A New Approach to Photoconductive Telecine

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The design of previous photoconductive telecine equipment has been heavily influenced in live color camera design. Many photoconductive telecines consist merely of a color camera looking into a projector through a suitable field lens, which is inadequate for transferring the original scene information to the television screen. Assessment of the basic problems of resolution, color analysis of film and dichroic shading effects leads to a more direct approach. The equipment described incorporates a direct imaging optical system and light-splitting optics designed specifically for telecine. The optical system has been designed to operate at constant aperture and to give the best compromise between diffraction limiting of resolution and lens aberrations. Advantage has been taken of the narrow angle projection system to employ a simple, low angle of incidence light splitter. The video processing channels have been specifically designed for film reproduction and incorporate logarithmic and exponential amplifiers to effect gamma correction. The employment of F.E.T. head amplifiers leads to a luminance SNR better than 50 dB; level dependent aperture correction and bandwidth limiting are employed to improve the subjective appearance of the picture. A simple integral multiplexing system produces acceptable on-air changes between film projectors and mixing or cutting between slides.

Standardization for a Time and Control Code for Videotape and Audio Recorders

An oral interim progress report is presented by Subcommittee Chairman on Editing Codes, ELLIS DAHLIN, CBS Television Network, N.Y.; and Video Tape Recording Committee Chairman, CHARLES E. ANDERSON, Ampex Corp., Redwood City, Calif.

JCIC/SMPTE Ad Hoc Color Television Study Committee Progress Report

K. BLAIR BENSON, CBS Television Network, New York

In September 1968, an Ad Hoc Committee was set up by the Joint Committee of Inter-Society Coordination (JCIC) to study the problem of variations in color observed on television pictures as viewed in the home. The member organizations of JCIC are the Electronic Industries Association, the Institute of Electrical and Electronics Engineers, the National Association of Broadcasters and the Society of Motion Picture and Television Engineers. Since the organization of the Ad Hoc Committee, investigations have been conducted into all phases of television broadcasting from the original scene through camera, recording and reproduction equipment, transmitters and receivers. A review of the committee activities to date is presented.

TUESDAY AFTERNOON

CONCURRENT SESSIONS

1:30 TELEVISION VERTICAL INTERVAL SIGNALS

Additional Information Within the Television Signal

R. A. O'CONNOR, CBS Television Network, New York

The adoption of the NTSC color television system about twenty years ago added the entire new dimension of color to the TV signal without any increase in required bandwidth. Although of considerably smaller scope, many ingenious techniques have been developed for the insertion of ancillary communications within the television signal. Within the active video portion of the signal such techniques can provide for an emergency channel for the sound portion of the signal and for coded identification of filmed commercials. Employing portions of the horizontal blanking interval, high-quality audio channels can be provided using pulse amplitude, pulse code or pulse-width modulation techniques. Within the audio portion of the TV signal many systems have been developed which involve unobtrusive audio tones for alerting station personnel, for the automatic control of equipment and for program or commercial identification. Several systems are also under consideration which involve tones designed for alerting the public in times of a national emergency. Perhaps the greatest relatively untapped portion of the TV signal for future additional communications is the vertical blanking interval, where twelve lines of each field — each line having a potential communication channel capacity of 12 kHz — are technically available for special signals.

Improved Color Uniformity Through Use of Vertical Interval Color Reference

B. D. LOUGHLIN, Hazeltine Corp., Little Neck, N.Y.

Since early in 1969 the Broadcast Television Systems Committee (BTS) of EIA, at the request of the JCIC Ad Hoc Color Television Study Committee, has been actively studying many facets of the question: "Are any changes in signal specifications appropriate in order to assure better color uniformity?" Some of the items under consideration include: the advisability of tightening up tolerances on sync and burst timing specifications; the possible need to specify a standard monitor and standard demodulator; and the possible need to update specifications regarding gamma, primaries and reference white. The problem considered to be of urgent priority is: How to assure during program transmission that the chrominance-to-luminance ratio is correct, and that the burst has the right phase and amplitude compared to chroma. BTS considers that an ever-present color reference signal during the vertical interval can be a solution to this urgent problem and can provide an important step in achieving better color uniformity in color TV.

The Vertical Interval: A General Purpose Digital Transmission Path

TED V. ANDERSON, TeleMation, Inc., Salt Lake City, Utah

Historically the vertical interval has been used by television networks and common carriers to transmit video test signals. Equipment is now available which further permits the addition of digital information from character generators, computers and other sources onto the vertical interval. The advantages of Vertical Interval Data Transmission (VIDT) lie in the limited amount of equipment necessary to perform numerous different communications functions: dissemination of information to affiliated network stations, news wire distribution, communication with TV mobile units, remote control of unattended videotape recorders, remote video switching and centralized control of clock systems. Each of these applications can be performed with no detectable interference to the program video; severe noise does not interfere with the accuracy of the digital transmission.

Transmission of Time-Frequency Signals in the Vertical Interval

D. D. DAVIS, Time and Frequency Div., National Bureau of Standards, Boulder, Colo.

Television, with its wide bandwidth, national distribution and high signal-to-noise ratio is a near-ideal medium for time/frequency transmissions. The daily variation of the path delay from Washington (U.S. Naval Observatory) to Boulder (National Bureau of Standards) was found to be typically less than 1 μs for any of the three networks over a 14-month period. The maximum variation over periods of one or more months was less than 10 μs, with the exception of three major reroutes that changed the delay of the affected network by several hundred microseconds. The short-term stability of the paths from New York to Boulder were checked by monitoring the phase of the color subcarrier (originated from a rubidium oscillator) as received in Boulder with respect to a local cesium oscillator. Typically stability for 15-min averaging times was on the order of 10 ns. This translates into a frequency stability of about one part in 10^{11} for 15-min averaging, a value that exceeds the performance of most currently used time/frequency dissemination systems by one to three orders of magnitude. By way of comparison, LF and VLF transmissions exhibit typical stabilities of a few parts in 10^{11} when averaged over several days or weeks, but diurnal variations degrade the short-term stability to a few parts in 10^{9}. The typical limitations of current time/frequency dissemination systems motivated the development of an experimental time/frequency dissemination system which uses one of the lines in the vertical interval.