# metric measures

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# metric

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# Metric System in India : the First Phase

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WHEN legislation to introduce the metric system of weights and measures in India was under consideration some six years ago there was wide general support for the reform; but there were also apprehensions. The common man, it was feared, would find it hard to understand and operate the new system. The task of manufacturing new weights for the whole country, of converting the existing machinery, of recalibrating measuring instruments, etc. was considered formidable.

The experience of the working of the metric system during the first five years has shown that while difficulties had to be faced, the change could be effected smoothly, so long as the programme was planned realistically and in close coordination and in consultation with those vitally affected by the change.

Realising that a change of this magnitude would necessarily take time, Parliament provided for a transitional period of 10 years during which the weights and measures prevalent in the country would be gradually replaced by metric units. The reform, moreover, would be of full advantage in day to day life only when associated with decimalisation of coinage. The first step, therefore, in the reform towards metric system was the decimalisation of the rupee which was enacted by Parliament in 1956. Here again a period of 3 years was allowed for transition.

The task of conversion to metric system was coordinated through the Standing Metric Committee which was set up in 1956 under the Chairmanship of the Minister for Commerce. The Planning Commission and the Indian Standard Institution were associated with the Committee which drew up a programme of gradual change-over. In the interim period, however, all new machinery was to be acquired only on the metric system.

### Phased Programme

The programme for the change-over has been phased, with a period of one or two years for the transition. The introduction

was industrywise, the date of change depending upon the convenience of the industry; the programme itself was drawn up in conference with representatives of the industry concerned. Thus the sugar or jute industry chose the beginning of the crop season for the change-over though industries generally changed on 1 April 1958. Secondly, the use of metric weights in retail market transactions was enforced area-wise. Initially on 1-10-1958 selected areas, including cities like Delhi, Bombay, Calcutta etc. were chosen for the introduction of metric weights. The usual period of transition was also allowed. From 1-10-1960, use of metric weights has become compulsory, rendering indigenous weights illegal. The phasing in regard to time has in fact been one of the essential features of the change-over, the intervening period being utilised for intensive educational and publicity measures to familiarise the public with the new weights. It also provides adequate time for the traders to acquire new weights, quote prices in metric units and bring the system in daily use.

There is no doctrinaire approach to the reform; practical considerations have always been supreme. For instance, the existing 4 gallon tin corresponds to 18 litres. To avoid scrapping of the tins, the existing sizes were allowed to be used, merely the marking on the tin being in metric units. In regard to jute, tea, the bulk of which are exported to the U.K. and U.S.A. the packages continue to be in yards and pounds so as not to inconvenience foreign customers.

Even within the country there were certain well established traditions which had to be accommodated, while changing over to the metric system. For instance, in Madras and Kerala, grain has always been sold in measures and not by weight. In deference to this wide-spread practice, provision has been made in the rules to permit the sale of grain in these areas in metric capacity measures of 1 litre, 5 litres, 10 litres, etc.

**Enforcement**

This reform would, no doubt, result in a uniform system of weights and measures throughout the country, but it had been realised by previous experience, that without adequate and vigorous enforcement, there was every possibility of inaccuracy in the weights, use of unauthorised weights and fraudulent practices in day to day transactions. It was, therefore, decided at the earliest stage to have a net-work of Inspectors of Weights and Measures in all the States and Union Territories, with a Controller of Weights & Measures in each State; there are nearly a thousand Inspectors in India now. On an average an Inspector has to deal with two to three thousand establishments. He is authorised to verify and stamp weights and measures and for this purpose he has working standards of weights and balances, the sensitivity of latter is so high that they can detect a variation of 0.1 gram in 50 kilograms. The degree of variation permitted in a metre rod is only 1 mm and in a litre measure only 2 ml.

No weights or measures can be used in the market unless they have been verified and stamped. The Inspector, moreover, is empowered to inspect establishments and conduct test checks; faulty or unauthorised weights will be seized. The metric weights will further have to be reverified and stamped once in two years.

**Supply of Weights**

The introduction of the reform was attended by administrative and organisational

problems of considerable magnitude. Initially, there was no idea of how many new weights would be required. A sample survey conducted in 1957 gave an estimate of about 40 million weights in use all over the country. Machinery had to be set up for the production and distribution of so many weights of accurate standard specification. The prescribed dates for the enforcement of the reform gave this matter added urgency. It was, therefore, decided to license a large number of manufacturing units in different States and to make available to them raw material such as iron or G.I. sheets for the manufacture of weights and litre measures. Over 800 manufacturers have so far been licensed and among themselves they produce a total of over 2 million weights a month; the capacity can be raised if the off-take of weights is kept steadily at the maximum.

The supply of accurate balances to the Inspectors (known as working standard balances) has also been a problem; there were few manufacturers within the country who could produce balances of such accuracy; initially, therefore, some balances had to be imported. Arrangements were side by side made to encourage competent manufacturers who undertook to produce these balances.

Contrary to the fears and doubts expressed by the urban spokesmen on behalf of the 'poor villager', the average Indian in rural areas has been able to adjust himself to the change. The experience of the working of the metric system in areas where it has already been enforced shows that even petty shop-keepers and labourers not only understand the new weights but find it easy to operate them. Confusion persists only in places where enforcement has been partial, resulting in old and new weights being used side by side; or in areas where new weights are used but prices are quoted in terms of seer or pound.

The programme for enforcement is reviewed and modified at the periodical Conferences of Controllers of Weights and Measures in the light of the administrative, technical and legal problems and experience. These Conferences are also helpful in coordinating arrangements for the production and supply of weights in the different States. Exchange of ideas based on the actual experience of enforcement measures helps to give direction and purpose to the programme of change-over.

**Task Ahead**

There is, however, much that remains to be done before people can think wholly in metric terms. At this transitional stage the tendency is to reconvert metric weights and lengths to older units like seer or yard for the purpose of reckoning and to satisfy oneself about reasonableness of the price or calculation of the cost. Thus while the law recognises only the metric units and the trader uses metric weights and measures, the consumer continues to hitch his counting to the old units, for years he has been used to them. This change in the reckoning and shopping habits of individuals, especially adults, is bound to take time but it must be done if the value of the metric system as a simple means of reckoning is to be fully realised.

Another problem of immense importance relates to education. Children now in school will grow up to deal wholly in metric units but unfortunatley they continue to be educated in the indigenous system of weights and measures in which they are made to learn several tables. While it has been repeatedly

emphasised that the metric system saves the school children's time and much more of their energy, teachers continue to burden the children with units which are already obsolete and which will be totally useless when the children grow. A complete revision of textbooks and the methods in teaching is called for immediately. Every year this is delayed will result in thousands of more children being educated in the 'wrong' way.

These then are the tasks ahead but meanwhile India is doing away with the medley of weights and measures and has joined the fraternity of nations using the metric system, extending over four-fifths of the world.

# *Rational Pricing Units & Wholesale Trade*

THE use of metric weights became compulsory for some 20 per cent of the population of the country from 1 October 1960. For the remaining population the compulsion to use new weights would begin from 1 April 1962. Thus from April 1962, metric weights alone would have to be used all over India, and the use of other weights like the pound and the seer will become illegal after that date.

**Converted Pricing Units**

As a result of the change-over in October 1960, people in the areas notified became familiar with the use of new weights although in the areas around them old weights continued to be used. This sometimes resulted in an incomplete adoption of the metric system which was particularly noticeable in the wholesale trade. Thus, while the wholesale traders weighed their commodities using metric weights, many of them continued to adapt and use pricing units based on the old system but expressed in terms of the new weights.

One of the main reasons for this partial adoption of the metric system was that the wholesalers in metric areas often had to purchase their requirements from areas where the new weights were not yet enforced. They, therefore, converted the units current in those areas to the metric system and sometimes rounded them off. This led to the use of pricing units like 37.32 kg, 40 kg, 50 kg and in certain areas, even units of 70 kg, 75 kg, 250 kg or even 300 kg in place of the maund, hundred weight, khandi and similar other units. For example, some markets adopted units of 250 kg for groundnuts but 50 kg for linseed, probably because other units in use were the candy of 560 lb* or hundred weight of 112 lb which on conversion came to 254.01 kg and 50·8 kg respectively. In all these cases it would have been appropriate and simpler for the trade had they adopted the unit of one quintal (100 kg) for pricing.

**Pricing by Containers**

In certain other trades, as for example, the edible oil trade, the rates continue to be quoted in terms of the tin. This apparently also has led to a certain amount of confusion. While the same tin was used for packing oil, in one area the rate is per tin of 17.108 kg (including the weight of the tin), while in another market it is 17 kg (including the weight of the tin), while in a third market the same oil is sold at the rate of 16.329 kg per tin, or even 16 kg (whether with or without weight of tin is not mentioned). Certain other markets have been more rational and quoted the rate per unit of 10 kg without any reference to a tin.

These practices have necessarily to be treated as transitional arrangements until the

*This is a peculiar unit. There used to be a 'Bombay' maund which was equated to 28 lb, and 20 of these maunds in turn were supposed to contain 40 'Bombay' seers. This system was not legally recognised in the Bombay Weights and Measures Act, 1932 but perhaps continued in existence under the respectability given by its relation with the British units.

rest of India changes over to metric weights. Now that in April 1962 the complete change-over to metric weights will occur in India, the wholesale trade should adopt the rational unit of the quintal in place of the maund and other such units. Pricing units like 37 kg, 37.32 kg, 40 kg, 50 kg, 75 kg, 250 kg, 300 kg, etc., should be replaced by the quintal.

It is also necessary in this connection to stress that the quotation of prices per tin of oil containing a cetain weight of the oil is not a desirable practice and the trade should adopt a rational unit like 10 kg or 100 kg, irrespective of the actual contents of the tin.

**Benefits of Rational Units**

The wholesale trade in India is very well organized and has associations practically in every market in the country. If the wholesale trade adopts rational units in the metric system, the effect is bound to percolate to the retail trade which is very much diffused and unorganised even in urban areas. If the wholesale trade continues to adhere to irrationally converted or adapted units it is likely to create confusion not only for itself, but more so in the retail trade and the advantages which the metric system can confer on us will be frittered away. Admittedly a certain amount of difficulty will be felt by the wholesale trade in any change-over from the old practice to the new rational units, even if the latter happen to be units of the simple metric system of weights and measures.

But the change-over has to be carried out and the greater will be its utility if a single system of units for price quotation is followed all over the country. The association of decimal currency with the decimal units of weights and measures would result in simplification of calculations and price quotation, if the trade adopts the same rational units all over the country. A glance at the newspapers or trade magazines shows the variety of units in which prices are quoted. Even the simple everyday commodities like rice and wheat are quoted in the numerous units indicated earlier and it is not easy to relate these prices to a single common unit.

The metric system is a great unifying force in the field of weights and measures and the trade of the whole country will benefit if it adopts a common set of units, irrespective of whether the trade is carried out in the North or South or in the East or West. One of the great merits of the metric system under Indian conditions is that it is not related with any of the older systems of weights and measures current in India. There should, therefore, be no controversy as to what units of metric system could be adopted by the trade, because we have to make a complete break with the past practices everywhere in India, if we want to derive the greatest benefit from the change-over. The earlier this is realised by the trade and put into practice, the greater will be the benefit for the whole country.

**Recommended Pricing Units**

There is no difficulty about the choice of the appropriate units because the Ministry of Commerce and Industry recommended some time back a set of pricing units to be used for various commodities. These have been adopted by a large number of traders in the areas notified earlier, and are now given in Appendix 1 for information. It is to be hoped that these pricing units would be used in wholesale trade all over the country from April 1962.

## APPENDIX—1

*Typical Metric Pricing Units for Wolesale Transactions*

| Serial No. | Commodity | Metric Unit |
|---|---|---|
| (1) | **Gold** | 10 grams (g) |
| (2) | **Grocery and Confectionery**<br>Biscuits, sweetmeats, cardamoms<br>Textiles & Textile Fibres<br>Cotton yarn, damaged and seconds cloth, raw silk, rayon, silk yarn, raw wool, wool manufactures (when sold by weight).<br>Paints & Chemicals<br>Paint (if sold by weight), indigo, liquid chlorine<br>Hides, Skins & Leather<br>Raw hides, leather (hides and skins).<br>Metals<br>Silver, aluminium sheets, strips and circles, copper and brass wires and utensils.<br>Miscellaneous<br>Tea, meat, camphor tablets, mica | 1 kilogram (kg) |
| (3) | **Grains and Pulses**<br>Rice, wheat, jowar, arhar, moong, masur, gram<br>Spices<br>Black pepper, mustard, chillies, dhania, dalchini, turmeric, betelnuts.<br>Plantation Products<br>Rubber, cashewnuts, cashew kernels, tobacco (raw and manufactured)<br>Forest Products<br>Lac and lac products, gums, myrobalans, galnuts, soapnuts<br>Textile & Textile Fibres<br>Raw jute, raw hemp, coir yarn<br>Oils, Oilseeds & Oilcakes<br>Vegetable oils, oilseeds, oil cakes<br>Non-Ferrous Metals<br>Aluminium: ingots, bars, blocks, slabs, billets<br>Lead: ingots, sheets and strips<br>Copper: ingots, blooms, slabs cakes, tiles, bricks, billets, blisterbars and wirebars, rods, sections and pipes, plates, sheets and strips, circles.<br>Brass. ingots, rods, sections, pipes, sheets, strips, circles<br>Zinc· ingots, sheets, strips<br>Tin: blocks<br>Chemicals<br>Caustic soda, bleaching powder, glycerine, soaps, paper, salt<br>Others<br>Sugar, gur, ice, fish, sugarcane vegetables, tamarind | 1 quintal (q) (100 kilogram) |
| (4) | **Minerals**<br>Iron ore, maganese ore, bauxite, coal<br>**Iron and Steel**<br>Pig iron, iron and steel manufactures, semis (billets for rolling etc ) | one metric tonne (t) (1000 kilogram) |
| (5) | Cloth (mill, handloom, silk, rayon and woollen cloth) | 1 metre (m) |
| (6) | Jute carpets, coir mats and mattings, sheet glass | one square metre ($m^2$) |
| (7) | Timber | one cubic metre ($m^3$) |
| (8) | Paints (when sold by measure), spirits | one litre (l) |

**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 or 10 grams.

(3) In place of maund or corresponding unit, use the quintal *i. e.*, 100 kg.

**Capacity Mesures**

In place of seer or gallon or any other measure use the litre.

**Length Measures**

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

**Square Measures**

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

**Cubic Measures**

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

**Packaging**

It is advantageous if sizes of packages correspond to series of commercial weights and measures prescribed. These are: 50 kg, 20 kg, 10 kg, 5 kg, 2 kg, 1 kg, 500 g, 200 g, 100 g, 50 g, 20 g, 10 g, 5 g, 2 g, 1 g, and so on.

# Development of Weights in Madras Area : Part 1

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THE history of the development of weights and measures in India is a fascinating subject for study. At whatever stage in the history of India we take up the thread, ultimately the origin goes back to the ancient Indian practices. Perhaps, the single system of weights and measures which may have existed in ancient India was in the course of millenia influenced by so many factors externally and internally that even the original meanings, leave alone the mass or capacity or length of the units have been lost. New units were introduced and the entire system was reshuffled to constitute a hybrid system of weights and measures in India, which now is far removed from the original.

A systematic study of the development of weights and measures in India is, therefore, an extremely difficult task as the various influences have to be traced, their impact gauged and conclusions drawn which have necessarily to be theoretical. Such a situation arises mainly because the actual physical replica of even a single weight used during the last 2,000 years or more is rarely available, although strangely enough, the actual weights used some 5,000 years ago are available for physical study. As a result an analysis of weights and measures at any period in India, except in the bronze age civilization, is a matter of guess work.

As the subject is vast, this article is restricted to a brief study of the possible lines of development of only the important units of weights current in South India today. The history of these units is summarized and the possible variations and their causes indicated. Some remarks on the weights of coins have also been included as often enough weights were related with coins. It is proposed to present in Part 1 of this article a broad historical sketch of the various influences which could have had their effect on weights and measures in South India. In Part 2 the possible lines of the historical development of some important units of weights in the Madras area will be traced.

**Ancient Weights**

Excavations and discoveries in the vast region extending over India and Pakistan in the Indus Valley show that there existed in ancient India (B.C. 3500-1500) an efficient administration of weights and measures second to none in the world of those days. A uniform system of weights and measures was used in an area some 1,500 kilometres in length as well as width. In fact, it is likely that organised control of weights and measures by a centralised authority, perhaps governmental, was first established in the ancient world in the Indus Valley Civilization. After the decay of this civilization, there is a dark period.

In Sanskrit literature, the Manu Smriti ([1,2]) gives a table of weights and measures and lays down that the king should inspect weights and measures and have them stamped every six months and punish offenders and cheats. The table of weights given by Manu in Chapter 8 (अध्याय ८) has perhaps an important bearing on South Indian weights and so is given below. References to some of these weights will be made later.

| | |
|---|---|
| | *For Gold* |
| 8 trasarenu (त्रसरेणु) | =1 liksha (लिक्षा) |
| 3 liksha | =1 black mustard (राजसर्षप) |
| 3 black mustards | =1 white mustard (गौरसर्षप) (6·89 mg) |
| 6 white mustards | =1 barley-corn (यव) (41·33 mg) |
| 3 barley corns | =1 krishnala (कृष्णल) (124 mg)* |
| 5 krishnala | =1 masha (माषा) (620 mg) |
| 16 masha | =1 suvarna (सुवर्ण) (9·92 g) |
| 4 suvarna | =1 pala or nishka (पल, निष्क) (39·680 g) |
| 10 pala | =1 dharana (धरण) (396·8 g) |
| | *For Silver* |
| 2 krishnala | =1 masha (रूप्यमाषक) (248 mg) |
| 16 masha | =1 dharana or Purana (धरण, पुरण) (3·968 g) |
| 10 dharana | =1 shatamana (शतमान) (39·680 g) |
| | *For Copper* |
| Karshapana (कार्षापण) | 16 masha=80 krishnala=1/4 pala=(9·920 g) |

The smallest unit here is the trasarenu which is defined as 'the very small mote which is seen when the sun beam passes through a lattice'

जालान्तरगते भानौ यत्सूक्ष्मं दृश्यते रज : ।
प्रथमं तत्प्रमाणानां त्रसरेणुं प्रचक्षते ॥ १३२ ॥

For the purposes of this article, the systematic development of weights in South India may be taken to have started earnestly with the Mauryas, although the influence of Manu is not negligible. The period earlier than Manu is somewhat obscure from the metrological point of view. The Mauryan kings during the period B.C. 320-200 extended their rule over North India and most of South India. The Mauryas were well-known for their efficient central administration and a special Officer of the high rank of the Superintendent was in charge of the administration of weights and measures over the entire kingdom. The *Arthashastra* of Kautilya ([3,4]) gives an admirable blue-print of such an organisation. The table of weights he has given is important from the point of view of this article and is shown below.

| | |
|---|---|
| 10 seeds of masha (धान्यमाषा) *Phraseolus Radiatus*) or 5 seeds of gunja (गुजा) *Abrus precatorius*) | =1 Suvarna-masha (सुवर्णमाषक) (620 mg) |
| 16 suvarnamasha | =1 suvarna or karsha (सुवर्ण, कर्ष) (9 920 g) |
| 4 karsha | =1 pala (पल) (39·680 g) |
| 88 white mustard seeds (गौरसर्षप) | =1 silver masha (रूप्यमाषक) (606 mg) |
| 16 silver masha or 20 saibya seeds (शैम्ब्य) | 1 dharana (धरण) (9·696 g) |
| 20 grains of rice (तण्डुल) | 1 dharana of diamonds (वज्रधरण) |

*The values of the various units are calculated on the basis of a *krishnala* being equal to 124 mg.

The *Arthashastra* further lays down that a series of weights based on masha, suvarna and dharana should be made. Kautilya then prescribes the rules for the verification of weights, beam scales, steelyards, weighing of commodities, fines for offences and so on.

Later Sanskrit literature reveals a certain amount of variation from these old tables. There is, therefore, no need to trace any further variations through the ages in Sanskrit literature. The two tables of Manu and Kautilya, which happen to be the most ancient records of weights and measures in India are useful in explaining the origin of some of the weights in South India. The main basic commercial weight on which the series is built up is the Krishnala in *Manusmriti* and the Gunja in *Arthashastra*. Both refer to the same seed. Its names in various languages are given below :

Besides the above two names it is also called raktika (रक्तिका) in Sanskrit. Other current names are : ratti or ghunchi (in Hindi) Kunch (Bengali), gunja (Marathi), Chanoti (Gujerati), guriginja (Telugu), gundumani (Tamil), guluganji (Kannada), kunni (Malayalam), ainuddik (Arabian), chashme kharos (Persian) (5).

The weight of this basic unit determines the weights of subsequent denominations. As the gunja or krishnala is a seed it is likely to vary in weight from time to time as also from place to place. Thus the variation of the basic weight of the krishnala or gunja itself could lead to a variety of values for weights based on it.

The difference could, however, have been set right in the course of time had there been no attempts by the large number of later invaders and others to standardize them in their own way in terms, perhaps, of their own foreign standards. A short historical sketch of these developments may help in the discussion later.

**Historical Background**

After the Mauryans, the South was ruled by various dynasties, the important ones among them being the Shatvahans, Kadambas, Pallavas, Pandyas, Cholas, Chalukyas of Badami and Kalyani, Hoysalas and others. (6) South India in olden days traded extensively with African and Middle East countries and Rome, and foreign weights and currencies of these countries were also known and used in coastal towns. In trade transactions, overseas traders paid for goods purchased in South India in their own coins and often on the basis of weights and measures obtaining in their own countries. It is, however, possible that the Hindu kings may have tried to standardise the weights to suit the requirements of their own internal trade.

Subsequently came the conquests by the Muslims from the 13th century and later, and then by the British, French and Portuguese traders and colonialists from the 16th century onwards. During the 18th century there were warring kingdoms and principalities like the Marathas, Nizam, Travancore, Malabar, Tanjore, the French at Pondicherry, Mysore under Hyderali, the Portuguese on the West Coast and English at Madras. By the end of the 18th century the British became the strongest power and soon held sway over the entire country. These developments were also reflected in the confusion in weights and measures. Perhaps the British contributed the 'lion's share' to the creation of this variety.

The British came to Madras early in the 17th century and they purchased some lands from the Raja of Chandrigiri and established the first English factory at Fort St. George in 1639. They also established another factory simultaneously at Fort William on the Hooghly.

**Hun**

As bazaar weights were often related to weights of a certain number of coins it may not be out of place, here to indicate briefly the various coins used normally in India.

The Madras mint came in existence around 1660. From this mint were issued the pagodas—the single Swami pagoda, the old star pagoda (see Fig. 1), three Swami pagoda (see. Fig. 2) and the mohur in gold (see Fig. 3) and the star pagoda in silver. Salaries were paid and accounts were maintained in star pagodas known as Company Varahans. The English factories were then engaged in reproducing the rupees of the Mughal Emperors. East India Company rupees bearing the names of Alam Gir II and Shah Alam II were issued from the Madras, Surat and Bengal Mints. In 1742, the Mughul Emperor Mohammad Shah permitted the Company to mint Arkat rupees and in 1756 after the battle of Buxar the Bengal Mints were taken over by them.

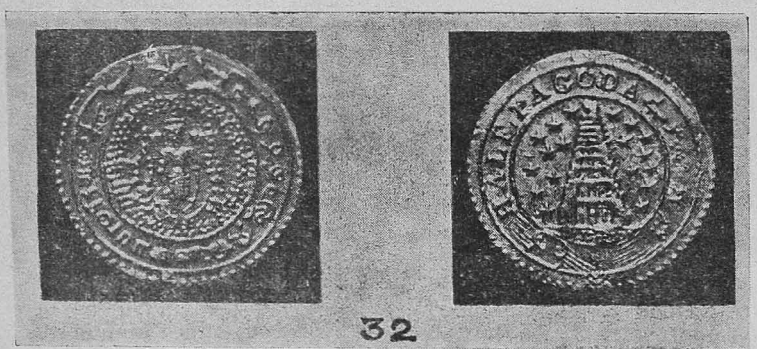


Fig.—1 Star Pagoda—Half: These star pagodas issued from the Madras Mint continued to be the standard coin of the British East India Company in the South until it was abolished in 1816 and the silver rupee was made the standard coin.

This coin has on one side the temple gopuram surrounded by 18 stars. Near the edge is the inscription both in English and Persian, *Half Pagoda*. The other side has the figure of Vishnu surrounded by dots and a star. The denomination of the coin, *'Half Pagoda'* is inscribed here both in Tamil and Telugu scripts.

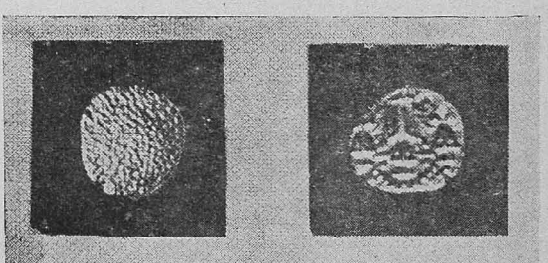

Fig.—2 Three Swami Pagoda : This pagoda issued by the English East India Company from the Madras Mint is called the three Swami Pagoda, as it has on one side the figures of Lord Venkateswara and his two consorts, as at the Tirupati temple. The other side is blank.

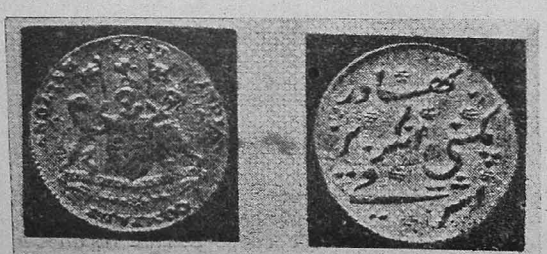

Fig.—3 Single Mohur : The English East India Company issued gold pagodas and mohurs from the Madras Mint from the latter part of the 17th century.

The Mohur has on one side the arms of the Company and the inscription in English—English East India Company. On the other side is found the Persian inscript which means 'Ashrafi of the honourable English Company.'

The English factory at Madras minted in 1811, a silver 'pagoda' with a representation of the goddess Bhagavati on its face and the gate tower, or gopuram of a temple on the reverse(7). It had a weight of 52.56 grains. Pagoda is probably a Portuguese word derived from the pyramidal temple depicted on the coin. The old Hindu name varied according to the image on the coin. Thus the Matsya Hun of Vijayanagar had four fish on the obverse (see Fig. 4). Other pagodas had Vishnu (see Fig. 5), Jagannath, Venkateshwar etc. on them. Hun was the term commonly used for the pagoda. It signified gold in Kannada (Honnu).

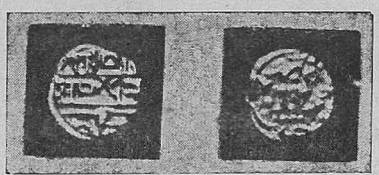

Fig. 4—The name of the King, Dhananjaya, who issued this coin is known to us only from legend.

On one side of the coin has a three-line Sanskrit legend which reads : 'Sri Panda (ndya) Dhana (n), Jaya'

The other side shows some symbols made up of lines and dots which have been identified as forming the figure of a fish.

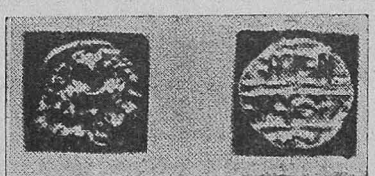

Fig. 5—Varahan of Krishnadeva Raya : Krishnadeva Raya (1509-1530) is the most famous of all Vijayanagar Kings. During his reign the Vijayanagar empire reached its zenith.

This gold *varahan* has on one side the figure of seated Vishnu and on the other a three-line legend in Sanskrit, 'Sri Pratapa Krishna Raya.'

The 'hun' which later went under the name of pagoda and became an important weight for the bullion trade in the South was current in South India from the 7th century A.D. in the territories of the king of Golconda, the king of Visapur, the Raja of Karnatics, the Raja of Velonche (Vellore). The hun used to weigh 55-56 grains, (3.560 to 3.630 g) sometimes even upto 70 grains (4.5g) (see Fig. 6).

The star pagoda was abolished in 1816, and the rupee became the 'standard coin' although the weight of the rupee varied from 175 to 185 grains or even more. In 1835 a standard weight of 180 grains was adopted for the rupee (8).

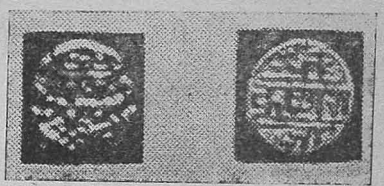

Fig. 6—Varahan of Krishnaraja: After the death of Tippu in 1799, the English restored Mysore to its old Hindu dynasty of Wodayars, and a boy, Krishna Raja (1799-1868), was installed on the throne.

This gold *varahan* of Krishnaraja has on one side the figures of Siva and Parvati. The other side has a three-line Sanskrit legend 'Sri Krishna Raja'.

Fig. 7—This coin is of Chalukya Dynasty with figures of a boar in symbolic words on obverse sides.
weight: 4.33 g (66.8 grains)

Fig. 8—This coin is of Chola Dynasty with figure of fish on both sides.
weight : 3.37 g
(52 grains)

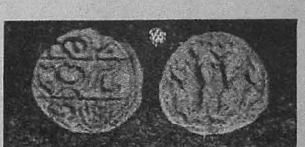

Fig. 9—This coin is of Pandya Dynasty with some inscription on one side and figures of two fishes, lamp and whisk on obverse.
weight : 3.69 g
(57 grains)

The hun was subdivided into fanams and kas. Fanam, or more probably panam, is perhaps related with the word pana, known as one of divisions of ancient Hindu weights. The old fanam was made of gold only and was 1/16 of a hun. In Lilavati we find,

16 pana = 1 dharan
16 dharan = 1 nishka

In this table the dharan seems to accord with the hun.

Kasu is interpreted in many ways. According to one, kasu is a Dravidian word, common to the Tamil, Telugu, Canarese and Malayalam languages. It has the general significance of money, wealth and likewise of coin, such as pon kasu = gold coin, velli kasu = silver coin, semba (or red) kasu = copper coin; as well as of a particular coin, anai kasu of Chera or Kongu dynasty (9).

Kasu, according to other authorities, may also represent the cowrie of Bengal, eighty of which made a pan, a fanam or pana(9). The kasu has even been identified with the Sanskrit karsha, and they are both probably derived from the same original source, as according to ancient law books a karsha of eighty ratis is called a pana or karsha pana *i.e.* 9.92 g or 153 grains(1,2). In later days it came to be restricted to a 'weight of gold or silver equal to 180 grains troy(9). The silver rupee of 180 grains was convertible at the rate of Rs. 350 for 100 pagodas. The formula being :

80 cash = 1 fanam, 42 fanam = 1 star pagoda

This was, perhaps, based on the exchange and relative value of the cash to silver fanam, according to which twelve fanams went to the rupee, and three and half rupees to the pagoda, giving forty-two fanams for the pagoda. The Ikkeru pagoda, however, contained 16 fanams, Virarai and Anandrai 14 and the Kalyan pagoda 28. The division adopted by the English was 42.

It is against this background that a brief discussion of the probable lines of development of the more prominent units among the South Indian weights would be taken up in Part 2 of this article.

**References**


(1) *The Laws of Manu*—Translation by G. Buhler—Vol. XXV of the Sacred Books of the East—edited by F. Max Muller—1886.

(2) *Manusmriti (with commentary by Kulluka)*—N. R. Acharya—Nirnaya Sagar Press, 1946.

(3) *Kautilya's Arthashastra*—by R. Shamasastry—Third Edition—1939.

(4) *The Kautiliya Arthasastra*—Part I R. P. Kangle—University of Bombay, 1960.

(5) *Wealth of India—Raw Materials—Vol. I*—Council of Scientific and Industrial Research, New Delhi—1948.

(6) *A History of South India*—K. A. Nilakanta Sastri—Oxford University Press—1955.

(7) *Essays on Indian Antiquities*—2 Volumes—James Prinsep—John Murray, London—1858.

(8) *Coins of India Through the Ages*—Government Museum, Madras, 1953.

(9) *Numismata Orientalia—Coins of Southern India*—Sir Watter Elliot, 1886.

# *Eleventh General Conference of Weights & Measures (2)*

(The Annual Report for the year 1960 sent by the International Committee of Weights and Measures to the Governments of the countries who are members of the Convention of the Metre, gives the texts of sixteen resolutions passed at the Eleventh General Conference of Weights and Measures held in October 1960. Already the texts of three resolutions dealing with the definitions of the metre, (Resolution 6) time, (Resolution 9) and the international system of units (Resolution 12) have been published in the September 1961 issue of *Metric Measures* on pp. 22-24. The following is a translation from the original French of the remaining thirteen resolutions—*Editor*)

**Extension of the Activities of the International Bureau in the Field of Standards of Measurement of Ionising Radiations**

RESOLUTION 1

The Eleventh General Conference of Weights and Measures,

**HAVING CONSIDERED** that the development of atomic energy and nuclear research requires that uniformity of standards for measurement of ionising radiations be ensured,

that international uniformity of measurements of the principal physical quantities has been achieved, maintained and improved with undeniable success in the last 85 years through the activities of the International Committee and the International Bureau of Weights and Measures,

that the major National Standards Laboratories associated with the work of ensuring uniformity of measurements in their respective countries have found in the International Bureau and in the meetings of the Consultative Committees the facilities which they desire for cooperative effort towards international uniformity of physical measurements and have expressed their desire that the laboratories and the scientific personnel of the International Bureau may be augmented and brought to full strength in order that the common task of unification of measurements may be extended to standards for measurements of ionising radiations,

that the International Committee of Units and Radiological Measurements (ICRU), which has played a decisive role in the selection and comparison of standards in the field of ionising radiations has now announced its desire to relinquish this part of its activity on condition that it be taken up by the International Bureau which alone is capable of taking up this activity with supreme authority,

that the work of international unification of standards for measurement of ionising radiations necessitates establishment of a single permanent scientific co-ordinating centre financed by an intergovernmental non-political agreement and that the International Bureau of Weights and Measures satisfies these conditions,

that the physical experiments for the preparation and execution of comparisons of

standards for measurements of ionising radiations require the use of standards of measurement of other physical quantities, that these latter standards are available in the most accurate form with the International Bureau, and that the personnel of this Bureau, inheriting a long tradition, is fully conversant with the general rules of metrology and those applicable to each form of standard,

**RATIFIES** the action already taken by the International Committee of Weights and Measures in the field of ionising radiations, and

**INVITES** the International Committee to organize in the International Bureau a section of standards for measurement of ionising radiations, equipped with a laboratory and scientific personnel, and to work for the unification of the standards for measurement of ionising radiations and of the corresponding units, taking into account the results obtained by national, international and other laboratories and organisations.

### RESOLUTION 2

The Eleventh General Conference of Weights and Measures,

**DECIDES** to sanction for the expansion of the laboratories of the International Bureau of Weights and Measures and for equipping them physically with standards for measurement of ionising radiations a sum of 1,800,000 gold-francs covered by an exceptional contribution of 900,000 gold-francs by adding to the annual endowment for the years 1962 and 1963,

**DESIRES** that the French Government grant an extension of the land which it has placed at the disposal of the International Committee of Weights and Measures around the Pavillon de Breteuil,

**DESIRES** that the Governments agree to the anticipated instalments so that the extension of the laboratories of the International Bureau may commence immediately without difficulty.

### RESOLUTION 3

The Eleventh General Conference of Weights and Measures,

**THANKS** the Radium Institute of the University of Paris for its willingness to entrust the custody of the International Radium Standard No. 5430 to the International Bureau of Weights and Measures and

**AUTHORISES** the International Bureau to take charge of this standard.

### RESOLUTION 4

The Eleventh General Conference of Weights and Measures,

**HAVING CONSIDERED** the necessity of establishing precisely certain units and concepts used in the field of ionising radiations,

**INVITES** the International Committee of Weights and Measures to undertake the necessary studies without delay,

**GIVES A MANDATE** to the International Committee of Weights and Measures to take decisions on this subject which will be submitted for approval to the Twelfth General Conference.

**Endowment of the International Bureau**

**RESOLUTION 5**

The Eleventh General Conference of Weights and Measures,

**HAVING CONSIDERED** that the constant refinement of the precision expected of the measurements which are in the charge of the International Bureau of Weights and Measures require more and more expensive instruments,

that the field of activities of the International Bureau has been extended to the standards for measurement of ionising radiations,

that in all its activities the International Bureau should be served by personnel with high scientific qualifications (who are) difficult to recruit,

**HAVINC ACCEPTED** without contrary opinion the proposal of the International Committee duly notified in advance to the Governments in compliance with article 6, paragraph 5, of the Rule annexed to the Metric Convention of 1875, modified in 1921,

**DECIDES** to increase the fixed portion of the annual grant in such a manner that the total of the fixed and complementary parts of the annual grant covering the maintenance expenses of the International Bureau and of the International Committee of Weights and Measures may be raised to 900,000 gold-francs. The total amount of the fixed part thus calculated will apply to the contributions payable in 1962 and the subsequent years.

**RESOLUTION 7**

The Eleventh General Conference of Weights and Measures,

**INVITES** the International Committee

(1) to lay down directives for implement ing the new definition of the metre*;

(2) to select secondary standards of wavelength for the interferometric measurement of lengths and to lay down directions for their use;

(3) to continue the studies with a view to improve the standards of length.

**RESOLUTION 8**

The Eleventh General Conference of Weights and Measures,

*In its session of October 1960, the International Committee of Weights and Measures adopted the following recommendation concerning the initial directions for implementing the definition of the metre:

"In conformity with paragraph 1 of Resolution 7 adopted by the 11th General Conference of Weights and Measures (October 1960), the International Committee of Weights and Measures recommends that the radiation of krypton 86, adopted as the fundamental length standard, may be obtained by means of a hot cathode discharge lamp containing krypton 86 of a purity not less than 99 percent, in quantity sufficient to ensure the presence of solid krypton at the temperature of 64° K, this lamp being provided with a capillary satisfying the following requirements. internal diameter 2 to 4 millimetres, thickness of walls about 1 millimetre

It is estimated that the wavelength of the radiation emitted by the positive column is equal within 1 hundred—millionth (10-8) part to the wavelength corresponding to the transition between the unperturbed levels, when the following conditions are satisfied:

1. The capillary is observed end-on in such a manner that the utilised light rays travel from the cathodic side towards the anodic side;
2. the lower part of the lamp, including the capillary, is immersed in a refrigerating bath maintained at the temperature of the triple point of nitrogen, correct to 1 degree;
3. The current density in the capillary is $0.3 \pm 0.1$ ampére per square centimetre".

**HAVING CONSIDERED** the initial directives laid down by the International Committee of Weights and Measures for implementing the new definition of the metre,

**INSTRUCTS** the International Bureau of Weights and Measures to verify the national prototypes as in the past.

RESOLUTION 10

The Eleventh General Conference of Weights and Measures,

**HAVING APPRECIATED** the experimental results obtained by competent laboratories in the recent years which prove that a standard of time interval based on the transition between two energy levels of an atom or molecule can be obtained and reproduced with a very high precision,

**HAVING CONSIDERED** that such an atomic standard of time interval is essential for demands of higher metrology,

**INVITES** the expert national and international laboratories in this field to continue their researches as actively as possible,

the International Committee of Weights and Measures to cooperate immediately with the concerned international organisations and to co-ordinate the results so as to enable the Twelfth General Conference to pass a resolution on this point.

**Gravimetric System**

RESOLUTION 11

The Eleventh General Conference of Weights and Measures,

**HAVING NOTED** with satisfaction the progress made in the absolute measurement of acceleration due to gravity, thanks to the work of the International Bureau of Weights and Measures and the national laboratories, but observing that several important determinations are still in progress,

1. **DECIDES** to retain provisionally the gravimetric system of Potsdam;

2. **INVITES** the International Bureau and the national laboratories to continue their determinations;

3. **AUTHORISES** the International Committee of Weights and Measures to take a decision on the change of the Potsdam system when it is considered that the value of this acceleration is known with adequate accuracy.

**Cubic Decimetre and Litre**

RESOLUTION 13

The Eleventh General Conference of Weights and Measures,

**HAVING CONSIDERED** that the cubic decimetre and the litre are not equal and differ by about 28 parts in a million,

that the determination of physical quantities involving measurements of volume are having increasingly higher precision, augmenting thereby the chances of a possible confusion between the cubic decimetre and the litre,

**INVITES** the International Committee of Weights and Measures to take up this problem for study and present its conclusions to the Twelfth General Conference.

**Adherence of Countries to the Metric Convention**

RESOLUTION 14

The Eleventh General Conference of Weights and Measures,

**HAVING CONSIDERED** that all countries benefit from the useful results of the work of the International Committee and the International Bureau of Weights and Measures, illustrated particularly by the report of its President on the activities of this Committee during 1954-1960,

that the development of contemporary science and technology would be promoted by an increasingly greater extension of the metric system throughout the world,

**DESIRES** that countries which do not yet adhere to the Metric Convention, and particularly countries which have recently achieved independence, should not delay in acceding to this Convention, and

**RECOMMENDS** to all the member countries of the Convention to exercise their influence in this direction through their scientific and technical bonds.

**Negotiation for an Agreement Regarding the Office with the French Government**

RESOLUTION 15

The Eleventh General Conference of Weights and Measures,

**HAVING CONSIDERED** that the International Bureau of Weights and Measures derives help from the generous hospitality of France, but that, in the accomplishment of its mission it meets with certain difficulties due to the application of rules laid down for French or foreign nationals and establishments existing in France,

**INSTRUCTS** the International Committee of Weights and Measures to negotiate with the French Government an agreement regarding an office on a non-discriminatory basis in accordance with the agreements of this type already concluded by this Government with other international institutions, and

**DESIRES** that this agreement may be immediately implemented as a provisional measure pending its approval by the Twelfth General Conference.

**Revision of the Metric Convention**

RESOLUTION 16

The Eleventh General Conference of Weights and Measures,

**HAVING OBSERVED** that it has not been possible to obtain agreement in the course of its sessions on the changes to be made in the Metric Convention and the annexed Rule, in spite of the praiseworthy conciliatory efforts of the Working Group set up at its first session and presided over by Mr. de Boer,

**GIVES A MANDATE** to the International Committee of Weights and Measures to pursue its studies with a view to arriving at a draft at the earliest which receives the consent of all the Contracting Parties.

# *News & Views*

**Fifth Conference of Controllers**

The fifth Conference of Controllers of Weights and Measures is scheduled to be held in Jaipur on 4-6 January 1962. Among the points for discussion are:

(1) Review of the progress in implementing the recommendations of the fourth Conference of Controllers.

(2) Review of the enforcement of metric weights in areas where the use of metric weights has become compulsory, and the steps to be taken to enforce them in remaining areas where compulsion starts from 1 April 1962.

(3) Review of the enforcement of metric capacity measures in the areas where their use will be compulsory from 1 April 1962, and the steps to be taken to enforce them in other areas.

(4) The use of metric length measures has been legalised from 1 October 1961 with a transition period of one year. Enforcement aspects of the question will be discussed.

(5) In order to meet the demand for weights and measures of capacity and length when they are compulsorily enforced over the entire country it is necessary to produce them in large numbers and assure their supplies. The steps to be taken to achieve this aim are to be discussed.

(6) There are a number of States where the enforcement organisation has been recently set up. It has been found necessary to lay down a general pattern of organisation for enforcement of weights and measures and the question will be discussed in detail.

(7) In view of the resolutions passed at the Eleventh General Conference of Weights and Measures, the definitions of the metre and the second have undergone changes. These have now to be reflected in the Standards of Weights and Measures Act, 1956. The steps to be taken will be discussed.

Besides these, there will be many other points arising out of the experience of enforcement of weights and measures over the last 2-3 years, which will be discussed in the Conference.

A report on the Conference will be published in the March 1962 issue of *Metric Measures*.

**Possession of Old Weights is Illegal**

A PTI release published in *The Hindu* on Monday, 6 November 1961 reports the following:

Allahabad, Nov. 4.

Mr. Justice Mathur of the Allahabad High Court to-day dismissed a writ petition, filed by a local shop-keeper, for directing the Civil Supply authorities not to interfere with

his right of keeping old weights—maunds, seers and chataks—at his shop.

After the Standards of Weights and Measures Act of 1956, fixing the standard units of weights and measures, was enacted by Parliament, the State Government by a notification under Section 13 of the Act had enforced it at Allahabad.

The Inspector of Weights and Measures visited the shop of the petitioner on August 7 last and took away the old weights.

The petitioner had challenged the validity of Rule 22 of the Act which provided for seizures, detention and disposal of the unauthorised weights, on the ground that the rule imposed an unreasonable restriction on the petitioner's right to carry on his trade.

His Lordship said that it was in the interest of general public that only standard weights should remain at shops and all weights not conforming to standard should be removed and if necessary seized by the authorities. The restriction imposed on the possession of the old weights at a shop was thus in the interest of general public and this restriction was reasonable.

Keeping in mind, His Lordship added, that businessmen were not in any way restrained from carrying on business, the only restriction imposed was that they should possess and weigh articles in kilogram and not in maunds, seers and chataks.

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# *The British Scene*

THE discussion on the possibilities of adoption of decimal coinage and the metric system of weights and measures in Britain in the wake of the recent report of the Joint Committee of the British Association for Advancement of Science and the Association of British Chambers of Commerce and as a consequence of Britain joining the European Common Market has been arousing considerable interest all over the world. The publication of the pamphlet *Systems of Measurement** by the Political and Economic Planning (PEP) which is an independent and non-party organisation in Britain is a welcome step. The PEP acts as a bridge between research on the one hand and policy-making on the other, whether in Government, the social services, or industry. It studies problems of public concern to find out the facts and present them impartially to suggest ways in which the knowledge can be applied.

The publications of this organisation take three forms: Reports, Planning Broadsheets and Occasional Papers arising from the study undertaken by this organisation. It has brought out a reprint of the Planning broadsheet on the *Systems of Measurement* which makes interesting reading. The small booklet running into only 21 pages reviews the history of the movement for the decimalisation of currency and the adoption of metric weights and measures in Britain.

In its introduction it has briefly indicated the pressures which are building up in Britain for the movement. It says:

> 'Britain at present stands at something of a cross-roads in respect of its units of quantity. It would be truer to say perhaps that it drifts in the eddies of many currrents since in such matters it is not possible to stand still. A Bill amending the law relating to weights and measures is before Parliament; there have been two major reports recently published; the countries of the Commonwealth are in the process of changing over to a decimal system of coinage; increased competition for foreign markets and also closer economic and military links with European nations since the war have brought into prominence the inconvenience of contrasted systems both of measure and of coinage; a consolidation of practice in the engineering and related industries between the Commonwealth and the United Kingdom has been taking place, and there have been a number of small adjustments such as the change-over from the Fahrenheit to Centigrade (Celsius) scale for all Meteorological Office calculations since 1 January 1961.
>
> 'It seems clear that further modifications, or even changes, to our traditional system will soon be made and may even be forced upon us, so that this is an appropriate moment to take stock of the situation.'

**Decimalization of Coinage**

It reviews the position of decimalisation of coinage in the Commonwealth countries and shows that almost all the countries except Britain have taken active steps either to introduce decimal coinage or to make the

**Systems of Measurement* (P.E.P.) Planning, Vol. XXVII, No. 449, 20 February 1961, 3 shillings.

necessary enquiries before proceeding with the step.

On the recent Weights and Measures Bill it says:

> 'The legislation foreshadowed in this Bill is sound, sensible—and minimal. It is the first comprehensive legislation in this field since the Weights and Measures Act of 1878. These eighty years have seen unprecedented technical advances and industrial expansion. During this time the need for nations to act and work together has superseded earlier political concepts. Such concerted action has been made possible and necessary by the shrinkage in world distances brought about by a revolution in transport and by the interdependence of scientific and technological research work. Yet part from the setting up of the permanent Commission the present Bill takes no account of these developments; it does little more than make a good job of consolidating previous legislation.'

The British Government's policy about the change-over appears to be lukewarm and it was announced in the British Parliament that the Government desired to have the widest public discussion of this question. A similar reply was given by Mr. Gladstone on the same subject in 1854—more than 100 years back. In the nineteenth-century considerable efforts were made to make the British Government to adopt the metric system. The booklet recounts an interesting story about the international acceptance of Greenwich as the prime meridian of longitude. It appears that 'the international conference held in Washington in 1884 for the purpose of getting world agreement to adopting Greenwich as the prime meridian of longitude for the convenience of navigators ran into severe difficulties with the French who were adamant that Paris had the preferential claim. When at last they realised they were almost alone in this view the French delegation magnanimously offered to accept Greenwich as the prime meridian if Britain would adopt the metric system'.

It is pointed out that 50 years ago promoters of currency and weights and measures reform in the Commonwealth countries used to be 'held back by the indelicacy of seeming to take action independently of the Imperial Government. Nowadays Commonwealth countries have no such inhibitions'. Decimal coinage is now well on the way to adoption in most of the Commonwealth countries. Metric weights and measures may follow. When this happens, 'Britain will be numerologically isolated and will possess the doubtful distinction of having the most antiquated counting system of any industrial nation. There is of course precedent for this conservatism: Britain lagged a century and a half behind the other countries of western Europe in adopting the modern calendar'.

**Metric Impact on Britain**

On analysing the extent of the impact of the British system on other countries and of the metric system in Britain, the pamphlet points out that the metric system is already in use universally for scientific and laboratory work and is used exclusively in the British optical and photographic industries. Pharmaceutical industry in Britain is also fast changing over to the metric system. At present all new products are made out and sold in metric units and it is expected that when the new Bill becomes effective, doctors will also adopt the metric units. In aircraft loading also kilogram is used exclusively. Dealings in jewellery and precious stones are principally in metric units (the carat). Electrical engineers use the metric system widely. Mechanical engineers also use metric units to some extent. The British Ordnance Survey conducts triangulation surveys in metres and metric

units are provided in all their publications. Height, however, is given in feet. By 1962 all mining surveys of the National Coal Board will also be redrawn to metric scale, depths being indicated in feet. The military maps have also a metric grid, but again heights are given in feet. The Meteorological Office has changed over to Centigrade for almost all purposes except forecasts and reports issued to the public.

Similarly it has been pointed out that the use of decimals is gaining ground. For example, the use of decimalised inch, foot and mile have also come into wide use and the use of decimalised units in pricing, costing, estimating etc. is also common. In measuring sand and ballast the use of decimals of the foot is common. Property is generally expressed in decimal acres and even the London foreign exchange market recently changed from fractions to decimals in quotations of dollar and other foreign currency rates. Decimal steps of weights *i.e.* 10, 50, 100 lb are being used in preference to 7, 14, 28, 56 etc.

It is also pointed out that British units are also used in international practice, though the use is rather restricted, as in leather manufacture and aircraft industry. The pamphlet states that the only aircrafts in the world that are all-metric are the Russian. Components of the oil industry are dominated by inch/pound sizes because of the hold that the American interests retain in this sphere.

The pamphlet analyses the various arguments put forth in the recent study made jointly by the British Association for the Advancement of Science and the Association of British Chambers of Commerce.

**Cost of Change-over**

The conclusion is that the Committee's recommendations stress the financial and practical aspects rather than the logical. They do not take into account the saving of time that would accrue on adoption of decimal coinage and the metric system. The joint report had given considerable weight to the complications and cost facing the industry if a complete change-over to the metric system was made. The pamphlet points out that the cost and difficulties drop dramatically with extension of the period in which the change has to be made. The bogey of complications is not so frightening in view of the industry's experience with the compulsory adoption of Unified threads (substantially based on American standards) ten years ago which had now been satisfactorily settled into the structure of the industry though when the agreement was announced there was a general outcry that it was 'impossible'. However this outcry progressively died down and Unified screw threads have now become common in Britain. 'The fact that they have several technical disadvantages compared with the threads used in Britain previously has not prevented them from being used for everything from military equipment to lawn mowers.'

So far as the decimal currency is concerned, the pamphlet feels that the 10 shilling main unit could be rechristened the £ and the 10s-cent system used as in South Africa.

**Conclusion**

In conclusion it states:

> 'Within a few years the United Kingdom will be out of step numerologically with all other countries of the world. Monetarily it will be isolated in the Commonwealth as the only member with non-decimal currency. It will be isolated in the world at large as the only major country with non-decimal currency and non-decimal measures.
>
> 'A change in the way in which we count money and measure in this country seems inevitable within a finite period, say fifty years. The question at issue is whether we choose to

change by an act of corporate will or are contents to be pushed. The problem resolves itself into orderly change carefully phased to suit the best interests of the economy as a whole versus *laissez-faire*.'

'Immediately after the war the United Kingdom was in a position to give a two-fold lead: to the Commonwealth in decimalising sterling and in the appropriate choice of a system; and to industry in their country where the newly set up nationalised undertakings could have set an example to the rest by adopting more up to-date standards and units (as was urged by the British Standards Institution).

'This problem in common with the need for basic research and other technological questions, has the disadvantage for the politician that legislation will produce immediate expense and upheaval while the benefits expected are long-term, gradual and intangible and likely to be reaped by another hand. A government cannot often be expected to look far beyond its five-year term of office in the measures it is prepared to undertake.

'If a fundamental change is to be made at all it would seem important to make the one change that can be guaranteed to involve no subsequent changes, that is to the metric system. The metric sysem means one thing and one thing only; it is precisely defined and already in world-wide use, and would be a step towards standardisation where standardisation can only be an advantage.

'In this matter of units, time is not on our side. Where decimalisation of the coinage is concerned, the longer the delay the greater will be the expense. Where weights and measures are concerned the longer the delay the greater the confusion to be ultimately disentangled and the heavier the handicaps to exports, particularly of high conversion value goods, such as precision engineering measuring instruments and machine tools. We have also to reckon with the cumulative loss of time involved both in calculations with imperial units and in conversions to and from decimal weights, measures and currencies.'

# Book Review

PRATHAM PATHYA DASHMIK DHARAPAT: (Bengali)—P.N. Seth, General Secretary, Indian Decimal Society, Calcutta-6—Published by the General Library, 115A, Upper Chitpur Road, Calcutta-6, pp. 104+VIII, Price Rs. 1.00.

First Book of Decimal Arithmetic (Pratham Pathya Dashamik Dharapat) is perhaps the first book to incorporate decimal coinage and metric system of weights and measures exclusively in all the examples and exercises meant for the students in the primary classes. At least this is true so far as Bengali books are concerned.

Earlier, authors and publishers just added one or two chapters dealing with the new system in their old publications, the greater portion of which was done in the traditional way. The result was, rarely anybody noticed the additional chapters. This was partly because Governmental authorities had not yet laid down new syllabi for arithmetic.

The book begins with a chapter on how to write and express numerals. In enumeration after ten, Shri Seth has introduced a refreshing and new attempt to rationalize the names of numerals. For example, he suggests the following new and rational names for some units.

11—is pronounced as 'akara' (not agara),
19—as 'nayara' (not unis)
29—as 'naybis (not untris)
39—as naytris (not unachallis)
49—as naychallis (not una pachas)
59—as nayanna (not unashat)
69—as nayshatti (not unasattar)
79—as nayattar (not unaashi)
99—as nayanabai (not niranabai)

The arugument that this has been done to maintain symmetry in all cases is not quite unconvincing. It is, however, difficult to foresee at this stage how the public in general would react to such innovations. The chances of the illiterate mass being misled in the initial stages are not small. When one says nabis, a layman generally understands nine times twenty. But in Shri Seth's style of expression, this simply means 29. The reaction of the children to the learning of such new but rational nomenclature does, however, deserve to be gauged.

Each chapter is followed by exercises. As the book is intended to be studied through a number of years, the exercises gradually become stiffer. In the preface, Shri Seth has requested the teachers to determine the exercises suitable for a particular class and have them worked out by the students accordingly. This was perhaps unavoidable as the volume had to be written in a condensed form to keep it within a reasonable price limit.

The book illustrates the simplicity and superiority of the metric system over the existing Indian and English systems and also the logical correlation between the different metric units of weights, capacity and length. To assist in the initial difficulties of the transitional period, Shri Seth has appended conversion tables necessary for day to day transactions. The lucid language, intelligent arrangement of the subject matter and the masterly way in which the subject has been presented should make the publication extremely useful.

J. RAY

# *Readers' Forum*

Dear Sir,

It is because of the low standards in design and workmanship of the various makers in India (as compared with those of other countries) which bring a bad name to the country itself, that I venture to put forth an humble suggestion for consideration to manufacturers of weighing instruments.

The business enterprises in the private sector, which are of recent origin, lack the experience which foreign firms of this industry possess. Mutual competition between firms in India itself often becomes unhealthy and in any case no individual maker can lay stress on very high quality and quality alone. If, on the other hand, all makers in India merge and form a single co-operative concern (a voluntary combination) BHARAT, BHARATI, ATLAS, AVENUE, ASIA, etc., are replaced by a single 'INDIA' trade-mark, then it leaves no room for unhealthy competition, poor-quality design or workmanship and their energies can well be directed towards developing inventive genius and research.

In the UK, it is understood, M/s. Avery & Co. Ltd., was formed after persuasion by the Government after merging Henry Pooley & Co., Hodgson & Stead, W. & T. Avery Ltd. & James Spencer & Co. etc. Today, the word *Avery* stands as the hallmark of quality, durability and service all over the world.

A research and improvement section must be a special feature of the new combine, which must be in constant touch with suggestions and complaints of the users and using Government Departments as well.

The formation and registration of competitive firms of lesser standards must be made impossible by legislation or executive authority.

If the existing firms do not merge to form a single company by a certain date, they should all be liquidated to permit the coming into existence of an industrial unit in the Public Sector—in other words, nationalised—in the larger interests of the country as a whole.

R. Rajagopalan
Weighing Machine Inspector,
Secunderabad.

**Advantages of Metric System**

Dear Sir,

In India there are over 143 different types of systems of weights and measures in use in trade. But the Government of India wants to introduce a uniform system *viz.* the metric system throughout the country in all spheres of business. The system is easier to understand and for calculation. The uniform system is more advantageous both to the traders and the people.

The use of metric weights will become compulsory throughout the country from 1 April 1962. This should help the common man in purchasing the commodities without any difficulty. He need not be afraid of the mischief of the traders. That is why the Central Government fixed the units for *gold* as '10 *grams*' and *silver* as '1 *kg*'

or '1000 *grams*' instead of tola and 100 tolas (now in common use). In the same way the Government fixed the weight of the cement *bag* at 50 *kg*. These weights are uniform throughout the country.

Even though the system brings about uniformity throughout the country in the regulated markets, the pricing and selling units of various commodities are not uniform. They vary from one State to another and one market to another.

For example, regulated units in markets in Andhra Pradesh vary from one market to another. The same happens from one State to another also.

In the above markets the commodities are sold in various weights even when using the metric system. When the weights differ from one market to another and one State to another, the advantages of adopting the metric system are lost. Previously also throughout India the weights of the commodities sold varied from one market to another. The Government has fixed the standard units to be used for pricing of various commodities throughout the country. Markets and traders in the country should use these irrespective of whether they be in Punjab or Kerala or Bengal or Gujerat.

G. Seshadri Sarma
Inspector of Weights & Measures,
Narasipatnam, Vizag Dist.
Andhra Pradesh.

# *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).

**Draft Specification for Spanners**

The Indian Standards Institution has prepared the following four draft Indian Standard Specifications on spanners:

(*a*) Width Across Flats for Spanners.
(*b*) Open Jaw Spanners.
(*c*) Ring Spanners.
(*d*) Box Spanners.

These draft specifications prescribe the requirements regarding dimensions, manufacture, finish and methods of test for the respective products.

Pursuant to the decision of the Government of India to change-over to the metric system of weights and measures, the Indian Standards Institution, had adopted metric screw threads with ISO profile as recommended by the International Organization for Standardization (ISO). Indian Standards have already been published for different grades of bolts and nuts having dimensions and threads as recommended by ISO. The draft standard for spanners have now been prepared to pave the way for a smooth change-over to the new threads.

**Draft Indian Standards for Calibration of Vehicle Tanks for Petroleum Products and Other Liquids**

A draft Code of Practice for Calibration of Vehicle Tanks for Petroleum Products

and Other Liquids, which covers recommendations for the calibration of vehicle tanks used for transport of petroleum and other products has been circulated for comments.

**Draft Indian Standard for Set Squares, Protractors and Metric Diagonal Scales**

The Indian Standards Institution has prepared three draft Indian Standard Specifications for the following subjects;

(1) Set Squares for Use of Drawing offices;

(2) Protractors for Use of Drawing Offices; and

(3) Metric Diagonal Scales (Cartographers, Surveyors and Engineers).

The first two draft standards prescribe requirements with regard to material, dimensions and test for set squares and protractors, which are used in drawing offices by engineers and draftsmen for marking angular measurements on geometrical and other drawings.

The third draft standard, namely, Metric Diagonal Scales, lays down provisions regarding material, constructional details and accuracy for such scales, which are used by cartographers, surveyors and engineers in measuring or setting off distances upon geometrical and other drawings on mass plans, etc., with correctness aimed up to one hundredth part of a millimetre.

**Draft Indian Standards for Galvanized Steel Sheets (Plain and Corrugated) (IS: 277—1951)**

The Indian Standards Institution has prepared a draft revision of Indian Standard Specification for Galvanized Steel Sheets (Plain and Corrugated), IS: 277—1951, which covers the minimum requirements for four classes of plain and corrugated galvanized steel sheets produced by hot dip galvanizing.

This standard was first issued in 1951, and the main modifications made in this revision relate to the inclusion of another class of galvanized steel sheets having a light coating of zinc and inclusion of rationalized metric values in the standard.

**Draft Indian Standard for Mild Steel Wire for General Engineering Purposes (IS: 280—1961)**

The Indian Standards Institution has prepared a draft revision of Indian Standard for Mild Steel Wire for General Engineering purposes, IS: 280, which covers requirements for mild steel wire of sizes 0.125 mm to 12.5 mm diameter or equivalent cross sectional area for general engineering purposes.

This standard was first issued in 1951, and based upon the experience gained in the use of the standard during the last 10 years, has now been revised.

The draft revision has been put into wide circulation.

**Draft Indian Specification for (1) Steel Sheet Piling Section [DOC: SMDC 6(322)] and (2) Angle Section with Legs of Unequal Width and Thickness**

**DOC: SMDC 6(320)**

Under the Steel Economy Programme initiated at the instance of the Planning Commission, the Indian Standards Institution has prepared the following two draft Indian Standards :

(*a*) Steel Sheet Piling Section, DOC: SMDC 6(322); and

(*b*) Angle Sections with Legs of Unequal Width and Thickness, DOC:SMDC 6(320).

The draft standard for a steel sheet piling section lays down the nominal dimensions and shape of hot rolled steel sheet piling sections. Structural properties of these sections as calculated on the nominal dimensions are also included. Piling sections are required in large quantities for coastal protection, hydroelectric, irrigation and power projects. Necessity has, therefore, arisen to standardize piling sections for immediate production in the country. Accordingly, three sections with section moduli of 1171, 1625 and 2222 cubic

centimetre, similar to the well-known sections already being used in the country, have been covered in the present draft standard. Further types sizes, if required, will be included later depending upon the needs.

The draft standard for Angle Sections with Legs of Unequal Width and Thickness prescribes the dimensions of angle sections with legs of unequal width and thickness for use in ship-building industry. Structural properties of these sections as calculated on the nominal dimensions are also included. With the publication of IS: 1863 Rolled Steel Bulb Plates (Under Print), and the finalization of this draft standard, it may be possible to meet the major requirements of the ship-building industry.

**Draft Indian Specification for Surface Plates DOC: EDC 43 (549)**

The Indian Standards Institution has prepared a draft specification for Surface Plates (Cast Iron) [DOC : EDC 43 (549)] which covers rectangular and square surface plates made of cast iron and used for inspection and marking purposes. The draft standard prescribes two grades of surface plates depending on the flatness of the top surface; Grade A for sizes up to and including $2000 \times 1000$ mm and Grade B for sizes up to $36000 \times 2000$ mm.

**Indian Standard for Code of Practice for Architectural and Building Drawings (IS: 962—1960)**

The Indian Standards Institution has just published IS : 962—1960 Code of Practice for Architectural and Building Drawings, which lays down recommendations for sizes and layout of drawings, methods of projections, sectioning and sectional views, sizes of lettering, dimensioning, abbreviations and symbols used in architectural and building drawing office practices.

The standard code has been prepared with a view to rationalizing and codifying the different practices in vogue in various architectural and civil engineering departments so that the drawings prepared in any office can be read and interpreted with care and without fear of misinterpretation. The code is also intended to serve as a basis for providing instructions and guidance to architects and civil engineering students, and the technical committee concerned has recommended the extensive use of the code by the educational and technical training centres for instructions in the preparation of architectural and civil engineering drawings.

**Price: Rs. 8·50**

**Indian Standard for Dimensions of Screw Thread Run Outs and Undercuts (IS: 1369—1961)**

The Indian Standards Institution has just published IS: 1369—1961 Dimensions of Screw Thread Run Outs and Undercuts. The Standard covers the dimensions of profile and width of undercuts of external and internal threads of pitches 0.2 to 6 mm having the ISO metric profile. It also deals with the lengths of thread run outs for different lead or throat angles.

In line with the decision of the Government of India to change-over to the metric system of weights and measures, this Institution has decided to adopt the metric screw threads as recommended by Technical Committee, ISO/TC 1 Screw Threads, of the International Organization for Standardization (ISO). A series of Indian Standards relating to screw threads and threaded fasteners is being issued; and this standard is a necessary adjunct to the Indian Standards for threaded fasteners.

**Price: Rs. 2·00**

**Indian Standard for Metric Steel Scales for Engineers (IS: 1481—1961)**

The Indian Standards Institution has just published IS: 1481—1961 Specification for Metric Steel Scales for Engineers, which covers the requirements for metric scales made of steel for the use of engineers.

This standard is primarily meant to cover scales divided into metric units. Non-metric values to which industry has been accustomed are also given, wherever necessary, for the sake of smooth change-over by December 1966.

**Price: Rs. 2·50**

**Indian Standard for 4 Metre Levelling Staff, Folding Type (IS: 1779—1961)**

The Indian Standards Institution has just published IS: 1779—1961 Specification for 4-Metre Levelling Staff, Folding Type. This Standard covers the requirements of the folding type of levelling staff, 4-metre in length, used in territory levelling to provide height control for topographical of engineering surveys.

**Price: Rs. 1·50**

**Indian Standard for Drums large Fixed Ends (IS: 1783—1961)**

The Indian Standards Institution has just published Indian Standard Specification for Drums, Large Fixed Ends (IS: 1783—1961), which covers the requirements regarding types, capacity, dimensions, material, manufacture, finish and tests for light duty mild steel 200-litre drums, large, with plain and dished fixed ends.

**Price: Rs. 1·50**

**Indian Standard for Mild Steel Wire for Manufacture of Wood Screws (IS: 1812—1961)**

With a view to assisting the manufacturers to supply mild steel wire of suitable quality for the manufacture of wood screws, the Indian Standards Institution has just published Indian Standards Specification for Mild Steel Wire for Manufacture of Wood Screws (IS: 1812—1961).

This Standard covers the requirements for cold drawn mild steel wire upto 12.5 mm diameter suitable for the manufacture of wood screws by the cold heading process.

**Price: Rs. 1.50**

**Indian Standard for Dimension for Clearance Holes for Metric Bolts (IS: 1821—1961)**

The Indian Standards Institution has just published IS: 1821—1961 Dimensions for Clearance Holes for Metric Bolts, which gives the dimensions of clearance holes for metric bolts from 1.6 up to 39 mm diameter.

In keeping with the policy of the Institution to collaborate actively with the work at the International level, this standard is based upon the relevant Draft Recommendation of the International Organization for Standardization.

**Price: Rs. 1·50**

**Indian Standard for Writing and Printing Papers (IS: 1848—1961)**

The Indian Standards Institution has just published IS : 1848—1961 Specification for Writing and Printing Papers, which prescribes the requirements for the commonly used types of writing and printing papers.

It is necessary that the industry should supply paper of suitable quality, the consumption of which for writing and printing purposes is rising rapidly under the impact of the industrial and other developments. This specification is, therefore, intended to help the consumers and the manufacturers in achieving this objective.

**Price: Rs. 1·00**

# *Licensed Manufacturers, Dealers and Repairers of Weights and Measures (17)*

*Metric Measures* has been publishing a series of lists of manufactuers, 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 seventeenth 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 the *Metric Measure* as this work progresses.

The number in brackets against the name of the State or Union Territory indicates the particular instalment number of the State or the 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 14 States and 4 Union Territories is 915 manufacturers, 3,154 dealers 727 repairers. The details of published information are as follows:

| Sl. No. | State/Union Territory | Licensees | | |
|---|---|---|---|---|
| | | Manufacturers | Dealers | Repairers |
| 1. | Andhra Pradesh .. | 40 | 84 | 31 |
| 2. | Assam .. .. | 11 | 44 | 16 |
| 3. | Bihar .. .. | 20 | 69 | 34 |
| 4. | *Delhi* .. .. | 22 | 76 | 19 |
| 5. | Gujerat .. .. | 107 | 544 | 132 |
| 6. | *Himachal Pradesh* | | 17 | 1 |
| 7. | Kerala .. . | 18 | 283 | 34 |
| 8. | Madhya Pradesh .. | 99 | 310 | 4 |
| 9. | Madras .. .. | 79 | 210 | 37 |
| 10. | Maharashtra .. | 95 | 163 | 185 |
| 11. | *Manipur* . . | 9 | 85 | 5 |
| 12. | Mysore .. .. | 75 | 399 | 41 |
| 13. | Orissa .. .. | 14 | 17 | 1 |
| 14. | Punjab .. . | 36 | 150 | 26 |
| 15 | Rajasthan . .. | 16 | 69 | 18 |
| 16. | *Tripura* . . | 1 | 9 | 0 |
| 17. | Uttar Pradesh .. | 207 | 515 | 88 |
| 18. | West Bengal . | 65 | 200 | 55 |
| | | **915** | **3,154** | **727** |

## PUNJAB (12)

In the July and September 1959, March, May, July, September and November 1960 and March, May, July, November 1961 issues of *Metric Measures* lists of manufactures, dealers and repairers of Punjab 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 Weights and Measures (Enforcement) Act, 1958.

| Sl. No. | Name and Address of Manufacturer | Details of Articles Manufactured |
|---|---|---|
| (1) | Ludhiana Measuring Tape Co-operative Industrial Society Ltd., Ludhiana. | Measuring tapes 100 ft. |

| Sl. No. | Name and Address of Dealers | Details of Articles Sold |
|---|---|---|
| (1) | Anand Singh Jagdish Rai, Gandhi Chowk, Hissar .. .. | Weights, Measures, Weighing and Measuring Instruments. |
| (2) | Chaman Lal Aggarwal Sangrur .. . . .. | Weights, Measures and Beam Scales. |
| (3) | Udaiya Ram Ram Partap, Lehragaga .. .. | Weights, Measures, Beam Scales and Measuring Instruments. |
| (4) | R. C. Uppal and Sons, Hamirpur (Kangra) . . . | Weights, Measures, Weighing Measuring Instruments. |
| (5) | Jai Ram Bhoop Singh Bhattu Kalam, Teh Fatehbad (Hisssar) | Weights, Measures, Weighing and Measuring Instruments. |

## RAJASTHAN (1)

### Manufacturers

| Serial No. | Name of the Manufacturer | Details of Articles Manufactured |
|---|---|---|
| (1) | M.C. Bhargava, Kucharı Road, Ajmer .. .. .. | Weights, Measures and Weighing Instruments. |
| (2) | Cables Scale Manufacturers and Repairers, Sardarpur, Jodhpur. | Counter Machines. |
| (3) | Chand Iron Foundry, Jaipur Road, Ajmer .. .. | Cast Iron kilogram Weights. |
| (4) | Gopal Industries, Shahpura Mohalla, Bewar .. .. | Cast Iron kilogram Weights. |
| (5) | Hassanali Alliji, Kapasanwale, Police Chokı, Bora wadı, Udaipur. | Capacity Measures. |
| (6) | Krishna Industries, Raghunath Bhawan, Ajmer .. .. | Weights, Measures and Weighing, Instruments. |
| (7) | Mahesh Metal Works, Madanganj, Kishanganj . .. | Capacity Measures. |
| (8) | Modern Scale Manufacturer & Repairers, Near Panna Niwas, Jodhpur. | Counter Machines. |
| (9) | Mundra Metal Works (P) Ltd., Bikaner .. .. .. | Brass and Cast Iron Weights. |
| (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 Trunk Co., Sriji Ki 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) | Swastick Iron and Metal Works, Bhim Gunj Mandı, Kotah .. | Brass & Cast Iron & kilogram Weights. |

## Dealers

| Serial No. | Name and Address of Dealer | Details of Articles Sold |
|---|---|---|
| (1) | Abdul Salam Abdul Rehman, General Merchants, opposite Sriji Ki Mori, Tripolia Bazar, Jaipur. | Weighing and Weighing Instruments. |
| (2) | Ahsan Hussain 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 Chadra (Kota) Rashooljı Mohd Ali, Chabra, Kotah. | Weights and Weighing Instruments. |
| (6) | Arahtmal & Sons, Mirchi Bazar, Jodhpur .. .. .. | Weights, Measures and Weighing Instruments, |
| (7) | Arora Crokery & Metal Co., Station Road, Jodhpur.. .. | Weights. |
| (9) | Badri Narain Om karmal, 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. |
| (14) | Chopra Bros., Tripolia, Jodhpur .. .. .. .. | Weights, Measures and Weighing Instruments. |
| (15) | Faiz Mohd Khan, Chandi Ki Taksal, Jaipur .. .. .. | Weights and Weighing Instrument |
| (16) | Gagandas & Sons, Darga Bazar, Ajmer .. .. .. | Weights and Weighing Insturments. |
| (17) | Gallula Lohiya, Opposite Nawab's Hawali, Triplia 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 Yoosufali, Fatehnagar, Tehsil Mavli, Udaipur | Weights, Measures and Weighing Iustruments |
| (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 Surajpole, Udaipur.. .. | Weights, Measures and Weighing Instruments. |
| (31) | Kalyan Tin Factory, Iron Merchants, Cinema Road, Ajmer .. | Weights, Measures and Weighing Instruments |

| Sl. No. | Name and Address of Dealer | Details of Articles Sold |
|---|---|---|
| (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 Measurers. |
| (35) | Lal Chand Tirathdas Kapoor, Naya Bazar, Ajmer .. .. | Weights, Measures and Weighing Instruments. |
| (36) | Madan Mohan Laxmi Kant, Loha Bazar, Bewar .. .. | Weights, Measures and Weighing Intruments. |
| (37) | Madanlal Laxmilal, Sadar Bazar Vijai Nagar, Ajmer | Weights, Measures and Weighing Instruments. |
| (38) | Mangaldas Wadhumal, Srinagar Road, Ajmer .. | Weights, Measures and Weighing Instruments. |
| (39) | Manpasand, Ghara Kothi Bistiyan Ka Bas, Shahpura, Jodhpur. | Weights, Measures and Weighing Instruments. |
| (40) | Malwa Iron Stores, Naya Bazar, Ajmer . .. . | Weights and Weighing Instruments |
| (41) | Mohd. Ali and Co., Chabra, Kotah . .. . | Weights and Weighing Instruments. |
| (42) | Mohd. Bux and 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) | Naraindas Mangaldas, Ladpura, Kotah . .. .. | Weights, Measures and Weighing Instruments. |
| (46) | Narsingdas Vitthaldas, 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 and Co., K E.M. Road, Bikaner .. | Weights and Weighing Instruments. |
| (51) | Prahladdass Mohanlal, Tripolia Bazar, Jaipur . | Weights |
| (52) | Prathviraj Mathur, Khatriyon Ki Kothi Girdhi Kot, Jodhpur. | Weights and Counter Machines |
| (53) | Prem Sukhdas Ramd Khatri, New Circular Market, Bikaner. | Weights, Measures and Weighing Instruments. |
| (54) | Quadarji Rasiaji, Clock Tower, Udaipur .. . | Weights, Measures and Weighing Instruments. |
| (55) | Rajabali, Daoodji and 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 Duddalal, Rampura Bazar, Kotah .. .. | Weights, Measures and Weighing Instruments. |
| (60) | Sadique Bhai Ahmed Bhai, Tobacco Bazar, Jodhpur.. .. | Weights, Measures and Weighing Instruments. |
| (61) | Sardar Ram Singh Sanghi Building, Naya Pura, Kotah | Weights, Measures and Weighing Instruments. |
| (62) | Shiv Chand Arora and Sons, K.E.M. Road, Bikaner | Weights, Measures and Weighing Instruments. |

| Sl. No. | Name and Address of Dealer | Details of Articles Sold |
|---|---|---|
| (63) | Shiv Ram C/o Sukh Deo Iron and Hardware Syndicate, Govind Rajaji Ka Rasta, Jaipur. | Weights. |
| (64) | Sindh Hard Waie 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) | Vishambar 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. |

| Sl. No. | Name and Address of Repairer | 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) | Cables Scale Manufacturers and Repairers, Sardar Pura, Jodhpur. | Weighing Instruments. |
| (4) | Faiz Mohd. Khan, Chandi Ki Taksal,Jaipur . .. . | Weights 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 Bhawan, 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 Road, Ajmer .. .. . | Weights, Measures and Weighing Instruments. |
| (10) | Modern Scale Manufacturer and Repairers, Near Panna Niwas, Jodhpur. | Weights and Weighing Instruments. |
| (11) | Mohd. Ismail, Loharon Ka Mohalla, Beawar . . | Weights, Measures and Weighing Instruments. |
| (12) | Mundia Metal Works (P) Ltd. Binaker . .. .. | Weights, Measures and Weighing Instruments. |
| (13) | Narain Dass Mangaldass, Ladpura, Kotah .. .. . | Weights, Measures and Weiging and Measuring Instruments. |
| (14) | Narain Dass Mangaldass, Ladpura, Kotah .. . | Weights, Measures and Weighing and Measuring Instruments. |
| (15) | Rajab Ali Ibraheem Ji, Rampura Bazar, Kotah .. .. | Weights, Measures and Weighing Measuring Instruments. |
| (16) | Rajasthan Trunk Co. Sriji Ki Mori, Tripolia Bazar, Jaipur. | Weights, Measures and Weighing and Measuring Instruments. |
| (17) | Safuddin Balbir Ali, Hathipole, Udaipur . .. .. | Weights, Measures and Weighing and Measuring Instruments. |
| (18) | Shankarlal, New Well, Bikaner .. . .. .. | Weights, Measures and Weighing and Measuring Instruments. |

## TRIPURA (5)

In the March and November 1960, and March and July 1961 issues of Metric Measures lists of licensed dealers, manufacturers, and repairers of weights and measures in Tripura Union Territory were published. The following are the names of dealers in addition to the number of dealers licensed for the current year published in July 1961 issue of Metric Measures.

| Sl. No. | Name and address of Dealer |
|---|---|
| (1) | Banerjee & Co, Motor Stand Road & Central Road Junction, Agartala. |
| (2) | Kalyan Stores, 59, Central Road, Agartala. |
| (3) | Radharani Bhandar, 128, Motorstand Road, Agartala. |
| (4) | Tripura Paint and Hardware Store, 58/2, Central Road, Agartala. |

## Uttar Pradesh (8)

The list of Dealers of Uttar Pradesh was published in November 1961 issue of Metric Measures. The following is a further instalment of list of dealers licensed under the Uttar Pradesh weights and Measures Act 1958.

| Sl. No. | Weights and Measures |
|---|---|
| (153) | Allahabad Trading Co., 26, Katra, Allahabad |
| (154) | Agra Weights Agency, 6417/1, Azad Gali Agra. |
| (155) | Imam Ali Sons, Tin Merchants, No. 15, Gautam Budh Marg, Lucknow. |
| (156) | V. N. Industries, Opposite Arya Samaj Mandir, Freeganj Road, Agra. |
| (157) | Kishanlal Jain, Bhoolaganj, Agra |
| (158) | Matadin Bhagwan Dass Oil Mills Ltd., Bans Mandi, Kanpur. |
| (159) | Sita Ram Bhola Nath, Iron Merchants, Muthiganj, Allahabad. |
| (160) | Pyre Lal Agarwal, S/o Ram Swaroop, Kirana Merchants, Chaumukhapul, Moradabad. |
| (161) | Star Engineering Works, Sheo-ka-Bazar, Agra. |
| (162) | Steel Fab. Company, 21, Dalampara, Meerut City. |
| (163) | Sahjogi Borthers, Civil Lines, Banki. |
| (164) | Shiv Charan Lal Gupta, Rawat Para, Agra. |
| (165) | United Industrial Concern, 98, Durga Bari, Meerut Cantt. |
| (166) | Narain Singh Ram Das, Tara Market, Hapur (Meerut). |
| (167) | Premchand Agarwal, 55/67, Raja-ka-Phatak, Kahu—Kothi, Kanpur. |
| (168) | Murari Lal Kalyan Singh, Iron and Hardware Merchants, Kabari Bazar, Meerut City. |
| (169) | Eagle Metal and Electrical Works, Bansal Building, Chhipotola, Agra. |
| (170) | Mahaur and Co., Prop. Misri Lal, Mahaur, Anaj Mandi, Budaun. |
| (171) | S.O. Engg. Works, Mansa Devi, Raja Mandi, Agra. |
| (172) | Hindustan Engg. Industries, Lisani Gate, Meerut. |
| (173) | Hanuman Traders, Shivpur (Near Railway Crossing) Varanasi. |
| (174) | Hari Shankar Agarwal, Hardware Merchants, Pathwari, Agra. |
| (175) | Hirala Radhe Shyam, Bhainsa Bazar, Gorakhpur. |
| (176) | Indian Trade Corporation, 3202, Belanganj, Agra. |
| (177) | Jain and Co, Bharon Bazar, Agra. |
| (178) | Khandelwal Metric Bant Stores, Deoria. |
| (179) | Hari Ram Om Prakash, Iron Merchants, 278 Subhash Ganj, Jhansi. |
| (180) | Kumar Co., 33, Kabari Bazar, Meerut |
| (181) | Prem Chand Agarwal, 55/67 Raja Ka Phatak, Kahu Kothi, Kanpur. |
| (182) | Purshotam Das Agarwal, 2442, Jeoni Mandi, Agra. |
| (183) | Ram Swaroop Shiam Behari Lal, Iron Merchants, Kabari Bazar, Meerut City. |
| (184) | Ram Swaroop Khandelwal, Iron Merchants, Bahadurganj, Shajahanpur. |
| (185) | Amar Nath Agarwal, No 3679, Sultanganj, Agra |
| (186) | Jayshree Industries, Haweli Bahadur *Jhansi.* |
| (187) | Brij Metal Industries Lanyra ki-Chauki, Agra. |
| (188) | Khandelwal Metric Bant Stores, Deoria. |
| (189) | Jhansi Iron and Steel Roling Mills 372, Civil Lines, Jhansi. |
| (190) | Kanodia Brothers Ltd., Matadia Street, Kanpur. |
| (191) | Mool Chand Likhdari, Iron Merchants, Bara Bazar, Jhansi. |

**Weights and Measures**—*Contd.*

(192) Matadin Bhagwan Dass, Shakkar Patti, Kanpur.

(193) Matadin Bhagwan Das Oil Mills Ltd., Banamandi, Kanpur.

(194) Kailash Industries, Pathwari, Belanganj, Agra.

(195) Kishan Swarup Kali Charan, Rawat Para, Agra.

(196) Keshri Narain Jaiswal, 3, Albert Road, Allahabad.

(197) Kanpur Iron Foundries, 104-A/307, Rambagh Kanpur.

(198) Raj Corporation Post Box No. 200, Chowk, Cawnpore.

*IV. Weights and Weighing Instruments*

(199) Bharat Hardware Stores, 2836/4, Pathwari Belanganj, Agra.

(200) Bhagwan Bansal, Hardware Stores, Belanganj, Agra.

(201) Bishambher Lal Ram Lal, Grain Merchants and Commission Merchants, P.O. Naupara, Dist. Bahraich.

(202) Chaman Lal Jain and Sons, Pipal Mandi, Dehra Dun.

(203) Ganesh Iron Foundry, Fieeganj, Agra.

(204) K. R. Kohli and Sons, C. K. 31/8, Gyanwapi, Varanasi-1.

(205) Lucknow Sarafa Association, Chowk, Lucknow.

(206) Prakash Jain, C. K. 21/33, Panchayati Taul, Thatheri Bazar, Varansi.

(207) Panchayat Dharam Kanta, Bazar Sarafa, Meerut City.

(208) Rewati Sharan Rajindra Sharan, Loha Mandi Agra

(209) Prayag Iron Stores, 60, Bahadurganj, Allahabad.

(210) Shiv Sahai Rajendra Prasad Choubey, Ji-ka, Phatak, Kinari Bazar, Agra.

(211) Lucknow Sarafa Association, Chowk Lucknow.

(212) Majadhar Lal Brij Nath, 76/157, Halsey Road, Lohai, Kanpur.

(213) Modi Engineering Works, K-4785, Machadari, Varanasi.

(214) Panchayat Dharam Kanta, Bazar Sarafa, Meerut City.

(215) Pyare Lal Agarwal S/o Ram Swaroop Kirana Merchants, Chadmukhapal, Moradabad.

(216) Shanker Lal Balkishan Das, Timber Merchants, Sardhana Dist. Meerut.

(217) S. K. Iron Foundry, Engineering Co., Ram Bagh, Agra.

*V. Weights and Measuring Instruments*

(1) R. G. Industries Service, 2442, Jeoni Mandi Agra.

(2) Naratham Das and Sons, C. K. 43/14, Chhattia, Tola, Varanasi.

(3) Narayan Das, 16/18, Pandey-Hoonly, Varanasi.

(4) Pratap Chand Bhagwan Das Jain, Lohe-ke-Veopary Loha Mandi, Agra.

(5) Ramesh Chand, Lakshmi Chand, Hardware Merchants, Kabirath Bazar, Agra.

(6) Ram Sanchi Omkar Nath, Bhaunanapura, 87/51, Kalpi Road, Kanpur.

*Weighing Instruments*

(1) Electrical Machines Corporation, The Mall, Post Box No. 120, Kanpur.

(2) Ravi Engineering Co., 81/1, Rajpur Road, Dehra Dun.

*IX. Measuring Instruments*

IX. Daulatram Sukhanandam Lal Jain Belanganj, Agra.

*Weights*

(1) Alloy Founders, Jeoni Mandi, Jamkuna Road, Agra.

(2) Adarsh Metal Works 2814, Bagh Auta, Lohamandi, Agra.

(3) Adarsh Beaopar Singh, Kaiser Ganj, Meerut.

(4) Baburam Sukhdoe Prasad, Iron Merchants, 105/672, Deputy-ka-Parao, *Kanpur*.

(5) Bhanamal Gulzarimal (P) Ltd., Reedganj, Faizabad.

(6) Daulat Ram Nathumal, Keisarganj, Agra.

(7) G. O. Iron Foundry, Bhairon Bazar, Belanganj, Agra.

(8) Moti Ram Bihari Ram, Station Road, Moradabad

(9) Mittal Brass Industries, 4569 Mohalla Rang Raizan, Raja-ki-Mandi, Agra.

(10) Madhu Sudan Iron Foundry, 1125, Dayanand Road, Agra.

(11) Nav Bharat Traders, Shahidganj, Bazar, Saharanpur.

(12) Raj Kumal Industries, 6382, Khati Para, Lohamandi, Agra.

(13) Raj Kumar Iron Foundry, Lashkarpur, P.O Jaganpur, Agra.

(14) Ramesh Chand and Sons, Pathwari, Belanganj, Agra.

(15) Om Prakash Jaiswal, 75, Subji Mandi, Kuldabad Allahabad.

(16) Paramatma Saran Devendra Kumar Bros., Chaumukhapul, Moradabad.

(17) Swatantra Bharat Iron Foundry, Narain Bhawan, Moti Lal Nehru Road, Agra.

(18) India Iron Industries, Langra-ki-Chowki, Agra.

(19) Baburam Sukhdeo Prasad Iron Merchants, 105/672, Deputy-ka-Parao, Kanpur.

(20) Gulab Rai Chhootey Lal Iron Foundry, Pathwari, Belanganj, Agra.

(21) Hindustan Agricultural and Engineering Works, 1075, Baghpat Gate, Meerut.

(22) Mohd. Ismail Trunk Manufacturers, Hazir Bagh Begumganj, 28/211, Kanpur.

(23) Om Iron Foundry, Patharı, Belanganj, Agra.

(24) Om Engineering Works and Manufacturing Co., Chawlawala Bagh, Sulganganj, Agra.

(25) Bagwan Chandra Tandon, Secretary, The Non-Federation Metal Dealers Association, Reg. Moh. Chauraha New Punjab Bank, Moradabad.

(26) Sool and Chand Ram Sawak, Iron Merchants, Bara Bazar, Jhansi.

(27) Standard Chemical Co., (P) Ltd., 113/8, Swarup Nagar, Kanpur.

(28) Supreme Engineering Co., 983, Belanganj, Near, Barapura Agra.

(29) Vibhuti Ram Paras Nath, Cinema Road, Golghar, Gorakhpur.

(30) Bharat Iron Foundry, 1514, Baraf Khana Moti Katra, Agra.

(31) Sun Rise Engineering Works, Yamuna Bridge, Agra.

(32) Vishnu Iron Foundry, 4533/1 Freeganj, Agra.

(33) Lok Nath Bishamber Nath Iron Merchants, 47/91 Hatria Lohai, Kanpur.

(34) Fateh Chand Bhagwan Das, Johari Bazar, Agra.

(35) Ghamandi Rai Ram Kishun Agrawal Iron Merchants, Subhas ganj, Jhansi.

(36) C.S. Industries, No. 2994-A, Naya Bans Loha Mandi, Agra.

(37) Hind Traders, 90, Bahadurganj, Allahabad, G.O. Iron Foundry Bhairaon Bazar, Belanganj, Agra.

(38) K.R. Industries, Ekkawali Gali, Noorigate, Agra.

(39) Indian Iron Chain Manufacturers, 76/492, Collie Bazar, Kanpur.

(40) Jain Iron Works, 5228, City Station Road, Opp. Basant Talkies, Agra.

(41) Gupta & Co , 55/108, Chommahala, Generalganj, Kanpur.

(42) Gopal Das Ram Charan, Bara Bazar, Jhansi.

(43) Goel Foundries 118/229, Kanshalpuri, Kanpur.

(44) Chandra Bhai Prem Chandra, Iron Merchants, Bachhrawan, Rae Bareli.

(45) District Co-operative Federation Workshops Sardhana Road, Kankar Khera, Meerut.

(46) Devi Sahai Gopaldas Iron Foundry Chiptola, Agra.

(47) M.K. Corporation, Padam Kuteer, Freeganj, Agra.

(48) Atul Engineering Works, 1251, Belanganj, Agra.

(49) Agra Mills Stores, 926, Belanganj, Agra.

(50) Basant Lall & Sons, Pathwari Belanganj, Agra.

(51) Chandra Prasad Tara Chand, K. 42/29, Seva Chaurdhary Gali Bhairon Nath, Varansi.

(52) Kanta Prasad Jain, Iron Merchants, Kasarat Bazar, Agra.

(53) Nenoomal Basarmal, Daresi No. 2, Shop No. 22 Agra.

(54) National Industries and Foundry, 488/37, Mirpur Cantonment, (Rail Bazar), Kanpur.

(55) Navin Engineering Works, 2, Tripolia, Hiraganj, Allahabad.

(56) Pioneer Moulding and Engineering Works, 1058, Lane Ganshala, Agra.

(57) Ram Shekhar Kailash Nath, 47/91, Hatia Lohai, Kanpur.

(58) Prakash Hardware Stores, Pathwari Belanganj, Agra.

(59) Randhir Singh Khubchand Iron Foundry, Masta-ki-Bagichi, Agra.

(60) Om Engineering Works and Manufacturing Co., Chowalawala Bagh Sultanganj, Agra.

## VIII. WEIGHTS MEASURES AND MEASURING INSTRUMENTS.

(1) Ganesh Das Ram Gopal & Sons, Halwasia Court, Hazratganj, Lucknow.

(2) Raghumal Nahar Singh, Hardware Merchants, Raja's Road, Dehra Dun.

## GUJARAT (4)

In the March, September and November 1961 issues of Metric Measures, lists of Licensed manufacturers, dealers and repairers of weights and measures in Gujarat State were published. The following is a list of manufacturers, dealers and repairers of weights and measures subsequently licensed under the Bombay Weights and Measures (Enforcement Act, 1958.

| Sl. No. | Name and Address of Manufacturer | Details of articles manufactured |
|---|---|---|
| (1) | Ajit Industries, Bedi Para, Main Road, Rajkot .. .. Kuvao, Ahmedabad. | Conical Litre Measures. |
| (3) | Babubhai N. Mistry, Mahidharpura, Opp. Maniara Sheri, Nershi Mandirs, Chawl, Surat. | Steel yard. |
| (4) | Bagyodaya Scale Repairing Works, K. 3, 1093/66, Piramshah Raja, near Regal Cinema, Ahmedabad. | Non-Flexible metre measures. |
| (5) | Bharat Trading Co., Opp. Indirabhai Park. Outside Vniawad Gate, Bhuj. | Weights. |
| (6) | Gujarat Engineering Works, Behind Police Station, Idar (A.P. Rly), Dist. Sabarkantha. | Do. |
| (7) | Janta Metal Works, Near Vijay Talkies, Dohad . .. | Do. |
| (8) | Jayantilal & Brothers, c/o Prabhudas B. Contractor, Raghunath Pura, Swaminarayan Wadi, Surat. .. .. .. | Do. |
| (9) | Laljibhai Shamji Luhar, Opp. Municipal Corporation Office, City Danapith, Ahmedabad. | Non-flexible Measures. |
| (10) | Makwana Iron Works, Od-wada, Savarkundla . .. | Counter Machines. |
| (11) | National Steel Industries, Near Naherpura, Dohad Road, Godhra. | Weights. |
| (12) | Shah Engineering Works, Canal Road, Rajkot .. .. | Do. |
| (13) | Soni Ramji Ladhabhai & Co., Chokshi Bazar, Junagarh | Flat Cylindrical Bullion Weights and Bullion Sheet Metal Weights. |
| (14) | Vishwakarma Iron Foundry, Baghikhana Station Road, Near Juni Haveli, Rajpipla. | Weights. |

| Sl. No. | Dealers Licensed for weights, Measures, Weighing and Measuring Instruments. |
|---|---|
| (1) | Asha Metal Industries, Prajapatiwadi Vejalpura, Navasari. |
| (2) | Arvind C. Dalal, Manek Mansion, Goharbag, Bilimora, Dist. Surat. |
| (3) | Balubhai Mohanlal Baranpuri Bhagol, Surat. |
| (4) | Shri Bhagwatlal D. Sheth, Ode Bazar, In Marketing Yard Umreth, Dist. Kaira. |
| (5) | Bharat Iron Foundry, 961, Mandvi's Pole, Kansara Pole, Ahmedabad. |
| (6) | Bharat Kanta Bhandar, Juna Bazar, Himatnagar, Dist. Sabarkantha. |
| (7) | Bharat Trading Co., Short Bazar Bhuj. |
| (8) | Chandulal Ratansi Modi, Bazar, Bhabhar, Dist. B K. |
| (9) | Chhotabhai Bhikhabai, Saloon Bazar, Nadiad, Dist. Kaira. |
| (10) | Ghanshyamwala Traders, Tower Rd., Dabhoi, Dist. Baroda. |
| (11) | Ghelabhai Devchand Shah, Baranpuri Bhagol, Surat. |
| (12) | Govindji Trikamji Mehta, Bazar, Keshod. |
| (13) | Gujrat Engineering Works, Near Police Station, Idar, Distt, S.K. |
| (14) | Hiralal Ambalal Amin, Bazar, Street, Chikhli, Dist. Surat. |
| (15) | Hari Stores, Library Road, Chhota Udepur, Dist. Broach. |
| (16) | Hatim Bros., & Co., New Bazar, Talaja. |
| (17) | Hakimji Mangalji Pokhanwals & Sons, Nani Bazar, Talaja. |
| (18) | Ibrahim Badrueldin Jakeen, Rajkot. |
| (19) | Jadavji Gopalji Parekh, Sardar Road, Morvi. |

| Sl. No. | Dealers Licensed for Weights, Measures, Weighing and Measuring Instruments. |
|---|---|
| (20) | Jamulbahi Abulkadar & Co., Nathubhai Road, Bulsar, Dist. Surat. |
| (21) | Jamnadas & Co., Tintol Dist., Sabarkantha. |
| (22) | Jayshree Metal Corporation, Shop No. 16, Monyla Baug, Opp. Natraj Cinema, Bhavnagar, |
| (23) | Jethalal Mulchand Soni, Near Swami-Narayan Mandir, Himatnagar, Dist. S.K. |
| (24) | Jupitar Watch Co., Main Road, Bulsar, Dist. Surat. |
| (25) | K.L Khandhari Industries Kuberngar, Bungalow Area, P.O. Sardarnagar (Ahmedabad). |
| (26) | Kripalam Muljibhai Doshi, Darbargadh Chowk, Upleta. |
| (27) | Khambha Mahal Co-operative Purchase & Sale Union, Khambher. |
| (28) | Kurbanhusein & Co., Saiyedwada on tank Road, Godhra, Distt. P'Mahals. |
| (29) | Maneklal Nathabhai Amanpurwala, Jwahar Bazar, Jambusar, Dist. Broach. |
| (30) | Manilal Umedram Bazar, UNJHA, Dist. Mehsana. |
| (31) | Madhusudan M. Mistry, Jawahar Road, Cambay, Distt. Kaira |
| (32) | Manager, Sabarkantha District Co., Operative Purchase & Sale Union Ltd., Himatnagar, Dist. Sabarkantha. |
| (33) | Maganlal Shivlal Doshi, Mandvi Bazar, Lunavada, Dist. P. Mahala. |
| (34) | Manjibhai Harjibhai Adhia, Hawahar Road, Dhari. |
| (35) | M.C. Mody & Co., Dhan Bazar, Radhanpur Dist. B.K. |
| (36) | Mohanlal & Bros., Nr. Adumber Well, Godhra, Dist. P.Mahals |
| (37) | Mohanlal Chhaganlal Kansara Kansara Bazar, Broach. |
| (38) | Mohanlal Khimjibhai & Sons, Subhas Road, Chalala. |
| (39) | Mukeshchandra Natverlal Kothari, Bazar, Radhanpur, Dist. Banaskantha. |
| (40) | Nandlal Amritlal Shah, Three Fanesh, Padra, Dist. Baroda. |
| (41) | Narshi Ladha Luhar, Sardar Road, Morvi. |
| (42) | Patel & Shah's Co., Station Road, Himatnagar, Dist S.K. |
| (43) | Panchal Engineering Works. Nathubhai Road, Bulsar, Dist. Surat. |
| (44) | Prabhudas Nulji Mahtma Gandhi Road, Dhoraji. |
| (45) | Pragjibhai Lakshmanbhai Mistry, Station Back Road, Rjpipla, Dist. Broach. |
| (46) | Purnima Store, Dabhan Bhagol, Nadiad, Distt. Kaira. |
| (47) | Ramji Ladhabhai Soni, Shroff Bazar, Junagadh. |
| (48) | Shafibhai and Bros., Hanjipura, Himatnagar, Distt. S.K. |
| (49) | Somalal Nagardas Modi, Dana Bazar, Dhandhuka, Distt Ahmedabad. |
| (50) | Taherali Haji Badudin Vohra, Bazar, Road, Balashinor, Dist. Kaira. |
| (51) | Tribhovandas Chakubhai, Near Tower, Amreli. |
| (52) | Vipinchandra Chandulal Shah, Opp. Tower, Waghodia, Dist. Baroda. |

**Repairers licensed for Weights, Measures, Weighing and Measuring Instruments.**

| Sl. No. | Name and address of the repairers |
|---|---|
| (1) | Bhegwan Ragha Mistry, Nava Para, Ghogha Road, Bhavnagar. |
| (2) | Bachubhai Thakkershi Soni, Post Mota, Devalia Bald Pipalia. |
| (3) | Bhikhabhai Fulchand Luhar, Kot Barna, Jambusar, Distt. Broach. |
| (4) | Chokshi Brothers, Mandi Bazar, Sidhpur, Distt. Mehsana. |
| (5) | Lahar Lalji Jettabhai, Shakti Road, Dhranggadhra. |
| (6) | Narottamdas G. Padia, (Murshall Scale Industries) Manibhai Road, Savarkundla. |
| (7) | Naranji Parshottam Chothani, Gokuldas Tejpal Road, Mandvi. |
| (8) | T.C. Panchal, Shop No. 12, Madansingh, Chowla, Adipur (Kutch). |
| (9) | Pragajibhai Lakshmanbhai Mistry, Station Road, Rajpipla, Distt. Brough. |
| (10) | Premji Velji, near Jubeli Hospital, Sarpat Naka, Bhuj. |
| (11) | Ravji Jivraj Makwana, C/o Purshottam Kala. Hathi Tanki, Probandar. |

## MAHARASHTRA (3)

In the November 1960 and January 1961 issues of '*Metric Measures*' lists of licensed manufacturers, dealers and repairers of weights and measures were published. The following is a further list of Manufacturers and repairers since licensed under the Bombay Weights and Measures (Enforcement), Act, 1958.

### Manufacturers

| Sl. No. | Name and Address of Manufacturer | Details of Articles manufactured |
|---|---|---|
| (1) | V. S. Amberkar & Sons, 2-23, Mohamadi Market, Dr. Babasaheb Ambedkar Road, Lalbaug, Bombay-12. | Linear Wooden Measures |
| (2) | Associated Commercial Mfg. Enterprises (Pvt) Ltd. Janmabhoomi Chambers, 29, Fort Street, P.B No. 1895, Bombay-1. | Measuring Instruments (hand operated petrol pumps). |
| (3) | Bansilal & Co., Main Road, Nasik City .. .. .. | Beam Scales of Class 'B', 'C' & 'D'. |
| (4) | P. S. Banarse Industries (India) Pvt. Ltd., Badnera Road, Amravati. | Weights |
| (5) | Bharat Scale Co., 200, Janjikar Street, Bombay-3. . .. | Beam Scales of Class 'B', 'C' and 'D' and Counter Machines. |
| (6) | L.M. Chudhary, 123, Gold Finch Peth, Sholapur . .. | Weights. |
| (7) | Chawra Engineering Works, Balaghat Road, Gondia (S.E. Rly). | Cast Iron Weights |
| (8) | Ebrahim Mulla Abdultayeb, 69, Sarang Street, Bombay-3. | Beam Scales of Class 'B', 'C' & 'D' & Counter Machines. |
| (9) | Esaji Gulamhusain, 203, Janjikar Street, Bombay-3 .. | Beam Scales of Class 'B', 'C' & 'D' & Counter Machines. |
| (10) | Fidali Gulamali, 163, Janjikar Street, Bombay-3 . .. | Beam Scales of Class 'B', 'C' & 'D' & Counter Machines. |
| (11) | Hakamchand Ishwardas, 167, Gurwar Peth, Poona-2. .. | Litre Measures. |
| (12) | Hindustan Scale Co., 186-88, Janjikar Street, Bombay-3 .. | Beam Scales of Class 'B', 'C' & 'D'. |
| (13) | A.A. Kantawala, 194, Janjikar Street, Bombay-3 . . | Beam Scales of Class 'B', 'C' & 'D' & Counter Machines. |
| (14) | Khandelwal Udyog, Khandelwal Bhawan, 166, Dr. Dadabhai Naoroji Road, Fort, Bombay-1. | Cast Iron Weights |
| (15) | N. J. Mehta & Co 10, Keshabji Road, Old Church Bunder Road, Laxmi Niwas, Bombay-9. | Beam Scales of Class 'C' & 'D.' |
| (16) | Misrilal Motilal, 71, Sarang Street, Bombay-3 .. . | Beam Scales of Class 'B', 'C' & 'D', & Counter Machines. |
| (17) | Mistry Ramji Devji Katewala, Tajnapeth, Akola .. .. | Beam Scales. |
| (18) | Mulji Lakhmidas & Co., 193, Janjikar Street, Cutlery Bazar, Bombay-3. | Beam Scales of Class 'B', 'C' & 'D' & Counter Machines. |
| (19) | A.M. Master & Co., 179/81, Janjikar Street, Bombay .. | Beam Scales of Class 'B', 'C' & 'D' & Counter Machines. |
| (20) | National Scale Traders, 199, Janjikar Street, Bombay-3. | Beam Scales of Class 'B', 'C' & 'D' & Counter Machines. |
| (21) | New Honesty Engg. Works, Pelodia Manzil, Dimtimkar Road, New Nagpada, Bombay-8. | Counter Machines. |
| (22) | Parvat Revji Mistry, Malegaon Motor Stand, Panchavati, Nasik. | Beam Scales |
| (23) | Patel Industries, Maasrul Tek, Old Tambat Lane, Nasik .. | Weights |
| (24) | Rajkamal Scale Co., 154, Janjikar Street, Nimakwala Bldg. Bombay-3. | Beam Scales of Class 'B' 'C' & 'D' & Counter Machines & Linear Measures. |

## Manufacturers *(Contd.)*

| Sl. No. | Name and Address of Manufacturer | Details of Articles manufactured |
|---|---|---|
| (25) | Rajkamal Iron & Metal Works, Gandhinagar Road, Kopergaon, Tal. Kopergaon, Dist. Ahmednagar. | Cast Iron Weights. |
| (26) | V. D. Rojani, 142, Upper Duncan Road, Bombay-8 .. | Weights. |
| (27) | Ravindra Works, Gandhi School Road, C. No. 2, New Shukrawari, Nagpur. | Cast Iron Weights |
| (28) | Sarda Iron Industries, Opp: Nav Bharat Press, Ghat Road, Nagpur-2. | Cast Iron Weights |
| (29) | Snehal Trading Corporation, 49, Khaka Bazar, Bombay-3 .. | Beam Scales of Class 'B', 'C' & 'D' & Counter Machines. |
| (30) | Tahira Industries (India) Private Ltd , 19/21, Manohardas Street, Bombay-1. | Measuring Instruments (Petrol Pumps) |
| (31) | Victory Industries, 215-A, Ripon Road, Bombay-8 | Conical Litre Measures. |
| (32) | Wafadar Metal Industries, 446-E, Shahupuri, Kolhapur .. | Cast Iron Weights. |
| (33) | G.B. Wagh & Co., Laxmi Bhuwan, 547, Delisle Road, Bombay-11. | Counter Machines. |
| (34) | Yande Iron Works, 268, Sadashiv Peth, Poona-2 . | Cast Iron Weights. |
| (35) | Zenith Textile Engineering Co., 250, Ripon Road, Bombay-8. | Weights. |

## Repairers

| Serial No. | Name and address of Repairers in Weights, Measures and Weighing Instruments |
|---|---|
| (1) | Abdul Beg Imangog Mirza, Repairer of Weights & Measures, Hanuman Wadi, Chalisgaon, Distt. E.K. |
| (2) | Abdul Rehoman Chikte, Ahmed House, 25, Mastan Tank Road, Shop No. 3, New Nagpada, Bombay-8.. |
| (3) | Abdul Rehman Vajeerkhan, OPP. Vyapari Mashid, House No. 7101-A, Ahmednagar. |
| (4) | Asha Iron Beam Scale Repairing Workshop, House No. 13/3550, Sakri Road, Dhulia (Distt. E.K.) |
| (5) | Asia Engineering Corporation, 13-A, Bruce Street, Fort, Bombay. |
| (6) | Amrat Shankar Rao, Repairer of Weights & Measures, Parli Vaijnath, Distt. Bhir. |
| (7) | Avery Co. of India (P) Ltd , 16, Dougall Road, Ballard Estate, Bombay-1. |
| (8) | Balance The Correct Concern, Shop No. 1, Bharat Bldg., Sambhaji Chowk, New Mill Ward, Kurla, Bombay-79. |
| (9) | B. Bajaj Workshop, 492, Ulhesnagar-2. |
| (10) | P. K. Bajmar, Niphad, Distt. Nasik |
| (11) | Bhikoba Dagdoba Jagtap, 842, Shurkwar Peth, Poona-2. |
| (12) | Bhujangnath Rao, Repairer of Weights & Measures, Chowk, Nanded. |
| (13) | Bombay Scale Repairing Works, 186, Kanchawala Mansion, Kazi Syed Street, Bombay-3. |
| (14) | S. D. Chaudhari Repairing Workshop, Hanuman Wadi Moghe Building, Chalisgaon, Distt. E.K. |
| (15) | D. M. Chaudhari, Repairer of Sarje pura, Ahmednagar. |
| (16) | L. M. Choudhari Workshop, 799, Shukrawar Peth, Sholapur. |
| (17) | D. E. Cycle Mart & Mechanical Repairers Shop, Khamdara Shivpur (W.K.). |
| (18) | Deccan Scale Repairing Works, Hanuman Wadi, Chalisgaon, E.K. |
| (19) | Deccan Industrial Corporation, Station Road, Parbhani. |
| (20) | B. S. Devagherkar at Gimavana Tal Dapoli; Distt. Ratnagiri. |
| (21) | Deccan Scale Repairing Works, Chalisgaon, Distt. Jalgaon. |
| (22) | D'Mello & Co., Kasamali Khatri Chawl, Gokildas Pasta Road, Bambay-14. |
| (23) | Ebrahim Mulla Abdul Tayeb, 69, Sarang Street, Bombay-3. |
| (24) | Ganesh & Co., 24 1st Pathan Street, Bombay-4. |
| (25) | B. L. Godva, H. No. 1203, Ward No. 6, Chiphra Distt. Ratnagiri. |
| (26) | G. N. Godwe & N. K. Shinde, Phadkewadi, Mahatma Gandhi Road, Ratnagiri. |
| (27) | B. J. Gudgekar, Kutchhi Mohulla, Panvel, Distt. Kolaba. |

## Repairers (*Contd.*)

(28) B. R. Herman & Mohatta (India) Prvt. Ltd., Mustfa Building, Sir P.M. Road, Bombay.

(29) Herman & Mohatta (P) India Ltd., Peoples Bldg., Sir P.M. Road, Bombay-1.

(30) Indo Aryan Traders, 71, Pipe Road, Kurla, Bombay-70.

(31) Ideal Cottage Industries, Dharmwala Chawl, Joshi Bhuwan, Property Bazar Ward, Kurla, Bombay-70.

(32) C. Jiwani, Amtoobai Clocks, Ghod Bunder Road, Opp. Bus Stop Near Petrol Pump, Bandra, Bombay.

(33) Jai Hind Workshop, 3891, Lakshmi Road, Barshi.

(34) Jalna Industries (P) Ltd., Station Road, Jalna, Distt. Aurangabad.

(35) D. N. Jathar & Co., Gamdavi Road, Sultan Buldg., Near Telephone Exchange, Office Navpada Thana.

(36) Jawahar Workshop, Bakri Bazar, Near Dwarkhadhish Temple, Nandurbar, Distt. Dhulia.

(37) S. H. Kadri & Sons, 36, New Kazi St., 1st Floor, Bombay-3.

(38) J. D. Kambala & Co., Sada Bazar Janna, Distt. Poona.

(39) V. J. Kambale, C/o. V. V. Shamde, Watch Maker, Maliwad Sangamner, Distt. Ahmednagar.

(40) Kardak & Co., 138, Vincent Road, Dadar, Bombay-14.

(41) A. M. Kantawala, 112, Pakwodia Street, Bombay-3.

(42) G. A. Kantawala, Masarain Mansion, Shop No. 42, Hall Road, Kurla, Bombay-70.

(43) G. A. Kantawala, 204, Khotwadi Main Road, Bombay.

(44) S. H. Kantawala, 203, A-Bazar Ward, Kurla, Bombay-70.

(45) H. R. Khan (Chopdekar), Repairing Workshop, Karvand Road, Shirpur (Distt. W. Khandesh).

(46) Khanbhai Hiplullabhai Amreliwala, Subhash Chowk, Jalgaon (E.K. Distt.).

(47) Kiran Traders, 10/25, Paringe House, Kaser Ali, Kalyan.

(48) B. B. Korde, 36, Pantas Got, Satara City.

(49) Larsen & Toubro Ltd., I.C. House, Dougall Road, Ballard Estate, P.B. No. 278, Bombay.

(50) Madhavrao Ramji Wankhede, Blacksmith Shop, Khamgaon, Distt. Buldhana.

(51) A.M. Marer, 2153 'C' Somwar Peth, Kolhapur.

(52) Maruti Balram Parwar, Nangaon Jali Tal, Sangamner, Distt. Ahmednagar.

(53) Mercantile and Industrial Development Co. Pvt. Ltd., National House 6, Tulloch Road, Appollo Bunder, Bombay-1.

(54) Misrilal Motilal, Chowk, Aurangabad.

(55) Misrilal Motilal, 256, Ganpati Peth, Sangli.

(56) Mohan Ranchod Lohar, Station Road, No. 9, Pandharpur.

(57) F. T. Oliya Kantalawala, 12, Khetwadi Zaveri Bldg., Bombay-4.

(58) B. T. Patil & Co., 75 Raviwar Peth, Karad.

(59) B. M. Patil, Bazar Peth, Roha, Distt. Kolaba.

(60) E. B. Patil, Scales Repairing Workshop, Near Weakly Bazar, Jillah Peth, Galgaon, Distt. E.K.

(61) Pitru Chaya Mechanical Workshop, Main Road, Akkalkot.

(62) R. K. Phatate, 260, W-Mangalwar Peth, Sholapur.

(63) Pratapmal Sampatlal, Prop: Vijay Repairing, Loha Bazar, Jalna.

(64) Rahamatulla, M. Naziral Chowk, Aurangabad.

(65) Ramesh & Co., 514, New Mill Road, Kurla, Opp. New Model Talkies, Kurla, Bombay-70.

(66) V. R. Ramool, Husein Bhai, Davji Chawl, Navali Road, Palghar, Distt. Thana.

(67) G. N. Randive, 36, Panta's Got, Satara City.

(68) G. H. Samel & Co., 162, Hill Road, Bandra, Bombay-20.

(69) P. K. Saikh, 5, Malhar Peth, Satara City.

(70) Shanker Vallabh Lohar Block No. 10, Old Bakri Bazar, Nandurbar, Distt. Dhulia.

(71) V. V. Sonar, Malliwada Carvande Galli, Ahmednagar.

(72) Suresh Bros., Halay Pool Road, Makadwala Chawl, Javel, Ramas' Hall Ward, Kurla, Bombay-70.

(73) G. S. Sutar, Repairers of Weights & Measures, Near Punjab National Bank, Station Road, Jalgaon, Distt. E.K.

(74) Subhash Workshop, 3891, Lakshmi Road, Londhe Building.

(75) Y. D. Shinde, 276, Shukrawar Peth, Phaltan, Distt. N. Satara.

(76) Shripati Maruti Ghonte, Near Tanpure Math, Pondharpur.

(77) Vijaya Repairing Works, Gufur Dam Chowk, Kalyan.

(78) Vikas Co., C/o T. D. Waghulkar, 747/48, Shukrawar Peth, Poona-2.

(79) Yevankar Iron Factory, 3298, Bhand Galli, Barshi.

## MANIPUR (2)

In the November 1961 issue of *Metric Measures* a list of manufacturers, dealers and repairers of weights and measures in Manipur State was published. The following is a list of licensees further licensed by the Manipur Administration.

### Manufacturers

| Sl. No. | Name and Address of Manufacturer | Details of Articles Manufactured |
|---|---|---|
| (1) | Associated Industrial Co-operative, 1278, Bheron Belangank, Agra. | Weights, Measures, Weighing and Measuring Instruments. |
| (2) | Girish-Chandra Ghosh, 58, Clive Street, Calcutta-7 | Weights, Measures, Weighing and Measuring Instruments. |
| (3) | Hannuman Industries Fancy Bazar, Gauhati . . | Weights, Measures, Weighing and Measuring Instruments. |
| (4) | R. B. Industries, Fancy Bazar, Gauhati (Assam) .. | Weights, Measures, Weighing and Measuring Instruments. |

### Repairers

| Sl. No. | Name and Address of Repairer | Details of Articles repaired |
|---|---|---|
| (1) | Hannuman Industries Fancy Bazar, Gauhati .. . | Weights, Measures, Weighing and Measuring Instruments. |
| (2) | R. B. Industries, Fancy Bazar, Gauhati . . . | Weights, Measures, Weighing and Measuring Instruments. |
| (3) | Lakhodia Road, Gauhati .. | Weights, Measures, Weighing and Measuring Instruments. |

# WHY TAKE CHANCES ?


In what you do every day, you are taking many chances. For example, take the things that you buy in the market. Are you always sure of their quality? Do you get good value for the money you spend?

And yet, you *can be sure* if you know that the goods you buy have been made to a given standard. Standardization benefits not only you, the consumer, but also the producer, the distributor and indeed, the country as a whole.

The Indian Standards Institution has prescribed standards for industrial as well as consumer goods. To manufacturers producing to relevant standards, ISI grants licences to apply on their goods its certification mark which is the guarantee of quality. The next time you buy anything, don't take a chance; look for the ISI mark.

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