

AMMETER RELAYS

1. GENERAL

1.01 This section covers the KS-5342, KS-5348, KS-5561, KS-5662, KS-5787, KS-15570, and KS-15573 ammeter relays.

1.02 This section is reissued to revise the description covering KS-15573 and KS-15570 ammeter relays, to revise the descriptive information of Fig. 10, and to revise the tool list. Detailed reasons for reissue will be found at the end of the section.

1.03 Reference shall be made to Section A400.001 covering general requirements and definitions, for additional information necessary for the proper application of the requirements listed herein.

#1.04 Requirements and associated procedures marked with a number sign (#) need not be checked by the installer, unless it is thought that the requirement is not being met, or performance indicates that such a check is advisable.

1.05 Requirements and associated procedures marked with an asterisk () need not be checked during maintenance, unless the apparatus or part is made accessible for other reasons, or performance indicates that such a check is advisable.

1.06 Covers are dust tight and moisture-proof. They should be removed as infrequently as possible to prevent dust, lint, or other dirt getting on working parts, particularly relay contacts.

1.07 Description

(a) KS-5342 ammeter relays are available with 250-millivolt shunts in steps from 25 to 1200 amperes. Scales are marked 0 to 100 and readings are in per cent of shunt ampere rating. The loop resistance of shunt leads must not exceed 0.3 ohm.

(b) KS-5348 ammeter relays are available with 250-millivolt shunts in steps from 25 to 1500 amperes. Scales are read in amperes and shunt leads are furnished with each ammeter relay. With a suitable relay connected to terminal 2 as shown in Fig. 7, a part of the relay coil current flows in the ammeter relay coil after high contact is made. This causes the high contact to break at a lower load current than that at which it makes and tends to prevent chatter.

(c) KS-5561 ammeter relays are available with 250-millivolt shunts for 30 or 40 amperes. Scales are read in amperes. The loop resistance of the shunt leads should be 0.028 ohm. For example, 7 feet 0 inch of No. 16 wire.

(d) KS-5662 ammeter relays are available in 100- and 200-ampere ratings for use with 250-millivolt shunts. Scales are read in amperes and shunt leads are furnished with each ammeter relay. With a suitable relay connected to terminal 2 as shown in Fig. 9, a part of the relay coil current flows in the ammeter relay coil after high contact is made. This causes the high contact to break at a lower load current than that at which it makes and tends to prevent chatter.

(e) KS-5787 ammeter relays are available in 250-ampere ratings for use with 312.5-millivolt shunts. Scales are read in amperes and shunt leads are furnished with each ammeter relay. With a suitable relay connected to terminal 2 as shown in Fig. 10, a part of the relay coil current flows in the ammeter relay coil after the high contact is made. This causes the high contact to break at a lower load current than that at which it makes and tends to prevent chatter.

(f) KS-15570 and KS-15573 ammeter relays are available with 250-millivolt shunts in steps from 100 to 1500 amperes. Scales are read in amperes and shunt leads are furnished with each ammeter relay. With a suitable telephone-type relay connected to terminal 2 as shown in Fig. 1 or 2, a part of the telephone-type relay coil current flows in the ammeter relay coil after high contact is made. This current adds to that which normally flows in the ammeter relay coil and causes high-contact lockup. That is, it causes the high contact to break at a lower load current than that at which it makes and tends to prevent chatter.

(1) KS-15570 Ammeter Relay: The circuit associated with the low stationary contact and moving pointer will not provide antichatter torque for the operating coil.

(2) KS-15573 Ammeter Relay: When the low contact is made, part of the telephone-type relay current flows through the ammeter relay coil in a direction which is opposite to normal. This causes low contact lockup and prevents chattering.

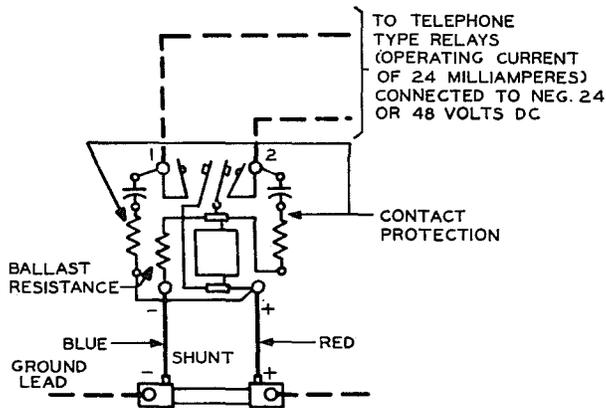


Fig. 1 - KS-15570

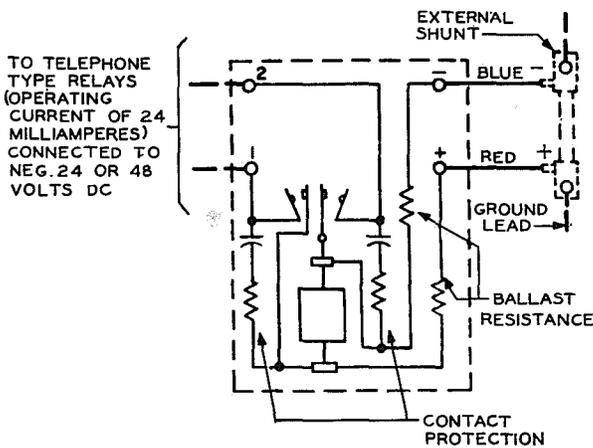


Fig. 2 - KS-15573

(g) Contacts are furnished as follows:

	Adjustable	Adjust-able With Cover On	Approx Factory Setting
KS-5342			
Low Contact	0 to 95%	Yes	-
High Contact	5 to 100%	Yes	-
Spread, High to Low	5% Min	No	10%
KS-5348			
Low Contact	-10 to 90%	†No	-5%
High Contact	0 to 100%	†Yes	100%
KS-5561, L01			
Low Contact	0 to 5A	No	3A
High Contact	25 to 30A	No	30A

Adjust-able With Factory Setting

KS-5561, L02			
High Contact	30 to 40A	No	35A
KS-5662 and KS-5787			
Low Contact	0 to 90%	No	10%
High Contact	10 to 100%	Yes	100%
KS-15570			
Low Contact	-10 to 90%	No	-5%
High Contact	0 to 100%	Yes	100%
KS-15573			
Low Contact	0 to 40%	No	10%
High Contact	60 to 100%	Yes	100%

†Prior to 1947, the low contact on the KS-5348 was adjustable and the high contact was not adjustable, with the cover on.

2. REQUIREMENTS

↳ 2.01 Tightness of Shunt and Shunt Leads: The connections on the shunt and shunt leads shall be tight.

Gauge by feel.

Check this requirement periodically.

*#2.02 Contact Cleaning: Contacts shall be cleaned when necessary as covered in Section A503.605.

↳ *2.03 Freedom of Movement: When the current value is gradually changed, the pointer shall smoothly follow this change.

Gauge by eye.

*#2.04 Contact and Pointer Accuracy: The accuracy of the pointer reading at any convenient point between contact settings shall be ±3 per cent of the full-scale reading. The difference between pointer and stationary contact readings in per cent of full-scale reading, at the time when the contacts make, shall be within the following:

- KS-5342 ±3 per cent
- KS-5348 ±2 per cent
- KS-5561 ±2 per cent
- KS-5662 ±2 per cent
- KS-5787 ±2 per cent
- KS-15570 ±2 per cent
- KS-15573 ±2 per cent

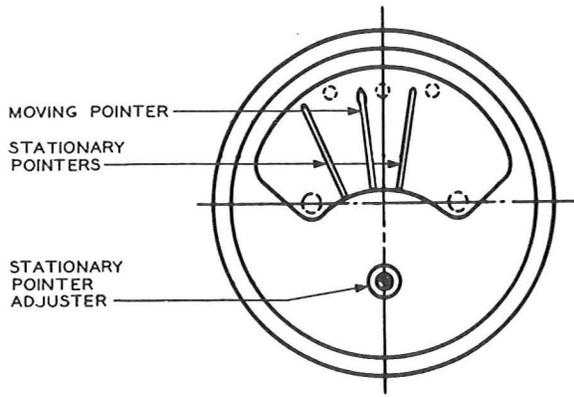


Fig. 3 - KS-5342 Front

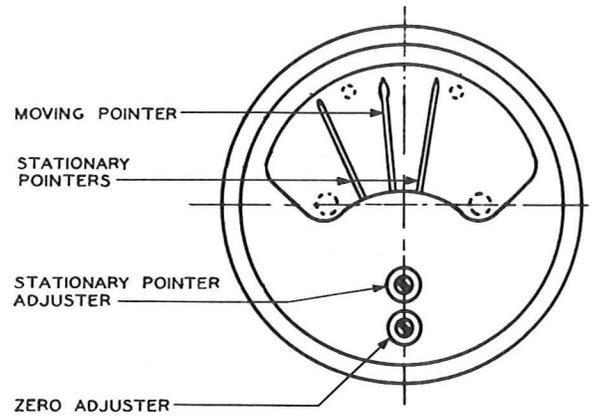


Fig. 4 - KS-5348 Front

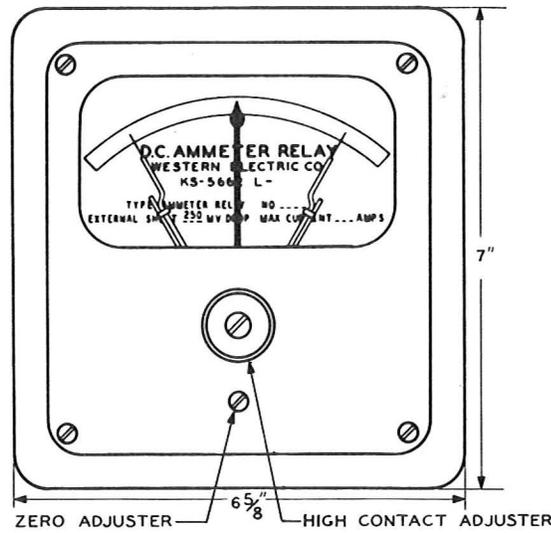


Fig. 5 - KS-5662 Front

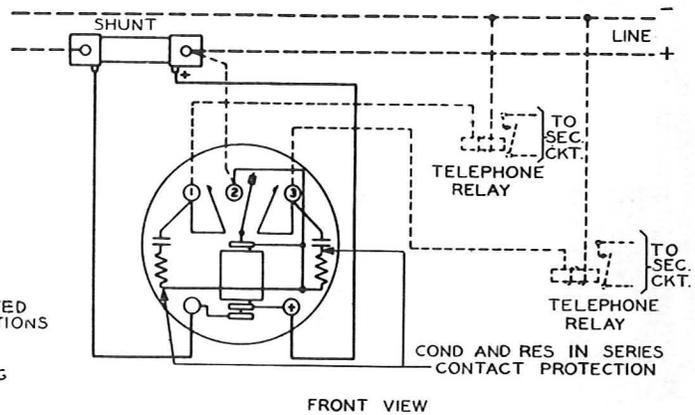
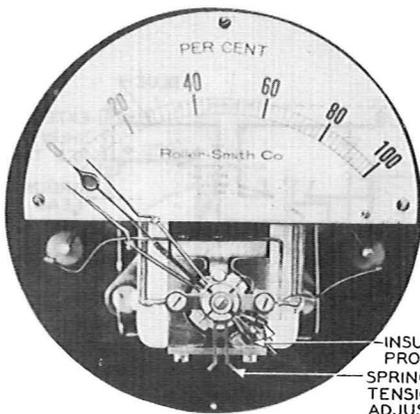


Fig. 6 - KS-5342 - Cover Removed

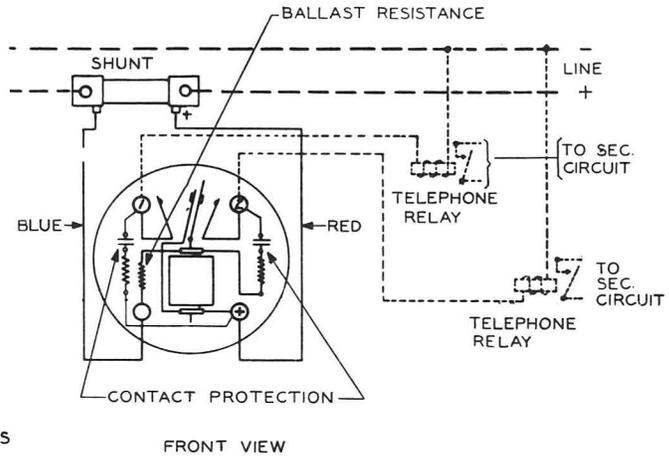
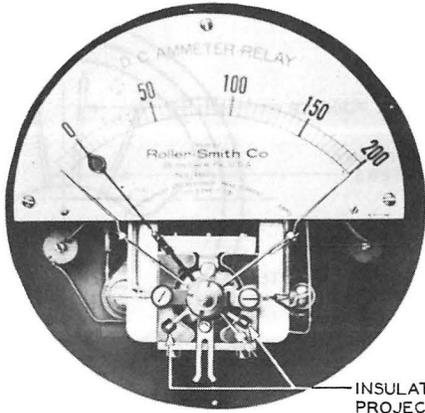


Fig. 7 - KS-5348 - Cover Removed

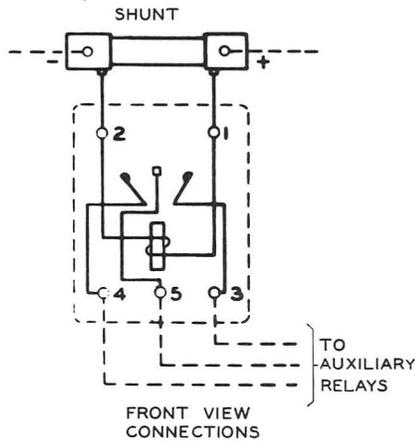
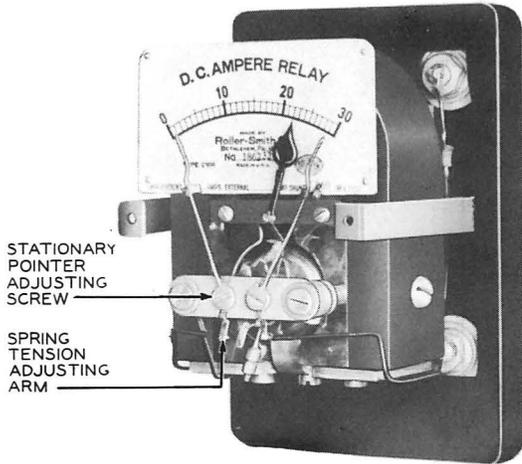


Fig. 8 - KS-5561 - Cover Removed

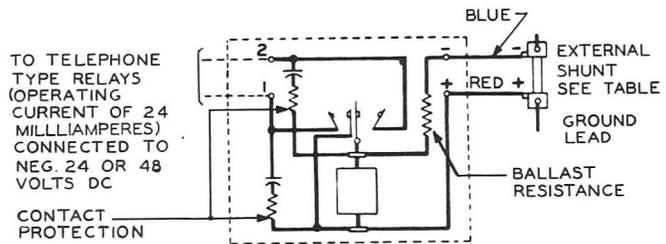
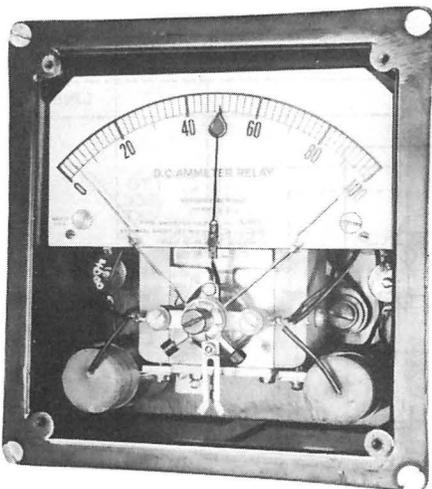


Fig. 9 - KS-5562 - Cover Removed

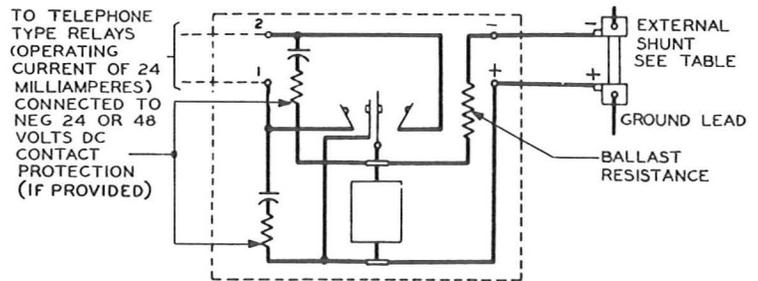
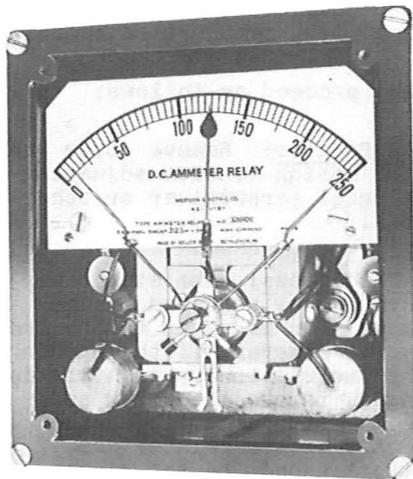


Fig. 10 - KS-5787 - Cover Removed

*#2.05 Temperature

(a) The shunt temperature shall not exceed 120C (248F). If conditions indicate the temperature is excessive, measure by thermometer.

(b) If the shunt shows no signs of overheating, that is, coloration or smoking, the temperature may be considered satisfactory.

Caution: Shunts reach temperatures at which it is dangerous to touch them.

3. ADJUSTING PROCEDURES3.001 List of Tools, Gauges, and MaterialsCode or
Spec No.DescriptionTools

265C	Contact Burnisher
R-2512	Adjustable Wrench, single end 8 inches or open end as required (to tighten current connection on shunts). Shunts require wrenches with openings as follows: 5 to 20A - 7/16 inch 25 to 50A - 9/16 inch 75 to 1000A - 3/4 inch 1200 to 1500A - 7/8 inch
→	3-inch Cabinet Screwdriver
→	4-inch Regular Screwdriver

Gauges

R-1032	Thermometer
KS-8039	Volt-milliammeter (Model 622)

Materials

-	Felt or Asbestos Pad
3.01	<u>Tightness of Shunt and Shunt Leads (Rq 2.01)</u>

(1) When necessary, tighten connections to the shunt and shunt leads using the R-2512 wrench.

*#3.02 Contact Cleaning (Rq 2.02)

(1) Clean the contacts as covered in Section A503.605.

*3.03 Freedom of Movement (Rq 2.03)

(1) Vary the current through the shunt. If the pointer does not smoothly follow this change, report it to the supervisor who may wish to return it for repairs.

*#3.04 Contact and Pointer Accuracy (Rq 2.04)

(1) During calibration of the ammeter relay, the secondary standard used for determination of actual current through the shunt may be either a model 1 dc ammeter with its shunt connected in series with the ammeter relay shunt or a millivoltmeter. Use of a KS-8039

→ volt-milliammeter as the secondary standard millivoltmeter is covered in (2).

(2) On ammeter relay shunts having 250-millivolt drop at rated full load, 40 per cent of full load would cause full scale deflection on a KS-8039 volt-milliammeter if the shunt leads were connected to its 100-MILLIVOLT binding post. In a like manner, an ammeter relay shunt having 312.5-millivolt drop at full load, with 32 per cent of full load connected to the same binding post, would cause a 100-millivolt drop with a resulting full scale deflection of the KS-8039 volt-milliammeter. It is suggested, therefore, that when the KS-8039 volt-milliammeter is used, the 100-MILLIVOLT post be used for loads up to 35 per cent and 30 per cent of the ammeter relay full scale for 250- and 312.5-millivolt drops, respectively; and the 1.5-volt tap on the VOLTS switch be used for larger loads.

(3) Vary the load as required and check the accuracy of relay contact settings and pointer readings.

→ Example 1: With the 100-millivolt connection on the KS-8039 volt-milliammeter, 75 on the 0-300 scale would represent $\frac{75}{300} \times 100 = 25$ millivolts. This is $\frac{25}{250} = 10$ per cent of the 250-millivolt shunt rated drop and if a 1000-ampere scale on the ammeter relay is used, the correct reading is 100 amperes. Or $\frac{25}{312.5} = 8$ per cent of the 312.5-millivolt shunt rated drop and if a 250-ampere scale is used on the ammeter relay, the correct reading is 20 amperes.

→ Example 2: With the 1.5-volt connection on the KS-8039 volt-milliammeter, on the 150 scale would represent $\frac{20}{150} \times 1500 = 200$ millivolts. This is $\frac{200}{250} = 80$ per cent of the 250-millivolt shunt rated drop and if an 800-ampere scale on the ammeter relay is used, the correct reading is 640 amperes. Or $\frac{200}{312.5} = 64$ per cent of the 312.5-millivolt shunt rated drop and if a 250-ampere scale on the ammeter relay is used, the correct reading is 160 amperes.

(4) If the relay does not meet the specified accuracy requirements, clean the contacts as covered in 3.02. If after

cleaning, the relay still does not function satisfactorily, readjust as required.

(5) To adjust, proceed as follows:

(a) KS-5342 Pointer: Remove cover and move the spring tension adjusting arm with a small screwdriver or other pointed tool.

(b) KS-5342 Contacts: The stationary pointers may be adjusted by the stationary pointer adjuster on the front of the cover. However, if the spacing between the two stationary pointers is to be changed, remove the cover and manipulate the insulated projections on the lower part of the pointer arm. These contacts cannot be set closer together than 5 per cent.

(c) KS-5348, KS-5662, KS-5787, KS-15570, or KS-15573 Pointer: Adjust by the zero adjuster on the front of the cover.

(d) KS-5348, KS-5662, KS-5787, KS-15570, or KS-15573 Contacts: One stationary pointer may be adjusted by the stationary pointer adjuster on the front of the cover. To adjust the other stationary pointer, remove the cover and manipulate the insulated projection on the lower part of the pointer arm.

(e) KS-5661 Pointer: Remove the cover and move the spring tension adjusting arm with a small screwdriver or other pointed tool.

(f) KS-5561 Contacts: Remove the cover and change the setting of the stationary pointer adjusting screw. A pin has been provided to limit the adjustment because the moving pointer contact will not make contact with the stationary pointer contact outside of a given range.

(6) After adjustment, replace the cover and recheck. If there is an adjustment screw on the outside of the cover, it is suggested that it be covered with wax or a sticker to insure that the adjustment will not be tampered with.

*#3.05 Temperature (Rq 2.05)

(1) To check the shunt temperature, hold the thermometer bulb against the shunt and cover that part of the bulb not in contact with the shunt with a small felt pad. Where the shunt has two or more laminations, the bulb may be held between any two laminations and the felt pad omitted.

Note: Where high temperatures cause the felt pad to smoke or char, asbestos on the face of the pad is suggested.

REASONS FOR REISSUE

1. To revise the description covering the KS-15570 and KS-15573 ammeter relays [1.07(f)].
2. To revise the descriptive information of Fig. 10 covering the KS-5787 ammeter relay.
3. To revise the requirement and procedure covering tightness of shunt and shunt leads (2.01 and 3.01).
4. To revise the requirement and procedure covering contact cleaning (2.02 and 3.02).
5. To revise the list of tools, gauges, and materials (3.001).