Tech Support & Specifications

LEVITON®
VOICE & DATA DIVISION
Building A Connected World

WIRE COLOR CODES AND CONNECTOR PIN DESIGNATIONS

Electrical Network Connection

From 1 to 25 single or multiple-pair circuits bridged to the network or other connected equipment.

Mechanical Arrangement

Circuits are provided on numbered tip and ring positions on a miniature 50-pin ribbon telco connector (Amphenol-type). Pins 1 (ring) and 26 (tip) are considered position 1. Pins 2 (ring) and 27 (tip) of the ribbon connector are position 2. This pairing continues through twenty-five pairs.

Typical Usage

Many key and PBX systems specify the RJ21X, or 'Amphenol-type' as the network interface device. Many of these systems also use the RJ21X as a connector for stations or telephone sets, wired from the KSU or PBX Main Distribution Frame.

NOTE: Sometimes an RJ11 or RJ14C can be installed in place of an RJ21X. While many smaller systems that require only a few lines may show the RJ21X as the 'official' connector required under registration, less complex connectors such as the RJ11 or RJ14C can often be specified (perhaps in multiples). If the system requires only a few lines but the RJ21X is specified on the registration label, under FCC Part 68 you may specify the RJ11C, RJ14C, RJ25C, or RJ61X instead.

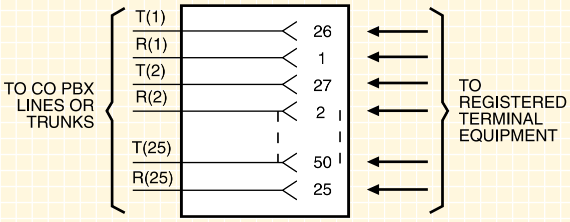
Many Leviton connectors can be used for the RJ21X configuration where 'intermixing' is permitted. Substitution of these special connectors is often both economical and practical. Contact Leviton Voice & Data Division Applications Engineering for information about versions to meet your requirements.

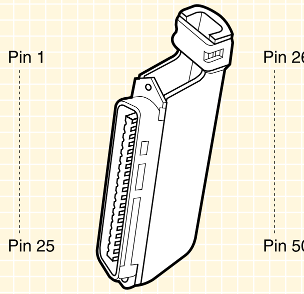
25-Pair Color Coding/ISDN Contact Assignments

RJ21X

25 PAIR CABLE

DESIGNATION	WIRE COLOR	Pin	Pin	WIRE COLOR	DESIGNATION
Ring	Blue/White	1	26	White/Blue	Tip
Ring	Orange/White	2	27	White/Orange	Tip
Ring	Green/White	3	28	White/Green	Tip
Ring	Brown/White	4	29	White/Brown	Tip
Ring	Slate/White	5	30	White/Slate	Tip
Ring	Blue/Red	6	31	Red/Blue	Tip
Ring	Orange/Red	7	32	Red/Orange	Tip
Ring	Green/Red	8	33	Red/Green	Tip
Ring	Brown/Red	9	34	Red/Brown	Tip
Ring	Slate/Red	10	35	Red/Slate	Tip
Ring	Blue/Black	11	36	Black/Blue	Tip
Ring	Orange/Black	12	37	Black/Orange	Tip
Ring	Green/Black	13	38	Black/Green	Tip
Ring	Brown/Black	14	39	Black/Brown	Tip
Ring	Slate/Black	15	40	Black/Slate	Tip
Ring	Blue/Yellow	16	41	Yellow/Blue	Tip
Ring	Orange/Yellow	17	42	Yellow/Orange	Tip
Ring	Green/Yellow	18	43	Yellow/Green	Tip
Ring	Brown/Yellow	19	44	Yellow/Brown	Tip
Ring	Slate/Yellow	20	45	Yellow/Slate	Tip
Ring	Blue/Violet	21	46	Violet/Blue	Tip
Ring	Orange/Violet	22	47	Violet/Orange	Tip
Ring	Green/Violet	23	48	Violet/Green	Tip
Ring	Brown/Violet	24	49	Violet/Brown	Tip
Ring	Slate/Violet	25	50	Violet/Slate	Tip

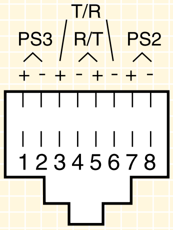




ISDN Assignment of Contact Numbers as specified by ISO Document 8877: 1987 (E)

Contact Assignments for Plugs and Jacks

Contact Number	TE	NT	Polarity
1	Power source 3	Power sink 3	+
2	Power source 3	Power sink 3	+
3	Transmit	Receive	+
4	Receive	Transmit	+
5	Receive	Transmit	+
6	Transmit	Receive	+
7	Power sink 2	Power source 2	+
8	Power sink 2	Power source 2	+



ISDN

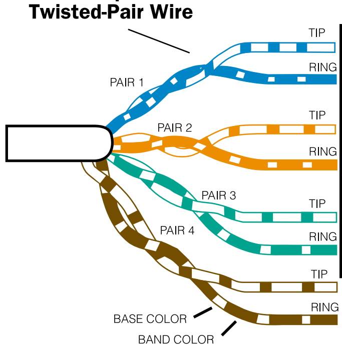
Note: *For use in TE to TE interconnections, power source/sink 3 shall conform to the requirements specified in CCITT recommendation 1.430, section 9.2 for power source/sink 2.*

Wire Color Codes

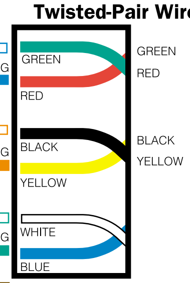
Standard 4-Pair Wiring Color Codes		
PAIR 1	T	White/Blue
	R	Blue/White
PAIR 2	T	White/Orange
	R	Orange/White
PAIR 3	T	White/Green
	R	Green/White
PAIR 4	T	White/Brown
	R	Brown/White

Note: For 6-wire jacks use pair 1, 2 and 3 color codes. For 4-wire jacks use pair 1 and 2 color codes.

A. Band-Striped Twisted-Pair Wire

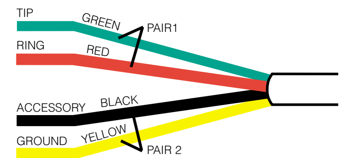


B. Solid-Color Twisted-Pair Wire



C.Quad Wire*

(Solid-Color, Non-Twisted Wire)

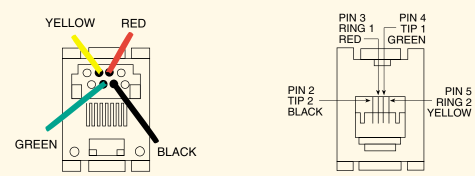


***CAUTION**
Quad wire is no longer acceptable for installation in multi-line environments. If encountered during a retrofit, quad wire should be replaced with 100Ω UTP. Connecting new quad to installed quad will only amplify existing problems and limitations associated with quad wire; leaving existing quad in place and connecting 100Ω UTP to it may also be ineffective, as the quad wire may negate the desired effect of the UTP.

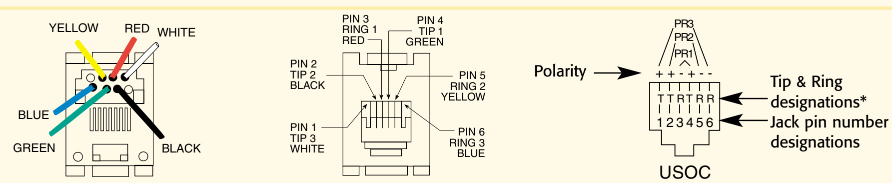
Jack Pin Designations

	Pin#	8P8C/8P8C Keyed	6P6C	MMJ	T568B	T568A
Jack Pin Designations	1	Blue	White	Orange	White/Orange	White/Green
	2	Orange	Black	Green	Orange	Green
	3	Black	Red	Red	White/Green	White/Orange
	4	Red	Green	Yellow	Blue	Blue
	5	Green	Yellow	Black	White/Blue	White/Blue
	6	Yellow	Blue	Brown	Green	Orange
	7	Brown	–	–	White/Brown	White/Brown
	8	White	–	–	Brown	Brown

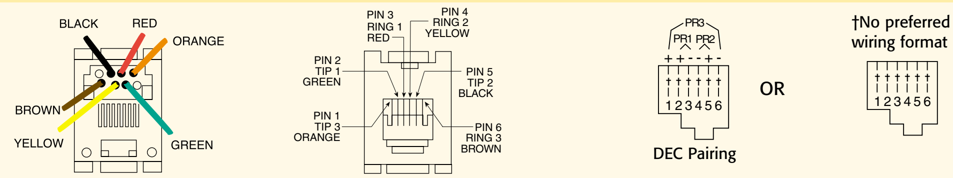
6P4C



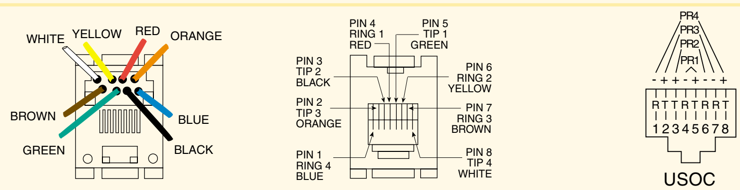
6P6C



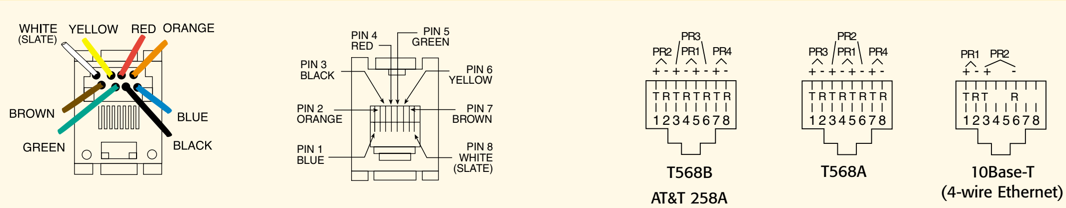
MMJ



8P8C and 8P8C Keyed, USOC



8P8C and 8P8C KEYED; T568B, T568A, and 10Base-T



Note: *Some equipment standards may vary from the standards shown heres.*

USOC CODES

This appendix contains descriptions of Universal Service Order Codes (USOC) for connecting telephone instruments and related equipment to telephone lines, based on Part 68, Subpart F, Section 68.502 of FCC regulations, and as described by the T1E1.3 Working Group on Connectors and Wiring Arrangements.

USOC Codes were developed years ago by the Bell operating companies to identify service or equipment under tariff. Information on USOC codes is provided here should you run across these in your work.

A Note About USOC Number Suffixes

RJ (Registered Jack) numbers end with a letter that indicates the wiring or mounting method:

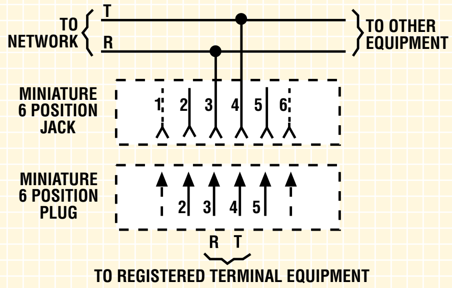
"C" identifies a surface or flush-mounted jack.

"W" identifies a wall-mounted jack.

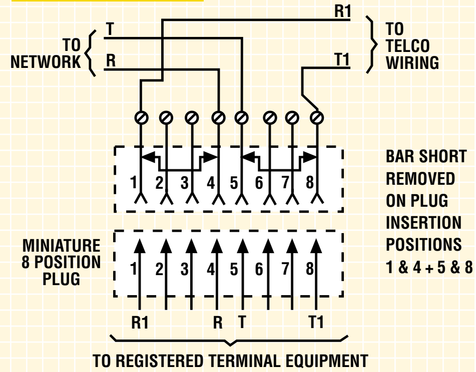
"X" identifies a complex multi-line or series type jack.

Note: *The telephone company will wire the lines in the sequence designated by the customer.*

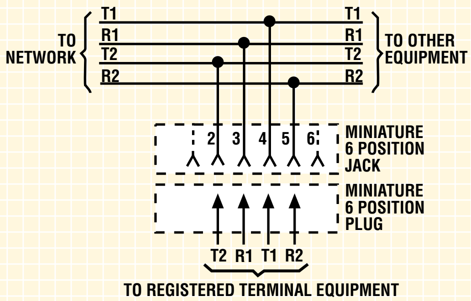
RJ11C/RJ11W



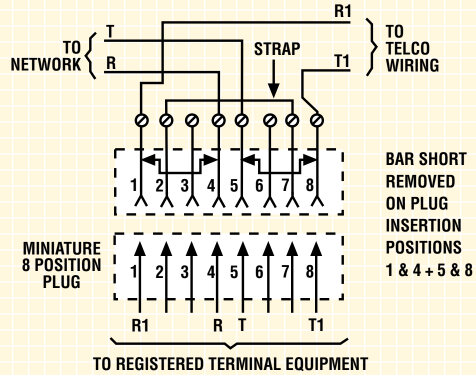
RJ31X



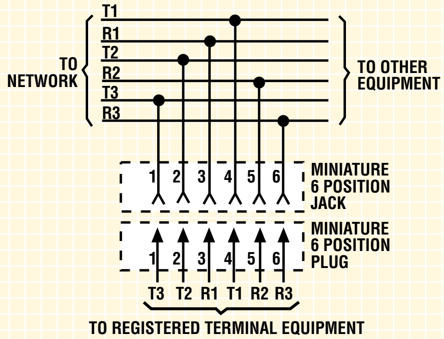
RJ14C/RJ14W



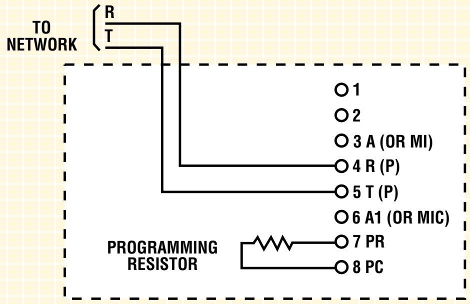
RJ38X



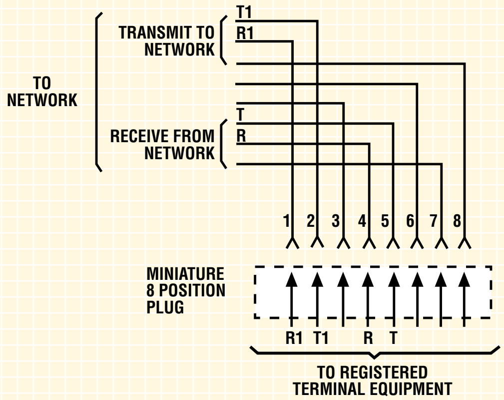
RJ125C



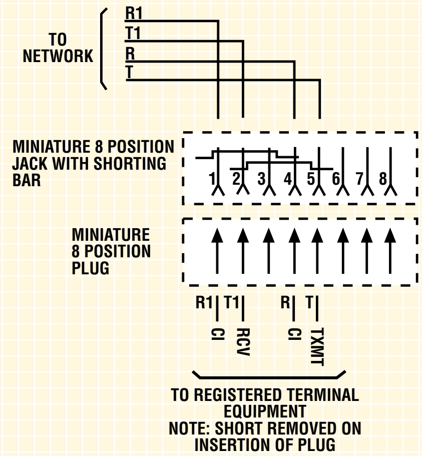
RJ45S



RJ48C

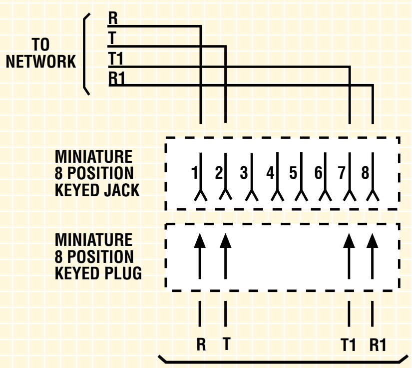


RJ48X

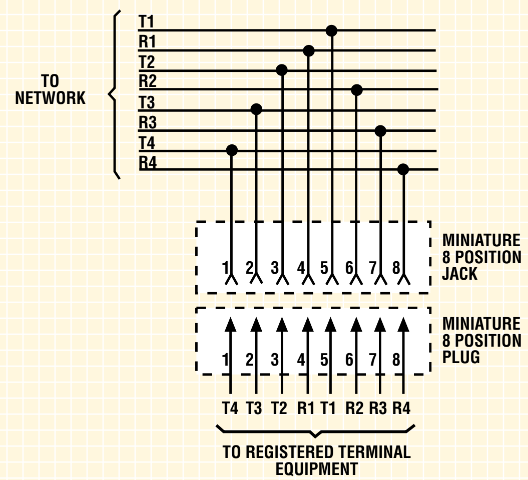


Note: *RJ48X drawing is provided for information purposes only. No Leviton products support the application.*

RJ48S



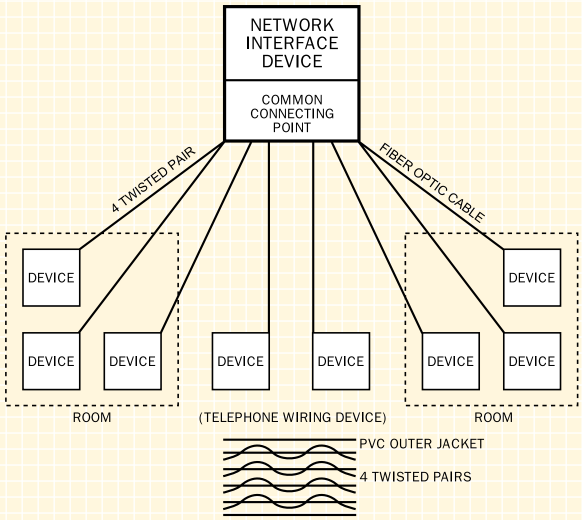
RJ61X



GENERAL INSTALLATION TIPS

TIA Preferred Wiring Method

The wiring method preferred by the Telecommunication Industry Association (TIA) is a star wiring method (see Figure below). Each individual workstation in a residential or commercial building is wired directly to the distribution device with four-pair twisted wire or fiber optic cable.



Star Topology

The star topology uses a hierarchical series of distribution frames. The backbone includes the main distribution frame (MDF) and the optional intermediate distribution frame (IDF). (See Figure top right.)

The first level, the MDF, links to other levels via the backbone cabling. The MDF may link to the third and final level, the telecommunications closet (TC) directly, or in large installations it may link to some TCs via an optional second level, the intermediate distribution frame (IDF). The TC terminates the backbone cable and cross-connects to the horizontal cabling. The horizontal cabling terminates in the work area at the workstation (WS).

GENERAL

Horizontal cabling is the cabling from the telecommunications closet to the work area. It includes the cross-connects in the telecommunications closet; horizontal cable; and the outlet at the work areas.

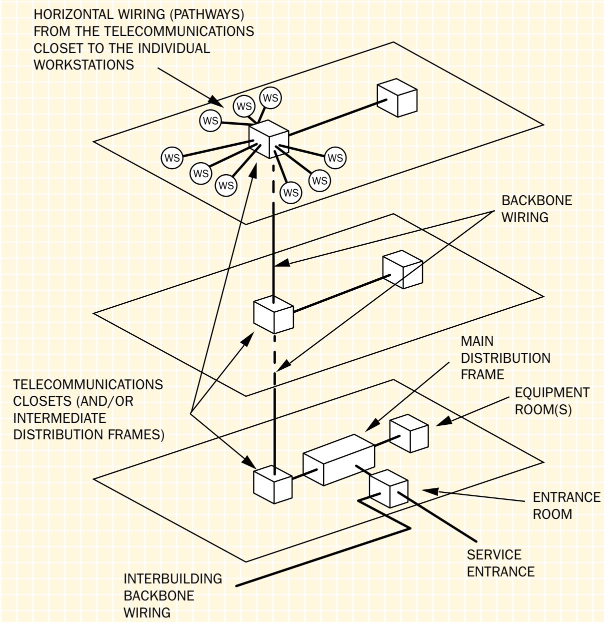
Commercial building horizontal cabling should be installed such that it will:

[a] Facilitate ongoing maintenance, relocations, and additions;

[b] Accommodate future equipment and service changes;

[c] Accommodate a diversity of user applications, including voice, data, LAN, switching, and other building services.

Typical Commercial Building Wiring Topology



Roughing-In Correctly

The following are general rules for running cable, whether residential, or commercial:

- **Always make a quick check for shorts, opens, and ground when the rough-in is completed.** Lightweight telephone wiring is much easier to damage than non-metallic cable. The jacket can be caught on sharp edges or nail points and inside conductors grounded, shorted, or broken. It will take just a few minutes to insure that no connections or splicing were forgotten and that no wiring was damaged as it was pulled in or secured during rough-in.
- **Do not splice wires on the cable runs.** Pull a new wire if things go wrong.
- **Do not exert more than 25 pounds of pulling tension on 4-pair cables.** Larger capacity cables should be pulled as per the manufacturer's directions.
- **Do not run cables in parallel with power wiring.** Consult industry standards for minimum separation of telecommunications cable from interference sources.
- Do not bend cable sharply or nick the protective sheath covering the insulated wires.
- **Maintain polarity** (i.e., carefully match wire colors) of the Tip (+) and Ring (-) pairs from the demarcation point to the outlets. Polarity reversal causes problems with some devices.
- **Maintain the access line number correlation with the pair number** (i.e., access line one goes to pair one, and so forth) when wiring connectors.

- **Use the two inner pairs of a housing for telecommunications.** Use the outer pairs of the connector for other purposes (if any) to provide compatibility with two-line telephones.
- **Use plastic non-metallic staples** to support wire, and leave the wire loose inside the staples—do not drive staples all the way in. Driving staples in tightly may crimp wire and damage the insulation or wire, impairing its ability to carry voice or data.
- **If conduit is installed, always leave a pull cord in to facilitate running new wire.**
- **Never run power in the same conduit with telecommunications cable.** Low-voltage monitor and control lines may share conduit with telecommunications.
- **Avoid undercarpet runs if possible,** as they are inherently more susceptible to damage, particularly in residences. If they must be installed, follow the manufacturer's directions carefully, and remember that only one transition from one type of cabling to another is standard in a single room. Avoid installing undercarpet runs in damp areas. Note that undercarpet power cables are not allowed in residential installations.
- **Where possible, use inner walls for runs to avoid conflict with firebreaks and insulation.** Inner-wall wiring also makes it a lot easier to replace wires if necessary, or to add wires. Nonetheless, wiring through external walls is not always avoidable, so installation handling should be the same as for electrical wire. Firestopping is also to be observed.
- **Do not run telecommunications wire parallel to power wiring without adequate separation, and do not share bore holes with power wires.**
- **Keep wire away from sources of heat,** like hot water pipes and heater ducts.
- **Avoid running external wires**—they are not desirable, both for appearance and safety reasons. Wires on the outside of a building may be allowed under local code for additions, but should be avoided for initial installations.
- **Leave 18 inches of spare wire at outlets and connection points** for connections and changes.
- **Firestopping, bonding, and grounding must be performed according to fire, building, and electrical codes that apply.**

Regardless of the installation type, proper wiring requires good planning and careful work to avoid damaging cables and to make good connections.

TELECOMMUNICATIONS OUTLETS

- **When installing outlet boxes on wooden studs, it is important to maintain proper separation of communications and power cables.** These two types of cables should not share drill holes or stud spaces. Desk telephone connectors should be located at the same distance from the floor as electrical outlets.
- **Each workstation should, at minimum, be served by either two 100Ω UTP cables,** or one 100Ω UTP cable and one cable of another type. Single or double outlets may be used.
- **Telecommunications outlets are usually placed at the same height as electrical outlets, and near an electrical outlet.**

The Importance of Pair Twisting:

The rate of twisting will range from four (4), to as many as 28 twists per foot on high speed data cable. The tighter the twist, the less likely it will be distorted during installation, and the greater the immunity from interference. While the specification for the rate of twist varies with the anticipated data rate carried by the installation, always untwist the least amount of cable necessary to make a connection.

- * *Category 3 max. allowed untwisting = 3"*
- * *Category 5 max. allowed untwisting =< 1/2"*
- * *Category 5e max. allowed untwisting =< 1/2"*
- * *Category 6 max. allowed untwisting =< 1/2"*

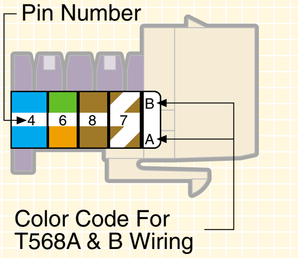
***Note:** TIA-568-A does not specify the maximum allowable untwisting for these connectors, they are suggested as the maximum distance for standard practice.*

GENERAL TIPS ON QUALITY INSTALLATIONS

- **Every connection degrades system performance, so use the minimum necessary.**
- **Better to provide excess capacity in terms of cable and outlets rather than not enough.** Later additions are costly and time consuming.
- **Wire to the highest anticipated data rate (speed) or greater—never less.**
- **Never install components of unknown/questionable origin or quality.** At the very best, the system will transmit signals to the level of its weakest component. Every element and connection is important.
- **Document all connections carefully, and keep installations neat and tidy.** This will save time and hassle when modifying or troubleshooting the system later.
- **Test everything.**

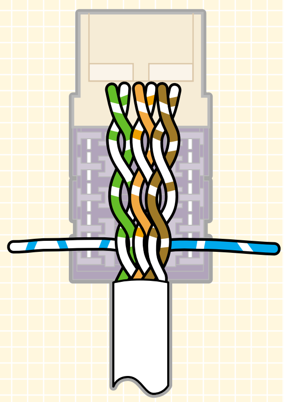
CATEGORY 5 AND GIGAMAX 5E CHANNEL CONNECTOR TERMINATION

1. Remove a few inches of jacket from the cable, to expose the wires.
2. Determine which wiring scheme to use, T568A or T568B. Note the associated color codes and connector pin numbers on the label located on the sides of the connector.

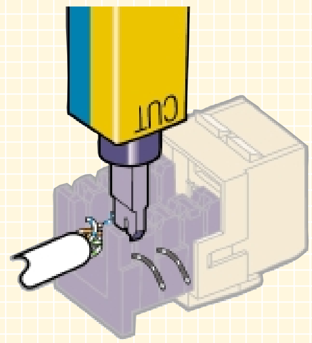


***Note:** Maintain cable jacket as close to termination as possible*

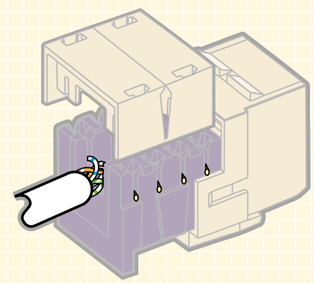
3. Route the wires for termination, according to the chosen color code. **Terminate and trim one pair at a time, starting from the rear of the connector, in the order shown. Terminating each pair after placement will prevent crushing the inside pairs with the punchdown tool.**



4. Using a 110 style impact tool, seat the wires into the slots of the insulation displacement connectors. Place the cutting side of the tool on the outside, to trim the excess wire flush with the connector body as you punch the wires down.



5. Place the dust cap over the terminated wires to ensure a secure connection and added strain relief.

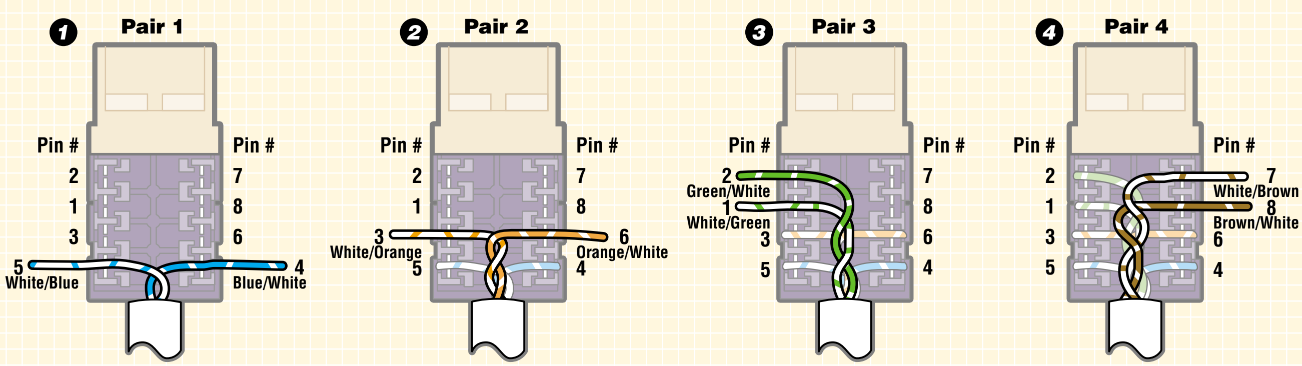


6. Noting the 'UP' orientation of the connector, insert the terminated connector into the desired QuickPort housing.

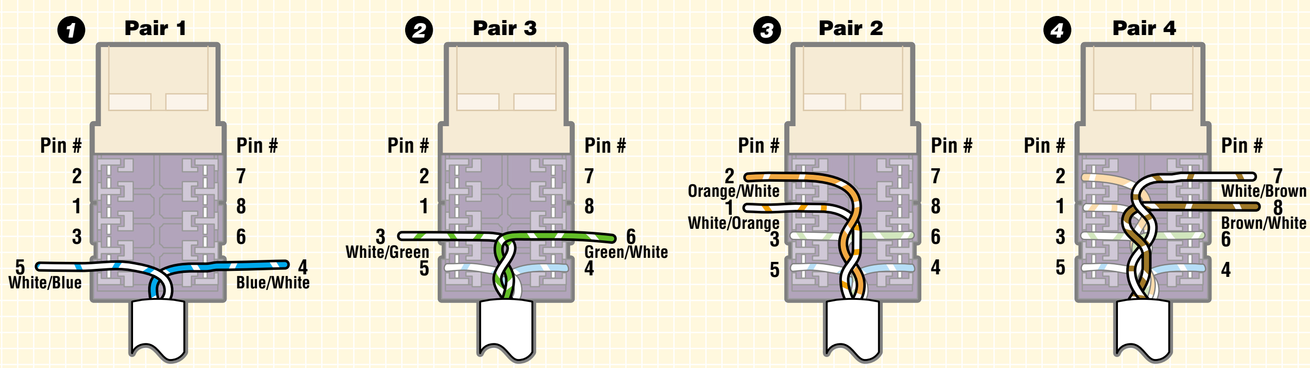
Inside Wire Colors

Pin#	T568A	T568B
	Wiring Standard	
1	White/Green	White/Orange
2	Green/White	Orange/White
3	White/Orange	White/Green
4	Blue/White	Blue/White
5	White/Blue	White/Blue
6	Orange/White	Green/White
7	White/Brown	White/Brown
8	Brown/White	Brown/White

T568A Category 5 and GigaMax 5e Channel Level Connector Wiring Scheme

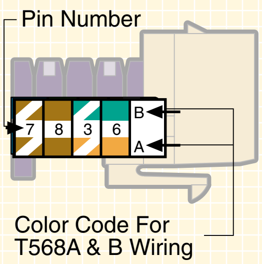


T568B Category 5 and GigaMax 5e Channel Level Connector Wiring Scheme



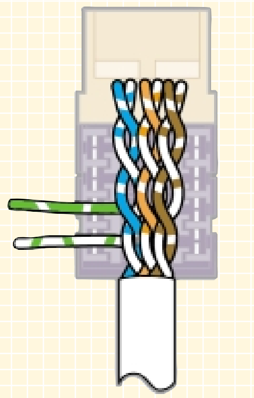
GIGAMAX 5E COMPONENT CONNECTOR TERMINATION

1. Remove about 2" of jacket from cable.
2. Determine the wiring scheme (T568A or T568B) and note the associated color codes on the label located on the sides of the connector. This label also includes connector pin numbers.

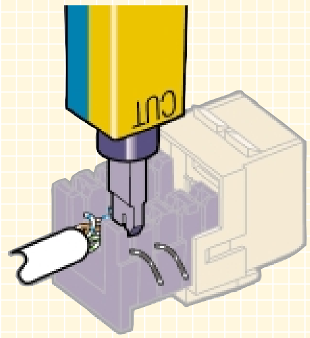


Note: Maintain cable jacket as close to termination as possible

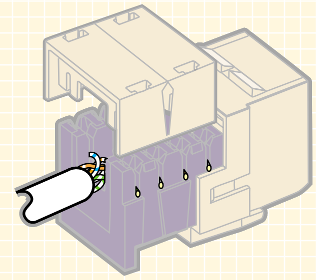
3. Route the wires for termination, as shown below. Terminate one pair at a time starting from rear of connector. Terminating each pair after placement will prevent crushing the inside pairs with the punchdown tool. Lay cable in so jacket touches rear of connector as shown.



4. Using a 110 style impact tool, seat the wires into the slots of the insulation displacement connectors. Place the cutting side of the tool on the outside, to trim the excess wire flush with the connector body as you punch the wires down.



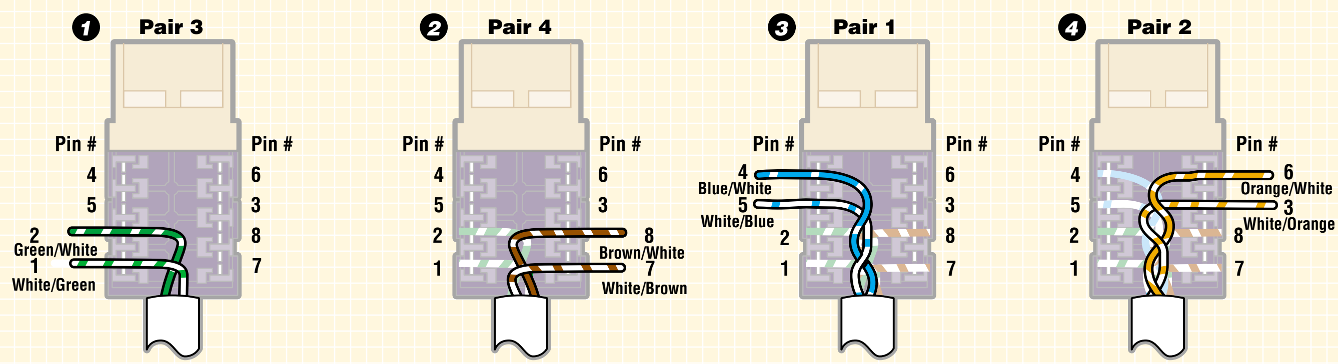
5. Place the cap over the terminated wires for secure connection and added strain relief.



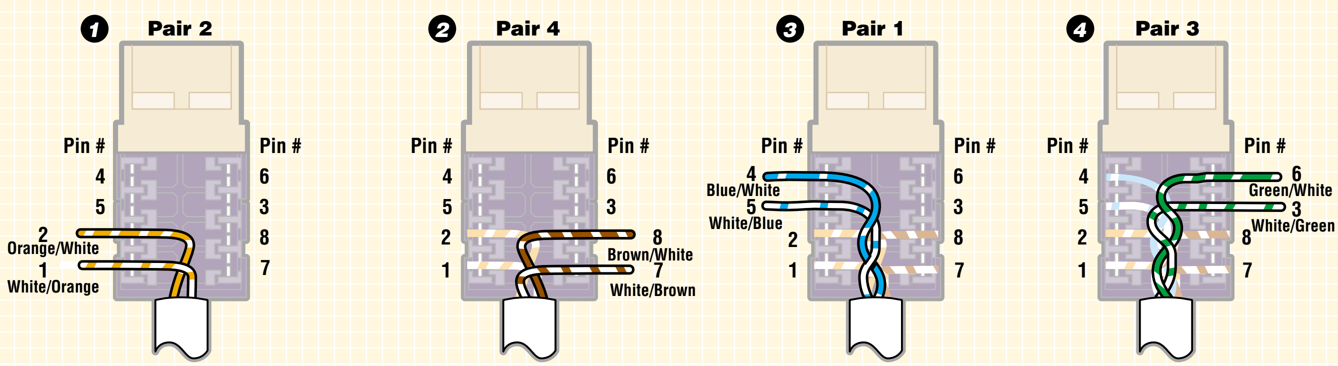
6. Insert connector assembly into platform or wallplate. Note the "UP" position of the connector.

Inside Wire Colors		
	Wiring Standard	
Pin#	T568A	T568B
1	White/Green	White/Orange
2	Green/White	Orange/White
3	White/Orange	White/Green
4	Blue/White	Blue/White
5	White/Blue	White/Blue
6	Orange/White	Green/White
7	White/Brown	White/Brown
8	Brown/White	Brown/White

T568A Gigamax 5e Component-Level Connector Wiring Scheme

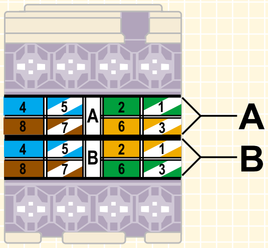


T568B Gigamax 5e Component-Level Connector Wiring Scheme

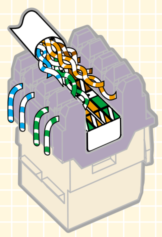


EXTREME 6 CONNECTOR TERMINATION INSTRUCTIONS

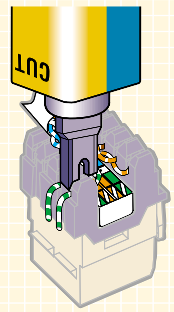
1. Remove about 2" of jacket from cable, to expose the wires.
2. Determine which wiring scheme to use, T568A or T568B. Note the associated color codes and connector pin numbers on the label located between the IDC connector slots.



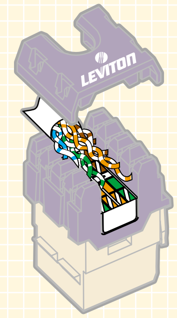
3. Route the wires for termination, according to the chosen wiring scheme. **Terminate and trim one pair at a time, starting from the side of cable entry. Terminating each pair after placement will prevent crushing the inside pairs with the punchdown tool. Lay cable in so jacket touches edge of connector as shown.**



4. Using a 110 style impact tool, seat the wires into the IDC slots. (Must be 1/4" or closer.) Use the cutting side of the tool to trim the excess wire flush with the connector body as you punch the wires down.



5. Place the dust cap over the terminated wires to ensure a secure connection and added strain relief.

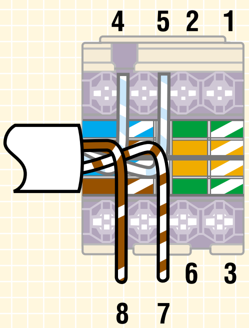


6. Noting the 'UP' orientation of the connector, insert the terminated connector into the desired QuickPort housing.

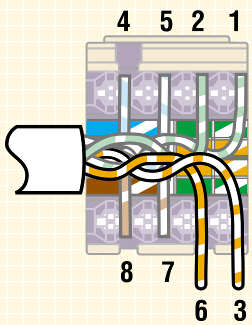
eXtreme 6 Wiring Scheme

Cable Entry from Left

❶

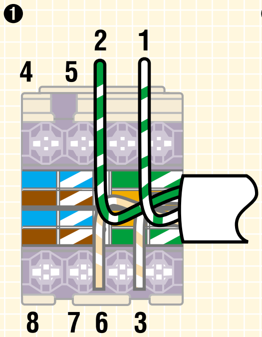


❷

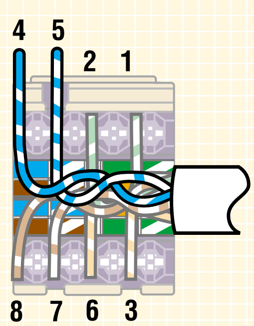


Cable Entry from Right

❶



❷



As noted above: Route and terminate one pair at a time to avoid cable damage.

eXtreme 6 Inside Wire Colors	Wiring Standard		
	Pin#	**T568A**	**T568B**
	5	White/Blue	White/Blue
	4	Blue/White	Blue/White
	3	White/Orange	White/Green
	6	Orange/White	Green/White
	1	White/Green	White/Orange
	2	Green/White	Orange/White
	7	White/Brown	White/Brown
	8	Brown/White	Brown/White

T568A and T568B Wiring

What's the difference between T568A and T568B wiring?

T568A and T568B are the two wiring standards for an 8-position modular connector, permitted under the TIA-568-A wiring standards document. The only difference between T568A and T568B is that the orange and green wire pairs (pairs two and three) are interchanged. For a wiring diagram, see page X8.

How to decide which wiring pattern to use:

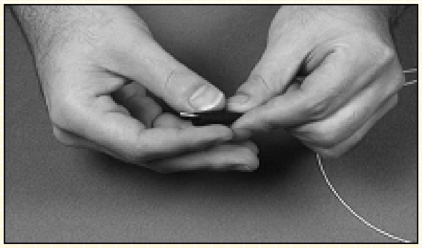
1. Does the job specification call out a wiring pattern?
2. Does the customer/end user have a preference?
3. Have patch panels already been purchased for the job? If so, they will probably be either T568A or T568B. Jacks should be wired to the same pattern as the panels.
4. Are you adding on to existing wiring? If so, your new wiring should match existing wiring.

If none of the factors above apply, either T568A or T568B may be used. It is important to ensure that workstation connectors and patch panels are wired to the same pattern. T568B is commonly used in commercial installations, while T568A is prevalent in residential installations.

THREAD-LOCK® ST® FIBER CONNECTOR TERMINATION: 900µm

Step One: Prepare

1. Thread the 900 Micron cable through the Strain Relief Boot and slide the Boot down about 6 to 7 inches.



2. Snap the Silicone Build-Up Sleeve onto the cable, gently rotating it to facilitate sliding. Slide it toward the Boot.
3. Using your 900 Micron Buffer remover, cut and remove about 1 1/4" of the PVC buffer. Strip about 1/4" at a time.
4. Clean the now-exposed fiber with isopropyl alcohol. This ensures that no buffer debris remains on the fiber.
5. Slide the Build-Up Sleeve back up the cable. Leave between 1/8" - 1/4" of the jacket showing between the Build-Up Sleeve and exposed fiber.
6. Wrap the Threaded Retention Sleeve around the Build-Up Sleeve. Make sure the ends are flush.

Step Two: Assemble

1. Remove the connector dustcap, and place the Tightening Tool over the connector housing.

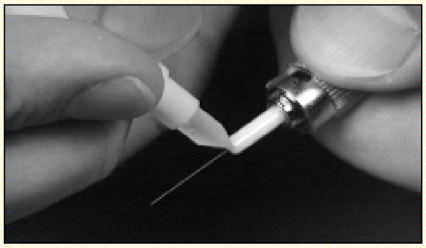
IMPORTANT

These are guidelines and not meant to substitute for the instructions that come with the connectors. Please use those instructions for terminating this connector. Follow proper safety procedures.

2. Firmly holding the Threaded Retention Sleeve closed with your fingers, carefully insert the exposed fiber into the connector housing. Rotate slightly while pushing, until you feel the first few threads of the Retention Sleeve click in.
3. Using the Tightening Tool, rotate the Connector Housing clockwise, screwing it down firmly onto the Retention Sleeve. After 2 or 3 turns, grip the bottom rim of the Retention Sleeve with pliers. Tighten until the Housing is flush with bottom of Sleeve.

NOTE: Be sure to rotate the Connector Housing and Tightening Tool, not the Retention Sleeve and Cable. Rotating the Retention Sleeve could harm the cable.

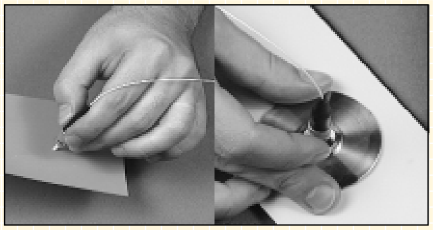
4. Slide the Protective Boot up to fit snugly around the back of the Connector Housing.
5. Carefully remove the Tightening Tool.
6. Using the Scribe tool, lightly scribe the fiber. To do so, gently touch the scribe to the fiber's base and draw it across horizontally. You will feel some friction of the cutting edge. Scribing should be done about 1/32" or less from where fiber meets ferrule.
7. Draw your thumb and forefinger lightly from the Housing down toward the fiber's end. Apply gentle pressure to pull the excess fiber away with your fingers, as it breaks from the scribed point. If the fiber does not break, rescribe and try again.



***NOTE:* If you have a Thread-Lock® Versa-Cleave™, simply place the cleave tool over the ferrule, and press the button to cleave.**

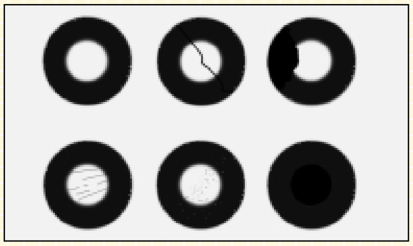
Step Three: Polish

1. Hold the bottom edge of the pink 12 Micron lapping film, dull side up, very loosely in one hand. Gently touch the tip of the Connector to the top of the film. Once contact is made, rotate the Connector gently, keeping contact with the polishing film. Slightly increase your pressure and air polish the excess fiber away.



NOTE: Listen to the sound the fiber makes as it scratches the paper. When the sound ceases to scratch so loudly, you will know that the fiber has been adequately polished.

2. Place the yellow 3 Micron film on top of the polishing pad, dull side up. Insert the Connector firmly into the polishing puck and then gently place end-down on the polishing pad. Using a figure-eight pattern and light pressure, polish the fiber for 15 to 20 rotations. Follow with a third puck polishing, using blue 0.3 Micron film.
3. Remove the connector from the puck and wipe the end clean, using first an alcohol wipe and then a lint-free wipe.
4. Plug the connector into the end of the Inspection Scope and turn the light on. When you look through the scope you will see two concentric circles. Do not be concerned with the outer circle, or "cladding". The center or "core" of the fiber is the important area. Visually check the core for breaks or scratches. The core should be smooth and clear, as shown in the image on the top left.



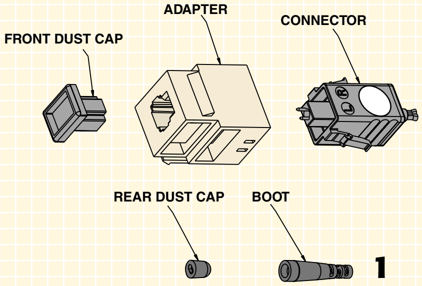
5. You now have an assembled and ready-to-use Thread-Lock Fiber Optic connector.

SPECTRO-LINK™ WORKSTATION CONNECTOR TERMINATION: 900µm

Fiber Preparation

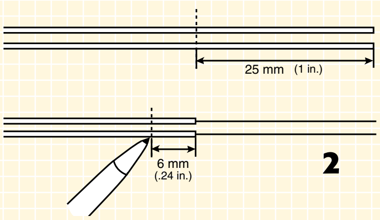
For 900 µm Distribution Tight-buffered Fibers

1. Feed both fibers through the boot (smallend first) and slide boot down until it is out of the way.



1

2. Measure and mark approximately 25 mm (1 in.) from the end of each buffer fiber (Fig. 2).



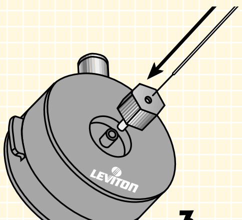
2

3. Using a buffer remover, strip away the 25 mm section of each buffer in small, 10 mm increments.
4. Using a permanent ink marker, precisely mark a line on each buffer 6 mm (.24 in.) back from the stripped edge of the buffer (Fig. 2). This will indicate when the field fibers come into contact with the pre-inserted fiber stubs.
5. Clean both bare fibers with two passes of an alcohol wipe. When cleaning, pull on the fibers with gentle but firm pressure. This will help identify potentially damaged fibers. Do not touch the bare fibers after cleaning them. Do not remove the 6 mm mark.

> **IMPORTANT**
>
> ***These are guidelines and not meant to substitute for the instructions that come with the connectors. Please use those instructions for terminating this connector. Follow proper safety procedures.***

Connector Installation:

1. Insert the Versa-Cleave Workstation adapter into the Thread-Lock Versa-Cleave as shown (Fig. 3).

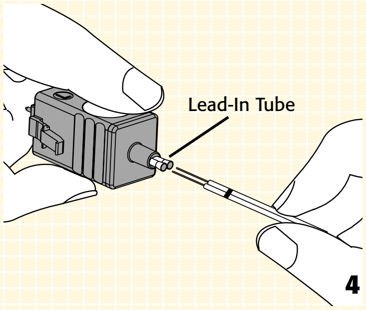


3

2. Gently thread one of the stripped fibers into the top of the WS adapter, until it can go no further (or "bottoms out"). Do not force.
3. Gently press the button to cleave the fiber.
4. Remove the cleaved fiber and repeat the process with remaining fiber.
5. Align fibers with the lead-in tube of the connector. Ensure that the fibers are separate and oriented in such as way as will maintain the system polarity.

NOTE: Whenever the fibers are being inserted into or removed from the connector, the button on the connector must be pressed. Once the button is released, the fibers are locked in place. The fibers cannot be inserted or removed without the button being pressed.

6. Hold the connector with your thumb on the button and your forefinger beneath the connector body (Fig. 4). Press and hold the button down while carefully inserting both cleaved fibers into the lead-in-tubes on the connector. The mark you made on the buffer will approach the mouth of the lead-in tubes. You will feel the fiber stop against the connector's fiber stub. Maintain slight inward pressure on the fibers, and remove pressure from the button. This will lock the fibers in place.

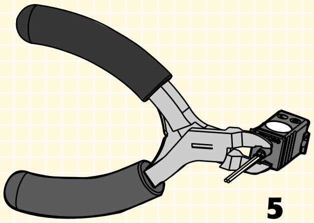


4

NOTE: Do not bend or angle fibers. Keep them separated and straight. Each fiber has a separate lead-in tube in the back of the connector. If the fiber ends are too close together, they may go in the same tube causing the fibers to bind.

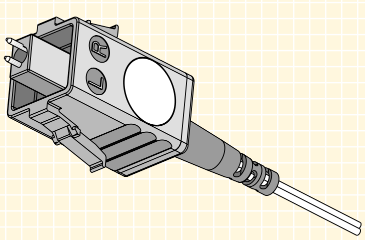
NOTE: If you have stripped and cleaved the fibers to the correct length, the buffer mark will line up with the edge of the lead-in-tube. This is an indicator that the fibers are touching properly. If the mark does not line up, remove the connector and check for broken fiber. If the fiber has broken, re-strip and re-cleave the fiber and begin with a new connector.

7. You may now test the connector with a Visual Fault Locator System (VFL). If the fibers are not seated properly, the reddish back of the connector will glow. If the fiber is not seated correctly, reinstall the fibers.
8. Using the Crimp Tool, crimp the brass crimp tubes. You should see a flat impression in the lead-in tubes, indicating a proper crimp. (Figure 5).


5

9. Slide the boot over the crimp tubes until it reaches the back of the connector.
10. The connector is now ready for use, and can be installed into the keystone adapter. Use with a Leviton MT-RJ MOS adapter and faceplate (see Page B4). If the connector will not be installed immediately, replace the adapter and dust cover until the connector is ready to be installed.

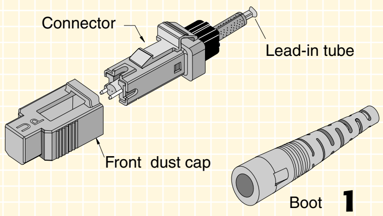
NOTE: The Spectro-Link Workstation Connector is not intended for use in a QuickPort-Style Outlet. Use in a keystone-style MOS outlet only.



SPECTRO-LINK™ FRAME-STATION CONNECTOR TERMINATION: 900µm

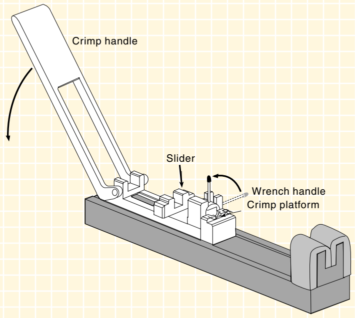
Connector Preparation

NOTE: This procedure REQUIRES the Leviton Frame-Station Connector Assembly Tool that comes in the Spectro-Link MT-RJ Tool Kit (see Page D9).



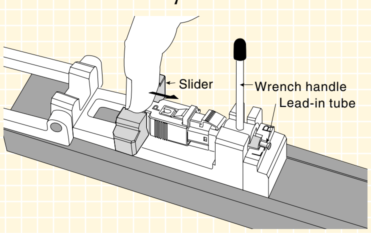
1

1. Flip the crimp handle of the Frame-Station Connector Assembly Tool open and rotate so that the wrench handle is in the "UP" position (Fig. 2).



2

2. Remove and discard the cap from the rear of the connector.
3. Examine the connector to make sure it is in the open position. The connector is in the open position when the key on the cam is positioned 90º from the "UP" lettering on top of the dust cap.
4. Pull back the slider of the Connector Assembly Tool and insert the connector, oriented as shown in Fig. 3, into the tool as far as it will go. The lead-in tube should rest on the crimp platform when the connector is fully seated. Do not force.



3

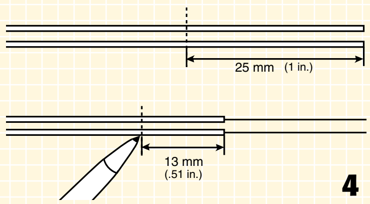
IMPORTANT

These are guidelines and not meant to substitute for the instructions that come with the connectors. Please use those instructions for terminating this connector. Follow proper safety procedures.

Fiber Preparation

For 900 µm Distribution Tight-buffered Fibers

1. Feed both fibers through the boot (small end first) and slide boot down until it is out of the way.
2. Measure and mark approximately 25 mm (1 in.) from the end of each buffer fiber.
3. Using a buffer remover, strip away the 25 mm section of each buffer in small, 10 mm increments.
4. Using a permanent ink marker, precisely mark a line on each buffer 13 mm (.51in.) back from the stripped edge of the buffer (Fig. 4).

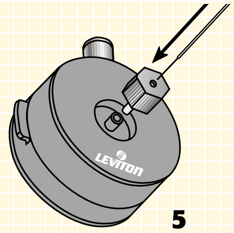


4

5. Clean both bare fibers with two passes of an alcohol wipe. When cleaning, pull on the fibers with gentle but firm pressure. This will help identify potentially damaged fibers. Do not touch the bare fibers after cleaning them.

Connector Installation:

1. Insert the Versa-Cleave Frame-Station adapter into the Thread-Lock Versa-Cleave as shown (Fig. 5).

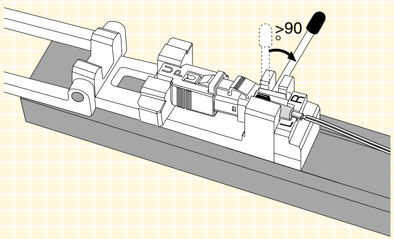


5

2. Gently thread one of the stripped fibers into the top of the FS adapter, until it can go no further. Do not force.
3. Gently press the button to cleave.
4. Remove the cleaved fiber and repeat the process with remaining fiber.
5. Align fibers with the lead-in tube of the connector. Ensure that the fibers are separate and oriented in such as way as will maintain the system polarity.
6. Carefully insert both cleaved fibers into the lead-in tube until you feel them firmly stop against the connector's pre-inserted fiber stub. Be sure to guide fibers evenly, without bending or angling. If you feel resistance at the entry funnel, pull the fibers back out a short distance and re-insert.

NOTE: The buffer mark will line up with the edge of the lead-in-tube. This is an indicator that the fibers are touching properly.

7. Rotate the wrench handle of the Connector Assembly Tool to the "DOWN" position, to cam the connector. The wrench must stay down––do not rotate it back upright (Fig. 6).

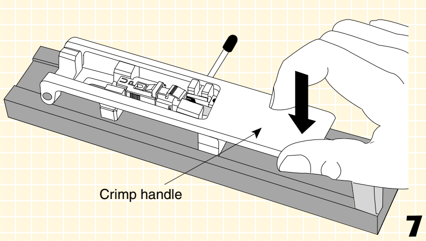


6

8. The fiber is now held inside the connector by the cam.
9. You may now test the connector with a Visual Fault Locator System (VFL).

WARNING: Use a Leviton Frame-Station Connector Assembly Tool to crimp the fiber.

10. Flip the crimp handle back. You should see a flat impression in the crimp tube, indicating a proper crimp. Leave the wrench handle down. Remove the connector by lifting it and its fibers straight up and out of the tool. Do not pull the fibers or cable away from the crimped tube. Handle the connector only.



7

11. Slide the boot back up onto the connector until it reaches the cam.
12. The connector is now ready to use.

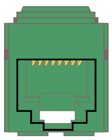
NOTE: The Spectro-Link Frame-Station Connector can be used at the workstation with the addition of a Spectro-Link QuickPort Adapter or Spectro-Link Keystone Adapter.

· TECH NOTE ·

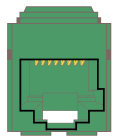
What is the difference between T568A and T568B wiring?

T568A and T568B are the two wiring standards for an 8-position modular connector, permitted under the TIA-568-A wiring standards document. The only difference between T568A and T568B is that the orange and green wire pairs (pairs two and three) are interchanged. For a wiring diagram, see page X10.

Keyed VS. Non-Keyed Connectors



NON-KEYED CONNECTOR



KEYED CONNECTOR

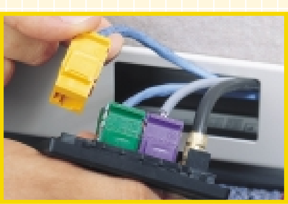
Modular non-keyed 8-position, 8-conductor connectors accept standard (non-keyed) 8-position patch cords.

Modular keyed connectors accept both keyed and non-keyed 8-position patch cords.

QuickPort Modular Furniture Faceplates

QuickPort Modular Furniture Faceplates allow access to connectors without removal of the channel cover. Simply run cable through the modular furniture.

Next, punch down or terminate QuickPort connectors onto the cable. UTP QuickPort Connectors have color-coded wiring labels and easy termination/punchdown to assure fast, accurate wiring.



Snap the connectors into the Modular Furniture Plate. For initial installation or later re-configuration, modules easily snap in and out of the plate.

And finally, snap the plate easily into your modular furniture. No tools are required to insert or remove the plate, and the furniture kickpanel does not have to be removed.

Singlemode vs. Multimode Fiber

Fiber optic cable and connectors come in two modes: multimode and singlemode. Here is a brief overview of the difference between them.

Multimode
Optical fiber which has a core size of either 50 micron or 62.5 micron. Can be used with either LED or LASER light sources to transmit many modes, or rays of light. Common in Local Area Networks.

Singlemode
Optical fiber which has a core size of 8.3-9.5 micron. Singlemode fiber is optimized for LASER light sources which transmit one mode, or path of light. Typical in long-haul networks and outside plant applications due to increased bandwidth.

Cable Testers - Manufacturer Listing

The following companies manufacture hand-held cable testers. This information is listed as a courtesy for your reference only and is not an endorsement nor a recommendation. You are advised to contact each company directly to request detailed information about each product. Some of these companies also sell their product through other companies under other product names; you are advised to ask which of these companies is the actual manufacturer of the tester.

Datacom Textron	Products
Datacom Textron 4455 Boeing Drive Rockford, Illinois, 61109 USA phone: 800-435-0786 fax: 800-451-2632	**FIBERcat™ Test & Talk, FIBERcat™ Optical Loss Measuring System, LANcat® System 5 Cable Tester & Talk Set, LANcat® System 6 Cable Tester & Talk Set, LANcat® Performance Modules, LANcat® Installer, Report Manager™ Software**

http://www.datacom.textron.com/products/install.html

Fluke Networks	Products
6920 Seaway Boulevard Everett, WA 98203 USA Phone: 800-283-5853 Fax: 425-446-5019	**DSP-4100 Digital CableAnalyzer™, DSP-4000 Digital CableAnalyzer™, DSP Permanent Link Adapter, DSP-2000 Digital CableAnalyzer™, DSP-100 Digital CableMeter®, 620 LAN CableMeter®, DSP Fiber Test Adapters, DSP-FTK Fiber Optic Test Kit, Laser Source**

http://www.flukenetworks.com/cabling/index.htm

Agilent Technologies, Inc.	Products
753 Forest Street Marlborough, MA 01752 Telephone: (800) 418-7111 Fax: (508) 486-0600	**Wirescope 350, Wirescope 155**

http://www.wirescope.com/

Microtest Inc.	Products
4747 North 22nd Street Phoenix, Arizona 85016-4715 USA phone: (602) 952-6400 Fax: (602) 952-6401	**OMNIScanner2™, OMNIFiber™, OMNIScanner, OMNIScanner CertiFiber™, SimpliFiber™, PentaScanner®, MICROSCANNER™, MICROSCANNER Pro™**

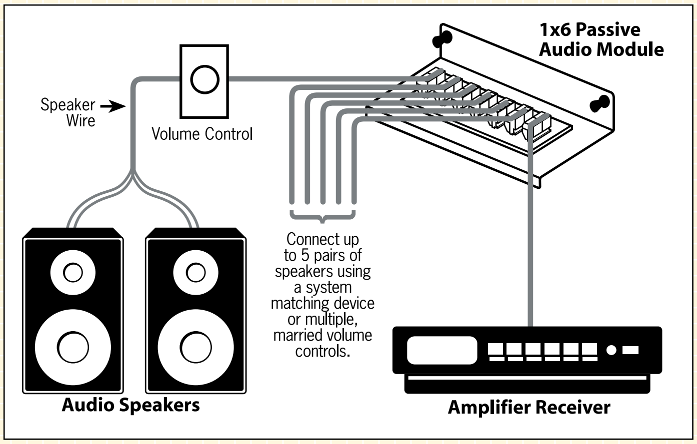
http://www.microtest.com/ntmnhome.jhtml

ACTERNA	Products
20400 Observation Drive Germantown, Maryland 20876-4023 phone: 800 638 2049 fax: 301 353 1536	**LT 8100A, LT 8155T, LT 8600T, LT8600TSP LANchecker 100, VFF5, FiberKit+**

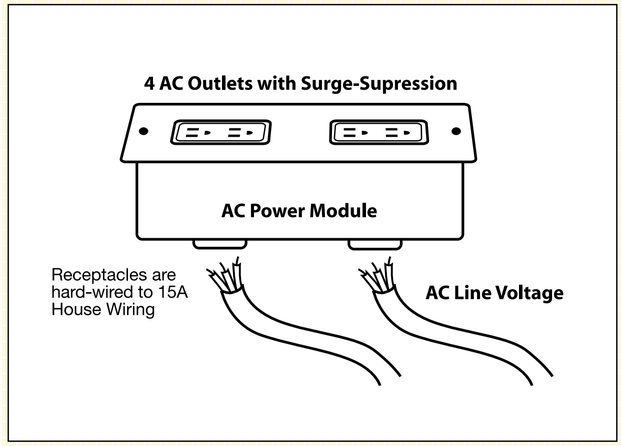
http://www.acterna.com/products/lan_cable/index.html

· TECH NOTE ·

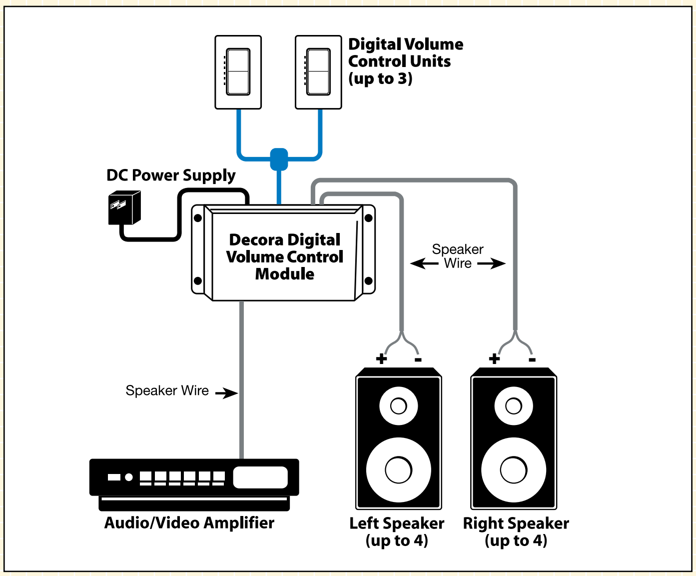
PN# 48211-6A - 1x6 Passive Audio Module Sample Configuration



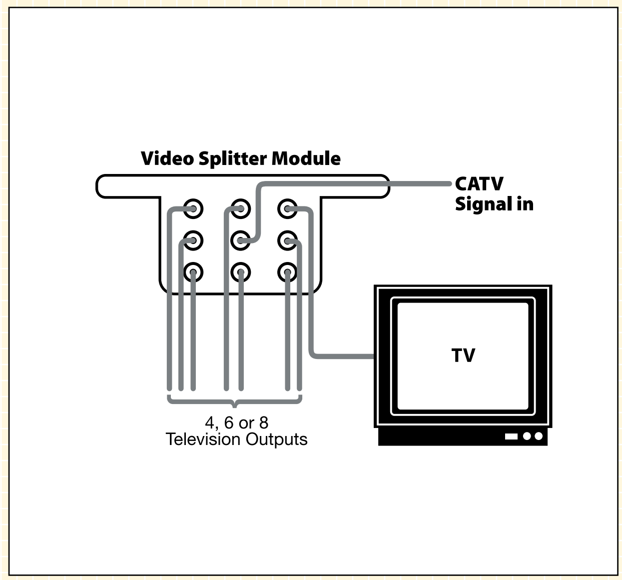
PN# 47605-DP - AC Power Module Sample Configuration



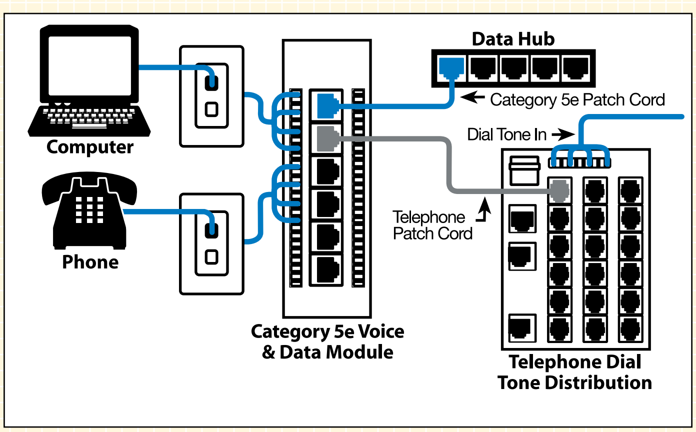
PN# 48211-*VK - Decora Digital Volume Control Module Sample Configuration



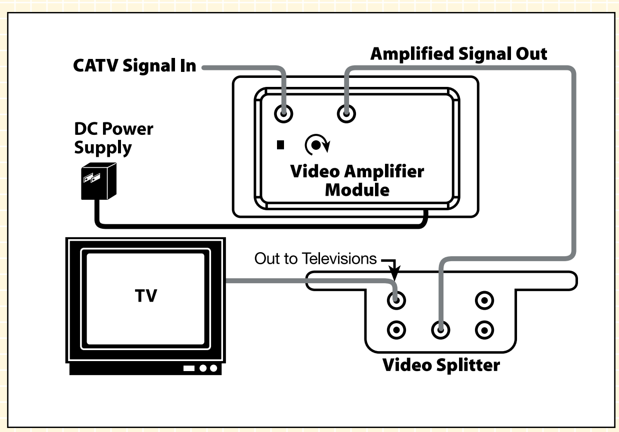
PN# 47690-*CK - Video Splitter Modules Sample Configuration



PN# 47603-C5, 47605-C5B - Category 5e Voice & Data Module Sample Configuration

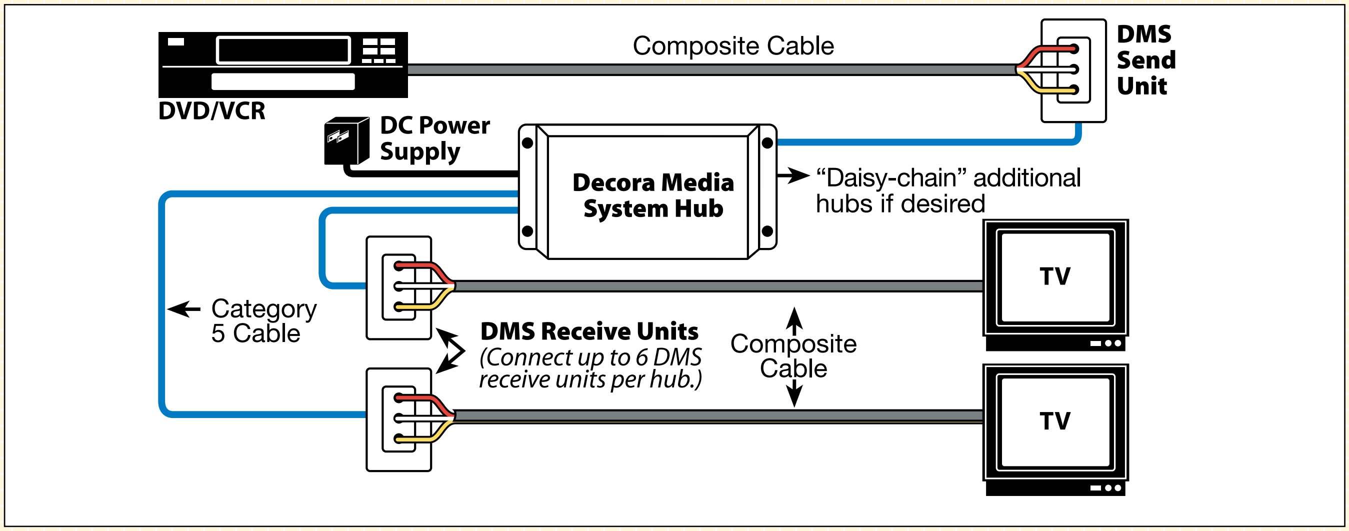


PN# 48210-VA - Video Amplifier Module Sample Configuration

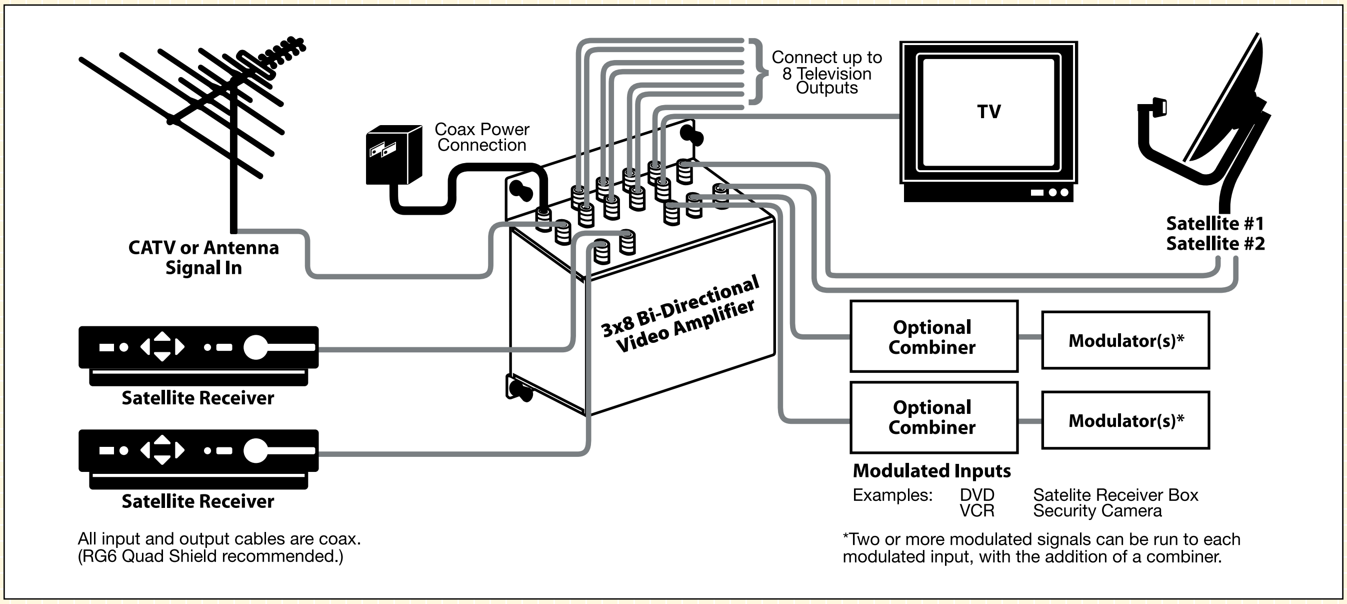


TECH NOTE

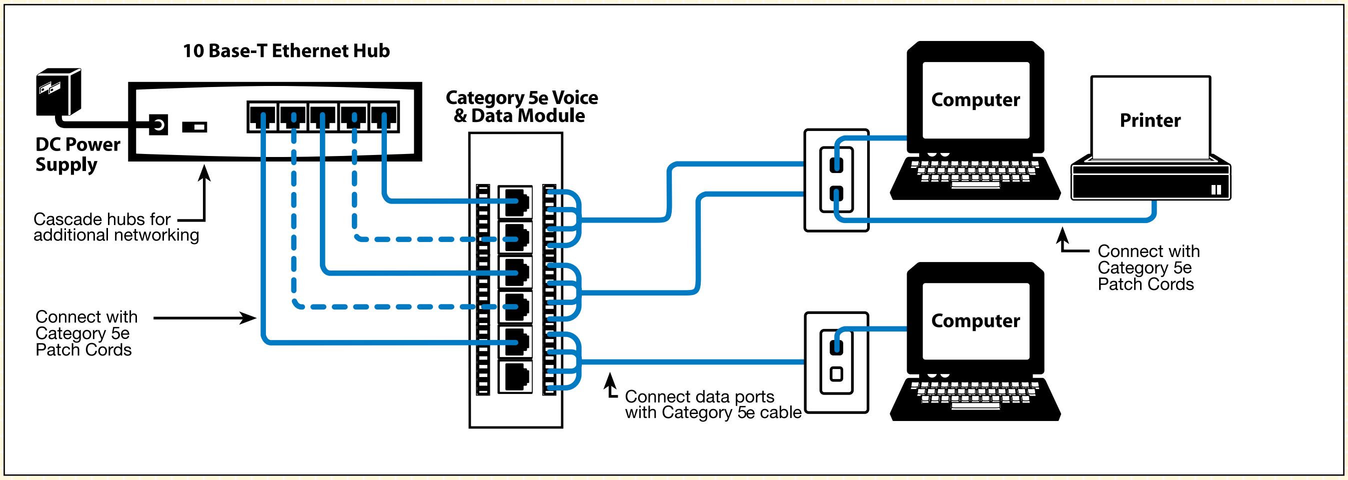
PN# 48210-MCH, 48210-SRU, 48210-MSU, 48210-MRU - Decora Media System - Sample Configuration



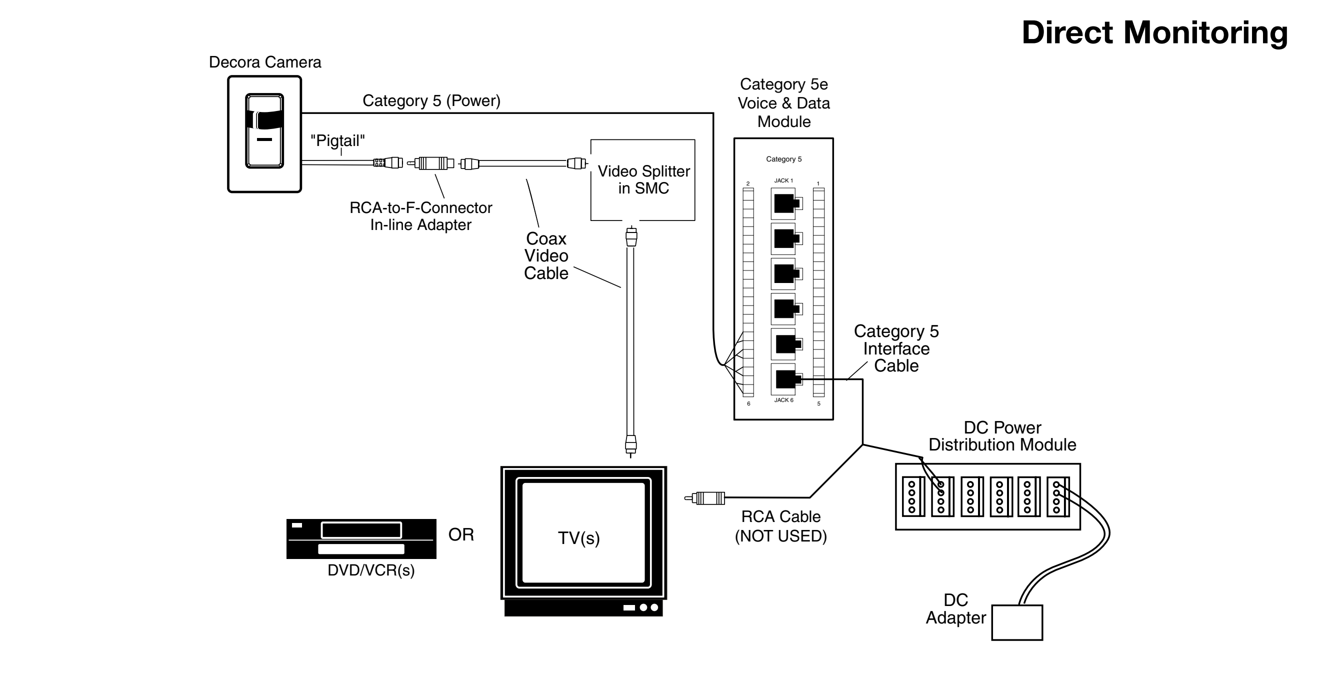
PN# 47690-38B - 3x8 Bidirectional Video Module- Sample Configuration



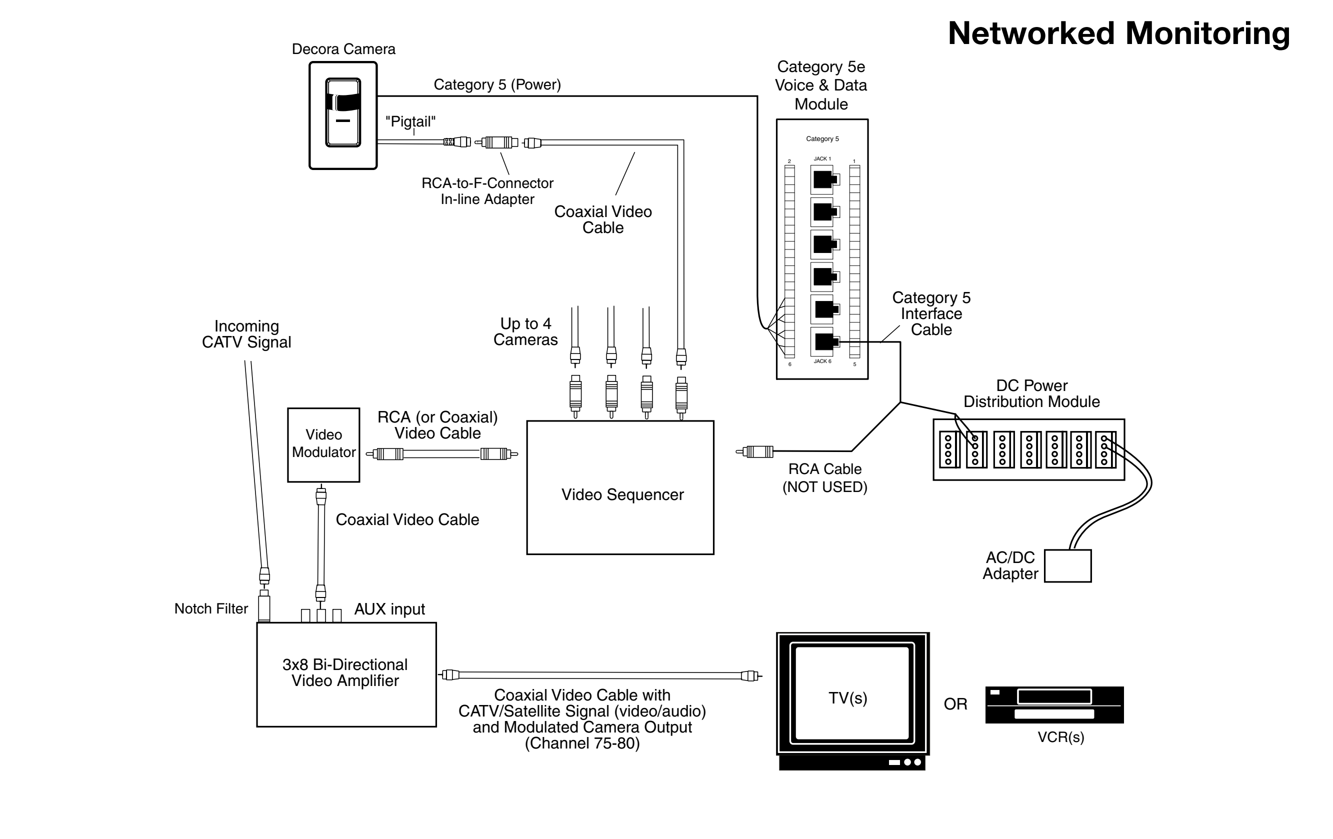
PN# 47605-EH - 10Base-T Ethernet Hub and PN# 47605-ETX - 10/100Base-T Network Hub - Sample Configuration



PN# 48213-*DC - Decora® Camera - Direct Monitoring Sample Configuration



PN# 48213-*DC - Decora® Camera - Networked Monitoring Sample Configuration

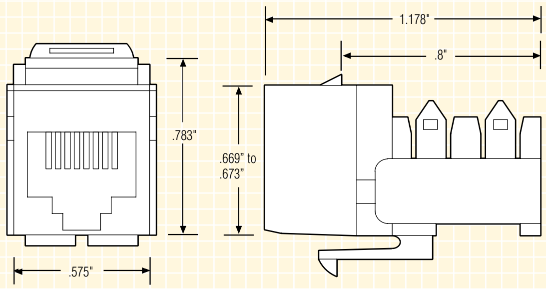


DIMENSIONAL LINE ART

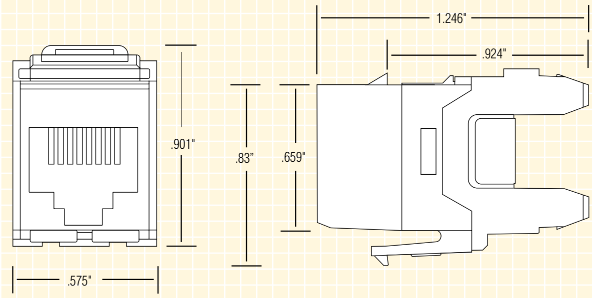
Note: Product drawings and dimensions are provided for your information, to help verify device compatibility with wallboxes or other intended device openings for installation. Line artworks are not shown at the same scale.

For complete up-to-date dimensional drawings and product specifications, visit our Design Tools Online web resource at www.levitonvoicedata.com.

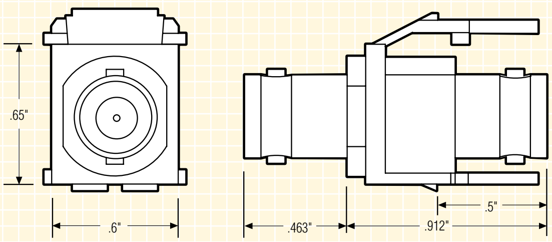
Quickport® Gigamax™ 5e, & GigaMax 5e Plus



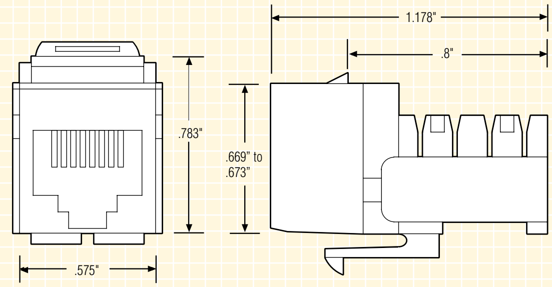
Quickport® eXtreme 6 Connector



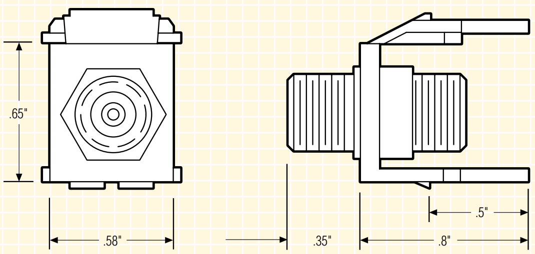
Quickport® BNC Module



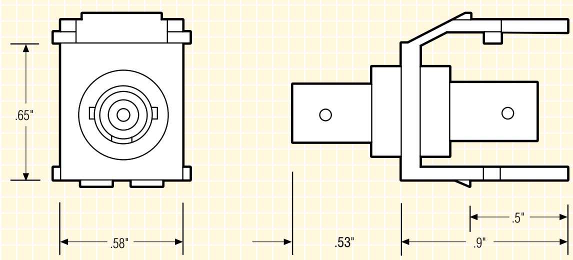
Quickport® Category 5, Category 3 and Voice Grade Connectors



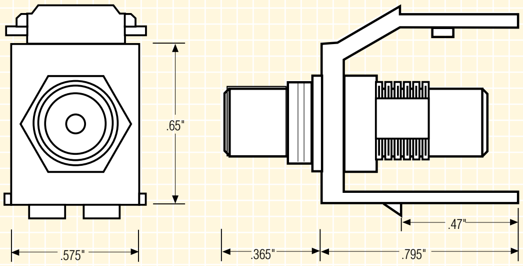
Quickport® F-Type Bulkhead Module



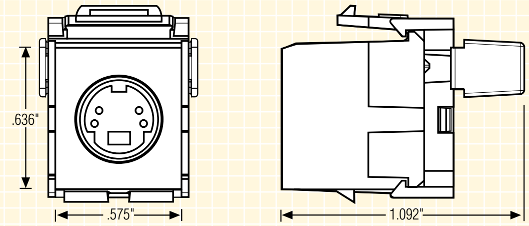
Quickport® ST Module



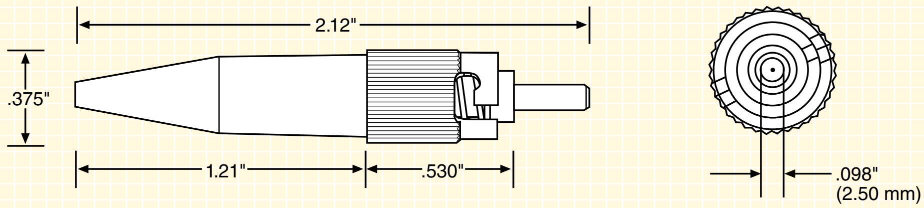
Quickport® RCA Module



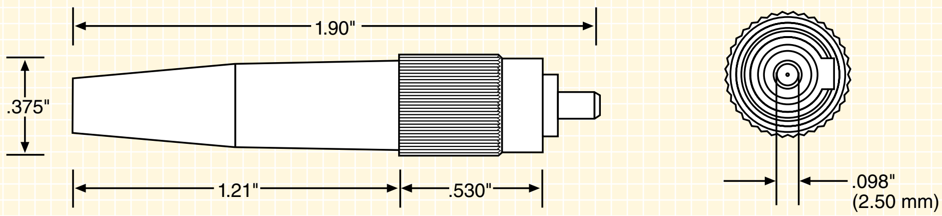
Quickport® S-Video Module



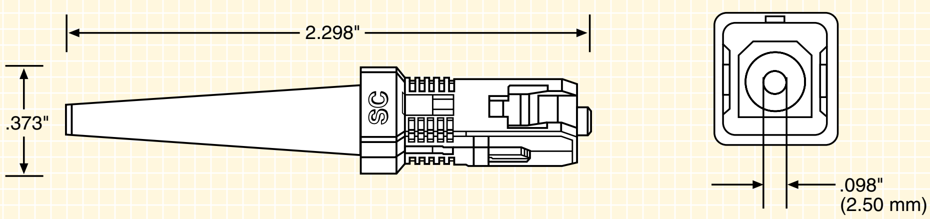
Thread-Lock ST® Fiber Optic Connector



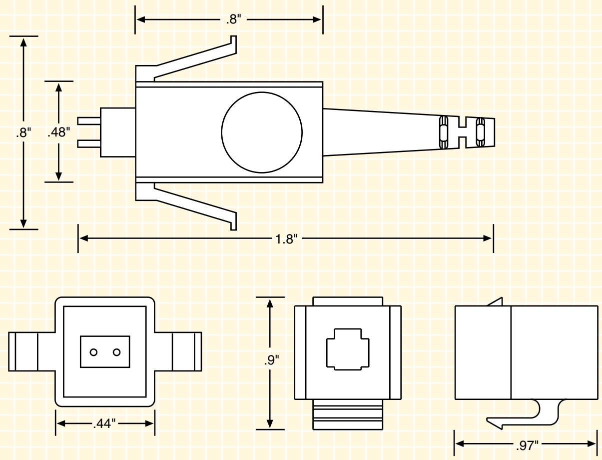
Thread-Lock FC Fiber Optic Connector



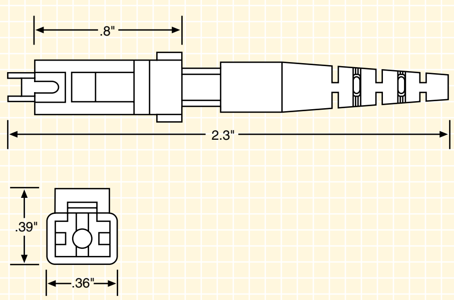
Thread-Lock SC Fiber Optic Connector



Spectro-Link Workstation MT-RJ Connector



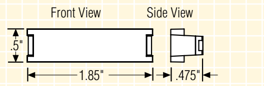
Spectro-Link Frame-Station MT-RJ Connector



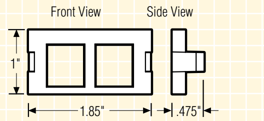
MULTIMEDIA OUTLET SYSTEM (MOS)

Quickport® MOS 1/2-, 1-, 1.5-, 2- and 3 Unit High Inserts

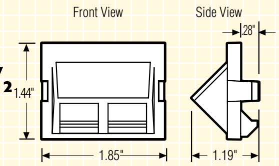
1/2



1



1 1/2



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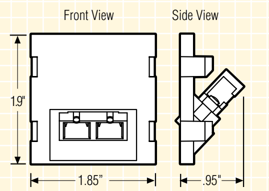

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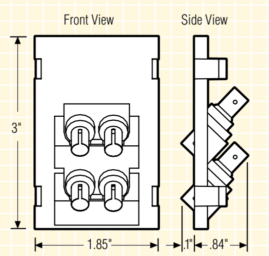
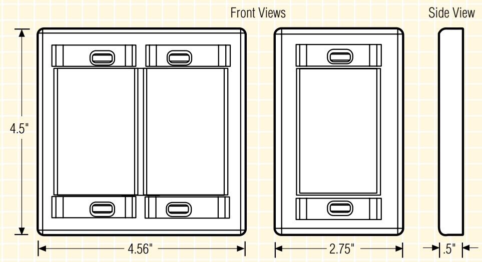
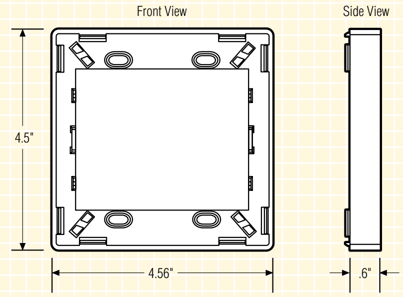


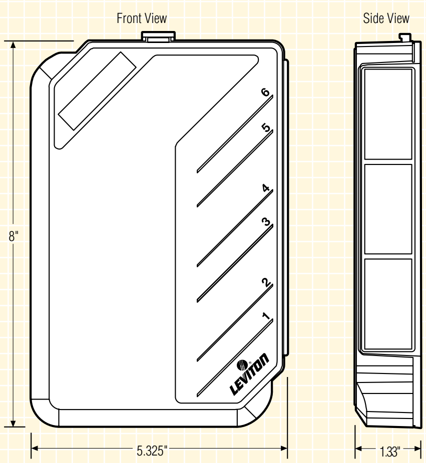
Quickport® MOS Wallplate



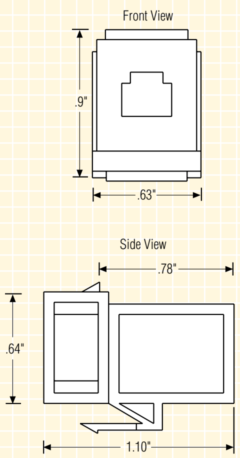
Quickport® MOS Storage/Spacer Ring



Quickport® MOS Surface Mount Box

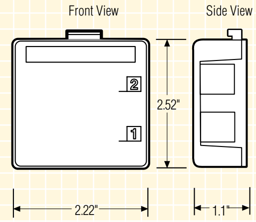


Spectro-Link Keystone Adapter *(Works with MT-RJ MOS Insert–– NOT a QuickPort Adapter)*

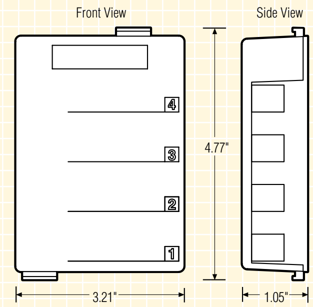


SURFACE MOUNT HOUSINGS

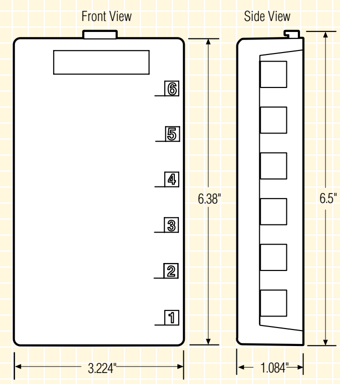
Quickport® 2-Port Surface Mount Box



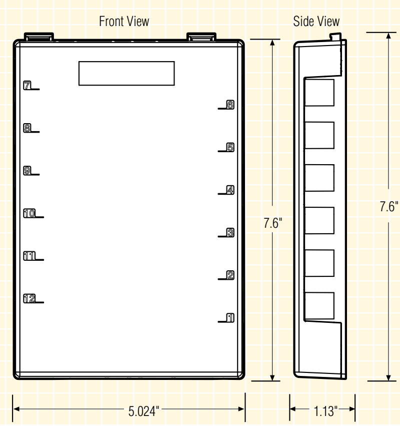
Quickport® 4-Port Surface Mount Box



Quickport® 6-Port Surface Mount Box

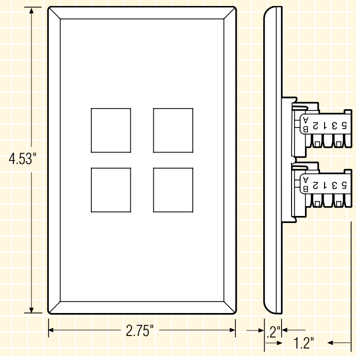


Quickport® 12-Port Surface Mount Box



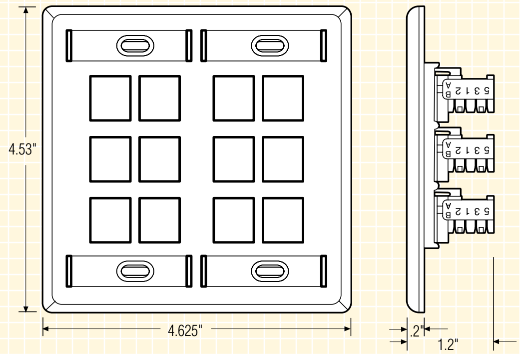
QUICKPORT® FLUSH MOUNT HOUSINGS AND WALLPLATES

Quickport® 4-Port Single-Gang Wallplate



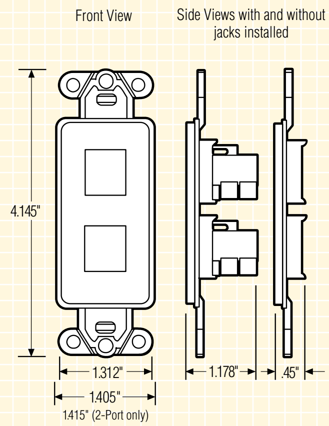
(Dimensions are the same for 1-, 2-, 3- and 6-port versions)

Quickport® 12-Port Dual-Gang Wallplate

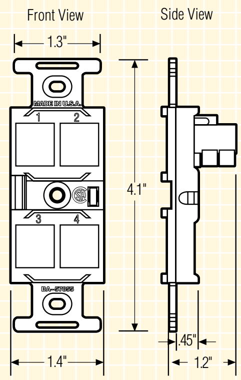


(Dimensions are the same for 1-, 2-, 3-, 6- and 8-port versions)

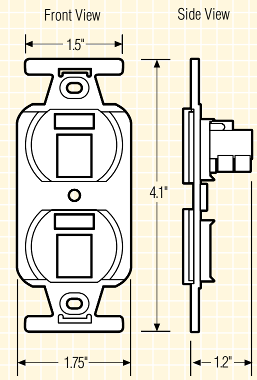
Quickport® Decora® Multimedia Wallplate Inserts, 2-, 3-, 4-, or 6-ports



Quickport® Quad 106

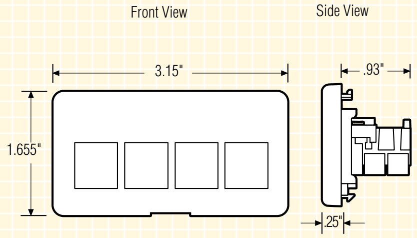


Quickport® Duplex 106

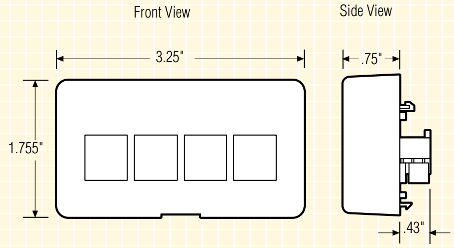


QUICKPORT® MODULAR FURNITURE FACEPLATES

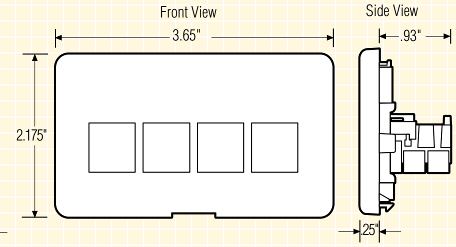
Standard Faceplate



Extended-Depth Faceplate

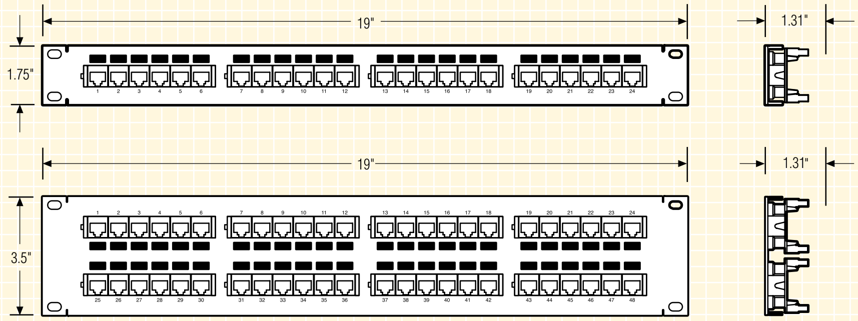


Herman Miller Faceplate

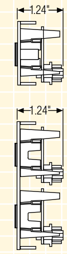


STANDARD AND UNIVERSAL PRE-CONFIGURED PATCH PANELS

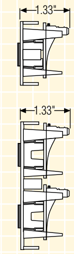
Category 5, GigaMax™ 5e, and Voice Grade 24- and 48-Port Panels



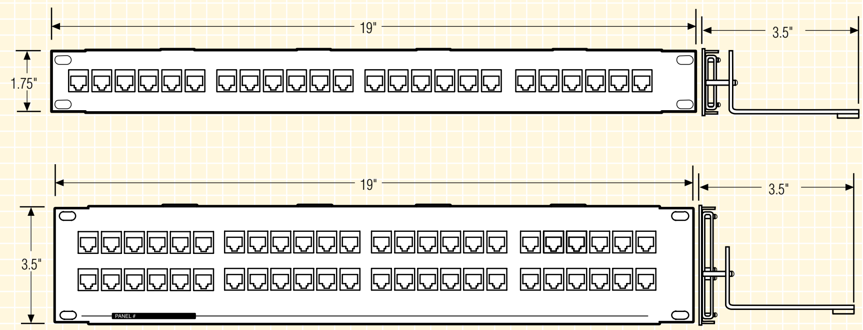
Side view for preconnectorized voice grade panel



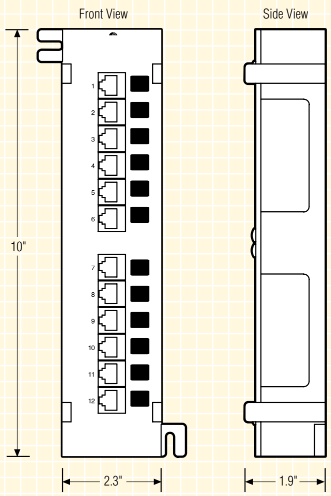
Side view for 110 voice grade panel



eXtreme 6 24- and 48-Port Universal Panels

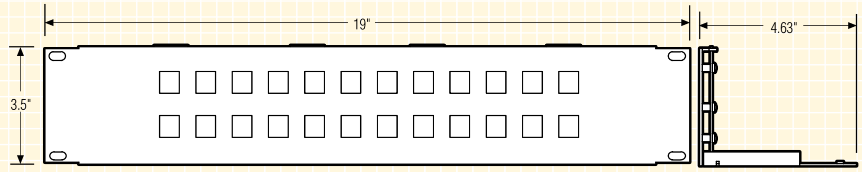


Category 5 and GigaMax™ 5e Patch Blocks

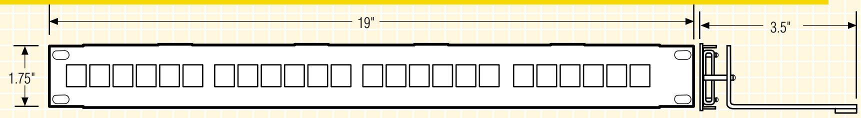


QUICKPORT® PATCH PANELS

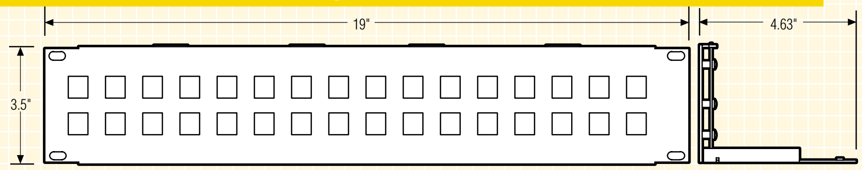
Quickport® 24-Port Panel



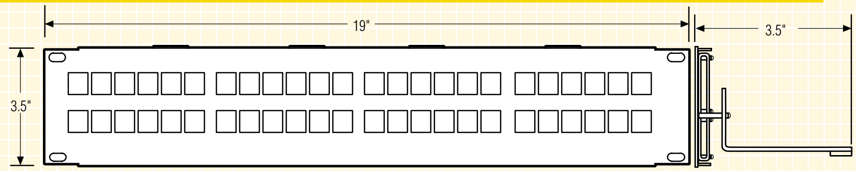
Quickport® High Density 24-Port Panel



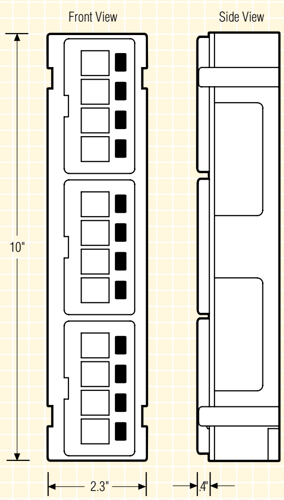
Quickport® 32-Port Panel



Quickport® High Density 48-Port Panel

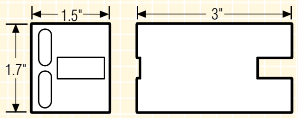


Quickport® Patch Block

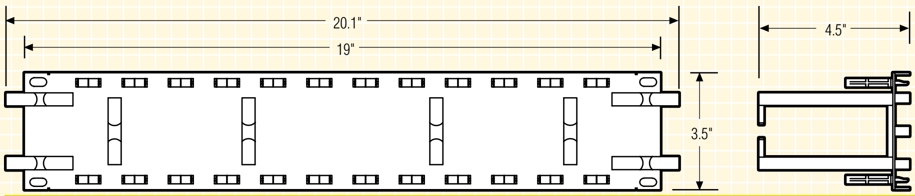


CABLE MANAGEMENT

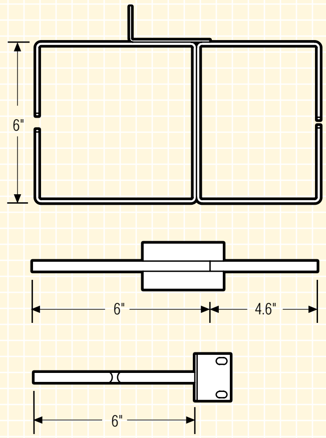
Tie Bracket



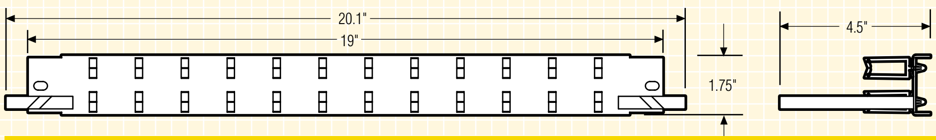
Two-Position Organizer Panel



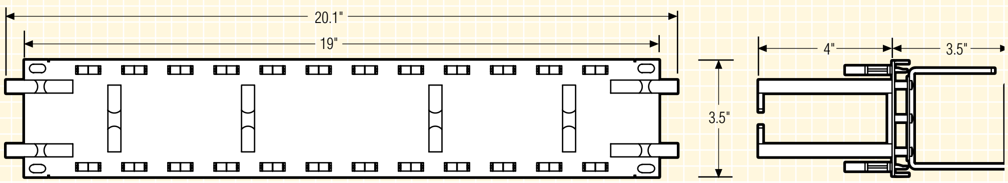
6" Vertical Manager Ring



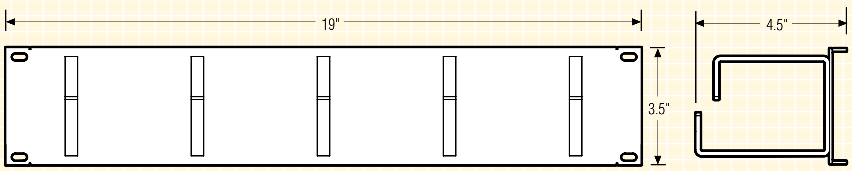
One-Position Organizer Panel



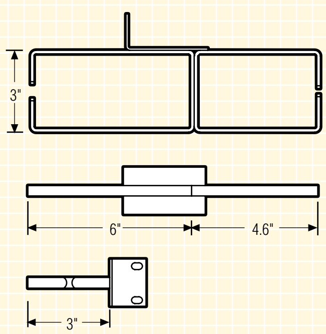
Combo Front/Rear/Manager



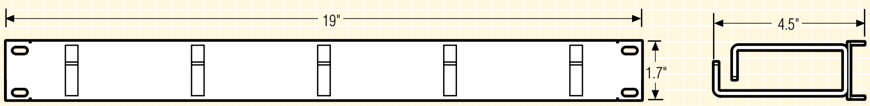
Standard Interbay Cord Manager



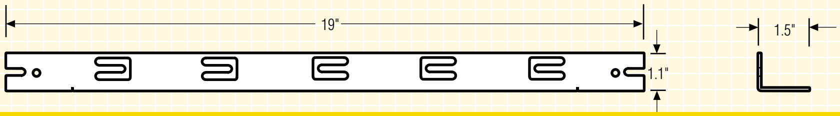
3" Vertical Manger Ring



Low-Profile Cord Manager

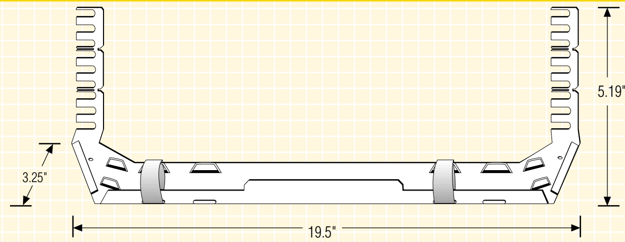


Support/Tie Wrap Bar

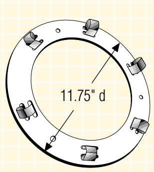


HOOK AND LOOP CABLE MANAGEMENT

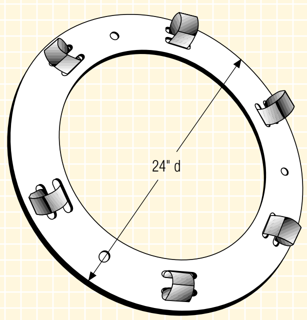
SpaceMaker® Cable Manager



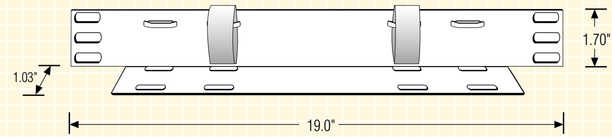
11.75" Recloseable Storage Ring



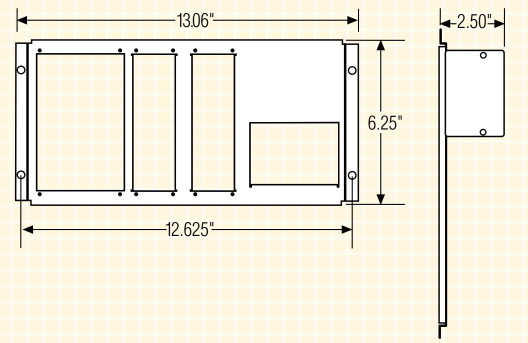
24" Recloseable Storage Ring



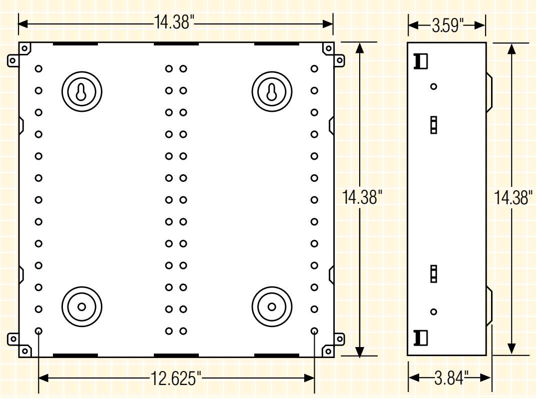
Recloseable Cable Bar



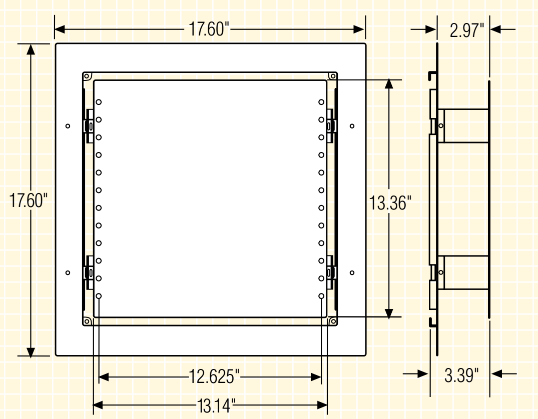
Pre-Configured Structured Cabling Panel



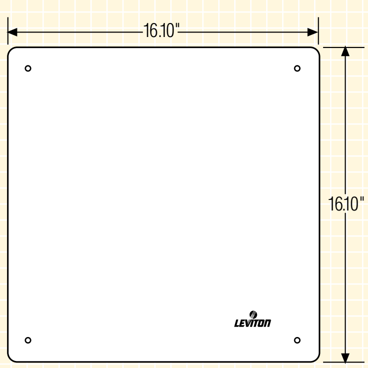
Series 140 Structured Media Center



Series 100 Structured Media Center



Series 100 & 140 Lid



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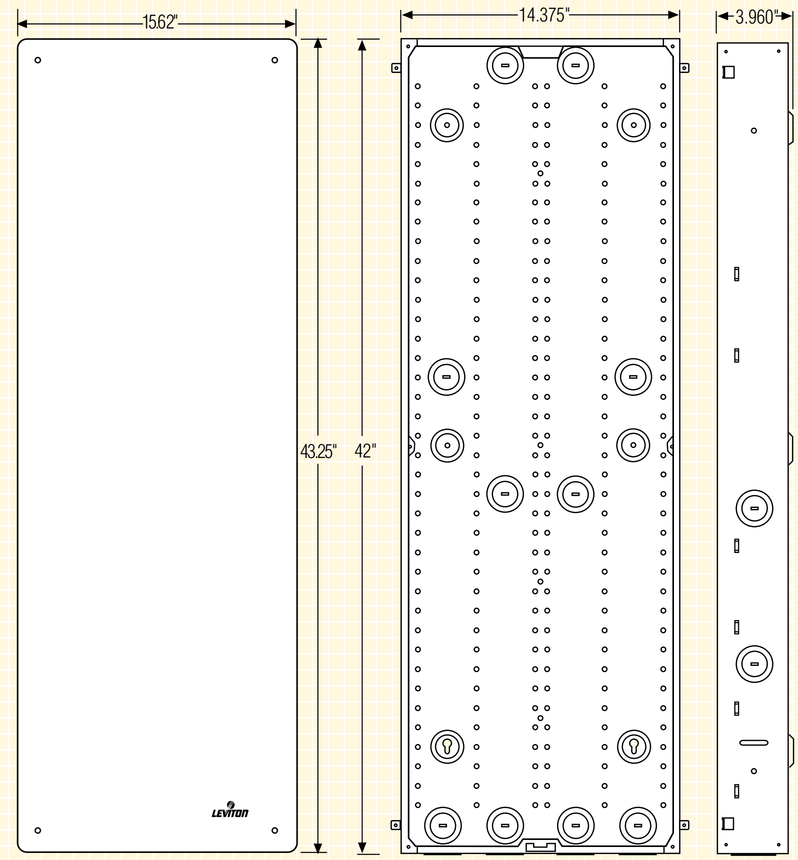

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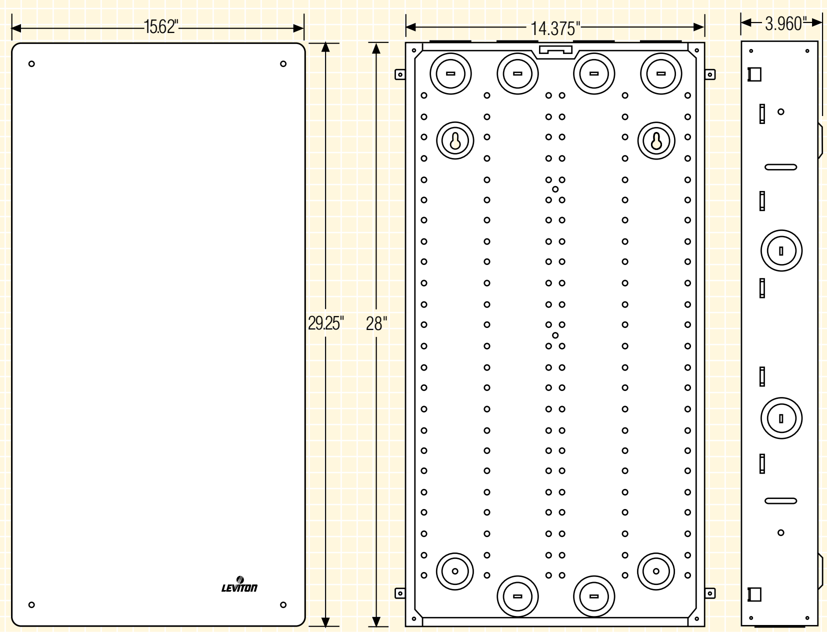
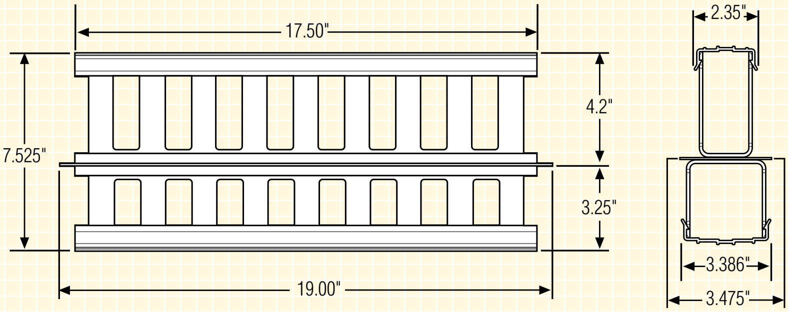
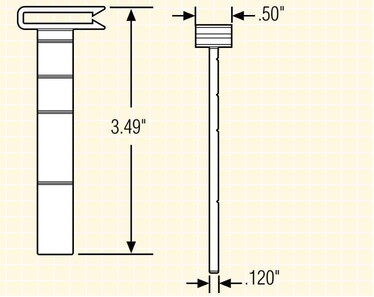


Horizontal Front and Rear Slotted Duct, 2RU



Cable Retainer



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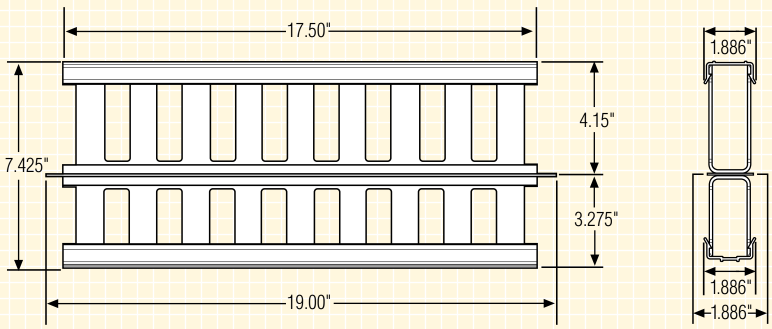
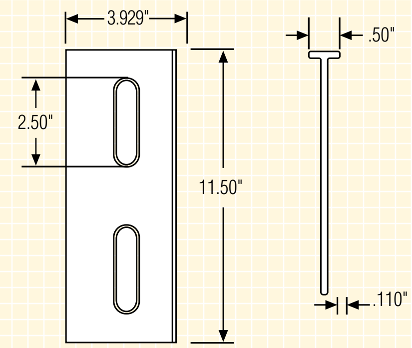


Vertical Divider



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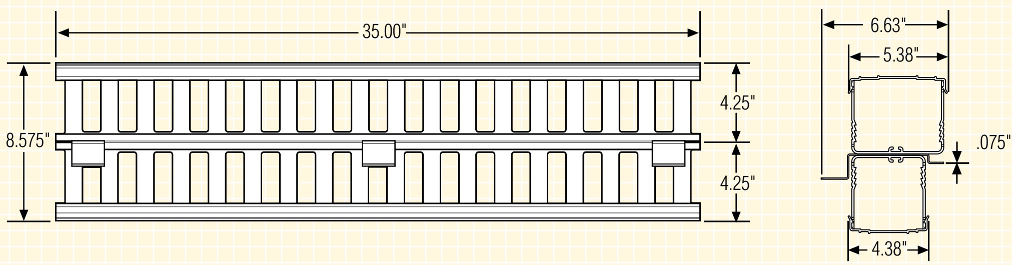
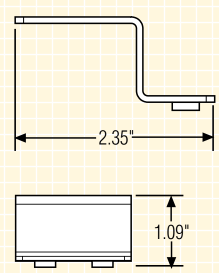
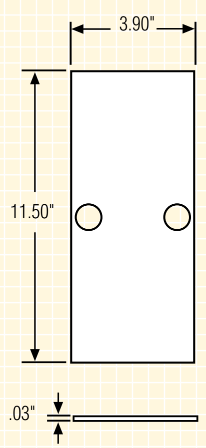


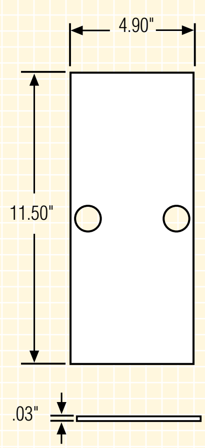
Mounting Braket



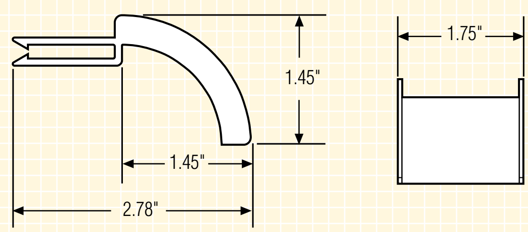
5" Front Lateral Divider



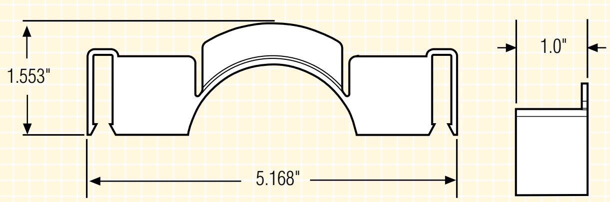
4" Rear Lateral Divider



Bend Radius Compliant Router

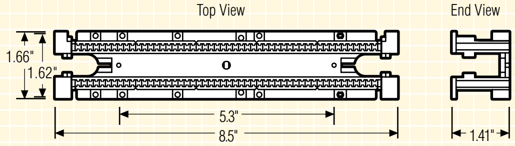


Slack Loop Storage Organizer

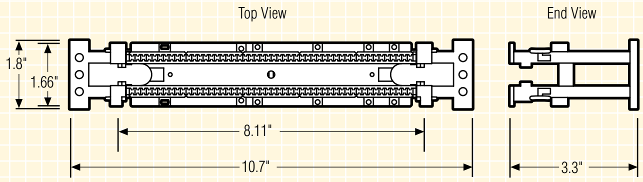


110 PRODUCTS

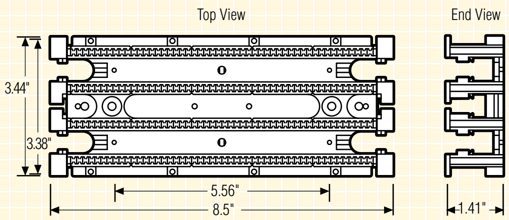
110 50-Pair Wiring Base



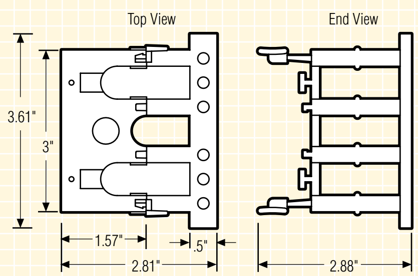
110 50-Pair Wiring Base with legs



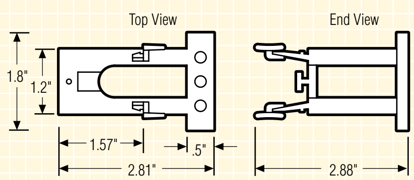
110 100-Pair Wiring Base



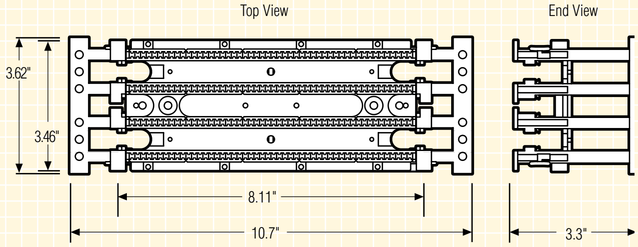
100-Pair Legs



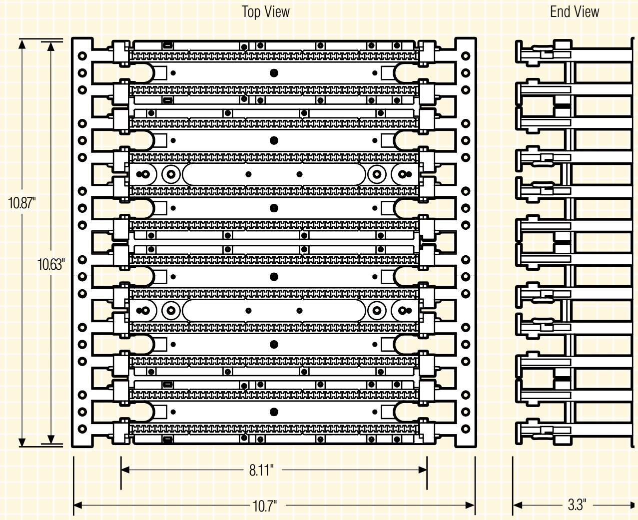
50-Pair Legs



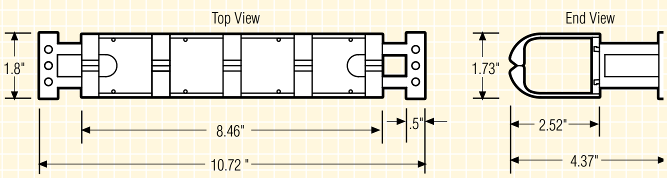
110 100-Pair Wiring Base with Legs



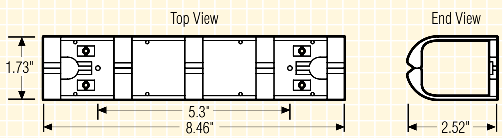
110 300-Pair Wiring Base with Legs



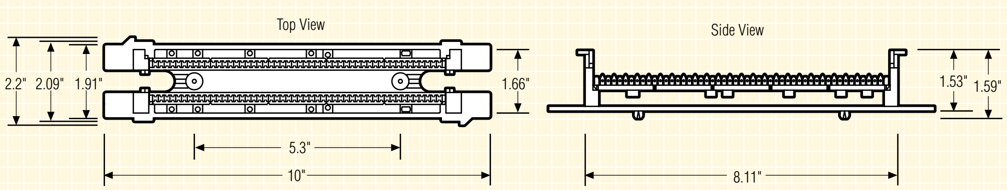
110 Horizontal Cord Manager with Legs



110 Horizontal Cord Manager without Legs

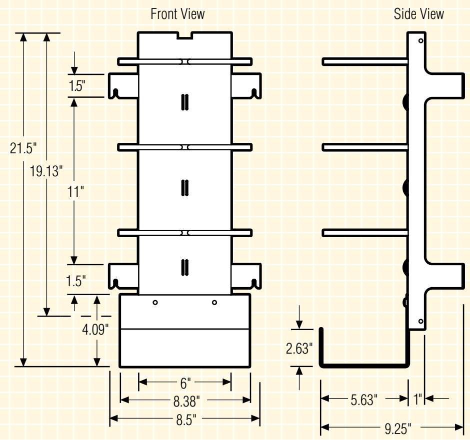


110 89D 50-Pair Wiring Base

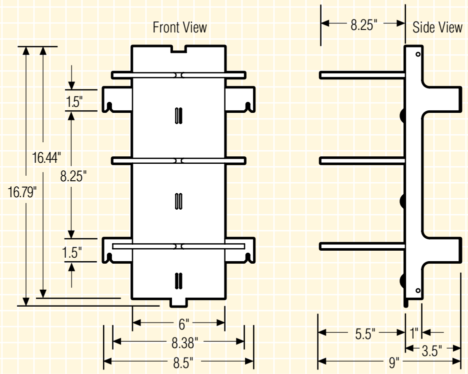


110 PRODUCTS

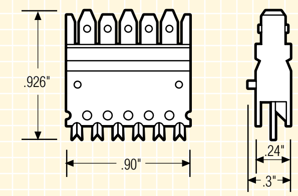
110 Vertical Cord Manager with Tray



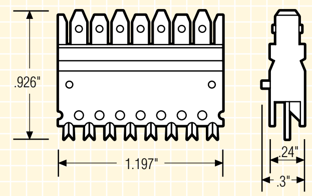
110 Vertical Cord Manager Extension



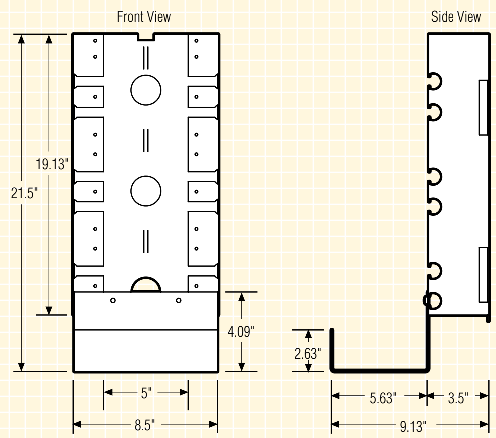
110 C-3 Connector Block



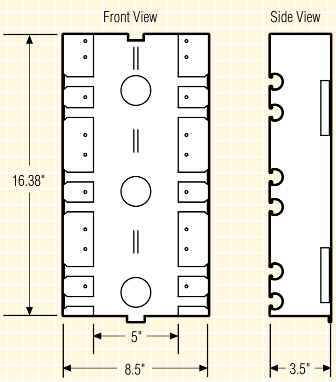
110 C-4 Connector Block



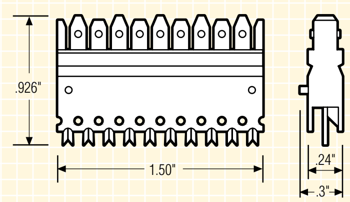
110 Tower



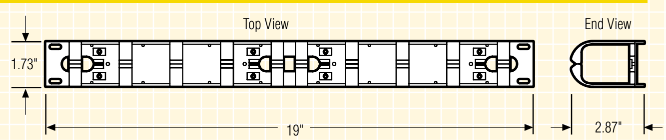
110 Tower Extension



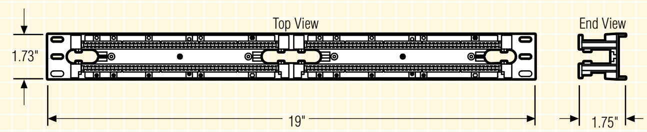
110 C-5 Connector Block



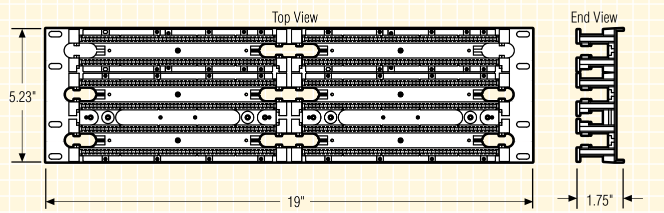
110 Rack Mount Horizontal Cord Manager



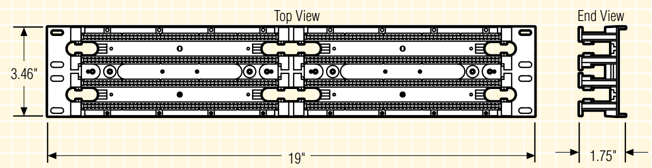
110 Rack Mount 100-Pair Wiring Base



110 Rack Mount 300-Pair Wiring Base

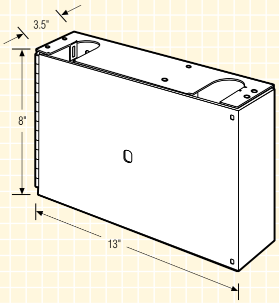


110 Rack Mount 200-Pair Wiring Base

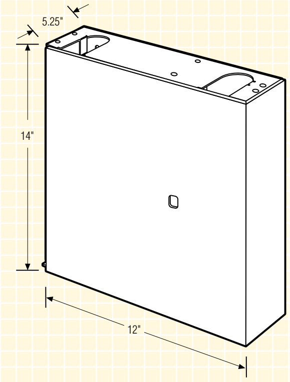


FIBER PRODUCTS

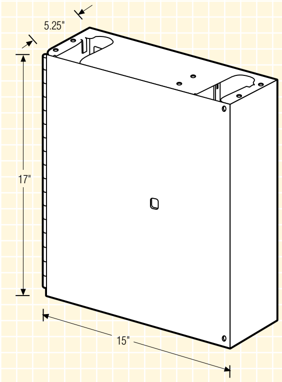
Small Wall-Mount Panel



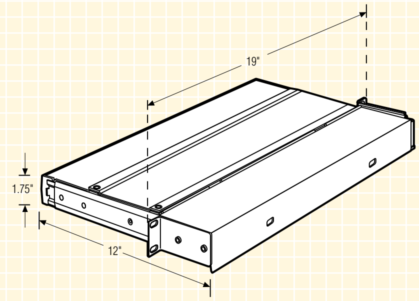
Medium Wall-Mount Panel



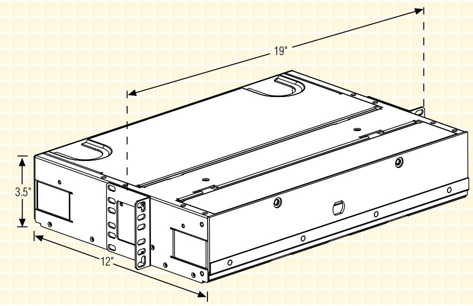
Large Wall-Mount Panel



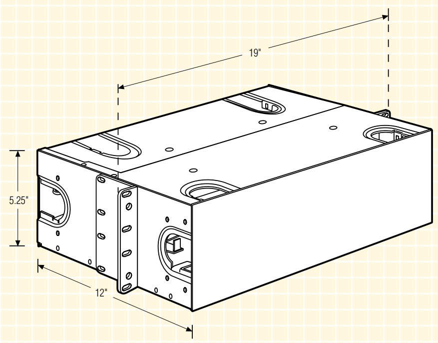
Low-Profile 1RU Rack-Mount Panel



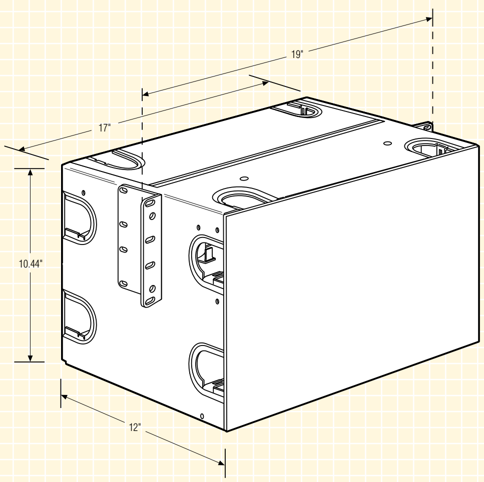
Universal 2RU Panel



3RU Rack-Mount Panel



6RU Rack-Mount Panel



Fiber Density Chart

Rack Mount Options

Low Profile 1RU

Holds 1 High-Density Bulkhead w/ or w/out 2 Mounting Plates

6-pack ST or FC = up to 12 Fibers
8-pack ST or FC = up to 16 Fibers
3-pack Duplex SC = up to 12 Fibers
6-pack SC = up to 24 Fibers
6-pack MT-RJ = up to 24 Fibers
12-pack MT-RJ = up to 48 Fibers

2RU

Holds up to 6 Mounting Plates

6-pack ST or FC = up to 36 Fibers
8-pack ST or FC = up to 48 Fibers
3-pack Duplex SC = up to 36 Fibers
6-pack SC = up to 72 Fibers
6-pack MT-RJ = up to 72 Fibers
12-pack MT-RJ = up to 144 Fibers

3RU

Holds up to 12 Mounting Plates

6-pack ST or FC = up to 72 Fibers
8-pack ST or FC = up to 96 Fibers
3-pack Duplex SC = up to 72 Fibers
6-pack SC = up to 144 Fibers
6-pack MT-RJ = up to 144 Fibers
12-pack MT-RJ = up to 288 Fibers

6RU

Holds up to 24 Mounting Plates

6-pack ST or FC = up to 144 Fibers
8-pack ST or FC = up to 192 Fibers
3-pack Duplex SC = up to 144 Fibers
6-pack SC = up to 288 Fibers
6-pack MT-RJ = up to 288 Fibers
12-pack MT-RJ = up to 576 Fibers

Wall Mount Options

Small

Holds up to 2 Mounting Plates

6-pack ST or FC = up to 12 Fibers
8-pack ST or FC = up to 16 Fibers
3-pack Duplex SC = up to 12 Fibers
6-pack SC = up to 24 Fibers
6-pack MT-RJ = up to 24 Fibers
12-pack MT-RJ = up to 48 Fibers

Medium

Holds up to 4 Mounting Plates

6-pack ST or FC = up to 24 Fibers
8-pack ST or FC = up to 32 Fibers
3-pack Duplex SC = up to 24 Fibers
6-pack SC = up to 48 Fibers
6-pack MT-RJ = up to 48 Fibers
12-pack MT-RJ = up to 96 Fibers

Large

Holds up to 12 Mounting Plates

6-pack ST or FC = up to 72 Fibers
8-pack ST or FC = up to 96 Fibers
3-pack Duplex SC = up to 72 Fibers
6-pack SC = up to 144 Fibers
6-pack MT-RJ = up to 144 Fibers
12-pack MT-RJ = up to 288 Fibers

STANDARDS DOCUMENT INFORMATION SOURCES

American National Standards Institute (ANSI)
Sales Department
American National Standards Institute
11 West 42nd Street, 13th Floor
New York, NY 10036
(212) 642-4900
(212) 302-1286 (FAX)
www.ansi.org

American Society of Test Measurement (ASTM)
1916 Race Street
Philadelphia, PA 19103-1187
(215) 299-5585
(215) 977-9679 (FAX)

Bellcore
Bellcore Customer Service
8 Corporate Place
Piscataway, NJ 08854-4196
(800) 521-CORE (2673)
(732) 336-2559 (FAX)
www.bellcore.com

BICSI
Building Industry Consulting
Service International
8610 Hidden River Parkway
Tampa, FL 33637-1000
(800) 242-7405
(813) 971-4311 (FAX)
www.bicsi.org

Canadian Standards Association
Standards Sales
178 Rexdale Blvd.
Etobicoke, Ontario
Canada M9W 1R3
(416) 747-4044
(416) 747-2475 (FAX)
www.csa.ca

Department of Communications (Canada)
See Canadian Standards Association

Exchange Carriers Standards Association
5430 Grosvenor Lane
Bethesda, MD 20814

Federal Communications Commission
1919 M Street N.W.
Washington, DC 20554
(888) 225-5322
(202) 418-0232 (FAX)
www.fcc.gov

Global Engineering
15 Inverness Way East
Englewood, CO 80112
(800) 854-7179
(303) 397-2740 (FAX)
www.global.ihs.com

Institute of Electrical and Electronic Engineers, Inc.
IEEE Customer Service Center
445 Hoes Lane
PO Box 1331
Piscataway, NJ 08855-1331
(800) 678-4333
(732) 981-9667 (FAX)
www.ieee.org

Insulated Cable Engineers Association, Inc.
PO Box 440
South Yarmouth, MA 02664
(508) 394-4424
(508) 394-1194 (FAX)

International Organization for Standardization/International Electrotechnical Commission
See Global Engineering or Phillips Business Info.

International Telecommunications Union/ International Telegraph and Telephone Consultative Committee
See Global Engineering or Phillips Business Info.

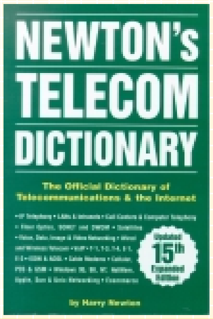
National Fire Protection Agency
Batterymarch Park
Quincy, MA 02269
www.opc.com

Phillips Business Info.
1201 Seven Locks Road, Ste. 300
Potomac, MD 20854
(301) 424-3338
(800) 777-5006
(301) 309-3847 (FAX)
www.phillips.com

Telecommunications Industry Association
2500 Wilson Blvd, Suite 300
Arlington, VA 22201
(703) 907-7700
(703) 907-7727
www.tiaonline.org

Underwriters Laboratories, Inc.
Corporate Progress
333 Pfingsten Road
Northbrook, IL 60062-2096
(847) 272-8800
(847) 272-8129 (FAX)
www.ul.com

GLOSSARY



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A

ATM Asynchronous Transfer Mode. A very high-speed transmission technology, ATM features high bandwidth, low delay, packet-like switching and multiplexing. Utilizes fixed-size cells with header and information fields.

Amplitude The distance between high or low points of a waveform or signal. Also referred to as wave "height".

Attenuation Loss of volume during transmission, or decrease in the power of a signal, light beam, or light wave. Measured in decibels. Opposite of gain.

AWG American Wire Gauge. Standard measuring gauge for non-ferrous conductors (i.e., non-iron and non-steel). Gauge measures the diameter of a conductor (thickness of cable).

B

Backbone Wiring The physical/electrical interconnections between telecommunications closets and equipment rooms. Cross-connect hardware and cabling in the Main and Intermediate Cross-Connects are considered part of the backbone wiring.

Bandwidth The difference between the highest and the lowest frequencies of a transmission channel (path for information transmission). Identifies the amount of data that can be sent through a given channel. Measured in Hertz (Hz); higher bandwidth numbers mean higher data capacity.

Bend Radius (Fiber) Radius of curvature that a fiber can bend without breaking. Also see Cable Bend Radius

BICSI (Building Industry Consulting Service International) Bicsi is a non-profit professional association, for the promotion of telecom industry standards.

Bit Error Rate (BER) In digital applications, the percentage of received bits in error to the total number of bits received. Usually expressed as a number to the power of 10. For example 10 to the fifth power means that one in every 100,000 bits transmitted will be wrong.

Buffer Coating Protective material coating applied to fibers. Stated in microns.

Bus A network topology in which nodes are connected to a single cable with terminations at each end.

C

Cable Assembly A fixed length of cable with connectors installed on both ends. Sometimes called a Patch Cord, or Patch Cable.

Cable Bend Radius The amount of bend that can occur before a cable may sustain damage or increased attenuation.

Category 3 CAT3, A Category of Performance for inside wire and cable systems. Commonly used for voice applications and data to 10 Mbps. Defined by FCC Part 68, ANSI/EIA/TIA-568, TIA TSB-36 and TIA TSB-40.

Category 5 CAT5, A Category of Performance for inside wire and cable systems. Used in support of voice and data applications requiring a carrier frequency of up to 100 MHz. Now the most common cabling being installed for LAN connectivity. Defined by FCC Part 68, EIA/TIA-568, TIA TSB-36 and TIA TSB-40.

Category 5e (Enhanced) CAT5e, A Category of Performance for inside wire and cable. Used in support of signalling rates of up to 100MHz over distances of up to 100 meters. Calls for tighter twists, electrical balancing between pairs and fewer cable anomalies. CAT5e is intended to support 100Base-T, ATM and Gigabit Ethernet.

Category 6 CAT6, A developing cable standard for UTP (Unshielded Twisted Pair) intended to support signaling rates up to 200 MHz. Applications will include 100Base-T, ATM and Gigabit Ethernet and wiring under development.

Category of Performance Cabling and cabling component standard adopted by the telecommunications industry.

Cladding The transparent material, usually glass, that surrounds the core of an optical fiber, causing any dispersed light to be reflected back into the central core, thereby helping to maintain signal strength over long distances.

Cleaving To cut the end of fiber at 90 degrees with as few rough edges as possible before a fiber termination.

CO Central Office. Telephone company facility where subscribers' lines are joined to switching equipment for connection to each other, locally and long distance. Sometimes the same as the overseas term "public exchange".

Coaxial Cable A cable composed of an insulated central conducting wire wrapped in another cylindrical conductor (the shield). The whole thing is usually wrapped in another insulating layer and an outer protective layer. A coaxial cable has great capacity to carry vast quantities of information. It is typically used in high-speed data and CATV applications.

Compliance A wiring device that meets all characteristics of a standard is said to be in compliance with that standard.

Conductor Any substance, usually a wire or cable, that can carry an electrical current.

Connecting Block Also called a terminal block, punch-down block, quick-connect block, or crossconnect block. A plastic block containing metal wiring terminals to establish connections from one group of wires to another. Usually each wire can be connected to several other wires in a bus or common arrangement. There are several types of connecting blocks: 66 clip, BIX, Krone, 110, etc. A connecting block has insulation displacement connections (IDCs), which means you don't have to remove insulation from around the wire conductor before you "punch it down" (terminate it).

Connector A device that connects wires or fibers in cable to equipment or other wires or fibers. Wire and optical connectors most often join transmission media to equipment or cross connects. A connector at the end of a telephone cable or wire is used to join that cable to another cable with a mating connector or to some other telecommunications device. Note: Connectors are sometimes referred to as jacks, but though all jacks are connectors, not all connectors are jacks.

Crossconnect Distribution system equipment used to terminate and administer communication circuits. In a wire crossconnect, jumper wires or patch cords are used to make circuit connections. In an optical crossconnect, fiber patch cords are used. The crossconnect is located in an equipment room, riser closet, or satellite closet.

Crosstalk See Near-End Crosstalk.

D

Daisy Chain In telecommunications, a wiring method where each telephone jack in a building is wired in series from the previous jack. Daisy chain is NOT the preferred wiring method, since a break in the wiring would disable all jacks "downstream" from the break. See also Home Run.

dB (Decibel) A dB is a unit of measure of signal strength, usually the relation between a transmitted signal and a standard signal source. Every 3 dB equals 50% of signal strength, so therefore a 6 dB loss is a loss of 75% of total signal strength.

Demarcation Point The point of interconnection between telephone company terminal equipment and your building wiring. The protective apparatus or wiring at a subscriber's premises.

Device As distinguished from equipment. In telecommunications, a "device" is the physical interconnection outlet. Equipment (a computer, phone, fax machine, etc.) then plugs into the device. See also Equipment and Plug.

Drop Wire Outside wire pair(s) from the telco plant (cable), to a house or building for connection to a protector.

DTMF Acronym for Dual Tone, Multi-Frequency. See Tone Dial.

E

EIA Electronic Industries Alliance. A trade organization of manufacturers which set standards for use of its member companies. Many associations fall under the umbrella of EIA, though it has recently been absorbed by the TIA, or Telecommunications Industry Association. See www.eia.org or www.tiaonline.org.

Electromagnetic Interference (EMI) The interference in signal transmission or reception caused by the radiation of electrical and magnetic fields.

Equipment As distinguished from Device. Telecom equipment (computers, phones, faxes, etc.) plugs into telecommunications outlets or devices. See also Device.

Epoxy Connector A type of fiber optic connector that requires a chemical bond, or epoxy.

Ethernet A type of local area network used for connecting computers, printers, workstations, terminals, etc. within the same building. Ethernet is a physical link and data link protocol that operates over twisted pair wire and over coaxial cable at speeds up to 10 Mbps. Ethernet LANs are being promoted by DEC, Intel and Xerox. Compare with Token Ring.

F

Ferrule A component of a fiber optic connection that holds a fiber in place and aids in its alignment.

Fiber Optics A technology in which light is used to transport information from one point to another. More specifically, fiber optics are thin filaments of glass through which light beams are transmitted over long distances carrying enormous amounts of data.

H

Headroom (also called Overhead or Margin) The number of decibels by which a system exceeds the minimum defined requirements. The benefit of headroom is that it reduces the bit-error rate (BER), and provides a performance 'safety net' to help ensure that current and future high speed applications will run at peak accuracy, efficiency and throughput.

Home Run Phone system wiring where the individual cables run from each phone directly back to the central switching equipment. Home run cabling can be thought of as "star" cabling. Every cable radiates out from the central equipment. All PBXs and virtually all key systems work on home run cabling. Some local area networks work on home run wiring. See also Star Wiring, Daisy Chain.

Hub The point on a network where circuits are connected. Also, a switching node. In Local Area Networks, a hub is the core of a star as in ARCNET, StarLAN, Ethernet, and Token Ring. Hub hardware can be either active or passive. Wiring hubs are useful for their centralized management capabilities and for their ability to isolate nodes from disruption.

Hybrid Connector A connector containing both optical fiber and electrical conductors.

I

Insertion Loss The difference in the amount of power received before and after something is inserted into the circuit. In optical fiber, insertion loss is the optical power loss due to all causes, usually expressed as decibel/kilometer.

Insulation Displacement Connection (IDC) A type of wire termination where wire is "punched down" into a metal holder which cuts into the insulation wire and makes contact with the conductor, causing the electrical connection to be made.

IDF Intermediate Distribution Frame. A metal rack designed to connect cables and located in an equipment room or closet. Consists of components that provide the connection between inter-building cabling and the intra-building cabling, i.e. between the Main Distribution Frame (MDF) and individual phone wiring. There's usually a permanent, large cable running between the MDF and IDF. The changes in wiring are done at the IDF. This saves confusion in wiring.

IEEE 802.3 IEEE stands for the Institute of Electrical and Electronic Engineers, a publishing and standards-making body responsible for many standards used in LANs, including the 802 series. Ethernet and StarLan both follow the 802.3 standard. Typically they transmit at 10 megabits per second. This is the most common local area network specification.

Impedance The total opposition (i.e. resistance and reactance) a circuit offers to the flow of alternating current. It is measured in ohms, and the lower the ohmic value, the better the quality of the conductor.

Interconnect 1. A circuit administration point, other than a crossconnect or an information outlet, that provides capability for routing and rerouting circuits. It does not use patch cords or jumper wires, and typically is a jack-and-plug device used in smaller distribution arrangements or that connects circuits in large cables to those in smaller cables. 2. An Interconnect Company is one which sells, installs, and maintains telephone systems for end users, typically businesses.

ISDN Integrated Services Digital Network. According to AT&T, today's public switched phone network has many limitations; ISDN's vision is to overcome these deficiencies.

J

Jack A receptacle used in conjunction with a plug to make electrical contact between communication circuits. Jacks and their associated plugs are used in a variety for connecting hardware applications including cross connects, interconnects, information outlets, and equipment connections. Jacks are used to connect cords or lines to telephone systems. A jack is the female component of a plug/jack connector system, and may be standard, modified, or keyed.

Jacket Also Cable Jacket or Sheath. The outer covering applied over internal cable elements for protection.

L

LAN Local Area Network. A short distance network (typically within a building or campus) used to link together computers and peripheral devices (such as printers) under some form of standard control.

Loop 1. Typically a complete electrical circuit. 2. The loop is also the pair of wires that winds its way from the central office to the telephone set or system at the customer's office, home or factory (i.e., 'premises' in telephony terms).

M

Mbps MegaBits Per Second. One million bits per second. (Different from MBps, or a million bytes per second.)

MDF Main Distribution Frame. A wiring arrangement which connects the telephone lines coming from outside on one side and the internal lines on the other. A main distribution frame may also carry protective devices as well as function as a central testing point.

MHz Megahertz. A unit of frequency denoting one million Hertz (i.e., 1,000,000 cycles per second).

MIcron One thousandth of a millimeter, or one millionth of a meter. Can be used to specify the core diameter of fiber-optic network cable.

MMJ Modified Modular Jack. A six-wire modular jack with the locking tab shifted off to the right hand side. Used in the DEC wiring system.

Modular Equipment is said to be modular when it is made of "plug-in units" which can be added together to make the system larger, improve the capabilities, or expand its size.

MT-RJ A small form factor style of fiber optic connector that is defined by its high density footprint and RJ-47 locking mechanism.

Multimode An optical fiber designed to allow light to carry multiple carrier signals, distinguished by frequency or phase, at the same time. (Contrasts with singlemode.)

N

Nanometer One billionth of a meter, abbreviated nm. The nanometer is a convenient unit for describing the wavelength of light.

Near-End Crosstalk (NEXT) Electrical noise coupled from one pair of wires to another within a multi-pair cable.

Network A network ties things together. Computer networks connect all types of computers and computer- related things—terminals, printers, modems, door entry sensors, temperature monitors, etc. The networks we're most familiar with are long distance ones, like phones and trains. Local Area Networks (LANs) connect computer equipment within a building or campus.

O

Open (Fault) Means that the circuit is not complete or the cable/fiber is broken.

Outlet A telecommunications outlet is a single-piece cable termination assembly (typically on the floor or in the wall), containing one or more modular telecom jacks. Such jacks might be RJs, coaxial terminators, fiber optic couplers, etc. See also Device and Equipment.

P

Part 68 Requirements Specifications established by the FCC as the minimum acceptable protection communications equipment must provide the telephone network.

Patching A means of connecting circuits via cords and connectors that can be easily disconnected and reconnected at another point. May be accomplished by using modular cords connected between jack fields or by patch cord assemblies that plug onto connecting blocks.

PBX Private Branch Exchange. A small, privately-owned version of the phone company's larger telephone central switching office.

Performance Compare with Compliance. A device can exhibit performance characteristics without being compliant to an industry standard.

Plug A male component of a plug/jack connector system. In premises wiring, a plug provides the means for a user to connect communications equipment to the communications outlet.

Polarity Which side of an electrical circuit is the positive? Which is the negative? Polarity is the term describing which is which.

POTS Plain Old Telephone Service. The basic service supplying standard single line telephones, telephone lines and access to the public switched network. Just receive and place calls. No added features like Call Waiting or Call Forwarding.

Power Sum A test method for four pair cable whereby the mathematical sum of pair-to-pair crosstalk from three pairs to one pair is measured.

Premises Telephony term for the space occupied by a customer or authorized/joint user in a building(s) on continuous or contiguous property (except railroad rights of way, etc.) not separated by a public road or highway.

Premises Wiring System The entire wiring system on the user's premises, especially the supporting wiring that connects the communications outlets to the network interface jack.

R

RBOC Regional Bell Operating Company. Seven RBOCs exist, each of which owns two or more Bell Operating Companies (BOCs). The RBOCs were carved out of the old AT&T/Bell System during the divestiture of the Bell operating companies from AT&T in 1984.

RCDD The RCDD (Registered Communications Distribution Designer) title is a professional rating granted by BICSI (the Building Industry Consulting Service International). RCDDs have demonstrated a superior level of knowledge of the telecommunications wiring industry and associated disciplines.

Return Loss A measure of the similarity of the impedance of a transmission line and the impedance at its terminations. It is a ratio, expressed in decibels, of the power of the outgoing signal to the power of the signal reflected back.

Ring As in Tip and Ring. One of the two wires needed to set up a telephone connection. See Tip.

RJ Registered Jack. RJs are telephone and data jacks/applications registered with the FCC. Numbers, like RJ-11, RJ-45, etc. are widely misused in the telecommunications industry. A much more precise way to identify a jack is to specify the number of positions (width of opening) and number of conductors. Example: "8-position, 8-conductor jack" or "6-position, 4-conductor jack".

S

Series Wiring See Daisy Chain.

Service Loop When a device is terminated to the wire in the communications outlet, a fair amount of "slack" should be left on the wire and wound in the box to accommodate future trimming when devices are changed out.

Singlemode A fiber that allows only a single mode of light to propagate. This eliminates the main limitation to bandwidth, modal dispersion.

Splice The joining of two or more cables together by connecting the conductors pair-to-pair.

Standards Agreed principles of protocol. Standards are set by committees working under various trade and international organizations.

Star Wiring/Star Topology See Home Run.

T

T1 A standard for digital transmission in North America. A digital transmission link with a capacity of 1.544 Mbps (1,544,000 bits per second.) T1 lines are used for connecting networks across remote distances. Bridges and routers are used to connect LANs over T1 networks.

Talk Battery The DC voltage supplied by the central office to the subscriber's loop, which allows voice conversation.

TCP/IP A set of protocols developed by the department of the defense to link dissimilar computers across many kinds of networks.

Telco An Americanism for TELephone COmpany.

Ten Base-T See10Base-T at end of Glossary.

Terminate To connect a wire conductor to something, typically a piece of equipment.

TIA Telecommunications Industry Association. A trade organization of manufacturers which sets standards for use of its member companies. Formerly fell under the umbrella of EIA, (Electronic Industries Alliance). See www.tiaonline.org.

Tip 1. The first wire in a pair of wires. (The second wire is called the "ring" wire.) 2. A conductor in a telephone cable pair which is usually connected to positive side of a battery at the telco. It is the phone industry's equivalent of Ground in a normal electrical circuit. See Ring.

Tone Dial A push-button telephone dial that makes a different sound (in fact, a combination of two tones) for each number pushed. The technically correct name for tone dial is Dual Tone Multi Frequency, or DTMF.

Token Ring A ring topology for a local area network (LAN) in which a supervisory frame, or token, must be received by an attached terminal or workstation before that terminal or workstation can start transmitting. The workstation with the token then transmits and uses the entire bandwidth of whatever communications media the token ring network is using.

A token ring can be wired as a circle or a star, with the workstations wired to a central wiring center, or to multiple wiring centers. The most common wiring scheme is called a star-wired ring. Whatever the wiring, a token ring LAN always works logically as a circle, with the token passing around the circle from one workstation to another.

The advantage of token ring LANs is that media faults (broken cable) can be fixed easily, since it's easy to isolate the faults. Token rings are typically installed in centralized closets, with loops snaking to served workstations.

Topology As in network topology. The geometric physical or electrical configuration describing a local communication network; the shape or arrangement of a system. The most common topologies are the bus, ring and star.

TP-PMD Twisted Pair - Physical Media Dependent. Technology under review by the ANSI X3T9.5 working group that allows 100 Mbps transmission over twisted-pair cable.

Twisted Pair Two insulated copper wires twisted around each other to reduce induction (thus interference) from one wire to the other. The twists, or lays, are varied in length to reduce the potential for signal interference between pairs. Several sets of twisted pair wires may be enclosed in a single cable. In cables greater than 25 pairs, the twisted pairs are grouped and bound together.

U

UL Underwriters Laboratories, a privately owned company that tests to make sure that products meet safety standards. UL also administers a program for the certification of Category-Rated Cable.

USOC Universal Service Order Code. An old Bell system term identifying a particular service or equipment offered under tariff.

UTP Unshielded Twisted Pair. See Twisted Pair.

W

Workstation The working area in a building required by one telecommunications user. Industry standards call for one voice drop and one data drop for each workstation. The voice drop is one 4-pair unshielded twisted pair (UTP). The data drop may be 100Ω 4-pair UTP, 150Ω 2-pair shielded twisted pair (STP), or optical fiber.

10BASE-T This is the IEEE standard that defines the requirement for sending information at 10 Mbps on unshielded twisted-pair cabling, and defines various aspects of running Ethernet on this cabling.

100BASE-T This is the IEEE standard that defines the requirement for sending information at 100 Mbps on unshielded twisted-pair cabling, and defines various aspects of running baseband Ethernet on this cabling.

1000BASE-T This is the proposed IEEE standard that defines the requirement for sending information at 1000 Mbps on unshielded twisted-pair cabling, and defines various aspects of running baseband Ethernet on this cabling.

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