KTS-270 Series UTP Components
Installation Instructions

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Introduction

This is the GE *KTS-270 Series UTP Components Installation Instructions* for models KTS-270, KTS-271, KTS-272-16, and KTS-273-16.

This UTP/CCTV system enables baseband (composite) video to be transmitted over unshielded twisted-pair (UTP) telephone wire for distances up to 3,000 ft. (900 m). These products do not transmit modulated or cable TV type signals. The wide bandwidth video signals employed are not compatible with dial-up telephone service. Designed with crosstalk immunity (NVT compatible), video signals can reside in the same wire bundle with other potentially interfering signals, such as ringing telephones and data communication signals. One-way or two-way video signals can reside in existing in-house wiring or where new Category 2 or better wires are supported. Video signals do not need to be digitized or compressed and do not have the associated signal degradation.

WARNING: To avoid a risk of fire or electrical shock, do not expose this product to moisture or rain.

Wiring guidelines

Do the following when wiring the product:

- Use point-to-point UTP wire, 24 to 16 AWG stranded or solid Category 2 or better.
- If applicable, place the video signal in the same wire bundle as other wires, such as video, telephone, data, control signals, or low-voltage power. It is okay to run the video signals in or near electromagnetic fields in accordance with National Electrical Code and local safety requirements.
- Measure the wire distance, and use transceivers that are designed for that distance.
- Make sure the wiring carrying the video signal is a twisted-pair (the blue-white/white-blue wires twisted together as a pair), not a split-pair (the blue-white conductor, part of one pair/orange-white conductor, part of another pair).

Avoid the following when wiring the product:

- Do not use shielded twisted-pair wire. It will severely degrade the distance performance. Short runs may be used with some signal degradation. Multipair wire with an overall shield is okay.
- Do not use untwisted wire. It will reduce the product's inherent interference immunity.
- Do not allow your installation to have bridge taps, loading coils, talk-battery, or MOV (metal-oxide varistor) type protectors. Bridge-taps are a twisted-pair connected to two twisted-pairs. Bridge-taps cause reflections as the signal propagates, resulting in *ghosts* in the video image.
- If the phone company is providing the cable runs between buildings, make sure it's *dry copper*. It should have the following: dial-tone, 48 volts, loading coils, bridge-taps, switching, or long paths to the phone company's central office and back.
- Because of near-end crosstalk, do not send a transmit and a receive signal in the same wire bundle (all signals should travel the same direction). Exceptions: less than 1,000 ft. (300 m) or Category 5 cable up to 2,000 ft. (600 m).
- Do not send *up-the-coax* PTZ signals through active (amplified) transceivers.
- For safety, never put UTP CCTV signals in the same conduit as high-voltage wiring.

Wiring resistance

Wire resistance can be measured with an ohmmeter by shorting the two conductors together at the far end, and measuring the loop-resistance out and back. *Table 1* shows the wire resistance by distance and wire gauge.

Table 1. Wire resistance

Distance		Wire gauge AWG			
Feet	Meters	18	20	22	24
250	76	3 ohm	5 ohm	8 ohm	13 ohm
315	96	4 ohm	6 ohm	10 ohm	16 ohm
397	121	5 ohm	8 ohm	13 ohm	21 ohm
500	152	7 ohm	10 ohm	17 ohm	26 ohm
630	192	8 ohm	13 ohm	21 ohm	33 ohm
794	242	10 ohm	16 ohm	26 ohm	41 ohm
1000	305	13 ohm	20 ohm	33 ohm	52 ohm
1260	384	16 ohm	25 ohm	42 ohm	66 ohm
1587	484	21 ohm	32 ohm	52 ohm	83 ohm
2000	610	26 ohm	40 ohm	66 ohm	104 ohm
2520	768	33 ohm	50 ohm	83 ohm	131 ohm
3175	968	41 ohm	63 ohm	105 ohm	165 ohm
4000	1219	52 ohm	80 ohm	132 ohm	208 ohm
5040	1536	66 ohm	101 ohm	166 ohm	262 ohm

PTZ control signals

Video signals can coexist in the same wire bundle with twisted-pair control signals, such as RS-422 and RS-485.

Ground lifting

Ground loop immunity (differences in grounds) is built-in to all active receiver models. This eliminates annoying ground loops that can result when connecting from building to building or floor to floor. Ground immunity is preserved when any active unit is used, even if the other end is passive (KTS-270).

Transient protection

Transient protection and surge suppression are built-in to most receiver/transceiver products. For optimal performance, follow the installation instructions in the order they appear.

Grounding

For the best protection against damaging transients, earth-ground connections must be short, smaller than or equal to 10 ft. (3 m) and thick, greater than or equal to 16 AWG. Connections should be made to a ground rod that is not shared with other equipment that might dump large currents, such as telephone company entry protection devices, lightning rods, metal-skinned buildings, and radio towers.

Environmental requirements

Temperature range for the KTS-270 and the KTS-272-16 is -4 to 167°F (-20 to 75°C).

Temperature range for the KTS-271 and the KTS-273-16 is 32 to 122 °F (0 to 50 °C).

Digital recording applications

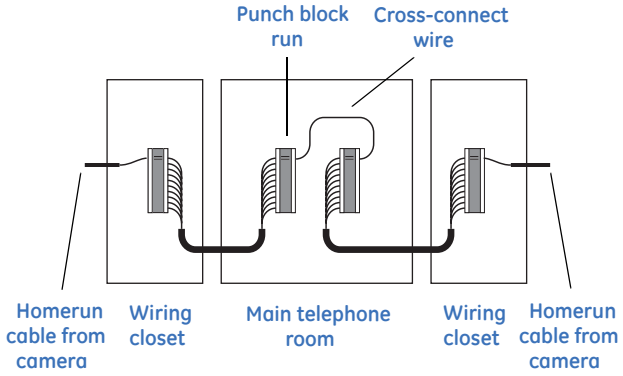
For the best signal quality, use an active receiver on all applications with wiring distance, including coaxial, greater than 750 ft. (228 m).

System layout

Use the following guidelines when planning your system layout:

- To facilitate installation, use existing wire. Assess your existing telephone cable-plant within the site or sites.
- Use a pair of battery-operated test devices called a toner set (available from telecom supply houses) to locate wire paths in the wiring closets and at both ends of wiring runs. One unit generates a distinctive audible warble signal. The other unit has a probe and speaker; when this unit is near the correct conductor, the warble can be heard. To get from the source location to the destination, find a spare homerun wire pair between the source and the wiring closet. When in the wiring closet, use a short length of twisted-pair cross-connect wire to connect between that pair and the pair that goes to the destination (*Figure 1*).

Figure 1. Wire paths



- If existing UTP is unavailable, it can be installed much more easily than coaxial. Use unshielded 24 to 16 AWG Category 2 or better telephone wire from camera to monitor. We recommend you use 66 or 110 blocks to distribute cross-connect signals to and from multipair bundles.
- Measure the distance of each run from camera to monitor.
- Select the correct transceivers/receivers for this distance.

Typical UTP configurations

You can use GE Security's UTP active and passive transceivers/receivers in various applications. When you use passive transceivers (KTS-270, KTS-272-16), video can be sent up to 1,000 ft. (300 m) over UTP wire. When you use active receivers (KTS-271, KTS-273-16), that distance can be extended to up to 3,000 ft. (900 m). Use these UTP components in conjunction with the CyberDome UTP interface module (KTS-275) on the camera end of the installation.

Figure 2 shows a typical camera-end configuration for distances up to 1,000 ft. (300 m), or up to 750 ft. (228 m) for DVR applications.

Figure 2. Typical camera-end configuration up to 1,000 ft.

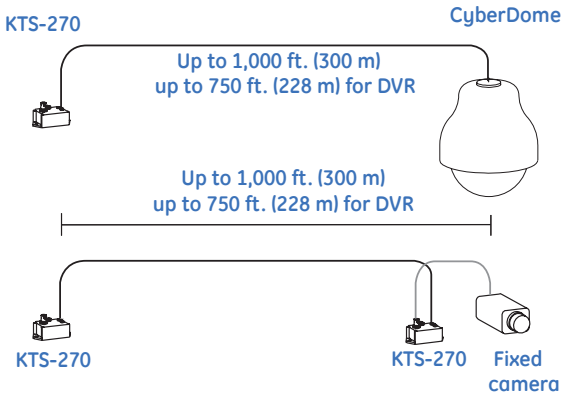
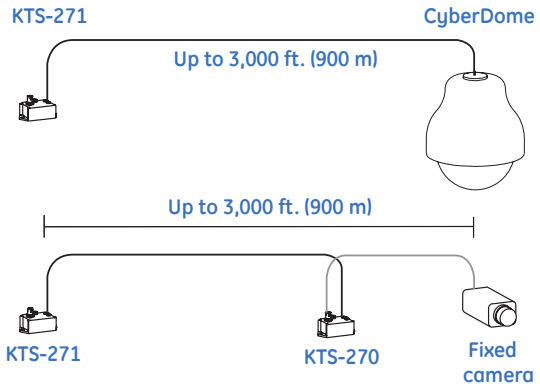


Figure 3 shows the typical camera-end configuration for distances up to 3,000 ft. (900 m).

Figure 3. Typical camera-end configuration up to 3,000 ft.



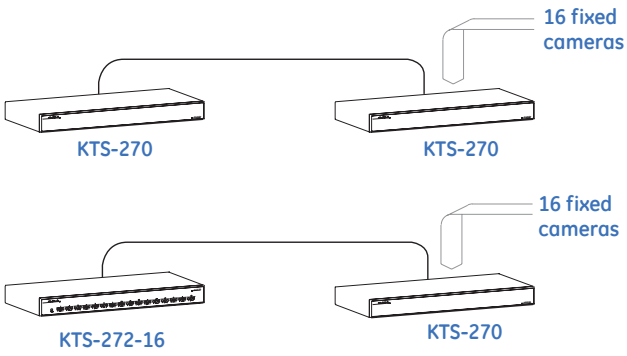
Note: The 1,000 and 3,000 feet distances include any coaxial in the run.

Older CyberDomes in an existing CCTV system can be fitted with the CyberDome UTP interface module, enabling them to transmit video over twisted-pair wire. Any fixed camera in the system can use a KTS-270 on the camera end to act as the transceiver in place of a CyberDome UTP interface module.

Typical hub configurations

You can rack mount hub receivers (KTS-272-16 and KTS-273-16) in a standard 19-inch rack or you can surface-mount them (*Figure 4*).

Figure 4. Typical hub configuration



Connecting the camera end

The instructions in this section are for video applications for a CyberDome with a UTP interface module.

You can fit existing CyberDomes and CyberDomes with a pendant-mount with the KTS-275 CyberDome UTP interface module. A CyberDome ordered with the CyberMount uses a UTP card that is internal to the mount itself.

To connect the camera end, see *Figure 5* for the pendant-mount UTP module and *Figure 6* for CyberMount UTP module, and do the following:

1. Insert the 24-volt power conductor ends into the screw terminals and tighten the screws. Polarity is not necessary.
2. Observing polarity, insert the conductor ends of the RS-422 control signal into the appropriate screw terminals and tightens the screws. Torque to 5 in.-lb. (0.058 kg-m).

   Note: The RS-422 must travel over twisted-pair wire.
3. Observing polarity, insert the conductor ends of the new or existing video twisted-pair wire into the appropriate screw terminals and tighten the screws. Torque to 5 in.-lb. (0.058 kg-m).
4. Plug the RJ45 cable into the RJ45 jack.
5. If the heater and fan option is included in the CyberDome, connect the Molex connector to the two-pin Molex receptacle located on the twisted-pair module.

Figure 5. Connection on pendant-mount UTP module

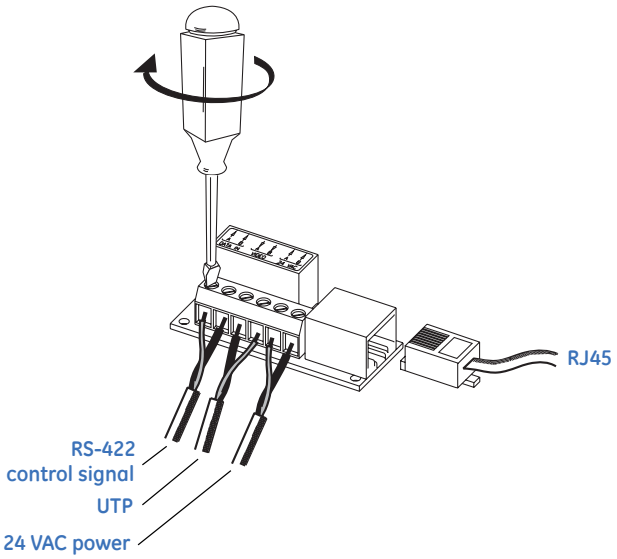
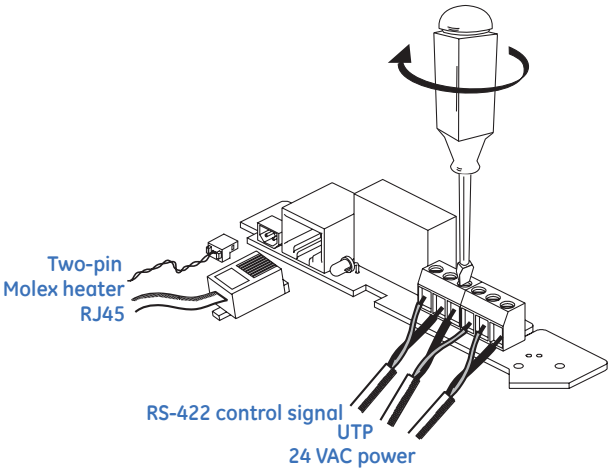


Figure 6. Connection on CyberMount UTP module



Connecting the monitor end

The instructions in this section are for video applications using models KTS-270, KTS-271, KTS-272-16, or KTS-172-16.

Because GE Security's UTP system was designed to operate with the integrated UTP CyberDome, all other UTP components are normally considered monitor-end installation components (receivers). You can use the KTS-270 as a transmitter or receiver in certain application.

Connecting the KTS-270

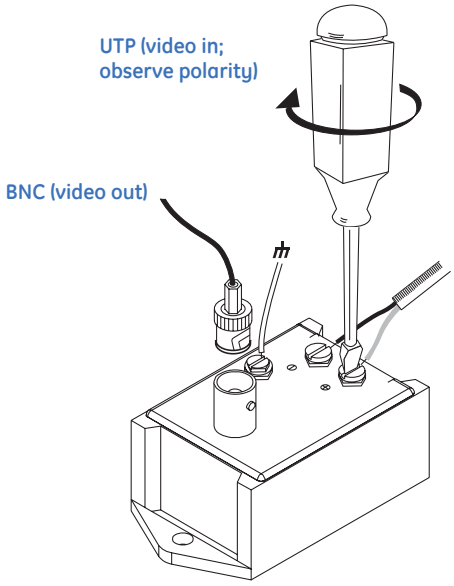
You can use the KTS-270 single-output passive transceiver as either a UTP video receiver or UTP video transmitter. Because it operates with an integrated UTP CyberDome, these instructions detail monitor-end installation.

To connect the KTS-270, do the following:

1. Select a flat mounting site for the KTS-270.
2. Observing polarity, insert the CyberDome video UTP conductors into the screw terminals and tighten the screws (*Figure 7*). Torque to 5 in.-lb. (0.058 kg-m).
3. Connect the monitoring-device video signal cable to the BNC connector.
4. Insert a solid earth ground wire into the ground screw terminal and tighten the screw.

   Note: Connect the ground to the same electrical ground used by the monitor and other receive-end equipment.

Figure 7. Connections on KTS-270



Connecting the KTS-271

You can use the KTS-271 only as a UTP video receiver. You cannot use it to transmit video over UTP wire.

CAUTION: The KTS-271 power supply requirement is 12 to 24 VAC/VDC at 100mA.

The power supply must have a floating output. Multiple KTS-271s can share a power supply.

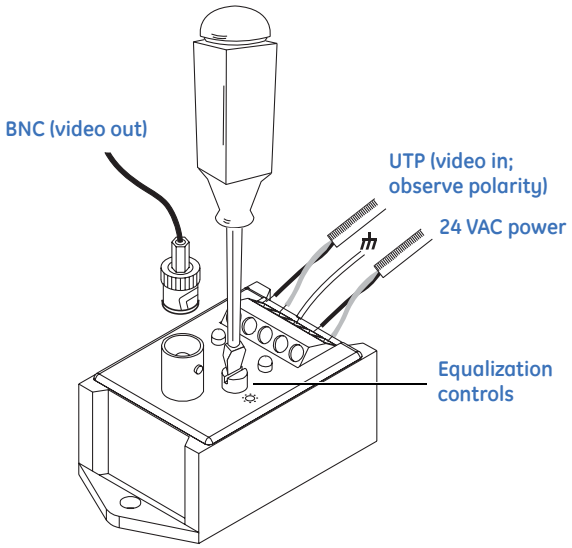
WARNING: Use power supplies marked Class 2 or LPS (limited power source). Using an incorrect power supply can cause electric shock or fire.

To connect the KTS-271, do the following:

1. Select a flat mounting site for the KTS-271.
2. Observing polarity, insert the CyberDome video UTP conductors into the video terminals (*Figure 8*). Torque to 5 in.-lb. (0.058 kg-m).
3. Connect the monitoring-device video signal cable to the BNC connector.
4. Insert a solid earth ground wire into the ground screw terminal and tighten the screw.

   Note: Connect the ground to the same electrical ground used by the monitor and other receive-end equipment.
5. Insert 24 VAC/VDC power conductors into the power screw terminals and tighten the screws. Polarity is not necessary.
   - The blue power LED lights.
   - The green active LED has a steady light signifying a video signal is present. A flickering green active light typically means that the UTP connection is faulty.

Figure 8. Connections on KTS-271



Distance equalization adjustments

For best pictures using the KTS-271, adjust the distance equalization controls. Two control adjustments can be made for each video/twisted-pair input: high frequency (sharpness) and low frequency (brightness).

Using a screwdriver (*Figure 8*), start with both controls fully counterclockwise. Adjust the brightness until the whitest part of the picture is white. Then, adjust the sharpness until the picture is clear.

Connecting the KTS-272-16

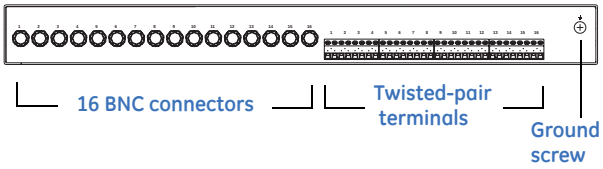
You can use the KTS-272-16 (16-output passive transceiver) as either a UTP video receiver or UTP video transmitter. Because it operates with the integrated UTP CyberDome, these instructions explain monitor-end installation.

To connect the KTS-272-16, do the following:

1. Install the KTS-272-16 on a flat surface or in a standard 19-inch rack.
2. Observing polarity, insert the CyberDome's video UTP conductors into the twisted-pair screw terminals and tighten the screws (*Figure 9*). Torque to 5 in.-lb. (0.058 kg-m).
3. Connect the monitoring devices video signal cable to the BNC connectors.
4. Insert a solid earth ground wire into the ground screw terminal (*Figure 9*) and tighten the screw.

   Note: Connect the ground to the same electrical ground used by the monitor and other receive-end equipment.

Figure 9. Connections on the KTS-272-16



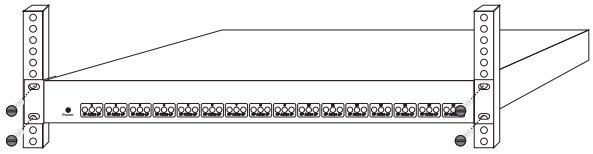
Connecting the KTS-273-16

You can use the KTS-273-16 (16-output active receiver) only to receive video over UTP wire. You cannot use it to transmit video over UTP wire.

To connect the KTS-273-16, do the following:

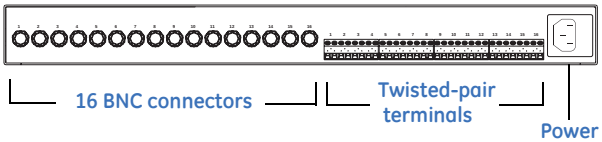
1. Set the switch on the bottom of the KTS-273-16 to the appropriate voltage (115 V or 230 V) for your power source.
2. Install the KTS-273-16 on a flat surface using self-adhesive rubber feet or in a standard 19-inch rack using the provided mounting brackets and screws (*Figure 10*).

Figure 10. Rack mounting the unit



3. Insert the power cord into the power socket on the back of the unit (*Figure 11*).

Figure 11. Connections on KTS-273-16



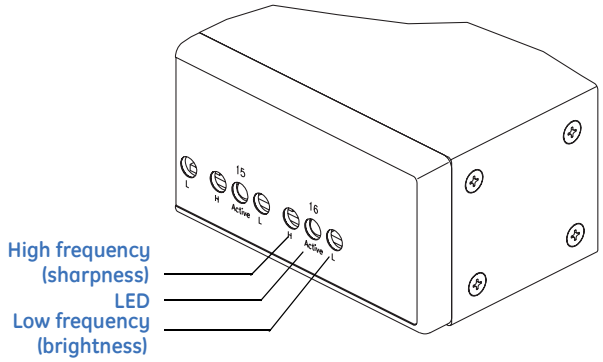
4. Insert the other end of the power cord into an approved grounded electrical outlet.
5. Observing polarity, insert the CyberDomes video UTP conductors into the twisted-pair screw terminals and tighten the screws. Torque to 5 in.-lb. (0.058 kg-m).
6. Connect the monitoring devices video signal cables to the BNC connectors.
7. Insert a solid earth ground wire into the ground screw terminal and tighten the screw.
8. Insert the AC power cord into the power screw terminals and tighten the screws. Polarity is not necessary.
   - The blue power LED lights.
   - Each corresponding green active LED has a steady light signifying a video signal is present. A flickering green active light typically means that the cabling is faulty.

Distance equalization adjustment

For the best picture using the KTS-273-16, adjust the distance equalization controls with a miniature screwdriver (*Figure 12*). Two control adjustments can be made for each video/twisted-pair input: H, corresponding to high frequency (sharpness), and L, corresponding to low frequency (brightness).

Using a screwdriver, start with both controls fully counterclockwise. Adjust the brightness until the whitest part of the picture is white. Then, adjust the sharpness until the picture is clear.

Figure 12. KTS-273-16 distance equalization controls



Troubleshooting

If you are experiencing problems, attempt to simplify your setup or isolate the problem. Test each cable segment separately. For example, test the camera and monitor together without the other equipment, then add the transceivers, back-to-back. Test each segment of a long cable-run independently

- ***There's no video.***

  Verify that good video is coming and going out. Verify with a portable monitor. Remove all intermediate equipment (switchers, multiplexers, etc.). Monitor the video signal as close as to the receiver end as possible.

- ***The picture is faint or blurry with little or no color.***

  The wire distance may be longer than expected. Verify that wire is unshielded twisted-pair cable. Multi-pair (six pairs or more) cable with an overall shield is okay. Be sure to include any coaxial cable as part of this distance.

  Verify end-to-end connectivity with an ohmmeter. Measure the distance by disconnecting the transceivers, shorting the far end, and reading the loop's resistance at the near end. See *Table 1* on page 1 for ohms versus distance ratings. If necessary, replace transceivers with correct models specified for this distance.

The distance equalization setting may be wrong. Adjust the equalization controls with a miniature screwdriver (KTS-271 and KTS-273-16).

There may be a poor connection at a punch-block, splice, or coaxial cable. Recheck using the method as described above, or use a wire test set.

There may be a short between conductors of the twisted-pair. Use an ohmmeter to locate a short.

There may be transient protection devices employing metal-oxide varistors. Use carbon blocks, gas-discharge tubes, or GE Security transceivers with built-in protection.

The camera settings may be wrong. Verify with a portable monitor that the focus and iris are set correctly.

- ***The picture is extremely faint.***

  One of the twisted-pair conductors is open or the wires are shorted together. Check with an ohmmeter.

- ***Will not sync; wide white jagged areas (looks like a scrambled cable TV signal).***

  Check polarity.

- ***Will not sync; torn picture.***

  Make sure that you are using unshielded twisted-pair wire.

  Check distance equalization settings.

  For installations with passive (nonamplified) transceivers at both ends, check for ground loops with an AC voltmeter. On the camera end, connect the twisted-pair together and connect to earth ground. At the monitor end, connect the twisted-pair together and measure with a voltmeter between the twisted-pair and earth ground. If the voltage is greater than 0.5 V, use an amplified receiver, such as the KTS-271 or KTS-273-16. Alternately, remove the ground at one end (usually at the camera end). Be sure that floating the camera conforms to local/regional and national electrical codes.

- ***Faint stripes are gliding up or down the screen.***

  There may be crosstalk from a second video path, or with ground-loops in installations employing passive models at both ends. To identify, temporarily disconnect all other video signals. If the interference goes away, check the wire to make sure the signal is traveling through a twisted-pair. Is two-way video being sent more than 1,000 ft. (300 m) over Category 2 or 3 wire? If so, you might need to upgrade to Category 5 wire or run the send and receive signals in separate jacketed cables.

  Check for ground loops.

- ***No power LED.***

  Check the power LED on powered units. If the light is not on, the receiver is not getting power. Recheck the power source and connections. If the video signal LED is on but the power LED is off, recheck the power source connections. Grounding one side of the power input can cause this condition.

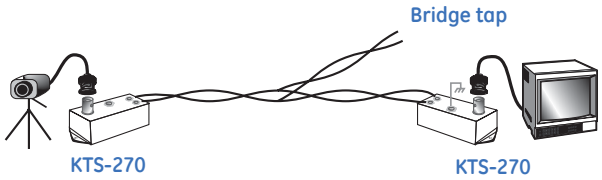
- ***No green light, no video.***

  The KTS-271/273-16 series receiver/hub is not detecting a video signal. There is an open or shorted connection. Use a multimeter to locate the fault.

- ***There are ghosts (faint shadows of the original signal shifted to the right).***

  There is an impedance mismatch along the wire. Verify that the monitor is terminated with 75 ohm (not in loop-through). Check that all wire is unshielded twisted-pair. The high-frequency should be 100 ohm. Check for bridge-taps (*Figure 13*) by inspecting the wiring closet connections or by using a time-domain reflectometer, sometimes called a cable tester.

Figure 13. Example of a bridge tap



FCC This device complies with part 15 of the FCC rules for Class B devices. Operation is subject to the following conditions:

1. This device may not cause harmful interference.
2. This device must accept any interference received, including interference that may cause undesired operation.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

EMC European representative for manufacture (EMC):
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The European directive *Waste Electrical and Electronic Equipment* (WEEE) aims to minimize the impact of electrical and electronic equipment waste on the environment and human health. For proper treatment, recovery, and recycling, return the equipment marked with this symbol to your local supplier upon the purchase of equivalent new equipment, or dispose of it in designated collection points. For more information, visit *www.recyclethis.com*.

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