Shadow Receivers

Why the Shadow is better than the competition. In short, Sombra Labs DSP features better noise rejection and glitch immunity while giving the lowest servo jitter and fastest servo output. These two parameters can be very critical in high performance models, excessive jitter can induce unpredictable behavior in a high-performance model, while excess latency can cause delayed control response from a model that can be catastrophic (e.g. in a high-speed helicopter/cars split second decisions need to be taken).

The DSP functionality of the Shadow is an extremely efficient adaptive noise and glitch filtering algorithm that takes into account the signal to noise ratio of the baseband signal. In simple English, we digitize the analog baseband signal and process it digitally with the help of a microprocessor, a simple analogy would be DVD (digital) versus a VHS tape (analog).

The DSP algorithm has multiple levels of filtering that is performed on the signal before it is allowed to be passed on to the servos. Here is what happens on the Rx upon power-up:

1. The Tx signal recognition algorithm on the Rx analyzes the transmitter characteristics, it identifies among other things the shift of the Tx, number of channels, frame rate, etc. From here onwards only frames matching these characteristics will be allowed to "graduate" to higher levels of filtering. You can see this in action by performing this simple experiment: Take two different Tx on the same frequency (e.g one 4ch. The other 7ch.). Turn one Tx ON and let Shadow register it, now turn the first Tx OFF and turn the second Tx ON, the second Tx commands will be rejected even though it operates on the same frequency!. To register the second Tx, Shadow will have to be power-cycled. We call this basic sanity or transmitter recognition and Level-1 filtering.

2. Every incoming baseband signal is continuously sampled and digitized. Our custom and proprietary digital signal processing algorithms are applied to baseband and valid signals can be recovered and reconstituted even in extremely noisy environments. We call this level-2 filtering. Once a frame is processed it is passed to level-3 filtering.

3. In level-3, we do another set of tests that qualify the frame further, e.g. the servo output signals in the frame, the proper sync pulse of a PPM frame, the low and high-phases of each pulse, etc. All of these have to pass a rigorous qualification test before the signal is sent out on the servo pins.

All the above happens at an extremely high processing rate. The benefits of our DSP algorithm to the user are an extremely reliable communication link, with the least amount of possibility of glitches, jitter and/or loss of Tx control. We also provide the least amount of latency and processing overhead of any of the competing products on the market and this shows clearly in high performance models (e.g. helicopters and high speed RC cars have very low tolerance to latency).