

tone presence
DETECTOR CIRCUIT (SD-2H132)
TEST AND ADJUSTMENTS
NO. 2 AND NO. 2B ELECTRONIC SWITCHING SYSTEMS

1. GENERAL

1.01 This section describes a method of testing and adjusting the tone presence detector circuit (SD-2H132) used in the No. 2 and No. 2B Electronic Switching Systems (ESS).

1.02 This section is reissued to include changes since the last issue and to cover the No. 2B ESS. Since this reissue covers a general revision, arrows ordinarily used to indicate changes have been omitted.

1.03 The test and adjustments covered are as follows:

A. Circuit State and Scan Point Operation:

This test verifies that the ferrod sensor associated with the circuit saturates, that all circuit relays can be operated from the trunk test panel (TTP), and the detector networks (CP A378) functions properly.

B. Tone Detection Level: This test is used to adjust the GAIN control of the KS-19220 L2 amplifier to its proper setting.

C. Voice Detection Level: This test is used to adjust the RELEASE control and the OPERATE control of the KS-19219 L2 voice operated relay circuit to their proper setting.

1.04 The test is to be performed on a periodic basis as prescribed by equipment test list procedures or when a malfunction of the circuit is suspected. The adjustments are to be performed if the test fails.

1.05 The test will be performed from the TTP in conjunction with the display buffer and

teletypewriter (TTY). For detailed information about the TTP and its operation, refer to Section 232-130-301, Trunk Test Panel—Method of Operation.

1.06 The keys on the TTP may be either a locking or a nonlocking type. In order to differentiate between the two types of keys, the use of a locking type key shall be identified by the words "operate" and "release" and the use of a nonlocking type key shall be identified by the word "depress" in the ACTION column.

Note: Nonlocking keys require a depression of at least one-half second to ensure system recognition.

1.07 Lettered Steps: A letter a, b, c, etc, added to a step number in Part 3 or 4 of this section indicates an action which may or may not be required depending on local conditions. The condition under which a lettered step or series of lettered steps should be made is given in the ACTION column and all steps governed by the same condition are designated by the same letter within a test. Where a condition does not apply, all steps designated by the letter should be omitted.

1.08 Check the battery voltages at the circuit packs to make sure they are within limits. Refer to SD-2H132.

1.09 Whenever the term TOUCH-TONE® telephone service is used, it refers to the equipment required to provide this service to the customer.

2. APPARATUS

Note: Equivalent apparatus may be substituted.

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2.01 One NJ 03504 tone presence detector test set, or equivalent with appropriate test leads. Equivalent apparatus must have output power level adjustable from -30 dBm to +10 dBm. The equivalent apparatus must send periodically interrupted input signal of 1000 Hzs composed of between 100 ±4 ms and 190 ±4 ms followed by a 300 ms minimum period of no signal.

2.02 KS-3008 stopwatch.

2.03 One 262C-type (900 ohm) plug.

2.04 Hewlett-Packard 3400A RMS voltmeter (VM).

2.05 Two Hewlett-Packard 11002A cable assemblies.

Note: If adjustments are performed, the following apparatus is required.

2.06 KS-14510 L1 volt-ohm-milliammeter (VOM).

2.07 KS-14510 L3 test leads (one red and one black).

2.08 Two testing cords, 893 cord, 3 feet long, equipped with two 360A tools (1W13A cord) and two KS-6278 connecting clips. Insulate KS-6278 connecting clips with 108 cord tip insulated tubing.

2.09 Two 508A blocking tools.

3. PREPARATION

3.01 Refer to the office records to obtain the member number (MEMN) and the directed scan point number (DSP) of the tone presence detector circuit to be tested. The trunk group number (TGN) for this circuit is 047.

3.02 Verify the information obtained from the office records as follows:

At the maintenance TTY type in:

A VY:SVC:aaa bbb!

aaa = 047

bbb = MEMN

The system response is as follows:

AR VY SVC 047 bbb

TEN nn gcsl

DSP ss rrb

ss = scanner number

rr = scanner row

bb = bit in row

The bb bit represents the first ferrod sensor (0) in the scanner row that is associated with the specific circuit. All other ferrod sensors assigned to the same circuit follow in consecutive order (0, 1, 2, etc). Refer to the output message manual (OM-2H200) of explanation of other data fields, if required.

3.03 The following is a step-by-step procedure to make the tone presence detector circuit traffic busy and connect it to TTY (Fig. 1).

STEP

ACTION

VERIFICATION

Test and Adjustments

- 1 At telephone set on TTP—
Operate access trunk 1 key.
- 2 Lift handset off-hook, or operate TRFR key at TEL CKT on TTP if using headset.

At telephone set—
Access trunk 1 lamp lighted.
At ACCESS TRUNK 1 CONTROL—
SUPV lamp lighted.

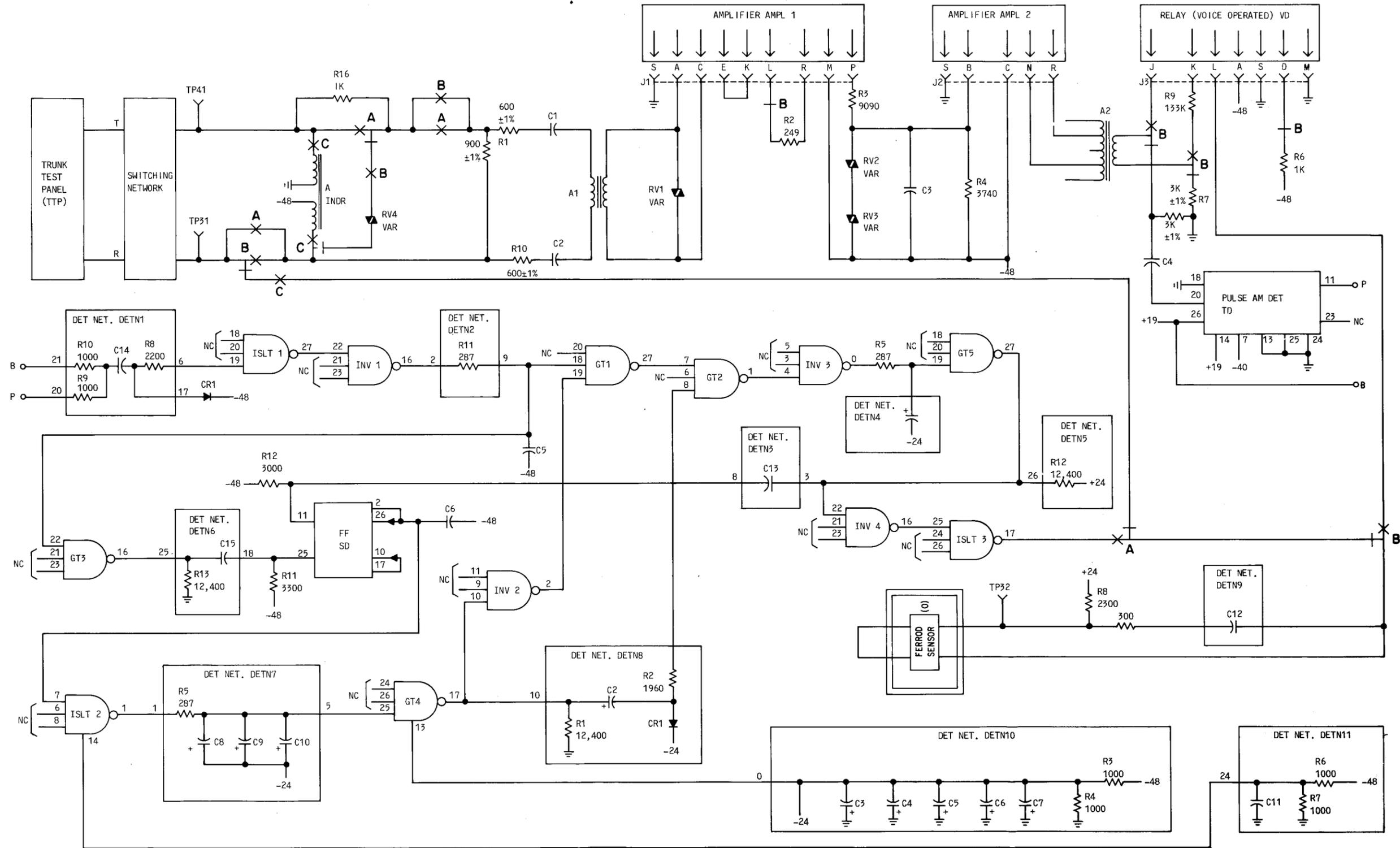


Fig. 1—Tone Presence Detector Circuit

| STEP | ACTION | VERIFICATION |
|------|---|---|
| | | At TEL CKT— TRFR lamp lighted if TRFR key is operated. |
| 3 | At TOUCH-TONE dial— Dial 1 + TGN + MEMN + ST. | At ACCESS TRUNK 1 CONTROL— EQPT ST lamp lighted steadily or flashing at a rate of 120 interruptions per minute. At MISC TEST CONTROL— P & E lamp lighted if connection was successful. |
| | | Note: If the EQPT ST lamp is flashing and the P & E lamp is not lighted steadily, the TTP is not connected to the circuit to be tested. |
| 4a | If the P & E is not lighted steadily— At ACCESS TRUNK 1 CONTROL— Depress RLS key. | |
| 5a | Repeat Steps 3 and 4a until connection is successful. | |
| 6 | Place handset on-hook, or release TRFR key. | At telephone set— Access trunk 1 lamp extinguished. At TEL CKT— TRFR lamp extinguished. |

4. METHOD

4.01 If the verification procedure fails or if a malfunctioning circuit is indicated during any part of these tests, proceed as follows.

- (1) Discontinue the test.

- (2) Troubleshoot the circuit which failed.
- (3) Replace faulty circuit components using standard repair procedures.
- (4) Repeat the test that failed. If verification is successful, continue the test.

| STEP | ACTION | VERIFICATION |
|------|--------|--------------|
|------|--------|--------------|

A. Circuit State and Scan Point Operation

| | | |
|---|--|---|
| 7 | Use the TTP printout from 3.02 to determine the trunk scanner and number of the scanner row associated with the scan points assigned to the tone presence detector circuit. | |
| 8 | At maintenance TTY— For No. 2 ESS offices type in: UBRL TS:RSN:ssrr! ss = Number of trunk scanner in decimal (0-11) from Step 7. rr = Number of scanner row to be displayed in decimal (0-63) from Step 7. | At DISPLAY BUFFER— Scanner row containing specific scan points displayed on DISPLAY BUFFER lamps. Lamps associated with ferrod sensors connected to circuit under test are lighted. |

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| STEP | ACTION | VERIFICATION |
|------|---|--|
| | <p>For No. 2B ESS offices type in: MON:TSSN ssrr;RDT LAMPS! ss = Number of trunk scanner in decimal (0-11) from Step 7. rr = Number of scanner row to be displayed in decimal (0-63) from Step 7. RDT LAMPS = Direct the result to the DISPLAY BUFFER.</p> | |
| 9 | Set PD GROUP switch 0-5 position. | |
| 10 | At ACCESS TRUNK 1 CONTROL— Depress VM key. | At ACCESS TRUNK 1 CONTROL— VM lamp lighted. At VOLTMETER CONTROL— 100K lamp lighted. At VOLTMETER— Meter indicates 0. |
| 11 | At VOLTMETER CONTROL— Operate TR REV key. | At VOLTMETER CONTROL— TR REV lamp lighted. At VOLTMETER— Meter indicates 0. |
| 12 | Depress FEMF key. | At VOLTMETER CONTROL— FEMF lamp lighted. 100K lamp extinguished. At VOLTMETER— Meter indicates 0. |
| 13 | Release TR REV key. | At VOLTMETER CONTROL— TR REV lamp extinguished. At VOLTMETER— Meter indicates 0. |
| 14 | At VOLTMETER CONTROL— Depress MET VM key. | At VOLTMETER CONTROL— MET VM lamp lighted. FEMF lamp extinguished. |
| 15 | At PERIPHERAL DECODER POINTS— Operate 0, 1, and 2 keys. | At PERIPHERAL DECODER POINTS— 0, 1, and 2 lamps lighted. |
| 16 | Depress AT 1 key. | At VOLTMETER— Meter indicates 30.5 and 37.5 volts on 120-volt scale. |
| 17 | At PERIPHERAL DECODER POINTS— Release 1 and 2 keys. | At PERIPHERAL DECODER POINTS— 1 and 2 lamps extinguished. |
| 18 | Depress AT 1 key. | At circuit under test— Relays B and C released. Relay A remains operated. |

| STEP | ACTION | VERIFICATION |
|------|--|--|
| 19 | At VOLTMETER CONTROL— Depress 1K key. Operate GRD key. | At VOLTMETER— Meter indicates between 9.6 and 10.4 volts on 24-volt scale. At VOLTMETER CONTROL— MET VM lamp extinguished. 1K lamp lighted. GRD lamp lighted. |
| 20 | At VOLTMETER CONTROL— Release GRD key. Operate TR REV key. Depress MET VM key. | At VOLTMETER— Meter indicates 0. At VOLTMETER CONTROL— GRD lamp extinguished. 1K lamp extinguished. TR REV lamp lighted. MET VM lamp lighted. |
| 21 | At PERIPHERAL DECODER POINTS— Release 0 key. Operate 2 key. | At PERIPHERAL DECODER POINTS— 0 lamp extinguished. 2 lamp lighted. |
| 22 | Depress AT 1 key. | At VOLTMETER— Meter indicates between 20.75 and 26.25 volts on 120-volt scale. At circuit under test— Relay A released. Relay C operated. |
| 23 | At front of writing shelf— Insert 262C-type (900 ohms) plug into ACCESS TRK-1 jack. | At DISPLAY BUFFER— Lamp associated with ferrod sensor 0 extinguished. |
| 24 | Remove 262C-type (900 ohm) plug from ACCESS TRK-1 jack. | Lamp associated with ferrod sensor 0 lighted. |
| 25 | At tone presence detector test set— Connect P1 to +24 jack below writing shelf at right-hand side of TTP frame and P2 to GRD jack. Use appropriate test cord to connect ACCESS TRK-1 jack to RELAY GND (ring) and RELAY NO (tip). | |
| 26 | Connect 3400 RMS voltmeter to RELAY GND and RELAY NO. | |
| 27 | Set AC-EXT-DIRECT switch to Direct. Set PRESET OFF CONT switch to OFF. Depress OPR key. | |
| 28 | At VOLTMETER CONTROL— Release TR REV key. | At VOLTMETER CONTROL— TR REV lamp extinguished. |

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| STEP | ACTION | VERIFICATION |
|------|---|--|
| 29 | At PERIPHERAL DECODER POINTS— Operate 0 and 1 keys. | At PERIPHERAL DECODER POINTS— 0 and 1 lamps lighted. |
| 30 | Depress AT 1 key. | At circuit under test— Relays A and B operated. Relay C remains operated. |
| 31 | At tone presence detector test set— Set 1000 Hz to obtain a 0.095 ± 0.001 reading on RMS voltmeter. | At DISPLAY BUFFER— Lamp associated with ferrod sensor 0 extinguished. Note: If a problem is encountered, perform Test C and continue at Step 37. |
| 32 | At PERIPHERAL DECODER POINTS— Release 2 key. | At PERIPHERAL DECODER POINTS— 2 lamp extinguished. |
| 33 | Depress AT 1 key. | At DISPLAY BUFFER— Lamp associated with ferrod sensor 0 remains extinguished. At circuit under test— Relay C released. Relays A and B remain operated. |
| 34 | At tone presence detector test set— Set 1000 Hz to obtain a 0.060 ± 0.001 reading on RMS voltmeter. | At DISPLAY BUFFER— Within approximately 8 seconds— Lamp associated with ferrod sensor 0 lighted. Note: If a problem is encountered, perform Test C and continue at Step 37. |
| 35 | At PERIPHERAL DECODER POINTS— Operate 2 key. | At PERIPHERAL DECODER POINTS— 2 lamp lighted. |
| 36 | Depress AT 1 key. | At DISPLAY BUFFER— Lamp associated with ferrod sensor 0 remains lighted. At circuit under test— Relay C operated. Relays A and B remain operated. |
| 37 | At tone presence detector test set— Set 1000 Hz to obtain a 0.030 ± 0.001 reading on RMS voltmeter. | |
| 38 | At PERIPHERAL DECODER POINTS— Release 1 key. | At PERIPHERAL DECODER POINTS— 1 lamp extinguished. |
| 39 | Depress AT 1 key. | At DISPLAY BUFFER— Lamp associated with ferrod sensor 0 extinguished. At circuit under test— Relay B released. Relays A and C remain operated. |

| STEP | ACTION | VERIFICATION |
|------|---|--|
| | | <i>Note:</i> If a problem is encountered, perform Test B and continue at Step 45. |
| 40 | At PERIPHERAL DECODER POINTS— Release 2 key. | At PERIPHERAL DECODER POINTS— 2 lamp extinguished. |
| 41 | Depress AT 1 key. | At DISPLAY BUFFER— Lamp associated with ferrod sensor 0 remains extinguished. At circuit under test— Relay C released. Relay A remains operated. |
| 42 | At tone presence detector test set— Set 1000 Hz to obtain a 0.027 ± 0.001 reading on RMS voltmeter. | At DISPLAY BUFFER— Lamp associated with ferrod sensor 0 lighted. <i>Note:</i> If a problem is encountered, perform Test B and continue at Step 45. |
| 43 | At PERIPHERAL DECODER POINTS— Operate 2 key. | At PERIPHERAL DECODER POINTS— 2 lamp lighted. |
| 44 | Depress AT 1 key. | At DISPLAY BUFFER— Lamp associated with ferrod sensor 0 remains lighted. At circuit under test— Relay C operated. Relay A remains operated. |
| 45 | At PERIPHERAL DECODER POINTS— Release 2 key. | At PERIPHERAL DECODER POINTS— 2 lamp extinguished. |
| 46 | Depress AT 1 key. | At circuit under test— Relay C released. Relay A remains operated. |
| 47 | At tone presence detector test set— Set 1000 Hz to obtain a 0.030 ± 0.001 reading on RMS voltmeter. | |
| 48 | At tone presence detector test set— Set the AC-EXT-DIRECT switch to the DIRECT position. Set the OPR PERIOD switches to 190. Set the NON-OPR PERIOD switches to 300. | |
| 49 | At tone presence detector test set— Set the MODE switch to the CONT position. | |
| 50 | At tone presence detector test set— Depress ST key. | At DISPLAY BUFFER— Lamp associated with ferrod sensor 0 flashes. |

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| STEP | ACTION | VERIFICATION |
|------|--|---|
| 51 | At tone presence detector test set— Set the MODE switch to the OFF position. Set the OPR PERIOD switches to 100. | |
| 52 | At tone presence detector test set— Set the MODE switch to the CONT position. | |
| 53 | At tone presence detector test set— Depress ST key. | At DISPLAY BUFFER— Lamp associated with ferrod sensor 0 lighted. |
| 54 | At tone presence detector test set— Set the MODE switch to the OFF position. | At DISPLAY BUFFER— Lamp associated with ferrod sensor 0 extinguished. |
| 55 | At front of writing shelf— Remove cord connecting tone presence detector test set and ACCESS TRK-1 jack. | |
| 56 | At tone presence detector test set— Remove P1 and P2 from +24 jack and GRD jack. | |
| 57 | At PERIPHERAL DECODER POINTS— Release 0 key. | At PERIPHERAL DECODER POINTS— 0 lamp extinguished. |
| 58 | Depress AT 1 key. | At circuit under test— Relay A released. |
| 59 | At ACCESS TRUNK 1 CONTROL— Depress RLS key. | At ACCESS TRUNK 1 CONTROL— XMSN lamp extinguished. SUPV lamp extinguished. EQPT ST lamp extinguished. At MISC TEST CONTROL— P & E lamp extinguished. |
| 60 | At telephone set on TTP— Operate green release key. | |
| 61 | At maintenance TTY— For No. 2 ESS offices type in: UB SY:CLB! For No. 2B ESS offices type in: STOP:UTIL! | Ferrod sensor display removed from DISPLAY BUFFER. |

B. Tone Detection Level

Note: Perform Test B only if problems were encountered in Test A.

- 7 Locate circuit to be tested and set up test equipment as shown in Fig. 2.

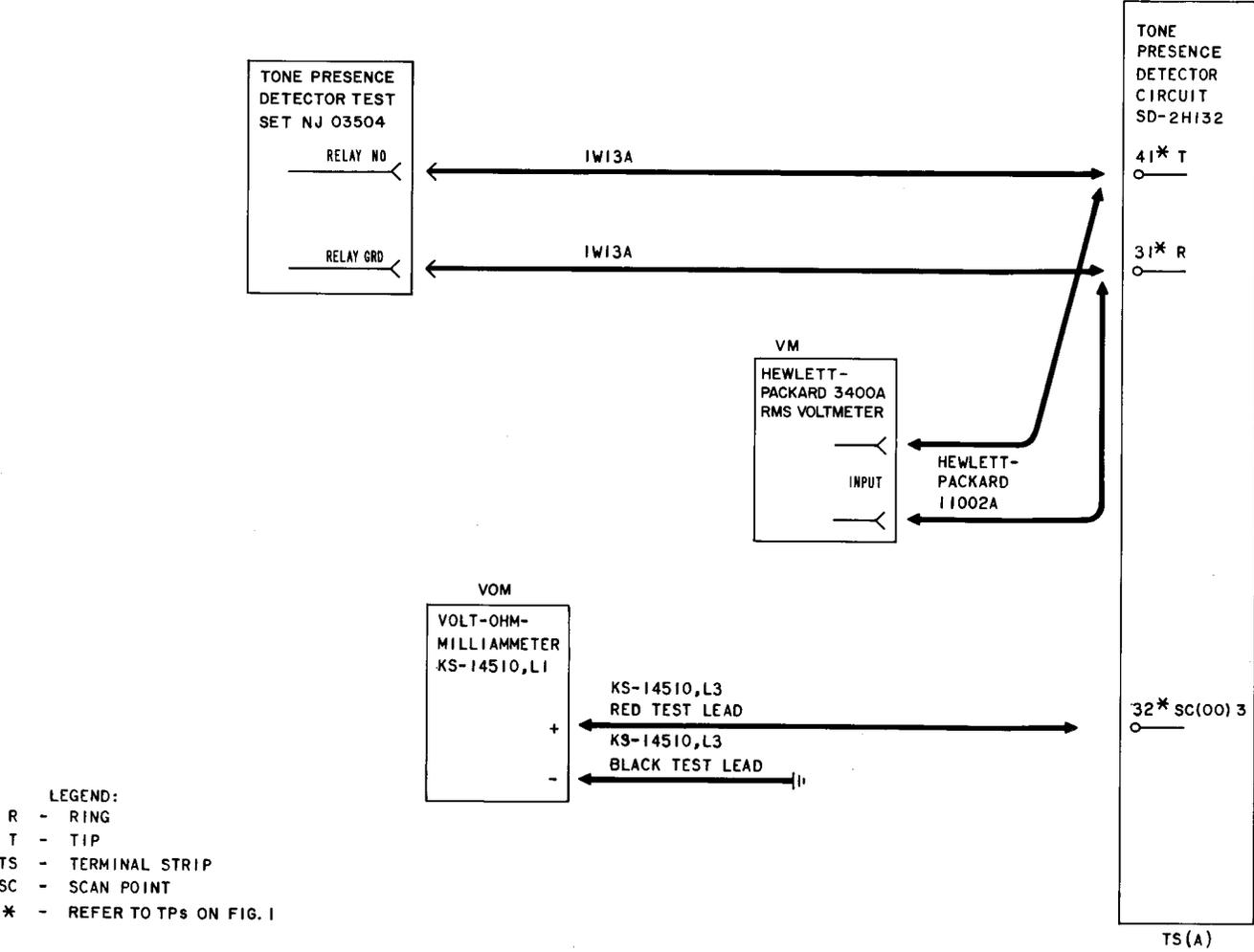


Fig. 2—Adjustments Connections

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| STEP | ACTION | VERIFICATION |
|------|---|---|
| 8 | At tone presence detector test set— Set the AC-EXT-DIRECT switch to DIRECT. | |
| 9 | At VM— Set RANGE switch to 0.1 volt. | |
| 10 | At VOM— Operate RANGE switch to DC volts 60. | |
| 11 | Block relay A operated. | |
| 12 | At tone presence detector test set— Set 1000 Hz to obtain 0.030 \pm 0.001 reading on RMS voltmeter. | At VM— Meter indicates 0.030 \pm 0.001 volts rms. |
| 13 | At tone presence detector test set— Depress OPR key. | |
| 14 | At amplifier 1 KS-19220 L2— Starting with GAIN control in its extreme counterclockwise position, adjust GAIN control clockwise until the dc voltage at terminal 32 is below +10 volts. | At VOM— Meter indicates decrease from above +19 volts to below +10 volts. |
| 15 | At tone presence detector test set— Set 1000 Hz to obtain 0.027 \pm 0.001 reading on RMS voltmeter. | At VM— Meter indicates 0.027 \pm 0.001 volts rms. At VOM— Meter indicates increase to above +19 volts. |
| 16b | If the voltage in Step 15 is within the limit— Proceed to Step 45 of Test A. | |
| 17c | If the voltage in Step 15 is not above +19 volts the gain control must be adjusted counterclockwise. Repeat Steps 12 through 16b. | |

C. Voice Detection Level

Note: Perform Test C only if problems were encountered in Test A.

- 7 Locate circuit to be tested and set up test equipment as shown in Fig. 2.
- 8 At tone presence detector test set—
Set the AC-EXT-DIRECT switch to DIRECT.
- 9 At VM—
Set RANGE switch to 0.1 volt.

| STEP | ACTION | VERIFICATION |
|------|--|--|
| 10 | At VOM— Operate RANGE switch to DC volts 60. | |
| 11 | Block relays A and B operated. | |
| 12 | At VD relay (VOICE OPERATED RELAY) KS-19219 L2— Adjust RELEASE control to its extreme counterclockwise position. | |
| 13 | At tone presence detector test set— Set 1000 Hz to obtain 0.095 ± 0.001 reading on RMS voltmeter. | At VM— Meter indicates 0.095 ± 0.001 volts rms. |
| 14 | At tone presence detector test set— Depress OPR key. | |
| 15 | At VD relay— Adjust OPERATE control clockwise until the dc voltage at terminal 32 is below +10 volts. | At VOM— Meter indicates decrease from above +19 volts to below +10 volts. |
| | Note: If this step is being repeated, adjust the OPERATE control clockwise to the approximate setting described in Steps 18d or 20e. | |
| 16 | At tone presence detector test set— Set 1000 Hz to obtain 0.060 ± 0.001 reading on RMS voltmeter. | At VM— Meter indicates 0.060 ± 0.001 volts rms. At VOM— Meter indicates increase from below +10 volts to above +19 volts within 5 to 15 seconds. (Use stopwatch to measure time.) |
| 17c | If the voltage increase occurs before 5 seconds— Turn RELEASE control slightly clockwise and repeat Steps 13 through 16. | |
| 18d | If the voltage increase does not occur or occurs after 15 seconds, the OPERATE control has been turned too far clockwise. Repeat Steps 13 through 17c until this condition is met. | |
| 19 | At tone presence detector test set— Set 1000 Hz to obtain 0.095 ± 0.001 reading on RMS voltmeter. | At VM— Meter indicates 0.095 ± 0.001 volts rms. At VOM— Meter indicates decrease from above +19 volts to below +10 volts within 5 seconds. (Use stopwatch to measure time.) |

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| STEP | ACTION | VERIFICATION |
|-------------|--|---------------------|
| 20e | If the voltage in Step 19 is within the limit— Proceed to Step 37 of Test A. | |
| 21f | If the voltage decrease does not occur within 5 seconds, the OPERATE control has not been turned far enough clockwise. Repeat Steps 15 through 20e until this condition is met. | |