CORD CIRCUIT SLEEVE RELAYS
CURRENT FLOW TESTS
NOS. 14C, 14D, AND 15C "A" SWITCHBOARDS
STEP-BY-STEP SYSTEMS

1. GENERAL

1.01 This section describes methods of making current flow tests of cord circuit sleeve relays in step-by-step offices. The tests described are made at the front of the switchboard.

1.02 This section is reissued to remove the hold test of the marginal sleeve relays from Test (C), where the circuit requirements tables do not specify a hold requirement, and to bring the section generally up to date. This issue covers a general revision and, therefore, arrows ordinarily used to indicate changes have been omitted.

1.03 The tests covered are:

(A) Nonmarginal Sleeve Relays - Operate and Hold Test: This test checks the operate feature, or the operate and hold features of the nonmarginal sleeve relays using the 35-type test set.

(B) Nonmarginal Sleeve Relays - Operate and Release Test: This test checks the operate and release features of the nonmarginal sleeve relays using the 35-type test set.

(C) Marginal Sleeve Relays - Operate and Hold Test, Using Cord Testing Circuit: This test checks the operate feature, or the operate and hold features of the marginal sleeve relays using the cord testing circuit and the 35-type test set.

(D) Marginal Sleeve Relays - Not Including Universal Answering Cords - Nonoperate Test Using Cord Testing Circuit: This test checks the nonoperate feature of the marginal sleeve relays using the cord testing circuit and the 35-type test set.

(E) Marginal Sleeve Relays - Universal Answering Cord - Nonoperate Test Using Cord Testing Circuit: This test checks the nonoperate feature of the marginal sleeve relays of the universal answering cord using the cord testing circuit and the 35-type test set.

(F) Calling Cord 34-Ohm Sleeve Relay - Recording Completing Cord Circuit - Using Cord Testing Circuit: This test checks the operation of the calling cord nonmarginal 34-ohm sleeve relay, using cord testing circuit and the 35-type test set.

(G) Calling Cord Marginal Sleeve Relay - Recording Completing Cord Circuit: This test checks the operation of the calling cord marginal sleeve relay using the 35-type test set.

(H) Marginal Sleeve Relays - Operate, Hold, and Nonoperate Test (Offices Not Having Cord Testing Circuit): This test checks the operation of the marginal sleeve relays using the 35-type test set.

1.04 The tests should be used as follows:

Type of Cord Circuit	Test of Non-Marginal Relay	Test of Marginal Relay
Combination Intercepting and Special Service Cord		
Answering Cord	(A)	(C)&(D) or (H)
Calling Cord	(A)	(C)&(D) or (H)
Intercepting Completing Cord		
Answering Cord	(Note)	-
Calling Cord	(A)	(C)&(D) or (H)
Special Service Cord		
Answering Cord	(A)	-
Calling Cord	(A)or(B)	(C)&(D) or (H)
Recording Completing Cord		
Answering Cord	(A)(Note)	-
Calling Cord	(F)	(G)
Universal Cord		
Answering Cord	(Note)	(C)&(E) or (H)
Calling Cord	(B)	(C)&(D) or (H)
Intercepting Cord		
Answering Cord	(Note)	-
Calling Cord	(A)	-

Note: The intercepting answering cord sleeve relay, the intercepting completing answering cord sleeve relay, the universal answering cord nonmarginal sleeve relay and the secondary winding of the nonmarginal sleeve relay in the recording completing answering cord can be tested only at the relay rack using the test set connections and test values given in the circuit requirements tables.

1.05 Tests (C), (D), and (F) are based on the use of cord testing circuit per SD-31025-01 or SD-90501-01. Test (E) is based on the use of cord testing circuit per SD-31025-01. Test (H) is used instead of Tests (C), (D), and (E) where the cord testing circuit is not provided.

1.06 While testing cord circuit relays, the various current values should be checked often enough to make sure that they have not changed due to voltage variations.

1.07 Cord circuits on which trouble is encountered should be removed from service until the trouble has been cleared.

1.08 The cover-on "nonoperate" test values to be employed for testing marginal sleeve relays of cord circuits in "A" switchboards in step-by-step offices are usually specified in the circuit requirements tables. When cover-on "nonoperate" test values are not shown on the circuit requirements tables, the values given in Table 1 should be used when testing from the front of the switchboard.

Table 1

Type of Relay	Cover-on "Nonoperate" Test Value
No. E-963	0.051
No. E-990	0.046
No. E-1527	0.047
No. E-6413	0.051
No. R-269	0.051
No. R-1037	0.057

1.09 Lettered Steps: The letters a, b, c, etc, are added to a step number to indicate that the steps cover an action which may or may not be required, depending on local conditions. The conditions under which a lettered step or series of steps should be made are given in the ACTION column, and all steps governed by the same condition are designated by the same letter. Where a condition does not apply, the associated steps should be omitted.

2. APPARATUS

2.01 The apparatus required for each test is shown in the following list. The details for each item are covered in the indicated paragraphs.

Apparatus	No. Required for Test (A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)
Cord Testing Circuit *(2.02)	-	-	1	1	1	1	-	-
Cord Testing Circuit *(2.03)	-	-	1	1	-	1	-	-
Test Set (2.04)	1	1	1	1	1	1	1	1
Patching Cord (2.05) or (2.06)	1	1	1	1	1	1	1	1
Patching Cord (2.07)	-	-	1	1	1	-	-	-
Test Receiver (2.08)	-	-	1	1	1	-	-	-
Test Receiver (2.09)	-	-	-	-	-	-	-	1

* See Paragraph 1.05

2.02 "A" Switchboard Cord Testing Circuit - SD-31025-01. (See Paragraph 1.05.)

2.03 "A" Switchboard Cord Testing Circuit - SD-90501-01. (See Paragraph 1.05.)

2.04 35-Type Test Set.

2.05 P2G Cord, 10 feet long, equipped with one No. 309 Plug with red shell and one No. 309 Plug with black shell (2P7A Cord) (for use in connecting battery and ground to test set when switchboard jacks require No. 309 Plugs).

2.06 P2H Cord, 10 feet long, equipped with one No. 310 Plug with red shell and one No. 310 Plug with black shell (2P8A Cord) (for use in connecting battery and ground to test set when switchboard jacks require No. 310 Plugs).

2.07 P3F Cord, 4 feet long, equipped with one No. 309 Plug and one No. 310 Plug (3P12A Cord).

2.08 Test Receiver - No. 716C Receiver attached to a R2CU Cord, 6 feet long, equipped with one No. 309 Plug (2W29A Cord), or to a R2CF Cord, 6 feet long, equipped with one No. 310 Plug (2W4A Cord) (for establishing connection to the cord testing circuit).

2.09 Test Receiver - No. 716C Receiver attached to a W2AB Cord, 6 feet long, equipped with two No. 360A Tools (2W21A Cord), one KS-6278 Tool and one No. 411A Tool (for establishing connection to the T and R binding posts of test set).

3. PREPARATION

ALL TESTS

STEP	ACTION	VERIFICATION
1	Restore all test set keys to normal.	
2	Operate No. 3 and No. 4 switches of test set to 0 position.	
3	Move all test set resistance slides to extreme right position.	
4	Connect TEST-BATT and GRD jack of test set to battery and ground supply jack in switchboard, using P2G (or P2H) cord, as required. Note: The black shelled plug should be connected to the test set.	

TESTS (C), (D), AND (E)

5	Insert plug of R2CU (or R2CF) cord attached to test receiver into REC jack of cord testing circuit.	

STEP	ACTION	VERIFICATION
6	Connect test set jack of cord testing circuit to T&R jack of test set, using P3F cord.	
7	Strap binding posts GRD and L1 of test set with piece of insulated wire with ends of wire having insulation removed.	

4. METHOD

STEP	ACTION	VERIFICATION

(A) Nonmarginal Sleeve Relays - Operate and Hold Test

5 Arrange test set keys and switches as follows:

Keys	Position	Switches	Position
1	Open	G	Closed
2	Open	L	Open
3	Open	Res.	0
4	Open		
BATT & GRD CO	Operated		
REV	Operated		

6	Insert plug of cord to be tested into S jack of test set.	
7a	If a "hold" value is specified on circuit requirements table - Depress key 2 - Adjust No. 2 resistance slides to obtain specified test "hold" value of sleeve relay. Note: The secondary winding of the recording completing answering cord sleeve relay can not be tested from the front of the switchboard. If it is desired to check the secondary winding for its "hold" value, the test must be made at the relay rack.	Test set meter indicates specified "hold" value.
8a	If "hold" value is specified on circuit requirements table - With key 2 depressed - Depress key 1. Adjust No. 1 resistance slides to obtain specified test "operate" current value for sleeve relay.	Test set meter indicates specified test "operate" value.
9b	If "hold" value is not specified on circuit requirements table - Depress key 1 - Adjust No. 1 resistance slides to obtain specified test "operate" current value for sleeve relay.	Test set meter indicates specified test "operate" value.

STEP	ACTION	VERIFICATION
10	Release key 1, and key 2, if operated.	
11a	If "hold" value is specified on circuit requirements table - Operate keys 1 and 2.	Supervisory lamp lights.
12a	Release key 1.	Supervisory lamp remains lighted.
13a	Release key 2.	Supervisory lamp extinguished.
14b	If "hold" value is not specified on circuit requirements table - Operate key 1.	Supervisory lamp lights.
15b	Release key 1.	Supervisory lamp extinguished.
16	Remove cord under test from S jack of test set.	
17	If other answering or calling cord sleeve relays are to be tested - Repeat Step 6, and Steps 11a through 16, as required. Note: To obtain maximum results during testing, the current values should be rechecked frequently by proceeding as in Steps 6 through 16, as required.	
18	Remove all connections established.	

(B) Nonmarginal Sleeve Relays - Operate and Release Test

5 Arrange test set keys and switches as follows:

Keys	Position	Switches	Position
1	Open	G	Closed
2	Open	L	Open
3	Open	Res.	0
4	Open		
BATT & GRD CO	Operated		
REV	Operated		

STEP	ACTION	VERIFICATION
6	Insert plug of cord under test into S jack of test set.	
7	Close locking lever of key 4.	
8	Adjust No. 4 resistance slides to obtain specified test "release" current value of sleeve relay.	Test set meter indicates specified test "release" value.
9	Depress key 3 - Adjust No. 3 resistance slides to obtain specified test "operate" current value of sleeve relay.	Test set meter indicates specified test "operate" value.

STEP	ACTION	VERIFICATION
10	Release key 3.	
11	Again depress key 3.	Supervisory lamp lights.
12a	If flashing recall feature operates when testing answering cord - Operate talking key.	Supervisory lamp flashes.
13	Release key 3 -	Supervisory lamp extinguished.
14	Restore talking key, if operated.	
15	Remove cord under test from S jack of test set.	
16	If other calling cord sleeve relays are to be tested - Repeat Step 6 and Steps 11 through 15, as required. Note: To obtain maximum results during testing, the current values should be rechecked frequently by proceeding as in Steps 6 through 15, as required.	
17	Remove all connections established.	

(C) Marginal Sleeve Relays - Operate and Hold Test, Using Cord Testing Circuit

8 Arrange test set keys and switches as follows:

Keys	Position	Switches	Position
1	Open	G	Closed
2	Open	L	Closed
3	Open		to 10
4	Open	Res.	0
BATT & GRD CO	Operated		
REV	Operated		

9	Insert plug of cord to be tested into S jack of test set.	
10a	If "hold" value is specified on circuit requirements table for marginal sleeve relay - Depress key 2 - Adjust No. 2 resistance slides to obtain specified test "hold" current value for marginal sleeve relay.	Test set meter indicates specified test "hold" value.
11a	With key 2 depressed - Depress key 1. Adjust No. 1 resistance slide to obtain specified test "operate" current value of marginal relay.	Test set meter indicates specified test "operate" value.

STEP	ACTION	VERIFICATION
12a	With keys 1 and 2 depressed.	Low tone heard in receiver. Supervisory lamp lighted.
13a	Release key 1.	Low tone still heard in receiver and supervisory lamp remains lighted indicating marginal relay held operated.
14a	Release key 2.	Low tone not heard in receiver. Supervisory lamp extinguished.
15b	If "hold" value is not specified on circuit requirements table for marginal relay - Depress key 1 - Adjust No. 1 resistance slides to obtain specified test "operate" current value for marginal relay.	Test set meter indicates specified test "operate" value.
16b	With key 1 depressed.	Low tone heard in receiver. Supervisory lamp lighted.
17b	Release key 1.	Low tone not heard in receiver. Supervisory lamp extinguished.
18	Remove cord from S jack of test set.	
19	If other answering or calling cord sleeve relays are to be tested - Repeat Step 9, and Steps 12a through 14a, or Steps 16b and 17b, as required, and Step 18. Note: To obtain maximum results during testing, the current values should be rechecked frequently by proceeding as in Steps 9 through 14a, and Step 18, if "hold" value is specified. If "hold" value is not specified use Step 9, and Steps 15b through 18.	
20	Remove all connections established.	
21	Remove strap from binding posts GRD and L1 of test set.	

(D) Marginal Sleeve Relays - Not Including Universal Answering Cords - Nonoperate Test Using Cord Testing Circuit

8 Arrange test set keys and switches as follows:

Keys	Position	Switches	Position
1	Open	G	Closed
2	Open	L	Open
3	Open	Res.	0
4	Open		
BATT & GRD CO	Operated		
REV	Operated		

STEP	ACTION	VERIFICATION
9	Insert plug of cord to be tested into S jack of test set.	
10	Depress key 3 - Adjust No. 3 resistance slides for specified cover-on "nonoperate" current value of marginal relay. Note: If the cover-on "nonoperate" current value is not specified on circuit requirements tables, use the value given in Paragraph 1.08, Table 1 of this section.	Test set meter indicates specified cover-on "nonoperate" value of marginal relay.
11	Release key 3.	
12	Again depress key 3.	Low tone heard in receiver.
13	Release key 3.	
14	Remove cord under test from S jack of test set.	
15	If other answering or calling cord sleeve relays are to be tested - Repeat Step 9 and Steps 12 through 14. Note: To obtain maximum results during testing, the current flow values should be checked frequently by proceeding as in Steps 9 through 14.	
16	Remove all connections established.	
17	Remove strap from GRD and L1 binding post of test set.	

(E) Marginal Sleeve Relays - Universal Answering Cord - Nonoperate Test Using Cord Testing Circuit

8 Arrange test set keys and switches as follows:

Keys	Position	Switches	Position
1	Open	G	Closed
2	Open	L	Closed
3	Open		to 10
4	Open	Res.	0
BATT & GRD CO	Operated		
REV	Operated		

9 Insert plug of cord to be tested into S jack of test set.

10 Insert plug of another pair of cords into RING B jack of cord testing circuit.

STEP	ACTION	VERIFICATION
11	Depress key 4. Adjust resistance slides for specified cover-on test "nonoperate" current value of marginal relay. Note: If the cover-on "nonoperate" value is not specified on the circuit requirements tables, use the value shown in Paragraph 1.08, Table 1 of this section.	Test set meter indicates specified cover-on "nonoperate" value.
12	With key 4 depressed - Operate ringing key of cord in RING B jack of cord testing circuit.	Supervisory lamp of cord under test lights.
13	Operate talking key associated with cord under test, or remove plug from S jack of test set.	Supervisory lamp of cord under test extinguished.
14	Restore talking key.	
15	If plug was not removed in Step 13 - Remove plug from S jack of test set.	
16	If other answering cord sleeve relays are to be tested - Repeat Steps 9 and 12 through 15. Note: To obtain maximum results during testing, the current flow values should be checked frequently by proceeding as in Steps 9 through 15.	
17	Remove all connections established.	
18	Remove strap from GRD and L1 binding posts of test set.	

(F) Calling Cord 34-Ohm Sleeve Relay - Recording Completing Cord Circuit - Using Cord Testing Circuit

5 Arrange test set keys and switches as follows:

Keys	Position	Switches	Position
1	Open	G	Closed
2	Open	L	Open
3	Open	Res.	0
4	Open		
BATT & GRD CO	Operated		
REV	Operated		

STEP	ACTION	VERIFICATION
6	Insert plug of calling cord into S jack of test set.	
7	Insert plug of answering cord into RING TEST jack of cord testing circuit.	Supervisory lamp lights.

STEP	ACTION	VERIFICATION
8	Close locking lever of key 4 - Adjust No. 4 resistance slides for specified test "release" current value for 34-ohm sleeve relay.	Test set meter indicates specified "release" value.
9	Depress key 3 - Adjust No. 3 resistance slides for specified test "operate" current value for 34-ohm sleeve relay.	Test set meter indicates specified "operate" value.
10	Release key 3.	
11	Again depress key 3.	Supervisory lamp extinguished.
12	Release key 3.	Supervisory lamp lights.
13	Remove plug of calling cord from S jack of test set.	
14	Remove plug of cord from RING TEST jack of cord testing circuit.	
15	If other calling cord sleeve relays are to be tested - Repeat Steps 6, 7, and Steps 11 through 14. Note: To obtain maximum results during testing, the current flow values should be checked frequently by repeating Steps 6 through 14.	
16	Remove all connections established.	

(G) Calling Cord Marginal Sleeve Relay - Recording Completing Cord Circuit

5 Arrange test set keys and switches as follows:

Keys	Position	Switches	Position
1	Open	G	Closed
2	Open	L	Open
3	Open	Res.	0
4	Open		
BATT & GRD CO	Operated		
REV	Operated		

STEP	ACTION	VERIFICATION
6	Insert plug of calling cord into S jack of test set.	
7	Close locking lever of key 4 - Adjust No. 4 resistance slides for specified test "release" value for marginal relay.	Test set meter indicates specified test "release" value.

STEP	ACTION	VERIFICATION
8	Depress key 3 - Adjust No. 3 resistance slides for specified test "operate" current value for marginal relay.	Test set meter indicates specified test "operate" value.
9	With key 3 depressed - Depress key 2. Adjust No. 2 resistance slides for specified test "soak" current value for marginal relay.	Test set meter indicates specified test "soak" value.
10	Release keys 2 and 3.	
11	Operate talking key of cord under test.	
12	Depress keys 2 and 3 at same time.	Supervisory lamp lights.
13	After approximately one second - Release keys 2 and 3.	Supervisory lamp extinguished.
14	Immediately depress key 3.	Supervisory lamp lights.
15	Release key 3.	Supervisory lamp extinguished.
16	Remove plug of calling cord from S jack of test set.	
17	If other calling cord sleeve relays are to be tested - Repeat Step 6 and Steps 11 through 16. Note: To obtain maximum results during testing, the current flow values should be rechecked frequently by proceeding as in Steps 6 through 16.	
18	Remove all connections established.	
19	Release locking lever of key 4.	

(H) Marginal Sleeve Relays - Operate, Hold, and Nonoperate Test (Offices Not Having Cord Testing Circuit)

5 Arrange test set keys and switches as follows:

Keys	Position	Switches	Position
1	Open	G	Closed
2	Open	L	Open
3	Open	Res.	0
4	Open		
BATT & GRD CO	Operated		
REV	Operated		

6 Insert plug of cord to be tested into S jack of test set.

STEP	ACTION	VERIFICATION
7	Depress key 2 - Adjust No. 2 resistance slides for specified test "hold" current value of marginal relay.	Test set meter indicates specified test "hold" value.
8	With key 2 depressed - Depress key 1 - Adjust No. 1 resistance slides for specified test "operate" current value for marginal relay.	Test set meter indicates specified test "operate" value.
9	Release keys 1 and 2.	
10	Depress key 3 - Adjust resistance slides for specified cover-on test "nonoperate" current value for marginal relay.	Test set meter indicates specified cover-on test "nonoperate" value.
11	Release key 3.	
12	Depress keys 1 and 2.	
13	With test receiver attached to W2AB cord - Check for battery and ground on T&R binding posts of test set.	Click heard in receiver.
14	With key 2 still depressed - Release key 1.	
15	With test receiver attached to W2AB cord - Check for battery and ground on T&R binding posts of test set.	Click heard in receiver.
16	Release key 2.	
17	Depress key 3.	
18	With test receiver attached to W2AB cord - Check for battery and ground on T&R binding posts of test set.	No click heard in receiver.
19	Release key 3.	
20	Remove plug of cord from S jack of test set.	
21	If other answering or calling cord sleeve relays are to be tested - Repeat Step 6 and Steps 12 through 20. Note: To obtain maximum results during testing, the current values should be rechecked frequently by proceeding as in Steps 6 through 20.	
22	Remove all connections established.	