
**L3 AND L4 CARRIERS
COMMON EQUIPMENT
J68820 AUTOMATIC LINE SWITCHING
TESTS
DETECTOR CIRCUITS**

PURPOSE OF TESTS

- (a) To measure the heater voltages and cathode activity of the associated tubes.
- (b) To check the detector sensitivity.
- (c) To measure the power of the outgoing switching signals.

REASON FOR REISSUE

This section is reissued to change Chart 2 to provide for the use of the bay TST jack of the oscillator frequency needed in Tests 1, 2, 3, and 4 instead of the sending test equipment. Other minor changes have been made to clarify the test procedure. Arrows are used to indicate significant changes. Equipment Test Lists are affected.

SYNOPSIS

The detector circuits in group A (Fig. 1) consist of:

- (a) J68820N director unit
- (b) Up to four J68820H transmit switch control units in an 11-foot, 6-inch bay
- (c) Up to three J68820H transmit switch control units in a 9-foot bay.

The detector circuits in groups AA and AB (Fig. 2) consist of:

- (a) J68820R miscellaneous control unit
- (b) Up to four J68820H transmit switch control units in an 11-foot, 6-inch bay
- (c) Up to three J68820H transmit switch control units in a 9-foot bay.

NOTICE

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

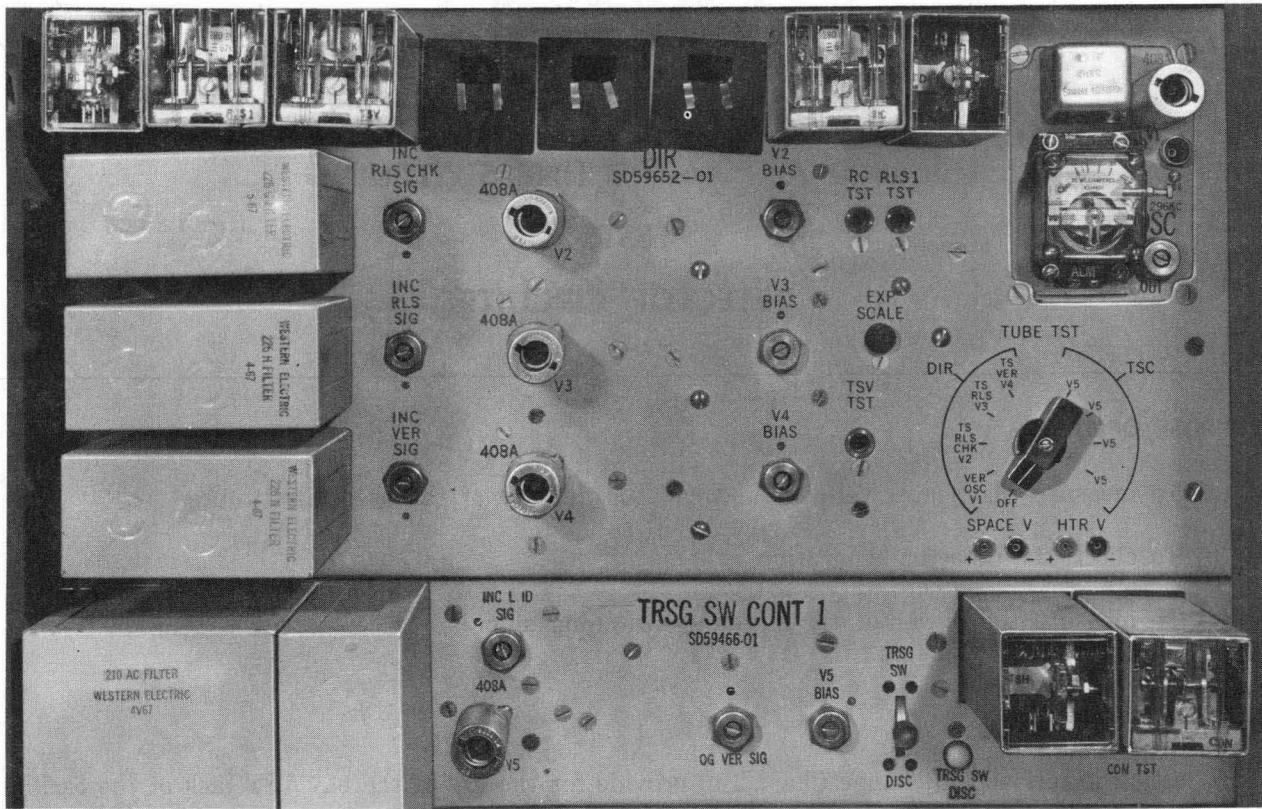


Fig. 1—Director and TRSG SW CONT 1 Panels for Group A

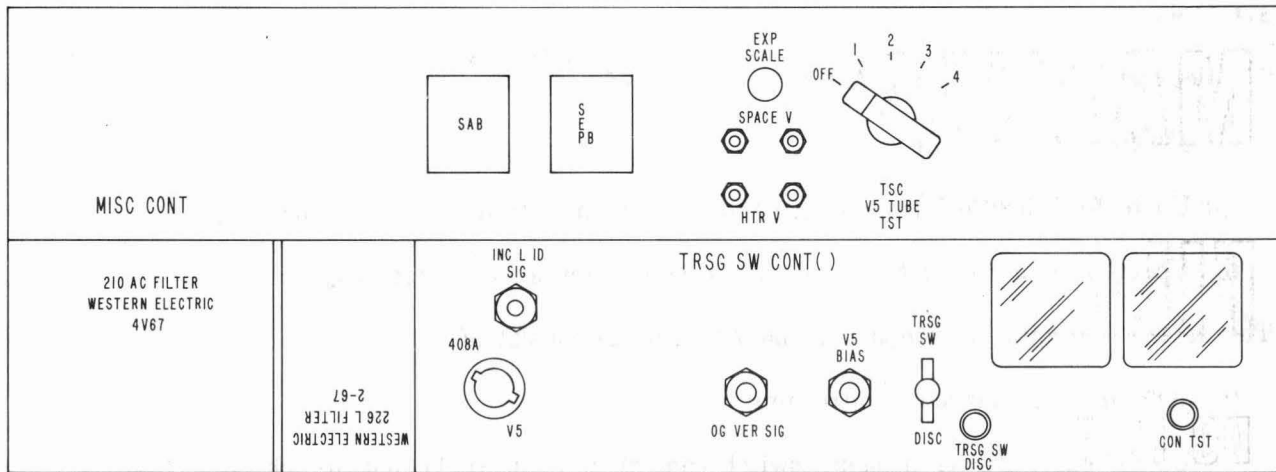


Fig. 2—MISC CONT Unit and TRSG SW CONT Panels

The director unit consists of three similar selective detector circuits, and each transmit switch control unit contains one selective detector. The signal frequencies of the three director circuits and for each transmit switch control unit are given in the tests in Chart 2 of this section.

The switch tone amplifiers shown in Fig. 4 and Fig. 5 are provided as standard equipment in new production L3 and L4 systems. The need for the amplifiers in existing systems is determined by switch tone measurements made over a switching section at the SW FLT OUT jack. If the level measured at this jack is -71 dBm $\pm$ 10 dB, then amplification and level compensation can be provided.

Caution: Before performing the following tests, the personnel at the distant end of the associated switching section should be notified.

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CHART 1

TUBE TESTS

APPARATUS:

KS-14510, L() Volt-Ohm-Milliammeter (VOM)

Note: No substitute should be used.

STEP	PROCEDURE
Note: This test is <i>not</i> required at offices where tubes have been replaced by Hybrid Integrated Networks (HINs). HINs are solid-state devices for conversion of transmission terminals, repeaters, amplifiers, switching, and special service equipment to solid-state operation. They plug directly into electron tube sockets with no extensive modification required. Their use eliminates tube replacement routines.	
A. Heater Voltage Test	
1	Set the selector switch on the VOM to the 0.3 DC VOLT position.
2	Connect the VOM to the test jacks as shown in Table A.
Note: A series resistor in the heater voltage test circuit changes the sensitivity of the meter so that the 0.3 volts on the scale is actually 30 volts.	

CHART 1 (Contd)

STEP

PROCEDURE

TABLE A

HEATER VOLTAGE TESTS

PANEL	SWITCH POSITION	TEST JACKS	REQUIREMENT
DIR	DIR TS RLS CHK V2 DIR TS RLS V3 DIR TS VER V4 TSC (1) V5 TSC (2) V5 TSC (3) V5 TSC (4) V5 (if equipped)	HTR V	Max 20 volts Min 19.5 volts
MISC CONT	TSC (1) V5 TSC (2) V5 TSC (3) V5 TSC (4) V5 (if equipped)	HTR V	Max 20 volts Min 19.5 volts

- 3 Measure the heater voltage.

Requirement: Between 19.5 and 20 volts as indicated in Table A.

Note: The actual readings will be between 0.195 and 0.2 volts on the 0.3-volts scale.

- 4 Proceed to Step 5 if the requirement is not met on V2, V3, and V4. Proceed to Step 7 if the requirement is not met on V5. Otherwise, proceed to Step 9.

Note: If the requirements are *not* met, resistor strapping on the director panel or the transmit switch control panel may be incorrect.

- 5 At the rear of the switch control bay, remove the director cover.

Note: Resistors R52 through R57 are located to the right of the 296-kHz oscillator unit.

- 6 Add or remove straps on the resistors to meet the requirements in Table A.

CHART 1 (Contd)

STEP	PROCEDURE
7	At the rear of the switch control bay, remove the cover from the transmit switch control panel under test.
	Note: Resistors R26-R31 are located under the TSH relay.
8	Add or remove straps on the resistors to meet the requirements in Table A.
9	Disconnect the VOM and set the selector switch on the DIR panel or the MISC CONT panel to the OFF position.

B. Detector Bias Test

- 10 With the VOM selector switch remaining in the 0.3 DC VOLT position, connect the leads to the SPACE V jacks on the DIR panel or the MISC CONT panel.
 - 11 Operate the TUBE TST switch on the director panel or the TSC V5 TUBE TST switch on the miscellaneous control panel to the desired switch position (see Table B).
 - 12 Operate and hold the EXP SCALE key on the DIR panel or the MISC CONT panel.
- Note:** Full-scale deflection of the VOM is now 0.3 Vdc.
- 13 Measure the voltage.

TABLE B
ADJUSTMENT OF DETECTOR BIAS

PANEL	SWITCH POSITION	CONTROL TO BE ADJUSTED	LOCATION OF CONTROL
DIR	DIR TS RLS CHK	V2 BIAS	Director Panel
	DIR TS RLS	V3 BIAS	Director Panel
	DIR TS VER	V4 BIAS	Director Panel
	TSC V5	V5 BIAS	TRSG SW CONT 1 Panel
	TSC V5	V5 BIAS	TRSG SW CONT 2 Panel
	TSC V5	V5 BIAS	TRSG SW CONT 3 Panel
	TSC V5	V5 BIAS	TRSG SW CONT 4 Panel (if equipped)
MISC CONT	1	V5 BIAS	TRSG SW CONT 1 Panel
	2	V5 BIAS	TRSG SW CONT 2 Panel
	3	V5 BIAS	TRSG SW CONT 3 Panel
	4	V5 BIAS	TRSG SW CONT 4 Panel (if equipped)

CHART 1 (Contd)

STEP	PROCEDURE
	Requirement: +0.02 Vdc
14	Adjust the associated control as indicated in Table B, if necessary, to meet the requirement.
15	Repeat Steps 11 through 14 for the remaining switch positions in Table B.

CHART 2

ADJUSTMENT OF DETECTOR SENSITIVITY AND MEASUREMENT
OF OUTGOING SIGNAL POWER

The tests in this chart should be made only after:

- (a) *Adjustments in Chart 1 of this section have been completed.*
- (b) *Tests in Section 359-100-504 (switching signal amplifiers) have been completed.*

In some of the tests of this chart, a -79 dBm test signal is applied at the input of the switching signal amplifier. (This is 8 dB less than the usual input signal.) At the test frequency, the amplifier delivers a +1 dBm output signal to the associated detector. The detector sensitivity is then set to operate its switching relay at this power. This allows for a sensitivity margin of 8 dB since the normal power level is +9 dBm. Therefore, if for some reason the power level decreases and a regular line fails, a switching signal can still be detected.

The switch tone amplifiers shown in Fig. 4 and Fig. 5 provide ± 15 dB of level adjustment transmitted for switching signals. During the initial alignment of the switching system, the output of each amplifier (switch S1) is set to 0. After the initial alignment is complete, the output of each amplifier is adjusted in accordance with Section 359-100-509.

When the tests in this chart are performed on a routine maintenance basis, switch S1 of the switch tone amplifiers is set to the 0 position and then returned to the original setting when the tests are complete.

The following tests may be performed separately or collectively.

APPARATUS:

Refer to Section 356-010-500 and select, from available equipment, receiving units having the following capabilities:

Receiving test equipment (RTE) capable of detecting, from 75-ohm circuits, signals between 200 and 300 kHz at a level from zero to -90 dBm.

CHART 2 (Contd)

APPARATUS (Contd):

In addition, the following are required:

11B Attenuator (used for bridging measurements)

P2BJ Cords, as required

Adjustable attenuator with the following characteristics:

- (a) 75-ohm input and output
- (b) Loss from 0 to 85 dB

TEST 1

**ADJUSTMENT OF RELEASE CHECK SIGNAL DETECTOR (280 KHZ)
(GROUP A ONLY)**

APPARATUS:						
Receiving Test Equipment (RTE) Adjustable Attenuator P2BJ Cord						
CIRCUIT PREPARATION		INPUT SIGNAL		ADJUST		RETURN CIRCUIT TO REGULAR
ACTION	LOCATION	FREQ	LEVEL	CONTROL	REQUIREMENT	
1. Remove cover from RC relay	Director Panel					1. Replace RC relay cover. Note: If no other tests are to be performed, complete the next two steps. 2. Remove patches (1), and (3), Fig. 3. 3. Replace plug as follows: L3: Between SW FIL OUT and SW AMP IN jacks. L4: Between LVL COM OUT and SW AMP IN jacks.*
2. Adjust INC RLS CHK SIG control to the maximum CCW position.	Director Panel					
3. Remove plug as follows: L3: Between SW FIL OUT and SW AMP IN jacks L4: Between LVL COM OUT and SW AMP IN jacks.*	Mounting strip in associated J68820 bay					
4. Patch RTE through adjustable attenuator to 280-kHz oscillator TST jack [patches (1) and (2), Fig. 3].	Jack strip in switch control bay	280 kHz	-79 dBm	Adjust adjustable attenuator	-79 dBm indication on RTE	

* Or SW FIL OUT and SW AMP IN, if provided.

TEST 1 (Contd)

**ADJUSTMENT OF RELEASE CHECK SIGNAL DETECTOR (280 KHZ)
(GROUP A ONLY)**

CIRCUIT PREPARATION		INPUT SIGNAL		ADJUST		RETURN CIRCUIT TO REGULAR
ACTION	LOCATION	FREQ	LEVEL	CONTROL	REQUIREMENT	
5. Remove patch (2) from RTE and connect patch (3) between adjustable attenuator and SW AMP IN jack	J68820 bay	280 kHz	—79 dBm	INC RLS CHK Sig (Director Panel)	Adjust until RC relay just operates.	

TEST 2

**ADJUSTMENT OF RELEASE SIGNAL DETECTOR (282 KHZ)
AND
ADJUSTMENT OF OUTGOING RELEASE CHECK SIGNAL (280 KHZ)
(GROUP A ONLY)**

APPARATUS:						
Receiving Test Equipment (RTE) 11B Attenuator Adjustable Attenuator P2BJ Cords, as required						
CIRCUIT PREPARATION		INPUT SIGNAL		ADJUST		RETURN CIRCUIT TO REGULAR
ACTION	LOCATION	FREQ	LEVEL	CONTROL	REQUIREMENT	
1. Remove cover from RLS1 relay (formerly RLS).	Director Panel					1. Replace RLS1 relay cover. 2. Remove patch (4), Fig. 3. Note: If no other tests are to be performed, complete the next two steps. 3. Remove patches (1) and (3), Fig. 3. 4. Replace plug as follows: L3: Between SW FIL OUT and SW AMP IN jacks L4: Between LVL COM OUT and SW AMP IN jacks.*
2. Adjust INC RLS SIG control to the maximum CCW position.	Director Panel					
3. Remove plug as follows: L3: Between SW FIL OUT and SW AMP IN jacks L4: Between LVL COM OUT and SW AMP IN jacks.*	Mounting strip in associated J68820 bay					

* Or SW FIL OUT and SW AMP IN, if provided.

TEST 2 (Contd)

CIRCUIT PREPARATION		INPUT SIGNAL		ADJUST		RETURN CIRCUIT TO REGULAR
ACTION	LOCATION	FREQ	LEVEL	CONTROL	REQUIREMENT	
4. Patch RTE through adjustable attenuator to 282-kHz oscillator TST jack. [patches (1) and (2), Fig. 3].	Jack strip in switch control bay	282 kHz	−79 dBm	Adjustable attenuator	−79 dBm indication on RTE	
5. Remove patch (2) from RTE and connect patch (3) between adjustable attenuator and SW AMP IN jack	J68820 bay	282 kHz	−79 dBm	INC RLS CHK SIG (Director Panel)	Adjust until RLS1 relay just operates.	
6. Patch RTE through 11B ATTEN to RLS CHK MON jack [patch (4), Fig. 3] (−54 dBm at 280 kHz).	J68820 bay			OG RLS CHK (COM SW CONT panel)	−54 dBm indication on the RTE (See Note)	

Note: If this requirement is *not* met, check the setting of S1 of the SW TONE AMP (if provided) in the transmitting switch control circuit. It should be set to 0 for this test.

TEST 3

**ADJUSTMENT OF LINE IDENTIFICATION SIGNAL DETECTOR (290, 288, 286, AND 284 KHZ)
ADJUSTMENT OF OUTGOING VERIFICATION SIGNAL (296 KHZ)
(GROUP A, AA, OR AB)**

Note: Repeat this test for each of the TRSG SW CONT panels in service.

APPARATUS:

Receiving Test Equipment (RTE)
11B Attenuator
Adjustable Attenuator
P2BJ Cords

CIRCUIT PREPARATION		INPUT SIGNAL		ADJUST		RETURN CIRCUIT TO REGULAR
ACTION	LOCATION	FREQ	LEVEL	CONTROL	REQUIREMENT	
1. Remove cover from CONT relay.	TRSG SW CONT panel under test					1. Remove patches (1) and (3), Fig. 4 and momentarily operate the RLS1 relay to release the CON relay. 2. Replace CON relay cover. Note: If no other tests are to be performed, complete the next two steps. 3. Remove 11B ATTEN and patch (4), Fig. 4. 4. Return switch S1 on the SW TONE AMP to its original setting.
2. Adjust control INC L ID SIG to maximum CCW position.	TRSG SW CONT panel under test					
3. Remove plug as follows: L3: Between SW FIL OUT and SW AMP IN jacks L4: Between LVL COM OUT and SW AMP IN jacks.*	Mounting strip in associated J68820 bay					
4. Record setting of switch S1 on the SW TONE AMP, if provided.	Director Panel			Set switch S1 to the 0 position		

*Or SW FIL OUT and SW AMP IN, if provided.

TEST 3 (Contd)

CIRCUIT PREPARATION		INPUT SIGNAL		ADJUST		RETURN CIRCUIT TO REGULAR
ACTION	LOCATION	FREQ	LEVEL	CONTROL	REQUIREMENT	
5. Connect RTE through adjustable attenuator to oscillator TST jack [patches (1) and (2), Fig. 4]	Jack strip in switch control by	290, 288, 286, or 284 kHz	—79 dBm	Adjustable attenuator	—79 dBm indication on RTE	
6. Remove patch (2) from RTE and connect patch (3) between adjustable attenuator and SW AMP in jack	J68820 bay	290, 288, 286, or 284 kHz	—79 dBm	INC L ID SIG (TRSG SW CONT panel under test)	Adjust until CON relay just operates	
7. Patch RTE through 11B ATTEN to TRSG SW CONT MON jack 1, 2, 3, or 4 (296 kHz at —54 dBm) [patch (4), Fig. 4]	J68820 bay			OG VER SIG (TRSG SW CONT panel under test)	—54 dBm indication on RTE	

TEST 4

ADJUSTMENT OF THE 296-KHZ INCOMING VERIFICATION SIGNAL DETECTOR
(GROUP A ONLY)

APPARATUS:						
Receiving Test Equipment (RTE) Adjustable Attenuator P2BJ Cord						
CIRCUIT PREPARATION		INPUT SIGNAL		ADJUST		RETURN CIRCUIT TO REGULAR
ACTION	LOCATION	FREQ	LEVEL	CONTROL	REQUIREMENT	
1. Remove cover(s) from TSV relay.	Director Panel					1. Replace cover(s) on TSV relay(s). Note: If no other tests are to be performed, complete the next two steps. 2. Remove patches (1), and (3), Fig. 4. 3. Replace plug as follows: L3: Between SW FIL OUT and SW AMP IN jacks L4: Between LVL COM OUT and SW AMP IN jacks.*
2. Adjust control INC VER SIG to the maximum CCW position.	Director Panel					
3. Remove plug as follows: L3: Between SW FIL OUT and SW AMP IN jacks L4: Between LVL COM OUT and SW AMP IN jacks.*	Mounting strip in associated J68820 bay					
4. Connect RTE through adjustable attenuator to 296-kHz oscillator TST jack [patches (1) and (2), Fig. 4]	Jack strip in switch control bay	296 kHz	−79 dBm	Adjustable attenuator	−79 dBm indication on RTE	

TEST 4 (Contd)

CIRCUIT PREPARATION		INPUT SIGNAL		ADJUST		RETURN CIRCUIT TO REGULAR
ACTION	LOCATION	FREQ	LEVEL	CONTROL	REQUIREMENT	
5. Remove patch (2) from RTE and connect patch (3) between adjustable attenuator and SW AMP IN jack	J68820 bay	296 kHz	—79 dBm	INC VER SIG (Director Panel)	Adjust until TSV relay(s) just operates	

* Or SW FIL OUT and SW AMP IN, if provided.

TEST 5

**ADJUSTMENT OF OUTGOING RELEASE SIGNAL (282 KHZ)
(GROUP A ONLY)**

APPARATUS:						
Receiving Test Equipment (RTE) 11B Attenuator P2BJ Cord						
CIRCUIT PREPARATION		INPUT SIGNAL		ADJUST		RETURN CIRCUIT TO REGULAR
ACTION	LOCATION	FREQ	LEVEL	CONTROL	REQUIREMENT	
1. Remove cover from RLS relay.	COM SW CONT panel					1. Release the RLS relay
2. Patch RTE into TRSG SW CONT 1 MON jack (—54 dBm at 282 kHz) —[patch (1), Fig. 5]	Mounting strip in associated J68820 bay					2. Replace RLS relay cover.
3. Record setting of switch S1 on the SW TONE AMP, if provided.	TRSG SW CONT PANEL			Set switch S1 to the 0 position		3. Return switch S1 on the SW TONE AMP to its original setting.
4. Manually operate the RLS relay and observe the RTE.	COM SW CONT panel			OG RLS (COM SW CONT panel)	—54 dBm indication on the RTE	4. Remove patch (1), Fig. 5.
5. Patch RTE into each remaining TRSG SW CONT () MON jack in service and operate the RLS relay as in Step 4.					—54 dBm ± 2 dB indication on the RTE	

TEST 6

ADJUSTMENT OF OUTGOING LINE IDENTIFICATION SIGNAL (290, 288, 286, AND 284 KHZ) (GROUP A, AA, AND AB)

Note: Repeat this test for each of the REG SW INIT units in service.

APPARATUS:

Receiving Test Equipment (RTE)
11B Attenuator
P2BJ Cord

CIRCUIT PREPARATION		INPUT SIGNAL		ADJUST		RETURN CIRCUIT TO REGULAR
ACTION	LOCATION	FREQ	LEVEL	CONTROL	REQUIREMENT	
1. Operate the REC L SW key to DISC.	REG SW INIT 1					1. Remove RTE cord from TRSG SW CONT 1 MON jack under test.
2. Operate the INIT key to TST.	REG SW INIT 1					
3. Operate the TST SENS key to a vertical position	REG SW INIT 1					
4. Block LO relay in a nonoperative condition.	REG SW INIT 1					
5. Connect RTE to the TRSG SW CONT 1 MON jack (−54 dBm at 290 kHz).	Mounting strip in associated J68820 bay			OG LINE SIG (REG SW INIT 1)	−54 dBm indication on the RTE (See Note)	2. Release TST SENS key to normal position.
6. Connect RTE to each TRSG SW CONT () MON jack in service.	J68820 bay				−54 dBm ±2 dB indication on the RTE (See Note)	3. Remove block from LO relay.
						4. Momentarily manually operate LO relay.
						5. Release INIT key to normal position.
						6. Release REC L key to normal position.

Note: If the requirements in Steps 5 and 6 are not met, check the setting of S1 of the SW TONE AMP (if provided) in the transmitting switch control circuit. It should be set to 0 for this test.

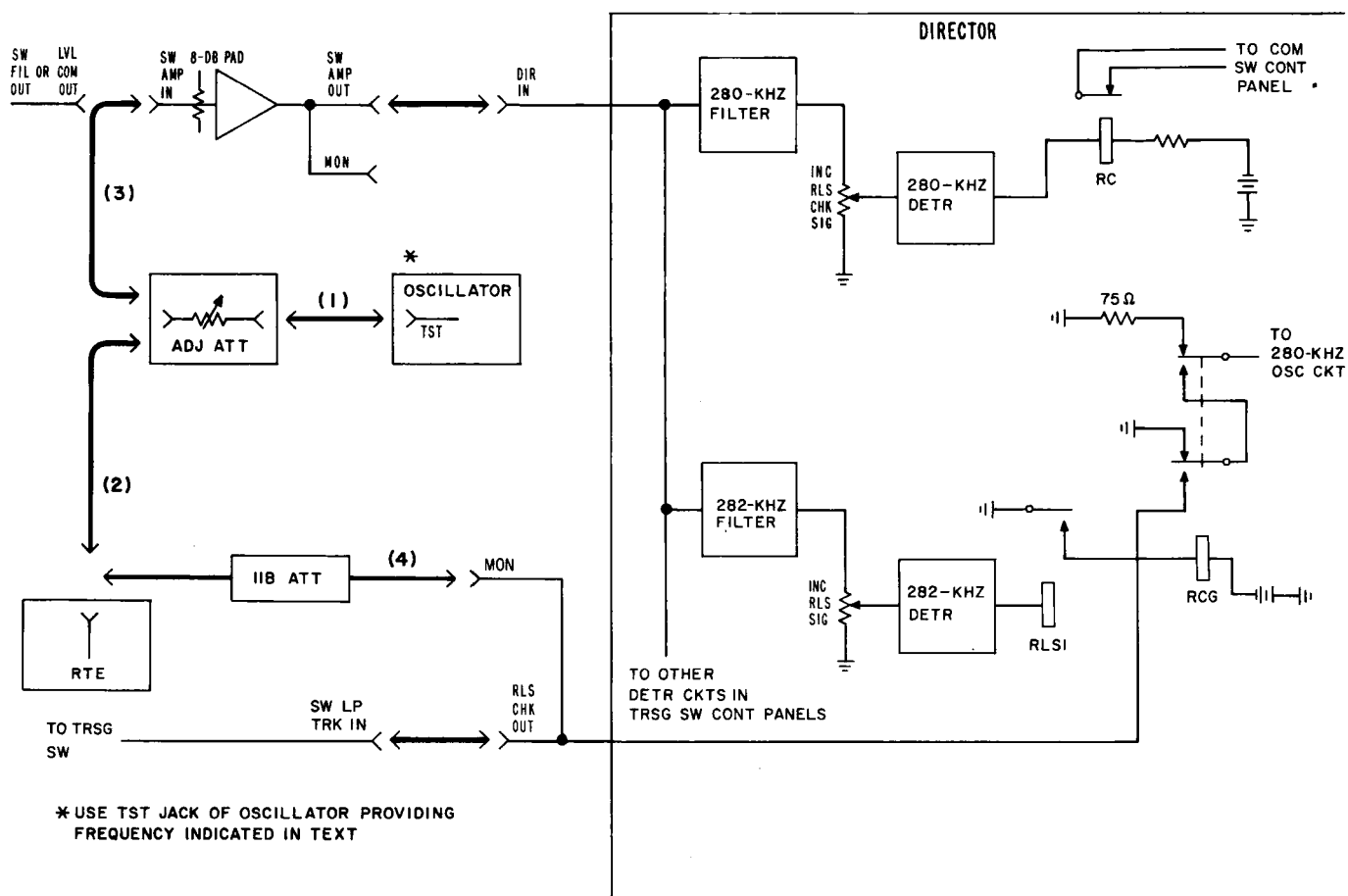


Fig. 3—Patching Arrangement for Tests 1 and 24

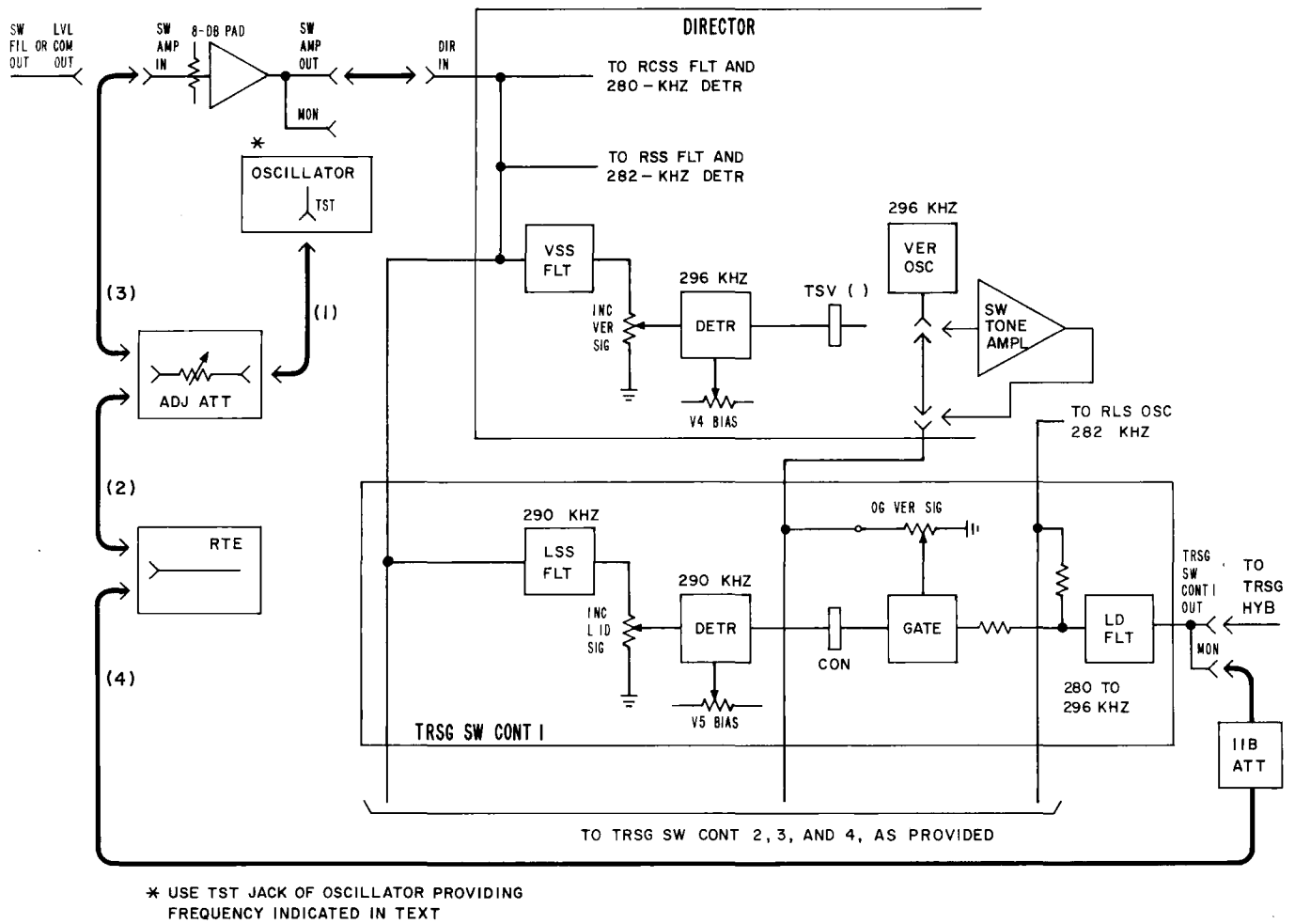


Fig. 4—Patching Arrangement for Tests 3 and 4

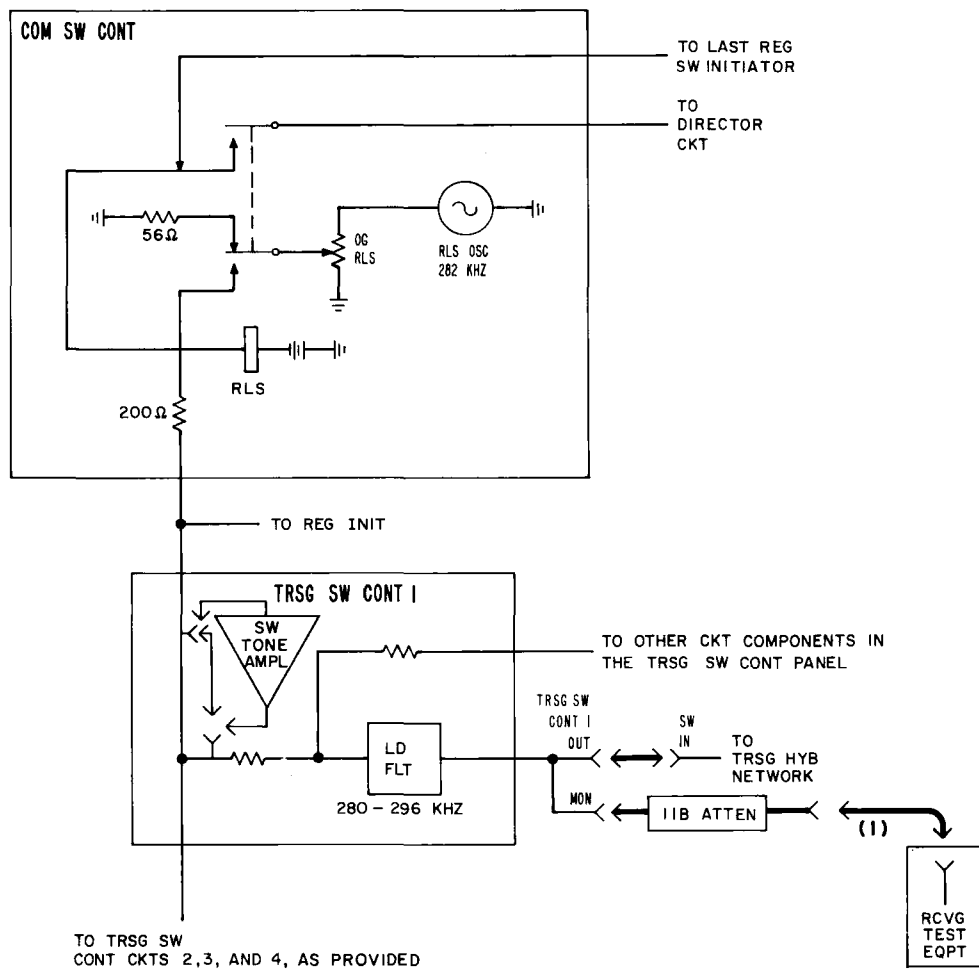


Fig. 5—Patching Arrangement for Test 5