What's Unusual about Video Signals

Video signals have a characteristic that is rare or unique among amplified electromagnetic signals. Specific absolute voltages within the video signal are interpreted as having special meanings. This differs from most other electromagnetic signals in that the signals have meaning in their frequencies, phases, and/or their relative amplitudes, but specific absolute voltages are not interpreted within most other electromagnetic signals.

In video signals, specific voltages are interpreted as specific IRE values, as shown in the following table.

Signal Component	IRE	Voltage
Sync Tip	-40	-0.286
Blanking	0	0
Reference Black	7.5	0.054
Reference White	100	0.714

Problems of Coupling Between Stages of a Circuit

Since the output of a stage often operates at a different DC potential than does the input of a successive stage connected to it, it is common for circuits to have a coupling capacitor to separate the output of one stage from the input of the next stage. This coupling capacitor prevents DC from the output of a stage from flowing into the input of the next stage and interfering with the operation of that stage.

Since video has the unusual property of having specific absolute voltages interpreted as specific meanings, the video signal being transferred between the stages gets its absolute voltage level changed based on the signal's APL (average picture level). The portion of the signal corresponding to the signal's APL will be at whatever DC voltage appears at the input of the stage just past the coupling capacitor, and the rest of the signal will be at voltages above and below that. The voltage difference between the minimum and maximum IRE values remains the same (1 volt).

Since the absolute voltages of various portions of the video signal cannot be assured to be constant, any circuit attempting to interpret a video signal that has passed through a capacitor will interpret that signal incorrectly.

Clamping

Clamping adjusts the voltage of a video signal so that it regains its original absolute voltages at known portions of the video signal.

Some advantages of clamping include:

- reduction in hum and other low-frequency noise
- present consistent absolute voltages for different input video signals
- improves amplifier performance by correcting peak level changes based on changes in the APL

Clamping circuits are designed to set a known portion of a video signal to a known absolute voltage.

Clamping occurs within each line of video, within the blanking interval. Most circuits will cause clamping to occur during either the front porch, breezeway, or back porch. Some circuits will clamp during the sync tip. A given circuit clamps at the same place within the blanking interval.

References

Standard Handbook of Video and Television Systems Engineering, 4th Edition, by Jerry Whitaker and Blair Benson, pages 9-137 to 9-138.

Class notes.