

DC KEY PULSING SENDERS
ARRANGED FOR REVERTIVE PULSES
USING AUTOMATIC TEST CIRCUIT SD-62059-011
NO. 1 AND NO. 3 TYPE TOLL SWITCHBOARDS

1. GENERAL

1.01 This section describes methods of testing DCKP-IN, RP-OUT senders SD-62058-01 by means of automatic test circuit SD-62059-011. This section is intended for use with No. 1, 3, 3B, 3C or 3CL toll switchboards.

1.02 This dually-numbered section replaces A226.561, Issue 1, which was noted "Provisional" and was given only limited distribution. The replaced section, A226.561, Issue 1, was not dually numbered nor was there a separate section designated A225.561. This section is reissued to include senders associated with No. 1 toll switchboards, to add tests of stored ring, ringing by sender, leak test of TS and RS relays, time out, time alarm, SR and SRA relay balance and release test of ST relay. Since this reissue covers a general revision, the arrows ordinarily used to indicate changes have been omitted.

1.03 The information in this section is under the following headings:

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1.04 Tests E, G, H and K need only be made when the features checked by these tests are provided in the sender and the keys are furnished in the test circuit.

1.05 The test circuit may be set up to perform a given test automatically on all senders in regular sequence or to repeat a given test automatically as often as required on a given sender.

1.06 The test circuit has access to the senders through 206-type selectors. When the test frame is used to test senders that are associated with No. 3-type toll switchboards only, it is equipped with one set of selector switches and associated equipment. When the test frame is used for testing senders associated with No. 1 and No. 3-type toll switchboards, it is equipped with two sets of selector switches and associated equipment. A maximum of 8 selectors, having a capacity for 160 senders, may be provided for each type sender. The test circuit will pass all unequipped sender selector terminals. When it reaches the last sender on a sequence test, audible and visual signals will be operated.

1.07 Registers are provided on the test frame as follows: CT (circuits tested), to record the number of senders tested; RT (repeat test), to record the number of repeat single tests on a sender; BY (busy), to record the number of busy senders passed without testing and TBL (trouble), to record the number of failures which bring in an alarm.

1.08 Keys are furnished on the test frame to make a check of the various features provided in the sender. Pulse lamps controlled by a PL key and match lamps controlled by an LP key are provided on the test frame. Pulse lamps 0 to 9 indicate the number of revertive pulses recorded by the test circuit for the selection on which it blocked and match lamps indicate the brush, group, tens or units which should have been selected and should compare with the highest numbered pulse lamp.

1.09 Test Numbers: The number which gives the most comprehensive test of the sender register relays is 1254. In order to test certain other leads in the sender not tested with 1254,

the following numbers should be used: 2915, 5490, 6538, 8171 and 9807.

2. APPARATUS

Test Circuit per SD-62059-011

No. 258C (Dummy) Make-Busy Plug for use when sender Fig. D is used

No. 184B Make-Busy Plug for use when sender Fig. E is used

No. 32-A Test Set for remote control

35-Type Test Set

No. 365 Tool

Patching Cord (2.01)

Patching Cord (2.02)

2.01 P3E Cord, 6 feet long, equipped with two No. 310 (or 110) Plugs (397A).

2.02 W2W Cord, 6 feet long, equipped at one end with a No. 310 (or 110) Plug and at the other end with a No. 360B and No. 360C Tool (2W17A) and a No. 365 Tool attached to the 360B Tool.

3. PREPARATION

3.01 Restore all operated lever-type keys to normal.

3.02 If it is desired to test all of the senders in sequence, set the off normal sender selectors on the first terminals, one at a time, by operating the associated TR key and then operate and release the STP key a sufficient number of times to restore the selector to normal. Release the TR key after stepping a selector.

3.03 If it is desired to test a particular sender, operate the TR key associated with the selector having access to the sender to be tested and operate the STP key a sufficient number of times to reach the desired terminal. Release the TR key.

3.04 Operate the following keys when they are provided as specified in 4. METHOD.

<u>Key</u>	<u>Purpose</u>
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SP	<u>Slow Pulse:</u> To simulate very slow commutator pulses for detecting crosses on prime counting relays, shorted protective condenser or resistance in (ST) contact lead. This key should be oper-
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<u>Key</u>	<u>Purpose</u>
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ated only when automatic ringing feature (AR key) or position disconnect feature (PD key) is also being tested.

SA	<u>Step Advance:</u> This key is used in conjunction with the SS key to advance the test circuit after each selection is checked on a step-by-step basis.
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STP	<u>Step:</u> This key is used in conjunction with the TR key of the group in which the sender is located to step the sender selector to a desired terminal.
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LP	<u>Lamp:</u> This key, when operated after the time alarm functions, checks the selection in which the sender has been stuck. The lighted match lamp will then indicate brush, group, tens or units which should have been selected and is compared to the last lighted pulse lamp.
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AR	<u>Automatic Ring:</u> When operated represents an inward toll position call where the sender is expected to ring.
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TR	<u>Transfer:</u> The operation of a TR key of a sender selector allows that selector to be stepped by means of the STP key to a particular terminal. If the test frame is used for a common group of senders serving both No. 1 and No. 3 toll switchboards, operate the TR key to Position 1 or 3 depending on whether the sender is to be tested for No. 1 or 3-type toll switchboard features.
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PL	<u>Pulse Lamps:</u> To permit the display of a lamp for each operated counting relay in the test frame when a failure is encountered.
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CA	<u>Control Advance:</u> When operated and released causes the test circuit to advance to the next sender if the REP key is normal. With the REP key operated, testing is repeated on the same sender.
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OR-NO	<u>Operator Ring Non-Operate:</u> This key operated makes a non-operate test of the SR relay when the sender is being tested for No. 3-type toll switchboard features.
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OR-0	<u>Operator Ring Operate:</u> This key operated makes an operate and release test of the SR relay when the sender is being tested for the No. 3-type toll switchboard features.
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<u>Key</u>	<u>Purpose</u>	<u>Key</u>	<u>Purpose</u>
OR	<u>Operator Ring</u> : This key makes an operate and release test of the SR relay when the sender is being tested for No. 3 toll switchboard features or makes an operate and release test of the AC relay when the sender is being tested for No. 1 toll switchboard features.	ASR	<u>Automatic Start of Ringing Trunk Class</u> : ASR key operated reverses the KT and KR leads to register automatic start of ringing trunk class in sender. ASR key normal registers controlled start of ringing trunk class in sender.
NOR	<u>No Operator Ring</u> : This key operated makes a non-operate test of the SR relay when the sender is being tested for No. 3 toll switchboard features or makes a non-operate test of the AC relay when the sender is being tested for No. 1 toll switchboard features.	SS	<u>Step-by-Step</u> : This key operated stops the test circuit at the end of each selection until advanced by the operation of the SA key.
TO	<u>Time Out</u> : The operation of this key checks the feature of the sender releasing the keyset and sending 120 IPM flashes to the No. 1 toll switchboard on time out as observed by the (FL) lamp.	TA	<u>Time Alarm</u> : To retire the audible and visual time alarm. This key operated prevents the test circuit from advancing except on repeat tests.
PG	<u>Progress</u> : This key operated lights the sender busy (SB), off normal (ON), sender control (SC), sender advance for keying (SA), keying (K), incoming brush (IB), incoming group (IG), final brush (FB), final tens (FT), final units (FU), or trunk closure (TC) lamp as the case may be.	TRT	<u>Tip Release Test</u> : To test the release of the TS relay with a leak resistance on the KT lead.
PD	<u>Preliminary Disconnect</u> : To test the operate and release adjustment of the PD relay in the sender.	RRT	<u>Ring Release Test</u> : To test the release of the RS relay with a leak resistance on the KR lead.
REP	<u>Repeat</u> : To enable the test frame to continue testing the same sender and to make the remote control feature effective. The (RT) register operates on each repeat test.		
APB	<u>Automatic Pass Busy</u> : This key operated causes the test circuit to operate the (BY) meter and automatically pass a busy sender if the sender is busy for a long enough period. If the key is normal and the test circuit encounters a busy sender the (TBL) register will operate, the TA lamp will light and an alarm will ring after 15 to 40 seconds.		
OT	<u>Overflow Telltale</u> : This key operated checks to see that the sender recognizes the premature reverse battery, opens the fundamental circuit and would supply an overflow indication to the link circuit.		

4. METHOD

(A) Sender Operation Test

- 4.01 This test checks that the sender performs its functions in handling the calls for which it is arranged.
- 4.02 Set up one of the test numbers shown in 1.09 on the numerical keys.
- 4.03 Operate the ST key to start the test. If no failures are encountered, testing will continue until the end of a test cycle is reached. This condition is indicated by the EC (end of cycle) lamp and, after a predetermined time interval, by the TA (time alarm) lamp and associated alarm.
- 4.04 To stop the test at any time restore the ST key. To temporarily stop the test, holding the sender busy, operate the REP key and then the CA and TA keys. When testing is to be resumed, restore the TA and CA keys and then the REP key.
- 4.05 To start another test cycle, restore the ST key. This restores the time alarm and extinguishes the EC lamp. Set up another of the preferred test numbers shown in 1.09. Operate the ST key to start another test cycle. Tests D, E, G and K may be combined with these tests.

(B) Preliminary Disconnect Test

4.06 Set up 0000 on the numerical keys. Operate the PD and ST keys. This test applies a non-operate, operate and release test to the PD relay in the sender.

(C) Overflow and Telltale Test

4.07 Sender Arranged to Operate with Controlled Start of Ringing Trunks Only: Set up 0400 on the numerical keys. Operate the OT and ST keys. This test checks that the sender recognizes the premature reverse battery and places ground through the 5-ohm winding of the SC relay to the SC lead.

4.08 Sender Arranged to Operate with Automatic Start of Ringing Trunks Only: Set up 0400 on the numerical keys. Operate the OT and ST keys. This test checks that the sender recognizes the premature reverse battery, places ground through the 5-ohm winding of the SC relay to the SC lead and opens the fundamental FT and FR leads.

4.09 Sender Arranged to Operate with Both Automatic and Controlled Start of Ringing Trunks: With the ASR key normal and OT key operated, set up 0400 on the numerical keys and operate the ST key. Sender test is made as outlined in 4.07. With the ASR and OT keys operated, set up 0400 on the numerical keys and operate the ST key. Sender test is made as outlined in 4.08.

(D) Ringing by Sender

4.10 This test checks that the sender will automatically ring on a call from an inward toll position.

4.11 Set up one of the test numbers on the numerical keys. With the AR key operated, operate the ST key.

(E) Test of Stored Ring

4.12 This test checks that the sender will change from a non-ring condition to a ring condition on a call from an outward toll position if the operator rings on the circuit immediately after completion of keying. The SR relay performs this function in the case of a DC signal from the No. 3-type switchboards to the sender. The AC relay performs this function in the case of a 20-cycle AC ringing signal from the No. 1 toll switchboard to the sender.

Operate Test of SR Relay

4.13 Test Frame Arranged to Operate with Senders Serving No. 3-Type Toll Switchboards Only: Set up one of the test numbers on the numerical

keys. With the OR key operated to the 0 position operate the ST key.

4.14 Test Frame Arranged to Operate with Senders Serving Both No. 1 and No. 3-Type Toll Switchboards: Set up one of the test numbers on the numerical keys. With the OR key operated, operate the ST key.

Non-operate Test of SR Relay

4.15 Test Frame Arranged to Operate with Senders Equipped with Fig. N and Fig. B with ZJ Option or Fig. M Serving No. 3-Type Toll Switchboards Only: Set up one of the test numbers on the numerical keys. With the AR key operated and the OR key operated to the NO position operate the ST key.

4.16 Test Frame Arranged to Operate with Senders Equipped with Fig. O and Fig. B with ZK Option or Fig. M Serving No. 3-Type Toll Switchboards Only: Set up one of the test numbers on the numerical keys. With the OR key operated to the NO position and the AR key normal operate the ST key.

4.17 Test Frame Arranged to Operate with Senders Serving Both No. 1 and No. 3-Type Toll Switchboards: Set up one of the test numbers on the numerical keys. With the AR and NOR keys operated, operate the ST key.

Operate Test of AC Relay

4.18 Test Frame Arranged to Operate with Senders Serving Both No. 1 and No. 3-Type Toll Switchboards: Set up one of the test numbers on the numerical keys. With the OR key operated, operate the ST key.

Non-Operate Test of AC Relay

4.19 Test Frame Arranged to Operate with Senders Serving Both No. 1 and No. 3-Type Toll Switchboards: Set up one of the test numbers on the numerical keys. With the NOR key operated, operate the ST key.

(F) Slow Pulse Test

4.20 This test applies slow revertive pulsing to the sender for reasons explained in 3.04 under SP key. This test may be combined with test B or D.

4.21 Set up 9999 on numerical keys. With the SP key and either AR or PD key operated, operate the ST key.

(G) Leak Test of TS and RS Relays

4.22 This test applies a leak resistance to the KT and KR leads to check the release of the TS and RS relays in the sender.

4.23 To test the TS relay, set up 3418 on the numerical keys. With the TRT operated, operate the ST key.

4.24 To test the RS relay, set up 5679 on the numerical keys. With the RRT operated, operate the ST key.

(H) Reorder Test

4.25 Test Frame Arranged to Operate with Senders Serving Both No. 1 and No. 3-Type Toll Switchboards:

4.26 This test is used when testing senders used with No. 1 toll switchboards to check that the keyset is released and 120 IPM flash sent to operator if the sender times out.

4.27 With the TO key operated, operate the ST key.

4.28 After observing that the (FL) lamp flashes at a 120 IPM rate, operate and release the CA key to advance to the next sender.

(I) Time Alarm Test

4.29 This test checks that, when a sender is stuck a predetermined interval of time, visual and audible signals are received.

4.30 Set up only two digits on the numerical keys and operate the ST key.

4.31 Note that, about 30 to 45 seconds after the test frame stops, the stuck sender lamp of the sender under test lights on the sender test frame. Also check that the master sender pilot lamp lights and that the audible alarm operates.

4.32 Operate and restore the CA key to test the next sender.

(J) Manual Test for Simplex Battery

4.33 This test provides a means of testing the PC (pad control) resistances in the sender. It also provides a resistance balance test of the SR and SRA relays when these relays are provided in the sender. If the sender is not equipped with the SR and SRA relays, proceed as in 4.34 to 4.39 with the exception that in 4.38 the current flow value would be .00215 to .0024.

If the Sender Is Equipped with the SR and SRA Relays

4.34 Note that all telegraph keys on the 35-type test set are open and that all resistance slides are at the extreme left.

4.35 Connect the ring conductor of a W2W cord to the test frame ground and insert the plug of the cord into the 3R jack of the 35-type test set.

4.36 Connect the Test-T and R jack of the 35-type test set to the T jack on the sender test frame using a P3E cord.

4.37 Set up any number on the numerical keys and operate the ST key.

4.38 After registration is completed in the sender and the (K) lamp becomes extinguished, operate the battery and ground-CO key and operate the Mil-Amp keys to the 3 and 15 positions. The reading on the meter for the KR lead should be .0021 to .00234 amp. Operate the REV key and the reading for the KT lead should be within the same limits.

4.39 Restore the battery and ground-CO key and then operate and release the CA key to advance to the next sender. When all senders are tested, release the ST key and disconnect the 35-type test set.

SR and SRA Relay Balance Test

4.40 Connect the ring conductor of a W2W cord to the test frame 24-volt test battery supply and insert the plug of the cord into Test Battery and Ground Jack of the 35-type test set. Proceed as outlined in 4.34, 4.36 and 4.37.

4.41 After registration is completed in the sender and the (K) lamp becomes extinguished, with the battery and ground-CO key normal and the REV key operated of the 35-type test set, the meter should read between .0228 and .0274 amp.

4.42 The CA key is then operated and released and the test circuit advances to the next sender. When all senders are tested release the ST key and disconnect the 35-type test set.

(K) Release Test of ST Relay

4.43 When Option A is provided, the resistance which checks the release requirement of the ST relay may be changed from 90 ohms test to 110 ohms readjust by inserting a 184B plug in the ST jack.

5. MISCELLANEOUS FEATURES OF TEST FRAME

5.01 The step-by-step and remote control features of the test circuit permit the observation of operations in the senders while they are under test.

Step-by-Step Feature

5.02 With the SS key operated the test circuit will await the momentary operation of the SA key before advancing to the next position.

Remote Control Feature

5.03 The operation of the test circuit may be controlled from the remote control jack associated with the sender under test as follows: Operate the REP key in addition to the other keys required by the test call used. Then operate the SS key.

5.04 Insert the plug of the No. 32-A test set into the remote control jack mounted on the sender frame.

5.05 Depress and release the white button of the test set to advance the test, simulating the operation and release of the SA key.

5.06 Depress and release the red button of the test set to disconnect and restart the test, simulating the operation and release of the CA key.

Control Advance Feature

5.07 To temporarily stop the test, meanwhile holding the sender busy, operate the REP key and then the CA and TA keys. When testing is to be resumed, restore the TA and CA keys and then the REP key.

6. TROUBLE CONDITIONS

6.01 Operate the TA key to retire the alarm.

6.02 Ascertain the sender selector involved, then note the position of this sender selector and refer to the sender selector designation strip for the sender affected.

6.03 Refer to the lamp signals provided at the test frame for data concerning the character of the trouble. The pulse lamps are controlled by the PL key, the match lamps by the LP key and the progress lamps by the PG key as shown in 3.04. The primary indications of the various lamp signals and their use is explained below:

<u>Lamp</u>	<u>Indication</u>
SB	Sender busy lamp. Normally lighted until the ON and SC lamps light.

<u>Lamp</u>	<u>Indication</u>
ON	Off normal lamp. Lights to indicate that the test circuit is off normal and in condition to test the sender control lead.
SC	Sender control lamp. Lights while the operation test is being applied to the sender control (SC) relay.
SA	Sender advance. Lights during registration of class information.
K	Keying lamp. Indicates that the sender is attached and ready to receive keying, or will remain lighted if SR or AC relay operates falsely on non-operate test.
Pulse	Indicates the number of rever- sive pulses transmitted to a sender during a selection. Each lamp indicates one pulse.
Match	Indicates the incoming or final selection number as determined by the numerical keys operated.
IB	Incoming Brush:)
IG	Incoming Group:)
FB	Final Brush:)
FT	Final Tens:)
FU	Final Units:)
	Indicates that incom- ing brush, incoming group, final brush, final tens or final units is be- ing checked.
TC	Trunk closure. This lamp lights during reverse battery and trunk closure, or will remain lighted if SR or AC relay fails to operate on operate test, or if sender fails to ring on auto- matic ring test.
FL	Flash: This lamp flashes on the reorder test on No. 1 toll switchboards.
TA	Time alarm.
EC	End of cycle.
R	Sender ring.

7. REPORTS

7.01 The required record of these tests should be entered on the proper form.