

**ANSWERING TIME RECORDER – PERMANENT TYPE SD-96235-01
EQUIPPED WITH TRAFFIC WEIGHTING APPLIQUE
TESTS**

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1. GENERAL

1.01 This appendix describes a method of testing the answering time recorder (ATR) SD-96235-01 and traffic weighting applique (TWA) circuits SD-96497-01 modified by PSD-3B001-02 or PSD-3B002-01.

1.02 PSD-3B001-02 replaces the TM rotary selector and duplicates its timing function with a solid-state timer.

1.03 PSD-3B002-01 Fig. 1 inserts a sensitive relay between the switchboard lamp multiple and the TWA circuit which eliminates input variations. This provides improved sensitivity and stability.

1.04 PSD-3B002-01 Fig. 2 provides an accurately timed 1-second or 5-second pulse for adjusting the TWA circuit sensitivity and eliminates the manual operation of the T1 key.

1.05 The following tests are covered for ATR-TWA circuits equipped with PSD-3B001-02:

A. Sensitivity Test: Checks the sensitivity setting of the TWA circuit in terms of the response of the counting circuit to repeated signals on the same input. Line relay operations are used as a source of signal.

B. Counting and Storing: Checks the ability of the TWA to count and store normal originated call signals on lines or trunks in service. It also checks the ability of the TWA to disregard false signals resulting from the following conditions:

- (a) Improper or undesirable customer action, such as dialing or switch-hook flashing while the line or trunk lamp is lighted.
- (b) Undesirable trunk action, such as momentary preliminary seizure of the trunk on panel office trunk guard test signals.
- (c) AC interference or inductive "kicks" coupled through the observed lamp leads.

The test thus provides a quick and simple observational check of the accuracy of the results obtained with the ATR-TWA. This test is primarily for verification and is not ordinarily made on a scheduled basis.

C. Concentrating: Checks the following features:

- (a) That the timing circuit can be seized over each of the inputs to the ATR.
- (b) That only one line or trunk can be cut through the timing circuit during a timing interval.
- (c) That a call cannot be partially timed.

D. Timing, Counting, and Registration: Checks the operation of the timing and register control circuits, including the constant holding time feature of the timing circuit, and the operation of the N, D, and S registers. It also checks the count storage and readout functions of the TWA circuit. Count storage refers to the stepping of the PC selector to store the count of total calls during timing of one call, and readout refers to the stepping of the RO selector as it transfers the count to message registers.

E. Input Paths: Checks the input circuits between the distributing frame pickup points of the lamp leads and the timing and counting circuits. It thus constitutes a check of the TST jack contacts of the ATR, the lamp input circuits of the TWA, the grouping relays if the switching circuit is furnished, and the BC relays of the ATR if provided.

F. Reseizure Prevention: Checks that the lamp lead supervisory relay is not reoperated. Thus, the answer time determination on the timed call is not interfered with should a timed call be answered and served and the trunk released and reseized during the same timing interval. It also checks that this feature is delayed after the first 2 seconds following the start of ATR timing when the circuit is so arranged (Fig. 20 of ATR provided).

The following test covers the ATR-TWA circuits modified by PSD-3B002-01 Fig. 1.

G. Sensitivity Test: This test checks the sensitivity setting of the TWA circuit in terms of the response of the counting circuit to repeated signals on the same input. The T1 key is used as a source of signal.

The following test covers the ATR-TWA circuits modified by PSD-3B002-01 Fig. 1 and 2.

H. Sensitivity Test: This test checks the sensitivity setting of the TWA circuit in terms of the response of the counting circuit to repeated signals on the same input. A solid-state timing pulse generator is used as a source of signal.

1.06 Only one of the Sensitivity Tests (A,G, or H) should be performed (depending on the circuits installed) and completed prior to the start of any other test.

A. PSD-3B001-02 installed. If equipped with PSD-3B002-01, do not do Test A. Do Test G or H.

G. PSD-3B002-01 Fig. 1 installed. If equipped with PSD-3B002-01 Fig. 1 and 2, do not do Test A or G. Do Test H.

H. PSD-3B002-01 Fig. 1 and 2 installed (using timing pulse generator of the TWA auxiliary circuit).

1.07 The ST relay referred to in this appendix is mounted in the space formerly occupied by the 206 rotary switch timer.

1.08 Test A requires action to be performed at the line relay location.

1.09 Before performing Test A, G, or H, the Operator Services Department should be notified so that switchboard answer lamps lighted for 5 seconds or less on the trunk or line selected for testing can be disregarded.

1.10 Test B will be facilitated if made in periods of heavy traffic, since the verifications required are directly related to the calling rate on the observed trunk group.

1.11 The timing interval which is obtained by a connection on the TM timer should be determined for use in Tests C and D. When the switching circuit is used, the timing interval must be determined for each group.

1.12 When time transfer arrangements are provided in the ATR under control of the TT key, Test D should be made once with the TT key normal and once with it operated. The operation of the TT key adds 10 seconds to the timing interval obtained with the key normal.

1.13 Where provided, terminal room registers should be connected to the timing circuit during these tests for checking circuit operation. The transfer is accomplished by the operation of the TR key. Test D provides for testing the

functioning of the registers in the operating room location. Verifications will be required at the operating room location of the registers for this portion of Test D.

1.14 Before performing Test E, the office records should be consulted to determine (for each group if the switching circuit is used) the potential used to light the line or trunk lamps to which the ATR is connected. This same potential must be used to perform Test E.

1.15 If the switching circuit is furnished, Tests A and E require action to be performed at the location of the group transfer switch upon completion of testing on each group.

1.16 Test E requires actions to be performed at the distributing frame location of the line or trunk lamp leads. (Where the switching circuit is furnished, this refers to punchings on the line or trunk side of the grouping relays.)

1.17 The Operator Services Department should be notified before starting and after completing these tests, so that any signals caused by performing these tests can be disregarded.

1.18 The BG key should remain nonoperated when the ATR is equipped with BC relays. When BC relays are not used, the BG key should be normal when the associated observed circuits furnish battery signals to the ATR-TWA (for example, trunks with ground lamps); and operated when ground signals are furnished (for example, sender circuits). When BC relays are not furnished and the switching circuit is used, this condition must be ascertained for each group.

1.19 Lettered Steps: A letter, a, b, c, etc, added to a step number in Part 3 of this section indicates an action which may or may not be required depending on 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 conditions are designated by the same letter within a test. Where a condition does not apply, all steps designated by that letter should be omitted.

1.20 Where operating room registers are used in these tests, local instructions should be followed for recording and reporting any register operations caused by performing these tests.

2. APPARATUS

2.01 The apparatus required for each test is shown in Table A. The details for each item are covered in the paragraphs indicated by the numbers enclosed in parentheses.

2.02 258C plugs (dummy) or equivalent, as required (maximum 25).

2.03 KS-3008 stopwatch or equivalent.

2.04 Testing cord, 893 cord, 6 feet long, equipped with two 360A tools (1W13B cord), one 411A (test pick) tool, and one KS-6278 connecting clip.

2.05 Patching cord, P3E cord, 6 feet long, equipped with two 310 plugs (3P7A cord).

2.06 Blocking tools, as required. Use tools and apply as covered in Section 069-020-801.

TABLE A

APPARATUS	TEST							
	A	B	C	D	E	F	G	H
258C Plugs (2.02)	*		*	*	-	*	-	
Stopwatch (2.03)	1		-	1	-	-	1	
Testing Cord (2.04)	1	-	-	-	1	-	-	-
Patching Cord (2.05)	-	-	2	2	-	1	1	2
Blocking Tools (2.06)	*	*	-	-	*	-	*	*
349A Plug	-	-	-	-	-	-	-	1

*As Required

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3. METHOD

STEP	ACTION	VERIFICATION
A. Sensitivity Test (ATR-TWA Equipped with only PSD-3B001-02)		
1	Establish talking path between line relay location and TWA location.	
2	At ATR, block ST relay nonoperated.	
3	Manually operate SU relay.	At TWA, PC selector advances one step.
4	At line relay location or trunk location, manually operate line relay at repeated intervals of 1.5 seconds operated and 1.5 seconds nonoperated.	At TWA, PC selector advanced one step for first operation and did not follow succeeding operations.
5a	If PC selector follows 1.5 second operations of line relay, at ATR, insert make-busy plug in first TST jack.	
6a	At TWA, connect test lead to D, E, or L2 lead associated with plugged out (first) input at terminal of corresponding B lamp.	
7a	Connect other end of test lead to ground, 24V, 38V, or 48V battery as required to simulate an incoming lamp signal in continuous 1.5 seconds on, 1.5 seconds off sequence.	
8a	At TWA, adjust SENS potentiometer to its extreme clockwise position.	
9a	Adjust SENS potentiometer counterclockwise (decreasing sensitivity) until the PC selector just fails to step with each ON pulse.	PC selector fails to step with each ON pulse.
10	Repeat Steps 2 through 9a on each working trunk or line of the group under test. <i>Note:</i> When all trunks or lines are found okay at Step 4, go on to Step 11.	
11	Repeat Steps 2 through 4 except that operation intervals shall be 5 seconds operated and 5 seconds nonoperated.	At TWA, PC selector advanced one step for each application of test signal.
12b	If PC selector does not follow 5 second pulses, perform Steps 5a through 10.	PC selector advances one step for each application of test signal.

STEP	ACTION	VERIFICATION
13	At ATR, remove blocking tool from ST relay.	ATR advances to time-out, then restored to normal. TWA readout, then restored to normal.
14c	If switching circuit is provided and other groups are to be tested, in operating room, move group transfer switch to position of next group to be tested.	
15c	Repeat Steps 2 through 13 until each working group is tested.	
16c	Restore group transfer switch to working position.	
	<p>B. Counting and Storing</p> <p>1 With selector switches PC and RO in the same position, at ATR, block ST relay nonoperated.</p> <p>2 At TWA and lamp panel, observe lamp panel and PC selector of TWA until sufficient call signals have been received to verify proper operation.</p> <p>3 At ATR, remove blocking tool from ST relay.</p>	<p>ST nonoperated.</p> <p>PC selector advances one terminal each time a pair of A and B lamps is lighted due to seizure of associated trunk; never advances without simultaneous lighting of a pair of A and B lamps; and advances one terminal only should a pair of lamps display pulsing, flashing or interrupted signals such as might result from dial pulses, switchhook flashing, TG test pulses, etc.</p> <p>At TWA, RO selector advances until it reaches terminal numbered same as that on which PC selector is standing.</p>
	<p>C. Concentrating</p> <p>1 Operate or restore BG key, as required. (see 1.18.)</p> <p>2 Insert 258C dummy plugs into all TST jacks of ATR.</p> <p>3 Remove dummy plugs from first two TST jacks.</p>	

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STEP	ACTION	VERIFICATION
4	Patch first TST jack to T1 jack.	
5	Patch second TST jack to T2 jack.	
	<i>Note:</i> Steps 6, 7, and 8 must be made within one timing interval. (See 1.11.)	
6	Operate T1 key.	BY lamp lighted.
7	Operate T2 key.	
8	Restore T1 key.	BY lamp extinguished. BY lamp does not relight at expiration of timing interval.
9	Restore T2 key.	
10	Remove patching cords from TST jacks.	
11	Move dummy plug from third TST jack to first TST jack.	
12	Patch second TST jack to T1 jack.	
13	Patch third TST jack to T2 jack.	
14	Repeat Steps 6 through 9; then advance each patching cord by one TST jack in same manner as in Steps 10 through 13 for first shift, continuing in this manner until all TST jacks have been used, making last test using last TST jack and first TST jack.	
15	Remove all dummy plugs.	
16	Remove patching cords from TST, T1, T2 jacks.	
	<p>D. Timing, Counting, and Registration</p> <p>1 Operate or restore BG key as required. (See 1.18.)</p> <p>2 Insert 258C dummy plugs into all TST jacks of ATR.</p> <p>3a If terminal room registers are provided, operate TR key.</p>	<p>KP lamp lighted.</p>

STEP	ACTION	VERIFICATION
4	Remove dummy plugs from any two TST jacks.	
5	Patch unplugged TST jacks to T1, T2 jacks. <i>Note:</i> Steps 6 and 7 must be made within one timing interval. (See 1.11.)	
6	Operate T1 key; <i>start timing.</i>	BY lamp lighted. ST relay operated.
7	Restore T1 key after any elapsed time within timing interval.	BY lamp extinguished. ST relay released.
8	Reset stopwatch. <i>Note:</i> Steps 9, 10, and 11 must be made within one timing interval. The following is a typical procedure, assuming 10-second setting of timing circuit. Operate T1; operate T2 momentarily at 2 and 8 seconds of timing interval; and restore T1 at 9 or 9.5 seconds of timing interval.	
9	Operate T1 key; <i>start timing.</i>	BY lamp lighted. ST relay operated.
10	Momentarily operate T2 key one or more times during timing interval resulting from previous step. <i>Note:</i> Allow 5 seconds minimum between operations of T2 key. With 5-second setting of timing circuit, operate T2 key only once.	
11	Restore T1 key at least 0.5 second before end of timing interval.	N register scores once for operation of T1 key plus once for each operation of T2 key. D register does not score. S register scores once. BY lamp extinguished.
12	Reset stopwatch. <i>Note:</i> Steps 13 and 14 must be performed within one timing interval and Step 15 shortly thereafter. The following is a typical procedure, assuming 10-second setting of timing circuit. Operate T1; operate T2 momentarily at 2 and 8 seconds of timing interval; restore T1 key 11.5 or 12 seconds after start of timing interval.	

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STEP	ACTION	VERIFICATION
13	Operate T1 key; <i>start timing</i> .	BY lamp lighted. ST relay operated.
14	<p>Momentarily operate T2 key one or more times during timing interval resulting from previous step.</p> <p><i>Note:</i> Allow 5 seconds minimum between operation of T2 key. With 5-second setting of timing circuit, operate T2 key only once.</p>	
15	Restore T1 key no sooner than 1.5 seconds after end of timing interval.	N, D registers score once for operation of T1 key plus once for each operation of T2 key. S register scores once. BY lamp extinguished.
16	<p>Reset stopwatch.</p> <p><i>Note:</i> Steps 17 and 18 must be performed within one timing interval and Step 19 shortly thereafter. The following is a typical procedure, assuming 10-second setting of timing circuit. Operate T1 key; operate T2 key momentarily at 1 and 6 seconds of timing interval; operate T2 key again when N and D registers start to score.</p>	
17	Operate T1 key; <i>start timing</i> .	BY lamp lighted. ST relay operated.
18	<p>Momentarily operate T2 key one or more times during timing interval resulting from previous step.</p> <p><i>Note:</i> Allow 5 seconds minimum between operations of T2 key. With 5-second setting of timing circuit, operate T2 key only once.</p>	
19b	<p>If testing ATR SD-96235-01, Fig. 20, equipped with TWA circuit, momentarily operate T2 key once again during register scoring activity which follows timing interval, but no sooner than 5 seconds after its last operation in Step 18.</p> <p><i>Note:</i> With 5-second setting of timing circuit, allow a minimum of 3 seconds between successive T2 operations.</p>	<p>N, D registers score once for operation of T1 key plus once for each operation of T2 key, including one score for T2 operation during register scoring activity.</p> <p>S register scores once.</p> <p>BY lamp extinguished.</p>

STEP	ACTION	VERIFICATION
20	Restore T1 key.	
21	Reset stopwatch.	
22c	If TT key is provided, change position of TT key.	
23c	Repeat Steps 6 through 21 using new timing interval. (See 1.11 and 1.12.)	
24c	Restore TT key to original position.	
25a	If terminal room registers are provided, Restore TR key to normal.	KP lamp extinguished.
26a	Repeat Steps 6 through 21, noting register operations in operating room location.	
27	Remove patching cords.	
28	Remove dummy plugs.	
	<p>E. Input Paths (Equipped with PSD-3B001-02)</p> <p>1 At ATR, block ST relay nonoperated.</p> <p>2 Momentarily operate SU relay.</p> <p>3 At distributing frame, apply required potential momentarily (see 1.14) through testing cord to each lamp lead terminal cross-connected or switched into ATR.</p> <p>4 Repeat Step 3 on first terminal tested.</p> <p>5 At ATR, remove blocking tool from ST relay.</p> <p>6a If switching circuit is provided and other groups are to be tested, in operating room move group transfer switch to position of group to be tested.</p> <p>7a Repeat Steps 1 through 6a until each group is tested.</p> <p>8a Restore group transfer switch to working position.</p>	<p>For each application of potential, pair of A, B lamps associated with lamp lead being tested lighted.</p> <p>PC selector advances one step.</p> <p><i>Note:</i> If two pairs of lamps lighted in the TWA circuit when the selector stepped, repeat test on that terminal.</p> <p>ATR advanced to time-out, then restored to normal.</p>

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STEP	ACTION	VERIFICATION
F. Reseizure Prevention		
1	Operate or restore BG key, as required. (See 1.18.)	
2	Insert 258C dummy plugs into all TST jacks of ATR.	
3	Remove dummy plug from any TST jack.	
4	Patch TST jack to T1 jack.	
5	Operate T1 key.	BY lamp lighted.
6	At 1-second, restore T1 key.	BY lamp extinguished.
7	At 2-seconds, momentarily operate T1 key.	BY lamp lighted momentarily.
8	At 4-seconds, operate T1 key.	BY lamp does not light.
9	Restore T1 key.	ATR completes cycle and releases.
10	Remove patching cord.	
11	Remove all dummy plugs.	
G. Sensitivity Test (PSD-3B002-01 Fig. 1 installed)		
1	At ATR circuit, set BG key (see 1.18) appropriate for the TWA circuit to be adjusted. Operate TR key to transfer from ATR.	KP lamp lighted.
2a	At ATR (if equipped with PSD-3B001-02), block relay ST nonoperated.	
2b	At ATR (if equipped with TM rotary switch), block relay P nonoperated.	
3	At ATR, momentarily operate relay SU.	
<i>Note: Steps 2a or 2b, and Step 3 have blocked ATR off-normal.</i>		
4	At ATR, connect a 3P7A patching cord to test jack T1. Connect the other end of cord to the first of the 25 TST jacks.	
5	At ATR, operate T1 key for 1-second, release it for 1-second, then repeat this cycle 4 to 6 times.	At TWA circuit, the PC selector advanced one step for the first 1-second ON pulse, but did not follow succeeding 1-second ON pulses.

STEP	ACTION	VERIFICATION
6c	If PC selector follows 1-second operations of T1 key, at TWA adjust SENS potentiometer to its extreme clockwise position.	
7c	Adjust SENS potentiometer counterclockwise (decreasing sensitivity) until the PC selector just fails to step with each ON pulse.	PC selector fails to step with each ON pulse.
8	Repeat Step 4 for each of the 25 TST jacks in order that sensitivity may be properly set for the "worst" or most sensitive condition..	
	<i>Note:</i> When all trunks or lines are found okay at Step 5, go on to Step 9.	
9	Repeat Steps 4 through 5 except that operation intervals shall be 5-seconds operated and 5-seconds nonoperated.	At TWA, PC selector advanced one step for each application of test signal.
10d	If PC selector does not follow 5-second pulses, perform Steps 6c through 8.	PC selector advances one step for each application of test signal after readjustment of SENS potentiometer.
11a	At ATR (if equipped with PSD-3B001-02) remove the blocking tool from ST relay.	
12b	At ATR (if equipped with TM rotary switch), remove blocking tool from P relay.	
13	At ATR, restore TR key to normal condition. <i>Note:</i> When PSD-3B002-01 Fig. 1 is installed, it is necessary only to test the 25 inputs to the TWA circuit. Differences in circuitry within other groups switched to the TWA circuit will not affect its sensitivity.	KP lamp extinguished.
	<p>H. Sensitivity Test (Using Auxiliary Circuit PSD-3B002-01 Fig. 1 and 2 installed)</p> <p>1 At ATR circuit, set BG key (see 1.18) as appropriate for the TWA circuit to be adjusted. Operate TR key to transfer from ATR.</p> <p>2a At ATR (if equipped with PSD-3B001-02), block ST relay nonoperated.</p> <p>2b At ATR (if equipped with TM rotary switch), block P relay nonoperated.</p>	<p>KP lamp lights.</p>

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STEP	ACTION	VERIFICATION
3	<p>At ATR, momentarily operate SU relay.</p> <p><i>Note:</i> Steps 2a or 2b, and Step 3 have blocked the ATR circuit off-normal.</p>	
4	<p>At ATR circuit, connect a 3P7A patching cord to T1 test jack. Connect other end to IN jack on the TWA auxiliary circuit. Depress T1 key on ATR circuit.</p>	
5	<p>Connect a second 3P7A patching cord from OUT jack of TWA circuit to the first of the 25 TST jacks.</p>	
6	<p>At TWA auxiliary circuit, insert a 349A plug in the 1SEC jack.</p>	<p>At TWA auxiliary circuit, T1 and T2 relays pulse at 1-second intervals. At TWA circuit, PC selector advanced one step for the first 1-second ON pulse, but did not follow succeeding 1-second ON pulses.</p>
7c	<p>At TWA, if PC selector follows 1-second operations of ON pulse, adjust SENS potentiometer to its extreme clockwise position.</p>	
8c	<p>Adjust SENS potentiometer counterclockwise (decreasing sensitivity) until the PC selector just fails to step with each ON pulse.</p>	<p>PC selector fails to step with each ON pulse.</p>
9	<p>Repeat Step 6 for each of the 25 TST jacks in order that the sensitivity may be properly set for the "worst" or most sensitive condition.</p> <p><i>Note:</i> When all trunks or lines are found okay at Step 6, go on to Step 10.</p>	
10	<p>At the TWA auxiliary circuit, remove 349A plug from 1 SEC jack.</p>	<p>At TWA, PC selector Stops. T1 and T2 relays stop pulsing.</p>
11	<p>Insert 349A plug in 5 SEC jack.</p>	<p>At TWA auxiliary circuit, T1 and T2 relays pulse at 5-second intervals.</p>
12	<p>Sequentially connect the 3P7A patching cord attached to the out jack to each of the 25 test jacks.</p>	<p>At TWA circuit, PC selector advances for each 5-second ON pulse.</p>
13d	<p>If PC selector does not follow 5-second pulses, perform Steps 6 through 9.</p>	
14a	<p>At ATR (if equipped with PSD-3B001), remove the blocking tool from ST relay.</p>	

STEP	ACTION	VERIFICATION
15b	<p>At ATR (if equipped with TM rotary switch), remove blocking tool from P relay.</p> <p>At ATR, restore TR key to normal condition.</p> <p><i>Note:</i> When PSD 3B002-01 Fig. 1 is installed, it is necessary only to test the 25 inputs to the TWA circuit. Differences in circuitry within other groups switched to the TWA circuit will not affect its sensitivity.</p>	KP lamp extinguishes.