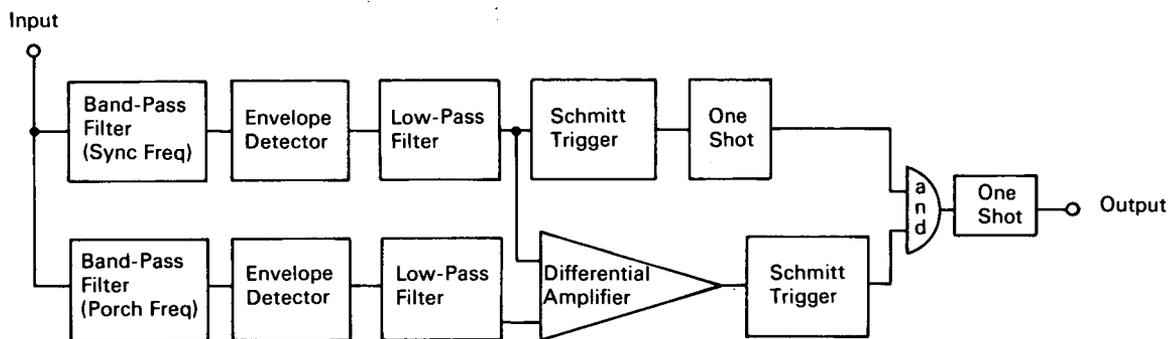


NASA TECH BRIEF



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TV Synchronization System Features Stability and Noise Immunity



The problem:

In television systems, specific portions of the video information (black-to-white levels) fall at designated frequencies. Similarly, the sync pulses fall in a specific very narrow frequency band near the limit of the transmission channel. Video information falls between the FM carrier and the sync frequencies. A tuned rf filter is used in the receiver to accept only the sync tip frequency. A noise spike present in the narrow pass band of the filter produces an ambiguous sync signal that results in a horizontal jitter in the video presentation.

The solution:

Circuitry that introduces an additional sync level, also sensed by a tuned filter, as a back porch on the sync pulse. Presence of simultaneous signals at both sync and porch frequencies provides a sync identification, in the presence of noise, from which a coincidence circuit can generate sync pulses having the required stability and noise immunity.

How it's done:

Referring to the figure, the sync frequency bandpass filter, envelope detector, and low pass filter are shown connected as in a basic system. A duplicate channel is

introduced here to sense and translate the porch frequency. Because noise at the summing point input to the differential amplifier is derived from two separate frequency domains of equal bandwidth but from statistically separate sources, the noise is added, the sum being 3 db greater than either separately. Peak-to-peak signal is, therefore, 6 db so that, for a given signal-to-noise condition, jitter due to noise vs rise time is 3 db less than would be the case without the differential amplifier.

Because sync immediately precedes porch and the transition of interest is common to both (the trailing edge of sync corresponds in time to the leading edge of porch), the leading edge of sync is sensed as a time reference only for the purpose of enabling the next transition into porch frequency to be used as the sync time reference.

The sync channel Schmitt trigger fires its delay one-shot which has a time duration slightly longer than the maximum sync duration. As soon as the porch pulse is received, the porch channel Schmitt trigger is fired. Coincidence of output from the sync channel one-shot and porch channel Schmitt trigger causes an output from the *and* gate that triggers the output one-shot to provide the actual sync pulse to the horizontal sweep.

(continued overleaf)

Notes:

1. This circuitry would be useful in an industrial television application where horizontal sync must be ultrastable in the presence of noise and vertical sync is available from power line frequency.
2. Inquiries concerning this invention may be directed to:

Technology Utilization Officer
Jet Propulsion Laboratory
4800 Oak Grove Drive
Pasadena, California 91103
Reference: B67-10118

Patent status:

Inquiries about obtaining rights for the commercial use of this invention may be made to NASA, Code GP, Washington, D.C. 20546.

Source: Frederick P. Landauer

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