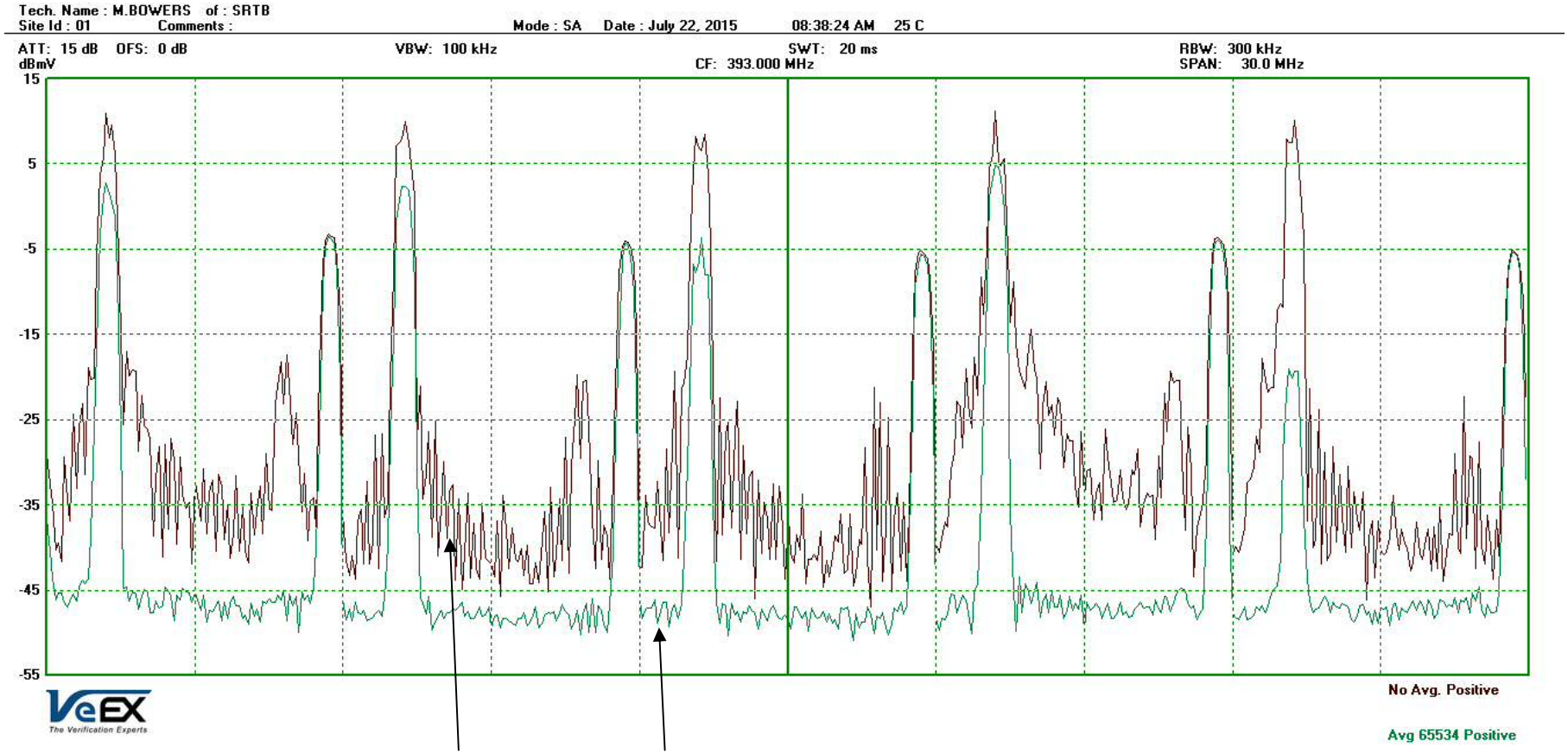
**Distortion Measurements in the 'Generic' Region, Western Systems**

**Significant distortions appear in three of the four systems as documented by the following waveforms and comments**

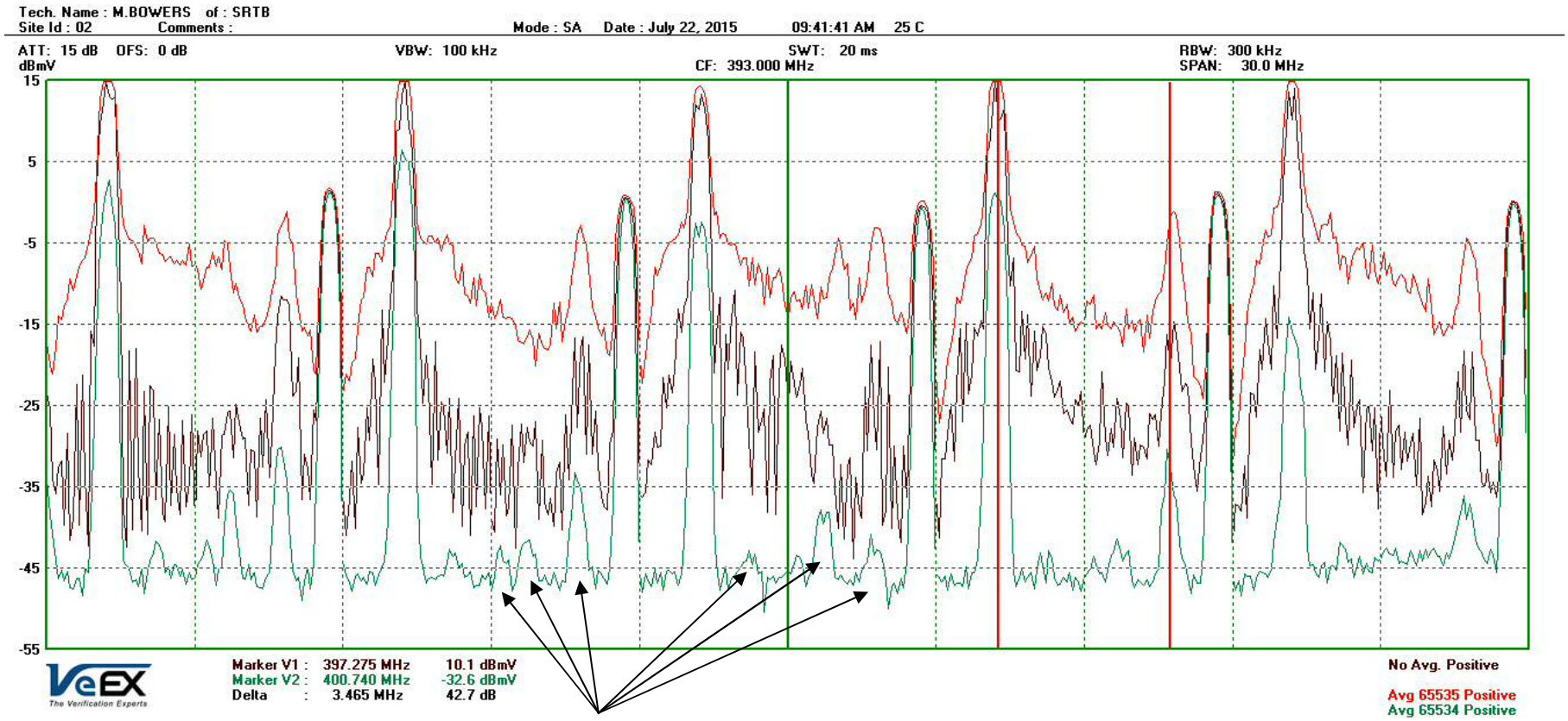
**Comments appear on the final page, including suggested causes and remedies**

Channels 50 through 54 at the 'System 1', ST System Test Point



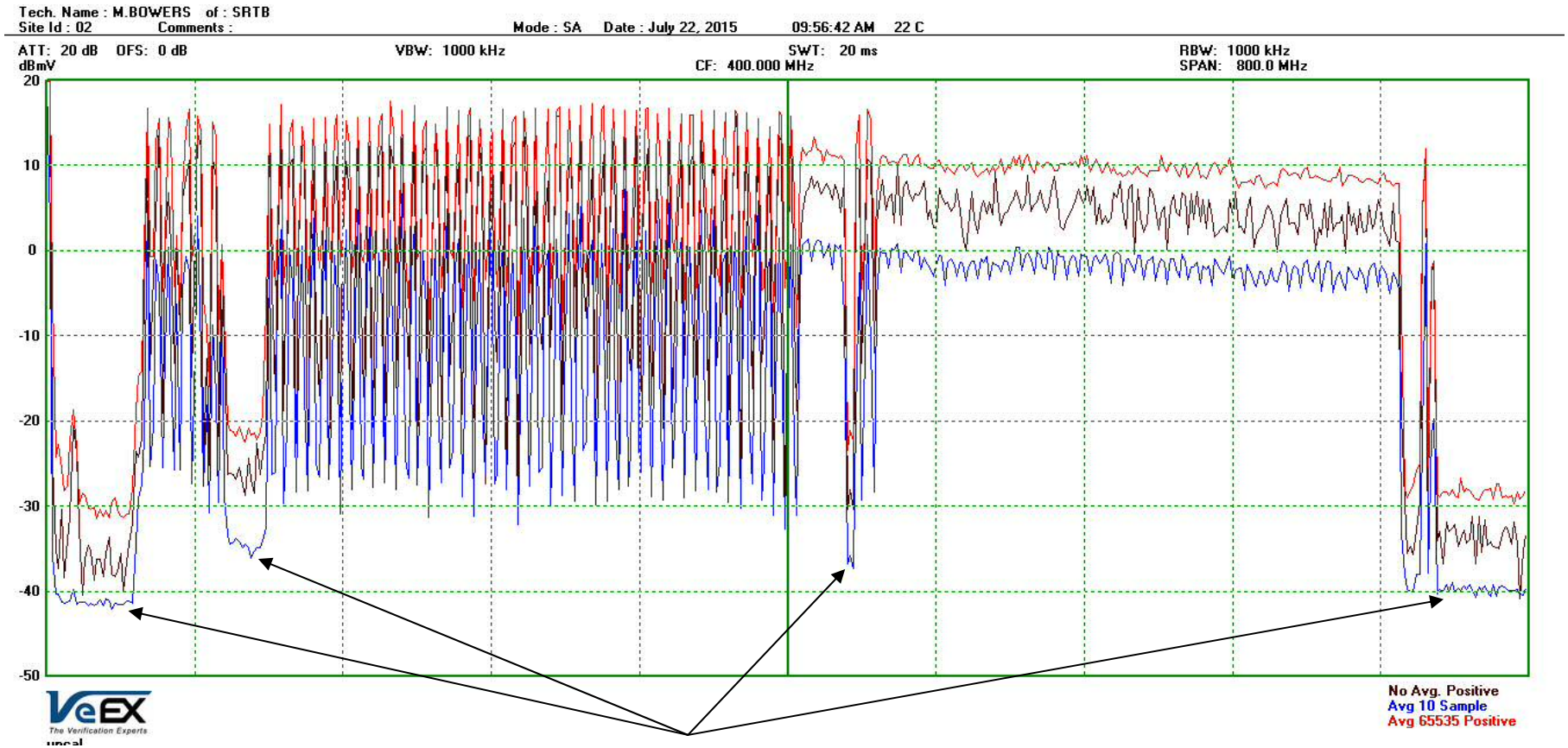

*Channels 50 through 54 with 'real time' and 'minimum hold' (green) traces activated. Note there are no intermodulation beats present; only the visual and aural carriers remain in 'min-hold', since in an NTSC-M system only those two carriers remain on all the time.*

Channels 50 through 54 at the ‘System 2’, ST System Test Point



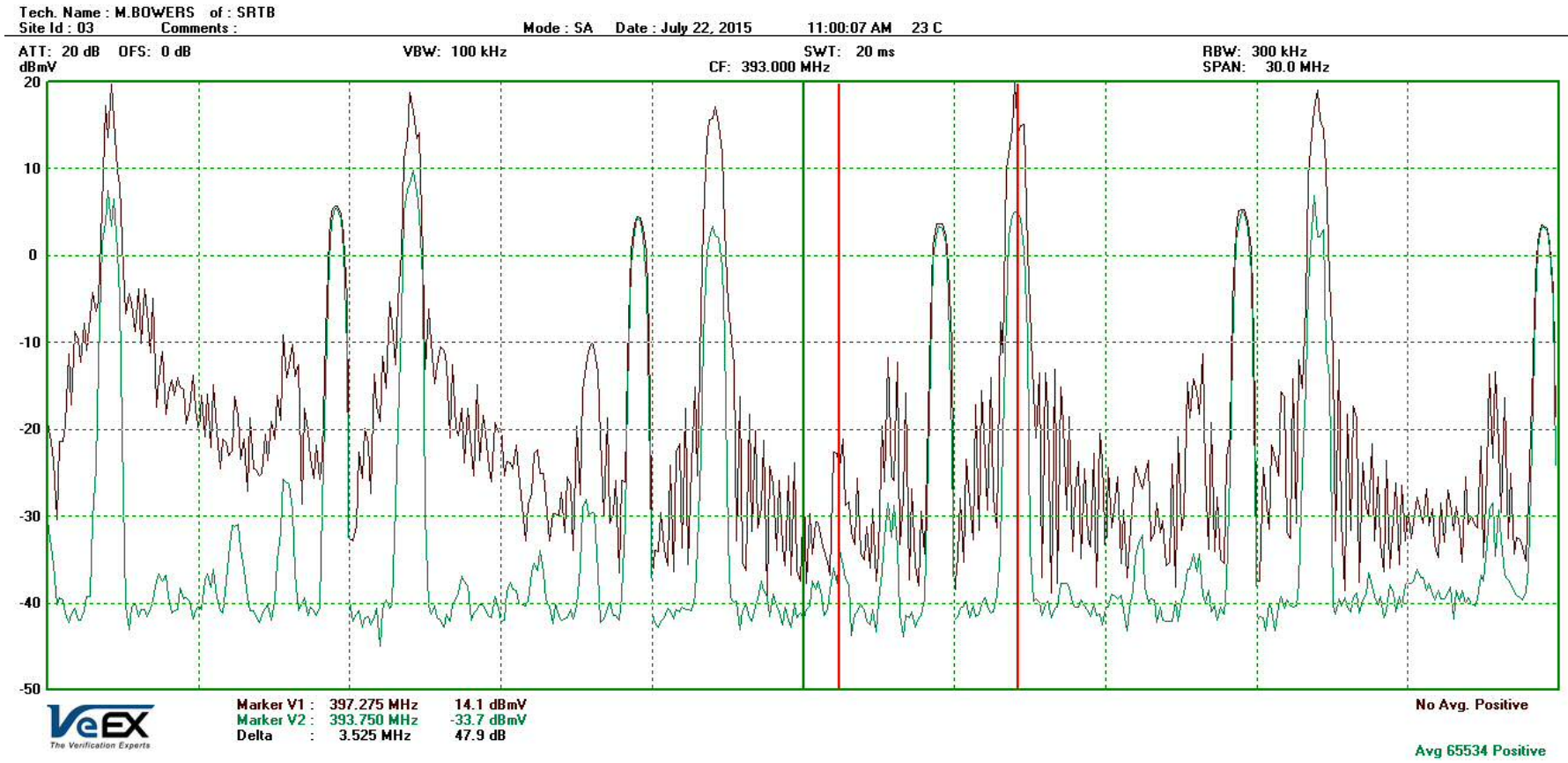

*Channels 50 through 54 with ‘real time’, ‘peak hold’ (red) and ‘minimum hold’ (green) traces activated. Note there are now many intermodulation beats present in the ‘min-hold’ trace, and although it’s not readily apparent, all of them are mathematically related by the following relationship: [Luminance carrier ± ˜3.5 MHz], & [Aural carrier ± ˜3.5 MHz]. Given that relationship, this is <u>not</u> classic CSO or CTB.*

Overall Response at the ‘System 2’, ST System Test Point



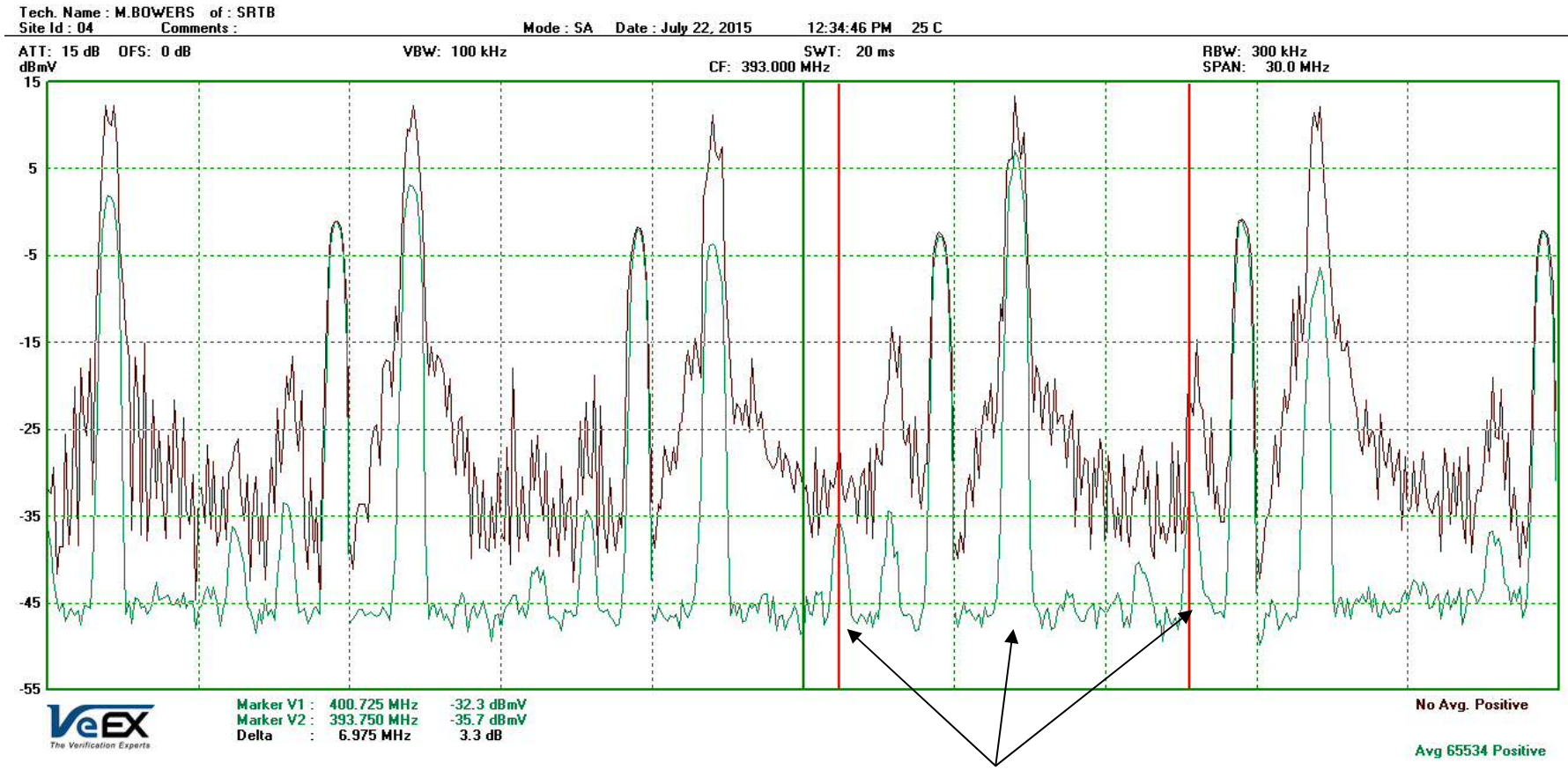

*This overall system response waveform includes an ‘average trace’ (blue, 10 samples) that better illustrates the ‘raised noise floor’ that is present in the three effected systems.*

Channels 50 through 54 at the ‘System 3’, ST System Test Point




*Channels 50 through 54 with ‘real time’ and ‘minimum hold’ (green) traces activated. Distortions remain the same.*

Channels 50 through 54 at the System 4, ST System Test Point




*The markers above are positioned to illustrate {the} two beats that are ± ˜3.5 MHz from the CH53 luminance carrier.*

*Channels 50 through 54 with 'real time' and 'minimum hold' (green) traces activated.*

## Comments and Suggestions

1. At the headend, all four systems are fed from the same 'post amplifier'. After the post-amp, the 'System 1' system (the closest geographically) is fed via a separate laser, with the remaining three systems ('System 2', 'System 3' & System 4) fed via a launch laser (laser transmitter) and EDFA. The 'System 1' system is free from these intermodulation products, whereas the three systems fed via the laser transmitter and EDFA have the distortions present. A second EDFA and 3-way coupler are located approx. 40 km away and the problem could also be at this location. This is not classic CSO or CTB, as the required mathematical relationship between the carriers and beats is not present. Rather, all beats appear to be related by the following: [luminance carrier ± ˜3.5 MHz] & [aural carrier ± ˜3.5 MHz].

2. I believe the most likely causes are:
   - Pre-distortion problems in the 'launch laser'. Laser transmitters generally pre-distort the RF response to minimize the effects of SBS.
   - Dirty or pitted optical connector somewhere between (and including) the launch laser output and 1st EDFA output.
   - 1st EDFA.
   - Dirty or pitted optical connector between the 2nd EDFA output & optical coupler input at the 'System 2' location.
   - 2nd EDFA

3. SBS is not thought to be a factor, nor are the optical connectors at the 2nd location (2nd EDFA, 3-way coupler, or connecting jumper) – although it's not totally out of the question. I've therefore included that as the last options to check in #2 above.

4. The 'launch laser' will be changed first, and if that's not the problem the system will move on to the other possible areas noted in #2 above. Although the system does not have access to a spectrum analyzer with a minimum-hold trace, they should be able to determine if the problem is resolved by monitoring C/N on a low frequency channel at any of the three effected field test points. CCN on CH04 measured at approx. 35 dB (very poor), and I anticipate it will improve by approx. 10 dB when this problem is resolved. Also, confirm the optical input power to the 2nd EDFA if possible. It should be +6 dBm minimum at 1510 nm.