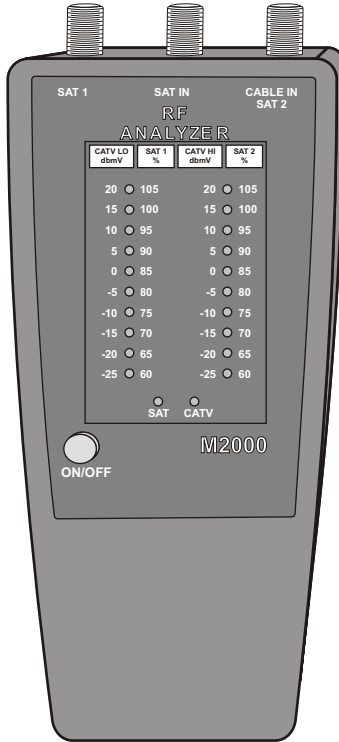


# M2000

## RF/Satellite Field Strength Meter



# CHANNEL VISION™

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**The M2000** provides a quick method of critically aligning all axes on satellite dishes, and troubleshooting common RF distribution problems in residential installations.

**What's included:**

M2000 meter  
9V battery

**What's happening:**

The M2000 simultaneously measures three bands:

20-450MHz (VHF and cable channels up to 450MHz, about channel 61)

450-950MHz (UHF and cable channels above 450MHz, digital on most cable systems)

950-1450MHz (DBS satellite IF in the US)

The M2000 rapidly measures ALL energy in these bands. This allows a very fast test of the entire band. This may give unexpected results to someone unfamiliar with this type of meter. See "*What do the numbers mean*" at the end of this manual."

**Getting Started:**

Install the 9V battery.

The power ON/OFF switch turns the M2000 on and off. If no signal is present for 5 minutes, the M2000 will automatically shut itself off.

When the M2000 first starts, the initializing routine will light all the LEDs in sequence.

If the M2000 finds DC voltage present, it shifts to the satellite mode.

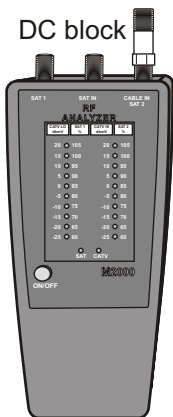
(Because a DC voltage is present to power the LNBS on a satellite dish.)

A DC block will be required to measure an RF distribution system that has a DC voltage on the coax.

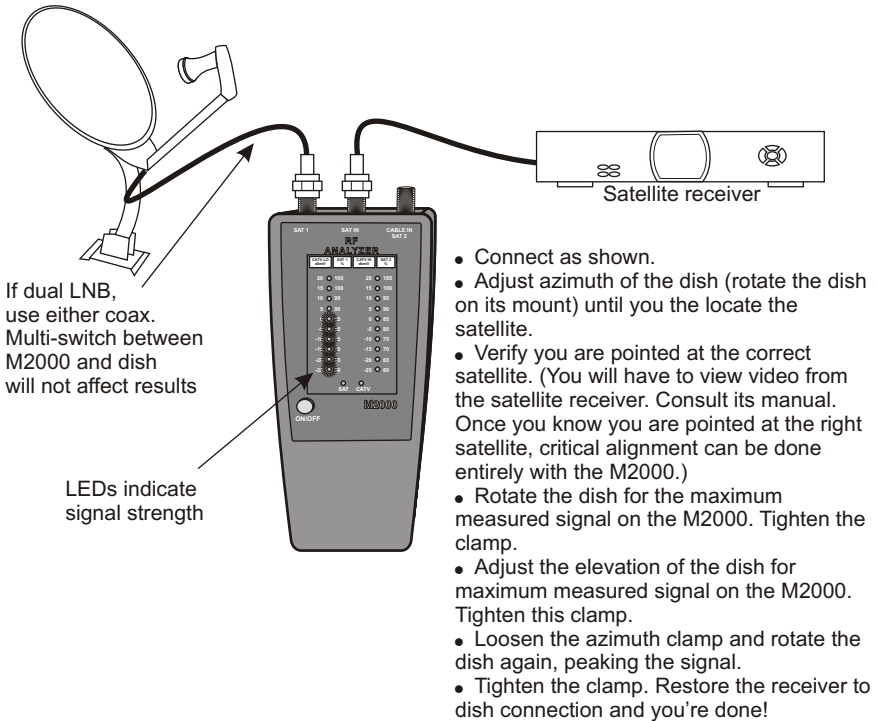
DC voltages are present on cable systems to power line extender amplifiers. (Although the cable company should have used a DC block before the cable enters the home.)

DC voltages are present on distribution systems that have an IR engine to remotely power IR receivers.

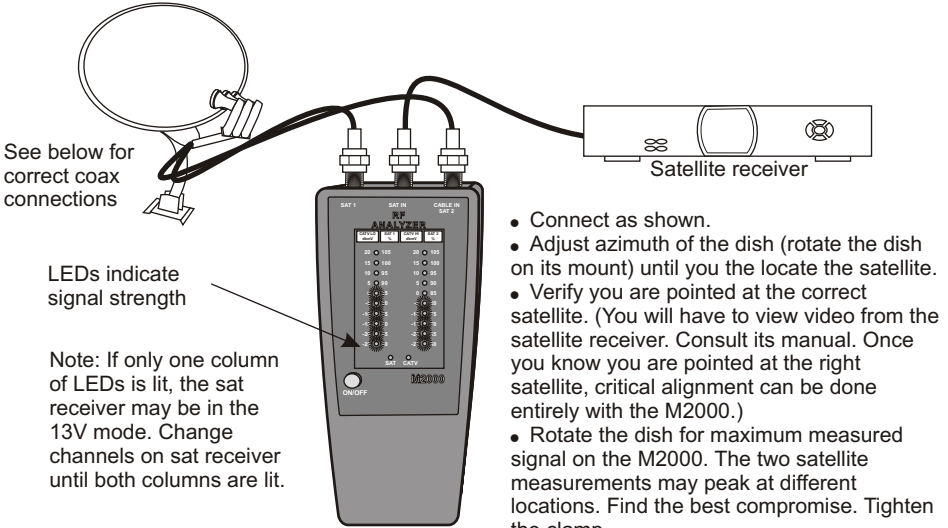
DC voltages are also present on systems that remotely power an amplifier or a camera.



## Aligning a round satellite dish

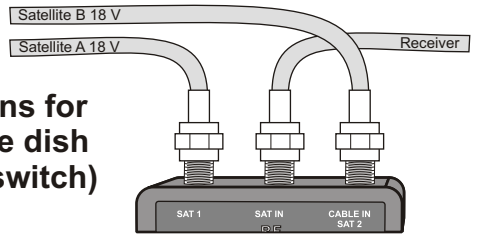


# Aligning an elliptical satellite dish (no multi-switch between M2000 and dish)

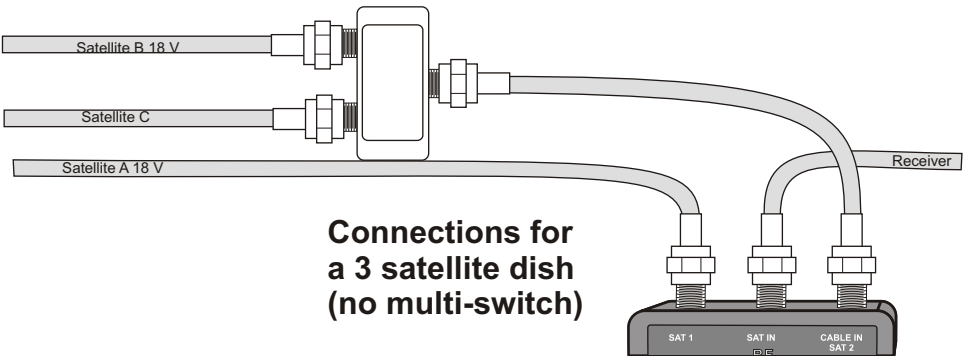


- Connect as shown.
- Adjust azimuth of the dish (rotate the dish on its mount) until you locate the satellite.
- Verify you are pointed at the correct satellite. (You will have to view video from the satellite receiver. Consult its manual. Once you know you are pointed at the right satellite, critical alignment can be done entirely with the M2000.)
- Rotate the dish for maximum measured signal on the M2000. The two satellite measurements may peak at different locations. Find the best compromise. Tighten the clamp.
- Adjust the elevation of the dish for maximum measured signal on the M2000. Again you may have to compromise between the two satellites. Tighten this clamp.
- Dish makers usually recommended to not bother with tilt. But with the M2000 it is easy to adjust. Just proceed in the same fashion.
- Loosen the azimuth clamp and rotate the dish again, peaking the signal. Tighten the clamp.
- Restore the receiver to dish connection and you're done!

## Connections for a 2 satellite dish (no multi-switch)

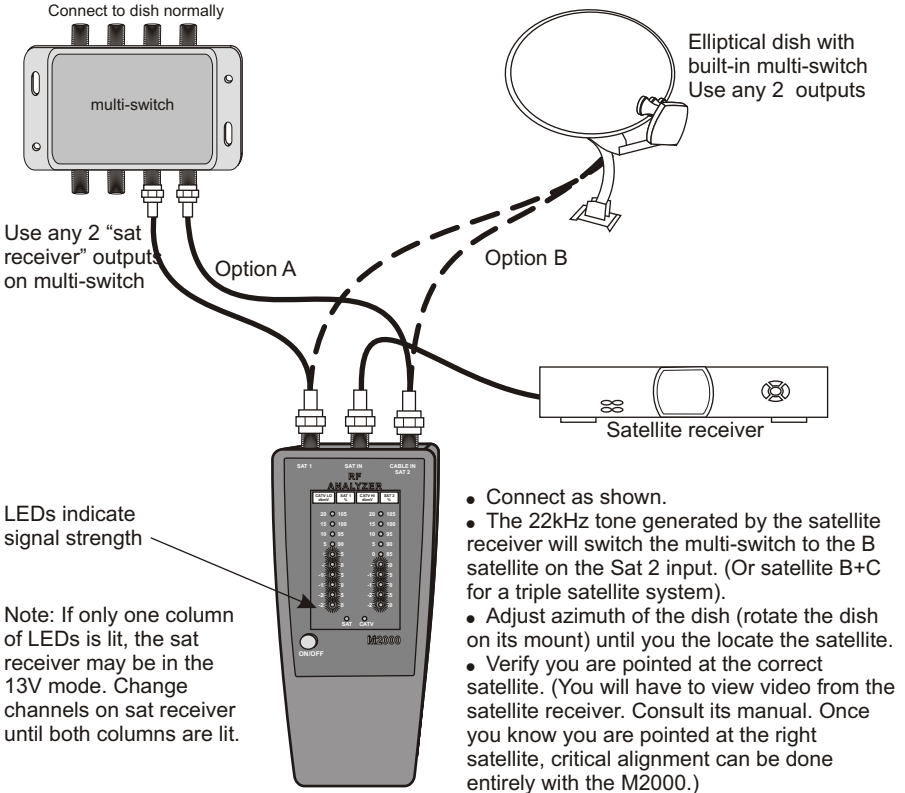


## Connections for a 3 satellite dish (no multi-switch)



# Aligning an elliptical satellite dish with multi-switch

A multi-switch can be separate or built into the LNB array.

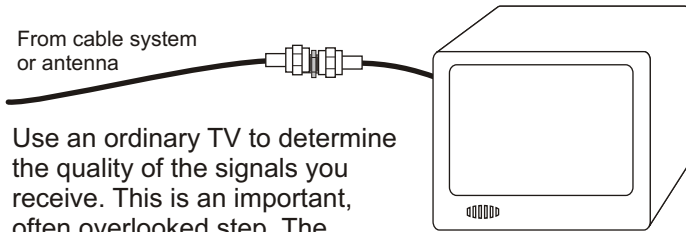


- Connect as shown.
- The 22kHz tone generated by the satellite receiver will switch the multi-switch to the B satellite on the Sat 2 input. (Or satellite B+C for a triple satellite system).
- Adjust azimuth of the dish (rotate the dish on its mount) until you locate the satellite.
- Verify you are pointed at the correct satellite. (You will have to view video from the satellite receiver. Consult its manual. Once you know you are pointed at the right satellite, critical alignment can be done entirely with the M2000.)
- Rotate the dish for maximum measured signal on the M2000. The two satellite measurements may peak at different locations. Find the best compromise. Tighten the clamp.
- Adjust the elevation of the dish for maximum measured signal on the M2000. Again you may have to compromise between the two satellites. Tighten this clamp.
- Dish makers usually recommended to not bother with tilt. But with the M2000 it is easy to adjust. Just proceed in the same fashion.
- Loosen the azimuth clamp and rotate the dish again, peaking the signal. Tighten the clamp.
- Restore the receiver to dish connection and you're done!

## Trouble-shooting residential RF distribution systems

Because the M2000 measures the total energy in a band it can give you a very fast picture of how your RF distribution system is working. The goal of any RF distribution system is for all TVs to receive the same signal. To achieve this, follow these steps ...

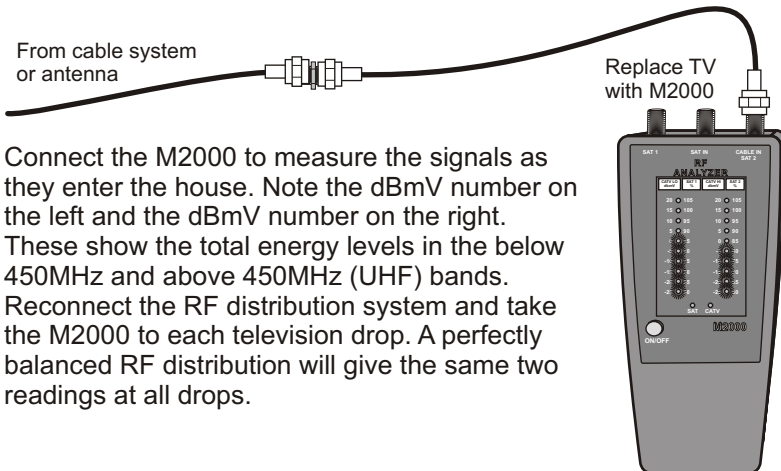
Step 1 ... Evaluate signal as it enters the house.



Use an ordinary TV to determine the quality of the signals you receive. This is an important, often overlooked step. The performance level of the signals

sets the standard of what you can achieve. If your signals are poor, try to correct them before you continue! This may mean complaining to your cable company, changing antennas, adding an antenna pre-amp or just aiming your antenna better. An RF distribution system will not improve the performance of the signals you start with!

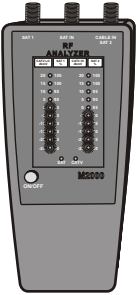
Step 2 ... Measure signal as it enters the house.



Connect the M2000 to measure the signals as they enter the house. Note the dBmV number on the left and the dBmV number on the right. These show the total energy levels in the below 450MHz and above 450MHz (UHF) bands. Reconnect the RF distribution system and take the M2000 to each television drop. A perfectly balanced RF distribution will give the same two readings at all drops.

# Trouble-shooting residential RF distribution systems (cont)

Typical readings and what they mean



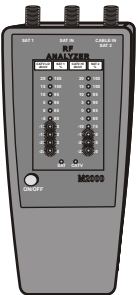
For these examples, assume the reading at the entry to the house matches this.

Note: If the M2000 will not stay in the CATV mode, a DC voltage is present on the coax. Use a DC block. (See page 2).

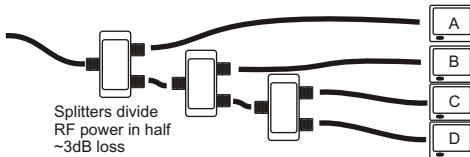


**CATV LO stays same, CATV HI drops**  
 Something is attenuating UHF frequencies only. Possible causes: 5-450MHz amps and 5-450MHz (CATV) splitters will roll off the high end of the spectrum. Find and replace these.

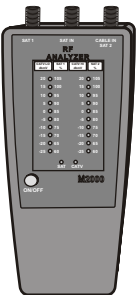
A low pass filter used to insert modulator channels will also cause this reading. This is normal, so nothing needs to be fixed.



**Both columns drop the same.**  
 If all ports are the same, evaluate the picture on the televisions. If the channels are noisy, add an amp where the cable enters the house. If the pictures are acceptable, the signal enters your house at a high enough level to compensate for all splitters. You do not need an amp. If only some ports are low, you may have an unbalanced distribution system. An unbalanced system will make achieving good performance more difficult. Re-wire system if possible.



Unbalanced system example  
 TV D gets 1/4 as much power as TV A



**Both columns unlit.**  
 A short or an open could cause this. Backtrack along the dead line to find the cable or splitter where the signal stops. On cables, look for short center conductors or shielding (braid or foil) that touches the center conductor.

## What do the numbers mean?

### Decibels, a short course

<Warning, math alert> Decibel measurement is a mathematical expression of the ratio of two power levels. (Specifically,  $\text{dB} = 10 \cdot \log_{10}(P1/P2)$ ). The shorthand 'dB' refers to a relative change in power level, e.g. "Raising the power by 10dB". In RF system design we use the shorthand 'dBmV', this represents the signal power in a 75 ohm system when the power level of 1 millivolt is 0dBmV. Thus dBmV is an absolute, not relative measurement. <Math alert over>

The M2000 measures the entire energy content of a band. The dBmV numbers are calibrated to measure a very large number of carriers that have identical power levels. In practice, this is very rare. In a situation with a small number of carriers, such as the output of a modulator, the number indicated will seem quite low. This is because the carrier count is very low. (1-4 carriers.) This is normal.

The advantage of this type of total energy measurement is speed. By comparing measurements on the coax as it enters a building with the measurement at each port, component problems and wiring errors can be quickly spotted.

### Specifications: (typical @25° C)

<b>Frequency Range:</b>	25MHz - 1550MHz
<b>Input impedance:</b>	75 ohms
<b>Power:</b>	9V battery
<b>Power consumption:</b>	Idle <200mA, sleep mode <200uA

Specifications subject to change without notice.

## CHANNEL VISION Limited Warranty

Channel Vision Technology will repair or replace any defect in material or workmanship which occurs during normal use of this product with new or rebuilt parts, free of charge in the USA, for two years from the date of original purchase. This is a no hassle warranty with no mail in warranty card needed. This warranty does not cover damages in shipment, failures caused by other products not supplied by Channel Vision Technology, or failures due to accident, misuse, abuse, or alteration of the equipment. This warranty is extended only to the original purchaser, and a purchase receipt, invoice, or other proof of original purchase date will be required before warranty repairs are provided.

Mail in service can be obtained during the warranty period by calling (800) 840-0288 toll free. A Return Authorization number must be obtained in advance and can be marked on the outside of the shipping carton.

This warranty gives you specific legal rights and you may have other rights (which vary from state to state). If a problem with this product develops during or after the warranty period, please contact Channel Vision Technology, your dealer or any factory-authorized service center.