GENERAL INSTRUCTIONS

INSTALLING THE LINE BREAKER OPERATING
RATCHET SWITCH AND AUXILIARY GROUND FINGER IN
THE FOLLOWING CONTROLLERS

K-35 FORM GR-2 HH & JJ
K-36 FORM JR & P

K-4C AR-2 & B
K-64 FORM BR, C & D

_SUBMITTED BY
GENERAL ELECTRIC COMPANY SCHENECTADY, N. Y._
GENERAL INSTRUCTIONS FOR
INSTALLING THE LINE BREAKER OPERATING
RATCHET SWITCH AND AUXILIARY GROUND FINGER IN
THE FOLLOWING CONTROLLERS

K-25 FORM GR-2 HH & JJ
K-36 FORM JR & P
K-40 FORM AR-2 & B
K-64 FORM BR, C & D

The parts furnished consist of a ratchet switch complete with contact fingers and arc chute to be located at the bottom of the controller, and an auxiliary ground finger to be located at the top of the controller.

Briefly, the operation of the ratchet switch is as follows:

It closes when the main handle is turned to the first point on the controller and remains closed when the handle is turned forward to the other points. When the handle is notched back from any point the switch immediately opens. It then remains open until the cylinder is turned completely off and cannot be closed until the main handle is again turned to the first point of the controller.

The function of the ground finger is to provide a means for cutting out a portion of resistance from the contactor control circuit so that sufficient current will flow to close the contactor. As the control cylinder is turned beyond the first point the ground finger breaks contact with its segment, thereby cutting the resistance back into the control circuit and reducing the amount of current so that the contactor will still be held closed, but the coil will not overheat. The two ratchet switch fingers, and under some conditions, the ground finger are subject to trolley potential.
Care should, therefore, be taken to allow sufficient creepage distance to grounded parts.

The following procedure should be followed to install the parts referred to above.

**FIRST:**

Remove the controller cap plate, also the upper and lower bearing caps.

**SECOND:**

The screws that hold the finger block should then be loosened and the block bent backward so that the main cylinder can be removed from the controller. If this is done the fingers do not have to be taken off.

**NOTE:** This need not be done with the X-36 types as there is sufficient room for the main cylinder to be taken out by first sliding the reverse cylinder from the shaft.

**THIRD:**

Remove the steel spacing collar from the bottom of the shaft and discard it. In its place assemble the ratchet mechanism first and then the steel spacing collar furnished second, so that the steel collar is next to the lower bearing when reassembled.

The set screw should be set up tight and swelled into the threads of the ratchet wheel with a cape chisel or center punch. This will prevent the ratchet mechanism from working loose.

**FOURTH:**

Reassemble the controller and fasten the arc chute with the two contact fingers on to the bearing cap so that the fingers line
up with the copper U shaped segment on the ratchet mechanism. The fingers should have between two and three pounds pressure to insure a good contact.

FIFTH:
The check pawl with roller should then be assembled on the bearing bracket and the compression spring inserted in place.

SIXTH:
The ground finger with finger base and terminal should then be fastened in place on the upper beveled portion of the finger block with the screws furnished. This finger must line up with the copper contact on the fibre disc and should have from two to three pounds pressure to insure a good contact.

NOTE: The K-40 types are for metallic return systems. There are two control fingers furnished which should be mounted one above the other so that they make contact on the same copper segment on the upper fibre disc.

The forward finger with offset finger base to be mounted on the front of the main finger block and the rear finger to be mounted on the beveled surface at the end.

Photograph 336261 shows the ratchet switch assembled in the controller.
336281 Controller Showing Ratchet Switch Assembled
**METHOD OF SUPPORTING RAILWAY RESISTORS USING PORCELAIN BOLT INSULATORS FOR 600- AND 1500-VOLT WORK**

Minimum Spacing: Use greater when possible.

- 7\(\frac{3}{8}\) in.
- 4\(\frac{1}{2}\) in.
- 4\(\frac{1}{2}\) in.
- 7\(\frac{3}{8}\) in.

Car Floor: A

6 in Minimum to Car Floor: B

Barrier: C

**Dimensions**

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<tr>
<th>Resistor Type</th>
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<th>B</th>
<th>C</th>
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Bolt and Metal Washer not supplied by G.E.Co.

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<th>1500 Volts</th>
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<td>Porcelain Insulator</td>
<td>Cat.No.450869</td>
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<td>Packing Washer</td>
<td>Cat.No.1435582</td>
<td>Cat.No.1435796</td>
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<tr>
<td>Insulating Tube</td>
<td>Cat.No.180347284</td>
<td>Cat.No.1436075</td>
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<td>Dimension D</td>
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<td>Dimension E</td>
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</table>

\(\frac{1}{2}\) in. Space between Barriers

\(\frac{1}{4}\) in. Thick Fire Resisting Heat Insulating Barrier

Barriers not supplied by G.E.Co.

4 Holes \(\frac{3}{8}\) in. in dia.

Drilling for Barriers

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District Offices may approve this print for construction.

General changes since last issue.

changed 1 NOV., 1923

destroy all copies of previous issue.

Engineering Dept.

General Electric Company, U.S.A.
DIMENSIONS OF ELECTRICAL APPARATUS USED WITH 600-VOLT, TYPE PC RAILWAY CONTROL EQUIPMENT

DA-82-C Coupler Socket and DC-54-C Coupler Plug
Approx. Weight 12 1/2 lb.

MS-14-G Switch
Approx. Weight 4 lb.

C-129-A Master Controller
Approx. Weight 45 lb.

MS-46-H Switch
Approx. Weight 4 1/2 lb.

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DISTRICT OFFICES MAY APPROVE THIS PRINT FOR CONSTRUCTION.

2 JAN., 1924

ENGINEERING DEPT.
GENERAL ELECTRIC COMPANY, U.S.A.
METHOD OF MAKING TAP CONNECTIONS FOR CAR CABLES

NOTES:
1. 218000 C.M. to 62000 C.M. inclusive, C - 1" D - 14. Use three wraps of splicing gum and adhesive tape.
2. 62000 C.M. to 180000 C.M. inclusive, C - 1", D - 11. Use three wraps of splicing gum and two wraps of adhesive tape.
3. 180000 C.M. to 218000 C.M. inclusive, C - 1", D - 14. Use two wraps of splicing gum and adhesive tape.
4. 218000 C.M. and smaller, C - 1", D - 14. Use two wraps of splicing gum and adhesive tape.

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For more flexible cable, make B 1 of length called for on list.
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Approved

15 MARCH, 1909

ENGINEERING DEPARTMENT
GENERAL ELECTRIC COMPANY

Chieft Engineer

No. 13774
OIL SCRAPER RINGS for AIR COMPRESSORS

DESCRIPTION

The effect of oil in the air lines of electric cars and locomotives on the operation and life of the devices on the lines is such as to make its total exclusion highly desirable.

To insure oil exclusion, G-E air compressor pistons are equipped with a special ring, known as the oil scraper ring, that fits into the groove nearest the crank chamber. The ring is ground with a slight bevel, and has one edge chamfered. Thus it presents a sharp scraping edge to oil on the crank chamber side, and a wiping edge on the other side, effectively preventing the passage of oil.

![Diagram of oil scraper ring]

SECTION THROUGH CYLINDER SHOWING METHOD OF ASSEMBLING OIL SCRAPER PISTON RING ON AIR COMPRESSOR PISTON

INSTALLATION

When assembling the piston with the oil scraper ring in the cylinder, care should be taken to make sure that the small hole (H), at the edge of the ring groove near the open end of the piston is on top in the cylinder. The purpose of this hole is to permit the oil collected in the groove by the ring to drain back into the crank chamber. The scraper ring should be assembled in the groove with the beveled side toward the wrist pin hole, i.e. away from the crank chamber. Mechanical peening on the inside surface of the ring insures a snug and even fit.

General Electric Company, Schenectady, N. Y.
SALES OFFICES IN ALL LARGE CITIES

May, 1924