

KS 23763-L1

PDS 4/PAIR CABLE TESTER

U.S. Patent #4,703,497



USER'S GUIDE FOR KS23763 LIST 1

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I. GENERAL INFORMATION

A. INTRODUCTION

1. KS23763-L1 will test four (4) cable pair simultaneously, in the pre-service condition or actual working environment. It also works with single pair, two pair and three pair cable.
2. KS23763-L1 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. KS23763-L1 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.

B. LED INDICATIONS

KS23763-L1 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 KS23763-L1.** 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. (KS23763-L1 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 - KS23763-L1 should never be used in the continuity test position when working with live cable. Voltage on the cable being tested will damage the KS23763-L1 in this position. The LED Shorting Plug may also be damaged by voltage on the pairs.

D. FUNCTION SWITCH - The function switch is used to select between the Pair Voltage Test, Tone or Continuity Test functions. The "Pair" switch position must match the function switch position to allow the test to be performed. **(KS23763-L1 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 1.B.) **(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 - (Alkaline Batteries Recommended) - Remove the battery door by pressing the two tabs in the direction of the arrows. Pull upward to expose the battery. The old battery can be removed and a new one snapped into place.

IMPORTANT - Always store the KS23763-L1 in the Pair Voltage Test position to avoid battery discharge.

H. KS23763-L1 ACCESSORIES - KS23763-L1 accessories include: 8 Conductor Modular Test Cord, two 3 Pair 110 Adapters, two 4 Pair 110 Adapters, Modular Polarity Sensing LED Shorting Plug with 5"

double ended Modular Test Cord, 9 volt Duracell Battery, User's Guide and Padded Carrying Case. (This is the standard KS23763-L1 accessory package. Other adapters and cords are available and are explained in the Optional Equipment Applications section.)

- I. **WARRANTY AND REPAIR** - For warranty and repair information, consult your local AT&T purchasing representative.

II. USING KS23763-L1

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 KS23763-L1 is the Pair Voltage Test position. This prevents battery discharge during storage, and test set damage upon initial connection.**

1. **110 Type Cross-Connect Field:** KS23763-L1 is connected to the 110 hardware by using the 3 or 4 Pair 110 Adapters as provided in the kit. Both adapters are terminated in an RJ45 configuration. (see figure 3)
2. **66 Type Terminal Blocks:** Discussed in the OPTIONAL EQUIPMENT APPLICATIONS section.
3. **BIX Type Cross-Connect field:** Discussed in the OPTIONAL EQUIPMENT APPLICATIONS section.
4. **8 Conductor Alligator Clip Cord:** Discussed in the OPTIONAL EQUIPMENT APPLICATIONS section.
5. **3 Pair Systems:** Discussed in the OPTIONAL EQUIPMENT APPLICATIONS section.

B. CABLE TESTING

For routine testing of cable, the 8 conductor modular test cord and appropriate adapters should be used in connection with the KS23763-L1 and LED shorting plug.

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 KS23763-L1 to it using the 8 Conductor Modular Test Cord. The KS23763-L1 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 KS23763-L1 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 KS23763-L1 at the other end and perform the continuity test as described above in paragraph B.1. Identify reversed cable pairs by leaving the KS23763-L1 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 KS23763-L1 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; ie: 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.

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 KS23763-L1 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 KS23763-L1.

CAUTION - Data spikes may damage KS23763-L1 if connected to the circuit in other than the Pair Voltage Test position.

D. TESTING A WORKING 1A2 KEY SYSTEM:

KS23763-L1 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. Vacant Line:

(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 KS23763-L1

The KS23763-L1 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 KS23763-L1 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.

F. OPTIONAL EQUIPMENT APPLICATIONS:

1. **66 Type Terminal Block:** Connection to both style 66 blocks can be accomplished by using the Modular Test Cord and Universal 66 Block Adapters.
2. **BIX Type Cross-Connect field:** Connection to the Northern Telecom BIX block can be accomplished by using the BIX adapter and modular test cord.
3. **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.
 - d. Testing unterminated cable or split pairs or when working with terminations other than 110, 66 or BIX type blocks.

(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 identifies the tip side of each pair.)

4. **3 pair Systems:** A 3 pair cord will not properly terminate all 6 conductors in the KS23763-L1 modular jack because of the difference in jack configurations. A 3 pair to 4 pair conversion test cord, 3002D, may be ordered for use with 3 pair systems. This cord allows a standard 3 pair jack to be directly connected to the KS23763-L1.

(Two, four and eight conductor set basecords may

be used with KS23763-L1. 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.

III. KS23763-L1 TROUBLESHOOTING GUIDE

SWITCHES IN CONTINUITY				LED INDICATIONS *				TROUBLE CONDITION INDICATED
TEST POSITION				KS23763-L1		SHORTING PLUG		
1	2	3	4	1	2	3	4	
X				G			R	
X	X			G	G		R G	Pair One
X	X	X		G	G	G	R G G	Reversal
X	X	X	X	G	G	G	G	
X				G			G	Transposition
X	X			G	G		G G	between the tip side
X	X	X		G	G	G	G R (Dim)	of pair 3 and the
X	X	X	X	G	G		G G	ring side of pair 4
X				G			G	Transposition be-
X	X			G	G		G G	tween the ring side
X	X	X		G	G		G G G (Dim)	of pair 3 and the
X	X	X	X	G	G	G	G G	ring side of pair 4
X				G			G	Transposition be-
X	X			G	G		G G	tween the ring side
X	X	X		G	G	G	R	of pair 3 and the tip
X	X	X	X	G	G		G G	side of pair 4
X				G			G	Transposition be-
X	X			G	G		G R	tween the ring side
X	X	X		G			G	of pair 2 and the tip
X	X	X	X	G		G	G G	side of pair 3
X				G			G	Transposition
X	X			G	G		G G	between the tip side
X	X	X		G	G		G G G (Dim)	of pair 3 and the
X	X	X	X	G	G	G	G G	tip side of pair 4

*R - Red, G - Green

IV. MODULAR JACK WIRING

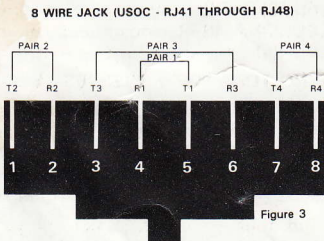
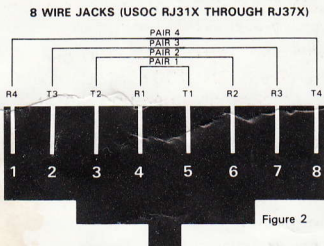
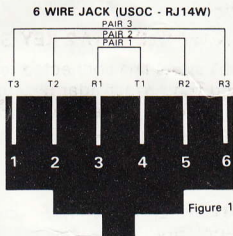
A. INTRODUCTION

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 KS23763-L1.

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)



KS23763-L1 and its associated cords and adapters are wired to the RJ45 configuration.

B. ADAPTING KS23763-L1 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 by using part description, 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 by using part description, 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, KS23763-L1 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 local AT&T purchasing representative.

V. ORDERING INFORMATION

**KS23763-L1 (includes battery and accessories)
AT&T Comcode: 406-165-423**

- 8 Conductor Modular Test Cord
AT&T Comcode: 405-752-338
 - 110 Block Adapter (3 Pair)
 - 110 Block Adapter (4 Pair)
AT&T Comcode: 405-546-482
 - Universal 66 Block Adapter*
AT&T Comcode: 405-546-474
 - Modular LED Equipped Shorting Plug
AT&T Comcode: 405-752-353
 - 8 Conductor Modular Alligator Clip Cord*
AT&T Comcode: 405-752-379
 - Carrying Case
AT&T Comcode: 405-490-780
 - BIX Adapter (4 pair)* (3 or 4 pair)*
 - 4 Pair Count Adapter Cord*
 - 3 to 4 Pair Adapter*
AT&T Comcode: 405-752-346
- (All items may be ordered separately by specifying the individual comcode or if not comcoded, specify the part description.)

* Optional Accessories.

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**For additional information or to place an order,
please contact your local AT&T purchasing representative.**