SEE ADDENDUM

MF KEY SET CIRCUIT

NO. 1 TOLL SWITCHBOARD

1. GENERAL

1.01 This section describes a method of making multifrequency tests on key sets used in the No. 1 toll switchboard.

1.02 This section is reissued to add key set tests for the 6 wire current supply and distribution system. The voltage output readings for the 24 wire supply have been revised to agree with the 2 out of 5 additive frequency combinations. This section covers a general revision and therefore arrows used to indicate changes have been omitted.

1.03 The tests covered are:

(A) Output Voltage Test of Key Set Using 24 Wire Distribution System

(B) Output Voltage Test of Key Set Using 6 Wire Distribution System

(C) Operation Test

1.04 Tests (A) or (B) provide a check of the MF key pulsing supply wiring to each key with respect to all other keys of a key set. They also check the output level of the MF impulses from each key.

1.05 All a-c voltmeter readings mentioned herein refer to the average or mid-point 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. Req'd. for Tests A	B	C
Transmission measuring set (2.02)(a) or 1 MW, 1000 cycle testing supply	(2.02)(b)	1	1	-
Test set	(2.03)	1	1	-
Test circuit	(2.04)	1	1	-
Patching cord	(2.05)	1	1	-
Patching cord	(2.06)	2	2	-
Operators 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 output oscillator.

(b) Milliwatt distributing circuit using J94002A - 2A sending panel or equivalent.

2.03 A-C voltmeter test set J68602AH (SD-64125-01) or J68602AJ (SD-63674-01).

2.04 Position test circuit SD-62140-02.

Note: When testing key sets other than SD-55078-01, test circuit SD-62140-02 must be provided with a-c voltage test jacks similar to Fig. 7 of SD-64735-01.

2.05 One of the following cords:

(a) 49 Type Jack Switchboard. P3E cord, 6 feet long, equipped with two No. 310 plugs or (3P7A cord).

(b) 92 Type Jack Switchboard. P3F cord, 6 feet long, equipped with one No. 309 plug and one No. 310 plug (3P12E cord).

2.06 P2AA cord, 6 feet long, equipped with No. 241A plugs (2P13B cord).

3. PREPARATION

Tests (A) or (B)

3.01 It is necessary to calibrate the voltmeter test set as covered in subsequent paragraphs in order to obtain the maximum accuracy at the 1 volt reading.

Voltmeter Calibration Using No. 40B or No. 6A Transmission Measuring Systems

3.02 Calibrate the transmission measuring equipment using 1000 cycles at one milliwatt (0 dbm). In the case of the No. 6A transmission measuring set, calibrate with the No. 5 key operated to the POS (positive) position.

3.03 Use a P2AA cord and connect the sending jacks to the T and R or T1 and R1 jacks of the a-c voltmeter test set. Using another P2AA cord, connect the

other T and R or T2 and R2 jacks of the voltmeter test set to the receiving jacks of the transmission measuring set. In the case of the No. 40B transmission measuring system, use the REC B + 0 (receive scale B + 0) or the REC 600 ohm SCALE B jacks as the receiving jacks and operate the SCALE A key.

3.04 With the measuring current frequency at 1000 cycles, adjust the output until a measurement of +2.2 dbm is indicated in the transmission measuring set when it is in the transmission measuring condition. Hold operated the 4 key of the a-c voltmeter test set and turn the 0 adjusting screw of the voltmeter until the pointer indicates 1 volt on the 4 volt scale.

3.05 Release the 4 key and disconnect the cords from the voltmeter test set and the sending and receiving jacks. Observe that the needle may not center exactly on zero when at rest.

Voltmeter Calibration Using 1 MW Supply at the Switchboard

3.06 Using a P3E or P3F cord, connect the 1 MW supply jack to the L jack of the voltmeter test set. Operate the SH or LSH key of the voltmeter test set.

3.07 Partially insert the front or rear cord of a spare cord circuit into the jack of the 1 MW supply at another multiple appearance so that the sleeves make contact but so that the ring of the plug does not contact the ring spring of the jack.

3.08 Hold operated the 4 key of the a-c voltmeter test set and turn the 0 adjusting screw of the voltmeter until the pointer indicates .7 volts on the 4 volt scale.

3.09 Release the 4 key and the LSH or LSH key and remove all connections set up for the test. Observe that the needle may not center exactly on zero when at rest.

Voltmeter Calibration Using 1 MW Supply at the Toll Test Board

3.10 Using a P2AA cord, connect the 1 MW supply jacks to the T and R or T1 and R1 jacks of the a-c voltmeter test set. Operate the SH or LSH key of the voltmeter test set.

3.11 Proceed as in 3.08 and 3.09.

Tests (A) or (B) (MF Key Set SD-55078-01)

3.12 With the LD key of the a-c voltmeter test set normal, use a P3E or P3F cord and connect the D jack of the a-c voltmeter test set to the TRK jack of the position test circuit.

3.13 Connect the front or rear cord of a cord circuit, with the talking key and the proper splitting key operated, to the L jack of the a-c voltmeter test set. Operate the SH or LSH key of the voltmeter test set.

Note: When using key sets equipped with only one KP key and KP lamp, disregard the use of the front or rear KP keys and S lamp described hereafter.

Tests (A) or (B) (Key Sets Other Than SD-55078-01)

3.14 With the LD key of the a-c voltmeter test set normal, use a P3E or P3F cord and connect the L jack of the a-c voltmeter test set to the VM (voltmeter) jack of the a-c voltage test jacks in the position test circuit.

3.15 Connect the front or rear cord of a cord circuit, with the talking key and the proper splitting key operated, to the P (plug) jack of the a-c voltage test jacks. Observe that the front or rear cord supervisory lamp is lighted. Operate the SH or LSH key of the voltmeter test set.

4. METHOD

(A) Output Voltage Test of Key Set Using 24 Wire Distribution System

4.01 Operate and hold operated the front or rear KP key, depending upon whether the front or rear cord is being used for the test.

Note: When using key sets SD-55918-01 or SD-56021-01 the KP lamp will light immediately after pressing the KP key.

4.02 Observe the momentary kick of the needle on the voltmeter test set indicating the presence of the KP tone signal.

4.03 Operate and hold operated the 4 key of the voltmeter test set. Observe that the reading on the voltmeter is 1.0 ± 0.1 volt. Release the KP key and observe that the S lamp lights when provided.

Note: When using key set SD-55078-01 the KP lamp will light after releasing the KP key.

4.04 Operate and release the 0 to 9 keys individually. With the 4 key of the voltmeter test set operated, observe that the reading on the 4 scale of the voltmeter for each key operated is 1.0 ± 0.1 volt.

4.05 Check that the voltmeter reading for each key is steady and that all readings are within .05 volt of each other. Also observe that the voltmeter pointer returns to a zero reading in accordance with the setting determined in 3.05 or 3.09 after each key is released.

Note: Failure to meet this requirement may indicate an incorrect value of protective resistance. Variations of more than .05 volt in readings together with unsteady readings may indicate troubles such as closed key contacts or crosses. In such a case, a steady and proper reading will be obtained when the key associated with the trouble is depressed.

4.06 Operate two keys at a time as covered in the following table and observe that the readings of the voltmeter for each pair of keys operated meets the associated voltage requirement.

Keys Operated	Volts
0-1	1.1 ± 0.1 Avg.
1-2	1.25 Min. Avg.
2-3	1.25 Min. Avg.
3-4	1.1 ± 0.1 Avg.
4-5	1.25 Min. Avg.
5-6	1.25 Min. Avg.
6-7	1.1 ± 0.1 Avg.
7-8	1.25 Min. Avg.
8-9	1.25 Min. Avg.
3-6	1.25 Min. Avg.
1-8	1.25 Min. Avg.
0-9	1.25 Min. Avg.
2-7	.9 Max. Avg.

4.07 Operate and hold operated the ST key. Observe that the voltmeter reading on the 4 scale is 1.0 ± 0.1 volt.

4.08 Continue to hold the ST key operated, then operate the 9 key and observe that the voltmeter reading on the 4 scale is 1.25 volts, minimum.

4.09 Release the ST and 9 keys and observe that the associated KP lamp is extinguished, and also the S lamp when provided.

4.10 Remove all connections set up for the test.

4.11 Typical a-c voltmeter readings in the following chart shows the combination of frequencies for two keys depressed simultaneously and the corresponding connection of each frequency to the "Tip" or "Ring" toward the cord circuit.

Frequency Codes

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

Frequency Codes		7R-4T	OR-1T	OR-2T	1R-2T	4R-OT	4R-1T	4R-2T	7R-OT	7R-1T	7R-2T	2R-10T	7R-10T
	Keys	0	1	2	3	4	5	6	7	8	9	KP	ST
7R-4T	0		1.1								1.2		
OR-1T	1			1.2						1.2			
OR-2T	2				1.2				.9				
1R-2T	3					1.1		1.2					
4R-OT	4						1.2						
4R-1T	5							1.2					
4R-2T	6								1.1				
7R-OT	7									1.2			
7R-1T	8										1.2		
7R-2T	9												1.2
2R-10T	KP												
7R-10T	ST												

1.1 = 4 frequencies - probably variable meter indication.
1.2 = 3 frequencies - occasional variable meter indication.
.9 = 2 frequencies - one common frequency cancelled - steady.

(B) Output Voltage Test of Key Set Using 6 Wire Distribution System

4.12 Proceed as in 4.01 to 4.05 inclusive.

4.13 Operate two keys at a time as shown in the following and observe that the readings of the voltmeter for each pair of keys operated results in a short-circuit or a zero reading: 1-3, 1-4, 1-8, 2-4, 2-9, 3-5, 3-9, 4-7, 5-8 and 6-9.

4.14 Proceed as in 4.07.

4.15 Release the ST key and observe that the associated KP lamp is extinguished, and also the S lamp when provided.

4.16 Proceed as in 4.10.

4.17 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.

	Codes										
Frequency	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 key sets SD-55918-01, SD-56021-01 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 key set.

(C) Operation Test

4.18 Connect an operators telephone set to the telephone set jacks of the position under test.

4.19 Insert the front or rear cord of a cord circuit, with the talking key and the proper splitting key operated, into the jack of an outgoing trunk arranged for MF key pulsing. When the cord circuit supervisory lamp lights, operate and release the KP key of the key set. Observe that the associated KP lamp lights, and also the S lamp when provided.

4.20 Key the number of a test line circuit, then momentarily operate the ST key. Observe that the associated KP lamp is extinguished, and also the S lamp when provided.

4.21 When the outgoing trunk is arranged for controlled ringing, operate and release the ringing key.

4.22 Observe that connection is made to the test line circuit as indicated by the proper supervisory signals.

4.23 Restore all keys and remove all connections set up for this test.

5. REPORTS

5.01 The required record of these tests shall be entered on the proper form.