

ROSTER OF SCIENTIFIC AND TECHNICAL PERSONNEL, INDIA

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THE Roster of Scientific and Technical Personnel is a project which will make available in a central place, an index of all citizens of India, who have special scientific or technical qualification.

The main object of the Roster is to accurately map the human wealth of the nation. The rapid advance of scientific and technical knowledge makes it necessary that the nation should be in a position to call upon its specialised personnel in rapid and effective manner.

In Britain, by 1939, a register of scientific and technical personnel was completed under the supervision of the Royal Society. In the following year there was established in America a Council under the joint management of the National Resources Board and the Civil Service Commission, to compile a national roster. By 1943 a great deal of valuable information had been collected with a total of 630, 770 and consisting of physicians, dentists, veterinarians, chemists, engineers, physicists, mathematicians, geologists, economists, biologists, psychologists, etc.

In India, it is proposed to compile a Roster of Scientific and Technical men, under the auspices of the National Institute of Sciences, Delhi. Last year the National Institute made a country-wide appeal to the scientific workers to help them with the necessary information to compile the roster. But, judging from the recent appeal issued by the Prime Minister, the response was poor. Consequent on this decision, a small sub-committee was appointed to collect data in all the four zones (North, South, East and West) of India, concerning scientific man-power resources of the Nation.

The success of such a venture depends largely on the willing help the scientists and technologists render by furnishing necessary information at an early date; for to-day the question before the scientists in India should be, not "where they can serve" but "where they can serve best".

Here is given a brief resumé of the methods of compilation and working of the Roster.

The Roster should include all scientific and technical workers in India, who have either a University degree or suitable technical training under the guidance of qualified scientists.

The necessary information concerning individuals is secured by sending each professional man a general questionnaire to get qualitative information on about 20 items such as (a) geographical area, (b) linguistic ability, (c) technical qualification, (d) foreign travel, and such others.

There are two lists under which information is collected: one is the 'General List' and the second is the check list for details of specialisation. The general list is prepared under the following broad groups with special check lists in each:—

(A) (a) Administration and Management, (b) Engineering and related fields, (c) Humanities, (d) Medical Sciences, (e) Physical Sciences, (f) Agricultural and Biological Sciences, (g) Raw Materials and Manufactured Products, (h) Social Sciences.

(B) The special check list will be drawn up by a committee of experts in each field and will reveal the special branches in which the candidate is proficient. This can be best illustrated by giving a check list related to Engineering and related fields:

Aeronautics, Architecture, Automotive, Chemical, Civil, Electrical, Heating, Ventilating, Refrigeration and Air-Conditioning, Mining and Metallurgy, Industrial Design, Motion Pictures, Mechanical, Naval-Architecture, Marine, Radio, Safety, Sanitary, Testing and Materials, Transit and Traffic Engineering.

With information thus collected, the Roster will be planned on a card-index system; with complete information concerning each individual. To give an idea of such a compilation, here is recorded the distribution in professional

Field of Specialisation	Extent of Education			
	Doctors Degree	Masters Degree	Bachelors Degree	Total
1 Aeronautical ..	1	..	11	12
2 Automotive Engineering ..	..	1	8	9
3 Bacteriology } Immunology }	..	..	7	7
4 Botany ..	..	3	..	3
5 Chemistry ..	14	45	36	95
6 Chemical Engineering ..	..	7	23	30
7 Civil Engineering ..	..	1	2	3
8 Electrical Engineering ..	1	12	30	43
9 Genetics ..	1	2	..	3
10 Geology ..	..	2	..	2
11 Heating (Air-conditioning) ..	..	..	..	..
12 History and Political Science ..	..	..	..	..
13 Languages ..	2	..	..	2
14 Mechanical Engineering ..	..	..	3	3
15 Mining and Metallurgy ..	2	5	9	16
16 Physics and Astronomy ..	2	7	4	13
17 Horticulture and Agriculture	2	1	3
18 Sociology ..	1	1
19 Statistics	1	..	1
20 Zoology ..	1	1
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fields of men (241) and women (6) at the Indian Institute of Science, Bangalore, together with a classification of the academic training of the Scientific Personnel.

Once started and organized, the Roster will be a continuous census of the scientific man-power of the nation. It requires expert administrative staff to develop all aspects of the

Roster, and it means funds. But the expense in maintenance and its continuation are very little as compared with other projects undertaken to conserve our national resources. The Roster will be of value to many constructive activities of the nation; such as (a) the effective use of the scientific talent available in the country, (b) to reveal the gaps in the present unco-ordinated growth of science and technology, (c) to help proper equipment of College faculties, (d) to supply service personnel to industries, (e) to suggest alternative names where

team-work is likely to be broken up, (f) to safeguard going concerns like education and research by conservation of present personnel and to stop the drift of scientific and technical men to purely administrative lines.

It seems evident, therefore, that in times of war as well as peace, a central list of this sort will be a National Asset for the effective use of its Scientific and Technical man-power. It is up to the Scientists and Technologists in India to render all help towards an early compilation of the National Roster.

RESUME ON SERIES CAPACITORS

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THE American transmission and distribution system during the war had to be loaded to its more than maximum capacity calling on the resources of the engineers resulting in notable strides of improvement in the construction and protection of power capacitors to meet the exigency. However, in India, during that period, when imports were restricted and hence no further additions of plant were feasible, the exploring of raising of the capacity of the existing system was hardly given any attention and power was denied to many industries some of which could have been supplied power and gone a long way in the industrialisation of the country which we are all seeking to-day. Furthermore, heavy voltage drops could have been avoided and helped in the current to be delivered at an optimum voltage to all the consumers connected to the power system. In this respect the response of capacitors connected in series with the lines, otherwise called Series Capacitors is highly interesting.

Improvement in voltage regulation can be effected in several ways. The method of transmitting more power at higher voltages through larger wires or more number of parallel lines will involve higher cost of line construction and transformers and a corresponding increase in operating cost. Moreover, very little voltage regulation will be obtained by increasing the size of conductors beyond a certain limit because the controlling factor is chiefly the inductive reactance of the line. Induction regulators common now on rural lines have high internal losses and are not instantaneous in action. A change of voltage is necessary to actuate them and a time factor is involved to effect the correction. It might so happen that by the time correction is effected the demand for excess current has ceased and an overvoltage results. Synchronous Condensers for voltage regulation, in large vogue at present, have losses varying from about one and a half per cent. of their rating on very large sizes to about five per cent. of their rating on smaller sizes and the machines with their control equipment are complicated and require periodic inspection and proper maintenance. The Shunt Capacitors like synchronous condensers improve voltage regulation by improving power factor. If they are left on circuits at light loads a voltage rise will occur at the distribution points which may be as disadvantageous as too low a voltage.

Series Capacitors provide automatic voltage

regulation from light load to full load changes in the circuit. They also tend to lessen the initial cost of a new circuit by making possible the use of a smaller size of wire for a given power with a given voltage drop. The reactance of a system has a predominant effect on the maximum power that could be conveyed over a line. It should be kept as low as possible and the method by which it could be reduced to a minimum is to alter the spacing which is, of course, governed by voltage, corona and mechanical considerations. The series capacitors nullify the inductive reactance of the line and transformers and it approximates the line to characteristics of direct current transmission. Their use enables the existing system to carry greater load than what could be handled by increasing the wire size.

It is common experience that due to reduced voltage induction motors sometimes start slowly or refuse to start through the action of the undervoltage device. Fluctuating, intermittent and suddenly applied loads such as, the working of the rolling mills, resistance welding machines impose difficult load conditions on the power system from the standpoint of feeder regulation and capacity. It is felt that these types of applications have a great future in our country since the use of electricity is playing a larger and larger part in welding, etc. From the economics point of view the power company cannot cater to such needs. Herein the series capacitors are of considerable advantage to other types of equipment for providing automatic voltage regulation.

The series capacitors have recently been used with success in improving the regulation of high frequency generators to supply power to induction furnaces. These generators are single phase, and the very nature of their design indicates that they have high reactance which causes very poor regulation.

On high voltage long transmission lines the series capacitors can be used to increase the stability limit of the circuits in which they are connected. They also find application in improving load division by alteration of the impedance of parallel circuits.

The series capacitors also excel other commercial apparatus in their characteristics of low losses which are of the order of 0.25 per cent. of their rating. Being static and sealed-off devices they require practically no maintenance or attendance; nor any specially prepared