Westinghouse
High Rate Telemeter System

INSTRUCTIONS

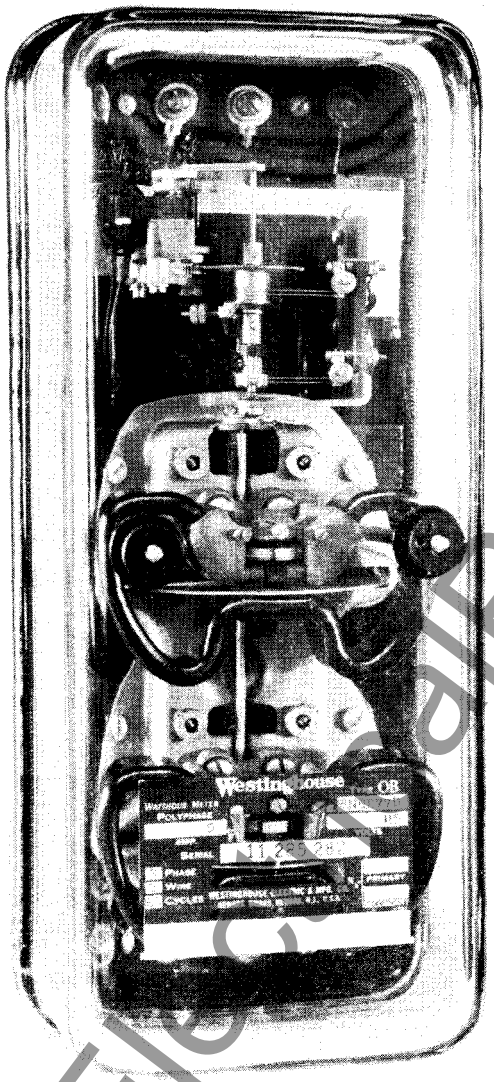

Fig. 1 - Base Rate Type Transmitter

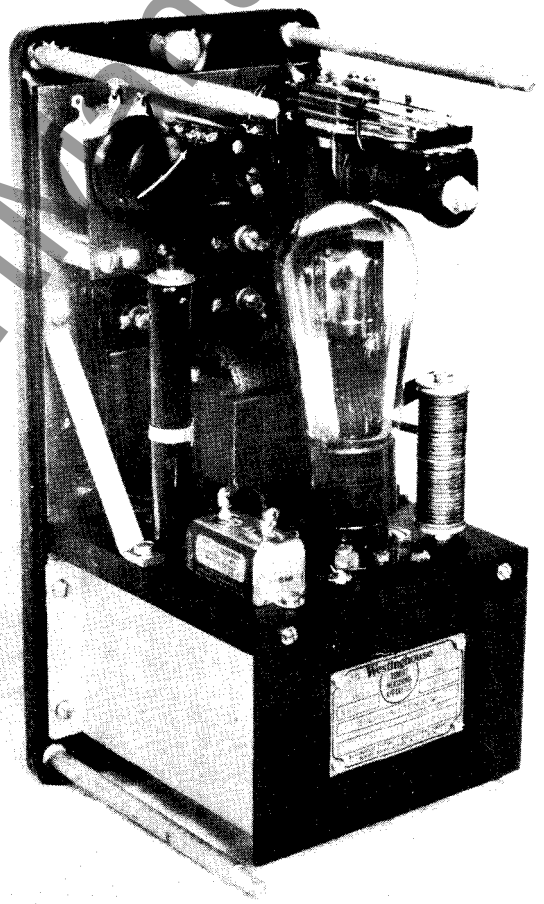

Fig. 2 - Impulse Receiver

APPLICATION

This system is used for remotely indicating or recording electrical or mechanical quantity values, such as watts, volts, amperes, revolutions per minute, etc., as distinguished from the transmitting of summation of integrated value, such as watt-hours, revolutions, etc.

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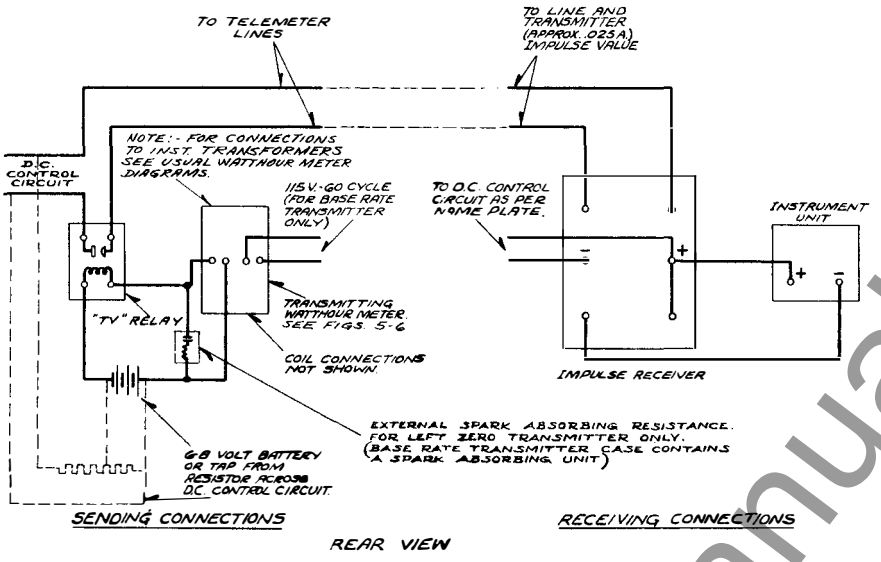

Fig. 3 - External Diagram of Connections

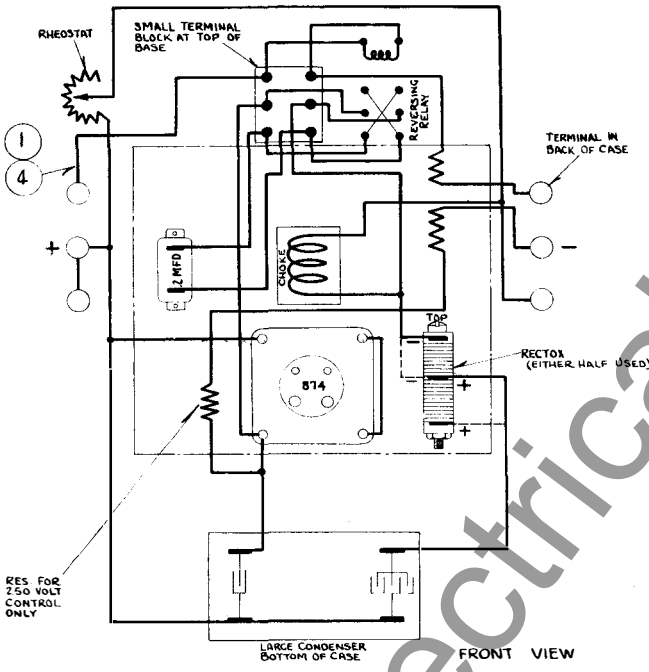

Fig. 4 - Internal Connections
Impulse Receiving Unit
for Milliampere Output.

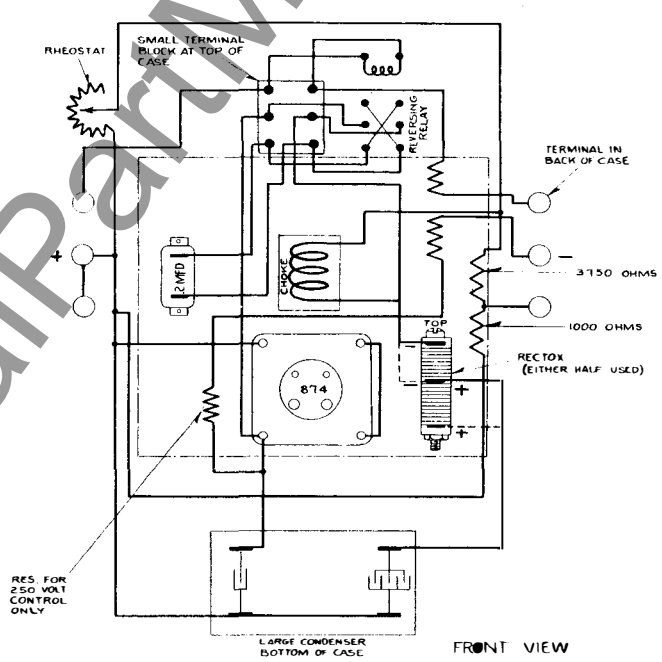

Fig. 5 - Internal Connections,
Impulse Receiving Unit
for Millivolt Output.

DESCRIPTION

The Transmitter

The transmitter, shown in Fig. #1, consists of a two element induction watthour meter, carrying on the upper end of the shaft a commutator similar to those on direct current watthour meters. Alternate bars are insulated with the intermediate bars connected to a slip ring. In the base rate type, as used for cases where power flow may be duo-directional, s synchronous motor drives a brush around the commutator, making and breaking in the circuit sending out the impulses.

When the meter is running, the circuit is made and broken at a speed corresponding to the algebraic sum of the speeds of the brush and meter. The friction compensation on the transmitter is set with the usual light load adjustment to take care of the drag of the rotating brush. The slip ring brush friction is supplied by the meter and is made slightly greater in diameter than the commutator to prevent the meter from drifting in the direction of the moving brush when not energized. All contacts are silver, resulting in satisfactory service in all cases. Where power flow is unidirectional with

the scale zero of the indicating instrument at the left, the transmitter does not include the base rate synchronous mechanism.

Sending Relay

A type TV auxiliary relay is used in connection with the transmitter to reduce the current and avoid sparking on the transmitting commutator. This is a highly sensitive telegraph type relay with a 500 ohm coil for 6 volt battery circuit. If the supply circuit is of higher voltage, a potentiometer tap-off resistor is used, as indicated in dotted lines on Fig. 3. For inspection and maintenance, see instructions under Type TT Relay.

The Receiver

The receiver uses the principle of releasing a constant quantity of electricity for each impulse. These charges are smoothed out into a steady meter reading by a new smoothing circuit. It is constructed as two units: one containing the glow tube constant voltage device, relay, and capacitors, and the other the indicating or recording instrument. Fig. #2 shows the physical arrangement, and Fig. #3 the schematic diagram.

The impulse operates the relay which transposes the leads to the .2 mfd. capacitor on a 90 volt D.C. circuit. Since the condenser is discharged and recharged in the opposite direction, the total charge represented by a change in relay position is 36 microcoulombs. The smoothing circuit consists of a choke coil in series with the meter and a condenser and copper-oxide rectifier in series, shunting the coil and meter. The impulse of current, from the operation of reversing the condenser, passes through the rectifier in the forward direction and is stored in the large capacitor from which it flows into the meter through the rectifier in the backward direction. The action of the rectifier in the charging of the capacitor is to stretch out the charging time over what can be obtained with an ohmic resistor.

The choke coil serves mainly to reduce the ballistic kick given the meter pointer when an impulse is received. The receiving meter is designed with a very strong field which permits a high counter e.m.f. to be developed with small motion, and further serves to reduce pointer pulsations. The glow tube UX-874 is used to keep the voltage constant for charging the capacitor.

INSTALLATION

The transmitter being the ordinary form of contact making watthour meter needs no special directions for installation further than following the wiring diagram for the transmission circuit, as given on this instruction leaflet, Figure 3. If a specialized system diagram has been prepared to suit an individual installation, a copy of such diagram drawing will be attached to this instruction leaflet.

The receiving apparatus consists of the indicating or recording instrument and a separate voltage regulator-filter unit. This unit is preferably to be mounted on the front of the panel. In the case of the type HX indicator, a good arrangement is to mount it directly below the indicator. However, if preferred, the regulator unit may be mounted on the back of a panel or at any other convenient place. The connection should be completed as per diagram.

Control Circuits

At the sending end, the sending relay, interposed between the transmitting wattmeter contacts and the telemeter line, is actuated by 6-8 volts from a D.C. control circuit. This relay in turn applies the proper voltage required for the telemeter line.

At the receiving end, the control circuit may be taken either from the station battery or from a Rectox operated from the A.C. lighting mains. In the case of receivers rated at 125 volts, the voltage applied must not be less than 120, in order to actuate the 874 tube properly.

Maintenance Required

The high-rate impulse apparatus can be supplied to any transmission channel through which telegraph indications can be sent. A channel may consist of both leased and privately owned lines and pass through several telephone centrals. In some cases the only channel available may be a pair of exposed telephone lines strung under high-tension power lines for long distances. The pair is used for telephone communication, leaving only the simplex circuit available for the measuring impulses. In such lines as this, transfer equipment consisting of insulating transformers and drainage coils must be used as it is not uncommon to find induced potentials of several thousand volts between the lines and ground. At each transfer point, auxiliary relays and batteries must be provided for repeating the impulses. Such channels as these may be subject to frequent interruption and require considerable maintenance, but, nevertheless, a reasonable amount of interruption and maintenance may be found permissible when the alternative of the cost of a high-grade channel is taken into consideration.

The type 874 voltage regulating tube has a characteristic variation in output voltage depending upon the time it remains in circuit. The change in voltage with time may amount to 8 per cent per year.

To compensate for this effect a convenient internal rheostat is provided in the filter box-voltage regulator unit.

Replacement tubes should be selected to ignite at voltages as low as 120. With this limitation they may be bought direct from radio tube suppliers.

On the whole, the maintenance required for this system is considerably less than for other high rate impulse systems.

The commutator and brushes of the transmitting unit require the same care and maintenance as in direct current watthour meter practice. For complete information on recommended practics, see "Handbook for Electric Metermen", N.E.L.A., third edition, pages 185 to 187.

Calibration Check

The transmitter is calibrated to produce impulses directly proportional to the value of the kilowatts flowing. In the case of the base rate sender, 0 watt corresponds to 120 impulses per minute, and the rate of impulses is increased or decreased from this base rate in proportion to the value and direction of power flow through the circuit or tie line. The calibration data, as derived from the transformer ratios, speed of disk, and gear ratio, are given on the name plate.

The rate of impulses per quantity measured as sent out by the transmitter being known, calibration check of the receiver will consist of counting the impulses for a time interval, such as a minute, during a sufficiently steady load condition and comparing the reading of the indicator. If a steady load condition is not available, disconnect the regulator unit from the telemeter line and apply impulses from a contact driven by a small motor, the speed of which may be controlled as desired. Calibration is altered or, if necessary, corrected by varying the slide wire resistor located in the upper left corner of the regulator unit. This adjustment takes care of any variations which may occur including ageing of the type UX-874 regulator tube, in condensers, or indicators, etc.

On a new installation it is recommended that the calibration be checked twice a month to start, increasing period gradually to once every six months as results seem to justify.

When the records show a serious change in calibration after a long time, it may be necessary to retest and, possibly, replace the UX-874 tube. Laboratory tests indicate its useful life to be at least one year's continuous service.

Type TT Relay

The type TT reversing relay in the regulator unit is designed to operate through a maximum line

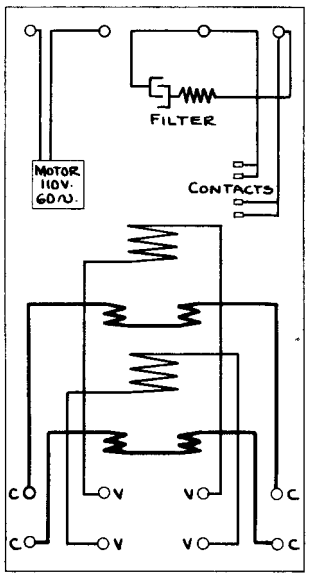

Fig. 6 - Type OB Base Rate Sender Wiring Diagram

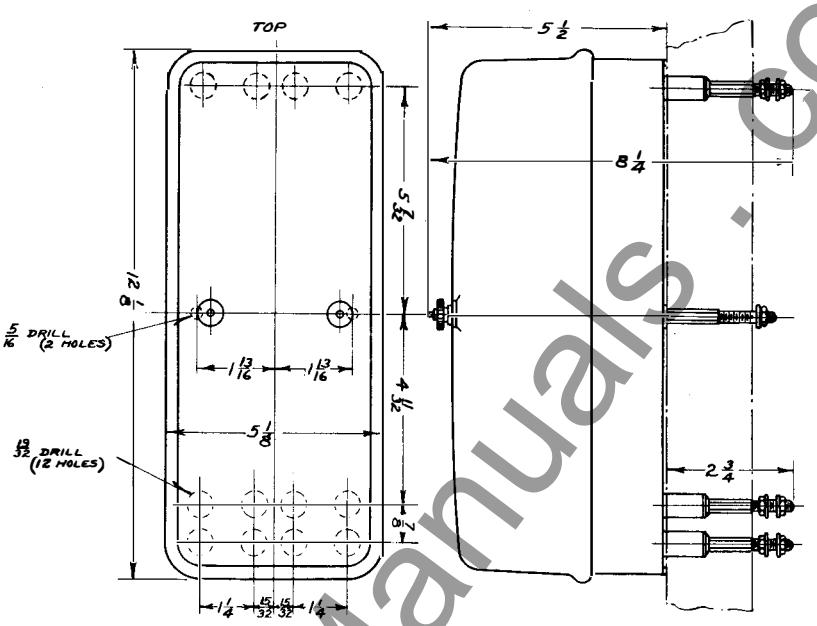

Fig. 8 - Type OB Base Rate Sender Outline and Drilling Plan

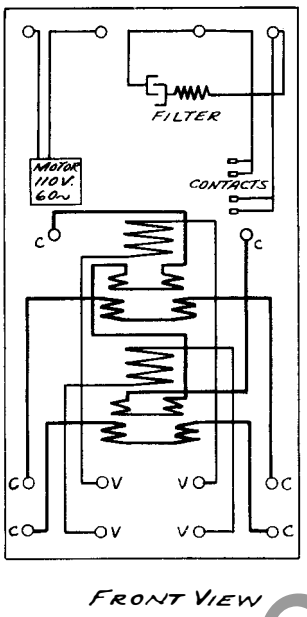

Fig. 7 - Type OB Base Rate Sender-3 Current Coil-Wiring Diagram

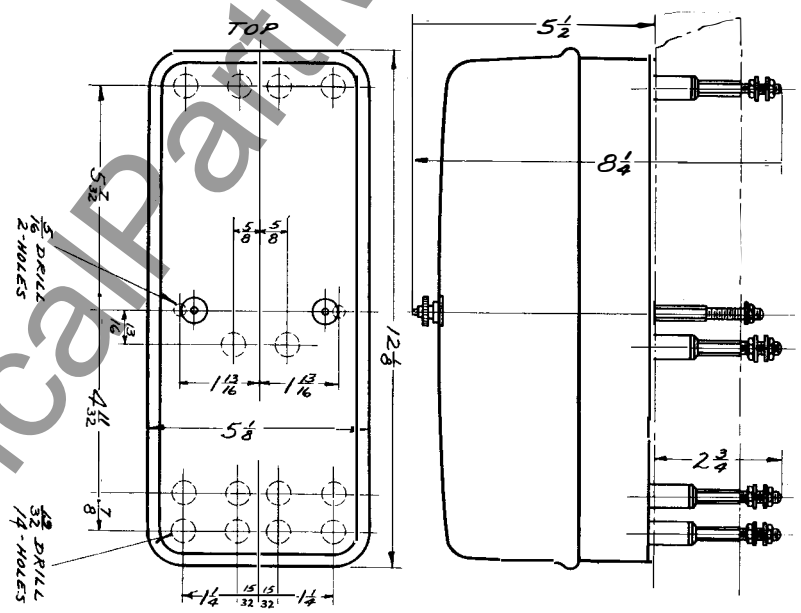

Fig. 9 - Type OB Base Rate Sender-3 Current Coil-Outline and Drilling Plan

loop resistance of 5,000 ohms from a 125 volt control circuit, or through a line of higher resistance in proportion to the control voltage.

This relay normally vibrates at a rate which may amount to millions of operations per year. It may, therefore, require readjustment or repairs after a long period of operation, depending upon the load. This need is evidenced by sticking or failure to respond to the incoming impulses.

The presence of the impulses may be determined by placing a small iron object, such as a piece of iron, wire, or small screwdriver, near the armature air gap so as to "feel" the magnetic impulses. If impulses are not being received, the difficulty may be at the transmitter or along the line.

If impulses are being received but the relay does not respond, remove it complete with its insulating block from the meter base, to which it is secured by two screws, and disconnect the leads from the terminal block. Carefully clean all surfaces with benzine to eliminate dust, soot, or accumulation of other dirt. Clean all contacts and resurface the contact points with finest "Crocus Cloth". The air gaps and hinge surfaces of the relay armature should also be cleaned with benzine to eliminate any oily accumulation or gumminess.

In case the relay has been damaged in such a way as to prevent local repairs, a complete new replacement relay should be inserted.

It is recommended that the type TT relay be inspected and cleaned as above described at periodic intervals as a routine matter of operation.

Telemeter Lines

For complete data on arrangement, maintenance and protection of communication channels, see report of the A.I.E.E. Subcommittee on Telemetering.

Westinghouse Electric & Manufacturing Company
Meter Division, Newark, New Jersey
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