Westinghouse
Type RB Recording-Demand Watthour Meters

INSTRUCTIONS

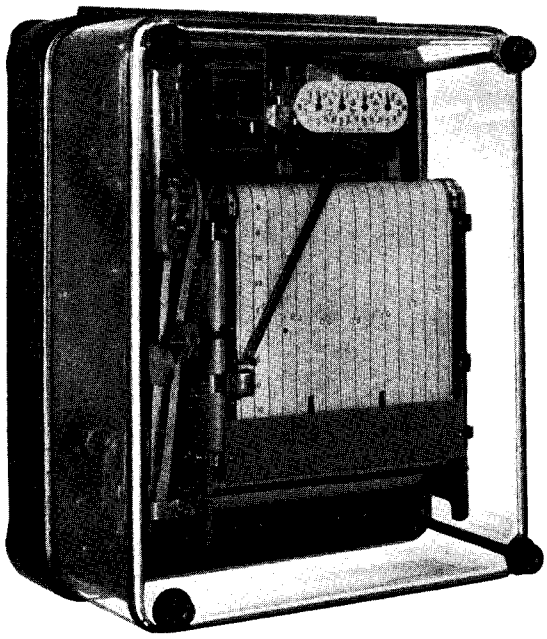

FIG. 1—RB RECORDING DEMAND WATTHOUR METER WITH COVER

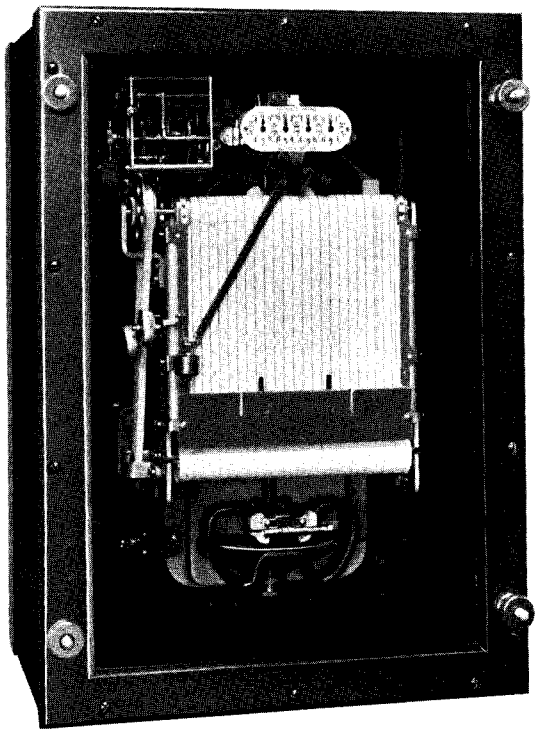

FIG. 2—RB-3 ELEMENT RECORDING DEMAND WATTHOUR METER

GENERAL

1. The Westinghouse Type RB Recording Demand Meter is an instrument designed to record both the kilowatt hours consumed and the integrated demand.

2. The time interval of the instrument, or the period at which the pen is reset to zero, is controlled by a synchronous motor clock mechanism. The small synchronous motor serves both to determine the time interval and to furnish power for advancing the chart. During the time interval, this motor stores energy in a spring which is released at the end of the time interval. It advances the chart and resets the pen to zero.

3. The paper advance is made at the end of each time interval, and starts just before the resetting of the pen, so that there is a distinct and easily observed record of the maximum pen travel. The pen is reset by the action of a balancing weight, after being tripped out of mesh. Both the amount of integrated demand and the time of its occurrence are recorded.

4. The paper mechanism is arranged so that the preceding demand record for a number of hours is visible. This complete mechanism may be removed as a unit or swung to one side on a hinge when the meter element is being inspected or adjusted. To swing the paper mechanism to one side, loosen the two thumb screws at bottom of movement frame until large gear on left side of paper roll drum clears the pinion in the reset mechanism, and until the post on the upper right hand side of the paper mechanism clears the movement frame.

For the best operation of the reroll mechanism, the drive belt should be loose enough to allow some slippage on the pulleys. This is necessary to compensate for changes in the size of the rolls as the paper is transferred to the reroll spindle.

PRINCIPLE OF OPERATION

5. The operation of the meter mechanism may be understood from Fig. 3. Under load the disc-shaft (DS) integrates watthours on the register through the gearing of shaft assemblies 1, 3, 7 and 8. At the same time the pen (P) is advanced through shaft assemblies, 1, 2, 4, 5 and 6. At the end of the time interval the tripping arm (A) Fig. 4, pushes against rod (R), moving the swinging basket supported by shaft (13) carrying shaft (14) and sector (S). This disengages the worm wheel on shaft (4) from worm on shaft (2).

6. The weight of the pen and pen arm is counter-balanced by weight (BI) and the adjustable weights (U) are so placed as to cause the pen to immediately swing to the zero position when its driving gears are disengaged. When falling to the zero position the rotation of the worm on shaft (4) moves the swinging section (S), against the stop (V) on gear wheel (Q) thus determining the zero position of the pen. When pressure on rod (R) is relieved the weight of the basket returns the pen gearing into mesh.

7. When for any reason the pen reaches full scale, arm (BF) on shaft (6) pushes against arm (BH) on bracket mounted on shaft (14). This causes pin (Y) on arm (Z) to mesh with worm (M) on shaft (2) which throws the pen gearing out of mesh and is held there by ratchet (BG) engaging with wheel (0) on shaft (4) until the end of the interval or until tripped manually.

8. Adjustment screw (BB) is to adjust the mesh between the pen worm and worm wheel. This is adjusted at the factory and should require no at-

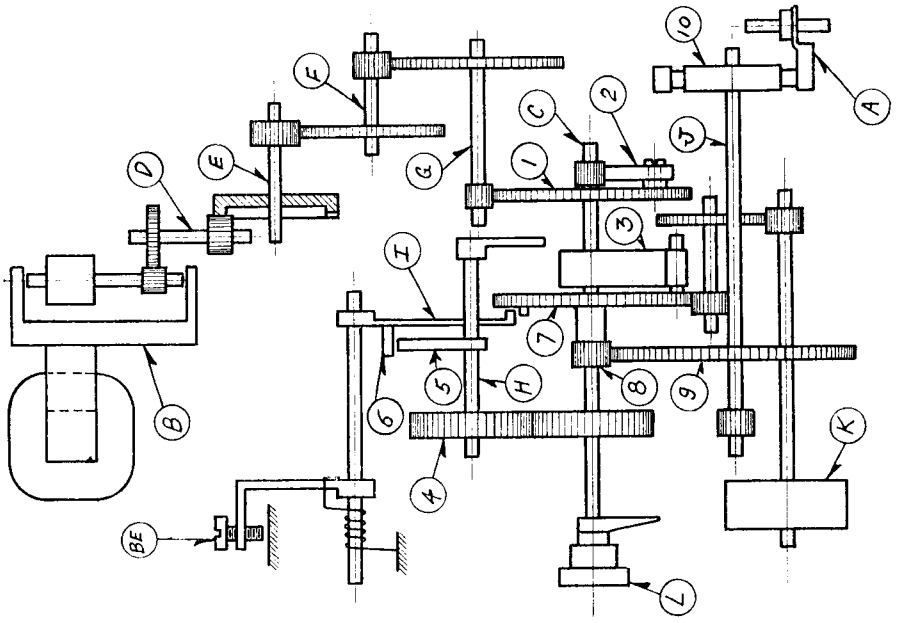

FIG. 4—RB TIMING ELEMENT

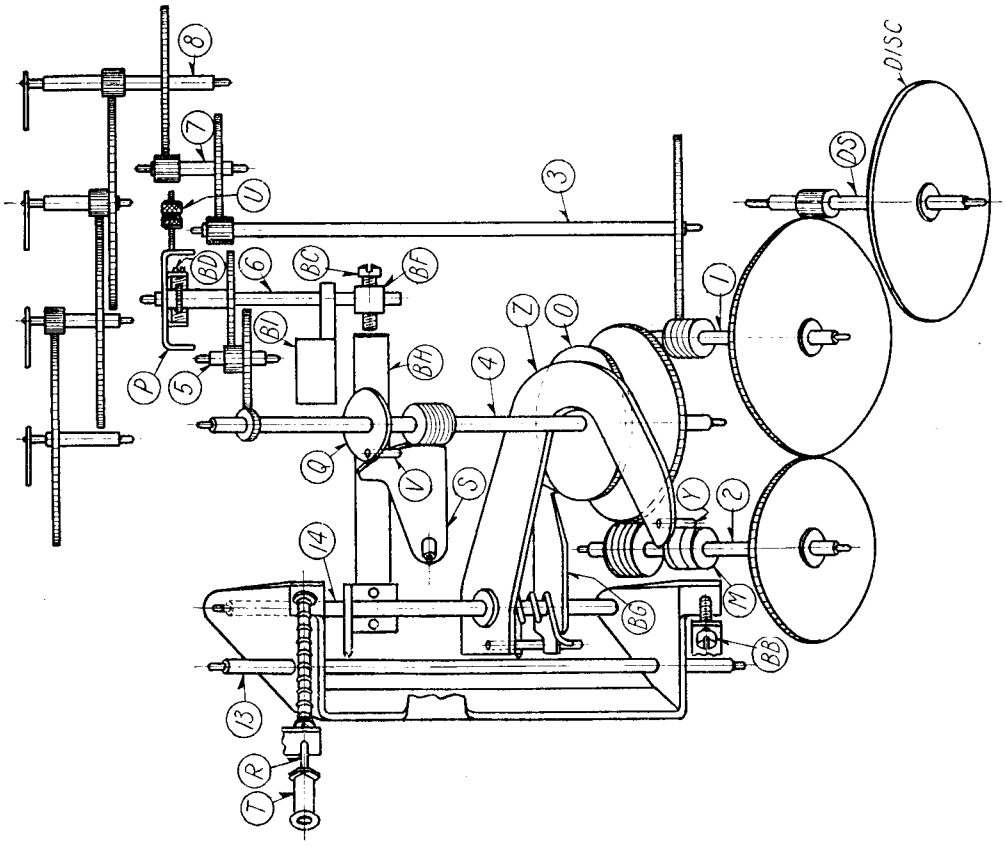

FIG. 3—DIAGRAM OF RB REGISTER

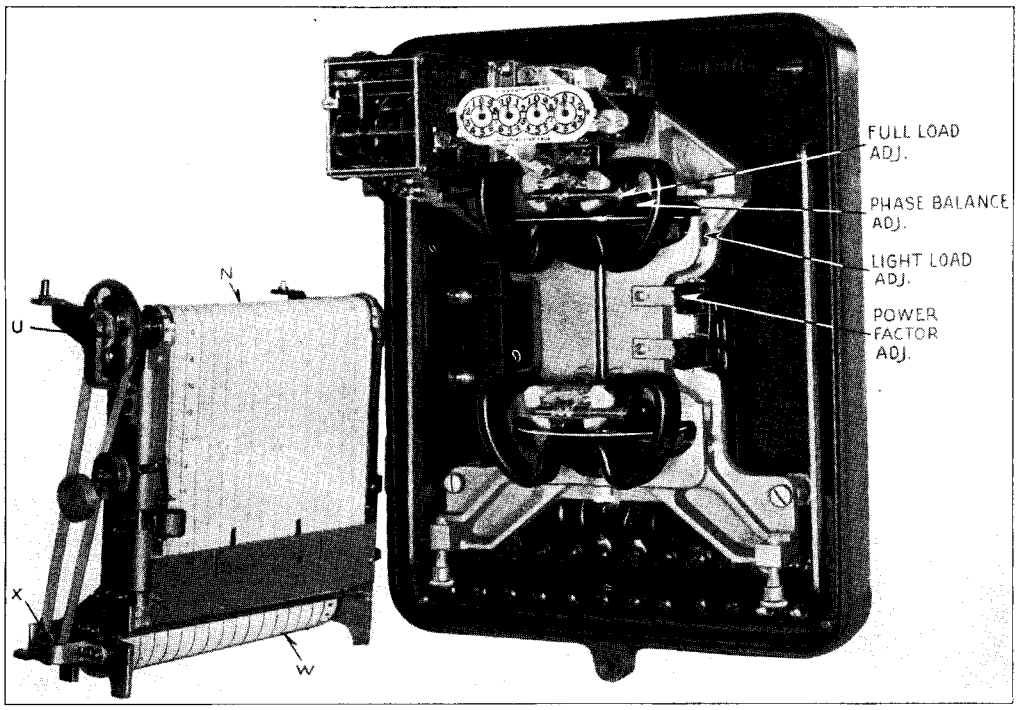

FIG. 5—RB METER WITH PAPER RE-ROLL MECHANISM REMOVED

tention. Screw (BC) adjusts the full scale tripping point, screw (BD) is to adjust the pen to zero position.

9. The time interval is determined by the synchronous motor (B) Fig. 4 driving shaft (C) through shaft D, E, F and G. Gear (1) is loose on shaft (C) and drives shaft (C) through ratchet (2). This winds up spring (3) and at the same time turns gear (4) on shaft (H) to operate cam (5). When shaft (H) makes one revolution the cam raises pin (6) on arm (I) and releases gear (7) on shaft (C) to which the other end of spring (3) is attached. Pinion (8) on shaft (C) drives gear (9) on shaft (J) causing the reset wheel (10) to force arm (A) against trip rod (R) in Fig. 3, allowing the pen to reset to zero and also advancing the paper the correct amount. The torque of the mechanism is held constant during the reset period by spring governor (K). Gear (1) is made to drive shaft (C) through a ratchet so that by turning knob (L) manually one revolution, the mechanism can be made to trip the pen gearing and reset pen to zero.

CAUTION—The spring (3) on shaft (C) is set at the factory to have 1½ turn initial tension. If this condition is disturbed in any way, be sure that it is restored in the following manner before putting the meter into operation.

It is necessary that the pin holding the end of spring (3) is back of the tripping trigger on shaft (H) before the 1½ turns of shaft (C) are made. The pin on gear (7) should be below the reset arm pin and in contact with same.

1. Hold tripping escapement and let the spring run down completely, setting pointer on zero.
2. Release the tripping escapement.
3. Hold shaft (C) gearing and wind the spring 1½ turns from the zero point.
4. Release shaft (C) gearing. The spring will then have the proper operating torque.

10. The only adjustment on this mechanism is screw (BE) which changes the position of arm (I) to make it release spring (3) at proper time. This is adjusted at the factory and should need no other attention. The paper chart unrolls from spindle (W) Fig. 5, passes upward over roll (N) on the re-roll frame and down between plates on reverse side to belt driven spool (X).

INSTRUCTIONS FOR USING

11. Support the meter in a vertical position, removing all shipping cords and tags. After the meter has been mounted and electrically connected according to one of the diagrams in Figs. 9 to 13, remove the small pieces of paper used to secure the disc shaft during shipment. The small ink reservoir of the inking device should be filled with the special ink provided with the meter. Other inks may evaporate too quickly or clog the pen.

12. It will be noted that the meter is designed to be either front or rear connected. As received it is adapted for front connection. However, brass studs are included, which, when screwed into the terminals on the back of the meter, convert it into a rear connected instrument suitable for mounting on a switchboard or any panel where the wiring is from the rear.

13. To feed on a new paper chart, slide the new roll endwise over the spindle (W), Fig. 5, and bring the end under the guides and over the roll (N). The locknut (U) should be loosened to allow the roll (N) to turn freely. Slide the end of the paper into slot in spool (X) and take several turns on this spool. Cutting the end of the paper to a point will facilitate this operation, Fig. 16. See that the edges of the paper do not bind under the guides.

14. To synchronize the paper with the time of day, set the paper so that the pen is on the line representing the correct interval of time, tighten the locknut (U). If the time of day falls between two interval marks on the chart, set the pen on the nearest elapsed interval mark. Then to compensate for the difference between the position of the pen and the actual time, turn the manual reset knob (located on the left hand side of the clock) in a counter clockwise direction until its pointer position corresponds to the number of minutes elapsed in that interval. The zero of the timing dial represents the end of the time interval.

15. As an example of the above, if we have a meter with a 15-minute interval and the time of day is 9:20 o'clock, set the paper so that the pen is on the 9:15 line and then turn the tripping knob on the timing device forward until its pointer is opposite division 10 on the timing dial, indicating that 5 minutes have elapsed. If it is a 30 or 60 minute interval meter, the paper should also be set so that the pen is on the 9:15 o'clock line and the tripping knob set to show that 5 minutes have elapsed. If the above is followed, a time interval will always begin on the hour and one will always end there.

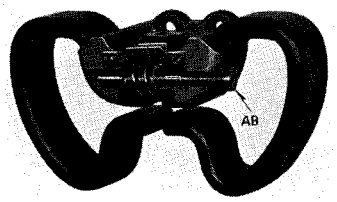

FIG. 6—RB PERMANENT MAGNET ASSEMBLY

This will simplify the keeping of demand records with respect to time.

16. To check the zero line press on rod (R) to trip the pen which should fall to zero. If it does not return to zero, first, see if the worm wheel on shatt (4) Fig. 3, is completely de-meshed from the worm on shaft (2), if it is not, move collar (T) out on its arm until the worm-wheel is de-meshed when rod (R) is pressed. Secure head (T) in position by the locknut provided. If the wormwheel de-meshes properly without the pen returning to zero, move the weights (U) further out on their arm locking them together. Do not however, place these weights so far out as to have the pen return too rapidly. If the pen does not come back exactly to zero, check to see if the stop (V) is in contact with the sector (S). When the stop is in contact with the sector (S) or only slightly out of position, the adjustment of the pen may be made by the micrometer adjustment given by worm (BD).

17. If the stop (V) is out of contact by a large amount, hold the rod (R) in the tripping position and rotate the disc which carries stop (V) until the stop makes contact with the sector (S). The final adjustment should be made with worm (BD). After adjusting zero, check it by tripping the pen from various positions on the paper.

18. The head (T) on the tripping arm should be very close to, but not in contact with, the end of the tripping rod, except at the moment of tripping.

19. With four studs in the reset wheel of the 15 minute interval clock, the pen is reset to zero every 15 minutes. With two studs, set 180 degrees apart, the pen resets every 30 minutes, although the forward movement of the paper which occurs each 15 minutes causes an offset mark at the middle of the 30-minute period, thus enabling the integrated demand to be read for the 15 as well as the 30-minute periods. Similarly, one stud causes a reset of the pen at each 60-minute interval, with an offset mark each 15 minutes. Using the 5-minute interval clock with corresponding arrangements of tripping studs, the pen can be made to reset on 5, 10 or 20 minute intervals. (For each time interval the corresponding register must be used.)

Watthour Meter Adjustments

20.

FULL LOAD

Turn screw (AB) Fig. 6, in a counter clockwise direction to increase meter speed. Turn screw in a clockwise direction to decrease meter speed.

LIGHT LOAD

Turn light load adjuster screw in a counter clockwise direction to increase meter speed. Turning it in a clockwise direction decreases the meter speed.

BALANCE

Turn adjustment screw to move balance plate in or out, as may be required. Moving balance plate out from electro magnet decreases the torque of the electro magnet.

POWER FACTOR

Adjustment is made by adjusting the resistance of the Power Factor Coil. Increasing the resistance over-compensates the electro magnet, hence making the element run fast on lagging power factor.

21. Use ink Style No. 256332 which comes ready mixed in 2-ounce bottles.

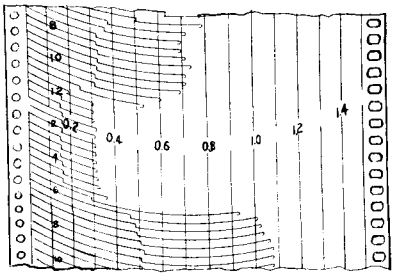

FIG. 7—SAMPLE OF CHART—30-MINUTE INTERVAL

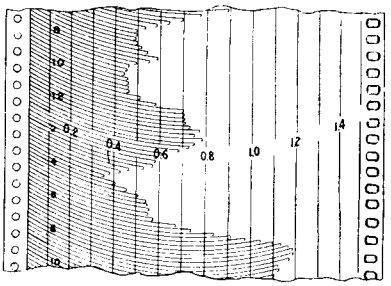

FIG. 8—SAMPLE OF CHART—15-MINUTE INTERVAL

22. No part of the meter should be lubricated except the synchronous motor bearings. These should be checked approximately every 2 years and lubricated with Pure Petrolatum.

23. CONSTANTS

A 5 ampere, 120 volt, 3 phase, 3 wire meter has a Register Ratio of 1800 and a watthour constant of ⅔. Other capacity meters have constants in pro portion.

24. RECORD PAPER

Time Interval	1 Roll of Standard Paper Lasts
5 minutes	12 days
10 minutes	32 days
15 minutes	35 days
20 minutes	32 days
30 minutes	35 days
60 minutes	35 days

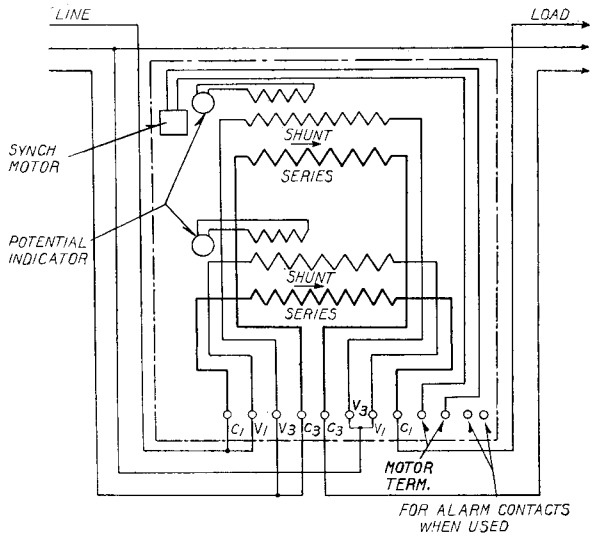

FIG. 9—EXTERNAL CONNECTIONS, 2 OR 3 PHASE, 3-WIRE WITHOUT TRANSFORMERS

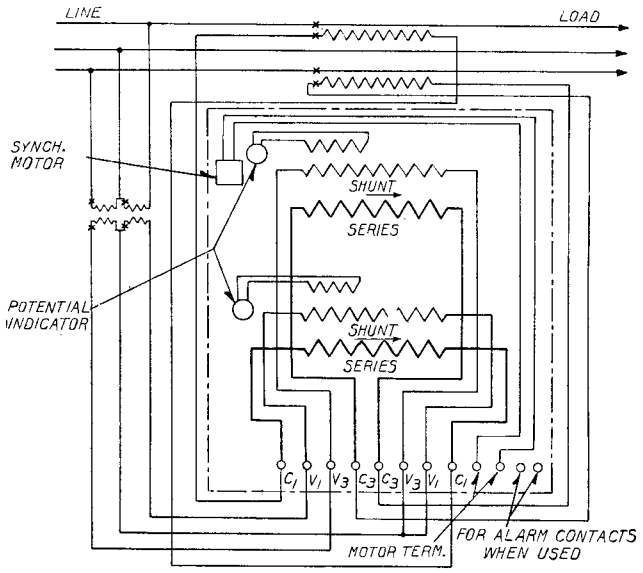

FIG. 10—EXTERNAL CONNECTIONS, 2 OR 3 PHASE, 3-WIRE WITH CURRENT AND VOLTAGE TRANSFORMERS

If alarm contacts are required on 3-phase, 4-wire meters, Figures 11 and 12, the synchronous clock is usually connected to one of the voltage circuits and the two remaining terminals are used for the contact circuit.

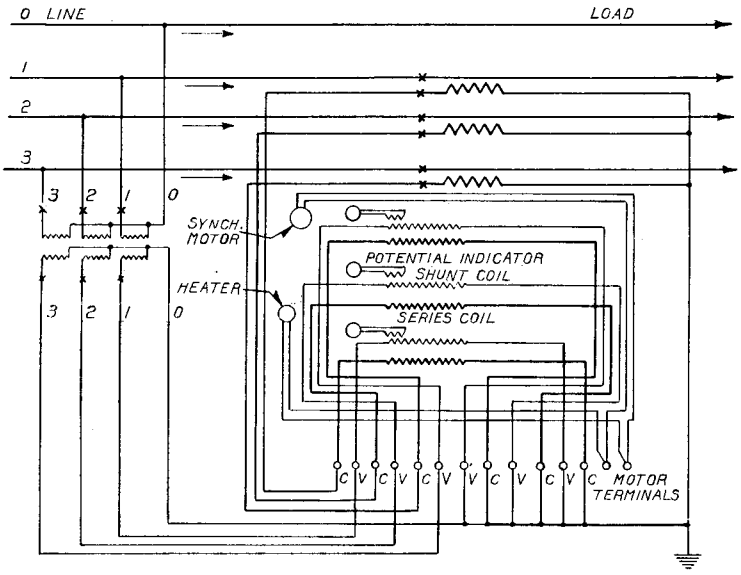

FIG. 11—WIRING DIAGRAM, WATTHOUR METER TYPE RB 3-ELEMENT, 3-PHASE, 4-WIRE

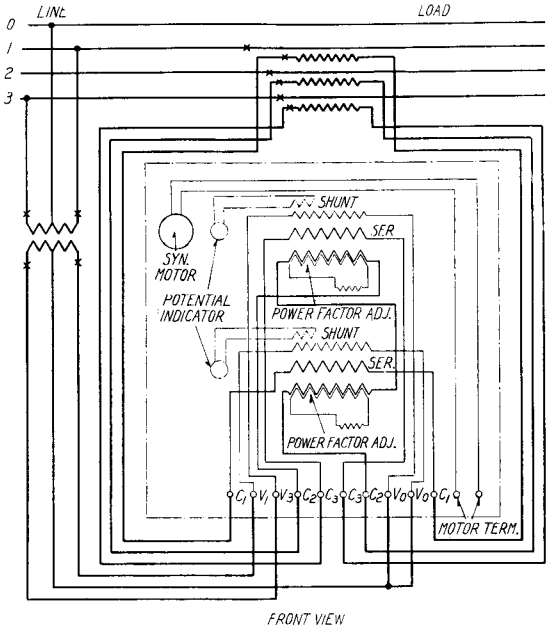

FIG. 12—EXTERNAL CONNECTION DIAGRAM, 2 ELEMENT, 3-PHASE, 4-WIRE WITH CURRENT AND VOLTAGE TRANSFORMERS

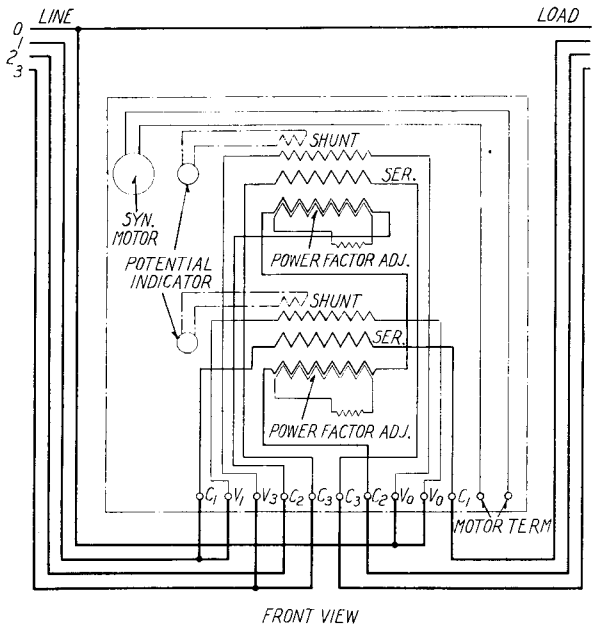

FIG. 13—EXTERNAL CONNECTION DIAGRAM, 2 ELEMENT, 3-PHASE, 4-WIRE WITHOUT TRANSFORMERS

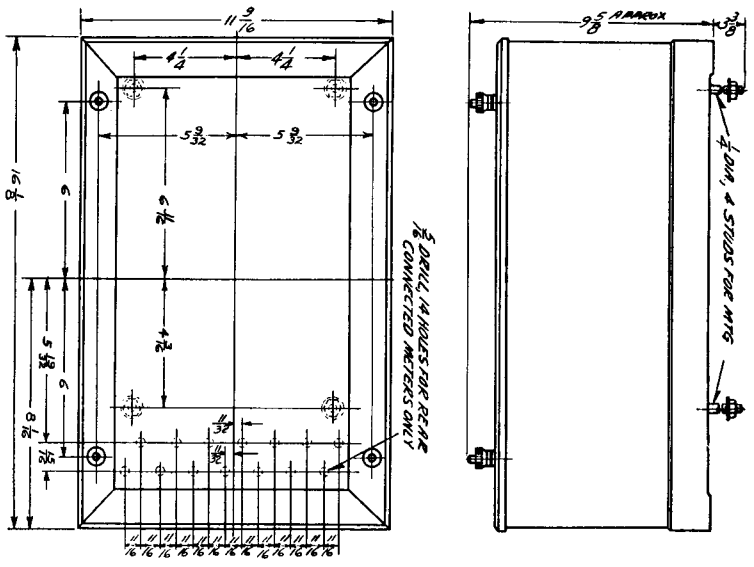

FIG. 14—OUTLINE AND DRILLING PLAN, 3 ELEMENT, 3-PHASE, 4-WIRE METER

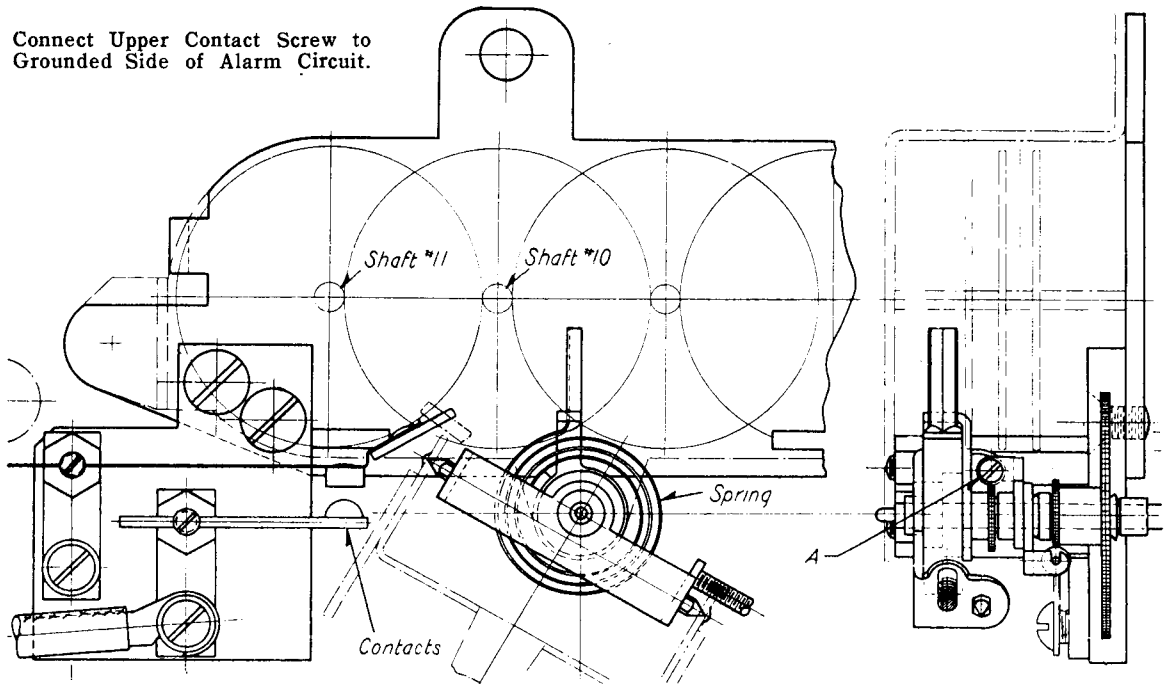

FIG. 15—ALARM CONTACT DEVICE

Alarm Contact Device

25. The adjustable alarm contacts are used to signal the operator of an installation utilizing power purchased on a demand basis, whenever a predetermined value of the demand has been reached.

The contact mechanism is adjustable to agree with the position of the pen point on the chart.

Referring to the diagram, the micrometer screw adjustment, shown at "A", changes the position of a spiral spring which is carried on the movable bracket and which supports the pen. The outer end of this spring then engages and depresses the contact spring, closing the circuit. With the pen at the required position on the chart, adjust the screw "A" until the contact just closes.

It will be noted that the flexible spiral spring will allow the pen arm to move farther up the sacle as the demand record increases, thus avoiding interruption of the record. Due to the gear reduction, the torque of the spring will have no perceptible effect upon the meter accuracy.

The contacts are designed to carry approximately 0.25 ampere inductive load without appreciable burning of the surfaces.

It may be found necessary to adjust the position of the contacts as well. To do this, loosen the set screws holding the contact springs in the posts, sliding the springs to the new position desired.

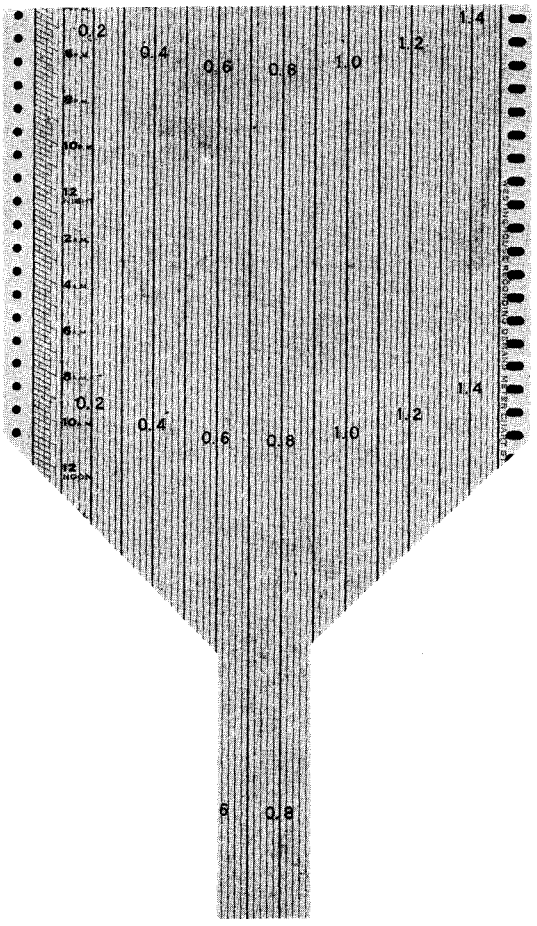

FIG. 16—SUGGESTED METHOD FOR TRIMMING LEADING END OF PAPER CHART WHEN STARTING

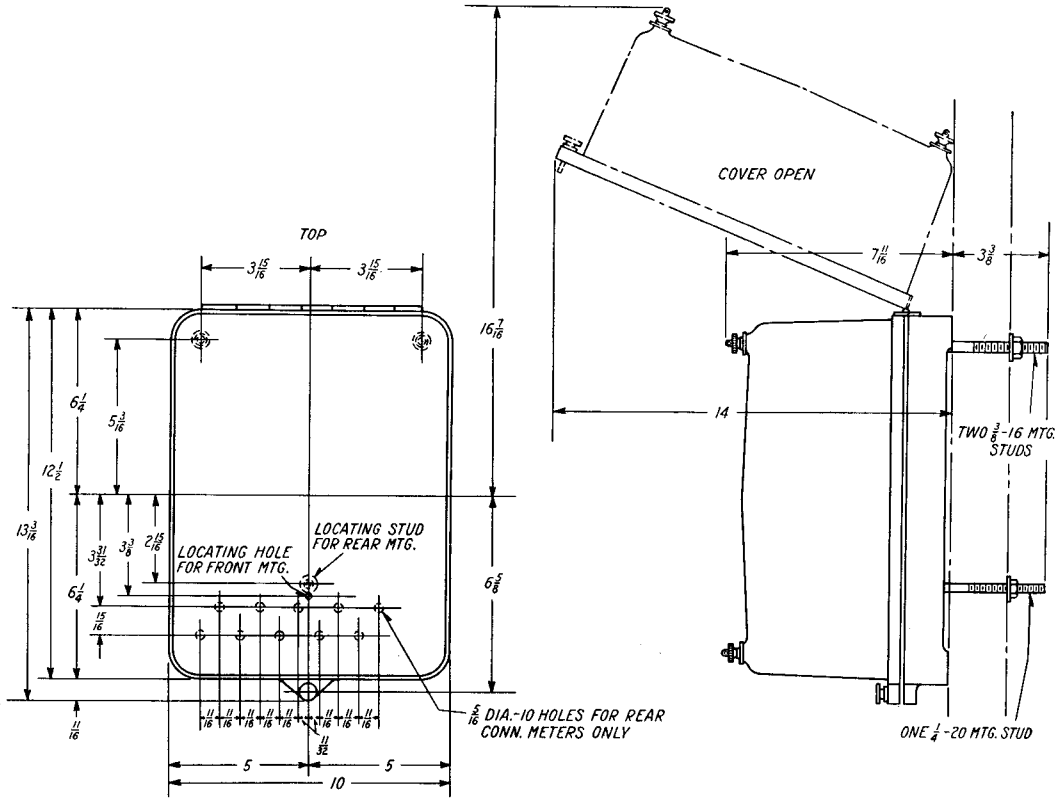

FIG. 17—OUTLINE AND DRILLING PLAN, 3-PHASE, 3-WIRE METER

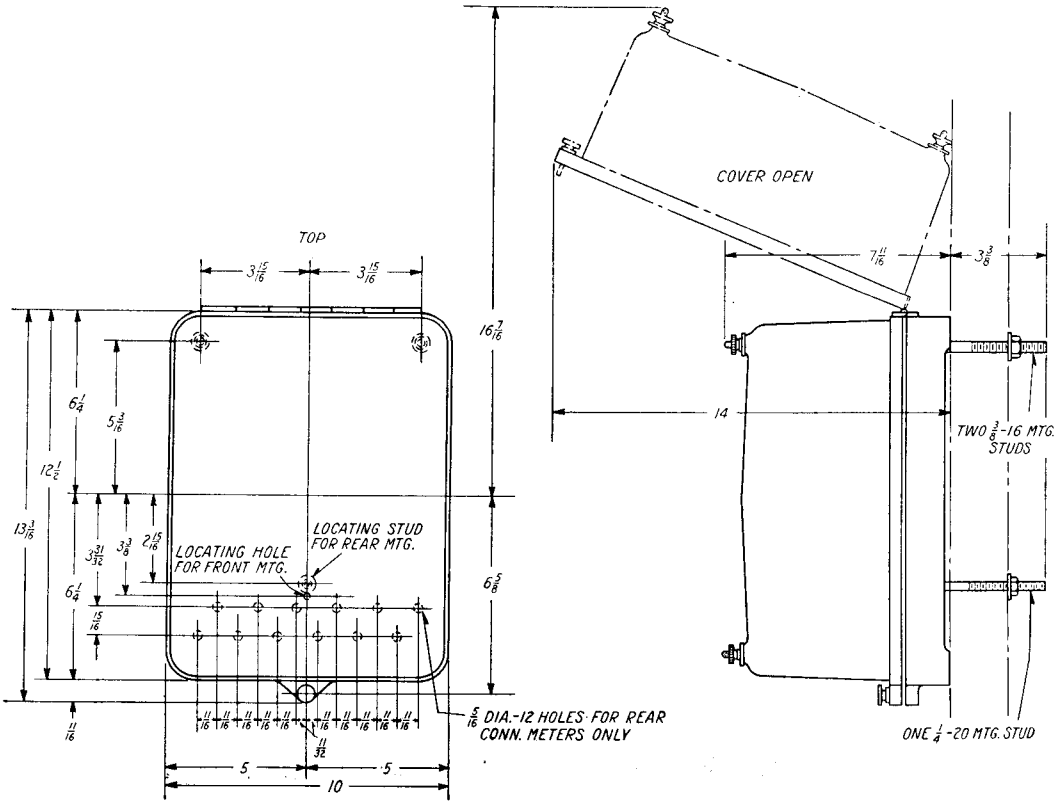

FIG. 18—OUTLINE AND DRILLING PLAN 2-ELEMENT, 3-PHASE, 4-WIRE METER

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