Westinghouse

Type OA Demand Attachment

For Polyphase Meters

INSTRUCTION BOOK

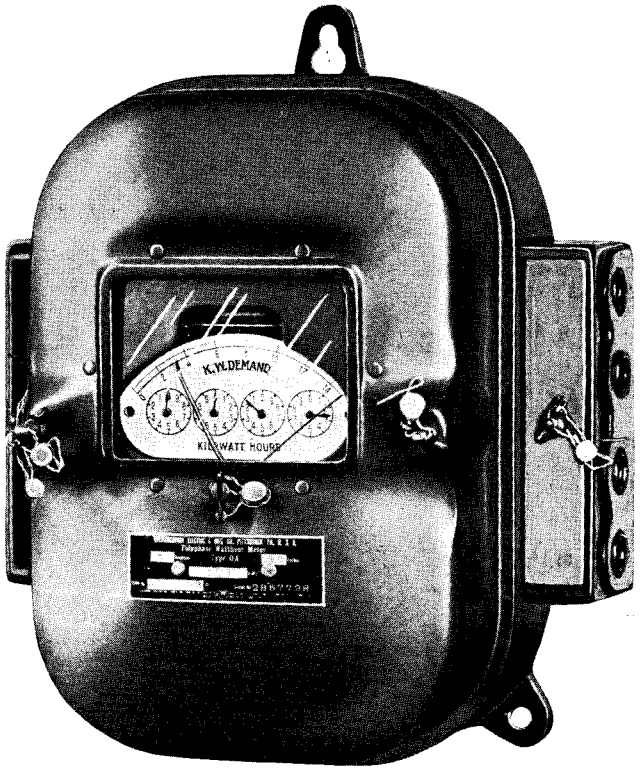

Fig. 1—Type OA Polyphase Meter with Demand Attachment and Special Cover

Westinghouse Electric & Manufacturing Company
Newark Works
Newark, N. J.
I. B. 5247-A

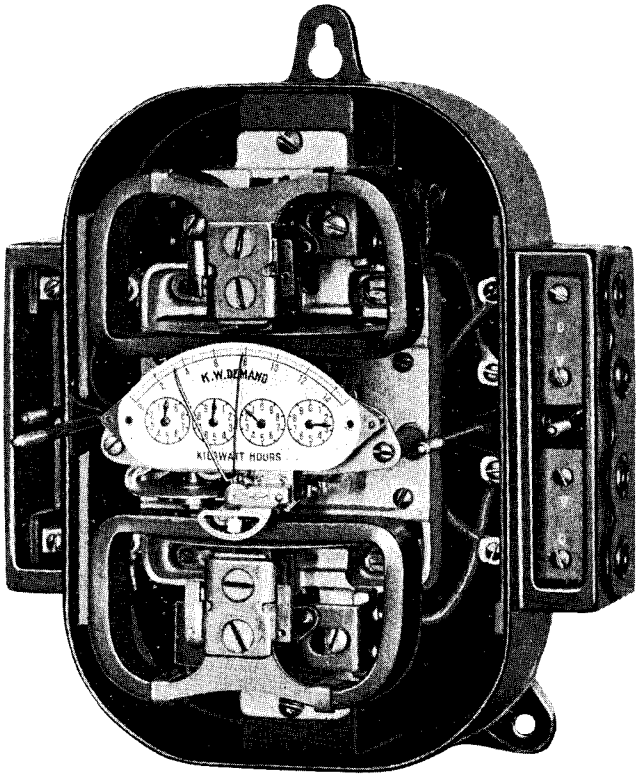

Fig. 2—Type OA Polyphase Meter with Demand Attachment

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DESCRIPTION

The Westinghouse Demand Attachment is a watthour meter register which combines the regular watthour meter register with an indicating demand scale and pointer. By replacing the register and cover of a standard polyphase OA watthour meter with the attachment and a special cover, the OA watthour meter is converted into an Indicating Block Interval Demand Meter.

The attachment is provided with two pointers, one of which is held in its position of maximum scale deflection by friction, while the other returns to zero at the end of each demand interval, thus providing means to readily check the length of the demand interval. The maximum demand pointer is finished in black, and the other pointer which advances the maximum demand pointer is finished in white.

The attachment is designed to give an integrated block interval demand indication with a negligible time elapse between the measurement of adjacent blocks. This is accomplished by disengaging the white pointer from the watthour meter gear train for a short interval of approximately two seconds, or very little more than the time taken for the pointer to return to zero from full scale deflection. The white pointer is returned to zero by gravity after the gears driving the pointer have been disengaged from the watthour meter drive by a small disc type induction motor.

The time interval of the attachment is determined by a small induction motor which is designed to give several times the torque necessary to release the demand pointer at the end of the time interval, thus assuring positive action of the attachment. The induction motor has practically a constant speed over a range of voltage varying from—10% to+10% of rated voltage, which permits calibrating the attachment in the laboratory and installing it on a line in which the voltage varies several per cent from the calibrated voltage, and, what is perhaps more important, allows the motor to operate over a large range of voltage variation without introducing an appreciable error into the length of the time interval of the demand meter.

The scale of the demand attachment is comparatively long, considering the available space, approximately 3¼ in., and the full scale deflection of the demand point is approximately 100 degrees. Many details, such as a small pointer for accurately determining the speed of the motor, and hence the length of the demand interval, are provided for the convenience of the meterman.

WATTHOUR METER TESTS AND ADJUSTMENTS

The watthour meter tests and adjustments are the same as for the standard OA watthour meter. Refer to Westinghouse "Hand Book of Watthour Meters," book number 5150-B.

METER AND MOTOR CONNECTIONS

The watthour meter connections are the same as the standard OA meter connections. Refer to the instruction labels on the meter or to "Hand Book of Westinghouse Watthour Meters," book number 5150-B.

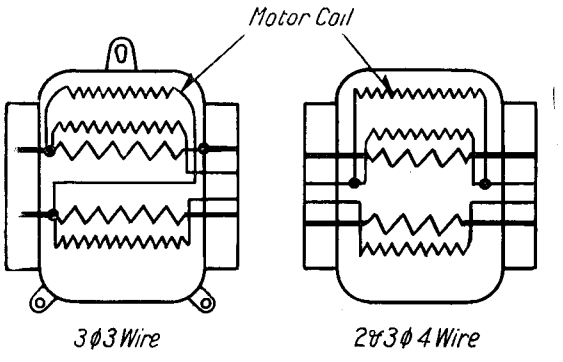


Fig. 3 —Wiring Diagram for Meter and Motor

The motor may be connected to either phase of a two-phase circuit or any one phase of a three-phase circuit whose voltage is approximately the same as the motor coil rating, i.e., a 100-volt coil of a given frequency may be used on a 110, 115, or 120-volt circuit.

The motor is usually connected as per Fig. 3.

KW. CAPACITIES AND REGISTER RATIO

The OA Demand Attachment is supplied in the same Kw. capacities as the standard OA meters. The register ratio of the attachment is the same as the standard OA register. Refer to page 35 of "Hand Book of Westinghouse Watthour Meters," book number 5150-B.

DIALS

The demand dial of the attachment is direct reading in Kw. A register constant which is a multiple of ten is supplied for the watthour dial reading on all capacities above 16 Kw.

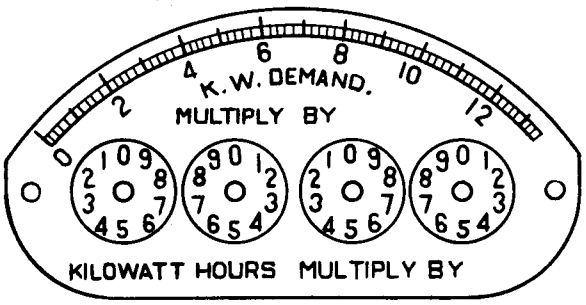


Fig. 4—Dial

A special dial (Fig. 4) is supplied for use with transformer type OA meters. Space is provided on this dial for placing a register constant and a demand dial constant depending upon the ratios of the instrument transformers.

OPERATION OF THE WESTINGHOUSE TYPE OA DEMAND ATTACHMENT

Fig. 5 illustrates by a schematic diagram the operation of the OA Demand Attachment The gearing of the attachment consists essentially of three separate sets: the watthour pointer gearing, the demand pointer gearing, and the motor gearing. The necessary compactness of the demand attachment makes it appear much more complicated than it really is, and a study of the mechanism will show that the attachment is simple in construction and operation, and has few adjustments. Although it is designed to be free of complex and troublesome mechanical parts, necessary adjustments have not been sacrificed or simplified to the extent that they are insecure or difficult to make.

Referring to the Figure it will be seen that the shaft No. 13 is connected by gear T and pinion S to the watthour meter disc shaft. Two worms are mounted on the No. 13 shaft, the upper worm U drives the worm wheel V, and the gears and pinions X, Y, Z, a, and thus rotates the first pointer shaft of the watthour dial. This set of gearing is very similar to the gearing in the register of the standard OA meter. The lower worm (f) advances the demand pointer by driving the worm wheel (d) and the gears and pinions e, Q, O and the gear sector (n). The similarity of this set of gearing to the gearing that advances the pen in the RA Demand Meter will be noted. As in the RA Meter, the worm wheel (d) shaft of this set of gearing has one bearing in a lever (g) which permits the worm wheel (d) to be demeshed from the worm (f), thus allowing the white pointer to be returned to zero by gravity. The maximum demand pointer C is advanced by the white pointer and held by friction in the position of maximum deflection of the white pointer.

The third set of gearing, the motor gearing, determines the length of the time interval of the attachment. The constant speed induction motor runs at 200 revolutions per minute on all attachments. This speed of 200 r.p.m. of the motor disc shaft is reduced by suitable gearing to give one revolution of the worm wheel I in the time interval of the attachment, 15 minute or 30 minute, etc. On the same shaft as the worm wheel I, but free to rotate about the shaft, are the worm wheel sector E and the cam L which are rigidly mounted on the same hub. A pin on the worm wheel I slowly rotates the worm wheel sector E until it reaches the worm F on the motor disc shaft. Since the worm F is making 200 rpm., the worm wheel sector E is quickly moved through the worm F. As the worm wheel sector E passes through the worm F,the cam L strikes the link A which transmits the motion of the cam to lever (g), thus demeshing the worm wheel (d) from the worm (f), and allowing the white pointer to return to zero. The period for the worm wheel sector E to pass through the worm F is selected to allow ample

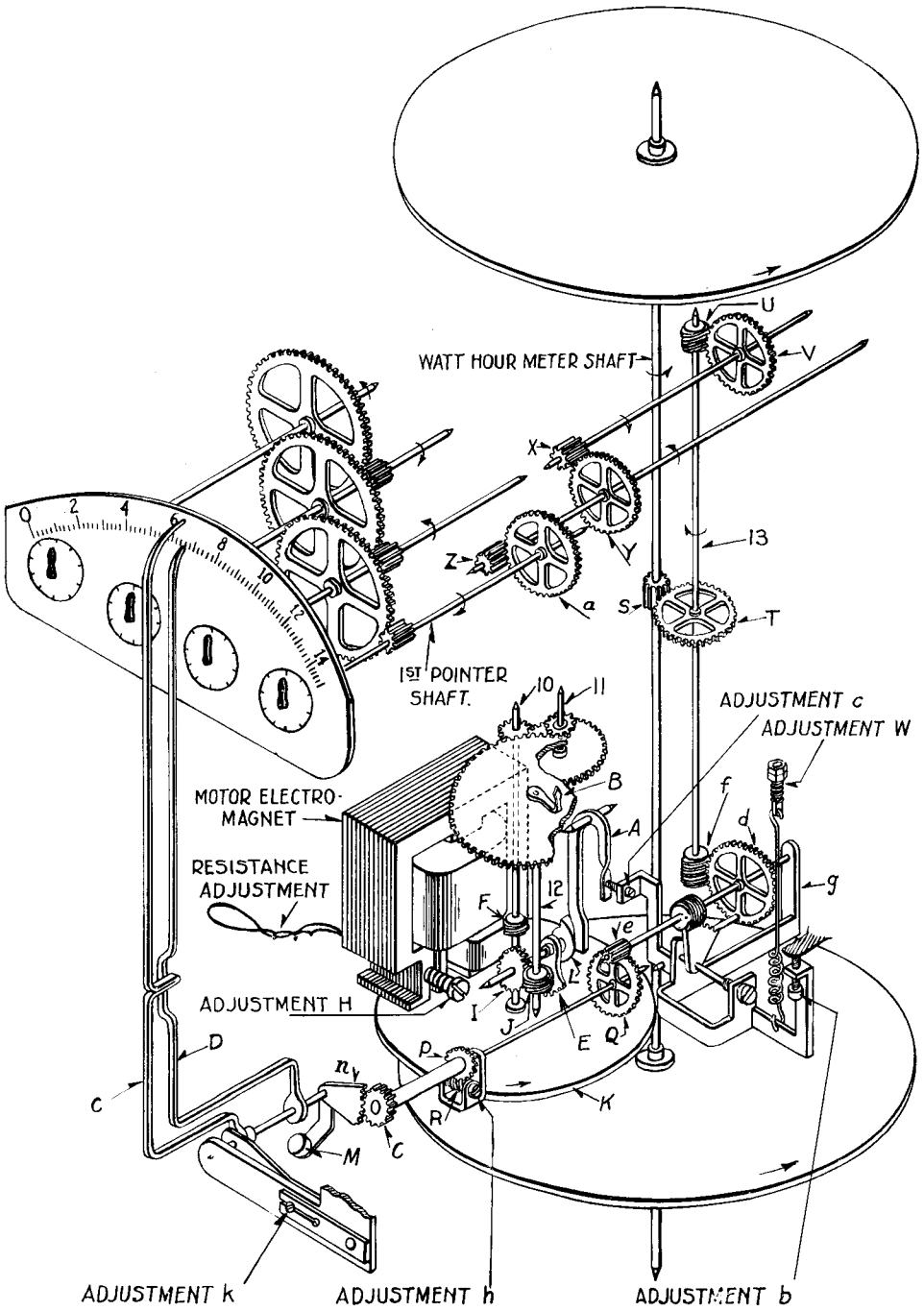


Fig. 5—Diagram of Type OA Demand Attachment

time for the white pointer to return to zero. The time of the demeshing operation is approximately 2 seconds, which is a negligible quantity when compared to the time interval of the demand measurement.

The time keeping motor has no load except for the small interval of time during which the cam L is demeshing the demand pointer gearing. This load is very small and the motor has many times the torque required to demesh the gearing. So little power is required for the demeshing operation that the inertia of the motor disc will demesh the gearing several seconds after motor is disconnected from line.

ADJUSTMENTS

The attachment has the following adjustments:

1. Time adjustment. The motor speed should be 200 rpm. for all intervals. As it is impossible to check this speed directly, a small white pointer is provided on the No. 12 shaft. THIS SHAFT MAKES 4 REVOLUTIONS PER MINUTE*, when the motor disc is revolving at proper speed of 200 rpm. Also a small black spot which may be used for timing is placed on one spoke of the gear wheel on No. 12 shaft, as many prefer this method for timing. The motor speed is adjusted by the motor adjustment screw H. Turning the screw *in* increases the motor speed. This adjustment gives a range of approximately 30% change in the motor speed. If sufficient adjustment can not be obtained with this adjustment, further adjustment is obtained by adjusting the resistance in the secondary of the motor circuit, very similar to the manner in which the power factor adjustment is made on the OA Watthour Meter. Increasing the resistance of the motor secondary circuit decreases the motor speed and decreasing the secondary resistance of the motor circuit increases the motor speed.

2. Zero adjustment. Turning worm R (adjustment h) in clockwise direction moves the white pointer up scale.

3. Adjustment (b) determines the depth of mesh of the worm wheel (d) with the worm (f). This should be adjusted so that the teeth on the worm wheel do not mesh the full depth of the thread on the worm and cause an excessive friction load on the No. 13 shaft.

4. Adjustment (c) is provided to insure proper connection between the link A and the lever (g). This adjustment should be made so that the worm wheel (d) will be moved out of mesh with the worm (f), a distance of approximately $\frac{1}{32}$ in. during the demeshing operation.

5. Adjustment (k) is provided on the front of the attachment near the bearings of the pointers for adjusting the spring tension, and hence the friction holding the maximum demand pointer. Moving the small screw *in* increases the friction holding the black pointer in position of maximum demand.

*Except for 60 minutes, which has speed of 2.4 Rpm.

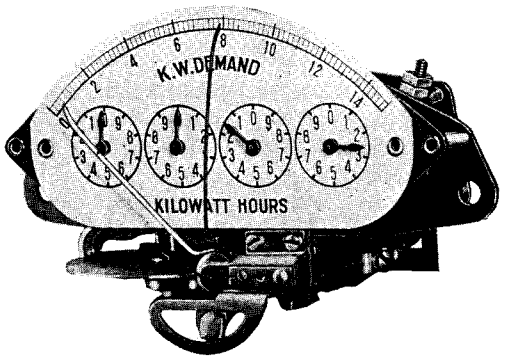
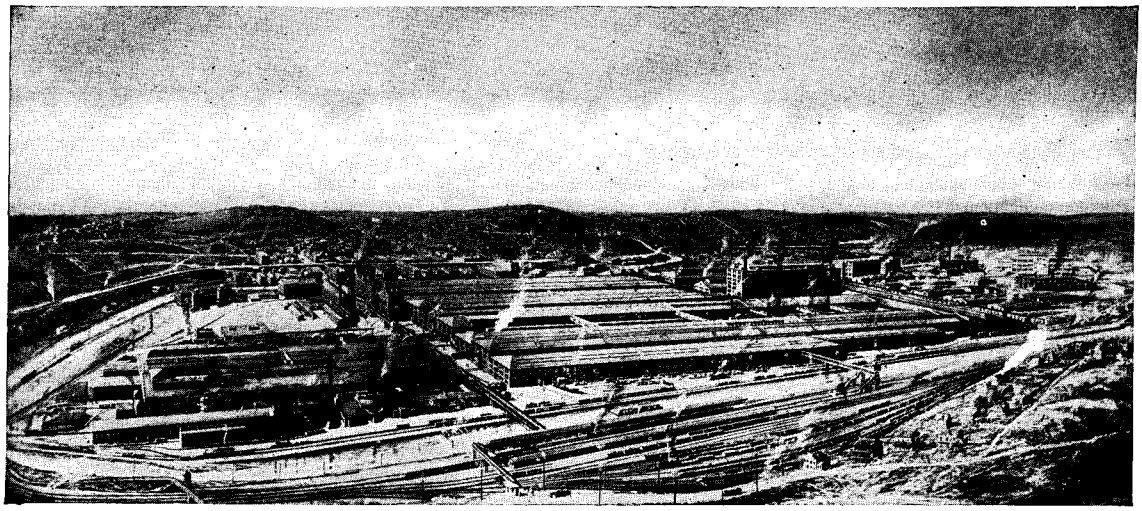


Fig. 6—Type OA Demand Attachment

Westinghouse Type OA Demand Attachment for Polyphase Meters



The Company's Works at East Pittsburgh, Pa.

Westinghouse Products

A few of the Westinghouse Products are listed below and will furnish some idea of the great variety of electrical apparatus manufactured by the Company and the many extensive fields for their use.

For Industrial Use

Instruments
Motors and controllers for every application, the more important of which are: Machine shops, woodworking plants, textile mills, steel mills, flour mills, cement mills, brick and clay plants, printing plants, bakeries, laundries, irrigation, elevators and pumps.
Welding outfits
Gears
Industrial heating devices, such as: Glue pots, immersion heaters, solder pots, hat-making machinery and electric ovens.
Lighting systems
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Line materal
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Motor-generators
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Relays
Solder and soldering fluids
Stokers
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Switchboards
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Transformers
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For Transportation

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Ventilating outfits

For Farms

Fans
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Motors for driving churns, cream separators, corn shellers, feed grinders, pumps, air compressors, grindstones, fruit cleaning machines and sorting machines.
Generators for light, power and heating apparatus.
Portable Power Stands, 32 Volts
Radio Apparatus
Transformers

For Office and Store

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Fans
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Incandescent lamps
Small motors for driving addressing machines, dictaphones, adding machines, cash carriers, moving window displays, signs, flashers, envelope sealers, duplicators, etc.
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Small motors for driving lathes, tire pumps, machine tools, polishing and grinding lathes.
Solder and soldering fluids
Starting, lighting and ignition systems, embracing: Starting motor generators, ignition units, lamps, headlights, switches, etc.
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CANADIAN COMPANY

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