

THE FOUR SERIES OF MEGGER INSULATION TESTER

SERIES 1 For testing high tension equipment, transformers, insulators, generators, mains and apparatus having a high degree of insulation and considerable electrostatic capacity. Testing pressures up to 2,500 volts. Ranges up to 50,000 megohms. *Publication No. 240.* A special 5,000 volt tester is also available. *Publication No. 243.*

SERIES 2 For testing power circuits, motors, etc. and apparatus operating on 500 volts, and for mains having moderate electrostatic capacity. It may also be supplied with a second scale for testing continuity of lead sheathing. Testing pressures up to 1,000 volts. Ranges up to 2,000 megohms. *Publication No. 236.*

SERIES 3 Known also as the Wee-Megger Tester. For testing house wiring, small motors and apparatus operating at pressures up to 250 volts. Only obtainable with a variable pressure generator. Weight 3 lbs. Testing pressures up to 500 volts, ranges up to 50 megohms. *Publication No. 211.*

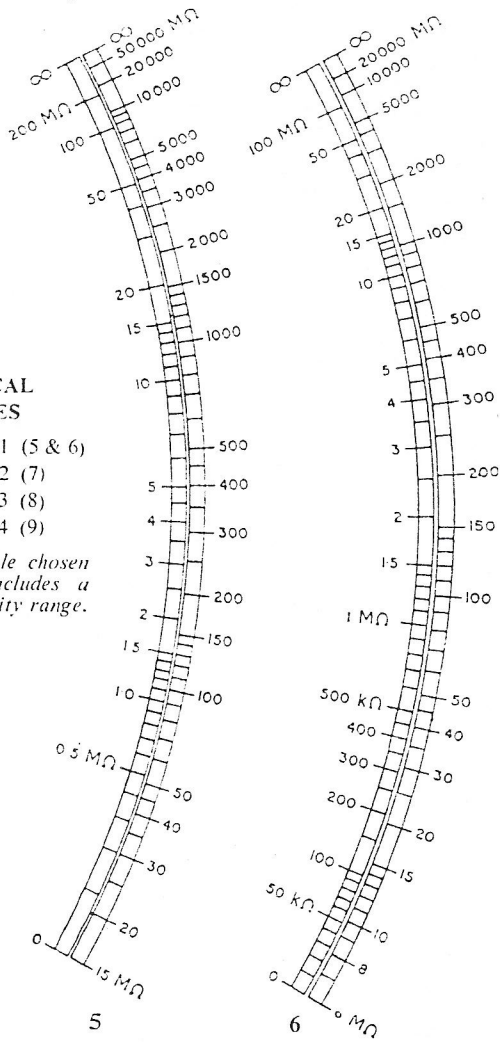
SERIES 4 An intermediate instrument with the voltage and megohm ranges of the Series 3 tester, but having a constant pressure generator. It may be fitted with a $\div 100$ switch or a continuity range, refinements hitherto only available in the Series 2 instrument. Weight 6 lbs. *Publication No. 051/5.*

MEGGER INSULATION TESTERS

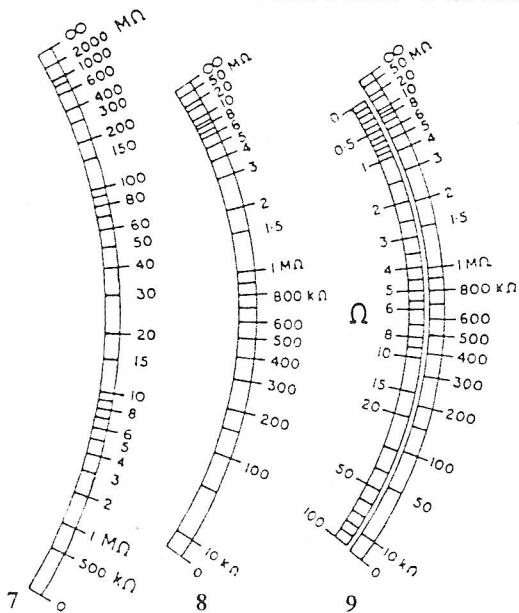
TYPICAL SCALES

Series 1 (5 & 6)
Series 2 (7)
Series 3 (8)
Series 4 (9)

*the scale chosen
also includes a
continuity range.*



INSULATION TESTER SCALES

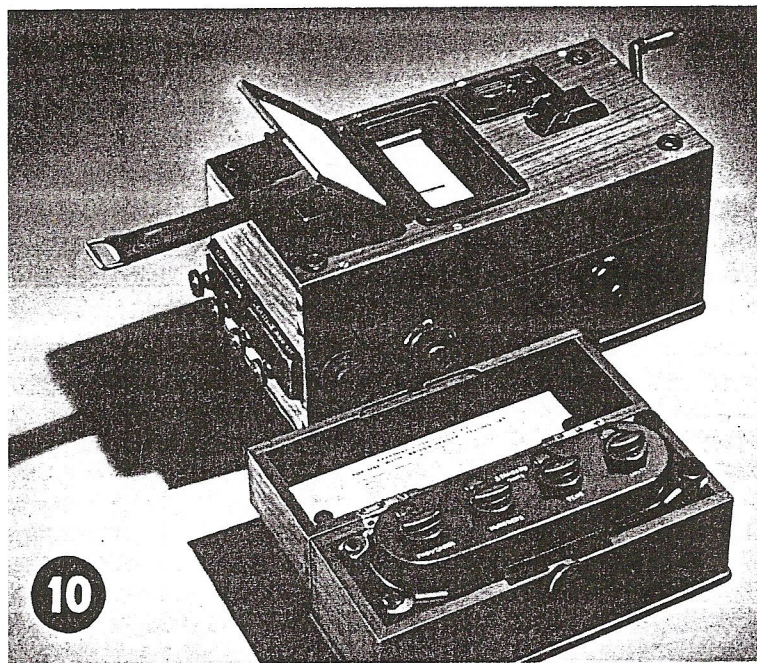


● The safety and reliability of electrical installations and apparatus depends chiefly on the condition of the insulation which should therefore be tested at regular intervals. These tests should be carried out during manufacture, before acceptance, after installation, and periodically while in service.

Megger Insulation Testers have received world wide recognition as the standard appliance for making these tests. They are made exclusively by the Evershed organisation under their registered trade mark "MEGGER," and are in general use throughout the civilised world.

The Megger Insulation Tester is a self-contained testing instrument, always ready for immediate use. It consists of a hand driven generator to produce the testing voltage, and a direct reading ohmmeter which measures the value of the insulation resistance. These components are mounted together in a portable case and are constructed of materials capable of withstanding tropical conditions. There are four patterns of instrument, the characteristics and uses of each being briefly described on the opposite page. Some instruments, moreover, have certificates of intrinsic safety, while the Series 1 instruments can also be supplied with three voltage ranges, and a special Series 1 instrument in a somewhat larger case is available for a testing pressure of 5,000 volts and a range of 100,000 megohms.

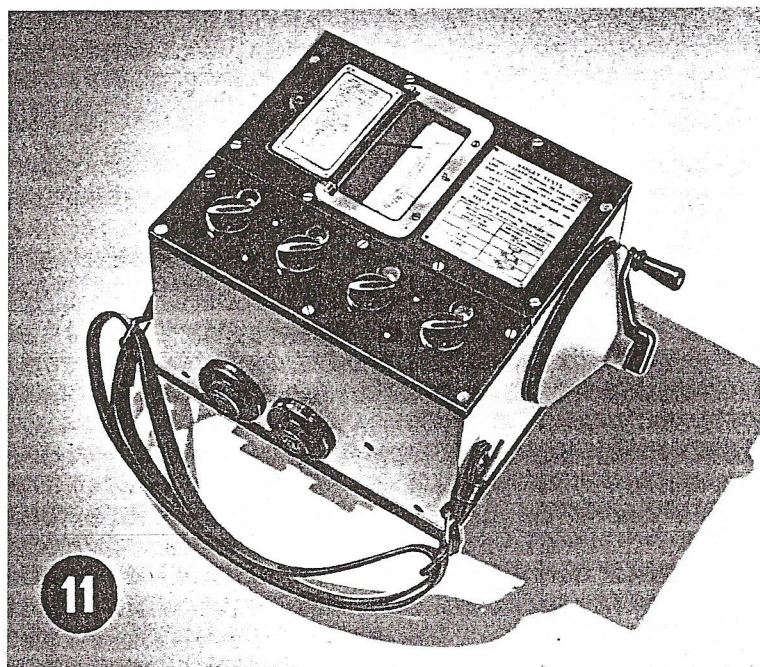
BRIDGE-MEGGER TESTERS



● The Bridge-Megger Testing Set is a combination of a Megger Insulation Tester and a complete Wheatstone Bridge. Covering a wide range of resistance, it is an ideal instrument for the maintenance engineer enabling the resistance of motor windings, contactor operating coils etc., to be accurately measured, periodical insulation tests made and faults in telephone cable located using the Varley Loop method.

The Bridge-Megger Testing Sets, Series 1 and 2, are self-contained testing instruments. Each comprises a hand driven generator of the constant pressure type to produce the testing voltage, a change-over switch to change from insulation to Wheatstone bridge tests, a moving coil ohmmeter which measures directly the value of the insulation resistance and which acts as the galvanometer for the bridge tests. A ratio switch and a direct reading adjustable resistance complete the bridge. This resistance is switch operated, its total value being shown on four dials as a row of figures. *Publication No. 212.*

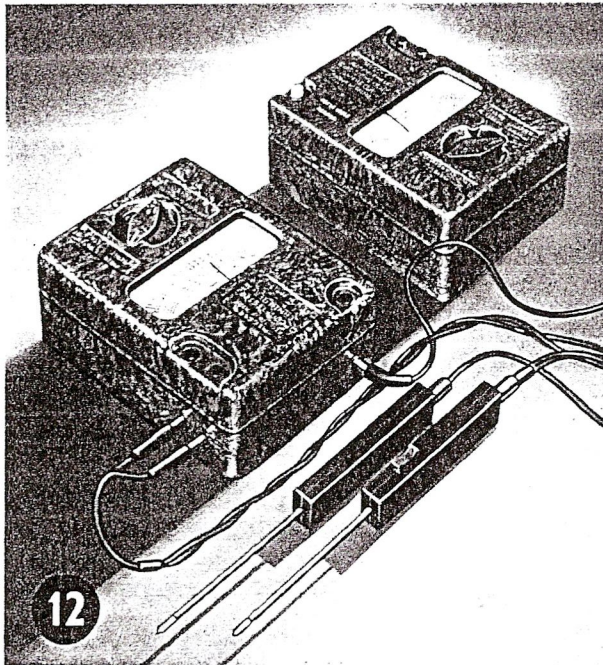
The Series 1 Testing Set (*Figure 10*) consists of two units, the adjustable resistance being contained in a separate case from the instrument to which it is connected by two short leads. Both cases are constructed of hard wood and have leather carrying handles. On the side of the instrument there are two terminals, marked "Line" and "Earth," which are used for insulation tests, and at the end of the case are two pairs of terminals marked "R" and "X" for connection to the resistance box and the resistance under test when making bridge tests. All instruments are internally guarded against surface leakage and those scaled to 1,000 megohms and over have a guard terminal for eliminating the effects of surface leakage on the apparatus under test. High sensitivity instruments are provided with levelling screws. All Bridge-Megger Testing Sets, Series 1, are suitable for carrying out Varley loop tests. Testing voltages up to 1,000 volts. Range covered .01 ohm. up to 2,000 megohms. Weight including resistance box 28 lbs.



The Series 2 Testing Set (*Figure 11*) is contained in a single case of aluminium alloy, the lid and base being of moulded plastic material. A leather carrying strap attached to the case is adjustable in length and can be arranged either short—for carrying the instrument by hand, or long—for slinging from the shoulder. The normal instrument has only two terminals marked "Line" and "Earth," and these are used for both insulation and bridge tests. Instruments incorporating Varley Test facilities have a third terminal marked "Varley Earth." Testing voltages up to 1,000 volts. Range covered .01 ohm. up to 200 megohms. Size $12 \times 8\frac{3}{4} \times 7$ ins. Weight $12\frac{3}{4}$ lbs.

●Evershed Ohmmeters are instruments intended for the rapid measurement of electrical resistance. They are direct reading *true* ohmmeters in that their accuracy is unaffected by variation in the supply voltage, the movements being similar to those fitted in Megger Insulation Testers. Instruments are available for the measurement of either insulation or conductor resistances and are widely used for testing components during manufacture.

OHMMETERS



MEGGER CIRCUIT TESTERS (Figure 12)

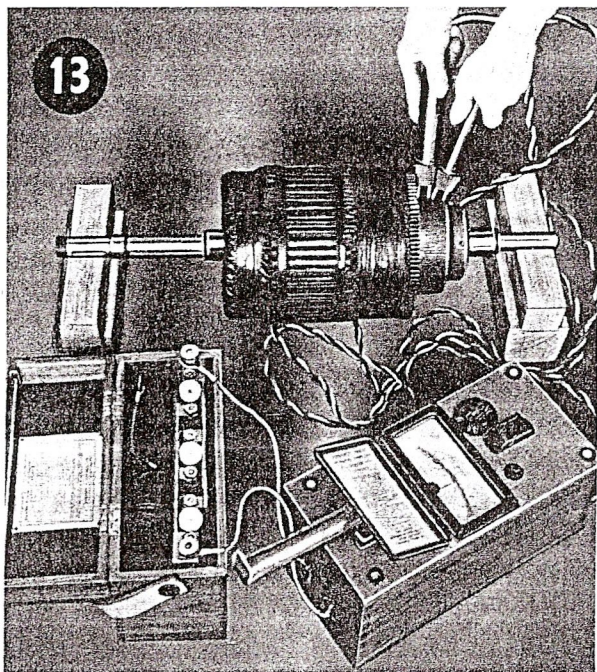
Portable direct reading true ohmmeters operated from self-contained $4\frac{1}{2}$ volt dry batteries. No adjustment necessary for battery voltage. Suitable for measuring the resistance of motor windings and other conductor resistances, and for testing the bonding of conduit. Four instruments available with ranges up to 30, 300, 50,000 and 200,000 ohms, respectively. Weight 2 lbs. *Publication No. 211.*

WORKSHOP OHMMETERS

Direct reading true ohmmeters operated from an external source of supply. Employed by manufacturers of telephone and telegraph apparatus, condensers, wireless sets, electric lamps, etc., for the rapid measurement of the insulation and conductor resistances of electrical components during manufacture. Instruments available for wall mounting or bench use, and covering a wide range of resistance. *Publication No. 414.*

DUCTER OHMMETER (Figure 13)

A portable direct reading true ohmmeter for the measurement of low resistances from a few ohms down to 1 microhm. Each instrument has four or five different ranges and is suitable for the testing of switch contacts, rail bonds, windings of series motors, etc. The ohmmeter operates from an external alkaline battery supplied with the set. *Publication No. 237.*



EVERSHED BOND TESTER

A low range true ohmmeter for testing the bonding of aeroplane structures, metallic sheathing, etc. It has a single range of 0-0.1 ohm, and operates from a self-contained alkaline cell. It is housed in a hard wood case supported by straps. Weight $9\frac{1}{2}$ lbs. *Publication No. P.L.230.*

SAFETY OHMMETER

This instrument is designed for testing detonator and shot firing circuits, and the testing current cannot exceed 12 milliamperes. Though similar in appearance to the Series 3 Megger Insulation Tester, it comprises a low voltage generator and a true ohmmeter, and is certified as intrinsically safe. Range 0-100 ohms. *Publication No. 215.*

MEGGER EARTH TESTERS

● These direct reading instruments enable the resistance to earth of earth electrodes to be quickly and easily determined. With these instruments it becomes an easy matter to ascertain whether at all times the resistance of these electrodes is sufficiently low to permit the correct operation of protective gear and to minimise the dangers due to lightning. The tests are carried out as shown in *Figure 14*.

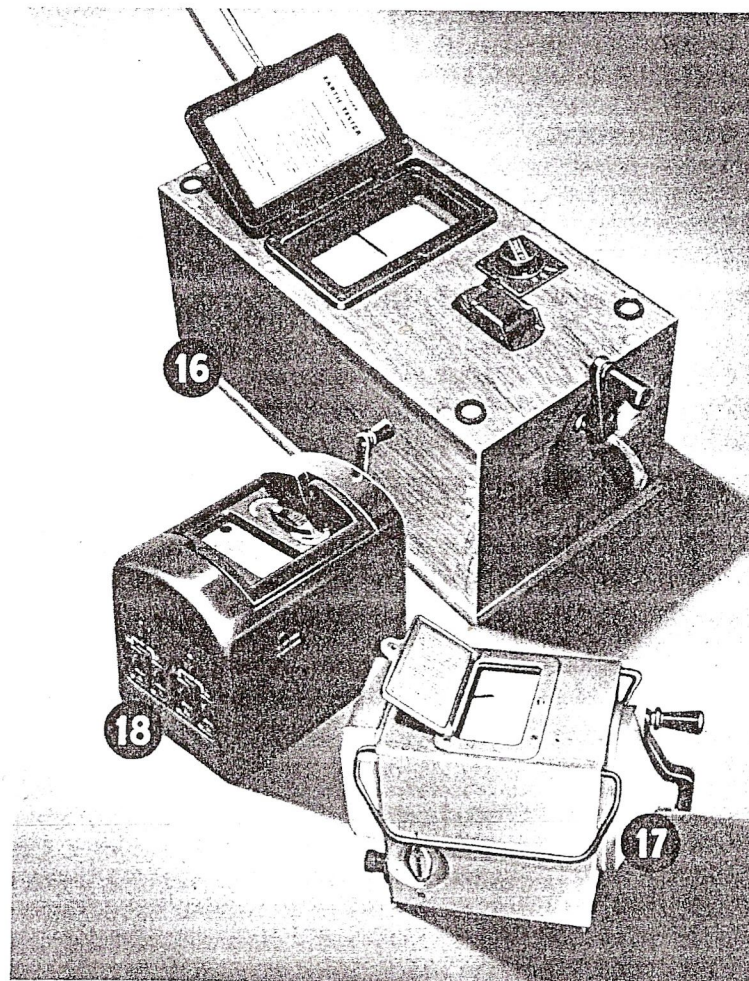
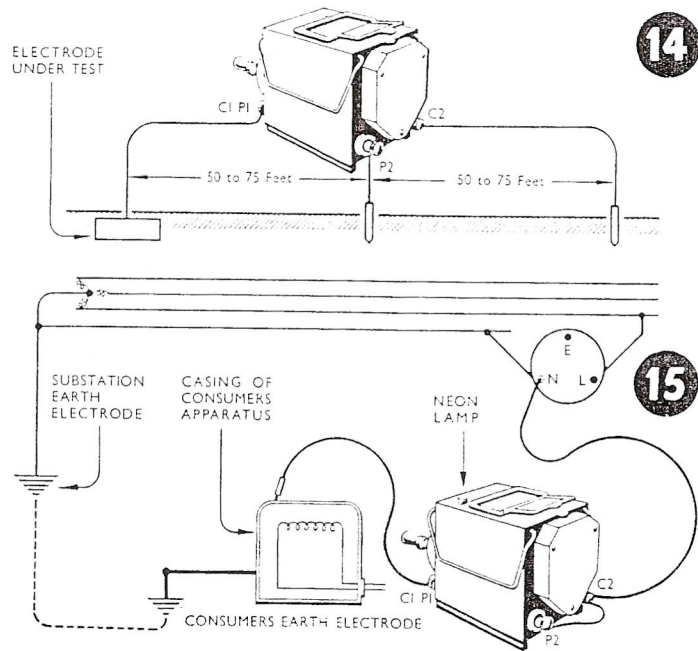
There are three patterns of instrument, each consisting of a direct reading ohmmeter and a hand generator of a special type so designed that under most practical conditions the effects of electrolytic back e.m.f. and of stray currents in the soil may be neglected.

The Series 1 instrument, *Figure 16*, has an evenly divided scale and can have up to four ranges, while the Series 2 and Series 4 testers shown in *Figure 17 and 18* respectively have logarithmic scales and up to two ranges only. In general appearance these instruments resemble the equivalent series of Megger Insulation Testers. *Publication No. 217*.

MEGGER EARTHOMETER TESTERS

These instruments measure the resistance of the complete earthing circuit which includes the resistance of the electrodes at both the sub-station and the consumer's premises. These instruments are similar to the Series 2 and Series 4 earth testers, but each contains a neon warning lamp and a special switch to protect the instrument as Earthometer tests are carried out with the circuit alive as shown in *Figure 15*.

These instruments may also be used as earth testers. *Publication Nos. 233 and 051/25*.

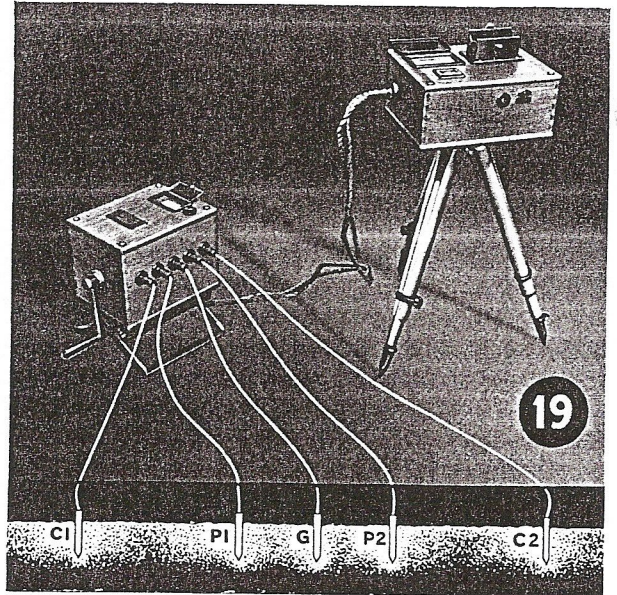


GEOPHYSICAL TESTS

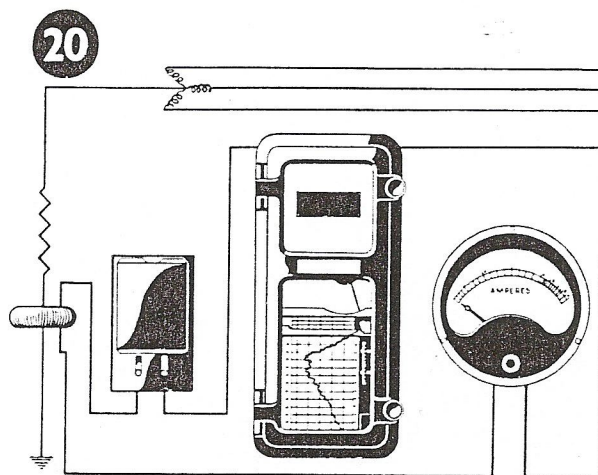
The resistivity method of prospecting has been found extremely useful for elucidating geological conditions. This method, which reduces very considerably the cost of a survey, is used extensively in prospecting for mineral deposits, in the search for shallow water supplies, and in the determination of depth to bed rock for dam foundations and the like.

These tests can be carried out very simply by the Geophysical Megger Earth Tester shown in *Figure 19*, and within its limitation by the Low Resistance Megger Earth Tester which is similar in appearance to the Series 1 Earth Tester, but has a lower range. Both instruments have hand driven generators to provide the testing current, and they give directly, without calculation, the value R in the resistivity $\rho = 2\pi aR$.

The Geophysical Megger Earth Tester has ranges of 0-0.3, 0-1, 0-3, 0-10 and 0-30 ohms, while those of the Low Resistance Megger Earth Tester are 0-1, 0-10, 0-100 and 0-1,000 ohms. *Publication No. 250.*



A.C. LEAKAGE INDICATOR



● It is normal practice to connect the neutral point of an A.C. system to earth, and a leakage ammeter is often included in this circuit. This instrument, which may be of the indicating or of the chart recording type, is, however, liable to damage by the passage of excessive earth current.

The Evershed Self-protecting A.C. Leakage Indicator and Recorder although calibrated only to 10 amperes, are not liable to damage from an excessive earth current

of several thousand amperes, and they require no protective relays. A diagram of connections is shown in *Figure 20* from which it will be seen that in addition to the indicator and recorder, the equipment includes a ring transformer with a mumetal core and a special reactor which makes the indications independent of wave form and frequency. This is necessary in view of the fact that when a disturbance occurs the fault current through the earthed neutral contains harmonics, the third predominating. *Publication No. 244.*

MEGGER CAPACITY METER

● The Megger Capacity Meter is direct reading instrument for the measurement of the electrostatic capacity of power condensers, underground cables, and condensers for radio and other purposes. A portable type having a self-contained hand generator, and a workshop type for operating from A.C. mains are available. Both types can be fitted with range switches. The self-contained portable instrument, which is similar in appearance to the Series 1 Megger Insulation Tester shown in *Figure 1*, is so constructed that the accuracy of the readings is not impaired even if the insulation of the apparatus under test is as low as 10,000 ohms. Lowest range available 0-3-003 microfarad. Highest range available 0-10 microfarads. *Publication No. 176.*

**WATER PURITY METERS
TACHOMETERS
RUDDER INDICATORS
PORTABLE AND SWITCHBOARD
INDICATORS**

**DIONIC WATER PURITY METER OR ELECTRIC
SALINOMETER**

This instrument measures continuously the purity of water flowing out of surface condensers, distilling plant, etc. *Figure 21* shows the usual generating station cubicle which includes a chart recorder and an alarm indicator, while *Figure 22* shows the marine pattern instrument. *Publication No. 216.* Instruments are also available for recording steam purity or boiler concentration, the former being supplied, if required, with the Evershed-Straub Degassifier, while those for boiler concentration may be provided with coolers.

PORTABLE DIONIC WATER TESTER *Figure 25*

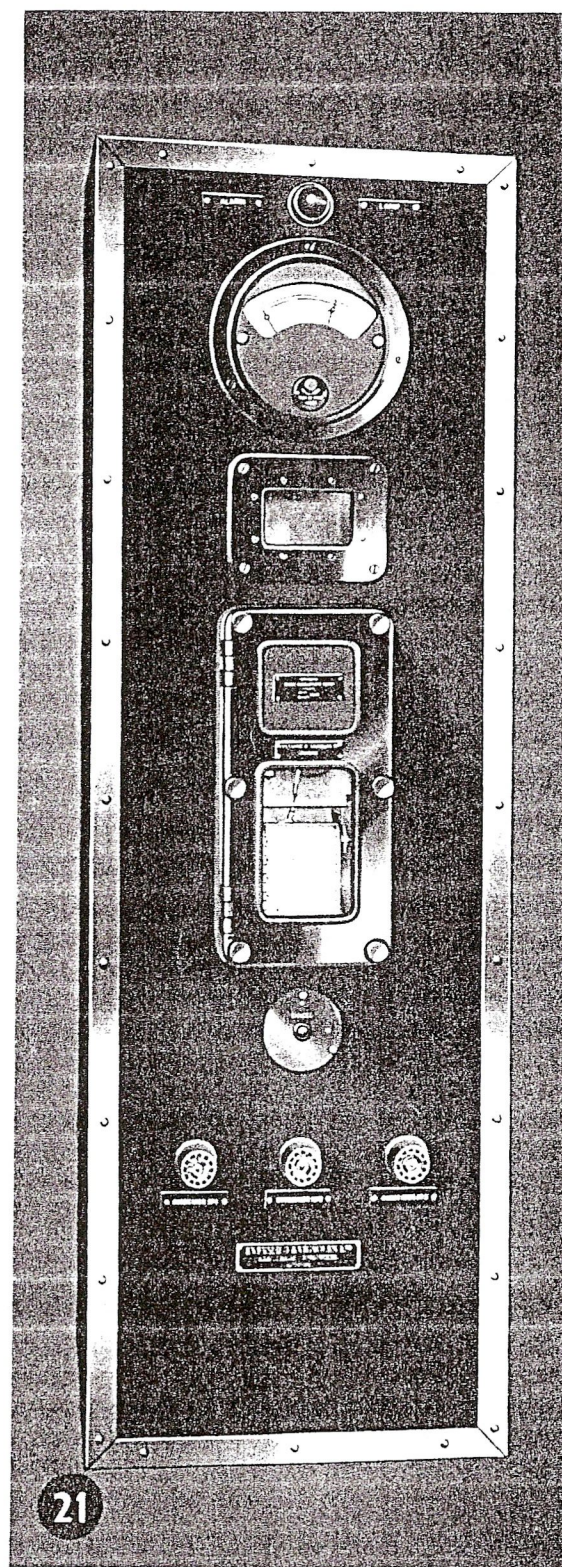
This is a direct reading instrument for measuring the electrical conductivity of a sample of water. It provides a rapid and accurate means of carrying out routine tests for determining the amount of dissolved inorganic impurity, and may be used by unskilled operators. *Publication No. 216.*

EVERSHED ELECTRICAL TACHOMETER

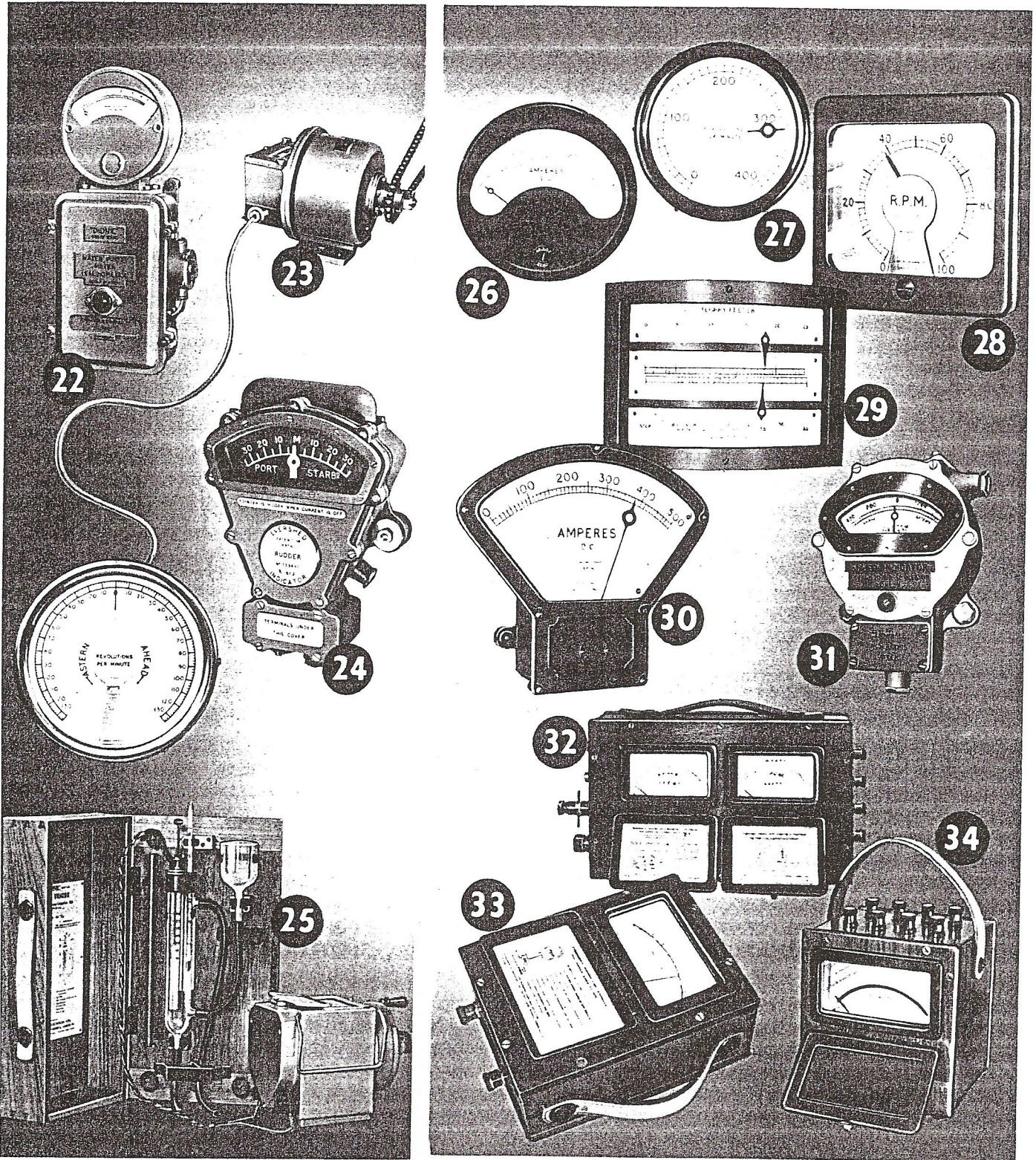
This consists of a transmitter, *Figure 23*, driven by the machinery, the speed of which is to be indicated, and connected by 2-core cable to one or more indicators or to a chart recorder. Its reliability has resulted in it being used extensively on board ship (*Figure 31*), in paper mills and in cement works (*Figure 29*). *Publication No. 224.*

EVERSHED RUDDER INDICATOR *Figure 24*

This apparatus has been used in the Royal Navy since 1893 and is also supplied to foreign navies and for use in ships of the British and foreign mercantile marine. This instrument, fitted on over 600 ships, operates directly from the ships mains. *Publication No. 231.*



A typical Dionic Water Purity Meter cubicle as supplied for generating stations. The equipment includes an indicator with adjustable alarm relay, a chart recorder and a mixing vessel for 3 or 4 sources of supply.



PORTABLE AND SWITCHBOARD INSTRUMENTS

Various patterns of portable and switchboard instruments are shown above. All have spring mounted jewels and are particularly robust. Each instrument is calibrated throughout its entire range and conforms to the appropriate British Standard Specification for first grade or substandard instruments.

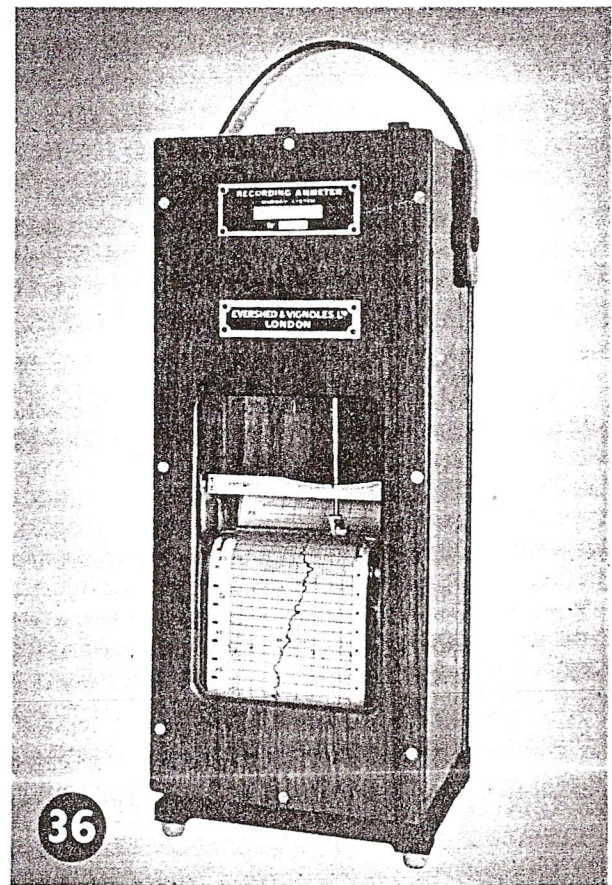
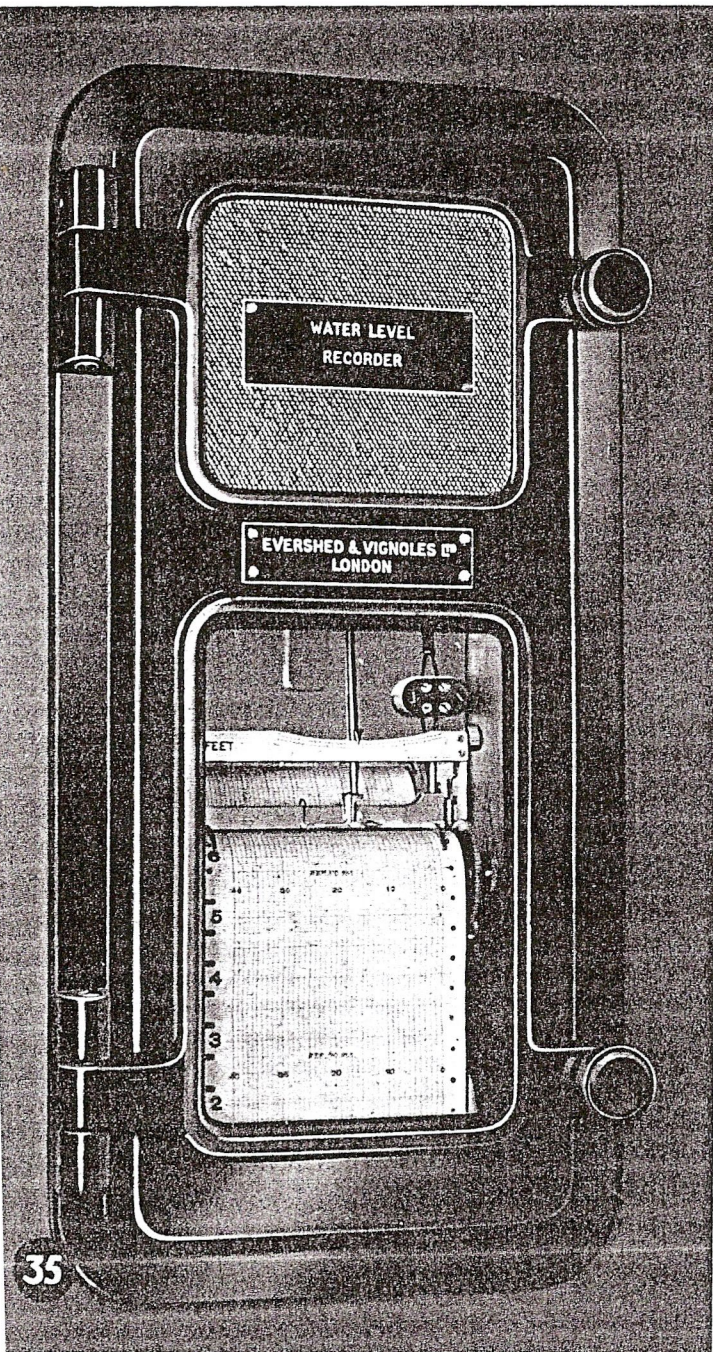
EVERSHED RECORDERS

● Careful planning and efficient management, upon which depends the success of any enterprise, are impossible without an accurate knowledge of all the relevant facts. Evershed recorders will be found invaluable in procuring this essential information. They will record transient phenomena however fleeting, they minimise manpower by dispensing with the need to take and plot periodic readings, and they enable records to be kept in unattended positions.

RECORDERS FOR ANY PURPOSE

Evershed recorders are available for many purposes, and to record such quantities as amperes, volts, watts, frequency, power factor etc. Often the electrical quantity measured represents some mechanical quantity, e.g. speed or water level, while for some purposes a mechanical movement may be fitted in the instrument.

Time interval or operation recorders are also available, these instruments automatically plotting on a time basis the stopping and starting of machines, the opening or closing of switches or any movement of which it is desired to have a true record.



MULTIPLE RECORDERS

Instruments can be supplied with one, two or three movements mounted in one case. Different combinations of movement can be provided, for instance, a triplex instrument may record simultaneously on one chart 12" wide the voltage of a three phase supply (Figure 38) or other quantities such as kilowatts, kilovolts and frequency. Operation recorders may have 20 pens recording simultaneously, or merely one pen on a drum chart.

FIXED OR PORTABLE INSTRUMENTS

Instruments for continuous service can be supplied for flush mounting on a switchboard (Figures 35 and 37), or for fixing on walls. It is, however, often convenient to have recorders which can be used for checking the operation of certain plant during a short period and then removed to obtain similar records elsewhere. For this purpose Evershed portable recorders (Figure 36 and 38) in hard wood cases are eminently suitable.

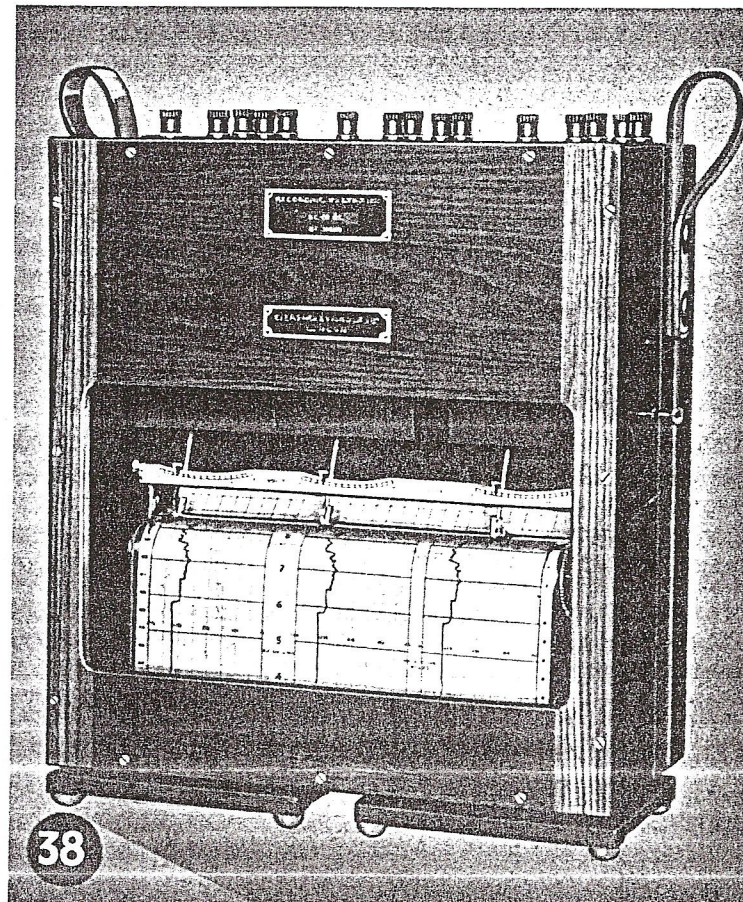
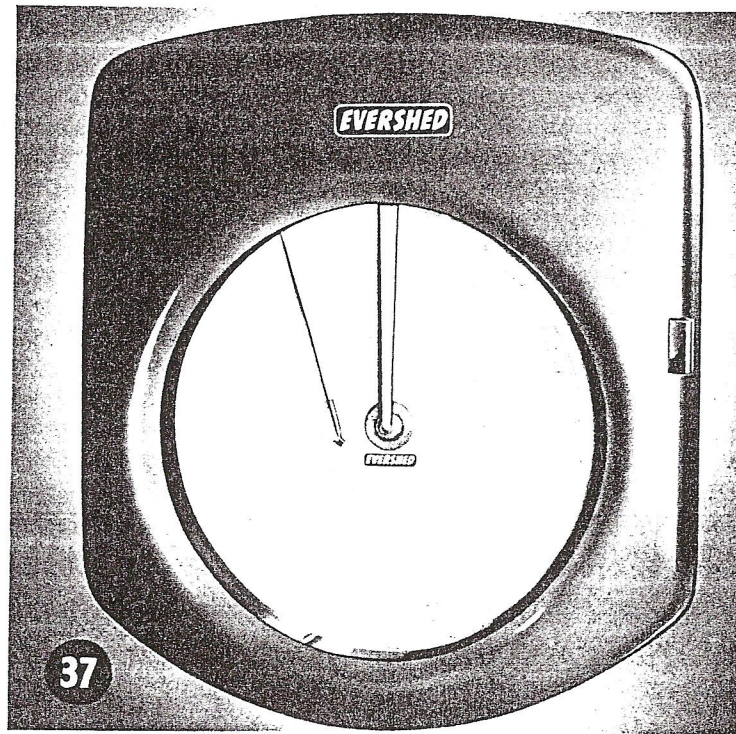
CHARTS

The usual pattern of recorder is of the roll or continuous chart type. Instruments of this type are shown in Figures 35, 36 and 38. These charts are supplied in 65 ft. lengths, sufficient for one month's use at a speed of 1" per hour. They have straight time lines, a valuable feature which facilitates the comparison of two or three quantities recorded on one or more charts. Recorders with daily disc charts (Figure 37) are also available for those who prefer a fresh chart every day.

CHART SPEED AND TYPES OF CLOCK

Recorders of the roll chart type are normally supplied with either spring driven or electrically driven clocks. The spring driven clocks are of two types, the low speed clock with escapement control, and the high speed clock with fly governor control. The electrical clocks are driven by small synchronous motors of the self-starting type. A special self-winding clock can also be supplied. This has a spring drive and escapement control but is automatically re-wound at regular intervals by means of a small motor. The arrangement is such that there is always a reserve of 24 hours on the spring as a precaution against supply failure. The clock is suitable for an alternating current supply and for chart speeds up to 12 inches per hour only.

Recorders of the roll chart type can also have a wide range of chart speeds. The range is determined partly by the type of clock, but for each type of clock a number of speeds can be obtained merely by changing external gear wheels. Speeds from $\frac{1}{3}$ " per hour to 12" per minute can be obtained on standard pattern recorders. *Publication No. 222.*



FLOWMETERS

The new Evershed "Rollflow" Meter is a transmitting type of flowmeter for indicating or recording liquid or gas flow at a distance. *Figure 39* shows a liquid flowmeter which incorporates a stainless steel glandless manometer so that corrosion, leakage and spindle friction are eliminated. *Publication No. P.L.5.*

PROCESS CONTROLLERS

These instruments, which are electronically operated, provide proportional, integral and derivative forms of control. In *Figure 40* can be seen a 3-term controller in flameproof case. The instruments may be used to control pneumatically operated valves fitted with the Evershed Valve Positioners (*Figure 43*), the electro-pneumatic system of control employed eliminating signal lag and removing limitations on transmission distances. *Publications Nos. P.L.7 and 8.*

TANK GAUGES

Figure 42 shows the transmitter of the Evershed Tank Contents Gauge, diaphragm type, which records at a distance the contents of tanks containing food stuffs, syrups and other viscous liquids. *Publication No. P.L.4.*

Figure 41 shows the transmitter of the Evershed Precise Tank Gauge. This operates on the null-point displacer system and has an accuracy of 1/10th inch irrespective of the range. The transmitter is waterproof and flameproof, and the indicators have double concentric dials marked in feet and inches. *Publication No. P.L.6.*

POSITION CONTROLLERS (*Figure 44*).

These are used for the control of engine throttles, large butterfly valves, tuning condensers etc. Each consists of a hand operated transmitter connected by three pilot wires to a slave unit which operates the mechanism under control. *Publication No. 220.*

REMOTE INDICATORS

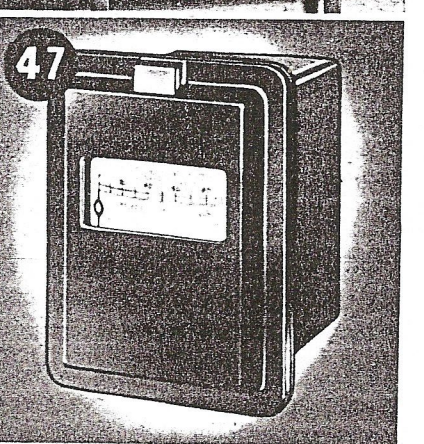
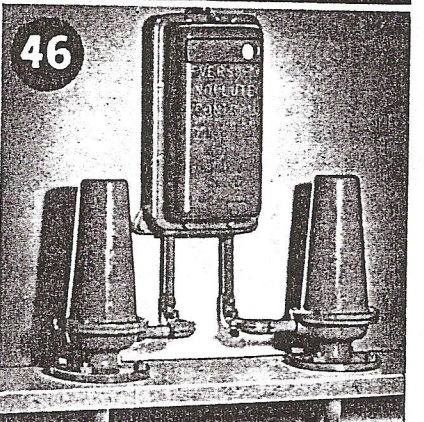
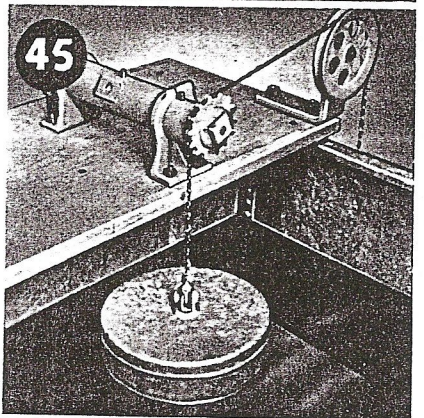
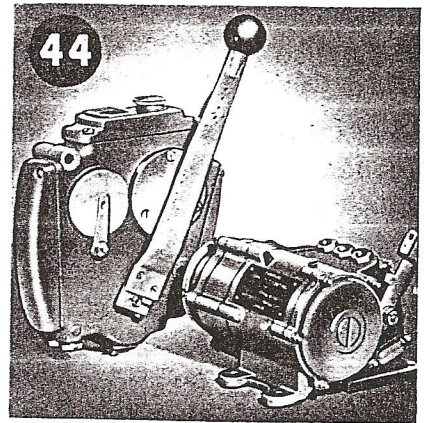
Evershed transmitters are available for repeating at a distance the following measurements:—electrical quantities such as amperes, volts, watts,—steam, water and gas pressure and flow—water level in reservoirs—gas-holder stock—degree of opening of valves, sluice gates etc. Other work undertaken includes the summation of two or more measured quantities such as electrical power, gas or water flow, the information being transmitted to a central point. *Publication No. 221.*

Figure 45 shows a simple transmitter for repeating the level of water in tanks, while *Figure 47* shows a gas pressure transmitter working on the Evershed Electronic Repeater System. *Publication No. 225.*

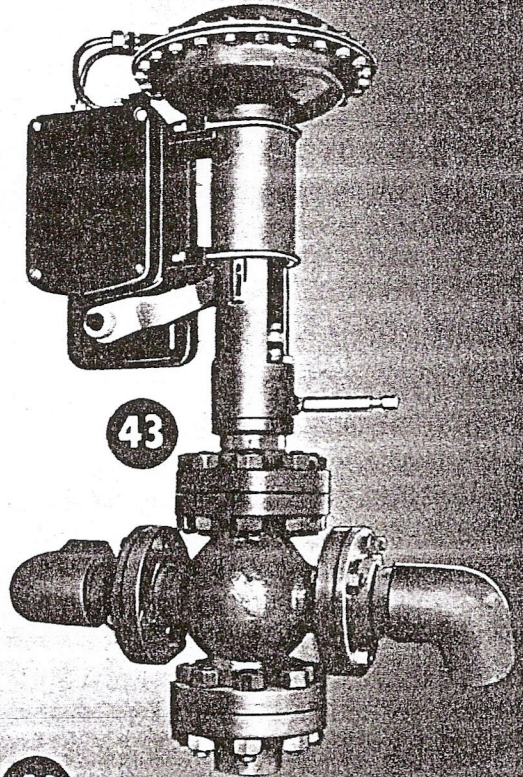
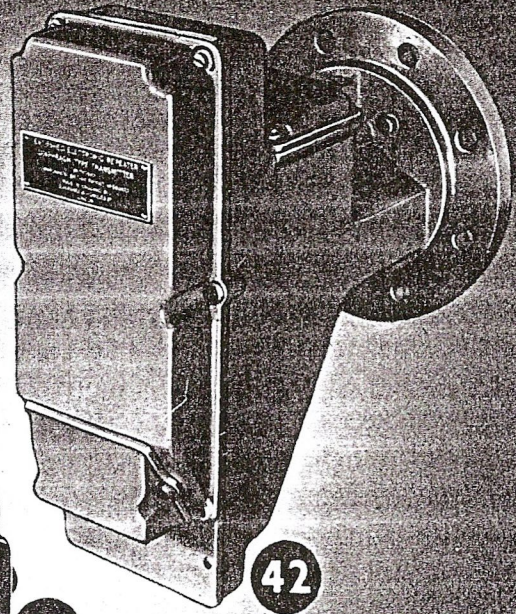
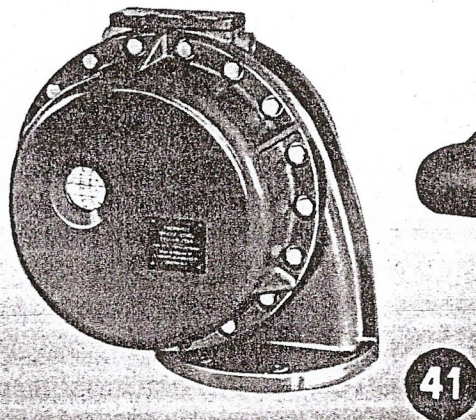
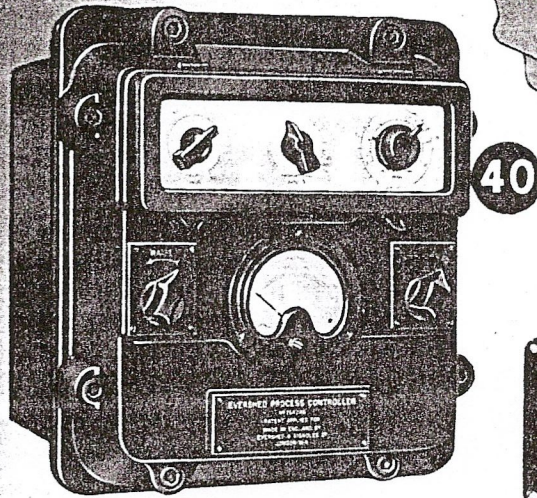
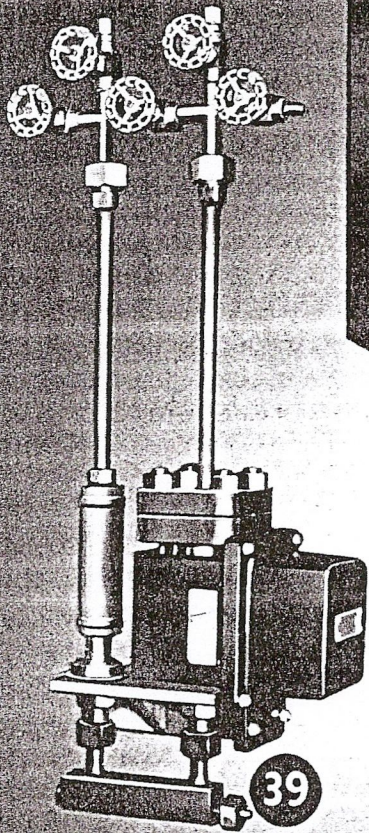
This system is fully automatic and unaffected by variation in supply voltage or line resistance, and the number of receivers can be varied at any time without the necessity of re-calibration.

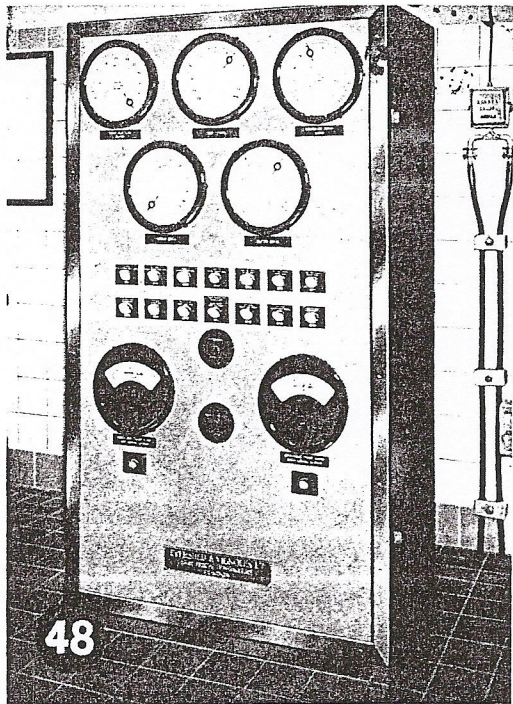
NOFLOTE PUMP CONTROL

This apparatus provides high and low level alarms and automatically controls drainage and other pumps without the use of float gear. An equipment (*Figure 46*) consists of two adjustable electrodes, and a relay connected to the motor starter. *Publication No. 234.*

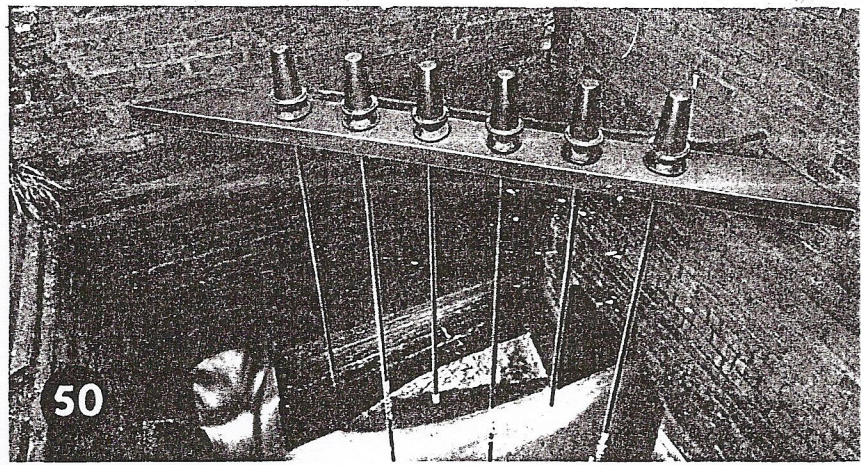


**FLOWMETERS, CONTROLLERS,
TANK GAUGES, POSITIONERS,
TRANSMISSION SYSTEMS**

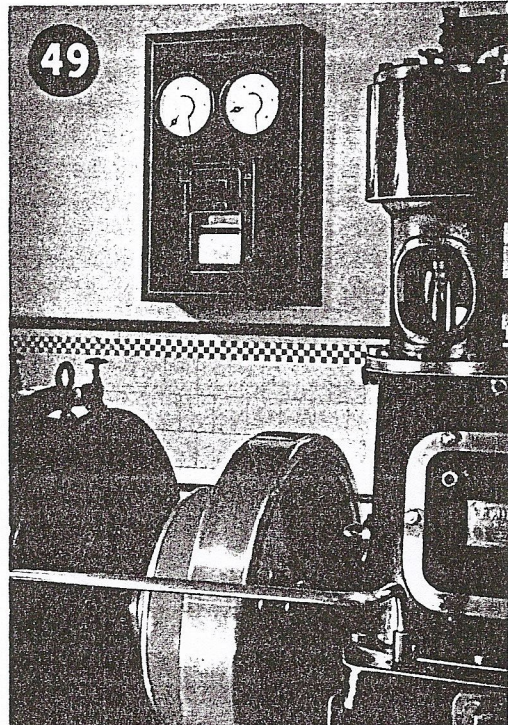




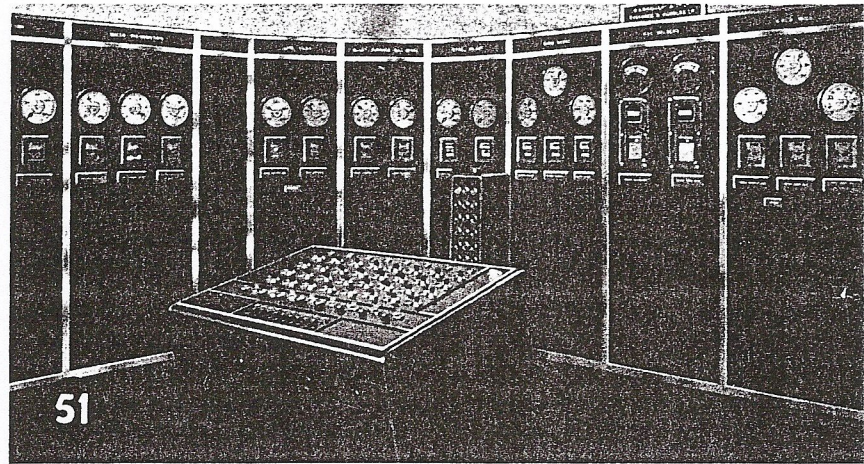
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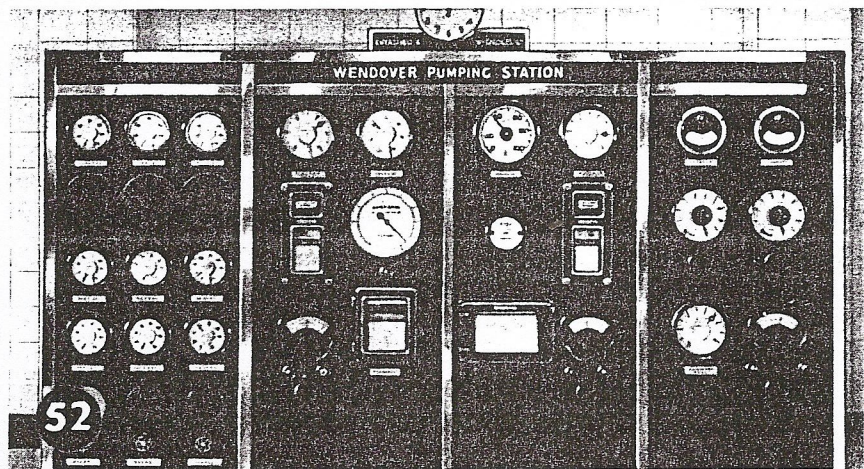
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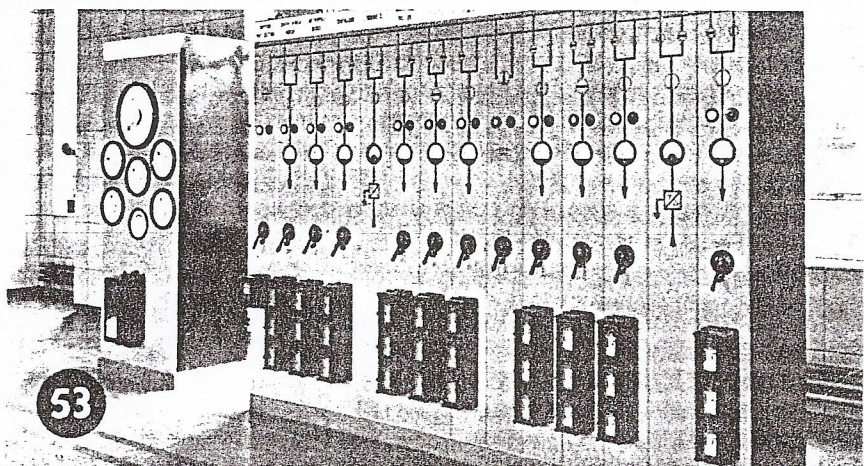


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- 48. Instrument panel at Captain Cook Graving Dock, Sydney, with water level indicators and high and low level alarms.
- 49. Two indicators and a duplex recorder showing gas pressures at remote points in a medium pressure gas distribution system.
- 50. Electrodes in the suction well at a sewage disposal works where pumps are operated by "Noflote" Control.
- 51. Metering panel in the gas control room at the Ebbw Vale Steel Works of Richard Thomas & Baldwins Ltd.
- 52. This panel includes reservoir level indicators and a controller for remotely operating motor driven valves.
- 53. The control cubicle on the left shows the load on 5 sub-stations, the larger indicator giving the total summated load.



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