

"TOUCH-TONE®" STATION TEST RECEIVER (J99297)
SD-98150-01
TESTS AND ADJUSTMENTS
USING KS-21715
PRECISION OSCILLATOR

CONTENTS	PAGE	PAGE
1. GENERAL	1	test checks the passband lower and upper frequencies (band edges) of the seven or eight channel detectors of the circuit.
2. TEST APPARATUS	1	3
3. PREPARATION	2	<i>B. Receiver Sensitivity Test and Adjustment:</i> This test checks the sensitivity of the station test circuit.
4. METHOD	3	6
 1. GENERAL		 1.04 Test B should be performed only after the results of Test A are satisfactory.
1.01 This section describes a method:		1.05 When any circuit board is replaced in the receiver, Tests A and B should be performed.
(a) To determine if the channel detector passbands and sensitivity level are within proper operating limits.		1.06 The adjustments should be made when a receiver under test fails to meet the test(s) of 1.03.
(b) To accomplish adjustment of the station test receiver.		1.07 If the adjustments do not provide specified receiver responses, send the receiver to the service center.
1.02 When this section is reissued, the reason for reissue will be listed in this paragraph. This issue affects the Equipment Test List.		
1.03 The tests and adjustments covered are:		2. TEST APPARATUS
A. <i>Channel Detector Passband Test and Adjustment:</i> This		2.01 The apparatus required for each test is shown in Table A. The details of each item are covered in the paragraph indicated by the number in parentheses.

NOTICE

Not for use or disclosure outside the
Bell System except under written agreement

TABLE A

APPARATUS	TEST	
	A	B
KS-21715 Oscillator (2.02)	1	1
KS-14510 Meter (or equivalent)	2	1
Cord (2.03)	2	1
Cord (2.04)	1	1
Cord (2.05)	1	1
Cord (2.06)	1	1
3-Inch C Screwdriver (2.07)	1	1
32 Tool (2.08)	1	
B17 Card Extender (2.09)	1	1

2.02 KS-21715 L1 Oscillator (Precision):

This instrument is a portable sine-wave oscillator whose output frequency can be accurately controlled from 100 Hz to 9999.9 Hz in 0.1 Hz steps. It provides a 600-ohm balanced output for general purpose use in the voice frequency range, and its amplitude can be varied from +9.9 to -39.9 dBm in 0.1 dB increments.

2.03 Patching cord assembly, 12 feet long, equipped with one KS-14672 L2 connector and one KS-14671 L2 connector (P21A cord) (for reconnection of receiver under test at a suitable level when the receiver is normally mounted too high on the frame for convenient adjustments.)

2.04 Patching cord assembly, 12 feet long, equipped with two KS-14530 connectors and two KS-19531 plugs (P2CK cord) (for interconnection of B18 circuit board test points and KS-14510 volt-ohm-milliammeter as required).

2.05 Patching cord assembly, 12 feet long, equipped with two KS-19531 plugs and two 47 cord tips arranged for tip and ring connection to 310 plug (P2CL cord) (for interconnection of B10 circuit board test points to the KS-21715 oscillator jack).

2.06 Patching cord assembly, 2 feet long, equipped with two KS-19531 L1 plugs arranged with a 47,000-ohm resistor (incased in one plug shell) in

series with conductor (P1T cord) (for interconnection of circuit board test points).

2.07 A 3-inch C screwdriver for adjusting KS-19069 potentiometers.

2.08 A 32 tool, 1/4-inch hexagon, single-end, socket wrench (for adjusting 1653-type inductors).

2.09 B17 card extender, a component of each receiver (for providing access to inductors and potentiometers on circuit boards for adjustment).

3. PREPARATION

Note: All test equipment shall be known to be correctly calibrated.

All Tests

(1) Prepare the KS-21715 oscillator for use as follows.

Note: All references to the KS-21715 oscillator hereafter in this practice will be to **OSC**.

(a) Operate the ON-OFF switch to OFF.

(b) Connect the power cord to a 105-125 volt 60 Hz power source.

(c) Operate the TONE RECVR TEST-600Ω switch to TONE RECVR TEST.

(d) Operate the ON-OFF switch to ON.

(2) At the SD-94813-01 TOUCH-TONE frequency test circuit associated with the receiver under test, operate the MB switch to MB.

(3) Remove the front cover from the receiver.

(4) If the location of the receiver under test on the frame is at a height so that the receiver is not readily accessible from the floor level (normally higher than 5 feet), proceed as follows.

(a) Disconnect the receiver from the circuit.

(b) Remove the receiver from the frame.

(c) Support the receiver at a suitable level with the front side up.

- (d) Reconnect the receiver into the circuit using the P21A cord.
- (5) Connect the B10 circuit board T and R test points to the OSC jack using the P2CL cord.

Note: If the OVERLOAD lamp is lighted, a low impedance bridge in the connecting circuit is indicated. Correct this condition before proceeding.

- (6) Select the 60-volt dc scale on one of the KS-14510 meters, and connect the positive terminal to the GRD test point (located on the B18 circuit board), and the negative terminal to the STR test point (located on the B9 circuit board) using a P2CK cord as required.

Note: All references to this KS-14510 meter hereafter in this practice will be to the **STR meter**.

- (7) Connect the -48 test point (located on B9 circuit board) to either one of the CKH test points (located on the B14 and B15 or B16 circuit boards) using the P1T cord. See Fig. 1.

4. METHOD

A. Channel Detector Passband Test and Adjustment

Channel Passband Test

- (8) Select the 60-volt dc scale on the other KS-14510 meter, and connect the positive terminals to the -22 test point (located on the B18 circuit board) and the negative terminals to L1 test point (located on the B12 circuit board) using the other P2CK cord as required.

Note: All references to this KS-14510 meter hereafter in this practice will be to the **L1 meter**.

- (9) Adjust the OSC output level to -5.0 dBm.
- (10) Adjust the OSC frequency to the midband frequency for the L1 channel in accordance with Table B.

Requirement 1: The L1 meter indicates about 26 volts.

Requirement 2: The STR meter indicates about 22 volts.

TABLE B

BAND EDGE FREQUENCY TEST LIMITS

CHANNEL	TEST POINT LOCATION	MIDBAND FREQ	LOWER		UPPER	
			MIN	MAX	MIN	MAX
	CIRCUIT BOARD	HZ	HZ		HZ	
L1	B12	697	685.1	687.9	705.6	708.4
L2	B12	770	757.0	760.0	779.5	782.5
L3	B13	852	837.3	840.7	862.8	866.2
L4	B13	941	925.1	928.9	952.6	956.4
H1	B14	1209	1188.6	1193.4	1224.0	1228.8
H2	B14	1336	1313.3	1318.7	1353.7	1358.1
H3	B15, B16	1477	1452.0	1458.0	1495.4	1501.4
H4*	B15	1633	1605.7	1612.3	1653.1	1659.7

* To be used only if J99297A L2 is under test.

- (11) Vary the OSC frequency toward the lower band edge frequency.

Requirement: The STR meter indication increases to 48 volts.

- (12) Slowly vary the OSC frequency toward midband observing the indications on both L1 and STR meters.

Requirement 1: A momentary dip is observed on the L1 meter at the time when the indication on the STR meter changes from 48 to 22 volts.

Note: The frequency of this point is the lower band edge frequency. It should be determined as accurately as possible using the OSC 0-1.0 Hz dial.

Requirement 2: The frequency lies within the limits shown in Table B.

- (13) If the requirements of Step (12) are not within the limits given in Table B, the 697-Hz channel must be adjusted [Steps (20) through (26)].
- (14) Repeat Steps (11) and (12), except vary the frequency to the higher side of 697-Hz channel midband frequency (toward 707 Hz).
- (15) If the requirements of Step (12) are not within the limits given in Table B, the 697-Hz channel must be adjusted [Steps (20) through (26)].
- (16) Repeat Steps (8) through (15) for each of the low group L2, L3, and L4 replacing references to L1 with L2, L3, and L4, respectively. Corresponding test points are shown in Table B.
- (17) Disconnect the P1T cord on the CKH test point, and reconnect to one of the two CKL test points (located on B12 and B13 circuit boards).
- (18) Repeat Steps (8) through (15) for each of the high group H1, H2, H3, and H4 replacing references to L1 with H1, H2, H3,

and H4, respectively. Corresponding test points are shown in Table B.

- (19) If no further test(s) are to be performed, remove all test connections, replace the front cover, and restore the receiver to normal service by operating the MB switch to N.

Adjustment of Band Edge Frequencies

- (20) Adjust the OSC output level to -5.0 dBm.
- (21) Adjust the OSC frequency, in accordance with Table C, to the midband for the first channel in the low group.

Note: Adjustment of band edge frequencies is accomplished by means of the bandwidth adjustment potentiometer R1 (or R9) and the adjustable 1653-type inductor in the channel filter. To gain access to R1 (R9) and the 1653-type inductor (in accordance with Table D), the particular channel circuit board must be removed, attached to the B17 card extender, and the combination reinserted into the circuit board location. Rotating the R1 (R9) adjustment screw clockwise increases the upper edge frequency and decreases the lower edge frequency by approximately the same amount. Rotating the inductor adjustment screw clockwise increases both the upper and lower edge frequencies by approximately the same amount.

- (22) Adjust the OSC frequency to the nominal value in accordance with Table C for the lower edge frequency.

Requirement: The STR meter indicates about 22 volts.

- (23) If the STR meter does not indicate about 22 volts, adjust R1 (R9) clockwise using the 3-inch C screwdriver until the meter indicates 22 volts and remains at 22 volts.
- (24) Vary the OSC frequency toward the upper edge frequency to the point where the STR meter indication just increases to 48 volts; then slowly vary the OSC frequency toward midband noting the point where the STR meter indication just changes from 48 to 22 volts.

TABLE C

BAND EDGE FREQUENCY ADJUSTMENT LIMITS

CHANNEL	NOMINAL MIDBAND FREQ	LOWER			UPPER		
		MIN	NOM	MAX	MIN	NOM	MAX
	cps	cps			cps		
L1	697	686.3	686.5	686.7	706.8	707.0	707.2
L2	770	758.3	758.5	758.7	780.8	781.0	781.2
L3	852	838.8	839.0	839.2	864.3	864.5	864.7
L4	941	926.8	927.0	927.2	954.3	954.5	954.7
H1	1209	1190.6	1191.0	1191.4	1226.0	1226.4	1226.8
H2	1336	1315.6	1316.0	1316.4	1355.0	1355.4	1355.8
H3	1477	1454.6	1455.0	1455.4	1498.0	1498.4	1498.8
H4*	1633	1608.6	1609.0	1609.4	1656.0	1656.4	1656.8

* To be used only if J99297A L2 is under test.

Note: If the frequency at this point is within the adjustment tolerance limits for the upper edge frequency (Table C), the adjustment of the channel passband is completed.

(25) If the frequency is not within tolerance limits, proceed as follows.

(a) Adjust the OSC frequency half way between the measured upper edge frequency determined in Step (24) and the nominal band edge frequency (Table C).

(b) Determine in what direction [Step (21) Note] the 1653-type inductor adjustment screw should be rotated.

(c) Slowly adjust the inductor until the STR meter indication just changes from 48 to 22 volts using the 32 tool.

(d) Adjust the OSC frequency to the nominal value for the upper band edge frequency (Table C).

(e) Adjust R1 (R9) to the point where the STR meter indication just changes from 48 to 22 volts using the 3-inch C screwdriver.

(f) Repeat Steps (24) and (25)(a) through (f) as required, except that the lower edge frequency is now checked and adjusted within tolerance limits given in Table C.

(g) Repeat Steps (24) and (25)(a) through (f) as many times as required so that both edge frequencies are within the adjustment tolerance limits.

(26) Repeat Steps (20) through (25) for each remaining low group channel requiring adjustment using appropriate designations from Tables C and D.

(27) Disconnect one terminal of the PIT cord from the CKH check point, and reconnect to either one of the two CKL test points (located on B12 and B13 circuit boards).

(28) Repeat Steps (21) through (26) for each high-group channel (H1, H2, H3, and H4) to be adjusted.

(29) If no further tests and/or adjustments are to be made, remove all test connections, return the receiver to the proper frame location as required, replace the front cover, and restore

the receiver to normal service by operating the MB switch to N.

TABLE D

CHANNEL CIRCUIT BOARD	CHANNEL	INDUCTOR	POTENTIOMETER
B12	L1	1653A	R1
B12	L2	1653B	R9
B13	L3	1653C	R1
B13	L4	1564D	R9
B14	H1	1653E	R1
B14	H2	1653F	R9
B15, B16	H3	1653G	R1
B15	H4*	1653H	R9

* To be used only with J99297A L2.

B. Receiver Sensitivity Test and Adjustment

Sensitivity Test

- (8) Adjust the OSC output level to -5.0 dBm.
 - (9) Disconnect one terminal of the PIT cord from the CKL test point, and connect it to the CKH test point.
 - (10) Adjust the OSC frequency to 941 Hz.
 - (11) Decrease the OSC output level to the point where the STR meter indicates 48 volts.
 - (12) Slowly increase the OSC output level and note the point at which the STR meter indication changes from 48 to 22 volts.
 - (13) Note the reading when option E for the receiver is provided.
- Requirement:** The OSC indicates between -15.7 and -17.7 dBm.
- (14) Note the reading when option D for the receiver is provided.

Requirement: The OSC indicates between -18.2 and -20.2 dBm.

(15) If requirements of Step (13) or (14) are not met, the input amplifier (B10) must be adjusted [Steps (17) through (23)].

(16) Remove all test connections, replace the front cover, and restore the receiver to normal service by operating the MB switch to N.

Sensitivity Adjustment

- (17) If option E for SD-98150-01 under test is provided, adjust the OSC output level to -16.7 dBm.
 - (18) If option D for SD-98150-01 under test is provided, adjust the OSC output level to -19.2 dBm.
 - (19) Arrange access to the input amplifier (B10) by adapting the B17 card extender to the amplifier and reinserting the combination in the location for the amplifier.
 - (20) Adjust the R14 potentiometer in the input amplifier to the point where the STR meter indication just changes to 48 volts; then slowly adjust the R14 potentiometer to the point where the indication on the STR meter just changes from 48 to 22 volts.
 - (21) If option E for SD-98150-01 under test is provided, decrease the OSC output level to -17.0 dBm.
- Requirement:** The STR meter indication changes from 22 volts to 48 volts.
- (22) If option D for SD-98150-01 under test is provided, decrease the OSC output level to -19.5 dBm.

Requirement: The STR meter indication changes from 22 volts to 48 volts.

- (23) If no further tests and/or adjustments are to be made, remove all test connections, return the receiver to the proper frame location as required, replace the front cover, and restore the receiver to normal service by operating the MB switch to N.

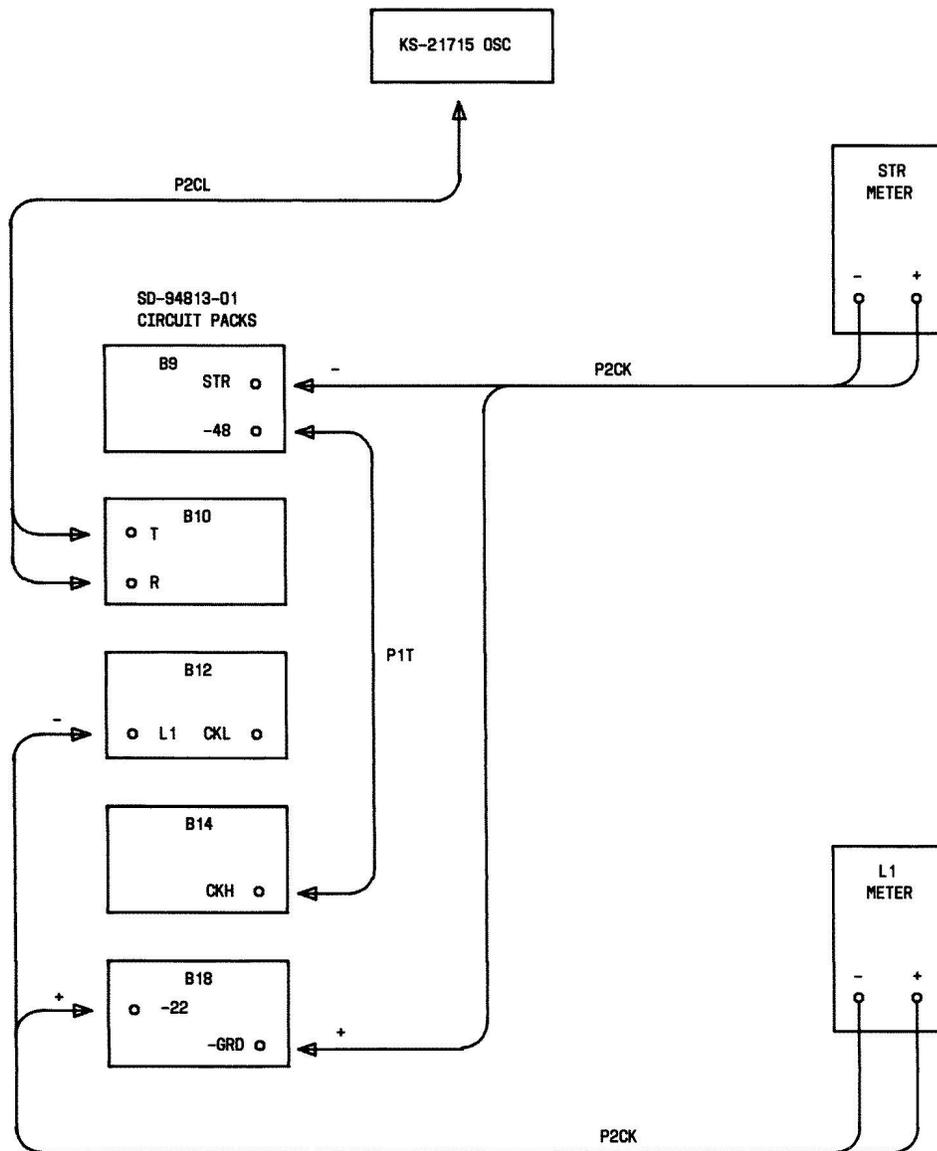


Fig. 1—Tests A and B Connections