APPLIED INSTRUMENTS, INC.

TELECOMMUNICATIONS INSTRUMENTATION

Application Note

Lower Ku Band Satellite Identification
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In North America, the satellite Ku band frequency range is roughly divided into the DBS satellites using 12,200 MHz to 12,700 MHz and what is referred to here as the "lower Ku band" from 11,700 MHz to 12,200 MHz. This paper addresses the problem of finding and identifying satellites in the lower Ku band.

The lower Ku band is characterized by a lot of satellites, closely spaced, carrying a mixed collection of signals, both analog and digital of various widths and formats including DVB-S, DIRECTV and Digicipher II (DC2). The satellites can be spaced as closely as 2 degrees apart; only a slight adjustment to the azimuth of the antenna will pick up a different satellite.

Pointing a dish at the desired satellite can be quite a challenge. The SAT 9520 has the ability to positively identify a large number of these satellites. This greatly simplifies the process of correctly pointing the dish and saves considerable time and frustration.

The identification process utilizes the ability of the SAT 9520 to lock onto and identify DVB-S and DIRECTV signals. The satellites in this band each utilize a different frequency plan and different signal types. In order for the SAT 9520 to obtain a signal lock, it must know the signal type, center frequency and symbol rate of a particular transponder. Because the satellite frequency plans vary so much, a channel set up to lock onto one transponder of one satellite very likely won't be able to lock onto that same frequency from any other satellite. This characteristic can be utilized to positively identify any satellite for which the SAT 9520 can obtain a locked signal.

Unfortunately, the SAT 9520 is not capable of locking onto Digicipher II signals or DVB-S signals that are narrower than its receiver's bandwidth. There are quite a few satellites at present that the SAT 9520 is unable to lock onto.

Reference the North American Satellites and Services chart/table which shows the satellites that the SAT 9520 is able to lock onto.

Two channel plans are available for the SAT 9520 to help in locating and identifying the satellites in this band: "Low Ku Band" and "Low Ku Stack". These plans contain one channel for each satellite. The "Low Ku Band" plan assumes an LNB LO frequency of 10750 MHz and uses 13 volts to select transponder with vertical polarity and 18 volts to select horizontal transponders. The "Low Ku Stack" plan is similar except horizontal transponders are shifted up by 575 MHz to obtain a stacked configuration.

To locate a particular satellite using an un-stacked system, do the following:

1) Mount and aim the dish using approximate settings:
   a) Make sure the pole is mounted plumb.
   b) Set the skew according to the location table (if using a dual satellite system).
   c) Set the elevation according to the location table.
   d) Set the polarity adjustment to something close (or zero offset).
   e) Point the dish in the approximate direction of the compass setting from the location table.
2) Connect the SAT 9520 to the LNB:
   a) Select "Low Ku Band" channel plan in setup screen.
   b) If using a dual satellite system, set the proper switch type.
   c) Select the channel corresponding to desired the satellite.
   d) Turn the LNB power on (select SAT A or SAT B etc if using a dual satellite system).
3) Use the power level peaking tone to find a satellite:
   a) Press the audio speaker button to turn the tone on.
   b) Slowly rotate the dish in the direction you think the satellite should be located.
   c) Listen to the tone and watch the level meter bar to see when a satellite signal is detected.
   d) When you find a signal, peak the azimuth setting and then peak the elevation setting.
   e) If you don't find a signal, re-point the dish using a compass and then adjust the elevation to scan for a signal.
4) Identify the satellite:
   a) If the SAT 9520 shows a lock (DIRECTV or DVB-S) then you have found the satellite indicated by the channel name.
   b) If not (more likely), then you have a satellite but not the one you are looking for. Press the up or down arrows to scroll through the other channels. Allow about 4 seconds on each channel to let the SAT 9520 have a chance to lock onto the signal.
   c) If you find one that locks, the channel name will indicate the satellite and you now know where you are pointed. You can then "walk across" to the satellite you want.
   d) If none of the channels will lock, you are either at a satellite that the SAT 9520 is unable to lock on, or your polarity or peaking is too far off. If you are sure of the peaking and polarity being close, then "walk across" until you identify a satellite.
5) To "walk across" from one satellite to another:
   a) First rotate the dish until the lock is lost or the signal level begins to drop.
   b) Then, if you are at a known satellite, change channels to the next satellite (down arrow if moving east, up arrow if moving west).
   c) Continue rotating until the signal starts to come back up, this should be the next satellite.
   d) Peak the azimuth and elevation on the new satellite.
   e) Check the lock status:
      i) If locked, the satellite is identified.
      ii) If not locked ("search" or (DC2)) then check all channels to see if any will lock.

Once you obtain a positive id on a satellite, it is fairly easy to walk across one satellite at a time until you find the one you are looking for. If you are looking for a satellite which the SAT 9520 cannot lock onto, you can find the nearest one that it will lock onto and then count across the non-locking satellites until you find the one you want.

One pitfall to watch out for is that if a satellite does not have a signal at the frequency that the SAT 9520 is tuned to, you may not see it as you scan past it. For this reason, it is best to set the SAT 9520 to the next expected satellite as you walk across. That way it will be tuned to a channel that is transmitted and you won't miss it.

Because the satellites are so close, it often appears there is no space between them, a slight twist of the antenna is enough to move to the next one. When walking across, the elevation does not need to be adjusted with each satellite, but should be adjusted at every third or fourth satellite to ensure you don't miss the next one. Be sure to peak the elevation when you find the desired satellite.

This method works well for the satellites between 87 degrees and 103 degrees west. It is also easy to pick up the adjacent positions of 85 and 107 degrees. Outside this range however it becomes more difficult due to the lack of positive identification. Furthermore, if the transponders that this method uses are changed, the SAT 9520 will fail to lock on the changed satellite signal until a new channel plan can be obtained and downloaded into the instrument.

We will continue to improve this method and post the improvements on our website.

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