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Instructions for

Installing and Operating

The

Thomson Recording Watt-Meter.



General Electric Company

Schenectady, N. Y.

No. 8019.

Sept. 7, 1896.

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INSTRUCTIONS FOR INSTALLING AND OPERATING

THE

THOMSON RECORDING WATT-METER.



GENERAL ELECTRIC COMPANY

MAIN OFFICES, SCHENECTADY, N. Y.

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CAUTION . . .

The accuracy of the Thomson Recording Watt-Meter is dependent upon INTELLIGENT USE. The slightest manipulations should not be attempted until the following pages have been carefully read and understood.

Do not handle the instrument roughly, or subject it unnecessarily to jar or vibration.

*If the meter is properly connected in circuit
the disk will always rotate to the right.*

THE THOMSON
RECORDING WATT-METER.

**INSTRUCTIONS FOR UNPACKING AND
SETTING UP.**

IN unpacking the meter it is necessary to handle the several parts in a careful manner, and to follow these instructions in every detail.

Meters may be divided into two classes according as they are provided with a removable or a fixed jewel; and into two other classes according as they are shipped in an assembled condition or with the field coils removed.

If the registering movement is not in place, it will be found in a small box in the compartment at one end of the packing case. The box also contains the top bearing stud, and, if the jewel is removable, a jewel screw.

Place the meter frame on a bench or table and remove the wedges from between the magnets and the disk. In removing these wedges take out the **under ones first**, carefully holding the disk rigid while so doing.

If the meter is not shipped in an assembled state, the armature is securely fixed by two temporary clamps which must be removed and the top bearing stud placed in position and secured by the set screw.

The wedges between the magnets which hold the disk rigid **must** be removed before the field coils are put on.

See that the number of the meter, on the back of the registering movement, on the cross-bar of the meter (or top of the terminal board), on the field coils, and on the cover, are the same. **Do not get these parts mixed.**

Place the field coils in position, being careful that dowel pins fit dowel holes, and screw down firmly before connecting the coils to their terminals.

If the jewel is fixed, a wedge will be found under the nut beneath the disk which raises the shaft from its jeweled bearing. **This wedge must not be removed until after the meter is connected and ready to start.** If the jewel is removable it should be inserted in the meter base and turned **partly** in. This is to protect the jewel screw from loss or injury.

Place the registering movement in position so that the pins in the movement shall enter the corresponding holes in the frame.

INSTRUCTIONS FOR INSTALLING.

SCREW the meter to a solid perpendicular support, inserting the first screw through the upper right-hand hole, then one through the diagonally opposite slotted hole.

Bring the meter very carefully to a level, using a small spirit level on the base near the magnets. Then insert screws in the two remaining holes and fasten the meter firmly to the wall.

Connect the meter, in circuit according to the diagram of its class. (See illustrations and notice on the back of the meter).

In those meters which have no rubber diaphragm to close the holes around the wires entering the meter, it is desirable to fill any space around these wires with tissue paper or similar substance to prevent the entrance of dust, being extremely careful that it does not project on the inside in such a way as to touch the disk.

Loosen the set screw which secures the top bearing stud in position.

If the jewel is removable, turn it in to the full length of the screw.

If the jewel is fixed, remove the wedge from under the nut beneath the disk, which raises the shaft off the jewel, and screw the nut down on the lower check nut, thus gently lowering the shaft into its jeweled bearing.

Adjust the top bearing stud until the end of the stud is half way between the shoulder and the end of

the shaft; fix at this point by means of the set screw provided for the purpose.

The meter may now be started. Never allow the shaft to rest on the jewel until everything else is ready for the meter to be started.

The meter must never be moved with the shaft resting on the jewel.

Be cautious about changing the tension of the brushes, as they are carefully adjusted before leaving the factory.

A slight sparking will sometimes be noticed when the meter is first started. This will soon disappear, as it is due to small particles of dust which have collected on the commutator and brushes in shipment, and will soon wear off.

Should the commutator need cleaning, carefully insert a piece of narrow tape between it and the brushes. Draw the tape gently back and forth, at the same time slowly rotating the shaft.

Be careful in doing this not to spring the brushes out of their original adjustment.

INSTRUCTIONS FOR RENEWING THE PIVOT.

LOWER the jewel away from the shaft until the disk rests upon the magnets, and wedge firmly in this position. Then remove the jewel screw and insert the shaft-end tool in its place. Turn the tool slowly until it engages with the pivot. Then unscrew and the pivot will be found in the end of the tool.

Replace the pivot by a new one, screw into the shaft, remove wedges from the disk, and insert the jewel screw.

Care must be exercised in this operation that the adjustment of the brushes is not injured, and that neither the disk nor the shaft is sprung.

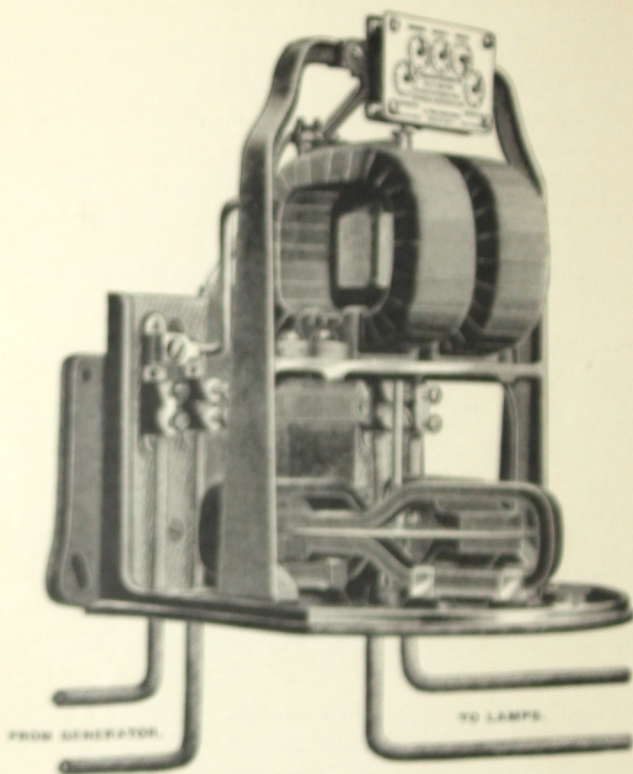


Figure 1.

Two-wire Meter. (Small Capacity).

Connect the house or lamp wires to the two **right-hand** binding posts, passing them up through the holes provided in the base of the meter and fastening them into the binding blocks, setting both screws of each block up firmly. In the same manner connect the wires from the generator or transformer, bringing them to the **left-hand** binding posts.

In using the meter on continuous current circuits, be careful to connect the positive side of the line to the terminal marked +, and the negative side to the terminal marked -.

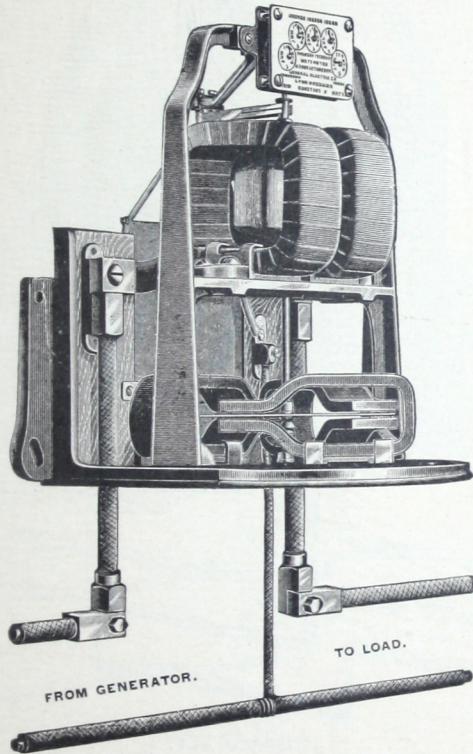


Figure II.

Two-wire Meter. (Large Capacity).

Connect the meter fields, by means of the two cables, in series with one side of the line. Connect the other side of the line by a potential wire to the small terminal inside the meter.

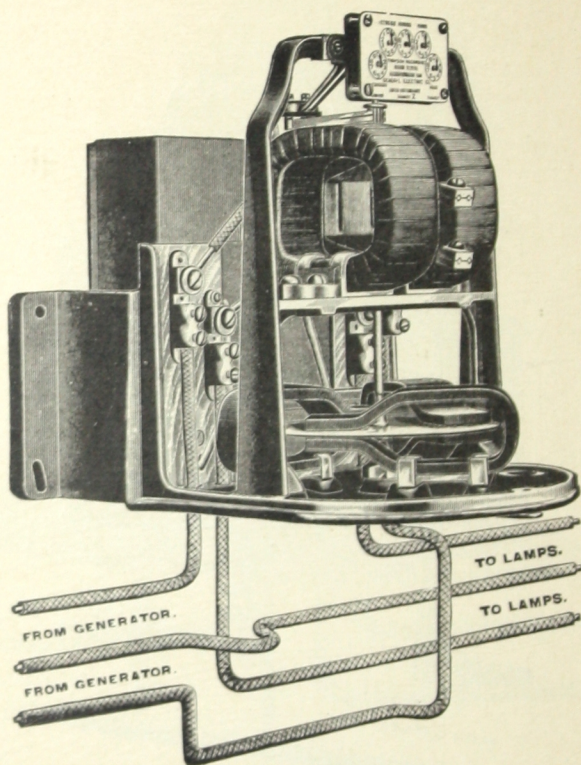


Figure III.
Three-wire Meter.

Connect the outside wires from the mains to the outside terminals of the meter, being sure to connect the positive side to the terminal marked +. Connect the outside wires from the lamps to inside terminals of the meter. The neutral wire does not enter the meter.

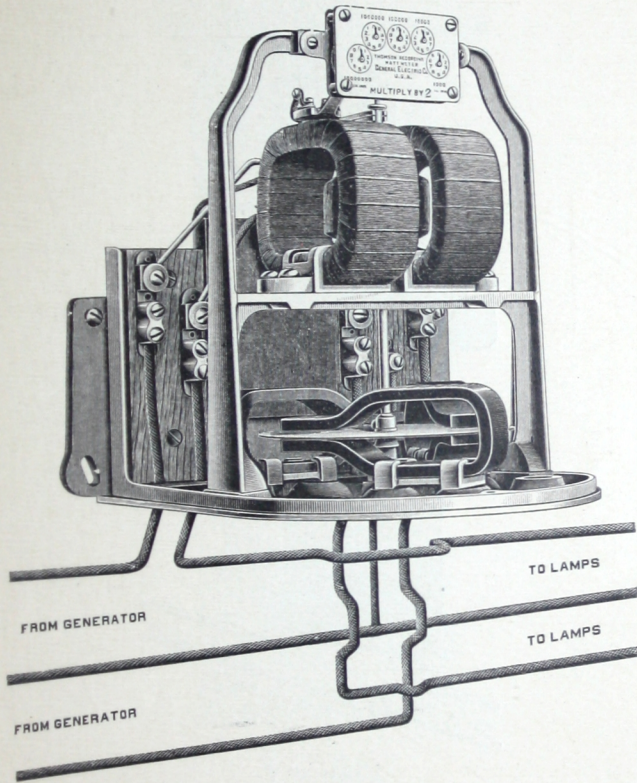


Figure IV.

Three-wire Meter. (High Efficiency Type).

Connect the outside wires from the mains to the outside terminals of the meter, being sure to connect the positive side to the terminal marked +. Connect the outside wires from the lamps to the inside terminals of the meter. Connect, by a potential wire, the middle binding post of right-hand terminal board to the neutral main.

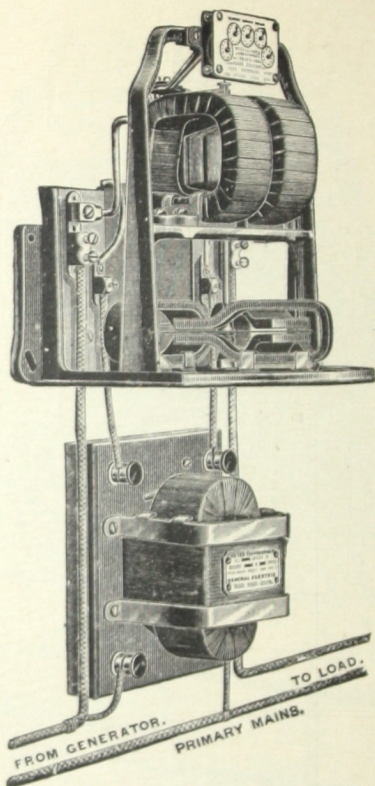


Figure V.
Primary Meter.

Connect the meter by means of the two outside terminals in series with one side of the primary circuit. Connect the terminals *P* of the small transformer across the primary mains, and the terminals *S* to the two small terminals of the meter.

The proper direction of rotation is indicated by an arrow on the disk of the meter. If the rotation should be in the opposite direction, reverse the wires in the inside terminals. The meter will rotate even when there are no lights burning. This is due to loss in the transformers, as the primary current always flows through the meter field.

The meter registers the total energy expended on the primary circuit to which it is attached.

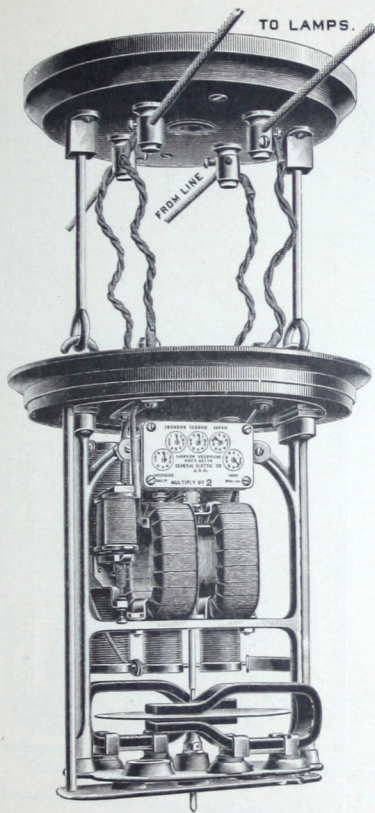


Figure VI.
Arc Circuit Meter.

After hanging the meter in position and levelling it by the use of a small spirit level on the base near the magnets, connect the four terminals of the meter by flexible cables to the corresponding terminals of the hanger board. Connect the two front terminals of the hanger board to the lamps and the two rear terminals through an absolute cut-out to the mains.

The cut-out in the meter is so adjusted that it will short circuit both the meter and the lamps with an excess of approximately 100 volts above the rated capacity of the meter, and in order to start the lamps again, it will be necessary to throw off the current by means of the absolute cut-out at the entrance of the building.

The meter should never be handled unless it is cut out of circuit, and all safeguards customary in handling high tension circuits should be employed.

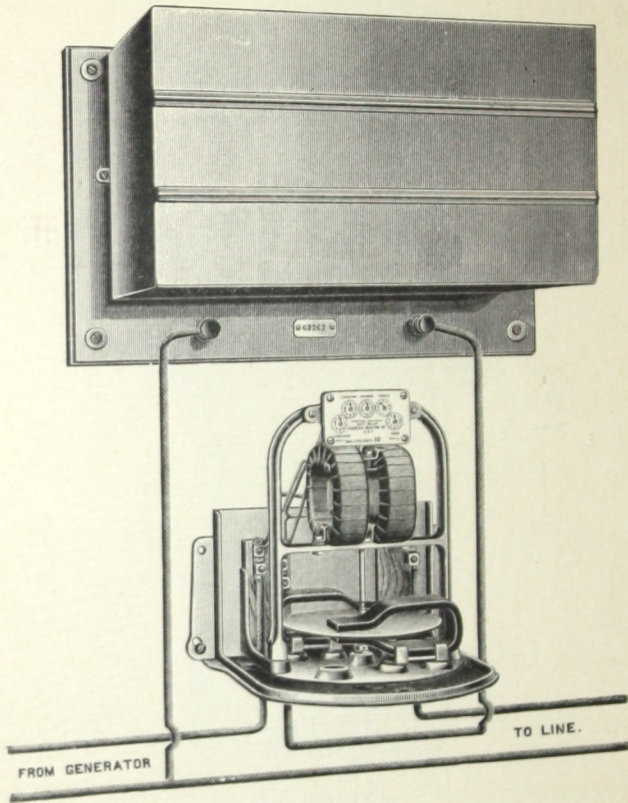


Figure VII.
Station Arc Meter.

Connect the meter field by means of the two outside terminals, in series with one side of the line, connecting the left-hand terminal to the generator. Connect the middle binding post of the meter to one terminal of the rheostat and the other terminal of rheostat to the opposite side of the line. The disk should rotate in the direction indicated by the arrow.

In securing the rheostat to the wall be sure that the perforated sides are in a position to allow a vertical circulation of air through the cage and that the binding posts are on the lower side of the rheostat.

The meter will register correctly only when used with rheostat of same number.

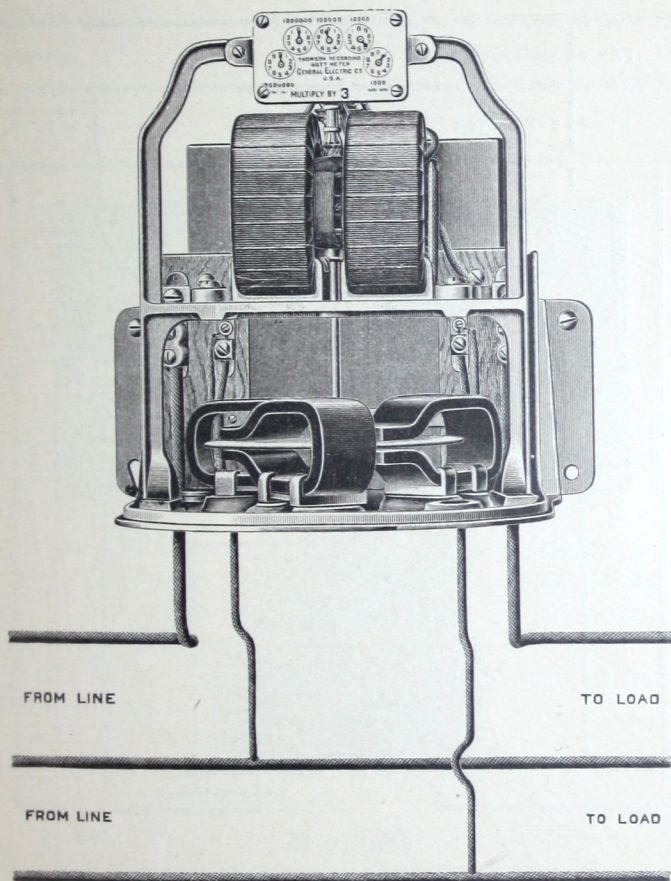


Figure VIII.

Balanced Three-Phase Secondary Meter.

Connect the meter fields in series with one of the three lines; connect the two other lines by potential wires, one to each of the small terminals inside the meter.

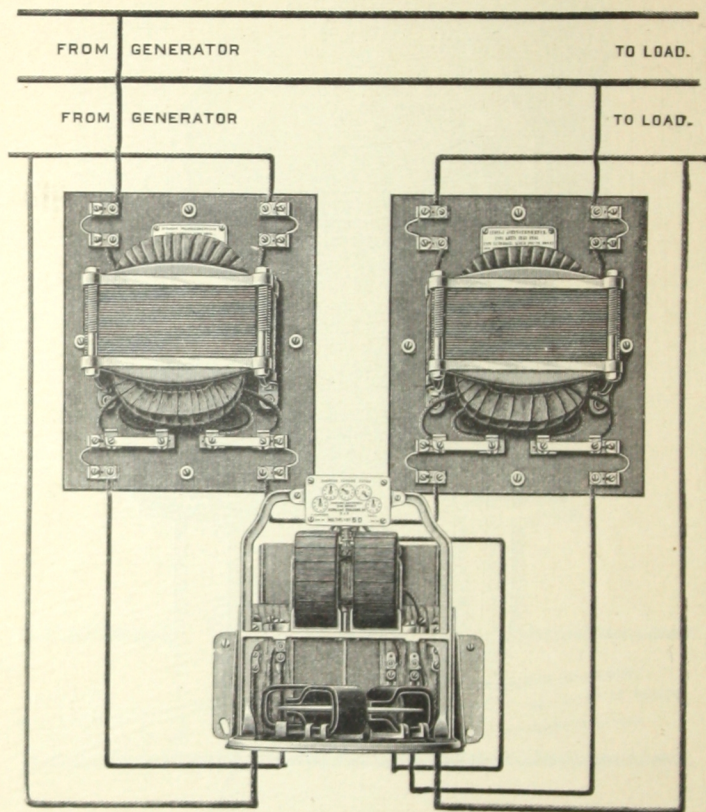


Figure IX.

Balanced Three-Phase Primary Meter.

Connect the meter fields in series with one of the three lines by means of the two outside terminals; connect transformers across two of the mains and connect their secondaries as shown in diagram. Bring the three leads of the secondaries of the transformers to the three small terminals inside the meter.

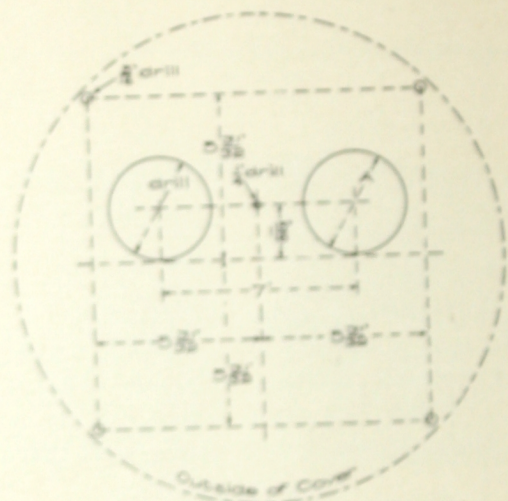
PORTABLE METERS.

TO avoid injury in shipment, the meter is held securely in its case by several blocks of wood which **must** be removed before starting the meter. Remove the back of the case and after taking out the wedges, turn the blocks partly on their side so that they can be withdrawn.

The shaft of the meter is raised from the jewel by means of a thumb screw located near the middle of the shaft. A small screw in the cross bar of the meter, clamps this thumb screw in any position in which it is placed. When the meter is not in use, the shaft **must** be raised from the jewel.

Connect the fields in series with one side of the line and the opposite side of the line to the small terminal inside the meter case.

If the disk does not revolve in the direction indicated by the arrow, reverse the current in the field.



Plan of Drilling in Panel for G1 Meter.

CAPACITY IN AMPERES.	SIZE OF HOLES "A" IN PANEL.
2,500	1 1/2"
4,000	2 1/4"
5,000	2 3/4"
6,500	2 7/8"
8,000	3 1/4"
10,000	3 3/4"
12,000	4 1/4"

HIGH CAPACITY METERS.

PLACE the meter without removing from the protecting case, upon an empty box or barrel with the studs projecting downward. Remove the screws from around the lower edge of the protecting case and carefully lift the same off. The meter may then be removed from the board on which it is shipped by removing the cover screws and then the nuts which secure the meter itself to the board. This should not be done, however, until the panel has been drilled in accordance with sketch on page 22.

In unpacking the meter, note that the armature is held in position by folds of tape which can be removed by gently drawing the loose end. Be careful during this operation not to disturb the adjustment of the brushes.

After connecting the field in series with one side of the line, connect this same side to one of the potential lines leading from the meter. Connect the other potential line from the meter to one terminal of the rheostat and the other terminal of the rheostat to the opposite side of the line.

If the disk does not rotate in the direction indicated by the arrow, reverse the potential leads at the meter.

Do not alter the connection from rheostat to opposite side of line.

In securing the rheostat to the wall be sure it is so placed that a current of air may circulate vertically through the cage and that the end marked "top" is up.

The meter will register correctly only when used with rheostat of same number.

TROPICAL METERS.

THESE meters, when properly installed, are dust and insect proof.

In order to obtain the best results, the instructions for installing the meter must be carefully carried out, and the following additional precautions be observed.

Fill the trough in which the cover rests with some gum or heavy oil suitable to the climate. This should run freely, in order that the trough at the back of the meter may be filled.

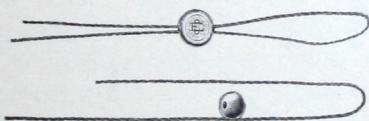
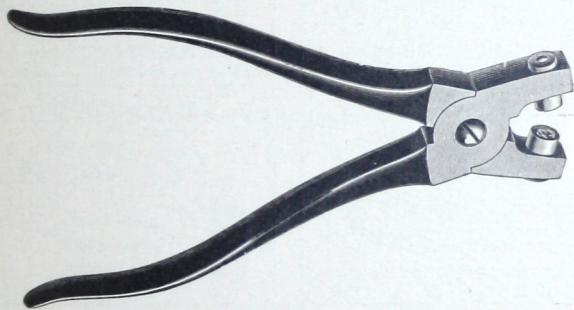
Be sure to replace the rubber washer on the sealing-pin of the cover, and see that the wing nut is screwed into position and the meter sealed.

Carefully inspect the holes through which the wires enter the meter and see that they are completely filled.

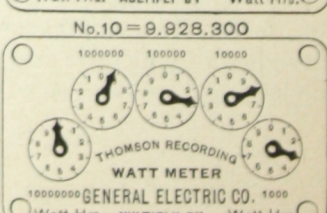
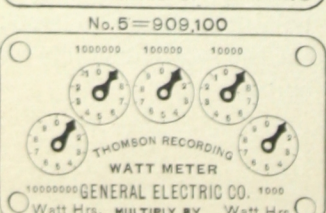
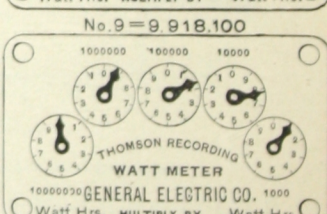
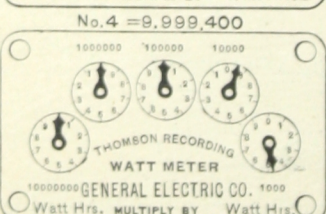
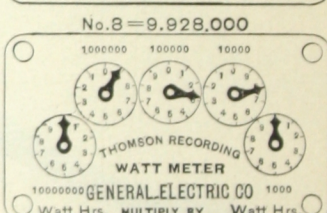
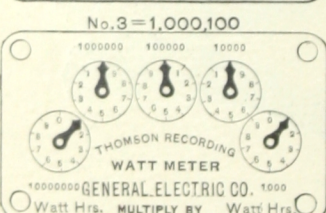
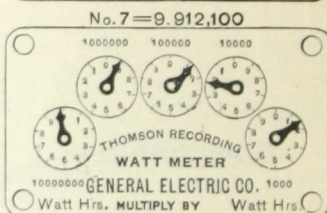
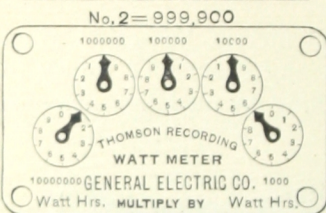
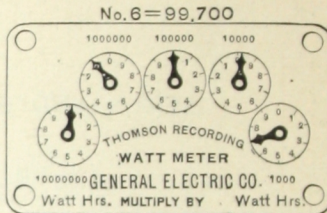
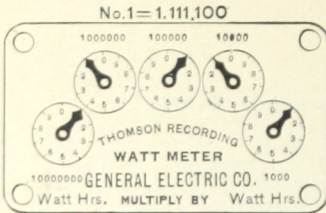
Each of the holes through which the wires enter is covered with a soft rubber diaphragm, punctured to admit the insertion of the wire.

SEALS AND SEALING TOOL.

IT is very important that all meters be sealed when installed. This obviates any chance of injury to the meter from careless handling by unskilled persons.



Lead seals and sealing wires are supplied for closing the meter case, and special tools are carried in stock designed to pinch the seal and at the same time impress upon it any desired mark or number.



DIRECTIONS FOR READING METER DIALS.

TO read correctly the sum indicated on the dial of a Recording Watt-Meter, it is necessary to use considerable care and to bear several important facts in mind.

First, it must be remembered that the figures marked under or over each dial (1,000, 10,000, etc.) refer to a **complete revolution** of the hand of that dial; therefore, each division on the dial to the extreme right indicates not one, two, three or four **thousands** of units, but one, two, three or four **hundreds** of units.

A complete revolution of the first hand, for example, will be 1,000, and will have moved the second hand one division. Thus in reading Diagram No. 6, in the accompanying cut, the first hand (the one to the extreme right), indicates 700 and **not** 7,000.

It must be remembered that a hand to be read as having completed a division, must be confirmed by the hand before it (to the right). Unless the hand before it has **reached** or passes the 0, or in other words, completes a **revolution**, the other has not completed the division on which it may **appear** to rest. For this reason it will be found easier and quicker to read a dial from right to left. Diagram No. 2, in the accompanying cut, demonstrates this. In the first dial (the extreme right), the hand indicates 900; this we write down. In the second, the hand **apparently** indicates 0; but

since the first indicates only 9, and has not completed its revolution, we know that the **second** has not completed its **division**; hence we know that the second dial indicates 9 also. This we place in front of what we already have, making 9,900. The same is true of the hand of dial 3. The second, being 9, has not quite completed its revolution, so the third has not completed its division; therefore we again have 9, which makes 99,900. The same thing holds true of the hand of dial 4, making 999,900. The last hand, (the extreme left), appears to rest on 1; but since the fourth is only 9, the last has not completed its division and therefore indicates 0. The total reading is 999,900, though one might read this 1,999,900, making a mistake of 1,000,000 units.

The hands sometimes become slightly misplaced. Diagrams Nos. 8, 9 and 10 are examples of this. In No. 8 we have on the first dial (the extreme right), 0; we therefore put down three zeros, thus: 000. The hand of the second dial is misplaced, for inasmuch as the first registers 0, the second should rest exactly on a division; therefore we know it should have reached 8, making 8,000. The third hand is apparently upon 3, but since the hand of the second dial is at 8, the third cannot have completed its division, and therefore indicates only 2; the hand being a little in advance of where it should be. The remaining two hands are correct, and make a total of 9,928,000.

In Diagram No. 9 the second hand is misplaced, for since the first indicates 1, the second should have just passed a division, and as it is nearest to the 8, we know it should have just passed that figure. The remaining three hands are approximately correct, the third hand

being a little in advance, and the fourth a trifle behind its proper position. The total reading is 9,918,100.

In Diagram No. 10 the second and fourth hands are slightly behind their correct positions, but scarcely enough to mislead. The total indication is 9,928,300.

By carefully following these directions little difficulty will be found in reading the meter, even when hands become misplaced.

NOTES.

IN case a new jewel is inserted in the meter it is advisable to put in **a new shaft end**, as the point on the old one will probably be injured, more particularly if the meter has been running on the broken jewel.

Just before inserting a new jewel in a meter, it is well to place a drop of fine watch oil on the jewel.

Oil must not be used in the top bearing under any circumstances.

If the clock is oiled, it should be carefully wiped afterward, in order that no oil may run down on the commutator.

Oil or dirt on the commutator will cause the meter to register less than the correct number of watt hours.

If no "constant" is marked on the dial, the meter reads directly in watt hours.

See that the disk and armature move freely, and that no dirt collects on the magnets in such a way as to touch the disk.

Install the meter in a dry place, as far away from any heavy vibration as possible.

When it is necessary to install a meter near a railroad or in any place where the vibration is sufficient to cause sparking at the brushes, the tension of the brushes upon the commutator should be slightly increased. This will do away with the sparking and ensure greater accuracy.

In case of severe jar, it is advantageous to place a number of soft rubber washers under the heads of the screws which bind the meter to the wall and between the meter and the wall itself at each screw.

Any information not given in this instruction book will be gladly furnished upon application.

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