunds and seers to kilos and we added an extra column to this which gave the money value for that weight in terms of rupees and naye paise according to the Government statutory prices.

As the weighment in the case of bullock carts is expected to have an accuracy of 5 seers only, the table has been drawn up to that accuracy only. A portion of such a table is given in Annexure 1.* The table is intended only for guidance.

ANNEXURE 1 CONVERSION TABLE MAUNDS & SEERS TO KILOGRAMS

Md	Sr	kg	Md	Sr	kg	Md	Sr	kg	Md	Sr	kg
0-5		5	4-20		168	8-35		331	13-10		495
0-10		9	4-25		173	9-0		336	13-15		499
0-15		14	4-30		177	9-5		341	13-20		504
0-20		19	4-35		182	9-10		345	13-25		509
0-25		23	5-0		187	9-15		350	13-30		513
0-30		28	5-5		191	9-20		355	13-35		518
0-35		33	5-10		196	9-25		359	14-0		523
1-0		37	5-15		201	9-30		364	14-5		527
1-5		42	5-20		205	9-35		369	14-10		532
1-10		47	5-25		210	10-0		373	14-15		537
1-15		51	5-30		215	10-5		378	14-20		541
1-20		56	5-35		219	10-10		383	14-25		546
1-25		61	6-0		224	10-15		387	14-30		551
1-30		65	6-5		229	10-20		392	14-35		555
1-35		70	6-10		233	10-25		397	15-0		560
2-0		75	6-15		238	10-30		401	15-5		565
2-5		79	6-20		243	10-35		406	15-10		569
2-10		84	6-25		247	11-0		411	15-15		574
2-15		89	6-30		252	11-5		415	15-20		579
2-20		93	6-35		257	11-10		420	15-25		583
2-25		98	7-0		261	11-15		425	15-30		588
2-30		103	7-5		266	11-20		429	15-35		593
2-35		107	7-10		271	11-25		434	16-0		597
3-0		112	7-15		275	11-30		439	16-5		602
3-5		117	7-20		280	11-35		443	16-10		607
3-10		121	7-25		285	12-0		448	16-15		611
3-15		126	7-30		289	12-5		453	16-20		616
3-20		131	7-35		294	12-10		457	16-25		621
3-25		135	8-0		299	12-15		462	16-30		625
3-30		140	8-5		303	12-20		467	16-35		630
3-35		145	8-10		308	12-25		471	17-0		635
4-0		149	8-15		313	12-30		476	17-5		639
4-5		154	8-20		317	12-35		481	17-10		644
4-10		159	8-25		322	13-0		485	17-15		649
4-15		163	8-30		327	13-5		490	17-20		653

*Full tables run into a number of pages. Only a few values are given here for information. Readers interested in full tables should contact the Director, National Sugar Institute, Kanpur.—Editor

METRIC MEASURES, VOL. 3, NOVEMBER 1960

Md	Sr	kg	Md	Sr	kg	Md	Sr	kg	Md	Sr	kg
17-25		658	23-10		868	28-35		1078	34-20		1288
17-30		663	23-15		872	29-0		1082	34-25		1292
17-35		667	23-20		877	29-5		1087	34-30		1297
18-0		672	23-25		882	29-10		1092	34-35		1302
18-5		676	23-30		886	29-15		1096	35-0		1306
18-10		681	23-35		891	29-20		1101	35-5		1311
18-15		686	24-0		896	29-25		1106	35-10		1316
18-20		690	24-5		900	29-30		1110	35-15		1320
18-25		695	24-10		905	29-35		1115	35-20		1325
18-30		700	24-15		910	30-0		1120	35-25		1330
18-35		704	24-20		914	30-5		1124	35-30		1334
19-0		709	24-25		919	30-10		1129	35-35		1339
19-5		714	24-30		924	30-15		1134	36-0		1344
19-10		718	24-35		928	30-20		1138	36-5		1348
19-15		723	25-0		933	30-25		1143	36-10		1353
19-20		728	25-5		938	30-30		1148	36-15		1358
19-25		732	25-10		942	30-35		1152	36-20		1362
19-30		737	25-15		947	31-0		1157	36-25		1367
19-35		742	25-20		952	31-5		1162	36-30		1372
20-0		746	25-25		956	31-10		1166	36-35		1376
20-5		751	25-30		961	31-15		1171	37-0		1381
20-10		756	25-35		966	31-20		1176	37-5		1386
20-15		760	26-0		970	31-25		1180	37-10		1390
20-20		765	26-5		975	31-30		1185	37-15		1395
20-25		770	26-10		980	31-35		1190	37-20		1400
20-30		774	26-15		984	32-0		1194	37-25		1404
20-35		779	26-20		989	32-5		1199	37-30		1409
21-0		784	26-25		994	32-10		1204	37-35		1414
21-5		788	26-30		998	32-15		1208	38-0		1418
21-10		793	26-35		1003	32-20		1213	38-5		1423
21-15		798	27-0		1008	32-25		1218	38-10		1428
21-20		802	27-5		1012	32-30		1222	38-15		1432
21-25		807	27-10		1017	32-35		1227	38-20		1437
21-30		812	27-15		1022	33-0		1232	38-25		1442
21-35		816	27-20		1026	33-5		1236	38-30		1446
22-0		821	27-25		1031	33-10		1241	38-35		1451
22-5		826	27-30		1036	33-15		1246	39-0		1456
22-10		830	27-35		1040	33-20		1250	39-5		1460
22-15		835	28-0		1045	33-25		1255	39-10		1465
22-20		840	28-5		1050	33-30		1260	39-15		1470
22-25		844	28-10		1054	33-35		1264	39-20		1474
22-30		849	28-15		1059	34-0		1269	39-25		1479
22-35		854	28-20		1064	34-5		1274	39-30		1484
23-0		858	28-25		1068	34-10		1278	39-35		1488
23-5		863	28-30		1073	34-15		1283	40-0		1493

News & Views

Metric System in Customs and Excise

Two important laws bearing on the conversion of customs and excise duties and cesses to metric units and decimal currency were passed recently by the Parliament. The acts, namely the Customs Duties and Cesses (Conversion to Metric Units) Act, 1960 (40 of 1960) and the Central Excises (Conversion to Metric Units) Act, 1960 (38 of 1960) received the President's assent on 20 and 21 September 1960 respectively, and have been brought into force from 1 October 1960 by notifications which are given below.

The Customs Duties and Cesses (Conversion to Metric Units) Act, 1960 (40 of 1960) amends the Indian Cotton Cess Act, 1923 (14 of 1923), Indian Lac Cess Act, 1930 (24 of 1930), the Indian Tariff Act, 1934 (32 of 1934), the Indian Coffee Act, 1942 (7 of 1942), Indian Coconut Committee Act, 1944 (10 of 1944), Indian Oilseeds Committee Act, 1946 (9 of 1946), Tea Act, 1953 (29 of 1953) and Coir Industry Act, 1953 (45 of 1953). Part I of the schedule to the Act gives the amended customs duties in terms of decimal coinage and metric units.

The Central Excises (Conversion to Metric Units) Act, 1960 (38 of 1960) amends the Central Excises and Salt Act, 1944 (1 of 1944), the Additional Duties of Excise (Goods of Special Importance) Act, 1957 (58 of 1957), the Mineral Oils (Additional Duties

of Excise and Customs) Act, 1958 (27 of 1958), the Khadi and Other Handloom Industries Development (Additional Excise Duty on Cloth) Act, 1953 (12 of 1953), the Dhoties (Additional Excise Duty) Act, 1953 (39 of 1953), Cotton Fabrics (Additional Excise Duty) Act, 1957 (33 of 1957) and Sugar Export Promotion Act, 1958 (30 of 1958). The First Schedule to the Act lists the converted excise duties in metric units and decimal coinage and substitutes the First Schedule of the Central Excises and Salt Act, 1944. The Second Schedule substitutes the First Schedule of the Additional Duties of Excise (Goods of Special Importance) Act, 1957.

In converting the customs and excise duties and cesses it is not possible to adopt the exact equivalents of the existing units and rates in the metric system, since such conversion would result in very odd practical rates in a number of cases, and operation of such rates would be inconvenient both to the assessee as well as to the Administration and would render the assessment and collection of duties needlessly arduous. The rates have, therefore, been rounded off resulting in minor variation in them, but the overall effect of such variations would be insignificant. Simultaneously with the conversion of rates, opportunity has also been taken to assess the duties on petroleum products on the basis of the standard temperature of 15° C.

The two notifications issued to bring these two Acts into force are as follows:

No. S.O. 2348 dated 23rd September 1960

In exercise of the powers conferred by sub-section (2) of section 1 of the Customs Duties and Cesses (Conversion to Metric Units) Act, 1960 (40 of 1960), the Central Government hereby appoints the 1st day of October 1960, as the date on which the said Act shall come into force.

G. S. R. 1098 dated 24th September 1960

In exercise of the powers conferred by sub-section (2) of section 1 of the Central Excises (Conversion to Metric Units) Act, 1960 (38 of 1960), the Central Government hereby appoints the 1st day of October, 1960, as the date on which the said Act shall come into force.

Extension of Central Act to Jammu & Kashmir

The Standards of Weights and Measures (Amendment) Act, 1960 (41 of 1960), which received the assent of the President on 21 September 1960, enables the Central Government to extend the provisions of the Standards of Weights and Measures Act, 1956 (89 of 1956) to Jammu and Kashmir. The ten year transition period for J & K would be counted from the date on which the Standards of Weights and Measures (Amendment) Act, 1960 comes into force.

In accordance with the following notification the Act has been applied to Jammu and Kashmir from 1 October 1960.

No. S.O. 2349 dated 23rd September 1960.

In exercise of the powers conferred by sub-section (2) of section 1 of the Standards of Weights and Measures (Amendment) Act, 1960 (41 of 1960), the Central Government hereby appoints the 1st day of October, 1960, as the date on which the said Act shall come into force.

The Standards of Weights and Measures (Amendment) Act, 1960 reads generally as follows:

THE STANDARDS OF WEIGHTS AND MEASURES (AMENDMENT) ACT, 1960

No. 41 of 1960

[21st September, 1960]

An Act to amend the Standards of Weights and Measures Act, 1956.

Be it enacted by Parliament in the Eleventh Year of the Republic of India as follows :—

1. (1) This Act may be called the Standards of Weights and Measures (Amendment) Act, 1960.

(2) It shall come into force on such date as the Central Government may, by notification in the Official Gazette, appoint.

2. In section 1 of the Standards of Weights and Measures Act, 1956 (hereinafter referred to as the principal Act)—

(i) in sub-section (2), the words "except the State of Jammu & Kashmir" shall be omitted ; and

(ii) to sub-section (3), the following proviso shall be added, namely :—

"Provided that, in relation to the State of Jammu & Kashmir, the said period of ten years shall be computed from the date on which the Standards of Weights and Measures (Amendment) Act, 1960 comes into force."

3. In section 17 of the principal Act, sub-section (3), the following sub-section shall be substituted, namely:—

'Every rule made under this section shall be laid as soon as may be after it is made, before each House of Parliament while it is in session for a total period of thirty days which may be comprised in one session or in two successive sessions, and if before the expiry of the session in which it is so laid or the session immediately following, both Houses agree in making any modification in the rule or both Houses agree that the rule should not be made, the rule shall thereafter have effect only in such modified form or be of no effect, as the case may be, so however that any such modification or annulment shall be without prejudice to the validity of anything previously done under that rule.'

Recent Additional Notifications

In addition to the three notifications mentioned above for customs and cesses, excise and Jammu and Kashmir, the following three notifications have been issued by the Government of India.

1. Extension for Defence Department and Undertakings

It is expected that all the Defence Establishments in India whether in the notified areas or elsewhere will change over to the metric system of weights for all transactions from

1st April 1961. The notification which would enable this reads as follows:

No. S.O. 2394 dated 28th September, 1960.

Whereas, by virtue of the notification of the Government of India in the Ministry of Commerce and Industry No. S.O. 1251 dated the 24th June, 1958 the provisions of the Standards of Weights and Measures Act, 1956 (89 of 1956), came into force in respect of, among others, certain classes of undertakings including Government Departments and commercial and industrial undertakings owned or controlled by Government in so far as they undertake the purchase or supply of stores, including drugs;

And whereas, by the notification of the Government of India in the Ministry of Commerce and Industry No. S.O. 1252 dated the 24th June, 1958, the Central Government permitted, in respect of the classes of undertakings aforesaid, the continuance of the use, for a period of two years from the 1st day of 1958, of any weight or measure which, immediately before that day, was in use in respect of the said classes of undertakings;

Now, therefore, in exercise of the powers conferred by sub-section (1) of Section 14 of the Standards of Weights and Measures Act aforesaid and in partial modification of S.O. 1252 aforesaid, the Central Government hereby permits, in respect of the departments and undertakings controlled by the Army, the Navy and the Air Force, the continuance of the use, for a further period of six months from the 1st day of October, 1960, of any weight or measure which, immediately before that day, was in use in respect of the said departments and undertakings.

2. Extension of Transition Period for Sale of Cotton Cloth

In the cotton textile industry, in the sale of yarn and cotton textile products (other than cloth) as also the stamping of cloth, yarn and other cotton textile products use of metric weights and measures becomes compulsory from 1 April 1961, although from 1 October 1960 it has become compulsory for the sale of cotton cloth and purchase of cotton. In order to enable the cotton textile industry to change over in its sales, on the same date the compulsory use of the metric length measures will also be enforced from 1 April 1961. The notification enabling this reads as follows:

No. S.O. 2395 dated 28th September 1960.

Whereas, by virtue of the notification of the Government of India in the Ministry of Commerce and Industry S.O. 1251 dated the 24th June, 1958, the provisions of the Standards of Weights and Measures Act, 1956 (89 of 1956), came into force in respect of, among others, cotton textile mills in so far as they undertake the purchase of cotton or sale of cloth;

And whereas, in the notification of the Government of India in the Ministry of Commerce and Industry S.O. 1252 dated the 24th June, 1958, the Central Government permitted, in respect of, among others, cotton textile mills, the continuance of the use, for a period of two years from the 1st day of October, 1958, of any weight or measure which, immediately before that day, was in use in respect of the said cotton textile mills ;

Now, therefore, in exercise of the powers conferred by sub-section (1) of section 14 of the Standards of Weights and Measures Act aforesaid and in partial modification of S.O. 1252 aforesaid, the Central Government hereby permits, in respect of cotton textile mills in so far as they undertake the sale of cloth, the continuance of the use, for a further period of six months from the 1st day of October, 1960, of any measure which, immediately before that day, was in use in relation to the sale of cloth.

3. Secondary Units of Area

No. S.O. 2134 dated 26th August, 1960.

In pursuance of section 12 of the Standards of Weights and Measures Act, 1956 (89 of 1956), the Central Government hereby declares in relation to the primary unit of area, the following units to be its secondary units, namely :—

Secondary units in relation to square metre

Are = 10^2 square metres.

Hectare = 10^4 square metres.

Conference on Metric System in Technical Education

A Conference to consider the adoption of the metric system in higher and technical education was held in the Ministry of Commerce and Industry, on 23rd October 1960, under the Chairmanship of Prof. M. S. Thacker. A review of the recommendation of the Conference would be published in the next issue of *Metric Measures*. The agenda

for the meeting was as follows :

- (1) Progress in the preparation of the necessary standards.
- (2) Supply of measuring tools and instruments calibrated in metric units to technical institutions.
- (3) Revision of textbooks in use, and preparation of new textbooks.
- (4) Phased programme for the adoption of the metric system in higher technical education.

Third Conference of Controllers

The third Conference of Controllers of Weights and Measures will be held at Bhubaneswar in Orissa, on 14-15 November 1960. The provisional agenda for the Conference is as follows:

- (1) Review of progress in enforcing metric weights in areas where they become compulsory on 1-10-1960.
- (2) Introduction of metric capacity measures.
- (3) Publicity.
- (4) Stamping of weights, measures and instruments manufactured in one State for use in another State.
- (5) Marking of contents of packed goods offered for sale in notified areas in metric units—packages already with traders on 1-10-1960.
- (6) Subjects proposed by Controllers.

Important recommendations of the Conference will be published in the January 1961 issue of *Metric Measures*.

Sale of Cement

The cement industry has changed over to the use of metric weights from October 1960. Under the new system each bag will contain 50 kg cement net, exclusive of the weight of the bag and will be marked accordingly.

The price at which the State Trading Corporation will sell cement has been fixed at Rs. 116.75 for a metric tonne of packed cement as against the price of Rs. 117.50 for the British ton. The prices for retail sale of cement in each State under the new system are to be fixed by the respective State Governments.

'Metric Paddhati' (Bengali Journal)

It is understood that the annual subscription of the Bengali bi-monthly, 'Metric Paddhati', has since been reduced to Rs. 1.50 with no reduction in pages and the price per single copy has been refixed at 25 nP. only from the previous 40 nP.

Units for Bullion

It will be recollected that the unit of 1 gram was recommended for quotation of prices of gold by the Conference held in January 1960 in the Ministry of Commerce and Industry. The Bombay Bullion Association had also been using this unit for some time. It now appears that the Reserve Bank has shown a preference for the unit of 10 grams for the quotation of gold prices and the Bombay Bullion Association and others concerned have accepted this recommendation. Silver quotation will continue to be per kilogram. It appears that the unit of trading accepted in Bombay for silver is 10 kg and for gold 1 kg. The tables for price conversion for gold on the basis of 10 g unit are given on page 55. These replace the tables published earlier for gold on the 1 g basis.

Book Review

BULLETIN de L'ORGANISATION INTERNATIONALE de METROLOGIE LEGALE (French) —published by the Bureau Internationale de Metrologie Legale, 9, Avenue Franco Russe—Paris VII—France, pp. 56, Vol. 1, January 1960.

The International Organization of Legal Metrology, (OIML) was introduced to readers of *Metric Measures* in the May 1958 issue by M. Costamagna, the Director of the International Bureau of Legal Metrology, which is the secretariat of the Organization. The OIML has now published the first issue of its monthly magazine *Bulletin de L'Organisation Internationale de Metrologie Legale*.

The first issue contains an article by M. Jacob (Belgium), President of the International Committee of Legal Metrology, in which the International Organization of Legal Metrology is introduced. The second article is by G. D. Bourdoun of USSR who introduces the Soviet Service of Legal Metrology. The third article is a posthumous note by M. Z. Rauszer of Poland on the magnitudes and units of measure. The next item deals with legislation and regulations of legal metrology and in this issue, a draft of the decree relating to units of measure and control of measuring instruments, which is intended to replace the present French practice is given. This is a comprehensive legal document and besides defining the units recommended by the International Bureau of Weights and Measures, namely, the metre, kilogram, second, ampere,

degree Kelvin and the candela also deals with units of area, volume, plane and solid angles, volumes, frequencies, speed, velocity, acceleration, force, work and energy, heat, power, electric units, such as EMF, resistance and the like, optical units, luminance, illumination and the diopetre. A number of other units for various types of uses are also indicated. A description of a mobile bureau of verification in Austria by M. Alois Rust follows. An article by J. Jasnorzewski deals with the creation of a microfilm documentation centre in the International Bureau of Legal Metrology. The *Bulletin* then gives a review of the work of the OIML, constitution and method of work of secretariat reporters and then lists comprehensively various subjects proposed or under study with the secretariat-reporters. The *Bulletin* ends with the list of member countries, their representatives and officers of OIML and the Bureau.

The *Bulletin* is extremely well printed and brought out. It may be expected to contribute substantially to the unification of weights and measures practices i.e. legal metrology, internationally by providing a forum for the exchange of views on this vital subject which is now assuming great importance in the light of the scientific and technical progress made during this century and particularly during the last decade. The future issues of the *Bulletin* will be read and used very widely

in the countries which are interested in establishing and strengthening of legal metrology in their areas.

It is intended to translate or summarize important articles and information from the *Bulletin*, which will be of interest to Indian readers in the present context of the metric reform, and publish them in the future issues of *Metric Measures*.

ISI HANDBOOK OF QUANTITIES, CONVERSION FACTORS, FORMULAE AND TABLES (in English)—published by the Indian Standards Institution, Manak Bhavan, 9, Mathura Road, New Delhi, pp. 163, July 1960, Price : Rs. 7.50.

The Indian Standards Institution has brought out a 'Handbook of Quantities, Conversion Factors, Formulae and Tables' in the context of the Government's policy of changing over to the metric system. This handbook, as stated in its introduction, is intended to serve as a source of basic data required for the students of the first degree course in science, engineering and technology. The handbook is divided into three Sections:

Section A: Quantities, Units and Conversion Factors.

Section B : Physical and Chemical Constants.

Section C : Mathematical Formulae and Tables.

With the adoption of the metric system in India, it is necessary for every one, and particularly students, to develop concepts in terms of the new system, and its relationship to the existing FPS system. In industries and in engineering, for a considerable period after the change-over to the metric system in commercial transactions, both the systems may have to co-exist, and the need, therefore, for conversions from the existing to the metric system remains and this handbook will serve as a means of ready reference for the various units used in engineering and technology and in general science.

In Section A, comprising of quantities, units and conversion factors, definitions of the various units of space and time, mechanics, temperature and heat, light, sound, electricity and magnetism are given. All these definitions follow the latest knowledge in the field and care has been taken to conform to the internationally accepted definitions for most of the units. Then follow a series of conversion tables for length, volume, area, capacity, mass, concentration, specific volume, moment of inertia and various other items and it is here that the student in engineering and general science will get the corresponding concepts in the British and the metric systems. A table of wire and sheet metal gauges and Indian standard thicknesses of sheet and diameters of wire are also given, the latter expressing the thicknesses in millimetre sizes will do away, on the adoption of metric system, with terminologies like numbers, S.W.G., B.G., A.W.G. etc. used in Continental and American practice.

Section B contains physical and chemical constants like properties of elements, gases, liquids and solids and includes properties of structural sections also. Units commonly used in aeronautics and telecommunications also find a place in this Section.

Section C deals mainly with mathematical formulae and tables and will be a useful source for the more common formulae in algebra, plane and spherical trigonometry and in calculus. The handbook ends with the usual logarithmic and trigonometric tables.

It is claimed that this handbook is intended for the students of the first degree course in science, engineering and technology but it will be of constant use throughout the degree course, and even beyond the college career. It may be pertinent to ask why the usual formulae of geometry, spherical trigonometry and others should find a place in this handbook, as these are generally found in

every textbook. Similarly, properties of structural sections and loaded beams are given in any textbook of applied mechanics or structural engineering. In the context of switching over to the metric system, perhaps it would have been more instructive if full use of the new units were made and numerical examples involving the new units were given as an appendix. This procedure might have acted as an impetus in the mind of the student to understand the new units from the very beginning of his college career. By emphasising the conversion aspect the objective of getting a mental concept of the metric system may be retarded. Further, as generally expected from a handbook of this nature, useful information regarding many of the common items like rivets and rivetted joints, ball and roller bearings, toothed gears, taper shanks, cotters, pins etc., do not find a place. Tables for weights of materials, values of I & Z for various sections, screw threads for water, gas and steam piping, standard forms of screw threads, dimensions of bolts and nuts and screwed fastenings, angle and tapers etc., also do not find a place in this handbook. Most of the new Indian Standards for these items are either published or in the process of finalization, and it would have been a useful addition to the handbook if all the information on the new metric sizes had been included in the handbook.

The handbook is very well got up and it is hoped that it will serve the needs of the young college student, but it must be said that the price, which is Rs. 7.50 nP may be too high to be within reach of the common student as it is intended to be. However, as a compendium of useful information, particularly in the context of the industries switching over to the metric system it will, it is hoped, meet the requirements to a large extent.

LAVOSSIERS CHART OF THE METRIC SYSTEM OF WEIGHTS AND MEASURES (in English, Malayalam, Tamil, Hindi, Telegu, Canarese and in all important Indian Languages)—A chart of metric weights and measures published by the Moneys Corporation (Private) Ltd., T.C. 21/834 Sreekantharam, Trivandrum-1, Price : Rs. 2 (per sheet) and Rs. 4.50 (per sheet mounted in cloth, varnished and provided with two rollers).

Moneys Corporation (Private) Ltd., have published a chart showing the various aspects of weights and measures in the metric system. The chart in English starts with a table showing the prefixes indicating relative values of the various metric units and explains the basis of metric units in a simple way. For example, the metre is defined as one ten millionth of the distance from the North pole to the equator and the gram is the weight of a cubic centimetre of distilled water at 4° Centigrade. These definitions have been replaced a long time back by new definitions, but they would serve to illustrate the metric system to children and students. The chart then goes on to explain the various units of length, area, capacity, volume, and weights and gives pictures of weights and measures recommended for commercial use.

Conversion factors for units in the British and the Indian systems are given. Tables showing equivalents of palams in grams, viss in kilograms and grams, standard seer in kilograms, tola in grams, pound in kilograms, ounce in grams, maund in kilograms and grams etc., are also given. Existing weights used in Madras and Kerala have received special attention.

The chart may be useful for the class room.

The English edition which is reviewed here contains some minor errors and it is hoped that these will be corrected in the future issues of the charts.

Licensed Manufacturers, Dealers and Repairers of Weights and Measures(10)

Metric Measures has been publishing a series of lists of manufacturers, dealers and repairers of weights and measures, weighing and measuring instruments licensed by the Governments in the various States and Union Territories under their Weights and Measures (Enforcement) Acts in their respective jurisdiction. This is the tenth list. The first list appeared in the March 1959 issue.

Progressively steps are being taken for licensing manufacturers, dealers and repairers in all States and further lists of licensees would be published in *Metric Measures* as this work progresses.

The number in brackets against the name of the State or Union Territory indicates the particular instalment number of the list of that State or Union Territory. The issues of *Metric Measures* in which previous lists appear are also shown suitably.

An analysis of the licensees, including the present list, shows that the total number of licensees, in 12 States and 3 Union Territories is 419 manufacturers, 1,567 dealers and 344 repairers. The details of published information are as follows :

Sl. No.	State/Union Territory	Licensees		
		Manufacturers	Dealers	Repairers
(1)	Andhra Pradesh	25	25	16
(2)	Bihar	20	69	34
(3)	Delhi	21	73	18
(4)	Himachal Pradesh	1	3	0
(5)	Kerala	4	125	0
(6)	Madhya Pradesh	13	84	0
(7)	Madras	62	147	35
(8)	Maharashtra & Gujerat	46	324	112
(9)	Mysore	37	232	27
(10)	Orissa	8	13	0
(11)	Punjab	14	248	17
(12)	Rajasthan	16	69	18
(13)	Tripura	0	12	0
(14)	Uttar Pradesh	62	55	21
(15)	West Bengal	50	75	30
		379	1,554	328

LICENSED MANUFACTURERS, DEALERS & REPAIRERS OF WEIGHTS & MEASURES (10)

HIMACHAL PRADESH (1)

Manufacturers

Sl. No.	Name and Address of Manufacturer	Details of Articles Manufactured
(1)	Nahan Foundry Ltd., Nahan (Government of India Undertaking), Sirmur District, Nahan.	Cast Iron Weights

Dealers

Sl. No.	Name and Address of Dealer	Details of Articles Sold
(1)	Nahan Foundry Ltd., Nahan (Government of India Undertaking), Sirmur District, Nahan.	Weights.
(2)	Prabhu Mal Ramchander, Hardware Merchants, Chowk Bazar, Nahan, Sirmur District.	Weights.
(3)	Ramsarup Ved Parkash, Iron & Paint Merchants, Bara Chowk, Nahan, Sirmur District.	Weights.

KERALA (3)

In the November 1959 and March 1960 issues of *Metric Measures* lists of licensed manufacturers and dealers of weights and measures in Kerala State was published. The following is a list of dealers subsequently licensed by the Government of Kerala:—

Dealers

Sl. No.	Name and Address of Dealer	Details of Articles Sold
(1)	P. Abdul Rahiman Kuttu, Managing Partner, Give & Take Stores, Camp Bazaar, Cannanore.	Weights & Measures.
(2)	B. Abdulla Kumhi, Hardware Merchant, CE. 210, (New Hardware), Camp Bazaar, Cannanore.	Weights, Measures, Weighing and Measuring Instruments.
(3)	Q. Aboobakker Sait, Hardware Merchant, Mukkada Bazaar, Quilon.	Weights, Measures, Weighing and Measuring Instruments.
(4)	K.A. Akbar Badshah, Hardware Merchants, Cochin-2	Weights, Measures, Weighing and Measuring Instruments.
(5)	Central Hardware, Palayam Road, Calcutta-1	Weights and Measures.
(6)	Chakiat Brothers, P.B. No. 34, Broadway, Ernakulam	Weights, Scales and Balances.
(7)	M.U. Cherian & Co., Market Road, Alwaye	Weights, Measures, Weighing and Measuring Instruments.
(8)	P.C. Cherian Pularekal, General Merchant, Puramattom P.O., Thiruvella.	Weights, Measures, Weighing and Measuring Instruments.
(9)	C.V. Cheru & Son, Hardware & Leather Merchants, Pattambi	Weights, and Measures.
(10)	Cochin Commercial Union Ltd., Hardware Merchants, Ernakulam-1.	Weights and Measures.

Dealers (contd.)

Sl. No.	Name and Address of Dealers	Details of Articles Sold
(11)	Das Brothers, Hardware Merchants, Thodupuzha	Weights and Measures.
(12)	A.J.Devassy, Proprietor, C. Laxmana Pai, Merchants, Hosdurg, Kanhangad, P.O. Hosdurg, Cannanore District.	Weights.
(13)	M.D'Souza & Sons, Bazaar Road, Cochin-2	Weights, Beam Scales and Platform Scales.
(14)	C.A. Galiakotwala & Co. (P) Ltd., Mattanchery, P.B. No. 34, Cochin-2.	Weights and Measures.
(15)	M.A. Gopalan, Stationery & Hardware Merchant, Kizhakkambalam, Ernakulam Distt.	Weights, Measures, Weighing and Measuring Instruments.
(16)	Gosris Hardwares, Cloth Bazaar Road, Ernakulam	Weights and Measures.
(17)	Hajee Hassan Yacoob Sait & Sons, Hardware & Paint Merchants, Shop No. 5, Kayamkulam.	Weights, Measures, Weighing and Measuring Instruments.
(18)	Hilal Traders, 9/627, Big Bazaar, Calicut-1	Weights, Measures, Weighing and Measuring Instruments.
(19)	Jaffer Stores, Hardware & Paint Merchants, V.K. Road, Palghat.	Weights, Measures, Weighing and Measuring Instruments.
(20)	A. Kadir Kunhi & Son, General Merchant, Cannanore ..	Weights, Measures, Weighing and Measuring Instruments.
(21)	Kerala Co-operative Society Ltd., No. 3032, Channanakavoo, Alleppey.	Weights, Measures, Weighing and Measuring Instruments.
(22)	Kerala Hardware Stores, Big Bazaar, Palghat	Weights, Measures, Weighing and Measuring Instruments.
(23)	K.I. Kuriakose & Sons, Hardware Merchants, Changanachery.	Weights, Measures, Weighing and Measuring Instruments.
(24)	C. Madhava Pai, Proprietor, C. Laxmana Pai, Merchants, Hosdurg, Kanhangad, P. O. Hosdurg, Cannanore Distt.	Weights, Measures and Measuring Instruments.
(25)	Madonna Agencies Enterprise, Sole Proprietor, Miss Mary Mathew, Kunjappu, P. O. Road, Trichur.	Weights, Measures and Weighing Instruments.
(26)	V.M. Mammoo, Hardware Merchant, Cloth Bazaar Road, Ernakulam.	Weights, Measures, Weighing and Measuring Instruments.
(27)	A. Mohammed Mohideen & Bros., Hardware Merchants, Big Bazaar, Palghat.	Weights, Measures, Weighing and Measuring Instruments.
(28)	P.S. Musthafa Rawther, Metal & Hardware Merchant, Kavala Merchant, Kavala, Changanacherry.	Weights and Measures.
(29)	M.K. Nambiar, Proprietor, M.K. Nambiar & Co., Kallai Road, Calicut-2.	Weights, Measures, Weighing and Measuring Instruments.
(30)	New Guna Shenoy Co., Direct Importers & Hardware Merchants, Kottayam.	Weights, And Measures.
(31)	New Guna Shenoy Co., Direct Importers of Hardware Machinery Etc., Broadway, Ernakulam.	Weights, Measures, Weighing and Measuring Instruments.
(32)	New Guna Shenoy Co., Cochin	Weights, Measures, Weighing and Measuring Instruments.
(33)	Pallipurathukaran Kunju Vareed Antony, Hardware Merchant, High Road, Trichur.	Weights and Measures.
(34)	M.M. Pylee, Hardware Merchant, Perumbavoor	Weights, Measures, Weighing and Measuring Instruments.

Dealers (Contd.)

Sl. No.	Name and Address of Dealer	Details of Articles Sold
(35)	M. Raghavan, Stationery Merchant, Mankavu, Kozhikode-7.	Weights and Measures
(36)	C. Raghavan & Sons, Hardware Merchants, Camp Bazaar, Cannanore	Weights and Measuring Instruments
(37)	P.M. Samuel, Hardware Merchant, Pathanamthitta	Weights, Measures, Weighing and Measuring Instruments.
(38)	C.S. Seethy & Bros., Hardware Merchants, Kothamangalam	Weights and Measures.
(39)	S. Subramonia Pullai, Hardware & Paint Merchant, Chalai Bazaar, Trivandrum	Weights, Measures, Weighing and Measuring Instruments.
(40)	Sukumaran Marakattapurathur Kodai Amsom, Post Pantherankavu	Weights, Measures, Weighing and Measuring Instruments.
(41)	C. Sumughom Vaidier, Janatha Hardware Mart, N. Parur	Weights and Measures.
(42)	Syed Mohamed Hameed Sons, General Merchants, Alleppey	Weights, Measures, Weighing and Measuring Instruments.
(43)	A.V. Thoma & Sons, Iron Merchants, High Road, Trichur	Weights, Measures, Weighing and Measuring Instruments.
(44)	T.L. Thomas & Sons, Hardware Merchants, Market Road, Irinjalakuda.	Weights and Measures.
(45)	Trikkandiyur Producers'-cum-Consumers' Co-operative Society Ltd., No. F. 1,254, Tirur	Weights, Measures, Weighing and Measuring Instruments.
(46)	Union Stores, Kakkodi, Kozhikode Distt.	Weights, Measures, Weighing and Measuring Instruments.
(47)	M.V.Umese, Kerala Hardware Stores, Market Road, Alwaye	Weights and Measures.
(48)	Union Trading Co., Punalur, Quilon District	Weights, Measures, Weighing and Measuring Instruments.
(49)	Usman Koya, Hardware Merchant, Big Bazaar, Kozhikode	Weights, Measures and Weighing Instruments.
(50)	R. Variar Sons, Jewellers, Kozhikode	Weights, Measures and Measuring Instruments.
(51)	Varkey Cherian, Vattakunnel, Hardware Merchant, Palai	Weights and Measuring Instruments.

CORRECTION

The license of M/s Venus Light Casting Works, 45, Erukkancheri High Road, Vyasarpadi, Madras-12, appearing as item No. 29 under 'Manufacturers' in Madras list on page-41 of November 1959 issue of Metric Measures, has since been cancelled.

MADRAS (4)

In the November 1959 and March and September 1960 issues of *Metric Measures* lists of licensed manufacturers, dealers and repairers of weights and measures were published. The following is a list of manufacturers, dealers and repairers subsequently licensed

by the Government of Madras under the Madras Weights and Measures (Enforcement) Act, 1958.

Manufacturers

Sl. No.	Name and Address of Manufacturer	Details of Articles Manufactured
(1)	S. Ahmed Ali, Dilawar Akbar, Industrial Works, (State aided) 1/126, Moore Street Madras-1.	Measures
(2)	Arkay Engineering Company, 38, Errabalu Chetty Street, Madras-1.	Weights and Measures
(3)	V. Arumugham, Anandan Foundry, 5/7 Vagraram, Aminjikarai, Madras.	Weights and Measures
(4)	A.R. Dhanaraman, 12, Maruthuvar Street, Tirupattur, N.A.	Weights
(5)	E.S. Haji & Co., 12, Sembudoss Street, Madras-1.	Litres
(6)	Indian Traders, 158, Broadway, Madras-1.	Weights and Measures
(7)	Karpaga Industries, 10-C, Waltax Road, Madras-3	Weights and Measures
(8)	P.V. Krishnan & Sri V.R. Subramanya Sithapathi, New Royal Engineering Works, 32/6, Katpadi Road, Vellore.	Weights
(9)	Royal Hardware Mart, 30, Devaraja Mudali Street, Madras-3	Measures
(10)	Somanathan Gopalan, South India Gold Weight Works, 10, Yegoppa Chettiar Lane, Karaikudi-1.	Bullion Weights
(11)	K.P.A. Sundararaj, 40, Chetty Street, Tirupattur, N.A.	Weights and Measures

Dealers

Sl. No.	Name and Address of Dealer	Details of Articles Sold
(1)	Ahmed Ali, Industrial Works, 1/126, Moore Street, Madras-1.	Weights, Measures, Weighing and Measuring Instruments.
(2)	Secretary, Chengam Co-operative Marketing Society Ltd. Chengam P. O.	Weights, Measures, Weighing and Measuring Instruments.
(3)	V. Chokanathan Chetty & Sons, Iron and Paint Merchant, Sehvapet, Salem-2.	Weights, Measures, Weighing and Measuring Instruments.
(4)	T.E. Dhanapal, 67, Lawrance Road, Tiruvettipuram, Cheyyar, N.A.	Weights, Measures, Weighing and Measuring Instruments.
(5)	S. Desikan, Jaya Trading Co., 129-B, Car Street, Tiruvannamalai, N.A.	Weights, Measures, Weighing and Measuring Instruments.
(6)	Doraiswamy Mudaliar, Iron Merchant, Tiruvettipuram, North Arcot District.	Weights, Measures, Weighing and Measuring Instruments.
(7)	M.J. Doraiswamy Naidu & Sons, Iron Merchant, 62, Bazaar Street, Madurantakam.	Weights, Measures, Weighing and Measuring Instruments.
(8)	S. Ekambaram, M/s India Scales, 45, E.H. Road, Vyasarpadi, Madras-12.	Weights, Measures, Weighing and Measuring Instruments.
(9)	Francis Machine Tools Corporation, 23, Broadway, Madras-1.	Weights, Measures, Weighing and Measuring Instruments.
(10)	Haji & Co., 12, Sembudoss street, Madras-1.	Weights, Measures, Weighing and Measuring Instruments.

Dealers

Sl. No.	Name and Address of Dealer	Details of Articles Sold
(1)	Indian Traders, 158, Broadway, Madras-1	Weights, Measures, Weighing and Measuring Instruments.
(2)	Jain Singh Jain, Mysore Engineering Corporation, 79/10, Sembudoss Street, Madras-1.	Weights, Measures, Weighing and Measuring Instruments.
(3)	M. K. N. D. Kasiraja Nadar & Hardware & Co. Paint Merchant, Madurai.	Weights, Measures, Weighing and Measuring Instruments.
(4)	Krishna Myer, Myers Scales Co., 9/22-C, Broadway, Madras-1	Weights, Measures, Weighing and Measuring Instruments.
(5)	Kuppuswamy Chettiar, Pelur Road, Chengam	Weights, Measures, Weighing and Measuring Instruments.
(6)	V.A.A. Lakshmana Nadar & Bros. Hardware Merchant, 90, East Masi Street, Madurai.	Weights, Measures, Weighing and Measuring Instruments.
(7)	Monasubha & Co. (P) Ltd., 82, E Royapettah High Road, Madras-4	Weights, Measures, Weighing and Measuring Instruments.
(8)	T.K. Munirathnam, 26, Bazaar Street, Tirukalikundram	Weights, Measures, Weighing and Measuring Instruments.
(9)	G.N. Narasimhan, Engineering & Scientific Works, Chromepet, Madras.	Weights, Measures, Weighing and Measuring Instruments.
(10)	New Royal Engineering Works, 32/6, Katpadi Road, Vellore	Weights, Measures, Weighing and Measuring Instruments.
(11)	O.A.S. Oobaidullah, Bazaar Street, Kallakurichi	Weights, Measures, Weighing and Measuring Instruments.
(12)	P.K.S. Pakkir Mohideen, Deen Stores, 11, Bazaar Street, Virudhunagar.	Weights, Measures, Weighing and Measuring Instruments.
(13)	T.A.S. Palani Mudaliar, 26/27-A, Bazaar Street, Tindivanam	Weights, Measures, Weighing and Measuring Instruments.
(14)	A.S.S. Prahassam 31, Market Road, St. Thomas Mount, Madras.	Weights, Measures, Weighing and Measuring Instruments.
(15)	C. Ramanujam, 53 Bazaar Street, Tindivanam	Weights, Measures, Weighing and Measuring Instruments.
(16)	K.P. Ramiah Chettiar & Sons, Bazar Street, Kallakurichi	Weights, Measures, Weighing and Measuring Instruments.
(17)	G. Seshachalam Naidu, Bhoopathy Stores, Tirupapuliyur	Weights, Measures, Weighing and Measuring Instruments.
(18)	A. Somarapuri, Railway Feders Road, Coverapet.	Weights, Measures, Weighing and Measuring Instruments.
(19)	Swamy Stores, 40-C, Bazaar Street, Tindivanam	Weights, Measures, Weighing and Measuring Instruments.
(20)	Tindivanam Cooperative Marketing Society Ltd., No. E. 1442, Tindivanam.	Weights, Measures, Weighing and Measuring Instruments.
(21)	Unicorn Co. (Motors) Private Ltd. Garden Road, Ooty	Weights, Measures, Weighing and Measuring Instruments.
(22)	G.K. Vasudave Gupta & Sons, Sri Venkateswara Hardware Stores, 25/48, Fort Main Road, Shevapet, Salem-2.	Weights, Measures, Weighing and Measuring Instruments.
(23)	D. Veerabhadran, Manellore, Panruti (T.K.)	Weights, Measures, Weighing and Measuring Instruments.
(24)	M. Veluswamy Chettiar, 41, Venkataramier Street, Pollachi	Weights, Measures, Weighing and Measuring Instruments.
(25)	Venu Pillai, Bazar Street, Panruti	Weights, Measures, Weighing and Measuring Instruments.

Repairers

Sl. No.	Name and Address of Repairers	Details of Article Repaired
(1)	A.R. Dhanaraman, 12, Maruthuvar Street, Tirupattur, North Arcot.	Weights, Measures, Weighing and Measuring Instruments.
(2)	N. Damodaran, R.K. Industries, Radhakrishna Nilayam, Railway Station Road, Tiruvellore.	Weights, Measures, Weighing and Measuring Instruments.
(3)	S. Ekambaram, India Scales, 45, F.H. Road, Vysarpadi, Madras-12.	Weights, Measures, Weighing and Measuring Instruments.
(4)	Gopal Tinker Works, 49, Linghi Chetty Street Madras-1	Weights, Measures, Weighing and Measuring Instruments.
(5)	A. Gurunath, 15, Stringers Street, Madras-1	Weights, Measures, Weighing and Measuring Instruments.
(6)	India Trades, 158, Broadway, Madras-1	Weights, Measures, Weighing and Measuring Instruments.
(7)	A. Krishnamurthy, 72, Chinnamman Koil Street, Chingleput	Weights, Measures, Weighing and Measuring Instruments.
(8)	R. Natarajan, 60, Chinnamankoil Street, Chingleput	Weights, Measures, Weighing and Measuring Instruments.
(9)	New Royal Engineering Works, 32/6, Katpadi Road, Vellore	Weights, Measures, Weighing and Measuring Instruments.
(10)	Rabindernath, Masseys, 4-B, 4-G, North Railway Terminus Road, Royapuram, Madras	Weights, Measures, Weighing and Measuring Instruments.
(11)	S.M. Thandavamoorthy Naicker, 61, Chinnamankoil Street, Chingleput	Weights, Measures, Weighing and Measuring Instruments.
(12)	Una & Company, 10, Muthiah Mudaly Street, Old washermenpet, Madras-21	Weights, Measures, Weighing and Measuring Instruments.

MAHARASHTRA (1)

The present list contains names of manufacturers, dealers and repairers licensed by the State of Maharashtra since its creation. The Gujarat list was not available at the time of going to press and it is hoped to publish it in the next issue. To get a general idea of the total number of manufacturers, dealers and repairers, the total given earlier is for the old Bombay State plus those published in this issue under Maharashtra.

Manufacturers

Serial No.	Name and Address of Manufacturer	Details of Articles Manufactured
(1)	Abbasbhai Yusufali Dohadwala, 29, Stable Street, Lambi Chawl, Bombay-8	Conical capacity measures.
(2)	Bajrang Metal Works, Itwari Bazar, Nagpur-2	Brass Weights.
(3)	Damle Iron Works, Baliram Peth, Jalgaon, East Khandesh	Weights.
(4)	Everest Tapes, Swastik House, Block No. 7, 383, Lamington Road, Bombay-7	Measuring Tapes.

Manufacturers (Contd.)

Sl. No.	Name and Address of Manufacturer	Details of Articles Manufactured
(5)	C.P. Foundry Works, Itwari Bazar, Nagpur	Weights.
(6)	Ganesh & Co., 215-A, Ripon Road, Rangunwala Compound, Bombay-8	Brass, Weights & Beam Scales.
(7)	Lallubhai Amichand Private Ltd. 48/50, Kansara Chawl, Bombay-2	Dipping type Conical capacity Measures.
(8)	Larsen & Toubro Ltd., I.C. House, Dougall Road, Ballard Estate, P.B. No. 278, Bombay-1.	Measuring Instruments (Petrol Pumps).
(9)	Mansukhlal Narandas, Chandawadkar Lane, Nasik City	Weights.
(10)	Mehta Deghani Metal Works, 94, Dhanji Street, Bombay	Weights.
(11)	Mercantile & Industrial Dev. Co. Pte., Ltd., National House, 67, Tulloch Road, Apollo Bunder, Bombay-1.	Measuring Instruments (Petrol Pumps etc.).
(12)	Mohd. Farooq Gallenwalla, Khetwadi, Mehar Bazar, Bombay-4.	Conical Capacity Measures.
(13)	Mohd. Siddik Tinwala, 94, Ripon Road, Ramzan Building, Bombay-11.	Conical Capacity Measures.
(14)	Mulji V. Narsi, Udyognagar, Sion, Bombay-22	Weighing Instruments (Counter Machines).
(15)	Munshi Sufi, 154, Janjekar Street, Bombay-3	Conical Capacity (Litre) Measures.
(16)	National Metal Industries, 15-A, Parel Village Road, Bombay-12.	Weights & Measures.
(17)	Oriental Metal Pressing Works, Private Ltd., 131, Worli, Bombay-18.	Capacity & Linear Measures.
(18)	Pax Tin Works, Haji Kasam Chawl No. 29, Shop No. 11, Small Kazi-pura, Two Tanks, Bombay-8.	Conical Measures of Capacity.
(19)	Rajabali Abdulhusain Tinwalla, 1st Parsiwada, Vithalbhai Patel Road, Bombay-4.	Conical Capacity Measures.
(20)	Ram Mills Ltd., Fergusson Road, Parel, Bombay-13	Weights.
(21)	Steel Industries of Hindustan, P. Ltd, Magazine Street, Darukhana, Bombay-10.	Weights.
(22)	Swastik Iron Works, Ghat Road, Nagpur-2	Weights.
(23)	Vidarbha Engineering Industries, Abhyankar Road, Sitabuldi, Nagpur-1.	Weights.

Dealers

Serial No.	Name and Address of Dealer	Details of Articles Sold
(1)	Abhadin & Sons, 3169, Juna Bazar, Ahmednagar	Weights, Measures and Weighing Instruments.
(2)	Abdul Husain M. Allabuxjee, Loha Oli, Itwari, Nagpur-2	Weights, Measures and Weighing Instruments.
(3)	Abdul Husain Yusufali Bohari, Patod Darwaja, Jeola (Nasik)	Weights, Measures and Weighing Instruments.
(4)	Abdul Rahiman Mohamad Husain Shaikh, 660, Shukrawar Peth, Sholapur.	Weights, Measures and Weighing Instruments.

Dealers (Contd.)

Serial No.	Name and Address of Dealer	Details of Articles Sold
(5)	Abdul Husain Essaji, General Iron & Steel and Hardware Merchant, Tilak Park, Wardha.	Weights, Measures and Weighing Instruments.
(6)	Abdul Husain Gulamali, C.N.4, Near Municipal Garden, Wardha.	Weights, Measures and Weighing Instruments.
(7)	Abdulla Bhai Mulla Ahmedeli Main Road Koamgaon, Distt (10) Buldana	Weights, Measures and Weighing Instruments.
(8)	Abidi Shop, Kampti Road, Nagpur	Weights, Measures and Weighing Instruments.
(9)	Akbarali Abdulali, Tunja Peth, Akola	Weights, Measures and Weighing Instruments.
(10)	Akbarali Kurbanhusain, Hardware Merchants, Sindhkheda (West Khandesh).	Weights, Measures and Weighing Instruments.
(11)	M.A. Akatewala, Itwari Bazar, Amravati	Weights, Measures and Weighing Instruments.
(12)	M.H. Akbarali Alimohomad, Main Road, Yeotmal	Weights, Measures and Weighing Instruments.
(13)	Akhtar Husain & Bros., General Hardware Merchant, Wardha	Weights, Measures and Weighing Instruments.
(14)	T.M. Akolawalla & Bros., Itwari Nazar, Amravati	Weights, Measures and Weighing Instruments.
(15)	Amer Trading Co., 64, Nagdevi St., Bombay-3	Measures only.
(16)	Annexed Agencies (Pvt.) Ltd., Station Road, Amravati	Weights, Measures and Weighing Instruments.
(17)	Asgarali Kadarbhai, Chowk Bazar, Aurangabad	Weights, Measures and Weighing Instruments.
(18)	Asha Iron Beam Scale Repairing Workshop, P. B. No. 13/3550, Sakari Road, Dhulia, (Distt. West Khandesh).	Weights, Measures and Weighing Instruments.
(19)	Asian Steels & Co., Hardware Stores, 1st Floor, Ismail Building, Pathakwadi, Lohar Street, Bombay-2.	Measures.
(20)	Avery Co. of India (Pvt.) Ltd., Homi House, Kingsway, Nagpur-1.	Weights, Measures and Weighing Instruments.
(21)	Baboo Maniram Workshop, Prop. Ramrattan Ramcharan, Mahule, Ram Mandir Road, Yeotmal.	Weights, Measures, Weighing and Measuring Instruments.
(22)	Bajaji General Stores, Main Road, Yeotmal	Weights, Measures, Weighing and Measuring Instruments.
(23)	Baraskar Stationery Mart, 914, Baraskar Bldg. Sangli	Weights, Measures and Weighing Instruments.
(24)	Behore Mullaji Shop, Bhandara Road, Itwari, Nagpur-2	Weights, Measures and Weighing Instruments.
(25)	Bhai Vallabhaji Ravashankar Joshi, Hardware Merchant, Chanda.	Weights, Measures, Weighing and Measuring Instruments.
(26)	Bhujangnath Rao, Chowk, Nanded	Weights, Measures and Weighing Instruments.
(27)	Bhunje Brothers, Koregaon, Distt. N. Satara	Weights, Measures and Weighing Instruments.

Dealers (Contd.)

Sl. No.	Name and Address of Dealer	Details of Articles Sold
(28)	G.A. Brother, 176, Kazi Sayed Street, Dhobi Building, Mandvi Koliwada, Bombay-3.	Weights, Measures and Weighing Instruments.
(29)	M.C. Brothers, 11, IIND, Bheiwada Lane, Bhuleshwar, Bombay-2.	Weights, Measures and Weighing Instruments.
(30)	Central Engineering Corporation, Abhyankar Road, Sitabuldi, Nagpur-1.	Weights, Measures and Weighing Instruments.
(31)	T.B. Chakhe, 23/44, Raviwar Peth, Karad	Weights, Measures and Weighing Instruments.
(32)	Chhanganlal Nihalchand Mutha, Baramati, Distt. Poona	Weights, Measures and Weighing Instruments.
(33)	L.M. Choudhari Workshop, 123, Gold Finch Peth, Sholapur	Weights, Measures and Weighing Instruments.
(34)	Chunilal Hiralal Dabi, Laxmi Road, Rajendra Prasad Chowk, Dhond.	Weights, Measures and Weighing Instruments.
(35)	Dagaduram Pirachand, Bonadia, 706, Shivaji Road, Shrirampur.	Weights, Measures and Weighing Instruments.
(36)	Datta Avinash, Loha Bhandar Chowk Bazar, Wani Distt. Yeotmal	Weights, Measures, Weighing and Measuring Instruments.
(37)	Dawoodbhai Shaikh Hasanji Shukrawar Peth, Karamala, Distt. Sholapur.	Weights, Measures and Weighing Instruments.
(38)	Deccan Industrial Corporation, Diggi Mohalla, Station Road, Parbhani.	Weights, Measures and Weighing Instruments.
(39)	R.S. Devane & Company, 4250-A, Somwar Peth, Barsi, District Sholapur	Weights, Measures and Weighing Instruments.
(40)	Devichand Hirachand Shaha, Shroff, Shroff Bazar, Kopargaon.	Weights, Measures and Weighing Instruments.
(41)	Dave Rathi & Co., Main Road, Hinganghat	Weights, Measures and Weighing Instruments.
(42)	Devendra Shantinath Moholkar, Near Post Office, Kurduwadi Distt. Sholapur.	Weights, Measures and Weighing Instruments.
(43)	D.H. Engineering & Co., 84/86, Nagdevi Cross Lane, Bombay-3.	Weights, Measures and Weighing Instruments.
(44)	Fakhruddin Saifuddin & Co., Baramati, Distt. Poona	Weights, Measures and Weighing Instruments.
(45)	Famous Steel Depot, 210, Mayor Bldg., Tulsipipe Road, Dadar (W. Rly.), Bombay-28.	Weights and Measures.
(46)	Fazelhusein Asgarali & Co., 893, Main Road, Pandharpur, Distt. Sholapur.	Weights, Measures and Weighing Instruments.
(47)	Fidahusen M. Gulamali, Corner Main Road, Yeotmal	Weights, Measures and Weighing Instruments.
(48)	Gajanan Agencies, Ward No. 4, Bakri Gin, Sheogaon, Distt. Buldana.	Weights, Measures Weighing and Measuring Instruments.
(49)	Gourhar Soni, Wani, Distt. Yeotmal	Weights, Measures and Weighing Instruments.

Dealers (Contd.)

Sl. No.	Name and address of Dealer	Details of Articles Sold
(50)	Govindram Meherchand Sindhi, Itwari Bazar, Wardha	Weights, Measures and Weighing Instruments.
(51)	Govindrao Punaji Bari, Main Road, Yeotmal.. ..	Weights, Measures and Weighing Instruments.
(52)	Gujarat General Stores, Sholapur	Weights, Measures and Weighing Instruments.
(53)	Gulam Husein Hasanbhai, Shukrawar Peth, At & Post Karmala, Distt. Sholapur.	Weights, Measures and Weighing Instruments.
(54)	Gulamabbas Hiptullabhai, Bombaywala, Yeotmal	Wights, Measures and Weighing Instruments.
(55)	Gurudutta Workshop, 79, Sidheshwar Peth, Sholapur ..	Weights, Measures and Weighing Instruments.
(56)	Haji Banekhan Dawoodkhan, 2432, Mahatma Gandhi Road, Ahmednagar	Weights, Measures and Weighing Instruments.
(57)	Haji Kadarsaheb Sultansaheb, Maner, 1642, C. Shivaji Road, Kolhapur.	Weights, Measures and Weighing Instruments.
(58)	Haji Mulla Esufally Ebrahimji, Grampanchayat House, No. 730, (Bazar Galli) Jamner, Distt. East Khandesh.	Weights, Measures and Weighing Instruments.
(59)	Haji Sultanali Mohamadali, Itwari Bazar, Amravati	Weights, Measures and Weighing Instruments.
(60)	M. Hakimuddin Esmailji, Ahmednagar, Juna Kapad Bazar, Ahmednagar.	Weights, Measures and Weighing Instruments.
(61)	Hasanali Sultanbhai Bohar, Pelti, Nasik City	Weights and Weighing Instruments.
(62)	Hatim & Brother, Subji Mandi, Chanda	Weights, Measures and Weighing Instruments.
(63)	Hiptulla Bhai Tyebali, Bombaywala, Main Road, Yeotmal ..	Weights, Measures and Weighing Instruments.
(64)	Honesty Paper Mart, Ajni Road, Wardha	Weights, Measures and Weighing Instruments.
(65)	Husanali Adamji, Kotwali Ward, Main Road, Chanda ..	Weights, Measures, Weighing and Measuring Instruments.
(66)	M. Husain Bhai Mohomadi, Nandurbar, West Khandesh ..	Weights, Measures and Weighing Instruments.
(67)	Husan Bawasaheb Kazi, Bazar Peth, Ratnagiri	Weights, Measures and Weighing Instruments.
(68)	Imdadali Tyebali Bombaywala, Hardware and General Merchants, Main Road, Yeotmal.	Weights, Measures and Weighing Instruments.
(69)	S.B. Inamdar, Zanda Chowk, Shrigonda, Distt. Ahmednagar	Weights, Measures and Weighing Instruments.
(70)	Iron and Hardware Syndicate, Loha Oli, Itwari, Nagpur ..	Weights, Measures and Weighing Instruments.
(71)	Ishwarlal Bros, Kanji, Gokuldas Bldg., Lohar Chawl, Bombay-2.	Weights, Measures and Weighing Instruments.
(72)	Jai Bharat Stores, At & Post Arale Peta-Shirala, Distt. Satara	Weights, Measures and Weighing Instruments.

Dealers (contd.)

Sl. No.	Name and Address of Dealers	Details of Articles Sold
(73)	Jamnadas Patilal Soni, H.No. 66, Ward No. 19, New Itwari, Road, Nagpur-2.	Weights, Measures and Weighing Instruments.
(74)	G.N. Jathar, Gamdevi Road, Sultan Building, Near Telephone Exchange Building, Navpada, Thana.	Weights, Measures and Weighing Instruments.
(75)	Jawanmal Hiralal Gandhi, Bazar Peth, Newasa, Distt. Ahmednagar.	Weights, Measures and Weighing Instruments.
(76)	K.C. Jiwani, Amtobai Blocks, Ghodbunder Road, Opp. Bus Stop, Near Petrol Pump, Bandra.	Weights and Measures.
(77)	Kamtaprasad Nandiprasad, Itwari Loha Oli	Weights, Measures and Weighing Instruments.
(78)	G.A. Kantawala, 254, Ripon Road, Sajan Buldg, Bombay-8 ..	Weights, Measures and Weighing Instruments.
(79)	S.K. Kardak & Co., 138, Vincent Road, Dadar, Bombay-4 ..	Weights, Measures and Weighing Instruments.
(80)	Khansaheb M. Hasonjee & Sons, Itwari, Nagpur-2	Weights, Measures and Weighing Instruments.
(81)	Kharda Hardware Stores, Kharada, Distt. Ahmednagar ..	Weights, Measures and Weighing Instruments.
(82)	Kisan Tormal, Sewkar Peth, Manohar Building, Yeotmal. ..	Weights, Measures and Weighing Instruments.
(83)	Limestones, Boho Oli, Itwari, Nagpur-2	Weights, Measures and Weighing Instruments.
(84)	Laxmichand General Stores, 2762, Ganj Bazar, Ahmednagar	Weights, Measures and Weighing Instruments.
(85)	Lucky Traders, Botawala Bldg., 3rd Floor, Horniman Circle, Bombay,	Weights, Measures and Weighing Instruments.
(86)	Mallikarjunappa Sidramappa Bidve, Latur, Distt. Osmanabad.	Weights, Measures and Weighing Instruments.
(87)	Malikarjun Mahoharkare (Gohdegaonkar), 835, Main Road, Kurmal, Distt. Sholapur.	Weights, Measures and Weighing Instruments.
(88)	Malluram Ramji Lal Mohadia H. No. 592 Cir. 19/17, Main Road, Sitarldi Nagpur-1	Weights, Measures and Weighing Instruments.
(89)	A.M. Maner, House No. 2153, Somwar Peth, Kolhapur ..	Weights, Measures and Weighing Instruments.
(90)	Manikchand Dharmchand Shaha, Mhaswad, Tal. Main, Distt. North Satara.	Weights, Measures and Weighing Instruments.
(91)	Mannalal Babulal, Bagdia, Itwari Bazar, Nagpur-2 ..	Weights, Measures and Weighing Instruments.
(92)	Manohar Metal Works, Gandhi Chowk, Bhan dara ..	Weights, Measures and Weighing Instruments.
(93)	Manubhai Mulchand & Co., 26-A, Behind Mumbadevi P.O., Bombay-2.	Weights, Measures and Weighing Instruments.
(94)	Markandey Workshop, 79, Sidheshwar Peth, Shoholapur ..	Weights, Measures and Weighing Instruments.

Dealers (contd.)

Sl. No.	Name and Address of Dealer	Details of Articles Sold
(95)	A. B. Maskati, Maskati House, Mohamadali Road, Bombay-3	Weights, Measures and Weighing Instruments.
(96)	D. G. Maste, 24, Main Road, Nasik Road	Weights, Measures and Weighing Instruments.
(97)	A. M. Master and Company, 179/81, Janjekar Street, Bombay-3	Weights, Measures and Weighing Instruments.
(98)	Misrilal Motilal 71, Sarang Street, Bombay -3	Weights, Measures and Weighing Instruments.
(99)	Misrilal Motilal, 256, Ganpat Peth, Sangli	Weights, Measures, Weighing and Measuring Instruments.
(100)	Misrilal Motilal, Chowk, Aurangabad	Weights, Measures, Weighing and Measuring Instruments.
(101)	Modern Foundry & Works Ltd., Station Road, Ahmednagar	Weights, Measures, Weighing and Measuring Instruments.
(102)	Mohandas Tuljiram Mahadwale, 394, Shaniwar Peth, Satara	Weights, Measures and Weighing Instruments.
(103)	Mohanlal Tukaram Shan, At Rahimatpur, Dist. N. Satara ..	Weights, Measures, Weighing and Measuring Instruments.
(104)	Mohd. Fashiuddin Prop. Abid Scales & Weights Dealers, Huzoorgunj, Degloor, Dist. Nanded.	Weights, Measures, Weighing and Measuring Instruments.
(105)	Mohd Zainulabuddin, S/o Mohd. Shujabddin, Main Road, Osmanabad.	Weights, Measures, Weighing and Measuring Instruments.
(106)	C. B. Mor, Nehru Chowk, Cross Lane, Yeotmal	Weights, Measures and Weighing Instruments.
(107)	Mulla Adamali Mulla Taiyebali, Sitabuldi, Nagpur	Weights, Measures, Weighing and Measuring Instruments.
(108)	Mulla Mohamadali Abdulali, Gujari Bazar, Nanurbar (West Khandesh).	Weights, Measures, Weighing and Measuring Instruments.
(109)	Mulji Laxmidas & Co., Shop No. 193, Janjekar Street, Cutlery Bazar, Bombay-3.	Weights, Measures, Weighing and Measuring Instruments.
(110)	National Scale Traders, Janjekar Street, Bombay-3	Weights, Measures, Weighing and Measuring Instruments.
(111)	National Metal Industries, Parel Village Road, Bombay-12	Weights, Measures, Weighing and Measuring Instruments.
(112)	Narsi Rupsi Jain, Mahatma Gandhi Road, Bazar Peth, Chalisgaon, Dist. East Khandesh.	Weights, Measures and Weighing Instruments.
(113)	Nicles Scale and Weight Stall, Opp. Nicles Mandir, Itwari, Nagpur-2.	Weights, Measures and Weighing Instruments.
(114)	F. T. Oliya Kantawala, 12, Khetwadi, Zaveri Building, Bombay-4.	Weights, Measures, Weighing and Measuring Instruments.
(115)	Onkar Bandu Kasar, Jalalpura, Main Road, Khangaon, Dist. Buldahan.	Weights Measures, Weighing and Measuring Instruments.
(116)	A. R. Patanwala, Hardware Merchant, Itwari Bazar, Amravati	Weights, Measures and Weighing Instruments.

Dealers (contd.)

Sl. No.	Name and Address of Dealer	Details of Articles Sold
(117)	Pathak Company, Opp. Empress Mill No. 1, Nagpur ..	Weights, Measures and Weighing Instruments.
(118)	V. D. Pathak, Dealer in Weights and Measures, Loha Bazar, Latur, Dist. Osmanabad.	Weights, Measures and Weighing Instruments.
(119)	B. T. Patil & Co., 75, Raviwar Peth, Karad, Dist. North Satara	Weights, Measures and Weighing Instruments.
(120)	R. K. Phatatye, 260, W. Mangalwar Peth, Sholapur	Weights, Measures and Weighing Instruments.
(121)	Pitru Chhaya, General Mechanical Works, Akalkot, Dist. Sholapur.	Weights, Measures and Weighing Instruments.
(122)	Plynet Traders, Shahru Castle, Bibijan Street, Mohamadali Road, Bombay-3.	Weights, Measures and Weighing Instruments.
(123)	Popatlal Manilal Shah, Bhandara Road, Near Mahavir Bhavan, Itwari, Nagpur-2.	Weights, Measures and Weighing Instruments.
(124)	Prabhuling Sonappa Hundekari, Vani Galli, Kharda, Dist. Ahmednagar.	Weights, Measures and Weighing Instruments.
(125)	Prakash & Co., Navi Peth, Pandharpur, Distt. Sholapur	Weights, Measures and Weighing Instruments.
(126)	Premchand Vijayakumar & Co., Amravati	Weights, Measures and Weighing Instruments.
(127)	Pupehand Zaverchand Soni, House No. 528/3, Ward No. 19, Near Itwari, Nagpur-2.	Weights, Measures and Weighing Instruments.
(128)	N. S. Rajurkar & Sons, Kapad Bazar, Ahmednagar ..	Weights, Measures and Weighing Instruments.
(129)	Ram Co., 88-90, Yatim Manzil, Dadsaheb Phalke Road, Dadar, Bombay-28.	Weights, Measures and Weighing Instruments.
(130)	Ram Narain & Co., 3/281 Laxmi Sadan, Station Road, Matunga, Bombay-19.	Weights, Measures and Weighing Instruments.
(131)	Ram Samarth Repairing Workshop, Kandajiwadi, Opp. G.P. City High School, Sakri Road, Dhulia (West Khandesh).	Weights, Measures and Weighing Instruments.
(132)	Ramji Devji Katewala, Malipura Chowk, Akola	Weights, Measures and Weighing Instruments.
(133)	Ratanlal P. Vera & Co., Shivapur Peth, Main Road, Akluj, Dist. Sholapur.	Weights, Measures and Weighing Instruments.
(134)	Ratanlal Bansilal Jaiswal, Kali Kurti Road, (Near Shani Mandir), Jalna, Dist. Aurangabad.	Weights, Measures and Weighing Instruments.
(135)	Ravji Ramchandra & Co., 35/39, Surat Street, Dana Bunder, Bombay-9.	Weights, Measuring and Weighing Instruments.
(136)	Shahard Shah, 185, Nagdevi Street, Bombay-3	Weights, Measures and Weighing Instruments.
(137)	Shah Mehta & Co., Masjid Siding Road, Opp. Princess Dock, Near Taxi Stand, Bombay-9.	Weights, Measures and Weighing Instruments.
(138)	Shah Chapsi Manshi, General Merchants & Commission Agents, Bazar Ward, Digras, Distt. Yeotmal.	Weights, Measures and Weighing Instruments.

Dealers (contd.)

Sl. No.	Name and Address of Dealer	Details of Articles Sold
(139)	Satyaniketan Rajur, Distt. Ahmednagar	Weights, Measures and Weighing Instruments.
(140)	P. K. Shaikh, 5, Malhar Peth, Satara, Distt. North Satara.	Weights, Measures and Weighing Instruments.
(141)	Shaikh Brothers, 120, Mody Street, 4th Floor, Fort, Bombay.	Weighing Instruments.
(142)	Shaikh Fida Ali Sultan Ali, General Hardware Merchant, Itwari, Nagpur-2.	Weights, Measures and Weighing Instrument.
(143)	Shankar General Stores, Mahatma Gandhi Road, Ekoriward, Chanda.	Weights, Measures and Weighing Instruments.
(144)	Shankar Pundlik Lohar, Akluj, Distt. Sholapur.	Weights, Measures and Weighing Instruments.
(145)	Shantilal Mathuradas, Inside Jawahar Gate, Amravati.	Weights, Measures and Weighing Instruments.
(146)	Sharafali Alimohamed, Main Road, Yeotmal.	Weights, Measures and Weighing Instruments.
(147)	Shashikant & Co., 350, Bazar Peth, Rahimatpur, Distt. North Satara.	Weights, Measures and Weighing Instruments.
(148)	Y. D. Shinde, C/o 276, Shukrawar Peth, Phaltan, Distt. North Satara.	Weights, Measures and Weighing Instruments.
(149)	R. D. Sinhal & Sons, Arms Dealers & Stationery, Wardha.	Weights, Measures and Weighing Instruments.
(150)	Steel Industries of Hindustan Private Ltd., Magazine Street, Darukhana, Bombay-10.	Weights.
(151)	Umashankar Gurupadappa Karangge, Loha Bazar, Latur, Distt. Osmanabad.	Weights, Measures and Weighing Instruments.
(152)	D. Umedlal & Co., 28-29, Kansara Chawl, Bombay-2	Weights, Measures and Weighing Instruments.
(153)	V. B. Undale, Batsi, 3891, Laxmi Road, Lone Bldg., Barsi, Distt. Sholapur (BARS).	Weights, Measures and Weighing Instruments.
(154)	United Hardware Mart, 1444, Agra Road, Dhulia (West Khandesh).	Weights, Measures and Weighing Instruments.
(155)	D. L. Vaid, 202, Cutlery Bazar, Bombay-3	Weights, Measures and Weighing Instruments.
(156)	Vakharia & Sons, 151, Girgaum Road, Opp. Majestic Cinema, Bombay-4.	Weights, Measures, Weighing and Measuring Instruments.
(157)	S. Vanchand & Co., 54, Kansara Chawl, Kalbadevi Road, Opp. Mumbadevi Post Office, Bombay-2.	Weights, Measures and Weighing Instruments.
(158)	Vidarbha Engineering Industries, 31, Great Nag Road, Nagpur-2.	Weights, Measures and Weighing Instruments.
(159)	Vijay Book Depot, General Merchants, Main Road, Chhota Bazar, Bhandara.	Weights, Measures, Weighing and Measuring Instruments.
(160)	Vijay Stores, Station Road, Yeotmal	Weights, Measures and Weighing Instruments.
(161)	Yadev Rambhan Halge, Sadar Bazar, Hingoli, Distt. Parbhani	Weights, Measures and Weighing Instruments.
(162)	Yevankar Iron Factory, 3298, Bhande Galli, Barsi	Weights, Measures and Weighing Instruments.

Repairers

Sl. No.	Name and Address of Repairer	Details of Articles Repaired
(1)	Abdul Rehman Vajeerkhan, Opp. Vyapari Mashid, House No. 7107-A, Ahmednagar.	Weights, Measures and Weighing Instruments.
(2)	Arkay Traders No. 5, Gustad Chambers, Jail Road (North), Opp. J. J. Hospital Gate No. 6, Bombay-9.	Weights, Measures and Weighing Instruments.
(3)	Asha Iron Beam Scale Repairing Workshop, H. No. 13/3550, Sakri Road, Dhulia (Distt. West I handesh).	Weights, Measures and Weighing Instruments.
(4)	Avery Co. of India (Private Ltd.), 16, Dougall Road, Ballard Estate, Bombay-1.	Weights, Measures and Weighing Instruments.
(5)	Asia Engineering Corporation No. 4, Gustad Chambers, Jail Road (North), Opp. J. J. Hospital Gate No. 6, Bombay-9.	Weights, Measures and Weighing Instruments.
(6)	Azad Hind Furniture Works & Merchants, 132, Murarji Peth, Saraswati Chowk, Hatch Road, Sholapur.	Weights, Measures and Weighing Instruments.
(7)	Baboo Maniram Workshop, Ram Mandir Road, Yeotmal	Weights, Measures and Weighing Instruments.
(8)	Baboorao Balasaheb Korde, 36, Panta's Got. Satara City	Weights, Measures and Weighing Instruments.
(9)	B. A. & Brothers, 2nd Bhoiwada Lane, 176, Kazi Syed Street, Dhoble Building, Mandvi-Koliwada, Bombay.	Weights, Measures and Weighing Instruments.
(10)	B. A. & Brothers, 175, Kazi Syed Street, Dhoble Building, Mandvi Kolwada, Bombay-3.	Weights, Measures and Weighing Instruments.
(11)	M. C. Brothers, 2nd Bhoiwada Lane, Bhuleshwar, Bombay-2.	Weights, Measures and Weighing Instruments.
(12)	Bhai Parmeshwardin Baldeo Prasad Gupta, Hansapuri, Nagpur-2.	Weights, Measures and Weighing Instruments.
(13)	Bhikoba Dagdeoba Jagtap, 842, Shukarwar Peth, Poona-2.	Weights, Measures and Weighing Instruments.
(14)	Bhujannath Rao, Repairer, Weights & Measures, Chowk, Nanded.	Weights, Measures and Weighing Instruments.
(15)	Bombay Scale Repairing Works, Raja Building, Shop No. 1., Kazi Syed Street, Bombay-3.	Weights, Measures and Weighing Instruments.
(16)	L. M. Choudhari Workshop, Sholapur	Weights, Measures and Weighing Instruments.
(17)	D. M. Chowdhari, Ahmednagar	Weights, Measures and Weighing Instruments.
(18)	D. E. Cycle Mart & Mechanical Repairs Shop, Khanderao Road, Shirpur (West Khandesh).	Weights, Measures and Weighing Instruments.
(19)	Deccan Industrial Corporation, Station Road, Parbhani	Weights, Measures and Weighing Instruments.
(20)	S. D. Mello, Kasamali Khatri Chawl, Gokuldas Pasta Road, Bombay-14.	Weights, Measures and Weighing Instruments.
(21)	Ghisa Bahadur Lohar, Sham Mandir Road, Yeotmal	Weights, Measures and Weighing Instruments.
(22)	B. R. Herman Mohatta (India) Pvt. Ltd., People's Building, Sir P. M. Road, Fort, Bombay-1.	Weights, Measures and Weighing Instruments.

Repairers (contd.)

Sl. No.	Name and Address of Repairer	Details of Articles Repaired
(23)	Ideal Cottage Industries, Daruwala Chawl, Joshi Bhuvan, Property, Bazar Ward, Kurla, Bombay-70.	Weights, Measures and Weighing Instruments.
(24)	Indo-Aryan Traders, 71, Ripon Road Kurla, Bombay-70	Weights, Measures and Weighing Instruments.
(25)	Jalna Industries Pvt. Ltd., Station Road, Jalna, Distt. Aurangabad.	Weights, Measures and Weighing Instruments.
(26)	D. N. Jathar, Gamdevi Road, Sultan Building, Near Telephone Exchange Office, Navpada, Thana.	Weights, Measures, Weighing and Measuring Instruments.
(27)	K. C. Jivani, Amtoobai Blocks, Ghodbunder Road, Opp. Bus Stop, Near Petrol Pump, Bandra Bombay.	Weights, Measures and Weighing Instruments.
(28)	S. K. Kardak & Co., 138, Vincent Road, Bombay-14	Weights, Measures and Weighing Instruments.
(29)	A. A. Kantawalla, Dhobi Galli, Mohamadi House, Bombay-3	Weights, Measures and Weighing Instruments.
(30)	G. A. Kantawala, 254, Ripon Road, Sujan Building, Bombay-4	Weights, Measures and Weighing Instruments.
(31)	H. R. Khan (Chopdekar), Repairing Workshop, Karvand Road, Shirpur, (Distt. West Khandesh).	Weights, Measures and Weighing Instruments.
(32)	S. H. Kantawala, 203-A, Bazar Ward, Kurla, Bombay-70	Weights, Measures and Weighing Instruments.
(33)	Khanbhai Hiptullabhai Amreliwala, Subhash Chowk, Jalgaon.	Weights, Measures and Weighing Instruments.
(34)	A. M. Maner, Kolhapur, 2153, 'C', Somwar Peth, Kolhapur	Weights, Measures and Weighing Instruments.
(35)	Mohamadali & Brothers, H. No. 384, Cir. No. B/19, Ward No. 25, Nagpur-2.	Weights, Measures and Weighing Instruments.
(36)	Misrilal Motilal, 256, Ganpati Peth, Sangli	Weights, Measures and Weighing Instruments.
(37)	Misrilal Motilal, Chowk, Aurangabad	Weights, Measures and Weighing Instruments.
(38)	New Bharat Engineering Corporation, Industrial Area, Nag Road, Nagpur-2.	Weights, Measures and Weighing Instruments.
(39)	F. T. Oliya, Khantawala, 12th Khetwadi Zaveri Building, Bombay-4.	Weights, Measures and Weighing Instruments.
(40)	Mistry Ramji Deoji Katewala, Malipura, Chowk, Akola	Weights, Measures, Weighing and Measuring Instruments.
(41)	B. P. Patil & Co., 75, Raviwar Peth, Karad	Weights, Measures and Weighing Instruments.
(42)	E. B. Patil, Scales Repairing Workshop, Near Weekly Bazar Jitha Peth, Jalgaon, Dist. East Khandesh.	Weights, Measures and Weighing Instruments.
(43)	R. K. Phatak, 260, Mangalwar Peth (West), Sholapur	Weights, Measures and Weighing Instruments.
(44)	Popatlal Manilal Shah, Bhandara Bhandar Road, Near Mahavir Bhuvan, Itwari, Nagpur-2.	Weights, Measures and Weighing Instruments.

Repairers (contd.)

Sl. No.	Name and Address of Repairer	Details of Articles Repaired
(45)	Pratapmal Sampatlal, Prop. Vijay Repairing Works, Loha Bazar, Pandit Nehru Road, Jalna, Distt. Aurangabad.	Weights, Measures and Weighing Instruments.
(46)	Ram & Co., 88/90, Yateem Manzil, Dadasaheb Phalke Road, Dadar, Bombay-14.	Weights, Measures and Weighing Instruments.
(47)	Ram Samarth Workshop, Kondajiwadi, Opp. J. R. City High School, Sakri Road, Dhulia (Distt. West Khandesh).	Weights, Measures and Weighing Instruments.
(48)	Ramesh & Co., 5th B. New Mill Road, Kurla, Opp. New Model Talkies, Bombay-70.	Weights, Measures and Weighing Instruments.
(49)	G. N. Ranadive, 36, Panta's Got. Satara City	Weights, Measures and Weighing Instruments.
(50)	Saran & Company, Liberty Building, Sadar, Nagpur	Weights, Measures and Weighing Instruments.
(51)	P. K. Shaikh, 5, Malhar Peth, Satara City	Weights, Measures and Weighing Instruments.
(52)	Y. D. Shinde, 276, Shukrawar Peth, Phaltan	Weights, Measures and Weighing Instruments.
(53)	V. V. Sonar, Ahmednagar	Weights, Measures and Weighing Instruments.
(54)	G. S. Sutar, Repairer of Weights & Measures, Near Punjab National Bank, Station Road, Jalgaon, Dist. East. Khandesh.	Weights, Measures and Weighing Instruments.
(55)	Swastik Iron Works, Ghat Road, Nagpur-2	Weights, Measures and Weighing Instruments.
(56)	Sapie's Scales Mfg. Co., Pvt. Ltd., 180-B, Gaiwadi, Girgaum, Bombay-4.	Weights, Measures, Weighing and Measuring Instruments.
(57)	D. L. Vaid, 202, Cutlery Bazar, Bombay-3	Weights, Measures and Weighing Instruments.
(58)	Vikar Co., 1587, Shukrawar Peth, Poona	Weights, Measures and Weighing Instruments.
(59)	Vithal Janaradan Kamble, Moliwada, Sangamner	Weights, Measures and Weighing Instruments.
(60)	Wamanrao S/o Sitaramji Kotle, Kotle Engineering Workshop, Waigaon Road, Wardha.	Weights, Measures and Weighing Instruments.

MYSORE (3)

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

Manufacturers

Sl. No.	Name and Address of Manufacturer	Details of Articles Manufactured
(1)	Agarwal Iron Works, Motilal Nehru Road, Agra	Cast Iron Weights.
(2)	Asiatic Machinery, Corporation (P) Ltd., Howrah	Weighing Instruments.

Manufacturers (contd.)

Sl. No.	Name and Address of Manufacturer	Details of Articles Manufactured
(3)	Bihar Agricultural Industries, Khagaul, Patna	Weights.
(4)	Decan Porcelain and Enamel Works, Hyderabad	Weights and Measures.
(5)	Dist. Co-operative Federation Ltd., Meerut	Weights.
(6)	Gulab Chand Chottey Lal, Agra	Weights.
(7)	India Iron Foundry, Agra	Weights.
(8)	Jivan Nagji & Sons, River Bank, Sauarkundla, (Saurashtra)	Weighing Instruments.
(9)	Krishna Iron Foundry, Agra	Weights.
(10)	Kasi Iron Foundry, Free Ganj, Agra	Weights.
(11)	Luhar Jiva Gopal & Co., Amratwel Gate Savar Kundla, (Saurashtra).	Beam Scales.
(12)	Luhar Karsan Ramji & Sons, Scale Factory, Popal Bogha Street, Savarkundla.	Weighing Instruments.
(13)	Majestic Metal Works, Mittika Sher, Begum Bazar, Hyderabad A.P.	Litre Measures.
(14)	Mallomal Rampershad Iron Foundry, Belanganj, Agra ..	Metric Weights of Cast Iron and Brass.
(15)	Multan Engineering Works, Mirjumala, Lakkhan, Delhi—6.	Brass and Bullion Weights Conical Capacity Measures.
(16)	K. Narayana & Sons, Dowlaisram	Weighing Instruments.
(17)	National Iron Foundry, Motilal Nehru Road, Agra ..	Weights.
(18)	National Iron Industries, No. 9, Motinagar, Bangalore-2 ..	Litre Measures (Conical).
(19)	National Moulding Factory, 1-4-741, Masheerabad Road, Near Badi Masjeed, Hyderabad-20 A. P.	Weights.
(20)	Pioneer Engineering and Trading Corporation, No. 21, B. Mahathma Gandhi Road, Bangalore-1.	Litre Measures (Conical).
(21)	Prabhat Iron Foundry, Free Ganj, Agra	Weights.
(22)	Prakash Engineering Co., and Rolling Mills, Agra ..	Weights.
(23)	Ram Krishna Iron Foundry, Sultan Ganj, Agra	Weights.
(24)	Seetha Ram Engineering Works (Regd.) Dowlaiswaram, East Godavari.	Beam Scales.
(25)	Standard Mechanical and Iron Works, Bombay.	Weights, Measures, Weighing and Measuring Instruments.
(26)	Standard Steel & Iron Foundry, Agra	Weights.
(27)	Swamy Engineering Works, High Class Beam Scales Manufacturers, Dowlaiswaram, Rajahmundry B. S., East Godavari Dist.	Weighing Instruments.
(28)	Watan Weight Works, Machli Kaman Mulgi No. 22-6-113, Hyderabad, A. P.	Weights.

Dealers

Sl. No.	Name and Address of Dealer	Details of Articles Sold
(1)	H. G. Anandaraja Setty, Doddapet, Tiptur	Weights, Measures, Weighing and Measuring Instruments.

Dealers (Contd.)

Serial No.	Name and Address of Dealer	Details of Articles Sold
(2)	Amarappa Angadi, Koppal	Weights, Measures, Weighing and Measuring Instruments.
(3)	Asgar Hussain, Manager, Mandya Rice Mills, Mandya ..	Weights, Measures, Weighing and Measuring Instruments.
(4)	Ashok Hardware Agencies, Maratha Galli, Hubli	Weights, Measures, Weighing and Measuring Instruments.
(5)	Agricultural Produce Market Committee, Challakere (Chitradurga Dist).	Weights, Measures, Weighing and Measuring Instruments.
(6)	Alijan, V. R. C. Market, Kumbarpur, Bangalore City ..	Weights, Measures, Weighing and Measuring Instruments.
(7)	V. G. Anvekar, Shroff Station Road, Gadag	Weights, Measures, Weighing and Measuring Instruments.
(8)	Airodi Radha Krishan Pai, Merchant, Car Street, Udipi (South Kanara).	Weights, Measures, Weighing and Measuring Instruments.
(9)	Attur Vasudevaprabhu, Hardware Merchant, Bunder, Mangalore.	Weights, Measures, Weighing and Measuring Instruments.
(10)	Abdur Rahim, Mohammed Yakub, Hardware Merchants, Raichur.	Weights, Measures, Weighing and Measuring Instruments.
(11)	Balaji Trading Company, Prof. G.T. Gopalan, No. 2 V Cross Road, Shankarpur, Bangalore-4.	Weights, Measures, Weighing and Measuring Instruments.
(12)	Bappanada, Hospet House, Bappanada Mulky, Post Mulky, Nallikai Road, Mangalore-1.	Weights, Measures, Weighing and Measuring Instruments.
(13)	Bapu Rao Pannalkar, Prof. Jai-Hind Flour Mills, No. 558 Theobald Road, Nazerabad, Mysore.	Weights, Measures, Weighing and Measuring Instruments.
(14)	Bhaskar Trading Agency, Hardware and General Merchant, Avenue Road, Cross, 4-Kumbarpur, Bangalore City.	Weights, Measures, Weighing and Measuring Instruments.
(15)	Bhavani Iron Works and Hardware Dealers, Market Road, Dharwar.	Weights, Measures, Weighing and Measuring Instruments.
(16)	C. B. Balulmath, Hardware Merchant, Bagalkot, Bijapur Dist.	Weights, Measures, Weighing and Measuring Instruments.
(17)	Babani Govind Bhat, Damodar Book Depot, Recognised Book Sellers, Kumta, North Kanara.	Weights, Measures, Weighing and Measuring Instruments.
(18)	H. Budan Baig, No. C. 1. III Main Road, Potato Merchant, New Taragpet, Bangalore-2.	Weights, Measures, Weighing and Measuring Instruments.
(19)	Basweshwar Repairing & Dealing Workshop, Jamkhandi.	Weights, Measures, Weighing and Measuring Instruments.
(20)	Bhagwan Stores, Prop. J. B. Soni, Jain Road, Jamkhandi	Weights, Measures, Weighing and Measuring Instruments.
(21)	Bhimasenappa and Bros., Harpanahalli, Davangere City	Weights, Measures, Weighing and Measuring Instruments.
(22)	A. B. Contractor, Hardware Merchant, Bagalkot (Dist. Bijapur).	Weights, Measures, Weighing and Measuring Instruments.

Dealers (Contd.)

Sl. No.	Name and Address of Dealer	Details of Articles Sold
(23)	Challakere Taluk Agricultural Produce Co-operative Marketing Society Ltd., Challakere.	Weights, Measures, Weighing and Measuring Instruments.
(24)	Chitradurga Taluk Co-operative Marketing Society Ltd., Chitradurga.	Weights, Measures, Weighing and Measuring Instruments.
(25)	N. S. Channabasappa Banappa, Hardware Merchant, Challakere (Chitradurga Dist).	Weights, Measures, Weighing and Measuring Instruments.
(26)	Cheapest Hardware Stores, V.R.G. Market, Avenue Road, Cross, Bangalore-2.	Weights, Measures, Weighing and Measuring Instruments.
(27)	Chau Shetty Brothers, Merchants, Haveri	Weights, Measures, Weighing and Measuring Instruments.
(28)	Chauamari & Co., Hardware Merchants, Raviwarpeth, Gokak	Weights, Measures, Weighing and Measuring Instruments.
(29)	A. Chause Mohadin & Sons, Iron Merchant Ghousia Buildings, Madhugiri.	Weights, Measures, Weighing and Measuring Instruments.
(30)	Chintamani Ishvarappa, Sonnad, Saundathi, Belgaum ..	Weights, Measures, Weighing and Measuring Instruments.
(31)	N. Y. Dhogdi, Gandhi Market, Hubli	Weights, Measures, Weighing and Measuring Instruments.
(32)	Y. Dassanna, Iron Merchant, Chintamani	Weights, Measures, Weighing and Measuring Instruments.
(33)	Davangere Agricultural Produce Market Committee, Davangere City.	Weights, Measures, Weighing and Measuring Instruments.
(34)	A. J. Danasetti & Company India (Bijapur Dist.) ..	Weights, Measures, Weighing and Measuring Instruments.
(35)	B. Dashrathappa, Hardware and General Merchant, Station Road, Davangere City.	Weights, Measures, Weighing and Measuring Instruments.
(36)	R.G. Deogiri & Sons, Iron and Hardware Merchants, Bijapur.	Weights, Measures, Weighing and Measuring Instruments.
(37)	Damodar Stores, General Merchants, B.H. Road, Sagar ..	Weights, Measures, Weighing and Measuring Instruments.
(38)	K. P. Gadgimath, Iron Merchants, Davangere	Weights, Measures, Weighing and Measuring Instruments.
(39)	A. A. Golewale, Nehru Road, Bijapur	Weights, Measures, Weighing and Measuring Instruments.
(40)	S. N. Gaur & Company, Cottonpet, Bangalore-2	Weights, Measures, Weighing and Measuring Instruments.
(41)	S. S. Hiremath, Stationery Shop, A. O. 2 P.O. Sindgi Dist., Bijapur.	Weights, Measures, Weighing and Measuring Instruments.
(42)	B. S. Honagudi, Namjoshi Road, Gadag	Weights, Measures, Weighing and Measuring Instruments.
(43)	Ishwarappa Hanumanthappa Kombali, Hardware and Commission Agent, Mundargi.	Weights, Measures, Weighing and Measuring Instruments.
(44)	Janath Stores, Baikampady, South Kanara	Weights, Measures, Weighing and Measuring Instruments.

Dealers (Contd.)

Sl. No.	Name and Address of Dealer	Details of Articles Sold
(45)	Janadri Venkanna Setty & Sons, Hospet	Weights, Measures, Weighing and Measuring Instruments.
(46)	Krishna Hardware Merchant, Puttur, South Kanara ..	Weights, Measures, Weighing and Measuring Instruments.
(47)	M.A. Krishna Nayak & Sons, Sri Krishna Buildings, P.O. Box No. 47, Bunder, Mangalore.	Weights, Measures, Weighing and Measuring Instruments.
(48)	S. M. Khodanpur, Hattikalsal, Hubli	Weights, Measures, Weighing and Measuring Instruments.
(49)	Krishna Surya Prakash, Kirana Merchant, Yadgir, Gulbarga District.	Weights, Measures, Weighing and Measuring Instruments.
(50)	Kunigal Taluk Agricultural Produce Co-operative Marketing Society, Kunigal.	Weights, Measures, Weighing and Measuring Instruments.
(51)	Kasi Radakrishna Setty & Sons, Hardware Merchants, Santhepet, Chitradurga.	Weights, Measures, Weighing and Measuring Instruments.
(52)	R.G. Kapalaganti, Stationery and Book Sellers Shop, Mahalingapur, Mudhol (Taluk).	Weights, Measures, Weighing and Measuring Instruments.
(53)	Kemchand Narayan Das, Hardware & Paints Merchant, 200 Avenue Road, Bangalore-2.	Weights, Measures, Weighing and Measuring Instruments.
(54)	S. G. Kotur, General Merchant, 68 Nehru Market, Dharwar	Weights, Measures, Weighing and Measuring Instruments.
(55)	Kamath & Company, Kalsank Udipti, South Kanara ..	Weights, Measures, Weighing and Measuring Instruments.
(56)	S. Khader Baig Sahib Son, General Hardware Merchants, 191, Avenue Road, Bangalore City.	Weights, Measures, Weighing and Measuring Instruments.
(57)	Kudukunji Narayan Pai, Market Road, Bangalore	Weights, Measures, Weighing and Measuring Instruments.
(58)	M. R. Katti & Bros., Iron Merchants, Bijapur (S. Rly.) ..	Weights, Measures, Weighing and Measuring Instruments.
(59)	G. C. Kumarnata Deshapande Chawl, Fort, Dharwar ..	Weights, Measures, Weighing and Measuring Instruments.
(60)	G. S. Laxmeshwar, Hattikalsal, Hubli	Weights, Measures, Weighing and Measuring Instruments.
(61)	Lakshmidas Chapsey, Takkar Hattikalsal, Hubli	Weights, Measures, Weighing and Measuring Instruments.
(62)	Laxmi General and Hardware Stores, Vijaya Road, Dharwar	Weights, Measures, Weighing and Measuring Instruments.
(63)	Laxmi Repairing and Dealing Workshop, Prop. M. T.ulkarni, Mirday Galli, Bijapur.	Weights, Measures, Weighing and Measuring Instruments.
(64)	Mirza Nabi Beig, S/o Late Madar Beig, Gomdhi Chowk, Hospet.	Weights, Measures, Weighing and Measuring Instruments.
(65)	Modern Repairing Work, Prop. P. H. Naik, Sunkdvar Oni, Ranibenur.	Weights, Measures, Weighing and Measuring Instruments.
(66)	M. Mahamed Usman, Door No. 1984, Adama Khan Street, K. R. Mahalla, Mysore.	Weights, Measures, Weighing and Measuring Instruments.

Dealers (Contd.)

Sl. No.	Name and Address of Dealer	Details of Articles Sold
67)	Model Rice Mills, Old M. C. Road, Kallahally Extension, Mandya.	Weights, Measures, Weighing and Measuring Instruments.
68)	N. Maheshwarappa & Co., Merchants, Mandipet, Davangere City.	Weights, Measures, Weighing and Measuring Instruments.
69)	B. Mohamed Hayath Saheb & Sons, Hardware Merchants, Sagar.	Weights, Measures, Weighing and Measuring Instruments.
70)	Mayanna, 622 Ashoka Road, Mysore	Weights, Measures, Weighing and Measuring Instruments.
71)	A. A. Maniyar, Dealer in Weights and Measures, Raviwarpeth, Belgaum.	Weights, Measures, Weighing and Measuring Instruments.
72)	Madhugiri Co-operative Society, Ltd., Madugir, Tumkur (Dist.).	Weights, Measures, Weighing and Measuring Instruments.
73)	Mahabub Saheb Meerasaheb, Nargegal, Hardware & Iron Merchant, Ilkal (Bijapur Dist.).	Weights, Measures, Weighing and Measuring Instruments.
74)	Mysore Weights Association, C/o Machinery and Foundry Works (P) Ltd., Tumkur Road, Yeshwantpur, Bangalore-22.	Weights, Measures, Weighing and Measuring Instruments.
75)	Mangalore Hardware Stores, Market Road, Mangalore (South Kanara).	Weights, Measures, Weighing and Measuring Instruments.
76)	Mathi Kotrabasappa, Merchants & Commission Agent, Chamarajpet, Davangere City.	Weights, Measures, Weighing and Measuring Instruments.
77)	T. M. Mahantaiah, Commission Agent, Main Road, Hospet, Bellary District.	Weights, Measures, Weighing and Measuring Instruments.
78)	M. D. Mulla, No. 2625, Tatagar Galli, Gokak, Belgaum District.	Weights, Measures, Weighing and Measuring Instruments.
79)	National Hardware Stores, Bazar Street, Mandya	Weights, Measures, Weighing and Measuring Instruments.
80)	Narayana Industries, V.V. Mahalla, Adipampa Road, Mysore	Weights, Measures, Weighing and Measuring Instruments.
81)	K. B. Naikwadi & Bros., Subhas Road, Dharwar	Weights, Measures, Weighing and Measuring Instruments.
82)	Nanjundappa Ramaiah & Sons, General Merchants, Gandhi Bazar, Shimoga.	Weights, Measures, Weighing and Measuring Instruments.
83)	Patcha Niyan Sahib Company, 197, Avenue Road, Bangalore	Weights, Measures, Weighing and Measuring Instruments.
84)	Panchayat Book House, Market Road, Dharwar	Weights, Measures, Weighing and Measuring Instruments.
85)	Puttaiah Setty & Sons, Merchants & Burmah Shell Dealer, Somwarpet, N. Coorg.	Weights, Measures, Weighing and Measuring Instruments.
86)	Peoples Hardware Stores, Bazar Street, Mandya	Weights, Measures, Weighing and Measuring Instruments.
87)	Prasanna Rudra, Merchant, Magadi, Bangalore District	Weights, Measures, Weighing and Measuring Instruments.
88)	D. Y. Puttanna Sons & Co., Metal Merchants, Santepet, Tumkur.	Weights, Measures, Weighing and Measuring Instruments.

Dealers (contd.)

Sl. No.	Name and Address of Dealer	Details of Articles Sold
(89)	Parappa Aminappa Chittargi, Honogund, Bijapur District	Weights, Measures, Weighing and Measuring Instruments.
(90)	Peter Pai's Metal Hardware Merchants, Coondopur, South Kanara.	Weights, Measures, Weighing and Measuring Instruments.
(91)	Pioneer Engineering & Trading Corporation, No. 21 B, Mahatma Gandhi Road, Bangalore.	Weights, Measures, Weighing and Measuring Instruments.
(92)	G. V. Rajashekar, M/S Vinoda Talies, Tumkur	Weights, Measures, Weighing and Measuring Instruments.
(93)	Rajah Lakshminarayan Setty and Sons, Hardware & General Merchants, Bangarpet.	Weights, Measures, Weighing and Measuring Instruments.
(94)	H. R. Rangaswamy, C/o B. Garudachar & Sons, Santhepet, Chitaldrug.	Weights, Measures, Weighing and Measuring Instruments.
(95)	Rattachathi-Seenappa & Sons, General Hardware Merchants, Sagar.	Weights, Measures, Weighing and Measuring Instruments.
(96)	G.C. Rudrakashi & Sons, Stationery Hardware Merchants, Gandhi Road, Bagalokot.	Weights, Measures, Weighing and Measuring Instruments.
(97)	K. Ramakrishna Gundu Nayak & Sons, General Merchants, Car Street, Udupi, S.K.	Weights, Measures, Weighing and Measuring Instruments.
(98)	D. N. Ramaswamy, Silk Merchant, Darga Mohalla, Doddaballapur, Bangalore Dist.	Weights, Measures, Weighing and Measuring Instruments.
(99)	P. K. Rugi, Hardware Merchants, Bijapur	Weights, Measures, Weighing and Measuring Instruments.
(100)	Ram Rao, Mohan Rao Ubale, Holikatta, Chittapur, Gulbarga District.	Weights, Measures, Weighing and Measuring Instruments.
(101)	Ramanagarram-Trading Co., Taluk Office Road, Ramana-garam, Bangalore District.	Weights, Measures, Weighing and Measuring Instruments.
(102)	Shivakumar & Co., Adagomahalli, Maddur Taluk, Mandya District, Mandya.	Weights, Measures, Weighing and Measuring Instruments.
(103)	T. R. Siddabasappa & Sons, General Merchants & Agent, Tiptur.	Weights, Measures, Weighing and Measuring Instruments.
(104)	Swastic Stores, Prop: M. L. Satyanarayana Setty and M. L. Adinarayana Setty, Hardware and Paint Dealer, Chan-napatna.	Weights, Measures, Weighing and Measuring Instruments.
(105)	V. R. Srinivas Setty, Prop: M/S Ranganath Metal Stores, Mercara (Coorg).	Weights, Measures, Weighing and Measuring Instruments.
(106)	R. G. Shamanna & Bros. 2359/29.A. Sehineerkatte Street, Manufacturer Representatives, K. R. Mohalla, Mysore.	Weights, Measures, Weighing and Measuring Instruments.
(107)	Syed Mahmood & Sons, 6/10 Richards Square, Bangalore-1	Weights, Measures, Weighing and Measuring Instruments.
(108)	Sidramappa Shivappa, Gondabal, Koppal	Weights, Measures, Weighing and Measuring Instruments.
(109)	S. N. Somashekaraiah Singdi, Merchant and Commission Agent, Tumkur.	Weights, Measures, Weighing and Measuring Instruments.
(110)	Sakuntala Stores & Coffee Works, Prop: Gopal Krishna Guptha, General Merchants, Kunigal.	Weights, Measures, Weighing and Measuring Instruments.

Dealers (contd.)

Sl. No.	Name and Address of Dealer	Details of Articles Sold
(111)	Subramanya Setty & Sons, General Merchants, Main Bazar, Post Box No. 1, Hospet.	Weights, Measures, Weighing and Measuring Instruments.
(112)	M. V. Sakri, Hardware & General Merchants, Bagalkot, Bijapur District.	Weights, Measures, Weighing and Measuring Instruments.
(113)	S. J. & Company, H. 121 Yerrappa Block, Srirampur, Bangalore-21.	Weights, Measures, Weighing and Measuring Instruments.
(114)	Shivakaran Murlidhar Malpani, E. T. S. No. 587 Ward No. 7, Bagalkot (Bijapur District)	Weights, Measures, Weighing and Measuring Instruments.
(115)	S. P. Sangappa, Stationery and General Merchant, Sargur, H.D. Kote, Taluk.	Weights, Measures, Weighing and Measuring Instruments.
(116)	Shivappa Shastri & Bros., Merchants, Shikarpur, Shimoga District.	Weights, Measures, Weighing and Measuring Instruments.
(117)	C. A. Savgaon, Hardware Merchant, Raviwarpeth, Gokak	Weights, Measures, Weighing and Measuring Instruments.
(118)	Sabjan Stores, General & Hardware Merchants, Bhadravati, Mysore State.	Weights, Measures, Weighing and Measuring Instruments.
(119)	Siddabasavaiah, General Stores, Turuvekere	Weights, Measures, Weighing and Measuring Instruments.
(120)	S. G. Tavargiri, Hardware Merchant, Bijapur (S. Rly.) ..	Weights, Measures, Weighing and Measuring Instruments.
(121)	Taluk Agriculture Produce Cooperative Market Society, Shorapur, Shorapur Taluk, (Gulbarga District).	Weights, Measures, Weighing and Measuring Instruments.
(122)	Vithappa Yankappa Panganti, P.O. Bhagiyannagar, Koppal Taluk, Raichur District.	Weights, Measures, Weighing and Measuring Instruments.
(123)	Vithal Yeshwant Gowda, 791, Raviwar, Belgaum	Weights, Measures, Weighing and Measuring Instruments.
(124)	B. Veerannaiah & Sons, Burmah Shell, Dealer, M. G. Road, Chikmangalore.	Weights, Measures, Weighing and Measuring Instruments.
(125)	M. Venkataraja Nayak & Co., Hardware, Brass Ware Merchants, Galikatta Bazaar, Bunder, Mangalore-1	Weights, Measures, Weighing and Measuring Instruments.
(126)	D. B. Vibhuti, Mathapati, Galli, Bijapur	Weights, Measures, Weighing and Measuring Instruments.
(127)	Vishandas & Sons, 167, Avenue Road, Bangalore	Weights, Measures, Weighing and Measuring Instruments.

Repairers

Sl. No.	Name and Address of the Repairer	Details of Articles Repaired
(1)	Avery Company of India (P) Ltd., No. 1, Narasimharaja Road, Bangalore-2.	Weights, Measures, Weighing and Measuring Instruments.
(2)	Burmah Shell Oil Distributing Co., Ltd., 11 Elpinstone Road, Post Box No. 61, Poona.	Weights, Measures, Weighing and Measuring Instruments.

Repairers (contd.)

Sl. No.	Name and Address of Repairer	Details of Articles repaired
(3)	Bopnad, Weights and Measures Repairing Workshop, Nellikai Road, Mangalore-1.	Weights, Measures, Weighing and Measuring Instruments.
(4)	Y. N. Dhongdi Bandiwad Bhes, Hubli	Weights, Measures, Weighing and Measuring Instruments.
(5)	R. K. Dhupatane, C/o Krishna Lock Industries, Venkatpet, Bagalkot.	Weights, Measures, Weighing and Measuring Instruments.
(6)	S. S. Gondbal, Repairer in Weights and Measures, Koppal	Weights, Measures, Weighing and Measuring Instruments.
(7)	M. G. Gaikwad, Repairer of Weights and Measures, Mahaveer Road, Bijapur.	Weights, Measures, Weighing and Measuring Instruments.
(8)	I. M. Halakere, Sri Basaweshwar Repairing Workshop, Saraf Bazar, Jamkhandi.	Weights, Measures, Weighing and Measuring Instruments.
(9)	G. R. Honakalse, Contractor and Repairer of Weights and Measures, Main Road, Bijapur.	Weights, Measures, Weighing and Measuring Instruments.
(10)	A. R. Kandagal Weights and Measures Repairer, C/o G. D. Telivenkatapete, Bagalkot.	Weights, Measures, Weighing and Measuring Instruments.
(11)	C C. Kumarmath Deshapande Chawl, Fort, Dharwar ..	Weights, Measures, Weighing and Measuring Instruments.
(12)	A. A. Maniyar, Prop: Repairers of Weights and Measures, Raviwar Peth, Belgaum District.	Weights, Measures, Weighing and Measuring Instruments.
(13)	Misrilal Motilal, Main Rofid, Kirana Bazar, Gulbarga ..	Weights, Measures, Weighing and Measuring Instruments.
(14)	M. D. Mulla, C.T.S. No. 2665, Tatgar, Gokak	Weights, Measures, Weighing and Measuring Instruments.
(15)	Narayan Annappa Chawan, Shiddeshwar Ves Post, Athani, Bijapur District.	Weights, Measures, Weighing and Measuring Instruments.
(16)	New Star Scale Co., Prop: Salehe Omar, C/o Patel Cycle Taxi, Attar Bazar, Gulbarga	Weights, Measures, Weighing and Measuring Instruments.
(17)	Pioneer and Trading Corporation, No. 21 B, Mahatma Gandhi Road, Bangalore-1.	Weights, Measures, Weighing and Measuring Instruments.
(18)	L. C. Thakkar, Weights and Measures Dealer & Repairer, Hubli.	Weights, Measures, Weighing and Measuring Instruments.
(19)	D. B. Vibhuti, Mathapati Gali, Bijapur	Weights, Measures, Weighing and Measuring Instruments.

ORISSA (3)

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

Manufacturers

Sl. No.	Name and Address of Manufacturer	Details of Articles Manufactured
(1)	Avenue Weighing Scales Company, 135, Netaji Subash Road, Howrah.	Cast Iron Weights.
(2)	Orissa Agricultural Industries, P. O. Khetrajpur, Dist. Sambalpur, Orissa.	Cast Iron Weights.

Dealers

Sl. No.	Name and Address of Dealer	Details of Articles Sold
(1)	S. Paul Chaudhury & Co., Buxi Bazar, Cuttack-1	Cast Iron Weights and Weighing Instruments.
(2)	Utkal Agency, Brooks Hill, P. O. Sambalpur, Dist. Sambalpur.	Cast Iron Weights.

CORRECTION

In the July 1960 issue in the list of Dealers appearing on page 39 under ORISSA (2) item 4 should be corrected to read as **Monilal Doshi, Motiganj Bazaar, Balasore.**

Item 5 should be corrected to read as **Muralidhar Gopikissen (P) Ltd., P.B. No. 18, Balasore.**

TRIPURA (2)

In the March 1960 issue of *Metric Measures* a list of licensed dealers of weights and measures in Union Territory of Tripura was published. The following is a list of dealers subsequently licensed by the Tripura Administration under the Rajasthan Weights and Measures (Enforcement) Act, 1958, as extended to the Union Territory of Tripura.

Dealers

Sl. No.	Name and Address of Dealer	Details of Articles Sold
(1)	Central Marketing Organisation, Agartala	Weights, Measures, Weighing and Measuring Instruments.
(2)	Kalyan Stores, 59, Central Road, Agartala	Weights, Measures, Weighing and Measuring Instruments.
(3)	Radharani Bhandar, 128, Motor Stand Road, Agartala ..	Weights, Measures, Weighing and Measuring Instruments.
(4)	Santalal Jibanlal, 58, Central Road, Agartala	Weights, Measures, Weighing and Measuring Instruments.

UTTAR PRADESH (3)

In the July and September 1960 issues of *Metric Measures* lists of manufacturers, dealers and repairers of weights and measures in Uttar Pradesh State were published. The following is a list of manufacturers, dealers and repairers subsequently licensed by the Government of Uttar Pradesh under the Uttar Pradesh Weights and Measures (Enforcement) Act, 1959.

Manufacturers

Sl. No.	Name and Address of Manufacturer	Details of Articles Manufactured
(1)	Agrawal & Sons, 414, Alamgirganj, Bareilly	Weights.
(2)	Aryavart Engineering Works, Khairnagar, Meerut	Cast Iron and Brass Weights.
(3)	Ganesh Iron Foundry, Freeganj Road, Agra	Weights.
(4)	Gulab Rai Chotalal Iron Foundry, Belanganj Agra	Weights.
(5)	Indian Metal Industries, 2273, Moti Katra, Agra	Cast Iron & Brass Weights and Brass Measures.
(6)	Mahabir Foundry Works, C/o Mahabir Steel & Iron Rolling Mills Private Ltd., Hati Mai Ka Than, Gorakhpur.	Weights and Measures.
(7)	Model Industries, Ltd., Dayalbagh, Agra	Cast Iron Weights and Balances.
(8)	Moti Industrial Works, Debai, Bulandshahr	Weights, Weighing Machines, and Brass, bronze and cast iron weighing bridges.
(9)	Moti Lal Agrawal & Co., Freeganj, Agra	Cast Iron Weights and Brass Weights-50 g to 10 g.
(10)	National Engineering Works, Thapar Nagar, Meerut ..	Weights and Measures.
(11)	National Iron Foundry, Motilal Nehru Road, Agra ..	Cast Iron Weights.
(12)	Perfect Spring Manufacturing Co. (Regd.), Lal Kurti, Meerut Cantt.	Weights, Measures, Steel Yards and Beam Scales.
(13)	Ram Krishna Iron Foundry, Sasni Gate, Aligarh	Weights.
(14)	K.R. Sharma Iron Foundry, Pathwari, Belanganj, Agra ..	Cast Iron & Brass Weights.
(15)	Shiv Engineering Works Industrial Colony, Naini, Allahabad.	Cast Iron & Brass Weights.
(16)	Vinod Chandra Maheswari Iron Foundry, Sarai Bali, Atrauli Aligarh.	Weights.

Dealers

Sl. No.	Name and Address of Dealer	Details of Articles Sold
(1)	Agrawal Hardware Stores, 42, Gautam Budh Marg, Lucknow	Weights, Weighing and Measuring Instruments.
(2)	Awasthi Stores, Water Works Road, Aishbagh, Lucknow ..	Weights and Measures. Weighing and Measuring Instruments.

Dealers (contd.)

Sl. No.	Name and Address of Dealer	Details of Articles Sold
(3)	Chandra Bhan Agarwal, Rakabganj, New Grain Market, Lucknow.	Weights and Measures.
(4)	Chandra Metal Co., 27, Gautam Budh Marg, Lucknow	Weights, Measures, Weighing and Measuring Instruments.
(5)	Gulab Chand Chhote Lal, Freeganj, Agra	Weights, Measures, Weighing and Measuring Instruments.
(6)	Indian Iron Foundry, Sultanganj, Agra	Weights.
(7)	Indian Metal Industries, 2273, Moti Katra, Agra ..	Weights and Measures.
(8)	Iqbal Ahmad, Azamnagar, Bareilly	Weights.
(9)	Jagdamba Iron Foundry, Pathwari, Belanganj, Agra	Weights.
(10)	Janta Iron Stores, Fatehganj, Lucknow	Weights, Measures, Weighing and Measuring Instruments.
(11)	Kanhayalal, 62, Beharipur, Khatriyan, Bareilly ..	Weights, Measures, Weighing and Measuring Instruments.
(12)	Krishna Iron Foundry, Gaurikunj, Freeganj, Agra ..	Cast Iron Weights.
(13)	Lala Govind Ram Saraf, Dharam Kante Vale, Shivaji Marg, Bareilly.	Weights, Measures, Weighing and Measuring Instruments.
(14)	Lucknow Mill Stores, 24, Latouche, Road, Lucknow	Weights, Measures, Weighing and Measuring Instruments.
(15)	Mahabir Steel & Iron Re-Rolling Mills Private Ltd., Hathi Mai Ka Than, Eastern Gate, Gorakhpur.	Weights and Measures.
(16)	Mallomal Ram Pershad Iron Foundry, Belanganj, Agra ..	Weights.
(17)	Mohd. Kareel Moh. Bagh Ahmad Alikhan, Near Lal Masjid, Bareilly.	Weights and Measures.
(18)	Moti Industrial Works, Kundan Sarai, P.O. Debri, District Bulandshahr.	Weights, Measures, Weighing and Measuring Instruments.
(19)	Neamatullah, 644, Moonbuilding, Azamnagar, Bareilly ..	Weights.
(20)	Perfect Spring Manufacturing Co., (Regd.), Lal Kurti, Meerut Cantt.	Weights, Measures, Weighing and Measuring Instruments.
(21)	Prabhat Iron Foundry, Freeganj Road, Agra	Weights.
(22)	Ram Bharosey Lal & Ram Das Varma, Alamganj, Shop No. 269, Bareilly.	Weights, Measures, Weighing and Measuring Instruments.
(23)	Ram Kumar Sahu, 17, Gur Mandi (Mirganj), Allahabad ..	Weights.
(24)	Ram Narain Ram Manohar, 616, Ahiya Puri, Allahabad ..	Weights.
(25)	Sakat Behari Madan Mohan, Iron Merchant, Bara Bazar, Bareilly.	Weights, Measures, Weighing and Measuring Instruments.
(26)	Shankar & Company, C/o Allahabad Bank Ltd., Meerut Cantt.	Weights and Measures.
(27)	Sheo Shankar Lal Mani Shankar Lal, Moh. Sahebganj Bazar, Gorakhpur.	Cast Iron & Brass Weight, Measures, Weighing and Measuring Instruments.

LICENSED MANUFACTURERS, DEALERS & REPAIRERS OF WEIGHTS & MEASURES (10)

Repairers

Sl. No.	Name and Address of Repairer	Details of Articles Repaired
(1)	Agrawal Hardware Stores, 12, Station Road, Lucknow	Scales.
(2)	Indian Iron Foundry, Sultanganj, Agra	Weights.
(3)	Indian Metal Industries, 2273, Moti Katra, Agra ..	Weights.
(4)	Mallomal Ram Pershad, Iron Foundry, Belanganj, Agra	Weights, Measures, Weighing and Measuring Instruments.
(5)	Perfect Spring Manufacturing, Lal Kurti, Meerut Cantt.	Weights, Measures, Weighing and Measuring Instruments and scale yards.
(6)	Seal & Sons, 119/320, Ramnagar, Kanpur	Weighing Instruments.

WEST BENGAL (3)

In the March and July 1960 issues of *Metric Measures* lists of licensed manufacturers, dealers and repairers in West Bengal were published. The following is a list of manufacturers, dealers and repairers subsequently licensed by the Government of West Bengal under the West Bengal Weights and Measures (Enforcement) Act, 1958.

Manufacturers

Sl. No.	Name and Address of Manufacturer	Details of Articles Manufactured
(1)	Dinesh Ch. Karmakar, 225, Mahatma Gandhi Road, Calcutta-7.	Beam scale.
(2)	Duston Eng. Corp. (P) Ltd., 13, Brabourne Road, Calcutta-1.	Cast Iron & Brass Weights and Weighing Instruments.
(3)	Eastern Weighing Machine Co., 192, Mahendra Bhattacharjee Road, Howrah.	Counter Scales.
(4)	Economic Scientific Works, 97A, Ram Damg Road, Salkia, Howrah.	Beam Scales of Class A & B & Brass Weights.
(5)	Ganges Foundry Works, 5, Fairlie Place, Calcutta ..	Cast Iron and Brass Weights.
(6)	D. Ghose & Co., 36, 37, Khangrapatty Street, Calcutta-7 ..	Bullion and non-bullion brass scales.
(7)	Great Eastern Machine House (P) Ltd., P 55, Beneras Road, P.O. Dasnagar, Howrah.	Cast Iron Weights.
(8)	Liluah Iron Works, 6, Guha Park, Lilluah, Howrah ..	Cast Iron Weights.
(9)	Krishna Private Ltd., 193, Cross Street, Calcutta-7..	Cast Iron Weights.
(10)	S.K. Nath, 8, Ratan Babu Road, Calcutta-2. ..	Brass Beam Scales and Brass Weights.

Dealers

Sl. No.	Name and Address of Dealer	Details of Articles Sold
(1)	Annapurna Hardware Stores, 78, Netaji Subhas Road, Calcutta-7.	Cast Iron Weights.
(2)	Avery Co. of India Private Ltd., 28/2, Waterloo Street, Calcutta-1.	Weights and Weighing Instruments.

Dealers (contd.)

Sl. No.	Name and Address of Dealer	Details of Articles Sold
(3)	P.C. Banerjee & Co., 113 E, Netaji Subhas Road, Calcutta-1.	Cast Iron & Brass Weights and Iron Beam Scales.
(4)	Basudeb Paul, 213, Harrison Road, Calcutta-7. ..	Cast Iron Weights and Beam Scales.
(5)	Bengal Hardware Co. (P) Ltd., 58, Clive Street, Calcutta-7.	Cast Iron Weights.
(6)	Bharati Scales & Eng. Co., 4/1, Halderapara Lane, Khurut, Howrah.	Weights and Weighing Instruments.
(7)	Bholanath Chatterjee, 225, Mahatma Gandhi Road, Calcutta 7.	Beam Scales & Weight
(8)	Bhusan Chandra Mehta, 56, Clive Street, Calcutta-7 ..	Cast Iron Weights.
(9)	Bujoyini, 161, Netaji Subhas Road, Calcutta-7 ..	Cast Iron Weights and Beam Scales.
(10)	Bimal Krishan Sil & Bros., Kharwa Bazar, Chinsure, Hooghly.	Weights Beam Scales and Litre Measures.
(11)	P.C. Biswas & Co., 213, Mahatma Chawh, Calcutta ..	Brass Beam Scales and Brass Weight.
(12)	Calcutta Hardware Deptt., 161, Netaji Subhas Road, Calcutta 7.	Cast Iron Weights and Beam Scales.
(13)	S.C. Das & Co., 67, Khengapatty Street, Calcutta-7 ..	Weights and Beam Scales.
(14)	Dinesh Ch. Karmakar, 225, Mahatma Gandhi Road, Calcutta.	Weights and Beam Scales.
(15)	Daw Dutt & Co., 57, Clive Street, Calcutta-7 ..	Weights and Beam Scales.
(16)	Durlav Chandra Mitra & Bros., 58, Clive Street, Calcutta-7	Cast Iron Weights and Beam Scales.
(17)	Dulal Chandra Mitra & Bros., 58, Clive Street, Calcutta-7	Cast Iron Weights and Beam Scales.
(18)	Gariahat Hardware & Paint Stores, 212, Rash Behari Avenue, Calcutta-19.	Weights.
(19)	General Industrial Stores Supplying Co. (P) Ltd., 10, Clive Row, Calcutta-2.	Weighing Machines
(20)	A.K. Ghosh & Co., 58, Clive Street, Calcutta-7 ..	Cast Iron and Brass Weights and Beam Scales.
(21)	K. L. Ghosh, Vill. & P.O. Billjoypur, Howrah ..	Brass Weights and Beam Scales.
(22)	India Machinery & Co. Ltd., Dasnagar, Howrah ..	Weights and Weighing Instruments including Beam Scales.
(23)	Jogesh Chandra Sarkar, 213, Harrison Road, Calcutta-7 ..	Weights.
(24)	Jyotish Chandra Singha, 58, Clive Street, Calcutta-7 ..	Cast Iron Weights and Beam Scales.
(25)	Kashinath Paul, 2/3, Mahatma Gandhi Road, Calcutta ..	Cast Iron Weights and Beam Scales
(26)	Keshetra Mohan Singha Bros., 225, Harrison Road, Calcutta-7	Weights and Beam Scales
(27)	Kali Mata Stores, 38, Khengrapatty Street, Calcutta-7 ..	Weights and Beam Scales.
(28)	Khagendra Nath Mukherjee & Bros. 113, Monohar Das Chawh, Calcutta-7.	Cast Iron Weights.
(29)	Krishna Das, 225, Mahatma Gandhi Road, Calcutta-7. ..	Cast Iron Weights and Beam Scales.
(30)	Khelaram Kundu & Co. 57, Clive Street, Calcutta-7 ..	Cast Iron & Brass Weights and Beam Scales.
(31)	Lakshmi Hardware Stores (P) Ltd., 55, Clive Street, Calcutta-7	Weights and Beam Scales
(32)	Liluah Iron Works, 41, Chowringhee Road, Calcutta-16.	Cast Iron Weights.
(33)	W.B. Lowson & Co., 116, Ripon Street, Calcutta-16 ..	Weights and Weighing Instruments.
(34)	Moti Lal Atta, 139, Siva Gopal Bannerjee Lane, Howrah ..	Cast Iron Weights.

Dealers (contd.)

Sl. No.	Name and Address of Dealer	Details of Articles Sold
(35)	Naba Kumar Routh, 78, Netaji Subhas Road, Calcutta-7 ..	Weights and Beam Scales.
(36)	Nagendra Nath Karmakar S/o Wooma Charan Karmakar, Prop. Gour Charan etc., 213, Harrison Road, (Silpatty) Calcutta-7.	Weights, Beam Scales and Counter Scales.
(37)	Nagendra Nath Banerjee, 55, Clive Street, Calcutta-7 ..	Cast Iron Weights.
(38)	D.C. Nath & Sons, 58, Clive Street, Calcutta-7 ..	Weights and Beam Scales.
(39)	Nimai Charan Gangully, 208, Mahatma Gandhi Road, Calcutta.	Weights and Beam Scales.
(40)	Paran Chandra Hazra, 58, Clive Street Calcutta-7 ..	Cast Iron Weights and Beam Scales.
(41)	Paresh Chandra Kar, 57, Clive Street, Calcutta-7 ..	Cast Iron Weights and Beam Scales.
(42)	S.C. Paul, 212, Rash Bihari Avenue, Room No. 3, Block 'C', Calcutta-19.	Cast Iron Weights and Hard Beam Scales.
(43)	Paul & Co., 212, Rash Bihari Avenue, Room No. 1 & 2, Block 'D', Calcutta-19.	Cast Iron Weights and Hard Beam Scales.
(44)	Phool Chand Company, 3 A, Mullick Street, Calcutta-7. ..	Cast Iron Weights.
(45)	Prosad Kumar Manna, 213, Mahatma Gandhi Road, Calcutta-7.	Weights and Beam Scales.
(46)	Rabindra Nath Mitra & Bros., 41, Raja Katra, Calcutta-7 ..	Cast Iron Weights.
(47)	Raj Krishna Das, 213, Harrison Road, Calcutta-7 ..	Cast Iron Weights and Beam Scales.
(48)	Rajendra Nath Mullick & Co., Ltd., 225, Mahatma Gandhi Road, Calcutta-7.	Cast Iron Weights and Beam Scales.
(49)	Ratan Mani Bhar & Co., 38, Purushattam Roy Street, Calcutta-7.	Brass Weights and Beam Scales.
(50)	Sarkar & Co., 161, Netaji Subhas Road, Calcutta-7 ..	Beam Scales.
(51)	Satish Chandra Das, 113, Khangrapatti Street, Calcutta-7	Brass & Cast Iron Weights and Counter and Beam Scales.
(52)	Satyendra Nath Shaw & Co., 161, Netaji Subhas Road, Calcutta-7.	Cast Iron Weights and Iron Beam Scales.
(53)	Scientia Ind. (India) P. Ltd., 34, Banerjee Bagan Lane, Sal-kia, Howrah.	Weights and Weighing Instruments.
(54)	Sen & Co., 57, Clive Street, Calcutta-7 ..	Cast Iron Weights and Beam Scales.
(55)	A. Sengupta & Co., P. 36, India Exchange Place, Calcutta-1	Weights and Weighing Instruments.
(56)	A. S. Singh P. Ltd., 55, Clive Street Calcutta-7 ..	Cast Iron Weights.
(57)	D. N. Singh & Co., 58, Clive Street, Calcutta-7 ..	Cast Iron Weights and Beam Scales.
(58)	Sinha & Singha 85, Netaji Subhas Road, Calcutta-1 ..	Cast Iron and Brass Weights.
(59)	Sitaram Ganesh Mall, 150/1, Cotton Street, Calcutta-7 ..	Cast Iron Weights and Beam Scales.
(60)	Subal Ch. Datta & Sons, P. Ltd., 13, Brabourne Road, Calcutta-1.	Measuring Instruments.
(61)	Tarasarkar Karfa & Bros., 56, Clive Street, Calcutta-7. ..	Cast Iron Weights.
(62)	Thakur Das Jana & Sons, 55, Clive Street, Calcutta-7 ..	Cast Iron Weights.
(63)	T.E. Thomson & Co. Ltd., 9A, Esplanade East, Calcutta-1 ..	Weights and Weighing Instruments.
(64)	Tulsi Charan Paul, 4, Mirbohor Ghat Street, Calcutta-7 ..	Cast Iron Weights and Beam Scales.
(65)	Wooma Charan Karmakar, Prop. Bhutnath, Balai Ch., Fatick Ch., Provat Kumar, Sankarlal Karmakar, 23B, Narikel-danga Main Road, Calcutta-11.	Weights and Beam Scales.

Repairers

Sl. No.	Name and Address of Repairer	Details of Articles repaired
(1)	Asiatic Machinery Corpn. Ltd., 101, Kailash Chandra Lane, Howrah.	Weighing Scales & Weighbridges.
(2)	Avery Company of India (P) Ltd., 28/2, Waterloo Street, Calcutta-1.	Weights and Weighing Instruments.
(3)	Bharat Weighing Scales & Eng. Syn., 75/1, Kalachand Nandi Lane, Howrah.	Weighing Instruments.
(4)	Bharati Scales & Eng. Co., 4/1, Halderpara Lane, Howrah.	Platform Scales, Weighbridge and Beam Scales.
(5)	Eastern Weighing Machine Co., 192, Mahendra Bhattacharjee Road, Howrah.	Weighing Instruments excluding Beam Scales.
(6)	S.P. Guchait & Sons, (P) Ltd., 2, Madhusudhan Pal Chowdhury Lane, Howrah.	Weighing Instruments excluding Beam Scales.
(7)	Hindustan Weighbridge & Eng. Co., 26, N.K. Guin Lane, Sreerampur, Hoogly.	Weighing Instruments.
(8)	House of Commerce, 5/2, Garstin Place, Calcutta-7	Spring Balance.
(9)	India Machinery Co. Ltd., Managing Agents, Das Group (P) Ltd., Dasnagar, Howrah.	Weighing Instruments including Beam Scales.
(10)	W.B. Lowson & Co., 116, Ripon Street, Calcutta-16	Beam Scales and Weighing Instruments.
(11)	Nagendra Nath Karmakar, S/o, Wooma Charan Karmakar, Prop. Makhnallal Karmakar & Sons, 208 Mahatma Gandhi Road, Calcutta-7.	Beam Scales, Counter Scales and Brass Weights.
(12)	Raman Industries, 193, Netaji Subhas Road, Howrah	Weighing Instruments other than Beam Scales.
(13)	W.B. Scales & Co., 10, Kailash Chandra Lane, Howrah	Weighing Instruments other than Beam Scales.
(14)	Scientia Industry (India) P. Ltd., 34, Bannerjee Bagan Lane, Salkia, Howrah.	Weights and Beam Scales.
(15)	Sham Sundar & Co., 16/1, Beliaghata Main Road, Calcutta-10.	Weighing Instruments.
(16)	O.K. Weighers (India) Private Ltd., 15 & 16, Madhusudhan Pal Chowdhury Lane, Howrah.	Weighing Instruments excluding Beam Scales.
(17)	Wooma Charan Karmakar, Prop. Jogendra Nath Karmakar, 23/C, Narikeldanga Main Road, Calcutta-11.	Beam Scales.
(18)	Wooma Charan Karmakar, Prop. Tarak Ch. Karmakar and others, 22D & 23A, Narikeldanga Main Road, Calcutta-11.	Beam Scales and Counter Scales.
(19)	Wooma Charan Karmakar, Prop. Dwijendra Lal Karmakar, 22D & 23A, Narikeldanga Main Road, Calcutta-11.	Beam Scales.

CONVERSION TABLE OF PRICES FOR WEIGHTS

TABLE A

GOLD

(Factor used 1 gram (g)=0.085735 tola
Naye paise per tola to naye paise per 10 grams (10g)

	0	1	2	3	4	5	6	7	8	9
nP/tola	nP/10g	nP/10g	nP/10g	nP/10g	nP/10g	nP/10g	nP/10g	nP/10g	nP/10g	nP/10g
0	0	1	2	3	3	4	5	6	7	8
10	9	9	10	11	12	13	14	15	15	16
20	17	18	19	20	21	21	22	23	24	25
30	26	27	27	28	29	30	31	32	33	33
40	34	35	36	37	38	39	39	40	41	42
50	43	44	45	45	46	47	48	49	50	51
60	51	52	53	54	55	56	57	57	58	59
70	60	61	62	63	63	64	64	66	67	68
80	69	69	70	71	72	73	74	75	75	76
90	77	78	79	80	81	81	82	83	84	85
100	86									

TABLE B

(Factor used : 1 gram (g)=0.085735 tola
Rupees per tola to Rs. per 10 grams (10g)

Rs/tola	0	1	2	3	4	5	6	7	8	9
	Rs/10g	Rs/10g	Rs/10g	Rs/10g	Rs/10g	Rs/10g	Rs/10g	Rs/10g	Rs/10g	Rs/10g
100	85.74	86.59	87.45	88.31	89.16	90.02	90.88	91.74	92.59	93.45
110	94.31	95.17	96.02	96.88	97.74	98.60	99.45	100.31	101.17	102.03
120	102.88	103.74	104.60	105.45	106.31	107.17	108.03	108.88	109.74	110.60
130	111.46	112.31	113.17	114.03	114.89	115.74	116.60	117.46	118.31	119.17
140	120.03	120.89	121.74	122.60	123.46	124.32	125.17	126.03	126.89	127.75
150	128.60									

METRIC WEIGHTS COMPULSORY

From October 1, 1960, only Metric Weights should be used in all transactions in the areas given below. All Metric commercial weights should be duly stamped by the Weights and Measures authority. It will be illegal to use any other weights.

ANDHRA PRADESH : Districts of Visakhapatnam, Krishna, Guntur, Kurnool, Hyderabad, Warangal, Nizamabad and all the Regulated Markets in the State.

ASSAM : District of Nowgong and town of Gauhati.

BIHAR : Divisions of Bhagalpur and Ranchi and the Municipal and Notified area in Patna and Tirhut Divisions.

GUJARAT : Cities of Ahmedabad, Rajkot Baroda and all the Regulated Markets in the State.

KERALA : Districts of Kozhikode, Ernakulam and Quilon.

MADHYA PRADESH : Districts of Sehore, Indore, Gwalior and Jabalpur.

MADRAS : Districts of Madras, Chingleput, South Arcot, North Arcot and all the Regulated Markets in the State.

MAHARASHTRA : Cities of Bombay, Poona, Nagpur, Aurangabad, Sholapur, Kolhapur, Akola, Amravati, Wardha, Yeotmal and all the Regulated Markets in the State.

MYSORE : Districts of Bangalore, Raichur, Dharwar and all the Regulated Markets in the State.

ORISSA : Towns of Berhampur, Cuttack and Sambalpur.

PUNJAB : Districts of Amritsar, Jullundur, Ludhiana, Ambala, Patiala, Gurgaon and all the Regulated Markets in the State.

RAJASTHAN : Districts of Ajmer, Bikaner, Jodhpur, Jaipur, Kotah and Udaipur.

UTTAR PRADESH : Towns of Meerut, Agra, Lucknow, Bareilly, Moradabad, Varanasi, Kanpur, Jhansi, Allahabad and Gorakhpur.

WEST BENGAL : Municipal areas of Calcutta and Howrah.

DELHI : The whole of Delhi.

HIMACHA PRADESH : Districts of Mandi and Sirmur.

MANIPUR : Town of Imphal.

TRIPURA : Town of Agartala.

ANDAMAN AND NICOBAR ISLANDS : Town of Port Blair.

PONDICHERY : The whole of Pondicherry.

★
Use of Metric System of Weights and Measures is compulsory in transaction in the following trades and industries:

Jute, Cotton, Textiles, Iron and Steel, Engineering, Heavy Chemicals, Cement, Salt, Paper, Refractories, Non-ferrous metals and rubber industries, Vanaspathi, Soap, Woollen products, control of forward market in Cotton and in transactions of the Coffee Board.

METRIC SYSTEM

FOR SIMPLICITY AND UNIFORMITY

ISSUED BY GOVERNMENT OF INDIA

DA 60/409

**our
METRIC SYSTEM
weights & measures**

Second to none



1 kg



1 lb



100 g



100 lb



100 g



100 lb

MANUFACTURERS
National Metal Industries
Parel Village Road, Parel
BOMBAY 12.
Phone: 62400

SOLE DISTRIBUTORS
Manubhai Mulchand & Co.
Behind Mumbadevi P. O.
BOMBAY 2
Phone: 71534
Gram: MANMUL

OUR SMALL WEIGHTS
from 1 gram. to 50 grams
will be supplied in an
unbreakable plastic container

CONVERSION OF PRICES FROM SEER TO KILOGRAM (kg)

TABLE A

(Factor used : 1 kg = 1.0717 seers)

Naye Paise per seer to Naye Paise per kg

nP/Seer	0	1	2	3	4	5	6	7	8	9
	nP/kg	nP/kg	nP/kg	nP/kg	nP/kg	nP/kg	nP/kg	nP/kg	nP/kg	nP/kg
0	0	1	2	3	4	5	6	8	9	10
10	11	12	13	14	15	16	17	18	19	20
20	21	23	24	25	26	27	28	29	30	31
30	32	33	34	35	36	38	39	40	41	42
40	43	44	45	46	47	48	49	50	51	53
50	54	55	56	57	58	59	60	61	62	63
60	64	65	66	68	69	70	71	72	73	74
70	75	76	77	78	79	80	81	83	84	85
80	86	87	88	89	90	91	92	93	94	95
90	96	98	99	100	101	102	103	104	105	106
100	107	..	..	..	..	..	..	..	..	..

TABLE B

(Factor used : 1 kg = 1.0717 seers)

Rupees per seer to Rupees and Naye Paise per kg

Rs/Seer	0	1	2	3	4	5	6	7	8	9
	Rs/kg	Rs/kg	Rs/kg	Rs/kg	Rs/kg	Rs/kg	Rs/kg	Rs/kg	Rs/kg	Rs/kg
0	0	1.07	2.14	3.22	4.29	5.36	6.43	7.50	8.57	9.65
10	10.72	11.79	12.86	13.93	15.00	16.08	17.15	18.22	19.29	20.36
20	21.43	22.51	23.58	24.65	25.72	26.79	27.86	28.94	30.01	31.08
30	32.15	33.22	34.29	35.37	36.44	37.51	38.58	39.65	40.72	41.80
40	42.87	43.94	45.01	46.08	47.15	48.23	49.30	50.37	51.44	52.51
50	53.58	..	..	..	..	..	..	..	..	..

How to use the Tables

Suppose a commodity is priced at Rs. 1.25 per seer. To find the price per kilogram look up Table B against Re. 1/seer. The value is Rs. 1.07/kg. Look up Table A against 25 nP/seer. The value is 27 nP/kg. Add up the two (Rs. 1.07 + 0.27 = Rs. 1.34). The price per kilogram (kg) is, therefore, Rs. 1.34.

Published by the Director, Publications Division, Ministry of Information and Broadcasting, Delhi and printed by the Manager, Government of India Press, Faridabad

Registered with the Registrar of Newspapers for India under No. 977/58.