Adaptive Equalizer Performance

An Adaptive Equalizer (AEQ) is a filter that automatically adjusts itself to mitigate time varying distortion in a received signal. A properly designed AEQ can be used to combat the effects of multipath distortion and fading on a telemetry signal.

The following illustrates the substantial improvement provided by an Adaptive Equalizer in a multipath environment. Figure 1 shows the spectrum of a 5Mbps PCM/FM signal with multipath. The effect of the multipath on the spectrum is obvious from the ~ 10dB notches.
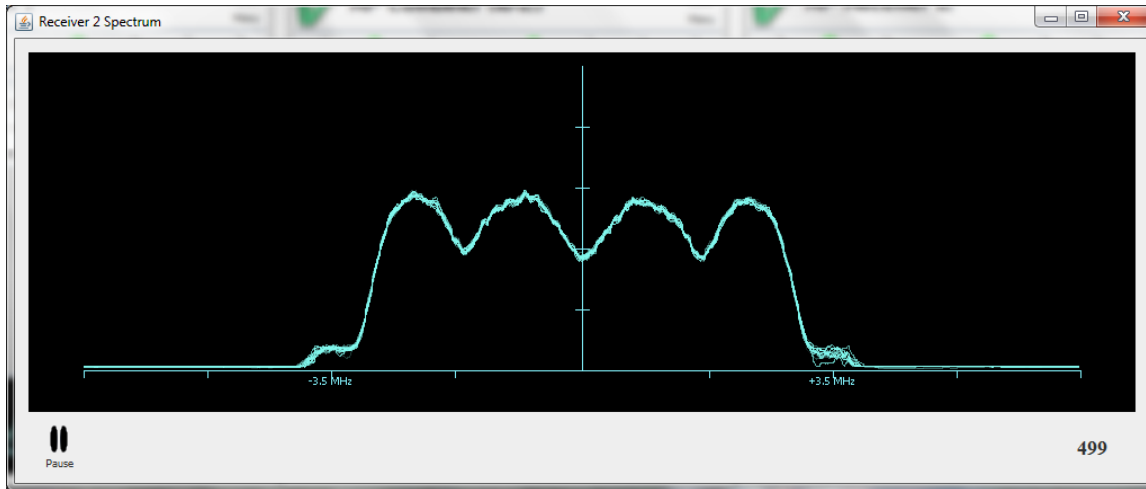

Figure 1: Spectrum with multipath

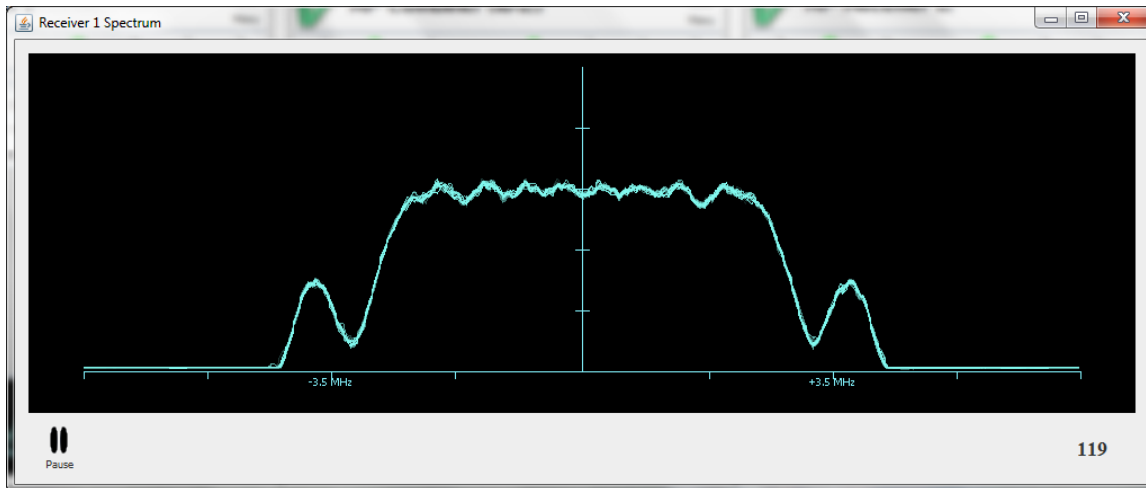Figure 2 shows the improvement the AEQ makes in the spectrum; the notches are eliminated.

Figure 2: Equalized spectrum with multipath

Figure 3 shows the constellation for the multipath corrupted signal. Note that the central circle is

nearly closed. The improvement in the constellation due to the AEQ is shown in figure 4. The AEQ opens the central circle of the constellation significantly wider.
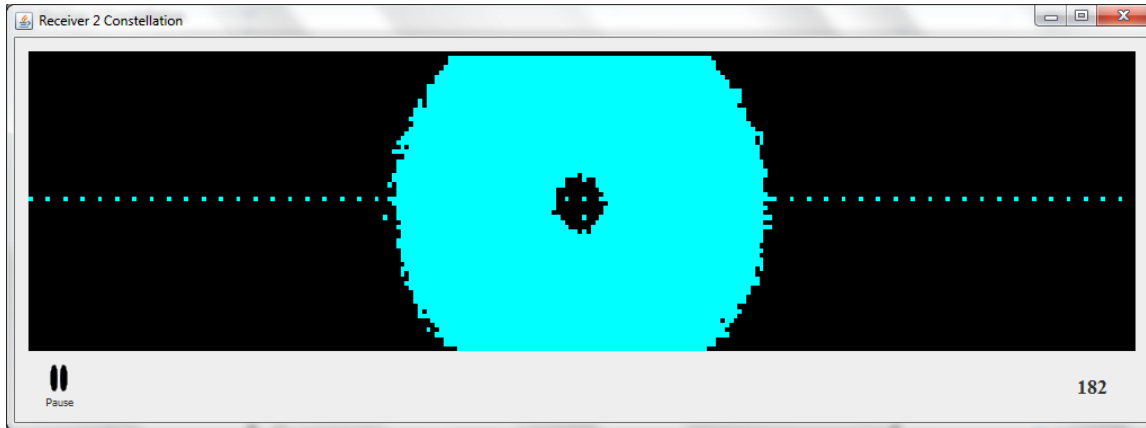

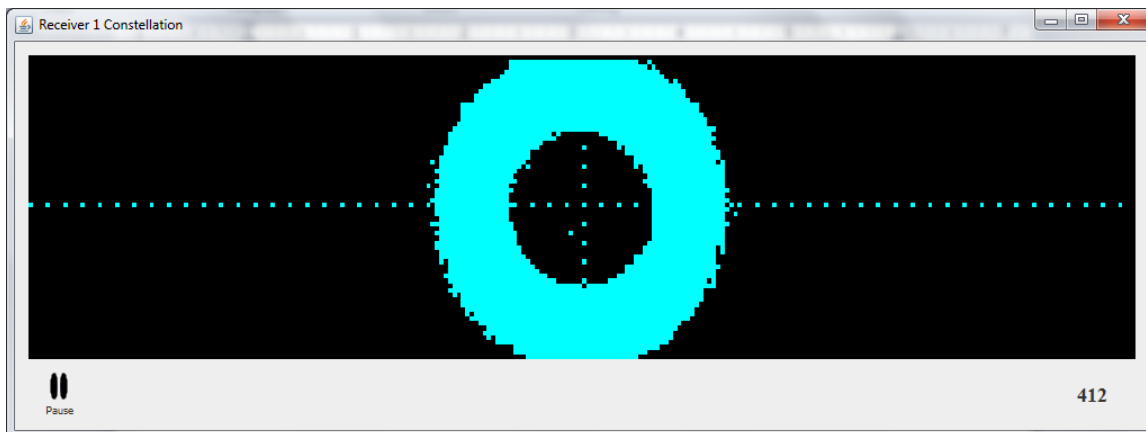Figure 3: Multipath corrupted constellation

Figure 4: Equalized constellation

Figure 5 shows the eye pattern of the multipath corrupted signal. The eye is nearly closed and the zero crossings are blurred. The equalized eye pattern is shown in figure 6. The eye is now wide open and the zero crossings are clean.
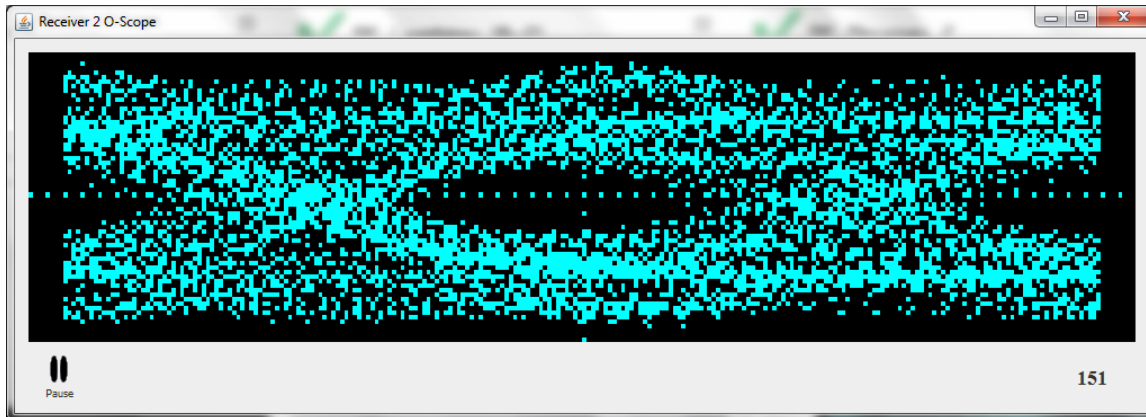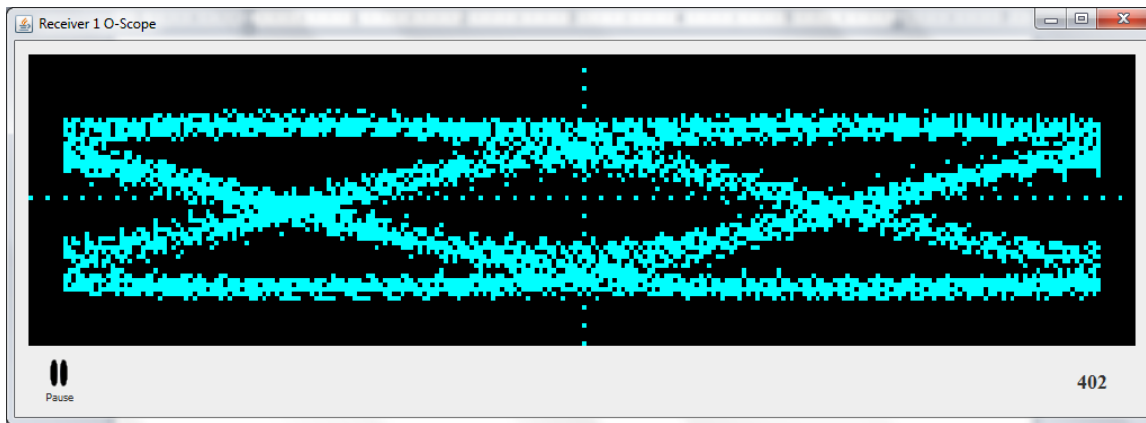
Figure 5: Corrupted eye pattern

Figure 6: Equalized eye pattern

The BER of the multipath corrupted unequalized signal at -40dBm was 4.7 x 10^-4. The equalized signal was error free at -40dBm and had a 10^-5 threshold of -82dBm.

An Adaptive Equalizer is available as an option in GDP Receivers.