Review

Clamping

Send video through a capacitor, where ever the average picture level is where zero is. Will always have an equal amount of signal above ground and below ground. Blanking is at zero volts. Going through multiple amplification stages with a video signal, ends up that blanking is nowhere near zero volts.

Put a switch to ground, and whenever see blanking, close the switch to ground blanking. Rest of line goes fast, faster than the capacitor's RC constant to allow the capacitor to recharge and bring the signal off of ground.

Nowadays, replace capacitor with a FET that is fed from a horizontal oscillator circuit, so it finds the right place to short out that circuit. Diagram 1.

This is also called **DC restoration**.

Why were the voltages chosen that they were? Use 0 to 100 IRE, leaving an odd position for sync (-40). Maybe originally in black and white days, zero blanking useful to separate sync from video via rectification.

Some times sync tip is used to clamp, but not the best choice since it requires an exact precise voltage that is nonzero.

If didn't clamp, would push down the brightness level. Blacker than black would be gray.

This is line-by-line clamping. This includes the vertical interval. How about the equalizing pulses (the ones that aren't the horizontal sync pulses)? No. May inhibit on broad pulses since there's not much zero volts in those lines, or may even clamp on it; probably doesn't matter at that stage (vertical sync is read earlier via a different circuit path).

Horizontal sync is 4.7 microseconds between the 50% points of the edges. Why are the edges on a received horizontal sync pulse sloped and not straight like they are when they are generated by house sync in the studio? The 3dB drop at 4.2 MHz filtering requirement.

Breezeway is 1.5 microseconds. Back porch is

Hammerhead allegedly is meant to interlace, but Steve disagrees with this; Steve believes these are ignored. The hammerhead are created by the (non-sync) equalizing pulses. Top one is pre, bottom one is post. The handle is the broad pulses of vertical sync, blank space is the serrations. Diagram 2.

Beam Landing / Purity

Where the beam actually lands during purity, so it lands on the right color. Has nothing to do with convergence. Have a beam landing analyzer downstairs; instructions say pull deflection yoke back, center the beam, then reposition the yoke and read the beam landing error.

Purity magnets affect all beams at the same time. There aren't any purity magnets dedicated to a particular beam. All electrons flow within the purity magnets.

Purity ensures electron beams run down the center of the tube. Forces beam to run to center of screen.

How does this differ from static convergence? Convergence alignment is with a picture, purity is

without a picture. Purity centers the trio of electron beams together (using the dominant color), convergence makes adjustments for manufacturing errors which might offset one or two of the beams. Purity magnets are powerful enough to move all three beams, static convergence magnets don't affect all beams (for example, the blue lateral magnet).

Convergence

Convergence is when the electrons for a gun hit the corresponding phosphor for the pixel being painted at the same time as the other gun electrons hit.

Focus on a Monitor

Adjusting electrostatic difference that squeezes the electron beam together.

Intermediate Frequency (IF)

A middle/medium frequency. So, must be upper and lower frequencies. Upper from 54 to 890 MHz (the VHF and UHF channels). Lower is 0 to 4.2 MHz. Range of IF would be 4.2 to 54 MHz. Actual IF is 45.75 and 41.25 MHz.

AM radio 550 – 1650 kHz upper, 0 – 10 kHz lower. IF from 10 to 550 kHz. Actual IF is 455 kHz.

FM radio 88 – 108 MHz upper, 20 to 15 kHz lower, IF possible from 15 kHz to 88 MHz. Actual IF 10.7 MHz.

If receiving channel 83 at 890 – 896 MHz, what will IF be? 45.75 and 41.25. IF frequency **constant** for any received channel.

At channel 2, channel carrier at 55.25 MHz, oscillator runs at 101 MHz. Sum: 101 + 55.25 = 156.25 MHz. Difference: 101 – 55.25 = 45.75 MHz.

At channel 3, channel carrier at 61.25 MHz, oscillator runs at 107 MHz. Sum: 107 – 61.25 = 45.75 MHz.

Most of the gain in a TV receiver is in the IF stages.

Audio on channel 2: 54.0 + 4.5 + 1.25 = 59.75 MHz. 101 – 59.75 = 41.25 MHz.

So, audio IF is lower than video/picture IF. Everything is flipped around. Vestigial sideband is at the high end of the IF passband.

AM radio: station at 610 kHz, IF of 455 kHz, add, get 1065 kHz for oscillator frequency. For 810 kHz, oscillator at 1205 kHz, IF still at 455 kHz. For 1010 kHz, oscillator runs at 1465 kHz, IF stays the same at 455 kHz.

FM radio: station at 105.3 MHz, oscillator runs at 10.7 + 105.3 = 116.0 MHz. IF at 10.7 MHz.

The circuit that does the subtraction is called a **mixer**. We have a **tuner** and an **oscillator** that contribute the two original frequencies fed to the mixer.

Satellite works by sending up an oscillator frequency, then what gets sent back down is the IF. That's why you only receive satellite on one channel.

Mixer output gets filtered within the IF stages. The tuner is pretty wide band and the mixer mixes that wide band.