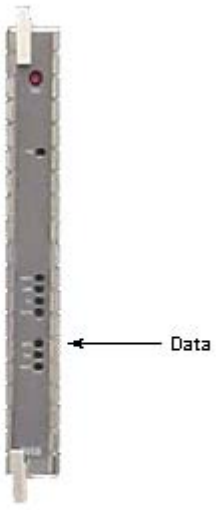
Technical Service Bulletin 030424
SMPTE-310 Lock Problems & Quality Checks

This service bulletin concerns all Comark ATSC transmitters. Comark has developed a retrofit kit to address SMPTE lock problems in the ADAPT ATSC exciter. These problems are due to a failure of the exciter 8VSB module to re-acquire lock on the incoming SMPTE 310 data stream after transient interruptions and typically manifest themselves as an intermittent **DATA** alarm light on the exciter, picture break-ups on the decoded video, or numerous **MPEG FAULT** messages in the logbook of Optimum or Ultimate transmitters. A characteristic symptom is this specific problem is that signal lock is reacquired only after the incoming SMPTE stream is interrupted for approximately five seconds (or more) then reactivated.



8VSB Module

The retrofit kit to eliminate this problem may be obtained by sending a request for part number 46745569 to Comark Customer Service at swikcsfeedback@comarktv.com One retrofit kit is required per exciter. Installation instructions and required tools are provided in the kit.

The retrofit kit upgrades the U106 chip on the 8VSB Module to a revision B (or higher). To determine if an exciter has already had this retrofit applied, remove the 8VSB Module and inspect the label on the U106 plug-in-chip. A part number ending in "/B" or higher indicates that the upgrade has already been performed.

If this retrofit kit fails to reliably re-establish data lock, the problem may be due to poor signal quality of the incoming SMPTE-310 data stream.

The service bulletin defines a simple set of requirements that may be checked in the field to verify if a SMPTE-310 signal is of sufficient quality. These checks are not meant to replace the SMPTE-310M specification itself, but rather to simplify the standard to something that may be easily and practically checked in the field. In most cases, if a signal passes these checks, it is compliant with the standard.

Cable

The cable used for a SMPTE-310 interconnection must be a 75ohm coaxial cable with BNC connectors. In general, the maximum length for a connection should be no more than 100 feet.

Frequency

The SMPTE-310 source should be set to an exact 19,392,658 Hz. Every Hz counts. In most cases, the programmed frequency setting of the source may be trusted. Note that an incorrect frequency setting will not only potentially cause problems with the ATSC exciter, but it may also reduce the measured SNR on certain types of test equipment (with non-floating data rates).

For those customers using a Thomson Turquoise stream format converter before the ADAPT exciter, the output rate should be set to **AUTO** if the upstream multiplexer is a Thomson Amber. If the upstream multiplexer is of another brand, the output rate should be set to the pre-defined SMPTE-310 rate of 19.392658 Mbps.

Amplitude

The amplitude of the signal should be 800mV peak-to-peak, as measured at the flat portions of the signal by an oscilloscope with a 75ohm termination. The scope should ideally have a bandwidth of 1GHz, if possible. The amplitude tolerance is +/- 10%, so the peak-to-peak signal amplitude should be between 720mV and 880mV. More generally, a signal between 1.0V and 0.5V p-p should suffice. The overshoots should be no more than about 0.1V (the specification is 10%).

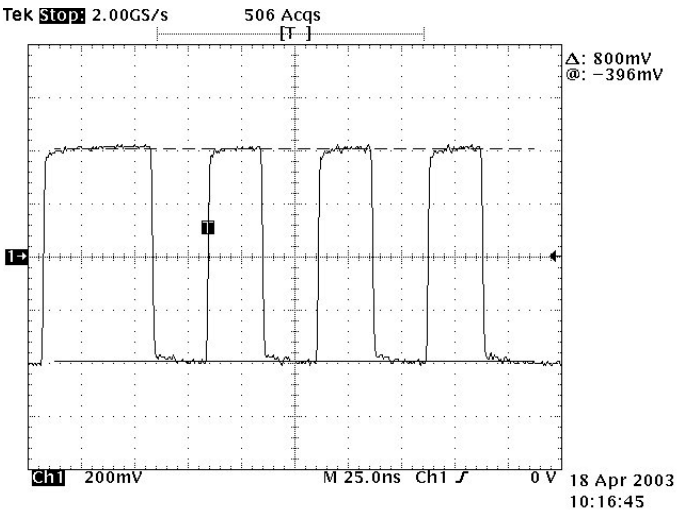


Figure 1 – Amplitude Measurement

Rise and Fall Time

The rise and fall time of the SMPTE-310 signal should be less than 5ns. Figure 2 contains an oscilloscope measurement of the signal on a 200mV/div scale with a time base of 5ns per division. With these settings, the time for the signal to go from a point at 2 divisions from the bottom to 2 divisions from the top and vice versa should be no more than 1 division in width. This ensures a rise and fall time of <5ns.

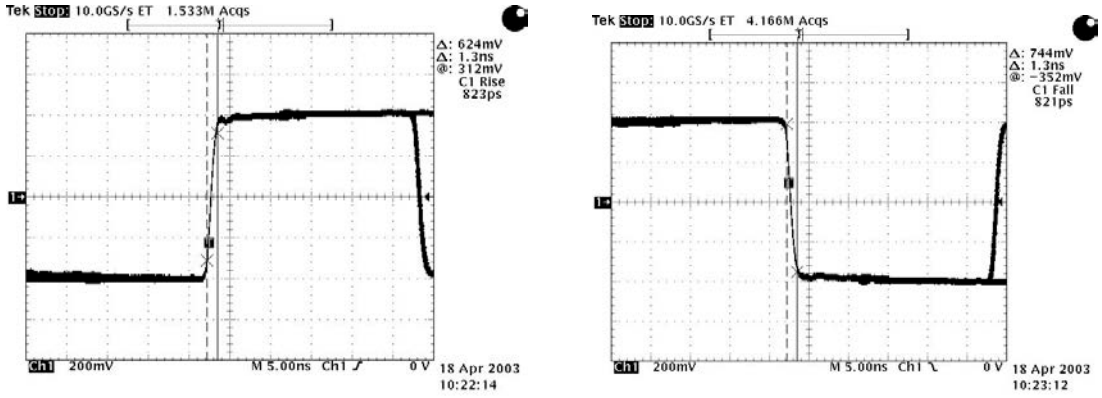


Figure 2 – Rise and Fall Times

Jitter

The stream jitter should be less than approximately 2ns. Figure 3 contains an oscilloscope measurement of the signal on a 200mV/div scale with a time base of 2ns per division. With these settings, the width of a transition at its narrowest point should be no more than 1 division.

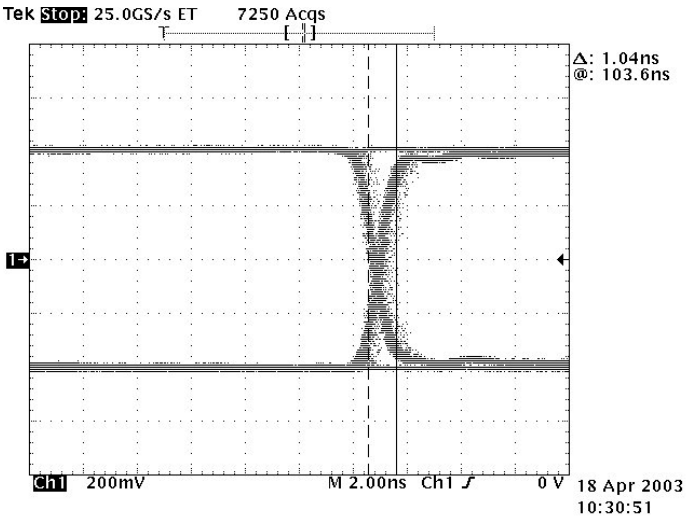


Figure 3 – Jitter Measurement

Figure 3, shows an example of jitter of approximately 1ns. This picture was taken using a Tektronix digital oscilloscope with the “persistence” set on variable for 10sec. The infinite persistence setting will also work well. Figure 4 shows another example of jitter, this time with a jitter value of about 0.28ns.

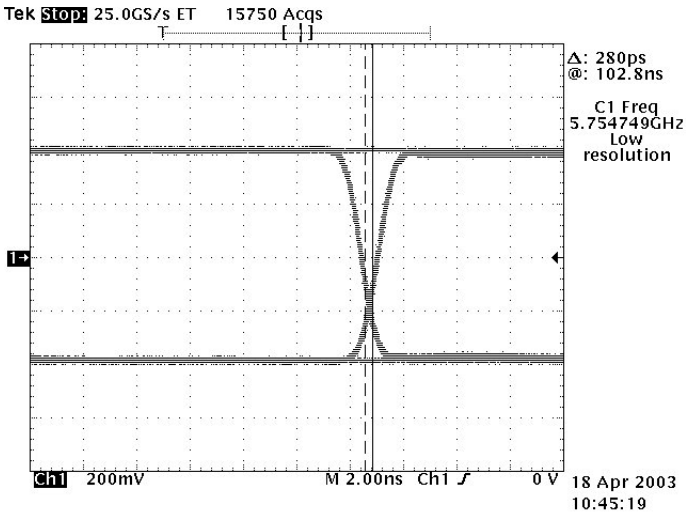


Figure 4 – Jitter Measurement with Jitter of 0.28ns

If MPEG video problems at the input to the exciter persist after all of the conditions put forth in this bulletin have been satisfied, please do not hesitate to contact Comark Customer Service.

Comark Communications
104 Feeding Hills Road
Southwick, MA 01077 U.S.A.
(800) 345-9295
Attn: Customer Service