

KS-15947 TOTALIZER CIRCUIT, SD-95965-01

TESTS USING KS-15946 TEST SET, SD-96568-01

1. GENERAL

1.01 This section describes a method of testing the KS-15947 totalizer circuit using the KS-15946 test set, SD-96568-01. It also describes a method of adjusting the sensitivity of the unit. The sensitivity adjustment must be made before a unit is put into service. All other tests described in this section need be made only if a trouble is suspected.

1.02 The tests covered are:

A. Sensitivity Adjustment: The sensitivity adjustment depends upon the connecting circuits that supply the input signals. These circuits and the associated sensitivities are listed under the working limits section of SD-95965-01.

B. Counter Test: This test verifies the accuracy of the decade scalar package.

C. Corrective Maintenance Test: This test outlines a procedure for locating the cause of a circuit failure.

1.03 The KS-15947 totalizer circuit is referred to in this section as totalizer.

1.04 The KS-15946 test set is referred to in this section as test set.

1.05 The test set PULSE key should always be depressed slowly and evenly to minimize generation of contact chatter.

1.06 Depressing the test set PULSE key will result in a test set meter reading near zero. On release, the meter will return to the original value.

1.07 The interval between test set PULSE key operations shall be no shorter than the time required for the test set meter to return to the original value.

1.08 It may be noted in some of the following tests that when the test set BLUE — OUT lead is connected to the totalizer, the test set lamp remains lighted or flashes intermittently. If this occurs, it indicates the totalizer ground is not at the same level as the test set ground. To insure that both grounds are on the same level under these conditions, the test set BLACK — GRD lead should be connected directly to the totalizer ground bus.

2. APPARATUS

All Tests

2.01 KS-15946 test set (SD-96568-01).

2.02 C-type screwdriver or equivalent.

Test C

2.03 KS-14510 L1 volt-ohm-milliammeter, (VOM) or equivalent.

3. PREPARATION

STEP

ACTION

VERIFICATION

All Tests

- 1 Connect test set RED 48V lead to — 48V, BLACK — GRD lead to ground.
- 2 Set test set controls as follows:
POLARITY switch to (-).
OUT COUPLING switch to (AC).

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STEP	ACTION	VERIFICATION
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Tests A and B

- | | | |
|---|--|--|
| 3 | Set test set OUT IMPEDANCE potentiometer to (0). | |
| 4 | Set test set SENS selector switch and PULSE AM potentiometer so that product of meter reading and SENS selector switch position (X1, X2, X3, or X4) equals input sensitivity value shown in working limits table of totalizer circuit. | |
| 5 | Remove totalizer patching cords between P5 and P6, P7 and P8, P11 and P12 jacks. | |
| 6 | Connect following test set leads to totalizer:
GREEN — IN to P11 jack.
WHITE — PATCH 1 and PATCH 2 to P5 and P8 jacks.
BLUE — OUT to T1 jack. | |
| 7 | Place totalizer SW-1 switch in N position. | |
| 8 | Place all other SW switches in G position. | |

Test C

- | | | |
|----|---|--|
| 9 | Set test set controls as follows:
OUT IMPEDANCE potentiometer at 2.
SENS selector switch at (0).
PULSE AM potentiometer so that test set meter reads 18 volts. | |
| 10 | Remove totalizer patch cords between P11 and P12, P9 and P10 jacks. | |
| 11 | Connect test set GREEN — IN lead to P11 and BLUE — OUT lead to P10 jacks. | |

4. METHOD

STEP	ACTION	VERIFICATION
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A. Sensitivity Adjustment

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|----|--|--|
| 9 | Turn totalizer SENS potentiometer fully clockwise. | |
| 10 | Operate test set PULSE key. | Test set lamp lights momentarily. |
| 11 | Turn SENS potentiometer counterclockwise in gradual steps, operating PULSE key at each step. | Test set lamp lights momentarily for each operation of key. At some point lamp will fail to flash. |
| 12 | Turn SENS potentiometer slightly clockwise and operate PULSE key. | |

STEP	ACTION	VERIFICATION
13	Repeat Step 12 until test set lamp just starts to flash. (Totalizer is now set at desired sensitivity.)	Test set lamp lights momentarily for each operation of key.
14	Remove all test set leads.	
15	Restore all totalizer switches and cords to normal.	

B. Counter Test

Note: The DS package should transmit one output pulse for each ten input pulses it receives. In order to minimize the possibility of stray pulses coming in while the test is being made, this test should be made during the lightest load period.

9	Turn totalizer SENS potentiometer fully clockwise.	
10	Operate test set PULSE key.	Test set lamp lights momentarily.
11	Turn SENS potentiometer counterclockwise in gradual steps, operating PULSE key at each step.	Test set lamp lights momentarily for each operation of key. At some point lamp will fail to flash.
12	Turn SENS potentiometer slightly clockwise and operate PULSE key.	
13	Repeat Step 12 until test set lamp just starts to flash. (Totalizer is now set at desired sensitivity.)	Test lamp lights momentarily for each operation of key.
14	Remove BLUE — OUT lead from T1 jack, WHITE — PATCH 1 and PATCH 2 leads from P5, P8 jacks.	
15	Replace totalizer patch cords between P5 and P6, P7 and P8 jacks.	
16	Reset SENS selector switch and PULSE AM potentiometer so that the product of meter reading and SENS selector switch position equals a value that is 20 per cent greater than value of input sensitivity shown in working limits table.	
17	Replace BLUE — OUT lead in T1 jack.	
18	Operate PULSE key as many times as required to flash test set lamp and no more.	Test set lamp lights momentarily.
	<i>Note:</i> The totalizer is now cleared of all stored counts.	
19	Operate PULSE key nine times.	

STEP	ACTION	VERIFICATION
20	Operate PULSE key once more.	On tenth pulse, lamp lights momentarily.
<i>Notes:</i>		
	1. Should it require more than ten key operations to light the lamp, repeat Steps 18 to 20 to confirm this. If the test fails again, the DS package is defective and should be replaced.	
	2. Under these test conditions the possibility exists that pulses from inputs associated with the A-1 package can come through during the test and cause the lamp to flash on less than ten pulses. If this is the case, all input sources to the A-1 package must be blocked to insure complete accuracy of the test. If under this blocked condition the totalizer consistently undercounts, the DS package is defective and should be replaced.	
21	Remove all test set leads.	
22	Restore all totalizer patch cords and switches to normal before returning totalizer to service.	

C. Corrective Maintenance Test

Notes:

	1. The individual package tests outlined are predicted on the assumption that all succeeding packages are working properly. Therefore, the tests are to be performed in the prescribed order. When a source of failure has been located and corrected, the tests may be terminated at that point.	
	2. All tests are to be performed with totalizer SENS potentiometer fully clockwise. The totalizer should be restored to its normal sensitivity setting before it is returned to service.	
12	Check for battery on terminals 22 and 13 of totalizer (A) terminal strip using VOM.	VOM should read between -45 and -50 volts on terminal 13. With "W," "X," "Y," or "Z" options provided, VOM should read between -45 and -50 volts on terminal 22. With "V" option provided, VOM should read between -21 and -26 volts on terminal 22.
13	Check voltage at -20V test jack of totalizer using VOM.	VOM should read between -18 and -22 volts.
14	Depress test set PULSE key.	Test set lamp lights momentarily. Failure of lamp to light indicates faulty DA package.
15	Remove BLUE — OUT lead from P10 jack.	
16	Set test set OUT IMPEDANCE potentiometer at (0).	
17	Set PULSE AM potentiometer so that test set meter reads 9 volts.	
18	Remove totalizer patch cord between P7 and P8 jacks, replace patch cord between P9 and P10 jacks.	

STEP	ACTION	VERIFICATION
19	Connect test set BLUE — OUT lead to P8 jack.	
20	Depress test set PULSE key.	Test set lamp shall light momentarily. Failure of lamp to light indicates defective PS package.
21	Remove BLUE — OUT lead from P8 jack.	
22	Set OUT IMPEDANCE potentiometer at (2).	
23	Set PULSE AM potentiometer so that test set meter reads 18 volts.	
24	Remove totalizer patch cord between P5 and P6 jacks, replace patch cord between P7 and P8 jacks.	
25	Connect test set BLUE — OUT lead to P6 jack.	
26	Depress test set PULSE key ten times.	Test set lamp shall light momentarily at least once. Failure of lamp to light indicates defective DS package. <i>Note:</i> This test is not intended to be a check of counter accuracy.
27	Remove BLUE — OUT lead from P6 jack.	
28	Set OUT IMPEDANCE potentiometer at (10).	
29	Remove totalizer patch cords between P3 and P4 jacks, replace patch cord between P5 and P6 jacks.	
30	Connect BLUE — OUT lead to P4 jack.	
31	Depress repeatedly test set PULSE key.	Test set lamp shall light momentarily. This should occur in less than 15 operations of key. Failure of lamp to flash indicates defective RPA package.
32	Remove test set BLUE — OUT lead from P4 jack.	
33	Set OUT IMPEDANCE potentiometer at (0) and SENS selector switch at X2.	
34	Set PULSE AM potentiometer so that test set meter reads 26 volts.	
35	Remove patch cords between P5 and P6, P7 and P8 jacks, replace patch cord between P3 and P4 jacks.	
36	Place totalizer SW-1 switch in N position and place all other SW switches in G position.	

STEP	ACTION	VERIFICATION
37	Connect WHITE — PATCH 1 and PATCH 2 leads to P5 and P8 jacks.	
38	Connect BLUE — OUT lead to T1 jack.	
39	Depress test set PULSE key.	Test set lamp shall light momentarily for each operation of key.
	<i>Note:</i> Failure of the test set lamp at this point indicates a trouble in either the SA package, the coupling between the SA and A packages, or in the first A package. The following procedure is to be followed to isolate the cause of failure.	
40	Disconnect two fuses associated with totalizer under test.	
41	Remove patch cord between P1 and P2 jacks.	
42	Place all totalizer SW switches in N position.	
43	Remove BLUE — OUT lead from T1 jack.	
44	Measure resistance between P1 and ground using VOM.	This reading shall be as follows:
		Option
		"V", "W", or "X" 8500 ohms min, 11500 ohms max
		"Y" 1700 ohms min, 2300 ohms max
		"Z" infinite
		Should the readings be within these limits the coupling network is not the source of failure.
45	Replace patch cords between P1 and P2 jacks.	
46	Restore totalizer fuses.	
47	Place clip adapter on BLUE — OUT lead.	
48	Connect BLUE — OUT lead to 1T terminal of A2 package.	
49	Place all SW switches except SW-2 switch in G position.	
50	Depress test set PULSE key.	Test set lamp should light momentarily for each operation of key.
	<i>Note:</i> Should the lamp fail to light, repeat Steps 48 to 50 for all other A packages. Failure of the lamp to light in all cases indicates a defective SA package. Should the lamp light for some of the A packages but not all, the SA package is operating but the individual A packages that failed to light the lamp are defective and should be replaced.	