North American Cable Equipment Inc. Headend Setup Instructions

The information contained in this document has been compiled as a set of guidelines to install a commercial SMATV headend system that has been pre-assembled by the lab technicians at North American Cable Equipment Inc. This document assumes that a proper sight survey has been conducted and that an acceptable location has been chosen for the system. The location should be temperature controlled, clean, dry and dust free. The location should have sufficient power to handle the amperage required by the system. This document also assumes that the required satellite dishes and or off air antennas have been installed with the proper number of coaxial lines wired into the headend's desired location.

When installing a system in a commercial building, it is the responsibility of the on-site technician to be aware of and follow all of the state and local building, electrical & grounding codes as well as the rules of The Federal Communications Commission (FCC).

This document has been designed to aid in the installation of SMATV headend electronics, it does not cover the distribution of the signal from the headend system to the viewing locations. Please contact our sales engineering department at (610) 429-1726 for distribution design assistance.
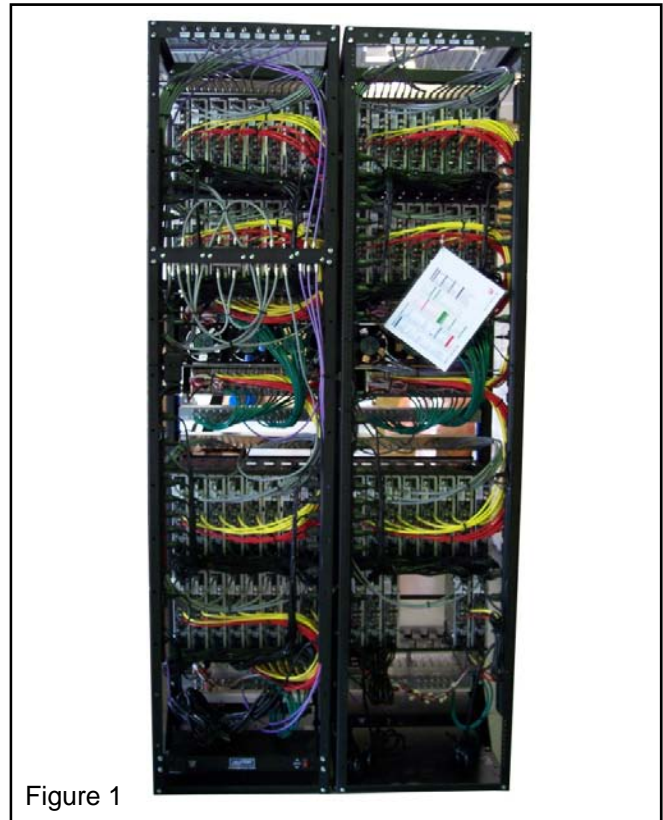
Figure 1

Step 1: Unpacking The System

A commercial SMATV system is a delicate yet heavy assembly of precision electronics. North American Cable Equipment Inc. (NACE) takes great care when packing a system to ensure that it will be delivered free of damage. Systems are shipped in a wood crate with an endoskeleton that was designed to protect the system. The inside of the crate has been lined with a foam damper that is required to reject the effects of vibration during the systems voyage to it's desired location. The system is also wrapped in bubble wrap and covered with shrink wrap to further avoid the effects of vibration, static and moisture. ***It is extremely important for the party taking receipt of the system to notify the carrier at delivery if there is any damage at all to the outside packaging of the system.***

The system should be left by the carrier laying flat on its attached pallet. Remove the screws from the lid of the crate and remove the lid. Remove the end and or one of the sides of the crate. By removing the foam packing material from the sides, top and bottom of the system, you will make room to be able to lift the system from the crate. Most systems will take at least two people to lift from the crate. Lift the system from the crate and set the system upright on its base.

Items that have been ordered for the Installation but are not attached to the headend may be in boxes inside the crate. Do not discard the crate and packing material until you have looked through the packing thoroughly to make sure that there are no products hidden. Pay close attention for items such as flat non penetrating roof mounts that could be in the bottom of the crate under all of the packing materials.

Now that the system is standing upright, remove the outer shrink wrapping and the bubble wrapping.
Do not plug anything in at this time!

Figure 2

Step 2: Arranging The Racks

In many systems there will be more than one rack of electronics. If this is the case, line the racks in a row with the lowest channels being on the left when facing the front of the rack. Align the remaining racks with the channels in ascending order from left to right. This is important since the cables that connect the racks have been cut to length and will not be the right length if the racks are not in order.   All of the connections that will be used to interconnect the racks are located at the top of the back of the racks on the Rack Interface Plates (RIP). Be sure to leave plenty of room to walk behind the racks.
Do not plug anything in at this time!

Step 3: Grounding The System

It is the responsibility of the installer to be aware of and to follow all local codes regarding grounding. Systems must be grounded in accordance with National Electric Code article 250. All racks must be grounded before you begin working on them. Most importantly, they must be grounded before the coaxial satellite lines are attached and before the system is plugged into a live AC outlet. In systems with multiple racks 1/2" flat braid ground cable with 1/4-20 bolts works well as long as it meets all local codes.
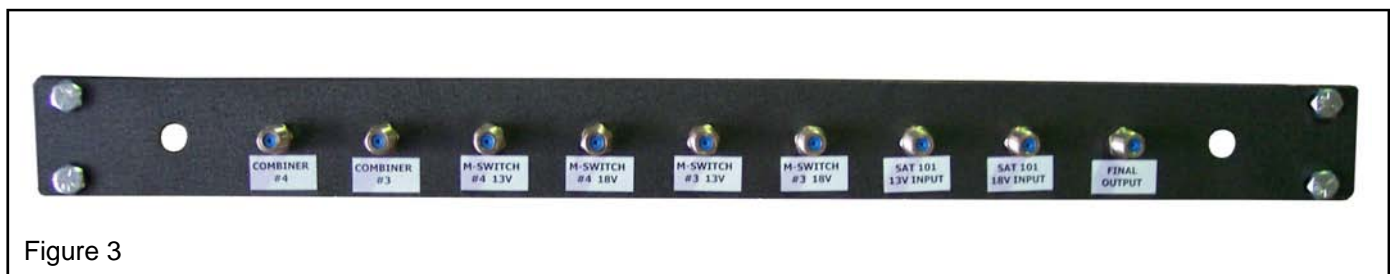
Figure 3

### Step 4: Interconnecting The Racks

Interconnecting the racks has been made very simple with the inclusion of a Rack Interface Plate (figure 3) located at the top rear of each rack. The RIP is designed to conveniently locate the satellite and antenna inputs as well as the RF test outputs. For systems that require more than one rack, the rack interface plate also houses the connections for the cables that must run between the multiple racks. All inputs/outputs have been placed on these plates and labeled so you can quickly attach all necessary cables. *It is important that the system is not powered up until the certified working satellite feeds have been connected to the system.* Powering the receivers without satellite input could cause the receiver to begin a boot sequence that will be interrupted. This shouldn't damage the receiver but it will take longer to program the receiver once the satellite lines are connected.

First: Locate your satellite inputs on the RIP. These will be labeled with the type of feed (DTV or DISH) followed by the voltage (18 or 13). For example, a DTV 18V signal, would be labeled as "DTV 18V INPUT" on the R.I.P. In the event you have multiple lines coming in from multiple satellite positions, the plate will be marked accordingly. Example 101 13V, 101 18V, 119 13V, 119 18V. Connect your satellite feed lines into the respective ports at this time. If the system is integrating an off-air antenna via demodulators and modulators, there will be a port on the plate labeled "ANT IN" for the antenna input.

Second: Cables cut to custom lengths will be located on one of the racks. Use these cables to connect the ports on the racks by matching the numbers (1 to 1, 2 to 2, 3 to 3 etc.). This will connect all of your multiswitches to the correct input signals, combine each racks combiner onto one line and provide you with two open ports on the top of one of the racks. The first port will be labeled "FINAL OUTPUT". This is the output you will use to begin your distribution. The second port will be labeled "TEST TV". This port has been attenuated and can be used as a test port to connect a television in the headend room.

Step 4: Interconnecting The Racks (Continued)

Third: With a connector wrench, tighten all connectors to ensure a clean connection. Be very careful not to torque these connections too hard. Connectors are factory tightened during assembly but they can vibrate loose in shipping. Push each of the RCA connections in to make sure they did not vibrate loose during shipping. Make sure that all of the power cords are plugged in.

Fourth: Find all of the remotes in the room and remove the batteries. **The accidental push of a button from a single remote can change settings on some or all of the receivers in the rack.** If you need to use a remote to program the receivers, select one and make sure that it is used on one isolated receiver at a time. After the system is installed, hide the remote in one of the rack rails so that it is not accidentally used. Some installers prefer to cover the remote eye of each receiver with a small strip of electrical tape .

Fifth: Before plugging the system in, it is imperative that the outlet, wire and circuit being used have an amperage rating that is sufficient for the system being plugged in. A standard headend rack with 24 receivers and 24 micro modulators would require a minimum 15 Amp circuit. An EMI, RFI rated outlet is recommended. For assistance in calculating the required amperage, please contact NACE before plugging in the system.

Sixth: Locate the power cord for each rack. This will usually be located at the bottom of the rack on the back of the rack mounted, surge protected power center. Plug each rack into its designated outlet being sure not to overload the circuit. Turn on the power centers and your system should come alive.
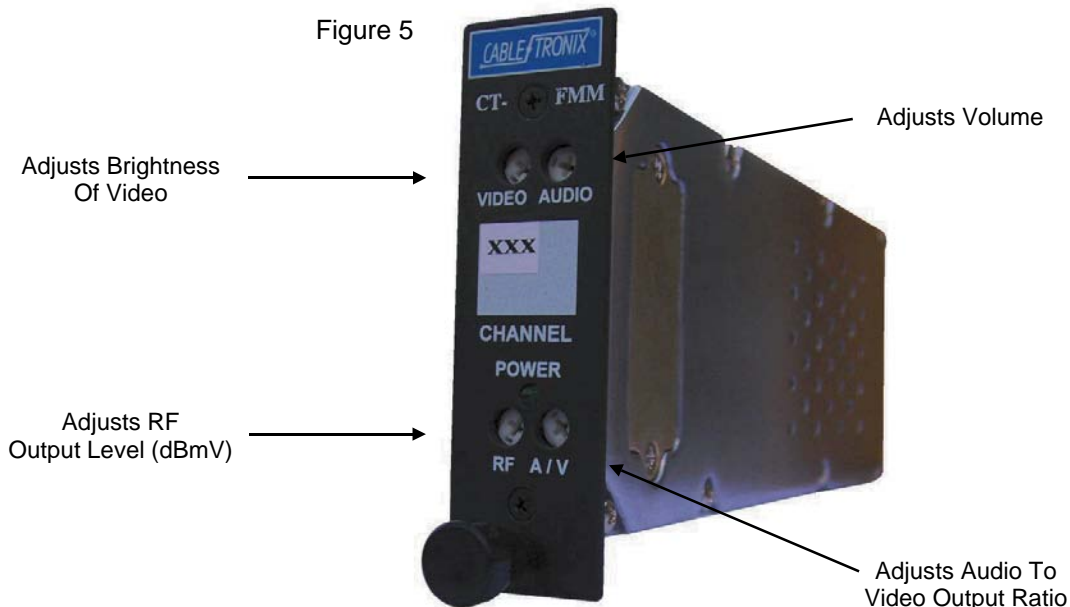
Figure 4
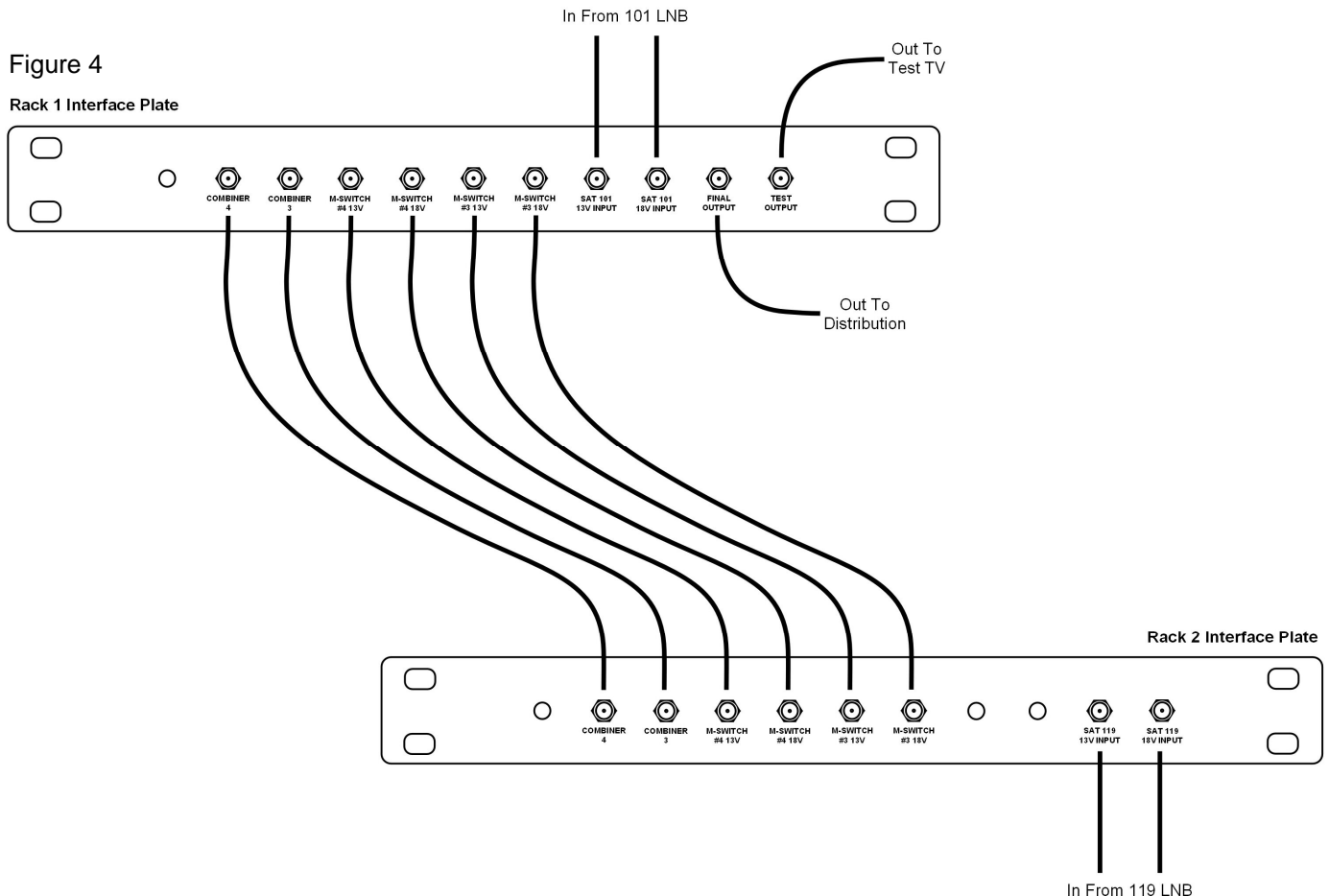
Step 5: Setting Up The Receivers

Since the receivers are not authorized by the satellite signal provider (usually DIRECTV or DISH NETWORK) at the time of assembly, they will not be tuned to the desired program. Each of the receivers will be labeled on the front with the output channel number of the modulator it is wired to at the very least. If programming information is supplied to NACE at the time of assembly, this information may be on the label as well. Consult your programming contract to determine what programming will be on each receiver.

Step 6: Balancing The Output

Do not adjust any of the tuning screws on the modulators or amplifiers if you do not have a signal level or spectrum analyzer connected to the system.

RF Output: Each system is balanced according to the customer's requirements. If no requirements are issued at the time of assembly, the system will be balanced with a flat 45 dBmV RF output.

Aural Carriers: Aural carriers are normally set at least 16 dB below the video carriers.

Audio: Volume levels are set to an even level during assembly using a constant input. When the receivers are authorized and providing individual programming to each of the modulators the volume may need to be adjusted to compensate for differences in the input to each modulator.

Video: Video levels are balanced during assembly to provide a balanced brightness and contrast using a constant, fixed input. This level may need to be adjusted slightly when individual programming is supplied to the modulator by its satellite receiver.

Figure 5

Adjusts Volume

Adjusts Brightness Of Video

Adjusts RF Output Level (dBmV)

Adjusts Audio To Video Output Ratio

Congratulations, your system should now be ready to connect to your distribution system.

Troubleshooting

Troubleshooting:
Most of the troubles that arise during the setup of a pre-built headend system can be solved by simply Isolating the problem.

Trouble With Groups Of Channels:
If you are missing a selected group of channels, find out what each of these channels have in common.

> Are all of the channels on one rack?
> > If Yes, does the rack have sufficient AC power?

> Are all of the receivers connected to the same multiswitch?
> > If Yes, using a satellite meter confirm that the inputs to the multiswitch have adequate signal level.
> >
> > If the proper signal level is at the input to the switch, confirm that the switch has the proper output voltages (13V/18V). Doing this will confirm that the switch is receiving power from the power supply. If there is no LNB power out of the switch, swap the switches power supply with a known working unit to see if this solves the problem.

> Are all of the channels from a specific satellite position?
> > Confirm that the incoming lines from the satellite dish contain signal from the desired satellite position. If you do not have a meter that verifies the incoming satellite position, hook a satellite receiver directly to each of the incoming satellite lines.

> Are all of the channels from one polarity of a single satellite position?
> > Follow the steps above to determine if the problem lies in the LNB, incoming satellite lines, satellite splitters, satellite power supply or individual multi-switch input ports.

> Are all of the channels on a single combiner?
> > If Yes, check the connections to ensure that the output cable from the combiner is connected to the output of the combiner and the combining network (usually a splitter/combiner) used to combine multiple combiners together before going into the system amplifier.

> Are the modulators plugged into the same power supply?
> > If Yes, swap the power supply in question with a known working unit and see if this fixes the problem.

Trouble With An Individual Channel:
If you are having trouble with a single channel's audio, video or audio and video the problem can
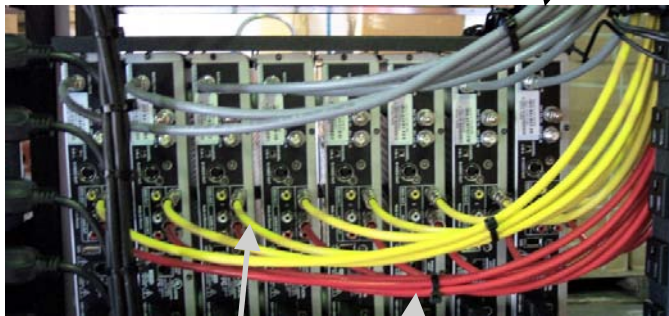usually be isolated to either the receiver or the modulator.

Receiver Isolation Test:
If you have no audio or video on channel 9, plug the audio (red) and video (yellow) lines from the input
of the channel 9 modulator into the channel 10 (known working) modulator. If you now get no picture
on channel 10 you are likely to have either have a bad receiver or bad cables. If you have determined
that the receiver is not working properly, skip to the receiver troubleshooting section below.

Modulator Isolation Test:
If this does not fix the problem, try connecting the audio and video input lines from the channel 10
(known working) modulator into the channel 9 modulator. If you get no picture on channel 9, the
modulator is likely to be the problem. If you have determined that the modulator is not working
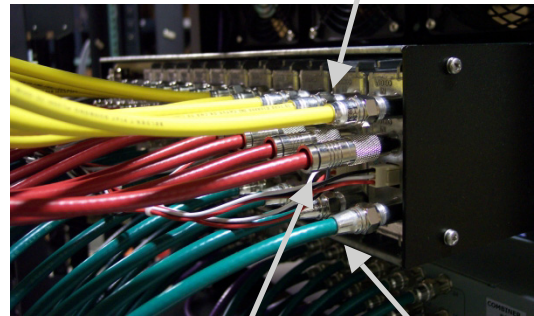properly, contact our lab for further troubleshooting options at (610) 429-1726.

In From Multiswitch
Gray RG-6

Video In From Receiver
Yellow RG-59,
F Connector

Figure 6 Receiver Connections

Figure 7 Modulator Connections

Video Out To Modulator
Yellow RG-59,
RCA Connector

Audio Out To Modulator
Red RG-59,
RCA Connector

Audio In From Receiver
Red RG-59,
RCA Connector

RF Out To Combiner
Green RG-59,
F Connector

Receiver Troubleshooting:
If you are having a problem with particular channel and you have isolated the problem to the satellite receiver, see
the following two pages for detailed receiver troubleshooting.

To download current receiver software on a DIRECTV D11 receiver, follow the steps below.

To verify the current software version:
MENU → SETTINGS → SETUP → INFO & TEST

As of 6/29/06, the current software version is 0X1005.

Follow these steps to force a receiver to update software.
1. Reset the receiver.
2. While it is re-booting, press 02468 on the remote.
3. The on-screen display will confirm a download in progress.