

44-TYPE RELAYS

REQUIREMENTS AND ADJUSTING PROCEDURES

1. GENERAL

1.01 This section covers 44-type relays. It is reissued to incorporate material from the addendum in its proper location. In this process marginal arrows have been omitted.

1.02 Reference shall be made to Section 020-010-711 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 Requirements are marked with an asterisk (*) when to check for them would necessitate the dismantling or dismantling of apparatus, or would affect the adjustment involved or other adjustments. No check need be made for these requirements unless the apparatus or part is made accessible for other reasons or its performance indicates that such a check is advisable.

1.05 Operate (Line Winding) means that when the operate current is applied to the line winding, the operating (rear) armature shall move towards its core sufficiently to release the restoring (front) armature, which shall close the contact reliably.

1.06 Non-Operate (Line Winding) means that when the non-operate current is applied to the line winding, the operating (rear) armature shall not move towards its core sufficiently to release the restoring (front) armature.

1.07 Release (Line Winding) means that when the current is reduced from the operate value to open circuit, the operating (rear) armature shall return to the unoperated position so that the tripping latch will be in position to engage the restoring (front) armature.

1.08 Operate (Restoring Winding) means that when the operate current is applied to the restoring winding, the restoring (front) armature shall move towards its core sufficiently to engage the tripping latch and open the contacts.

1.09 Figs. D and A/C The electrical requirements formerly covered by these figures are now given on page 3.

2. REQUIREMENTS

2.01 Cleaning The contacts and parts shall be cleaned when necessary in accordance with the section covering cleaning of relay contacts and parts.

2.02 Relay Mounting The relay shall be fastened securely to the mounting plate. Gauge by feel.

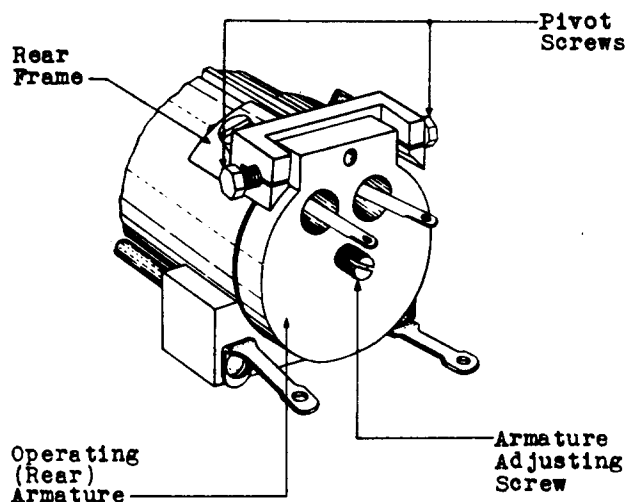


Fig. 1

2.03 Armature Movement - Fig. 1 (A) - The operating (rear) and restoring (front) armatures shall move freely in their 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 armatures are moved from side to side in line with the axes of their pivot screws. Gauge by feel and by eye.

*2.04 Tripping Latch Movement and Position

(a) There shall be no obstruction interfering with the free movement of the tripping latch. Gauge by feel and by eye.

(b) The latch shall not touch the sides of the slot in the mounting plate or front frame with the side play of the operating (rear) armature taken up in both directions. Gauge by eye.

2.05 Contact Alignment - Fig. 2 (A) - Contacts shall line up so that the point of contact falls wholly within the boundary of the opposing contact. Gauge by eye.

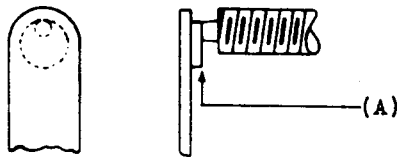


Fig. 2

***2.06 Tightness of Spring Assembly Clamping Nut - Fig. 3 (A) -** The nut which holds the contact screw bracket shall be sufficiently tight to hold the bracket in its proper position. Gauge by feel.

***2.07 Tightness of Contact and Pivot Screws Fig. 3 (B) -** The contact and pivot screws shall be sufficiently tight in their brackets to hold any adjusted position. Gauge by feel.

2.08 Contact Separation There shall be perceptible clearance (approximately .005") between the contact spring and the contact screw with the tripping latch engaged with the restoring (front) armature. Gauge by eye.

2.09 Electrical Requirements

(a) Except as specified in (b) and (c), all relays shall meet the electrical requirements specified on the circuit requirement tables.

(b) When the relay is used in a toll or telegraph circuit in a toll office and (1) and a-c voltage test set is used and (2) a-c voltage requirements are not shown in the circuit requirement table,

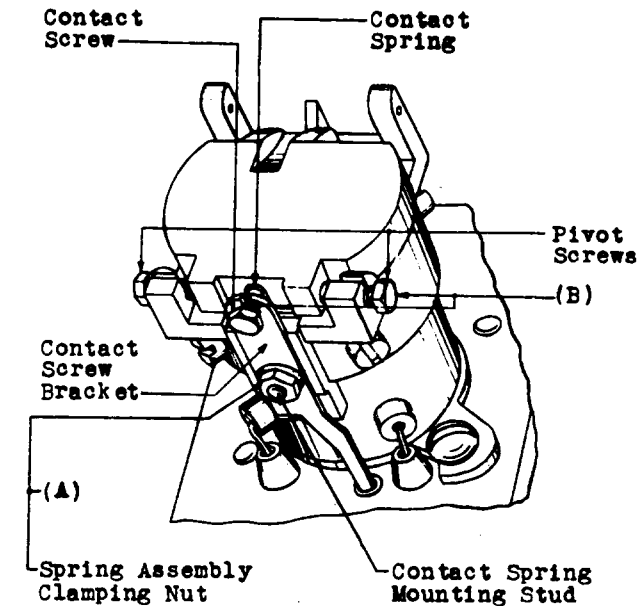


Fig. 3

the following a-c voltage requirements shall be used.

(c) When the Circuit Requirements Table refers to Figs. D or A/C of the "X" specification or specifies the electrical test and readjust requirements to be in accordance with the B.S.P., R.A.P., or "X" specification, the requirements given on page 3 shall apply. The particular requirements that are to be applied shall be determined by the ringing voltage and frequency involved or as specified by item number.

A-C VOLTAGE REQUIREMENTS						
Relay Code	Type of Swbd.	Type of Circuit	Freq. In Cycles	A-C Test and Readjust Requirements		Shunt Res. Ohms
				Meter Settings		
				Volts Across Relay Winding		
				Test Opr.	Readj. Opr.	
44A (Line)	No. 1	Intertoll	16 2/3	18.5	16.5	225
44C (Wdg.)	Toll	Trunk	20	21.0	18.5	
44D (Line)	No. 1	Toll	16 2/3	19.5	17.5	225
44D (Wdg.)	Toll	Cord	20	22.0	20.0	

ELECTRICAL REQUIREMENTS FOR 44-A AND 44-C RELAYS IN TOLL LINE CIRCUITS											
WHEN RESISTANCE NETWORK METHOD OF TESTING AND ADJUSTING IS USED				WHEN LOW SHUNT METHOD OF TESTING AND ADJUSTING IS USED							
FREQUENCY IN CYCLES	VOLTAGE AT BUS BAR	N.I. RESISTANCE "X"		ITEM NO.	FREQUENCY IN CYCLES	AC TEST AND READJUST CURRENT FLOW REQUIREMENTS					
		READJUST OPERATE	NON-OPER.			CURRENT IN RELAY AMPERES		METER SETTING AMPERES		SHUNT RESISTANCE #	ITEM NO.
16-2/3	75-80	470	290	1.01	16-2/3	.010	.0075	.118	.100	230 ω	
	80-85	450	275	1.02				.121	.102	225 ω	3.011
	85-90	430	260	1.03				.134	.110	230 ω	3.02
	90-95	410	245	1.04				.137	.112	225 ω	3.021
	95-100	390	230	1.05							
	100-105	370	220	1.06							
	105-110	350	205	1.07							
	110-115	330	195	1.08							
20	115-120	310	175	1.09	20	.010	.0075	.134	.110	230 ω	3.02
	75-80	580	330	1.10				.137	.112	225 ω	3.021
	80-85	530	305	1.11							
	85-90	495	285	1.12							
	90-95	465	265	1.13							
	95-100	440	245	1.14							
	100-105	415	230	1.15							
	105-110	395	220	1.16							
20	110-115	375	205	1.17	20	.010	.0075				
	115-120	355	190	1.18							
Notes 1, 2, 4 and 5 on this page apply to the above items.				Notes 1 and 6 on this page apply to the above items. # Meter setting values shall be chosen to conform to the particular value of shunt resistance in the testing or adjusting circuit.							
				3. Testing and readjusting shall be done with the DC bridge of the cord circuit							

44-D RELAY IN TOLL CORD CIRCUITS WHEN RESISTANCE NETWORK METHOD OF TESTING AND ADJUSTING IS USED				
FREQUENCY IN CYCLES	VOLTAGE AT BUS BAR	N.I. RESISTANCE "X" OPERATE	OPERATE TEST	ITEM NO.
16-2/3	75-80	470	520	2.01
	80-85	450	500	2.02
	85-90	430	480	2.03
	90-95	410	460	2.04
	95-100	390	440	2.05
	100-105	370	420	2.06
	105-110	350	400	2.07
	110-115	330	380	2.08
	115-120	310	360	2.09
20	75-80	580	640	2.10
	80-85	530	590	2.11
	85-90	495	560	2.12
	90-95	465	530	2.13
	95-100	440	500	2.14
	100-105	415	480	2.15
	105-110	395	450	2.16
	110-115	375	430	2.17
	115-120	355	420	2.18
Notes 1, 3, 4 and 5 on this page apply to the above items.				

NOTES

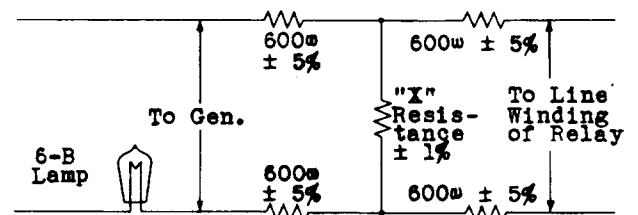
1. Testing and readjusting shall be done with the standard testing and adjusting circuits, networks or AC milliammeter circuit, if installed; if not, the current values, meter settings or resistance values specified in the tables on this page shall be used in connection with the testing and adjusting networks shown in Notes 5 and 6.

2. Readjusting shall be done when the relay is isolated from the toll line. No test requirements are specified.

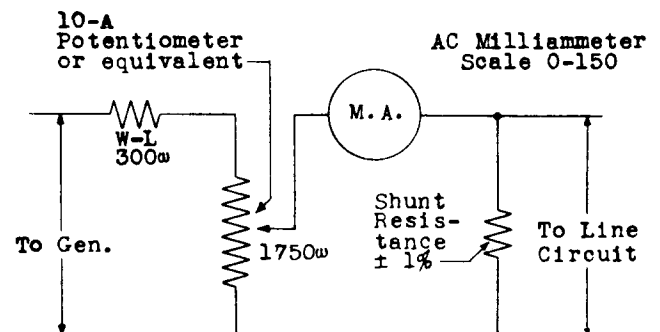
3. Testing and readjusting shall be done with the DC bridge of the cord circuit not shunting the relay.

4. If the voltage at bus bar overlaps two items, the resistance values for the lower voltage band should be used.

5. Testing and Adjusting Network



6. Testing and Adjusting Network



Vary the potentiometer arm to get specified meter setting. This shall be done before the testing and adjusting circuit is connected to the circuit under test.

3. ADJUSTING PROCEDURES**3.001 List of Tools, Gauges and Test Apparatus**

<u>Code No.</u>	<u>Description</u>
<u>Tools</u>	
74	Wrench - 5/32" and 7/32" Hex. Open Double-end - Flat
349	Wrench - 3/16" and 7/32" Hex. Closed Double-end - Offset
KS-6015	Duck-bill Pliers
KS-6854	Screw-driver - 3-1/2"
-	Bell System Cabinet Screw- driver - 3-1/2" per A.T.& T.Co. Dwg. 46-X-40
-	Bell System - P-Long Nose Pliers - 6-1/2" per A.T.& T.Co. Dwg. 46-X-56

Gauges

74-D Thickness Gauge Nest

Test Apparatus

35-C Test Set

3.01 Cleaning (Rq.2.01)

- (1) Clean the contacts and other parts in accordance with the section covering cleaning of relay contacts and parts.

3.02 Relay Mounting (Rq.2.02)

- (1) To tighten loose mounting screws use the 3-1/2" cabinet screw-driver.

3.03 Armature Movement (Rq.2.03)

- (1) If either the restoring (front) or operating (rear) armature binds in its bearings, it may be due to dirty or defective bearings or insufficient side play. If the side play is within the specified limit and the armature fails to operate satisfactorily, clean the bearings in accordance with procedure 3.01.

- (2) If the amount of side play is too small, adjust the pivot screws with the No. 74 wrench so that the side play is about .005". One quarter turn of the screw back from finger tight provides approximately .005" side play. Exercise care not to turn in one screw much more than the other since otherwise the trip-

ping latch may not clear the sides of the slot in the mounting plate and front frame or the restoring (front) armature which is counterbored may strike the protruding core.

- (3) If the side play is excessive turn the pivot screws in a clockwise direction with the No. 74 wrench.

3.04 Tripping Latch Movement and Position (Rq.2.04)

- (1) If the tripping latch does not clear the slot in the front frame and mounting plate, it may be due to the operating (rear) armature not being centered or the tripping latch not being straight.

- (2) If the operating (rear) armature is not centered, turn the pivot screws in a clockwise or counter-clockwise direction as required. Exercise care in making this adjustment to see that the armature still operates freely and without too much side play.

- (3) If the tripping latch is not straight, back off the operating (rear) armature pivot screws with the No. 74 wrench so as to permit removing the operating (rear) armature. Tilt the operating (rear) armature downward so as to lift the front of the tripping latch up and then pull the armature back. After the front of the tripping latch comes through the mounting plate turn the armature through an angle of 180°. This will permit more of the tripping latch to be adjusted. Adjust the tripping latch with the duck-bill pliers. Access for adjusting the tripping latch may also be obtained by removing the two screws that hold the rear frame to the shell. This will permit removing the entire rear frame and armature assembly.

3.05 Contact Alignment (Rq.2.05)**3.06 Tightness of Spring Assembly Clamping Nut (Rq.2.06)****3.07 Tightness of Contact and Pivot Screws (Rq.2.07)**

- (1) If the mounting plate is located so that the spring assembly clamping nut is inaccessible for adjustment remove the mounting plate to make the adjustments outlined in (2) to (4).

- (2) If the contacts are not in alignment from front to rear, loosen the spring assembly clamping nut slightly with the No. 74 wrench and shift the contact screw bracket as required. Tighten the clamping nut securely.

- (3) If the contacts are not in alignment sideways or the contact spring is bent so that the contacts do not line up

properly, remove the spring assembly clamping nut with the No. 349 wrench and remove the contact screw bracket and insulators. To shift the contact spring or remove the contact spring so that the spring may be adjusted, remove the contact spring mounting stud. To do this loosen the stud with the smaller end of the No. 74 wrench and then shift the contact spring as required. Tighten the stud securely and reassemble the parts. To straighten the spring remove the stud and adjust the spring with the duck-bill pliers. After the contact spring has been properly adjusted, reassemble all parts.

(4) If the contact or pivot screws are too loose in their brackets remove them with the No. 74 wrench and close the slot in the bracket as necessary with the long-nose pliers. Replace the screw and if still too loose repeat the adjustment. If the screws are too tight in their brackets, the slot may be widened by forcing the blade of the KS-6854 screw-driver into it.

3.08 Contact Separation (Rq.2.08)

(1) If there is no perceptible separation between the contact screw and the front contact, turn the contact screw in a clockwise direction with the No. 74 wrench until the contact screw just touches the front contact. Then turn the contact screw in a counter-clockwise direction approximately 1/4 turn which will allow a clearance between the front contact and the screw of approximately .005".

3.09 Electrical Requirements (Rq.2.09)

(1) General If the relay fails to meet the electrical requirements, adjust as follows:

(2) Operate and Non-Operate (Line Winding)
Failure of the relay to meet either of these current requirements is probably due to the air-gap between the operating (rear) armature and the core when the relay is in the unoperated position, being incorrect. If the relay fails to operate decrease the unoperated air-gap. If the relay fails to meet the non-operate requirement increase the air-gap. To do this remove the tripping latch as outlined in procedure 3.04 and change the angle of the latch with respect to the operating (rear) armature. To do this grasp the latch near where it is fastened to the operating (rear) armature, with the long nose pliers, then force the armature toward or away from the latch manually. Adjusting the armature away from the tripping latch will increase the air-gap and adjusting toward the latch will decrease the air-gap. Reassemble the parts and if the relay still does not meet the requirement, repeat the adjustment until it does.

(3) Release (Line Winding) Failure of the operating (rear) armature to release is probably due to the air-gap between the armature and the core when the relay is in the operated position being too small. If the relay fails to release turn the armature adjusting screw in a clock-

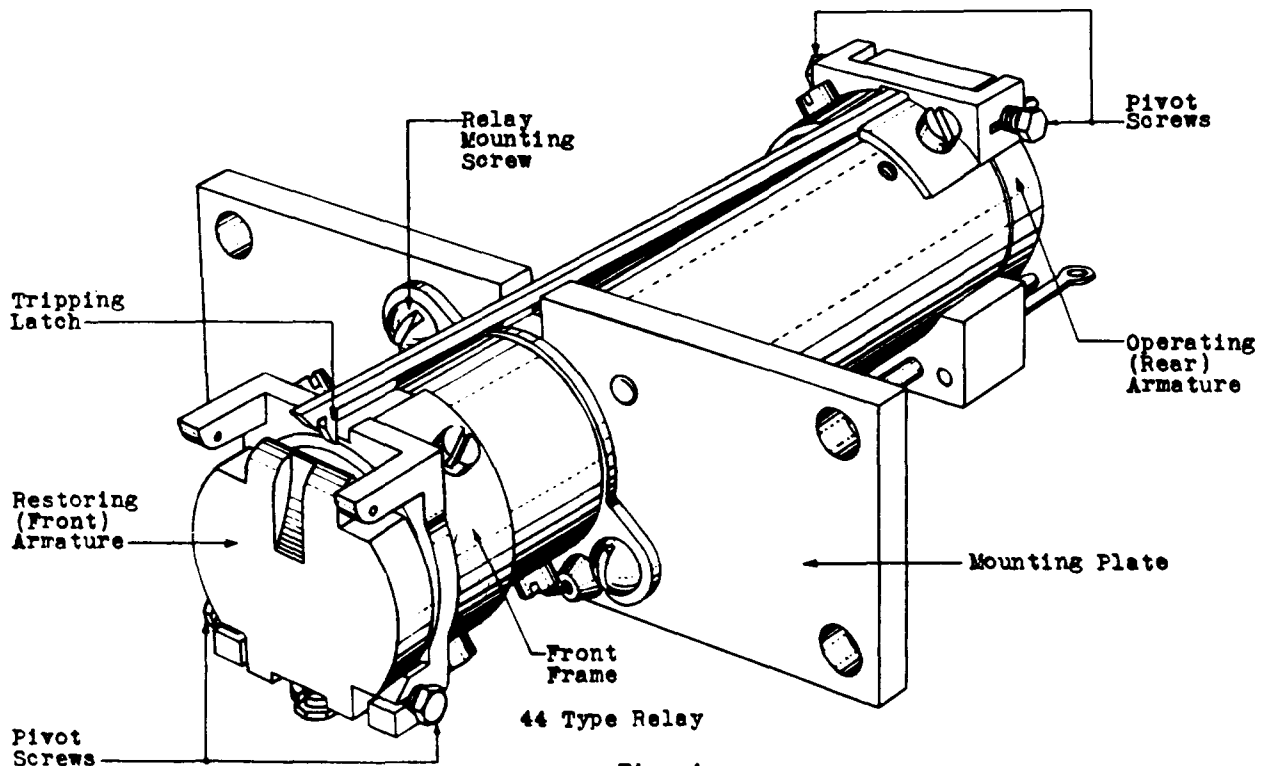


Fig. 4

wise direction with the KS-6854 screwdriver until the requirement is met.

(4) Where the circuit requirement table refers to Fig. A/C or D of the "X" specification or to the "X" specification, R.A.P. or B.S.P. for the electrical requirements, it will facilitate meeting the release requirement if the operated armature air-gap is adjusted as follows: Place the .010" blade of the No. 74-D gauge between the operating (rear) armature and the shell, diametrically opposite the hinge and turn the armature adjusting screw in a clockwise or counter-

clockwise direction with the KS-6854 screwdriver until the gauge fits loosely with the armature operated.

(5) Operate (Restore Winding) If the restoring (front) armature does not return to its unoperated position, turn the contact screw in a clockwise direction with the No. 74 wrench consistent with meeting the contact separation. If necessary, remove the contact spring as outlined in procedure 3.05 and adjust it so that the spring normally is farther away from the contact screw. This will permit the screw to be turned in further.