

TEST-ALL IV[®]

ITC-3002

U.S. Patent #4,703,497



USER'S GUIDE



I. GENERAL INFORMATION

A. INTRODUCTION

1. Test-All IV ® will test four (4) cable pairs simultaneously, in the pre-service condition or actual working environment. It also works with single pair, two pair and three pair cable.
2. Test-All IV ® works with all types of communication systems from 1A2 Key systems, to local area networks (LANS), to the newest Electronic PBX and Key systems.
3. Test-All IV ® will detect voltage on the cable pairs and test for continuity, detecting opens, shorts, polarity reversals and wire transpositions. It also contains a built-in tone source for each pair.

Test-All IV ® should never be used in the continuity test position when working with live cable

B. LED INDICATIONS

Test-All IV ® has four LED's (Light Emitting Diodes) which provide simultaneous indications of the condition of the four cable pairs being tested.

1. The LED's indicate GREEN for proper polarity, RED for reverse polarity, AMBER for AC voltage, and remain DARK if no voltage is present.

C. PAIR SWITCHES

Each pair has a slide switch which controls the test being performed using the associated LED. The slide switch positions are as follows:

1. **Pair Voltage Test Position (up):** The LED is on-line and indicates if voltage is present on the associated cable pair. **It is VERY IMPORTANT that all tests start with the switches in the Pair Voltage Test position to prevent damage to the Test-All IV ®.**

All switches should be in the Pair Voltage Test position before the test set is connected to a circuit. This position indicates if voltages are present before further testing is attempted. (Test-All IV ® is passive to the circuit in the Pair Voltage Test position).

2. **Tone Position (center):** This position removes the LED from the circuit and sends a warble tone on the associated cable pair.
3. **Continuity Test Position (down):** This position is provided to test cable in a pre-service condition or in a working environment after the system has been disconnected. (In this position the test set places battery on one side of the pair and ground on the other side.)

A short on the cable pair will illuminate the associated LED "green" to indicate continuity, for an open pair the LED remains dark. (Use the LED Shorting Plug to terminate the circuit on the distant end when making continuity tests.)

CAUTION - Test-All IV ® should never be used in the continuity test position when working with live cable. Voltage on the cable being tested will damage the Test-All IV ® in this position. The LED shorting plug is not used in the Pair Voltage Test as it may be damaged if plugged in when voltage is present.

D. FUNCTION SWITCH

The function switch is used to select between the Pair Voltage Test, Tone or Continuity Test functions. The "Pair" switch positions must match the function switch position to allow the test to be performed.

(Test-ALL IV ® should always be stored with all of the switches in the Pair Voltage Test position to avoid battery discharge and prevent test set damage upon the initial connection to a circuit.)

1. **Function Switch Positions**

- a. Pair Voltage Test position - LED's are monitoring their respective cable pairs to determine the presence of voltage. (LED indications are explained in section I.B.I (The test set must always have the function switch in this position when initially connected to a circuit to prevent test set damage.)
- b. Tone - This position of the slide switch causes a warble tone to be superimposed on the selected pair. In the tone position the red LED to the right of the switch will be illuminated.
- c. Continuity Test position - Used for continuity testing, an illuminated LED indicates a short on the cable pair.

E. "A" LEAD CONTROL BUTTON

The "A" Lead Control button is used to test 1A2 type key systems by providing a contact closure on pair 2. (It may be used to test any system which requires a closure on pair 2 for equipment operation.)

F. BATTERY INDICATOR

The battery indicator LED located next to the function switch is illuminated whenever the function switch is in the "tone" position. It reminds the user to return the function switch to the "Pair Voltage Test" position for storage. (A dim LED indicates low battery condition.)

G. BATTERY REPLACEMENT

DURACELL BATTERY RECOMMENDED - Pull on the two tabs holding the battery cover on the back of the case to expose the battery. **IMPORTANT - Always store the Test-ALL IV ® in the Pair Voltage Test position to avoid battery discharge.**

H. TEST-ALL IV ® ACCESSORIES

Test-All IV ® Accessories include: 8 Conductor Modular Test Cord, 110 Adapter*, 2 Universal 66 Block Adapters*, BIX Four Pair Adapter*, Modular Polarity Sensing LED Shorting Plug, 8 Conductor Modular to Alligator Clip Cord and Carrying Case. (Accessory uses are explained in following sections).

*This is the standard adapter package; in some markets two 110 adapters may be included or BIX adapters may be substituted. In all cases four adapters should be included with your test set.

I. WARRANTY

Independent Technologies, Inc. warrants the Test-All IV ® against all defects in material and workmanship for a period of one full year from the date of original purchase. Subject to the following conditions: Warranty does not cover accessory items, battery replacement, damage caused by negligence or misuse or common carrier shipment damage. Damaged products should be returned to the factory, postage paid, in the original package or a suitable equivalent. Defective units still under warranty will be repaired or replaced, at the manufacturer's option, and returned at no additional charge. Defective units not under warranty will be repaired or replaced, at manufacturer's option, for actual cost of repair not to exceed 50% of current replacement cost.

II. USING TEST-ALL IV ®

A. INTRODUCTION

The Pair Voltage Test should always be performed first with all switches in the Pair Voltage Test position. The technician will then know if any voltages are present on the cable pairs. All tests start from the Pair Voltage Test position. The recommended storage position for all switches on the Test-All IV ® is the Pair Voltage Test position. This prevents battery discharge during storage, and test set damage upon initial connection.

1. 66 Type Terminal Block: Connection to both styles of 66 blocks can be accomplished by using the Modular Test Cord and Universal 66 Block Adapters.
2. 110 Type Cross-Connect Field: Connection to the AT&T 110 block can be accomplished by using the 110 Adapter and Modular Test Cord.
3. BIX Type Cross-Connect field. Connection to the Northern Telecom BIX block can be accomplished by using the BIX adapter and modular test cord.
4. 8 Conductor Alligator Clip Cord: Some Alligator Clip Cord uses are:
 - a. Identify up to four individual cables simultaneously by utilizing the "tone" function of the test set. Apply tone to pair 1 of cable 1, pair 2 of cable 2, etc. This method identifies 4 cables in one trip and permits them to be individually identified at the far end by which pair the tone appears on.
 - b. Verify terminated cables that are not in sequential order on the terminal blocks.
 - c. To aid in cable tagging between manholes or splice points.

(The alligator clip ends of this test cord are identified using standard telephone color codes. Pair 1- White/Blue, Pair 2 - White/Orange, Pair 3 - White/Green and Pair 4 - White/Brown. White wire identifies the tip side of each pair.)

5. 3 pair Systems: A 3 pair cord will not properly terminate all 6 conductors in the Test-All IV ® modular jack because of the difference in jack configurations. A 3 pair to 4 pair conversion test cord, ITC-3002D, I may be ordered for use with 3 pair systems. This cord allows a standard 3 pair jack to be directly connected to the Test-All IV ®. (Two, four and eight conductor set base-cords may be used with Test-All IV ®. Six conductor cords will not work properly because of the pin configuration in the test set modular jack; two conductor cords work with pair #1 on the test set. Four conductor cords work with pair #1 (red and green wires) and pair #3 (yellow and black wires) on the test set. See section IV MODULAR JACK WIRING for more information.

B. TESTING CABLE

For routine testing of cable, the 8 conductor modular test cord and appropriate adapters should be used in connection with the and LED shorting plug.

CAUTION - Continuity Testing must never be performed on live cable or the test set will be damaged. Damage may also occur from large charges of static electricity or induced voltage in new or unterminated cable because of the inherent capacitance in unterminated cable conductors. To prevent test set or LED Shorting Plug damage, momentarily ground cable conductors prior to performing continuity tests. This can be done by hooking a wire to frame or building ground and touching the block termination with the conductor on the other end.

1. Testing Cable Installations/Two Technicians:
Two technicians can verify cabling installations using the following procedures. (These tests require a method of 2 way communications between the technicians. either a talk pair setup or a 2 way radio.) Technician #1 on the near end plugs the appropriate adapter onto the block and connects the Test-ALL IV to it using the 8 Conductor Modular Test Cord.

The Test-All IV ® switches must be in the Pair Voltage Test position at this time to check for voltage on the pairs. (If voltage is indicated, stop the continuity test until the voltage source is located and disconnected.) Technician #1 now operates the function switch to the Continuity Test position and then moves each pair switch, one at a time (in sequence beginning with pair #1) from the Pair Voltage Test position to the Continuity Test position. Each switch should be left in the Continuity Test position until all have been operated. No LED's should be illuminated at this time, as the distant end is not yet terminated. (An illuminated LED indicates a shorted cable pair.) If all LED's remain dark, operate all pair switches back to the pair Voltage Test position. Technician #2 on the distant end should now be instructed to terminate the cable using the proper adapter and LED shorting plug. Technician #1 should again operate the pair switches from the Pair Voltage Test position to the Continuity Test position, one at a time (beginning with pair #1) and observe the LED's as the switches are operated. Each LED should light green as the associated switch is operated. Technician #2 should also receive a green indication on the LED shorting plug as each switch is operated. A red LED indication on the shorting plug indicates a reversed pair.

2. Testing Cable/One Technician:

One technician may perform cable tests by visiting both ends of the cable installation. The technician first connects the Test-All IV ® at one end with the function switch and all pair switches in the Pair Voltage Test position.

No LED's should be illuminated at this point. (An illuminated LED indicates voltage potential on the pair. Continuity testing should be stopped until this voltage is disconnected, or the test set and the LED shorting plug will be damaged). Next, the function switch is operated to Continuity Test position and the pair switches are operated individually in sequence (beginning with pair #1) to the Continuity Test position. Each switch should be left in the Continuity Test position until all have been operated. All LED's should remain dark (an illuminated LED would indicate a shorted pair). Return all pair switches to the Pair Voltage Test position. Next, disconnect the test set and connect the LED shorting plug at this location. Reconnect Test-All IV ® at the other end and perform the continuity test as described above in paragraph B.1. Identify reversed cable pairs by leaving the Test-All IV ® connected with all switches in the Continuity Test position and return to the LED shorting plug end. All LED's should be illuminated green. A red LED indicates a reversed cable pair. This completes the continuity test. Disconnect the LED shorting plug and continue on to the next test.

3. Trouble Indications:

Indications other than green LED's on both ends show a trouble condition. Possible trouble conditions are:

- a. Shorted cable pairs are indicated when a green LED appears on the Test-All IV without the LED Shorting Plug being connected at the distant end.

- b. Reversed cable pairs are indicated by a red LED on the shorting plug end.
 - c. Transpositions are identified when more than one LED lights as a single pair switch is operated. Transposed pairs are further defined on the shorting plug end. When two green LED's light on the shorting plug end as one pair switch is operated, a straight transposition is indicated; i.e.: tip of one pair transposed with the tip of the other pair. Other possible indications of transpositions are shown in section III.
 - d. Open pairs are indicated by no light on either end.
4. Testing Unterminated Cable or Split Pairs: The 8 Conductor Alligator Clip Cord provided with the Test-All IV ® should be used when testing unterminated cable or working with terminations other than 66, 110, or BIX type blocks.

C. TESTING LIVE SYSTEMS

A live system test is performed by placing the Function Switch and all Pair Switches in the Pair Voltage Test position. The Test-All IV ® may then be connected to the system. The presence of voltage on the pairs will illuminate the associated LED's either GREEN, RED OR AMBER.

The Technician must be aware of the proper indications that should be seen on a working system to fully utilize this test. i.e.: on an AT&T Merlin System for instance, pair 3 will be illuminated red if the cable is properly connected to the common equipment and the common equipment is working properly. The Pair Voltage Test will display analog voltage only. Digital signals and data flow are of too low voltage potential to be displayed by Test-All IV ® .

CAUTION - Data spikes may damage Test-All IV ® if connected to the circuit in other than the Pair Voltage Test position.

D. TESTING LIVE SYSTEMS

Test-All IV ® should be connected to the system being tested using the proper adapter and 4 pair cord. All switches should be in the Pair Voltage Test position. One or more of the following should appear if the key system is operating properly:

1. (LED #1) GREEN - The Tip & Ring leads are of the proper polarity.
(LED #2) RED - Indicates the presence of "A" battery and "A1" ground.
(LED #3) DARK - The 400 card relays are not energized. (The 400 card relays may be operated by momentarily operating the "A" Lead Control button on the test set. This will cause an AMBER indication on the LED #3 - indicating the presence of AC "lamp voltage".)
(LED #4) GREEN - Not used for this test.
2. Busy Line:
(LED #1) GREEN
(LED #2) DARK - may show a very dim shade of red
(LED #3) AMBER - indicates busy line
(LED #4) - not used for this test

E. SENDING TONE WITH TEST-ALL IV ®

The Test-All IV ® contains a warble tone, which may be used to trace and identify cables. To activate tone, operate the function switch to the "tone" position. The red LED located next to the function switch will illuminate when the tone generator is operating. To send tone on a cable pair or pairs, set the associated pair switch in the Tone Position and connect the Test-All IV ® to the cable. The tone may then be located using a telephone handset or amplifier designed for such purposes.

Four cable pairs or four different cables may be toned simultaneously without affecting tone quality. Return the function switch to the Pair Voltage Test position when not in use to prevent battery discharge.

III. Test-All IV ® TROUBLESHOOTING GUIDE

Switches in Continuity Test Position	Test All IV LED Indications	Shorting Plug LED Indications	Trouble Condition Indicated
1 2 3 4	1 2 3 4	1 2 3 4	
X X X X X X X X X X	G G G G G G G G G G	R R G R G G R G G G	Pair One Reversal
X X X X X X X X X X	G G G G G G G G	G G G G G G R (Dim) G G	Transposition between the tip side of pair 3 and ring side of pair 4
X X X X X X X X X X	G G G G G G G G G	G G G G G G (Dim) G G G G	Transposition between the ring side of pair 3 and the ring side of pair 4
X X X X X X X X X X	G G G G G G G G	G G G G G R G G	Transposition between the ring side of pair 3 and the tip side of pair 4
X X X X X X X X X X	G G G G G G G G	G G R G G G	Transposition between the ring side of pair 2 and the tip side of pair 3
X X X X X X X X X X	G G G G G G G G G	G G G G G G (Dim) G G G G	Transposition between the tip side of pair 3 and the tip side of pair 4

R - Red G - Green

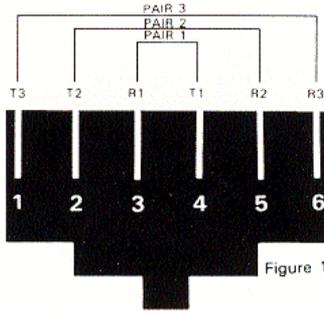
IV. MODULAR JACK WIRING

A. INTRODUCTION

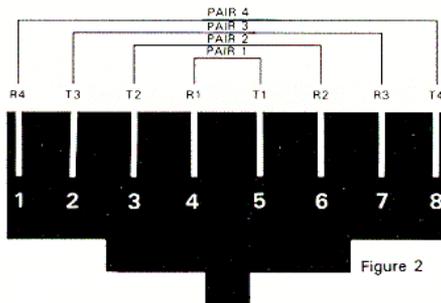
Several different modular jacks and wiring arrangements are used today. This section explains modular jack wiring as it relates to U.S.O.C. codes and Test-All IV ®. Standard modular jacks are defined as 4, 6, or 8 position jack frames regardless of how many pin positions are actually loaded in the jack frame. The 4 position jack frame is commonly used only for handset cords and therefore has been eliminated for the purpose of this discussion.

Modular jack contacts are numbered from left to right looking at the jack opening with the plug tap down. (see illustrations)

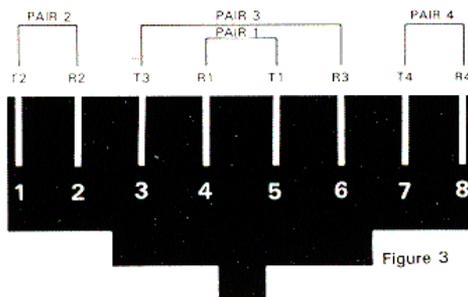
6 WIRE JACK (USOC - RJ14W)



8 WIRE JACKS (USOC - RJ31X THROUGH RJ37X)



8 WIRE JACKS (USOC - RJ41 THROUGH RJ48)



TEST-ALL IV AND ITS ASSOCIATED CORDS AND ADAPTERS ARE WIRED TO THE RJ45 CONFIGURATION.

B. ADAPTING TO TEST OTHER PIN COUNTS

Testing to the 8 wire count of the RJ31S through RJ37X requires a conversion cord which can be fabricated in the field or ordered from Independent Technologies using part # ITC-3002H, 4 pair count adapter cord.

Testing to 3 pair count of the RJ14W requires an adapter cord. The cord can be fabricated in the field or ordered from Independent Technologies using part # ITC-3002D, 3 to 4 pair adapter.

When testing from modular jack to modular jack using an adapter cord, the cord is needed at both ends.

Due to its modular design, Test-All IV ®~ may be used to test all types of communications wiring. Adapters are available from various manufacturers that adapt the IBM and other coaxial cable wiring plans to an RJ45 connection. In addition, many computer industry adapters are available that adapt RS232 and "D" connectors to RJ45 connections. If you need assistance in obtaining information about these adapters, we suggest you contact your favorite communications distributor, or call Independent Technologies for assistance.

V. USING TEST-ALL IV ®

ITC 3002 - Test-All IV ® (includes battery and accessories)

ITC 3002A - 8 Conductor Modular Test Cord

ITC 3002B - 110 Block Adapter (5688 Pin-Out)

ITC 3502A - 110 Block Adapter (568A Pin-Out)

ITC 3002C - Universal 66 Block Adapter

ITC 3002E - Modular LED Equipped Shorting Plug

ITC 3002F - 8 Conductor Modular Alligator Clip Cord AT&T

ITC 3002G - Carrying Case

ITC 3009 - BIX adapter (4 pair)

VI. REPAIR INFORMATION

If the Test-All IV ® unit is in need of repair, call Independent Technologies corporate headquarters at (402) 496-4700 to obtain the repair center address and an RTA #. This RT A # will need to be referenced when shipping the unit for repair.



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