

a recording transmission-measuring set was developed that covers the voice-frequency spectrum in a few minutes. As originally used, the chart of this recorder could be read to about 0.2 db., but for many present-day measurements this is not adequate, and a new 'spread-scale' recorder has been developed that can be read to 0.02 db.

For a transmission measurement, an adjustable-frequency oscillator is provided with a small synchronous motor that changes the output frequency continuously over the range from 200 to 3,500 cycles for each test. An equalizer and adjustable attenuator in the output of the oscillator maintain the output power constant at the desired level for the test. At the output of the circuit being measured is an I-U amplifier-rectifier that converts the received A.C. into D.C. for operating the recorder. A 500 cycle selective detector is employed to mark the chart at a point corresponding to a test frequency of 500 cycles, and this mark is used in placing the frequency ordinates on the chart. A biasing circuit was added as one of the changes required to produce the spread-scale characteristic.

To secure the added precision needed for a chart that is to be read to 0.02 db., certain other changes were made, including principally an increased voltage stability of the power supplies and an increased stability of the oscillator output and of the detector gain as the frequency varied over the test range. Steps taken to improve the circuit in these respects include the provision of a regulated plate-battery power supply for both the oscillator and the detector, storage battery for filament supply, the selection of quiet tubes, and special regulation for the oscillator output characteristics.

The circuit is calibrated by applying an input of 10 db. below 1 milliwatt to the amplifier-rectifier, and then adjusting the resistance in the circuit of the biasing battery until a mid-scale deflexion is obtained. When making a measurement of the transmission characteristic of a piece of equipment, it is then necessary to adjust the oscillator output so that the output of the equipment under test is 10 db. below 1 milliwatt at roughly the frequency of the mean attenuation. The dial of the oscillator is then set below the edge of the desired band, and the oscillator and recorder are both started. The article describes and illustrates the recorder and its performance characteristics in detail.

## FORTHCOMING EVENTS

(Meetings marked with an asterisk are open to the public)

### Saturday, February 27

**MALACOLOGICAL SOCIETY** (at the Linnean Society, Burlington House, Piccadilly, London, W.1), at 2.30 p.m.—Annual General Meeting and Commemoration of the 50th Anniversary of the Society's Foundation.

**LIGHT RAILWAY TRANSPORT LEAGUE** (at Fred Tallant Hall, Room J, Drummond Street, London, N.W.1), at 3 p.m.—Dr. Hugh Nicol: "A Scientist Looks at Transport".\*

### Monday, March 1

**FARMERS' CLUB** (at the Royal Empire Society, Craven Street, Strand, London, W.C.2), at 2.30 p.m.—Sir William Prince-Smith, Bart.: "An Industrialist's Views on Agriculture and its Future".

### Tuesday, March 2

**MANCHESTER LITERARY AND PHILOSOPHICAL SOCIETY** (in the Geographical Department, The University, Manchester), at 5 p.m.—Prof. J. Kenner, F.R.S.: "Historical Method in Teaching Science".

**INSTITUTE OF WELDING** (at the Institution of Mechanical Engineers, Storey's Gate, St. James's Park, London, S.W.1), at 6 p.m.—A series of Papers on "Developments in Arc Welding Technique".

### Wednesday, March 3

**ROYAL SOCIETY OF ARTS** (at John Adam Street, Adelphi, London, W.C.2), at 1.45 p.m.—Dr. J. D. Robertson: "Calcium Metabolism in Health and Disease".

**PHYSICAL SOCIETY (COLOUR GROUP)** (in the Lecture Theatre of the Science Museum, Exhibition Road, London, S.W.7), at 2.30 p.m.—Third Annual General Meeting. At 3 p.m.—Mr. J. Guild: "The Significance and Limitations of the C.I.E. Standard Observer Tables".

**INSTITUTE OF METALS** (at the Institution of Mechanical Engineers, Storey's Gate, St. James's Park, London, S.W.1), at 3 p.m.—35th Annual General Meeting, Dr. Harold Moore: "Co-operative Research in the Metal Industries".

**INSTITUTION OF MECHANICAL ENGINEERS (JOINT MEETING WITH THE IRON AND STEEL INSTITUTE AND THE INSTITUTE OF METALS)** (at Storey's Gate, St. James's Park, London, S.W.1), at 5.30 p.m.—Dr. S. W. Smith: "The Life and Work of Sir William Chandler Roberts-Austen".

### Thursday, March 4

**INSTITUTION OF ELECTRICAL ENGINEERS** (at Savoy Place, Victoria Embankment, London, W.C.2), at 5 p.m.—Sound Films of Honorary Members and Faraday Medallists—Sir J. J. Thomson, O.M., F.R.S.; Lord Rutherford, O.M., F.R.S.

### Friday, March 5

**ROYAL SOCIETY OF ARTS (INDIA AND BURMA SECTION)** (at John Adam Street, Adelphi, London, W.C.2), at 1.45 p.m.—Sir Malcolm Darling: "The Indian Village and Democracy".

**ROYAL INSTITUTION** (at 21 Albemarle Street, London, W.1), at 5 p.m.—Sir John Russell, F.R.S.: "Restarting of Agriculture in Devastated Europe".

### Saturday, March 6

**GEOLOGISTS' ASSOCIATION** (at the Geological Society of London, Burlington House, Piccadilly, London, W.1), at 2.30 p.m.—Annual General Meeting. Prof. H. H. Read, F.R.S.: "Meditations on Granite" (Presidential Address).

### Friday, March 5—Sunday, March 7

**INSTITUTE OF INDUSTRIAL ADMINISTRATION** (at the Waldorf Hotel, Aldwych, London, W.C.2). Conference on "Training for Industrial Management".\*

#### Friday, March 5

4.30 p.m.—Registration of Members.

#### Saturday, March 6

10 a.m.—Management and the Nation.

11.15 a.m.—Address by His Grace the Lord Archbishop of Canterbury.

12.30 p.m.—Management and Industry.

3 p.m.—External Training for Industry.

5.30 p.m.—Internal Training in Industry.

#### Sunday, March 7

10 a.m.—Management and the Board Room.

11.30 a.m.—Review of Conference.

## APPOINTMENTS VACANT

APPLICATIONS are invited for the following appointments on or before the dates mentioned:

**LECTURER-INSTRUCTOR IN ENGINEERING WORKSHOP TECHNOLOGY AND PRACTICE** in the Bolton Municipal Technical College—The Director of Education, Education Offices, Nelson Square, Bolton (March 5).

**MASTER TO TEACH MATHEMATICS AND SCIENCE** at the Bingley Technical School—The Divisional Educational Officer, Education Offices, Bingley, Yorks. (March 7).

**LECTURER IN MECHANICAL ENGINEERING** in the Oxford Schools of Technology, Art and Commerce—The Chief Education Officer, City Education Office, 77 George Street, Oxford (March 9).

**LECTURER OF TEXTILE TESTING** in the School of Textiles—The Principal, College of Technology and Commerce, Leicester (March 13).

**CHAIR OF CHEMISTRY** in the University College of North Wales—The Bursar and Acting Registrar, University College of North Wales, Bangor (April 3).

**ASSISTANT FIELD OFFICER** (either sex) for Crop Investigations of Mineral Deficiencies—The Secretary, Research Station, East Malling, Kent.

**ASSISTANT (woman) FOR THE STRAWBERRY NUCLEAR STOCKS SCHEME**—The Secretary, Research Station, East Malling, Kent.

**TECHNICAL ASSISTANT** (male or female) in the DEPARTMENT OF ECONOMICS—The Secretary, South-Eastern Agricultural College, Wye, Kent.

**ASSISTANT ENGINEERS** for operation and maintenance of hydro-electric Public Supply Company, Nigerian Plateau—The Ministry of Labour and National Service, Central (Technical and Scientific) Register, Section D.553X, Alexandra House, Kingsway, London, W.C.2.

**LECTURER IN MECHANICAL ENGINEERING**—The Secretary, Woolwich Polytechnic, Woolwich, London, S.E.18.