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Systematic Troubleshooting

This module familiarizes the participant with all steps of the troubleshooting process, as well as all of the steps taken to prepare and care for test equipment and materials used during this process. This module also explains the importance of working together. The module is divided into two major topics:

- Use and care of common test equipment
- Systematic approach to troubleshooting

Use and Care of Common Test Equipment

While troubleshooting cable systems, you will encounter and use many types of test equipment. Many of the devices will complete the same task but in different ways. There are many models of the same type of equipment; each will operate in its own unique way. Commonly encountered devices are discussed in this section. When you encounter an unfamiliar device, always refer to the device's user manual regarding specific operation.

Signal Level Meter

The most frequently used piece of test equipment by cable field technicians is the signal level meter (SLM). The SLM is a device used to measure signal levels carried throughout the system. The SLM is extremely susceptible to physical damage. Great care must be taken when handling the device. The use of a padded casing is highly recommended when storing or transporting the device.

This section discusses typical measurements that you should receive at critical test points.

The FCC has published regulated minimum signal levels for cable signals at the point of entrance to a consumer's television set. The regulated minimum signal at the converter or television is 0 dBmV; however, many technicians will argue that +10 dBmV is a more desired level. Check with your local office to ensure you are measuring appropriate signal levels. The measurement must be accurate because a low signal level results in a snowy presentation. A high signal level results in a distorted picture.

The three common points where a field technician takes signal level measurements are at the tap, the network interface or ground block and the input to the television or converter box. Each of these points produces a unique measurement to allow for attenuation from the cabling.

The FCC has listed minimum signal levels for the cable industry at these 3 points. The minimum levels are as follows:

- Television input 0 dBmV
- Network interface/ground block +5 dBmV
- Tap (low channels) +8 dBmV
- Tap (high channels) +17 dBmV

The FCC minimum level for television input is 0 dBmV but a higher level is desired. The level at the network interface or ground block is slightly higher than that at the television depending on the number of televisions being connected. On a normal one- or two-television configuration, the minimum levels range from +5 to +10 dBmV, with actual desired levels being slightly higher.

The remaining test point for field technicians is the tap. The measurement at the tap is also higher than the interface due to drop attenuation. Typical minimum levels at the tap for a one- or two- television configuration depend on the channel or frequency being measured. High channels should be no lower than+12 to +17 dBmV, whereas, the lower channels should be at least +8 to +12 dBmV.

These levels are minimum levels and are based on a configuration using a maximum of one 2-way splitter. Depending on the individual customer's desired configuration, these values can vary greatly.

Volt-Ohm Meter

Another piece of commonly used test equipment is the volt-ohm meter (VOM). This may also be referred to as the multi-meter. The VOM has many uses and selectable functions. One common problem with the VOM is the user attempting to use one function while another function is selected on the VOM. This is very important because using the VOM with the incorrect function selected can result in internal destruction of the VOM. Always double-check the location of the function switch before taking a measurement. As a field technician, you will use the YOM for functions including the following:

- Test for hot chassis
- Check AC voltage and polarity
- Check DC voltage
- Check cable condition
- Identify specific drops in a multi-drop situation

Do not connect a cable drop to a device with a hot chassis. An electrical shock or fire hazard will result.

A hot chassis refers to a voltage being present on a metallic surface due to a faulty power supply or an improper modified AC plug. Before connecting a drop to a television, check for a hot chassis. To check for a hot chassis, use the following steps:
Turn on the power to the television.
Using the VOM, function set to measure at least 120 VAC, measure from the nut of the coax jumper to the threaded portion of the female F-connection on the television.
Check that the measurement is close to 0 volts.
If the measurement is higher than 0, turn off the television and measure again.
If voltage is still present, check for proper grounding of the cable drop and proper polarization of the outlet, as described in the following information:

Checking AC voltage levels and polarity is another main use of the VOM. To check the polarity of an AC outlet, with the function set for AC voltage, measure from the hot (small) opening to the ground screw. This measurement should be approximately 115 VAC +/- 10%. If the measurement is not within this range, measure from the hot to the neutral (large) opening. If this reading indicates 115 VAC +/- 10%, then the polarity has been reversed. Do not attempt to repair this problem. Instead, run an extension cord from a correctly polarized outlet, if possible and recommend that the customer contact a licensed electrician to repair the polarization problem.

Checking DC voltage levels with the VOM is less common, yet it is still important to know the process. The DC voltage check is used for checking batteries or other DC levels. To check a DC signal, first ensure that the DC voltage function has been selected. Next, place the black test lead from the VOM to the negative side of the battery and the red test lead to the positive side of the battery.

A more commonly used function of the VOM is checking the condition of coaxial cable. The resistance can be checked as well as checking for a conductor-to-shielding short by using the resistance, or ohm (W) function. When measuring from the center conductor to the connector housing or shielding, the resistance should be infinite, or immeasurable. Any measurable resistance, especially levels close to zero, indicate a short in the cable.

The final function of the VOM discussed in this section is the ability to identify a specific drop in a multi-drop configuration. When you need to inspect a particular cable where multiple cables are coming from a single point, such as a tap or splitter, it is sometimes difficult to identify that particular cable. A simple way to use the VOM to determine the correct cable is by shorting the center conductor to the shielding at the known end of the cable. Check the cables at the unknown end for a center-to-shielding short to locate the particular cable.

TV Test Set

The final piece of test equipment is probably the most simple to use. A TV test can be an instrumental piece of equipment when you feel that the customer's set may be the cause of the problem. If you have checked all of the signals to the input of the television and found them all to be correct, connect the portable set to the cable and check for a proper display. If the customer's set is causing the problem, be tactful when explaining to the customer that his or her television is the cause. Advice the customer that they will need to have their TV set repaired. Under no circumstances should you recommend a television repair facility.

Systematic Approach to Troubleshooting

This section describes the process of systematic troubleshooting. This module provides basic information necessary to become an effective troubleshooter.

There are five crucial steps to the troubleshooting process. These steps, combined with the ability to remain customer friendly, will aid in your troubleshooting attempts. Although experience is the primary factor in becoming an effective troubleshooter, the following steps will help in your effort:

- Verifying the Problem
- Collecting Data
- Identifying the Cause
- Completing the Repair
- Verifying the Repair

Remember through each step to remain customer friendly. Many times the customers become aggravated due to cable problems that they have no control over. Some may become hostile or belligerent. Remain calm and use a relaxed approach when dealing with customers. Make them feel that you understand their frustration and will do your very best to remedy the problem in an efficient manner. Customers are our most important assets. Without them, none of us would be here.

Verifying the Problem

First, verify the problem. Although the customer may already feel that he or she knows what the problem is, tactfully inform the customer that you must see the problem for yourself. Now that you have been introduced to some of the common problems of the trade, you might be able to narrow your search by simply observing the discrepancy.

Collecting Data

Before taking measurements or chasing cabling, you might want to collect some pertinent information. Some types of information to gather include the following:

- System data
- Customer data
- Observed data
- Test equipment data
- Documentation

System Data

System data refers to any information you can locate about the particular drop. This information includes expected measurement levels, system maps of the area, data involving any nearby problems, or similar information from other employees or technicians. This alone is a beneficial aspect of maintaining good employee relationships. The ability to work with others greatly aids in the effort of gathering system data. This data could prove useful when trying to narrow your search.

Customer Data

Customer data refers to any information that you can gather from the customer. This includes information such as modifications that the customer may have done to the system. Customer modifications may include splitter additions and home theater setup. Listen to what the customer states is wrong, but remember not to use that as your only source of information.

Observed Data

Observed data is important to the cable technician. Observed data includes information ranging from how the customer has the system hooked up inside the home to local construction or landscaping. Anything that you can visually inspect is considered observed data. Initially this might not seem important, but you will discover that many cable problems are not caused by signal faults; the problems are due to damaged cables or improper wiring. Landscaping and construction projects frequently damage underground drops and automobile accidents knock down utility poles that support cable lines. By observing these situations and verifying the affected area, you might be able to repair the problem without entering the customer's house.

Test Equipment Data

Another important type of information is test equipment data. This is the actual data gathered from the measurements taken with test equipment. By taking measurements from specific locations and comparing them with system specifications for those points, you can narrow your search even more.

Documentation

Documentation is a necessary process when handling all of the information that you collect, especially information such as measurements. Once information is documented, it can easily be referred to and compared.

Identifying the Cause

Once you have verified the problem and collected all of the necessary data, the next step is to identity the actual cause of the problem. This is the main step in the troubleshooting process. Many beginning troubleshooters think that this is the only step for troubleshooting, but without the other steps, the process is more difficult.

Attempt to make a connection between the problem that you have verified, the data that you have collected and any of the common problems that would relate. If any connection between the symptom and a common problem can be made, the list of likely causes is narrowed, giving you a possible starting point for troubleshooting. If no connection can be made, the best place to start is the first known location of the fault. This is usually the customer's television set unless the problem is present on multiple sets; the splitter for the affected sets would be the first known location. From the first known location, work your way toward the tap.

One common practice is to first determine if the problem is an internal or external problem. This is done by measuring the input to the television. If the signal is faulty there, the next measurement is from the network interface or grounding block. A faulty signal at that location signifies an external fault. External faults narrow the search field for a field technician and aid in determining if the fault is plant or customer premise related. The presence of a proper signal at the grounding block or network interface confines the fault to internal cabling or devices.

Locating problems within the home's internal wiring can be difficult because much of the cabling system may be hidden behind walls or in basements, crawlspaces or attics. Sometimes the best option is to find a point that has proper signal and run a new drop from that location rather than spending time attempting to locate the path of the existing cabling. However, if the existing cabling can be located, use that cabling.

Measure signal levels at the inputs and outputs of splitters and other associated devices. Remember the effect of attenuation on the unit. A proper output from one device and a faulty input to the next device in the cabling series signifies a fault in the cable itself. Faulty cable should be replaced rather than repaired whenever feasible.

When measuring signals, use nonintrusive testing, whenever possible. This can be useful when the customer uses the cable system for telephone or data transmission. Just because the television signal is not functioning properly, the cable modem or telephone may still be working fine. Every time that you have to disconnect the cable, be sure to notify the affected customer(s) in advance. This will prevent any telephone conversations or data transmissions from being interrupted unexpectedly.

Completing the Repair

The next step in the troubleshooting process is completing the repair. Now that the problem has been isolated, the faulty device or cabling must be repaired or replaced. This step may not be as simple as it seems. Replacing a faulty device may not be the only step that needs to be done. Many times, the faulty device is defective due to an obscure cause. Always consider any hidden faults that might cause the particular device to fault. This could range from voltage spikes caused by a faulty power supply to a shorted cable, resulting in excess reflected signal levels.

Make permanent repairs whenever possible. Many times a temporary or quick-fix may seem acceptable. Just remember that most customers will be less irritated by a lengthy one-time outage than by multiple short outages. If taking a little more time can correctly repair a problem, take the time.

Verifying the Repair

The final step of the troubleshooting process is to verify the repair. This is simply checking with the customer to ensure that the primary symptom was not masking another less noticeable condition. Ensure that the customer is fully satisfied with the service that has been performed and the television reception is satisfactory.

Once the repair has been verified, the technician must ensure that the work area is in the original condition as it was on arrival. This requirement aids in preventing any injuries associated with an unattended work area as well as promoting a professional image of all technicians.

Troubleshooting CATV

This module presents the basic information needed to solve cable-related problems using all tools and equipment available.

This module is designed to familiarize the participants with the symptoms of some of the most common cable problems that they will encounter in the field. It will give them the ability to narrow their troubleshooting search by simply observing the problem. The module is divided into four major topics, which include the following:

- Noise problems
- Distortion problems
- Ingress and egress problems
- Other common problems

Noise Problems

This section introduces the participants to common symptoms of and the causes associated with noise-related problems. It will familiarize the participants with common terms, measurements, and calculations used to evaluate noise levels.

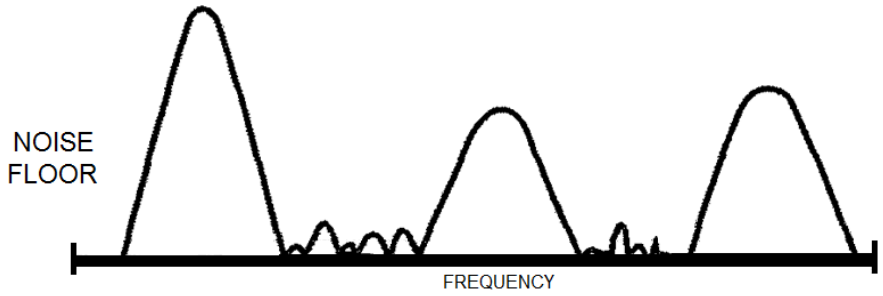
System noise is a common problem in the cable industry. In a transmission system such as cabling, noise is caused by almost every element in the system. Nearly everything, from amplifiers to simple resistors, produces some level of noise when a signal is passed through it. The level of noise produced is determined by each component individually.

The amplifier is the primary noise-causing component in a cable system. Cable systems use amplifiers because of the signal attenuation caused by the length of the cable. They are placed throughout the system to amplify the signal to high enough levels for the customer's television set. These amplifiers cause a variable level of noise depending on the individual amplifier's noise figure (NF). The noise figure is a comparison (in decibels) of the noise level of the amplifier compared to the noise level of a perfect amplifier. The lower the NF of an amplifier, the higher the quality of the amplifier; this quality is often offset by the cost.

The Noise Floor Goal is -35 dBmV. Notice a correlation between the noise floor and ingress requirements. All active devices contribute to the noise floor since all active devices add noise to their output. It is important to realize that many noise problems are beyond the troubleshooting capabilities of the Field Service Technician.

The noise produced by these elements is the primary cause of what customers refer to as

"snowy" reception. This condition is caused by a low carrier-to-noise (C/N) ratio. The C/N ratio is the difference in the strength between the RF (Radio Frequency) carrier signal and the noise present on the same frequency. The Federal Communication Commission (FCC) has set limits on minimum C/N ratio limits. The FCC has adopted a standard of +43 dB C/N. It is because of this C/N ratio that it is important to take readings at the tap. By using an attenuation calculation for a customer's service, you can figure out what measurement you need at the tap. If the reading is low at the tap, refer the problem to Outside Plant.



Carrier-to-Noise Ratio

Noise can produce a variety of the problems in the digital world such as video pixilation or freezes, Internet is slow or no connectivity, voice is dropping parts of the conversation or no dial tone.

Distortion Problems

Another aspect of amplified signals is the possibility of intermodulation distortion. This may also cause several problems. Intermodulation distortion (intermod) is a non-linear interference between signals being passed through an amplifier. Amplified signals are more vulnerable to intermod at higher levels and at higher numbers of signals passing through the amplifier. This is based solely on the principle of the cause of this distortion. If amplifiers were only used to amplify single signals, distortion problems would not be a concern. However, in the cable industry, amplifiers are used with multiple signals at the same time. Therefore, many types of intermod distortion are possible.

A common cause of distortion is an in-house amplifier amplifying the signal to such a degree that the signal is distorted. The maximum allowable signal level at the input of the TV is+10 dB. The use of an in-house amplifier should be limited and install properly according to signal level specification. Of if it is not needed, remove it as it can only cause problems.

A few forms of intermod include cross modulation, composite second order, or composite triple beat modulation.

Cross Modulation

Cross modulation (X mod) is when the signal riding on one carrier is superimposed or overlaps onto another carrier. That is, information from one signal in the amplifier is added to another signal within the same amplifier. The result is a display of overlapping signals or channels on the customer's television set. When you see this on a customer's set, hook a test set to the tap port with a temporary drop to ensure a proper diagnosis. Report the problem to Outside Plant.

Composite Second Order

Composite Second Order (CSO) modulation is more in-depth than X mod. When many signals are passed through an amplifier, the amplifier produces additional output frequencies that are the sums and the differences of the original frequencies. If these new frequencies are close enough to any of the wanted frequencies, a new modulation problem develops. This new problem is known as second order distortion. When second order distortion is transmitted through the rest of the system amplifiers, it is displayed on the customer's television as fine diagonal lines that drift across the screen. This symptom is known as CSO. When you see this on a customer's set, hook a test set to the lap port with a temporary drop to ensure a proper diagnosis. Report the problem to Outside Plant.

Composite Triple Beat

Composite triple beat is another type of distortion caused by a large number of original frequencies (channels) going through a single amplifier. This also creates new frequencies at the output of the amplifier. The original and new frequencies can become very close. When a large number of new frequencies "pile up" around one of the original frequencies, the result is similar to snowy reception and can easily be mistaken for noise interference. Composite triple beat usually affects the entire band. It is rare that the problem originates from the subscriber location. It typically occurs from system amplifier problems.

If you find what you believe is composite triple beat or one of the other distortion problems covered earlier, be sure to take quick action to resolve the problem. The problem is bigger than your current service call. These problems can have a huge impact on many customers. The best thing you can do when you discover these problems is to contact Outside Plant for resolution.

Ingress and Egress Problems

Ingress and egress problems can have many causes. Anything from corroded connectors to cracked insulation can result in signals entering (ingress) or radiating out of (egress) cabling systems.

Ingress is when foreign signals enter the cabling system due to faulty cables, connectors or poor shielding. These faults allow foreign signals to overpower the desired signal. These foreign signals are mainly from local television or radio stations, CB radios, pagers or other transmitted RF signals. Ingress causes various problems ranging from echoed audio or video, to ghosting another channel behind the desired channel.

Egress or signal leakage, is exactly as its name means: RF signal leaking or radiating from the cabling into the air or atmosphere. Egress is not dangerous to an individual, but it can interfere with aircraft navigation or communication. That is why the FCC strictly regulates egress or signal leakage. If the frequency designated by the FCC as the communication frequency for approaching aircraft is cluttered with television audio, danger exists for all the passengers and crewmembers of any approaching aircraft. They cannot plan approach paths with coordinating sources to avoid colliding with another aircraft. This may be an extreme case, but this is how federal agencies must look at the threat caused by cable signal leakage.

The FCC has set a regulated level for signal leakage from cable systems. This standard is in terms of a cumulative leakage index (CLI). The FCC states that any leakage in excess of 50 uV/M at 10 feet is in violation of set maximum levels. They have stated that the CATV industry must monitor all of its systems quarterly and submit a CLI report yearly. It is critical that egress greater than 5uV (microvolts) be repaired. The repair must read 0 uV.

System leaks can occur at the headend, the customer's television set and anywhere in between. The majority of signal leaks are drop-related. The primary causes of CLI problems are loose F-connectors. A good work practice is to always tighten EVERY F-connector that you encounter.

Detecting signal leakage is an important responsibility of all cable technicians. In order to comply with the stringent FCC regulations regarding RF signal leakage, cable companies are required to monitor their entire cable system at least once quarterly. This includes the plant; all of the outside cable lines, including underground drops and customer premises. This is most efficiently accomplished by routinely monitoring the portion of the system that is being worked.

In the digital world, ingress can also have an affect on the quality of the signal. As the QAM signal is transmitted, intruding signals may interfere with the signal, as we discussed for off-air ingress and cable analog TV ingress. Exposed to noise or intruding signals, one or more of the bits within a symbol may change. Errors will be recognized at the receiver and several error correction processes attempt to determine which bits are errors. If a large portion of

the data is damaged, some or all of the original bit values can't be deciphered. The quality of the service suffers or stops functioning as the receiver waits for some or all of the data to be resent. This can be seen on the TV as video pixilation or freezing, Internet connection slows down, no connectivity or part of the conversation is dropped/chopped on the phone.

Other Common Problems

There are many other common problems that you may encounter during your troubleshooting experiences. A few of the more common discrepancies are as follows:

- Co-channel interference
- Ghosts
- Hum modulation
- Direct pick-up
- Converter and terminal device malfunctions

Co-Channel Interference

Co-channel interference is when two or more channels are received together at the headend and transmitted through the entire cable system together. The symptoms of co-channel interference are similar to those of CSO modulation except that CSO is usually reported as fine diagonal lines. Co-channel interference is usually reported as fine horizontal lines. As a field technician, there is little that you can do with this problem. Inform the customer that you will report it to the appropriate personnel, who will then correct the problem as quickly as possible. Whenever there are three calls in the same area reporting these types of symptoms, the trouble calls are automatically routed to Outside Plant.

Ghosts

There are several causes for ghosts in a signal reception. One of the previous causes that we discussed is ingress. When ingress causes ghosting, it is called inductive ghosting, and the ghosts appear to the left of the original image. This is also sometimes called a leading ghost. This happens when two signals from the same channel are received. Factors that promote inductive ghosting include, but are not limited to:

- Faulty cabling
- Corroded connections
- Loose connectors
- Faulty equipment
- A poorly shielded tuner
- A subscriber's antenna

Leading ghosts are most often solved at the subscriber's residence.

Impedance mismatch is another major cause of ghosting. This improper system impedance can be caused by many factors. This happens when a signal is over-amplified in some way. These factors include, but are not limited to:

- Faulty feeder cable
- Corroded connections on the feeder cable
- Loose connectors on the feeder cable
- An in-house amplifier
- Other active equipment pieces

Improper system impedance causes signal reflection through the cable, which appears on a video screen as a delayed image to the right of the current image. This is called reflective ghosting or a trailing ghost. Sound craftperson habits can help prevent both types of ghosting in many cases.

Hum Modulation

Hum modulation is another problem that you may experience many times in your career. Hum modulation is typically described as vertically moving bars of static or snow. Depending on the number of bars and the number of channels affected, the problem can be caused by many things, m many areas.

If the hum is affecting a single channel, the cause is likely at the headend and there is little a field technician or outside plant technician can do. On the other hand, if the hum is affecting nearly all channels, the problem is likely caused by a local fault in the cabling. Once you have determined if the problem is local, you can then begin to narrow your search based on the number of bars moving up or down the screen.

If there is a single bar, it is a 60-Hz hum, which is normally caused by poor bonding or a cracked shielding in the cabling. A two-bar problem is known as a 120-Hz hum, which is caused by a faulty power supply of an associated electronic device. Knowing this information helps to narrow your search and reduces your troubleshooting time.

Always check the drop and the ground wire with an amp meter. Hum is sometimes related to electrical faults with a high potential for electric shock. If energized, DO NOT disconnect the drop or ground wire.

Converter and Terminal Device Malfunctions

Many of the devices associated with cable television can cause problems. Fortunately, many of these devices have error codes or other associated menus. A listing of these codes and techniques for troubleshooting these devices is covered in the training guide for each specific device.

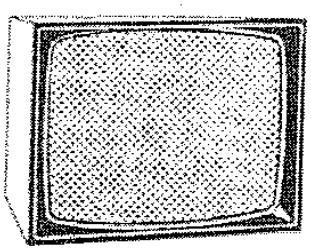
Basic Troubleshooting

Review this section with any questions that you might have. The table on the below lists the types, symptoms, causes and corrective actions for many commonly encountered cable problems.

Causes listed on the table on below are the more common causes, NOT the only cause(s).

Common Problems and Their Causes			
Problem	**Symptom**	**Cause**	**Corrective Action**
Poor C/N Ratio	Snowy reception	Not enough difference between picture signal level and noise level	Repair faulty amplifier Repair faulty connectors
X-Modulation	Shadowing image from adjacent channel on desired channel	One or more faulty amplifiers	Adjust or replace faulty amplifier/equipment
CSO Distortion	Fine diagonal lines	Faulty terminal device Usually caused at headend	Repair or replace faulty device
CTB Distortion	Thin, random lines Snowy reception	Faulty active device (commonly amplifiers) Usually caused at headend	Repair or replace faulty device
Co-Channel Interference	Multiple fine, horizontal lines similar to looking through blinds	Two or more channels received together at headend and sent through the system as such	Notify headend staff who will then relocate or shield antenna
Ghosting	Ghosted images appear on right of desired image	Ingress, improper impedance Normally caused by cable damage, corroded or loose connectors or a faulty device	Repair or replace faulty equipment or connector(s) Replace drop
Hum Modulation	Vertically moving horizontal bars	Single bar caused by faulty ground Multiple bars caused by faulty power supply in associated terminal equipment or active device	Single channel hum will be repair at headend Repair faulty ground, power supply or active device
Direct Pick-Up	Ghosted images appear on left side of desired image	Local channels are received by customer's television tuner, slightly before cable signal	Install converter into customer's system
Ingress	Depends on interference Background audio, video, etc.	Undesired signal leaks into the system through faulty connectors or cabling	Tighten or replace connectors Repair or replace cabling
Egress (Signal Leakage)	Degraded signal levels	Desired signals radiate from faulty connectors or cabling	Tighten or replace connectors Repair or replace cabling

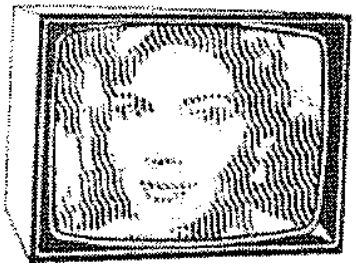
Common Picture Problems



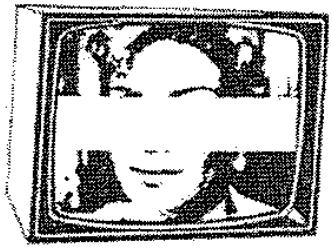
SNOW, NO SOUND
(NO SIGNAL)

SNOWY PICTURE
(LOW LEVELS)

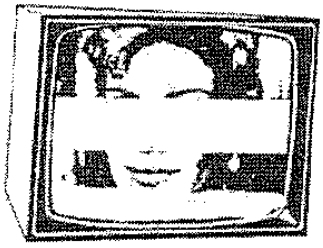
GHOSTING (INGRESS)



HERRING BONE PATTERN
(COMPOSITE TRIPLE BEAT)

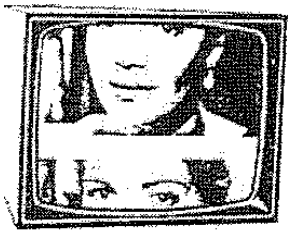


60 CYCLE HUM



120 CYCLE HUM

ELECTRICAL INTERFERENCE



VERTICAL HOLD PROBLEM
(TV SET PROBLEM)

Informing the Customer

If you have determined that the problem is caused by a defective component in the drop, you should be able to correct the problem at the time of the service call by replacing or repairing the defective cable or device. If the problem is with the customer's TV set, you must be able to explain to the customer that it is not the responsibility of Cablevision. This must be done tactfully without insulting the customer.

Do not make negative comments about the customer's TV or equipment – ever.

Bring your test TV into the customer's house, split the cable feed, and show your TV picture next to the customer's TV at the same time to show the customer that the cable is in working order. Remember never try to explain something that you are not sure of yourself. Do not make up a story in order to leave the house. Seek assistance from the area lead technician or your supervisor. If you cannot get the answer at the time of the service call, let the customer know that you will find out the answer and get back to him/her as soon as possible. Always treat the customer the way you would want a service person working in your house to treat you or your family. If the problem is with the system, it is your job to report the problem to the area lead technician and write a system referral. Also, let the customer know that the problem will be corrected as soon as possible.

House Heath Check (HHC)

What is Tech Assist: House Health Check?

It is a diagnostic tool that captures the signal level data of all the devices on a customer's account and can be used to assist a technician in troubleshooting.
Helps the technician ensure every device is working and within specifications before departure of a job.

All other policy and procedure for installation still apply.

What it is not?

- Does not replace Standard Network Certification Process
- Like any diagnostic tool it is an aid and not a replacement for troubleshooting and repairing signal level problems.

Policy

- The House Health Check must be used on every completed job.

Process

- Follow standard operating procedure for installation, Change of Service or Troubleshooting call.
- Use the Tech Assist: Check House Health after all equipment is installed.
- If any equipment does not pass corporate signal level standards, troubleshoot accordingly and re-verify using Tech Assist: Check House Health prior to leaving the house.
- If you are unable to establish proper signal levels on all equipment follow standard troubleshooting procedures up to and including a referral to OSP.

Accessing the Tech Assist Site

You are able to launch the Tech Assist Site two ways. You can launch it through the TV Monitor or on your laptop or computer.

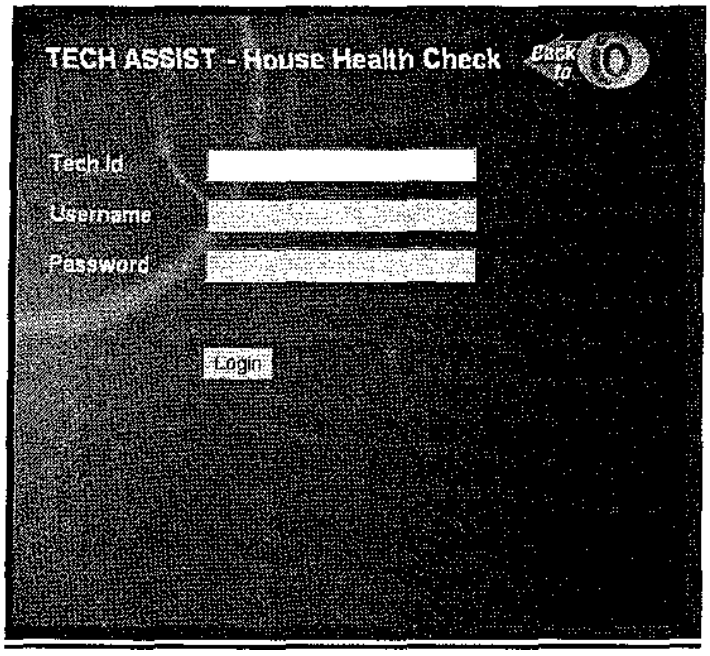
Make sure to read each screen carefully and enter the information completely so that you can log on and verify completion of install.

Follow the directions below to access the site that is best for your situation.

Launching via TV Monitor

Tune to Channel 900 and press 'cbbc' on the remote. The Tech Assist "Log In" page will display.

- In the Tech ld field, type your Technician number. In the Username field, type your Username. In the Password field, type your appropriate area password.
- Click on Login.

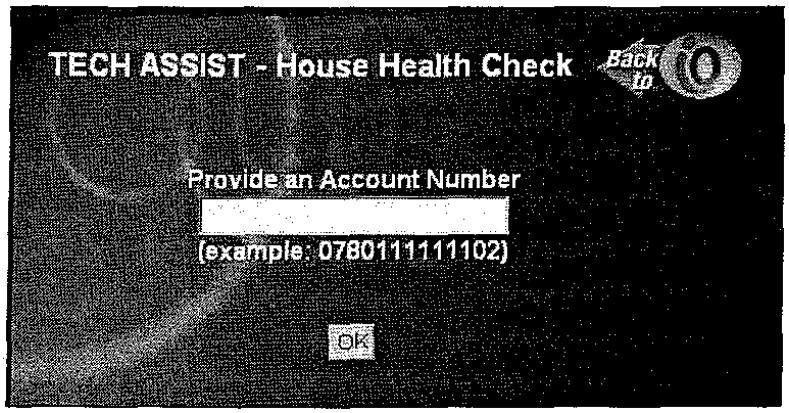


The "**Provide Account Number**" screen will appear:

- Enter the Customer's 13-digit Account Number exactly as it appears on the customer's Cablevision bill. "CableData" using the following format: 5-digit Corp+6-digit Account, including any leading zeroes to make six digit+2-digit House Code (ex: 0780100080102).

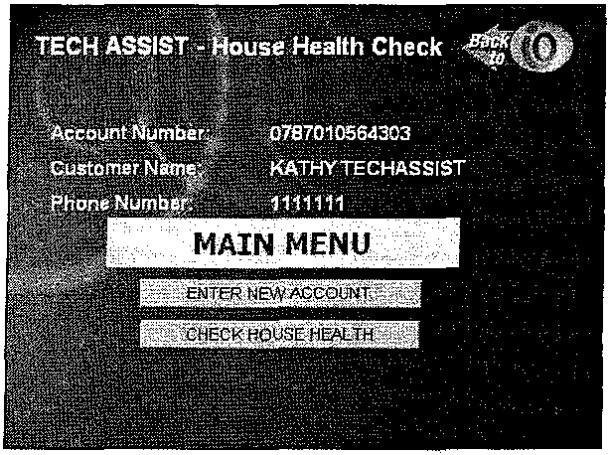
The iO remote does not contain a backspace key. To correct a typo entered into the account number field, the user may Down arrow to [OK] then Up arrow back to the account number field. The account number will be highlighted and can be re-entered.

- Click OK.

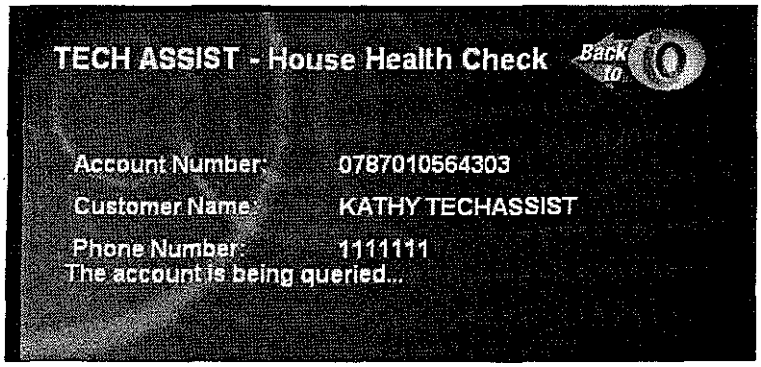


The **MAIN MENU** screen will appear:

- Click on **CHECK HOUSE HEALTH**.

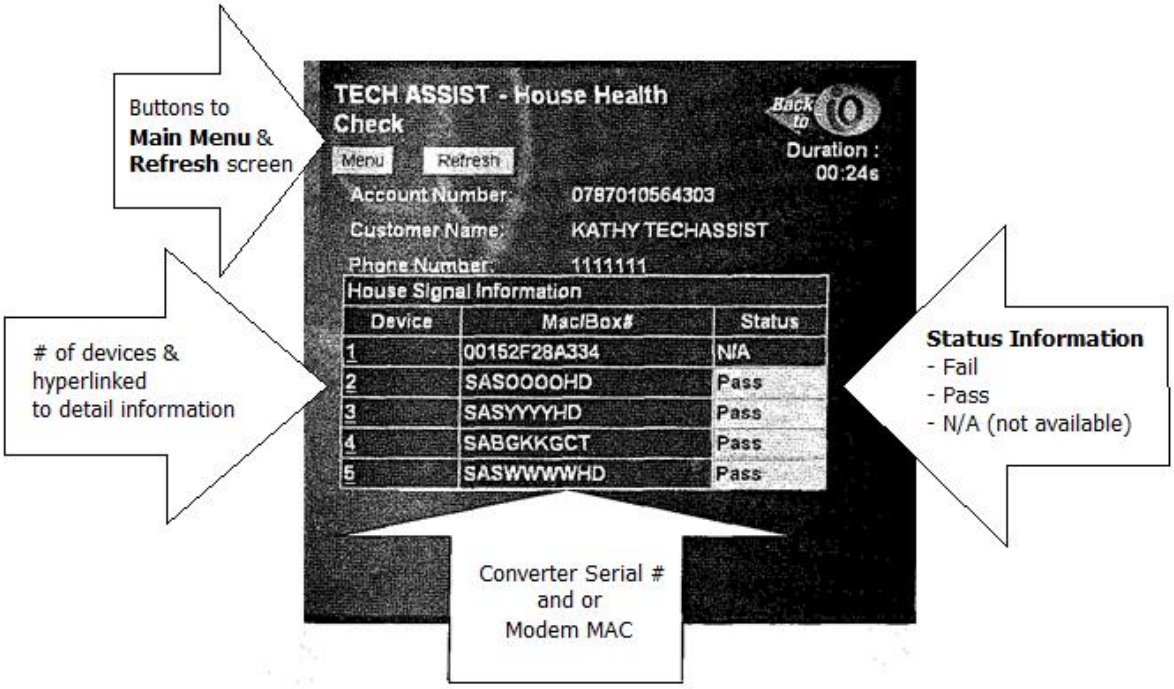


Note: System may take a while depending on the number of devices on the account.



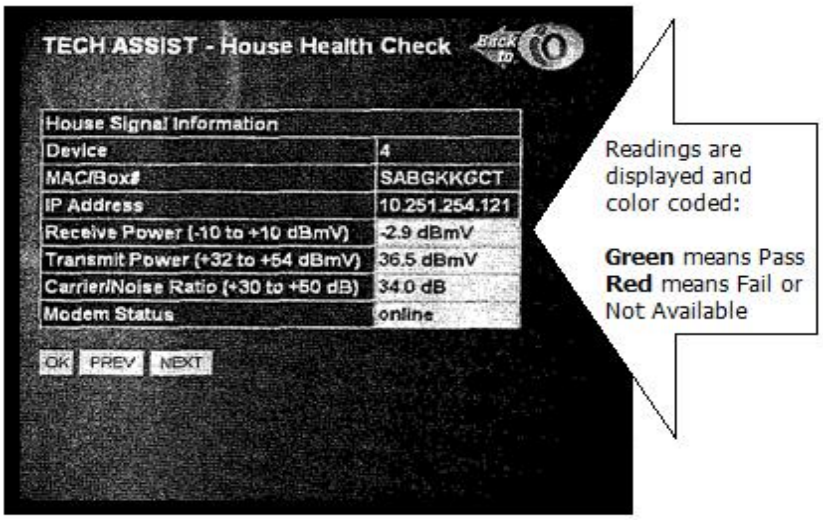
The **CHECK HOUSE HEALTH** screen will appear:

- Click on a device hyperlink to view device information



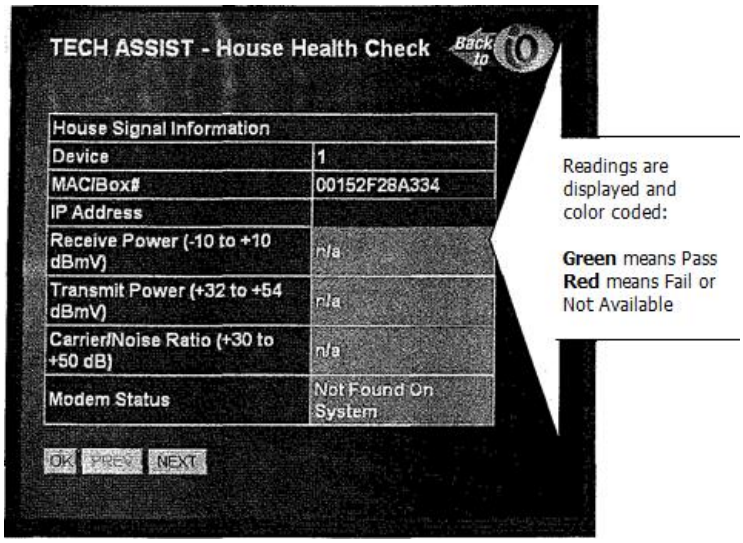
If the device is a converter the following screen will appear:

- Click OK to go back to **CHECK HOUSE HEALTH** screen
- Click Prev to go back to previous screen
- Click Next to go to the next device



If the device is a modem the following screen will appear:

- Click OK to go back to **CHECK HOUSE HEALTH** screen
- Click Prev to go back to previous screen
- Click Next to go to the next device



To exit the application, change the channel or close Internet Explorer.

Launching Online via a Computer

Access the House Health Check (HHC) web site by using the web browser. Type URL into the browser's address field:

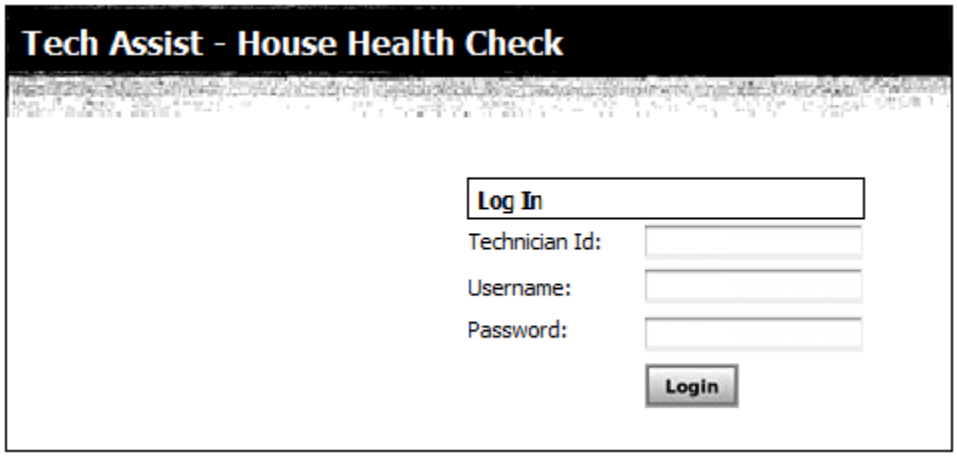
https://techassist.cablevision.com

The website is a secure website and requires 'HTTPS'. If you do not enter the 'S', you will not access the website correctly. Once you have entered the website, you can bookmark it as a Favorite to go back to without having to type it again.

Microsoft Internet Explorer 5.5 or higher or Netscape Navigator 4.72 or higher must be used to access the website and it needs to support 128-bit encryption. If the Internet browser does not meet these requirements, the website will not be accessible.

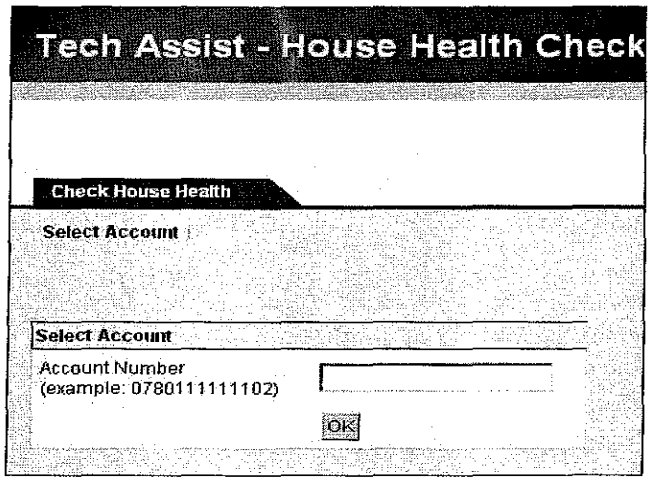
The Tech Assist "Log In" page will display:

- In the **Tech Id** field, type your *Technician number*. In the **Username** field, type your *Username*. In the **Password** field, type your *appropriate area* password.
- Click on **Login**.



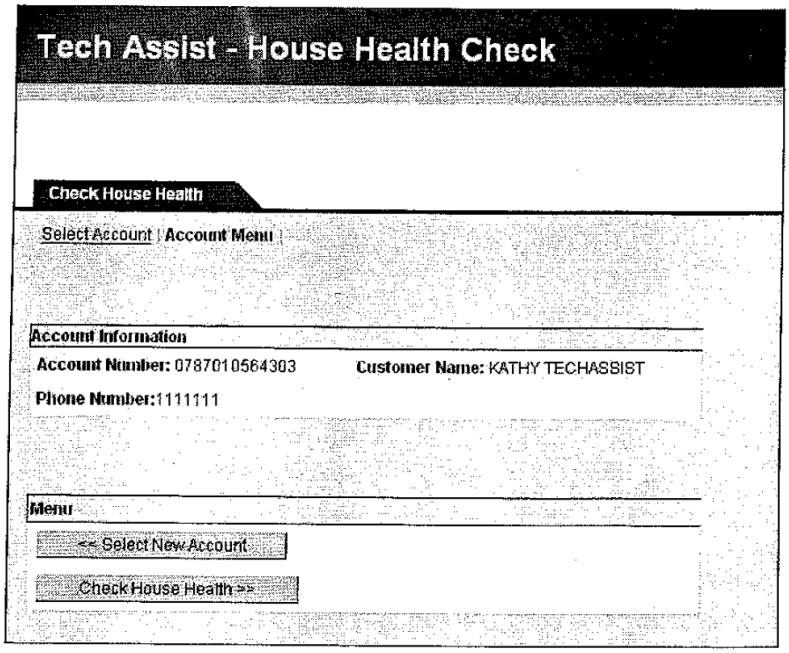
The "**Provide Account Number**" screen will appear:

- Enter the Customer's 13-digit Account Number exactly as it appears on the customer's Cablevision bill. "CableData" using the following format: 5-digit Corp+6-digit Account, including any leading zeroes to make six digit+2-digit House Code (ex: 0780100080102).
- Click OK.

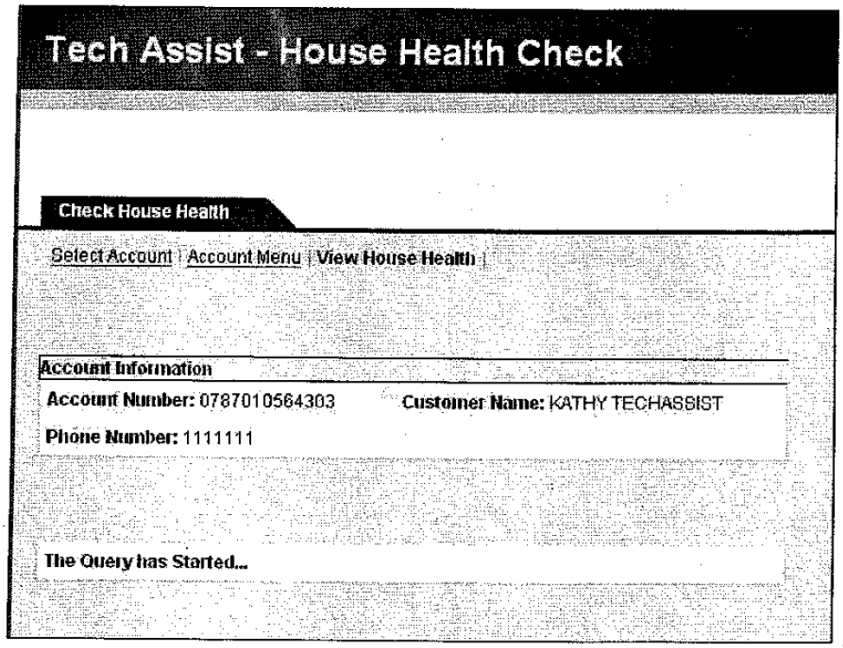


The **MAIN MENU** screen will appear:

- Click on **CHECK HOUSE HEALTH**

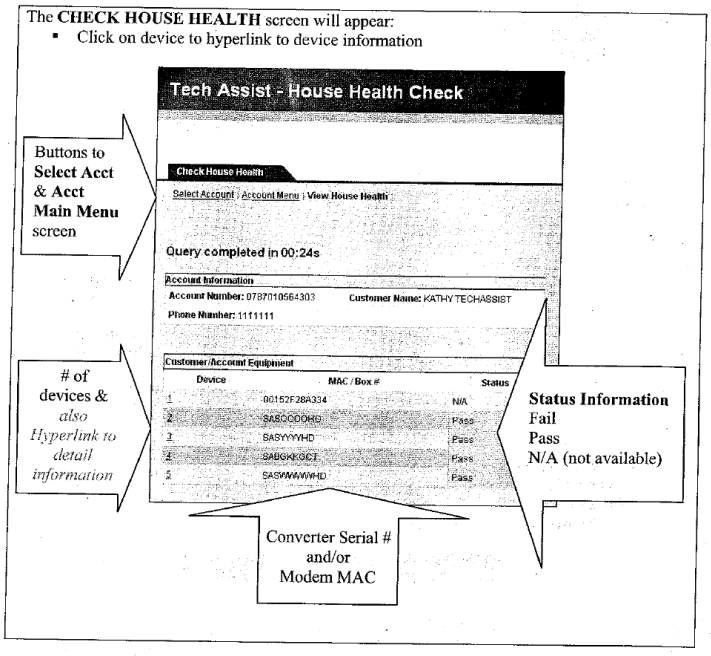


Note: System may take a while depending on the number of devices on the account.



The **CHECK HOUSE HEALTH** screen will appear:

- Click on device hyperlink to view device information



Specifications Used for the Tech Assist:

The Pass or Fail criteria on the website is based on the following Cablevision Signal Specifications:

Converter & HSD/VoiP modem Input (receive) Levels (Digital)	Minimum: -10 dBmV Maximum: +10 dBmV
Converter & HSD/VoiP modem Output (transmit) Levels (Digital)	Minimum: +32 dBmV Maximum: +54dBmV
Converter & HSD/VoiP modem Carrier/Noise ratio	Minimum: +30dB Maximum: +50 dB

Restrictions:

- The House Health check does not work on SA1850's
- A Sony converter can launch the HHC application but cannot return any results.
- The HHC application may restrict queries performed on bulk accounts.