

LINE RELAYS

DESCRIPTION

1. GENERAL

1.01 This section covers the description of the 209FG, 209FH, 215H, 255A, 314A, and 314B relays used as line relays on teletypewriters, various types of subscriber sets employed on teletypewriter services, as well as in certain other applications.

1.02 While the 209FH and 215H relays are now rated Mfr Disc. (having been replaced by the 255A type relay), information is included herein on these relays for use at locations where they may still be in service.

1.03 The 314A and 314B relays have been developed to replace the 255A relay for use in standard teletypewriter service applications. The difference between these relays and their recommended application on teletypewriter services is discussed hereinafter.

1.04 No field maintenance is required on the 314A or 314B relays. If trouble is encountered the relay should be replaced.

2. DESCRIPTION

2.01 Table A shows the relays covered in this section as well as information regarding the number of windings provided and the resistance in ohms per winding.

TABLE A

<u>Code</u>	<u>Winding</u>	<u>Resistance in Ohms per Winding</u>	<u>Figure</u>
215H	2	85	1A,2
255A and 2-winding 209FH	2	136	1A,3,4
6-winding 209FG	4	185	1B,4
	2	115	
314A	2	136	-
314B	2	136	-

2.02 The relays shown in Table A are of the polar type and when used as line relays they may be operated by either neutral or polar signals. For use in circuits operated by neutral or open-and-close signals, one winding is connected in the line circuit and the other winding has a locally supplied biasing current. For use in circuits operated by polar signals, the two windings are usually connected in series aiding in the line circuit. The arrangement of the relay windings and terminals for the 209, 215, 255, 314A, and 314B type relays is shown in Figures 1A, 1B, and 1C. Figures 2, 3, and 4 illustrate the 215, 255, and 209 type relays, respectively, as viewed from the front and with the cover removed. Figure 5 illustrates the 314A and 314B type relays.

2.03 Tungsten contacts should always be used for the contact screws in the 209-type relays as well as in the 215A and 255A relays. Tungsten contacts can be identified by a T stamped on the screw head. When No. 4 metal contacts are found on contact screws, they should be replaced with tungsten contacts that have part numbers as follows:

<u>Relays</u>	<u>Tungsten Contact Screw</u>
209-type	P-356521
215H and 255A	P-356517

2.04 The 314A and 314B relays are equipped with a mercury-wetted contact switch and have the same base mounting configuration and electrical characteristics as the 255A relay, which they replace. The relays can therefore be substituted in place of the 255A relay.

**CAUTION: AVOID CARRYING OR PLACING THESE RELAYS IN THE VERTICAL POSITION, WITH BASE UP, JUST PRIOR TO INSERTING IN THEIR SOCKET AS IT IS POSSIBLE FOR THE MERCURY TO SHORT THE RELAY CONTACTS, CAUSING FUSES TO OPERATE. IF THESE RELAYS HAVE BEEN INVERTED, THEY SHOULD BE HELD IN THE CORRECT OPERATING POSITION FOR SEVERAL SECONDS PRIOR TO INSERTING IN THE SOCKET.**

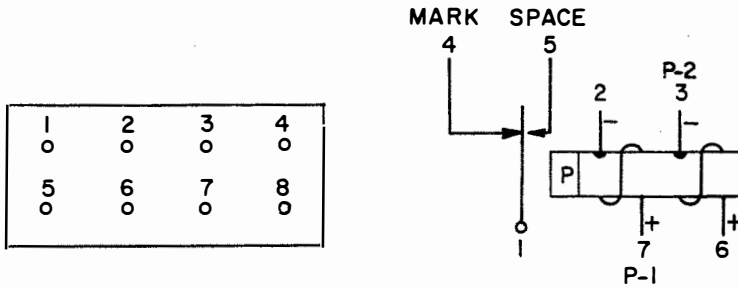


FIGURE 1A  
215-TYPE, 255A AND 2-WINDING 209-TYPE RELAYS

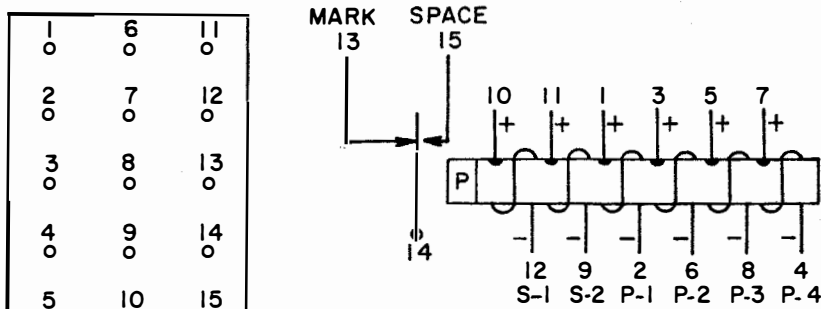


FIGURE 1B (SEE NOTE 1)  
6 WINDING 209-TYPE RELAYS

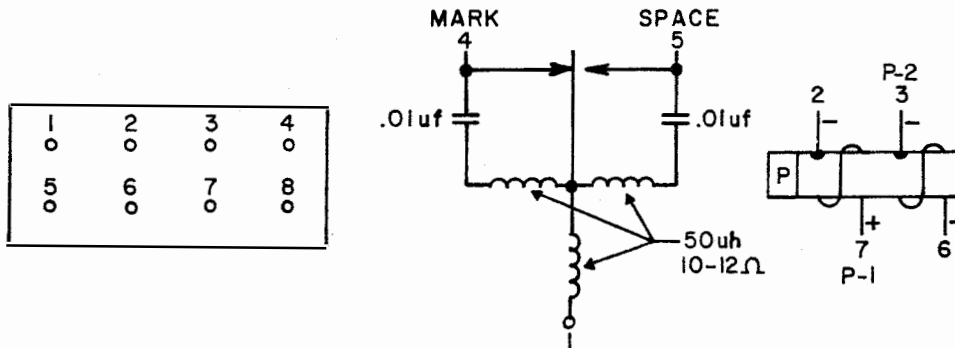


FIGURE 1C (SEE NOTE 2)  
314A RELAY

NOTES:

GENERAL: WINDING AND PIN TERMINAL ARRANGEMENTS AS VIEWED FROM THE REAR. (TERMINAL SIDE)

POTENTIALS OF POLARITIES INDICATED WILL OPERATE ARMATURES TO SPACING CONTACTS.

INNER END OF RELAY WINDINGS INDICATED BY SEMI-CIRCLES

1. FOR 2-WINDING 209-TYPE RELAYS, TERMINALS 6 AND 7 ARE THE INNER ENDS OF THE WINDINGS.
2. WITH THE EXCEPTION OF THE INTERNAL CONTACT PROTECTION NETWORK ASSOCIATED WITH THE 314A RELAY, THIS RELAY AND THE 314B RELAY ARE IDENTICAL.

Figure 1

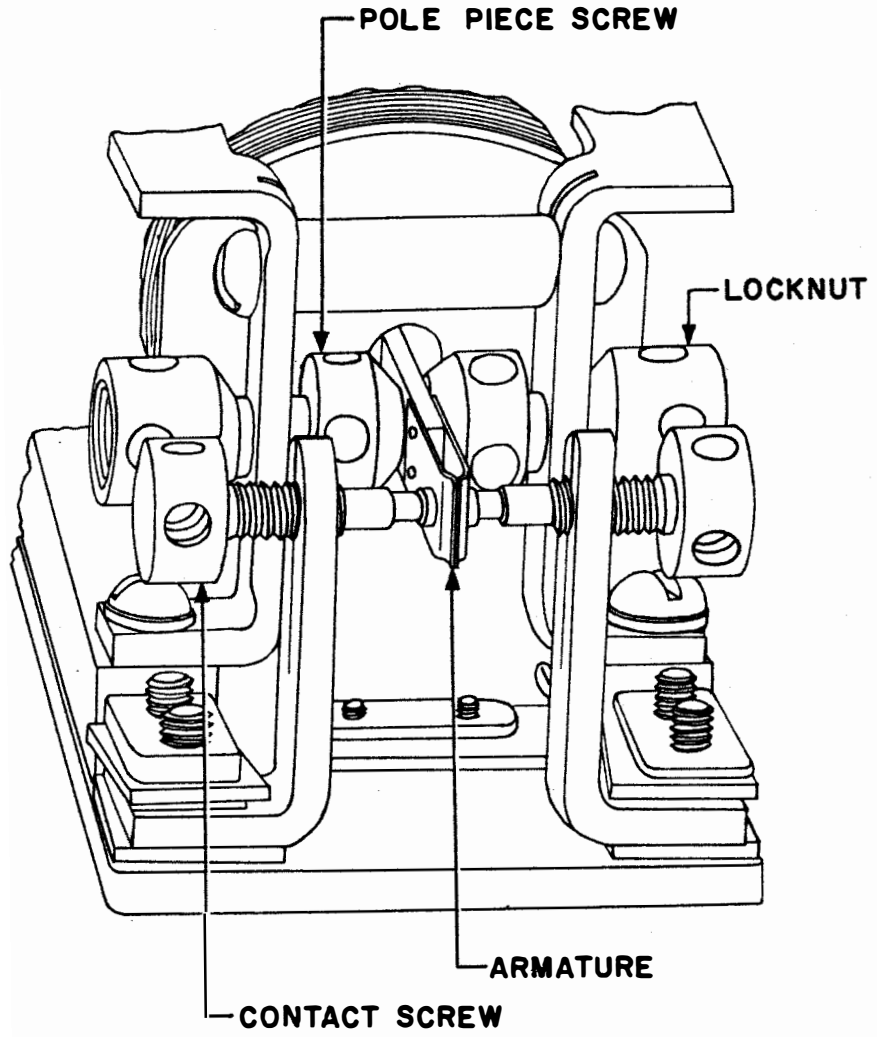


Figure 2 — 215-type Relay

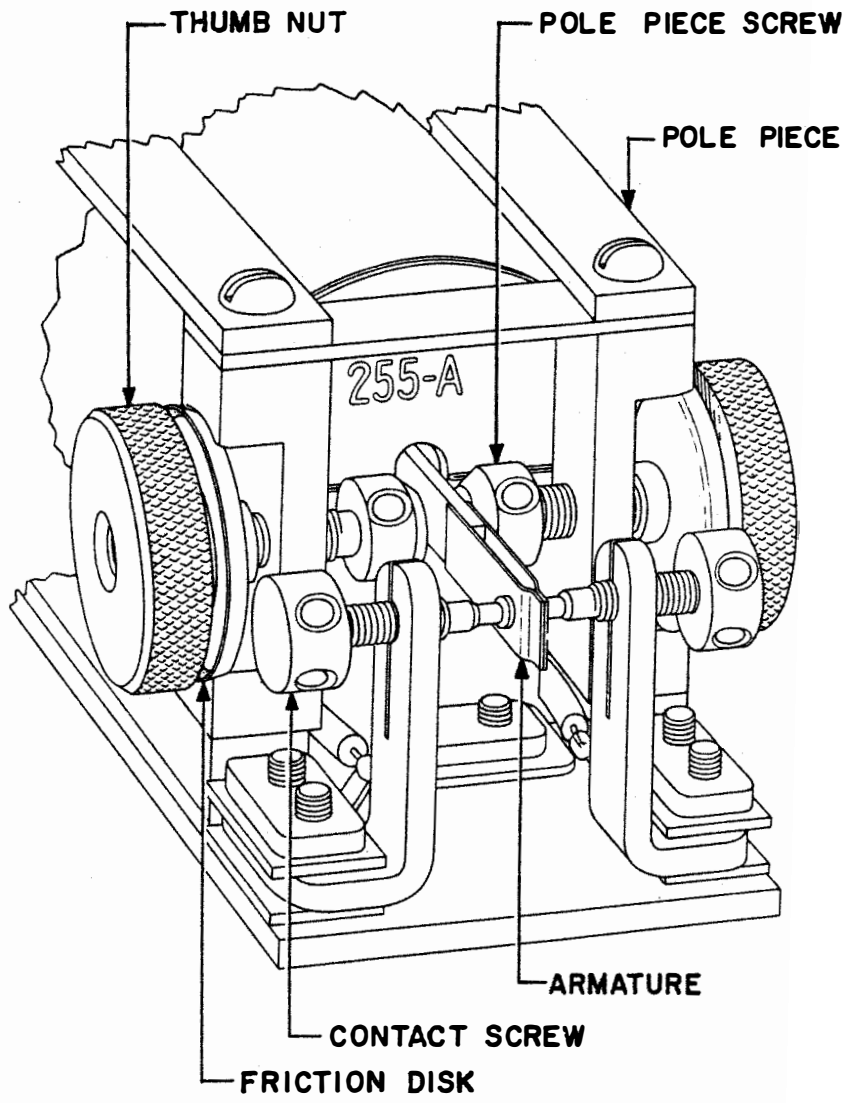


Figure 3 — 255-type Relay

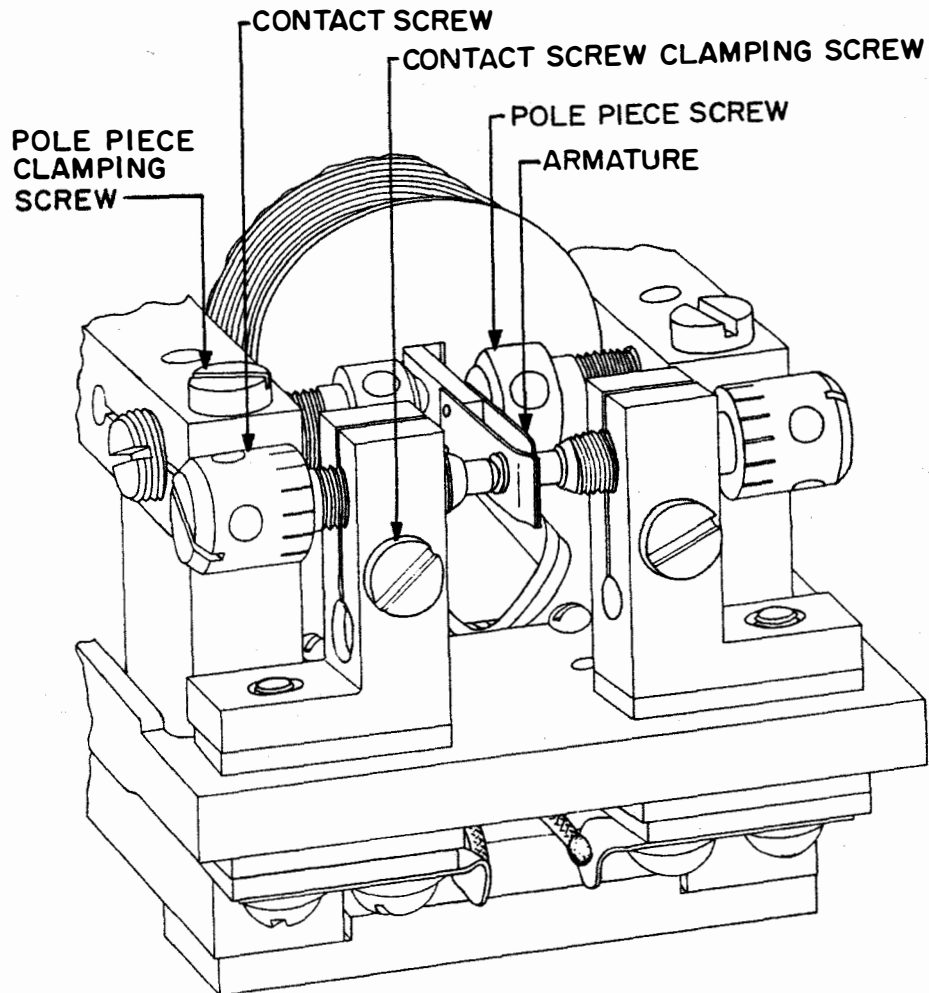


Figure 4 — 209-type Relay

2.05 The overall dimensions of the 314A and 314B relays are approximately 4.9 inches by 2.7 inches by 2.7 inches. The relays will mount on 2-3/4 inch vertical and horizontal centers, on 823-type or equivalent mounting plates, by means of an 18B connecting block. The relays consist of a double wound coil (136 ohms per winding), a 226D switch (nonbridging) assembled in a rectangular metal container and mounted on an insulated base. The 314A relay has an internal contact protection network while the 314B relay is not so equipped. The base provides eight plug-in terminals and four keyed plug-in mounting posts. The relays can be operated in a horizontal position with the orientation mark at the top, or in a vertical position with the base on the bottom.

2.06 The 314A relay has an armature travel time which is substantially shorter than

the 255A relay which it replaces. In conjunction with 255A relays, wave shaping networks (commonly called spark suppression networks) are used in most equipment applications across the relay contacts. For neutral operation these networks should be removed in dc telegraph repeaters when the 255A relays are replaced with the 314A type, as they overcompensate for the shorter armature travel time of the 314A relay and produce marking bias. Removal of the networks provides better transmission.

2.07 Bias does not occur when equipment is arranged for polar operation, as the armature travel time is equal for both mark-to-space and space-to-mark transitions. For polar operation the contact suppression networks (generally 0.05 uf and 1600 ohms) must be retained in the 13F1 and 13S1 repeaters as the line noise suppression units (noise killers)

have high Q coils. A voltage can be built up across these coils that is sufficiently high to damage the relay contacts.

2.08 It should be noted that the internal contact protection network in the 314A relay is for the protection of the relay contacts and does not contribute materially to waveshaping.

2.09 The electrical characteristics of the 40B1, 40B2, and 40C1 carrier telegraph systems are such that the 314B relay, rather than the 314A relay, is required in the send position of these systems due to the high impedance of the associated circuit. The 314B relay is not suitable, however, for the break position of the 40B1

or 40B2 systems, as excessive contact deterioration may result; thus, the 314A relay should be used in that position. Either the 314A or 314B relay will operate satisfactorily in the break position of the 40C1 system and in the level compensator position of the 40B2 system.

2.10 In connection with the field application of the 314 type relays, the 314B relay should not be used for any teletypewriter service applications other than the 40-type carrier telegraph systems discussed in 2.09. The 314A relay should be used in all other applications. In applying the 314A relay as a replacement for the 255A relay, all such relays should be replaced at the same time in equipment that uses more than one relay.

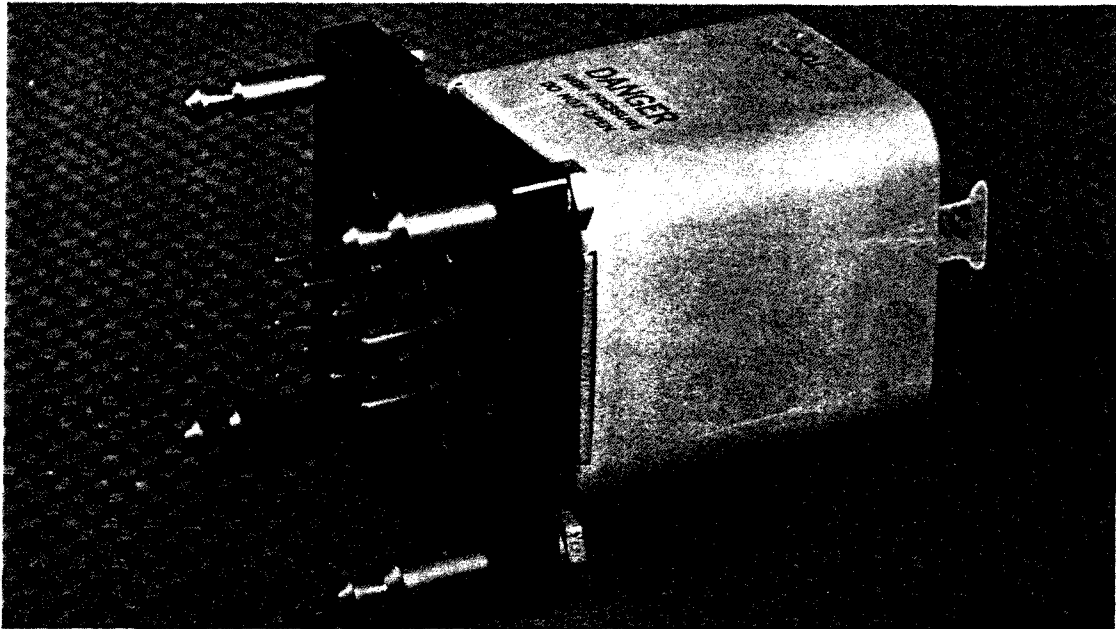


Figure 5 — 314A- and 314B-type Relays