

**CONNECTORS**  
**PULSING TESTS**  
**USING PULSING TEST SET SD-31481-01 (J34717A)**  
**STEP-BY-STEP SYSTEMS**

**1. GENERAL**

**1.01** This section describes a method of applying pulsing tests to 100-point local, toll, and combination connectors, 200-point local and combination connectors, and test connectors. Both local and toll level hunting connectors are included, except those wired to hunt over a group of 100 trunks regardless of the digit dialed. The tests are based on the use of pulsing test set SD-31481-01.

**1.02** This section is reissued to clarify the description of Test C, to add a note to Step 11 of Test C, and to correctly number the steps of Test C.

**1.03** The tests covered are:

	<b>PAGE</b>
<b>A. Overall Pulsing Test:</b> This test checks the stepping features of connectors under loop and leak conditions. . . . . .	4
<b>B. Overall Pulsing and E Relay Hold Test:</b> This test checks the stepping features of connectors under loop and leak conditions. It also checks the E relay for hold and release requirements. . . . . .	6
<b>C. Magnet Pulsing Test:</b> This test checks switch vertical and rotary stepping mechanism by applying marginal pulses directly to vertical and rotary magnet. . . . . .	7

**1.04** Tests A and B are alternative methods. Test B is intended for use when it is desired to include a check of the holding time of the E relay. Ordinarily, Test B, if applied on a routine basis, would be made at less frequent intervals

than Test A; either one or the other, but not both, being made on any one testing cycle. Test B should be applied as a final check after clearing any trouble involving adjustment of the E relay.

**1.05** Whenever the C and E relays are mentioned in this section, it is intended to mean the relays which perform the functions corresponding to those of the C and E relays in a regular local connector. As the level hunting connectors and test connectors do not have a relay which performs the function of the E relay, Test B does not apply to those types of switches.

**1.06** Test C is not required on a routine basis, but should be performed on any switch on which a failure is encountered under the leak test condition in Test A or B in order to determine if the trouble indicated by these tests is due to the switch mechanism.

**1.07** The general procedures for the analysis and correction of pulsing failure encountered in making pulsing tests of connectors is covered in Section 226-170-700.

**1.08** Tests A, B, and C require the use of a connector test line connected to terminal 99 of nonhunting connector banks or to terminal 90 of rotary-hunting connector banks.

**1.09** In performing these tests, service may be adversely affected by possible delay or denial of service as in Test C.

**1.10** Unless otherwise covered by local instructions, the pulsing tests should be made with a 1400-ohm loop and with leak "A" condition in offices where all the connector B functional relays are of the 248 or 222 type, modified with a 1.1 ratio armature. Otherwise, the pulsing tests should be made with a 1200-ohm loop and with leak "A" condition. Local instructions, however, may specify the use of other loop and leak conditions.

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**1.11** The test equipment specified in this section is designed to apply proper marginal tests (simulated critical circuit conditions) when the circuit under test and the test equipment have an applied voltage of 48.5 to 50. In those offices where power plants are normally operated at more than 50 volts, the battery voltage should be reduced and maintained within the required limits while the tests are being made.

**1.12 Lettered Steps:** A letter a, b, c, etc, added to a step number in Part 3 or 4 of this section indicates an action which may or may not be required depending upon local conditions. The condition under which a lettered step or a series of lettered steps should be made is given in the ACTION column, and all steps governed by the same condition are designated by the same letter within a test. Where a condition does not apply, all steps designated by that letter should be omitted.

**1.13** Local instructions should be followed for recording and reporting any register operations caused by performing these tests.

## 2. APPARATUS

### Tests A, B, and C

**2.01** Pulsing test set J34717A (SD-31481-01).

**2.02** 36B (remote control) test set.

**2.03** Connector test lines No. 1 SXS, SD-31657-01, No. 355A, SD-31857-01, No. 35-E-97, SD-30947-01, or equivalent.

**2.04** Patching cord, P2J cord, 9 feet long, equipped with two 310 plugs (2P9A cord) (used where a battery supply jack is available).

**2.05** Testing cord, W2M cord, 9 feet long, equipped with one 310 plug, tip and sleeve connections, two 59 cord tips (2W12A cord), and two 108 cord tips (used where a battery supply jack is not available).

**2.06** Patching cord, P3H cord, 10 feet long, equipped with one 310 plug and one 240A plug (3P2A cord) (the 240A plug to be equipped with a 30 cord tip). One 893 cord equipped with two 360 tools and one 419A or KS-6278 tool. Connect as shown in Fig. 1.

**2.07** 184B plug (or 310 plug with ring and sleeve strapped).

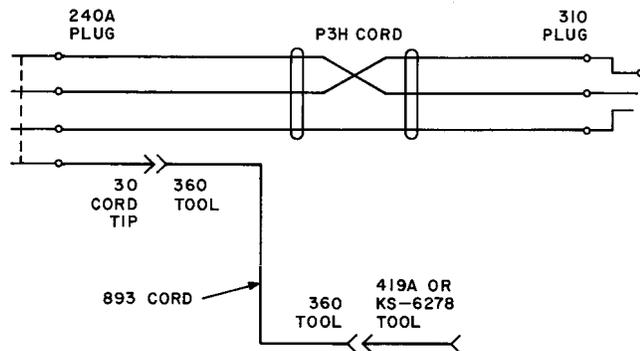


Fig. 1—Testing Cord

**2.08** 477A or 375A (make-busy tools), as required.

### Tests A and C

**2.09** 240A plug (for testing level hunting connectors only).

### Test C

**2.10** W1H cord, 10 feet long, equipped with a 347B plug, a 360A tool (1W8A cord), and a 419A tool.

### Tests B and C

**2.11** Testing cord, 893 cord, 6 feet long, equipped with two 360A tools (1W13B cord), one KS-6278 connecting clip, and one 419A tool (for connecting ground to connector test jack).

**3. PREPARATION**

STEP	ACTION	VERIFICATION
<b>Tests A, B, and C</b>		
1	Using P2J cord, patch test set BAT G jack to 48-volt battery supply jack.—  <i>Note 1:</i> If W2M cord is used, connect red (sleeve) conductor of cord to frame ground and white (tip) conductor to equipment side of a convenient fuse (not to exceed 5 amperes).  <i>Note 2:</i> To avoid possible grounding of battery supply lead, connect cord to test set first and, when disconnecting, remove cord from test set last.  Insert No. 310 plug of W2M cord into test set BAT G jack.	
2	Connect 36B test set to pulsing test set jacks A, B, with stay cord of 289B plug to bottom.	
3	Allow pulsing test set to operate for at least 15 minutes (to reach a constant temperature) before making tests.	
4a	If testing local or combination connectors or test connectors— Insert 310 plug of P3H cord into pulsing test set SW jack.	
5b	If testing toll connectors— Insert 310 plug of P3H cord into pulsing test set TL jack.	
6c	If testing connectors, other than level hunting and 10-party terminal-per-line types, in offices equipped with test lines which are normally intercepted— Insert 184B plug into test line No. 4 jack (No. 1 step-by-step) or into test line B jack (No. 355A or 35-E-97). Remove plug when tests are completed.	
7	Set up loop, leak condition, establish loop values (see 1.10) by operating keys indicated on the following listing.	

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<b>STEP</b>	<b>ACTION</b>	<b>VERIFICATION</b>
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LOOP RESISTANCE	KEYS OPERATED
1000 ohms	200 and 800
1200 ohms	400 and 800
1400 ohms	200, 400, and 800

LEAK CONDITION	KEYS OPERATED
Leak B	LKB
Leak A	LKA

**Test C**

- 8 Insert 347B plug of W1H cord into MAG jack.

**4. METHOD**

**A. Overall Pulsing Test**

**Nonlevel Hunting Connectors**

- 8 With the connector to be tested normal—  
Insert 240A plug of P3H cord into connector  
test jack, leaving 893 cord disconnected.

*Note:* Use the local jack of combination  
connector or the "line" jack of the test  
connector.

- 9 Depress, hold remote-control LP key until  
connector starts to rotate.

BY lamp does not light.

*Note:* If BY lamp lights, either remove plug  
to proceed with other switches, or delay test  
until BY lamp is extinguished.

- 10 Momentarily depress remote control RLS key.

Connector steps smoothly to ninth level, rotates  
smoothly to terminal 99 (or 90 in the case of  
rotary hunting connectors).

*Caution: If the connector steps on any  
other terminal, release immediately to avoid  
ringing on a subscriber line.*

- 11 Depress, hold remote control LK key until  
connector starts to rotate.

Connector releases.

*Note:* Disregard any momentary lighting of  
BY lamp.

Connector steps smoothly to ninth level, rotates  
smoothly to terminal 99 (or 90 in the case of  
rotary hunting connectors).

*Caution: If the connector steps on any  
other terminal, release immediately to avoid  
ringing on a subscriber line.*

STEP	ACTION	VERIFICATION
12	<p>Unless other tests are to be made on this connector— Remove 240A plug from test jack, then remove 184B plug from jack, if used.</p> <p><i>Note:</i> If testing toll connectors, momentarily depress remote-control RLS key and then remove 240A plug.</p>	Connector releases.
<b>Level Hunting Connectors</b>		
13	Set up loop, leak conditions as in Step 7, PREPARATION.	
14	<p>With connector to be tested normal— Insert 240A plug of P3H cord into connector test jack, leaving 893 cord disconnected.</p>	BY lamp does not light.
		<i>Note:</i> If BY lamp lights, either remove plug to proceed with other switches or delay test until BY lamp is extinguished.
15	Insert 240A plug into connector sleeve cutoff jack.	
16	<p>Momentarily depress remote-control LP key.</p> <p><i>Note:</i> In the case of toll connectors requiring two digits to start hunting or local connectors arranged to start level hunting only when the units digit is received, hold the LP key operated long enough to pulse two digits.</p>	Connector starts hunting for level corresponding to ninth terminal of recording switch.
17	<p>When connector starts rotary hunting— Momentarily depress remote-control RLS key.</p>	Connector releases.
		<i>Note:</i> Disregard any momentary lighting of BY lamp.
18	<p>Momentarily depress remote-control LK key.</p> <p><i>Note:</i> In the case of toll connectors requiring two digits to start hunting or local connectors arranged to start level hunting only when the units digit is received, hold the LP key operated long enough to pulse two digits.</p>	Connector starts level hunting for the level corresponding to ninth terminal of recording switch.
19d	<p>If no other tests are to be conducted on this connector— Depress remote-control RLS key when connector starts rotary hunting.</p> <p><i>Note:</i> If Test C is to be made as a consecutive operation, allow connector to hunt over all terminals in group and leave plugs in jacks.</p>	Connector releases.

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STEP	ACTION	VERIFICATION
20d	Remove plug from sleeve cut-off jack, then remove 240A plug from test jack.	
<b>B. Overall Pulsing and E Relay Hold Test</b>		
<b>Nonlevel Hunting Connectors</b>		
8	Set up loop, leak conditions as in Step 7, PREPARATION.	
9	With 893 cord connected as shown in Fig. 1— Insert 240A plug into connector test jack.  <i>Note:</i> Use the local jack of combination connector or "line" jack of test connector.	BY lamp does not light.  <i>Note:</i> If BY lamp lights, either remove plug to proceed with other switches or delay test until BY lamp is extinguished.
10	Depress, hold remote-control LP key until connector starts to rotate.	Connector steps smoothly to ninth level, rotate smoothly to terminal 99 (or 90 in the case of rotary hunting connectors).  <i>Caution:</i> If the connector stops on any other terminal, release immediately to avoid ringing on a subscriber line.
11	Momentarily depress remote-control RLS key.	Connector releases.  <i>Note:</i> Disregard any momentary lighting of BY lamp.
12	Momentarily depress remote-control LK key.	Connector steps smoothly to ninth level.  <i>Caution:</i> If the connector stops opposite one of the lower levels, release immediately to prevent rotation on the remaining pulses and ringing on a subscriber line.
<b>For Testing 100-Point Connectors</b>		
13	Connect 419A tool of 893 cord (Fig. 1) to sleeve wiper cord terminal at test jack.  <i>Note:</i> In offices where the wiper cords do not terminate at test jack assembly, connect KS-6278 tool of 893 cord directly to the sleeve wiper.	
<b>For Testing 200-Point Connectors</b>		
14d	If No. 4 spring of test jack is connected directly to ground— Connect 419A tool of 893 cord (Fig. 1) to sleeve wiper cord terminal at test jack.	
15e	If No. 4 spring of test jack is not connected directly to ground— Connect ground to sleeve wiper cord terminal on test jack using separate 893 cord.	

STEP	ACTION	VERIFICATION
16	Momentarily again depress remote-control LK key.  <i>Note:</i> ♦If the connector stops on one of the lower numbered terminals, the E relay should be checked, readjusted if necessary, and Step 16 should be repeated. In the case of rotary hunting connectors, the trouble may be indicated by the switch stopping on one of the lower numbered terminals and then starting to hunt instead of step.♦	Connector rotates smoothly to terminal 99 (or 90 for rotary hunting connectors).
17	Remove 419A (or KS-6278) tool upon completion of rotary action.	
18	Unless other tests are to be made on this switch— Remove 240A plug from test jack, then remove 148B plug from jack, if used.  <i>Note:</i> If testing toll connectors, momentarily depress the remote-control RLS key, then remove plug.	Connector releases.

### C. Magnet Pulsing Test

#### Nonlevel Hunting Connectors

- 9 With test set connections established and test set resistance and leak keys operated as in Test A or B (except that in performing this test following Test A, connect the 893 cord to 240A plug of P3H cord)—  
Operate MAG key.

*Note:* The 200, 400, and 800 keys and the LKA key are ineffective when making the magnet pulsing test. The LKB key, however, is effective. This key should be in the normal position if the leak A requirement is to be met on Test A or B. It should be operated to the LKB position if the leak B requirement is to be met on Test A or B. By having the keys operated as in the over-all pulsing test, while conducting the magnet pulsing test, it is convenient to switch from one test to the other in the process of clearing trouble. This switching is accomplished by the release or operation of the MAG key as required.

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<b>STEP</b>	<b>ACTION</b>	<b>VERIFICATION</b>
10	Remove switch cover and connect 419A tool of W1H cord to back contact spring of A relay pulsing springs.  <i>Note:</i> If test C is made as a consecutive operation with Test A or B and the connector has been left off-normal at the completion of test, momentarily operate the remote-control RLS key to restore connector to normal.	
11	Momentarily depress remote-control LK key.	Connector steps smoothly to ninth level.  <i>Caution: If the connector stops opposite one of the lower levels, release immediately to prevent rotation on the remaining pulses and ringing on a subscriber line.</i>  <i>Note:</i> It is not a requirement that the C relay hold during the magnet test. If the C relay releases during this test, hold it operated manually to check the vertical magnet pulsing. If the overall pulsing test indicated a C relay failure, correction of the failure should be made in accordance with Section 226-170-100.

**For Testing 100-Point Connectors**

- 12 Connect 419A tool of 893 cord (Fig. 1) to sleeve wiper cord terminal at test jack assembly.
- Note:* In offices where the wiper cords do not terminate at the test jack assembly, connect the KS-6278 tool of the 893 cord directly to the sleeve wiper.

**For Testing 200-Point Connectors**

- 13d If No. 4 spring of test jack is connected directly to ground—  
Connect 419A tool of 893 cord (Fig. 1) to sleeve wiper cord terminal at test jack assembly.
- 14e If No. 4 spring test jack is not connected directly to ground—  
Connect ground to sleeve wiper cord terminal on test jack using separate 893 cord.

STEP	ACTION	VERIFICATION
15	Momentarily again depress remote-control LK key.	Connector rotates smoothly to terminal 99 (or 90 in the case of rotary hunting connectors).  <i>Note:</i> It is not a requirement that the E relay hold during the magnet test. If the E relay releases during this test, hold it operated manually to check the rotary magnet pulsing. If the overall pulsing and E relay hold test indicated an E relay failure, correction of the failure shall be made in accordance with Section 226-170-700. In the case of rotary hunting connectors the trouble may be indicated by the switch stopping on one of the lower-numbered terminals and then starting to hunt instead of to step.
16	Remove 419A (or KS-6278) tool upon completion of rotary action.	
17f	If it is desired to repeat Test A, B, or C— Momentarily depress remote-control RLS key.	Connector releases.
18g	If it is desired to hold connector busy in normal position— Remove 240A plug from test jack, insert make-busy tool in jack.  <i>Note:</i> In the case of toll connectors, depress remote-control RLS key momentarily before removing 240A plug.	
19	Unless other tests are to be made on this switch— Remove 240A plug from test jack. Remove 419A tool of W1H cord and replace switch cover.  <i>Note:</i> In the case of toll connectors, depress remote-control RLS key momentarily before removing 240A plug.	Connector releases.

#### Level Hunting Connectors

- 20 With test set connections established and test set resistance and leak keys operated as in Test A or B (except that 893 cord is not connected to 240A plug of P3H cord)— Operate MAG key.

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STEP	ACTION	VERIFICATION
	<p><i>Note:</i> The 200, 400, and 800 keys and the LKA key are ineffective when making the magnet pulsing test. The LKB key, however, is effective. This key should be in the normal position if the leak requirement is to be met on Test A or B. It should be operated to the LKB position if the leak B requirement is to be met on Test A or B. By having the keys operated as in the overall pulsing test, while conducting the magnet pulsing test, it is convenient to switch from one test to the other in the process of clearing trouble. This switching is accomplished by the release or operation of the MAG key, as required.</p>	
21	<p>Remove switch cover, connect 419A tool of W1H cord to back contact spring of A relay pulsing springs.</p>	
	<p><i>Note:</i> If Test C is made as a consecutive operation with Test A or B and the connector has been left off-normal at the completion of test, operate the remote-control RLS key momentarily to restore switch to normal.</p>	
22	<p>Insert 240A plug into sleeve cut-off jack of switch, unless already inserted under test A.</p>	
23	<p>Momentarily again depress remote-control LK key.</p>	<p>Connector steps to level corresponding to ninth terminal of recording switch and starts hunting.</p>
	<p><i>Note 1:</i> In the case of toll connectors requiring two digits to start hunting or local connectors arranged to start level hunting only when the units digit is received, hold the LK key operated long enough to pulse two digits.</p>	
	<p><i>Note 2:</i> It is not a requirement that the C relay hold during the magnet test. If the C relay releases during the test, hold it operated manually to check the recording switch rotary magnet pulsing. If the overall pulsing test indicated a C relay failure, correction shall be made in accordance with Section 226-170-700.</p>	
24h	<p>If it is desired to repeat Test A or C— Momentarily depress remote-control RLS key.</p>	<p>Connector releases.</p>
25j	<p>If it is desired to hold the connected busy in normal position— Remove 240A plug from test jack, insert a make-busy tool in test jack.</p>	

STEP	ACTION	VERIFICATION
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*Note:* In the case of toll connectors, momentarily depress remote-control RLS key before removing 240A plug.

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| 26 | Unless other tests are to be made on this switch—<br>Remove plug from sleeve cut-off jack. Remove 240A plug from test jack. Remove 419A tool of WIH cord and replace switch cover. | Connector releases. |
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*Note:* In the case of toll connectors, momentarily depress remote-control RLS key before removing 240A plug from test jack. Remove 419A tool of WIH cord and replace switch cover.

*Note:* In the case of toll connectors, momentarily depress remote-control RLS key before removing 240A plug.