

Digital TV TROUBLESHOOTING

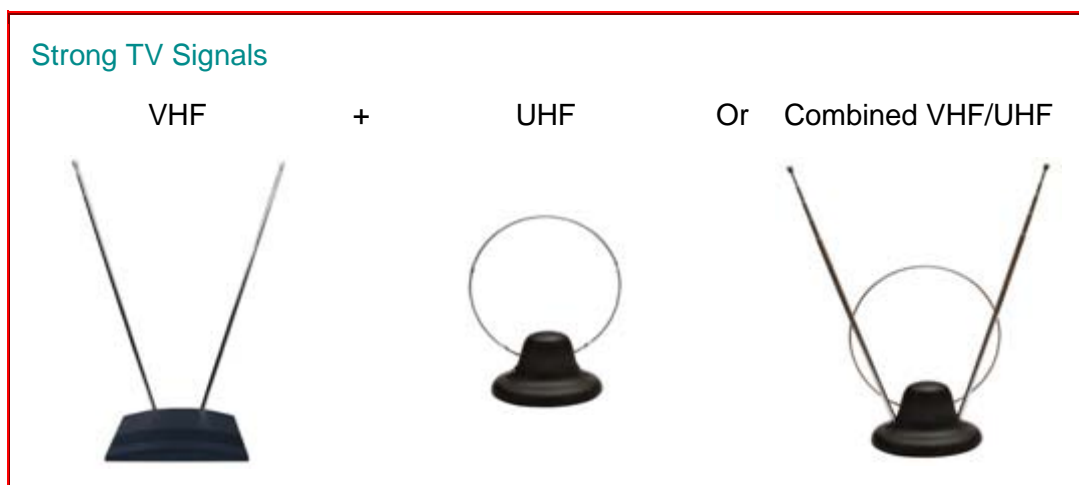
Broadcast TV stations in the U.S. have switched from analog to digital transmissions. This Fact Sheet provides information on TV antennas and tips for obtaining good quality reception of digital broadcasts.

What Kind of Antenna Do I Need to Receive Digital TV Signals?

To receive digital TV signals from all stations, it is important that your antenna be able to receive both VHF channels (channels 2-13) and UHF channels (channels 14-51). Some antennas only provide good reception of VHF or UHF channels, but not both. For example, indoor “rabbit ears” usually need to be augmented with an additional “wire loop” or “bowtie” antenna (see pictures below) in order to pick up signals on UHF channels. Consumers should be aware that even if they use a digital-to-analog converter box, they will still need to use an antenna to receive DTV signals. Many of the antennas currently being sold as “HDTV Antennas,” perform best at receiving UHF signals; some of these models state that they provide reception of signals on channels 7-13 but actually perform less well receiving those channels. If you obtain one of these antennas, be sure it provides good reception of all the VHF channels as well as the UHF channels. The reception capabilities of TV antennas also vary considerably, so be sure to talk to retail consultants and look at information on the packaging and/or the Internet to make sure that any new antenna you may choose provides good reception of both VHF and UHF channels. In addition, if you use an indoor antenna and receive signals on VHF channels, you may need to use an antenna with amplification. To check for the DTV signals that are available at your location, use the DTV Reception Maps available at www.fcc.gov/mb/engineering/maps.

Antennas for Reception in Different Signal Conditions

The antennas shown below will work for the indicated signal strength in most instances, but may not work in all cases. Indoor reception of TV signals may be affected by factors such as nearby buildings, trees, terrain, or home construction.



Simple indoor antennas will usually be sufficient for locations having strong TV signals.

Moderate TV Signals

High quality indoor antenna (check the box for information) or an outdoor antenna may be appropriate.



Weak TV Signals



Outdoor antenna is appropriate.



See www.antennaweb.org for guidance on the type of outdoor antenna you may need.

You can check the signal strength of your local stations at www.fcc.gov/mb/engineering/maps/. This Web page will help you find out whether you remained in the coverage area of your local stations once they started broadcasting in digital. In addition, for consumers who may wish to purchase outdoor antennas, information on the appropriate type of outdoor antenna for your location can be obtained at www.antennaweb.org. Note that the type of antenna needed at a specific location may vary depending on geographic location, the height at which the antenna is used, the presence of nearby structures and other local factors.

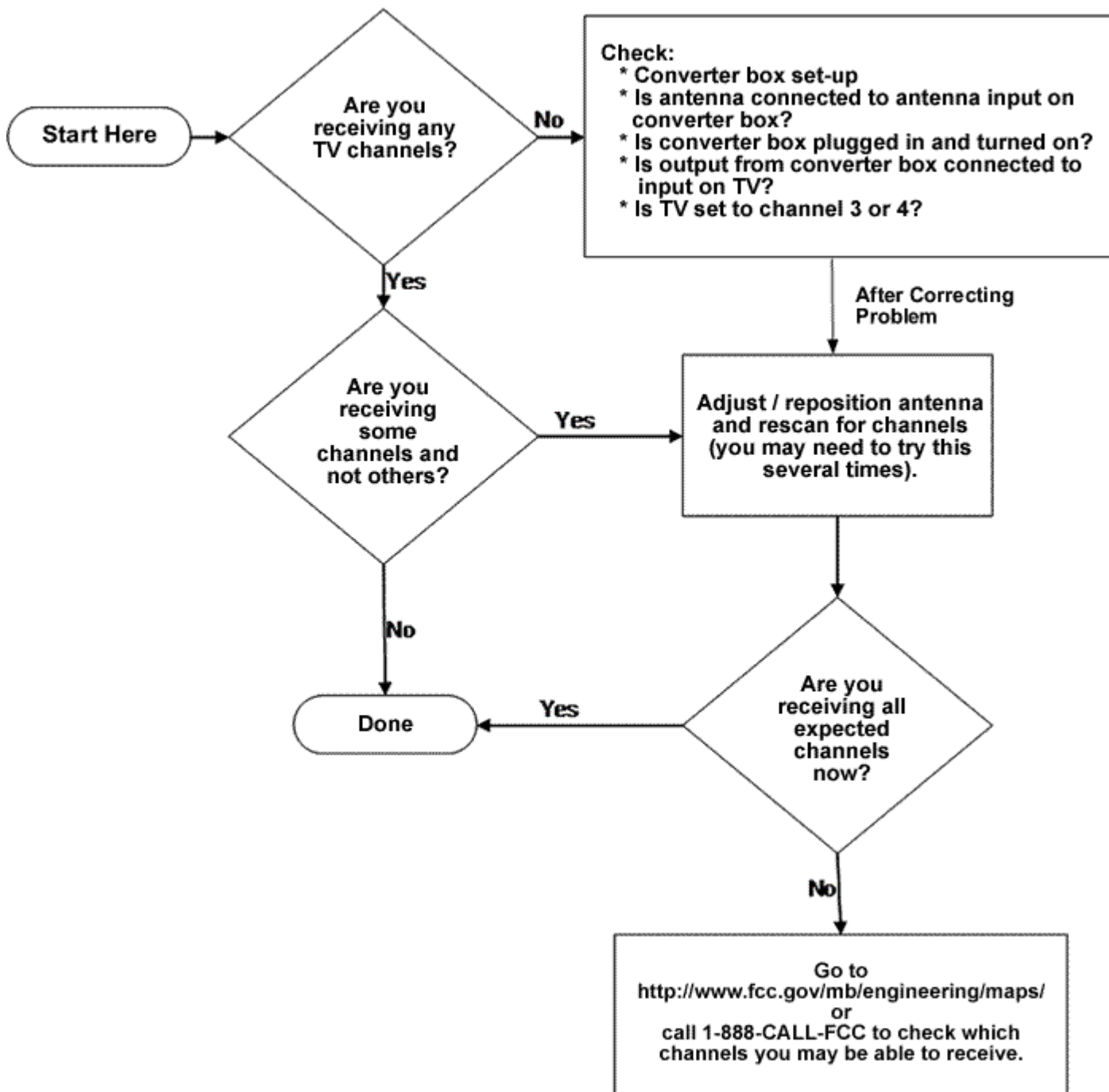
Try Using Your Existing Antenna First

If your television received good quality reception on analog channels 2-51 with a broadcast antenna, it should be able to receive digital television (DTV) signals, including high definition television (HDTV) signals, with the same antenna. You do not need to purchase a "DTV antenna" or an "HDTV antenna" to receive DTV or HDTV signals;

however, your antenna must be able to receive both VHF and UHF signals as indicated above.

Before making any changes to your current antenna or antenna system, you should check, using your digital-to-analog converter box or digital TV, to see if your antenna receives the digital signals being broadcast in your area. Once you have connected your digital-to-analog converter box to your analog TV and to your antenna, you should perform a “channel scan.” You should also perform a channel scan if your antenna is connected to a digital TV. Digital-to-analog converter boxes and digital TVs have a button, usually on the remote control, that is labeled “set-up” or “menu” or some similar term. Press that button to access the set-up menu. Using the directional arrow buttons on your remote, scroll to the option that allows you to search for digital broadcast channels that are available in your area. Consult the owner’s manual of your digital-to-analog converter box or digital TV for detailed instructions on how to perform a channel scan for your device. **You should perform a channel scan periodically to check whether additional digital channels have become available.** In many cases, this is all you need to do to watch digital television broadcasts.

Flowchart for diagnosing reception problems



Reception Tips

- Digital TV reception can often be improved just by changing the location of your current antenna, even as little as a few inches. For example, moving it away from other objects or placing it higher or lower can often improve reception. Be sure to move the antenna slowly as digital TV tuners need a little time to properly detect the signal. You need to rescan for available signals if you are missing channels.
- Antennas typically need to be oriented or “aimed” to get the best signal from the desired station. While adjusting your antenna, it may be helpful to access the

“signal strength meter” on your digital-to-analog converter box or digital television to determine whether your adjustments are improving the signals’ strength. The signal strength meter is usually accessed through the menu feature on your remote control. Refer to the owner’s manual of your device for detailed instructions on how to access its signal strength meter. Remember to do another channel scan after you have adjusted your antenna. For outdoor antennas, a rotor that re-orientes the antenna can improve performance, particularly when trying to receive stations that transmit from different locations.

- If you are unable to get satisfactory reception with your current indoor antenna, you may wish to add a clip-on bow-tie element (see picture above) or obtain a combination indoor antenna that includes features for reception of both VHF and UHF signals and/or an amplifier to boost the received signal.
- Generally, an outdoor antenna will get better reception than an indoor antenna.
- If you are near a station’s broadcast tower, reception of that station, as well as other stations, can be impeded by strong signal “overload.”
- If you decide to replace or upgrade your outdoor antenna, websites such as www.antennaweb.org provide information on the locations of broadcast transmitters and the types of outdoor antennas appropriate for the stations you wish to receive. If you need assistance with upgrading your antenna system, check with a local antenna retailer or antenna installer.
- If you are not receiving certain digital TV stations, this does not necessarily mean there is a problem with your antenna or receiver. Check with the TV station to find out whether they are planning changes that will improve reception.
- To check for the DTV signals that are available at your location, use the DTV Reception Maps available at www.fcc.gov/mb/engineering/maps.

use an Antenna that Provides Good Reception of All Channels

- Most existing antennas used by consumers will provide good reception of DTV signals. (Before making any changes, try your existing antenna first to see if it allows you to receive all the stations you normally watch.)
- For watching DTV signals, you will need an antenna that provides good reception of both VHF signals (channels 2-13) and UHF signals (channels 14-51) to reliably receive all of the digital signals broadcast in your area.
- Many antennas are designed only for reception of either VHF or UHF signals (but not both). For example, the commonly used “rabbit ears” indoor antenna is only suitable for receiving VHF signals. To receive UHF signals, an indoor antenna should also include a wire loop or other feature for reception in that band.
- The reception capabilities of TV antennas also vary considerably, so be sure to talk to retail consultants and look at information on the packaging and/or the Internet to make sure that any new antenna you may choose provides good reception of both VHF and UHF channels. In addition, if you use an indoor antenna and receive signals on VHF channels, you may need to use an antenna with amplification.
- Many antennas currently being sold as “HDTV Antennas,” perform best at receiving UHF signals; some of these models state that they provide reception of signals on channels 7-13 but actually perform less well receiving those channels.

If you obtain one of these antennas, be sure it provides good reception of all the VHF channels as well as the UHF channels.

- To check for the DTV signals that are available at your location, use the DTV Reception Maps available at www.fcc.gov/mb/engineering/maps.

Check Your Connections

- Check that your digital-to-analog converter box or digital television is connected properly. Make sure your antenna is connected to the antenna input of your digital-to-analog converter box or digital television. If using a digital-to-analog converter box, also ensure that the antenna output of your converter box is connected to the antenna input of your analog TV. Refer to the owner's manuals of your components if you are unsure of the proper connections.
- Ensure that your components are plugged in and have their power turned on.
- If you have a digital-to-analog converter box, tune your analog TV to channel 3. You should see a set-up menu or picture displayed on your TV screen. If you do not see a set-up menu or picture, tune your TV to channel 4. If you still do not see a set-up menu or picture, recheck your connections.

Perform a Channel Scan

- Digital-to-analog converter boxes and digital televisions have a button, usually on the remote control, that is labeled "set-up" or "menu" or some similar term. Press that button to access the set-up menu.

Using the directional arrow buttons on your remote, scroll to the option that allows you to perform a "channel scan." The channel scan will automatically search for digital broadcast channels that are available in your area. Consult the owner's manual of your digital-to-analog converter box or digital television for detailed instructions on how to perform a channel scan for your device.

- Once the channel scan is complete, you will be able to tune to the digital channels received by your antenna. **You should perform a channel scan periodically to check whether additional digital channels have become available.**

Adjust Your Antenna

- Small adjustments to your antenna can make a big difference in the number of digital channels you can receive. If you have an indoor antenna, try elevating it and moving it closer to an exterior wall of your home. After adjusting your antenna, perform another channel scan to see if your reception is improved.
- While adjusting your antenna, it may be helpful to access the "signal strength meter" on your digital-to-analog converter box or digital television to determine whether your adjustments are improving the signals' strength. The signal strength meter is usually accessed through the menu feature on your remote control. Refer to the owner's manual of your device for detailed instructions on how to access its signal strength meter. Remember to do another channel scan after you have adjusted your antenna.

- Television stations broadcasting in digital use both the VHF band (channels 2-13) and UHF band (channels 14-51). Many indoor antennas use “rabbit ears” for the VHF band and a “loop” or “bow-tie” antenna for the UHF band. Make sure you are using an antenna that covers both the VHF and UHF bands and have connected it properly.

If You are Still Having Difficulty:

- If you are not receiving certain digital TV stations, this does not necessarily mean there is a problem with your antenna or digital-to-analog converter box or digital television. Check with the TV station to find out whether they are planning changes that will improve reception.
- Digital broadcasting generally provides a clear picture; however, if the signal falls below a certain minimum strength, the picture can disappear. This “cliff effect” means that if you watch analog TV stations that have static and distortion, you may have to adjust or upgrade your antenna system.
- Simple indoor antennas provide minimal performance that may not be suitable for your location. If you are unable to obtain satisfactory DTV reception with your current indoor antenna, you may wish to obtain an indoor antenna that includes features for better reception of UHF signals, as well as VHF, and/or an amplifier to boost the received signal (often referred to as an active indoor antenna).
- Generally, an outdoor antenna will get better reception than an indoor antenna. However, the performance of outdoor antennas can degrade over time due to exposure to the weather. If you are having problems, check for loose or corroded wiring, broken antenna elements and that the antenna is pointed in the right direction.
- Try to keep the length of wire between your antenna and digital-to-analog converter box or digital television as short as possible for best reception.
- “Splitters” that are used to connect a single antenna to multiple digital-to-analog converter boxes or digital televisions reduce the amount of signal available to each device. If you are having problems, check whether reception is improved without the splitter. In some cases an “active” splitter that includes an amplifier can solve the problem.
- If you are near a station’s broadcast tower, reception of that station, as well as other stations, can be impeded by strong signal “overload.” Consider using an “attenuator” or removing amplifiers to improve your reception.
- If you decide to replace or upgrade your indoor or outdoor antenna, many types are available from electronics retail stores at a variety of prices. Web sites such as www.antennaweb.org provide information on the locations of broadcast towers and the types of outdoor antennas appropriate for the stations you wish to receive. If you need assistance with upgrading your antenna system, check with a local antenna retailer or antenna installer.
- To check for the DTV signals that are available at your location, use the DTV Reception Maps available at www.fcc.gov/mb/engineering/maps.

KNLC ANTENNA GUIDE

This guide will provide background information along with useful tips to set-up an antenna and configure a television set for over-the-air reception of KNLC’s digital signal.

Background

In the United States, broadcast television stations were offered in two different flavors, VHF and UHF. VHF stands for Very High Frequency. Stations in the VHF band include channels 2 through 13. UHF stands for Ultra High Frequency. Stations in the UHF band are the television channels 14 to 69. KNLC is UHF since it transmits on Channel 14.

There are two major factors that determine the coverage area of a TV station. The first factor is the height of the station's transmitting antenna. To keep the broadcast stations on a somewhat level playing field, the FCC limits the maximum antenna height. TV stations west of the Mississippi are restricted to a height of 2,000 feet above average terrain.

The second factor that defines coverage is the effective radiated power (ERP). UHF stations operate at a higher frequency. It requires a greater amount of power output for UHF stations to match the coverage area of a VHF station.



[Click for a larger image](#)

The KNLC tower is located near House Springs Missouri. A television tower does not radiate a signal. It is simply a steel structure that holds the antenna in the air. A station will have greater reach with a higher antenna. KNLC's antenna is mounted at the top of the tower, which is about 1,299 feet above average terrain.

Television signals are the strongest when there is a line of sight between the transmitting tower and the home-receiving antenna. The signal is weakened when buildings, hills, and trees block the line of sight. Signal strength also decreases as the distance from the transmitting tower is increased. Careful attention to the selection of a reception antenna can overcome many of the problems. Choose an antenna dealer or TV shop that is willing to work through your reception problems. A good shop can offer valuable advice. They will also allow you to exchange equipment that doesn't work out.

Gain and directivity are two important specifications to check when selecting a TV antenna. Gain is measured in decibels (dB). It indicates the antenna's sensitivity. There is a greater need for gain the farther you live from KNLC's tower. If you live close to KNLC's tower, a "local" or "suburban antenna" with a gain of 5-9dB should do the job. Most areas in and around St Louis can use a "near fringe or fringe" antenna with 8-10dB of gain. If you live 30 to 35 air miles from House Springs, consider a "deep fringe" or "far fringe" antenna with 11-16dB of gain.

Directivity indicates the antenna's ability to receive only the signals in the direction the antenna is pointing. The spec is measured in degrees. The smaller the number the greater the directivity. A highly directive antenna will have a narrow receiving angle to eliminate signal reflections that can result in ghosting. (Faint double images that appear on the screen). Alignment is critical and may take more time with a directive antenna. A movement of inches can dramatically improve or degrade the signal. Use a directional antenna if ghosting is a problem in your area.

In most places around St Louis it is unnecessary to spend over \$50 for an antenna that will provide quality reception. We do not recommend the bi-directional RV antennas or the type shaped like a helicopter blade. They are often installed with home satellite dishes.

The bi-directional (or omni directional) antennas are simply an expensive set of rabbit ears. They do not have the director and reflector elements necessary for quality reception. The bi-directional antennas consequently lack selectivity and sensitivity. Ironically, they usually cost more money than a conventional antenna capable of doing the job.

Some of the bi-directional antennas contain a built-in amplifier to boost the signal. The spec sheets often list the gain of the amplifier, not the gain of the antenna. Remember the old expression Garbage In, Garbage Out? It applies in this case. If the antenna lacks sensitivity, it will pass a snowy signal to the integrated amplifier. The amplifier will boost the noise along with the signal. The signal will not improve. The appropriate solution is a larger antenna with higher gain.

The other item to consider is the bi-directional nature of the "helicopter blade" antennas. Bi-directional means the antenna is equally sensitive to signals coming from the front and backside. A Bi-directional antenna is more susceptible to low signal quality because it is unable to cancel a signal reflection coming from behind.

Outdoor Antennas

Outdoor antennas are always better than indoor antennas. The mechanical details of an outdoor antenna installation depend upon the selected antenna and the available site. Shops that sell rooftop antennas offer a wide variety of hardware to secure the antenna to any structure. Consult with the shop's sales staff to select the appropriate hardware for your particular situation. We encourage you to have your antenna professionally installed if you feel uncomfortable about working on a rooftop.

Here are some general comments about antenna installation. The rooftop is a good location because it is a cost-effective place to obtain the necessary height. As a general rule, higher is better. Six to eight feet above the roofline is usually adequate. Keep the antenna as far as possible from tree limbs, power lines, and any electrical equipment. If the house is located near a heavily traveled highway, the antenna should be placed on the far side of the house away from the highway. The antenna and its mast should be well grounded. Fully extend all elements of the antenna. The antenna should be positioned with the horizontal elements at right angles to the KNLC tower. Connect the antenna to a television to check reception. If it is unsatisfactory, the antenna will have to be moved or rotated until a strong, stable signal is received. Once the antenna is aligned, it should be locked down tight to prevent it from moving in the wind.

Attic Antennas

The next best option is to place a full size antenna in the attic. This approach has many limitations. The physical space may not permit optimum orientation. Structural elements of the house can block and reflect the signal. A metal roof will shield the station's signal from reaching the antenna.

If you install an antenna in your attic, locate the antenna in a place where all of the elements can be fully extended. It is important to find a spot where the antenna can point to the KNLC tower near House Springs. If there is enough room, experiment with different places in the attic. Sometimes the movement of only a couple of feet can make a world of difference with the quality of reception.

It does not mean that your house is located in an area outside of KNLC's signal range if an attic antenna does not result in satisfactory reception. More than likely, it means that you will need to move the antenna to an outside location.

Indoor Antennas

The least expensive antennas are the indoor, set-top variety. Often times they are provided with the television set. If your television set was not provided with an indoor antenna, there are generally four types available for purchase.

The UHF loop antenna only costs a few dollars. It is quite literally a round wire loop. On older television sets, the loop connects directly to the UHF terminals on the back of the set. Make certain that the UHF lugs are securely tightened.

Bow Tie antennas are slightly more expensive than loop antennas. The antenna consists of a wire bent in the shape of two connected triangles, hence the name "Bow Tie". The bow tie is often times clipped to the telescoping pole on a set of rabbit ears.

Rabbit ears consist of two telescoping poles that stand up like a "V". Some UHF-VHF rabbit ears have a round loop sitting near the base of the "V". UHF is received with the loop. Rabbit ears without the UHF loop usually provide disappointing UHF reception.

The Mono Pole is a single telescoping rod that is usually built into a portable television. Normally, UHF reception is poor, but it can be enhanced when the rod is telescoped to a smaller size.

Older sets have separate connections for UHF and VHF antennas. If you are using a loop or bow tie with an older set, make certain the antenna is connected to the UHF terminals with the lugs tight and secure.

For best results, locate the indoor antenna near a window, away from electrical sources. You will need to experiment to find the best orientation and placement. It can take a considerable amount of manipulation to optimize for best reception.

The movement of people in the room can affect the signal. Indoor antennas usually require adjustment as you switch from station to station.

If you are disappointed with the performance of an indoor antenna, it does not mean that you are outside the station's signal range. To clear up your reception problems, it may be necessary to install an outdoor antenna with greater sensitivity.

Antenna Alignment

KNLC's broadcasts from a tower about 1,300-feet above average terrain. It is located near House Springs MO. A Majority of the other primary St Louis stations are in the same region so aiming to the South West from central St Louis will get you the best reception of KNLC as well as the greatest collection of other St Louis signals.

The Transmission Line

An important element often overlooked is the transmission line. It is the wire that carries the signal between the antenna and the television set. Transmission lines deteriorate with age. If your transmission line is worn-out, you may be looking at a blocky or no signal even if the antenna and television are brand new.



Just be aware that the condition of your transmission line has a major affect on any over-the-air reception. It should be considered for replacement any time the antenna is properly aligned and the over-the-air reception is "not what it used to be".

If you are installing new transmission line, it is important to select a quality grade to minimize signal loss. Round coaxial cable and flat twin lead are the two basic types of transmission line. Twin lead cable is less expensive, but it deteriorates faster and is more susceptible to interference. RG-6 coaxial cable is highly recommended. You should switch to the coaxial cable if you are having reception problems with the twin lead transmission line.

Here are a few tips about transmission line installation. Use the most direct route possible between the antenna and the television set. Long cable runs result in signal loss. The shorter the cable, the better the signal. The line should be kept as far as possible from electrical equipment, even if it means a longer cable run. One continuous piece of cable is best. Keep the line free of splices and sharp bends.

Amplifiers

A picture that breaks up in blocks usually indicates a weak signal. A preamplifier mounted near the antenna can help a marginal signal. Signal strength deteriorates as it travels down the transmission line to the TV. A weak signal will be non-existent when it reaches the television unless it receives amplification before the trip. The pre-amp boosts the signal to offset any loss from the transmission line.

An amplifier only prevents additional signal deterioration. If the signal is noisy leaving the antenna, the amplifier will amplify the noise along with the signal.

Splitters

Households with multiple sets often use passive splitters to send the antenna lead to different televisions. Passive splitters do not require any power to split a signal two to four times. If your signal is low on the converter box, it may be the result of a weak signal. If you are using a splitter, bypass it by directly connecting the antenna to a television set. If the signal improves, you will need to get an amplified splitter. The amplified splitter divides the signal and amplifies each output.

Maintenance and Troubleshooting

The big key in digital converter boxes is to rescan for channels. If the channel was not found last search it will not show up on your list as available. If the channel was there and shows a low signal or lost signal, start at the television set and work your way toward the antenna. Check for a loose antenna connection on the back of the TV or converter. If everything is secure and tight, examine the condition of the line.

Transmission lines can suffer damage from hungry pets and vacuum cleaners. A nicked section of line should be repaired or replaced. If everything looks fine behind the TV, grab a ladder and head outside. Loose connections and damaged antenna elements will be readily obvious by a visual inspection. Make certain that all connections and fasteners are tight and secure. Look for frayed wires, corrosion, or other evidence of deterioration. Check the orientation of the antenna. Windstorms can blow the antenna out of proper alignment.

Breaks or short circuits in a transmission line will cause a reduction of signal strength. Lines that are loose from their fastenings may swing against other objects causing changes in the picture intensity. Secure the transmission line and repair any chaffing. Replace the transmission line if it is in bad shape.

Wind, hail, and ice are the most common cause of damaged antenna elements. In most cases, it is better to replace the antenna if there are several broken elements. Even if the elements can be reconnected, the performance will never be as good.

Clean any corrosion found on the antenna connectors. The corrosion on the terminals can be removed with steel wool or an emery cloth.

The entire outdoor antenna system should be visually inspected at least once a year.