

## AUTOMATIC CALL-THRU TEST SET SD-32522-01 (J34728)

### DESCRIPTION

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**1. GENERAL**

**1.01** This section describes the automatic call-thru test set SD-32522-01 and its application in step-by-step central office and PBX tests. Detailed description of test set and jack access circuits is shown in SD-32522-01 and SD-32523-01.

**1.02** This section is reissued to:

- (a) Add KS-19506 L5 shorting pins to Table A
- (b) Add Remote Control (RC) jack to description
- (c) Add Tone Detector (TD) key to description.

**A. Features**

**1.03** The SD-32522-01 test set

- (a) Can be moved from office to office.
- (b) Can be used to test both central offices and PBXs.
- (c) Tests five intraoffice or toll switch trains simultaneously or interlocal and intertoll trains individually.

(d) Automatically directs up to five simultaneous test calls on flat rate, message rate, or party lines.

(e) Performs tests using optional loop, leak, ringing polarity, pretrip, and trip values. Interdigital timing, connector B relay release timing, pulse speed, and percent break may also be varied to accommodate switching equipment testing requirements.

(f) Is capable of testing four calls per line per minute or has a trouble-free calling rate of 1200 calls per hour.

(g) Provides integral staggered pulsing to prevent selectors on the same shelves from stepping to the same terminal simultaneously.

(h) Provides adjustable pulsing from 8 to 13 pulses per second with a percent break adjustable between 35 and 75 percent.

(i) Prevents ringing of a customer telephone number if an incorrect termination is reached.

(j) Times various portions of the test cycle and indicates by an alarm the occurrence of time-out due to a trouble condition.

(k) Has a cutout in the side of the test set so the tester can see the index wheel on the 206-type selector which, with lighted lamps on the test set, provides readout to assist in determining the type and location of trouble encountered.

(l) Has a self-contained trouble tracing tone that may be applied to any test line.

(m) Makes available a distant office terminating circuit.

(n) Has a simplex circuit, in addition to a loop pulsing circuit, on test line 1 to permit testing intertoll selectors with simplex pulsing and incoming selectors with loop pulsing.

## SECTION 100-197-101

### Test Lines

**1.04** Two methods are provided for gaining access to the originating equipment used for test calls:

- (a) Access to successive finders in a line finder group by means of the progression circuit requiring use of originating connections through the OL and LF jacks of the test set
- (b) Access to successive line finders in allotter-type line finder offices (line finders using a combined line and cutoff relay) by establishing a connection to any particular vacant line terminal (combined relay) through the OL jack only.

**1.05** To terminate test calls, nonworking connector terminals are selected and connected to the test set. The test set sequentially seizes the originating equipment, outpulses the digits required to reach the connector terminals selected, and trips the ring, after which it recycles and repeats the process. Various test conditions and circuit operational checks are performed during the progress of each call.

**1.06** If any circuit connected to any of the five test lines should fail to meet the preset test values, the test set will block, hold the connection, and give a visual indication at the test set. Provision is also made to connect to the office visual and audible alarm.

**1.07** The line finder progression feature provided in the test set works in conjunction with the line finder group start circuit. This feature enables the test set to select line finders progressively, thereby providing dispersion of calls throughout the line group. Provision is also made to bypass this circuit when desirable.

**1.08** When the progression circuit is used, the test set supplies ground to the start leads and AB commutator leads of the five selected line finder groups. After finding the correct terminals, the line finders cut through to their associated first selectors. The first selectors return ground on the sleeve leads, operating the five S relays and momentarily lighting the associated LS lamps. After all five S relays are operated, a ground signal is applied to the sleeve auxiliary relay (SA) which operates and starts the pulsing cycle. The first digit is sent only on test line 1 when the step

(STP) selector is on position 1. The pulse sent out matches the number set up on the matrix board. The digit relay operates and shorts the pulsing contacts on test line 1. The operated digit relays start the preset interdigital timing cycle and the STP selector steps to position 2. The interdigital timing relay releases and starts the pulsing of the second digit on test line 1 and the first digit on test line 2. This staggering of outpulsing continues until all except the last two digits have been sent on all lines. The STP selector, now in position 13, operates the CK relay which starts pulsing the first digit into the five connectors simultaneously, looks at the five paths, and determines if an all-paths-busy condition had been encountered. If an all-paths-busy condition exists, the test set will automatically recycle without completing any of the five calls. If all paths are available, the last digit is pulsed and the wrong number check circuit tests that the proper termination was reached. If a wrong number is reached, the WN lamp lights and the connector is pulsed to the eleventh rotary position and held to prevent ringing a customer telephone. After each line has terminated, a ringing test is made and the RNG lamps lighted, a pretrip test is made and the PRT lamps lighted, and a trip test is made. When tripping occurs, the REV lamps are lighted, all connections are released, and the circuit returns to normal.

### B. Description

**1.09** The approximate weight of the portable call-thru test set is 65 pounds. A separate shipping case is provided and has a compartment for storing connecting cords, spare parts, and relay adjusting tools.

**1.10** The test set is 23 inches wide, 11-1/2 inches high, and 14-1/2 inches deep. The metal box-type housing is equipped with fiber panels for mounting jacks, lamps, keys, switches, matrix board, meter, and registers. The following switches, lamps, and keys are located on the top panel. (See Fig. 1 and 3.) The jacks and the TD key are located on the upper right side of the test set. (See Fig. 2.)

***Ringling Switches (RNG SW 1-5):*** There is one RNG SW switch for each test line. Each switch has five positions and is set to provide the desired ringing condition

for a line termination. The position designations are as follows:

HLD (Hold) Holds up the line under test or bypasses testing on that line if set initially

T-	Negative ringing on tip	1050
		1196
T+	Positive ringing on tip	1606
		1800
R-	Negative ringing on ring	1920
R+	Positive ringing on ring	

**Loop Switch (LOOP):** There is one LOOP switch for the five test lines. The position designations are as follows:

	600	500
	800	650
	1200	750
	1400	850
	2000	

In any one position, the LOOP switch sets the loop resistance on all lines.

**Leak Switch (LEAK):** There is one LEAK switch for the five test lines. The five switch positions used to set the leak condition to be applied across the lines are designated as follows:

NONE  
A  
B  
C  
AB

**Pretrip Switch (PTR):** There is one PTR switch for the five test line terminations. In any one position, the same pretrip resistance requirement is provided on all five lines. The five switch positions are designated as follows:

1.4K  
2.0K  
2.2K  
2.7K  
3.2K

**Trip Switch (TRIP):** There is one TRIP switch for the five test line terminations. In any one position, the same trip resistance requirement is provided on all five lines. The five switch positions are designated as follows:

**Connector B Relay Test Switch (CBRT):** There is one CBRT switch for the five test lines. The four switch resistance positions are designated as follows:

500  
650  
750  
850

**Line Sleeve Lamps (LS 1-5):** There is one LS lamp for each test line. In normal operation, ground on the originating line sleeve will cause the lamp to be lighted.

**Ringling Lamps (RNG 1-5):** There is one RNG lamp for each terminating line. These lamps give a visual indication during the ringing intervals.

**Reverse Lamps (REV 1-5):** There is one REV lamp associated with each test line. The lamp lights to indicate the occurrence of polarity reversal between tip and ring of the originating and terminating line on cut-through.

**Wrong Number Lamp (WN):** There is one wrong number lamp which lights to indicate that a connector has not been stepped to the test line terminal. This lamp is also used in remote control operation to indicate completion of each digit outputted.

**Trunk Test OK Lamp (TTOK):** There is one trunk test OK lamp which lights when a trunk test is successful.

**Alarm Lamp (ALM):** There is one alarm lamp which lights when a trouble condition occurs.

**Pretrip Lamp (PTR):** There is one pretrip lamp which lights when ringing is pretripped.

**Power Lamp (PWR ON):** There is one power lamp which lights when the power switch (PWR) is operated to ON.

**Power Switch (PWR-ON-OFF):** This switch controls the 48-volt dc supply to the test set.

**Interdigital Timing Digital Control Switch (ITDG 400-800-600):** This switch controls the length of time between digits.

**Pulse Check Switch (PS CHK):** When operated, the PS CHK switch conditions the pulse indicating circuit so that PPS (pulses per second) and %BK (percent break) adjustments may be performed.

**Outgoing Trunk Switches (OGT 1 and OGT 5):** Switch OGT 1 or OGT 5, in the IN position, conditions the test circuits for making performance checks of outgoing trunks and disables the wrong number check feature associated with through-testing of customer lines. Either simplex or loop dialing tests may be accomplished using OGT 1 equipment, whereas loop dialing facilities only are associated with OGT 5.

**Simplex Control Lead Switch (SP-IN-OUT):** This switch closes the connection between the SP1 jack and the winding of the RV1 relay so that supervisory signals from the selector can be recognized for test line 1 only.

**Simplex Switch (SX-IN-OUT):** This switch operates the SPX relays which convert pulsing on the tip and ring leads from loop to simplex for test line 1 only.

**Call Advance Switch (CA):** The test set recycles when the CA switch is operated.

**Start-Repeat Switch (ST-RPT):** This switch must be operated to the ST position to initiate a test cycle. The test set will recycle after each trouble-free test if the switch is in the RPT position.

**18V—PPS—%BK:** This 3-position key provides for a check of the pulses per second speed or the percent break of the test set pulsing circuit. The internal -18 volt supply of the test set may also be monitored by the use of this key. Normally this key should be in 18V position.

**Pulse Indicator (PI):** The meter indicates pulses per second, percent break, and the level of the -18 volt test set supply.

**Pulses Per Second Potentiometer (PPS):** This potentiometer adjusts the pulse rate.

**Percent Break Potentiometer (%BK):** This potentiometer adjusts the percent break of the pulse.

**Cycle Counter (CY):** The CY register scores the number of times that the test set has completed a trouble-free cycle.

**Trouble Counter (TBL):** The TBL register scores each time an equipment failure is encountered during a test cycle.

**Busy Tone Counter (BT):** The BT register scores each time an equipment busy condition is encountered during a test cycle.

**48V Jack:** This jack is used to connect the negative -48 volt central office battery to the test set using a patching cord provided for this purpose.

**ALM Jack:** This jack is used to connect the internal test set alarm circuit to the central office alarm system.

**OL 1-5 Jacks:** There is one OL jack for each originating line. Each jack provides access to the line finder terminals selected for the test.

**LF 1-5 Jacks:** There is one LF jack for each test line. These jacks provide

access to the line finder by way of the jack access panel when the line finder progression circuit is used. Their function is to extend control of the line finder chain circuit start leads and the commutator leads to the test set from the line finder groups.

**TL 1-5 Jacks:** There is one TL jack for each terminating test line. Each jack provides access to the connector terminals selected for association with the test set.

**TEL TONE 1-5 Jacks:** These jacks provide access to the five originating lines for monitoring and connecting tracing tone from the trouble tone oscillator.

**TR TONE Jack:** This jack provides access to the trouble tone oscillator for connection to any one of the five originating test lines through the TEL TONE jack.

**SP1 Jack:** This jack provides access to the SP lead of an intertoll selector.

**RC Jack:** This jack is optional and, if provided, allows the tester to control the pulsing and recycle from a remote location using a 32A test set.

**TD Key:** When operated, this key increases the bandwidth of the busy-tone detector.⚡

### C. Accessories

- 1.11** The accessories provided with the test set are shown in Table A.

### D. Precautions

- 1.12** The characteristics of some components of the test set are such that even a momentary application of a small current will damage the components. For this reason, a volt-ohm meter should not be used except when sufficient familiarity with circuit requirements is assured. The volt-ohm meter used should have a minimum resistance of 20,000 ohms per volt. Refer to Section 032-173-301 for precautions to be observed when working with semiconductors.

- 1.13** When connecting battery to the test set, connect cord to test set first and disconnect from test set last to avoid possible grounding of battery supply.

- 1.14** Refer to Section 100-197-500 for tests and adjustments to be performed before using the test set to ensure that performance will be satisfactory.

- 1.15** When the test set and its accessories are packed for transporting, it is important that the cords and connecting clips be placed only in the carrying case provided.

## 2. PLACING TEST SET IN OPERATION

- 2.01** After initial receipt, prolonged inactivity, movement from office to office, or modification, see Section 100-197-500 for verification of test set performance.

- 2.02** **Line Finder Group Test:** The five originating lines can be used to simultaneously test five line finder groups. OL1 through OL5 jacks on the test set are patched to the desired line finder groups located on the jack access panel. These connections are made by using the 3P7A cords that are furnished with the test set. LF jacks 1 through 5 are also patched to the jack access panel using the 3P7A cords. The five LF jacks on the test set must be patched to the corresponding LF jack on the access panel that is associated with the line finder group being tested.

- 2.03** An example of a typical connection is made as follows. Assume that line 1 in the test set is to be used to test a particular line finder group. This particular line finder group appears at OL20 jack on the access panel. OL1 jack on the test set is patched to OL20 jack, and LF1 jack on the test set is patched to LF20 jack on the access panel. The LF jacks will ground the LP lead, lighting the LGT lamp at the line finder group being tested. The five terminating lines, TL1 through TL5 on the test set, are patched to the desired terminating lines, TL1 through TL10 on the jack access panel.

- 2.04** **Incoming Selector and Incoming Toll Selector Test:** The five lines associated with the test set can be used to simultaneously test incoming selectors and incoming loop dialing toll selectors. The connections between the test

**TABLE A**  
**TEST SET ACCESSORIES**

ITEM	DESCRIPTION	QUANTITY	USE
ED-32339-( ) G1	Carrying case	1	Protects spare parts during transit
3P7A	Patching cord, P3E cord, 6 feet long, equipped with two 310 plugs	18	Connects the test set jacks to the jack access panel
3P6A	Patching cord, P3E cord, 1 foot long, equipped with two 310 plugs	1	Connects TR tone jack to TEL TONE jacks on test set
3P30A	Patching cord, P3AA cord, 10 feet long, equipped with one 240A plug and one 310 plug	5	Connects the jack access panel to an incoming selector test jack
6P4C	Patching cords, two P3H cords equipped with one 240C plug and two 310 plugs (one red and one black shell)	1	Connects the jack access panel cabling to an intertoll selector
W2FN	Patching cord, two conductor with yellow vinyl jacket equipped with two 310 plugs	1	Connects -48 volt supply to test set
ED-32309-( ) (CPS2)	Pulsing multivibrator	1	Spare plug-in circuit
ED-32310-( ) (CPS3)	Relay driver amplifier	1	Spare plug-in circuit
ED-32311-( ) (CPS4)	Timing circuit	1	Spare plug-in circuit
ED-32332-( ) (CPS10)	Ringling check circuit	1	Spare plug-in circuit
732A	Circuit pack extractor tool	1	Used to remove circuit packs from the automatic call-thru test set
◆KS-19506 L5	Shorting pins	50	Used to select office code and line number on matrix board◆

set and access panel are the same for incoming selectors and incoming toll selectors. When testing an incoming local selector or incoming toll selector, the trunk associated with the selector must be made busy at the distant office. Vacant selectors may be used if available. At the selector frame, a connection is made from the selector test jack to an IS1 through IS5 jack. This connection is made by using the 3P30A cord furnished with the test set.

**2.05** An example of a typical connection is made as follows. Line 2 in the test set is to be used to test a particular incoming selector. The OL2 jack on the test set is patched to the IS2 jack located on the jack access panel. At the selector frame, a connection is made between the selector test jack and the IS2 jack, which also has an appearance at the selector frame. The TL2 terminating line jack on the test set is patched to the test number by way of the TL jacks located on the jack access panel. The TL jack grounds the sleeve to keep the test number busy when no cords are connected to it.

**2.06 Intertoll Selector Test:** Only line 1 in the automatic call-thru test set is arranged to test intertoll selectors. An example of a typical connection when testing intertoll selectors is as follows. The OL1 and SP1 jacks in the test set are patched to the IS1 and SP1 jacks located on the jack access panel. At the intertoll selector frame, the IS1 and SP1 jacks are patched to the selector test jack with a 6P4C cord. The TL1 terminating line jack on the test set is connected to the test number through TL jacks located at the access panel if the call is to be terminated in the same office with the intertoll switch train. If the call is to be switched through the intertoll train and terminated in a distant office, no TL connection is required. In place of the termination in the test set, operate the OGT1 key and set up the distant office test line number. See 2.08.

**2.07 Outgoing Trunk Test:** Lines 1 and 5 in the test set are arranged to make outgoing trunk tests. Line 1 or 5 of the test set is connected as described in 2.06 and 2.02, respectively. There

are no connections between the TL jacks on this type of test. Lines 1 and 5 would terminate in circuits similar to SD-31636-01 or SD-31642-01.

### **2.08 Method of Establishing One to Five Test**

**Calls:** The automatic call-thru test set is equipped with a matrix board which contains five sections. Each section is designated to correspond to the telephone dial numbers and letters. Test calls are directed to the terminating test line by setting the office code and line numbers on the matrix board. This is accomplished by beginning with the last digit of the test number. The last digit of the number should be pegged in position K, by inserting a KS-19506 L5 shorting pin in the jack corresponding to the desired digit in row K, the next preceding digit in position J, the next preceding digit in position I, etc. The positions (A, B, C . . .) not used by the digits of the test number should be pegged in the OFF position. The wrong number check feature of the test set can function only when the last digit of the test number is in position K. Loop or leak, ringing polarity, pretrip value, and trip value switches must be set to the proper position.

**2.09 Power Connection:** Using the W2FN cord provided with the test set, connect test set -48V jack to the -48V jack on the access panel. Connect cord to test set jack first and then to jack on access panel to avoid possible grounding of battery.

## **3. EXTENT OF TESTS**

**3.01** In order to assure adequate dispersion of calls through higher choice selectors and connectors, the tests should be scheduled to extend through various traffic load periods. If equipment dispersion is not considered adequate, or if the tests are conducted during periods of light load, it may be necessary to initiate an equipment "busy out" program. If tests are conducted during heavy load periods, the test program must not be permitted to interfere with customer access to equipment. If call blocks or frequent overflow conditions should occur, tests should be discontinued until the heavy customer traffic conditions subside.

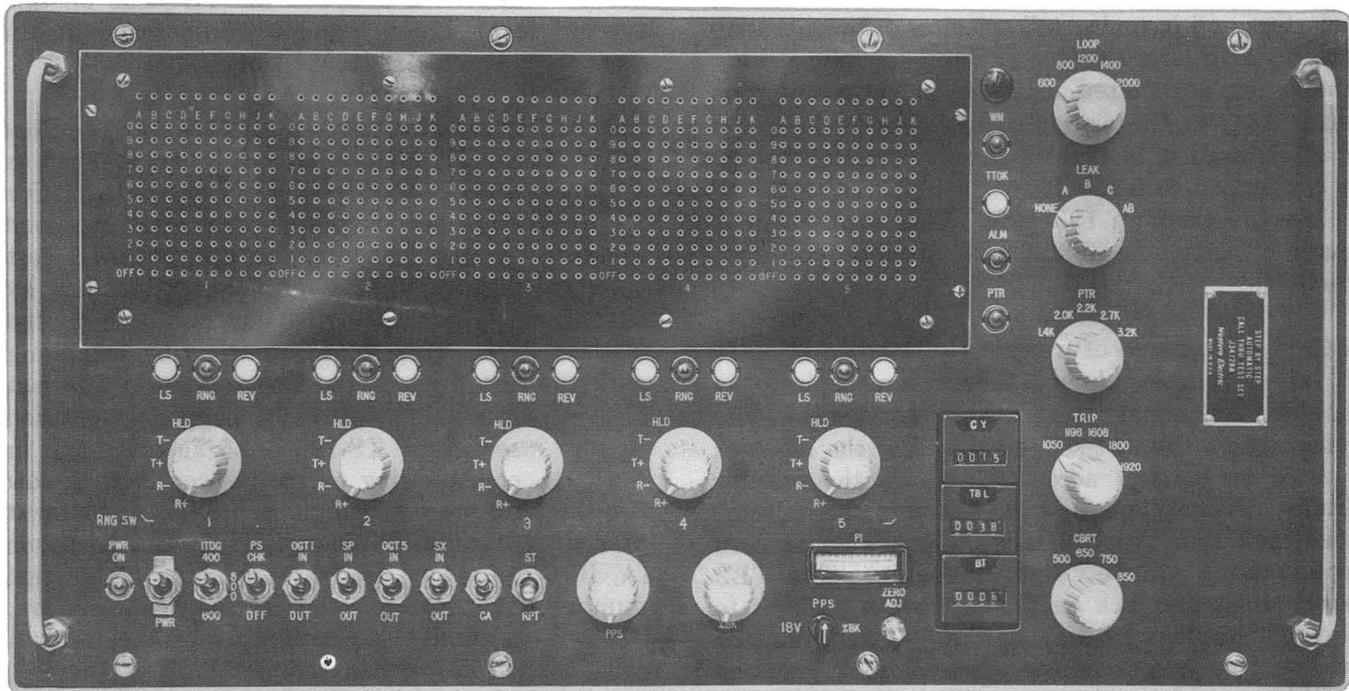


Fig. 1—Automatic Call-Thru Test Set SD-32522-01—Top View

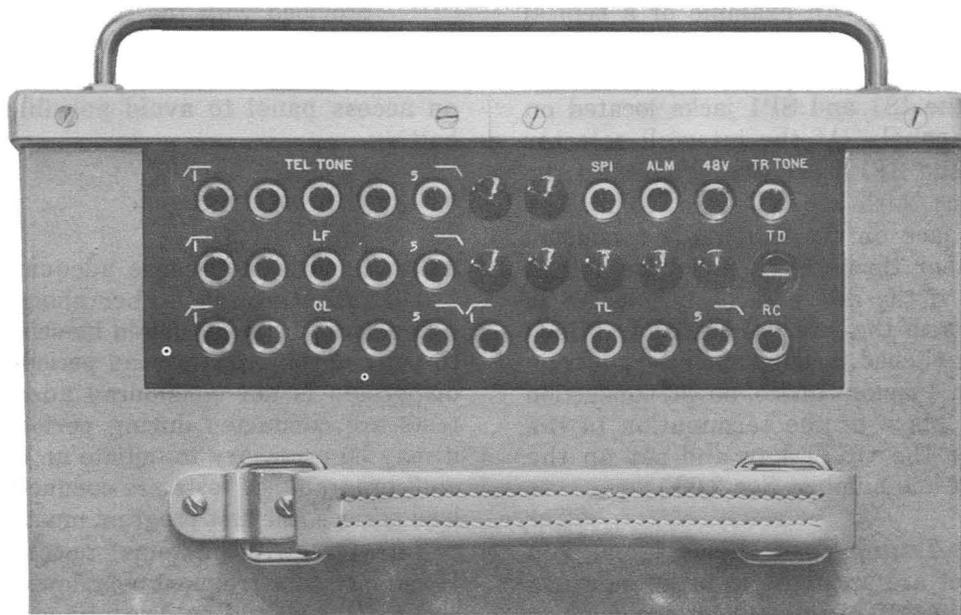
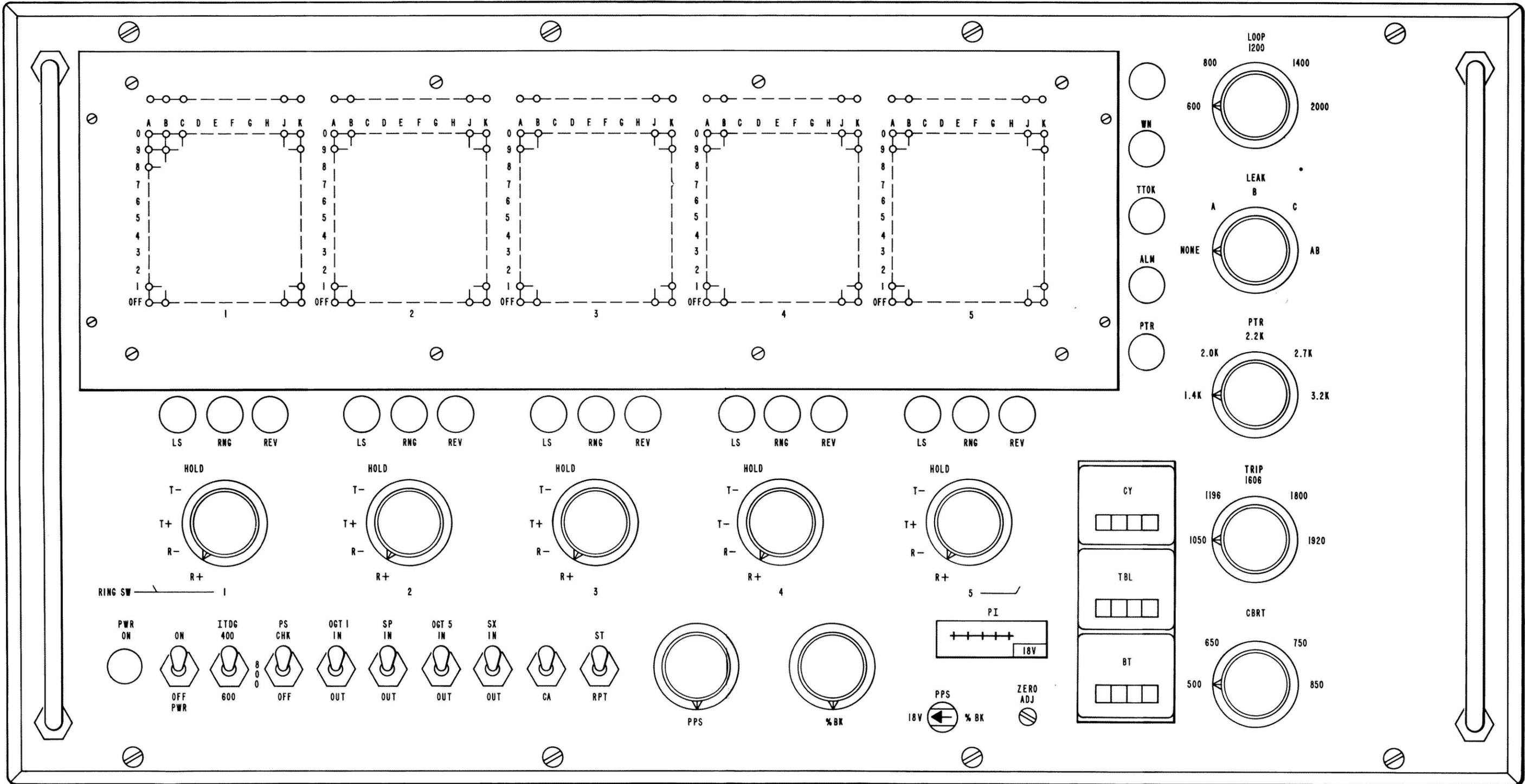


Fig. 2—Automatic Call-Thru Test Set SD32522-01—Front View



TPA 461046

Fig. 3—Automatic Call-Thru Test Set SD-32522-01—Top View