REVIEW OF FIRST EIA/CEA-909 SMART ANTENNA IMPLEMENTATION: SYLVANIA 6900DTE OTA STB WITH DX ANTENNA DTA-5000

<holl_ands> 8/3/05

SYLVANIA 6900DTE OTA STB (AKA FUNAI STB400E):

ATSC reception with the Sylvania 6900DTE provided a 1080i HD picture with roughly the same exceptional HD picture quality as on TWC-SD cable using PACE DC-550P and SA8300HD PVR. (It also has a switch to select 720p and 480p, but apparently not 480i). The rear panel (see picture) has a 6-pin RJ-12 type connector for Smart Antenna Control, DVI-D HDCP, Component Video, S-Video, Composite Video, Dolby Digital Audio (Optical and Coax) and two pairs of L/R Stereo outputs.

I watched both HD outputs (switch selectable) DVI/HDCP or Component Video but would not declare a preference without extensive watching and comparing. The 4:3 sidebars are always black…the worst possible setting for a plasma panel…which needs greybar settings for top and sides to prevent burn-in.

Display driver is ATI's Xilleon 226 (same as several Samsung DLPs and numerous other HDTV manufacturers). Inside the Sylvania 6900DTE I found the TUHU2-551A ATSC Tuner Module. The Alps Electric (Japan) spec sheet says it contains an ATI NXT2004. Although both the NXT24004 and the TUHU tuner module support NTSC and QAM, Funai/Sylvania elected not to turn them on in the STB. [Fortunately, I do not need them.]

The Alps TUHU spec sheet also lists the TDEU Tuner Only Module, which claims a typical Noise Figure of 7 dB. Since they are on the same spec sheet, the same Noise Figure probably applies to the TUHU ATSC Tuner Module tuner. The TUHU is also reportedly used in the Ricavision AverMedia ATSC A180 Tuner PCI Card.

ATI's NXT200x series of ATSC Decoder chips are capable of handling difficult multipath conditions including when the various multipath components are roughly the same strength (i.e. 0 dB echo case), as is sometimes found in indoor locations. Fol. is description of NXT2004 (ditto NXT2002, NXT2003, NXT2005) from ATI's website:

> *"The NXT2004 is a highly integrated solution to DTV reception demonstrating superior performance in the presence of multipath, phase noise, impulse noise, adjacent and co-channel interference in terrestrial and cable environments.* ***The NXT2004 handles 0dB echoes through a wide range of delays.****"*
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> *"The sparsed equalizer provides better AWGN performance,* ***exceptional dynamic multipath tracking****, and less stochastic jitter than conventional equalizers. Advanced integrated adaptive control provides fast reliable acquisition and reacquisition. These advancements in equalizer technology improve the overall demodulator performance resulting in reliable operation in environments where competing solutions may not acquire or maintain signal lock."*

ATI press releases say that the NXT2004 demodulator chip is used in the Funai (Japan) aka Sylvania STB, as well as ATI's HDTV Wonder, Hisense (China) aka USDTV/Walmart STB, Comtech (Taiwan) ATSC Tuner Modules and Philips (Netherlands) TU1236 series ATSC Tuner Modules. Which begs the question of why the EIA/CEA-909 Smart Antenna Control Interface is ONLY available in the 6900DTE.

The Philips TUV1236 uses the similar NXT2003 (which adds a QPSK Out-Of-Band receiver for use on cable systems). A Nov 2004 ATI press release claimed that the NXT2003 is used in the "vast majority" of Digital Cable Ready (DCR) HDTVs, including Samsung, Toshiba, Hitachi, Sony, Mitsubishi, Thomson and Sharp. But the built-in EIA/CEA-909 Control Interface is still not available for the user.

The spec sheet for the "similar" Comtech DAVB-20046R1P ATSC/NTSC/QAM Tuner Module shows the NXT2004 being used with varactor tuned RF filters, externally AGC'd RF Preamps (one each for lo-VHF, hi-VHF and UHF band), then a TUA6034 PLL/OSC/ Mixer IC and a pair of SAW (Surface Acoustic Wave) filters, each with it's own AGC controlled 44 MHz IF amplifier before the signal is finally processed by the NXT2004. The NXT2004 generates the varactor RF tuning and AGC control voltages.
See http://comtech.myweb.hinet.net/.

With Comtech's choice of components, they specify a UHF Noise Figure of 7 dB (10 dB max), a VHF Noise Figure of 6 dB (9 dB max), input sensitivity of –80 dBm (–78 dBm max), max input level of 0 dBm (-5 dBm min) and a 1 percent cross modulation input level of 80 dBuV (that is -28.8 dBm, well below the overload spec point for most non-AGC Preamps). This also implies that they are assuming a minimum of 18 dB C/N for the ATSC detection process, so perhaps they are allowing 3 dB above the usual ATSC Gaussian Noise C/N value to accommodate some multipath degradation.

Comtech specifications more specific to the NXT2004 are an equalizer range of –8 uS pre-echo to +45 post-echo (Desired/Undesired ratio unknown), adjacent channel interference from NTSC channel of 40 dB (38 dB min) and one other adjacent channel spec number that might be co-channel interference from a DTV channel (vice the erroneous duplication of the preceding description).

DX ANTENNA DTA-5000 SMART ANTENNA:

The Sylvania 6900DTE (aka Funai STB400E) provides the first commercially available implementation of the EIA/CEA-909 Smart Antenna control interface. And thus far, the only commercially available Smart Antenna is the DTA-5000 from DX Antenna (Japan).

The DTA5000 appears to use two crossed dipoles for VHF (labeled "3" and "4" in the pictures), which employ several inductor-loading coils to help compensate for the overly short length of these elements. Extension elements attach to the inner VHF elements, which also have an inductor-loading coil.

So I would expect the antenna gain for VHF to be just shy of 0 dBd, due to element length being sub-optimum for most frequencies in the channel 7-13 band. For channel 2-6 the gain would be even lower due to the compactness of the structure.

An array of 2-element Yagis appears to be used for UHF (labeled "1" and "2" in the pictures). To point "North", element "1" would be configured as the active element and element "2" configured as the reflector element. To point "South", the roles are reversed. Another set of elements point "East" and "West".

An inductor-loading coil is used at the base of each element plus what looks like an LCR "trap" mounted mid-length that could better optimize reception at both low-UHF and hi-UHF frequencies. For those not familiar with multi-band Ham radio antennas, an RF trap can be mounted in the middle of an antenna element so that element lengths between the traps resonate on a higher frequency while the overall element lengths resonate on a much lower frequency.

As can be seen in the circuit board picture, there are dozens of RF integrated circuits on the upper board. I didn't see anything resembling PIN diode attenuators. So I would speculate that there might be a separate gain controlled preamp for each of the antenna elements. The lower board has a large LSI chip and several discrete elements, probably concerned with handling the antenna steering control information coming up the coax.

A DPI-10 Smart Antenna Control Box is used to inject 12 VDC power onto the coax going between the Sylvania/Funai STB and the DTA-5000. A 6-pin RJ-12 type connector connects the DPI-10 to the Sylvania/Funai STB in order to obtain 12 VDC as well as control signals to reportedly select from any of 16 different arrival directions, using different preamp gain settings on the antenna elements to "steer" the antenna. For example, adding a little bit of gain on the "East" pointing antenna to the "South" pointing antenna would result in the beam being directed towards SSE. During the EXTENDED SCAN, I observed the coax D.C. voltage changing, but did not investigate any further.

Hopefully the algorithm is smart enough to lower the gain in the presence of strong signals to minimize overload problems. The DTA-5000 spec sheet indicates 15 to 25 dB of total preamp gain for UHF (10 to 20 dB VHF). Unfortunately, it does not stipulate much of anything else.

If the DTA-5000 is derived from the similar DTA-3000 and DTA-3500 antenna arrays, then the Noise Figure could be expected to be in the range of 1.5 to 4.0 dB for UHF (1.5 to 3.0 dB for VHF) and the Maximum Output Level could be expected to be 95 dBuV, which puts it in the same general region as some of the better Preamp modules. (And 15 dB more than the 1 percent intermodulation input level spec for the "similar" Comptek ATSC Tuner module!!!). Unfortunately, the overload specs for the TUHU Tuner Module are, thus far, unknown.

SYLVANIA 6900DTE OPERATION:

It takes 4 minutes to AUTOSCAN for channels. I don't know whether it uses some sort of "quasi-omni" antenna setting for this process…or perhaps the antenna steering results from the last extended scan…or perhaps a truncated, less than optimum beam steering process…or perhaps uses the antenna settings for the last tuned channel….or whatever. If using the DTA-5000, skip this and go on to the next option.

It takes 20 minutes to perform an EXTENDED SCAN process wherein the STB controls the antenna beam steering (and overall gain?) to search all 16 compass headings for each and every possible channel. An on-screen idiot light flashes each time a channel is successfully found, but since there is no channel number displayed, it's pretty much a meaningless display.

Twice I found that I had to do a complete rescan to reacquire the antenna settings after the STB was turned off over night. Another time I was inserting RF attenuation to measure the remaining margin and the STB became confused. No only did it claim that it had found a non-existent sub-channel, but the antenna settings were no longer optimum, forcing a repeat for the EXTENDED SCAN. [See quickscan recommendations below.]

Once the scan is complete, the EPG (Electronic Program Guide) displays the list of virtual channels found. The lowest virtual channel number detected will be the currently displayed channel. The channel up or down buttons can be used to cycle through the channels to finally see what was detected. The EPG will eventually be populated with program information, but only by actually watching each channel for perhaps half-a-minute.

KSWB-DT (UHF channel 19) shows up as BOTH virtual channel 5-1 and 69-1. It appears they want to remind cable and analog on-air listeners where to go when their DTV signal drops out (which sometimes happens). For me, it just means I have to take the time to go into the SETUP menu and punch over half a dozen buttons before I can delete the redundant channel after each 20 minute Extended Scan.

ANTENNAWEB.ORG AND RADIO MOBILE RESULTS:

Yellow	KPBS-DT	15-1	143 deg	22 mi	CH30
Yellow	KNSD-DT	39-1	144 deg	22 mi	CH40
Yellow	KSWB-DT	5-1	144 deg	22 mi	CH19
Violet	KUSI-DT	18-1	143 deg	22 mi	CH18

I have reported on how the RADIO MOBILE (RM) propagation prediction program can be used to calculate total path loss, which are then plugged into my Excel Spread Sheet DTV FADE MARGIN CALC in order to estimate the remaining Fade Margin: **http://hdtv.forsandiego.com/messages/1/2846.html?1122107959**.

RADIO MOBILE calculates line-of-sight (LOS) or nearly LOS paths for all of the above Mt Miguel stations on a SSE (true) heading, depending on the presumed antenna height. Looking at the RM path profiles, it was obvious that the tested antenna locations were just below LOS. RM follows the FCC OET-69 guidelines by using a default antenna height of 10 meters (32.8 feet). I calculated the additional path loss for an antenna height of 6 meters (0 dB loss), 5 meters (12 dB loss) and 2.5 meters (22 dB). So for the Mt. Miguel paths, RM calculates an unusually sharp drop off below an antenna height of about 20 feet (if RM antenna height results are to be believed….which is another, as yet unresolved issue….).

RM calculates analog A-KPBS to have a very strong receive signal, followed by analog A-KSWB, A-KNSD and A-KUSI. So I need to watch out for overload and if I decide to use a Preamp, then I should use one with a high input signal overload capability, such as is found in the lower gain (under 20 dB) models.

I was curious to see how close to LOS the path really was, so I fired up GoogleEarth, marked Mt Miguel with a "thumbtack" and drilled down to just above the "roof-tops". Yup, looking from (hard to say) feet above ground level, I can just barely see Mt. Miguel peaking over a distant hill. So I would guess that at the tested antenna heights, it is very close to LOS with perhaps some diffraction loss.

But the signal also passes through about a dozen small skinny pine trees and finally (depending on antenna location), one huge one. I can only guess on how much more to assume for attenuation through the Trees.

Although KFMB-DT and KGTV-DT are only 14.3 miles away, they arrive via a diffraction path, with the signal being blocked by Black Mountain/Carmel Mountain (signal path crosses at 1200 feet) plus a 60-foot high hill in my back yard. RADIO MOBILE calculations indicate that it should be possible to receive KGTV-DT with an outdoor antenna, especially if using a Preamp. RM calculates only a few more dB of loss for antennas shorter than the 10 m "standard".

RM fade margin calculations for XETV-DT from Tijuana, Mexico are actually a few dB better than Mt. Soledad stations, with less than 2 dB of additional loss calculated for shorter antenna heights.

Presuming the use of a low-noise Preamp, my calculations indicate that KVCR-DT (1 Megawatt PBS station) might be receivable (i.e. Fade Margin greater than 15-20 dB). I would be interested in adding KVCR-DT to my viewable channel list, especially if they decide to broadcast in HD vice current SD-only. It is "only" 68 miles away, at a 3000-foot level in the San Bernardino Mountains. There are no local terrain obstructions towards the North and I can locate the antenna to shoot between the trees and other two story houses.

I also wouldn't mind adding PBS KOCE-DT as well as other 6000-foot high LA stations to my list, but they are much further away (102 miles) and calculations indicate that they

would probably require an 8-Bay Antenna mounted on the chimney with a rotator. So I was looking to see if I could at least detect a weak signal. There are no significant local terrain obstructions towards NNE, other than a few trees and houses.

One thing that RADIO MOBILE does not calculate is multipath. Unfortunately, I'm surrounded by potential signal reflectors. A big 60-foot hill is in my backyard, another with industrial buildings on top a couple hundred yards to the East and several two-story houses to the North. And multipath would be worse when using the antenna indoors. On the other hand, I would not expect very long echo delays, such as are found in some urban canyon environments.

DTA-5000 SMART ANTENNA COMPARED TO 4-BAY VERTICAL-ZIG-ZAG:

I have a 25+ year-old relic of an antenna (manufacturer unknown) from my pre-cable days that has simple reflector elements like a Winegard PR4400, but with vertical zig-zag elements (two section log periodic) of different resonating widths similar to the Fracarro PU4 (7-10 dBd gain, same as their PU-4A 4-Bay Bowtie with reflector grid). So it's probably close to the gain of the W-G PR4400 with reflector elements, rather than the slightly higher gain Channel Master CM4221 4-Bay with reflector screen.

I can use the 4-Bay Zig-Zag with or without a Scientific Atlanta 562775F Multimedia Drop Amp (15 dB gain, 2.4 dB Noise Figure). This is normally used on a 2-way CATV system and is actually a pretty good choice for OTA use, considering I found in my junk drawer. A Channel Master 3075 Balun (1.5 dB +/- 0.5 dB loss) adapts the 300-ohm impedance of the antenna to 35-feet of 75-ohm RG-6 downlead prior to the Preamp.

After making sure that there was no DC or other control signal on the DPI-10 to STB coax connection, I inserted a Radio Shack 15-678 RF Variable Attenuator in order to estimate the amount of signal strength reserve. I used TWC-SD's SA8300HD STB to "calibrate" the attenuation settings, using the dBmV signal strength display found on one of the Extended Diagnostic pages. I described how to do this when measuring typical Balun loss: **http://hdtv.forsandiego.com/messages/1/2489.html**

I attempted several different indoor and outdoor locations, chosen primarily for aesthetic (i.e. WAF) rather than optimum signal performance. This resulted in test conditions with likely strong (Loc #3, #5) vs weaker (Loc #4) outdoor signal overload and presumably optimum (Loc #6) vs non-optimum (Loc #1, 2) indoor locations. I intentionally chose Loc #5 and Loc #6 to be in almost the same location, except that one is outside at 17-feet and the other is inside at 8-feet with only a wire-mesh stucco wall separating them.

Location #1: SE, 4-ft high, near East window and South wall: UNACCEPTABLE
All 4 Mt Miguel DTV and no others on both antennas, but very low signal margin.
KUSI-DT antenna location is sensitive and KNSD-DT has low attenuation margin.

This is close to HDTV and perhaps can receive strong signal via window.

Both 4-Bay and DTA-5000 successfully received all four Mt. Miguel stations listed above but no other stations. It was very difficult to adjust the 4-Bay + Preamp for KUSI-DT. So advantage goes to the automatic adjusting feature in the DTA-5000.

<u>Location #2:</u> Central upstairs, 15-ft high, just under ceiling: DTA ACCEPTABLE
DTA-5000: All 4 Mt Miguel DTV and no others.
4-Bay + Preamp: No KUSI-DT at same location as DTA-5000. Could receive weak signal after moving antenna a few feet away.

DTA-5000 successfully received all four Mt. Miguel stations, but no additional stations. All four DTV stations tolerate 20 dB attenuation, although KUSI-DT had a few dropouts. KNSD-DT experienced large fluctuations in the reception percentage display and could not tolerate 10 to 15 dB of additional RF Attenuation. Note that the signal from Mt Miguel passes through the roof (fibercrete tiles, ¾-inch plywood and paper backed insulation) after being partially blocked by brick chimney and big pine tree.

The 4-Bay, at same location as DTA-5000, could not receive KUSI-DT, but could tolerate more than 20 dB of RF Attenuation for the other 3 Mt. Miguel stations. After moving the antenna over a few feet, KUSI-DT finally came in, but was not very reliable. [So being behind the chimney is probably not a sweet spot.]

Upstairs, using the 4-Bay + Preamp, I searched unsuccessfully for Mt. Soledad, XETV-DT, L.A. and San Bernardino stations, including operating through both South and West facing windows. So the advantage again goes to the DTA-5000, which did not have to be relocated to find the best signal.

<u>Location #3:</u> NE, 8-ft high, outside in driveway, hand waving the 4-Bay + Preamp:
DTA-5000: Did not (yet) test in this ad-hoc location.
4-Bay + Preamp: All 4 Mt Miguel DTV plus KVCR-DT with many dropouts.

Found KVCR-DT, PBS from San Bernardino (hurray), but it was very sensitive to position. Calculated arrival angle is 10 degrees West of True North, which means looking nearly straight up the street, with no trees or houses in the way. Did not detect XETV-DT from Tijuana towards the South nor any Mt. Soledad or L.A. DTV stations.

<u>Location #4:</u> NE, 17-ft high pole, outside on rear of house: DTA ACCEPTABLE
DTA-5000: All 4 Mt Miguel DTV plus KVCR-DT with frequent dropouts.
4-Bay + Preamp: 3 out of 4 Mt Miguel DTV plus KVCR-DT with frequent dropouts. Could not receive KUSI-DT without frequent drop outs.
4-Bay w/o Preamp: Much worse.

This location was chosen to attenuate the powerful analog signals from Mt Miguel as much as possible to minimize overload desensitization. A steep hill, trees and houses help to block the signal in all directions except North. DTA-5000 successfully received all four Mt. Miguel stations with over 20 dB of “attenuation margin” plus KVCR-DT, the

PBS station from San Bernardino, but neither of the two nearby Mt. Soledad stations, nor any from L.A. or XETV-DT.

I was curious whether there would be a difference pointing the DTA-5000's elements directly toward Mt. Miguel as compared to a 45-degree rotation. At a 45-degree offset, the RF Attenuation margin was slightly reduced for 3 out of the 4 DTV stations. Curiously, KUSI-DT's reception reliability actually improved the several times I attempted this test. Of course, each trial run had to be preceded by a 20 minute Extended Scan to readapt the Smart Antenna settings. However, in this location the DTA-5000 was clearly better at receiving the Mt. Miguel stations, especially KUSI-DT.

While watching KVCR-DT via the DTA-5000, reception would sometimes drop out for 10-30 seconds at a time. I was surprised how long these drop outs would last, expecting them to be much shorter if they were typical fading events. Most of the time, KVCR-DT reception was unaffected by an additional 20 dB of attenuation inserted between the DPI-10 Smart Antenna Control Box and the 6900DTE STB. So, there seems to be ample "attenuation reserve" using the DTA-5000 in this location, but apparently not enough to ensure long-term reliability for KVCR-DT.

I then inserted a 2-way RF splitter between the RF Attenuator and the STB in order to view the Analog stations on my HDTV. In order to find the "best" Smart Antenna setting for the Analog channel of interest, I sequenced through the five DTV channels. Only three out of the four high power Analog stations on Mt Miguel were watchable (A-KPBS, A-KNSD, A-KUSI). The very heavy snow and multipath on high power A-KSWB (UHF Ch69) surprised me, since it should have been one of my strongest stations. The DTA-5000 was probably causing severe attenuation on this high channel frequency, since the highest DTV setting was only for UHF Ch40. This illustrates the need for the Sylvania 6900DTE to turn on the built-in NTSC (and QAM) capabilities. Without this capability, many people will need a separate antenna system to receive Analog stations.

With the 4-Bay with Preamp pointed SSE, 3 out of 4 Mt. Miguel DTV stations had at least 20 dB of "attenuation reserve". KUSI-DT could not be received without frequent dropouts, even after tweaking the reception angle. With the 4-Bay with Preamp pointed North, on some days there was success in receiving KVCR-DT.

Due to the wide variation in KVCR-DT reception reliability from hour to hour and day to day, I was unable to draw any conclusions regarding which antenna was better for this station. I would probably need to mount the 4-Bay (or better yet an 8-Bay) via a rotator and a chimney mount to receive KVCR-DT, which at this time just isn't worth it since KVCR-DT doesn't (yet) transmit HD programs.

No configuration or pointing direction detected KGTV-DT or KABC-DT from Mt. Soledad or XETV-DT from Tijuana. Since I didn't get even a sniff for the higher power L.A. stations, it is unlikely that a bigger antenna will magically pull them out of thin air.

All four high power Analog stations on Mt. Miguel were received, plus a weak A-KVCR, and some snowy stations from Tijuana. But no Analog stations were received from either Mt. Soledad (both VHF) or L.A.

Without the Preamp, the amount of "attenuation reserve" dropped to less than 10 dB and even less for KVCR-DT. So the Preamp was truly needed, especially considering it had to drive 35-feet of RG-6 plus nearly 100 feet of RG-59 to reach the HDTV in this non-optimized trial run.

Location #5: SE corner of house, 17-ft high pole, outside: UNACCEPTABLE
DTA-5000: All 4 Mt Miguel DTV but KUSI-DT had infrequent dropouts.
4-Bay + Preamp: All 4 Mt Miguel DTV but KPBS-DT had infrequent dropouts. Locked onto San Bernardino's KVCR-DT for a few seconds at a time.
4-Bay w/o Preamp: Much worse.

DTA-5000 received all four Mt Miguel DTV stations, except KUSI-DT had infrequent dropouts. Nightime RF Attenuation margins were slightly better than (HOT!) daytime margins. Pointing directly to Mt Miguel yielded better RF Attenuation margins for 3 out of 4 stations, whereas KUSI-DT had few if any dropouts and slightly better attenuation margin when rotated 45 degrees. No sign of DTV stations from Mt. Soledad, L.A. or San Bernardino's KVCR-DT.

The 4-Bay + Preamp: RF Attenuation margins were about the same as optimized DTA-5000 pointing directions for KSWB-DT (towards Mt Miguel) and KUSI-DT (45 degree rotation). KNSD-DT RF margin was significantly lower and KPBS-DT was experiencing infrequent dropouts during the day (HOT!), but not in the evening. Pointing North, I was able to lock onto KVCR-DT for a few seconds at a time, but nothing from L.A., Mt. Soledad or XETV-DT. The DTA-5000 (with 45 degrees rotation) was the clear winner in this particular location.

Although there is a huge pine tree partially blocking the presumably line-of-sight signal from Mt Miguel, I decided to insert a 6 dB attenuator prior to the Preamp to see if overload might be an issue. All four Mt Miguel stations continued to be received, although with slightly lower RF Attenuation margin. I also tried reception without the Preamp, which resulted in many dropouts for KUSI-DT and almost no RF Attenuation margin for the other 3 stations. Of course without the Preamp there is a lot of loss in the 35-feet of RG-6 plus nearly 100-feet of RG-59.

Location #6: SE corner of house, 8-ft high, indoors: UNACCEPTABLE
DTA-5000: 3 out of 4 Mt Miguel DTV but KUSI-DT comes and goes.
4-Bay + Preamp: Did not retest. See results for Location #1.
Loop (7 inch diameter): Mostly NO-GO, although had some limited success.

DTA-5000 (at 45 degree rotation to Mt Miguel direction) reliably received KSWB-DT, but sometimes experienced infrequent dropouts for KPBS-DT and KNSD-DT and very

frequent dropouts for KUSI-DT. During the day, KUSI-DT only came in infrequently. That night it was reliable, tolerating over 15 dB of RF Attenuation.

Loop Antenna (7 inch diameter): NO-GO using picture hook on South wall 5 feet North of the chimney. Hand waving the loop mostly resulted in no signal lock. Best signal was found in SE corner of the room, close to DTA-5000 location: 3 out of 4 Mt. Miguel DTV stations had acceptable reception for the several minutes of testing. KSWB-DT and KNSD-DT could (sometimes) tolerate up to 10 dB of RF Attenuation, but not KPBS-DT.

OBSERVATIONS AND RECOMMENDATIONS:

1. The Sylvania 6900DTE OTA STB needs the ability to a) QUICKSCAN the Smart Antenna for only those channels already in memory and b) RESCAN the Smart Antenna for just the currently tuned channel. This is important, given the long 20 minute Extended Scan time and the need to rescan when things go wrong.

2. The Sylvania 6900DTE OTA STB also should add a display of the relative signal strength. This should be easy, since it already monitors the AGC control voltages.

3. The Sylvania 6900DTE OTA STB needs to activate the NTSC function that is already in the Tuner so a typical user isn't forced to have a separate antenna system for Analog channels. And activate the built-in QAM while you're at it so the tuner can be used with low-cost basic cable to receive the "missing" OTA channels.

4. When selecting the Electronic Program Guide (EPG) display, the Sylvania 6900DTE OTA STB shouldn't have to take half-a-minute to reacquire the currently tuned channel in order to reappear in a shrunken window.

5. Message for KSWB-DT: delete virtual channel 5-1 from your PSIP, it's causing problems for those listeners that receive both KSWB-DT and KTLA-DT (the REAL virtual channel 5-1).

6. Urgent message for KSWB-DT: stop HD simulcast!!! The data rate requirements during stressful video scenes are way too high when both HD sub-channels carry the same program.

7. KUSI-DT performance was so poor compared to the other stations on Mt. Miguel, they must be using only 23 kW. So when does the 355 kW Change Proposal go into effect? It's been on the FCC's website for several years now. And when does the use it or lose it rule come into effect for retaining channel elections?