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METRIC MEASURES

VOL. 3 JULY 1960

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metric measures

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

Vol. 3 JULY 1960 (ASHADHA 1882) No. 4

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Cover design by A. Sarangan

Annual Subscription Rs. 2.00

40 nP



metric measures

METRIC MEASURES is published every two months.

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

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

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

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Significance of October 1960

It has been announced that use of metric weights would become compulsory from 1 October 1960 in the areas, industries and Government Departments notified earlier, where the two year transition period comes to an end. There have been many enquiries as to how this change-over would affect the industries and trades situated in notified and other areas. The effect could be considered under the following categories:

- (1) the meaning of compulsory change-over in notified areas;
- (2) position of traders in other areas who sell their products in the areas notified;
- (3) the meaning of the change-over in notified industries; and
- (4) position of industries situated in areas not notified.

Areas

About two years back certain industrially and commercially important areas such as divisions, districts, cities and towns covering some 10 percent of the total population of India, were selected for the introduction of metric weights from 1 October 1958. In these areas all the commercial transactions which involve use of weights would be carried out with metric weights only from October 1960. Those who do not do so would expose themselves to prosecution.

In order to avoid large scale prosecution, the Controllers and Inspectors of Weights

and Measures in the various areas have been persuading the wholesale and retail traders and their associations to purchase weights and change over to the metric system on an agreed date before October 1960, so as to avoid last minute rush for weights which may lead to confusion. The response to these approaches by Government authorities has been very favourable, although in some cases the dates have not been strictly adhered to for some reason or another. It is in the interest of traders and the general public that the metric change-over should take place in a planned manner so that everybody is aware of what is happening in this field and get himself accustomed to the new system.

Many people in the areas which are to change-over have expressed the fear that their trade with other areas would be affected by this change as they purchase their materials from non-notified areas where the metric system may not come in use upto 1 April 1962, in accordance with the latest Notification which makes use of metric system optional in the rest of India from 1 April 1960. This would mean, they argue, that they would have to purchase in terms of maund or hundredweight and sell in metric units. This is true to a certain extent, but as a result of the Notification permitting use of metric weights there should be little difficulty in quoting and selling in metric units throughout India.

Traders from non-notified areas who want to sell their products in the notified areas would do so only in terms of the metric system. Therefore, it is not only the traders and the public in the notified areas who should be getting acquainted with the meaning of the change-over, but also those who trade with these areas.

Industries

According to the Notification issued some two years back industries such as, engineering, coffee, salt, textiles, etc. will be going over compulsory to metric weights and measures from 1 October 1960 for purchase and sale of materials in their transactions. It must be emphasized here that the entire notified industry, wherever it is located in the country, would change over to the metric system. Thus, for example, the salt industry is spread all over India and in some parts it is concentrated in non-notified areas. However, for the purchase of raw materials and sale of salt, this industry will quote prices and deliver salt only in terms of metric weights from October 1960 or earlier if they so desire. Quotation in maund units and delivery in these units would be *but-mugai*. This also means that even though a trader in a non-notified area may sell salt in the trade in that area by the seer, he would have to purchase it in metric units from the producers.

There is also the case of non-notified industries which are situated in notified areas. For example, for the vegetable oil industry the period of transition is upto 1-4-1962 when metric weights will become compulsory in the rest of India. However, if a factory producing and selling vegetable oils is situated in an area or a city, already notified, for example, Bombay, Delhi or Calcutta, it will be compulsory for that industry to quote and sell its

products in metric weights only, whether this transaction is with the notified or non-notified areas.

Similarly, any industry situated in non-notified area, but having trade relations with a notified area, will have to sell its products in the notified areas only in metric units. For example, in making packages to be sold in notified areas, they have to indicate the contents in terms of metric units. It must be made clear, however, that this does not mean that the contents of the package should be changed over immediately. The industry may continue to mark the packages as at present but indicate the contents in metric units. For example, a 1 lb package may be marked 454 grams, for the time being. When, however, the proper packages or containers are available the industry could change over to rational metric packages e.g. 500 g.

Those who market ready-made packages have to remember that under the provisions of the State Acts, it will be necessary to mark the net contents of the packages sold in the areas or by industries changing over from October 1960. Even small-retail packer who sells daily requirements in sealed packages by weight would be required to observe this legal provision.

Many notified industries fear that they have to get their weighing instrument recalibrated in terms of the metric system before 1 October 1960. It is realized that the number of weighing instruments in use is extremely large and the number of repairers who can competently undertake the job of recalibration is very small. The Governments of the States have, therefore, provided in the Rules that as every machine cannot be recalibrated immediately, the users could continue to employ them by reference to conversion tables for the time

being, the machines being recalibrated in due course, though not necessarily before October 1960.

Other Important Factors

The Railways have gone over fully to the metric system in their commercial transactions from April 1960. It is expected that this would serve as an incentive to the traders to change over to the metric system at the earliest possible opportunity. Another important change is in the petro-

leum industry. It may also be remembered that no advantage will be gained by a last minute change-over to the metric system. Another point which the industries should note, wherever they are situated, is that sometime in August, the Customs and Excise Department and the Shipping industry will change over to the metric system. In the light of these events, it is expected that the pace of adoption of the metric system in trade and industries would be quickened.

Oil Companies Go Metric

T. R. Rao

Burmah-Shell Oil Storage & Distributing Co. of India Ltd.,
Bombay

THE marketing oil companies in India adopted the metric system for the distribution and sales of petroleum products on 1 April 1960. This event marked an important step in the phased implementation of the metric system, as capacity measures (litres) were introduced in all parts of India for the first time. Amongst the oil refineries, only Assam Oil Company changed over on 1 April, the others electing to synchronize their change-over with the Central Excise Department who are expected to adopt the metric system for the levy of taxes in August this year.

Educational Programme and Staff Training

Education of staff being an essential prerequisite in any kind of reform, staff training at all levels was started long before the date of change-over. This was carried out in the form of lectures and circulars explaining the fundamentals of the metric system and

how it affected the oil companies' business. Drawings and property inventories were prepared in dual units. For the benefit of customers petroleum containers were marked in dual units. Nearer the date of change-over field staff were trained in the conversion of equipment from gallon to litre measurement.

Publicity Campaign

The implementation was preceded by a well organized publicity campaign which was directed mainly towards petrol and H.S.D. filling stations where the impact of the change-over was first felt. Hoardings and stickers at filling stations boldly displayed the relationship between gallons and litres. Illustrated booklets and circulars explaining the new system were distributed in advance to agents, dealers and other interested parties. Great pains were taken by the oil companies to explain the method of calculating prices in

the new units to their agents and dealers. Price lists were posted at all sales points. This proved invaluable in winning the confidence of customers who were prone to think that advantage would be taken of the change-over to raise prices. Conversion cards were distributed to customers and ready reckoners, which facilitated quick conversions, were supplied for internal use and to important customers. Some of the oil companies came out with announcements about the introduction of the metric system in the newspapers on 1 April.

As a result of this publicity campaign the change-over was smooth and market reaction was favourable.

Oil Industry Metric Committee

Finding that they had many problems in common in connection with the implementation of the metric system, the oil companies set up an Oil Industry Metric Committee, whose main function was to discuss problems of common interest pertaining to metric conversion and to 'liaise' with Government Departments and other bodies. The O.I.M.C. rendered excellent service during the change-over.

Physical Conversion

(1) Dispensing Pumps

The conversion of these pumps to litre measurement was one of the most difficult jobs in the change-over programme. There are over 12,000 pumps scattered all over the country and some are located at remote upcountry stations. They are of various makes and models requiring different types of conversion kits most of which had to be imported. The conversion of these pumps was carefully programmed in consultation with the O.I.M.C. Pump conversion was started in the last week of March and a good number of pumps were dispensing in litres in the main cities on 1 April.

(2) Calibration Tables for Oil Storage Tanks

A calibration table for a storage tank

shows the quantity of oil in the tank for varying depths. In the Imperial system the depths or 'dips' are shown in feet and inches and the quantities in gallons; in the metric system the dips are in centimetres and the quantities in litres. The dips are measured with vulcanized graduated steel tapes which are lowered to the bottom of the tank and the depth of oil is read off the tape.

Metric calibration tables were required for all storage tanks. This presented no great problem as far as upcountry depot and filling station tanks were concerned as the work was handled by the oil companies themselves. However, in the case of main installation and terminal tanks used for the storage of bonded stocks on which customs and excise duties have to be paid, the calibration tables are normally prepared by Government agencies e.g. Central or State P.W.D. and the Mercantile Marine Department. The calibration of a large number of tanks within a limited period presented a problem to the Departments concerned. The oil companies were, therefore, called upon to assist in the work and it is hoped that all tables will be completed by August 1960 when the Customs and Central Excise Departments change over to the metric system.

(3) Calibration of Railway Tank Wagons

There are about 7,000 tank wagons used for petroleum products and they required to be physically calibrated. For various reasons it has not been possible to prepare metric calibration tables for many of them. For the present the final loading gallonages are converted to litres using statutory conversion factors.

(4) Tank Lorries and Tank Carts

The calibration of tank lorries and tank carts presented no difficulty as they are fewer in number than tank wagons and easier to calibrate, but the work was hampered owing to the delay in obtaining the necessary litre check measures.

(5) Bulk Meters and Filling Machines

These are being gradually converted for litre measurement. Some delay is being experienced in the case of some of the meters as conversion parts have to be imported from the United States.

(6) Weighing Machines

Only machines required for weighing product were converted. Machines used in stores continue to read in Imperial units as the purchase of stores continues in these units.

(7) Liquid Capacity Measures and Containers

The ISI standards for liquid capacity measures and small packs have been adopted and are gradually replacing the old measures and packs. The denominations are as follows:

Liquid Measures	.. 20, 10, 5, 2 and 1 litres, 500, 200 and 100 millilitres.
Small Packs	.. 5 litres, 1 litre, 500 ml and 250 ml for liquids; 2 kg and 500 g for solids.

Existing large containers are being used with their capacities marked in metric units. For example 44/45 gallon barrels are being filled to a capacity of 200/205 litres, 5-gallon drums to 23 litres and 2-gallon cans to 9 litres.

Special consideration was given to the 4-gallon tin used mainly for kerosine. Over a lakh of these tins are produced daily in India. After great deliberation, the oil companies decided that as a temporary measure this tin should continue to be filled to a capacity of 4 gallons (18.184 litres) and not to 18 litres as recommended by the ISI with a view to conserving tinplate, foreign exchange on tinplate, and better utilization of box wagons. The matter will come up for review shortly when it will be decided finally whether to fill the tin to 18 litres or, if possible, to 18.50 litres.

Calculation of Bulk Quantities

The oil companies have adopted 15° C as the standard reference temperature for oil measurement as proposed by the ISI. ASTM/IP Petroleum Measurement Tables (Metric Edition) are being used for bulk oil calculations. Centigrade thermometers and density hydrometers calibrated at 15° C are being used to facilitate these calculations. It is hoped that the Central Board of Revenue will adopt this method of measurement for the calculation of oil quantities for assessing customs and excise duties on petroleum products when they change over to the metric system in August next.

Sales and Accounting

The oil companies changed over to the new system completely on 1 April for distribution, sales and accounting. Dual accounts are being maintained only in respect of transactions involving payment of customs and excise duties which are based on the old units at present.

Price Conversion

A great deal of thought was given by the O.I.M.C. to the question of prices in metric units. As prices in metric units had to be calculated by converting existing prices using statutory conversion factors as provided for in the Standards of Weights and Measures Act, 1956, it was important to ensure that the loss or gain to buyer or seller resulting from rounding off prices to the nearest nP was kept to a minimum. After careful consideration it was decided, with the approval of Government, that for all products for which a ceiling price had been established or for which a contract price existed, prices in metric units would be calculated on the basis of 1,000 litres or 1,000 kg. This basis of calculation ensures that the loss or gain by conversion is limited to a maximum of half nP per kilolitre or a metric tonne.

Rate Cards

The preparation of thousands of rate cards showing the various components of the price build-up for each product and each destination station all in terms of metric units presented a colossal task to the oil companies. This work had to be completed in a short time and was hampered by the delay in receiving junction kilometre tables from the Railways. Oil company staff had to work extremely hard in order to complete the work in time.

Conclusion

The oil companies were faced with the enormous task of gearing their entire distribution network to the new system within a limited period of time. With careful planning and by visualizing the difficulties and problems which were expected to crop up, they have been able to implement the scheme successfully without disruption of supplies and causing little inconvenience to their customers.

Metric System in French Railways, Posts & Taxes

GUY KNOCHE

French Economic and Technical Bulletin,
France

I

METRIC SYSTEM IN RAIL TRANSPORT

OWING to the diversity of its traffic, the Societe Nationale des Chemins de Fer Francais (National Society of French Railways) has established two separate tariffs, one for passengers and the other for freight.

Passengers

Passenger fares are calculated on a single basis, the distance to be covered. Nevertheless, as a few kilometres make a comparatively greater difference on short distances, three scales have been established according to whether the distance covered is less than 50 kilometres, between 50 and 200 kilometres or over 200 kilometres. In the first case, distance is charged per block of 2 kilometres, in the second per block of 5 km

and in the third per block of 10 km. The distance charged for is always for the mean distance of the block. Thus a passenger travelling 55.6 km is classified in the block between 55 and 59 km and pays for 57 km (mean distance of the block applicable to the length of his journey). On the other hand, a passenger travelling 59 km also pays for 57 km. Once the distance to be charged for has been determined, a kilometric rate is applied which is 6.80 francs per km for the second class. Therefore, a second class passenger travelling a distance of 248 km (block between 240 and 249 km) pays for a distance of 244.5 km the sum of:

$244.5 \times 6.80 = 1\ 662.60$ francs, rounded off to 1 660 francs.

However, special rates are charged for short distances where traffic is very heavy, as in the case of the Paris suburbs.

METRIC SYSTEM IN FRENCH RAILWAYS, POSTS AND TAXES

Freight

The problem of freight charges is more complex. For small parcels weighing less than 50 kilograms, the rate is determined according to a tariff which takes into account the geographical departments of origin and destination without considering the cities themselves. A double entry table enables the correct tariff zone to be located without difficulty. For instance, between the geographical departments of 'Nord' and 'Alpes Maritimes' a parcel must travel over the whole of France and the maximum rate (for Zone 20) is chargeable. On the other hand, if the parcel is going from the department of 'Nord', only to the neighbouring department of 'Pas-de-Calais', the rate applicable is that for Zone 1. In the first instance, the charge for a parcel weighing 30 to 40 kg is 1 767 francs, in the second instance, only 518 francs.

Lastly, for parcels over 50 kg, tariffs have been established according to weight and distance, by fractions of 60 kg or, in extreme cases, by complete truckloads of 3 to 5 tonnes. These are special tariffs reserved for industrial concerns.

On the whole this system does not give rise to difficulty in operation. Tariffs are naturally established according to the metric system (weight in kg or tonnes, distances in km when actual distance is considered, or tariff zone in other instances) and are applied in all the railway stations of the French Rail network where the clerks in the various departments concerned have no trouble in using them.

II

METRIC SYSTEM IN POSTAL SERVICES

The French postal system comprises two large branches: domestic and foreign.

But whatever be the basic rate adopted in working out scales of charges, the metric system is in use. The main question is the determination of the unit of weight, which by the way, cannot be made with complete freedom since France adheres to the International Postal Convention.

Domestic Postage Rates

An ordinary letter weighing less than 20 grams must bear a 25 franc stamp. This is the minimum postage, the maximum (300 francs) is reached with a letter weighing 2 000 grams i.e. 2 kg. Between these two extreme weights there is a graduated schedule of weights with corresponding progressive rates, as shown in the following table:

Less than 20 grams	..	25 francs
From 20 to 50 grams		45 francs
From 50 to 100 grams		65 francs
From 100 to 200 grams		85 francs
From 200 to 300 grams		110 francs
From 300 to 500 grams		150 francs
From 500 to 1,000 grams		200 francs
From 1,000 to 1,500 grams		250 francs
From 1,500 to 2,000 grams		300 francs

An important point is that the rate remains unchanged whatever the distance to be covered within the postal area of metropolitan France. For instance, a letter posted in Paris and weighing less than 20 grams must be franked with a 25 francs stamp whether it is to be delivered in Versailles (20 kilometres from Paris) or in Marseilles, 800 kilometres from its mailing point.

This also applies to other objects sent through the post, whether post cards, samples, small packets weighing not more than 3 kilograms, newspapers etc.

Foreign Postal Rates

The same principle is applied to the franking of letters or objects for foreign countries. The rate is, of course, higher (50 francs for a letter weighing less than 20

grams) and rises progressively, by units of 20 grams, from 20 to 200 grams. Above 200 grams and upto 2 kilograms, the rate is uniformly fixed at 30 francs per 20 grams.

The postage on a letter weighing 365 grams sent to New Delhi will, therefore, be 320 francs (the rate applying to a letter of 200 grams) *plus* postage on the weight comprised between 200 and 365 grams, *i.e.* 165 grams or 9 fractions of 20 grams (165 being between 160, that is 8 times 20, and 180, or 9 times 20), which makes 9 times 30 francs, or 270 francs. Therefore, the total postage to be paid on the letter weighing 365 grams is 590 francs (320 francs for the first 200 grams *plus* 270 for the additional 165 grams).

Additional Airmail Charge

However, connections between Paris and New Delhi by sea are comparatively slow and if the matter is urgent the sender may prefer to send his letter by airmail. In that case, he must pay an extra charge which is calculated by fractions of 5 to 20 grams, according to the distance between countries. The concept of weight still remains an essential basis. In France, the charge on letters airmailed to the Indian Union is 50 francs per 5 grams. This means that a letter weighing 365 grams will have to be franked as follows: 590 francs representing the normal postage, *plus* $\frac{365 \times 50}{5} = 3\ 650$ francs extra postage.

Therefore, the metric weight unit, taken as a basis for all postal operations, makes it easy to determine the cost of postage.

III

METRIC SYSTEM IN TAX SYSTEM

As at present organized, France's tax comes from four broad sources of

receipt: recording dues, stamp duty, indirect and direct taxation.

Recording Dues and Stamp Duty

Recording dues are either fixed or proportional. The stamp duty is a fixed amount which varies according to the nature of the transaction. Thus a receipt for a sum of 15 000 francs is not valid unless it is made out on a sheet of paper bearing a 135 franc stamp.

Indirect Taxes

Indirect taxes yield, according to some experts, 75 percent of the total from all tax sources. These comprise of tax on accrued value, services rendered, local taxes, parafiscal taxes, specific taxes etc. These various taxes are generally expressed in percentages, but in certain cases they are fixed amounts.

Direct Taxes

Direct taxes, the most tangible burden felt by individual taxpayers as they are levied directly on income, are essentially of two categories: a progressive surtax (assessed on all income according to a certain progressive percentage) and a proportional tax, assessed only on income from certain sources. These direct taxes are expressed as a percentage of the taxable income which is calculated on the basis of the actual income less certain expenses allowed in connection with the business or profession.

Percentage System

To sum up, apart from certain fixed dues, the French tax system is essentially based on the concept of percentage. This is a simplification which avoids the use of numerous different schedules of scales which it would be extremely complicated to apply. Thanks to the metric system, this percentage

calculation can be made without the slightest difficulty. For the technicians in charge of operating the French tax system, this is considerable simplification which the metric system alone makes feasible. And owing to the inherent complexity of all tax systems, such unification in methods of collection is indispensable.

Indian Geodetic System and Foot-Metre Ratio

J. C. BHATTACHARJI,

Dehra Dun

THE object of geodetic surveying is the precise measurement of widely separated positions of points lying on the earth's surface. These points known as 'geodetic stations' form the framework of cadastral, topographical, hydrographic, engineering and other similar surveys.

For a country like India which is fairly open and undulating, the best method to be adopted is triangulation. But, when a country or an area happens to be very flat or very narrow or covered with forests, the primary traverse is the real answer, especially if triangulation is considered extremely costly.

'Triangulation is the method of location of a point from two others of known distance apart, given the angles of the triangle formed by the three points. By repeated application of the principle, if a series of points form the apices of a chain or network of connected triangles of which the angles are measured, the lengths of all the unknown sides and the relative positions of the points may be computed when the length of one of the sides or the base, is known. The geodetic positions and the azimuths of all

the lines can be computed if the latitude and longitude of one station and the azimuth of the base are observed' (Ref. 1). But the main difficulty with triangulation is that it tends to accumulate errors of scale and azimuth, as each side derives its scale and azimuth from the preceding side. Hence, although a single base normally suffices for computation, the accumulation of error in scale requires to be controlled by additional bases, and that in azimuth also by astronomical observations at regular intervals.

The geodetic system of surveying in India is known as the Indian triangulation and consists of networks of triangulated series covering nearly the whole of India including Burma and Pakistan.

The old base-lines of the Indian triangulation were measured during 1831-69 and their lengths expressed in terms of the Indian foot or tenths of the Indian standard known as 'Indian 10-foot Bar A', at 62°F, as the latter was used for the standardization of the compensated bars employed for the measurement of the base-lines. The measurement

of the new base-lines carried out after 1930 was by means of invar wires duly compared with the metre standard for base-measurement, instead of the Indian 10-foot Bar A which had become practically obsolete by then. The lengths of the new base-lines, which are in terms of the International Metre, have to be reduced to the Indian foot before comparing them with the old base-lines for inclusion in the Indian triangulation. It is, therefore, necessary to establish the actual length of the Indian 10-foot Bar A at 62°F in terms of the International Metre, so that the Indian triangulation system becomes self-consistent and comparable to geodetic systems of other countries.

Historical

The earliest comparison of the Indian 10-foot Bar A in terms of the International Metre Standard was made only in 1906-07. Prior to that in 1865 Captain Clarke (Ref. 2) had made comparisons of the Imperial Standard Yard with the Indian 10-foot Bars Is and IB which were later compared with the Indian 10-foot Bar A in 1867.

The Imperial Standard Yard was, however, compared with the International Metre Standard as early as 1894 and again in 1922, 1932 and 1947.

These comparisons would thus enable us to extrapolate the length of the Imperial Standard Yard in terms of the International Metre provided the rate of change of length of the Imperial Standard Yard after and before 1894 is assumed to remain practically constant.

The length of the Indian 10-foot Bar A at 62°F in that case would reduce to 3.047 984 1 metres (International Standard) which was accepted by Brigadier Bomford (Ref. 3) as the most probable value for the Indian foot-metre ratio while reducing the lengths of the Indian new base-lines to Indian foot.

But recent investigations of J.S. Clarke, (Ref. 4), however, show that the rate of change of length of the Imperial Standard Yard after and before 1894 was not actually constant, for the results of measurements made in 1864 on some of the old Toise standards clearly indicate that the Imperial Standard Yard had shortened before 1894 rather more rapidly than it has since that date. The five different values of the yard-metre ratio as obtained by J.S. Clarke for the year 1865, are 0.914 400 2, 0.914 400 3, 0.914, 401 5, 0.914, 406 0 and 0.914 404 0, the mean value being $0.914\ 402\ 4 \pm 9.10^{-7}$.

Now according to the results of comparisons carried out in 1865-67, the length of the Indian 10-foot Bar A at 62°F is found to be equal to 3.333 318 86 yards (Imperial Standard). Hence the mean length of the Indian 10-foot Bar A at 62°F reduced to the year 1865, finally becomes $3.047\ 995 \pm 3.10^{-6}$ metres (International Standard) which is practically identical with the corresponding value of 3.047 996 metres (International Standard) obtained in 1906-07.

This shows that the length of the Indian 10-foot Bar A had remained practically constant during 1865-1907 and may be expected to have remained so in the period 1831-69 as well. The most probable value of the foot-metre ratio to be adopted for conversion of International Metre measure into Indian foot measure, thus works out to be $0.304\ 799\ 5 \pm 3.10^{-6}$.

Effect of Error in Previous Foot-Metre Ratio

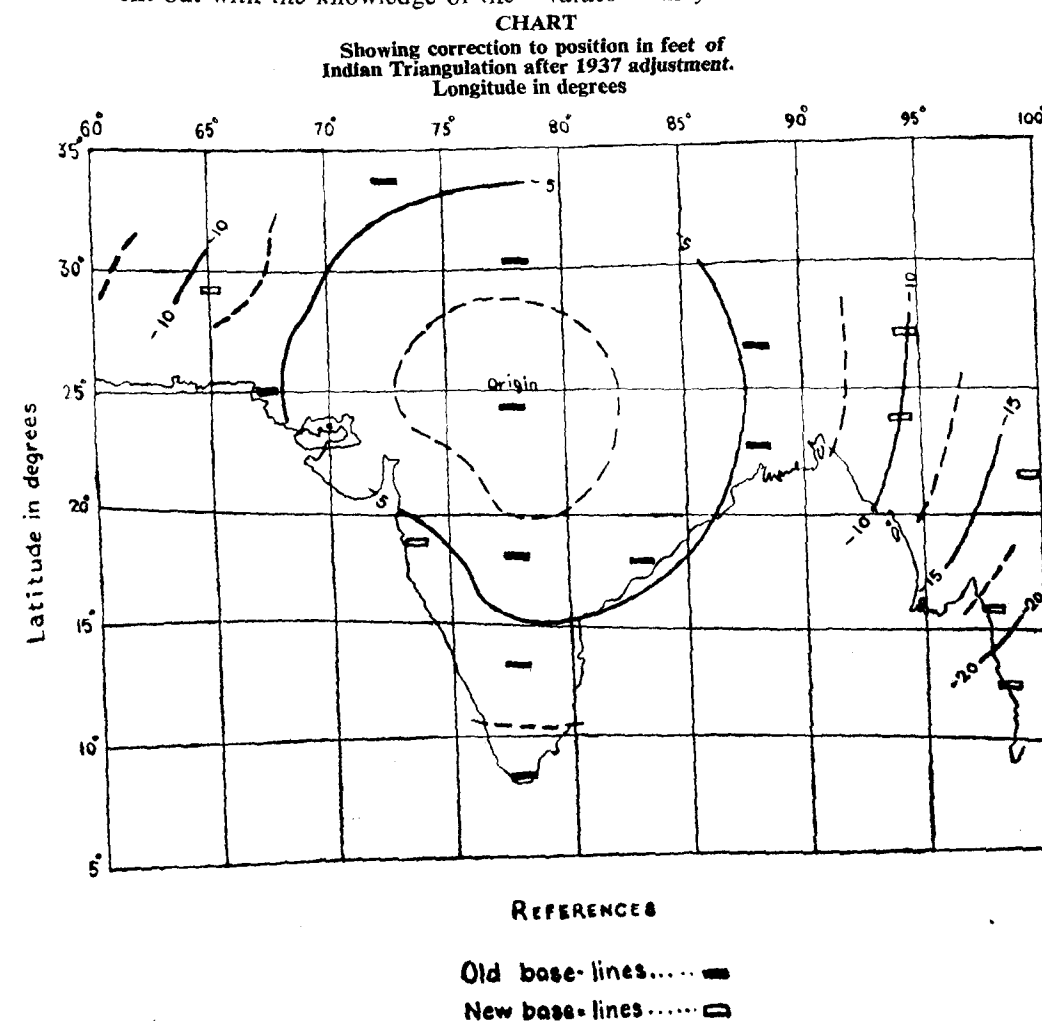
This foot-metre ratio differs from Brig. Bomford's accepted figure by 0.000 001 09. Consequently a scale error of 3.6×10^{-6} is introduced in the lengths of all the new base-lines measured after 1930, because of using Brig. Bomford's less accurate value of the foot-metre ratio while converting to Indian foot. The Indian triangulation net as

adjusted in 1937 by Brig. Bomford has thus lost its self-consistency of scale—the old and the new base-lines not being identical.

The small positional error due to this scale error, though calculable and systematic, has to be considered only when extreme accuracy is needed for precise geodetic investigations. Even then one can actually read off these scale corrections from a correction chart designed for the purpose and apply them to the positional values obtained after the 1937 adjustment. As a result the Indian triangulation becomes not only self-consistent but with the knowledge of the

length of the Indian 10-foot Bar A at 62°F now available may also be safely used for any study of the shape of the earth.

For topographical purposes, on the other hand, much less precise data is needed in practice and the effect of the scale error in the new base-lines is considered negligible. Even the 1937 adjustment corrections, though quite substantial are not large enough to affect the topographical surveying significantly and have, therefore, been completely ignored in topographical works. As such all the present Indian triangulation pamphlet values may be considered sufficiently



accurate and continued to be used as before for topographical purposes without applying corrections for either scale error in the new base-lines or the 1937 triangulation adjustment.

Adoption of International Foot-Metre Ratio in the Indian Geodetic System

With the introduction of the metric system of weights and measures in India, it is necessary to relate satisfactorily the existing fundamental units of Indian measures to their metric equivalents prescribed in the Standards of Weights and Measures Act, 1956. This Act defines the foot as :

1 foot = 0.304 8 metre (exact).

The above definition is not only very simple in application, e.g., 1 foot = 0.3 metre + 0.3 metre $\times$ 0.016 and extremely close to the old Indian foot-metre ratio, differing by 1.7×10^{-6} only, but is also in complete agreement with the technical definition of the International Yard accepted in July 1959 by the National Standard Laboratories of the British Commonwealth countries and USA.

The only difficulty in accepting the new legal foot-metre ratio : 0.304 8 (exact), in preference to the existing Indian foot-metre ratio : 0.304 799 5 is that these are not exactly identical. As the existing Indian foot-metre ratio is less than the new legal ratio by 1.7×10^{-6} all the Indian base-lines have to be increased by this amount to adjust the Indian triangulation system to the new ratio. The effect of the scale error in all the base-lines though negligible for topographical purposes, is significant for precise scientific investigations. It is systematic and becomes substantial at great distances from the origin of survey. But this may advantageously be combined with

that due to the previous scale error of 3.6×10^{-6} in the new base-lines and given in the form of a single correction chart. The combined correction is generally within 10 feet, though in areas at considerable distances from the origin of survey it may be even 20 feet.

Conclusion

We can easily adopt the legal foot-metre ratio : 0.304 8 (exact) in preference to the existing old Indian foot-metre ratio : 0.304 799 5 in the Indian triangulation by a declaration only to that effect.

In cases of extreme accuracy, however, the corrections given in the adjoining chart can be incorporated in the 1937 adjustment of the Indian triangulation. In this manner the entire system of precise measurements, both the past and present, employed in Indian triangulation as a whole, may be straightaway brought to a uniform system of measures in conformity with both the Indian Standards of Weights and Measures Act, 1956 and the recent international agreement on the definition of the yard.

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Peering Into The Mind of A Child*

WHEN does a child start to 'think'? At what age can he understand such ideas as length and number? When is he capable of what is called 'scientific thought'?

Educators and parents the world over would be extremely interested in knowing the answers to such questions. Today, they are being sought in Switzerland at the Institute for the Sciences of Education in Geneva. The Institute was founded in 1912 and attached to the University of Geneva in 1929, but its origins go even further back. In 1901, at the dawn of the new century, the

Medical Society of Geneva heard a daring proposal by Edouard Claparede, the future co-founder of the Institute along with Pierre Bovet. Claparede called for nothing less than a school 'made to measure' for children. Into his startled audience, he dropped this bombshell : 'We now pay more attention to children's feet than we do to their minds.'

Five years later, Claparede was to state : 'It is just as important for the educator to know the laws of the mind and its growth as it is for the horticulturist to know the biology of plants or the doctor to know the

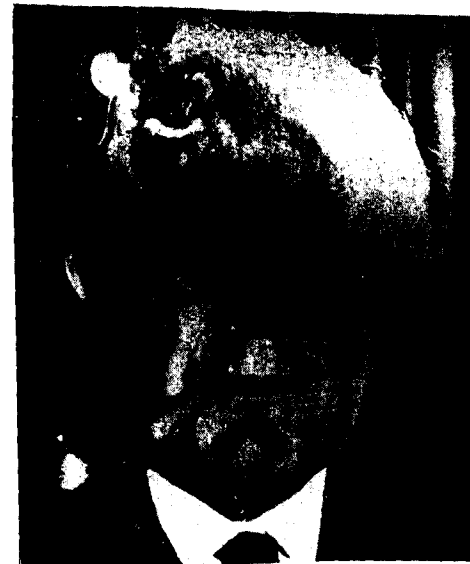


Fig. 1—Professor Jean Piaget, Co-Director of the Institute for the Sciences of Education and Director of the International Bureau of Education, Geneva. Prof. Piaget, who is a Swiss, was formerly a member of the Executive Board of Unesco.

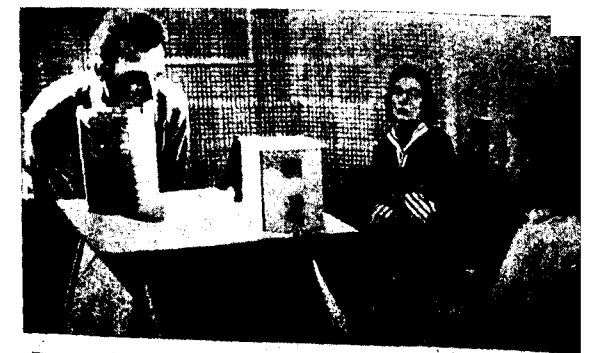


Fig. 2—HOW DO YOU THINK I SEE THIS LANDSCAPE? An educational researcher puts the above question to a child who must select the drawing corresponding to what she believes the experimenter sees from his position opposite her. Thus she shows her capacity for judging how perspective varies according to the position of the observer.

physiology of organs'. It was on this principle that the Institute started a laboratory in which experimental psychology is applied to education. For the past thirty years, both at Geneva and at Neuchatel, this work has been carried on by Prof. Jean Piaget,

*Reproduced with permission from *The UNESCO Courier*, July-August 1959. Photographs WHO-Eric Schwab.

a leading figure in psychological research which has a bearing on education.

Prof. Piaget's studies had previously shown that the development of a child's thought processes can be compared to a ladder. The child goes from one step or level to another. At each level, corresponding to a certain age, there is an equilibrium in his thinking.

Then, two years ago, a special section of the Institute was created to study how the child passes from one stage to another. This study, directed by Dr. Barbel Inhelder, professor at the Institute of Child Psychology,

They come from all social classes, have average intelligence test ratings and have experienced no special difficulties in school.

They Have it All Taped

Some fifty tests based on special observation techniques developed by Prof. Piaget over the years are used with these children. In addition, the research workers have at their disposal an experimental psychology laboratory set up by the state of Geneva and provided with ultra-modern equipment through a grant from an American foundation.

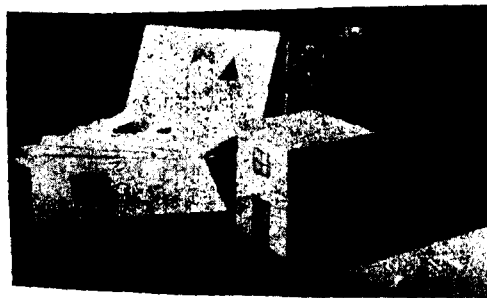


Fig. 3-4—Close-up of experimental equipment used for the test. Using a variety of similar experiments, researchers at the Institute for the Sciences of Education in Geneva study the development of a child's thought processes.

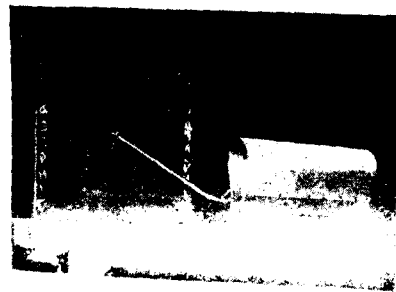


Fig. 5—Covered wagon-like apparatus is used to test girl's ability to understand the law of falling objects along an inclined plane. Angle of chute (that of "covered wagon") is altered and child is asked to judge how far object will fall each time.



Fig. 6—Study of the concept of size. The object is to measure the height of a tower standing on a stool. The child is asked to build a tower the same height on the ground.

and Dr. Gerald Noehling, is based upon a long-term experiment. Twenty children, divided into four age groups, have been selected from Geneva schools for study.

PEERING INTO THE MIND OF A CHILD

In this laboratory, each conversation between the scientist and a child is recorded on tape. At key points in the interview, a motion picture camera comes into play. The result is that the Institute has been able to 'produce' records and a film on each child, showing the changes in his social behaviour and the way his mind works at various stages of growth over the years. These experiments have already shown that the child first groups familiar objects or even geometrical elements into 'logical classes' between the ages of four and seven. By pouring liquids from one glass to another, for example, he grasps the idea of a quantity which does not vary even if its appearance changes.

He understands concepts of length and number between the ages of five and seven. Weight and volume come later—between



Fig. 7—The concept of volume. Child must construct houses with identical volumes on islands with different surface areas.

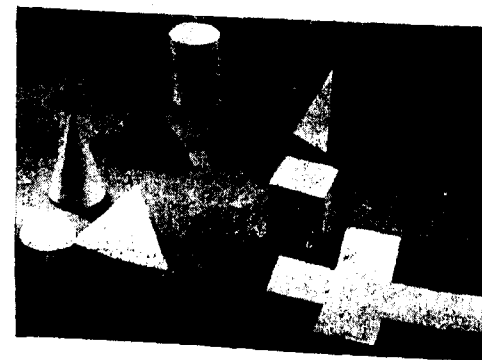


Fig. 8-9—Representation in two and three dimensions. Child draws on a plain sheet the opened-out surface of a geometrical solid she is shown.



nine and twelve—and now the framework of his thought processes has been erected. At the age of ten, he begins to experiment and then, research shows, he is capable of scientific thinking at twelve when he starts formulating theories and searching for proofs.

As is often the case in science, the answers to the first questions have now raised new ones. For example, scientists now wonder if this development is the result of mental and nervous 'maturing' or whether it is the fruit of education and just plain practice. Professor Piaget has already shown that ex-

ternal and internal factors always interact—that is, you cannot separate them. How this 'interaction' takes place is yet to be answered. There is also an even bigger question: how is the young child's mind, concentrated on the present and on what he can see and touch, transformed into the mind of the adolescent conscious of the world and capable of co-operating with his fellow men?

This is pure research at present, but Prof. Piaget and the Swiss scientists working with him believe that its results may represent a valuable contribution to education.

*Will UK Go Metric?**

WILL UK GO METRIC?

IT would be recollected that the British Association for the Advancement of Science and the Association of British Chambers of Commerce had each set up a Committee to enquire into the possibility of change-over to the decimal coinage and the metric system in the UK and its cost. Their report has now been published, and is a joint report of the two committees.

Fruit of the Collaboration of the two Committees

The terms of reference of the Committee were to report on the practicability, implications and consequences and the cost of change-over to the metric system and decimal coinage in the UK, and examination of the possibility of rationalization or decimalization of present units of weights and measures.

Questionnaires were issued to trade and other commercial associations, individual firms, Government Departments, local authorities, public utilities and nationalized industries, British Trade Commissioners Overseas, learned societies, professional institutions, educational authorities and the like. The answers were analysed, and on their basis conclusions drawn and recommendations made.

The report is divided into four parts: the first part deals with decimal coinage,

the second with the metric system, the third with the possibilities of rationalization and decimalization of the Imperial system and the fourth with the educational aspects.

Decimal Coinage

As regards decimal coinage, the Committee examined the world trends and the advantages and the disadvantages that may be gained by the change-over to the decimal system. The problems of machine conversions and the impact on general public, industry and commerce have been analysed. Various systems of decimal coinage such as the pound/cent/fraction system, the pound-mil system (£1=1000 mils), the ten shilling : cent system (10 shillings=100 cents), the shilling : decime system (1 shilling=10 cents), the 8/4 d : 1d system and 4/2 d : 1/2 d system have been examined.

The Committee has concluded that although some did not express much dissatisfaction with the present system of coinage, there was a strong case for the adoption of decimal coinage. In decimalizing the coinage, the general opinion was that the pound should be retained as the major unit. The transitional cost of a change would be heavy, but would not be too large in relation to the resources of the country and the long-term benefits expected.

It was also seen that the question of decimal coinage has to be examined independently of the change-over to the metric system of weights and measures. In any case,

decimalization of coinage should precede the adoption of the metric system. The Committee recommended that the Government should take an early decision for or against the principle of the adoption of a decimal coinage as the longer the delay the heavier would be the transitional costs. They have also recommended that if it is decided to adopt decimal coinage, three years, notice should be given for preparation.

Metric System

As regards adoption of the metric system, the Committee examined the extent of the present use of the metric system in the UK and found that it was not largely used except in certain industries such as optical, drugs and scientific instruments, in firms which specialize in export and the like.

Some 84 per cent of those who answered the questionnaire were in favour of the principle of the adoption of the metric system. There was a definite opinion that if the UK has to adopt the metric system, it should be done in full consultation with the Commonwealth and the United States of America.

Transitional costs in some sectors of industry, for example, engineering would be heavy but the financial gains were difficult to assess. If the metric system is to be adopted a long transitional time would be desirable to lower transitional costs and it should be phased with obsolescence. It was further noticed that the educational benefits were real though they could not be measured in terms of money. The total saving for children of age group 7-11 years would be 5 per cent if in teaching only the metric system is used.

Based on the above findings, the Committee has recommended that in view of the trend towards greater and greater use of the metric system in the world as also in the UK, a close watch should be kept on the world situation. This could be done by a regular

two-yearly review by the Board of Trade in consultation with industry and commerce and in collaboration with its counterparts in the Commonwealth countries and the USA.

The Committee recommended that in these reviews 'particular note should be taken of trends in Japan and India and in the under-developed countries of Asia and Africa'. The object of the reviews should be to study 'world developments in the usage of both metric and non-metric systems together with the progress in adoption of metric and non-metric standards, to publish such information and to determine any joint action' that may be necessary. Although the metric system is legal in England, the change-over on a voluntary basis may be slow. The two yearly review should, therefore, indicate what 'stimulus might be given to more rapid change-over to the metric system in the UK. The reviews should also indicate in what sections of the industry and commerce metric usage could be introduced with most benefits and the least transitional dislocations'. About international standardization, the Committee feels that although a common standard is ideal, in cases where this is unattainable attempts should be made to secure international acceptance of standards on both metric and inch/pound systems. The British Standards Institution should publish further metric standards to facilitate manufacture in metric dimensions for export.

Improving the Imperial System

Under this Section, the Committee has considered the decimalization and rationalization of the inch/pound system, as for example, the decimalized inch, decimalized foot, decimalized mile and the use of the cental of 100 pounds and the ton of 2,000 pounds. The Committee feels that such decimalization of the inch/pound units may find increased usage in some specialized trades and in engineering, but it is unlikely

*Review of the Report: DECIMAL COINAGE AND THE METRIC SYSTEM : SHOULD BRITAIN CHANGE ? (English)—published by Butterworths Scientific Publications, Ltd., 88 Kingsway, London, W.C. 2, pp 107, price 7s. 6d.

that a coherent system could be evolved in this way. They recommended that further study should be given to the problem of the rationalization and decimalization of the inch/pound system on its merits for each industry. Some advantages may be obtained in this process in certain industries. They have further recommended that the Government Departments and the nationalized industries should examine the possibility of eliminating the units of weights between ton and pound or alternatively to use the cental (100 lb) and the short ton of 2,000 lb. The abolition of the apothecaries, troy and pennyweight systems and the rod, pole or perch of 5 1/2 yards and the corresponding square measure of 30 1/4 yards is recommended.

Educational

So far as educational aspects of the decimalization are concerned, the Committee's findings are extremely interesting. In the tests carried out, it was found that an office group tested showed a saving of time up to 30 percent in solving 'money sums' with errors reduced by 50 percent when using decimals. Tests were also made at two schools. For children of average age 9 years, 4 months, the time saved by using decimals and reduction in errors were each 40 percent. It is estimated that in the age group 7-11, there would be saving of 10 to 20 percent of mathematics time and up to 5 per cent of total teaching time. For the age group 11 to 13 the saving, though smaller

than for age group 7-11, would still be significant and for ages over 13 there would be some saving though not large. Science teaching would be simplified.

The replies received have refuted the argument that the study of the Imperial system produces 'valuable mental skills' and is 'stimulating to the number sense of children'. It is seen that many of these skills are required simply because of the system in use. Anyhow, a reorganization of the syllabus could take care of this point.

The Committee recommended that 'even if no action is taken on decimal coinage or the metric system, much greater emphasis should be placed immediately on the teaching and use of decimals and the metric system in the educational curriculum at the earliest stages. This would not only promote 'decimal thinking' at an earlier age than at present, but would be of value to entrants into industry and commerce where the practical use of decimals is increasing. It must also be remembered that should positive action be taken on the adoption of decimal coinage or the metric system, one of the earliest steps to be taken would be a revision of the educational approach.'

The last recommendation regarding education is of particular significance to India immediately as we have already adopted the decimal coinage and will go over substantially to the metric system during 1960-61. A delay in the change of the syllabus of schools would mean a wastage of national effort of students as well as teachers.

News & Views

11th General Conference of Weights & Measures

It is understood that the 11th General Conference of Weights and Measures would be held from 11 to 12 October 1960 in Paris.

Among the subjects proposed to be discussed at the Conference are:

A change in the definition of the metre as proposed by the International Committee on Weights and Measures.

(In the November 1959 issue of *Metric Measures*, M. Henri Moreau has given the background of this change.)

(2) Another proposal recommends a change in the definition of the second.

(In the article 'New Astronomical Definition of Unit of Time' appearing in *Metric Measures*, September 1959, M.A. Danjon, President of the Consultative Committee for the Definition of Second, which has been responsible for defining the second for international use, has discussed in detail the background of the change.)

(3) It is also proposed to discuss the creation of a laboratory within the Bureau, which would consist of three sections: (i) dosimetry of X-rays and 'gamma-rays' (ii) absolute measurement of activity, and (iii) measurement of flux of neutrons.

The International Committee has proposed that the member States should make a special contribution of 1,395,000 gold francs for the building of the laboratory and for its equipment and materials.

Other important points for discussion

are the absolute determination of gravity and standard atmosphere, and examination of the proposal to name the system of units proposed by the International Committee in 1956 and 1958, 'the International System of Units', use of the abbreviation 'SI' for this system to be adopted in all the languages, list of supplementary and derived units, inclusion of the prefixes tera, giga, nano and pico. It is also proposed to amend the Metre Convention and its regulations to enable the extension of activities of the Bureau to newer fields of standards of measurements.

Metric Bottles for Alcoholic Liquors

In a meeting of the Panel for Metric Glass Containers for Alcohol, CDC 10:3:1 of the Indian Standards Institution, it was agreed that the bottles for both India made foreign liquors and country spirits should have the nominal capacities of 750 ml, 500 ml and 250 ml and the tolerances on each capacity would be ± 7 ml, ± 5 ml and ± 3 ml respectively. It is expected that the Panel's recommendations, after duly consulting all the interests, would be finalized before 1 October 1960, leaving a period of 6 months for the production of the new bottles to metric specifications before 1 April 1961, the date set for the introduction of the metric system in the alcohol industry. The period between October and April 1961 would be utilised in making the bottles available to packers.

Adoption of Metric Weights in Maharashtra

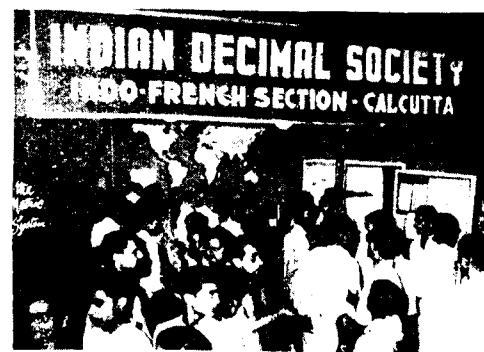
It is understood that the use of metric weights began in Poona when traders in brass and copper vessels adopted them from 1 December 1959. It was then taken up by wholesale traders who brought it into use from 28 March 1960. The Fair Price Shops and the Agricultural Produce Market Committee have already changed over to metric weights from 28 April 1960. It appears that the new State of Maharashtra have changed over substantially to the metric system, as all the licensed Fair Price Shops get their quota from the Government godowns in metric weights only and they have to sell it to the customers in metric units.

Exhibitions and Melas

The metric system was one of the attractions at the stall put up by the Weights

Children Park, Agartala. Some 5,000 people visited the stall during the 10 days of the Mela. Literature on metric system was distributed among the visitors and the system was explained.

The Indo-French Section of the Indian Decimal Society participated in the Calcutta Industry Fair which concluded recently. The French weights and the old Indian weights were on view. Over 20,000 persons visited



the stall and acquainted themselves with metric weights and measures. A number of tables and other literature, pamphlets, rules for students marked in inches and centimetres were given to the visitors.

Metric System in the Jute Trade and Industry

The jute trade and industry were first to adopt the metric system in India. It was adopted on an optional basis for two years from 1 July 1958, and the transition period would expire on 30 June 1960. It will become compulsory from 1 July 1960. The maund and the seer of the weight would be replaced by the kilogram, and the yard and the inch of the measurement would be replaced by the metre.

The compulsory change-over to the metric system from 1 July 1960 would replace kutchha bales of $1\frac{1}{2}$ mds., $3\frac{1}{2}$ mds., and 4 mds. by bales of 70, 130 and 150 kilograms respectively. The existing measure of pucca bales would continue for one more month and could be offered in bales of

400 lb. during July 1960, but from 1 August 1960 they would be replaced by bales of 180 kilograms.

After the change-over, it would become obligatory for all concerned in the jute trade and the industry to use only metric units in all of their transactions, and a contravention in this respect would be considered penal under the law. The use of maunds in offers and counter-offers would, therefore, come to an end, and the raw jute will be offered per 100 kg. Similarly, hessian cloth now being sold or bought per 100 yards would be sold or bought per 100 metres. The sale or purchase of sackings would, however, not be affected, as they are being bought and sold in numbers i.e. per 100 bags.

The Railways have also adopted the metric system from 1 April 1960 and the

growers and dealers in the upcountry are becoming conversant with the metric system, but their inconvenience arising out of this first compulsory change-over might need careful watch and a special effort to minimize it.

The change-over from July might prove the year 1960 to be a crucial year for the jute and the jute goods trade. Similar has been the consideration of the Government for the metric system as a whole, since the compulsory change-over would affect a number of trades and industries from 1 October 1960. Under the circumstances, the jute trade and the industry have really shown wisdom in adopting the change-over before it becomes compulsory for other trades and industries.

(From *The Jute Trade*, Vol. VII, No. 11, 1 June 1960)

Readers' Forum

Conversion Made Easy

Dear Sir,

Here is a simple, readily usable method of finding the approximate equivalent price of a commodity per kilogram when its price per pound is given.

Method: Convert the given price to naye paise, multiply this by two and add one-tenth of this value (corrected to the next higher integer) to the value already obtained. The figure thus obtained is the price per kilogram in naye paise.

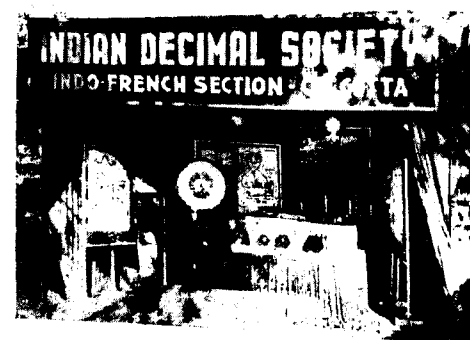
For example: If the price of a commodity is (1) 50 nP, (2) 88 nP and (3) Rs. 1.25, find the price per kilogram.

(1) $50 \times 2 + \frac{50 \times 2}{10} = 100 + 10 =$	110 nP
	Rs. 1.10
(2) $88 \times 2 + \frac{88 \times 2}{10} = 176 + 18 =$	194 nP
	Rs. 1.94
(3) $\frac{125 \times 2 = 250}{250 + 250} = 250 + 25 =$	275 nP
	Rs. 2.75

It will be observed on testing that in some cases there is a slight difference between the actual value obtained by using the factor $1 \text{ kg} = 2.20462 \text{ lb}$ and the



and Measures Department of Tripura, in the Annual Mela-cum-Exhibition at



approximate values obtained by the above method. These differences are of the following order:

Price of Commodity	Maximum differences Observed
Upto Rs. 3	1 nP
Above Rs. 3 and upto Rs. 5	2 nP
Above 5 and upto Rs. 7	3 nP
Above Rs. 7 and upto Rs. 9	4 nP
and so on.	

In day-to-day transactions we usually deal with commodities priced less than Rs. 3.00 per lb. As the maximum difference between the correct value and value obtained by the method suggested is only 1 naya paisa, this method may be useful for spot mental conversions.

G. VENKATESWARAN
Assistant Director (Weights & Measures)
New Delhi

Metric Measure of Fuel Consumption in Motor Vehicles

Dear Sir,

The oil industry in India has shown exemplary promptitude in adopting the metric system from 1 April 1960. While getting familiar with the new measures and prices, the motoring public, by now, may have discovered that the checking of fuel consumption in litres presents certain problems.

The present practice of measuring fuel consumption is in terms of miles per gallon. It gives a convenient indication and a natural trend would be to convert it to miles per litre or perhaps miles per 5 or 10 litres. There would be no problem if

such conversions conveniently served the purpose, but unfortunately they do not. The litre being a small measure and moreover not a simple sub-multiple of a gallon, converted values in miles per litre come out too small to be useful and, on top of it, they have to be expressed in decimal fractions to maintain a fair degree of accuracy. For example, 15 miles per gallon correspond to 3.3 miles per litre and 25 miles per gallon to 5.5 miles per litre. Few would be interested to check consumption for a run of 3.3 or 5.5 miles, particularly when miles are divided into 8 furlongs and no roads are marked in tenths of a mile. Neither is it easy to manipulate such figures to estimate the fuel requirement for a comparatively longer run.

In Continental countries, fuel consumption is normally measured in terms of litres per 100 kilometres, which would appear to offer solutions to both the problems. Expressing in this manner, 15 miles per gallon would correspond to 30 litres per 100 miles and 25 miles per gallon to 18 litres per 100 miles. Conversion error involved in this case is 1 percent which is much less than the accuracy of measurement. Both the mileage and the consumption in litres attain reasonable magnitudes. If one has to estimate fuel requirement for small fractions of 100 miles, it would present no major difficulty, for example 18 litres per 100 miles means 9 litres for 50 miles, 4.6 litres for 25 miles, 1.8 or nearly 2 litres for 10 miles, and so on. As Indian manufacturers of motor cars begin to fit their vehicles with kilometre speedometers, it would be easy to change over finally to litres per 100 kilometres.

There is much to commend in this Continental practice for general acceptance in India. For convenience, a ready reckoner

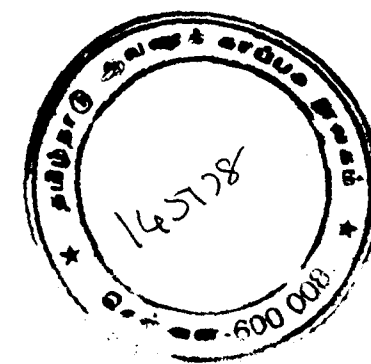
READERS' FORUM

to convert values from miles per gallon is given below:

Miles per gallon	Litres per 100 miles	Litres per 100 kilometres	Miles per gallon	Litres per 100 miles	Litres per 100 kilometres
10	45	28	26	17	11
12	38	24	27	17	10
14	32	20	28	16	10
16	28	18	29	16	10
18	25	16	30	15	9
20	23	14	32	14	9
21	22	13	34	13	8
22	21	13	36	13	8
23	20	12	38	12	7
24	19	12	40	11	7
25	18	11	45	10	6
			50	9	6
			55	8	5
			60	8	5

S. K. SEN

Deputy Director (Metric Cell),
Indian Standards Institution,
New Delhi



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Book Review

METRIC TABLES OF WEIGHTS & MEASURES (English) by U. Vasudeva Mallya, Publisher U. Vasudeva Mallya, Udipi, South Kanara, p. 76, First Edition, 1959. Price: Rs. 2-50.

The need for different types of conversion tables for use during the transition period cannot be over-stressed. The Indian Standards Institution has done pioneering work in this sphere. However, different tables have to be devised for various regions of the country in view of the variety of weights and measures in the country. A set of tables which covers these variations is welcome.

The book under review, 'Metric Tables of Weights & Measures', contains, besides the usual conversion tables for length, area, volume, capacity and weights, such unusual tables as the conversion of tolas, vals, grains, sovereigns, thukas, addas etc. into the corresponding metric weights and their value at Rupee 1 per tola, Rupee 1 per sovereign and Rupee 1 per gram. The author has also given special tables for gold weights in grains as also in kilograms, grams, milligrams and indicated their value.

Tables for the conversion of pounds of 40 tolas to grams and kilograms and seers of 24 tolas to grams and kilograms are welcome. As is well known the seer of 24 tolas is very common in South India and this particular set of tables will be useful there.

A table has been included for the conversion of litres to tolas and its decimal fractions. By definition capacity is the volume occupied by a certain weight of water. The same conversion factor as for weights may not necessarily apply in this case because of differences in the temperatures of definition and other allied factors. An exact conversion factor for litres to tolas has not yet been worked out. As a result the litre to tola tables given would be useful for judging how much a litre is in terms of tolas, though it may not be possible to use them for accurate conversions. To make tables doubly useful in South India, the author has included tables for Madras grain measures, Kanara grain measures, liquid measures etc.

One point which has apparently gone unnoticed is that of abbreviations. For example, decametre and hectometre are abbreviated as 'Dm' and 'Hm', whereas they should be 'dam' and 'hm'. The author has also given the current paper sizes but not of the 'A-series' which is to come into use in India in the near future.

On the whole, the book will be useful in day-to-day transactions everywhere, particularly in South India.

METRIC PADDHATI—Bi-monthly Bengali journal published by the Government of West Bengal.

The West Bengal Government has launched a Bengali bi-monthly magazine called *Metric Paddhati* from January 1960.

BOOK REVIEW

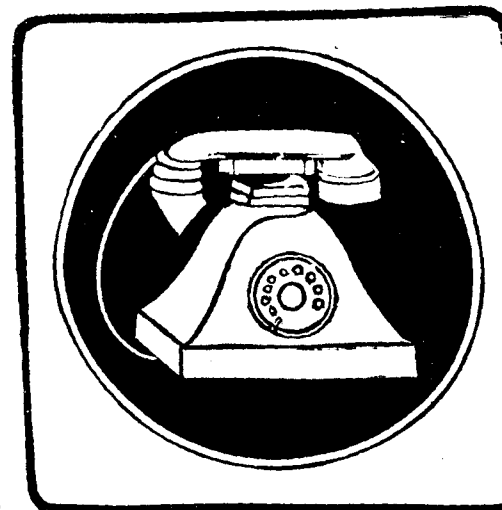
The first issue opens with an article by Shri Bhupati Majumdar, Minister-in-charge, Commerce and Industries Department and Tribal Welfare Department, Government of West Bengal. It also contains articles by Richard Vieweg, P.N. Nayer, M.L. Madan, N.K. Mukherjee and Phanindra Nath Seth. Some of the articles have been translated from *Metric Measures*. A review of the West Bengal Standards of Weights and Measures (Enforcement) Act as also a list of licensed manufacturers, dealers and repairers licensed under the Act have been included.

The second issue contains articles by V.M. Pednekar, Nanda Kumar Mukherjee, Tripti Seth, B.C. Kundu, B.B. Roy, S. Kushary and Phanindra Nath Seth.

The journal is well produced and its annual subscription is Rs. 2.00 and each issue is priced as 40 nP.

The West Bengal Government deserves congratulations for bringing out the Bengali magazine to enable propagation of the metric system among the largest section of Bengal's population. It is hoped that the magazine will serve as a forum for the exchange of views by the various interests in trade, commerce and industry, education and other fields. Other States should also bring out their own magazines, so that the metric system gets the widest publicity in a short time and reaches every person in the State. The effort deserves emulation.

TELEPHONE BRAND



METRIC WEIGHTS

Manufacturer : N. K. ROUTH

78, Netaji Subhas Road, Calcutta-7.

Telegram: 'NILKAMA'

Phone: 33-5134

Licensed Manufacturers, Dealers and Repairers of Weights and Measures(8)

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

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

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

An analysis of the licensees, including the present list, shows that the total number of licensees in 12 States and 2 Union Territories is 242 manufacturers, 972 dealers and 184 repairers. The details of published information are as follows:

Sl. No.	State/Union Territory	Licensees		
		Manufacturers	Dealers	Repairers
(1)	Andhra Pradesh	25	25	16
(2)	Bihar	20	69	34
(3)	Bombay	23	160	52
(4)	Delhi	13	59	18
(5)	Kerala	4	74	0
(6)	Madhya Pradesh	13	84	0
(7)	Madras	38	74	14
(8)	Mysore	9	106	8
(9)	Orissa	6	11	0
(10)	Punjab	13	222	12
(11)	Rajasthan	16	69	18
(12)	Tripura	0	8	0
(13)	Uttar Pradesh	22	2	1
(14)	West Bengal	40	9	11
		242	972	184

LICENSED MANUFACTURERS, DEALERS & REPAIRERS OF WEIGHTS & MEASURES (8)

BIHAR (1)

Manufacturers

Sl. No.	Name and Address of Manufacturer	Details of Articles Manufactured
(1)	Asiatic Machinery Corporation, 10, Kailash Chandra Lane, Santragachi (Howrah).	Heavy type of Weighing Machine.
(2)	Avery Company of India Private Ltd., Avery House, 28/2, Waterloo Street, P.O. Box No. 377, Calcutta-1.	Heavy type of Weighing Machine.
(3)	Avenue Weighing Scales, 135 Netajee Subhas Road, Howrah.	Heavy type of Weighing Machine.
(4)	Bankipore Iron Works, Mithapore, Patna	Cast Iron Weights.
(5)	Bharti Weighing Scales, 4/1, Haldarpara Lane, Khrut (Howrah).	Heavy type of Weighing Machine.
(6)	Bharat Weighing Scale and Engineering Syndicate, 75-1, Kalachand Nandy Lane, Howrah.	Heavy type of Weighing Machine.
(7)	Bihar Agricultural Industries, Cantt. Road, Dinapore	Cast Iron Weights.
(8)	Chouthi Charan Karmokar, Vill-Jaipur (Bhagalpur)	Scales.
(9)	H.P. Das & Co., 22, Srigopal Ariada (24 Parganas)	Bullion Weights.
(10)	Girish Chandra Ghosh, 58, Clive Street, Calcutta	Scales.
(11)	India Machinery Co. Ltd., 29, Strand Road, Calcutta	Heavy type of Weighing Machine.
(12)	Jaiswal Trading Co., Dhanbad	Cast Iron Weights.
(13)	A.M. Master & Co., Janjkar Street, Bombay	Bullion Weights.
(14)	Nagendra Nath Karmokar, C/o Wooma Charan Karmokar, 208, Harrison Road, Calcutta.	Scales.
(15)	Patra Nirman Sadan, Siwan	Bullion Weights.
(16)	Saple's Scales Manufacturing (Private) Ltd., Donimic House, 196-98, Girgaon Road, Bombay-4.	Bullion Weights.
(17)	Satish Chandra Dass & Co., 25/A, Ratan Babu Road, Cossipur, Calcutta.	Bullion Weights.
(18)	W.B. Scales and Co., 10, Kailashchandra Lane, Santragachi, Howrah.	Heavy type of Weighing Machine.
(19)	Umesh Chandra Karmoker, C/o Girish Chandra Ghose, 58, Clive Street, Calcutta.	Scales.
(20)	Wooma Charan Karmokar, 23, Narikeldanga, Calcutta	Scales.

Dealers

Sl. No.	Name and Address of Dealer	Details of Articles Sold
<i>Patna Division</i>		
(1)	Asiatic Machinery Corporation (P) Ltd., 10/1 Kailash Chandra Lane (Howrah).	Weights, Measures and Weighing and Measuring Instruments.

Dealers (contd.)

Sl. No.	Name and Address of Dealer	Details of Articles Sold
(2)	Asok Kumar, Boaring Works, G.T. Road, Shahabad	Weights, Measures and Weighing and Measuring Instruments.
(3)	Avery Company India Private Ltd., Avery House, 28/2, Waterloo Street, Calcutta.	Weights, Measures and Weighing and Measuring Instruments.
(4)	Bandhu Ram Lachmi Narain, Station Road, Patna Junction.	Weights, Measures and Weighing and Measuring Instruments.
(5)	Bandhu Ram Lachminarain, Chowk, Patna City	Weights, Measures and Weighing and Measuring Instruments.
(6)	Behar Scientific Corporation, Bankipore (Patna)	Weights, Measures and Weighing and Measuring Instruments.
(7)	Bihar Agriculture Industries, Cantt. Road, Khagaul (Dinapur).	Weights, Measures and Weighing and Measuring Instruments.
(8)	Central Hardware Stores, Gaya	Weights, Measures and Weighing and Measuring Instruments.
(9)	Hiraman Sahu Lato Sahu, Nawadah (Gaya)	Weights, Measures and Weighing and Measuring Instruments.
(10)	India Machinery Co. Ltd., 29, Strand Road, Calcutta ..	Weights, Measures and Weighing and Measuring Instruments.
(11)	Jagdish Pd., Iron Works, Tekari Road, Gaya	Weights, Measures and Weighing and Measuring Instruments.
(12)	Kaloo Ram Sitaram, Gola Road, Dinapore	Weights, Measures and Weighing and Measuring Instruments.
(13)	Kamala Kant Gupta, Hasua Bazar, Gaya	Weights, Measures and Weighing and Measuring Instruments.
(14)	Mahabir Hardware Stores, Patna city	Weights, Measure and Weighing and Measuring Instruments.
(15)	Matuk Ram & Co., 16/ Anugrah Road, Gaya	Weights, Measures and Weighing and Measuring Instruments.
(16)	R.N. Mehra, Dinapore	Weights, Measures and Weighing and Measuring Instruments.
(17)	Nageshwar Mistry, Chowk, Arrah	Weights, Measures and Weighing and Measuring Instruments.
(18)	Narayandas and Sons, Pachim Darbaza, Gulzarbagh ..	Weights, Measures and Weighing and Measuring Instruments.
(19)	Nathun Ram, Kaburddinganj, Beharshariff	Weights, Measures and Weighing and Measuring Instruments.
(20)	Sheokumar Pd., Barh (Patna)	Weights, Measures and Weighing and Measuring Instruments.
(21)	Shohan Lall Narangi Lall, Ramna, Gaya	Weights, Measures and Weighing and Measuring Instruments.
(22)	Sundar Cottage Industries, Hari Mandir Gaw, Patna City	Weights, Measures and Weighing and Measuring Instruments.

LICENSED MANUFACTURERS, DEALERS & REPAIRERS OF WEIGHTS & MEASURES (8)

Dealers (contd.)

Sl. No.	Name and Address of Dealer	Details of Articles Sold
(23)	Suresh Mistri, Sohsarai, Beharshariff (Patna)	Weights, Measures and Weighing and Measuring Instruments.
(24)	Triloki Chand Nathuni Ram, Aurangabad, Gaya	Weights, Measures and Weighing and Measuring Instruments.
<i>Muzaffarpur Division</i>		
(25)	Agarawalla Stores, Saryaganj, Muzaffarpur	Weights, Measures and Weighing and Measuring Instruments.
(26)	Badri Singh Ram Lochan Singh, Jainagar, Darbhanga	Weights, Measures and Weighing and Measuring Instruments.
(27)	Bajinath Pd. Gupta, Kachhari Road, Chapra	Weights, Measures and Weighing and Measuring Instruments.
(28)	Bhagwan Sah & Co., Muzaffarpur	Weights, Measures and Weighing and Measuring Instruments.
(29)	Chandumall Bajinath, Henry Bazar, Motihari	Weights, Measures and Weighing and Measuring Instruments.
(30)	Devi Pd. Kijaribal, Goghardiha, Darbhanga	Weights, Measures and Weighing and Measuring Instruments.
(31)	Dhurb Narain Bishwanath, Gudri Bazar, Madhubani (Darbhanga).	Weights, Measures and Weighing and Measuring Instruments.
(32)	Khublal Sah Mathura Sah, Sitamarhi	Weights, Measures and Weighing and Measuring Instruments.
(33)	Mahabir Mahto, Barabazar, Darbhanga	Weights, Measures and Weighing and Measuring Instruments.
(34)	Patra Nirman Sadan, Kesara Bazar, Saran	Weights, Measures and Weighing and Measuring Instruments.
(35)	Rajendra Pd. Chowdhary, Saryaganj, Muzaffarpur ..	Weights, Measures and Weighing and Measuring Instruments.
(36)	Ramchandra Bhagwandass Co., Saryaganj, Muzaffarpur..	Weights, Measures and Weighing and Measuring Instruments.
(37)	Ram Lakhan Pd. Jaiswal, Gopalganj, Saran	Weights, Measures and Weighing and Measuring Instruments.
(38)	Ram Sagar Sharma, Hajipur (Muzaffarpur)	Weights, Measures and Weighing and Measuring Instruments.
(39)	Shamlall, Hajipur (Muzaffarpur)	Weights, Measures and Weighing and Measuring Instruments.
(40)	Sheotahal Sah Luxmi Pd., Janakpur Road, Muzaffarpur ..	Weights, Measures and Weighing and Measuring Instruments.
(41)	Shivbalak Ram Deo Narain Ram, Raxaul, Champaran ..	Weights, Measures and Weighing and Measuring Instruments.
(42)	Sitaram Biswanath, Samastipur (Darbhanga)	Weights, Measures and Weighing and Measuring Instruments.

Dealers (contd.)

Sl. No.	Name and Address of Dealer	Details of Articles Sold
(43)	Sonalall Jagannath Pd., Sariyaganj, Muzaffarpur	Weights, Measures and Weighing and Measuring Instruments.
(44)	R.B. Tunki Sah, Baidnath, Sariyaganj, Muzaffarpur	Weights, Measures and Weighing and Measuring Instruments.
(45)	Yogendra Pd., Bettiah, Champaran	Weights, Measures and Weighing and Measuring Instruments.
<i>Bhagalpur Division</i>		
(46)	Abinath Mistri, Dumka, Deoghar	Weights, Measures and Weighing and Measuring Instruments.
(47)	Ashoke Kumar, Begusarai((Monghyr)	Weights, Measures and Weighing and Measuring Instruments.
(48)	Bajinath Trading Co., Deoghar (Santhal Parganas)	Weights, Measures and Weighing and Measuring Instruments.
(49)	Dwarka Pd. Gobind Ram, Khagaria, Monghyr	Weights, Measures and Weighing and Measuring Instruments.
(50)	Ganesh Trading & Co., Banmankhi (Purnea)	Weights, Measures and Weighing and Measuring Instruments.
(51)	Ghose & Sons, Katihar (Purnea)	Weights, Measures and Weighing and Measuring Instruments.
(52)	M. L. Goil, Forbesganj (Purnea)	Weights, Measures and Weighing and Measuring Instruments.
(53)	Jethumall Ganesh Narain, Araria (Purnea)	Weights, Measures and Weighing and Measuring Instruments.
(54)	Munshi Lall Arya, Nehru Chowk, Kaswa (Purnea)	Weights, Measures and Weighing and Measuring Instruments.
(55)	Nanhu Ram Bajinath, Bara Bazar, Kathihar (Purnea)	Weights, Measures and Weighing and Measuring Instruments.
(56)	Rameshwar Pd., Purabsarai, Monghyr	Weights, Measures and Weighing and Measuring Instruments.
(57)	Ram Chandra Bhagwan Dass, Sujaganj, Bhagalpur	Weights, Measures and Weighing and Measuring Instruments.
(58)	Satya Narain Mahabir Pd., Dumka, Deoghar	Weights, Measures and Weighing and Measuring Instruments.
(59)	Sheodutta Rai, Khetap, Lohapatti, Bhagalpur	Weights, Measures and Weighing and Measuring Instruments.
(60)	Sheodutt Roy Khaitan, Lohapapar, Bhagalpur	Weights, Measures and Weighing and Measuring Instruments.
<i>Ranchi Division</i>		
(61)	Basista Narain Tewari, Jumarhi Tellaiya, Hazaribagh	Weights, Measures and Weighing and Measuring Instruments.
(62)	Bharat Dubey, Candwa, Latihar, Palamau	Weights, Measures and Weighing and Measuring Instruments.

LICENSED MANUFACTURERS, DEALERS & REPAIRERS OF WEIGHTS & MEASURES (8)

Dealers (contd.)

Sl. No.	Name and Address of Dealer	Details of Articles Sold
(63)	Biswanath Pd., 29, Dalda Road, Jamshedpur	Weights, Measures and Weighing and Measuring Instruments.
(64)	Braj Bilas Pd., Bisun Mandir Road, Daltonganj	Weights, Measures and Weighing and Measuring Instruments.
(65)	Jadulal Gupta, Upper Bazar, Ranchi	Weights, Measures and Weighing and Measuring Instruments.
(66)	Lakshman Ram, Rani Mohalla, Garhwa, Dhalbhum	Weights, Measures and Weighing and Measuring Instruments.
(67)	Madan Lal Budha, Main Road, Ranchi	Weights, Measures and Weighing and Measuring Instruments.
(68)	Parmanand Singh, Jhumari Telaiya, Hazaribagh	Weights, Measures and Weighing and Measuring Instruments.
(69)	Radhe Shyam Bhagwan Dass, Jugbai, Tatanagar (Singhbhum)	Weights, Measures and Weighing and Measuring Instruments.

Repairers

Sl. No.	Name and Address of Repairer	Details of Articles Repaired
(1)	Avery Co., (India) Ltd., Waterloo Street, Calcutta	Platform Scales and Weighbridges
(2)	Avenue Weighing Scales Co., Netajee Subhas Road, Howrah	Platform Scales and Weighbridges
(3)	Belsund Sugar Co. Ltd., Righa, Muzaffarpur	Platform Scales and Weighbridges
(4)	Bharat Weighing Scales and Engineering Syndicate 75/1, Kalachand Nandy Lane, Howrah	Platform Scales and Weighbridges
(5)	Bharat Sugar Mill Ltd., Sindwalia, Saran	Platform Scales and Weighbridges
(6)	Bihar Sugar Works, Pachrukhi Saran	Platform Scales and Weighbridges
(7)	Biswas & Co., Main Road, Ranchi	Scales and Weights.
(8)	Canpore Sugar Works Ltd., Marhowrah, Saran	Platform Scales and Weighbridges
(9)	Champaran Sugar Co., Barachakia, Motihari	Platform Scales and Weighbridges
(10)	Champaran Sugar Co., Ltd., Bettiah, Champaran	Platform Scales and Weighbridges
(11)	Chauthi Charan Karmkar, Jaipur, Bhagalpore	Scales and Weights.
(12)	Hanuman Sugar Mills, Motihari, Champaran	Platform Scales and Weighbridges
(13)	Hindusthan Scales Corporation, 71, Netajee Subhas Road, Calcutta.	Platform Scales and Weighbridges
(14)	India Machinery Co., Dasnagar, Howrah	Platform Scales and Weighbridges
(15)	Machine Sugar Mill, Warsaliganj, Gaya	Platform Scales and Weighbridges
(16)	B.K.G.S. Mills Ltd., Lauriya, Champaran	Platform Scales and Weighbridges

Repairers (contd.)

Sl. No.	Name and Address of Repairer	Details of Articles Repaired
(17)	S.K.G.S. Mills Ltd., Mirganj, Saran	Platform Scales and Weighbridges.
(18)	Motipur Sugar Factory, Motipur, Muzaffarpur	Platform Scales and Weighbridges.
(19)	New Savan Sugar Factory, Siwan, Saran.	Platform Scales and Weighbridges.
(20)	New India Sugar Mills, Hassanpur, Darbhanga	Platform Scales and Weighbridges.
(21)	New Swadeshi Sugar Mills, Narkatiaganj, Champaran	Platform Scales and Weighbridges.
(22)	Patra Nirman Sadan, Kesra Bazar, Siwan	Scales and Weights.
(23)	Punjab Flour Mills, Motihari, Champaran	Scales and Weights.
(24)	Rohtas Industries Ltd., Dalmianagar, Dehri (Shahabad)	Platform Scales and Weighbridges.
(25)	Rayam Sugar Co. Ltd., Rayam, Darbhanga	Platform Scales and Weighbridges.
(26)	Samastipur Central Sugar Co., Samastipur, Darbhanga	Platform Scales and Weighbridges.
(27)	Sasamusa Sugar Works(P), Sasamusa, Saran	Platform Scales and Weighbridges.
(28)	Sakari Sugar Works, Sakari, Darbhanga	Platform Scales and Weighbridges.
(29)	W.B. Scales & Co., 10/1, Kailashchandra Lane, Howrah	Platform Scales and Weighbridges.
(30)	Sitalpore Sugar Works Ltd., Goraul, Muzaffarpur	Platform Scales and Weighbridges.
(31)	M.P. Sugar Mills Co. (P) Ltd., Majhoulia, Champaran	Platform Scales and Weighbridges.
(32)	S.K.G. Sugar Ltd., Guraru, Gaya	Platform Scales and Weighbridges.
(33)	Sugauli Sugar Works (P) Ltd., Sugauli, Motihari	Platform Scales and Weighbridges.
(34)	Universal Scale Manufacture Co., Muradpore, Patna	Scales and Weights.

MADHYA PRADESH (2)

In the May 1960 issue of *Metric Measures* a list of manufacturers of weights and measures in Madhya Pradesh State was published. The following is a list of manufacturers and dealers subsequently licensed under the Madhya Pradesh Weights and Measures (Enforcement) Act, 1958.

Manufacturers

Sl. No.	Name and Address of Manufacturer	Details of Articles Manufactured
(1)	Guru Nanak Factory, Lashkar, Gwalior	Cast Iron Weights.
(2)	National Engineering Works, Sinda-ki-Chhawani, Lashkar, Gwalior.	Cast Iron Weights.
(3)	Weights & Measures Manufacturing Society, Lashkar, Gwalior.	Cast Iron Weights.

LICENSED MANUFACTURERS, DEALERS & REPAIRERS OF WEIGHTS & MEASURES(8)

Dealers

Sl. No.	Name and Address of Dealer	Details of Articles Sold
<i>Indore Division</i>		
(1)	Abdul Tayab M. Hasanbhoy & Co. Siyaganj, Indore	Weights and Measures.
(2)	Ali Hussain Abdul Ali, 64, Hathi Pala Road, Indore	Weights and Measures.
(3)	F.H. Barkah Ali, 20, Kasera Bazar, Indore	Weights and Measures.
(4)	Bhana Mal & Co. Ltd., Siya Ganj, Indore	Weights and Measures.
(5)	Dinesh Industries, 81, Siya Ganj, Indore	Weights and Measures.
(6)	Esoofally Dawoodbhoy & Co., Indore	Weights and Measures.
(7)	Faizullahbai Moosakhanji, 10, Siyaganj, Indore	Weights and Measures.
(8)	A. Ibrahim & Co., Ghadiwala, 20/3, Siyaganj, Indore	Weights and Measures.
(9)	T. Ibrahim & Sons, Siya Ganj, Indore	Weights and Measures.
(10)	Indore Grammodityog Sahkari Samiti, Gandhi Bhawan, Indore.	Weights and Measures.
(11)	Indore Nagarnivasi Sahakari Sanstha (Ltd.) 17, Krina Pura, Indore.	Weights and Measures.
(12)	Indore Iron Steel Trunk Factory, Siyaganj, Indore	Weights and Measures.
(13)	Indore Iron Works, 40, Lohar Patti, Malhariganj, Indore	Weights and Measures.
(14)	Kahandelwal Traders, 26, Siya Ganj, Indore	Weights and Measures.
(15)	Kamsuddin, Mhow	Weights.
(16)	Kapoor Hardware & Paint Mart, 45, Ranipura, Indore	Weights and Measures.
(17)	Krishna Iron & Hardware Mart, Siya Ganj, Indore	Weights.
(18)	M.H. Lakhandala, 20/10, Siya Ganj, Indore	Weights and Measures.
(19)	Laxmi Lock House, Siya Ganj, Indore	Weights and Measures.
(20)	M.P. Small Scale Industries, Cooperative Society Ltd., 16, Siyaganj, Indore.	Weights and Measures.
(21)	Mhow Iron Industries, Mhow	Weights and Measures.
(22)	J.K. Mistry & Bros., 24, New Dewa Road, Indore	Weights and Measures.
(23)	H. Muhamad Hussain & H.M. Ibrahim & Co., 22, Siyaganj, Indore.	Weights and Measures.
(24)	Patel Industries & Engineering Works, 1, Silnath Camp, Indore.	Weights and Measures.
(25)	Radha Krishan Chogalal, Mhow Cantonment	Weights and Measures.
(26)	Rajni Tea House Bajani Gate Market, Indore	Weights and Measures.
(27)	N.A. Shinde, 15, Yaswant Road, Indore	Weights and Measures.
(28)	Umbrella Trunk Mfg & Co., 80, Siyaganj, Indore	Weights and Measures.
(29)	Vinay Pustak Bhandar, Sitalmata Road, Indore	Weights.
(30)	N.M. Yusufal, H.M. Abdulali, 86, Siyaganj, Indore	Weights and Measures.

Dealers (contd.)

Sl. No.	Name and Address of Dealer	Details of Articles Sold
<i>Jabalpur Division</i>		
(1)	Akbar Ali Muradali, Naya Bazar, Damoh	Weights and Measures.
(2)	Arun Iron and Steel, Jabalpur	Weights and Measures.
(3)	Devkirt Hardware Stores, Khurai, Dist. Sagar	Weights and Measures.
(4)	Gopikrishna Rathe, Main Road, Chhindwara	Weight and Measures.
(5)	Guru Nanak Hardware Stores, Guruduvara, Marhatal, Jabalpur.	Weights and Measures.
(6)	Hari Prasad Mohanlal, Jaihind Stores, Murwara, Katni, Dist. Jabalpur.	Weights and Measures.
(7)	Jai Hind Stores, Railway Road, Katni (Dist. Jabalpur)	Weights and Measures.
(8)	Kamal Narain, Sausar, District Chhindwara	Weights and Measures.
(9)	A.N. Kamruddin and Sons, Damoh	Weights and Measures.
(10)	Kanchadilal Saraf, Rahti, District Sagar	Weights and Measures.
(11)	Kashmir Hardware Stores, Gol Bazar, Katni	Weights and Measures.
(12)	Khan Sahib M. Hassanjee & Sons, Chhindwara	Weights and Measures.
(13)	Mahabir Iron Stores, Pandhurna, Tahsil Sausar, Dist. Chhindwara.	Weights and Measures.
(14)	Mohammadali Badruddin, Chhindwara	Weights and Measures.
(15)	Nand Kishore Jain, Bara Bazar, Hatta, District Damoh	Weights and Measures.
(16)	Parmanik Co. Jawaharganj, Jabalpur	Weights and Measures.
(17)	Pishori Lal Suri, Ranghi, Jabalpur	Weights and Measures.
(18)	Regional Cooperative Society, Sihora, Dist. Jabalpur.	Weights and Measures.
(19)	Singhi Hukumchand Singhaliya, Patan (Jabalpur)	Weights and Measures.
(20)	Swastik Hardware Mart, 524-1, Marhatal, Jabalpur	Weights and Measures.
(21)	Yusufali M. Mohammadali & Sons, Katra Bazar, Sagar	Weights and Measures.
<i>Bhopal Division</i>		
(1)	Ashtra Cooperative Marketing Society Ltd. Ashtra, District Sehore.	Weights and Measures.
(2)	Bhai Umar Adaji, Jumnerati Bazar, Bhopal	Weights and Measures.
(3)	Chairman, Marketing Society, Bhopal	Weights and Measures.
(4)	Fakir Brothers, 5, Hamidia Road, Bhopal	Weights.

LICENSED MANUFACTURERS, DEALERS & REPAIRERS OF WEIGHTS & MEASURES (8)
Dealers (contd.)

Sl. No.	Name and Address of Dealer	Details of Articles Sold
(5)	Fakirchand Shrikishan Das, General Cloth Merchants, Ashta, District Sehore.	Weights and Measures.
(6)	Ifran General Trading Stores, Jumnerati Bazar, Bhopal	Weights and Measures.
(7)	Kanhaiyalal Bhutai, Gandhi Chowk, Ashta, Dist. Sehore	Weights and Measures.
(8)	Kashiva and Company, 5, Bal Bihar, Hamidia Road, Bhopal	Weights and Measures.
(9)	Mughal Hussain Imdad Ali, Loha Bazar, Bhopal	Weights and Measures.
(10)	Munawar Mohamad Khan, Anwar Ganj, Bhopal	Weights and Measures.
(11)	Nutan Traders, Itwara, Bhopal	Weights and Measures.
(12)	Sagarmal Banwat, Gandhi Chowk, Ashta, Dist. Sehore	Weights and Measures.
(13)	D.S. Saxena, Daya Kuteer, Naimalpura, Idgah Hill, Bhopal.	Weights and Measures.
(14)	J.P. Vasistha, Manager, Cooperative Society, Ashta, District Sehore.	Weights.

Dealers

Sl. No.	Name and Address of Dealer	Details of Articles Sold
<i>Gwalior Division</i>		
(1)	Agarwal Iron & Steel Trading Co., Lohia Bazar, Lashkar, (Gwalior)	Weights and Measures.
(2)	Amarnath Premnath, Naya Bazar, Lashkar	Weights and Measures.
(3)	Dayaram Mannu Lal, Lohia Bazar, Lashkar	Weights and Measures.
(4)	Deshri Mal Pahari Mal, Lohia Bazar, Lashkar	Weights and Measures.
(5)	Dinanath Badriprasad, Lohia Bazar, Lashkar	Weights and Measures.
(6)	Ghasi Ram Baiz Nath, Lohia Bazar, Lashkar	Weights and Measures.
(7)	Gopilal Chhoteylal, Lohia Bazar, Lashkar	Weights and Measures.
(8)	Govind Dass Mannulal, Iron Merchant, Dabra Mandi, Dabra, Gwalior.	Weights and Measures.
(9)	Jankiprasad Laxmi Narain, Iron Merchant, Bhomdar, Gwalior.	Weights and Measures.
(10)	Kalloomal Ram Bharose, Lohia Bazar, Lashkar	Weights and Measures.
(11)	Kunjilal Piyare, Iron Merchant, Morar, Gwalior	Weights and Measures.
(12)	Lallimal Beharilal, Lohia Bazar, Lashkar	Weights and Measures.

Dealers (contd.)

Sl. No.	Name and Address of Dealer	Details of Articles Sold
(13)	Lallmal Mehta Lal, Lohia Bazar, Lashkar	Weights and Measures.
(14)	Mukesh & Co., Madhoganj, Lashkar, Gwalior	Weights and Measures.
(15)	Narain Dass Mangal Dass, Inderganj, Lashkar	Weights and Measures.
(16)	Niraj & Co., Daulatganj, Lashkar, Gwalior	Weights and Measures.
(17)	Phoolchand Hirachand Kothari, Lohia Bazar, Lashkar, Gwalior.	Weights and Measures.
(18)	Prakash Iron Stores, Lohia Bazar, Lashkar	Weights and Measures.
(19)	Tulsiram Bhagwandass, Lohiya Baazar, Lashkar	Weights and Measures.

ORISSA (2)

In the March 1960 issue of *Metric Measures* a list of licensed manufacturers and repairers of weights and measures in Orissa State was published. The following is a list of manufacturers, dealers and repairers subsequently licensed by the Government of Orissa under the Orissa Weights and Measures (Enforcement) Act, 1958.

Manufacturers

Sl. No.	Name and Address of Manufacturer	Details of Articles Manufactured
(1)	B.C. Iron Foundry, Sultanganj, Agra	Cast Iron Weights
(2)	Krishna Iron Foundry, Free Ganj, Agra	Cast Iron Weights.

Dealers

Sl. No.	Name and Address of Dealers	Details of Articles Sold
(1)	Behari Mishra, Grand Road, Puri	Cast Iron Weights.
(2)	Dwarka Prasad Sharma, Lion's Gate, Puri	Cast Iron Weights.
(3)	Mishra & Partner, Ranihat, Cuttack	Cast Iron Weights.

LICENSED MANUFACTURERS, DEALERS & REPAIRERS OF WEIGHTS & MEASURES (8)

Dealers (contd.)

Sl. No.	Name and Address of Dealer	Details of Articles Sold
(4)	Monilal Doshi, Mltigak Bazar, Balasore	Cast Iron Weights.
(5)	Muralidhar Gopikissen (P) Ltd., P.B. No. 8, Balasore	Cast Iron Weights.
(6)	R. Rath, Proprietor, Engineering Stores, Bejipur, Berhampur.	Cast Iron Weights.

PUNJAB (5)

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

Repairers

Sl. No.	Name and Address of Repairer	Details of Articles Repaired
(1)	Jagan Nath S/o Shri Sant Ram, Ambha Bhawan Road, Hoshiarpur.	Weights and Measures of length and capacity.
(2)	Puran Chand Sikander Pal, Karnal	Weights and Measures of length and capacity.
(3)	Ram Kishan Daya Nand, Jhajjar Road, Rohtak	Weights and Measures of length and capacity.

Dealers

Sl. No.	Name and Address of Dealer	Details of Articles Sold
(1)	Basant Rai Nathu Mal, Morinda Railway Road, Morinda.	Weights, Measures, Weighing and Measuring Instruments.
(2)	Bhag Chand Harbilas Rai, Iron Merchants, Goniana Mandi	Weights, Measures, Weighing and Measuring Instruments.

Dealers (contd.)

Sl. No.	Name and Address of Dealer	Details of Articles Sold
(3)	Haryana Co-operative Stores, Ltd., Sonapat, Dist. Rohtak	Weights, Measures, Weighing and Measuring Instruments.
(4)	Indian Weighing Machines, Hide Market, Amritsar	Platform weighing machines upto 8 mds. capacity (loose weights).
(5)	Jesa Ram Vishan Narain, 37/22-D, Chandigarh	Weights, Measures, Weighing and Measuring Instruments.
(6)	Jainko Industries, Spatu Road, Ambala City	Spring balances dial type 100 kg Capacity.
(7)	Kastur Chand Suraj Bhan, Katra Nauhrian, Patiala	Weights, Measures, Weighing and Measuring Instruments.
(8)	National Tape Company, 188-Ikbal Ganj, Ludhiana	Measuring tapes.
(9)	Nathu Ram Singala, Iron Merchants, Goniana Mandi	Weights, Measures, Weighing and Measuring Instruments.
(10)	Rakha Ram Hira Lal, Iron Merchants, Jagraon	Weights, Measures, Weighing and Measuring Instruments.

RAJASTHAN (1)

Manufacturers

Sl. No.	Name and Address of Manufacturer	Details of Articles Manufactured
(1)	M. C. Bhargava, Kucheri Road, Ajmer	Weights, Measures and Weighing Instruments.
(2)	Calebs Scale Manufacturers & Repairers, Sardarpura, Near Panna Niwas, Jodhpur.	Counter Machines.
(3)	Chand Iron Foundry, Jaipur Road, Ajmer	Cast Iron Kilogram Weights.
(4)	Gopal Industries, Shahpura Mohalla, Beawar	Cast Iron Kilogram Weights.
(5)	Hassanali Alliji, Kapasanwale, Police Choki, Bora Wadi, Udaipur.	Capacity Measures.
(6)	Krishna Industries, Raghunath Bhawan, Ajmer	Weights, Measures and Weighing Instruments.
(7)	Mahesh Metal Works, Madanganj, Kishangarh	Capacity Measures.
(8)	Modern Scale Manufacturers & Repairers, Near Panna Niwas Jodhpur.	Counter Machines.
(9)	Mundra Metal Works (P) Ltd., Bikaner	Brass and Cast Iron Weights.

LICENSED MANUFACTURERS, DEALERS & REPAIRERS OF WEIGHTS & MEASURES (8)

Manufacturers (contd.)

Sl. No.	Name and Address of Manufacturer	Details of Articles Manufactured
(10)	Om Prakash Gupta & Co., Rampura Bazar, Kotah	Length Measures.
(11)	Rajasthan Engineering Works, Amber	Weights.
(12)	Rajasthan Industries, Behind Power House, Jodhpur	Cast Iron kilogram Weights.
(13)	Rajasthan Truck Co. Srijiki Mori, Tripolia Bazar, Jaipur	Weights Measures and Weighing Instruments.
(14)	Ramesh Iron Foundry, Mal Godam Road, Bharatpur	Brass & Cast Iron kilogram Weights.
(15)	Shanuram Chandra Prakash, Adarsh Nagar, Jaipur	Bullion Brass Weights.
(16)	Swastic Iron & Metal Works, Bhim Gunj Mandi, Kotah	Bullion & Cast Iron & kilogram Weights.

Dealers

Sl. No.	Name and Address of Dealer	Details of Articles Sold
(1)	Abdul Salam Abdul Rehman, General Merchants, Opposite Srijiki Mori, Tripolia Bazar, Jaipur.	Weighing and Weighing Instruments.
(2)	Ahsan Hussan M. Abdul Hussain, Rampura Bazar, Kotah	Weights, Measures and Weighing Instruments.
(3)	Akbar Ali Taiyyabali, Mandikinal, Udaipur	Weights, Measures and Weighing Instruments.
(4)	Ali Mohd. & Co., Mochibazar, Girwa, Udaipur	Weights, Measures and Weighing Instruments.
(5)	Ali Mohd. Hussainji, Chabra (Kota) Rashoolji Mohd. Ali, Chabra Kotah.	Weights and Weighing Instruments.
(6)	Arhatmal & Sons, Mirchi Bazar, Jodhpur	Weights, Measurement Weighing Instruments.
(7)	Arora Crockery & Metal Co., Station Road, Jodhpur	Weights.
(8)	Asanand Jugal Kishore, Gopalji Ka Rasta, Jaipur	Weights & Weighing Instruments.
(9)	Badri Narain Omkarmal, Naya Bazar, Ajmer	Tape Measures.
(10)	Baldev Kani Ram, Tripolia Bazar, Jaipur	Weights, Measures and Weighing Instruments.
(11)	Bansilal & Sons, Tobacco Bazar, Jodhpur	Weights, Measures and Weighing Instruments.
(12)	Bhanamal & Co., Madanganj, Kishangarh, Ajmer	Weights, Measures and Weighing Instruments.
(13)	Bhanamal & Co. (P) Ltd., Tripolia Bazar, Jaipur	Weights, Measures and Weighing Instruments.

Dealers (contd.)

Sl. No.	Name and Address of Dealer	Details of Articles Sold
(14)	Chopra Bros. Tripolia, Jodhpur	Weights, Measures and Weighing Instruments.
(15)	Faiz Mohd. Khan, Chandi Ki Taksal, Jaipur ..	Weights and Weighing Instruments.
(16)	Gagandas & Sons, Darga Bazar, Ajmer	Weights and Weighing Instruments.
(17)	Gallula Lohiya, Opposite Nawab's Hawali, Tripolia Bazar, Jaipur.	Weights, Measures and Weighing Instruments.
(18)	Ganesh Das Samir Mal, Chandpole Bazar, Jaipur ..	Weights, Measures and Weighing Instruments.
(19)	Girdhari Lal Mangilal, Pali Bazar, Beawar	Weights, Measures and Weighing Instruments.
(20)	Gulab Bohara & Sons, Outside Hatipole, Udaipur ..	Weights, Measures and Weighing Instruments.
(21)	Haji Aabid Hussain, M. Nazirji Mandi Ki Nal, Dhanmandhi, Udaipur.	Weights, Measures and Weighing Instruments.
(22)	Hanuman Dass & Co., Vaido Ka Chowk, Bikaner ..	Weights, Measures and Weighing Instruments.
(23)	Hassan Bhai M. Rahmatullaji, Bhadur Bazar, Kotah ..	Weights, Measures and Weighing Instruments.
(24)	Her Pd. Gupta, Nataniyan Ka Rasta, Jaipur	Weights, Measures and Weighing Instruments.
(25)	Hussain Ali Yoosafali, Fatehnagar, Tehsil Mavli, Udaipur	Weights, Measures and Weighing Instruments.
(26)	Isaji Aliji, Clock Tower, Udaipur	Weights, Measures and Weighing Instruments.
(27)	Ismail Hassanji, Sangod, Kotah	Weights.
(28)	Jamuna Lal Shankarlal Loheya, Tripolia Bazar, Jaipur	Weights, Measures and Weighing Instruments.
(29)	Jamuna Metal Works, Chandi Ki Taksal, Jaipur ..	Weights.
(30)	Jeevanali Gulam Hussain, inside Surajpore, Udaipur ..	Weights, Measures and Weighing Instruments.
(31)	Kalyan Tin Factory, Iron Merchants, Cinema Road, Ajmer	Weights, Measures and Weighing Instruments.
(32)	Khatrri Gangaram Mancharam, Kandoi Bazar, Jodhpur ..	Weights.
(33)	Kewalram Govindram, Sabjimandi Road, Kotah	Weights, Measures and Weighing Instruments.
(34)	Ladu Ram Ram Niwas, Naya Bazar, Ajmer	Tape Measures.
(35)	Lal Chand Tirathdas Kapoor, Naya Bazar, Ajmer ..	Weights, Measures and Weighing Instruments.
(36)	Madan Mohan Laxmi Kant, Loha Street, Beawar ..	Weights, Measures and Weighing Instruments.

LICENSED MANUFACTURERS, DEALERS & REPAIRERS OF WEIGHTS & MEASURES (8)

Dealers (contd.)

Sl. No.	Name and Address of Dealer	Details of Articles Sold
(37)	Madanlal Laxmilal, Sadar Bazar, Vijai Nagar, Ajmer ..	Weights, Measures and Weighing Instruments.
(38)	Mangaldas Wadhmal, Srinagar Road, Ajmer	Weights, Measures and Weighing Instruments.
(39)	Manpasand, Ghana Kothi, Bastiyan Ka Bas, Shahpura, Jodhpur.	Weights, Measures and Weighing Instruments.
(40)	Malwa Iron stores, Naya Bazar, Ajmer	Weights and Weighing Instruments.
(41)	Mohd. Ali & Co., Chabrha, Kotah	Weights and Weighing Instruments.
(42)	Mohd. Bux & Sons, Ghas Mandi, Jodhpur	Weights and Weighing Instruments.
(43)	Mohd. Ismail, Lohar Mohalla, Beawar	Weights, Measures and Weighing Instruments.
(44)	M.K.M. Mussa Bhai, Bhadur Bazar, Kotah	Weights and Weighing Instruments.
(45)	Narain Das Mangaldas, Ladpura, Kotah	Weights, Measures and Weighing Instruments.
(46)	Narsingdas Mitthaldas, Tripolia Bazar, Jaipur ..	Weights, Measures and Weighing Instruments.
(47)	Nathmal Madan Gopal, Naya Bazar, Ajmer	Weights, Measures and Weighing Instruments.
(48)	Om Prakash & Co., Rampura Bazar, Kotah	Weights, Measures and Weighing Instruments.
(49)	Poonam Chand, Proprietor M/s. Man Mohan Raj Kunj, Tripolia, Jodhpur	Weights, Measures and Weighing Instruments.
(50)	Prakash Distributors & Co., K.E.M. Road, Bikaner ..	Weights and Weighing Instruments.
(51)	Prahladass Mohanlal, Tripolia Bazar, Jaipur	Weights.
(52)	Prathviraj Mathur, Khatriyon Ki Kothi, Girdhi Kot, Jodhpur	Weights and Counter Machines.
(53)	Prem Sukhdas Ram Deo Khatri, New Circular Market, Bikaner.	Weights, Measures and Weighing Instruments.
(54)	Quadarji Rasiaji Clock Tower, Udaipur	Weights, Measures and Weighing Instruments.
(55)	Rajabali Daoodji & Sons, Clock Tower, Udaipur ..	Weights, Measures and Weighing Instruments.
(56)	Rajabali Quadar Ji, Nathdwara, Udaipur	Weights, Measures and Weighing Instruments.
(57)	Rajasthan Trunk Co., Sriji Ki Mori, Jaipur	Weights, Measures and Weighing Instruments.
(58)	Rashoolji Mohd. Ali, Chabra, Kotah	Weights and Weighing Instruments.
(59)	Roop Chand Buddalal, Rampura Bazar, Kotah ..	Weights, Measures and Weighing Instruments.
(60)	Sadique Bhai Ahmed Bhai, Tobacco Bazar, Jodhpur ..	Weights, Measures and Weighing Instruments.

Dealers (contd.)

Sl. No.	Name and Address of Dealer	Details of Articles Sold
(61)	Sardar Ram Singh, Sanghi Building, Naya Pura, Kotah	Weights, Measures and Weighing Instruments.
(62)	Shib Chand Arora & Sons, K.E.M. Road, Bikaner	Weights, Measures and Weighing Instruments.
(63)	Shiv Ram c/o Sukh Deo, Iron and Hardware Syndicate, Govind Rajaji Ka Rasta, Jaipur.	Weights.
(64)	Sindh Hardware and Iron Merchant, Naya Bazar, Ajmer	Weights, Measures and Weighing Instruments.
(65)	Sunder Das Kanhyalal, Katla Bazar, Jodhpur	Weights, Measures and Weighing Instruments.
(66)	Surajmal Chaganlal, Dhanji Road, Bikaner	Weights, Measures and Weighing Instruments.
(67)	Vijai Kumar Varma c/o Shri Gayatri Petrol House, Pushkar	Weights, Measures and Weighing Instruments.
(68)	Vishamber Dyal Badri Pd., Sansar Villa, M.I. Road, Jaipur	Weights, Measures and Weighing Instruments.
(69)	Vyas Bros. K.E.M. Road, Bikaner	Weights, Measures and Weighing Instruments.

Repairers

Sl. No.	Name and Address of Repairers	Details of Articles Repaired
(1)	Abdul Rehman Mistri, Teh Girwa, Udaipur	Weights, Measures and Weighing Instruments.
(2)	Advin Johnson, House No. 182 A, Christian Colony, Anasagar, Ajmer.	Weights, Measures and Weighing Instruments.
(3)	Calebs Scale Manufacturers & Repairers, Sardar Pura, Jodhpur.	Weighing Instruments.
(4)	Faiz Mohd. Khan, Chandi Ki Taksal, Jaipur	Weights and Weighing Instruments.
(5)	Jamna Metal Works, Chandi Ki Taksal, Jaipur	Weights, Measures and Weighing Instruments.
(6)	Kistoorji Dhanji, Laxmi Mills, Chawl, Beawar	Weights, Measures and Weighing Instruments.
(7)	Krishna Industries, Raghunath Bhavan, Ajmer	Weights, Measures and Weighing Instruments.
(8)	Man Pasand, Ghana Kothi, Bhishtiyon Ka Bas, Shahpura, Jodhpur.	Weights, Measures and Weighing Instruments.
(9)	Mangaldas Vadumal, Srinagar, Road, Ajmer.	Weights, Measures and Weighing Instruments.
(10)	Modern Scale Manufacturer & Repairers, Near Panna Niwas, Jodhpur.	Weights and Weighing Instruments.

LICENSED MANUFACTURERS, DEALERS & REPAIRERS OF WEIGHTS & MEASURES (8)

Repairers (contd.)

Sl. No.	Name and Address of Repairers	Details of Articles Repaired
(11)	Mohd. Ismail, Loharon Ka Mohalla, Beawar	Weights, Measures and Weighing Instruments.
(12)	Mundra Metal Works (P) Ltd., Bikaner	Weights, Measures and Weighing Instruments.
(13)	Narain Das Mangaldass, Ladpura, Kotah	Weights, Measures and Weighing and Measuring Instruments.
(14)	Rajab Ali Ibraheem Ji, Rampura Bazar, Kotah	Weights, Measures and Weighing and Measuring Instruments.
(15)	Rajasthan Trunk Co. Srijji Ki Mori, Tripolia Bazar, Jaipur	Weights, Measures and Weighing and Measuring Instruments.
(16)	Saffuddin Balbir Ali, Hathipole, Udaipur	Weights, Measures and Weighing and Measuring Instruments.
(17)	Shankarlal, New Well, Bikaner	Weights, Measures and Weighing and Measuring Instruments.

UTTAR PRADESH (1)

Manufacturers

Sl. No.	Name and Address of Manufacturer	Details of Articles Manufactured
(1)	Agra Steel & Iron Foundry, Jawaharnagar, Agra	Metric Weights of Brass & Bronze and Cast Iron of all denominations.
(2)	Bansal Iron Foundry, Belanganj, Agra	All kinds of Cast Iron & Brass Metric Weights.
(3)	Devi Sahai Gopal Dass, Iron Foundry, Chhippitola, Agra	Full set of Cast Iron Metric Weights.
(4)	District Cooperative Federation Ltd., Nehru Road, Meerut	Full sets of Cast Iron and Brass Weights.
(5)	Gulabchand Chhotay Lal, Freeganj, Agra	Cast Iron and Brass Commercial Metric Weights of different denominations.
(6)	Indian Casting Co., near Billochpura Railway Station, Agra	Cast Iron Metric Weights.
(7)	Indian Iron Foundry, Sultan Ganj, Agra	Cast Iron Metric Weights.
(8)	Jagdamba Iron Foundry, Pathwari, Belanganj, Agra	Cast Iron Metric Weights.
(9)	Kashi Iron Foundry, Freeganj Road, Agra	Cast Iron Metric Weights.
(10)	Krishna Iron Foundry, Freeganj, Agra	Cast Iron Metric Weights.

Manufacturers (contd.)

Sl. No.	Name and Address of Manufacturer	Details of Articles Manufactured
(11)	Mallo Mal Ram Prasad, 1105, Lane Gaushala, Agra	Metric Weights of Cast Iron and Brass.
(12)	Narain Singh Babu Lal, Iron Foundry, Behind Loha Mandi, Agra.	Cast Iron Metric Weights.
(13)	Nav Prabhat Engineering Works, Maina Gate, Pathwari, Agra.	Metric Weights of Brass, Bronze and Cast Iron of all denominations.
(14)	Prakash Engineering Co. & Rolling Mills, Freeganj, Agra	Full set of Metric Weights.
(15)	Prabhat Iron Foundry, Freeganj, Agra	Cast Iron Metric Weights of all denominations.
(16)	Panchool Gopal Karmokar and Bros., Badshahi Naka, Kanpur.	Metric Weights of Cast Iron and Brass Weights, Weighing and Measuring Instruments.
(17)	Rajendra Sanitary Filling, Agra	Metric Bullion Weights.
(18)	S.K. Iron Foundry & Engineering Co., Rambagh, Agra	Full set of Cast Metric Weights.
(19)	Standard Steel & Iron Foundry, Jevni Mandi, Agra	Cast Iron Metric Weights of all denominations.
(20)	Standard Engineering Corporation, Belanganj, Agra	Metric Weights and Measures of Cast Iron, Brass and Bronze.
(21)	Society Iron Industries, Kaliaanpur, Kanpur	Metric Weights of Cast Iron and Brass Weights, Weighing and Measuring Instruments.
(22)	U.P. Iron Foundry, Belanganj, Agra	Metric Weights of Brass and Bronze and Cast Iron of all denominations.

Dealers

Sl. No.	Name and Address of Dealer	Details of Articles Sold
(1)	Panchoo Gopal Karmokar and Bros., Badshahi Naka, Kanpur.	Weights, Measures and Weighing and Measuring Instruments.
(2)	Society Iron Industries Office, 59/51A, Birhana Road, Kanpur	Weights, Measures and Weighing and Measuring Instruments.

Repairers

Sl. No.	Name and Address of Repairer	Details of Articles Repaired
(1)	Panchoo Gopal Karmokar & Bros., Badshahi Naka, Kanpur.	Repairing of Weights and Weighing Instruments.

LICENSED MANUFACTURERS, DEALERS & REPAIRERS OF WEIGHTS & MEASURES (8)

WEST BENGAL (2)

In the March 1960 issue of *Metric Measures* a list of licensed manufacturers, and repairers of weights and measures in West Bengal State was published. The following is a list of manufacturers, dealers and repairers subsequently licensed by the Government of West Bengal under the West Bengal Weights and Measures (Enforcement) Act 1958.

Manufacturers

Sl. No.	Name and Address of Manufacturer	Details of Articles Manufactured
(1)	K.P. Dass & Co. (P) Ltd., 43, Circular Road, Howrah (Office & Factory).	Weights.
(2)	Eastern Scientific Works, 98, Ram Dhang Road, Salkia, Howrah (Office & Factory).	Precision & other Balances.
(3)	Ganga Iron Works (P) Ltd., 58, Clive Street, Calcutta, (Office) & 94 'O' Road, Belgachia, P.O. Dasnagar, Howrah (Factory).	Cast Iron Weights.
(4)	Kundu Sett & Co., P.O. Santragachi, P Ramrajatola, Howrah (Office & Factory).	Cast Iron Weights.
(5)	Scientia Industries (India) (P) Ltd. 34, Banerjee Bagan Lane, Salkia, Howrah (Office & Factory).	Precision Balances, Beam Scales—Class 'A' & 'B' Counter Scales, Brass weights & Sheet metal weights.

Dealers

Sl. No.	Name and Address of Dealer	Details of Articles Sold
(1)	Bengal Chemical & Pharmaceutical Works Ltd., 6, Ganesh Avenue, Calcutta-13, (Office) & 164, Manicktala Main Road, Calcutta-11 (Factory).	Precision Balances and Metallic Volume Measures & Other balances.
(2)	Das Brothers, 57, Clive Street, (New No. 167, Netaji Subhas Road), First Floor, Room No. 75, Calcutta-7.	Cast Iron Weights.
(3)	Dhirendra Nath Ghosh, 58, Clive Street, Calcutta	Beam Scales & Cast Iron Weights.
(4)	Girish Chandra Ghosh, 58, Clive Street, Calcutta-7	Weights, Beam Scales & Counter Scales.
(5)	"Jatindranath Ghosh, 58, Clive Street, Calcutta-7 (Office & Factory).	Beam Scales & Cast Iron Weights.
(6)	Lauha Bipani, 161, Netaji Subhas Road (Old 58, Clive Street), Calcutta-7.	Cast Iron Weights.
(7)	Nagendranath Karmakar, S/o Uooma Ch Karmakar, 208, Mahatma Gandhi Road, Calcutta-7, (Office) & 16 & 17, Narkeldanga Main Road, Calcutta-21 (Factory).	Beam Scales, Counter Scales and Weights.
(8)	Narendranath Chowdhury & Co., 161, Netaji Subhas Road, (Old 58, Clive Street), Calcutta-7	Cast Iron and Brass Weights & Beam Scales.
(9)	Novelty Hardware Stores, 2, Moharshi Debendra Road, Calcutta-7.	Beam Scales & Cast Iron Weights.

Repairers

Sl. No.	Name and Address of Repairer	Details of Articles Repaired
(1)	Nagendra Nath Karmakar, S/o Udaya Charan Karmakar, 16 & 17, Narkeldanga Main Road, Calcutta 7 (Office & Factory).	Beam Scales, Counter Scales & Brass & Cast Iron Weights.
(2)	New Bengal Scale Co., 48, Fakir Chand Ghosh Lane, (Circular Road) Howrah, (Office & Factory).	Weighing Instruments.

