

TELEVISION SYSTEMS

GLOSSARY OF TELEVISION TERMS

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1. GENERAL

1.01 This section furnishes a list of terms presently used in the lineup, operation, and maintenance of Television Transmission Systems. Also included is the American Standards Association scale used in the measurement of video signal levels.

1.02 This section is reissued to include new terminology. Since this is a general revision, arrows ordinarily used to indicate changes have been omitted.

1.03 Experience in providing television service has proven the need for common understanding and use of terms by all the Telephone and Broadcasting Companies. The terms and definitions appearing in this section were compiled through the mutual efforts of the Telephone Company, the Canadian Standard Association (CSA), the Satellite Technical and Operational Committee—TV, and the following television networks: American Broadcasting Company, Columbia Broadcasting System, and National Broadcasting Company. The contents of this glossary include those in general use by all broadcasters and other network television users. Its use by all groups should facilitate reporting, describing, and locating television service impairments.

1.04 Because these terms are intended for practical use by operating personnel, they may differ somewhat in wording from published standards which are not as well suited for the intended purpose.

2. TERMS AND DEFINITIONS

Abrasions (Film): Unwanted slight marks on the surface of film.

A-Scope: A cathode-ray oscilloscope arranged to present a display such that time is one coordinate and signals appear as deflections in a direction perpendicular to the time scale (also called *waveform monitor*).

Aspect Ratio: The numerical ratio of picture width to height.

Audio (Webster's International): Of or pertaining to electric current and phenomena of frequencies corresponding to normally audible sound waves. These frequencies are approximately 16 to 20,000 Hz. In television parlance, *audio* is used to denote the sound portion of a television signal or system.

Audio Channel: A channel capable of satisfactorily transmitting audio signals. As a television term, *audio channel* refers to a channel transmitting the audio signals which are generally, but not necessarily, associated with video signals.

Average Picture Level (APL): The average level of the picture signal during active scanning time integrated over a frame period and defined as a percentage of the range between blanking and reference white.

Babble: (See also *Crosstalk*.) Undesired and unintelligible signals inadvertently imposed on a desired audio signal. CSA defines babble as the aggregate crosstalk from a large number of disturbing channels.

Back Porch: That portion of the composite video signal which lies between the trailing edge of the horizontal sync pulse and the trailing edge of the corresponding blanking pulse (interval). (See Fig. 1.)

Back Porch Tilt: The slope of the back porch from its normal horizontal position. Positive or

negative refers respectively to upward or downward tilt to the right.

Banding: (See also *Color Banding, Velocity Banding*.) One or more groups of four bands, generally 16 lines per band and spaced approximately 48 lines apart, in each reproduced field containing a different video level and/or signal-to-noise ratio, as compared to the rest of the picture or to other groups of bands. This can only appear in a television picture which originates from the playback of video tape recordings. Because of interlace, the band appears as 32 lines spaced 96 lines apart on a monitor.

Bandwidth: The number of hertz expressing the difference between the limiting frequencies of a frequency band. For example, a 2.5- to 3.5-MHz band has a width of 1 MHz.

Baseband: The band of frequencies occupied by the signal in a carrier wire or radio transmission system before it modulates the carrier frequency to form the transmitted line or radio signal.

Bassy: A qualifying adjective to describe the sound resulting from audio having accentuated low frequencies.

Black Clipper: A piece of equipment or a circuit which does not transmit black peak below a certain pre-set level of picture signal and at the same time transmits all the remainder of the input signal without change.

Black Compression: (a) The compression of the steps toward the black end of a staircase waveform or gray scale. (b) The reduction of contrast in the dark gray to black range of a television picture.

Black Level: Level of picture signal corresponding to maximum limit of black peaks. (See Fig. 2.)

Black Peak: The maximum excursion of the picture signal in the black direction at the time of observation.

Blacker-than-Black: The amplitude region of the composite video signal below reference black level in the direction of the synchronizing pulses.

Blanking (Picture): The portion of the composite video signal whose instantaneous amplitude makes the vertical and horizontal retrace invisible.

Blanking Level: That level of the composite video signal which separates the range of levels containing picture information from the range of levels containing synchronizing information. The setup is regarded as part of the picture information (See Fig. 1.)

Blanking Pulse (Interval): A signal used to cut off the electron beam and thus remove the spot of light on the television picture tube or image tube. Also applies to a signal used to suppress the picture signal at a given time for a required period.

Blanking Signal: A specified series of blanking pulses.

Bleeding Whites: An overloading condition in which white areas appear to flow irregularly into black areas.

Blooming: An increase in the size of the spot on a picture monitor screen resulting in apparent defocusing in the highlights of the picture. Blooming may be due to halation of the fluorescent screen or electrical effects on the electron beam or excessive picture signal level. Electrical effects on the electron beam which cause blooming may cause a change in raster size. Blooming should not be confused with a fault having similar appearance but due to overexposure of an image orthicon. This image orthicon fault will be independent of monitor adjustments.

Boomy: Manifesting a form of distortion having a masked resonance occurring toward the lower end of the audio frequency range and causing low-pitched sounds to be accentuated and prolonged.

Bounce: An unnatural sudden variation in the brightness of the picture. Sudden undesired changes in video levels as shown by a waveform monitor.

Breathing: Unnatural variation at a slow regular rate in the brightness of a television picture. Also, slow regular undesired change in video level as shown by a waveform monitor.

Breezeway: That portion of the back porch between the trailing edge of the sync pulse and the start of the color burst.

Broadcaster: A company or individual legally authorized to carry on broadcasting. In international parlance (CCI terminology), *broadcaster* is referred to as *television authority*.

Broadcasting: The dissemination of audio and video signals by means of hertzian waves intended to be received by the public either directly or through the medium of relay stations.

Broadcasting Authority—Receive: The broadcasting authority at the receiving end of an international sound program or television connection.

Broadcasting Authority—Send: The broadcasting authority at the sending end of an international sound program or television connection.

Building Circuit: A channel located completely within one building.

Burned-In Image: An image which persists in a fixed position in the output signal of a camera tube after the camera has been turned to a different scene.

Business Telephone: A telephone instrument installed by a communications company at a designated location, connected to a local telephone exchange and having its own exchange number.

Calendar Month: A period of consecutive days falling within one of the twelve calendar divisions of a year.

Note: Legally, a month is identified as above unless otherwise specifically defined.

Call Sign: Suitable station identification consisting of a combination of letters, and sometimes also of numerals, required by broadcasting regulations. A call sign includes both the visual and aural parts of the identification.

Camera Tube: An electron-beam tube used in a television camera where an electron current or a charge-density image is formed from an optical image and scanned in a predetermined sequence to provide an electrical signal.

Carrier: Usually a continuous wave applied to a modulator and suitable for modulation by an information-bearing signal.

Cathode-Ray Tube (CRT): An electron tube assembly containing an electron gun arranged to direct an electron beam upon a fluorescent screen. Scanning of the beam can produce light at all points in the scanned raster.

CCIR: International Radio Consultative Committee. A branch of the International Telecommunications Union (ITU) consultative committee responsible for the study of questions and the formulation of recommendations regarding radio communication matters.

CCITT: International Telephone and Telegraph Consultative Committee. A branch of the International Telecommunications Union (ITU) consultative committee responsible for the study of questions and the formulation of recommendations regarding telephony and telegraphy communication matters.

CEPT: European Conference of Postal and Telecommunications Administrations. A European organization of the Telecommunications Administration of European States which are members of the Universal Postal Union or International Telecommunications Union. The purpose of the organization is to establish closer relations between member Administrations and to coordinate and improve their services.

Channel: A transmission circuit over which a signal is conveyed from one point to another. (See specific type of channel.)

Chrominance Signal (Chroma): That portion of the color television signal which contains the color information.

Cinch Marks: Small vertical scratches appearing over film and caused by film slippage on reel.

Circuit: An arrangement of transmission facilities to meet a particular need for communications between points.

Circuit Section: Part of a circuit, the terminals of which are accessible at baseband frequencies.

Clamp(er): Equipment or a circuit which carries out a clamping operation.

Clamping: The process of reestablishing the dc level of the picture signal at the beginning of each scanning line. The clamping process sets the level

of the peak of the sync pulse or, more often, the level of the back porch at a given reference level. Clamping is a process by which any low-frequency voltage envelope appearing on the sync pulse tips is attenuated to nearly zero. A signal is said to be clamped when all sync pulse tips exist at the same voltage with respect to a fixed reference such as ground.

Clicks: Short, sharp, undesired noises varying from light to heavy. *Clicks* is an audio term.

Clipping: The shearing off of the peaks of an audio or video signal. For a picture signal, this may affect either the positive (white) or negative (black) peaks. For a composite video signal, the sync signal may be affected.

Closed Circuit: Television or sound-program channel or channels usually not involving broadcasting but used to transmit program material for a specific purpose or audience.

CMTT: A joint CCIR/CCITT committee for television transmission. An ITU study group composed of both CCIR and CCITT members for the consideration of questions concerning the transmission of television (video and sound) signals over long distances.

Color Banding: (See also *Banding, Velocity Banding*.)

- (a) Color phase shift banding visible because of differences in color phase between head channels of tape recorders.
- (b) First line hue shift banding visible because of difference in hue of the first line of each band.
- (c) Hue shift banding visible because of hue shifts within a band.
- (d) Saturation banding visible because of difference in saturation between head channels of tape recorders.

Color Burst: In National Television System Committee (NTSC) color, normally refers to a burst of approximately 9 cycles of 3.6-MHz (3.579545-MHz) subcarrier on the back porch of the composite video signal. This serves as a color-synchronizing signal to establish a frequency and phase reference

for demodulating the chrominance signal. (See Fig. 1.)

Color Flicker: That flicker which results from fluctuation of both chrominance and luminance.

Color Fringing: Spurious chromaticity at boundaries of objects in the picture. Color fringing can be caused by the change in relative position of the televised object from field to field or by misregistration. In the case of small objects, it may cause them to appear to be separated into different colors.

Color Phase Shift Banding: Banding made visible by differences in color phase between head channels. (See also *Banding, Color Banding*.)

Color Picture Signal: The electrical signal which represents complete color picture information excluding all synchronizing signals. One form of color picture signal consists of a monochrome component plus a subcarrier modulated with chrominance information.

Color Signal: Any signal at any point in a color television system for wholly or partially controlling the chromaticity values of a color television picture.

Color Subcarrier: A signal (3.579545 MHz in NTSC color) whose modulation sidebands are added to the monochrome signal to convey color information.

Color Temperature: The temperature at which a black body radiator must be operated to have a chromaticity equal to that of the light source.

Color Transmission:

- (a) The transmission of a signal which represents both the brightness values and the color (chrominance) values in a picture.
- (b) The transmission of a signal which represents both the luminance values and chromaticity values in a picture.

Common Carrier (Carrier): (See *Communication Company*.)

Communication Company: Any organization legally authorized to provide transmission facilities from one point to another for lease for private communication purposes. These organizations are

the national and international telecommunication entities.

Composite Video Signal: The complete video signal. For monochrome, it consists of the picture signal and the blanking and synchronizing signals (noncomposite video signal and synchronizing signals). A composite video signal of standard amplitude (from correct sync to reference white level) should be presented between -40 and $+100$ units of the IRE scale on a waveform monitor.

Compression: The undesired effect on a signal, when transmitted through a device, that results in an output amplitude which is not a linear function of the input amplitude. Also, a less-than-proportional change in output of a circuit for a change in input level. For example, compression of the sync pulse means a decrease in the percentage of sync during transmission. Compression also applies to the reduction in amplitude of some of the steps of a staircase waveform or of a gray scale.

Connection: The unidirectional path between the Broadcasting Authority—Send and Broadcasting Authority—Receive, comprising the international link extended at its two ends over national circuits to the Broadcasting Authorities.

Contact Engineers: Members of European broadcasting organizations participating in Eurovision who serve as contacts for the coordination of programs on this European television network.

Contrast: The range from designated light to designated dark shades of gray in a scene or television picture usually considered as the ratio between the maximum and minimum luminance values in the scene or picture. For example, in a high-contrast picture there would be intense blacks and whites, whereas a low-contrast picture would contain only various shades of gray.

Control Circuit: A telephone circuit used by Broadcasting Authorities to provide them with a direct link between the program source and the point where it is used.

Control Station: For Video: The ITC at the receiving end of a television link. This ITC is the control station (control office) for both the video link and connection.

For TV Sound Program: The ISPC at the receiving end of a television link. This ISPC is the control

station (control office) for both the sound-program link and connection.

CRO: Cathode-ray oscilloscope.

Cropping: Elimination of picture information near the edge or edges of a picture.

Cross-Color: A low-frequency beat pattern in the picture. A beat pattern is due to luminance signal components with a frequency near to that of the color subcarrier when synchronously detected.

Crosstalk: (See also *Babble*.) An undesired signal, superimposed on a desired signal, caused by coupling from some other source. Crosstalk means audio crosstalk unless video is specified.

Cue Circuit: A control circuit used to signal specific actions to the program source or receiving points.

Cue Missed: (See also *Network Cue*.) A network cue which was not transmitted when or as required.

Cut: An undesired interruption in the transmission of program material. Without qualification, the term may refer to loss of both audio and video signals.

Cutoff Frequency: The frequency beyond which the signal is appreciably diminished and which indicates the upper or lower limit of the transmitted frequency band. The determination of the value of a cutoff frequency may be specified by that frequency at which a relative loss occurs, such as the 3-dB cutoff point.

Cut Start (Upstart): The commencement of transmission of the video and/or audio signals of a program which is already in progress. An audio cut start or a video cut start should be so specified.

Cut to Time (Downcut): The terminating of a program before its completion in order to comply with the time period scheduled for that program.

Daily Service: Facilities supplied daily at a specified hour for a specified period of time.

Damped Oscillation: Oscillation which gradually dies out in smooth, regular decay, each swing being smaller than the preceding.

De-emphasis: (See also *Restorer*.) The use of a network having a loss shape inverse to that of a pre-emphasis network in a given circuit. The de-emphasis characteristic is complementary to the pre-emphasis characteristic. Thus the amplitude-vs-frequency characteristic, from the input to the output of the facility, is not affected by the use of pre-emphasis and de-emphasis within the facility.

Definition: Clarity of audio transmission and reception making possible the aural identification of the various musical units in an orchestra. This definition has been previously used in radio terminology. In video service, the term *resolution* is more commonly used than *definition*. The terms are synonymous.

Delay Distortion: Distortion resulting from nonuniform speed of transmission of the various frequency components of a signal through a transmission system.

Detail: (See also *Resolution*.) Minimum resolvable or distinguishable information in a television picture. Detail is an evaluation of performance based on experience and is consequently an opinion.

Differential Gain: The difference in gain of a video facility at the color subcarrier frequency between any two luminance levels from blanking to reference white level. Differential gain is measured by shifting the axis of a small-amplitude sine wave at 3.58 MHz from one level to the other, and measuring the change in amplitude of the sine wave at the output of the facility. A differential gain value which is not zero indicates the presence of nonlinearity at the color subcarrier frequency.

Differential Phase: The maximum difference in phase of a video facility at the color subcarrier frequency between any two luminance levels from blanking to reference white level. Differential phase is measured by shifting the axis of a small-amplitude sine wave at the color subcarrier frequency from one level to the other and measuring the change in phase shift of the sine wave at the output of the facility.

Dirt: Foreign material on the surface of an optical system or of motion picture film. Dirt on film appears as a random distribution, changing from frame to frame, of dark gray spots or of light gray spots in a television picture. Dirt on film

adds to the noise of a sound track signal. Dirt on optical systems causes picture or sound degradation. If the dirt is in focus, it will cause visible spots, fixed in location in the television picture.

Displacement of Porches: Refers to any difference between the level of the front porch and the level of the back porch.

Dissolve: A slow, controlled reduction to black level of one picture signal and a slow, controlled increase to normal level of a second picture signal occurring at the same time.

Distortion: An undesired change in waveform of a signal in the course of its passage through a transmission system.

DOC: Department of Communications. The Canadian government department responsible for developing policy and regulations for communications other than broadcasting.

Driving Signals: Pulses which synchronize the vertical and horizontal scanning waveforms of pickup devices. Driving signals are also employed in reproducing devices when the input signal has the noncomposite video form.

Drop Outs: Black or white lines (not necessarily the full width of the picture) or spots appearing in a television picture originating from the playback of a video tape recording which has imperfections in the magnetic coating of the tape surface.

Duty Cycle: This term applies to the operation of machines or devices and denotes the ratio of "on time" to the total of one operating cycle. This term should not be used in a video context except with certain specified test waveforms.

Dynamic Gain: A change in transmission system gain as measured by changes in peak-to-peak luminance and sync levels resulting from variations of the average picture level.

Early Finish: The completion of program material before the end of the period designated for that program. (a) The network cue has been specified as part of the program material. (b) Unless specified, the term *early finish* refers to both audio and video signals.

Early Start: The commencement of the transmission of program material before the starting time scheduled for that program period. Unless specified, this term refers to both audio and video transmission.

EBU: European Broadcasting Union. A private nonprofit association composed of radio and television broadcasting organizations in Europe and the Mediterranean area, with associate members in other parts of the world. It has two sections: the Administrative and Legal Section (Geneva) and the Technical Section (Brussels).

Echo: A wave that has been reflected or otherwise returned. Echoes may be either leading or lagging the primary wave, and, if of sufficient magnitude and time difference, will appear on the picture monitor as reflections or "ghosts".

Edge Effect: The overemphasizing of well-defined objects because of the addition of black or white outlines to the vertical edges of the objects. This is more informative if edge effect is further identified, ie, trailing white, leading black, etc. A white outline is generally considered an image orthicon effect.

EIA: Electronics Industries Association. An association in the U.S.A. providing standards, including interfaces, designed for use between manufacturers and purchasers of electronic products.

Equalization: The process of using linear networks to correct for gain or delay characteristics, generally with the objective of obtaining flat gain and delay vs frequency over the band of interest. The process of correcting a channel for its transmission deficiencies. Phase equalization and frequency-response equalization are more specific terms.

Equalizing Pulses: Pulses of one-half the width of the horizontal sync pulses which are transmitted at twice the rate of the horizontal sync pulses during the blanking intervals immediately preceding and following the vertical sync pulses. The action of these pulses causes the vertical deflection to start at the same time in each interval and also serves to keep the horizontal sweep circuits in step during the vertical blanking intervals immediately preceding and following the vertical sync pulse. (See Fig. 3.)

ESC (Order Wire): Engineering Service Circuit. A voice or teletype circuit interconnecting stations

in a network for the use of operations and maintenance personnel of the communications companies when coordinating and maintaining services on the network.

Eurovision: An arrangement between European and Mediterranean television services for the distribution of television programs as required. Technical coordination is performed by the International Technical Control Center (CICT), which forms part of the EBU technical establishment in Brussels.

Expansion: An undesired amplitude increase of one portion of the composite video signal relative to that of another portion. Also a greater-than-proportional change in the output of a circuit for a change in input level. For example, expansion of the sync pulse means an increase in the percentage of sync during transmission.

Facility: Any technical apparatus or transmission system employed for purposes of electronic communication.

Fade: A gradual change of picture signal amplitude, audio signal amplitude, or both. The application of the term should be specified as audio or video. The level of the fade should be specified, eg, in, up, down, out, to black, under, etc.

Fading: A progressive deterioration of picture quality due to increasing loss in an electromagnetic (usually referred to as radio) propagation path. The term *fading* used in television network operations may be identified by the following sequence:

- (1) Noise, increasing in amplitude, appears on porches and peak of sync pulses.
- (2) Noise appears in the picture.
- (3) Loss of picture occurs because of the loss of synchronization, which in turn is caused by the distortion of sync pulses by noise. Partial fading occurs when only the first or first and second steps in the sequence occur.

Failure: Interruption of the transmission of program material, apparently caused by the faulty functioning of facilities. Unless otherwise specified, this term refers to both audio and video transmission.

FCC: Federal Communications Commission. An agency of the Government of the U.S.A. responsible for communications regulations and policy.

Field: One-half of a complete picture (or frame) interval, containing all of the odd or even scanning lines of the picture. (Some systems may divide the frame into more than two equal fields for interlace scanning.)

Field Blanking Interval (Vertical Blanking Interval): The period which is provided at the end of field picture signals primarily to allow time for the vertical sweep circuits in receivers to return the electron beam completely to the top of the raster before the picture information of the next field begins. During this period equalizing and vertical synchronizing pulses are transmitted.

Field Frequency: The number of times per second a field is scanned (60 times per second in the 525-line NTSC system).

Field Time Distortion: The linear waveform distortion of time components from 64 microseconds to 16 milliseconds; ie, time components of the field time domain.

Flare: Unnatural white or colored margins of a television picture.

Flash: Momentary disturbance of a major area of television picture of such duration that the real impairment cannot be readily identified.

Film Break: Interruption of the transmission of program material due to the mechanical failure of film being used as a source of the material.

First Line Hue Shift Banding: (See also **Banding**, **Color Banding**.) Banding made visible by a difference in hue of the first line of each band.

Flutter: Rapid undesired fluctuations in the pitch of reproduced sound. If the fluctuation rate is less than 5 Hz, the term *wow* is more appropriate.

Fly-back: See **Horizontal Retrace**.

Foldover: A superposition and mirror reversal of picture information near the right edge or left edge of a television picture.

Following (or Trailing) Blacks: A term used to describe a picture condition in which the edge following a white object is overshadowed toward black. The object appears to have a trailing black border. (Also called trailing reversal.)

Following (or Trailing) Whites: A term used to describe a picture condition in which the edge following a black or dark gray object is shaded toward white. The object appears to have a trailing white border. (Also called trailing reversal.)

Frame: One complete picture consisting of two (more in some systems) fields of interlaced scanning lines.

Framing: Establishing the margins of a picture to produce an artistic result. Adjusting the aperture or frame of telecine equipment to present one complete frame of the film.

Frame Frequency: The rate at which a complete frame is scanned (ie, nominally 30 frames per second for the 525-line television system).

Frame Roll: (See **Roll**.) A momentary roll.

Frequency/Attenuation Distortion: (See **Gain-Frequency Distortion**.)

Front Porch: That portion of the composite picture signal which lies between the leading edge of the horizontal blanking pulse and the leading edge of the corresponding sync pulse.

Gain-Frequency Distortion: Distortion which results when all of the frequency components of a signal are not transmitted with the same gain or loss. A departure from flatness in the gain-frequency characteristic of a circuit.

Gamma: The exponent of that power law which is used to approximate the curve of output magnitude versus input magnitude over the region of interest. For quantitative evaluation, plot the log of the output magnitude (ordinate) versus the log of the input magnitude (abscissa) as measured from a point corresponding to some reference level and select a straight line which approximates this plot over the region of interest and take its slope. If the plot departs seriously from linearity, it cannot be adequately described by a single value of gamma. Even when the plot is reasonably linear, the procedure for determining the approximation should

be prescribed. (This definition is that of the IEEE.)

Ghost: A shadow or weaker image in the television picture, offset either to the left or right of the predominant image. (Synonym for *echo*.)

Glitch: A form of low-frequency interference, appearing as a narrow horizontal bar moving vertically through the picture. This is also observed on an oscilloscope at field or frame rate as an extraneous voltage pip moving along the signal at approximately reference black level.

Goodnight Time: The term used to designate the actual termination of video or associated audio transmissions at the customer facility.

Grain or Graininess: A uniform distribution of dark spots throughout the entire television picture from a motion picture film source. Caused by clumping of the individual particles of silver forming the image in the film giving a mottled effect to the projected image. Hence, the term should be limited to film or film reproduction.

Gray Scale: A visual test chart, slide, or electronically produced waveform consisting of a stepped transition from black through the gray range to white.

Halo: Most commonly, a dark area surrounding an unusually bright object, caused by overloading of the camera tube. Reflection of studio lights from a piece of jewelry, for example, might cause this effect. With certain camera tube operating adjustments, a white area may surround dark objects.

Harsh: An adjective to describe strident or unmusical sound.

Head Channel: Used to define the signal derived by a recording head on a video tape recorder. (Usually found in number on most recorders for broadcast use.)

Head Switching Transients: White or black transients which occur regularly in bands. Resulting from improper operation of a video tape recorder-reproducer head switching system.

Height: The size of the picture in a vertical direction.

Herringbone or Herringbone Pattern: An interference pattern in a television picture, appearing as rows of parallel diagonal or sloping lines superimposed on the picture information.

Hertz: Standard term signifying cycles per second but applicable to sine waves only.

High Chrominance Signal Level: The chrominance signal component of a color television picture received at too high a level, causing colors to increase in saturation. If the picture-to-sync ratio is correct, the color burst and sync pulse amplitudes should be equal. Difference between them may indicate incorrect level of chrominance signal.

High-Frequency Distortion: Distortion effects which occur at high frequency. In video, generally considered as any frequency above the 15.75-kHz line frequency.

High-Frequency Interference: Interference effects which occur at high frequency. In video, generally considered as any frequency above the 15.75-kHz line frequency.

Highlights: The maximum brightness of the picture which occurs in regions of highest illumination.

Highlight Tearing: Polarity changes in highlight picture areas. In moderate cases, this appears as streaking from white peaks; and, in severe cases, the picture starts tearing. Highlight tearing is caused by overdeviation in the modulation process and can appear in a television picture originating from the playback of a video tape recording.

Hit: A distinctive sound of very short duration heard from a sound monitor. This term should be qualified by adjectives, eg, light, medium, heavy, intermittent, etc. Hits are generally considered to be the result of high-voltage discharges such as lightning, etc. It should be noted that the origination disturbance will probably be modified by the transmission and reproduction system.

Horizontal Bars: Thick horizontal bars, alternately dark and light, which extend over the entire picture. The bars may be stationary or may move up or down. Generally the transition is smooth from dark to light areas. This is sometimes referred to as a "venetian blind" effect. Caused by approximate 60-Hz interfering frequency, or one of its harmonic frequencies (not to be confused with banding).

Horizontal Blanking: The blanking signal at the end of each scanning line.

Horizontal Blanking Interval: The interval from the end of the picture information on one line to the start of picture information on the following line. During this period, a combined blanking and synchronizing pulse is transmitted.

Horizontal Displacement: (See *Serrations, Jitter*.) A picture condition in which the scanning lines start at relatively different points during the horizontal scan.

Horizontal Retrace: The return of the electron beam from the right to the left side of the raster after the scanning of one line.

Hue: The attribute of color perception that determines whether the color is red, yellow, green, blue, purple, etc.

Hue Shift Banding: (See also *Banding, Color Banding*.) Banding made visible by hue shifts within a band.

Hum: A low-pitched undesired tone or tones, consisting of fundamental and/or several harmonically related frequencies. Hum is usually due to electrical disturbance at the power supply frequency and/or harmonics thereof.

Hum/Noise Rejection Ratio: The improvement in signal to hum/noise in dB of a circuit which has hum rejection.

Iconoscope: A camera tube in which a high-velocity electron beam scans a photoemissive mosaic which has electrical storage capability.

IEEE: Institute of Electrical and Electronics Engineers Inc. An engineering society formerly known (separately) as the Institute of Radio Engineers (IRE) and American Institute of Electrical Engineers (AIEE).

IEEE Roll-Off: A specified frequency response-versus-amplitude curve.

- (a) Refer to Institute of Electrical and Electronics Engineers Standard, IRE 205 (58 IRE 23.S1) as amended July 1, 1961.

- (b) This characteristic has been adopted as standard for all level measurements of video signals.

- (c) Unless specified in the pertinent procedure, the IRE roll-off characteristic is not used in the observing or measuring of test waveforms.

IEEE Scale: (Formerly the *IRE Scale*.) An oscilloscope or waveform monitor scale used to assist in evaluating the performance of television transmissions. Scale is still in IRE units.

Impairment Scale: A scale for the subjective assessment of sound programs and television pictures. (See Table A.)

Impulsive Noise: See *Noise*.

Informal Order: An order or request for service from a broadcaster which is not transmitted through the normal means of communications with a communication company. An informal order is usually issued by a broadcaster's television service point directly to a communication company's television service point.

Insertion Gain: A change in signal level expressed in dB caused by the inclusion of a circuit, circuit section, etc, or item of equipment in a network. If the sign is reversed, the change is referred to as insertion loss.

Insertion Test Signals (ITS): See *Vertical Interval Test Signal*.

INTELSAT: International Telecommunications Satellite Consortium. The international consortium formed in August, 1964, which, through intergovernmental agreement, established the interim arrangements for a global commercial communications satellite system.

Intercity: Refers to communication company channels between facilities in different urban areas.

Interconnection Point: Any point in a channel or network where broadcaster facilities and communication company facilities, or two different communication company facilities, are physically connected. This term should be qualified by a term indicating its use, ie, video, audio.

Interface: Term designating the demarcation point between connected equipment or facilities owned by different entities.

Interference: Undesired energy which tends to interfere with the reception of the desired signals.

Interlaced Scanning: A scanning process in which the distance from center to center of successively scanned lines in the same field is twice the normal line displacement, and in which the adjacent lines belong to different fields.

Intermediate Subcontrol Station/ITC: A station (office) or ITC on a television connection which is not the originating ITC or terminating ITC.

International Sound-Program Circuit: The unidirectional transmission path between two ISPCs which comprises one or more sound-program circuit sections (national or international), together with any necessary audio equipment (amplifiers, companders, etc). (See Fig. 4 and 5.)

International Sound-Program Circuit Section: Part of an international sound-program circuit between two stations from which the program is transmitted at audio frequencies. (See Fig. 4 and 5.)

International Sound-Program Connection: The unidirectional path between the broadcasting authority—send and the broadcasting authority—receive. This connection comprises the international sound-program link extended at its two ends over national sound-program circuits to the broadcasting authorities. (See Fig. 4 and 5.)

International Sound-Program Link: The unidirectional path for sound-program transmissions between the ISPCs of the two terminal countries involved in an international sound-program transmission. The international sound-program link comprises one or more international sound-program circuits interconnected at intermediate ISPCs. It can also include national sound-program circuits in transit countries. (See Fig. 4 and 5.)

International Television Circuit: The unidirectional transmission path between two ITCs which comprises one or more television circuit sections (national or international), together with any necessary video equipment. (See Fig. 6 and 7.)

International Television Circuit Section: Part of an international television circuit between two stations, eg, television operating centers or ITCs, through which the picture portion of the program is transmitted at video frequencies. (See Fig. 6 and 7.)

International Television Connection: The unidirectional path between the television authority—send and the television authority—receive. This connection comprises the international television link extended at its two ends over national television circuits (domestic facilities) to the television authorities. (See Fig. 6 and 7.)

International Television Link: The unidirectional transmission path for television transmissions between the ITCs of the two terminal countries involved in an international television transmission. The international television link may be composed of a single international television circuit. The link may be composed of more than one circuit, interconnected at intermediate ITCs. (See Fig. 6 and 7.)

Interval: A period of time, usually between specified times, during which program material is not fed to a channel or, if fed, is not employed for broadcasting.

Interview Channel: A channel used to permit an interviewer to talk to another person. Unless otherwise specified, an interview channel means an audio channel only.

Ion: A charged atom, usually an atom of residual gas in an electron tube.

Ion Spot: A spot of the fluorescent surface of a cathode-ray tube which is somewhat darker than the surrounding area because of bombardment by negative ions which reduce the sensitivity.

Ion Trap: An arrangement of magnetic fields and apertures which will allow an electron beam to pass through while obstructing the passage of ions.

IRE: Institute of Radio Engineers. This organization combined with the American Institute of Electrical Engineers effective January 1, 1963, to form the Institute of Electrical and Electronics Engineers (IEEE).

IRE Roll-Off: The IRE standard oscilloscope frequency-response characteristic for measurement of video amplitude. This characteristic is such that at 2 MHz the response is approximately 8.5 dB below that in the flat (low-frequency) portion of the spectrum and cuts off slowly.

IRE Scale: An oscilloscope or waveform monitor scale, extending from -40 to +100 units. On the IRE scale 140 units are equal to 1 volt peak-to-peak. (Refer to Institute of Electrical and Electronics Engineers Standard, IEEE 205 [58 IRE 23.S1] as amended July 1, 1961.) This characteristic has been adopted as standard within the United States and Canada for level measurements only.

ISPC: International Sound-Program Center. A center at which at least one international sound-program circuit terminates and in which international sound-program connections can be made at audio frequencies by the interconnection of international and national sound-program circuits. (See Fig. 4 and 5.)

ITC: International Television Center. An operating center at which one or more international television circuits terminate and at which connections can be made at video frequencies between international and national television circuits. (See Fig. 6 and 7.)

ITU: International Telecommunications Union. The ITU is an organization or union of member countries set up to maintain and extend international cooperation for improvement and rational use of telecommunications of all kinds. It is a specialized branch of the United Nations.

Jitter: An unsteady television picture usually attributed to one of the following:

- (a) Improper synchronizing of lines, groups of lines, or entire fields.
- (b) Improper positioning of a film frame with reference to the preceding frame in the gate of telecine or film camera equipment. The improper positioning results in a vertical jerky movement of the resultant image.
- (c) Improper damping in a video tape recorder-reproducer which will result in horizontal jitter.

K Factor: A rating factor given to television transmission and reproducing systems to express the degree of subjective impairment of the television picture. Waveform distortion, due to a single well-displaced echo of the waveform, has been adopted as a basis of reference so that the amplitude of this echo relative to the amplitude of the waveform is numerically equal to the K rating factor. The K rating of the system is specified in terms of the K factor associated with distortions or the \sin^2 pulse and bar test signals.

Keystone:

- (a) The nonparallel presentation in a television picture of originally parallel lines.
- (b) A correction signal applied to a television picture to remove the distortion defined in (a).

Kine Recording: The technique of converting a television video image to motion picture film. Unless specified, the associated sound shall also be present on the film in standard form.

Kinescope: Frequently used to mean picture tubes in general. However, this name has been copyrighted.

Lagging Chrominance: The chrominance signal lags the luminance signal. In a color picture monitor, the colors will appear to the right of the image. This is often called "funny-paper effect." When severe, this impairment might be observed as edge effect on monochrome pictures transmitted over the same facilities.

Late Finish: The completion of the transmission of program material after the end of the period scheduled for that program. The network cue has been specified as part of the program material.

Late Start: The commencement of the transmission of program material at some time after the scheduled starting time.

Leading Blacks: (See also **Edge Effect**.) This is a term used to describe a picture condition in which the edge preceding a white object is overshadowed toward black. The object appears to have a preceding or leading black border.

Leading Chrominance: The chrominance signal leads the luminance signal. In a color picture monitor, the colors appear to the left of the image. Sometimes this is called "funny-paper effect." When severe, this impairment might be observed as edge effect on monochrome pictures transmitted over the same facilities.

Leading Whites: This is a term used to describe a picture condition in which the edge preceding a black object is shaded toward white. The object appears to have a preceding or leading white border.

Level: The apparent signal amplitude as indicated on a standard measuring scale.

Note: The indicating device must have the properties specified in the appropriate standard for the device. (See IRE Scale, vu Meter.)

Line Frequency: The number of horizontal scans per second, ie, nominally 15,750 times per second in the 525-line monochrome television system (15,734 for 525-line color).

Line-Time Distortion: The linear waveform distortion of time components from 1 microsecond to 64 microseconds; time components on the line-time domain.

Linear Waveform Distortion: The distortion of the shape of a TV waveform signal where this distortion is independent of the amplitude of the signal. For ease of measurement it is convenient to group these distortions in three separate time domains as follows:

- (a) Short-time waveform distortions
- (b) Line-time waveform distortions
- (c) Field-time waveform distortions.

Line Frequency: The number of times per second that the scanning spot crosses a fixed vertical line in one direction. Scanning during the vertical retrace intervals is counted.

Line-Up Period: The period of time used by communication companies (carriers) for verification of the technical and operating parameters of a circuit prior to handover to a customer.

Lip Sync: Synchronization of the sound portion with the visual portion of a television program. This synchronization is most critical with a close-up picture of a person speaking; hence, the origin of the term.

Local Channel: A channel for the transmission of program material between two points within a given urban area. A common application of local channels is to interconnect the facilities of broadcasting companies with intercity channels.

Loop: (See also *Upper Loop*, *Lower Loop*.) The term *loop* as a synonym for circuit, channel, etc, is not common among television broadcasters.

Low Chrominance Signal Level: The chrominance signal component of a color television picture received at too low a level causes colors to decrease in saturation. If the picture-to-sync ratio is correct, the color burst and sync pulse amplitudes should be equal in amplitude. Differences between them may indicate incorrect level of chrominance signal.

Lower Loop: The free length of film between the gate and the sound head of a motion picture camera or projector.

Note: The correct length of lower loop results in lip sync.

Low-Frequency Distortion: Distortion effects which occur at low frequency. In video, generally considered as any frequency below the 15.75-kHz line frequency.

Low-Frequency Interference: Interference effects which occur at low frequency. In video, generally considered as any frequency below the 15.75-kHz line frequency.

Luminance Signal: That portion of the NTSC color television signal which contains the luminance or brightness information.

Master Control Room (MCR): The key location at a network origination center or broadcasting station where overall technical supervisory control and monitoring are accomplished. This location is also the control point for all incoming and outgoing circuits.

Meshbeat: See *Moire*.

Microphonics: Refers to the mechanical vibration of the elements of an electron tube, or some other device, ie, transistor, diode, etc, resulting in a spurious modulation of the normal signal. In video transmission this usually results in erratically spaced horizontal bars in the picture.

Microphonic Bars: In a television picture, light and dark horizontal bars which generally move erratically in a vertical direction. These bars are caused by mechanical vibration of the elements of an electron tube which results in a spurious modulation of the video signal.

Microsecond: One millionth of a second.

Mismatched Cameras: A dissimilar gray-tone or color presentation on one picture monitor of the same picture transmitted by two television cameras. Correct matching is a camera adjustment.

Mixing Point: A designated location at which the contributions of a number of program sources are integrated into a complete program. Both audio and video operations are involved at a mixing point. Specific identification should be made where only one is involved.

Mobile Unit: A vehicle and equipment used to permit the production of program material at a location remote from studio facilities.

Modulated 20T Pulse: A test signal which is derived by the linear addition of a \sin^2 pulse with half-amplitude duration equal to 20T, and a color subcarrier amplitude-modulated to a depth of 100 percent by the above \sin^2 pulse. This signal is generally used to evaluate relative chroma time and level.

Moire: A rippling and flickering reproduction of straight lines. Usually appears as a curving of the lines in the horizontal wedges of the test pattern and is most pronounced near the center where the lines forming the wedges converge. A moire pattern is a natural optical effect when converging lines in the picture are nearly parallel to the scanning lines. This effect to a degree is sometimes caused by the characteristics of color picture tubes and of image orthicon camera tubes (in the latter, termed *meshbeat*).

Monitor (Noun): A unit of equipment used for the measurement or observation of program material.

Monitors are generally referred to according to function, eg, picture, waveform, audio, vu, etc.

Monochrome: A television signal which contains only luminance information.

Multiple Blanking Lines: Evidenced by a thickening of the blanking line trace or by several distinct blanking lines as viewed on an oscilloscope. May be caused by hum.

Multiple Destination Sound-Program Circuit: See Fig. 4.

Multiple Destination Sound-Program Connection: See Fig. 4.

Multiple Destination Sound-Program Link: See Fig. 4.

Multiple Destination Sound-Program Transmission: A sound-program transmission which is simultaneously received by more than one country.

Multiple Destination Television Circuit: See Fig. 6.

Multiple Destination Television Connection: See Fig. 6.

Multiple Destination Television Link: See Fig. 6.

Multiple Destination Television Transmission: A television transmission which is simultaneously received by more than one country via a single satellite repeater.

National Sound-Program Circuit: A sound-program circuit which originates and terminates within one country.

National Television Circuit: A television circuit which originates and terminates within one country.

Negative Image (Picture): Refers to a picture signal having a polarity which is opposite to normal polarity and which results in a picture in which the white areas appear as black, and vice versa.

Negative Picture: A television picture in which light areas appear dark and dark areas appear light due to inversion of the signal polarity.

Network:

- (a) The simultaneous transmission by two or more broadcasting stations of identical program material.
- (b) The channels and other facilities necessary for the simultaneous transmission of identical program material by two or more broadcasting stations.
- (c) The channels and other facilities necessary to the interconnection of two or more of a broadcaster's service points for the transmission of program material.

Network Broadcast Repeater Station: A broadcasting station which does not originate programs and which is programmed exclusively from a television network.

Network Cue: A predetermined form of signals containing visual and/or aural information employed to indicate that a program transmission is being completed.

Note 1: Network cue normally includes both the audio and video signals.

Note 2: An interval always follows a network cue.

Note 3: A network cue may be designated as a signal for the start of other procedures, eg, station call sign, switching operation by communication company, etc.

Noise: An extraneous electrical disturbance tending to interfere with the normal reception of a transmitted signal.

(a) **Impulsive Noise:** Noise characterized by nonoverlapping transient disturbances commonly introduced by devices such as switches and relays.

(b) **Random Noise:** Band-limited noise generated from electron motion within resistive elements of electronic equipment. This noise is developed from a large number of minute current pulses occurring in a completely random sequence. Random noise appears as small white, gray, black, or colored dots on the television picture

and as a thickening of lines or as very fine spikes on the waveform monitor.

(c) **Weighted Noise:** (See also **Weighting Network**.) Noise energy that has been shaped to meet the needs of power meters. (See Fig. 8 for typical weighted noise characteristics.)

(d) **White Noise:** Random noise energy with all frequencies present.

Noise Weighting Network: See **Weighting Network**.

Noncomposite Video Signal: The picture signal and the blanking pulses combined into one signal. (The composite video signal minus the synchronizing signals.) A noncomposite video signal of standard amplitude (from blanking level to reference white) should be presented between 0 and 100 units of the IRE scale on a waveform monitor.

Normal Direction: The direction of transmission of a signal as specified by contract, agreement, or formal order.

NTC: Network Transmission Committee. A subcommittee of the U.S. Video Transmission Engineering Advisory Committee (VITEAC), which is composed of Television Network Broadcasters and the Bell Telephone System entities.

NTSC: National Television Systems Committee. The color television system adopted by this committee is referred to as *the NTSC system*.

NUFB: Not unfit for broadcast.

Occasional Circuit/Link/Connection: A circuit, link, or connection set up between two stations (office) on an as-required basis and on which maintenance activities cannot be performed at predetermined intervals.

Occasional Service: Service performed or facilities supplied on a per-occasion basis for a limited duration of time.

Order Wire: See **ESC**.

Orthicon (Conventional): A camera tube in which a low-velocity electron beam scans a photoemissive mosaic on which the image is focused optically and which has electrical storage capability.

Orthicon (Image): A camera tube in which the optical image falls on a photoemissive cathode which emits electrons that are focused on a target at high velocity. The target is scanned from the rear by a low-velocity electron beam. Return beam modulation is amplified by an electron multiplier to form an overall light-sensitive device.

Orthicon Effect: One or more of several image orthicon impairments that have been referred to as *orthicon effect* as follows:

- (a) Edge effect—usually a white outline of well-defined objects.
- (b) Meshbeat or Moire.
- (c) Ghost—appears in connection with bright image and is limited in position to leading or lagging the moire image.
- (d) Halo.
- (e) Burned-in image.

It is obviously necessary to indicate specifically the effect or effects experienced, and therefore, the use of the general term *orthicon effect* is not explicit.

Outside Broadcast: A collective term including remote pickup or remote pickups, the program material contributed by each, and the coordination and control required to blend all into one program.

Overshoot: An excessive response to a unidirectional signal change. Sharp overshoots are sometimes referred to as *spikes*. Overshoot is usually detected by means of a waveform monitor.

Pairing: A partial or complete failure of the interlace process in which the scanning lines of one field tend to overlap the scanning lines of the other field.

PAL: A color television system developed and used in the Federal Republic of Germany and adopted by a number of other countries for use as their national standard. PAL is an acronym derived from *Phase Alternation Line Color Television System*.

Peak-to-Peak Voltage: The amplitude (voltage) difference between the most positive and the most

negative excursions (peaks) of a television or other electrical signal.

Peak Program Meter: A peak level indicator used in the measurement of speech and music on sound-program transmission. It has a very fast rise time and a very slow decay time (3 seconds for the reading to decay 26 dB).

Percentage Sync: The ratio, expressed as a percentage, of the synchronizing pulse amplitude to the total composite signal.

Per Diem Period: A daily period of specified hours commencing at a specified hour.

Permanent Circuit/Link/Connection: A circuit, link, or connection set up between two stations (offices) on a permanent basis and on which maintenance activities can be performed at predetermined intervals.

Photoemissive: Emitting or capable of emitting electrons upon exposure to radiation in and near the visible region of the spectrum.

Pickup Tube: See *Camera Tube*.

Picture Monitor: This refers to a cathode-ray tube and its associated circuits, arranged to display a television picture.

Picture Out of Focus: Lack of image sharpness in a television picture due to improper optical or electrical focus. Thus detail in the resulting television picture is reduced.

Note: It is obviously very difficult to indicate a picture fault as "out of focus" unless the focus of the pickup device is changed during transmission of the picture.

Picture Signal: That portion of the composite video signal which lies above the blanking level and contains the picture information.

Picture Tube: A cathode-ray tube used to produce an image by variation of the intensity of a scanning beam.

Pigeons: Noise observed on picture monitors as pulses or bursts of short duration, at a slow rate of occurrence—a type of impulse noise.

Polarity of Picture Signal: Refers to the polarity of the black portion of the picture signal with respect to the white portion of the picture signal. For example, in a black negative picture, the potential corresponding to the black areas of the picture is negative with respect to the potential corresponding to the white areas of the picture. In a black positive picture, the potential corresponding to the black areas of the picture is positive. The signal as observed at broadcasters' master control rooms and telephone company television operating centers is black negative.

Pre-emphasis (Predistortion): Desired departure from flat amplitude versus frequency response of a system to permit improvement of transmission characteristics (signal-to-noise advantage). The pre-emphasis characteristic is complementary to the de-emphasis characteristic.

Preparatory Period: A period after the start of a service period during which customers (broadcasters) may perform their own tests, adjustments, and other work as necessary.

Printed Dirt: A random distribution of white or light gray spots only in the reproduced picture from a motion picture film. The spots are the result of dirt which adhered to the negative before the printing process.

Processing Marks: Spots or marks of various shapes and sizes on a film which are caused by defects in the processing or drying of the film and/or random variations in film density, running longitudinally, due to failure to process uniformly the images on the film.

Program: A cohesive, identified subject, story, or theme used (or to be used) for broadcasting purposes. The complete material filling a single scheduled period of time.

Psophometer: A noise measuring set which includes a weighting network with characteristics specified by the CCITT.

Psophometric Noise Level: Noise level measured using a psophometer weighting network.

PTT: Posts, Telegraphs, and Telephones. European government departments responsible for national telecommunications. With regard to technical operations and maintenance of television networks,

they can be considered synonymous with communications companies within North America.

Pulse and Bar Test Signal: A test signal which contains, on one line, one or more \sin^2 pulses and white bars with line-synchronizing pulses.

Quadrature Crosstalk: Color contamination at color transitions resulting from interaction of the I and Q chrominance signals.

Note: Chrominance signal sidebands which are not equal in delay and/or level are the principal causes of this distortion.

Quadrature Error: One or more groups of the head bands of approximately 16 lines of a video tape playback displaced horizontally as compared to the rest of the picture or other groups of bands.

Random Noise: See *Noise*.

Raster: The scanned (illuminated) area of the cathode-ray picture tube.

Rebroadcasting Station: A broadcasting station which does not originate programs and which is programmed exclusively by off-air pickup from a parent station or another rebroadcasting station.

Recognized Private Operating Agency: An ITU term referring to National Communications organizations which provide international communications facilities, but which are not a department of the government of a country.

Reference Black Level: The level corresponding to the specified maximum excursion of the luminance (picture) signal in the black direction. (See Fig. 2.)

Reference Signals (Vertical Interval): Signals inserted into the vertical interval at the program source which are used to establish black and white levels. Such a signal might consist of 5 μ s of reference black at 7.5 IRE divisions and 5 μ s of reference white at 100 IRE divisions located near the end of line 18 and/or 19 of the vertical interval.

Reference White Level: The level corresponding to the specified maximum excursion of the luminance (picture) signal in the white direction. (See Fig. 2.)

Reflections or Echoes: In video transmission, this may refer either to a signal or to the picture produced.

- (a) Signal—Waves reflected from structures or other objects, or waves which are the result of impedance or gain and delay irregularities in the transmission medium.
- (b) Picture—Echoes observed in the picture produced by the reflected waves.

Relative Burst Amplitude: That distortion which causes a common change in saturation; that is, the amplitudes of all color components are changed by an equal amount. (This is an interim definition. The subject is still under study.)

Relative Burst Phase: That distortion which causes a common hue shift; that is, phases of all color components are shifted equally. (This is an interim definition. The subject is still under study.)

Relative Chroma Level: The difference between the level of the luminance and chrominance signal components.

Relative Chroma Time: The difference in absolute time between the luminance and chrominance signal components.

Remote Pickup: (See also *Outside Broadcast*.) The process of originating program material outside of permanent broadcaster studio buildings.

Remote Pickup Point: A location, outside of permanent broadcaster studio buildings, which is provided with the necessary facilities and with channels to the mixing point, thus permitting origination of program material.

Repeater Point: Communication company premises at which amplifying and associated apparatus is installed to permit modification of electrical signals for retransmission over company channels.

Resolution (Horizontal): (See also *Detail*.) The amount of resolvable detail in the horizontal direction in a picture. It is usually expressed as the number of distinct vertical lines, alternately black and white, which can be seen in three-quarters of the width of the picture. This information usually is derived by observation of the vertical wedge of a test pattern. A picture which is sharp and clear and

shows small detail has good, or high, resolution. If the picture is soft and blurred and small details are indistinct, it has poor, or low, resolution. Horizontal resolution depends upon the high-frequency amplitude, the phase response of the pickup equipment, the transmission medium, and the picture monitor as well as the size of the scanning spots.

Resolution (Vertical): (See also *Detail*.) The amount of resolvable detail in the vertical direction in a picture. It is usually expressed as the number of distinct horizontal lines, alternately black and white, which can be seen in a test pattern. Vertical resolution is primarily fixed by the number of horizontal scanning lines per frame. Beyond this, vertical resolution depends on the size and shape of the scanning spots of the pickup equipment and picture monitor and does not depend upon the high-frequency response or bandwidth of the transmission medium or picture monitor.

Restorer (De-emphasis): As used by the telephone company, a network designed to remove the effects of predistortion or pre-emphasis, thereby resulting in an overall normal characteristic.

RETMA: Abbreviation for Radio Electronic Television Manufacturers Association.

Retrace: (See also *Horizontal, Vertical Retrace*.) The return of a scanning beam to a desired position. Retrace is usually specified as horizontal or vertical.

Return Feed (Feedback Circuit or Channel):

- (a) Program material returned to its point of origin from some different geographic location by a channel specifically assigned for the purpose.
- (b) The channel used to transmit the program material specified in definition (a). (Sometimes referred to as *feedback circuit* or *feedback channel*.)

RF Pattern: A term sometimes applied to describe a fine herringbone pattern in a picture. May also cause a slight horizontal displacement of scanning lines resulting in a rough or ragged vertical edge of the picture. Caused by high-frequency interference.

Ringings: Undesired damped oscillations occurring prior to or following an abrupt change in the luminance signal level and appearing as closely spaced multiple images in a television picture.

Roll: A lack of vertical synchronization which causes the picture as observed on the picture monitor to move upward or downward.

Roll-Off: A gradual attenuation of gain-frequency response at either or both ends of the transmission passband. (Most commonly the high-frequency end.)

S Distortion: A curving reproduction in a television picture of a vertical or horizontal straight line.

- (a) Unless otherwise specified, S distortion will indicate a stationary curve.
- (b) A moving curve relative to the picture will be designated as "weaving" S distortion.

Saturation Banding: (See also **Banding, Color Banding.**) Banding made visible by difference in saturation between head channels.

Saturation (Color): The vividness of a color described by such terms as pale, deep, pastel, etc. The greater the amplitude of the chrominance signal, the greater the saturation.

Scalloping: Horizontal displacement of lines in bands of approximately 16 per field, resulting in a repetitious curving effect which is apparent on vertical picture detail of a television picture originating from a playback of a video tape recording.

Scanning: The process of dividing a picture or an image into elements in line sequence, thus permitting the transmission of luminance values of the elements in time sequence.

Scanning Line: A single continuous narrow strip of the picture area containing highlights, shadows, and half-tones, determined by the process of scanning.

Scanning Spot: Refers to the cross section of an electron beam at the point of incidence in a camera tube or picture tube.

Scrape: An apparently continuous sound composed of a rapid series of clicks.

Scratch (Film): (See also **Abrasions.**) A break in the surface of the emulsion or the base material of the film.

SECAM: A color television system developed and used in France and adopted by a number of other countries for use as their national standard. SECAM is a acronym derived from *Séquentiel Couleurs a Memoire*.

Send Reference Station—Television: The transmit earth station of a multiple destination satellite television transmission.

Serrated Pulses: A series of equally spaced pulses within a pulse signal. For example, the vertical sync pulse is serrated in order to keep the horizontal sweep circuits in step during the vertical sync pulse interval.

Serrations: This is a term used to describe a picture condition in which vertical or nearly vertical lines have a saw-tooth appearance. The result of scanning lines starting at relatively different points during the horizontal scan.

Serration (Distortion): A picture condition in which vertical or nearly vertical lines have a ragged appearance.

Service Circuit: See **ESC**.

Setup: The separation in level between blanking and reference black levels. (See Fig. 2.)

Shading: Spurious variations in tonal gradient of a television picture. Shading may result from an improperly adjusted camera tube, incorrect frequency response of a video channel, improper setting of controls in kine recording equipment, etc.

Shading Signal: A controlled signal used to correct some shading effects.

Short-Time Distortion: Distortion (either frequency or phase) occurring just below or at the nominal cut-off frequency of the television channel. The linear waveform distortion of time components from 0.125 microsecond to 1.0 microsecond; ie, time components of the short-time domain.

Shutter Bar: One thin, light-toned, horizontal line or two thin, light-toned, horizontal lines about one-half the picture height apart, which move slowly up or down in a television picture. Discrepancies in gray tones above and below the line or lines may also be detected.

Note 1: Shutter bar may be caused by incorrect phasing of the kine-recording film camera pull-down mechanism and the superblanking pulse applied to the kine-recording picture tube.

Note 2: Shutter bar may be caused by incorrect phasing of the kine-recording film camera shutter and the vertical synchronizing pulses.

Signal: The electrical form of any information of an audible, visible, or otherwise detectable nature.

Sine Squared Pulse: A test signal used principally to evaluate short-time waveform distortions.

Sing: A high-pitched spurious audible tone or a high-frequency spurious audio signal. Sing may result on a network channel from sustained inductive currents due to impedance unbalance or in an audio system from an unwanted self-sustained oscillation.

Skewing: Horizontal displacement of video information in bands of approximately 16 lines per field producing a saw-tooth effect which is most apparent on vertical picture detail of a television picture originating from the playback of a video tape recording.

Smearing: Blurring of the vertical edges of images in a television picture. Smearing is short-term streaking.

Snow: Light gray or white and dark gray or black spots distributed throughout a television picture. This term is used to indicate that a picture has very high noise degradation.

Sound: (See also **Audio**.) The sensation produced through the ear: what is or may be heard; vibration causing this sensation.

Note: The word *sound* should not be used as a term.

Sound-Program Local Channel: A channel used to transmit the audio portion of a television program between two points within a given urban area.

Special Facility: (See also **Occasional Service**.) Facility ordered and supplied on a per-occasion basis.

Spike: (See also **Overshoot**.) An undesired short-duration overshoot added to a unidirectional voltage change.

Sprocket Hole Noise: A repetitive noise occurring at the frequency of the film sprocket perforations.

Note: This noise occurs when doubly perforated film is being used as a source of program material and the audio channel is open. This noise can occur when film is improperly positioned in the telecine equipment audio pickup or sound head.

Staircase Video Waveform: A waveform consisting of a series of discrete steps resembling a staircase. In practical application, this is combined with blanking and synchronizing pulses.

Standard Video Network Link: The facilities employed to supply television picture transmission from a transmitting to a receiving video interconnection point when such facilities have been aligned as a single link. This term should not be confused with the term *video section* as defined by communication companies or with the term *link* as used in international parlance with a different connotation.

Standby Facilities: Facilities furnished for use as replacement in the event of failure or faulty operation of normally used facilities.

Station: Any broadcasting installation licensed as such under the Broadcasting Act.

Station Connection: The facilities and operation by which a broadcaster's television service point is connected on communication company premises to a network.

Streaking: A picture condition in which objects appear extended horizontally beyond their normal boundaries. This condition is more apparent at the vertical edges of objects when there is a sharp transition from high to low luminance level or vice versa. Streaking is termed negative if the tonal degradation is opposite that of the original figure (black following white) and positive if the tonal degradation is the same as the original figure (white following white).

Studio: A specially designed room with associated control and monitoring facilities used by a broadcaster for the origination of radio or television programs.

Superblanking Pulses: A special blanking signal generated in kine recording equipment and used to override and thus remove a part of the picture normally presented by a picture monitor. Refer to details of the kine recording process for more information.

Sub-Control ITC: The ITC at the originating end of an international television transmission. This ITC is the sub-control ITC for both the international television link and the international television connection.

Sub-Control Station: A station (office) at the transmitting end of a sound-program or television circuit section, circuit, link, or connection.

Sync: An abbreviation for the words *synchronization*, *synchronizing*, etc. Applies to the synchronization signals, or timing pulses, which lock the electron beam of the TV receiver and/or the picture monitors in step, both horizontally and vertically, with the electron beam of the pickup tube. The color sync signal (NTSC) is known as the *color burst*.

Synchronization: The maintenance of one operation in step with another.

Sync Compression: The reduction in the amplitude of the sync signal, with respect to the picture signal, occurring during transmission.

Sync Level: The level of the tips of the synchronizing pulses referred to blanking level.

Sync Pulses: Specific pulses used to cause the electron beam of a television picture tube to operate in synchronism with the electron beam of the scanning device of the program source equipment.

Tearing: A term used to describe a picture impairment in which horizontal lines are displaced in an irregular manner. Caused by lack of horizontal synchronization.

Telephone Coordinating Circuit (TCC): A circuit used for point-to-point speech communication between or among members of a broadcaster's staff or among broadcasters' staffs. A TCC may be used in conjunction with other facilities for program purposes. When a point-to-point speech circuit is used alone, the facility is called a "private line" (PL).

Television Authority—Receive: See *Broadcasting Authority—Receive*.

Television Authority—Send: See *Broadcasting Authority—Send*.

Television: The electronic transmission and presentation of pictures and sounds. The use of the term indicates that both the audio and video signals or the sound and visual components of the program material are included.

Television Operating Center (TOC): A communication company location where television signals are switched and monitored.

Television Recording (TVR): See *Kinescope Recording*.

Television Service Point: The nearest operation point in a broadcaster's or a communication company's facilities to the interconnection point. For example, for the broadcaster, this will be the service TOC; for the communication company, this will be the MCR.

Thin: An adjective to describe the sound resulting from audio lacking in low frequencies.

Thump: A low-frequency transient disturbance which is characterized audibly as a heavy, short, muffled, foreign noise.

TIDI: Time DIplexed Sound System which provides a 6-kHz audio channel by placing a PAM pulse on the video signal front porch.

Tilt: The maximum variation of the amplitude of a window signal, line-bar signal, or other rectangular waveform. Tilt is expressed as a percentage of the amplitude of the waveform at the midpoint of its top.

Note: Tilt is a distortion due essentially to lower frequency imperfections and is defined in two time domains, ie, line-time and field-time. To eliminate higher frequency effects while evaluating tilt, the top of the test waveform is taken as being that portion of the top between points on it which are inside the leading and trailing edges by 0.25 millisecond for field-rate measurements and by 1.0 microsecond for line-rate measurements. In addition, care must be exercised not to

interpret tilt as clamping deficiencies or hum, either of which produces similar results.

Time Cue: The designation of a predetermined time at which a specified operation is to be performed.

Transient: Not permanent; of short duration. A single or irregularly recurring spurious signal of such duration that detailed identification cannot be made.

Transit Country: A country through which an international television link is routed without the use of the program material by that country.

Unbalanced Channel: An audio channel whose terminals are at different potentials with respect to ground. An unbalanced channel can result in a noise accompanied by hum or sing.

UFB: Unfit for broadcast.

Upper Loop: The free length of film on the feed side of the gate of a motion picture camera or projector. The specified length of upper loop must be maintained in order that correct film movement occurs through the gate.

Undershoot: An insufficient response to a unidirectional voltage change.

Vacant Line: A horizontal line in the vertical blanking interval on which no information is present.

VANDA: A code word meaning video and audio combined.

Velocity Banding: (See also **Banding, Color Banding.**) Characterized by a hue change from top to bottom of the bands. This type of banding generally appears on all bands.

Vertical Blanking: Refers to the blanking signals which occur at the end of each field.

Vertical Blanking Interval: The interval between fields of a composite video signal. During this period, a blanking pulse is transmitted, together with horizontal and vertical synchronizing pulses and equalizing pulses.

Vertical Edge Effect: The narrow bands of color subcarrier which appear at the vertical edges of

color transitions in the picture. This effect is due to inadequate elimination (in the decoder) of the color subcarrier from the luminance signal.

Vertical Interval Test Signal (VITS): Test signals inserted on one or more of the vacant lines in the vertical blanking intervals. These signals are also referred to as **insertion test signals (ITS)**. In the U.S. and Canada, lines 18 and 19 are used.

Vertical Retrace: The return of the electron beam from the bottom to the top of the raster after the completion of each field.

Vestigial Sideband Transmission: A system of transmission used to obtain maximum signal bandwidth with limited channel bandwidth, wherein the sideband on one side of the carrier is transmitted only in part, and the amplitude composition of both sidebands is reshaped.

Video: Of or pertaining to electric currents and phenomena of frequencies corresponding to the variation in electrical levels of samples obtained by scanning a scene or image. These frequencies are approximately from 0 to 10 MHz in present North American practice.

Video Band: The frequency band used to transmit a composite video signal.

Video Channel:

- (a) A channel capable of satisfactorily transmitting the composite video signal required for television purposes.
- (b) A portion of the radio-frequency spectrum assigned for the electromagnetic transmission (broadcasting) of composite video signals required for television purposes.

Video Local Channel: A channel used to transmit the composite video signal portion of a television signal between two points within an urban area.

Video Network Channel: Facilities including channels used to transmit the composite video signal portion of a television signal between broadcaster facilities in different urban areas. Usually a video network channel is made up of a transmitting video local channel, one or more video sections, and a video local channel for each receiving broadcaster.

Video Section: The electrical path used to transmit the video portion of a television signal from one urban area to another urban area, the terminals of the path being on the premises of the communications company.

Video Tape Recording: The retention in magnetic form on tape of composite video signals and/or audio signals.

Video-in-Black: A term used to describe a condition as seen on the waveform monitor when the black peaks extend through reference black level.

VITEAC: Video Transmission Engineering Advisory Committee. A U.S.A. Committee composed of the major Television Network Broadcasters and the Bell Telephone System entities which carry out long range engineering coordination of the U.S.A. Television Network.

Volume Unit (vu): The average volume of speech or music on sound program transmissions as measured on a vu meter. There is no simple relationship between the volume measured in volume units (vu) and the power of a complex waveform. For steady sine waves within the frequency range of the measuring instrument, the reading in vu will be equal to the reading in dBm.

vu Meter (vi meter): A volume indicator constructed and calibrated to indicate volume in vu. It incorporates a dc milliammeter having a slow response time and a damping slightly less than critical.

Waveform Monitor: (See also *A-Scope*). A cathode-ray oscilloscope, which displays a voltage-versus-time graph, used to examine composite or noncomposite video waveforms.

Weighting Network: A network used in or with test equipment for the measurement of noise. For audio channels the network attenuates the noise

level at various frequencies to simulate the subjective effect of the noise on the human ear.

White Clipper: A device which prevents the transmission of white peaks exceeding a certain preset level.

White Compression: Amplitude compression of the signals corresponding to the white regions of the picture, thus modifying the tonal gradient.

White Level: That level of picture signal corresponding to the maximum limit white peaks. (See Fig. 2.)

White Peak: The maximum excursion of the picture signal in the white direction at the time of observation. (See Fig. 2).

Width: The size of the picture in a horizontal direction.

Word Cue: A predetermined word or group of words at the end of which word or group of words a specified operation is to be performed.

Wow: Slow undesired fluctuating in pitch of reproduced sounds. Wow is a form of flutter in which the rate of fluctuation is less than 5 Hz.

3. QUALITY ASSESSMENT SCALE

3.01 Television picture impairments may be present in varying degrees. In the case of oscilloscope presentations, most impairments can best be described to remote points by indicating the IRE scale readings of the various signal components. In the case of picture monitor presentations, however, impairments generally must be described in qualitative terms rather than quantitative terms, and the exchange of intelligence between remote observers is more complicated. The quality assessment scale, Table A, provides five numerical grades and terms, without a sharp line of demarcation, for common usage to indicate the scale of quality and/or impairments.

TABLE A

5-GRADE QUALITY ASSESSMENT SCALE FOR TELEVISION TRANSMISSIONS

GRADE	AUDIO (A) VIDEO (V)	ASSESSMENT	CORRESPONDING IMPAIRMENT
5	A or V	Excellent	No perceptible impairment.
4	A or V	Good	Perceptible impairment, detectable under close examination.
3	A or V	Fair	Impairment noticeable, but not objectionable.
2	A or V	Poor	Impairment objectionable, but program still usable.
1	A or V	Unsuitable	Impairment so objectionable as to be considered not suitable for use.

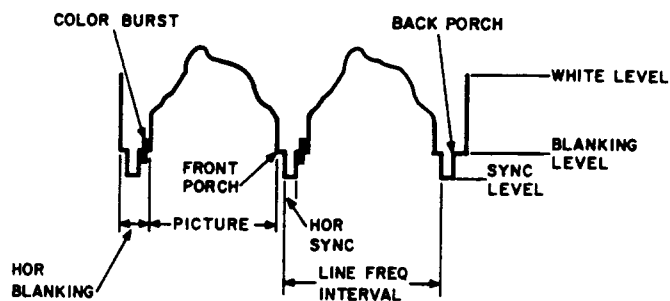


Fig. 1—Video Signal Showing Horizontal Blanking and Synchronizing Pulses

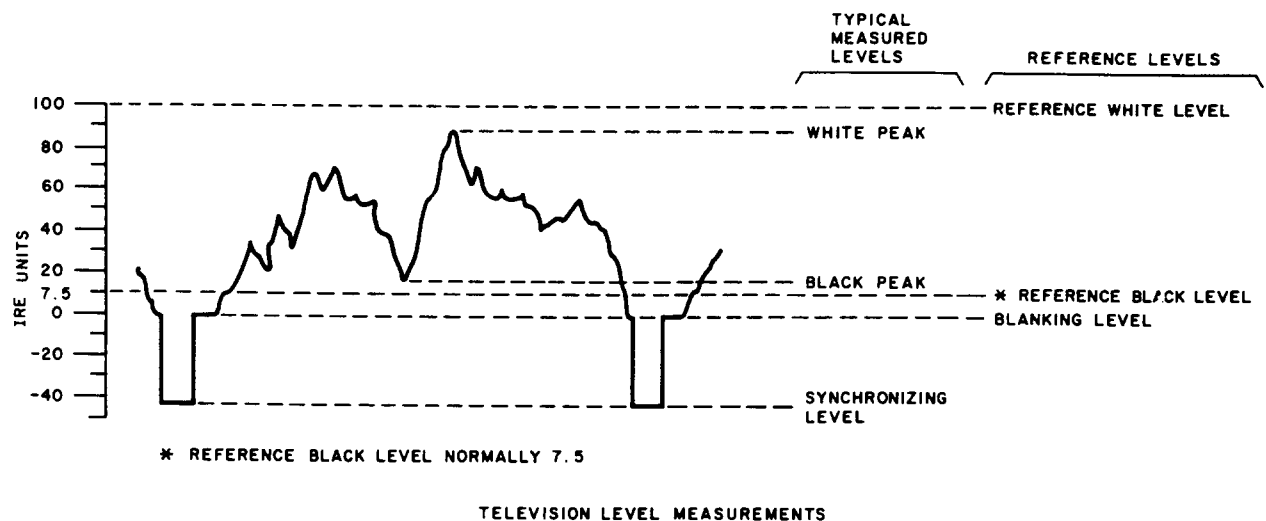


Fig. 2—Significant Levels and Details of Standard Scale

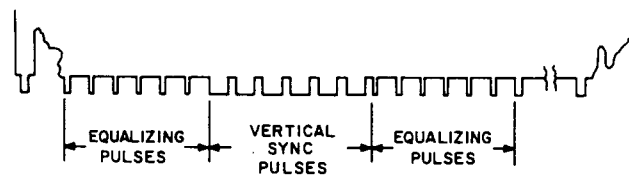


Fig. 3—Vertical Synchronizing Signal

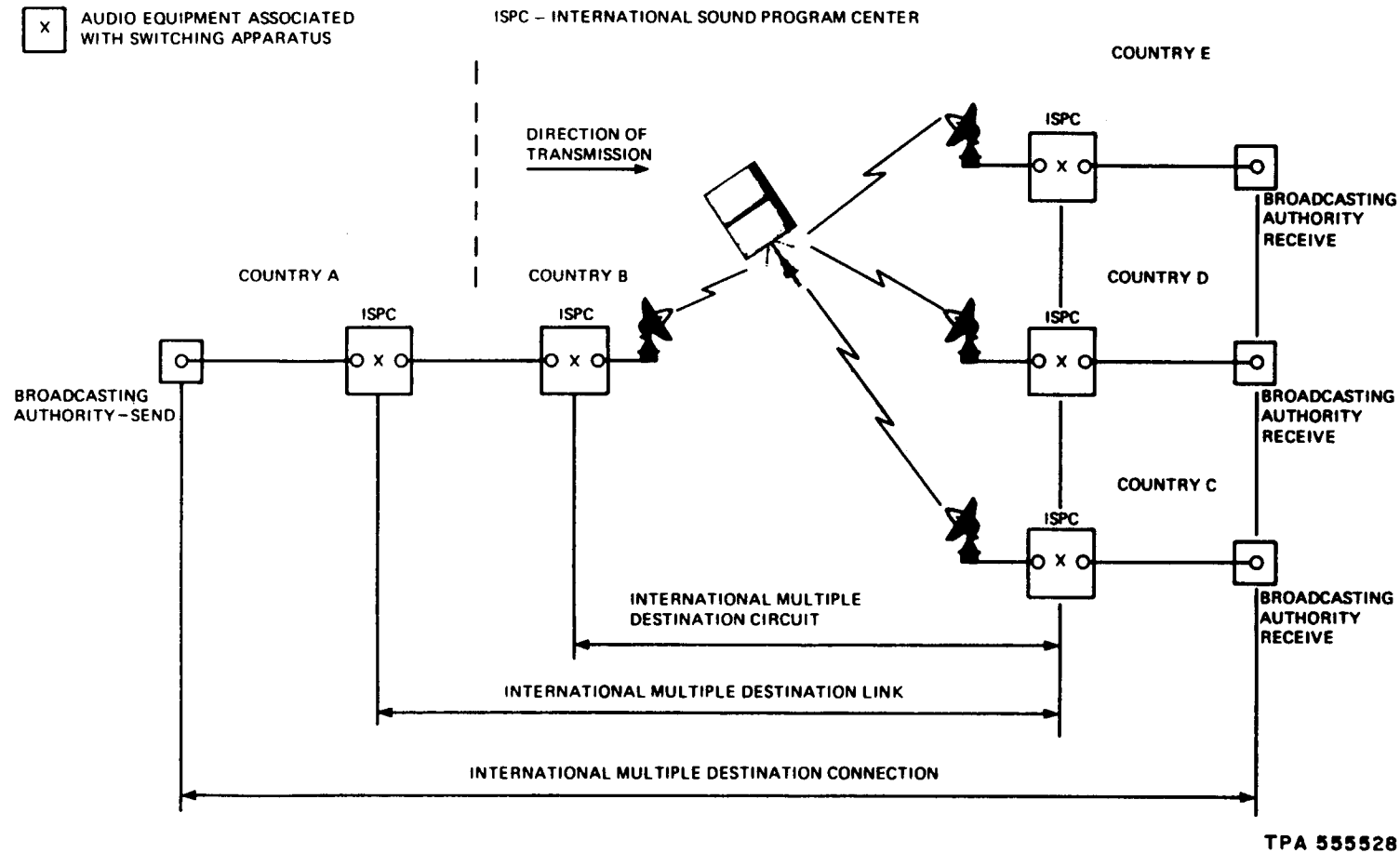


Fig. 4—International Sound-Program Multiple Destination Link

ISPC - INTERNATIONAL SOUND PROGRAM CENTER
 NSPC - NATIONAL SOUND PROGRAM CENTER

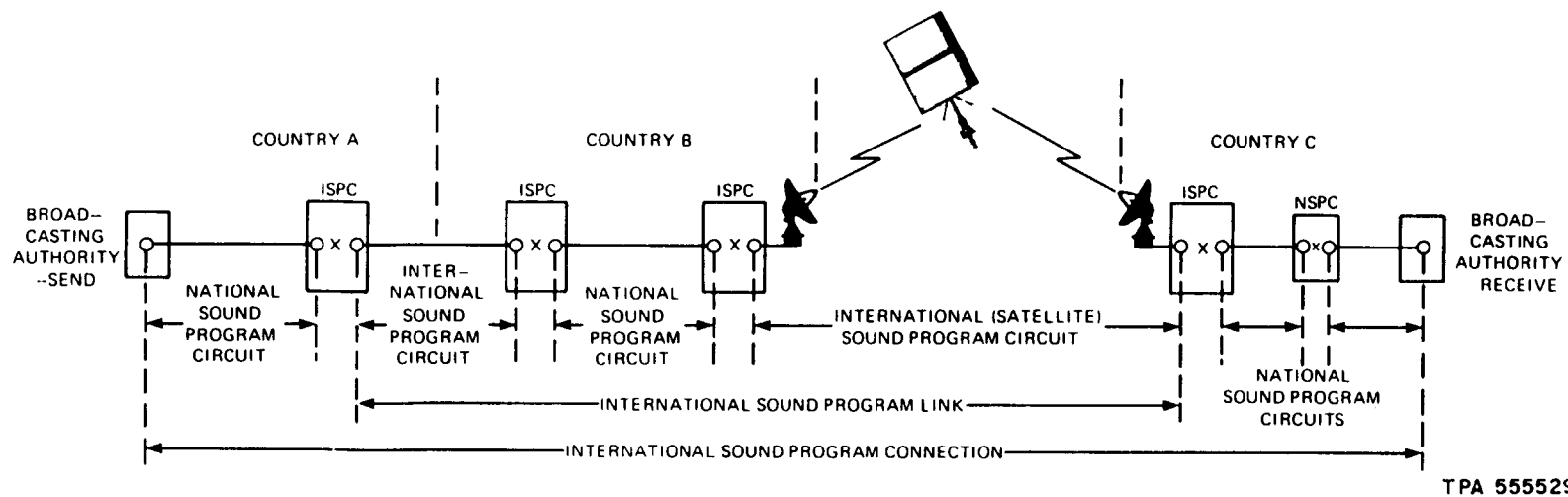


Fig. 5—International Sound-Program Link

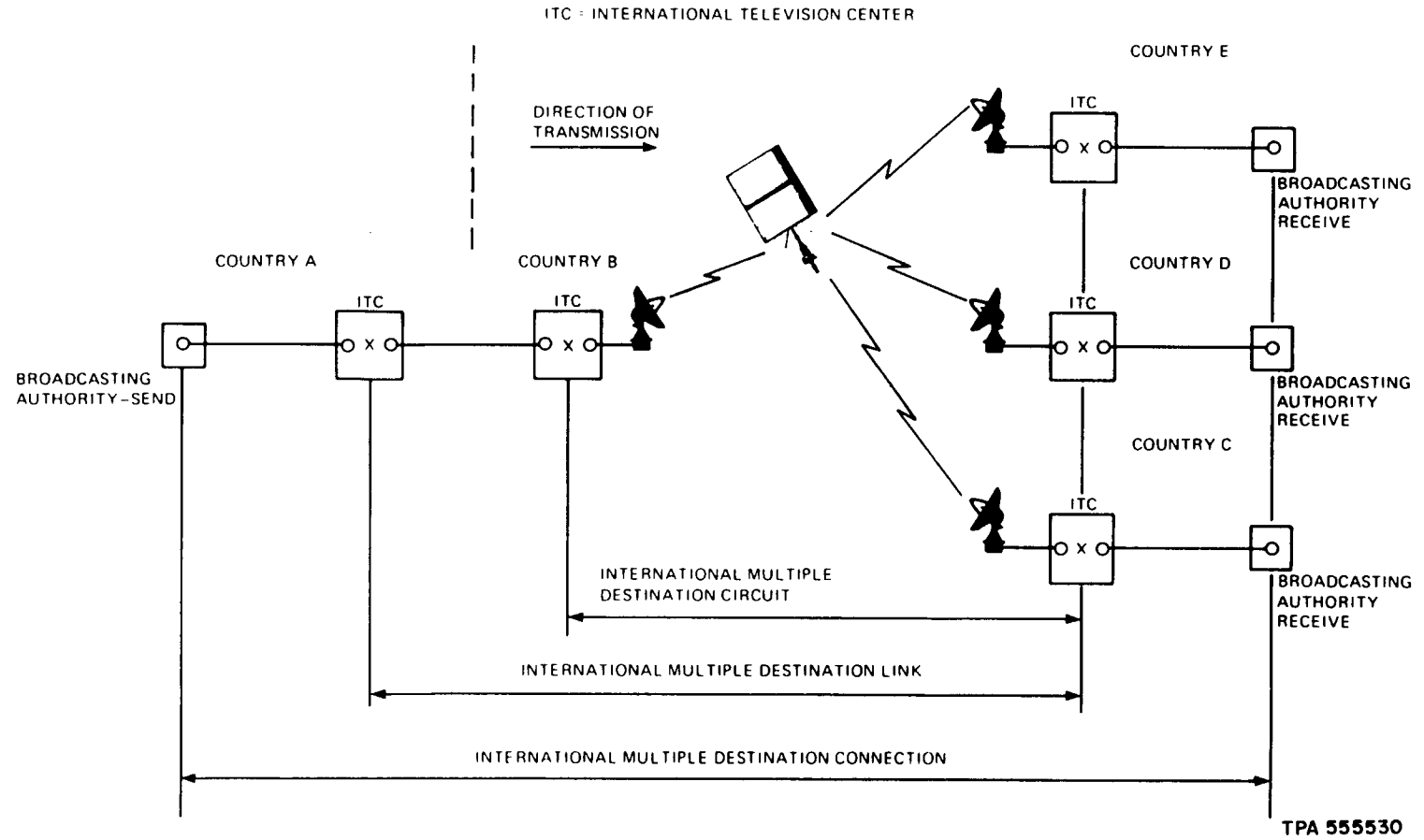


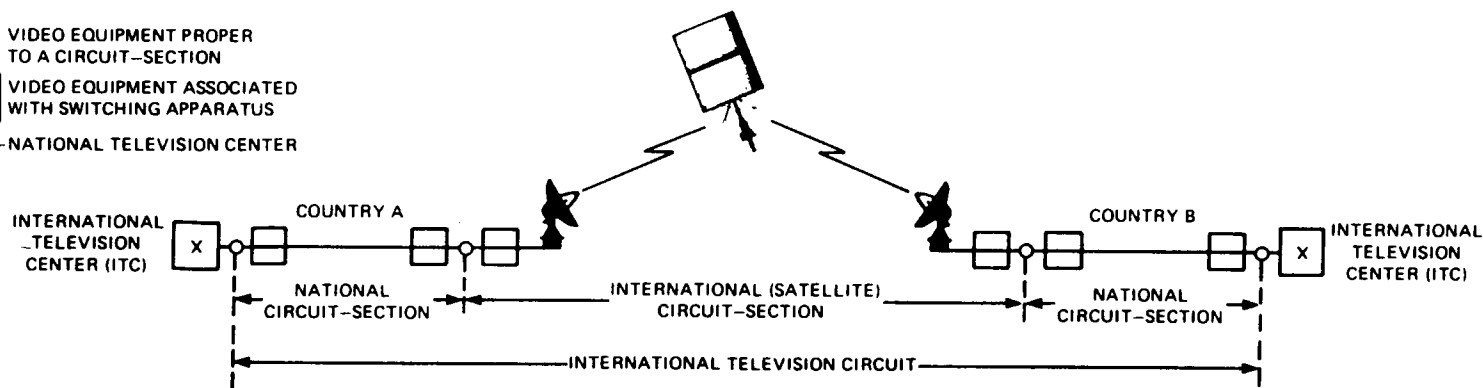
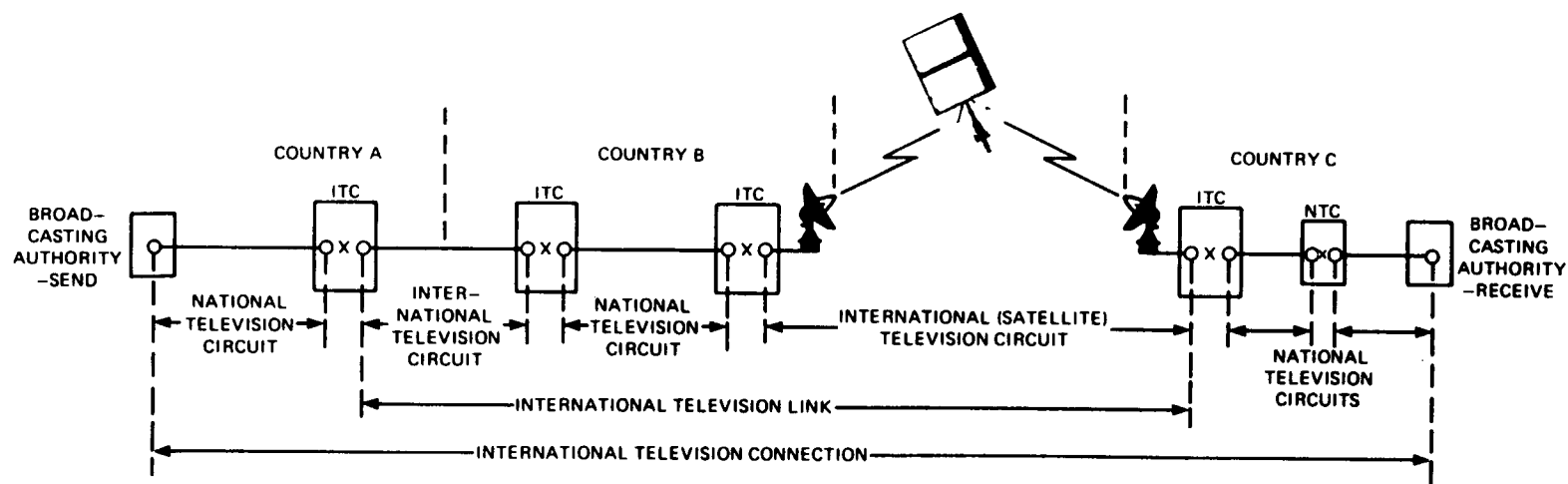


Fig. 6—International Multiple Destination Television Link

 VIDEO EQUIPMENT PROPER TO A CIRCUIT-SECTION
 VIDEO EQUIPMENT ASSOCIATED WITH SWITCHING APPARATUS
 NTC—NATIONAL TELEVISION CENTER



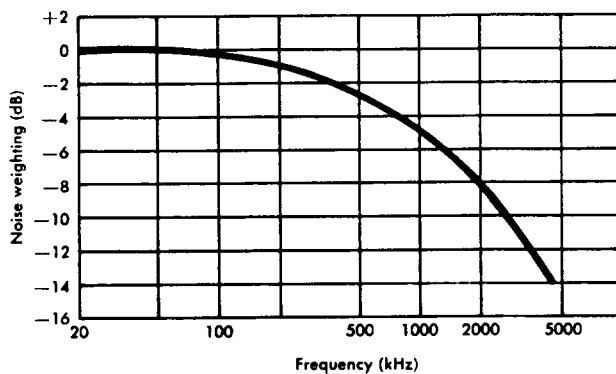
AN INTERNATIONAL TELEVISION CIRCUIT COMPOSED OF TWO NATIONAL AND ONE INTERNATIONAL (SATELLITE) CIRCUIT-SECTIONS



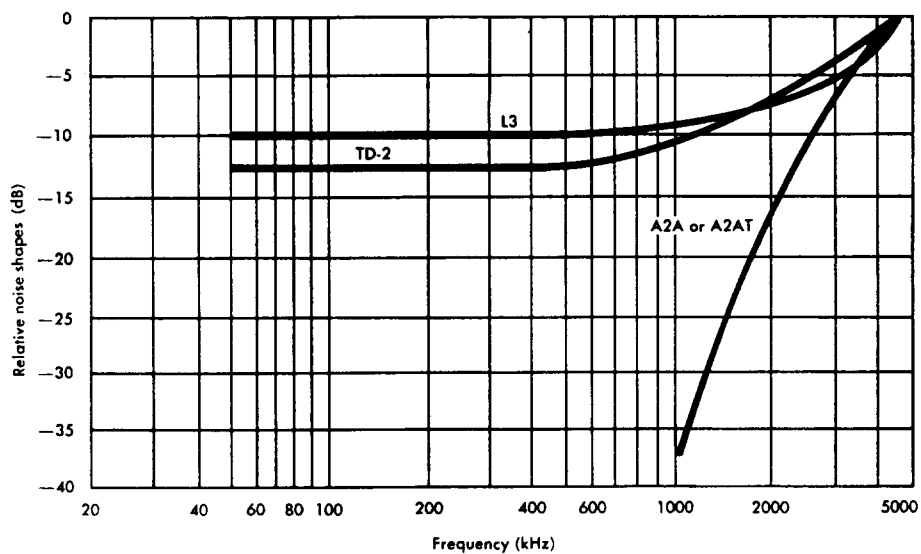
AN INTERNATIONAL TELEVISION LINK COMPOSED OF INTERNATIONAL (INCLUDING SATELLITE) AND NATIONAL TELEVISION CIRCUITS AND EXTENDED ON NATIONAL TELEVISION CIRCUITS AT EACH END TO FORM AN INTERNATIONAL TELEVISION CONNECTION.

TPA 555531

Fig. 7—International Television Connections



Television Noise Weighting Characteristic



Typical System Noise Shapes

Fig. 8—Weighted Noise Characteristics