MF KEYSET CIRCUIT

NO. 1 TOLL SWITCHBOARD

OUTPUT LEVEL -3 DBM PER FREQUENCY

1. GENERAL

1.01 This section describes a method of making multifrequency tests on keysets used in No. 1 toll switchboards where the multifrequency distribution system or the keyset or both have been modified for the reduced transmitting level.

1.02 The tests covered are:

(A) Output Level Test of Keyset Using 24-Wire Distribution System: This test provides a check of the keyset voltage or power output level.

(B) Keyset Wiring, 24-Wire Distribution System: This test checks the key pulsing supply wiring to each key with respect to all other keys of a keyset connected to the MF current supply using 24-wire current distribution system.

(C) Output Level Test of Keyset Using 6-Wire Distribution System: This test provides a check of the keyset voltage or power output level.

(D) Keyset Wiring, 6-Wire Distribution System: This test checks the key pulsing supply wiring to each key with respect to all other keys of a keyset connected to the MF current supply using 6-wire current distribution system.

(E) Operation Test: This test provides an operate test for the MF keyset.

1.03 All AC voltmeter readings refer to the average or midpoint position between the maximum and minimum swing of the voltmeter pointer.

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)
Transmission Measuring System (2.02(a)) or 1000-cycle 1 MW Testing Supply (2.02(b))	1	1	1	1	
Test Set (2.03)	1	1	1	1	
Transmission Measuring Set (2.04)	1		1	1	
Test Circuit (2.05)	1	1	1	1	
Patching Cord (2.06)	1	1	1	1	
Patching Cord (2.07)	2	2	2	2	
Operator's Telephone Set					1

2.02 One of the following:

(a) No. 40B Transmission Measuring System equipped with an adjustable output oscillator, or a No. 6A Transmission Measuring Set and adjustable type oscillator.

(b) Milliwatt distributing circuit using J94002A Sending Panel or equivalent.

2.03 AC Voltmeter Test Set J68602AH (SD-64125-01) or AC Relay and Signaling Test Set J68602AJ (SD-63674-01).

2.04 12-type Transmission Measuring Set.

2.05 Position Test Circuit SD-62140-02.

2.06 One of the following cords:

(a) For switchboards using 49-type Jacks.

One P3E Cord, 6 feet long, equipped with two No. 310 Plugs (3P7A Cord).

(b) For switchboards using 92-type Jacks.

One P3F Cord, 6 feet long, equipped with one No. 309 Plug and one No. 310 Plug (3P12E Cord).

2.07 P2AA Cord, 6 feet long, equipped with two No. 241A Plugs (2P13F Cord).

3. PREPARATION

STEP	ACTION	VERIFICATION
	TESTS (A), (B), (C), AND (D)	
	Voltmeter Calibration Using the No. 6A Transmission Measuring System	
1	Using a P2AA cord, connect the SEND jacks of 6A set to T and R or T1 and R1 jacks of voltmeter test set.	
2	Using another P2AA cord, connect the RECEIVE jacks of 6A set to the other T and R jacks or T2 and R2 jacks of voltmeter test set.	
3	Set variable oscillator to 1000 cycles.	
4	Calibrate 6A set at 0 dbm.	
5	Operate CAL-MEAS key of 6A set to MEAS.	
6	Adjust 6A set SEND dial until 6A set meter reads 0 dbm.	
7	Hold operated 4 key of voltmeter test set.	
8	Turn zero adjusting screw on AC voltmeter until meter reads 0.77 volt on 4-volt scale.	
9	Release 4 key of voltmeter test set.	Note: AC voltmeter pointer may not point to zero when at rest.
10	Remove all cords.	
	Voltmeter Calibration Using the No. 40B Transmission Measuring System	
11	Using a P2AA cord connect the SEND jacks of 40B set to T and R or T1 and R1 jacks of voltmeter test set.	
12	Using another P2AA cord connect the REC 600-ohm SCALE B jacks of 40B set to the other T and R jacks or T2 and R2 jacks of voltmeter test set.	
13	Operate SCALE B key of 40B set.	
14	Adjust oscillator output until 40B set meter reads 0 dbm.	
15	Hold operated 4 key of voltmeter test set.	
16	Turn zero adjusting screw on AC voltmeter until meter reads 0.77 volt on 4-volt scale.	
17	Release 4 key of voltmeter test set.	Note: AC voltmeter pointer may not point to zero when at rest.
18	Remove all cords.	

STEP	ACTION	VERIFICATION
	Voltmeter Calibration Using 1 MW Supply at Switchboard	
19	Using a P3E or P3F cord connect the 1 MW supply jack at switchboard to L jack of voltmeter test set.	
20	Operate SH or LSH key of voltmeter test set.	
21	Insert plug of spare switchboard cord into a multiple appearance of 1 MW supply.	
22	Hold operated 4 key of voltmeter test set.	
23	Turn zero adjusting screw on AC voltmeter until meter reads 0.70 volt on the 4-volt scale.	
24	Release 4 key of voltmeter test set.	Note: AC voltmeter pointer may not point to zero when at rest.
25	Remove all cords.	
	Voltmeter Calibration Using 1 MW Supply at Toll Testboard	
26	Using a P2AA cord connect the 1 MW supply jacks to the T and R or T1 and R1 jacks of voltmeter test set.	
27	Operate SH or LSH key.	
28	Hold operated 4 key of voltmeter test set.	
29	Turn zero adjusting screw on AC voltmeter until meter reads 0.70 volt on the 4-volt scale.	
30	Release 4 key of voltmeter test set.	Note: AC voltmeter pointer may not point to zero when at rest.
31	Remove patch cord.	
	Test of Keyset SD-55078-01	
32	Using a P3E or P3F cord connect the D jack of the voltmeter test set to the TRK jack of position test circuit.	
33	Connect the front or rear cord to L jack of voltmeter test set.	Front or rear supervisory cord lamp lighted
34	Operate SH or LSH key, if not operated.	
35	Operate talking key of cord circuit.	
36	Operate splitting key to proper position.	
	Note: When testing keysets equipped with only one KP key and KP lamp, disregard the use of the front or rear KP keys and S lamp described in Part 4 of the section.	

STEP	ACTION	VERIFICATION
	Test of Keysets Other than SD-55078-01	
37	Using a P3E or P3F cord connect the L jack of the voltmeter test set to the VM jack of position test circuit.	
38	Connect the front or rear cord to the P jack of position test circuit.	Front or rear supervisory cord lamp lighted.
39	Operate SH or LSH key, if not operated.	
40	Operate talking key of cord circuit.	
41	Operate splitting to proper position.	
	TESTS (A), (C), AND (D)	
	Using the 12-Type Transmission Measuring Set	
42	Connect 12-type set to any 1 MW supply, 6A, or 40B SEND jacks and adjust CAL potentiometer until meter reads 0 dbm. Note: When 1 MW supply is used at switchboard as tone source, insert a spare switchboard cord into one of the DIAL jacks of the 12-type set.	
43	Remove all cords.	
44	Using a P3E or P3F cord connect the 109 MEAS or 110 MEAS jack of the 12-type set to the VM jack of position test circuit.	
45	Connect the front or rear cord to the P jack of position test circuit.	Front or rear supervisory cord lamp lighted.

4. METHOD

STEP	ACTION	VERIFICATION
	(A) Output Level Test of Keyset Using 24-Wire Distribution System	
	Using Voltmeter Test Set	
46	Hold operated the front or rear KP key.	KP lamp lighted on keyset SD-55918-01. Momentary kick of AC voltmeter pointer indicating presence of KP tone signal.
47	Hold operated 4 key of voltmeter test set.	Reading of 0.65 $\pm$ 0.1 volt on 4-volt scale of AC voltmeter.
48	Release KP key.	S lamp (if provided) lighted. KP lamp on keyset SD-55078-01 lighted.

STEP	ACTION	VERIFICATION
49	Operate and release 0 to 9 and ST keys individually.	Reading of 0.65 ± 0.1 volt on 4-volt scale of AC voltmeter for each key operated. KP and S lamps (if provided) extinguished on release of ST key. Note: Unsteady or variable reading may indicate closed key contacts or crosses.
50	When keyset wiring test is to be made, proceed with Test (B).	
51	When keyset wiring test is not to be made, release 4 key and SH or LSH key of voltmeter test set.	
52	Remove all cords.	
Using 12-Type Transmission Measuring Set		
53	Hold operated the front or rear KP key.	KP lamp lighted on keyset SD-55918-01. Reading of -0.8 ± 0.8 dbm on 12-type set.
54	Release KP key.	S lamp (if provided) lighted. KP lamp on keyset SD-55078-01 lighted.
55	Operate and release 0 to 9 and ST keys individually.	Reading of -0.8 ± 0.8 dbm on 12-type set for each key operated. KP and S lamps (if provided) extinguished on release of ST key.
56	Remove all cords.	
	(B) Keyset Wiring, 24-Wire Distribution System	
46	Operate and release the front or rear KP key.	KP lamp lighted. S lamp (if provided) lighted.
47	Hold operated 4 key of voltmeter test set.	
48	Simultaneously operate two keys as covered below:	Readings on the 4-volt scale of AC voltmeter as covered below:
	0-1	0.70 ± 0.1
	1-2	0.80 min.
	2-3	0.80 min.
	3-4	0.70 ± 0.1
	4-5	0.80 min.
	5-6	0.80 min.
	6-7	0.70 ± 0.1
	7-8	0.80 min.
	8-9	0.80 min.
	3-6	0.80 min.
	1-8	0.80 min.
	0-9	0.80 min.
	2-7	0.60 max.
49	Hold operated ST key.	
50	Operate the 9 key.	Reading of 0.80 minimum on the 4-volt scale of voltmeter test set.

STEP	ACTION	VERIFICATION
51	Release 9 and ST keys.	KR or KF and S lamps extinguished.
52	Release all keys.	
53	Remove all test connections.	

Note: Typical AC voltmeter readings are shown in the following chart for the combination of frequencies for two keys operated simultaneously and the corresponding connection of each frequency to the "tip" or "ring" toward the cord circuit.

Frequency Codes

0 = 700 cycles 2 = 1100 cycles 7 = 1500 cycles
1 = 900 cycles 4 = 1300 cycles 10 = 1700 cycles

Frequency Codes		7R-4T	0R-1T	0R-2T	1R-2T	4R-0T	4R-1T	4R-2T	7R-0T	7R-1T	7R-2T	2R-10T	7R-10T
	Keys	0	1	2	3	4	5	6	7	8	9	KP	ST
7R-4T	0		0.7								0.8		
0R-1T	1			0.8						0.8			
0R-2T	2				0.8				0.6				
1R-2T	3					0.7		0.8					
4R-0T	4						0.8						
4R-1T	5							0.8					
4R-2T	6								0.7				
7R-0T	7									0.8			
7R-1T	8										0.8		
7R-2T	9												0.8
2R-10T	KP												
7R-10T	ST												

0.7 = 4 frequencies - probable variable meter indication.

0.8 = 3 frequencies - occasional variable meter indication.

0.6 = 2 frequencies - one common frequency canceled - steady.

(C) Output Level Test of Keyset Using 6-Wire Distribution System

Using Voltmeter Test Set

46	Hold operated the front or rear KP key.	KP lamp lighted on keysets SD-55918-01. Momentary kick of AC voltmeter pointer indicating presence of KP tone signal.
47	Hold operated 4 key of voltmeter test set.	Reading on the 4-volt scale of AC voltmeter as follows: (a) When keyset and distribution circuit modified, 0.65 ± 0.1 volt. (b) When keyset circuit modified, 0.80 ± 0.1 volt. (c) When distribution circuit modified, 0.85 ± 0.1 volt.

STEP	ACTION	VERIFICATION
48	Release KP key.	S lamp (if provided) lighted. KP lamp on keyset SD-55078-01 lighted.
49	Operate and release 0 to 9 and ST keys individually.	Readings on the 4-volt scale of AC voltmeter as follows: (a) When keyset and distribution circuit modified, 0.65 ± 0.1 volt. (b) When keyset circuit modified, 0.80 ± 0.1 volt. (c) When distribution circuit modified, 0.85 ± 0.1 volt. KP and S lamps (if provided) extinguished on release of ST key. Note: Unsteady or variable reading may indicate closed key contacts or crosses.
50	When keyset wiring test is to be made proceed with Test (D).	
51	When keyset wiring test is not to be made, release 4 key and SH or LSH key of voltmeter test set.	
52	Remove all cords.	

Using 12-Type Transmission Measuring Set

Note: This test can be made only where the keyset and distribution circuits have been modified for the reduced level.

53	Hold operated the front or rear KP key.	KP lamp lighted on keyset SD-55918-01. Reading of -0.8 ± 0.8 dbm on 12-type set.
54	Release KP key.	S lamp (if provided) lighted. KP lamp on keyset SD-55078-01 lighted.
55	Operate and release 0 to 9 and ST keys individually.	Reading of -0.8 ± 0.8 dbm on 12-type set for each key operated. KP and S lamp (if provided) extinguished on release of ST key. 0 to -1.6 DB
56	Remove all cords.	

(D) Keyset Wiring, 6-Wire Distribution System

Using Voltmeter Test Set

46	Operate and release the front or rear KP key.	KP lamp lighted. S lamp (if provided) lighted.
47	Hold operated 4 key of voltmeter test set.	

STEP	ACTION	VERIFICATION
48	Simultaneously operate two keys as covered below:	
	1-3, 1-4, 1-8, 2-4, 2-9, 3-5, 3-9, 4-7, 5-8, and 6-9	AC voltmeter reads zero for each pair of keys operated.
49	Momentarily operate ST key.	KP and S lamps (if provided) extinguished.
50	Remove all cords.	

Using 12-Type Transmission Measuring Set

51	Operate and release the front or rear KP key.	KP lamp lighted. S lamp (if provided) lighted.
52	Simultaneously operate two keys as covered below:	
	1-3, 1-4, 1-8, 2-4, 2-9, 3-5, 3-9, 4-7, 5-8, and 6-9	Observe that no reading is obtained on meter for each pair of keys operated.
53	Momentarily operate ST key.	KP and S lamps (if provided) extinguished.
54	Remove all cords.	

Note: The following chart shows the combination of frequencies for each key and the corresponding connection of each frequency to the "tip" or "ring" toward the cord circuit.

Frequency	Codes 0	1	2	3	4	5	6	7	8	9	KP	ST
700 Cycles (0)		T	T		R			T				
900 Cycles (1)		R		T		R			T			
1100 Cycles (2)			R	R			R			T	R	
1300 Cycles (4)	T				T	T	T					
1500 Cycles (7)	R							R	R	R		R
1700 Cycles (10)											T	T

When two digit keys are depressed, and both a T and R appear in a horizontal line opposite any one of the component frequencies, a short-circuit of the output will result. For example, simultaneous depression of keys 5 and 8 will produce an output short via the 900-cycle connection. When using keyset SD-55918-01 or SD-56099-01, simultaneous depression of the 9 and KP keys will not result in an output short due to the operation of relays in the keyset.

(E) Operation Test

1	Connect operator's telephone set to the telephone set jacks of the position under test.	

STEP	ACTION	VERIFICATION
2	Connect front or rear cord to jack of outgoing trunk arranged for MF key pulsing.	Front or rear supervisory cord signal lamp lighted.
3	Operate talking key of cord circuit.	
4	Operate splitting key to proper position.	
5	Operate and release the front or rear KP key.	KP and S lamps (if provided) lighted.
6	Key the number of the test line circuit.	
7	Momentarily operate ST key.	KP and S lamps (if provided) extinguished.
8	Operate ringing key, if required.	Supervisory cord signal lamp follows the proper supervisory signals.
9	Restore all keys to normal.	
10	Remove test connections.	