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*A Journal of
Electricity Supply and Utilization*


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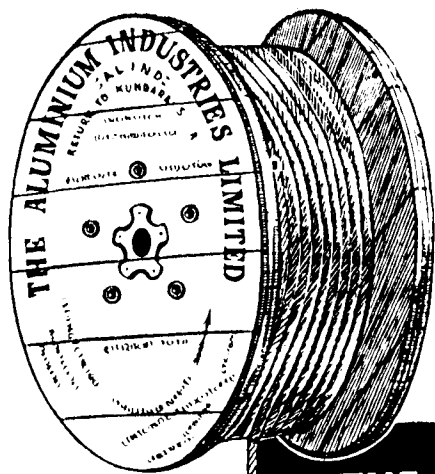
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Electrolite

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FREEDOM FROM POWER CUTS!

DURING the last seven years, on account of the failure of the monsoon and the consequent curtailment of generating capacity of the hydro stations of the Madras System, severe power cuts have had to be enforced and, such electricity as was available, had to be rationed. As, however, "the rains came" last season, there is, at present, sufficient storage of water at the various reservoirs. The thermal stations, both at Madras and Madura, are, also, in full production. The chances, are, therefore, extremely remote that any restrictions will be imposed this year—at least, not for the reason of lack of generating capacity. And we do fervently hope that before the next cycle of droughts begins, the Kundah and Periyar hydro stations and the Neiveli super-power station would be in commission.

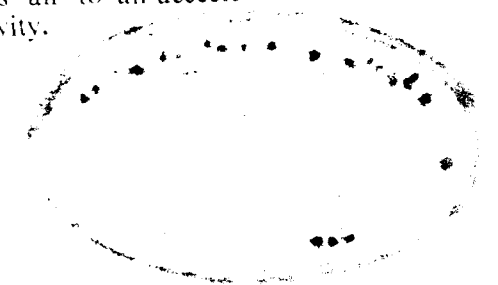
Meanwhile, the grid is not immune from other problems. The transmission lines are all overloaded. At several stations, transformer capacities are not adequate enough. Though the generating stations are working to capacity, the connected system loads have so grown that restrictions of one kind or another (like staggering of loads, etc.) are still necessary to

prevent overloading of the generating stations and of individual substations. All these problems are expected to be resolved only by stages, as items of machinery and equipment, like power transformers, high-tension switchgear, etc., have all to be imported from abroad.

Yet, another difficulty in the way of development has been finance, or, the lack of it. For want of finance, the Government Electricity Department had had to curtail severely its programme of new work last year; so also licensees, their programmes.

This year, however, some schemes have been taken on hand by the Department—thanks to assistance from the Centre. This assistance, it is gathered, will, also, be available to licensees through the State.

It must be remembered that Madras State occupies a premier place in rural distribution, and unless the various problems that beset the State are tackled with zeal and imagination, it might easily slip from its present proud position of being a rural electrification leader. This fearful thought should spur us all to an accelerated tempo of activity.



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REVISION OF THE INDIAN ELECTRICITY ACT

by

K. V. KARANTHA, M. A., M. I. E.*

As long ago as 1910, the Indian Electricity Act, practically as it stands today, took shape. Since the passing of the Act, there have been a few modifications, but these are of minor importance.

The Government of India has now appointed an Advisory Committee to put up proposals for a re-draft of the Act. Obviously, the great changes that have taken place in the electricity supply field during the last forty years, demand thorough alterations in the Act. Some of these alterations might have to be even drastic to keep in line with the very radical changes that have taken place in the practice of electricity supply. For example, we can no longer think of electric supply as an amenity or a necessity mainly for towns, or local authorities being suitable successors to all private electric supply undertakings, or of Government not being generally interested in the supply field, and so on.

Electricity generation and electric supply works have now expanded

hundreds of times of what they were when the present Act was first drawn up. Also, electricity has begun to function in ever so many newer ways. Values and emphases have also shifted significantly in many respects, and our knowledge of electricity supply is to-day much vaster than it was some years ago. It would, therefore, be wrong to think of re-drafting the Act on lines that would have passed muster in the past. The Act has definitely to be far more comprehensive and, therefore, much bulkier. This is no matter for regret since it is the natural law of development, the only logical course. Many problems in electricity supply, for which only vague solutions could be offered at the time of the compilation of the Act in 1910, have now to be found precise answers, based upon the experience gained so far. On the whole, the work on the new Act will have to be one of not so much of redrafting the old Act, as evolving an altogether different, and a far better, Act.

* Chief Electrical Engineer, Director to the Government of Madras.

ENGINEERS' JOB

Essentially, the framing of the Act is a job for engineers in the supply field. It is they that know the problems to be clarified. No doubt, the Act is intended for the benefit of consumers, but consumers could hardly ever be expected to have any clear ideas either about the functions of the Act or the solutions that it can offer to supply problems. It is, therefore, incumbent upon supply engineers that they spend time and thought not only on clauses that they consider good and adequate from their own view-point, but they must, also, bear in mind the overall perspective of the Act. Which is that it is being drafted or redrafted primarily in the interests of consumers.

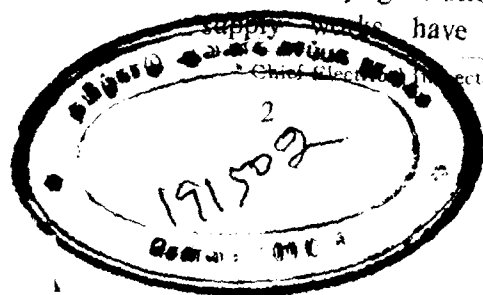
And among engineers who should now apply their minds to the framing of the Act, I would also include Government engineers in the supply field. When the existing Act was drafted, it was never, for a moment, imagined that Government itself might one day be the most dominating operator in electricity supply—with the result that several of the provisions of the Act which are binding on other suppliers of electricity do not apply to Government operators engaged in supply work. In the Electricity Supply Act of 1948, this position was somewhat altered by the term "licensees"

being made applicable also to State Electricity Boards, and certain sections of the Indian Electricity Act becoming applicable to them. But even then, certain other provisions, such as the schedules to the Indian Electricity Act, which govern the conditions for extensions of supply, the terms for disconnection of supply, etc., are not binding on the State Boards, as these conditions are on licensees.

CHANGED TREND

The trend now seems to be even to go one step further, and to make all the provisions considered fair and necessary in the interests of consumers binding on Government as a public supplier of energy. It would not be surprising, if the new Act should be formulated in this manner. How important it is also for Government supply engineers to help in the framing of a good, new Act is, therefore, obvious.

In the matter of suggestions for the new Act, there is bound to be some difference of opinion. The solutions that Government supply engineers and the Electrical Inspectorates might put forward, might not be the same as those put forward by the engineers of private supply industry. Such differences are inevitable, due to differences in the outlook and the approach to these problems by the two groups concerned. But both Government and private engineers



have the good of the country at heart, and, it should not, therefore, be difficult, in the final stages, to iron out differences, and reach agreed solutions.

It seems to me that the best way to start on the job of framing the new Act is to enunciate, first, the problems for which the Act should find solutions. Next, the engineers, in both the sectors, should suggest solutions, each based on his own line of thinking, but with cogent arguments. If this is done in the sincerest manner possible, I am sure, that for many of the problems, solutions sufficiently good for all to accept, could be found. Based on these solutions, the provisions of the Act should be drafted.

It is not improbable that, despite our best efforts, there might still be a few problems left for which, at present, no simple and satisfactory solutions are in sight. The best thing to do will be to leave them severely alone, much in the same way as the old Act did, in a number of cases, such, as for example, ownership of service lines, 'what is engaging oneself in the business of electric supply,' etc.

LAW FOR THE LAYMAN

Even where proper provisions for incorporation in the new Act have been evolved, I would suggest that a major point to be kept in mind should

be this—namely, that the Act being primarily for the benefit of the public should be as far as practicable be lucid enough for them to follow. It is no doubt true that for any final interpretation of an Act, only those who are legally trained for the work have to be called in, but it is also true—ignorance of law being no excuse—any enactment should be lucid enough for laymen to understand.

From this view-point of feasible lucidity, it seems to me, that the existing Act requires drastic revision. For example, if a consumer were to read the Act, he would hardly find in its main body any of the provisions most important to him—such as, for example, the terms on which supply authorities could be compelled to extend supply lines to serve him, and the guarantees that could legitimately be demanded of him for such extensions of supply, and the conditions governing the continuity of supply to him. In the present Act, most of these provisions, so important in public interest, are relegated to a schedule, and even there, there are one or two clauses—Clause VI is a good example—which are hopelessly overloaded with a number of most important provisions, while there are other clauses which are of little or no significance. I would suggest,

therefore, that the new Act should have greater clarity and better balance.

Some of the subjects on which better clauses than seen at present in the Act could be provided are the following:—

1. Extension of electricity supply to new consumers; terms to be more detailed and specific.

2. Financial control of licensees and electric supply rates; changes needed based on actual working.

3. Powers to lay mains on private lands; need for detailed provisions based on a changed outlook.

4. Licensees; changes needed in the forms of controls and the terms of purchase of undertakings.

5. State Electricity Boards and Government Electricity Departments; extent of applicability of the Act.

6. Miscellaneous matters like ownership of service lines; what is engaging in the business of supplying electricity; should resale by H. T. consumers to their staff at specially low rates be permitted; can occupiers ask for electric supply when owners object; can electricity be used by consumers outside licensee areas; and control of electricity supply made by non-licensees.

The above list is by means exhaustive, but supply engineers could help by thinking out modifications necessary on these and other related problems that occur to them.

(The views expressed in this article are those of the writer, not official views.)

Don't fiddle with electrical equipment if you know nothing about it; it can so easily become a killer in amateur hands. Leave it to the electrician who knows the job.
—News Chronicle.



Breakdown Tester: Picture shows Mr. R. A. Godwin of Shalimar's operating the 25000-volt tester in their new Electrical Test Laboratory.

INSULATING COMPOUNDS FOR THE ELECTRICAL INDUSTRY

by

G. H. GATES-REED M. I. A. M. A.*

THE importance of the part played by insulating varnishes and compounds in the efficient working of all types of electrical machines and components, from the smallest coil to the largest armature, cannot possibly be over-emphasised. The electrical equipment designer and the electrical engineers, generally, are aware of this fact, although certain manufacturers do not readily appreciate the high quality of varnish required. Probably to the man-in-the-street, however, the role of yet one more essential finishing product of the Paint Industry may not be as obvious. And this is understandable, as insulating varnishes are not usually outer surface finishes. But that does not certainly

obviate the technical man's need for constant concern about the service that is being rendered by these varnishes.

Just as the loss of a small nut and bolt may put a complete, complex engine, temporarily out of commission so also, complex and expensive electrical equipment can be brought to a standstill—even entirely ruined—through “burning-out,” as the result of breakdown of an insulating varnish or compound. This failure can, of course, be due to the faulty application of the correct insulating material in the first place.

If, for instance, an insulating varnish should break down, a power station transformer may well fuse, and a general blackout may result with a consequent, overall loss in industrial

output. Related to the domestic sphere, a fuse for the same reason could result in a radio set going off the air suddenly, an inconvenience which no doubt would occur just as the programme was getting really exciting! These varnishes and compounds do, therefore, play an important background part in our day-to-day lives. As the editor of PAINTINDIA put it once: “Scores of gigantic hydro-electric power projects are afoot all over the country. Electric motors, generators, transformers, switches and coils, *all needing good insulating varnishes*, are slowly being produced in this country”.

PAINT INDUSTRY'S APPROACH

Naturally, the paint industry formulates these many specialised finishes and compounds scientifically and watch their bulk production so carefully that, provided they are correctly applied to a correctly prepared surface, the failure of electrical equipment would rarely, if ever, be due to faulty varnishes. Our own company has installed costly testing equipment which subjects manufactured varnish batches to severe tests, directly related to the purpose for which the formulation has been prepared, before the material is released to the user.

TESTING VARNISH

The two main items of equipment are the Electrical Breakdown Tester

and the Humidity Chamber. The Electrical Breakdown Tester itself cannot give full test results. Its function is to give the voltage required to break down the insulating qualities of the film of varnish under specific conditions. The apparatus is simple, and it is so designed that a uniformly increased voltage is applied across the varnish film which is placed between two electrodes coated on to a special paper—the thickness of the specimens would vary between 0.005 in. and 0.007 inch. The voltage is produced by a transformer which, in this equipment, gives a maximum potential of approximately 25,000 volts.

In testing, the voltage in the primary of the transformer is slowly and uniformly increased to the point at which breakdown occurs. Until breakdown occurs, there is no flow of current either through the primary or the secondary, because of the varnish-coated paper in between. As breakdown occurs, the current flows through the secondary and primary coils. Immediately, a cut-out switch is operated through a solenoid relay, and the current through the primary is switched off. A voltmeter in the circuit indicates the voltage at which this occurs.

Ten readings are taken of each specimen tested. The thickness of the

* Shalimar Paint, Colour and Varnish Company, Limited.

varnish film at three points close to the point of breakdown is measured, with a micrometer capable of giving a reading to four places of decimals in inches.

The second part of the equipment is the Humidity Chamber. This conditions the varnish films to be tested before the breakdown test is actually carried out. A film placed in the chamber can be kept under temperature conditions varying from room temperature to 100 deg. C. and under humidity conditions of up to 100 per cent relative humidity at any temperature of the chamber.

The normal conditions of testing are :—

1. Atmospheric conditions after the film has been suitably air dried or stoved.
2. After being conditioned in the chamber at 95 deg. C.-100 deg. C. and a completely dry atmosphere.
3. After having been conditioned at a temperature between 95 deg. C.-100 deg. C. and a relative humidity of 100 per cent.

Obviously, the last conditions are the most rigorous, as all varnishes will absorb some percentage of their own weight of water vapour under the

conditions obtaining in the humidity chamber. It is necessary to heat the electrodes as well as the varnished film when conducting tests at other than atmospheric temperatures. The test is carried out immediately the conditioning period is completed, and should be conducted preferably in the humidity chamber itself which is equipped with electrodes to which leads from the secondary of the transformer can be attached.

The Indian Paint Industry as a whole is in a position to meet the ever increasing and varied requirements of an expanding indigenous Electrical Engineering Industry. Once, most electrical goods were imported—as were the relatively small supplies of insulating varnishes then required. Today's picture is a very different one—the demands on the paint industry should expand annually; the paint industry has equipped itself to meet this growing demand with products of a standard equal to those of foreign manufacture.

PURPOSE OF INSULATING VARNISHES

The main purpose of insulating materials is implied in their name. However, the duties expected of them are varied and manifold. The following extract from Manfred Hess's *Paint Film Defects on Electrical Insulating varnishes for armature*

windings demonstrates the degree of care that must be put into their formulation and the multi-duties they must perform.

“An armature impregnating varnish of satisfactory properties with regard to dielectric strength and low loss angle must possess the following properties :—

- I. Elasticity and, consequently, resistance to ageing by as slow a loss of elasticity as possible under working conditions such as increased temperature and vibration. In order to attain these properties to the fullest extent, it is advisable not to demand excessively short drying times.
- II. Resistance to hot oil.
- III. Freedom from acidity to avoid any corrosive influences on copper and on fibrous materials.
- IV. Sufficient impermeability (after application) against moisture to the underlying conductor, ensuring complete filling of pores and capillaries and delaying the re-absorption of moisture from the atmosphere on the part of the hygroscopic fibres.

- V. Non-softening, non-tackiness under the influence of the working temperature of the electric machine for which the varnish is selected.

We see that, apart from providing effective insulation, the duties of insulating varnishes include the protection “of delicate and costly machinery against the ruinous action of oils, acids, water, moisture, and other deleterious influences”; that they must have good adhesive qualities and yet be sufficiently elastic to withstand the expansion and contraction of the base metal during use. In the case of high speed armatures which may rotate up to 8000 revolutions per minute, causing the windings and the impregnation to tend to fly off, the varnish must be capable of baking to a hard solid mass fusing the winding into a rigid unit which cannot “fly”. At the same time it must be sufficiently elastic to take up heat expansion.

The need to be resistant to oil is particularly important with transformers which are often built to work in an oil bath—oil which becomes extremely hot.

And so in almost every application of these varnishes to the extensive range of electrical units upon which they are used, there are individual angles, special problems with their

particular solutions, not only in the formulation of the compounds, but in their application methods also. In fact, application methods, being governed to a considerable degree by the mechanical make-up of the unit to which application is being made in their turn influence the formulation.

APPLICATION PROBLEMS

The correct application of Insulating Varnishes must to a great extent be guided by the experience of individual engineers who will be well aware of the particular circumstances governing usage. However, in this context, it is essential that full details of these circumstances should be supplied to the manufacturer of the Insulating material at the time of ordering. Only in this way can the manufacturer be happy that he is supplying the correct material for the job in question. It may well be that he will also be able to advise the user on changes in application methods or suggest an alternative varnish that will result in a reduction in finishing costs.

As with any paint application, correct preparation of the surface before application is essential to a correct and durable finish. Even the correct varnish correctly applied to a surface not properly prepared will not produce a lasting finish. A good finish lies almost entirely in making a good start. This is a fact which manufacturers must constantly bear in mind.

Skimping the preparation of the surface will, eventually, have results as disastrous as those resulting from using inferior, untested varnishes.

Manufacturers will always supply detailed instructions along with each batch. It is most important that these instructions should be closely followed, with particular reference to thinning (where required). Only the thinner recommended, in the quantities recommended, should be used. For instance, the greening of copper wires and coils may be produced if a Benzol-based thinner is used; that is but one example of many that could be noted.

In the same way, unsatisfactory insulation which may produce disastrous results may be due to a great number of causes. Among these are the use of the wrong formulation for the particular job; faulty application methods; unsatisfactory impregnation equipment. Additionally, the very atmosphere in which the work is being carried out can effect results. Chemical action due to acid-laden vapours may decompose the layers of insulating varnish. To quote Manfred Hess again, the effectiveness of the insulation material can be negated, through conducting solvents remaining behind, because—

- (a) "the varnish was too thick and could not dry through sufficiently in the usual time. Air bubbles may also be created in the insulation.

(b) Insufficient drying time is allowed.

(c) The initial heating was too sudden, so that only surface drying occurred and the solvents of the lower layers could not escape, nor could the whole layer be thoroughly oxidised or polymerised."

With transformer windings, for instance, it is most important that the varnish is baked really hard or short circuits may result.

If varnishing is carried out by brushing, then again one must ensure that the application is not too heavy; it is best to apply several thin coats.

The examples could be multiplied. It is hoped, however, that enough has been said to stress the need for great care in application and in placing the order for correct materials.

TYPES OF VARNISHES

The range of insulating varnishes and compounds required to fulfil all the needs of the electrical industry is much too extensive to detail here. Many insulating varnishes are air-drying, as used generally for final coatings to protect assembled windings. In such cases, their main job after providing insulation, is protective. High voltage windings on the other hand, require stoving varnishes, as only in that way, can the requisite degree of hardness and high dielectric strength be obtained. For small coils, either stoving or air-drying impregnating varnishes, clear or black, are

available. With these the drying time will obviously depend upon coil size. Transformer varnishes are invariably stoving varnishes applied either by roller or spraying methods. And so the list goes on covering the particular requirements of arc-lamp spools, armatures, armature coils and discs, cut-out boxes, storage batteries, switch and panel boxes, transformer bushings, cases, coils and stampings; weather-proof wire and power cables. There are flexible mica sticking varnishes and varnishes for insulating cloth. Jointing compounds also come under this group. This abbreviated list adequately demonstrates that it is essential to indicate the purpose for which the varnish finish is required when ordering.

Manufacturers will also prepare Insulating Varnishes formulated in accordance with customers' own specifications.

Before concluding, one should re-emphasise that, as has been indicated above, the uses for and the results required of Insulating varnishes vary so widely that a special quality is really necessary for almost every different purpose—therefore, both customer and manufacturer should be perfectly clear as to their objective.

That the Indian paint industry is supplying these materials to specifications of international and proven suitability should be a closing point of satisfaction to all those connected with the Electrical Industry in India.

RURAL ELECTRIFICATION IN SOUTH ARCOT

by

A. R. K. MURTHY, B.E., M.I.E.*



Mr. A. R. K. Murthy.

IN India, the extension of electric supply to rural areas is chiefly confined to supply to pumps which are used for lifting water for agricultural purposes. Here and there, there will be a lighting installation, but as a rule the lighting load will be negligible, compared with the pump load. Perhaps, a rice-mill load would also be available in one or two villages.

The nature of the load usually available in villages is not generally expected to attract the business *entrepreneur*. The urban load is something very compact requiring usually less capital. Further, there is no knowing whether pumps would be utilising supply all through the year, as operations of pumps depend upon seasonal conditions. If in a year there should be heavy precipitation of rains, the need for the operation of pumps would be eliminated. Again, should there be no rains, the wells would dry up and, consequently the consumer would not be in a position to use his pump. This, in turn, would mean a loss in revenue to the supply authority.

It is, therefore, most important that such factors as these are taken into consideration before a scheme is taken on hand for the extension of supply to rural parts.

In the South Arcot District, in particular, the major portion of the licensee's area being rural, ways and means had to be devised for the economical distribution of electricity. A survey carried out showed that scope existed for giving supply to a number of agricultural pumps required for the irrigation of sugar-cane and paddy fields.

In these parts, wells of fourteen to sixteen feet diameter and fifty feet depth are dug, and the suction head would usually be within fifteen feet. The difference of water level between summer and the "season" would be about six to eight feet.

In Villupuram Taluk, 10 horse-power pumps are used, for the most part, as the head in the villages of this Taluk is greater—the average

ranging from 30 to 40 feet. In Cuddalore and Chidambaram Taluks usually 5 and 7.5 horse-power pumps are used. In Tindivanam Taluk, where water supply is not copious, only 3 horse-power pumpsets are used. Most of the pumps are either "Kirloskar" or "P. S. G."

In South Arcot, because of the demand for sugar-cane by the sugar factory of the East India Distilleries, and the sugar factories at Nellikuppam, for a period of six months in a year—from December to June—a large area of land is utilised for growing sugar-cane. If continuous water supply is assured, each acre would yield a sugar-cane crop of fifty tons. The factories crush at an average of 2,200 tons of sugar-cane per day. If good quality sugar-cane is produced with uniform watering, the yield of sugar from the sugar-cane will be between 9 and 10 per cent.

The sugar factory gives a special rate for quality cane. For one thing, it is uneconomical for the factory to crush sugar-cane of inferior quality. The best yield usually comes in the month of February, as well-seasoned sugar-cane is cut only in this month. Even if water is baled out continuously for twelve months, from twelve to fifteen hours a day, the wells would still yield a good supply.

USE OF WOOD POLLS

In our area, six to eight wells can be covered in a mile of extension. A scheme was launched by us for the extension of 22 kV lines to a central point, and for the installation of a substation with a 5 kVA transformer, and extending the L. T. lines

with the aid of wood poles and copper wire. As South Arcot District is simply rife with casurina trees of good growth, experiments were carried out with these trees, treating them with 'Ascu,' the well-known wood preservative. As results bade fair to be good, these poles were utilised on a span length of 150 to 200 feet with an average size of No. 6 to No. 4 SWG. copper conductors. In the year 1935-1940, the cost of such extensions varied from Rs. 2,000 to Rs. 3,000 per mile and the cost per pole did not exceed Rs. 15/-. "Ascu" itself was cheaper in pre-war days, being available at the rate of Re. 1/- per pound. Each pole required about five pounds of "Ascu" solution for impregnation. Planted in wet lands, the poles successfully withstood the attack of white ants and fungus, and were proof against deterioration. Hence, our Company was encouraged to use treated wood poles on a large scale. When World War II broke out, the cost of raw casurina poles shot up from Rs. 5/- to Rs. 25/- per pole. Although when the cost goes upwards of Rs. 10/- it is not economical to use these poles, yet they had to be used, as steel was in short supply during the war. In view of the rise in prices of agricultural produce, the demand for electric supply was most pressing, and so extensions were put up in cases where the consumer would be prepared to help in procuring poles at reasonably competitive prices.

For a period of eight years or so, the wood poles behaved magnificently and we had no difficulties whatever. Afterwards, however, rot set in, and the poles began to show signs of deterioration. Whenever there was a gale, our poles were usually the first casualties. There

* Chief Engineer, South Arcot Electricity Distribution Company, Limited.

were occasions when thirty to forty poles in a line fell down. On examination, it was found that the portion of the wood pole dug in the ground had developed fungus which in turn contributed to the deterioration of the pole. The poles had also become brittle, and the slightest application of pressure was enough to make them break down. The obvious conclusion was that these poles would last no more than eight years, ten years at the outside.

PROBLEMS

This "decline and fall" of the wood pole created for us a number of problems. Poles by the thousand had already been used, and it was no easy matter replacing them at a time when steel was particularly hard to come by. Also replacement costs would tend to be very heavy. So far as the original poles were concerned, purchased as they were at economical prices, (and also by virtue of their useful service of eight years) the Company was not much of a loser. But when the price of wood poles also rose considerably, replacements became a problem. We tried to meet our difficulty by replacing wood poles with one metallic pole for every five poles to start with. The idea was to replace gradually all the wood poles as and when other material would be available. (All our new extensions are taken up with only girders or rails or steel tubular poles.)

Another problem which we had to face was—maximum demand. If unrestricted supply were to be allowed to agricultural pumps, it was likely that all the pumps would work simultaneously during day-time between 6 a.m. and 6 p.m., thereby raising the maximum demand. Correspondingly,

the maximum demand during night-time would be below thirty per cent of the day maximum demand. The result would be that the load factor of the system would be brought down. We would also lose in revenue. From a survey of the operations of the pumps, it was found that only about fifteen to twenty per cent operated for twenty hours, while the large majority

of pumps worked only for ten to twelve hours a day. To make supply conditions economical, it was suggested to consumers that they operate their pumps on shifts and from the same substation. Whenever a substation was erected, supply to pumps was arranged in groups of two—one to work between 12 noon and 12 midnight, and the other to work between 12 midnight and 12 noon. Controlling arrangements were made with a change-over switch at the substation itself, so that whenever one group of pumps were operating, the other group would not get any supply at all, excepting of course lighting supply on a single-phase basis. This arrangement effectively staggered the power, and also considerably restricted the maximum demand of the system. As a matter of fact, a total of 1,863 agricultural pumps with a connected load of 9,153 kW are working on this system. In addition, there are 229 industrial installations with a connected load of 3445.588 kW. Against this connected agricultural and industrial load, the maximum demand of the system is only 5,000 kVA at present, with a load factor of 80 per cent. If unrestricted supply had been given to agricultural pumps, the maximum demand would have been at least 7,500 kVA, and the load factor would have certainly come down to 50 per cent.

It may be argued that what we are doing militates against the provisions of the Indian Electricity Act and Rules. But it would be conceded that a supply company's chief concern should be to maintain supply as efficiently as possible and also make it economical for the company so that

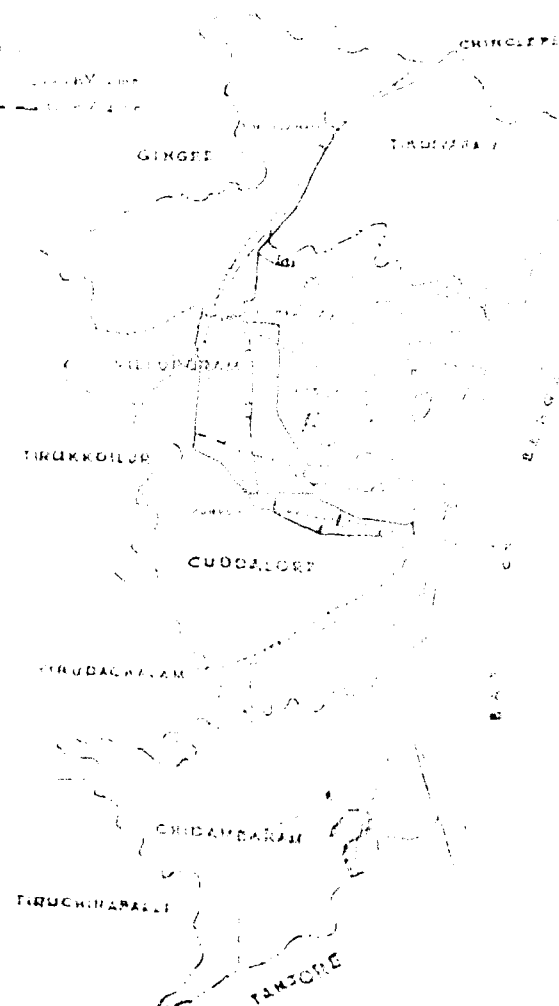
shareholders would not lose in the bargain.

Further, the power shortage in South India, being what it is, it would be meaningless to give unrestricted supply to consumers, making all their pumps work simultaneously and keeping the remaining power idle during the nights. Government, I am sure, would appreciate this kind of rationalisation of power.

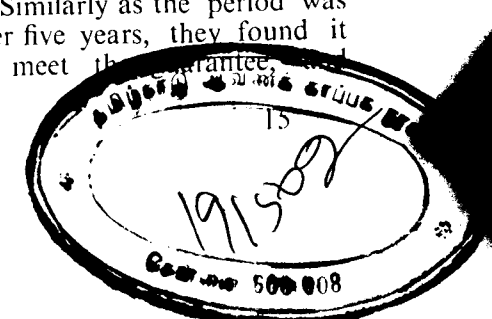
CONSUMER CONDUCT

The grievances of consumers are, as often as not, not quite real. Once they find that the Inspectorate is inclined to be sympathetic, they put up a number of objections. But when the company points out to them that power would not be available for the reason that the substation would be overloaded during day-time, the users would readily agree to take up supply during nights. They know that electricity is much cheaper than other forms, and that, with electricity, the margin of profit would be wider.

As stated already, the possibility is always there of the pumps not operating due to heavy rains or want of rains, and if the supply company does not take precautions, it is bound to suffer. It is in view of this uncertainty and also to make it easy for consumers to utilise energy, that a 20-per cent return on capital, spread over a period of five years, was fixed. In practice, it was found that the consumers were able to utilise this amount of guaranteed minimum in the shape of energy, and did not have to pay out of their pockets. Similarly as the period was spread over five years, they found it easier to meet the guarantee.



Area of Supply—S. Arcot.



utilised supply for a stretch of twelve hours. The question of remissions due to drought conditions and other causes has to be considered on a uniform basis. Surely, the supply company cannot be expected to be too liberal in such matters, as it puts up capital in the expectation of a return, and it has to answer its shareholders, should there be a loss. The State or the Government Electricity Department could be liberal in the matter of remissions as their resources are wider, and in cases where the land is cultivated, the State not only gets revenue from its sale of power, but also as land tax.

NATIONALISATION

One effect of the Acquisition Act passed by the Madras Legislature has been to check the inflow of capital for extensions. Government has not been able to keep up its programme of taking over the undertakings in five stages, and this has resulted in stagnation. However hard the licensees might try, they found that they could not get the required capital, as the investing public seemed to cling to the belief that if Government took over the undertakings, the dividends or the interest on capital would be reduced to unattractive levels; hence, the public would not subscribe. Government also could not fulfil its obligations of advancing loans to licensees during the transition period as it did not have sufficient finance.

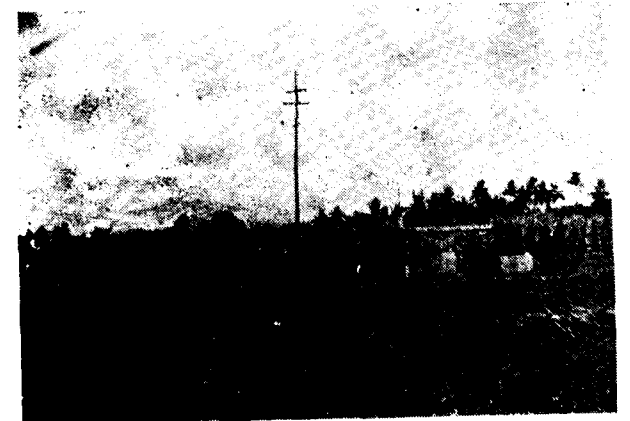
In 1950, when the attention of the Minister of Public Works was drawn to this state of affairs, he was of the opinion that inasmuch as Government itself found it difficult to raise capital, licensees could receive loans on a

voluntary basis from such of those prospective consumers, as were prepared to give them loans, and execute electrification schemes for them. This suggestion was taken up by us, and a loan to the extent of Rs. 2,98,000 was raised on a basis of 4 per cent interest returnable in two years. Schemes were put up and consumers given supply and the loan was also returned in the stipulated period. Once confidence was thus created, other potential consumers came forward with further offers of loans. We, therefore, embarked upon a new scheme of receiving loans on a five-year basis at 4 per cent interest. Again, the response was good, but Government soon stepped in, and drew attention to the fact that under the provisions of the Indian Electricity Act, a licensee had no powers to raise loans from consumers, such powers vesting only with Government. So, the scheme had to be modified. The objection of Government would appear to be this—namely, that it would not be possible to keep up a proper scale of priorities, if such loans were raised, as supply would be given only to those who could give loans. Another objection was that the poorer sections of the people who could not furnish the loans would be denied power. But Government did not come forward with any alternative suggestion which would enable the supply company to raise the required capital so as to be of benefit to those agriculturists who could not themselves furnish the capital. The upshot of it all is that neither the rich nor the not-so-rich are getting any benefit.

It is only in recent months that Finance and Industrial Investment

Corporations are coming forward to give loans, and it may be possible for supply companies to get loans from them, instead of being dependent upon consumers. The South Arcot Electricity Distribution Company hopes to be able to secure a loan of Rs. 15 lakhs from the Madras Industrial Investment Corporation, for its further extensions.

Added to other handicaps, the power position in S. India is also not very satisfactory. For the best part of the year, during the last six years, a heavy power cut had to be enforced and particularly in the South Arcot District, where power for agricultural purposes during the summer was a necessity, there was no power available, and agriculturists had to undergo considerable loss. When restrictions are relaxed sometime in August or September, the monsoon starts, and the agriculturists no longer need power. In this manner, the supply company loses revenue both ways. Although the excuse put forward is that the post-war period had brought in an unprecedented demand for the supply of power and that it was not possible to meet the demand, it is, nevertheless, a fact that even at the present time there is no guarantee that adequate power would be available throughout the year, generating capacity being still very limited. The future would appear to lie with the Neiveli Lignite Project and the Kundah and the Periyar hydro-electric projects. But no definite plans have so far been drawn up for the installation of a power house either at Neiveli or any other place. Even if a decision were to be taken, the schemes would take quite some time for completion, and until these schemes come to fruition



A rural pump station.

the power supply position cannot be stated to be on a sound basis. It is in view of this fact that industry in South India is not making the headway that it is making in North India. This aspect requires the serious consideration of both Government and the licensees.

MATERIALS OF CONSTRUCTION

As stated already, in the light of past experience, it would scarcely be advisable for us hereafterwards to use wood poles, as their span of life is limited from eight to ten years. Further, the present cost of the wood poles being high and the material itself not comparing favourably with steel poles, it is always preferable to use steel poles. If second-hand rails are available from the Railways, they would be ideal for use in rural areas, as the rails are quite strong and could withstand heavy wind pressures compared with girders. For cross-arms, angle iron and channel iron appear to be best. When the price of copper rose, and

even at high price, it was not available, aluminium came into its own. The light metal has been used extensively in our area. So far, aluminium conductors have not created for us any problems, but only time will tell, as our present experience does not extend over many years.

MAINTENANCE

The costs of maintenance in rural areas are far heavier than in urban areas, as rural areas being open country, are subject to heavy wind pressures. Installations are also scattered far and wide, and the staff have to cover longer distances for fuse renewals, etc. If controlling is also thrown in, a larger staff has to be maintained. All the expenditure that has to be incurred should have some proportion to the revenue to be got from the area. In the South Arcot area, a Supervisor will have his office at a central point, and he maintains on an average, eight substations supplying 500 consumers. The revenue in such areas would be around Rs. 10,000 per month. The line staff of the Supervisor would be one lineman, two assistant lineman and five helpers.

It would always be advantageous to have telephone lines throughout a rural area. Whenever there is a breakdown, the field staff could communicate with headquarters, so that they could rush materials and men without loss of time. On our system, each Supervisor's Office is connected by phone.

SAFETY

Apart from the precautions prescribed in the Indian Electricity Act,

and the rules about the factor of safety for poles, conductors, etc., a fork-type guarding is usually provided at each pole below the pins, so that the conductor, when it snaps, will touch this fork. As the fork is connected to the earth wire, there will be heavy short-circuiting, and the fuse will be blown off at the section point or at the substation. The line staff are trained in first-aid precautions, and all of them are certificate-holders. Lists of authorised persons are maintained systematically and rigidly followed in each area, and no unauthorised person is permitted to climb a pole. Instead of safety belts, all line staff are given cotton ropes of about three-quarter inch thickness, and about eight feet long, so that they could tie the ropes round their waists and the poles. They are also supplied with gloves, tool kits, and ladders. All the tools are examined once a month by the respective Engineers and Supervisors of the stations, and reports sent to head office about their condition. If any of the gloves or tools are found defective they are replaced forthwith. The line staff are also given written instructions about the precautions to be taken at the time of renewal of fuses. Only linemen and assistant lineman are permitted to renew high tension fuses.

PILFERAGE OF ELECTRICITY

As a result of the heavy power cuts of the last several years, unscrupulous consumers have found ways and means for pilfering electricity with the help of persons who might, in the past, have worked for supply companies. To prevent the occurrence of theft of energy, all the apparatus including cut-

outs, meters, etc., at the installations, are throughout enclosed in a steel covering and sealed.

TRANSPORT

Jeep is the ideal conveyance for Engineers and Supervisors, as they could then easily cover the whole field and also complete their inspections quickly and efficiently. The jeep is certainly cheaper in the long run.

QUARTERS FOR STAFF

In many of the key points as buildings were not available, we constructed our own quarters for staff. The cost per quarter is about Rs. 2,000. The construction of quarters has been found to be of great advantage as the lineman comes to the switching point within a few minutes of any breakdown, and is available for switching on and off the controlling links. It has, therefore, been possible to restrict the duration of shutdowns to the minimum.

LENGTH OF EXTENSIONS

It is always advisable to put up a small-size transformer and limit the length of extension to half-a-mile or so in radius from the substation so as to save on distribution losses and to enable easy control. The capacity of the transformer could be 50 kVA as we could then easily connect up a 100 kVA load on such substations, as at a time there might not be more than 50 kVA working in view of the bifurcation of the load.

SUBSTATION METERS

It has been found that if meters are provided at the substations, we could have a check on L. T. distribution

losses. Oil level and the condition of the silicagel or calcium chloride in the breathers are examined once a month at each substation by the Supervisors. The installation of the oil is tested once in six months. The transformer is thoroughly overhauled once in four years. Meters are tested in a central laboratory and despatched to the various stations. Lighting meters are tested once in two years, while power meters are regularly tested once a year.

SCOPE FOR COTTAGE INDUSTRIES

In view of the fact that the power supply is not utilised in rural areas throughout the year, the available power that is reserved could be economically and beneficially used for the development of cottage industries. But unless the men are trained for cottage industries, no initiative would be forthcoming from the villages. If the State is to sponsor a scheme of training men in cottage industries a number of consumer goods could be produced at a comparatively cheap rate. Co-operative banks should finance such enterprises at low interest. The capital required would not be heavy as it would not exceed Rs. 50,000/- in each case.

A few cottage industries that could be started are: (1) Dairying (2) Metal plating and polishing (3) Knitting (4) Mirror manufacturing (5) Toys for children (6) Electric heaters (7) Electric table lamps (8) Tumbler switches (9) Farm implements (10) Small-size power looms for manufacturing cloth of twenty to forty counts (11) Boot polish (12) Inks (13) Wire nails (14) Screws (15) Soaps (16) Umbrellas (17) Packing thread and (18) Furniture.

OUR BOOK SHELF

BRITAIN: An official handbook—British Information Services, Eastern House, Mansingh Road, New Delhi.

If you want to know more about Britain to-day—its people, institutions, administration, and economy, this book is the answer.

It presents in condensed form a wide range of basic reference material dealing with British Government and administration, the national economy, transport and communications, labour and management, social welfare, religion, science and the arts, broadcasting and the press. It will, also, prove invaluable to the traveller-business man or holiday-maker who comes to the United Kingdom. Its reference index will enable one to make a quick and simple assessment, and help him understand the people, the culture, and the institutions of the country. For the writer and journalist, the book is important as it can provide a quick check on facts. For the ordinary reader who takes an interest in British affairs, the book is a "must".

Among its hundred and one paragraphs, it tells how the British are governed; how much they pay in income-tax; how research is developed;

how much is spent on national defence; how law and order is maintained; the connection between Church and State; the size of the Hindu and Muslim communities; how trade and industry are organised; who own British newspapers and how many people buy them; what Britain does for its youth, and so on.

Its extensive bibliography should prove useful to the reader whose appetite for British affairs this handbook has whetted.

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INDIAN CABLES AND TABLES: The Indian Cable Co. Ltd., Calcutta.

Here's a little book which will delight the heart of all electrical engineers in the country. It contains useful data on copper wires and strands, aluminium conductors, flexibles, the carrying capacity of cables, fuse wires, amperage of motors capacity of conduits and other information including extracts from I. E. E. Regulations of special interest to electrical engineers. Another recommendation for the book is that it is extremely well got up.

Y. M.

OUR PEOPLE



P. P. Venkatasubramaniam.

It looks as though we can't do our thumb-nail sketch of Mr. P. P. Venkatasubramaniam, Secretary, Seshasayee Bros., Limited, without, bringing up again the name of Mr. R. Varadarajan, his colleague and room mate—and hero of the last issue of *Electolite*. Several people who had read, marked, and inwardly digested our bright copy about R. V. had all one minor complaint to make. Why, they all chorused, had we not made even a passing reference to R.V's bonhomous, back-slapping, anatomy-pinching addiction? We profoundly apologise, and would like to take this opportunity for making amends for

this sin of omission. Often, Mr. Venkatasubramaniam provides the back for Mr. R. V's slapping, and his fleshiest part for Mr. R. V's pinching!

Mr. P. P. V. S., as Mr. Venkatasubramaniam is known to friends, is a brilliant M. A. in Economics of the Madras University. He is our Personnel Manager. The pattern of personnel policy may vary from industry to industry, depending upon its size, geographical location, and so on, but personnel problems always demand of the executive in charge, objective, and at the same time, sympathetic threshing. Rather a difficult department, this personnel, but P. P. V. S. brings to bear upon his work, much careful and conscientious devotion.

A martinet for discipline, P. P. V. S. cannot naturally be expected to wink at cases of habitual unpunctuality and similar lapses, but his insistence on a strict code of official conduct, does not certainly mean that he is no friend of staff. Indeed, beneath his apparently brusque manner, he has a heart of pure gold.

Talking of gold, Mr. P. P. V. S. is a firm believer in the philosophy of saving and thriving. He would like staff to bear in mind Mr. Micawber's economic analysis.

"Annual income twenty pounds, annual expenditure nineteen six, result happiness. Annual income twenty pounds annual expenditure twenty nought and six, result misery".

P. P. V. S. has a service of little over 20 years to his credit with the Seshasayee Group. He started his career as an apprentice with the former Trichy-Srirangam Electric Supply Corporation, and was later appointed its Stores Officer. For a brief stint he was with the Nilambur Gold Mines, Limited, of which even now he is a Director. In 1947, he was appointed Secretary, Seshasayee Bros., Ltd.,

in which capacity, he is looking after, among several other things, the Personnel Department of the Corporation.

P. P. V. S. has a mordant kind of wit, but only a few close friends know how fabulous can be his sense of humour. By nature, he is rather reserved, but with friends he is free and easy, and tells very good stories.

While at college, P. P. V. S. was playing badminton and volleyball, but he does not play any game now excepting bridge, and even this game only occasionally, the occasions being confined to our tournaments.

As could have been guessed, P. P. V. S. fancies most Charles Dickens among the older masters. Among present-day writers, P. G. Wodehouse, immortal creator of Jeeves, is his favourite.

ACCIDENT PREVENTION

Tidiness is essential for the prevention of accidents.

See that all tools, machinery and equipment are maintained in a safe condition. Don't let those under you work with unsound equipment. Encourage the reporting of defects by having them put right as quickly as possible.

If men from another department are doing repairs or other work in your department, see that it is done safely and right and that they leave the place as tidy as they found it. You are responsible for the conditions in your department and have a right to insist.

See that all guards and safety signs are replaced securely if they have to be removed.

If there are fire appliances in your department, it is your duty to keep an eye on them, no matter what routine inspections may be made by another department. You are the only person who can ensure that they are always accessible. Remember that if they are obstructed "only for five minutes," fire is just as likely to break out during those five minutes as at any other time.

— Efficiency News.

1954

REPUBLIC

COLOURFUL PROGRAMME

DAY

OF SONG, DANCE AND FUN!

(1) Radha. (2) Sumandha and Radha. (3) Lalitha, (Vocal) Rajam (Mridangam) and Balam (Violin). (4) N. Swaminathan and N. Venkataraman. (5) N. Ramani.

IN the dim dawn of time, when pre-historic man slipped on a banana skin or—maybe, it was a tiger skin—and fell over a precipice, his companion could not possibly contain himself, and broke out in a gorilla-like grin. Human nature being always the same, the risible propensities of man remaining pretty constant throughout the ages, perhaps nothing amuses the modern school-boy more than the spectacle of his form master tripping on the foot-ball field.

Other people's misfortunes have always been an unfailing source of delight; other people's manners and mannerisms have always meant joy unalloyed.

We have it on the authority of Macaulay that David Garrick, the celebrated eighteenth century Shakesperian actor, often, threw private audiences into convulsive laughter with his imitations of the billing and cooing of Dr. Johnson and his wife. This Falstaff among men of letters

had married a woman who was the mother of all grandmothers!

The flair for mimicry is, as Dr. S. Radhakrishnan might have put it, "a gift from the gods above". Like a poet, a mimic is probably born and not made. In any event, that was the impression left on our minds after we have been treated to some inspired buffoonery on Republic Day. The artistes were V. Venkataraman of our Madras Office, and his friend V. Swaminathan of Prithivi. This precious pair brought the roof down, if our building contractor would excuse us the use of this expression! The man who said that imitation was the sincerest form of flattery would have radically revised his views, if he were to be present at our show. If what these two boys perpetrated was flattery, by God, we could do with a spot of downright abuse! All their numbers were stupendously good, but one number that is still ringing in our ears is their rendition of the professional musician wanting to swap places with the professional priest, and *vice versa*.

The day's programme got off to an excellent start in the morning with the unfurling of the tri-colour by Mr. K. K. Raman, Director, Seshasayee Brothers Limited.

This item was followed by distribution of sweets to children of employees.

In the evening, we had the time of our lives. Besides the clowning provided by Venkataraman and his friend, we had a music recital by Kumari P. V. Lalitha, daughter of P. P. Venkatasubramaniam, Secretary, Seshasayee Bros., Limited, a flute recital by N. Ramani and a dance recital by Kumari R. Radha, daughter of H. K. Ramaswami, Dy. Chief Engineer, and Kumari Sunandha, his niece.

Lalitha was accompanied on the violin by Kumari N. Balam, and on the *mridangam* by Kumari N. Rajam. Both these girls are sisters, and are the daughters of R. Natesa Iyer, one of our Switchboard Operators at Tiruvarur. For their age, they displayed consummate artistry, and they are bound to do even better as the years pass by.

As usual, Lalitha was in very fine form, and she sang most delightfully indeed.

N. Ramani's flute recital was another welcome item. "Accompaniments" were provided by his two talented sisters, Balam and Rajam. Ramani has now more poise, more assurance, than ever before in the past, and if the promise he held forth in his performance at our function is any indication, it will not be long before he is admitted into the company of front-rank artistes in the country. He is a worthy disciple of a worthy master—T. R. Mahalingam.

Another well-received item was the dance recital. Radha, H. K. R.'s vivacious little daughter, and Sunandha, her *confrere* gave a most delightful terpsichorean display. Their repertoire included *Bharata Natyam* and other popular items like Gypsy and Marwari.

Radha's *bhava* (expression) was particularly good and drew from the audience much appreciative comment.

The prizes (silver cups) were given away by Lt. Col. Swami Desikachari, well-known local Advocate.

Earlier, Mr. K. K. Raman spoke appreciatively about the artistes.

R. Santanam, Secretary, Staff Association proposed a vote of thanks.

Strictly Personnel

We said farewell to: P. V. Sambasivam, Line Superintendent, Kallal, (12 years); K. Nagaswami, Bill Collector, Kallal (6 years); and Chinammal, Building Maintenance, Head Office. (18 years).

Director's sixty-first birthday:

Our respectful congratulations to Mr. Appanna N. Rangachariar, Director, on his *Shastibadapurti* (sixty-first birthday) which came off on February 24. Among others who called at Mr. Rangachariar's place to offer him felicitations were Mr. S. Raghava Aiyangar, our esteemed Board Chairman, Mr. R. Narayana Iyengar, Director, Dr. T. S. Balasubramania Iyer, Director, Mr. S. M. A. R. N. Narayanan Chettiar, Director, Mr. V. Seshasayee and Mr. K. K. Raman.



Mr. A. N. Rangachariar.

Quipped Mr. Narayana Iyengar on the occasion: "May it be given to us (himself and Mr. Raghava Aiyangar—and who by the way are seniors in age to Mr. Rangachariar) to wish



P. R. Subramanian.

you many happy returns on your centenary!"

Feather in our "Co-op" Cap:

In recognition of its good record of work during the official year 1952-53, our Cooperative Stores was awarded a silver trophy by the Trichinopoly District Cooperative Central Bank, Limited. Congratulations to the Directors of the Stores, Mr. P. R. Subramanian, Secretary/Manager, and his very able band of staff.

St. John Ambulance:

The year's annual training camp for the Officers of the St. John Ambulance Brigade (India) was held at Tirukattupalli on November 27, 1953. R. Varadarajan, M. Dandayudapani, M. R. Srikant, V. Balasubramanian, T. R. Rajagopal, B. A. Padmanabhan and K. Natarajan attended the camp.

The camp was inaugurated by H. K. Ramaswami, Deputy Chief Engineer.

S. M. E. Ambulance Division II has since been formed. A third Division is, also, in process of formation.



Australian Lignite: In the course of her Australian tour, Queen Elizabeth saw one of the world's largest man-made holes when she inspected the State Electricity Commission's open-cut mine at Yallourn, near Melbourne.

QUEEN Elizabeth and the Duke of Edinburgh saw one of the world's largest man-made holes on March 3, when they inspected the State Electricity Commission's open-cut mine at Yallourn, near Melbourne. The Royal Pair saw features of the 200-foot deep open-cut, which is more than one-and-a-half square miles in area. The Yallourn field consists of brown coal lignite which goes to supply the S. E. C. power station nearby, main source for the State's electricity and

also to provide briquettes for Victorian industrial power. The field is estimated to contain 6,00,000,000 tons of lignite and, when extensions to the plant are complete in 1956, will supply some 10,000,000 tons each year.

ENGINEERING INDUSTRIES

A number of important engineering industries recorded a rise in production as compared with figures for 1952. The production of the important ones among them is as shown on the next page. Figures in brackets indicate comparative production in 1952.

Electric fans—201,805 (195,400); Power Transformer—311,471 kVA (214,950); Conduit Pipes—3.77 million ft. (3.69); Rubber Insulated Cables and Flexibles—48.68 million yards (32.86); Electric Motors—164,202 H. P. (157,477); Dry Cells—148,346,414 units (130,181,499); House Service Meters—82,027 (34,358); Domestic Refrigerators—1,078 (600); Lead—1,574 tons (1,132); Steel Tubes—319 tons (215); Copper Sheets/Circles—1,061 tons (805.7).

Some engineering industries, however, did not fare very well. The fall in production was sometimes due to a slump in the market, as in the case of radio receivers, the production of which declined from 71,495 in 1952 to 56,880 in 1953, or due to deliberate restrictions on some units as in the case of incandescent lamps which declined from 20.88 millions to 19.54 millions. Restrictions were imposed on manufacturers having a capacity of over one million lamps per annum to ease up excessive stocks held by some of the smaller manufacturers.

PLAN FOR RAJASTHAN

The Rajasthan Government's Rs. 2.5 crore scheme for the development of the nineteen Government-owned electricity undertakings is now awaiting approval of India's Central Planning Commission. Under this scheme

many power stations will be extended. The Jaipur power house which now has a capacity of 10,000 kW will have a further 8,000 kW of plant, at an estimated cost of Rs. 53 lakhs. The extension lines to Sikar, 60 miles away, and the link-up of Dausa and Rajgarh in Alwar with the Jaipur station will cost another Rs. 21 lakhs. The Jodhpur power station, now of 2,000 kW capacity will be increased by 6,000 kW and plant at Bikaner station will be replaced, while a further Rs. 21 lakhs will be spent on its associated transmission and distribution lines. The State Government also plans to replace and increase the plant at the Kotah power station, and two 750 kW steam sets will be installed at the Alwar station. Others to be similarly treated are Bharatpur and Bhilwara (both to have two 750 kW sets) in addition to a number of smaller stations.

LOW COST HOUSING EXHIBITIONS—USE OF 'PARAMITE' CABLES.

The Low Cost Housing Exhibition that was recently held in New Delhi bore striking testimony to the ability of our architects to build a range of houses, attractive to look at, and within the financial reach of a majority of us. Just shelter—a mere roof over the head—will not, however, do in these days. A house to be called a

home must necessarily have certain basic amenities, like tap water, internal sanitation, cooking facilities, fans and electric lights. Not only the building materials, but the complex industrial products involved in providing water, sanitation and light, are, at present, available from the country's own resources.

In the electric wiring of a house, for example, several hundred yards of cable are required. With a few exceptions the houses on show at the Delhi Exhibition, were wired throughout with Indian-made cables produced by the Indian Cable Company Limited, at its Tatanagar factories.

Both the prize-winning designs, won by V. J. Mistry for Hot and Humid Climate, and the other by S. P. Caprihan for Hot and Dry Climate were wired with the Indian Cable Company's "Paramite" brand of rubber-insulated cables.

MADRAS ELECTRICITY PROJECTS

Addressing the joint Houses of the Madras Legislature on 22nd February, Mr. Sri Prakasa, Governor, stated that with the lifting of famine conditions in the State, it had been possible to earmark larger funds for the extension of electricity to rural areas.

"The scheme by which villagers were expected to find the capital for rural extensions has been given up and the department is now taking up these extensions at an increased pace. With a view to meeting the overall power shortage, the capacity of the Madras thermal plant is being augmented, and it is proposed to sanction a new hydro-electric project making use of the Periyar waters. The storage in our reservoirs is adequate for power generation this year, and, therefore, there may not be any power cut this season," he said.

COLOMBO PLAN

The Second Annual Report of the Consultative Committee on Economic Development appointed under the Colombo Plan, published as a White Paper on 13th December, 1953, records the progress achieved in carrying out the projects for economic development provided for in the second year of the Colombo Plan.

Dealing with electric power development the report says:

"In the field of power, India increased generation capacity by 315,000 kW, Pakistan increased the total electric power capacity from 70,000 to 140,000 kW and Ceylon increased her capacity by 25,000 kW.

SME SUPPLY NEWS

VILLAGES electrified in the Tiruchi-Srirangam licence area during the quarter ending 31st March, 1954 were Porasampatti and Thanneerpalli, in Kulitalai taluk.

In February, supply was given to Porasampatti, which is one among the eight villages under the Thalanji scheme. A 30 kVA, pole-mounted transformer substation was erected in the village, supply being tapped off the main incoming 11 kV feeders. An agricultural load of 40 h.p. is fed from this substation. Fifty-pound rail posts with ACSR "Squirrel" conductors were used.

Thanneerpalli: Eighteen lighting services and twenty street lights constitute the current load of this village, which is about a mile east of Kulitalai on the Trichy-Karur road. The formal switch-on which took place on March 6 was performed by Mr. S. Doraiswami Iyer, President, Panchayat Board. "It was a simple and quiet function", reported our Resident Engineer, "but as the lights went up, the faces of the villagers also lit up".

Supply is off post No. 5 A—on the 11 kV duplicate feeder to Musiri. A

single-phase, 10 kVA pole-mounted transformer substation was erected, and L. T. lines of 4,200 feet in length were taken into the village. Fifty-pound rails and ACSR "Squirrel" were used in this extension—the cost of which is Rs. 10,410. There are enquiries for the supply of power for agricultural purposes and to a rice mill.

In the Mayavaram-Mannargudi-Tiruvavur licence area, Moongilthottam was electrified. L. T. overhead mains were drawn from the Dharmapuram transformer substation for a distance of about 2,500 feet at a cost of Rs. 3,740. Nine domestic lighting services and one rice mill are fed from this extension. Fifty-pound rails with all-aluminium conductors (Size—7·0772) were used. Supply was given on February 18.

The two 500 kVA, 22/11 step-down transformers at Samayapuram catering to loads at Manachanallur, Thuraiyur, and the villages beyond north, were recently shifted to Manachanallur. Reason: the agricultural loads in Thuraiyur area went up beyond our expectations and the step-down transformers were always fully loaded—occasionally even overloaded! Further, as a number of agricultural pumpsets are to be connected up at Sengattupatti, Kalathur and Surathur—the next schemes to be taken on hand—the loads of Manachanallur were released

from the step-down transformer and fed directly by the 22 kV feeder.

SYSTEM IMPROVEMENTS IN THE TIRUCHI URBAN AREA

Four transformer substations -- namely, Macdonald's Monument, Bhajan Ice Factory, Pudukottah Road, and Sangiliandapuram have all along been fed by a 3.3 kV line. As this system was fully loaded, and as the growing demands for power in this area could not be met, the 3.3 kV system was converted into a 11 kV one, and the substation capacities were also increased. The supply was formally switched on by Mr. H. K. Ramaswami, Dy. Chief Engineer, on October 18, 1953.



Mr. H. K. Ramaswami, Dy. Chief Engineer, switches on the supply of the new system.

The original pole-mounted Macdonald's Monument substation was

shifted to a better location, and was also converted into a floor-mounted one.

A 22 kV, 50 kVA pole-mounted transformer substation was erected at Mannarpuram, and was energised on January 29 to cater to local loads and also as an improvement on the supply voltage.

A 60 h. p. oil engine rice mill at Eda Street, one of the oldest mills in Tiruchi, changed over to electric drive on February 24. A 50 h. p. Crompton motor was erected replacing the oil engine. The mill is now fed from the 150 kVA Sangiliandapuram transformer substation which, as mentioned earlier, was changed over from 3.3 kV to 11 kV. Extension of a three-phase L. T. overhead line with No. 2 S.W.G. copper conductor for nearly half-a-mile was made. The work was executed in a week. Full marks go to T. R. Rajah, one of our veteran supervisors, his able assistant Sebastin, Head Line-man, and his crew.

Industrial and agricultural loads connected in the quarter are as follows: -

Area	Industrial	Agricultural
Tiruchi-		
Srirangam	148 h. p.	142 h. p.
East-Tanjore	73 ..	Nil
East-Ramnad	35 ..	15 h. p.

எலக்ட்ரோலிட்டீ

தமிழ் அநுபந்தம்

மின்சார விநியோகமும்
மீட்டர் இலக்கானிலும்

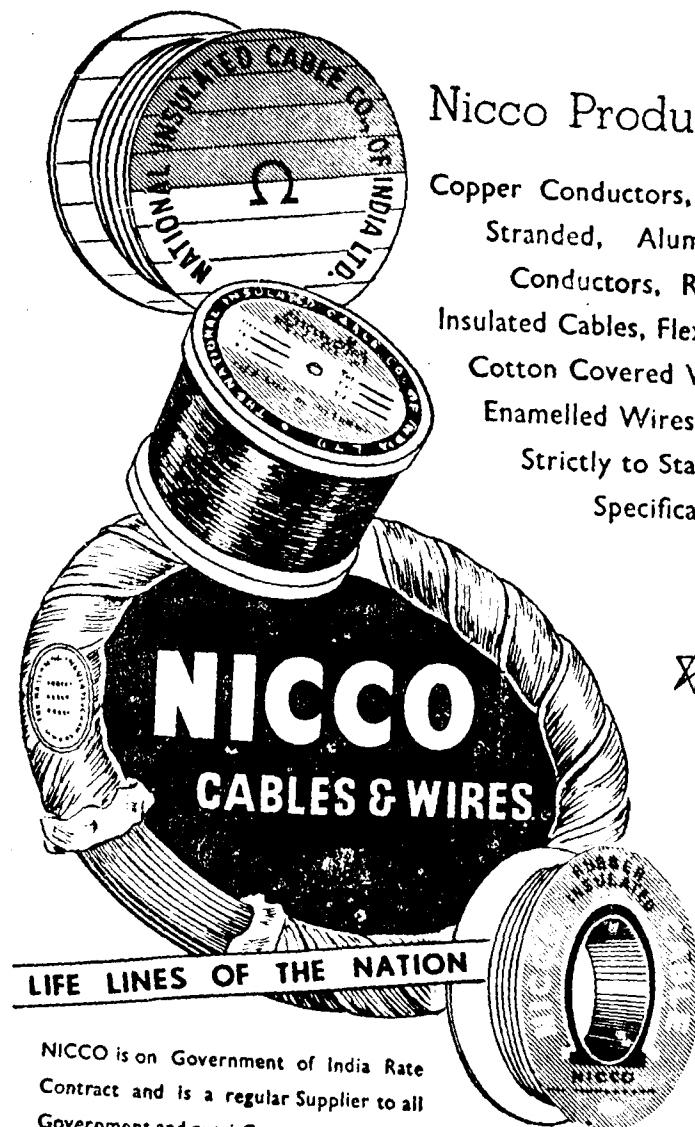
மீட்டர் என்றும் பதத்திற்கு அளவு கருவி என்பது பொருள். மீட்டர் மின்சாரம் எவ்வளவு உபயோகிக்கப் பட்டது என்பதை அளந்து காட்டுகிறது. மின்சாரம் நம் கண்களுக்குப் புலனாகாத ஒரு சக்தி. கண்களுக்குப் புலனாகாத ஒரு சக்தியை கண்களுக்குப் புலப்படும் மீட்டரைக்கொண்டு அளப்பது சாத்தியமாக என்ற ஐயம் ஏற்படலாம். தானியத்தைப் படியினால் அளக்கிறோம். துணியைக் கெஜக்கோல் கொண்டு அளக்கிறோம். இதுபோலவே மின்சார விநியோகத்தை மீட்டர் அளந்து தெரிவிக்கிறது.

நகரத் தண்ணீர் விநியோகம் பற்றி நிறுது இச் சாத்திரப்பத்தில் அறிந்து கொள்ளுதல் நலம். உயரமான இடங்களில் பெரிய தொட்டிகளில் தண்ணீர் தேக்கப்பட்டு குழாய்கள் மூலம் விநியோகம் செய்யப்படுகிறது. எவ்வளவுக் கெவ்வளவு தொட்டி உயரத்தில் அமைக்கப்படுகிறதோ அவ்வளவுக் கவ்வளவு அந்த சாதனம் குழாய்கள் மூலம் தண்ணீரைக் கடத்தும் சக்தியைப் பெறுகிறது. குழாயில் ரெல்லும் தண்ணீர்

குழாயின் பரிமாணத்தையும் அனுசரித்து இருக்கிறது. உயரமான மேடையிலிருந்து பெரிய குழாய்கள் மூலம் அதிகமான ஜலத்தை விநியோகிக்க இயலும். இதைப் போலவே மின்சார விநியோகத்திற்கும் மின் சக்தியைக் கடத்தும் சக்தி தேவை. இந்தச் சக்தியையே நாம் வோல்ட் என்று அழைக்கிறோம். மின்சாரத்தின் அளவு அதைக் கடத்தும் சக்தியை அனுசரித்திருக்கும். ஒரு குறிப்பிட்ட காலத்தில் அதன்மூலம் செல்லும் மின்சாரத்தை ஆம்பியர் என்று கூறுகிறோம்.

மின்சாரம் இருவகைப்படும். ஒன்று மாறுபடாத, ஒரே அளவில் செல்லும் மின்சாரம் (Direct Current); மற்றொன்று மாறுபடும் மின்சாரம் (Alternating Current), Alternating Current-ல் வோல்ட் ஆம்பியர் நீங்கலாக Power Factor என்பதாக மூன்றாவது தத்துவமும் உண்டு. Power Factor எவ்வளவுக் கெவ்வளவு நேராக அமைகிறதோ அவ்வளவுக் கவ்வளவு மின்சார விநியோகம் வரபடியாய் இருக்கும். ஒருவிதத்தில் மின்சார விநியோகத்தில்

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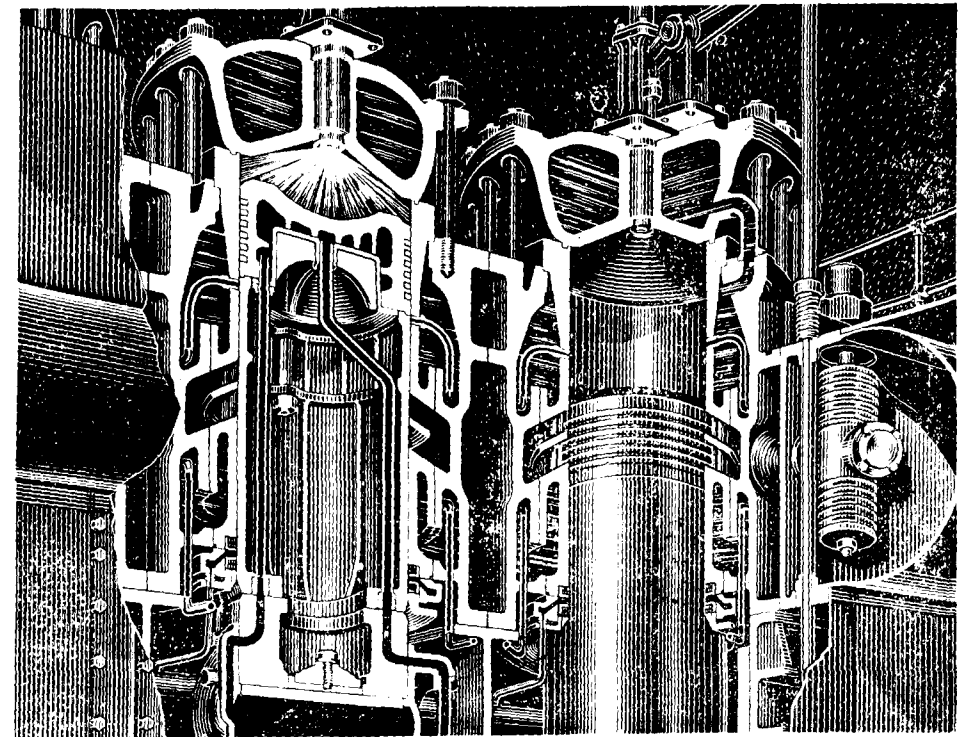
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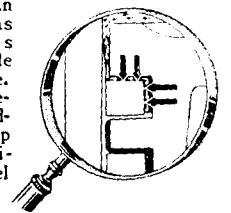
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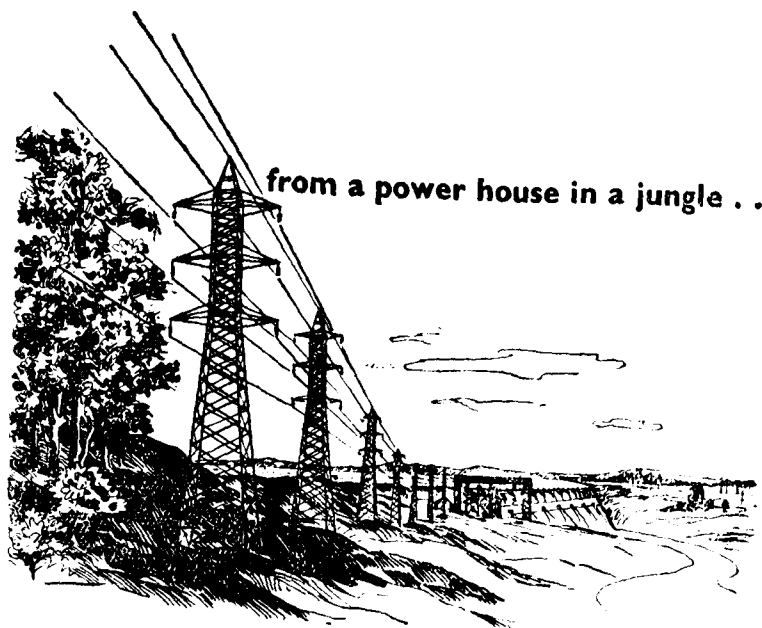
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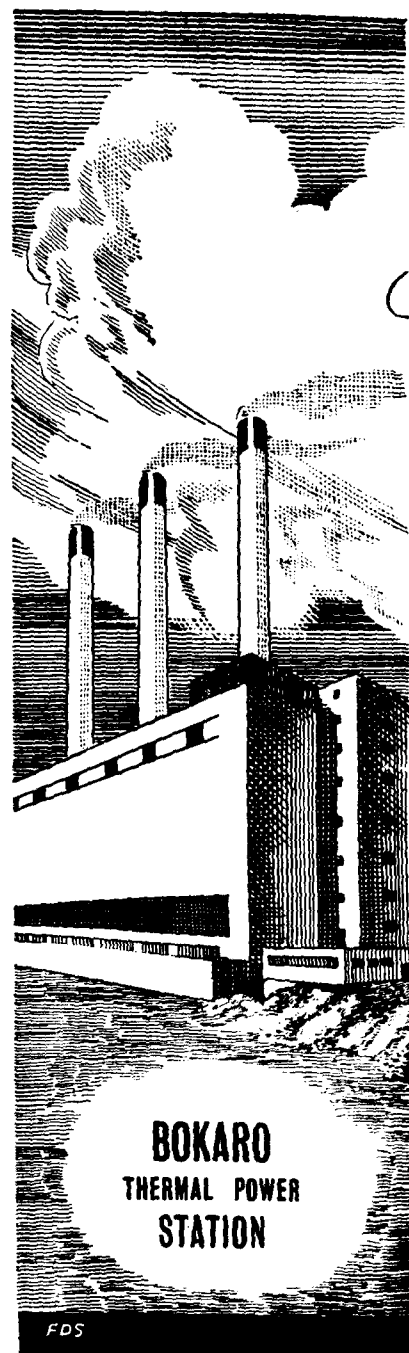
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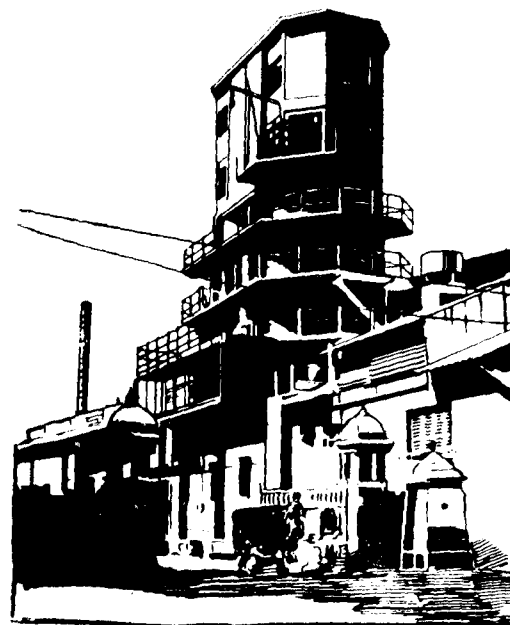
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