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metric measures

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metric measures

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Development of Weights in Madras Area : Part 2

L. RAJU

Ministry of Commerce and Industry,
New Delhi

IN the first Part of this article* the general historical background against which the variety of the more important South Indian units of weights could be discussed was briefly presented. In this Part the discussion can now be taken up.

In South India, as in the North, commercial weights were often based on multiples of local coins such as the pagoda, hun or the silver rupee coins issued by various authorities. The weight of the gold, silver and copper coins in turn was related to the gunja or ratti, which does not have a constant weight. The British tried to standardise the weights and the efforts of the Madras Government and the municipalities to assign exact values in terms of British units or rupees to the weights added to the confusion. It may, therefore, be interesting to trace the broad changes in the weights and the causes of variation of some of the principal weights. The very brief analysis taken up here may appear somewhat cursory because of the lack of full data and inadequate knowledge of local customs, traditions, prejudices, trade practices and the like.

The Madras Weights and Measures Act, 1948 (Madras Act No. XXII of 1948), which was not fully enforced, lists among others,

the following typical weights. In later discussions this table as also another given later on, would be frequently referred to. Approximate metric values are indicated in brackets against each unit.

1 tola	= 180 grains	troy
	(11.6638 g)	
3 tola	= 1 palam	(34.99 g)
8 palam (24 tola)	= 1 Madras seer	(279.93 g)
5 Madras seer (120 tola)	= 1 viss	(1.40 kg)
8 viss (960 tola)	= 1 Madras maund	(11.20 kg)
20 maund (19,200 tola)	= 20 Madras maunds or	
	1 kandy	(223.94 kg)
	carat	= 1/120 of a tola (97.2 mg)

Krishnala

The krishnala or raktika may be taken as the starting point.

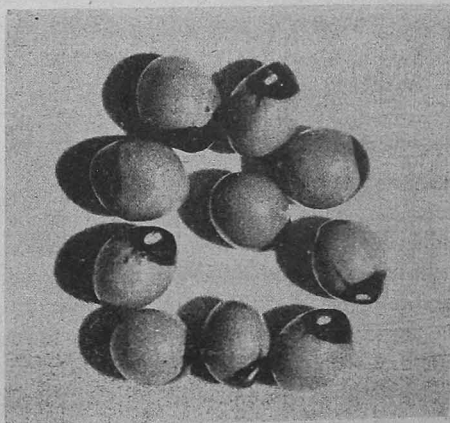


Fig. 1—The Gunja seeds. The seed is red with a spot of black. This is the basic weight for the ancient series of weights.

*See *Metric Measures*, January 1962, pp 11-16.

As shown earlier, the krishnala or gunja is the basic weight on which higher units of commercial weights were based. Its actual weight has been known to vary and many values have been obtained varying between 1.2 grains (65-130 milligrams)⁽¹⁰⁾. One of the values accepted for long was $1\frac{5}{16}$ grains (85 mg)^(3,7). Values obtained by others vary e.g. 1.75 grains (113 mg)⁽¹¹⁾, 1.8 grains (117 mg)⁽¹²⁾ while on the basis of the standard tola (180 grains) divided into 96 rattis, the value is 1.875 grains (121.5 mg).

Recently, Shri H. L. Mehandru, Controller of Weights and Measures, Delhi, carried out a few preliminary experiments on the weight of the ratti seeds available in the Delhi area and found that the value varied between 115.5 mg to 129 mg, the arithmetic mean being 124 mg (1.93 grains). This value may be taken as the unit value for the present analysis in view of the paucity of other reliable data. The weights prescribed by Manu and Kautilya and given in Part-1 are evaluated on this basis.

The two ancient authorities do not agree among themselves about the weight of the silver masha. According to Manu, the silver masha is 2 krishnala or 36 white mustard seeds but according to Kautilya it is 88 white mustard seeds. Both, however, agree that the weight of the pala is 320 krishnala.

Tola and Pagoda

The tola as a unit of weight does not seem to have been known in ancient India⁽¹¹⁾. It appears very late in the development of weights in India and may have been related with the weight of the silver coin, the rupee, minted particularly by the Muslim rulers of the North. The name of Sher Shah (1540-1545) is often mentioned in connection with the tola⁽⁸⁾ whose influence could have percolated to the South. The tola does not, however, correspond with the dharana

which weighs about 9.7 grams if Kautilya's table is considered and some 4 grams if Manu's table is taken as basis. Coins of weight 3.5-4 grams (54 to 60 grains) have been in use from ancient times in North India as well as South India. Suffice to say that the tola as a unit of weight came into use very late in the history of India and silver coins employed in 16th-19th century and later, used to weigh between 175 to 200 grains. Perhaps this variation was due to the basic weight of the ratti being taken differently by different kings and rulers.

The British tried to standardise the tola and around 1811 the Madras mint fixed its value at 180 grains which subsequently became the all-India Standard tola⁽⁹⁾. This standardisation, however, may have affected the actual mass of higher units of weights based as they were on the weight of a certain number of local silver coins. The silver rupee may have formed the basis perhaps on account of its easier availability in commercial transactions than the gold coins and because copper coins lost their accuracy due to constant circulation and could not be used as standards. The tendency to relate weights with silver coins may have arisen because of these considerations.

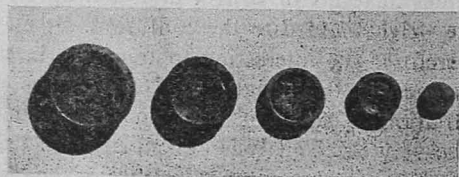


Fig. 2—A Series of tola weights. The 1 tola piece weighs 11.66 grams.

In South India, however, the bullion trade used a special weight which was called the pagoda and which apparently had the same weight as the gold hun. The British standardised it (in 1950) at 54.79 grains (3.550 g)⁽¹³⁾. This figure is somewhat different from

the actual weights of other pagodas or huns of old. Perhaps the value is 54.69 grams which would make it 1/8 ounce avoirdupois *i.e.* 2 drams. As is obvious this weight is at variance with the older value of pagoda. The star pagoda weighed 52.56 grains (3.406 g). Other huns like Anandrai (52.46 grains), Bangalore (52.87 grains), Dharwar (50.52 grains), Durgi (51.55 grains), Ikkeri old and new (52.40 grains and 52.50 grains), Madras (45.83 grains), Travancore (51.00 grains) were also known. Thus the pagoda was standardised so as to give a rational value in terms of British units, irrespective of the basic considerations. Here is one source of diversity.

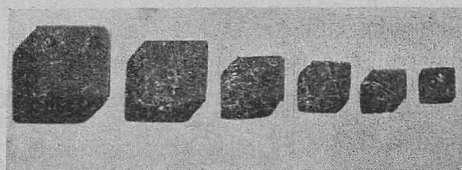


Fig. 3—A set of pagoda weights used in the bullion trade. This particular pagoda weighs 3.84 grams as against the standard weight of 3.55 grains. The two pagoda weight, however, weighs 7.08 grams.

At this stage the following table of weights, compiled on the basis of weights mentioned in the various volumes of the Madras District Gazetteers⁽¹⁴⁾, may be of interest, particularly with reference to other units to be discussed later. Most of the units given below were still now in use the Madras area:

4 paddy grains	= 1 kundu seed (<i>Abrus precatorius</i>)
4 kundu	= 1 panavedai (panam weight)
8 panavedai	= 1 varahanedai (pagoda weight) = 54.79 grains.....I
10 varahanedai	= 1 palam
8 palam	= 1 seer
5 seer	= 1 viss
8 viss	= 1 maund
20 maund	= 1 candy

Also the following:

800 tolas	= 1 tulam
70 kundu	= 1 sovereign 123.27447 grains ...II
102 kundu	= 1 tola of 180 grains or 3 1/2 pagodas...III



Fig. 4—The panavedai or manjadi is a red seed. This particular seed shown here weighs 0.304 grams.

From the above tables, the values of kundu *i.e.* ratti from equations I, II and III work out to be 1.71 grains (111 mg), 1.761 grains (114 mg), and 1.765 grains (114.5 mg), respectively as against the standard value of 1.875 grains (121.5 mg). The value of the pagoda also works out to 51.43 grains on the basis of the 180 grain tola (*see* equation III). Thus the attempt to standardise the pagoda (*i.e.* hun, varaha etc.), the sovereign and other coins in terms of both Indian and British weights led to a number of values for the kundu or ratti, the basic unit. It is no wonder then that many types of weights were used in trade. A few examples may suffice to illustrate the point. The ratti is taken as 124 mg and the tola as 11.664 grams *i.e.* 180 grains for evaluating the various units.

Gold was usually weighed in pagodas, the standard pagoda weighing 54.79 grains (3.550 grams). In some places a large seed was used which was 1/16 of a pagoda or 2 rattis (248 mg). The fanam was also used as a weight for gold and was equivalent to 1/9 pagoda (3 5/9 rattis or 441 mg) in North Arcot, Coimbatore, Nilgiris, Malabar and in parts of Coimbatore district but 1/10 pagoda (3.2 rattis or 397 mg) in Tanjore. In Trichanapalli the fanam was 1/32 tola *i.e.* (3 rattis or 372 mg). The weight of Varaha *i.e.* pagoda differs from district to district.

In Cuddappah it is $7/24$ tola (52.50 grains or 3.402 g) in Coimbatore it is $18/61$ tola (53.1 grains or 3.44 g). Scents and medicines of indigenous manufacture were also weighed with weights used for gold ⁽¹⁵⁾.

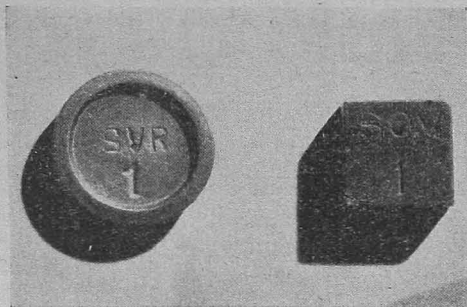


Fig. 5—Two sovereign weights. These are also used in the bullion trade. The square piece weighs 8.02 grams and the round one 7.91 grams.

Diamonds and rubies were weighed by carats in Bellary, 58 carats being equal to one tola, each carat thus being 3.1 grains (200 mg). A carat of $1/57$ tola (3.16 grains or 204.8 mg) was used in Ramnad district for imitation rubies ⁽¹⁵⁾.

Pearls were valued on real and nominal weights. Real weights were used for purchase and nominal weights for sale. Real weight was the Mangelin (6 grains or 389 mg) which was divided into 16 parts. The nominal weight was equal to $317/1000$ tola (57 grains or 3.70 grams) derived from Mangelin and divided into 64 parts. A masha of $1/12$ tola was used in the Kurnool district.

It should now be clear how the variety has occurred in the smaller denomination weights of the pagoda and the tola which were mostly used for weighing gold, silver and other precious commodities.

Palam

The next important higher unit is the palam. This unit may have been derived from

the weights mentioned by Manu and Kautilya. According to both a pala weighs 320 krishnala or gunja (39.68 grams). The modern palam is 3 tolas (35 grams). Because of the large number of values which have been assigned in the past to the ratti, the palam also has tended to differ in weight. Moreover, if 3 standard tolas make the British defined palam, and each tola is equal to 96 rattis, the palam is 288 krishnala *i.e.* 32 less than the palam defined by Manu. On the basis of a ratti of 124 mg, the weight of 288 rattis would be 35.722 g which agrees closely with the standard of 35 g now accepted. In other words, $3\ 1/3$ standard tolas make a palam of Manu.

If the table given earlier is to be used then 306 kundu (ratti) *i.e.* 37.944 g make a palam. Thus the present standard palam cannot be easily related with the old weights because its very definition has changed in the course of time and particularly by the standardization brought about by the British in terms of their own weights. The result has been that a variety of palams based on traditional values has continued to be used all over South India.

In Malabar, Tinnevely and in certain taluks in Krishna the palam is $3\ 3/8$ tolas (39.36 g) which agrees with the Manu palam; in Malabar the ordinary palam is either $1/4$ lb (116.6 g) or $1/3$ lb avoirdupois (155.517 g) the pound being 40 tolas. These are close to the 3 and 4 palams of Manu. In the 19th century there was in Malabar a palam of 9 Pondicherry rupees, weighing 1624 grains or say 9 tolas (104.9 grams). In some parts of the district a palam was 10, $12\ 1/2$, 14 and 15 tolas. In Tinnevely, the palam is exactly $1/7$ pound avoirdupois (1,000 grains or 64.8 grams).

Seer

The standard Madras seer is 8 palams (24 tolas or 279.931 g). In terms of ancient

weights it would be $320 \times 8 = 2560$ krishnala = 26 $\frac{2}{3}$ tolas *i.e.* 317.14 grams.

The seer was often derived in older times from the weight of a certain number of silver coins *i.e.* rupees, or even pagodas that were current in the respective areas. The weight of the silver coins and pagodas varied from place to place, and also depending upon the period when the coin was originally minted. The variety of seers can now be examined on this basis.

In Cuddapah the seer ordinarily in use was 20 standard tolas (233.3 g) and 5 seers made a viss (*i.e.* 100 tolas). In Kurnool the most common seer was 21 tolas (244.9g) with a viss of 6 seers and a maund of 8 visses. Bellary and ceded districts were using a seer of 21 Mysore rupees (20.621 standard tolas).

The seer of 24.9 tolas was used by Madras butchers. This could perhaps be the seer of 80 Madura pagodas which came to 24.913 standard tolas. The palam used by butchers would then be $3 \frac{9}{80}$ tolas—almost equal to the ancient palam. A seer of 25 tolas was in common use in one taluq of North Arcot and in part of Ramnad, while a seer of 27 tolas for firewood, vegetables, locally manufactured articles, dry fish etc. was used in Krishna district.

Besides these seers, others which contained 22, 22.5, 23.4, 24.4, 27, 32, 36, 71.5, 72, 75, 80, 82.5, 84, 105 tolas were also in use in many areas. Many of these seers may be explained on the basis of the weights of coins or foreign weights.

These variations arise because the number rupees or pagodas that go to make a seer varies. Besides, the weight of the rupee, hun, varaha or pagoda itself varied. The variation in the weight of the hun or pagoda has already been indicated. The silver rupee

and similar coins had also different weights. Thus the old Madras 'rupee' weighed 176.4 grains but the British coin of 1811 weighed 186.701 while the Mysore rupee was equal to 174.28 grains. Added to this were the European and other weights such as the Portuguese mark of 19.675 standard tolas, the Egyptian rottolo of 36.965 standard tolas, the Persian rottel of 39.78 tolas, the English troy pound of 32 tolas and the old Roman libra of 29.077 tolas.

Thus a 24 rupee seer would weigh 23 to 24 tolas depending upon which rupee was used as the basis. The Kachcha seer of Mysore, for example, was equal to 24 Mysore rupees or 24.304 tolas, while the Belgaum seer was 24 Shahpur rupees or 23.091 tolas. The Bellary seer was 21 Mysore rupees or 20.621 tolas. The Calicut seer was equal to 20 Surat rupees or 19.849 tolas, the Quilon seer was the old Dutch pound of 42.535 tolas, the Hyderabad seer was 80 Hyderabad rupees or 77.17 tolas, the Masulipattam seer was 90 Madras pagodas or 27.875 tolas and the Arkat seer was 24 palams or 70.486 tolas, the Srirangapattanam pakka seer was 84 saltani rupees (82.604 tolas (?)). Some of the seers are apparently of North Indian origin *e.g.* 80 tolas, 84 tolas (Jaipuri), the Malva seer of 80 Bhopal rupees (73.892 tolas), or 84 Salimsahi rupees (78.689 tolas), the Banaras seer of 105 tolas (tola being 215 grains), the Farrukhabad seer for spices which consisted of 82 tolas and so on.

Viss

The viss is generally 5 seers (120 standard tolas), but occasionally varies. In Ganjam there are visses of 118 and 180 tolas, in Kurnool, Bellary and Anantapur, the viss is six seers of 21 tolas *i.e.* 126 tolas; there are visses of 125 tolas and $2 \frac{3}{4}$ lb in Vizagapatam (15). These variations can be easily

explained as the viss is based on the seer as the main unit and the variety of seers is immense as shown earlier.

Maund

The customary unit like the maund probably originated in some feature of packing and transport. In the extreme North and North West of India it was associated with a donkey-load known as 'Kharwar'. In Kashmir the donkey load was '3 maunds and 8 seers—Akbari Shahi' which implied the Akbari maund so that in this region the unit was 176 lb, a wayload for a mountain donkey but not inconsistent with the implications of the name.

Babur's 'maund of Hind' was taken as 15 lb while the Akbari maund was supposed to be 55 lb. Jehangir maintained two Indian units, Akbari and Hindustani and four foreign units, those of Iraq, Khurasan, Wilayat and Iran. The equation with which he connected them were contradictory and he used them loosely (¹⁶). It is possible that the term maund may have come down to South India from the North.

In Southern states the maund is generally 8 visses *i.e.* 40 seers (960 standard tolas). Thus again we find a unit based on the seer and so reflects the variations in the seer. Additionally trade practices also introduced their own peculiarities. For example, there are special maunds in use in certain places and they consist of 1 000 tolas (40 seers of 25 tolas each) or 1,008 tolas (48 seers of 21 tolas each) 1024 tolas, 1050 tolas and 22, 24 (Serlingapatam, Madras) 26, 28 lb (Mangalore). It will be extremely difficult to assign a particular basic unit to any of these maunds. The British attempted to standardize the maund unit, making it equivalent to 25 lb irrespective of its actual local value which used to be related with the actual weight of the seer. This has also contributed in no small measure to the variety.

Candy

A candy is normally 20 maunds (*i.e.* 800 seers). The British standardized the Madras maund at 25 lb and the candy automatically became 500 lb, a convenient unit for trade. Even then a variety of candies existed to suit the requirements of various commodities. Thus the candy for onions was 900 lb and oil cakes 1,200 lb in South Arcot, and a candy of groundnut or oil cakes etc. was 480 French pounds (¹⁵) (French pound or livre=489.5 g).

Travancore merchants used a candy of 30 tulams (597 lb) for purchase and a candy of 20 maunds (or 500 lb) for sale (⁷).

Tulam

The tulam was defined as equal to 144 palams or 800 tolas (9.331 kg). The palam would then work out to 5.55 tolas. Earlier it was pointed out that the Tinneveli palam was 1,000 grains=5.55 tolas.

In Madura, however, there was a tulam of 810 tolas; and in Malabar there were tulams of 1,400 and 1,500 tolas and 30 Dutch pounds and 25 lb (1,000 tolas), 32 lb (1,200 tolas), 33 lb (1,333 tolas) and 34 lb (1,360 tolas). In Travancore there was a tulam of 20 lb; in Quilon there was a tulam of 100 palams for cotton (about 16 $\frac{3}{4}$ lb) and a tulam of about 15 $\frac{1}{2}$ lb for spices. Malabar was using a tulam of 40 seers (or about 23 $\frac{1}{4}$ lb) (¹⁵).

Conclusion

This discussion shows some of the causes that may have led to the variety of weights obtaining in South India. There are a large number of other weights which have not been taken into account here. But as they are not commonly used, they have not been considered here. It is now clear that the variety arose through historical reasons but mainly because at every step

a compromise between the old and the new as, for example, between the ratti and the grain or the maund and the pound or the rupee and the seer was attempted. Every such compromise led to a new set of values for units without a change of their names. On applying this reasoning to the present when metric weights are to be enforced shortly all over India, it should be clear that if we have to make the best use of the rational metric system, we must give up any attempt to evaluate it in terms of old weights. If this lesson is learnt, the variety of Indian weights can be done away with early; if not, we shall continue with our chaos in weights.

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I M P O R T A N T T R A D E R S

Have you purchased your metric weights ?

The use of any other weights except metric weights will become illegal from 1 April 1962 all over the country.

Weights are now available for sale. Purchase your requirements of weights well before 1 April 1962 to avoid inconvenience and trouble later on.

French Experts Study Metric Progress in India

M. Francis Viaud, General Engineer and Head of the French Department of Measuring Instruments, and M. Louis Krach, Chief Engineer of Measuring Instruments, France, were deputed by the French Government to visit India in November and December 1961.

The purpose of the visit was to study the conditions under which the metric system was being adopted in India and the enforcement of various types of weighing and measuring instruments likely to be introduced and developed in India. The Experts toured all over the country and met most of the Controllers of Weights and Measures in the States, visited foundries producing weights etc., attended various meetings and had discussions with a number of people representing various interests. They have now submitted their report and made a number of recommendations which are now under the consideration of the Government of India and are likely to come up for discussion in the next Conference of Controllers sometime in the middle of this year.

Change in Definition of Litre

Analysing the provisions of the Standards of Weights and Measures Act, 1956, the experts have suggested that the definition of the litre should be amended and the litre be made equivalent to 1 cubic decimetre. The difference between the litre and the cubic decimetre is so small as to be negligible for most purposes. The maintenance of two definitions, one for the

litre and the other for the cubic metre, lead to incoherence. The French law has already laid down that the litre is just another name of the cubic decimetre.

It is laid down in the Standards of Weights and Measures Rules, 1958, that reference standards of weights and length should be verified every five years by the National Physical Laboratory of India. The experts recommend that the reference standards should be verified once in ten years because these standards were not subject to much wear and tear and retain their accuracy for fairly long periods.

Organizational Aspects

So far as State (Enforcement) Acts are concerned, they feel that the basic law provides for the adoption of the metric system and the establishment of the verification organization in the State under satisfactory conditions.

Studying the role of various bodies, such as the Standing Metric Committee, the Indian Standards Institution, the National Physical Laboratory of India etc., they have recommended that the Standing Metric Committee should set down the principles and follow up the legal and administrative evolution of the law relating to metrology. The specifications laid down by the Indian Standards Institution (ISI) should not be fully adopted in the laws. They should be examined by the Weights and Measures Authorities and adapted to the requirements of the law. This step is necessary because conditions under

FRENCH EXPERTS STUDY METRIC PROGRESS IN INDIA

which the specifications are drafted may be influenced considerably in favour of manufacturers and not consumers. They should also recommend representation for the Controllers of Weights and Measures in the ISI Sectional Committees concerned with various aspects of weights and measures. On the Commercial Weights and Measures Sectional Committee at least half the members should be representatives of the Weights and Measures Department.

State Enforcement Act

After examining some of the State (Enforcement) Acts and Rules, the experts recommend that there should be uniformity throughout the country regarding the specifications and methods of verification of weights, measures, weighing and measuring instruments. They also felt that the sole use of the old units should be avoided in all fields, more particularly, in public administration.

Another recommendation is that in some States, manufacturers are required to seek prior approval of the Weights and Measures Authorities of the design of weights, measures and weighing and measuring instruments they intend to manufacture. There was no such control in other States. Such control is necessary and must be exercised on manufacturers throughout the country. Every manufacturer should submit designs to the Weights and Measures Authority in advance for approval. On approval,

a few specimens should be manufactured. Scale manufacture should be allowed only after the specimen has been thoroughly examined and found satisfactory. To achieve this aim, a permanent organization should be set up under the Standing Metric Committee, to examine and approve designs of samples. This body should be advised by a Committee in which Controllers as well as the Indian Standards Institution were represented. Technicians of this organization should keep in close touch with the State (Enforcement) Organizations to ensure uniformity in the procedure for verification and inspection. Where material differences arise, they should be brought to the notice of the Advisory Committee or the Controllers' Conference.

So far as the manufacture of weights is concerned, they have recommended that as in France, cast iron weights should remain as cast, their surface should be smooth and even, so as to avoid the use of any paint or machining. Such a provision would prevent any filing or painting of the weights and it would be easier to detect defective weights.

Inspector's Equipment

For verification of commercial weights of 5 kg and above, steelyards may be used. Equal armed beam scales may be used for smaller weights. The following types of steelyards and beams were recommended:

TABLE I—PERIODICAL VERIFICATION EQUIPMENT (PORTABLE)

Sl. No.	Type	Max. Range kg.	Denominations of weights for which this type will be used	Sensitivity mg per division	Accuracy mg
(1)	Steelyard	50	50 kg (normal) 20 kg (exceptional)	2,000	2,000
(2)	Steelyard	20	20 kg & 10 kg (normal) 5 kg (exceptional)	500	500
(3)	Equal armed beams	5	5 kg to 500 g (normal) 200 g (exceptional)	50	50
(4)	Equal armed beams, Assay Balance Type	0.2	200 g to 1 g	1	1

Verification of bullion weights should be done in the laboratory against secondary standard weights using secondary standard balances.



Figure - 1 : Two French Experts M. Francis Viaud and M. Louis Krach visited India recently. They visited the various States and Union Territories. They also visited M/s. Saple's Scale Manufacturing Company (Private) Ltd., Bombay. In the above picture are seen from left to right M. Viaud, M. Krach and Sarvashri Bhutani, Dhurandhar, Saple Junior and Pednekar.

On examining the specification for dispensing measures, they have pointed out that plastic materials may not have the same coefficient of expansion in all cases and this might lead to errors larger than the permissible errors.

So far as the working standard capacity measures are concerned, these are at the moment metal cylinders having equal height and diameter. In France, such metallic measures have been discarded long ago and replaced by standard measures made of glass and having graduated index. It is easy to use these glass measures and to read out the error of the measure on the graduated part of the neck. With the metal cylindrical measures, a pipette has to be used for measuring the error.

Coming to the non-flexible metre rods, the experts pointed out that the first 10 centimetres are now divided into centimetre parts and thereafter marks are provided at every five centimetres, and cross-marks at 25, 50 and 75 centimetres.

The experience of France and Europe in the last century has shown that such a measure is insufficient and it may be desirable to graduate metre rods at every centimetre, and figures or special marks provided at 10, 20, 30 centimetres and not at 25, 50 and 75 centimetres.

Suggestions for Future

On review, they opine that the work that has been done is 'worthy of the highest praise'. They have summed up their general reaction by saying: 'In the three fields—mass, volume and length—the work was wonderfully carried out'.

For the future they have a few suggestions and they feel that in a developing country like India, it is necessary to think of further avenues of work for the Weights and Measures Organization. For this purpose, it is necessary to start thinking of bringing under the purview of the Organization, the verification of the more complicated instruments like water meters, gas meters, electricity meters, etc.

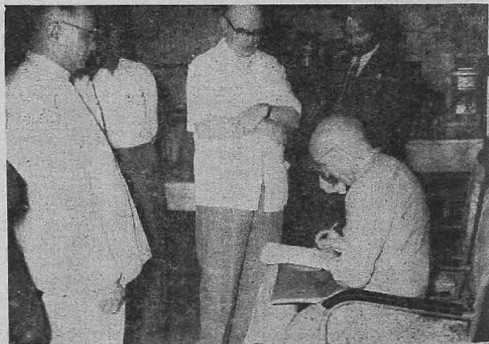


Figure - 2 : The above picture shows M. Krach seated while M. Viaud standing facing him. Others in the picture are from left to right Sarvashri Pednekar, Dhurandhar and Bhutani.

In the field of scientific equipment, they feel that the National Physical Laboratory of India is well equipped and competent to meet all the requirements of India in future.

FIFTH CONFERENCE OF CONTROLLERS

As for training of Inspectors, the experts recommend that more advanced training than is being imparted in India at present is necessary. They suggest the following syllabus.

(1) General

- (a) *Composition*: It should enable those receiving training to draft reports in clear and precise language.
- (b) *Law*: General laws of the country, special laws on weights and measures, legal procedure, etc.
- (c) *Mathematics*.
- (d) *Mechanics*: including strength of materials.
- (e) *Physics*.

(f) *Chemistry*.

(g) *Electricity*.

(2) Special Course on Weights and Measures.

(a) *Weighing*: (current devices).

(b) *Capacity measures*.

(c) *Length measures*.

(d) *Volume measurement*.

(e) *Gauging* (tank lorries, tank wagons, etc.).

(f) *Liquid meters*. (water, petrol, etc.)

(g) *Electricity meters*.

(h) *Gas meters*.

The minimum qualification for Inspectors should be a University degree. The training should be preferably for a year, but not less than 6 months in any case.

(Contd. on P. 30)

Fifth Conference of Controllers

THE fifth Conference of Controllers of Weights and Measures was held in Jaipur on 4, 5 and 6 January 1962.

The Conference was inaugurated by Shri R.D. Dhariwal, Minister for Industries, Rajasthan. Shri K.V. Venkatachalam, Joint Secretary, Ministry of Commerce and Industry, New Delhi, presided. It was attended by Controllers of Weights and Measures in States and Union Territories and by representatives of the Ministries of Commerce and Industry, Law, Information and Broadcasting, as also the Indian Standards Institution, the Government of India Mint, Bombay, and the National Physical Laboratory.

Inaugural Speech

Welcoming the delegates the Minister for Industries said that weights and measures played an important role in life. In India,

weights and measures varied from place to place. Often even in the same place, different weights were used for weighing different commodities. In the State of Rajasthan which was formed by the integration of 22 princely states, weights and measures were in a confusing and chaotic state. There were no laws regulating the use of weights and measures. It was common to use even pieces of stone as weights. The weight of the seer varied from place to place. It was 100 tolas in Jodhpur, 86 tolas in Jaipur and 108 tolas in Bilwara. This state of affairs affected all sections of the people adversely. There was a crying need for the reform of weights and measures by adoption of a single system of weights and measures throughout the country.

Parliament decided that the metric system should be the standard system for the country

because of its simplicity and universality. Its adoption would simplify all calculations involving weights and measures and facilitate trade. The complete replacement of the weights and measures in use would be no easy task. People would not easily take to a new system in preference to the indigenous systems or to which they are used. The Controllers of Weights and Measures had an arduous task in introducing the new system. Experience in the last 5 years had been encouraging. The metric system had come into use in the Railways and in major industries like cotton and jute textiles, iron and steel, engineering, petroleum, tea, coffee, chemicals, cement, salt and paper.

In Rajasthan, the use of metric weights had become compulsory in 6 districts. In the remaining parts of the State also, the use of other weights would become illegal on 1 April 1962. Metric capacity and length measures would also be enforced throughout the State in 1962-63.

The Conference was being held, he added, at a critical stage in the reform of weights and measures. Rajasthan had made significant progress in organising the enforcement of weights and measures during the last two years. Sixteen Weights and Measures Laboratories had been established. The number would be raised to 20 in the current year. There had been considerable increase in the capacity for the production of weights and measures. Metric weights and measures had been made available in the remotest parts of the State. A campaign of publicity to familiarise people with the new weights was in progress. The transition to the new system of weights and measures in the State had been remarkably smooth and there had been very little opposition from the public.

A manufacturer in the State had been able to produce satisfactory working standard

balances used by Inspectors of Weights and Measures. This should be regarded as a significant achievement since production of balances of this sensitiveness and quality is a highly exacting task, and there were only 3 units in the whole country capable of producing them.

The success achieved by the State's Weights and Measures Department, he said, had been due to the assistance and cooperation it had received from manufacturers and traders in the State and guidance from the Central Standing Metric Committee.

Chairman's Remarks

Shri K.V. Venkatachalam, the Chairman, said that the Conference would review the progress of the reform of weights and measures in the last 5 years. During this period there had been significant gains and a foundation had been laid for the reform. Legislation had been enacted by Parliament laying down the metric system as the system of weights and measures for the whole country. Complementary legislation had been enacted by the State Legislatures to enforce this system. The State Governments had set up organisations to enforce weights and measures.

The base of the Organisation, he said, was the Inspector of Weights and Measures who visited trading establishments, verified traders' weights and measures, and advised the public and the trading community on the new system of weights and measures. About 800 Inspectors were at work in the field in the whole country. It was not an easy task to recruit, train and equip such a large force of Inspectors during the relatively short period of two to three years. Inspectors worked with standard weights and measures and sensitive balances. Production of these standards and balances was a highly exacting task. A sufficient number of the standards had been produced in the country and distributed to the States. The manufacture of

such sensitive balances as required by Inspectors of Weights and Measures was developed within the country.

In 1958 it was decided to introduce metric weights in selected areas and in major industries. In these areas and industries, the use of other weights was banned in 1960. It was proposed to make other weights illegal throughout the country on 1 April 1962. By April 1963 metric weights and measures of capacity and length would be enforced throughout the country.

The task had, however, only begun and much yet remained to be done. The public at large had yet to be educated on the new weights and measures. They still understood them imperfectly and continued to ask for things from their shop-keepers in seers instead of kilograms. Greater familiarity with the kilogram alone would persuade them to ask for their requirements in that unit.

The metric system had to be introduced in the teaching of subjects like arithmetic in schools and only that system used in all examples and illustrations. Although the metric system had been adopted in their transactions by industry, the products of industry continue to be designed in the inch-pound system. The numerous products of industry had to be redesigned in the metric system.

The role of the Conference of Controllers of Weights and Measures, he pointed out, was to pool experience and to secure uniformity of enforcement procedure throughout the country. The Conference would have its utility even after the metric system was firmly established in the country.

Shri P. N. Nayer, Secretary, Standing Metric Committee, thanked the Minister for inaugurating the Conference and the Rajasthan Government for the arrangements

made for the Conference and for the accommodation of delegates.

The following are some of its recommendations:

(1) Enforcement of Metric Commercial Weights

(a) In areas where other weights were illegal

Metric commercial weights had been purchased by almost all the traders in these areas. They were being used in trade by most traders with fixed establishments. Certain squatters and hawkers, however, continued to use old weights. Inspectors should pay repeated visits to markets where non-standard weights were in use and seize any such weights found in the possession of traders.

The Weights and Measures Administration had so far relied on persuasion to bring metric weights in use. It was over 18 months since the use of seer and maund weights became illegal. There was no longer any reason to show leniency to traders who continued to use non-standard weights. Controllers might prosecute recalcitrant traders who ignored warnings and used non-standard weights against the law.

(b) In other areas

Weights other than metric weights would become illegal in these areas on 1 April 1962. There would be a very large demand for metric commercial weights on that date. Manufacturers and dealers should be induced to hold substantial stocks of metric weights.

Traders should buy new weights now when they were plentiful and cheap instead of waiting till April 1962.

(2) Enforcement of Capacity Measures

Capacity measures other than metric measures would become illegal over specified areas in all the States on 1 April 1962.

The manufacture of metric capacity measures had begun and no difficulty was

anticipated in the supply of a sufficient number of liquid measures for trading purposes. The National Physical Laboratory had offered to verify and certify one set of measures for every manufacturer of capacity measures who sought this assistance from the laboratory.

(3) Enforcement of Metric Length Measures

The use of length measures other than metric measures would become illegal in trade throughout the country on 1 October 1962. The manufacture of metric length measures had begun and substantial stocks had already been built up. No difficulty was anticipated in the supply of commercial length measures for trading purposes.

(4) Organisation for Enforcement

Type of Organisation

The Weights and Measures Organisation should be considered as a technical Organisation manned by persons with technical qualifications and training in their specialized fields. It should be a separate Department of the State Government.

Inspectors, Deputy Controllers and the Controller should be wholtime officers without any responsibility not connected with weights and measures. The Department should be directly under the administrative control of the State Government.

Controllers

The Controller was the head of the Organisation and his duties were not of a routine nature. The Controller should be a wholtime officer of the status of a head of Department. He should have a Deputy Controller (in larger States), or an Assistant Controller (in smaller States) to assist him at headquarters.

Deputy Controllers

The Organisation would need, besides a Deputy Controller at headquarters, one

Deputy Controller for every Division or a group of districts to supervise the field work.

Assistant Controllers

The Organisation should have one Assistant Controller at the district level to supervise the work of the Inspectorial Unit.

Inspectorial unit

The Inspectorial unit was the basic administrative unit for the enforcement of weights and measures. Every such unit should consist of one Inspector of Weights and Measures, one Manual Assistant (semi-skilled) and a Peon. [Where the work load justified it, as for instance in the metropolitan areas, Clerks might be attached to the unit].

The jurisdiction of an Inspectorial unit might be 2 to 3 Taluks, depending on the size of the Taluk, or a Revenue Sub-Division. In Metropolitan areas, the jurisdiction of a unit might be limited to an area with about 3,000 establishments.

Inspectors directly recruited should be Graduates, preferably in Science or Engineering.

Laboratory

There should be a Laboratory attached to the office of the Controller under a Technical Officer of the status of an Assistant Controller. The Technical Officer would be responsible for the testing of secondary standards and balances, routine repair and maintenance of equipment and training of staff. He would be assisted by one or two Maintenance Supervisors. The Supervisors would be trained at the Bombay Mint. The duration of the training would be 3 months.

(5) Amendments to Act and Rules

(a) Central Act

The Eleventh General Conference of Weights and Measures had redefined the metre in terms of wavelengths of light emitted by Krypton 86 in place of the length

between two lines on a platinum iridium bar. The definition of the second was also slightly modified to make it more accurate.*

Both these units have been defined in the Standards of Weights and Measures Act, 1956. In view of the changes effected by the Eleventh General Conference, it is necessary to amend the Act so as to bring it in line with the latest advances in the field of metrology. Another new unit—the nautical mile—will be introduced in the Standards of Weights and Measures Act, 1956. This internationally recognised unit is to be used as the unit of length in navigation by sea or air and is equal to 1852 metres.

(b) State Enforcement Acts and Rules

In the light of the experience of enforcement gained by the States during the past few years it was found necessary to make some legal and technical changes in the State Enforcement Acts and Rules. The more interesting of these are given below:

A new provision to be made in the State Enforcement Act relates to defining what is meant by the term 'Use for transactions in trade or commerce.' The term was vague and led to difficulties in deciding whether certain transactions like paying wages for work done on the basis of units of weight or measure, tolls and duties, fees for storage of weighed or measured commodities and many others would come under the purview of the State Acts. The proposed new definition would have wide scope and cover a number of commercial transactions besides those mentioned above.

Another provision prescribes tolerances to be allowed on the net weight or measure contained in a sealed package or container. Thus a bag of sugar weighing one quintal

would have a tolerance of ± 0.1 percent (100 grams), while a cement bag should weigh within ± 2 percent of its nominal weight (50 kg) at the factory and within ± 3 percent in retail trade. Tea packs of 500 g, 200 g and 100 g and chests packed at places other than tea gardens would be allowed an error of 1 percent at the place of packing. Many other commodities would also be covered by this provision.

Traders henceforth might be required to exhibit conversion tables in a conspicuous place in their establishments. The implementation of this provision in the Enforcement Rules would facilitate transactions and help the consumer and trader to assess quantities and prices satisfactorily.

Upto now only bullion and carat weights had to be verified after every 12 months to ensure sufficient accuracy in transactions. In the light of experience gained it is now being provided that besides bullion and carat weights, weighing instruments used by factories for commercial transactions and all commercial measuring instruments wherever used should be got verified and stamped after every twelve months. Other commercial weights, measures and instruments would have to be verified after every 24 months.

(6) Weights, Measures and Instruments Manufactured in one State for Sale in Another

There was no legal bar to a weight, measure, etc. manufactured in any State being sold throughout the country provided it complied with the requirements of the Rules in the States. The Rules should not be used to impede free commerce in weights, measures and instruments within the country. Manufacturers should be permitted to appoint reputed licensed dealers as their selling agents in States other than their own.

*The resolutions adopted by the Eleventh General Conference of Weights and Measures have been published in *Metric Measures* (September 1961, January 1962).

(7) **Verification of Secondary Standard Measures:
Table of Weights of Distilled Water**

A table of weights of distilled water of volumes corresponding to the capacities of

the secondary standard measures at different temperatures was necessary for the periodical verification of the standard measures. The National Physical Laboratory would draw up a table and send copies to Controllers.

Metric System in Timber Trade

A meeting of the Chief Conservators of Forests of the States, the Inspector-General of Forests (Ministry of Food and Agriculture), and Director of the Forest Research Institute, Dehra Dun and representatives of the Ministry of Railways, Directorate General of Supplies and Disposals, Indian Standards Institution, and the Ministry of Commerce and Industry was held in New Delhi on 19 December 1961 to consider the adoption of the metric system in the measurement of timber and timber products.

The metric system of standard units of length had been brought into force from 1 October 1961 with a one year period of transition. The continued use of yard and its multiples and submultiples would cease completely from October 1962 and it would be illegal to use any units other than the metre, square metre and the cubic metre and their secondary units in the measurement of timber and timber products.

The meeting was held to draw up a programme for adoption of these units in the timber trade in a smooth and orderly way. The following recommendations were made:

Date of Adoption

The metric system has to be adopted in transactions in timber and timber products

from 1 October 1962. From that date in all transactions, prices and quantities should be expressed in terms of metric units, namely, the metre, square metre, the cubic metre and the secondary units derived from them. The Forest Departments of State Governments and the trade should be advised to provide themselves in time with metric tapes and other measuring instruments and conversion tables.

The metric system should be adopted, as early as possible, in technical and scientific work. The Forest Research Institute, Dehra Dun, and the Forest Departments of State Governments would initiate necessary studies immediately.

Measurement of Timber

(1) *Units of Measurement*

(a) *Girth* should be measured in metres and centimetres correct to the nearest centimetre.

(b) *Length* should be measured in metres accurate to 5 centimetres. Every length measurement should be rounded off to the next lower 5 centimetres before it is recorded.

(c) *Volume* should be expressed in cubic metres to the second decimal place. It should be rounded off by the ordinary rule of rounding off.

(2) *Class Intervals* : Measurements of diameter, height and girth should be recorded with the following class intervals: Diameter Class interval of 1 decimetre (i.e. 10 cm). Girth. Class interval of 3 decimetres (i.e. 30 cm). Height..... Class interval of 1 metre, 3 metres or 5 metres, as may be convenient.

(3) *Breast Height Measurements* : The present practice is to measure the diameters and girths of trees at a height of 4 feet 6 inches (1.37 metres). If future measurements are made at a different height, the data would not be comparable with the recorded data of the past. Breast height measurements should, therefore, continue to be made at a height of 1.37 metres.

(4) *Calculation of Volume* : The practice of calculating volumes of logs using the 'quarter girth' formula may be continued. The Indian Standards Institution would compile tables on the lines of Mercer and Nandalal's tables for use by the trade for estimating volumes of round and sawn timbers in cubic metres from dimensions in metres.

(5) *Specifications for Sawn Timbers*: The Indian Standards Institution would recommend dimensions for sawn timber in rational metric units. These would be circulated to Forest Departments of the State Governments and to the trade at least two to three months before 1 October 1962. The Railways would circulate specifications in metric units for sleepers to Forest Departments and the trade.

Metric System in Engineering Industries

THE Sixth Indian Standards Convention was held in Kanpur from 25 December to 30 December 1961. One of the sessions was devoted to 'Introduction of Metric System in Engineering Industries'. The session was presided over by Shri K.V. Venkatachalam, Joint Secretary, Government of India, Ministry of Commerce and Industry, New Delhi. In all eight papers, listed in Appendix I, were presented in the session and the discussion occupied the entire morning session on 30 December 1961.

In his opening remarks, the Chairman said that the most complex aspect of the metric reform was in relation to the design and production aspects of the engineering industry. He then briefly indicated the

progress of the reform. He said that the use of metric weights would become compulsory all over India from April 1962, that of length measures from October 1962 and of capacity measures from April 1963. The metric system had now been adopted by all the Government departments and large government undertakings like the Railways, Posts and Telegraphs, Customs and Excise Departments, Ports, etc. Most of the organized industries, like the cotton and jute textiles, petroleum products, iron and steel, cement, paper, engineering etc. had adopted it in their transactions.

So far as the engineering industry was concerned, he said it was realised that in the matter of production and design the

change-over would have to be gradually and carefully planned. Engineers had been accustomed to the foot-pound system. Ideas and concepts had to be reoriented to the metric system. It would also take some time to redesign products to conform to the metric system. Till then the industry would have to continue to work with drawings and specifications on the foot-pound system side by side with metric units. Until complete redesigning and manufacture of products was carried out in metric units, it could not be said that the industry had adopted the metric system fully. In the meanwhile, however, the metric system had to be progressively utilised and metric standards used.

In the field of standardization, the Indian Standards Institution had revised some 72 percent of the old standards using metric units while new standards were fully metric. Many basic standards required by the engineering industry had already been made available in the metric system and a number of auxiliary standards had been completed or were being progressed. In view of the progress of standardization, the stage had now come when a beginning could be made with the adoption of these standards in various engineering activities.

The Chairman, however, sounded a note of warning that for the sake of interchangeability mere conversion of inch to metric dimensions should not be resorted to. Such a compromise would not do full justice to the metric system whose advantages were likely to be thrown away thereby. It was, therefore, necessary to introduce the metric system rationally in all our day-to-day work.

The Chairman then took up the question of production of materials to metric dimensions. The availability of raw materials to the new standards would determine the pace of adoption of the metric system. Already

steel was available in metric dimensions and steel re-rollers had decided that from April 1962 they would switch over production to metric dimensions. Products of non-ferrous metals like copper, zinc, etc. were already available in metric dimensions. As and when these materials became available, designers would have to use them. There were a few manufacturers producing drills, tapes, scales, woven metallic tapes, etc. to conform to the new Indian Standard specifications. By and large, the demand for these had not risen as expected, probably because of the vicious circle of producers not starting manufacture unless there was adequate demand and consumers wanting to be assured about availability before ordering. This vicious circle had to be broken and as more and more demand came from indentors the suppliers would start meeting this demand. Most of the larger Government organisations like the Railways and Defence Services had set up metric cells for selection of materials according to national standards. Major Engineering Associations at Calcutta have also set up their cells wherein problems arising in conversion to metric system were discussed and suitable lead given to the members.

The Chairman proposed that other engineering institutions, big or small, likewise should have small metric cells to discuss the problems of conversion and devise suitable remedies to the problems that arise. It would have to be left to each individual industrial unit to devise its own policy for conversion, after taking into consideration its own needs, the nature of its activity and the availability of materials. No general guide could be given as the problem varied from industry to industry. A few small units, perhaps, could combine and form a study group which would facilitate understanding of problems and coordination of efforts.

METRIC SYSTEM IN ENGINEERING INDUSTRIES

The Chairman also recommended to large organisations like the Railways, the Defence Services, the Military Engineering Services, Central Public Works Departments and others that they should revise their departmental specifications to conform to the Indian Standard specifications as quickly as possible. Indian Standards were now in the metric system and their adoption by these organisations would give a lead to the smaller ones and thus quicken the pace of adoption of the metric reform.

So far as training of men was concerned, the Chairman said, metric units had to be cultivated in the minds of men who actually worked with the machines. In-plant training would be necessary and organisations would have to impart it to their workers, skilled and semi-skilled, and even to personnel engaged in drawing offices and tool rooms. The problem of training appeared vast at first sight, but once undertaken it was generally found that the metric system was easy to work with, less time consuming and less cumbersome. A start could be made in the use of materials, measuring instruments etc., in the metric system and in a very little time, by usage, sufficient knowledge would have been acquired. In design offices greater effort would be necessary. Both the foot-pound and the metric systems would have to exist for a few years until the entire design and production work was carried out in metric units. It was here that intensive training was needed and the metric cells could arrange some courses for the benefit of their personnel.

In the case of machinery also the adoption of the metric system gave rise to some problems. Machine tools now produced in the inch-pound dimensions would have to be converted or certain alterations made. New dials and gauges would have to be fitted and measuring apparatus changed. By and large,

however, the changes were not of a major nature.

The Chairman also suggested that in advertisements of machinery and products published in newspapers, periodicals and technical magazines, the use of metric dimensions and units should be encouraged.

He then threw open the papers for discussion.

Discussion

The discussion showed that there was a general desire that in the standards that India adopted, a place should not be found for odd sizes which might have been converted from inch dimensions. Even if such dimensions were non-preferred, the demand might build up around them and later on they would tend to become the accepted sizes to the detriment of preferred sizes. To avoid such a danger the adoption of the metric system should mean the adoption of a pure rational metric series, not vitiated by expediency.

A few suggestions were also made for enlarging the paper; 'Notes for Training in Metric System for Engineering Industries', prepared by the Engineering Subcommittee of the Standing Metric Committee. It was suggested that a list of approved abbreviations of metric units should be incorporated in the 'Notes'.

It was also pointed out that a number of production units were having collaboration with British and American counterparts. The designs used were in the foot-pound system. With the metric change-over, it might be difficult for these units to discard the designs of the collaborators. In such cases, it was suggested that conversion to metric units might continue until such time as new designs were developed, which would be wholly in metric system. The example of Heavy Electricals Ltd., Bhopal, was cited.

A great deal of emphasis was laid on the necessity of changing over early in the field of technical education.

It was also brought out by Shri Lalchandani that conversion of machine tools did not involve any major changes and metric machine tools could be used for inch-dimensioned products in future, if necessary.

Shri Varshneya and Shri Mohile highlighted the ease with which metric system could be adopted in architectural designs and concrete structures.

Summing Up

The Chairman, summarising the discussion, said that the question as to who should start the use of the metric system earlier, the manufacturer or the consumer, had been asked very often. He felt that the larger consumers should do it first. If the Railways, public sector projects and bigger engineering concerns begin asking for their requirements in metric units, a demand would be built up and the suppliers would be forced to change over. At the same time, suppliers should also study the problems involved and be pre-

pared to supply according to requirements. In his opinion progress should be achieved by both the consumers and the suppliers, so that the gap between the supply and demand would be reduced.

In the field of technical education, a programme had already been laid down so that the change-over to the metric system would begin in 1962 and be completed by 1965. The main problems were the recalibration of equipment and preparation of necessary textbooks. The first problem was comparatively easily solved but the question of textbooks was somewhat difficult. A number of Institutes of Technology had been set up in the country with the help of countries using the metric system. They could, perhaps, help in preparing suitable textbooks. Translation or adaptation of Continental textbooks may have to be undertaken to serve the immediate needs. In the meanwhile, Indian experts should get ready to write textbooks to suit the change-over.

After a vote of thanks the session concluded at 1 p.m.

APPENDIX 1

List of Papers Presented

- | | |
|--|------------------|
| (1) Planning for Change-over to Metric System in Design and Manufacture in Engineering Industry. | |
| (2) Notes for Training in Metric System for Engineering Industries | |
| (3) Utilisation of Present and Future Machine Tools for Production in Metric and Inch Terms. | M.W. Lalchandani |
| (4) Introduction of Metric System in Indian Telephone Industries Limited | D.A. Chelliah |
| (5) Progress Made by Joyti Limited for Changing Over to Metric System | M W Lalchandani |
| (6) Introduction of Metric System in the Field of Building, Architecture and Town Planning. | P.D. Chawla. |
| (7) Problems of Change-over to Metric System in Building Industry | J.K. Varshneya |
| (8) Metric System in the Manufacture of Precast Concrete Products | N H. Mohile |

Recent Notifications

(1) Corrigendum

S.O. No. 197 dated 10th January 1962.

In the Ministry of Commerce and Industry Notification published in the Gazette of India Part-II-Section 3-Sub-section (ii) dated 3rd December, 1960 as S.O. 2874 dated the 25th November, 1960, the following corrections shall be incorporated :—

In Table II (Acres and Cents to Hectares and Areas upto 100 acres) appearing on pages 3406-3411.

For the exist- ing figures against	Acres	Cents	Read	Hectares	Ares
"	2	40		0	97.12
"	2	50		1	1 17
"	5	10		2	6.39
"	7	20		2	91.37
"	7	90		3	19.70
"	12	50		5	5.86
"	13	50		5	46.32
"	14	40		5	82.75
"	20	40		8	25.56
"	22	0		8	90.31
"	25	50		10	31.95
"	26	90		10	88.60
"	30	0		12	14.05
"	32	10		12	99.04
"	46	20		18	69.64
"	47	90		19	38.44
"	55	30		22	37.91
"	55	40		22	41.95
"	59	90		24	24.06
"	66	80		27	3.29
"	72	30		29	25.87
"	91	0		36	82.63
"	93	20		37	71.66

(The original Notification, after due correction was published in *Metric Measures, March* 1961, pp. 23—28, and *May* 1961, p.44).

(2) Ports and Shipping

S.O. No. 255 dated 16th January 1962.

In exercise of the powers conferred by section 14 of the Standards of Weights and Measures Act, 1956 (89 of 1956), the Central Government hereby makes the following amendment in the notification of the Government of India in the Ministry of Commerce and Industry No. S.O. 1899 dated the 1st August, 1960 (relating to the permission of the continuance of the use of any weight or measure which immediately before the 1st August, 1960 was in use in respect of ports and shipping industry), namely :—

In the said notification, for the words "for a period of eighteen months", the words "for a period of two years" shall be substituted.

Antarctic Region

A team of Soviet scientists lead by Dr. Alexander Afansiev will study seismic phenomena at Vostok, the Soviet Research Station at the South Magnetic Pole—the "Pole of Cold"—in November 1962.

Already the scientists have collected data about climatic phenomena which would be published. The temperature in the region ranges from 40 degrees centigrade to minus 90 degrees centigrade. On the basis of calculations, it was stated that the Antarctic Region contained 40 million cubic kilometres of ice. If the entire ice were to melt, it would raise the level of water in the seas all over the world by 70 metres.

Book Review

A GUIDE TO THE METRIC SYSTEM : by Professor V.V.L. Rao, Principal, Engineering College, Anantpur, Andhra Pradesh; published by Asia Publishing House, Contractor Building, Ballard Estate, Bombay-1, pp. 64, 1961, Price : Rs. 6.00

Professor V. V. L. Rao needs no introduction to academic circles. During a career spread over a number of years, Professor Rao has taught a variety of subjects like electrical engineering, physics, electronics and radio engineering. He is deeply interested in the different systems of units and has studied the subject thoroughly with particular reference to the metric system.

At present, the adoption of the metric system in technical institutions is of topical interest, and his latest book 'A Guide to the Metric System' should be a welcome addition to publications of this nature. The Guide is intended particularly to meet the needs of the staff and students of various institutions in India where conversion from the existing system to the metric system will be a daily necessity. The tables in this book cover a very wide range from mathematics to physics and from civil and mechanical engineering to electrical and telecommunication engineering.

There are some 70 comprehensive conversion tables useful alike to engineers, scientists and students who can readily refer to this book for conversion from the existing system to the metric system. The subtle differences between the CGS and MKS systems, which the author calls the new metric system, have been clearly indicated. It is to be emphasised that the two systems, the CGS and MKS are

not in any way different from each other, the essential difference between the two being that the MKS system deals with practical units and adopts the units defined internationally whereas the CGS system uses units defined long back. There is the same fundamental relationship between the various units in the two systems.

The 70 tables published include the usual conversion of linear measures, square measures, volumetric measures, capacities, weights, stresses, pressures etc. In Table 32, showing values for accurate calculations, the equivalent of an inch had been given as 2.539956 cm. Similarly, a lb is given as 0.4535923 kg. So far as India is concerned, these values should be 2.54 (exactly) and 0.4535923 kg as the latter have been prescribed in the Standards of Weights and Measures Act, 1956. A few minor errors in abbreviations are also noticed, e.g., kilometre is given as Km instead of km. The abbreviation of newton is 'N' and not Nw. The abbreviation for Deca is da, not 'D'. In spite of these minor errors, the book is a very useful compendium of all tables required by technologists and students.

Interesting features of this Guide include the explanation of the fundamental principles of the units of force, work and power. The speciality of the MKSA system, wherein the watt and the joule are the units of power and energy common to both mechanical and electrical units, has been highlighted. Similarly, the relative magnitudes of the three forces,

*See *Metric Measures*, September 1961, pp. 23-24

newton, kg (force) and 1 lb (force) and of the erg, joule and the foot-pound are explained in an interesting manner.

Numerous tables of units used in electromagnetism, both electromagnetic and electrostatic units of electricity, the table of General Constants and a fairly exhaustive table of the MKSA and British Units for electric quantities are included in this valuable Guide.

It is hoped that this publication will meet

the immediate demand of people in technological institutions in the present context of the adoption of the metric system in engineering colleges and polytechnics from the coming academical year in the first and second years of their respective courses, and for other classes in the subsequent years, the programme being completed by 1964-65.

The book is very well got up by the Asia Publishing House.

Readers' Forum

You and Metric Units

(Shri Joginder Singh Bakshi, Inspector, Weights and Measures, Yamunanagar (Distt. Ambala), Punjab has sent the following which would be of interest to all the people. It will be remembered that Shri Bakshi has written *A Hand Book of Metric Weights & Measures*. This was reviewed on page 33 of *Metric Measures*, Vol. 4 No. 2 (March 1961) Issue.—*Editor*.)

Metric weights have now come into compulsory use in the notified areas throughout the country. Old weights of seers and pounds have been replaced by metric weights.

Now that there is legal compulsion to carry out transactions in metric weights, traders are obliged to use new units. A few traders who stealthily use old type weights cause annoyance in the markets and they are to be prosecuted in the court and punished with heavy fines.

The superiority and simplicity of the metric system lies in its decimal steps. It is a little confusing in the beginning for a common trader and a layman to use these steps. Even if transactions are done completely in new units and in terms of rational metric weights he finds difficulty in working out prices and quantities of commodities. This is more so with frac-

tions of the new units. All this leads to irritating calculations and leaves the purchaser baffled. Traders and consumers would be saved a good deal of trouble if they get guidance on how to transact conveniently in terms of the new units.

To facilitate calculations a few workable formulas are given here with illustrations. They may be useful in every day transactions.

Weights

1. *As many Rupees per quintal so many Naye Paise per kilogram.*

For example: The rate of wheat is Rs. 53.00 per quintal. To calculate the value of 12 kilograms. Directly the value of one kilogram is 53 nP and so price of 12 kg = $12 \times 53 \text{ nP} = \text{Rs. } 6.36$.

2. *As many Rupees per kilogram so many Naye Paise per 10 grams.*

For example: Cashewnuts are Rs. 9.00 per kilogram. Calculate the value of 50 grams—Directly the price of 10 grams is 9 nP and so the price of 50 grams is 45 nP.

(b) If the rate of chillies is Rs. 4.00 per kilogram and a customer asks for chillies worth 12 nP. Directly the value of 10 grams is 4 nP and as such he can claim 30 grams for 12 nP.

3. *As many Naye Paise per kilogram one tenth so many Naye Paise per 100 grams.*

For example : If tomatoes are 80 Naye Paise per kilogram, calculate the value of 300 grams—Directly the price of 100 grams = $80/10 = 8$ nP. Therefore, the price of 300 grams = 24 nP.

4. *As many Rupees per 10 gram as many Naye Paise per 100 milligram.*

For example: If the rate of gold is Rs. 120.00 per 10 gram, find the value of 700 milligrams—Directly the price of 100 milligrams is Rs. 1.20 and so the price of 700 milligrams is $7 \times 1.20 = \text{Rs. } 8.40$

Capacity and Length Measures

What applies to weights is also true for capacity and length measures.

5. *As many Naye Paise per litre one tenth so many Naye Paise per 100 millilitres.*

For example: If the rate of milk is 80 nP per litre calculate the value of 400 millilitres—Directly the value of 100 millilitres is $80/10 = 8$ nP.

Therefore, the price of 400 millilitres is = 32 nP.

6. *As many Rupees per metre as many Naye Paise per centimetre*

For example : The rate of worsted cloth is Rs. 24.00 per metre, calculate the value of 40 cm. The price of one cm is 24 nP as such the price of 40 cm = $40 \times 24 = 960$ nP = Rs. 9.60.

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, Madras and Kanpur).

Indian Standard for Split Cotter Pins (IS: 549—1961)

The Indian Standards Institution has just published IS: 549—1961 Specification for Split Cotter Pins (Revised), which covers requirements and tests for ferrous and non-ferrous split cotter pins.

Consequent to the decision of the Government of India to change over to the metric system, the 1954 edition of this standard has

been revised on the basis of the latest document of the International Organisation for Standardization, as far as dimensional requirements are concerned. The method of designation has been modified and changes have also been made in the requirements as regards materials, packing etc.

Price : Rs. 1.50

Indian Standard for Dimensions of Ends of Bolts and Screws (IS: 1368—1962)

The Indian Standards Institution has just published IS: 1368—1961 Dimensions of Ends of Bolts and Screws, which gives the dimensions of ends of bolts and screws of

thread diameters 1 to 39 produced by cutting or rolling processes.

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 the relevant Technical Committee of the International Organization of Standardization. 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 : Re. 1.00

Indian Standard for Aluminium Milking Pails (Hooded Type)—(IS: 1792—1961)

The Indian Standards Institution has just published IS: 1792—1961 Specification for Aluminium Milking Pails (Hooded Type), which prescribes the quality and dimensional requirements for aluminium milking pails (Hooded type) of 10—, 15— and 20—litre capacities.

An ideal milking pail has to be designed in such a way as to prevent dust, chaff and other undesirable foreign substances from getting into the milk at the time of milking. This standard has been drawn up after giving due consideration to this point.

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

Price : Rs. 1.50

Indian Standard for Dimensions for Milling Cutters (IS: 1831—1961)

The Indian Standards Institution has published IS: 1831—1961 Dimensions for Milling Cutters. This standard lays down dimensions for various types of milling cutters. It also specified dimensions and tolerances for keys and keyways, tenons and cross slots for drives.

Milling cutters are used for removing metal and also to obtain formed profiles. In this standard a number of types and sizes of milling cutters, which are useful for general engineering purposes, is included.

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

Price : Rs. 6.50

Indian Standard for Reamers (IS: 1836—1961)

The Indian Standards Institution has just published IS: 1836—1961 Specification for Reamers. This standard relates to the commonly used types of reamers, namely, parallel hand and machine reamers, chucking reamers with parallel and taper shank, socket reamers for Morse tapers with parallel and taper shank, taper pin hand and machine reamers, machine bridge reamers, and shell reamers.

Reamers are tools for finishing drilled holes to close tolerances required for precision assemblies. In this standard a number of types and sizes of reamers used for general engineering purposes has been included.

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

Price : Rs. 5.00

Indian Standard for Dimensions for Shank Diameters and Driving Squares for Rotating Tools (IS: 1850—1961)

The Indian Standards Institution has just published IS: 1850—1961 Dimensions for Shank Diameters and Driving Squares for shanks and dimensions for external and internal squares provided for rotating small tools.

Squares are provided on the shank ends of small tools, such as reamers and screwing taps for holding and driving. In some cases, an internal square is provided.

Price : Rs. 1.50

Indian Standard for Studs (IS: 1862—1961)

The Indian Standards Institution has just published IS: 1862—1961 Specification for Studs, which covers the requirements of precision grade studs intended for use in steel and cast iron.

Pursuant to the decision of the Government of India to adopt metric system of weights and measures throughout the country, the Indian Standards Institution has recognized the metric screw thread. The Institution is engaged in making available various standards on threaded fasteners based on the metric screw thread, and this standard is one of a series of such standards, other standards in the series being :

IS: 1363—1960 Specification for black Hexagonal Bolts (6 to 39 mm) with Nuts and Black Hexagonal Screws (6 to 24 mm).

IS : 1364—1960 Specification for Precision, and Turned Hexagonal Bolts (6 to 39 mm) with Nuts and Hexagonal Screws (6 to 39 mm).

Price : Rs. 2.50

Draft Indian Standard for :

- (1) Structural Steel (Ordinary).
- (2) Structural Steel (Draft Revision of IS: 226—1958) and
- (3) High Tensile Structural Steel (Draft Revision of IS: 961—1957)

The Indian Standards Institution has prepared three draft Indian Standards Specifications for Structural Steel (Ordinary), Structural Steel, and High Tensile Structural Steel.

Draft Standard for Structural Steel (Ordinary) relates to the so-called "untested steel" being marketed in the country, and covers two grades of steel in the form of plates, sections and bars (round, square, hexagonal, flat etc.).

Draft standard for structural steel covers requirements for two grades of steel (A and ASW) for steel plates, sections and bars (round, square, flat, hexagonal, etc.) for use in structural work. This standard was first issued in 1950 and was subsequently revised in 1955 and 1958. In this third revision, the yield strength of steel has been increased based on the past experience and steel has been classified according to its chemical composition.

High tensile steels are a specific class of steels in which enhanced mechanical properties, and in most cases increased resistance to atmospheric corrosion, are obtained by the incorporation of low proportions of one or more alloying elements besides carbon. These steels are generally intended for application where saving in weight can be effected by reason of their greater strength, and atmospheric corrosion resistance. This standard covers the requirements of High Tensile Structural Steel (including fusion welded quality) used in bridges and general building construction. This standard was first issued in 1957 and in this revision the tensile strength and yield stress values have been revised.

These draft standards will be circulated shortly to interested producers, consumers, and technologists for eliciting technical comments and will be open for comments for a period of three months from the date of circulation. The comments will be taken into consideration before the draft standards are finalized.

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

The Indian Standards Institution has prepared a draft revision of IS: 1161—1958 Specification for Steel Tubes for Structural Purposes.

IS: 1161 which was published in 1958, specifies the requirements for plain carbon

steel tubes for structural purposes and does not cover tubes required for pressure purposes. With a view to rationalizing the sizes and weights of tubes used in this country, the sizes and weights of tubes for structural purposes have been kept the same as those specified in IS: 1239—1958 Specification for Mild Steel Tubes and Tubulars (draft revision of which is under circulation). The erratum issued earlier has also been incorporated in this revised standard.

This draft revision (which is in English) will be circulated shortly to interested producers, consumers and technologists for eliciting technical comments and will be open for comments for a period of three months from the date of circulation. The comments will be taken into consideration before the draft standard is finalized.

Draft Indian Standard for Mild Steel Tubes and Tubulars (IS: 1239—1958)

The Indian Standards Institution has prepared a draft Revision of the Indian Standard Specification for Mild Steel Tubes and Tubulars, IS: 1239—1958.

IS: 1239, which was first published in 1958, specifies the requirements for three classes of mild steel screwed tubes and tubulars and plain-end steel tubes, designated as 'Light', 'Medium' and 'Heavy'. In this draft revision, it has been clarified that tubes conforming to this standard are suitable for conveying gas, water and steam. In the case of tubes suitable for steam services, the maximum temperatures and pressures up to which they are suitable are also indicated.

This standard covers the requirements of welded and seamless, screwed and socketed mild steel tubes and tubulars and of plain-end steel tubes, suitable for screwing to pipe-threads conforming to IS: 554—1955 Specification for Pipe Threads for Gas List Tubes and Screwed Fittings, of nominal bores ranging from 6 to 160 mm. Three grades of

thicknesses have been included in this standard which are designated as 'Light', 'Medium' and 'Heavy'.

This draft standard (which is in English) will be circulated shortly to interested producers, consumers and technologists for eliciting technical comments for a period of three months from the date of circulation. The comments will be taken into consideration before the draft standard is finalized.

Draft Indian Standard Specification for Slotted and Castle Nuts and Hexagon Socket Head Cap Screws

The Indian Standards Institution has prepared two draft Indian Standard Specifications, one for Slotted and Castle Nuts, and the other for Hexagon Socket Head Cap Screws.

Draft Standard for Slotted and Castle Nuts deals with commonly used types of castle and slotted nuts made in three grades of accuracy, in the diameter range 4 to 39 mm. The socket head cap screws specified in draft standard for Hexagon Socket Head Cap Screws are employed in machine tool and allied industries and only the precision grade of cap screws has been included keeping in view the demand in the country. These two standards belong to a series of Indian Standards being prepared by ISI on metric screw threads and fasteners.

These draft standards will shortly be put into wide circulation to all interests concerned for eliciting technical comments which will be given due consideration before finalizing the drafts as Indian Standards.

Draft Indian Standard for Taper Keys and Keyways

With a view to ensuring the interchangeability to plain taper keys, component commonly used in transmission of power, the Indian Standards Institution has prepared a draft Indian Standard Specification for Taper Keys and Keyways.

This draft standard covers the dimensions and tolerances for plain taper keys and

keyways for various shaft diameter ranges, and specifies the material for keybars and preferred lengths of keys for various cross-sections.

The draft will be circulated shortly to interested producers, consumers and technologists for eliciting technical comments, which will be taken into consideration before finalizing the draft as an Indian Standard.

Draft Dimensional Standards for :

- (1) Sizes and Thicknesses of Aluminium and Aluminium Alloy, Sheet and Strip,
- (2) Sizes of Wrought Aluminium and Aluminium Alloy, Plate,

(3) Sizes of Round Aluminium and Aluminium Alloy, Drawn Tube, and

(4) Diameters of Drawn Aluminium and Aluminium Alloy Wire.

The Indian Standards Institution has prepared four draft dimensional standards on the subject mentioned above. These draft standards have been prepared with a view to simplifying and rationalizing the various metric sizes of aluminium and aluminium alloy wrought products.

These draft standards will shortly be circulated.

(Contd. from p. 13)

It would be preferable to have a Central Training Institute where the Inspectors of all the States could be trained. If this is not practicable, 2 or 3 centres may be set up at suitable points in the country.

In addition to training Weights and Measures Inspectors, the experts also recommend that it is necessary to build up a corps of Weights and Measures Engineers. These Engineers would be specialised in weighing and measuring instruments. Persons with a degree of Bachelor in Science and Technology should be selected for training. Initially 10 or 20 qualified Engineers may be sent for training to France.

An important recommendation is that the Controllers and Inspectors of Weights and Measures should not under any circumstances be saddled with responsibilities not connected with weights and measures enforcement in the country. It is also necessary, according to them, that the Inspectors should be supplied with well equipped staff cars. It is not necessary to give each Inspector a staff car, but one car could be used in turn by a number of Inspectors for inspection and verification. Such a provision will also ensure efficiency of verification and is important for surprise inspection and checks.

Licensed Manufacturers, Dealers and Repairers of Weights and Measures(18)

Metric Measures has been publishing a series of lists of manufacturers, dealers and repairers of weights and measures, weighing and measuring instruments licensed by the Governments in the various States and Union Territories under their Weights and Measures (Enforcement) Acts in their respective jurisdiction. This is the eighteenth 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 Measures* as this work progresses.

The number in brackets against the name of the State or Union Territory indicates the particular instalment number of the State of the Union Territory. The issues of the *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 940 manufacturers, 3512 dealers, 779 repairers. The details of published information are as follows :

Sl. No.	State/Union Territory	Licensees		
		Manu- facturers	Dealers	Repairers
1.	Andhra Pradesh	40	84	31
2.	Assam ..	11	44	16
3.	Bihar	20	69	34
4.	Delhi	22	76	19
5.	Gujarat ..	107	544	132
6.	Himachal Pradesh	1	28	1
7.	Kerala ..	27	354	81
8.	Madhya Pradesh	115	496	9
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
		940	3,512	779

HIMACHAL PRADESH (3)

In the November 1960 and March 1961 issues of 'Metric Measures' lists of licensed manufacturers, dealers and repairers in Himachal Pradesh Administration were published. The following is a list of Dealers subsequently licensed under the Rajasthan Weights and Measures (Enforcement) Act, 1958 as extended to the Union Territory of Himachal Pradesh and Rules framed thereunder.

Dealers

Sl. No.	Name and Address of Dealer	Details of articles sold
(1)	Gobind Ram Anant Ram, Gohar Bazar, Bilaspur	Weights and Measures.
(2)	Goel Bros., Hardware Merchants, Dogra Bazar, Chamba	Cast iron weights, brass weights 50g to 10g.
(3)	Jagan Nath Prem Sagar, General Merchant, Chowari Bazar, Tehsil Bhatiyat, District Chamba.	Weights and Measures.
(4)	Multi-Purpose Co-operative Society, Banikhet, District Chamba.	Weights and Measures.
(5)	Munshi Ram Roshan Lal, General Merchant, Theog, Mahasu District.	Cast Iron and Bullion Weights.
(6)	Nand Lal & Sons, Gandhi Chowk, Mandi	Cast Iron, Brass & Bullion Weights, Conical capacity measures.
(7)	Paras Ram Devi Dass, Bhaujraru, Tehsil Tissa, District Chamba.	Weights and Measures.
(8)	Partap Chand Milkhi Ram, Hardware Merchants, Theog, District Mahasu.	Cast Iron Weights, Brass Weights, Beam Scales class C. & D. Metre.
(9)	Sharma Bros., The Mall, Solan, Mahasu District	Weights, Beam Scales.
(10)	Tara Chand, Kasumpti Bazar, Mahasu District	Cast Iron and Brass Weights, Beam Scales C. & D. Capacity Measures, Metre.
(11)	Wadhawa Mal Hari Chand, Chowgan Bazar, Chamba ..	Weights, capacity and length measures, beam scale.

KERALA (7)

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

Manufacturers

Sl. No.	Name and Address of Manufacturer	Details of articles manufactured
(1)	K. Chellappan Achary, Palaparambu Madom, Cullen Road, Mullackel, Alleppey.	Beam Scales (Class C. & D.).
(2)	Malabar Fisheries Company, Chaliyam P.O., (Via) Feroke	Capacity Measures.
(3)	HTW & NLWI Concern, Vellayil, Calcutta	Capacity Measures (Liquid and Dry).
(4)	T. T. Mohamed Koya, The Best Ox Brand Steel Trunk Works, Calcut.	Do.
(5)	Mukunda Agricultural Implements and Steel Trunk Works, Near Karimbana Bridge, Badagara.	Do.
(6)	V. Palani Achari, Ulladamparambu, Alleppey	Beam Scales.
(7)	Palliveed Industries, Tobacco Street, Calcut	Do.
(8)	Praveen Industries, P.O. Kadalundi, Via Feroke . . .	Capacity Measures (Conical and Dry).
(9)	C. K. Sankunny Nair, Cloth Bazar Road, Ernakulam ..	Capacity Measures (Conical Type).

LICENSED MANUFACTURERS, DEALERS & REPAIRERS OF WEIGHTS & MEASURES (18)

Dealers

Sl. No.	Name and Address of Dealers	Details of Articles Sold
(1)	K. Abdul and Brothers, Stationery Merchant, Main Bazar, Taliparamba.	Weights, Measures, Weighing and Measuring Instruments.
(2)	A. S. Aboobacker sait, Hardware Merchant, Marakada Road, Chalai, Trivandrum.	Weights, Measures, Weighing and Measuring Instruments.
(3)	M. Abdulsalam, Salam General Stores, Nedumangad P.O. Trivandrum District.	Weights, Measures, Weighing and Measuring Instruments.
(4)	P. Achutha Bhaktha, Merchant, Feroke, Nileswaram P.O.	Weights, Weighing and Measuring Instruments.
(5)	P. K. Antony, Hardware Stores, Main Road, Pudukad	Weights and Measures.
(6)	Ahmed and Brothers, Camp Bazar, Cannanore	Weights, Measures, Weighing and Measuring Instruments.
(7)	K. S. Balakrishnan Nair, Kudukail House, Chemmanathukara, Vaikom.	Weights, Measures, Weighing and Measuring Instruments.
(8)	Bharath Repairing and Sales Corporation, Cannanore	Weights, Measures, Weighing and Measuring Instruments.
(9)	Bhima and Brothers, Jewellers, Mullackal, Alleppey ..	Bullion Weights
(10)	Bhaktha Brothers, Hardware and General Merchants, Kasargod.	Weights and Measures.
(11)	K. P. Chacko, Hardware Merchant, Edathuva	Weights, Measures, Weighing and Measuring Instruments.
(12)	K. V. Chandy, Hardware Merchant, Thiruvalla	Weights, Measures, Weighing Instruments.
(13)	M. M. Chacko, Jewellers, Changanacherry	Weights and Weighing Instruments.
(14)	S. Damodara Pai, Hardware Merchant, Alleppey	Weights, Measures, Weighing and Measuring Instruments.
(15)	Edathil Kadiri and Sons, Merchants, Manantoddy, P.O.	Weights, Measures, Weighing and Measuring Instruments.
(16)	K. K. Gopalan Nair, Jayachandra Hardwares, Alleppey	Weights, Measures, Weighing and Measuring Instruments.
(17)	P. S. George, General Merchants, Edathua	Weights, Measures, Weighing and Measuring Instruments.
(18)	A. Hassankunju, Hardware Merchants, Kayamkulam ..	Weights, Measures, Weighing and Measuring Instruments.
(19)	Hilal Traders, Main Road, Tellicherry	Weights, Measures and Weighing Instruments.
(20)	Hajee K. Beeran and Company, Merchants, Payyannur	Weights, Measures, Weighing and Measuring Instruments.
(21)	M. A. M. Haneefa and Brother, Brass Vessel Merchants, Chalai, Trivandrum-1	Weights, Measures, Weighing and Measuring Instruments.
(22)	Hameedia General Stores, Nedumangad	Weights, Measures, Weighing and Measuring Instruments.
(23)	Industrial Sales Agencies, Kottayam	Weights, Measures, Weighing and Measuring Instruments.
(24)	V. J. Ittiavira, Iron Merchant, Ponkunnam	Weights, Measures, Weighing and Measuring Instruments.
(25)	M. Ismail Kunju, Ismail Stores, Nedumangad	Weights, Measures, Weighing and Measuring Instruments.
(26)	V. P. Janardhana Shenoi, General Merchant, Muttatheyili, Shertallay.	Weights, Measures, Weighing and Measuring Instruments.
(27)	V. Janardhanan Pillai, Hardware Merchant, Ambika Stores, Attingal.	Weights, Measures, Weighing and Measuring Instruments.
(28)	K.A.S. Jainudeen and Company, General Merchants, Chowghat.	Weights, Weighing, and Measuring Instruments.

Dealers (Contd.)

Sl. No.	Name and Address of Dealers	Details of Articles Sold
(29)	T.T. Joseph, Hardware Merchant, Kandassankadavu ..	Weights and Measures.
(30)	K. Kesava Reddiar, Gold and Jewellery Merchant, Main Road, Qulon.	Bullion Weights and Weighing Instruments.
(31)	Keloth Moidu Hajee, Thirumana Bazar, Villiappally	Weights, Measures, Weighing and Measuring Instruments.
(32)	K.K. Kunju Marakar and Sons, Hardware Merchants, Jews Street, Ernakulam	Weights, Measures, Weighing and Measuring Instruments.
(33)	M.V. Kunju Palu, C/o, M.D. Vareeth, Hardware Merchant, High Road, Trichur.	Weights and Measures.
(34)	P.V. Kurian, Hardware Merchant, Athirampuzha	Weights and Measures.
(35)	Kerala Hardwares, New Bazar, Alleppey	Weights, Measures, Weighing and Measuring Instruments.
(36)	Kovoor Brothers, Hardware Merchants, Thiruvella. . .	Weights and Measures.
(37)	Kalathil Gopi, Pradeep Industries, Chowghat	Weights and Measures.
(38)	T.T. Mathew, Hardware and Stationery Merchant, Market Road, Irinjalakuda.	Weights, Measures, Weighing and Measuring Instruments.
(39)	M.A. Moideen, Sheriif Stores, Hardware Merchant, Big Bazar, Palghat.	Weights, Measures, Weighing and Measuring Instruments.
(40)	E. Muthuswamy and Brothers, Swamy Jewellery, Big Bazar, Palghat.	Bullion Weights and Weighing Instruments.
(41)	P. J. Mathew, Kaithakam Mart, Kottayam	Weights, Measures, Weighing and Measuring Instruments.
(42)	K. Mohan Das and Brothers, Hardware Merchant Big Bazar, Alleppey.	Weights, Measures, Weighing and Measuring Instruments.
(43)	P. Madhavan Thampi, Brass Vessel Merchant, Chalai, .. Trivandrum	Weights and Measures.
(44)	P.L. Mathew, Hardware Merchant, Kanjirappally	Weights, Measures, Weighing and Measuring Instruments.
(45)	C.M. Mammu, General Merchant, Cannanore P.O. . . .	Weights and Measures.
(46)	K.K. Mathai and Sons, Hardware Merchants, Changanacherry.	Weights and Weighing Instruments.
(47)	N. Maideen Kannu, Merchant, Chalai, Trivandrum	Weights, Measures, Weighing and Measuring Instruments.
(48)	T.M. Mohammed Abdul Khadar, Chalai, Trivandrum . . .	Weights, Measures, Weighing and Measuring Instruments.
(49)	M.K.M. Maluk Mohammed, Hardware Merchant, Chalai, Trivandrum.	Weights, Measures, Weighing and Measuring Instruments.
(50)	P. Mammoo, Stationery Merchant, Villiappally, Via. Badagara	Weights, Measures, Weighing and Measuring Instruments.
(51)	M.A. Mohammed, Brass Vessel Merchant, Chalai, Trivandrum.	Weights, Measures, Weighing and Measuring Instruments.
(52)	S. Nainar Pillai, Hardware Merchant, Muttam Bazar, Shertallai.	Weights, Measures and Weighing Instruments.
(53)	G. Narayana Pai, C/o. G.N. Pai and Company, Hardware Merchant, Kottayam.	Weights, Measures, Weighing and Measuring Instruments.
(54)	T. M. Ouseph and Sons, Hardware Merchants, Kandassankadavu.	Weights, Measures, Weighing and Measuring Instruments.
(55)	Peeyer and Sons, Kottayampil, Koothuparamba, Tellicherry	Weights, Measures, Weighing and Measuring Instruments.
(56)	Pallikkandy Uommarkutty and Brothers, Camp Bazar, Cannanore.	Weights, Measures, Weighing and Measuring Instruments.
(57)	A.P. Packery, Hardware Merchant, Taliparamba	Weights, Measures, Weighing and Measuring Instruments.

Dealers (Contd.)

Sl. No.	Name and Address of Dealers	Details of Articles Sold
(58)	Paul and Mathew, Jewellers, Trichur	Bullion Weights and Weighing Instruments.
(59)	M. Raghunath, Vaman Baliga, Car Street, Manjeshwar ..	Weights and Measures.
(60)	D. Rama Pai, Usha Hardwares, New Bazar, Alleppey ..	Weights, Measures, Weighing and Measuring Instruments.
(61)	D. Raghavendra Kamathy, Mohan Hardware Stores, Shertallai.	Weights, Measures, Weighing and Measuring Instruments.
(62)	K. V. Raman, Copper and Brass Vessel Merchant, Main Bazar, Payannur.	Weights, Measures, Weighing and Measuring Instruments.
(63)	K. Rajappan Achary, Raja Brother Jewellers, Mullakkal, Alleppey.	Weights, Measures, Weighing and Measuring Instruments.
(64)	K. Rajarathinam, Hardware Merchant, Mannarghat	Weights, Measures, Weighing and Measuring Instruments.
(65)	T.O. Rappai, General Merchant, Kandassankadavu, Trichur	Weights and Measures.
(66)	T V. Sadasivan, Merchant, Mannarghat, Palghat	Weights, Measures, Weighing and Measuring Instruments.
(67)	M. Sadananda Pai and Company, Tellicherry	Weights, Measures, Weighing and Measuring Instruments.
(68)	V. Shira Shenoi, Hardware Merchants, Tellicherry	Weights and Measures.
(69)	South India Central Stores, Mundakkayam	Weights, Measures, Weighing and Measuring Instruments.
(70)	W.S.M. Sulaiman, Wavoo Sons, Jewellers, Thirunakkara, Kottayam.	Weights and Weighing Instruments.
(71)	N.P. Thomas, Stationery and Hardware Merchant, Athirampuzha, P.O. Kottayam	Weights, Measures, Weighing and Measuring Instruments.
(72)	Thottan Kunjippalu Rappai and Sons, Jewellers, Trichur	Bullion Weights and Weighing Instruments.
(73)	T.A. Varghese, Hardware Merchant, Market Road, Irinjalakuda.	Weights, Measures, Weighing and Measuring Instruments.
(74)	L.N. Venkitarama Gouder and Sons, Hardware Merchants, Palghat.	Weights, Measures and Weighing Instruments.
(75)	Venugopal Stores, Hardware Merchants, West Gate, Vaikom	Weights and Measuring Instruments.
(76)	B. Yahia Firm, Hardware Merchant, Camp Bazar, Cannanore	Weights, Measures, Weighing and Measuring Instruments.

Repairers

Sl. No.	Name and Address of Repairers	Details of Articles Repaired
(1)	P.K. Abdul Karim, Thattakatta, thekethil Veedu, Karunagapally.	Weights, Measures and Beam Scales.
(2)	P. M. Abdul Khadar, Hardware Merchant, Main Road, Tellicherry.	Weights and Beam Scales.
(3)	Alleppey Metal Industries. Near Stone Bridge, Alleppey ..	Weights, Measures and Beam Scales (Class C&D).
(4)	Ambalparambil Ayyappan, P.O. Kadalundi	Weights and Beam Scales.
(5)	Arumughom Achary, Thayil Veedu, Alleppey	Weights, Measures and Beam Scales (Class C & D).
(6)	A.P. Ayyappan, P.O. Kadalundi, (Via) Feroke	Beam Scales.
(7)	Aruna Foundry and Engineering Works (Private) Limited, N.S.M. Mount P.O., Kottayam.	Platform Machines.
(8)	A.P. Ayyappan, P.O. Kadalundi, (Via) Feroke	Beam Scales (Classes C&D).

Repairers (Contd.)

Sl. No.	Name and Address of Repairers	Details of Articles Repaired
(9)	Bharat Repairing and Scales Corporation, Cannanore	.. Beam Scales.
(10)	Bismulla Hardware Stores, Big Bazar, Palghat Beam Scales.
(11)	C.K. George, Cheriakottackal House, Kalloopara P.O.	.. Platform Machines.
(12)	Kalathil Gopi, Pradeep Industries, Ghowghat Beam Scales.
(13)	Hilal Traders, Big Bazar, Calicut Weights and Beam Scales.
(14)	Hamson Industries, Pappinasseri Beam Scales.
(15)	K.M. Haneefa, Kizhakkallazhi Veedu, Edava Beam Scales (Classes C&D).
(16)	M.A.M. Haneef and Brother, Brass Vessel Merchants, Chalai, Trivandrum.	Beam Scales (Classes C&D).
(17)	V.J. Joseph, Near English Church, Kozhikode-1 Weights and Beam Scales.
(18)	Jayaraj Foundry and Engineering Works, Millar Road, Tellicherry	Platform Machines and Beam Scales.
(19)	K. Kesavan Achary, C/o. Trivandrum Gold, Silver and Jewellers, Association, Chalai, Trivandrum.	Beam Scales.
(20)	P.C. Kelappan and Sons, Thavam, Pazhayangadi, Cannanore	Beam Scales.
(21)	Mukunda Agrl. Implements and Steel Trunk Works, Badagara, Trivandrum.	Beam Scales.
(22)	M.K. Mohammed Nana, Barkath Metal Industries, Chalai, Trivandrum.	Beam Scales.
(23)	Mather Stores, P.B. No. 2, Trivandrum Beam Scales (Classes C & D).
(24)	P. Madhavan Thampi, Brass Vessel Merchant, Chalai, Trivandrum.	Do.
(25)	Mighty Scale Company, Kurancherry, Wadakkandherry (Cochin).	Weighing Instruments.
(26)	P. Natarajan, Biscuit Block, Chalai, Trivandrum Beam Scales, (Classes C & D).
(27)	P. B. Natarajan Chertiyar, Selva Industries, Shertallai	.. Weights, Measures and Beam Scales.
(28)	Popular Industries, Robinson Road, Calcutta-1	.. Weights and Beam Scales.
(29)	Palliveetil Mammed Koya and Brothers, 9/88, Tobacco Street, Calicut.	Platform machines and Beam Scales.
(30)	Palani Achary, Ulladan Parambu, S. D. Puram, P.O. Alleppey.	Beam Scales (Classes C & D).
(31)	P. N. and Sons, Kottayampri, Koothuparamba, Tellicherry.	Beam Scales.
(32)	Palghat District Rice Mill Owners' and Rice Merchants Association, Palghat.	Platform Machines.
(33)	P. Ramachandran Achary, Parakkudi Veedu, T.C. 30/267, Kuttikkadu, Manacaud, Trivandrum-9.	Beam Scales and Platform Machines.
(34)	P. Raghavan Unni Nair, 2/104 A, Cur Road, Tirur	.. Weights and Beam Scales.
(35)	A. L. Rodrigues, Metal Merchant, Jalur Road, Kasargode.	Do.
(36)	Scales and Services, Ramanarayana Building, Logam's Road, Tellicherry.	Platform Machines.
(37)	W. B. Sivanandan, Prop: "Weights and Measures", Near 3rd Rly. Gate, Kozhikode.	Beam Scales.
(38)	Scales Repairing Workshop, Wadakkechanthrapadi, Manjeri.	Weights and Beam Scales.
(39)	K. N. Sreedharan Nair, T. C. 749/23, Perumthanni, Trivandrum.	Beam Scales.
(40)	Southern Scales Services, Melamuri, Palghat-1	.. Weighing Instruments.
(41)	Southern Scales Services, Royal Lunch Home, Fort Road, Cannanore.	Do.

Repairers (Contd.)

Sl. No.	Name and Address of Repairers	Details of Articles Repaired
(42)	A. Shahul Hameed, Manacaud, Kallathumukku, Trivandrum.	Beam Scales (Classes C & D).
(43)	K. Shanmughom Achary, Roduvila Veedu, Thottakkadu, Attingal.	Do.
(44)	A. Shahul Hameed, Kadayaravilakam, Thaiveedu, Balamapuram.	Do.
(45)	S. Shahul Hameed, Hardware Merchant, Main Road, Attingal.	Do.
(46)	M. Thankappan Pillai, Kuzhivila Veedu, Kattakkada ..	Do.
(47)	Western Scales and Services, 9/88, Tobacco Street, Calcutta-1.	Weighing Instruments.

CANCELLATIONS

The following dealers licenses have since been cancelled by the Controller of Weights and Measures, Kerala :—

Reference

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| (1) | V. M. Mammeo, Hardware Merchant, Cloth Bazar Road, Ernakulam. | Item No. 26 on page 24 of November 1960, <i>Metric Measures</i> . |
| (2) | K. R. Narayanan, Karippayil House, General Merchant, Market Road, Ernakulam. | Item No. 60 on page 41 of January 1961, <i>Metric Measures</i> . |
| (3) | T. M. Ouseph, Hardware Merchant, Kandassankadu, Trichur Dist. | Item No. 20 on page 43 of September 1961, <i>Metric Measures</i> . |
| (4) | A. S. Mani, V. P. Vilas, Parry & Co., Junction, Quilon | Item No. 54 on page 41 of January 1961, <i>Metric Measures</i> . |
| (5) | Oorampalli Engg. Works, Mudakkal West, Quilon. | |

MADHYA PRADESH (5)

In the May and July, 1960 and January and May, 1961 issues of Metric Measures lists of manufacturers, dealers and repairers of Weights and Measures in Madhya Pradesh State were published. The following is a list of manufacturers, dealers and repairers subsequently licensed under the Madhya Pradesh Weights and Measures (Enforcement) Act, 1959 :

Manufacturers

Sl. No.	Name and Address of Manufacturers	Details of Articles Manufactured
(1)	Anil Metal Industries, 1047, Lane Gaushala, Agra ..	Weight.
(2)	Bapulal Panna, Kothari Pipala Mandi, Mahavir Factory, Mandsaur.	Weights and Measures.
(3)	Bhilai Engineering Corporation Private Limited, Post Box 31, Bhilai Steel Plant, Bhilai.	Weights and Measures.
(4)	Bhilai Engineering Works, Industrial Estate, Bhilai ..	Weights and Measures.
(5)	Bilaspur Iron and Steel Works, Tar Bhar Naka, Bilaspur.	Measures.
(6)	Bilaspur Sheet Metal Works, Near Pratap Talkies, Bilaspur.	Weights, Capacity Measures.
(7)	Ganga Iron and Steel Works, Canal Road, Harpalpur, (District Chhatarpur).	Measures.

Manufacturers (Contd.)

Sl. No.	Name and Address of Manufacturers	Details of Articles Manufactured
(8)	Gopal Prasad and Sons, 887, Barha Bhai Street, Belanganj, Agra.	Brass Weights.
(9)	Indore College, Industries, Siyaganj, Indore	Measures and Measuring Industries.
(10)	Iron and Brass Foundry, New Delhi, Ujjain	Weights.
(11)	Jawahar Tin Factory, Bhutta Bazar, Ratlam	Measures, Weighing and Measuring Instruments.
(12)	Mahavir Metal Industries, Karera, Bazar, Ratlam ..	Weights.
(13)	Universal Engineering and Scientific Works, 33, Kingsway Cantonment, Jabalpur.	Weights.
(14)	Union Iron and Steel Works, Industrial Estate, Indore	Weights and Measures.
(15)	Seth Narayandass, Cotton Ginning and Pressing Factory, Mandasaur.	Weights, Measures, Weighing and Measuring Instruments.
(16)	Raipur Metal Products Private Limited, Khamtari, Raipur-Bilaspur Road, Raipur.	Weights and Measures.
(17)	Superintendent, Gun Carriage Factory, Jabalpur ..	Weights.
(18)	Solanki Work Shop, Civil Station Road, Raipur ..	Weights.

Dealers

Sl. No.	Name and Address of Dealers	Details of Articles Sold
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Bhopal Division

(1)	Abbas Husain, Jawahar Chowk, Bhopal	Weights.
(2)	Agrawal Agencies, Shop No. 2, Opposite Sindhi Cloth Market, Bhopal.	Weights and Measures.
(3)	Amritlal Nathu Rade, Betul	Measures, Weighing and Measuring Instruments.
(4)	Abdul Gaffar Ahmed, Kirana Merchant, Betul	Do.
(5)	Babulal Ramesh Chand, Hardware Merchants, Ganj-Basoda (District—Vidisha).	Do.
(6)	Bhagwandas Phool Chand Sahu, Kirana Merchants, Chowk Bazar, Sohagpur (District—Hoshangabad).	Weights and Measures.
(7)	Babu Ram Khilawan Ramdhin Jaiswal, Kirana Merchants, Sohagpur, (District—Hoshangabad).	Do.
(8)	Balmukand Ram Narain, Kirana Merchant, Piparia (District—Hoshangabad).	Weights, Measures, Weighing and Measuring Instruments.
(9)	Bhanwarlal Ballabhadass, General Merchant, Tagore Road, Khilchipur, (District—Raigarh).	Do.
(10)	Chandrabhan Jamna Parsad, Hoshangabad	Weights and Measures.
(11)	Chouthaji Tulsi Ram & Sons, Gandhi Chowk, Harda (District—Hoshangabad).	Do.
(12)	Durga Prasad Kanhiyalal Jaiswal, Kasera Bazar, Itarsi (District—Hoshangabad).	Do.
(13)	Gothi Bros, Sarafa Bazar, Itarsi, District—Hoshangabad	Weights Measures, Weighing and Measuring Instruments.
(14)	Gopi Krishan Kanhiyalal, Sarafa Market, Susner, (District—Shajapur).	Weights, Measures, Weighing and Measuring Instruments.
(15)	Hukum Chand Gendalal Jain, Narabada Road, Hoshangabad.	Weights and Measures.
(16)	Harlal Phoolchand Agrawal, Banapura (Tah—Seonimalwa), District—Hoshangabad.	Do.
(17)	Kalu Ram Suraj Mal Bhandari, Jawahar Marg, Rajgarh	Weights.

LICENSED MANUFACTURERS, DEALERS & REPAIRERS OF WEIGHTS & MEASURES (18)

Dealers (Contd.)

Sl. No.	Name and Address of Dealers	Details of Articles Sold
(18)	M. Gulam Hussain M. Yusufali, General Merchants, Basoda, (District—Vidisha).	Weights, Measures, Weighing and Measuring Instruments.
(19)	Mohsin Ali Fakhruddin, Hardware & Iron Merchant, Loha Bazar, Vidisha.	Do.
(20)	Mohammad Hussain M. Ahsan Ali, Rana Pratap Ward, Harda (District—Hoshangabad).	Weights and Measures.
(21)	Mohanlal Bhagirath Prasad Sharma, Sobhapur Road, Via-Piparia, District—Hoshangabad.	Weights, Measures, Weighing and Measuring Instruments.
(22)	Mohd. Haidar & Sons, Bareilly, (District—Raisen) . . .	Do.
(23)	Pt. Chander Bhanji Laxmi Narayan Joshi, Hardware Merchant, Sohagpur (District—H'bad).	Do.
(24)	Peerkhanji M. Salehmohamadji, Abdul Kalam Azad Road, Shajapur.	Weights, Measures, Weighing and Measuring Instruments.
(25)	Roop Chand Jeet Mal, Hardware Merchant, Chopad Bazar, Barasia, (District—Sehore).	Do.
(26)	Shivdayal Rameshwar Dayal, Sarafa Bazar, Itarsi (District—H'bad).	Weights and Measures.
(27)	Ram Hari Ram Lohia, Iron Merchant, Hoshangabad . .	Weights.
(28)	Sh. Ram Das Agarwal, Gandhi Chowk, Harda (District—H'bad).	Weights and Measures.
(29)	Shyam Sunder, Dargar Stores, Bareilly (District—Raisen)	Weights Measures, Weighing and Measuring Instruments.
(30)	The Madhya Pradesh State Co-operative Marketing Society Limited, Itarsi (District—Hoshangabad).	Do.
(31)	Tulsiram Ramchandra, General Merchant, Biaora (District—Rajgarh).	Do.
(32)	The Poorna Co-operative Marketing Association Limited, Bhainsdehi (Betul).	Do.
(33)	The Grain and Oil Seed Merchants Association, Itarsi . .	Do.

Gwalior Division

Sl. No.	Name and Address of Dealers	Details of Articles Sold
(1)	Bhargava Bandhu, Pichhore, District—Shivpuri	Weights, Measures and Weighing Instruments.
(2)	Batta Mal Sampat Ram, Iron Merchants, Paret Chauraha, Bhind.	Weights and Measures.
(3)	Badri Nath and Sons, Sarafa Bazar, Lashkar (Gwalior)	Metric Measures.
(4)	Chhakkaram Gyasiram Gohad, (District—Bhind)	Weights, Measures and Weighing Instruments.
(5)	Dharmeshwar Nath Harihar Nath, Hospital Road, Morena	Weights.
(6)	Gopaldas Kashi Ram, Hardware Merchant, Ahok Nagar, (Guna).	Weights, Measures, Weighing and Measuring Instruments.
(7)	Ganga Ram Hari Shanker Diwan, Iron Merchants, Mandi, Sabalgarh.	Do.
(8)	Iron Association, Pichhore, (District—Shivpuri)	Do.
(9)	Kanhiya Lal S/o Ram Charan, Iron Merchant, Lahar (District—Bhind).	Do.
(10)	Lal Behari Gupta, Gohad (District—Bhind)	Weighing Machines.
(11)	Loyiya Iron and Steel Traders, Mandi Gandhi Ganj, (District—Bhind)	Weights, Measures, Weighing and Measuring Instruments.

Dealers (Contd.)

Sl. No.	Name and Address of Dealers	Details of Articles Sold
(12)	Mool Chand Ayodhya Prasad, Dal Bazar, Laskar (Gwalior)	Weights, Measures, Weighing and Measuring Instruments.
(13)	Ratan Singh, Raghuwanshi, Grain-Merchant, Ashoka Nagar, (District—Guna).	Weights and Measures.
(14)	Ram Swarup Jagannath Jain, Iron Merchant, Lohia Bazar, Morena.	Weights, Measures and Weighing Instruments.
(15)	Seetaram Gangaram, Nakhera, Near Police Station, Gohad. (District—Bhind).	Weights and Measures.
(16)	Swroop Chand Manak Chand Jain, Mehgaon (District—Bhind).	Weights, Measures, Weighing and Measuring Instruments.
(17)	Shyam Lal Gendalal Jain, Kirana-Merchant, Khaniadhana, (District—Shivpuri).	Do.
(18)	Shukla Brothers, Kunjanpura, (District—Datia)	Do.

Jabalpur Division

Sl. No.	Name and Address of Dealers	Details of Articles Sold
(1)	Abdul Kuyam Gulzar Husain, Budhwara Bazar, Seoni ..	Weights Measures, Weighing and Measuring Instruments.
(2)	Abhaya Kumar Ajit Kumar Jain, Cloth Merchant, Main Road, Balaghat.	Weights, Measures and Measuring Instruments.
(3)	Gupta Kirana Stores, Ranjhu Bazar, Jabalpur	Weights, Measures, Weighing and Measuring Instruments.
(4)	Gupta Hardware Merchant, Main Road, Balaghat	Weights.
(5)	Gokul Pd. Ramnarayan Agrawal, Medicine, General and Hardware Merchants, Mandla Fort, Mandla.	Weights, Measures, Weighing and Measuring Instruments.
(6)	Ganga Hardware Stores, Main Road, Katni ..	Weights and Measures.
(7)	Hamid Bhai Noor Bhai, Hardware Merchant, Katra Bazar, Sagar.	Do.
(8)	Kunjital Kishanlal Agrawal, Nehru Road, Seoni ..	Weights, Measures, Weighing and Measuring Instruments.
(9)	Mohanlal Gopal Krishna Gupta, Tinbathi, Katra Bazar, Sagar.	Do.
(10)	Moolchand Vaidya, Sagar ..	Do.
(11)	Mohanlal Basudeo Pd., Sarafa Bazar, Hanuman Ganj, Katni	Iron and Brass Weighing Instruments.
(12)	Motilal Nemichand Jain, Narsinghpur ..	Weights, Measures, Weighing and Measuring Instruments.
(13)	Onkarchand Deegar & Co., Iron, Hardware and Tumber Merchants, Near Shiv Talkies, Naya Bazar, Sagar.	Do.
(14)	Ramdas Satbhajya & Sons, Katra Bazar, Sagar	Do.
(15)	The Anand Agency, Katra Bazar, Sagar ..	Weights and Measures.
(16)	The Secretary, Rashtriya Tamrakar Udyog, Co-operative Society Ltd., Mandla.	Weights.
(17)	Vijaya Traders, 617, Gandhi Marg, Jabalpur	Weights, Measures, Weighing and Measuring Instruments.

Raipur Division

Sl. No.	Name and Address of Dealers	Details of Articles Sold
(1)	Abdul Husain M Allaum, Station Road, Raipur	Weights, Measures and Weighing Instruments.
(2)	Buwalal Ratanlal & Sons, Ganj Line, Rajnandgaon	Weights, Measures, Weighing and Measuring Instruments.

Dealers (Contd.)

Sl. No.	Name and Address of Dealers	Details of Articles Sold
(3)	Basakmal Sabaldas, Hardware Merchant, Sadar Bazar, Dhamtari, (District—Raipur).	Weights and Measures.
(4)	Ganpatlal Kaluram, Hardware and Kirana Merchants, Baloda Bazar, Raipur.	Do.
(5)	Harnarayan Mukundlal, Sadar Bazar, Rajnandgaon ..	Weights, Measures, Weighing and Measuring Instruments.
(6)	Harilal Jiv Raj, Sadar Bazar, Dhamtari, (District—Raipur)	Weights, Measures and Measuring Instruments.
(7)	Jayantilal & Co., 12 Ramdev Market, Raipur	Weights, Measures, Measuring and Weighing Instruments.
(8)	Janta Watch and Radio House, Cinema Line, Rajnandgaon ..	Do.
(9)	Jugal Kishore Musadilal, Hardware Merchant, Dongargarh, (Raipur).	Do.
(10)	Kanchedulal Kunjilal, Hardware Merchant, Baloda Bazar, Raipur.	Weights and Measures.
(11)	Loh Bhandar, Jagdalpur, (Bastar)	Do.
(12)	Mulla Hasanali Mulla Abdul Hussain, Azad Chowk, Sadar Bazar, P. Box 20, Rajnandgaon.	Weights, Measures, Measuring and Weighing Instruments.
(13)	Narendra Kumar and Co., Main Road, Jagdalpur	Do.
(14)	Narayan Pd. Ram Gopal, Kirana and Hardware Merchant, Gudrupara, Mahasamud, District—Raipur.	Weights and Measures.
(15)	Shambhoolal Ganeshlal, Hardware shop, Rajnandgaon ..	Do.
(16)	Shyam General Stores, Dudiari, Raipur	Do.
(17)	M.P. Hardware & Machinery Mart, Surana Bungalow, Station Road, Durg.	Weights, Measures, Weighing and Measuring Instruments.

Rewa Division

Sl. No.	Name and Address of Dealers	Details of Articles sold
(1)	Ali Husain, Seth Haji Mulla, Mazaffar Husain, Main Road, Shadhol.	Weights, Measures, Weighing Instruments.
(2)	Chandra Bhan Madan Mohan, Satana	Do.
(3)	Dashrat Prasad Rameshwar Pd., Chowk Bazar, Satana	Weights, Measures, Weighing and Measuring Instruments.
(4)	Gauri Shanker Ramdin, Hardware & Kirana Merchants, Harpalpur (District—Chattarpur).	Weights.
(5)	Har Prasad Ghasi Ram Lohia, Main Bazar, Tikamgarh ..	Weights, Measures and Weighing Instruments.
(6)	Lakhan Lal Raja Singh, Metric Weights Store, Khajuraha, District—Chhatarpur.	Weights.
(7)	Marketing Cooperative Society Ltd., Sidhi	Weights, Measures and Weighing Instruments.
(8)	Maganlal Goel, General Merchants, Sabji Mandi, Tikamgarh	Do.
(9)	Raj Hans Partners, Nagar Mandi, Tikamgarh	Weights and Measures.
(10)	Raja Ram Ganesh Pd. Lohia, Bara Bazar, Tikamgarh ..	Weights, Measures, Weighing Instruments.
(11)	Ram Bharosa Ram Dulare, Chohta Bazar, Rewa	Weights, Measures, Weighing and Measuring Instruments.
(12)	Ram Gopal Sunderlal, Janki Park, Rewa	Weights, Measures and Weighing Instruments.
(13)	Sunder Lal Lohia, Iron Merchant, Tikamgarh	Weights and Weighing Instruments.

Dealers (Contd.)

Sl. No.	Name and Address of Dealers	Details of Articles Sold
Bilaspur Division		
(1)	M/s. Asha Ram Govind Ram, Sadar Bazar, Raigarh ..	Weights, Measures and Beam Scales.
(2)	Anandlal Gahlot, Pendra Road, Bilaspur	Do.
(3)	Ajodhya Pd. Permeshri Dass, Kirana and Oil Merchant, Raigarh.	Iron, Brass Weights and Measures.
(4)	Bhura Mal Hanuman Begas, Gattari, Naila, (Distt. Bilaspur)	Weights, Measures, Beam Scales and Measuring Instruments.
(5)	Bhura Mal Hanuman Begas, Gattari, Iron and Hardware Merchants, Akaltara (Distt.—Bilaspur).	Do.
(6)	Banarsilal Kishan Gopal, Hardware and Manikari Merchants, Sadar Bazar, Ambikapur.	Weights, Measures and Weighing Instruments.
(7)	Bhagwandass Ramdass and Co, Bara Bazar, Chirmiri (Distt.—Surguja).	Weights, Beam Scales and capacity Measures.
(8)	Banarsidass Samraj, Hardware and General Merchants, Sadar Road, Ambikapur (Distt.—Surguja).	Weights, Measures, Beam Scales and Measures.
(9)	Bhagwati Pd. Om Prakash, Hardware Merchants, Naila, (Distt.—Bilaspur).	Weights, Measures, Beam Scales and Measures.
(10)	Birendra Kumar Bose and Bros., General Merchants, V.P.O. Kurasia Colony (Distt.—Surguja).	Weights.
(11)	Bhagat Ram Shri Kishan Agarwal, Station Road, Kharsia, (Distt.—Surguja).	Weights Measures and Weighing Instruments.
(12)	Cooperative Marketing Society, Sakti (Distt.—Bilaspur) ..	Do.
(13)	Banarsilal Fathechand, Naila, (Distt.—Bilaspur) .. \	Do.
(14)	Chotalal Shri Kishan Agrawal, Subhash Chok, Raigarh	Weights, Measures, Weighing and Measuring Instruments.
(15)	Chandulal Lakhiram, Shop No. 6, Garj Kharsia (Distt.—Surguja).	Weights, Measures and Weighing Instruments.
(16)	Devidattamal Amrk Singh, Sadar Bazar, Ambikapur (Distt.—Surguja).	Weights, Measures, Weighing and Measuring Instruments.
(17)	Ebrahim Bhai Musaji, Hardware Merchants, Sadar Bazar, Bilaspur.	Weights, Measures and Measuring Instruments.
(18)	E. Musekhan Kader Bhai, Sadar Bazar, Bilaspur	Weights and Measures.
(19)	Gohil Hardware Stores, Juna, Bilaspur	Weights, Measures and Weighing Instruments.
(20)	Gyan Chand Guglani, General Merchants, Sadar Bazar, Raigarh.	Weights and Measures.
(21)	G. Abdulla Bhay & Bros., General Merchants, Champa, (District—Bilaspur).	Weights, Measures and Weighing Instruments.
(22)	Hradhar Vishnoolal Kesharwani, Akbargnj, Sarangarh, (District—Raigarh).	Do.
(23)	International Stores, Jashpur Nagar, (Distt.—Raigarh) ..	Weights
(24)	Jamnadas Kanhiyalal, Sadar Bazar, Raigarh	Weights and Measures.
(25)	Khaildas Shewaram, Budhwani Bazar, Bilaspur	Weights and Measures.
(26)	Kailash Pd. Sahu, Kirana Merchant, Jashpur Nagar, (Distt.—Raigarh).	Weights, Measures, Weighing and Measuring Instruments.
(27)	Lalman Santlal, Hardware and Iron Merchants, Sakti (Distt.—Bilaspur).	Weights, Beam Scales and Measures.
(28)	Laxminarayan Badri Pd., Hardware Merchant, Sadar Bazar, Champa (Distt.—Bilaspur).	Weights, Measures and Weighing Scales.
(29)	Mohar Singh Dalp Singh, Sadar Road, Ambikapur, Distt.—Surguja.	Weights, Measures and Weighing Instruments.
(30)	Mahabir Pd. Tara Chand Jain, Maila (Distt.—Bilaspur) ..	Weights, Measures and Measuring Instruments.

LICENSED MANUFACTURERS, DEALERS & REPAIRERS OF WEIGHTS & MEASURES (18)

Dealers (Contd.)

Sl. No.	Name and Address of Dealers	Details of Articles Sold
(31)	Mulla Ahsan Hussain H.M. Abdul Hussain, Sadar Bazar, Bilaspur.	Weights, Measures and Scale Balances.
(32)	Maman Chand Ram Niwas Agrawal, Sadar Bazar, Raigarh	Weights and Measures.
(33)	Manoharlal Chunnilal Agrawal, Main Road, Dharamjaigarh (Distt.—Raigarh).	Weights, Measures, Weighing and Measuring Instruments.
(34)	M. Salim M. Haroon, Akaltara, Distt.—Bilaspur ..	Weights and Measures.
(35)	National Hardware Stores, Juna, (Distt.—Bilaspur) . .	Weights and Beam Scales.
(36)	Priyag Raj Agrawal, Sadar Road, Ambikapur (Distt — Surguja).	Iron and Brass Weights.
(37)	Ram Kumar Agrawal, Pathalgaon, Distt.—Raigarh .	Weights, Measures and Measuring Instruments.
(38)	Ram Nath Bhimsen, Kharsia, District—Raigarh	Iron and Brass Weights, Beam Scales and Measures.
(39)	Ramalal Kashiram, Cement Stockist, Bilaspur .	Weights.
(40)	Shah Uttam Chand Kalyanji, Sadar Bazar, Raigarh	Weights.
(41)	Swaraj Bhan Baij Nath Modi, Sarangarh Road, Raigarh	Weights, Measures and Beam Scales.
(42)	Santosh Singh Brij Mohan, Surya Bhawan, Narain Road, Juna (Distt.—Bilaspur).	Do.
(43)	Sher Singh Mohan Singh, Sadar Road, Ambikapur (Distt.—Surguja).	Weights, Capacity Measures and Weighing Instruments.
(44)	Shri Krishna Iron & Hardware Stores, Juna (Distt.—Bilaspur)	Weights, Measures, Weighing and Measuring Instruments.
(45)	Shanker Pd. Kasri, Mangli Bazar Road, Pendra Road, Bilaspur.	Weights, Measures and Measuring Instruments.
(46)	Ramji Stores, Kunkuri, (Tah-Jashpur, Distt. Raigarh) ..	Weights, Measures and Weighing Instruments.
(47)	Shiv Kumar Pawan Kumar, Hardware Merchant, Mahatma Ghandi Road, Korba (Distt.—Bilaspur).	Weights, Measures and Beam Scales.
(48)	Shankerlal Surajbhan, General Stores, Sakti, (Distt. Bilaspur)	Do.
(49)	The Raigarh Co-operative Marketing Society Ltd., Raigarh	Weights.
(50)	The Nutan Stores, Pendra Road, Bilaspur	Weights, Measures and Weighing Instruments.
(51)	Vallabhadas Ram Narayan Gupta, Subhash Chowk, Khilchipur, (Distt.—Raigarh).	Weights, Measures, Weighing and Measuring Instruments.

Indore Division

Sl. No.	Name and Address of Dealers	Details of Articles Sold
(1)	Agrawal Loha Bhandar, 79, Siya Ganj, Indore .. .	Weights, Weighing and Measuring Instruments.
(2)	Abdeali Fiadali & Brothers, Daulat Ganj, Indore . . .	Weights, Measures and Measuring Instruments.
(3)	Abdulji Ismailji Dalal, Mandi Gate, Mandsaur .	Weights and Measures.
(4)	Asgar Ali H. Tayab Bhai, Devi Sagar Road, Dewas	Weights.
(5)	Ali Hasan and Sons, Lokhandwalla, Near Cotton Market, Khandwa.	Weights and Measures.
(6)	Bhil Chand Mohanlal Parikh, Mahatma Gandhi Road, Anjad (Tah-Barwani, Distt. West Nimar).	Weights and Measures.
(7)	Bombay Fancy Stores, Jawad (Distt Mandsaur) ..	Weights, Measures, Weighing and Measuring Instruments.
(8)	Bharat Stores, Sadar Bazar, Mandsaur	Brass and Iron Weights.

Dealers (Contd.)

Sl. No.	Name and address of Dealers	Details of Articles Sold.
(9)	Bhatia Brothers, Ranjit Chowk, Barwani (Distt. W. Nimar)	Weights, Measures, Weighing and Measuring Instruments.
(10)	Bharat Vastu Bhandar, Dalumodi Bazar, Ratlam	Weights and Measures.
(11)	Banarsidass Agrawal, 2, Dharmandi, Shivaji Marg, Dhar	Weights, Measures, Weighing and Measuring Instruments.
(12)	Badrilal Rambhuj Agrawal, Garoth (District-Mandsaur)	Weights, Measures, Weighing and Measuring Instruments.
(13)	Calcutta Hardware Stores, Ganj Bazar, Khandwa	Weights and Measures.
(14)	Choudhary Stores, Gandhi Chowk, Garoth (Distt-Mandsaur)	Weights, Measures, Weighing and Measuring Instruments.
(15)	Dawoodbhai Aladbhai, Ganj Bazar, Khandwa (Distt-East Nimar).	Weights and Measures.
(16)	Dwarkadass Munnalal, Harwada, (Distt.-Dhar)	Weights, Measures, Weighing and Measuring Instruments.
(17)	Fida Hussain Natha Bhai & Sons, Mandigate, Mandsaur	Weights, Measures, Weighing and Measuring Instruments.
(18)	Fida Hussain Jiwaji & Sons, Bombay Bazar, Khandwa, Distt. -East Nimar).	Weights and Measuring Instruments.
(19)	Govind Stores, Bijaj Khana, Dhar	Weights, Measures, Weighing and Measuring Instruments.
(20)	G. Ratanlal & Bros. Nagda Niwas, Bhagat Singh Marg, Khandwa, (Distt.-E. Nimar).	Weights, Measures, Weighing and Measuring Instruments.
(21)	Jai Hind Trunk Depot, Sadar Bazar, Mandsaur	Weights, Measures, Weighing & Measuring Instruments.
(22)	Jiwajee Ammijee, Bombay Bazar, Khandwa (Distt.-E. Nimar)	Weights, Measures, Weighing and Measuring Instruments.
(23)	Kailash Chandra Madanlal, Gandhi Road, Kharagone (Distt.-W. Nimar).	Weights and Measures.
(24)	Lachmanji Jagan Nath Saraf, Sadar Bazar, Dhar	Weights, Measures, Weighing and Measuring Instruments.
(25)	Laxminarayan Narayan, Itwariya Bazar, Barwani (Distt.W. Nimar).	Weights.
(26)	Mohanlal, 24, New Dewas Road, Opposite Malwa Mills, Gin. Indore.	Weights and Weighing Instruments.
(27)	Mulla Abdulah Adamjee and Co, Sarafa Bazar, Mandsaur . .	Weights, Measures, Weighing and Measuring Instruments.
(28)	Mohammad Hussain H M. Kayum Bhai, Gandhi Road, Kharagone, (Distt. -W. Nimar).	Weights and Measures.
(29)	Motilal Babulal Chourasiya, Bombay Agra Road, Sendhwa (Distt.-W. Nimar).	Weights and Measures.
(30)	Nazar Ali Lukmanji, Hardware Merchant, Bombay Bazar, Khandwa.	Weights, Measures, Weighing and Measuring Instruments.
(31)	Noor Mohammad Allarkh, Hardware Merchant, Jaora (Distt-Rutlam).	Weights, Measures, Weighing & Measuring Instruments.
(32)	Nutan Stores, Bajaj Khana, Dhar	Weights, Measures, Weighing and Measuring Instruments.
(33)	Prabhat Trading Company, 21, Suja Ganj, Indore	Weights.
(34)	Prabhat Radio Services, Chowk Bazar, Burhanpur (E Nimar)	Weights and Measures.
(35)	Pramod General Stores, Gopal Chowk, Ujjain	Weights and Measures.
(36)	Phool Chand Nemu Chand and Sons, Itwari Bazar, Barwani, (Distt. W. Nimar).	Weights, Measures, Weighing and Measuring Instruments.
(37)	Rajmal Sagarmal Chandani Chowk, Ratlam	Weights, Measures, Weighing and Measuring instruments.

LICENSED MANUFACTURERS, DEALERS & REPAIRERS OF WEIGHTS & MEASURES (18)

Dealers (Contd.)

Sl. No.	Name and Address of Dealers	Details of Articles sold
(38)	Ram Krishna Madanlal, Subhash Chowk, Tarana, (District Ujjain).	Weights, Measures, Weighing and Measuring Instruments
(39)	Satya Narain Anil Kumar, 381, Jawahar Marg, Indore	Weights and Measures.
(40)	Salebhai Nomanali, Kirana Merchant, Gandhi Marg, Indore.	Weights, Measures, Weighing and Measuring Instruments.
(41)	Krishna Stores, Harsud, District-East Nimar .. .	Weights.
(42)	Ram & Co., Lohar Road, Ratlam .. '	Weights, Measures, Weighing and Measuring Instruments.
(43)	Shantilal Sugandhilal Jain, 188, Gandhi Marg, Alirajpur, (District Jhabua).	Weights.
(44)	Secretary, The Kirana Merchants Association, Khandwa, (District-E. Nimar).	Weights.
(45)	Vishnu Hardware Mart, Nai Sarak, Ujjain .. .	Weights, Measures, Weighing and Measuring Instruments.
(46)	Ratanlal Chhaganlal Bazaz, Khana Jaora (District Ratlam)	Weights and Measures.
(47)	Jawarlal Chunnillal Manawar, Vallabh Marg, Manawar (District-Dhar).	Weights and Measures.

Repairers

Sl. No.	Name and address of Repairers	Details of Articles Repaired
(1)	Anandilal Vishnu Parsad Sharma, Rajnandgaon	Weights, Measures, Weighing and Measuring Instruments.
(2)	Bhagwanji Gula Bhai, Ganj Dabri, Baster	Beam Scales.
(3)	Jawahar Tin Factory, Bhutta Bazar, Raflam	Weights, Measures and scale.
(4)	Jayantilal and Co., Ganjpara Bamboo Stall, Raipur ..	Weights, Measures, Weighing and Measuring Instruments.
(5)	Poonamchand Parmanand and Sons, Sajaganj, Indore ..	Do.

The following names of manufacturers and dealers in Madhya Pradesh whose names have appeared in July, 1960, January & May 1961 issues of *Metric Measures* may be deleted from the earlier lists.

Manufacturers

Serial No.	Name of Manufacturers	Page No.	S. No.	Reference to issue of Metric Measures
(1)	Bhupendra Iron & Steel Works, Vinod Mills, Ujjain	43	7	January, 1961.
(2)	Rajaram & Brothers, Lesees Gwalior Maize Production, Mhow Neemuch Road, Limited, Mandsaur.	32	48	May, 1961.

Dealers

Serial No.	Name of Dealers	Page No.	S. No.	Reference to issue of Metric Measures
(1)	Rajni Tea House, Benyani Gate Market, Indore	35	26	July, 1960.
(2)	Krishna Iron and Hardware, Siyaganj, Indore	38	17	July, 1960.
(3)	Indore Gram Udyog, Shakari Samiti, Gandhi Bhawan, Indore	35	18	July, 1960.
(4)	Radhaknshan Chhogelal, Mhow	35	25	January, 1961.
(5)	Hiralal & Brothers, Station para Ganjpara, Raipur	46	2	January, 1961.
(6)	New M P. Mechanical Industries, Station Road, Durg ..	46	6	January, 1961.
(7)	Inder Store, Station Road, Biaragarh, Bhopal	44	11	January, 1961.
(8)	Ramesh Iron Works, 41, Malharganj, Loharpatti, Indore ..	44	8	January, 1961.
(9)	Sehore Chemicals, Mandi, Sehore	33	26	May, 1961.
(10)	Manohar Brothers, Siyaganj, Indore	36	40	May, 1961.

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