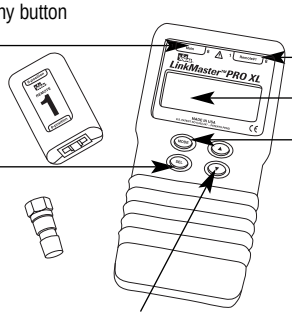
LinkMaster™ PRO XL Tester Instructions

⚠ Warning!
Do not attach to energized cables. The LinkMaster™ Pro XL may be damaged.

Caution!
Inspect plugs for proper termination before inserting into the LinkMaster™ Pro XL.
Minimum cable length for testing split pair condition is 3 feet.

LinkMaster™ Pro XL Key Functions

Power ON by pressing any button



- Main jack for all testing
- Remote jack for patch cords
- Larger back-lighted LCD screen
- Six modes of operation
  - Cable Test
  - Hub Blink
  - Length
  - Tone
  - Coax
  - Setup mode

Press SEL to:
- Turn on back-light (Hold 2 seconds)
- Execute current displayed mode
- Start new test cycle
- Select one of four tones
- Change pair being measured for length
- Change user selectable options
  –Beep On/Off
  –Unshielded or Shielded Cable
  –Units: Feet or Meters

Arrow Keys
- To change length constant (see chart for required parameters)
- To change pair or pin selection for tone
- To scroll through setup selectable options

FEATURES
- Larger back-lighted LCD screen for better test results readability
- Toggle ON/OFF option of lighted display for battery power savings (Hold SEL for 2 seconds)
- Blinks HUBS to assure connected configurations
- Increased voice testing capability detects RJ-11 (1,2 and 3 pair)
- Voice test also shows Normal and Reserve for pins 1 through 6
- Length measurement is shown during initial test results for convenience and time savings
- Eight twisted pair remotes have both RJ-45 and TJ-11 jacks for longer life and increase testing capabilities
- Tone option for pins land 8 for cables connected to hub or switch
- Two line by 16 character full alphanumeric LCD with icons for clear results
- Tests for shield continuity, shorts, opens, miswires, reversals and split pairs with remote connected
- Cable Test – One ended testing for shorts, opens and split pairs (no remote connected)
- Test results displayed in wire map format with message line for shorts and split pairs
- Displays PASS and sounds beep (optional) for T568A/B
- Will display wiremap for 10Base-T and Token Ring with remote connected
- Length measurement in feet or meters using cable capacitance method
- UTP, ScTP and coax length measurements with and without remote attached
- Coax mapping with up to eight color coded coax remotes

- Tone generator mode sends four different tones on all conductors, selected pair or selected pin
- Auto-off in any mode and low power consumption for long battery life
- Low battery symbol indicates when to change battery
- Black battery cap allows for quick and easy battery change
- Two tester jacks allows patch cord testing without use of remote
- Will identify if connected to network device during length test
- 9 volt battery included

LinkMaster™ PRO XL Reference Card

Cable Test – Test cable from one end for shorts, opens or splits without remote. With remote, performs all cable tests with ID.

MODE Exit to mode select
SEL Start a new test

Length – Measure length of cable

MODE Exit to mode select
SEL Select specific pair or Auto-select pairs
▼ ▲ Adjust capacitance/ft or m (CAL)

Tone – Apply tone to pin, pair or all pairs

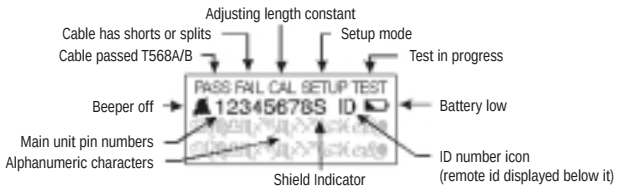
MODE Exit to mode select
SEL Select from 4 tone sounds
▼ ▲ Select pin or pairs w/tone signal

Hub Blink – Sends link pulses on NIC transport pair
MODE Exit to mode select

Setup – Set user selectable options
MODE Exit to mode select
SEL Toggle option to other choice
▼ ▲ Scroll through options
Options: Beep-on-Pass On or Off
Pass Shielded or Unshielded Cable
Length in Feet or Meters

Coax – Identify remote color and number. Tests for opens or shorts.
MODE Exit to mode select
SEL Start new test

Mode Select – Used to step through above functions and to turn off the tester.
MODE Advance to next mode
SEL Enter currently displayed function



LinkMaster™ PRO XL LCD Display

DESCRIPTION

The LinkMaster™ Pro XL can be powered on by pressing any of the four buttons. LinkMaster™ Pro XL powers off automatically after 5 minutes of continuous testing of a single cable. Disconnecting the cable restores the tester to normal function. Most power-on modes will timeout in 20 minutes. The tone mode will power off after 2½ hours. The LinkMaster™ Pro XL will turn on in the last mode used before turning off. The back light is toggled on and off by holding down SEL for 2 seconds or more. At power on, the back light is always off. The back light turns off automatically 3 minutes after being turned on. (with or without test activity)

Upon completion of the test, the wire map, ID and any faults are displayed.

- The top line of numbers on the display represents the connector pins on the main unit.
- The second line of pin numbers is the connector pin numbers of the remote.
- If there is a miswire, the numbers on the second line will indicate the pin numbers detected.
- If no connection was detected for some of the pins, the second line will be blank in those pin locations.
- If a short is detected, the second line will have a flashing 'x' in that position, and the specific short condition displayed on the third line.
- If a split pair is detected, the pins affected will flash on the second display line. The specific split condition will be displayed on the third line.
- If there are multiple errors to display on the third line, the messages will be displayed in sequence until all are displayed.
- Under "ID", the number of the remote being used will be displayed.

Note: Connecting a coax remote to the LinkMaster™ Pro XL with the unit off will power up the unit but the second line of the display will be blank. To use the coax remotes, the LinkMaster™ Pro XL must be on and in the coax test mode as described below.

There are five modes of operation as described below plus a setup function. In any mode, pressing the MODE button causes the mode select screen to be displayed. The OFF message is usually the first one displayed. Continued pressing of the MODE button will cycle through the other modes. Pressing the SEL button causes the currently displayed mode to be entered.

Cable Test – If there is no remote, press any of the buttons to turn on the LinkMaster™ Pro XL. The tester will then test for shorts, opens, and split pairs. The results are displayed as messages on the LCD. Whenever a new cable assembly is inserted for testing, press the SEL button to start a new test cycle. Partial and erroneous results can occur if not done.

Typical Cable Parameters

Cable		pF/ft	pF/m
Data	CAT3	19.0	62.5
	CAT5/5E	15.0	49.0
	CAT6	15.0	49.0
Coax	RG6/U	16.25	53.0
	RG11/U	16.25	53.0
	RG58/U	27.5	90.0
	RG59/U	16.25	53.0

Typical Cable Parameters

Cable		pF/ft	pF/m
Security Wire			
	22 AWG, Jacketed	24.0	78.5
	22 AWG, Unjacketed	14.0	46.0
	20 AWG, Unjacketed	16.0	52.5
	18 AWG, Unjacketed	17.0	55.0

Length – The length mode measures the length of a cable by measuring its capacitance and using the capacitance per unit of length (length constant) to calculate the length. The length is displayed on the LCD along with the current value of the length constant. The SEL button changes the pair being measured in a 1-2, 3-6, 4-5, 7-8 and auto-select sequence. The pair number is displayed next to the length except in auto-select mode. If a selected pair has a fault, the fault replaces the length reading on the LCD. In auto-select mode, the LinkMaster™ Pro XL automatically selects a pair without a fault. Use the auto-select or 1-2 pair settings to measure the length of a coax cable connected to the F-connector. The length constant is changed with the up and down arrows. The CAL icon is on while adjusting the constant.

Note: If the far end of the cable is connected to a Network Device (Hub, Switch, etc.), the LinkMaster™ Pro XL will display "T Ring Network??", "xbase-T Network?" or "Network?" (based on the number of conductors terminated into the device).

Tone – The tone mode generates four different tones for use with tone tracers on all pairs, a selected pair or a selected pin. The SEL button selects one of the four tone sounds provided. The up and down arrows scroll through the pairs and pins that have signal on them. The LinkMaster™ Pro XL has constant tone amplitude over the life of the battery and two tone amplitude of normal and half (HI on pair and Low on pin).

Note: When using the coax adapter or alligator clip assembly, tone is connected only to pin 1 and pin 2.

Coax – The coax mode is used in conjunction with special numbered and color-coded F-connector terminators (coax remotes). These eight remotes each have unique signatures that the LinkMaster™ Pro XL can identify. The LinkMaster™ Pro XL displays the remote number and color code if cable passes. If cable fails, "Open" or "Short" will be displayed and coax mode.

Setup – The setup mode is provided to set user selectable options. The up and down arrow buttons scroll through the options. The SEL button changes the current setting to the choice for that option. To exit Setup, press Mode key.

- The beep-on-pass can be turned on or off (default is on).
- The pass criteria can be set for shielded or unshielded cables (default is unshielded).
- The length can be set for meters or feet (default is feet).
  – If the length units are changed, the LinkMaster™ Pro XL converts the currently set length constant to the new units on exit of setup.
  – The length constant can be set to any value (default is 15 pF/foot; most Cat 5, Cat 5e & Cat 6 are very close to 15pF/foot – check with your cable manufacturer for possible variances.)

Voltage Protection

The LinkMaster™ Pro XL is designed to withstand input voltage conditions that occur during normal telephony applications for a very short period of time (approximately 10 seconds). The LinkMaster™ Pro XL monitors for voltage presence in CABLE TEST, LENGTH or COAX modes. The "VOLTAGE!!" message appears on the screen and the tone sounds continuously. Remove tester from line immediately or tester could be damaged. (see specs for specifics)

INSTRUCTIONS FOR USE

To Test a Patch Cable

1) Plug one end of patch cable into Main jack on the tester.
2) Plug other end of cable into a remote unit or Remote jack on the tester.
3) Press any button to power on. Wiremap results will be displayed, as well as PASS if correctly wired to T568 A/B standards. Beep tone also indicates a PASS. The test repeats every 5 seconds.
4) For FAIL, refer to Interpreting Cable Test Results at end of instruction guide. Neither PASS or FAIL icon will show for open or Miswire. Inspect wiremap numbers for these types of errors.
5) Disconnect patch cable after test.

Note: Be sure Set-up mode is properly set for Unshielded versus Shielded cables (Unshielded is default. If the internal Remote jack is used on the tester, the Remote ID will always show as 1.

To Test Cable from One Terminated End Only – Remote unit is not needed to run Cable Test.

1) Attach one end of supplied jumper cable to main jack on tester and the other end to the wall plate or patch panel jack to be tested.
2) Turn on unit by pressing any button. If not in Cable Test mode, press MODE until Cable Test is displayed, than press SEL button.
3) The tester will then test for shorts, opens, and split pairs. The results are displayed as messages on the LCD.
4) Results should appear within 5 seconds. The test repeats every 5 seconds.
5) Disconnect cable after test.
6) Pressing SEL button starts a new test immediately when a new cable is inserted for testing.

Note: Jumper cables must be no more than 10% of the total run length or 3 feet, whichever is less.

To Test Installed Cable (Horizontal, in-wall cabling)

1) Attach remote(s) to far end of cabling with supplied jumper cable(s).
2) Attach the main unit to patch panel with supplied jumper cable.
3) Press any button to power on. Wiremap results and remote ID number will be displayed, as well as PASS if correctly wired to T568 A/B standards. Beep tone also indicates a PASS. The test repeats every 5 seconds.
4) When the RJ-11 adapter is used, the LinkMaster™ Pro XL automatically senses and adjusts the pairing and pin numbers to the 3-pair USOC standard in CABLE TEST, LENGTH, and TONE Generator modes. The split pair testing is disabled.
5) In the RJ-45 mode, cross-over cables are recognized by displaying the PASS icon and adding the "X-Over" message after length. In RJ-11 mode, reverse-pinned cables are recognized and a "REV-PIN'D," message added after length. The PASS icon is displayed if it is a correctly pinned reverse-pinned position cable.
6) For FAIL, refer to Interpreting Cable Test Results at end of instruction guide. Neither PASS or FAIL icon will show for open or Miswire. Inspect wiremap numbers for these types of errors.
7) Disconnect cable after test.

Note: Patch cables must be, no more than 10% of the total run length for accurate split pair indication.

To Measure Length

1) Connect cable to main unit. (A remote may or may not be present at other end.)
2) Turn on main unit by pressing any button. Cable length will be displayed whenever there are no splits or shorts to report.
   –To adjust pF "length constant" parameters, use arrow keys.
   –To change pair measured, press SEL to cycle through pairs 1-2, 3-6, 4-5, 7-8. (1-2 is default pair and must be used for coax length)
   –To change length between feet and meters, use SETUP mode.

Note: Default is 15 pF/foot; most Cat 5, Cat 5e & Cat 6 are very close to 15pF/foot – check with your cable manufacturer for possible variances.)

Note: If a selected pair has a fault, the fault replaces the length reading on the LCD. In default mode, if the 1-2 pair has a fault, the LinkMaster™ Pro XL automatically sequences to a pair without a fault.

Unknown Length Constant

If "length constant" is unknown for a particular cable, a known length of cable may be used to calibrate the constant. Measure fifty feet of cable and attach main unit to one end. Turn on unit, press MODE until LENGTH is displayed. Press up/down arrow keys until 50ft is displayed, then use the pF constant displayed to measure length of unknown cable. (Fifty feet or more is suggested to minimize the resolution error; 1 foot in 50 is 2% uncertainty).

To Test Coax

1) Attach cable to be tested to the F-connector on the adapter. Insert adapter into Main jack on LinkMaster™ Pro XL.
2) Attach coax remote terminator to wallplate on the other end.
3) Turn on main unit by pressing any button. If not in Coax mode, press MODE until COAX is displayed, than press SEL button.
4) Remote number and color will be displayed if cable passes. If cable fails, OPEN or SHORT will be displayed.
5) Coax length may be measured by setting length constant to manufacturer's specs and selecting pair 1-2 in LENGTH mode. (no remote required)

To Generate Tone

1) Turn on main unit by pressing any button. If not in tone mode, press MODE until TONE is displayed, than press SEL button.
2) Press SEL until desired tone is selected. The up/down arrow keys select the pin or pair(s) to carry the tone.

3) Connect cable to be traced to main unit. For best signal, do not connect remote.
   Due to the canceling effect of twisted pairs, the strongest signal is obtained by having one wire of a pair carry tone. Selecting a single pin instead of a pair will do this.
4) To turn tone off, press the MODE button until OFF is displayed, then the SEL button.
   The tone will power off automatically after 2½ hours.

Note: When using the coax adapter or alligator clip assembly, tone is connected only to Pin 1 and Pin 2

To Blink Hub

When Mode is selected, the LinkMaster™ Pro XL sends link pulses on the NIC transmit pair for 3 seconds, then no pulse for 3 seconds for an overall cycle time of 6 seconds. The TEST icon is on when sending pulses and off when not. It turns off automatically after 1.2 hours.

BATTERY REPLACEMENT – When the "battery low" icon is on, the battery should be replaced as soon as practical. The cable testing results will become unreliable when the battery reaches about 4.5 volts.

To replace battery:

1) Remove rubber battery cap on bottom of main unit by pulling or prying off with hand.
2) Remove and replace battery.
3) Snap battery cap back into place

Note: When installing a new battery, disconnect any cables connected.
The length and cable test modes will be improperly calibrated if a cable is present.

SPECIFICATIONS

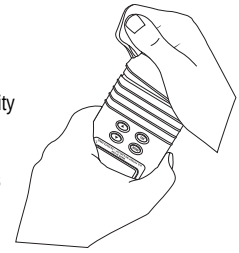
Environmental:

Operating temperature: 0 to 50°C (32 to 122°F)
Storage temperature: -10 to 60°C (14 to 140°F)

Humidity: 10% to 90%, non-condensing

Battery Life (9V Alkaline battery, typical) Times are for the full capacity of the battery used continuously in one of the following modes:

Standby: 3.5 years
Cable Testing: No Back Light (Tone, Length, Test) 108 hours
(Hub Blink) 54 hours
Back Light On (Tone, Length, Test) 27 hours
(Hub Blink) 20 hours



Cable Types: Shielded or unshielded, Cat 6, Cat-5E, Cat-5, Cat-4, Cat-3 and Coax
Minimum cable length for testing for split pairs: 1 meter (3 feet)
Minimum cable length for TEST: 1.25 meter (4 feet)
Length measurement range (CAT5/6): 0 to 640 meters (0 to 2100 feet)
Length measurements coax cable: Average 3,000 ft. – depends on coax cable resistance values
Applied Voltage: 100 volts DC or RMS AC applied continuously. Can stand 240 volt peak.

INTERPRETING CABLE TEST RESULTS – The PASS icon will be on if the cable has all pins properly connected per T568A/B standard. The FAIL icon will be on if there is a short or split pair. Neither icon will be on if there are opens or miswires. The wiremap should be inspected for these types of errors.

Definition of Errors – (See failure example drawings) The three classes of faults below are in order of severity. The more severe wiremap error will mask less severe wiremap errors. For example, if there is a short in the cable; miswires and splits pairs may not be detected until the short is corrected.

Short – The pair has a low resistance connection from one wire of any pair to another wire in any pair in the cable or shield. A short with remote attached is indicated by the FAIL icon being on and flashing X's in the appropriate pin position of the second display line. Error messages listing all the pins shorted together will also be displayed. In the CABLE TEST mode (no remote), all error messages will be displayed.

Miswire – Single or multiple conductors are not connected to the same pins at both ends of the cable. With a remote attached, the wire map shows the pin numbers from display line 1 (main) to display line 2 (remote). A reverse pair is a special case of a miswire in which the pair is wired to the correct pair of pins, but the two conductors are reversed. In CABLE TEST (no remote), this type of error is not detectable.

Split Pair – A split pair occurs when a cable is terminated consistently at both ends, but in the wrong order. Twisted pair cables typically are made up of eight wires twisted together in 4 pairs. These 4 pairs are designated as pairs by the wiring standards and are intended to carry a signal by creating a circuit. 1 & 2, 3 & 6, 4 & 5 and 7 & 8 are the pairs designated by T568A/B for a RJ45 jack or plug. A cable can be wired with correct continuity but not with correct pairing. With remote attached, the pin numbers split pairs flash and an error message is displayed listing the split pair pin numbers. In the PRETEST mode (no remote), the Error message is displayed.