21 AND 22 TYPE TELEGRAPH RELAYS

1. GENERAL

1.01 This section covers 21 and 22 type telegraph relays and replaces specification X-70293-01, Issue 2.

1.02 Reference shall be made to Section 400.001, covering General Requirements and Definitions for additional information necessary for the proper application of the requirements listed herein.

1.03 Part 1 "General" and Part 2, "Requirements" form part of the Western Electric Co. Inc. Installation Department Handbook.

1.04 Operate means that the operate current shall pull the armature towards the pole piece until the armature contact touches the front contact or stop.

1.05 Non-operate means that when the non-operate current is applied, the armature shall not move from the unoperated position against the back contact or stop sufficiently to cause an unreliable contact.

1.06 Release means that when the current is reduced from the operate value to the release value, the armature shall move from the operated position sufficiently to open normally open contacts, and to make reliably contacts that have been broken.

REASON FOR ISSUE COVERING CHANGES IN GENERAL

1. To cover 21 and 22 type relays in general.

2. To change the definitions of Non-operate and Release to include a reference to reliable contact (1.05 and 1.06).

2. REQUIREMENTS

2.01 Relay Mounting
(a) The sub-base shall be securely fastened to the mounting. Gauge by feel.
(b) The base shall be securely fastened to the sub-base. Gauge by feel.
(c) The coil adjusting bracket, goose neck, armature base and windlass bracket shall be securely fastened to the base. Gauge by feel.
(d) The contact and winding terminals shall be fastened securely to the base. Gauge by feel.

2.02 Armature Movement The armature shall move freely in its bearings and shall have a slight but not excessive side play. Excessive shall be interpreted to mean more than .005". The side play shall be measured when the armature is moved from side to side in line with the axis of the bearings. Gauge by eye and feel.

2.03 Contact Alignment Contacts shall line up so that their centers are not out of alignment more than 20% of the diameter of the contact points (.012") when the armature side play is taken up in both directions. Gauge by eye.

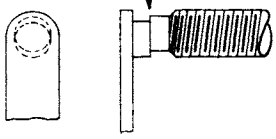

Fig. 1

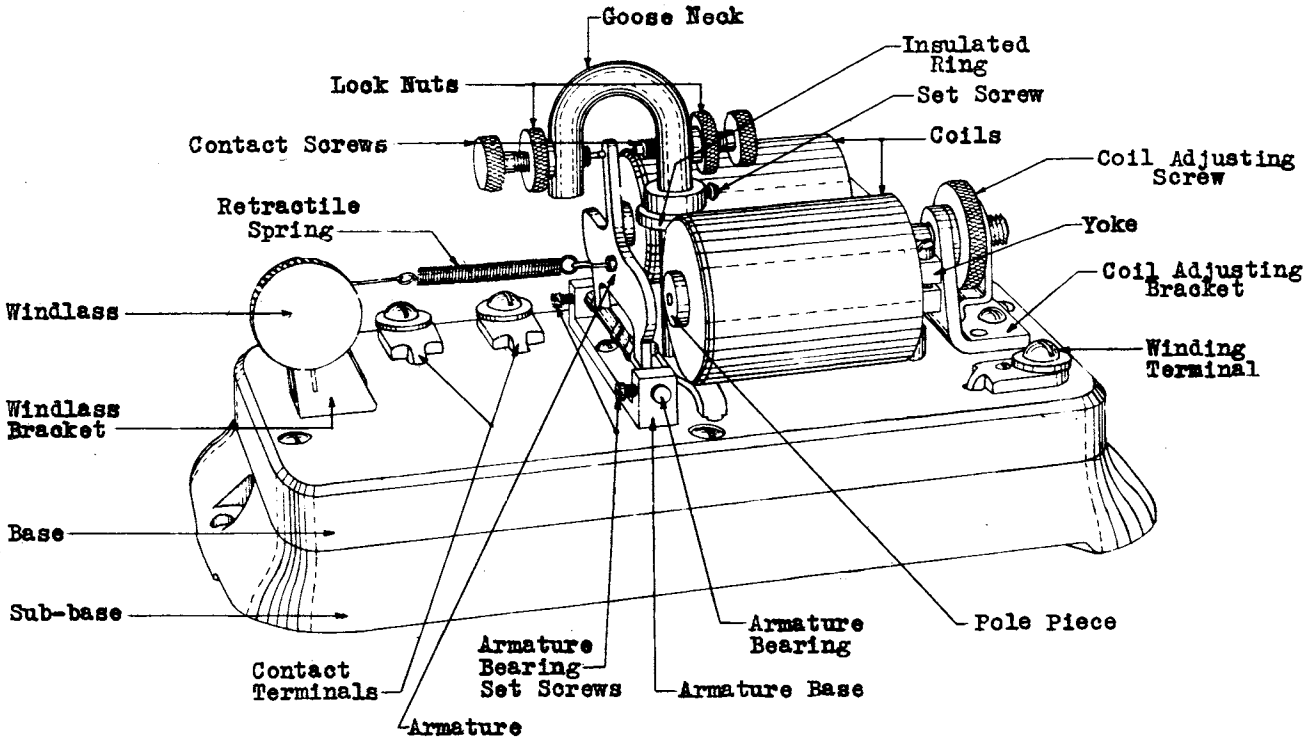

Fig. 2

2.04 Coil Movement The insulated ring on the goose neck shall hold the coils to prevent shaking. Gauge by feel.

2.05 Tightness of Windlass The windlass shall be sufficiently tight in the bracket to hold the adjusted position. Gauge by feel.

2.06 Tightness of Lock Nuts The lock nuts shall be sufficiently tight to hold the contact and stop screws in the adjusted positions. Gauge by feel.

2.07 Electrical Requirements A relay shall meet the electrical requirements specified on the circuit requirement table.

2.08 Contact Cleaning Contacts shall be cleaned when necessary in accordance with Section 460.005 covering cleaning procedures for relay contacts and parts.

REASON FOR ISSUE COVERING CHANGES IN REQUIREMENTS

1. To add a requirement for relay mounting (2.01).

2. To omit requirements for Unoperated Position of Armature, Contact Separation and Magnetic Air-Gap (2.5, 2.7 and 2.8 of X-70293-01, Issue 2).

3. ADJUSTING PROCEDURES

TOOLS

Code No.	Description
45	Wrench 5/16" Hex. Socket
46	Wrench 3/8" Hex. Socket
-	Bell System Cabinet Screwdriver 3 1/2" per A.T.&T. Co. Drawing 46-X-40
-	Bell System P-Long Nose Pliers - 6 1/2" per A.T.&T. Co. Drawing 46-X-56

GAUGES

74-D (or the replaced 74-C or 74-A)	Gauge Nest

3.01 RELAY MOUNTING (Rq.2.01)

M-1 If the relay is not fastened securely to the mounting, tighten the screws that hold the sub-base to the mounting using the 3 1/2" cabinet screw-driver.

M-2 If the base is not fastened securely to the sub-base attempt to tighten the base mounting screws using the 3 1/2" cabinet screw-driver. If it is not possible to tighten these screws remove the relay from the mounting and tighten the base mounting screws while holding the nuts in place with the No. 45 wrench. Before remounting the relay see that the coil adjusting bracket, goose neck, armature base, windlass bracket and contact and winding terminals are fastened securely and if they are not, tighten them as covered in M-3, to M-7 inclusive.

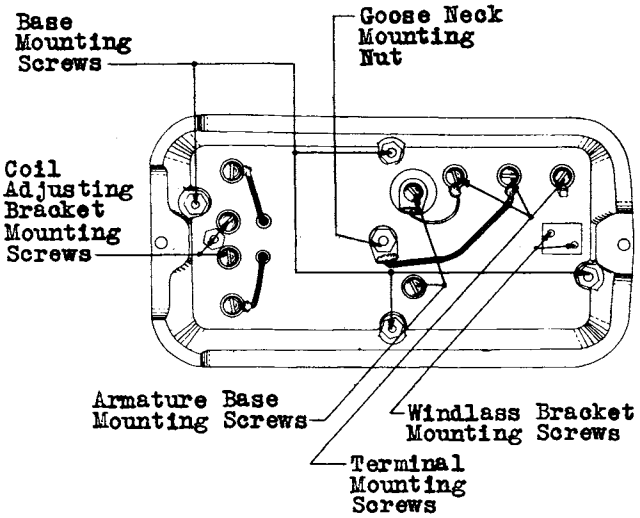

Fig. 3 - Designation of Mounting Screws and Nut

M-3 If the coil adjusting bracket is loose attempt to tighten the mounting screw, the head of which is visible from the top of the relay, using the 3 1/2" cabinet screw-driver. If it is not possible to tighten this screw remove the relay from the mounting and tighten the screw while holding the nut in place with the No. 45 wrench. Also tighten the two screws which hold the bracket from the under side of the base.

M-4 If the goose neck is loose remove the relay from the mounting and tighten the goose neck mounting nut with the No. 46 wrench.

M-5 If the armature base is loose remove the relay from the mounting and tighten the armature base mounting screws using the 3 1/2" cabinet screw-driver.

M-6 If the windlass bracket is loose tighten the windlass bracket mounting screws using the 3 1/2" cabinet screw-driver.

M-7 If the contact and winding terminals are not fastened securely to the base remove the relay from the mounting and tighten the terminal mounting screws with the 3 1/2" cabinet screw-driver.

3.02 ARMATURE MOVEMENT (Rq.2.02)
3.03 CONTACT ALIGNMENT (Rq.2.03)

M-1 If the armature binds or has excessive side play loosen the armature bearing set screws with the 3 1/2" cabinet screw-driver and shift the bearings by tapping them lightly with the screw-driver. At the same time align the contacts in accordance with M-2. Retighten the set screws.

M-2 If the contacts do not line up horizontally shift the armature exercising care not to disturb the adjustment made in M-1.

M-3 If the contacts do not line up vertically replace the armature.

3.04 COIL MOVEMENT (Rq.2.04)

M-1 If the position of the insulated ring does not prevent the shaking of the coils loosen the set screw that holds the insulated ring in position on the goose neck using the 3 1/2" cabinet screw-driver and adjust the position of

3.04 (Continued)

the ring until the shaking or rocking movement of the coils is practically eliminated. The ring should not be so tight on the coil that the coil will not freely follow the movement of the coil adjusting screw. Replace defective set screws.

3.05 TIGHTNESS OF WINDLASS (Rq.2.05)

M-1 If the windlass is not held securely by the windlass bracket remove the windlass from the bracket by exercising a turning upward movement. Take care not to distort the retractile spring. Force the slotted parts of the bracket closer together with the long nose pliers. Replace the windlass by forcing it between the slotted parts of the bracket.

3.06 TIGHTNESS OF LOCK NUTS (Rq.2.06)
3.07 ELECTRICAL REQUIREMENTS (Rq.2.07)

M-1 Unoperated Position of Armature Loosen the lock nuts on the contact (or stop) screws and adjust the screws until the armature is in an approximately vertical position. Retighten the lock nut on the back contact screw securely.

M-2 Operated Position of Armature (Contact Separation) With the lock nut on the front contact (or stop) screw loosened adjust the screw until with the armature in the unoperated position the .005" blade of the No. 74-D gauge just fits between the armature and the front contact (or stop) screw. Retighten the lock nut securely without changing the position of the screw.

M-3 Magnetic Air-Gap Turn the coil adjusting screw in a counter-clockwise direction until the pole pieces just touch the armature. If one pole piece touches the armature before the other, shift the core of the coil not touching the armature until it does touch. To do this loosen the screw that clamps the core of this coil to the yoke. Tighten the clamping screw. Then turn the coil adjusting screw in a clockwise direction one full turn.

M-4 Electrical Requirements If the relay fails to operate decrease the tension of the retractile spring by turning the windlass in a clockwise direction. If the relay fails to meet the non-operate or release requirements increase the tension of the retractile spring by turning the windlass in a counter-clockwise direction.

M-5 If the non-operate requirement can not be met without impairing the adjustment to meet the operate requirement decrease the magnetic air-gap slightly by turning the coil adjusting screw in a counter-clockwise direction. After setting the magnetic air gap, increase or decrease the retractile spring tension until both the operate and non-operate requirements are met.

M-6 If the release requirement can not be met without impairing the adjustment to meet the operate requirement increase the magnetic air-gap slightly by turning the coil adjusting screw in a clockwise direction and recheck in accordance with M-4 and M-5.

3.08 CONTACT CLEANING (Rq.2.08)

M-1 Clean the contacts in accordance with Section 460.005 covering cleaning procedures for relay contacts and parts.

REASON FOR ISSUE COVERING CHANGES IN ADJUSTING PROCEDURES

1. To add adjusting procedures for relay mounting (3.01).

2. To include the adjusting procedures for Unoperated Position of Armature, Contact Separation and Magnetic Air-Gap as part of the adjustment for Electrical Requirements (3.06 and 3.07).

3. To omit the exception of relays mounted vertically to the Magnetic Air-Gap adjustment (3.06 and 3.07).

APPROVED:

Bell Telephone Laboratories, Inc. FAC 10-2-29
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