

H. G. CISIN'S

NEW

TRouble SHOOTING

PIX GUIDE
combined with
TV TERMS

EXPLAINED

\$1

TROUBLE SHOOTING PIX GUIDE

combined with

TV TERMS EXPLAINED

By H.G.Cisin, Consulting Engineer

This useful book has been compiled to take into account the many new and interesting developments in the rapidly expanding field of television.

The PIX GUIDE (Section 1) illustrates commonly recurrent faulty picture conditions, explains their probable causes and suggests logical cures.

The TV TERMS (Section 2) defines and explains technical television terms, including the latest UHF concepts, in the clearest possible manner. Consequently, this complete up-to-the-minute compilation is the ideal reference book for TV serviceman, students, set owners, engineers, those preparing for FCC licenses and, in fact, for all directly or indirectly associated with or interested in the television art.

Over 70 illustrations are included, plus a Trouble Indicating Tube Location Guide of a typical TV set showing where troubles originate and referring to the faulty pictures which these troubles cause.



All Rights Reserved

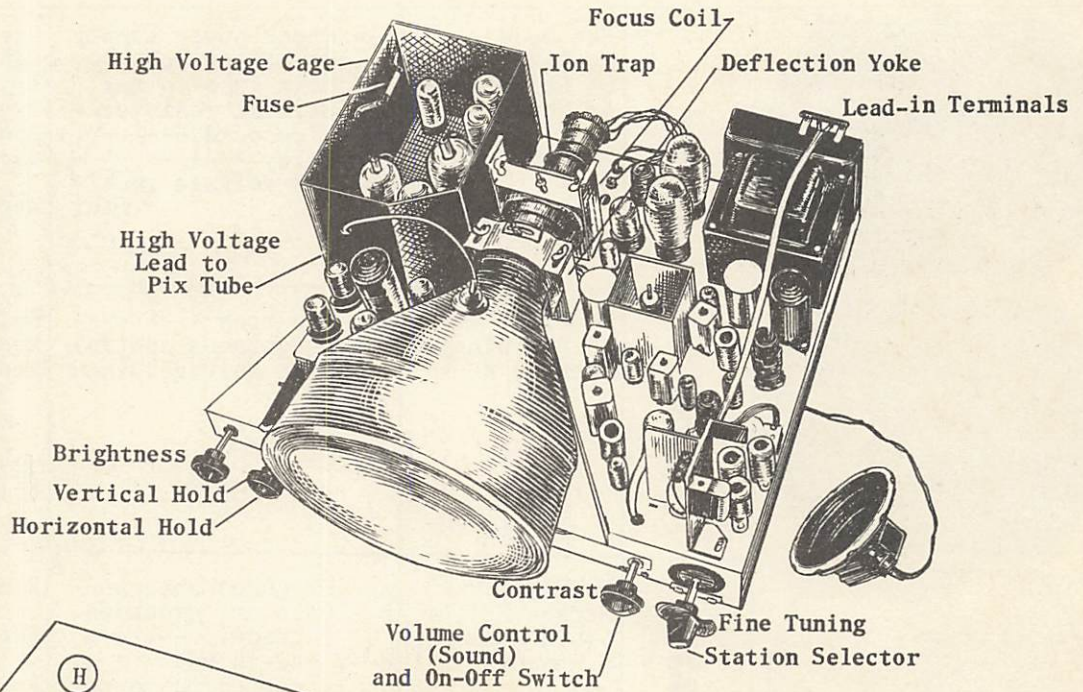
This book, or any parts thereof, may not be reproduced in any form without written permission from the author.

Printed in the United States of America

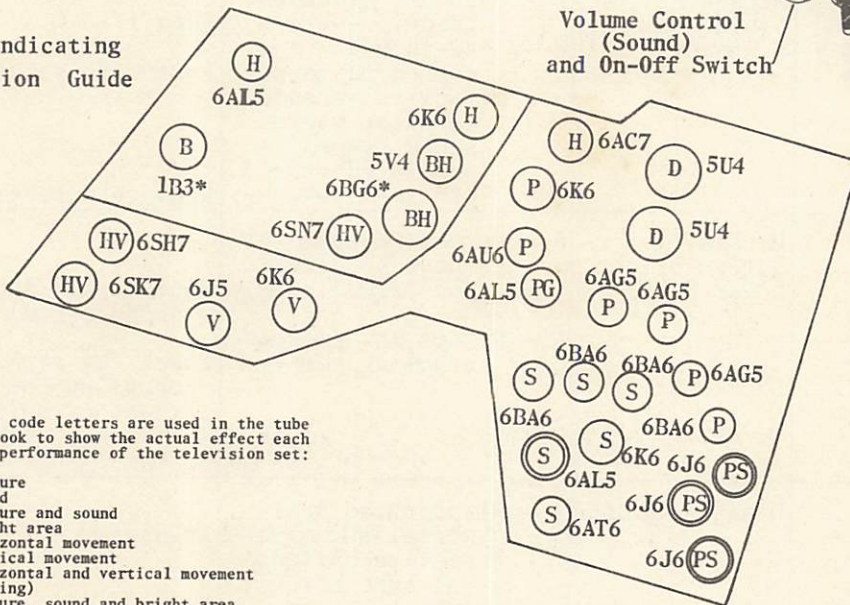
Copyright 1953 by Harry G. Cisin



Sources of Trouble in a Typical TV Set



Trouble Indicating Tube Location Guide



The following code letters are used in the tube chart in this book to show the actual effect each tube has on the performance of the television set:

- P Picture
- S Sound
- PS Picture and sound
- B Bright area
- H Horizontal movement
- V Vertical movement
- HV or VH Horizontal and vertical movement (timing)
- D Picture, sound and bright area (dead set)
- BH or HB Horizontal movement and bright area

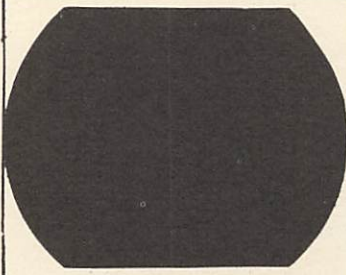
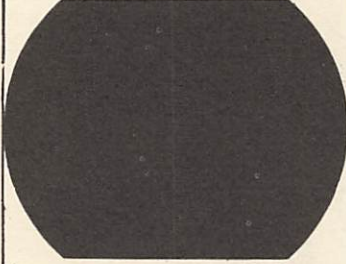
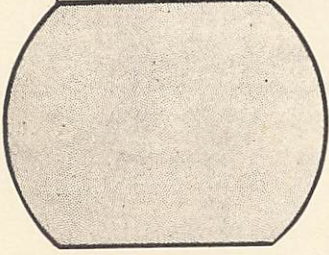
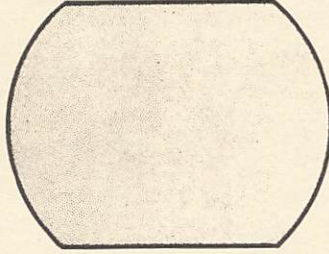
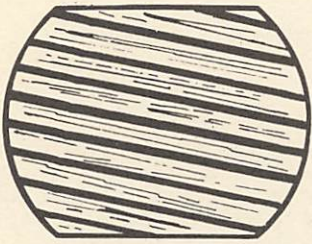
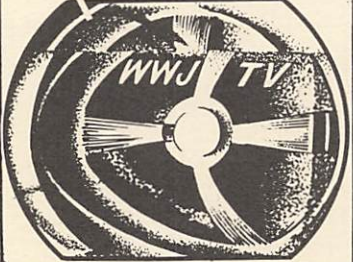
Asterisk (*) indicates presence of high voltage

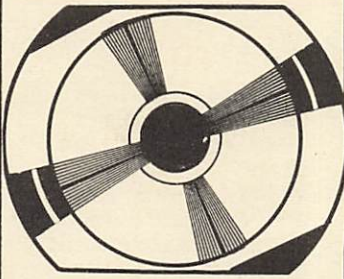
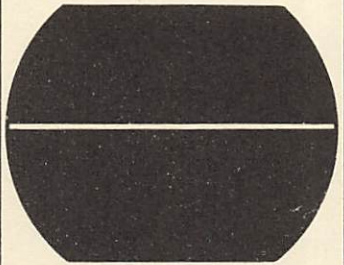
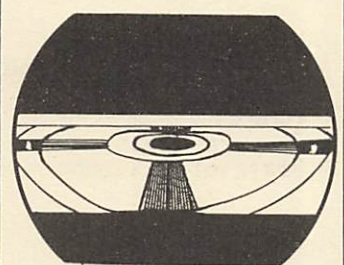
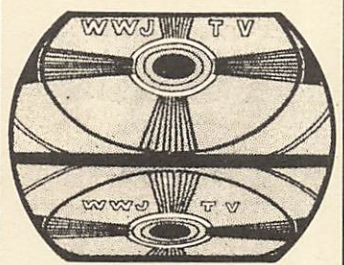
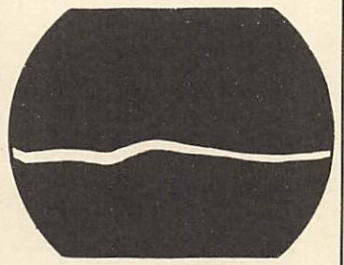
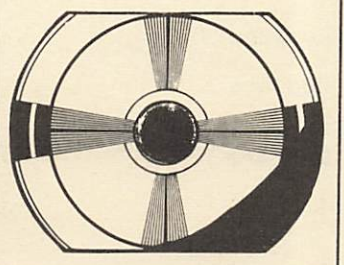
NOTE: Bright area refers to the illumination of the screen visible when set is tuned to an unused channel.

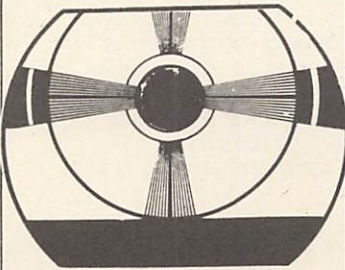
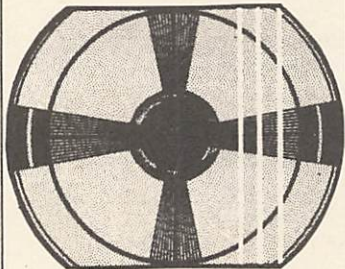
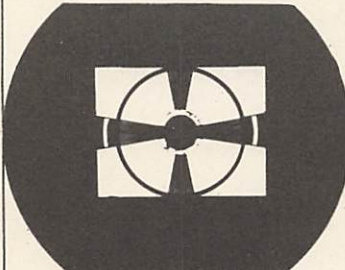
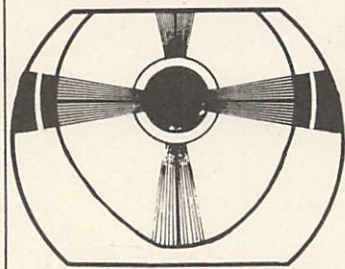
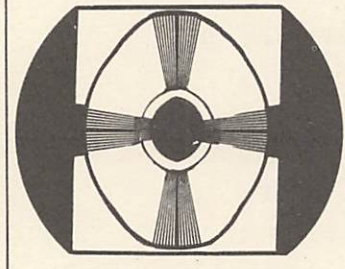
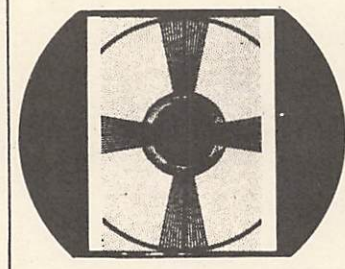
NOTE: The top view sketch and TROUBLE INDICATING TUBE LOCATION GUIDE shown above refer specifically to the 630-type television sets. This model has been selected to show sources of trouble, because it contains controls and many features which are typical of all television receivers.

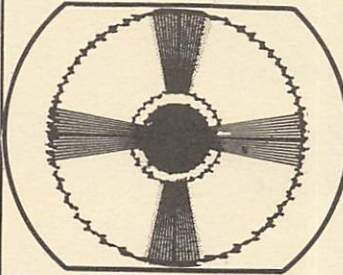
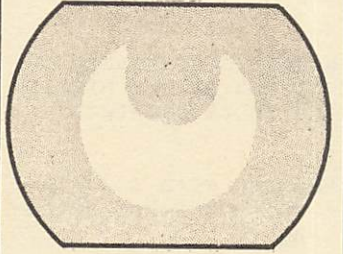
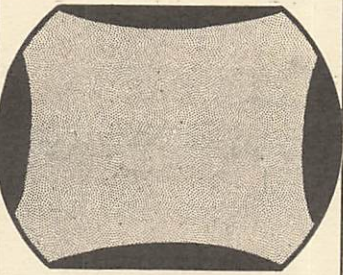
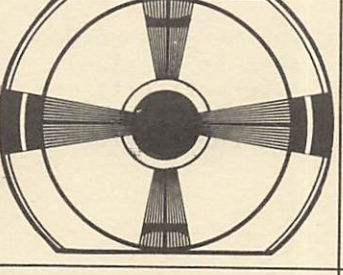
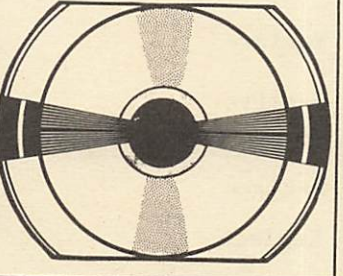
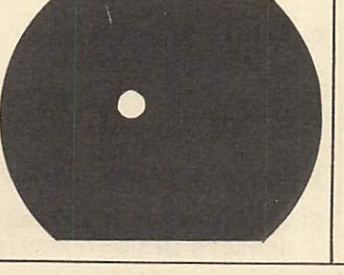
Misadjusted or Defective Parts Listed	May Cause Pix Trouble Number	Defective Tube Marked	May Cause Pix Trouble Number
Vertical Hold	10-A, 30-A	D	1-D
Horizontal Hold	5-A, 6-A, 32-B	PS	3-D, 33-A
Contrast Control	25-C, 33	S	29
Brightness Control	2-B, 25-A, 25-B	P	33-B, 33-C
ON-Off Switch	1-A	H	5-C, 5-D, 17-B, 18-C, 32-C, 34-C
Volume Control	29-D	V	8, 9-B, 9-C, 10-B, 16-B, 28
Deflection Yoke	7, 11, 12-B, 15-B, 21-B	HV	5-B
Focus Assembly	12-C, 13-C	B	2-C, 15-A, 21-B
Ion Trap	12-A, 20, 24-A	BH	17-B, 15-A, 18-A, 34-A
Fuse	2-C	BH*	15-A, 17-B, 18-B, 21-B, 34-B

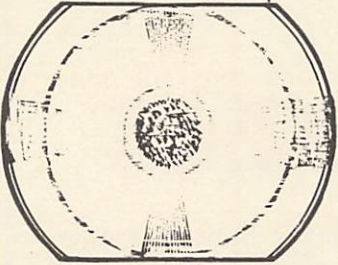
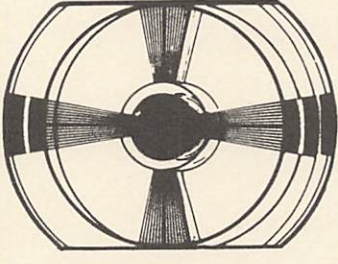
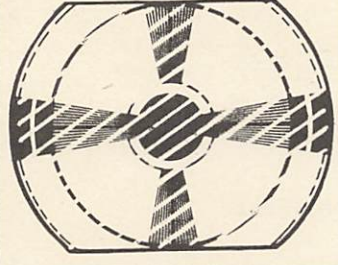
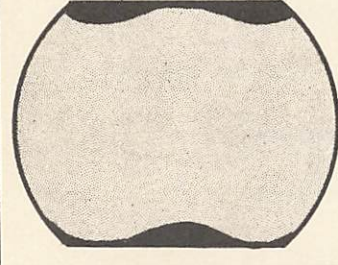
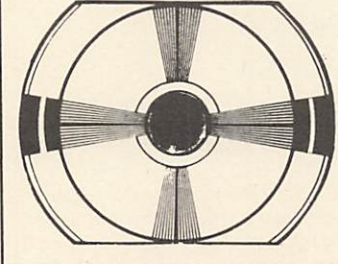
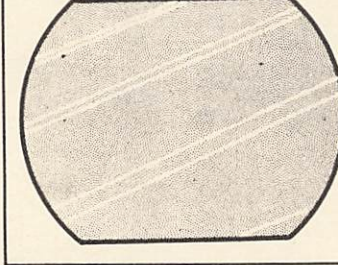
Section 1 - TROUBLE SHOOTING PIX GUIDE

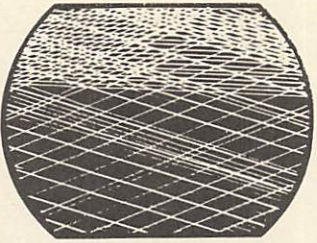
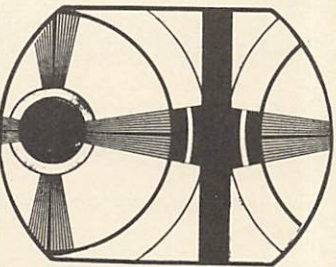
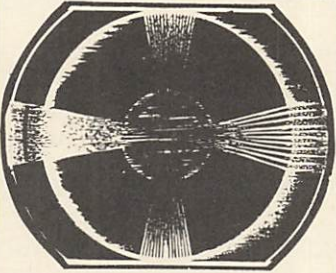
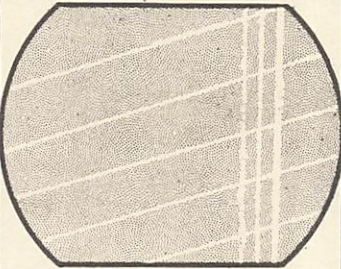
	TROUBLE NUMBER	DESCRIPTION OF TROUBLE	CAUSE	CURE
	1	Set Dead No Pix No Brightness No Sound	A - Check power supply B - On-off switch ---- C - Main fuse in set - D - Ballast resistor - E - Line cord ----- F - Relay ----- G - Low voltage rectifier	Replace supply fuse Replace if no click Try new fuse Try replacement Look for break at ends Replace
				Replace rectifier
	2	No Pix No Brightness Sound 0 K	A - Ion trap ----- B - Brightness control C - High Voltage failure	Readjust Readjust or replace Replace H.V. rectifier, damper, horizontal output tube, hori- zontal oscillator. Replace fuse in high voltage section
	3	No Pix Screen Bright Sound Weak or Absent	A - Grounded antenna - B - Open or grounded Lead-in ----- C - Lead-in not connected to set D - Defective tubes up to point where sound signal is separated from pix -----	Remove ground Repair Fasten to set terminals Replace defective tubes
	4	No Pix Screen Bright Sound 0 K	A - Defect in tube or tubes handling pix signal only - B - Defect in circuit handling pix ---	Replace all tubes after sound signal separation Check (by replacement) coupling condensers in these circuits
	5	Diagonal Lines	A - Misadjusted hori- zontal hold control B - Defective hori- zontal sync circuit tubes ----- C - Defective hori- zontal oscillator tube ----- D - Defective hori- zontal AFC tubes	Readjust Replace Replace Replace
	6	Tears, Pulls or Weaves Horizontally	A - Misadjusted hori- zontal hold control B - Misadjusted line- arity control -- C - Misadjusted drive control----- D - Defective video amplifier tubes - E - Defective d.c. restorer tubes -	Readjust Readjust Readjust Replace Replace

	TROUBLE NUMBER	DESCRIPTION OF TROUBLE	CAUSE	CURE
	7	Pix Tilted	Misadjusted deflection yoke -----	Loosen wing screw on deflection yoke and slightly rotate yoke until picture is straight. Tighten wing screw.
	8	No Pix Bright Horizontal Line	Defective vertical deflection circuit - WARNING: Bright line may damage tube. Turn set off at once.	Replace vertical oscillator tube. Replace vertical output tube. Check output transformer. Check vertical deflection coils.
	9	Dwarfed Vertically	A - Misadjusted height and/or vertical linearity controls B - Weak vertical output tube ----- C - Weak vertical discharge tube ----	Alternately readjust height and vertical linearity controls. Replace Replace
	10	Pix rolls up or down	A - Misadjusted vertical control ---- B - Defective vertical oscillator tube -	Readjust Replace
	11	No Pix Bright Wavy Horizontal Line	Defective vertical deflection coil ----	Replace yoke
	12	Darkened Corner	A - Misadjusted ion trap ----- B - Misadjusted deflection yoke -- C - Focus assembly not concentric with neck of tube ---	Readjust Readjust. Move forward as far as possible Readjust

	TROUBLE NUMBER	DESCRIPTION OF TROUBLE	CAUSE	CURE
	13	Not Centered	A - Centering control misadjusted (many sets omit this control) B - Picture positioning lever incorrectly set C - Focus assembly not centered	Readjust Reset, moving lever up, down or sideways, then readjust ion trap Readjust focus assembly and at same time correct adjustment of height and linearity
	14	Vertical Lines at Right	A - Defective horizontal output tube B - Stray coupling between pix tube lead and horiz. deflection circuit ----- C - Misadjusted or defective horizontal drive -----	Replace Move lead Readjust or replace
	15	Picture Undersized	A - Excessive high voltage ----- B - Improper yoke placement -----	Replace high voltage rectifier, damper and horizontal output tubes Move yoke closer to flare of pix tube
	16	Vertically Squeezed or Stretched	A - Misadjusted vertical linearity and/or height controls ----- B - Defective vertical oscillator, discharge tube or output tube ----	Alternately readjust both controls Replace
	17	Insufficient Width	A - Misadjusted width, horiz. drive or horiz. linearity controls ----- B - Defective horizontal output tube, damper or discharge tube ----	Readjust Replace
	18	Fold-over at Sides	A - Defective damper tube ----- B - Defective horizontal output tube - C - Defective horizontal oscillator/discharge tube -	Replace Replace Replace

	TRouble NUMBER	DESCRIPTION OF TROUBLE	CAUSE	CURE
	19	Edges jagged, Pie-crust Effect	A - Poor contact in high voltage line from H.V. recti- fier to pix tube contact fastener B - Poor pix tube cath- ode return contact C - Sparking or corona in high voltage section -----	Resolder Resolder Spray with anti-corona lacquer
	20	Crescent Shaped Glow	Ion trap reversed ----	Readjust
	21	Pin-Cushion Effect	A - Defective horizon- tal deflection coils ----- B - Defective horizon- tal output tube or H.V. rectifier C - Misadjustment of special magnets at tube flare --	Replace Replace Readjust
	22	Dark Horizon- tal Streaks across Ver- tical Lines of Station Pattern	A - Misaligned pix I.F. B - Poorly grounded shields ----- C - Defective front end tubes ----- D - Defective peaking coil -----	Realign Ground to chassis Replace Replace
	23	Vertical Wedge of Station Pat- tern Absent or Weak	A - Shorted peaking coil ----- B - Open plate by-pass condensers in video amplifier-	Replace Check by substitution
	24	Bright Spot on Screen After Turn- ing Set Off	A - Slightly mis-ad- justed ion trap - B - Poor set design --	Readjust slightly Turn brightness control full on an instant before set is turned off

	TROUBLE NUMBER	DESCRIPTION OF TROUBLE	CAUSE	CURE
	25	Excessive Brightness	A - Misadjusted brightness control --- B - Defective brightness control --- C - Defective contrast control -----	Readjust Replacé Replace
	26	Ghosts	A - Reflections from surrounding buildings ----- B - Reflections due to use of incorrect lead-in -----	Relocate or rotate antenna or use highly directive antenna Replace with lead-in which matches antenna
	27	Weaving Diagonal or Vertical Lines Across Picture	A - Interference from neighboring TV sets ----- B - Interference from FM -----	Relocate or rotate antenna Install FM wave trap
	28	Wavy, Top and Bottom	60 cycle or 120 cycle hum in vertical deflection system	Check by-pass condensers in vertical sweep circuit, especially electrolytic condensers
	29	Pix Normal but Sound Weak or Absent	A - Defective tubes in sound section B - Sound trap misaligned ----- C - Open condenser in sound take-off line ----- D - Defective volume control	Replace Realign Replace Replace
	30	Return Traces Unequally Spaced	A - Misadjusted vertical (hold) control B - If on only one channel fault is with transmitting station ----- C - Defective integrator circuit ----	Readjust, particularly if control is set too close to rolling point. Tune to another channel Check resistors and condensers in this circuit

	TROUBLE NUMBER	DESCRIPTION OF TROUBLE	CAUSE	CURE
	31	Criss-cross Traces	Defective vertical sawtooth-maker circuit -----	Check resistor and condenser in this circuit
	32	Right Portion on Left Side	A - Misadjusted phase control ----- B - Misadjusted horiz. (hold) control - C - Defective AFC (automatic frequency control) tubes -----	Readjust Readjust Replace
	33	Weak, Darkened	A - Defective front end tubes ----- B - Defective video I.F. tubes ----- C - Defective video detector or video amplifier tubes - D - Defective d.c. restorer tube ----	Replace oscillator and mixer Replace Replace Replace
	34	Bright Vertical Bars at Left	A - Defective damping tube ----- B - Defective horizontal output tube - C - Defective horiz. discharge tube - D - Leaky coupling condenser at grid of horiz. discharge	Replace Replace Replace Replace condenser

How to Adjust the Ion Trap

If possible, use the transmitted test pattern. If removal of the back panel of the set disconnects the interlock switch, use a separate "cheater cord". Observe customary high voltage safety precautions.

First, set the brightness control for normal brightness, positioning the ion trap close to the base of the picture tube. Then gradually move the ion trap forward and backward, simultaneously rotating it very gradually in either direction until picture appears brightest.

Next reset the brightness control for normal brightness and adjust focus control for satisfactory focus. Again readjust ion trap for greatest brightness. If there are two points where brightest picture can be obtained, use

the one nearest the socket (base) of the picture tube. Picture tube may be damaged if point farthest from base is used.

If brightest ion trap adjustment is accompanied by corner shadows, do not remove shadows by changing ion trap adjustment, but instead adjust picture centering device. If picture positioning lever or focus assembly positioning is changed, again readjust the ion trap. If ion trap uses a mounting screw, tighten this when adjustments have been completed.

Adjustment of the ion trap upon installation, at each servicing, after moving picture positioning lever, or after adjusting the focus assembly, will improve reception and prolong the life of the picture tube.

Section 2 - TV TERMS EXPLAINED

A

AC - (Alternating Current). Current which flows first in one direction and then in the reverse direction.

AC-DC POWER SUPPLY - A method of supplying power to a television set or radio receiver, invented by H. G. Cisin. Receivers which use this supply operate equally well from an AC or a DC source and do not require power transformers.

ACCELERATING ELECTRODE - An element or electrode such as a grid in a picture tube to which high voltage is applied in order to increase the speed of the electron beam.

ADAPTER - A device for changing circuit connections, either temporarily or permanently. A color adapter is used in television to change the circuit connections of the TV set sweep circuits.

AERIAL - See antenna.

AF - Abbreviation of "audio frequency" current.

AFC - See "automatic frequency control".

AGC - See "automatic gain control".

ALIGNMENT - The process of semi-permanently tuning certain circuits of a television receiver prior to placing it in regular operation. See "Video I.F. Alignment", "R.F. Alignment", "Mixer Alignment," "Oscillator Alignment", "Sound I.F. Alignment", "Front End Alignment", "Discriminator Alignment", "Ratio Detector Alignment" and "Misalignment".

ALTERNATING CURRENT - See "AC".

ALTERNATION - The rise and fall of an alternating current in one direction only.

AM - (Amplitude Modulation) A form of broadcasting used for transmitting television picture signals. Also used in standard radio broadcasting.

AMMETER - An instrument for measuring the amount of electric current flow.

AMPERE - The unit of electrical current flow.

AMPLIFICATION - The process of magnifying the strength of an electrical current or signal.

AMPLIFIER - A device for magnifying electrical current or signal.

AMPLITUDE - A measure of the maximum change in intensity of an AC signal.

ANODE - An electrode (element) in a vacuum tube or a picture tube. The one to which the electron stream flows. Sometimes called a "plate".

ANODE CONNECTOR - The snap-button fastener which makes connection with the second anode terminal at the side of the picture tube. Usually insulated by means of a rubber suction cap which fits over it.

ANTENNA - A conductor for intercepting or radiating television or radio waves.

ANTENNA ARRAY - An antenna combined with a reflector and one or more directors.

ANTENNA BAY - A single antenna array is sometimes called a single "bay". If two arrays are stacked one above the other it is referred to as a "two-bay" antenna. A four-array stacked antenna is said to have four bays.

ARRAY - See antenna array.

ASPECT RATIO - The numerical ratio of picture or raster width to picture or raster height. This has been standardized at 4 to 3. For example, if the picture has a width of 12 inches, it must be adjusted to have a height of 9 inches to conform to the aspect ratio of the transmitted scene.

ATTENUATION - Weakening - usually referring to a signal.

AUDIO AMPLIFIER - A vacuum tube device for magnifying alternating currents having frequencies from 30 to 20,000 cycles per second.

AUDIO FREQUENCY CURRENT - AC having frequencies from 30 to 20,000 cycles per second.

AUDIO HOWL - Howling noise from a television loud speaker caused by a microphonic tube or by feedback.

AUDIO TRANSFORMER - An iron core device having two separate windings used to couple circuits carrying audio frequency currents.

AUTOMATIC FREQUENCY CONTROL (AFC) - A circuit used in television receivers for automatically controlling the frequency of the front end oscillator. Also see reactance tube.

AUTOMATIC GAIN CONTROL (AGC) - A circuit used in TV receivers for maintaining a constant signal input to the video detector regardless of strength of incoming signals.

B

"B" SUPPLY - Circuit in a TV receiver which supplies a direct current voltage to the anode or plate as well as to the screen grid of vacuum tubes.

BACKGROUND NOISE - Additional noise heard along with sound in speaker of television set. May be due to defective tubes or faulty circuits.

BALANCED LINE - A lead-in of the twin-lead type in which each line is maintained at the same potential level above ground.

BALLAST TUBE - A tube containing a resistor placed in series in a television circuit to reduce voltage to a desired amount and in some cases to protect other portions of the circuit from burnout.

BALUN - An Ultra High Frequency (UHF) matching transformer which permits the matching of a 72-ohm coaxial input to a 300 ohm balanced line.

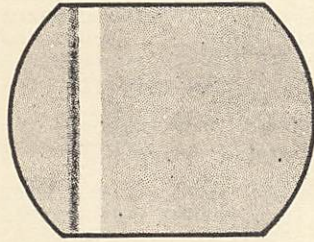
BANDPASS FILTER - Combinations of tuning devices such as condensers and chokes or conductors having equivalent capacitances and inductance designed to pass certain desired bands of frequencies at full strength while blocking upper and lower undesired frequencies.

BANDSWITCH - Device in a TV receiver for tuning in various television channels.

BAR GENERATOR - See "Cross Bar Generator".

BARKHAUSEN OSCILLATIONS -

A picture defect which causes the picture to show a faint dark vertical line followed by a light area at the left of the screen. It is caused by undesired oscillations which occur during a short period in each horizontal sweep due to a defective horizontal output tube.



BAS-RELIEF - See "Negative Picture".

BEAM BENDER - See ion trap.

BEAM POWER TUBE - A vacuum tube generally used as an output tube because of its power handling ability. Typical beam power tube is 25L6.

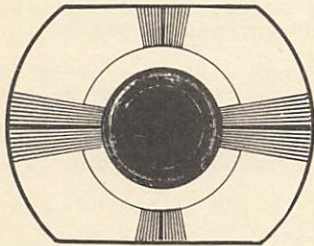
BIAS - Negative potential generally applied to the control grid of a vacuum tube.

BLOCK DIAGRAM - A simplified method of illustrating the passage of signals through a TV receiver or other electronic apparatus, whereby each vacuum tube or group of these tubes performing a particular function is noted within a rectangular block with arrows between the blocks to denote the direction being taken by the signal.

BLOCKING OSCILLATOR - A sweep circuit used in the television receiver which includes a transformer and a vacuum tube. Often used to sweep the electron beam vertically.

BLANKING PULSES - TV signals accompanying the picture information signal which serve to darken the picture tube during the time the electron beam is moving back from right to left and also during the interval when the beam is returning from the bottom to the top.

BLOOMING - A TV picture defect in which the picture grows abnormally large and goes out of focus while the set is in operation. The most common cause of this trouble is insufficient high voltage at the picture tube. First remedy to try is to replace the tubes in the high voltage section.



BOOSTER - A device usually including one or more vacuum tubes which amplifies television signals before they reach the TV receiver.

BOW-TIE ANTENNA - A form of fan dipole antenna now being adapted to UHF television reception. Name is derived from its resemblance to a bowtie. The triangular sections are made of metal, usually aluminum. Connection to the lead-in is made at the center where the apexes of the triangles point to one another. A reflector is usually employed behind the bow-tie, some manufacturers using an aluminum meshed screen for this purpose.

BRIGHTNESS (Brilliance) CONTROL - A control usually placed at the front of the TV set which varies the background brightness to suit the taste of the viewers.

BROAD TUNED ANTENNA - A TV antenna capable of receiving a number of channels efficiently.

BROADSIDE ARRAY ANTENNA - An array of antenna elements in the same plane thus giving maximum sensitivity in a plane at right angles to that of the array.

BY-PASS CONDENSER - A device which by-passes AC, preventing it from taking an undesired path. A device which provides a low opposition AC path around a particular circuit element.

C

"C" SUPPLY - A power supply for providing a negative bias to the control grid of a vacuum tube. See "Bias".

CAMERA DOLLY - A moveable platform which carries the television camera and enables it to be transferred readily from one place to another.

CAMERA TUBE - A tube which receives light impulses and changes these to electrical currents which vary in accordance with the degree of light and shade.

CAPACITOR - A device which consists essentially of metal plates separated by insulators. Also called a condenser. Used to permit flow of AC, while blocking flow of DC. Also used to "tune" electrical circuits. Has the ability to store electricity for a limited time.

CAPACITANCE - Also called capacity. A measure of the quantity of electricity which a condenser can store

CAPACITATIVE REACTANCE - Opposition offered by a capacitor to the flow of AC. Measured in "ohms".

CARRIER - An electrical wave, used in television to transmit picture and sound signals by variations of its amplitude and frequency respectively.

CASCADE TUNER - A type of television tuner, usually employing two double triodes, the first set of triodes used as first and second r.f. amplifiers, the second set as an oscillator-mixer. The first r.f. stage is of standard design, but the second employs a type of circuit known as "grounded grid", noted for its stability. The cascode tuner provides greater gain and less noise than most pentode tuners. Tube types often used in the r.f. stages are either the 6BK7 or the 6BQ7. The second double triode is usually a 6J6 tube.

CATHODE - An electrode of a vacuum tube or picture tube capable of emitting electrons when heated.

CATHODE RAY OSCILLOGRAPH - Also called Cathode Ray Oscilloscope, and abbreviated to "scope". A device containing a picture tube used in television servicing to permit visual inspection of electrical (signal) wave forms.

CATHODE RAY TUBE - See "Picture tube".

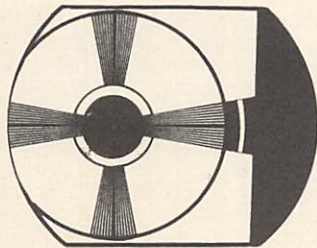
CAVI-TUNER - Trade name for a three-cavity tuner which can be used in a television set to enable it to receive both VHF and UHF stations.

CAVITY RESONATOR - A metallic "box", cut to predetermined size, used as the tuning element of a UHF oscillator.

Form of the cavity resonator may be cubical, cylindrical, spherical or partially spherical, or rectangular. Variation in tuning may be accomplished by a plunger which changes the length of the cavity, by the insertion of a metal slug or sphere in the cavity, or merely by turning a small screw which varies the internal capacitance.

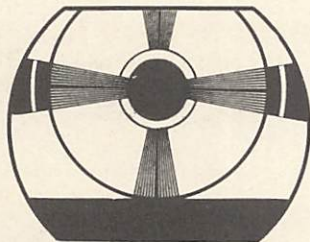
CENTERING CONTROL - A means of centering the television picture within the borders of the viewing screen.

If set is off center horizontally, readjust centering control if set is equipped with such a control. If none is used, readjust position of focus coil. In some sets, horizontal centering is obtained by adjustment of amplitude and linearity controls combined with correct positioning of focus coil on the neck of the picture tube.



Off center horiz.

If set is off center vertically, readjust vertical centering control or if no such control is provided, readjust position of focus coil.



Off center vert.

CHANNEL - In television this is the frequency band allotted to a TV transmitter by the Federal Communications Commission. The standard channel is 6,000,000 cycles (6 mc) wide. VHF channels are numbered from 2 to 13. Channels 2 to 6 cover the band from 54 to 88 mc. Channels 7 to 13 cover the band from 174 to 216 mc. UHF channels are numbered from 14 to 83 and cover the band from 470 to 890 mc.

CHARACTERISTIC IMPEDANCE - A property of a television lead-in based solely on the spacing of the lead-in wires, the material between them and their diameter. Characteristic impedance is independent of the length of the lead-in (transmission line). If the above-mentioned dimensions are known, characteristic impedance may be calculated by using standard formulas.

CHARGE - Electricity stored in a capacitor. A stored charge is capable of giving a dangerous shock.

CHASSIS - The metal base on which parts of a TV set are mounted. In some cases the word "chassis" refers to the entire assembly of parts on the metal portion.

CHEATER CORD - A line cord for connecting the TV set to the power supply, having a plug at one end and a receptacle at the other, for use with sets in which the regular line cord can only be used when back is fastened to set.

CHOKE - A coil consisting of turns of copper wire used in an AC circuit to offer opposition to AC current flow.

CIRCUIT - An electrical path.

CLOSED CIRCUIT - A complete electrical path.

COAXIAL CABLE - Also called "concentric line". A copper conductor surrounded by, but insulated from a shield of braided copper which acts as a second conductor. Outer conductor is generally grounded. Used for lead-in.

CO-LINEAR ARRAY - An array in which the elements are arranged end-to-end in a straight line.

COMMUTATOR - The part of a DC motor or DC generator on which the brushes rest.

CONDENSER - See "Capacitor".

CONDUCTOR - A material which provides an easy path for electrical current flow.

CONICAL ANTENNA - Specifically, an antenna consisting of two cones having identical axes with bases away from each other and with points coming together at the center for connection to the lead-in. The term "conical antenna" however, has been generalized to include all antennas having conical sections, as for example x-shaped or fan-type antennas.

CONTACT - Point where connection from one part of a circuit to another is made.

CONTROL GRID - The element placed nearest the cathode in a vacuum tube between cathode and plate, for controlling the electron current flow from cathode to plate.

CONTRAST CONTROL - A means of adjusting the television receiver to obtain various shades desired, between black and white.

CONVERSION GAIN - A measure of the increase in signal voltage in passing through a vacuum tube mixer as used in a VHF television tuner.

CONVERSION LOSS - A measure of the decrease in signal voltage in passing through a crystal mixer, as used in a UHF television tuner.

CONVERTER - Color wheel used in the CBS system of color television. Also see "First Detector".

CONVERTER, UHF - A device for use with a conventional (VHF) television set, by which the set is made capable of receiving UHF channels. The converter may utilize UHF strips, each including a crystal to replace VHF strips if a turret-type tuner is used in the TV set. In other types, the converter is a separate device containing one or more vacuum tubes and one or more crystals. In either case, the converter serves the purpose of reducing the higher UHF to the lower VHF, which the conventional TV set is designed to receive.

CORNER REFLECTOR ANTENNA - A type of UHF antenna used for semi-fringe areas which derives its name from the fact that the two reflecting surfaces form an angular corner within which the driven element of the antenna is placed.

CORONA - Also referred to as "Corona Discharge". A blue-violet glow around high voltage conductors.

COUPLING - Means of transferring electrical signals from one portion of a circuit to another.

CROSS BAR GENERATOR - An instrument used in television servicing which places vertical or horizontal bars, or both, on the screen of a picture tube of a television set, thus providing a means of checking and adjusting linearity, as well as of making various other checks and adjustments without the necessity of a signal from a television broadcasting station.

CROSS MODULATION - Undesired reception from a nearby channel interfering with desired reception.

CURRENT - Movement of electrons.

CRYSTAL DIODE - A device used in the television receiver to separate television information signals from the carrier. Also used for general purpose of rectifying high frequency signals. See "Germanium Crystal."

CRYSTAL MIXER - A circuit employing a germanium crystal used in UHF television sets and converters to provide conversion from UHF to VHF or directly to an intermediate frequency. The action consists of beating the incoming UHF against a locally generated frequency in order to obtain a new lower frequency.

CRYSTAL NOISE - Interference frequencies generated within a germanium crystal mixer as incoming signal is mixed with signal from local oscillator said to be due to minute changes in temperature within crystal.

CYCLE - One complete set of conditions which regularly repeat themselves. For example, a pendulum passes through one cycle when it travels from one extreme of its path to the other and back again. An electrical cycle, in connection with AC, is a single rise and fall of current in one direction and then a rise and fall of current in the reverse direction. In other words, two consecutive reversals of an alternating current constitute a cycle.

CYCLES PER SECOND - The unit of electrical frequency.

D

DAMPING TUBE - Also called "Damper Tube". A vacuum tube employed in most television sets in the horizontal sweep circuit for preventing "oscillations" or unwanted surges of current in the deflection coils from causing a washed out, distorted picture on the left side.

D.C. (Direct Current) - A steady current which flows in one direction only.

D.C. RESTORER - (Also called "D.C. Reinsertor"). A circuit in the television set sometimes including a vacuum tube, which automatically changes the average background brightness of the picture being received in accordance with the average illumination of the scene being televised. This circuit is generally located close to the picture tube and its operation is actuated by the variations in the received signal put into the signal for this particular purpose.

D.C. VIDEO COMPONENT - The portion of the video signal which conveys information to the television receiver regarding the average background illumination of the scene televised at the transmitter.

DECIBEL - A measurement of sound level which may be determined mathematically if the ratio between two levels of power, current or voltage in a sound amplifier is known.

DE-EMPHASIS NETWORK - Combination of resistor and condenser forming a "low pass filter". This circuit at the output of the ratio detector or discriminator of the television receiver sound section, improves tone quality.

DEFINITION - A term which expresses the relative clearness of a television picture. If picture has "good definition" it is relatively clear.

DEFLECTION - Movement of the electron beam in a picture tube either horizontally or vertically.

DEFLECTION YOKE - See "Yoke, deflection".

DEMODULATION - See "detection".

DETECTION - The process of separating picture and sound signal information from the carrier signal. Detection, also called demodulation, is accomplished by a circuit which usually includes a 6AL5 detector tube, but which in some cases employs a "crystal" detector in the place of this tube.

DIELECTRIC - A poor conductor of electricity, particularly the insulating substance between the conducting plates of a condenser.

DIODE - A vacuum tube which contains two elements, an anode (plate) and a cathode. Used in television

circuits as a video detector, a ratio detector, a discriminator, a d.c. restorer, a rectifier for both high and low voltage currents, and in other parts of the circuit which require "rectification".

DIODE DETECTOR - See "Diode" and "Detector".

DIFFERENTIATOR - A circuit in a television receiver which is used to separate horizontal timing pulses from the vertical pulses of the received signal, so that the separated pulses may be applied to control the timing of the horizontal sweep circuit. The circuit usually employed is a simple "high-pass" circuit consisting of a condenser and a resistor.

DIHEPTAL SOCKET - A 14-pin socket used for a TV picture tube.

DIPLEXER - Trade name for a device which is mounted on the antenna mast and which permits the use of a single lead-in, although separate UHF and VHF antennas are used.

DIPOLE - A basic type of television antenna consisting of two conducting arms of equal length, generally constructed of light metal tubing and insulated from each other. Arms are separated by about 6 inches of insulation.

DIPOLE DIRECTOR - A metal tube slightly shorter than the dipole antenna, placed between the antenna and the TV transmitter. It is usually mounted on the same mast as the antenna, a short distance from the latter. It is not connected to the lead-in. The purpose of the director is to improve reception of weak signals.

DIPOLE REFLECTOR - Similar in construction and purpose to the "dipole director", except that it is slightly longer than the antenna and is placed in back of the antenna instead of in front.

DIRECTIVE ANTENNA - One which receives TV signal best from a particular direction. The "Yagi" is a typical directive antenna.

DIRECTOR - See "Dipole Director".

DISCHARGE TUBE - A vacuum tube used in television receivers which functions as a switch to turn current off rapidly after it has charged a condenser at a slower rate. This produces what is known as a "sawtooth" waveform, used for deflecting the electron beam of the picture tube.

DISCRIMINATOR - A form of "detector" used in FM receivers and television sound sections, usually consisting of a "double diode" tube such as the 6AL5, connected in an appropriate detector circuit.

DISCRIMINATOR ALIGNMENT - The process of tuning the FM discriminator in the sound section of a television receiver.

DISTRIBUTED CONSTANTS - The effect of resistance, inductance and capacitance in a lead-in or other electrical circuit as distinguished from the same properties existing in components such as resistors, coils and condensers. The constants in the latter instances are known as "lumped constants".

DOUBLE CONVERSION - A method of converting a high frequency television signal to a lower frequency signal in two separate steps involving the use of two sets of local oscillators and mixers. Used in UHF converters.

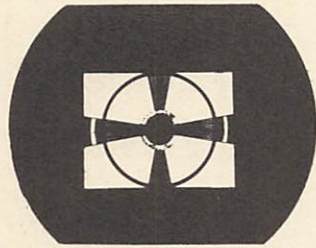
DOUBLE DIODE - Two diodes in a single glass envelope or metal tube. See "Diode".

DOUBLE IMAGE - See "Multiple Image".

DRIP LOOP - Loop at end of lead-in where it enters building to prevent condensed moisture from getting inside.

DRUM - A drum-shaped device used in a number of station selectors. This drum has a number of sets of movable contacts which are brought consecutively tightly against a single set of stationary contacts as the drum is rotated. Different sets of inductance coils within the drum are soldered to the various drum contacts, thus making it possible to change coils and tune in different channels, merely by turning the station selector knob.

DWARFED PICTURE - A defect in which the picture is reduced in size both vertically and horizontally. This trouble is usually caused by weak or insufficient low voltage. First check the low voltage rectifier tubes. If the power supply voltage is low, this will also cause a "dwarfed picture".



DYNAMIC SPEAKER - Loud speaker sometimes used in television sets, which has an electromagnetic field and a movable coil connected at the base of a paper cone and firmly fastened to it. The audio frequency currents (voice currents) pass through the movable coil causing it to vibrate within the magnetic field and this, in turn, causes the paper cone to vibrate, thus producing the speech or music.

E

ECHO - A reflected television signal which arrives at the TV set shortly after the directly transmitted signal, causing duplicated pictures known as "ghosts" to appear on the screen.

ELECTRICAL CIRCUIT - See "Circuit".

ELECTRICITY - A form of energy which manifests itself by heating, by magnetic effects, by corona effect, by shock and by chemical reactions. Sometimes defined as a movement of electrons.

ELECTRIC EYE - A light-sensitive device which uses small variations in light to produce changes in electrical circuits.

ELECTRODE - An element or active portion of an electrical device. Thus, a cathode is referred to as an electrode of a vacuum tube.

ELECTRODYNAMIC LOUDSPEAKER - See Dynamic Loudspeaker.

ELECTROLYTE - An acid or alkaline solution used in storage batteries and electrolytic condensers.

ELECTROLYTIC CONDENSER - A form of wet or moist condenser which employs aluminum and aluminum oxide electrodes immersed in an electrolyte such as sodium hydroxide.

ELECTROMAGNETIC FIELD - An area, usually near an electromagnet which exhibits magnetic properties of attraction and repulsion.

ELECTROMAGNETIC FOCUSING - A method of focusing the electron beam of a picture tube on the screen of the tube, which employs a current carrying coil around the neck of the tube to accomplish the desired result.

ELECTROMAGNETIC WAVES - Also called "Hertzian Waves" or radio waves. These waves are invisible, but are put into motion when a high frequency current flows in a suitable antenna. They are intercepted by a receiving antenna and converted by electromagnetic action into high frequency currents identical in nature with those flowing in the transmitter antenna.

ELECTROMOTIVE FORCE - Electrical pressure. An electrical force which sets electrons in motion.

ELECTRON - The smallest known particle of matter. Electrons in motion constitute a current of electricity.

ELECTRON EMISSION - The breaking away of electrons from a metal surface under the action of heat, light or impact of other electrons.

ELECTRON GUN - That portion of picture tube which produces the electron beam and directs it against the fluorescent screen.

ELECTRON RAY TUBE - A special form of vacuum tube which contains a fluorescent target in addition to an amplifier. Also called "Magic eye" tube. Used for more accurate tuning of FM and other radio receivers.

ELECTROSTATIC FIELD - Area surrounding an electrically charged body.

ELECTROSTATIC FOCUSING - A method of concentrating an electron beam of a picture tube so that it will focus at the picture screen. This method employs electric "charges" in order to accomplish the desired result.

ELEMENTS (OF TELEVISION PICTURE) - Tiny spots of light put on the picture tube screen one after another by impact of electrons from the electron gun. These make up the television picture.

EMF - See "Electromotive Force".

END FIRE ARRAY ANTENNA - An antenna having parallel elements in which currents are in different phases.

ENERGY - Ability to perform work. Energy is classified as potential and kinetic. Forms of energy are heat, light, electricity, atomic or nuclear, mechanical and chemical.

ENGRAVED EFFECT - See "Negative Picture".

EQUALIZING PULSES - A series of six short square wave pulses sent out with the picture signal at the end of every field before and after the vertical sync pulse to insure equal spacing between scanning lines and permit the transmission of exactly equal vertical intervals between frames and between fields. Interlaced scanning would not be feasible without the equalizing pulses.

F

FADING - Changes in signal intensity which cause temporary loss or weakening of sound and/or picture.

FARAD - A measurement unit used with a condenser to measure its capacity.

FAN DIPOLE ANTENNA - See "Bow-Tie Antenna".

FEEDBACK - In electrical circuits, such as found in a television set, feedback is generally an undesirable return of electrical energy from the output of an amplifying circuit to its input. Heard in the speaker as a howl.

FEED-THRU INSULATOR - Tubing of low-loss material, such as polystyrene, used to bring lead-in through wall of house.

FIELD - In present TV practice, horizontal lines are not traced by the electron beam consecutively.

Instead, every other line is painted on the screen until the bottom space is reached. Then this constitutes the first field. The alternate lines which were omitted in the first field are then filled in one after another and constitute the second field.

FIELD COIL - The coil of a dynamic speaker used to provide a strong steady magnetic field.

FIELD STRENGTH METER - A device used to measure strength of television signal at any designated location.

FILAMENT A thin tungsten wire also called a heater, used to heat the cathode of a vacuum tube. In some vacuum tubes, the filament also serves as a cathode in which case it is called a filamentary cathode.

FILAMENT WINDING - A winding in a transformer used to supply current to the filament of a vacuum tube.

FILTER - An electrical circuit which screens out unwanted frequencies allowing desired ones to pass.

FINE TUNING CONTROL - A control on many TV sets which varies or adjusts the local oscillator frequency to compensate for slight variations. If not for the fine tuning control, the sound and picture on some channels might come in at different points.

FIRST DETECTOR - Also called "mixer" or "converter". A circuit in a television receiver wherein incoming TV signals are mixed with locally generated signals (produced by a vacuum tube oscillator) in order to form signals of a new, lower frequency, known as intermediate frequency signals.

FLAGS - Two markers resembling flags in the neck of the picture tube, used to indicate the correct placement of the ion trap.

FLASH-BACK - A break-down in the normal conduction path of a vacuum tube rectifier resulting in a reversal of current flow.

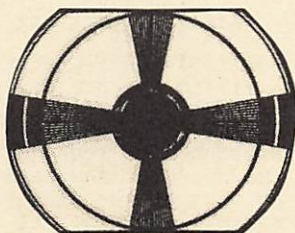
FLICKER - A visual sensation caused when the eye perceives light impulses at such a slow rate that the light of one impulse dies down before the new impulse arrives. Thus, if pictures are flashed on a screen at a rate of less than about 48 per second the eye will note the intervals between pictures and this unpleasant sensation is called "flicker".

FLUORESCENT SCREEN - The inside face of the picture tube. This is painted with a material which glows or becomes illuminated when struck by the electron stream from the electron gun.

FM - Abbreviation of "Frequency Modulation". A system of transmitting the sound information which accompanies the TV signal, wherein variations in carrier frequency convey the desired information.

FOCUS COIL - A coil carrying direct current, placed around the neck of the picture tube which accomplishes focusing by the interaction of the magnetic field within the coil with that of the magnetic field due to the electron beam.

FOCUSING - A means of bringing the electron stream within the picture tube to a single point on the screen of the tube. If the picture is out of focus, readjust the focus control to a setting which produces the clearest picture. If set is working properly, it will be out of focus either side of this setting. If this does not occur, check focus control potentiometer; check for open focus coil or for shorted turns in this coil.



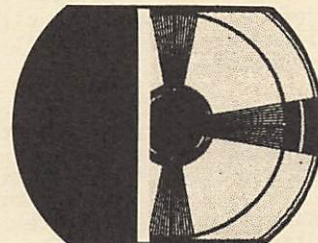
Out of Focus

In some cases, this trouble may be due to a gassy picture tube

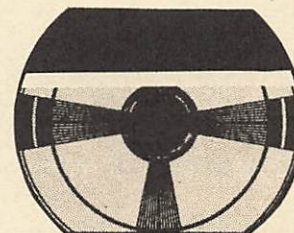
FOLDED DIPOLE - A TV antenna consisting of two half wave elements, whose ends are connected together. It could also be described as a full wavelength of tubing bent around or "folded" to form an antenna of about 1/2 wavelength.

FOLDOVER - A fault in a television picture in which a portion of the picture appears to be folded across another portion. For example, the top of the picture may be folded back, thus reducing the height of the picture. Foldover may also occur at the bottom or at either side. Foldover troubles are an indication of defects in the sweep circuits.

FOLDOVER, HORIZONTAL - See "Foldover". If foldover occurs at left, check for leaky coupling condenser between horizontal discharge and horizontal output tubes, also for open filter condenser at cathode or damper tube or for defective saw-tooth maker condenser. If foldover occurs at right, check by-pass condenser in plate return circuit of horizontal output tube, also check for greatly lowered value of horizontal output tube grid resistor.



FOLDOVER, VERTICAL - See "Foldover". If foldover takes place at bottom, it may be caused by shorted or leaky coupling condenser between discharge tube and vertical output amplifier or by defective grid leak resistor at the vertical output tube. If foldover appears at top of picture, check same resistor and also check for open coupling condenser at grid of vertical output tube. Trouble may also be due to defective blocking oscillator transformer.



FRAME - Two consecutive "fields". One complete TV picture constitutes a frame.

FREQUENCY - Number of cycles per second.

FREQUENCY BAND - A range of frequencies between an upper and a lower limiting frequency. For example, the frequency band of channel 2 is a range of 6 megacycles extending from 54 megacycles to 60 megacycles.

FREQUENCY MODULATION - See FM

FRONT END - This is the portion of the television receiver which includes the channel selector, the r.f. tube, the oscillator and the mixer.

FRONT END ALIGNMENT - The process of tuning the r.f., mixer and oscillator circuits of a TV receiver.

FRONT-TO-BACK RATIO - A comparison between the front and rear sensitivity of the TV receiving antenna. For example, an antenna having a 3 to 1 Front-to-Back Ratio would be three times as sensitive to signals moving from the desired front direction as it would be to signals arriving from the rear.

FRONT PORCH - The part of a synchronizing signal preceding the horizontal sync pulse occurring at the end of each horizontal line.

FUSE - A protective device capable of opening a circuit if subjected to over-voltage or excessive current. Sometimes used to cut off entire power supply to a TV set. Also employed in high voltage part of TV set, usually inside the high voltage compartment.

G

GAIN - The amount by which the signal is amplified.

GAIN CONTROL - This control determines the strength of the picture signal. It is analogous to the volume control used in a radio set, but regulates picture rather than sound. Since the effect is most noticeable on the contrast, this control is usually called a "contrast" control. It is also known as a "picture" control.

GENERATOR - A rotary machine for converting mechanical energy into electrical energy. Also used to define a vacuum tube circuit which employs an oscillator capable of generating high frequency electrical currents.

GERMANIUM CRYSTAL DIODE - See "Crystal". A compact crystal rectifier which resembles a small resistor, used in some television sets to take the place of the vacuum tube video detector. Usually mounted in a ceramic jacket having nickel end caps and tinned leads. Also used in certain TV sets in the sound section as discriminator.

GRID - An element of a vacuum tube or picture tube used to control or accelerate an electron stream.

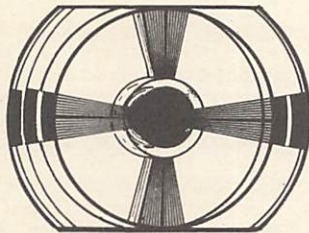
GRID BIAS - Negative voltage applied to the grid of a vacuum tube.

GRID CAP - Device used to make a connection to grid element of vacuum tube, where this element terminates at top of tube.

GRID CONDENSER - A condenser in the control grid circuit of a vacuum tube.

GRID LEAK - A resistor connected between the control grid and the cathode of a vacuum tube for the purpose of allowing excess electrons to leak to the cathode.

GHOST - A single undesired image or a series of such images visible to the right or the left of the desired picture signal. Caused by reflection of signal or mismatched lead-in.



GROUND - The earth, when used as a point of unchanging potential. A common negative return for various circuits. In a television receiver, the chassis is generally used as a common negative return or ground.

GROUND CLAMP - A metallic clamp for making a ground connection to a pipe.

GROUNDING GRID AMPLIFIER - An r.f. amplifier circuit employing a triode vacuum tube in which the grid is grounded. The incoming signal is applied between cathode and ground, the output being taken from the plate circuit. The grid acts as a shield between input and output. Used in many TV tuners.

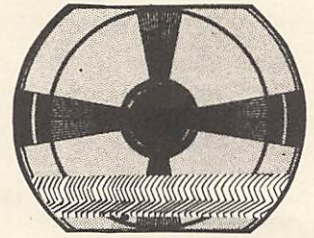
H

HEATER - An element of a vacuum tube for heating the cathode.

HEIGHT CONTROL - An adjustment which determines the picture height by increasing or decreasing the strength of the vertical sweep oscillation.

HEPTODE - A seven element vacuum tube.

HERRINGBONE PATTERN - The name itself describes this characteristic pattern which appears horizontally on the picture. It is caused as a result of diathermy or similar radio frequency interference.

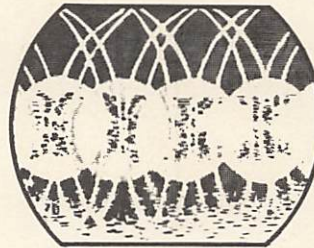


HIGH FREQUENCY - A very large number of cycles per second. For example, television waves are said to be high frequency waves.

HIGH PASS FILTER - A filter designed to obstruct lower frequencies, while passing higher frequencies.

HIGH VOLTAGE POWER SUPPLY - See Power Supply.

HOLD CONTROL - The controls on a television receiver which are used to stop the picture from moving vertically and horizontally.



Defective Horizontal Hold Control



Defective Vertical Hold Control

HOOK-UP WIRE - Insulated copper wire used for making connections between components in a TV or radio set.

HORIZONTAL BLANKING - Blanking out of the picture tube illumination during the short time interval when the electron beam is returning from right to left.

HORIZONTAL CENTERING CONTROL - An adjustment which provides a means of moving the picture to the right or left in order to center it horizontally.

HORIZONTAL DEFLECTION - Movement of the electron beam in a picture tube in a horizontal direction.

HORIZONTAL DRIVE CONTROL - This control is also referred to as a "peaking" control. This control is used to provide sufficient horizontal linearity on the right hand side of the picture.

HORIZONTAL LINEARITY - A condition in a television picture which results when the electron beam is swept from left to right at a uniform speed. The resulting picture then retains its natural proportions in a horizontal direction.

HORIZONTAL LOCK SYSTEM - Method used to prevent picture from drifting to the right or left.

HORIZONTAL NON-LINEARITY - A condition in a television picture which results when the electron beam is swept from left to right at a non-uniform rate of speed. The resulting picture will then appear to be broadened or squeezed depending upon the way in which the speed of the beam is affected. In some cases a portion of the picture is spread out at the left and squeezed together at the right. In other cases this condition is reversed. Some of the causes of horizontal non-linearity are: defective damping tube;

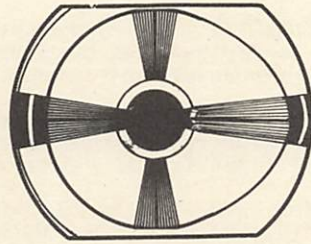
defective horizontal output transformer; mis-adjusted or defective horizontal drive control. Width control also affects horizontal linearity.

HORIZONTAL OSCILLATOR - A circuit which generates a sawtooth voltage for producing horizontal deflections.

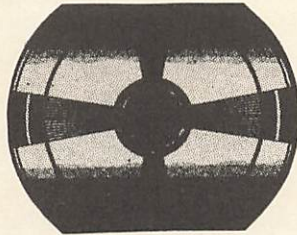
HORIZONTAL RESOLUTION - A measure of the horizontal picture detail, determined by the number of picture elements in each scanning line.

HORIZONTAL SYNCHRONIZATION - A method of timing the horizontal sweep so that each horizontal line will be swept by the electron beam in exact time with the action at the TV transmitter. This timing is accomplished by means of horizontal sync pulses which occur at regular intervals at the end of each line of picture information.

HUM (IN PICTURE) - A picture defect caused by 60 cycle or 120 cycle currents reaching the control grid of the picture tube. In the case of 60 cycle hum, part of the picture is darker than normal and part is lighter. In the case of 120 cycle hum, there are two dark areas and two light areas, each dark bar being followed by a light bar. Picture hum may be due to poor filtering of low voltage power supply. If so it will be accompanied by hum in speaker. Check electrolytic condenser in low voltage power supply.



Horizontal Non-Linearity.



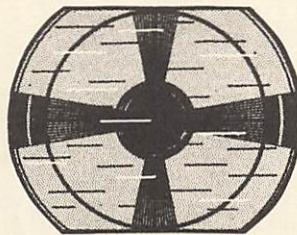
ICONOSCOPE - A trade name for a television camera tube which picks up visual information and converts it into electrical impulses.

I.F. - Abbreviation of intermediate frequency. This is the resultant frequency obtained when an incoming television signal is "mixed" with the signal obtained from a local oscillator.

I.F. TRANSFORMER - A device containing two electromagnetically coupled windings used to couple I. F. amplifier circuits in a TV set.

IGNITION INTERFERENCE - Interference due to automotive ignition. See "interference".

IMAGE FREQUENCY - The frequency at which an undesired image of the desired frequency occurs in a super-heterodyne circuit. Where the local oscillator is operated at a higher frequency than the incoming signal, the image will appear at a frequency which is the sum of the local oscillator frequency plus the I.F. frequency



Ignition Interference

IMAGE ORTHICON - An improved type of television camera tube which requires less illumination of the scene to be televised than the iconoscope. This type of TV camera is especially well adapted for remote pickup or sporting events or other programs away from the studio.

IMAGE REJECTION - A method of eliminating or weakening image frequency by use of preselector r.f. circuits.

IMPEDANCE - Total opposition of a circuit or of a component of a circuit to the flow of an alternating current. Measured in "ohms".

IMPEDANCE MATCHING TRANSFORMER - A device used to match antenna impedance to lead-in impedance where these happen to differ. May consist of a quarter-wave section of transmission line open at unconnected end.

INDUCTANCE COIL - Also called "inductance". - A coil of wire inserted in a circuit to oppose change of current flow. As long as current is steady coil has practically no effect, but the more rapid the change, the greater the effect. See choke.

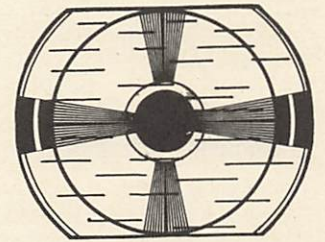
INDUCTUNER - Trade name for a TV tuner (station selector) which operates on a principle of varying inductances by the use of a sliding tap along the coil.

INSERTION LOSS - Signal loss between the input and output of a mixer in a UHF front end tuner.

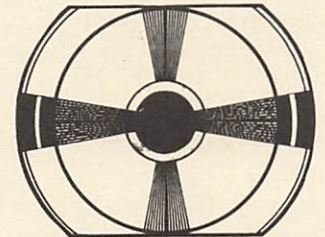
INSULATOR - A poor conductor of electricity. A material used to prevent electrical current from flowing.

INTEGRATION CIRCUIT - A circuit in a TV receiver which builds up a charge on a condenser in accordance with the duration of the vertical sync pulse. It consists of a simple low-pass filter which will not respond to horizontal pulses because of their short duration, thus providing a means of segregating the vertical sync pulses from the horizontal sync pulses. The vertical sync pulses thus obtained are used to control the timing of the vertical oscillator.

INTERFERENCE - Reception of undesired picture or sound signals which affect the reception of the television receiver. Interference may be caused by lightning, man-made static, amateur radio stations, neon lamps, flashing signs, diathermy, X-ray machines, spark plugs, etc.



INTERLACED SCANNING - Method of scanning whereby each complete picture is scanned from top to bottom in two scanings instead of in a single scanning. This is done by scanning only the odd numbered lines during the first scanning and then filling in the even numbered lines during the second scanning. A single scanning is called a "field". Two consecutive scanings comprise a complete picture or a "frame". If picture is defective due to poor interlace, this will cause horizontal lines of test pattern to appear wavy. The raster when observed without a picture signal will show unequally spaced return traces. This condition may be due to defective resistors or condensers or both in the integrating circuit.

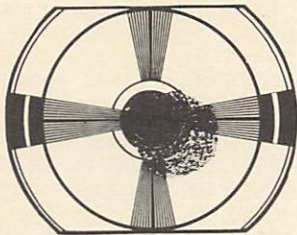


INTERCARRIER SYSTEM - A system of television reception in which the sound signal is not separated from the picture signal until after the "video detector". This method reduces the number of tubes required and simplifies the circuit.

INTERMEDIATE FREQUENCY - See I.F.

INTERMITTENT - A fault in a television receiver which appears at irregular intervals.

ION SPOT - A dark brown or yellowish spot at the center of the picture tube due to the decomposition of the phosphorescent coating inside the face of the tube under the impact of ions. May be prevented by the use of an "ion trap".



ION TRAP - A device employing permanent magnets or in some few instances an electromagnet, which fits over the neck of the picture tube serving to attract the ions so that they will be deflected from the path of the electron beam and thus be prevented from striking the fluorescent screen. Sometimes called a "beam bender".

J

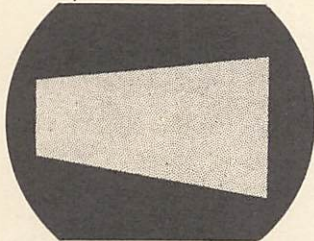
JACK - A receptacle which provides a means for making temporary connections to a TV set or radio set through the use of an external closely fitting "plug".

K

KEYED AUTOMATIC GAIN CONTROL - Also called "gated AGC" - See "Automatic gain control". An improved system of automatic gain control which acts much faster than previous systems. Keyed AGC acts fast enough to compensate for airplane interference (called "flutter") and it is practically immune to noise which comes in with the picture signal.

KINESCOPE - A trade name for a picture tube.

KEYSTONE RASTER - A picture defect in which the raster assumes a trapezoidal shape. If trapezoid is narrowed at top or bottom trouble is caused by the fact that one of the horizontal deflection coils is shorted. Raster size is reduced both horizontally and vertically. If trapezoid is on its side with the narrow side either at the left or the right, this trouble is due to a shorted vertical deflection coil. Raster size is normal horizontally but is reduced vertically. In each case, the shorter side of the trapezoid will face the shorted coil.



L

LEAD-IN - Generally called a "transmission line". Conductors used to connect the antenna with the television set.

LECHER WIRE - A bare parallel wire arrangement including a shorting bar used in UHF circuits for tuning or for measuring frequency.

LIGHTNING ARRESTOR - A device for diverting lightning from antenna to ground and away from the television set.

LIMITER - A circuit in the television sound section and in FM receivers in general, for limiting the amplitude of signals to a common level.

LINEARITY - See "Horizontal linearity" and "Vertical linearity". Correct proportioning of image at all points on picture screen.

LINEARITY CONTROLS - Adjusting controls on a television receiver for restoring vertical and horizontal linearity to a distorted picture.

LINE CORD - The wires which are used to connect the television set to the house lighting circuit.

LINE FILTER - A circuit which prevents electrical disturbances in the power supply line from reaching the television receiver.

LINE-OF-SIGHT RECEPTION - A characteristic of high frequency waves used in television transmission which limits reception to a distance within the line of sight. This accounts for increased range of reception obtainable by increasing the height of the antenna.

LINE VOLTAGE - The voltage of the power supply line. In most sections of the United States line voltage is either 110 or 117 volts.

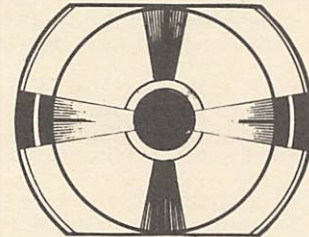
LOOPS - In a lead-in or transmission line in which standing waves are present, those points along the line which show maximum voltage.

LOUD SPEAKER - See "Dynamic Speaker" and "PM Speaker".

LOW PASS FILTER - A filter which will pass currents of all frequencies below a certain critical value but will weaken or attenuate greatly, currents of frequencies above this value.

LOW VOLTAGE POWER SUPPLY - This is a circuit in a television receiver which supplies direct current voltages to the plates and screen grids of the vacuum tubes in the set.

LOW FREQUENCY RESPONSE - The ability of a television receiver to amplify frequencies of from 200 cycles per second down to one or two cycles per second. If low frequency response is poor large objects will be indistinct and smeared. For example, a long black object will show smears or streaks at its right end. Loss of low frequencies very often results in defective vertical blanking in which case vertical return lines become plainly visible. Causes of poor low frequency response are improper R.F. and I.F. alignment, defective coupling condensers, defective video amplifier cathode by-pass condensers, defective video detector load resistor or defective first video amplifier grid resistor.



LUG - A metal connector which is fastened mechanically to the end of a wire and then soldered to the wire. It then provides a convenient and sure means of connecting the wire to a binding post.

LUMPED CONSTANTS - This refers to inductance, capacity or resistance of coils, condensers or resistors respectively in TV circuits. Lumped constants are used to supplement distributed constants in UHF circuits.

MAGIC EYE - Trade name for an electron-ray vacuum tube. This tube indicates visually, by means of a fluorescent target, the effects of a change in a controlling voltage. Used as a means of indicating accurate radio set tuning, especially in FM receivers.

MAGNET, ION TRAP - See "Ion Trap".

MAGNETIC DEFLECTION - The most generally used method of deflecting the electron stream in a picture tube. This stream must be deflected both horizontally and vertically and this is accomplished by two separate pairs of coils, each pair carrying currents of suitable nature which create changing magnetic fields capable of affecting the electron beam. Deflection coils are mounted around the neck of the picture tube.

MAGNETIC FIELD - The area around a magnet through which magnetism acts.

MAGNETIC FOCUSING - A method of directing and concentrating the electron beam of a picture tube so that it will be focused at a single spot on the fluorescent screen. In this method a coil carrying direct current placed around the neck of the tube is used to produce the desired magnetic field.

MARKER - A calibrated high frequency signal used by service technicians to indicate the exact frequency of a wave form being examined on an oscilloscope.

MASK - The piece of felt placed on the inside of the safety glass. This felt mask frames the face of the picture tube. The face of the picture tube must fully contact the surface of the mask. In some TV sets, sponge rubber masks are used instead of felt.

MASK, PLASTIC - A solid optically clear plastic safety mask used in front of the picture tube screen.

MATCHING - Correct fitting of an electrical load to its supply source. For example, a loud speaker must be matched to its supplying output transformer. A transmission line must be matched to its antenna at one end, to the input of the television set at the other end. Matching is accomplished by making the impedances of the two circuits to be matched approximately equal.

METER - An instrument used for measuring electrical units. For example common types of meters used by television technicians are "voltmeters", "ammeters" and "ohmmeters". A meter is also a unit of length commonly used in television to measure the length of a TV wave. One meter is equivalent to 39.37 inches.

MFD - Abbreviation of "Microfarad".

MICROFARAD - One millionth of a farad. See "farad".

MICROMICROFARAD - One millionth of a microfarad.

MICROPHONIC TUBE - A vacuum tube having faulty elements whose vibrations produce a ringing sound in the loud speaker and streaks or bars in the picture.

MINIATURE TUBE - A small glass vacuum tube $1\frac{1}{2}$ inches to $1\frac{7}{8}$ inches high, having seven or nine contact pins.

MISALIGNMENT - A trouble which sometimes occurs in television receivers which results in picture faults, sound faults, or both. If misalignment occurs in the front end, this means that the R.F. circuit, mixer circuit and oscillator circuits are incorrectly adjusted and both picture and sound will be affected. If misalignment occurs in the video I.F. circuit, only the picture will be affected provided intercarrier circuit is not employed. If misalignment occurs in the sound I.F. portion of the TV set, only the sound will be affected.

MIXER - A vacuum tube or crystal used in a TV or radio circuit for "beating" or "mixing" the incoming signal with a fixed frequency from a local oscillator, thereby reducing the frequency of the signal to a desired intermediate frequency.

MIXER ALIGNMENT - The process of tuning the mixer stage of a television receiver.

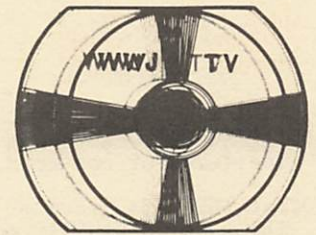
MIXER TUBE - Also called a "first detector". A vacuum tube in a television set or other superheterodyne circuit in which the incoming signal is mixed with the signal from a local oscillator to obtain a signal having same characteristics as the received signal but a lower frequency called the "intermediate frequency".

MIXER-OSCILLATOR CIRCUIT - This is a part of the front end circuit of a television receiver which includes the mixer and the oscillator tubes. Both tubes are sometimes combined in a single envelope.

MMF - Abbreviation of micromicrofarad.

MOSAIC - A deposit of photo-sensitive silver globules on a thin mica sheet within iconoscope (camera tube). The mosaic plays an important part in converting light into electrical impulses.

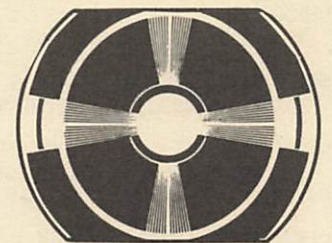
MULTIPLE IMAGES - Also see "Ghosts". A picture defect wherein more than one image appears on the screen either horizontally or vertically. In the former case, trouble is due to incorrect horizontal sweep frequency; in the latter case trouble is due to incorrect vertical sweep frequency. Multiple images also are caused by reflections of incoming signals against buildings or reflections due to mismatched lead-in. In both latter cases, they are called "Ghosts". Ghosts are distinguished from multiple images caused by incorrect sweep frequencies since the latter appear as several distinct and separate pictures whereas ghosts are duplicate images quite close to the desired image.



MULTIVIBRATOR - A form of oscillator used in some television sets to provide "sawtooth voltage" for horizontal and vertical deflection circuits.

N

NEGATIVE PICTURE - Also called "Bas-Relief", "Engraved Effect" and "Reversed contrast". A picture defect in which parts that should be white appear to be black and vice-versa. May be caused by defective video amplifier tubes, by advancing contrast control too far, by defective video detector, defective peaking coils, excessively strong signal, or by interference picked up by video amplifier. In some cases this trouble may be caused by a defective picture tube.



NEGATIVE TERMINAL - A terminal of a circuit lower in potential than other parts. The terminal towards which electrical current flows.

NEGATIVE BIAS - A measure of the amount of voltage by which the grid of a vacuum tube is negative with respect to the cathode.

NEGATIVE TRANSMISSION - A system of television transmission used in this country in which a darker scene needs more power output from the transmitter than a lighter scene.

NEON - A gas used in small lamps and tubes which glows when electric current is applied to them. A small neon lamp makes an excellent detector of high voltage.

NOISE - A form of "interference" which changes the character of the television signal causing streaks in the picture and crackling sounds to come from the loud speaker.

NOISE LIMITING CIRCUIT - Special circuits in TV sets, designed to prevent loss of horizontal and vertical synchronization due to noise (interference) pulses picked up along with desired signal. Such circuits are also referred to as noise "suppressor" circuits, noise "canceller" circuits, noise "immunity" circuits, noise "inverter" circuits and noise "suicide" circuits. Most of these are based on the principle of cancelling the unwanted noise pulses, without affecting the wanted signal.

NON-CONDUCTOR - An insulator. A substance which offers high opposition to the flow of an electric current.

NON-LINEARITY - See "Horizontal non-linearity" and "Vertical non-linearity".

NOVAL TUBE - A miniature tube type having nine prongs used in television receivers.

O

OCTAL SOCKET - A vacuum tube socket having eight apertures or contacts. Used with an octal tube.

OCTAL TUBE - A vacuum tube having an octal base. The base is usually made of bakelite and has eight metal pins which make contact with the tube elements and a bakelite center key which permits the tube to be inserted in its socket in only one way.

OHM - The basic unit of electrical opposition to current flow. The unit of "resistance".

OHM'S LAW - The fundamental law governing the action of an electric current. This law states that the current flowing in any circuit is directly proportional to the voltage applied to that circuit and inversely proportional to the resistance of that circuit. Stated more simply, if the voltage applied to a circuit is doubled, the current will also be doubled. If the resistance is cut in half, with other conditions remaining the same, the current will be doubled.

OHMMETER - An instrument used by servicemen to measure the resistance of an electrical circuit.

OMNI-DIRECTIONAL ANTENNA - A television antenna which works equally well in all directions.

OPEN CIRCUIT - An incomplete electrical circuit. A circuit in which current is prevented from flowing because of an incomplete conductive path.

OPEN WIRE TRANSMISSION LINE - A television lead-in which employs two parallel conductors having air-dielectric and separated at suitable intervals by low-loss insulating separators. This type of transmission line is characterized by very low losses and is affected only slightly by weather conditions. Recommended for use on long lines.

ORIENT - To turn the TV antenna in a certain direction.

ORTHICON - See Image Orthicon.

OSCILLATOR - A combination of a vacuum tube and other circuit components capable of transforming direct current into alternating current of any desired frequency.

OSCILLATOR ALIGNMENT - The process of tuning the oscillator stage of a television receiver.

OSCILLOSCOPE - See "Cathode ray oscilloscope".

OUTPUT TUBE - The vacuum tubes in a television set which feed signals to the loud speaker and to the picture tube. The former is called a sound output tube, the latter the video output tube.

P

PADDER - A small mica condenser, capable of being adjusted with a small screw driver. Used in television receivers for adjusting circuit alignment.

PARALLEL CONNECTION - A form of electrical circuit which provides two or more paths for the current. For example, if the top end of one condenser is connected to the top end of another condenser and the two bottom ends are similarly connected together, the two condensers are said to be connected in parallel.

PARALLEL LINE - A two-wire transmission line. See "Lead-in".

PARASITIC ELEMENT - A reflector, or a reflector and director used in an antenna array.

PEAKING COIL - A small air core coil used in the video amplifier circuit of the TV set to improve picture reproduction.

PERSISTENCE OF VISION - A characteristic of the eye whereby it retains the impression of light after the source of light has disappeared.

PHASE - In connection with an electrical current, phase refers to the relative timing of voltage and current.

PHASE CONTROL - Used in television sets equipped with automatic sync control to permit adjustment so that return of the deflected beam takes place only when beam is blanked out and not while picture information is being received.

PHASE INVERTER - A vacuum tube or circuit used to reverse or invert the signal phase.

PIG-TAIL - Metal conductor extending from the ends of resistors, condensers and other components.

PICK-UP, PHONO - An assembly, consisting of phonograph arm, crystal or magnetic cartridge and needle used in an electric phonograph to "pick up" mechanical vibrations from the phonograph record and convert these to electrical impulses which are brought to the input of an audio frequency amplifier.

PICK-UP TUBE - See "Camera" tube.

PICTURE ELEMENT - A minute component of a television image placed in sequence along each line of the picture. There are approximately 500 to 600 elements in a single picture line, and hence in 485 active lines there are about 270,000 picture elements.

PICTURE FREQUENCY - Also called "picture repetition rate". The number of complete pictures or "frames" scanned and transmitted per second.

PICTURE TUBE - The large tube (also called Cathode ray tube) in a television receiver which reproduces the scenes taking place before the camera tube at the television transmitter. It is the face of this tube on which you see the picture.

PLATE - See "Anode".

PLATE VOLTAGE - The voltage measured between plate and cathode of a vacuum tube. Plate voltage is always positive with respect to cathode.

PLUG - A device having an insulated handle for making temporary connection to a radio or TV set. The metal contact tip is designed to fit tightly into a receptacle in the set known as a jack.

POTENTIAL - This word is used to express the same meaning as "electromotive force" and "voltage". It defines the degree of electrical pressure. "Difference of potential" is the difference in electrical pressure between two definite points in an electrical circuit.

POTENTIOMETER - In television sets, this is a circular variable resistor, used to vary and control the voltage or signal strength applied to different parts of the TV circuit. Illustrative examples are hold control potentiometers and brightness control potentiometers. A potentiometer is also used to control volume.

POWER - The time rate of performing work.

POWER AMPLIFIER - An amplifier which provides considerable power output. In television sets, the last stage before the speaker (that is the portion of the circuit which includes the output tube) is the power amplifier. The video amplifier is also considered to be a power amplifier.

POWER SUPPLY - Television sets are equipped with a low voltage power supply and a high voltage power supply. The former usually includes a transformer, rectifier tube(s) and a filter. In some low voltage power supplies, voltage doubler or tripler systems permit elimination of the transformer. (See "Low voltage power supply"). The high voltage power supply furnishes high voltage to the picture tube and also includes rectifier tube(s) and filter plus a special transformer. In some TV sets this special transformer is a "fly-back" transformer, also called a "high voltage horizontal output transformer". Other types of TV sets use a special transformer known as an "R.F. Transformer".

PM SPEAKER - A loud speaker extensively used in TV sets, which has a moving coil attached to the base of a paper cone and a P.M. (Permanent magnet) to provide the magnetic field. Audio currents flow through the movable coil causing the paper cone to vibrate and emit sounds.

PRIMARY - The input winding of a transformer.

PRINTED CIRCUIT - A type of circuit coming into extensive use in television sets, wherein the components and the wiring form a compact single unit. The base of the printed circuit is a ceramic plate. The wiring is made of silver, which is pressed into the base as a silver compound. When subjected to intense heat, the compound becomes an extremely thin conductor of almost pure silver, which cannot be removed from the base except by enormous force. A carbon mixture is pressed on as a resistive element and the ceramic capacitive elements may be added separately or the needed capacity may consist merely of the distributed capacity of the unit. Pig-tail leads extending from the unit are provided to permit connection to other circuits. Printed circuits are employed in TV sets, as diode filters, coupling circuits, vertical integrating networks, I.F. transformers, coils and wave traps.

PROBE, HIGH FREQUENCY - Accessory used with oscilloscope or vacuum tube voltmeter to permit accurate signal tracing in high frequency TV circuits. This type of probe usually incorporates a germanium crystal for rectifying the high frequency signal at the point of contact.

PROBE, HIGH VOLTAGE - Accessory used with vacuum tube voltmeter, which permits testing of high voltage circuits beyond the rated capacity of the meter.

PROJECTION RECEIVER - A television receiver which provides a large picture by projecting the images

from a small, very brilliant picture tube upon a large screen, using mirrors and lenses.

PULSES - Voltage waves used as part of the television signal to accomplish blanking of the picture at the end of each line of picture information and also to control timing or synchronization of the vertical and horizontal deflection circuits of the receiver. The pulses consist of sharp rises in voltage which retain their maximum values for definite but short time intervals and then drop back sharply again. They are known as "square waves".

PUSH-BACK WIRE - A type of conductor used to wire TV and radio sets, in which the insulation may be pushed back from the conductor.

PUSH-PULL AMPLIFIER - A connection of two separate vacuum tubes or two tubes in a single envelope whereby each tube aids the other to produce increased output with reduced distortion.

R

RADAR - A means of locating the distance and direction of a moving object such as an airplane, through the utilization of reflected radio waves.

RADIATION - The action of a transmitting antenna which sends radio waves into space.

RADIO FREQUENCY - Generally defined as frequencies above 100,000 cycles per second, although frequencies considerably lower are sometimes placed in this classification.

RFC - Abbreviation of "radio frequency choke".

RADIO FREQUENCY CHOKE - A coil consisting of relatively few turns of fine wire used in television sets to keep R.F. currents out of the power supply circuits and also used as "peaking coils" for improving the detail of the television picture.

RADIO WAVE - Waves used for broadcasting and telecasting. These waves travel at the speed of light, 186,000 miles per second.

RASTER - The bright area normally visible on the face of a picture tube when the TV set is turned on, but not tuned to an operating channel.

RATIO DETECTOR - A circuit used in a television or other FM receiver to separate the audio frequencies from the I.F. carrier frequency. A circuit which translates variations in I.F. frequency to variations in audio frequency in accordance with the time rate and the amount of the I.F. frequency changes.

RATIO DETECTOR ALIGNMENT - The process of tuning the ratio detector in the sound section of a television receiver.

REACTANCE TUBE - Also called a reactance modulator tube. A vacuum tube used in television receivers equipped with automatic frequency control, in place of a fine tuning control. This tube automatically returns the frequency of the local oscillator to its normal preset value if oscillator frequency drifts. A reactance tube is also used in automatic sync-lock circuits for holding the horizontal oscillator at its correct frequency with respect to the arrival rate of the horizontal sync pulses.

RECTIFIER - A device such as a two element tube or a selenium rectifier for converting alternating current into current flowing in only one direction.

REFLECTIONS - Arrival of a television signal at the receiver via more than one path produces multiple images due to reflection of the television wave from

intervening buildings or hills. Another type of reflection is caused by mismatch between transmission line and TV receiver.

REFLECTOR - An element similar to an antenna placed behind the antenna to produce a stronger signal in one direction. It is not connected to the lead-in and instead of being constructed of two insulated quarter-wave sections, it is made in one piece and slightly longer than one half wave length.

RELAY - A device by which contacts in one circuit are actuated by a change in conditions in another, or associated circuit.

RESISTANCE - Opposition to the flow of current.

RESISTOR - A component used to regulate current flow or reduce voltage.

RESOLUTION - A television picture is said to have good "resolution" if its detail is good.

RESTORER - See "D.C. Restorer".

RETRACE - The return of the picture tube electron beam from right to left is known as "horizontal retrace". The return from bottom to top is called "vertical retrace".

RETRACE LINES - Diagonally horizontal lines visible in the raster of a TV receiver or in the picture of a defective or poorly adjusted set. Usually about five or six lines are seen. These are due to the return of the electron beam from bottom to top.

RETURN TRACES - When the diagonal white lines (retrace lines) are visible, this may be caused by misadjustments of the brightness and contrast controls. Other causes are weak signal and poor low frequency response.



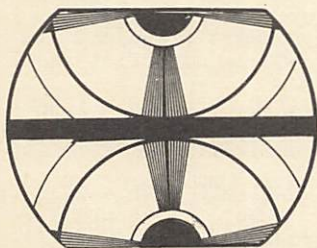
Return traces.

REVERSED CONTRAST - See "Negative Picture".

R.F. ALIGNMENT - The process of tuning the R.F. stage of a television receiver.

RHOMBIC ANTENNA - A special television antenna in the shape of four long conductors forming the sides of a rhombus. (Two V's facing each other). Has the advantage of high efficiency and the disadvantage that it requires considerable space since its efficiency varies directly with the length of its sides.

ROLLING - Movement of picture up or down. Due to a defect of vertical synchronization. Readjust vertical hold control.



Rolling

ROTARY ANTENNA - A directional antenna of narrow beam width, rotatable through 360 degrees by means of a small electric motor on top of the antenna mast. The control box for the motor is located near the television receiver.

ROTOR PLATES - The movable plates of a variable condenser.

S

SAFETY GLASS - Protective glass placed in front of face of picture tube.

SAWTOOTH WAVEFORM - A voltage wave or current wave which rises gradually and falls off steeply, thus resembling the shape of the teeth of a saw. This wave form is used in television receivers to accomplish both vertical and horizontal deflection. The comparatively slow rise in voltage gradually draws the beam from the top of the screen to the bottom. The rapid fall in voltage brings the electron beam back to the top of the picture in less than one-tenth the time needed for the downward trip.

SCANNING - The process whereby a picture is transmitted and put on the screen of the picture tube in minute units. The method now used is more fully described as horizontal linear scanning. Spots of light in varying shades are placed along a horizontal line from left to right and 525 lines make up the complete picture.

SCHEMATIC DIAGRAM - A method of showing connections and hook-up of components in a TV or radio set wherein the parts such as resistors, condensers, coils, etc. are represented by symbols rather than pictorially.

SCREEN - Fluorescent coating inside face of picture tube.

SCREEN GRID - An element of a vacuum tube located between control grid and plate.

SCREEN REJECTOR - Trade name for a flat screen-like reflector placed behind a UHF bow-tie antenna.

SECONDARY - The output winding of a transformer.

SECONDARY EMISSION - Electrons discharged from a surface by the impact of other electrons.

SELECTIVITY - The ability of a television set to accept or tune in desired channels and reject undesired adjacent ones.

SELECTOR SWITCH - Switch used to tune in different TV channels.

SELENIUM RECTIFIER - A device consisting of a number of stacked metal plates coated with selenium. This offers low resistance to the flow of current in one direction and high resistance in the reverse direction. Hence, it can be used as a rectifier of alternating current instead of a vacuum tube.

SENSITIVITY - The ability of a television set to respond to signals of a specified signal strength is a measure of its sensitivity.

SERRATIONS - These are slots in the vertical sync pulse for the purpose of preventing loss of horizontal synchronization during the vertical pulse interval.

SHIELDING - Metal shell or housing placed over R.F. and I.F. coils or other parts to prevent undesired interaction between various parts of the television circuit.

SHIELDED LINE - A transmission line such as a coaxial cable having an outer flexible metallic cover which acts as a shield.

SHIELDED WIRE - An insulated wire used in certain parts of the television receiver, which is covered by flexible metallic shield.

SHORT CIRCUIT - An undesired low resistance path taken by an electric current which causes unusually high current flow.

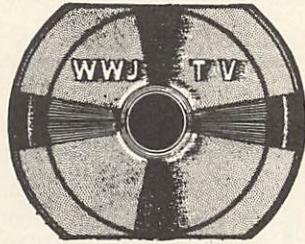
SIDE BANDS - A band of frequencies either side of the carrier frequency known as upper and lower side bands.

SIGNAL - This refers to the composite TV signal which contains picture information, blanking pulses, equalizing pulses and vertical and horizontal sync pulses.

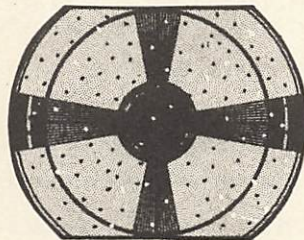
SIGNAL TRACING - A method of television trouble shooting whereby the signal is traced from one point to another and its changes are noted on an oscilloscope or vacuum tube voltmeter. See "Test Probe".

SIZE CONTROL - Potentiometers used to adjust the height and width of the TV picture.

SMEARING - A picture condition caused by poor low frequency response, wherein large black vertical objects are followed by gray or white smears. This condition is usually most noticeable after large vertical letters of station patterns. First check for defective load resistor at video detector. Fault may be due to excessive bias on 2nd video amplifier. A somewhat similar fault known as "streaking" consists of long horizontal streaks after large objects. This is due to excessive low frequency response. May be due to an open coupling condenser at the picture tube grid.



SNOW - This name describes the characteristic appearance of the picture when a very weak signal arrives at the picture tube.



Snow

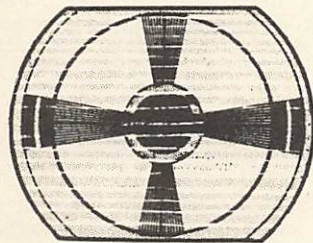
SOCKET - An insulating receptacle for holding and making electrical connection with a vacuum tube, a picture tube, a plug or an incandescent lamp.

SOLDER - An alloy of lead and tin used for making good electrical connections.

SOLDERING GUN - A type of soldering iron in which heating is accomplished by transformer action rather than by use of a resistance type heating element.

SOUND I.F. ALIGNMENT - The process of tuning the sound I.F. stages of a television receiver.

SOUND INTERFERENCE - A picture defect caused by sound signals reaching the control grid of the picture tube. Readjust sound trap as first remedy.



Sound Interference

SOUND SECTION - This is the portion of the TV receiver devoted solely to the handling of the sound signal.

SOUND TRAP - A circuit in a TV set used to prevent sound signals from reaching the picture tube.

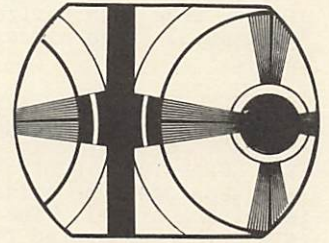
SOUND WAVES - Vibrations of from 30 to 20,000 cycles per second.

SPAGHETTI - Tubular insulating material placed over wiring inside the TV set to furnish added insulation.

SPARK-OVER - When corona between two oppositely charged conductors exceeds a critical value, a low resistance path exists between the two conductors and a spark known as "spark-over" results. This is accompanied by a characteristic snapping sound.

SPLIT-SOUND CIRCUIT - Name given to TV receiver circuit where sound signal is separated from picture signal before reaching the video detector.

SPLIT PICTURE (Horizontally) - A picture condition wherein the left-hand portion of the picture is on the right side and the right-hand portion of the picture is on the left side, with a dark vertical bar between. This defect can usually be remedied by re-adjusting the slug in the horizontal discriminator transformer. However, the trouble may also be due to a defective horizontal discriminator tube or to a defective condenser in this portion of the circuit.



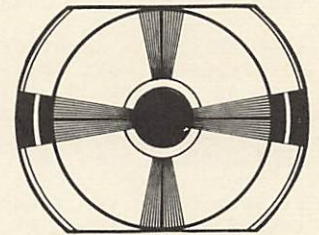
SPLIT PICTURE (Vertically) - Picture defect wherein lower portion of picture appears at top and upper part at bottom with dark horizontal bar between. This is usually due to defective tubes in vertical sync section.

SPURIOUS FREQUENCIES - In television or radio, this refers to undesired frequencies present in the receiving set, due to interference, images or oscillations.

SQUEGGING - A defect in a television receiver caused by intermittent functioning of the local oscillator at an audible or slightly higher than audible rate. May be caused by an open grid resistor or one whose value has greatly increased. Results in noisy unnatural sound and streaky picture.

SPEAKER - See "Dynamic Speaker" and "PM Speaker".

STATION PATTERN - A pattern used by all TV transmitting stations and sent out for a short period of time preceding each telecast. Useful in checking the performance of television receivers and transmitters.



Station Pattern

SWEEP SIGNAL GENERATOR - An instrument used by television servicemen for aligning television receivers and also for trouble shooting.

STACKED ARRAY - A multiple arrangement of television antennas and parasitic elements, one set above another. Some television installations use four complete sets.

STANDING WAVES - These occur in a television lead-in in cases where antenna and TV receiver impedances are very badly mismatched to the lead-in impedance. As a result of such mismatch, reflections of the signal occur in the lead-in. These add to or subtract from the incoming signals and in this way establish fixed points of high voltage along the lead-in and other fixed points of very low voltage between the high voltage points with a separation between high and low points of one-quarter wave-length. Such waves are called "standing waves". Their presence in a lead-in is undesirable since they reduce signal strength due to radiation and may cause "ghosts".

STATIC - Atmospheric static consists of electrical discharges due to lightning and other similar electrical disturbances which cause noise in the TV set. "Man-made" static produces similar results, but is due to sparking electrical equipment.

STATION SELECTOR - See "Selector switch".

SUPERHETERODYNE CIRCUIT - A circuit used in all TV receivers and most radio sets. Its chief feature is the fact that all incoming signals are mixed with the signal from a local oscillator to produce a new lower frequency signal called the intermediate frequency.

SURGE IMPEDANCE - See "Characteristic Impedance".

SWEEP CIRCUITS - Circuits which generate a sawtooth wave form used to sweep the electron beam of the picture tube both horizontally and vertically. See "Horizontal sweep circuit" and "Vertical sweep Circuit".

SYNC PULSES - See "Horizontal Synchronization" and "Vertical Synchronization".

SYNC SEPARATOR CIRCUIT - A circuit in a TV set used to separate sync pulses from the remainder of the television signal. The horizontal and vertical pulses are then separated from each other and used to control the timing of their respective sweep circuits.

SYNCHROGUIDE HORIZONTAL LOCK SYSTEM - A circuit used in many present-day TV sets for controlling horizontal synchronization. It uses a 6SN7GT tube as a combined horizontal AFC (automatic frequency control) and horizontal blocking oscillator. It is characterized by the fact that it employs a tunable inductance in its output circuit for waveform adjustment.

T

TEARING - A TV picture defect in which a portion of the picture appears to tear away horizontally.

TERMINAL - A point at which one circuit is connected to another. A place in a circuit specifically provided for making a connection.

TEST PATTERN - A pattern transmitted at regular intervals by most television stations for the purpose of testing and adjusting receivers tuned to these stations. See "Station Pattern".

TEST PROBE - Also see "Probe, High frequency" and "Probe, High voltage". A device which permits the TV serviceman to trouble shoot a television set by taking off a signal at any desired point in the circuit without appreciable loss and bringing this to an indicating test instrument, such as an oscilloscope or vacuum tube voltmeter. This process is called "signal tracing". The test probe is equipped with a metallic tip for making temporary contact with the desired point in the circuit. This tip is securely held in a low-loss insulated handle. The point where the tip emerges is often made of high dielectric lucite. Test probes are classified according to their use as RF or High Frequency probes, low capacitance probes, capacitance divider probes, tuned signal tracing probes and voltage doubler probes. The r.f. probe contains a crystal rectifier, while other types of probes may contain crystal or tube rectifiers, carbon ceramic resistors and suitable condensers. A shielded cable is used to convey the signal from the probe to the indicating test instrument. A lead from the shield, provided with a clip, is used to make connection to the chassis or ground point of the set under test.

TEST PRODS - Used for making a momentary connection between points in the TV set under test and a measuring instrument such as voltmeter. The prods consist of insulated shafts used as handles, with metallic tips at one end for making contact and leads coming out of other end for connection to the measuring instrument.

TRANSISTOR - A semi-conductor, usually a germanium crystal, set in a suitable moisture-proof container and provided with electrodes at each end and also in the center. Actually, the germanium in present day transistors is of two different types, a thin layer in the center called "P-type", that at each end called "N-type". Different types are obtained by treating the germanium with different chemicals. Such

transistors are known as "junction" type. Another, older type consists merely of a germanium crystal soldered to a metal electrode and having two pointed wires touching the crystal near each other. This type is known as a point-contact transistor. Transistors can be made to function in place of vacuum tubes as amplifiers and oscillators, but present day usage is limited not only by their high cost, but also by difficulties in production and by the fact that a slight amount of moisture reaching the crystal can spoil its operation.

TRANSIT TIME - This is the time, measured in microseconds, for electrons to move between the adjacent elements in a vacuum tube.

TRANSFORMER, BIFILAR - A type of video I.F. transformer in which primary and secondary are interwound so that a secondary turn is wound about a primary turn, followed by another secondary turn and again by a primary turn, close wound and still suitably insulated to prevent d.c. leakage to the secondary. This provides exceedingly close coupling and results in a high mutual inductance which enables the two windings to act as a single unit requiring only one resonant adjustment. Use of the Bifilar Transformer has the additional advantage of better isolation between stages and permits the elimination of the coupling capacitor.

TRANSMISSION LINE - See "Lead-in".

TRAPS - Circuits in a TV receiver used to filter out undesired signals.

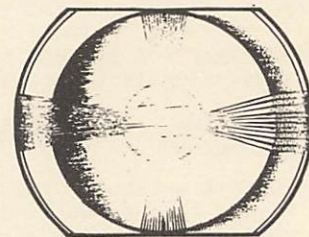
TRIMMER CONDENSER - A small adjustable mica condenser.

TRIODE - A three element vacuum tube having a cathode, a grid and a plate.

TROUBLE INDICATING TUBE LOCATION GUIDE - A new copyrighted method of indicating the source of tube trouble in a television set, devised by the author, wherein a top view chart of a particular TV set is provided, showing the location and tube type of each tube in the set, and further showing the part that each tube performs in the operation of the set. Thus if a tube function is to amplify the sound signal it is labelled "S". If used to amplify the picture signal it is marked "P", etc. Through the use of this method, it is possible to determine source of trouble at once and replace tubes which affect picture, picture and sound, brightness, vertical movement, horizontal movement, contrast, etc. TITL Guides for thousands of television models are available in H.G. Cisin's TV TUBE LOCATOR.

TROUBLE SHOOTING - The process of locating faults in a television receiver.

TUBE BRIGHTENER - An adapter consisting essentially of a step-up transformer, a plug and a socket. The socket is mounted on the base of the picture tube and the plug fits into the original picture tube socket. The action is to step up the picture tube heater voltage enough to increase electron emission but not enough to burn out the filament. The result is a brighter picture in cases where dull quality and lack of contrast are due to a defective picture.



Defective Picture Tube

TUBE LOCATION GUIDE - A chart which shows the location of each tube in a television set. See "TROUBLE INDICATING TUBE LOCATION GUIDE".

TUBE NOISE - Intermittent undesired voltages generated within vacuum tubes due to random movement of electrons called "thermal agitation" and also due to

impact of electrons on plate of tube. This latter source of noise is called "shot effect". Where desired signal is small, these two effects set a limit on the useful amplification at the front end of the TV set.

TUNING SYSTEM - Methods by which the TV set may be tuned to different television channels. These include rotary band switches, drum or turret tuners, variable air condensers and variable inductances.

TURRET TUNER - This is a drum-like arrangement used as a station or channel selector. Different sets of coils are needed for tuning in different channels and each set is mounted within the drum on a different set of contacts. As the drum is revolved the contacts disconnect one set of coils and switch another set into the tuning circuit.

TVI - Abbreviation of "Television Interference" - Any type of interference with the television picture due to reception of undesired signals. TVI may be caused by radiation from various types of transmitters, or from oscillations in neighboring receivers or in other types of electronic apparatus or it may be due to sparking or arcing in electrical devices. See "Interference".

TWEETER - A small loud speaker capable of emitting the higher audio frequencies, generally used in conjunction with a large speaker called a "woofer" designed especially to reproduce audio frequencies below 600 cycles.

TWIN-LEAD - Lead-in (transmission line) most commonly used to connect antenna to television set. Consists of two parallel conductors imbedded in a flat ribbon-like insulating plastic material.

U

UHF (Ultra High Frequency) - All frequencies between 300 megacycles and 3000 megacycles are designated as ultra high frequency. The UHF band for television extends from 470 to 890 megacycles. There are provisions for 70 channels, each 6 megacycles in width. These are numbered from 14 to 83.

UHF ANTENNA - These are available in various designs. The folded dipole, double-V and Yagi are similar to the antennas used for VHF, but are shorter in order to be resonant at the higher frequencies. Other types include rhombic, conical, fan dipole, corner reflector, slot, colinear array and stacked bowtie.

UHF CONVERTER - A device used in conjunction with a VHF television set to enable it to receive UHF signals. See "Converter, UHF".

UNBALANCED LINE - A television lead-in (transmission line) in which the conductors are at different potentials above ground.

V

V-DIPOLE ANTENNA - A dipole antenna of V-shaped construction. Open end of "V" is faced toward station to be received; lead-in is connected to the points where the arms come together.

VHF - Very High Frequency - The range or band of frequencies between 30 and 300 megacycles. Most of this band of frequencies is used for television transmission.

VACUUM TUBE - A partially evacuated tube having a glass or metal envelope, always containing cathode

and a plate and sometimes also containing other elements to control or speed up electron flow from cathode to plate. Usually a means of heating cathode electrically is also provided.

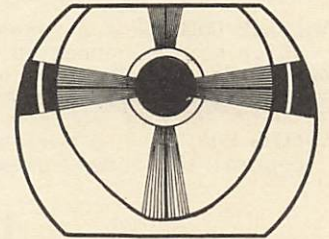
VACUUM TUBE VOLTMETER (VTVM) - A voltmeter which uses the amplifying functions of one or more vacuum tubes to permit measurement of very small voltages without requiring high sensitivity meter movements. The VTVM has practically no loading effect on the circuit under test and when used with suitable probes, can be employed to measure voltages of any frequency encountered in television servicing. May be used to measure either a.c. or d.c. and when measuring the latter will indicate either positive or negative polarity. Can be adapted to measure very high voltages through the use of a high voltage probe.

VERTICAL BLANKING - Blanking out of the picture tube illumination during the time interval that the electron beam is being returned from the bottom to the top of the picture.

VERTICAL DEFLECTION - Movement of the electron beam in a picture tube in a vertical direction.

VERTICAL LINEARITY - A condition in a television picture which results when the electron beam is swept from top to bottom at a uniform speed. The resulting picture then retains its natural proportions in a vertical direction.

VERTICAL NON-LINEARITY - A condition in a television picture which results when the electron beam is swept from top to bottom at a non-uniform rate of speed. The resulting picture will then appear to be squeezed or expanded vertically depending upon the way in which the speed of the beam is affected. In some cases the top part of the picture is spread out and the lower part squeezed, while in others just the reverse condition is found. Sometimes a portion of the picture is squeezed or spread apart vertically and the rest of the picture is normal.



Causes of vertical non-linearity include misadjusted or defective vertical linearity control, open cathode by-pass condenser in vertical amplifier, defective coupling condensers in vertical sweep circuit, open condenser or resistor in sawtooth maker, shorted turns in vertical output transformer, shorted turns in vertical deflection coils or defective vertical sweep tubes.

VERTICAL OSCILLATOR - A circuit including a vacuum tube which generates a sawtooth voltage for producing vertical deflection.

VERTICAL SWEEP CIRCUIT - That circuit in a television set which causes the electron beam of the picture tube to sweep across the face of the tube in a vertical direction.

VERTICAL SYNCHRONIZATION - A method of timing the vertical sweep in a TV set so that each field will be swept by the electron beam in exact time with the action at the transmitter. This timing is accomplished by means of vertical sync pulses which occur at regular intervals at the end of each field.

VESTIGIAL SIDE BAND TRANSMISSION - The method of television transmission now in use suppresses most of the lower side band in order to permit the use of a smaller channel width than would otherwise be possible. The word "vestigial" means "partial". Only a vestige of the lower side band remains, the rest being filtered out.

VIDEO - From the Latin, meaning "to see".

VIDEO AMPLIFICATION - The amplification of video signals after detection (after separation from the video I.F. carrier.)

VIDEO DETECTOR - A diode vacuum tube or a crystal detector used in a circuit to remove the picture information from the I.F. carrier.

VIDEO FREQUENCIES - Frequencies used to convey picture information. Video frequencies range from a few cycles up to over 4 megacycles.

VIDEO I.F. ALIGNMENT - The process of tuning video I.F. amplifier. Usually accomplished by adjusting powdered iron slugs within I.F. coils. This process involves the use of a sweep signal generator and an oscilloscope.

VIDEO I.F. SECTION - This is the section of the television receiver which receives the video I.F. signal from the mixer and amplifies it to a value high enough to actuate the video detector.

VIDEO SIGNAL - The part of the television signal which contains only picture information.

VIEWING SCREEN - In projection type TV sets, this is a large translucent or reflecting screen on which the picture is projected. In direct viewing TV sets the viewing screen is the fluorescent face of the picture tube.

VOLT - The unit of electrical pressure. It is the pressure necessary to send a current of one ampere through a resistance of one ohm.

VOLTAGE BOOSTER - A transformer or autotransformer which may be connected between TV set and power source for the purpose of stepping up line voltage, where latter falls below the required minimum value.

VOLUME CONTROL - A variable potentiometer used to control the sound volume in a TV or radio set.

W

WAVE GUIDE - A hollow pipe, ordinarily rectangular in form, made of conducting material. Used for conduction of electromagnetic waves at ultra high frequencies. The outer surface of the pipe is kept at ground potential.

WAVELENGTH - The length of a radio wave measured between two consecutive symmetrical points such as two positive peaks of voltage or current.

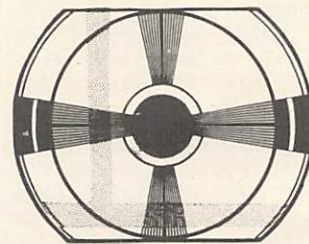
WAVE TRAP - A circuit which traps out or suppresses signals of an unwanted frequency while permitting desired signals to pass.

WIDE BAND AMPLIFIER - One which gives uniform amplification over an extensive range of frequencies.

WIDTH CONTROL - A control used to regulate or adjust the width of a television picture.

WINDSHIELD WIPER EFFECT

A picture defect characterized by the movement of a dark vertical bar across the picture from left to right. Usually caused by interference from another channel. The first remedy is to try re-orienting the antenna.



WOOFER - A large loud speaker, generally used in conjunction with a "Tweeter", designed to reproduce audio frequencies below 600 cycles.

Windshield Wiper Effect

Y

YAGI ANTENNA - An array of antenna elements consisting of a dipole antenna, a "Reflector" and a number of "Directors". The lead-in connects only to the dipole antenna element. The reflector is placed at a definite distance behind the antenna element (about $2/10$ wavelength) away from the station to be received. The directors are placed at definite distances in front of the antenna (about 0.15 wavelength between antenna and director and between directors). For best results, the exact distances between directors is determined experimentally. The director nearest the antenna is slightly shorter than the latter.

Each succeeding director is then made shorter than the preceding one. The purpose is to produce radiation from each director which will be cumulative in a forward direction, so that the signal received by the antenna element will be greatly strengthened.

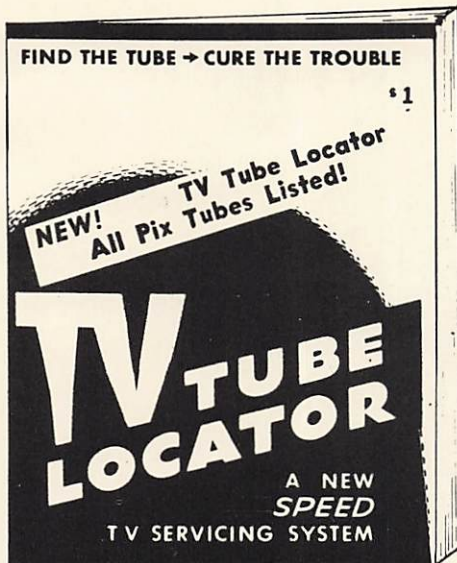
YOKE, DEFLECTION - Two sets or pairs of coils, one pair used to deflect the electron beam vertically and the other pair used to deflect the beam horizontally, in combination are called the deflection yoke.

The vertical coils are energized by a 60-cycle sawtooth current, the horizontal coils by a 15,750 cycle sawtooth current.

Yokes in present-day television sets are designed for use with 66-70 degree cathode ray tubes. Average horizontal winding inductances range from 10.5 mh to 30 mh. Average vertical winding inductances are from 30 to 50 mh.

LEARN MORE ABOUT TELEVISION!

H. G. Cisin's Up-to-the Minute Service Books Help Solve TV Problems

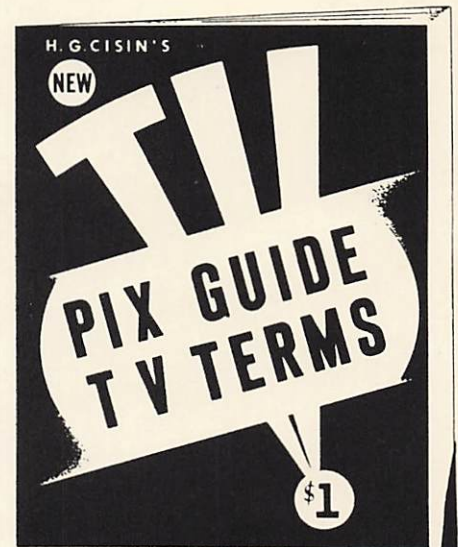


Money-making Time Saver tells which tubes to replace to cure every type of tube trouble. Over 135 such TV troubles listed with clear charts for quickly locating the faulty tubes. Copyrighted **TROUBLE INDICATING TUBE LOCATION GUIDES** for over 3000 most popular models from Admiral to Zenith, 1947 to 1953 models. A storehouse of valuable TV servicing info. Priced very low for large volume sales. **Only...\$1**

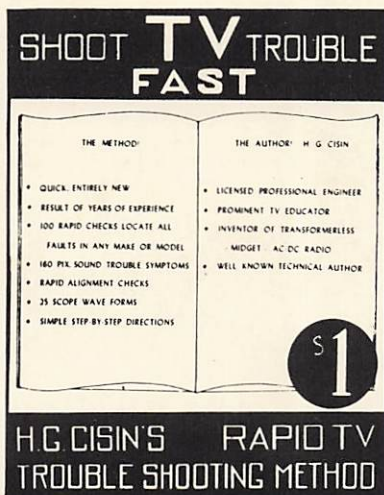


TV Serviceman's Silent Partner

New, easy-to-use way to solve toughest TV troubles. UHF sect. includes conversions, installations and servicing. Modern alignment methods shown by pictures, diagrams and simple directions, tell exactly what to do and how to do it. Practical pointers on use of all TV Test Instruments. Over 300 pix, raster and sound symptoms. Detailed directions tell where and how to find faulty parts. Over 135 **RAPID CHECKS**; many using pix tube as trouble locator. 125 illustr. of scope wave forms, diagrams, station patterns, show various defects—take mystery out of TV servicing. **NO THEORY—NO MATH—NO FORMULAS**—just practical service info. covering all types of TV sets. **Only...\$2**



Sect. 1 is a fully illustrated **GUIDE** to oft-recurring pix faults. Causes and cures explained. Copyrighted Trouble Indicating illustrated chart tells where troubles start in typical TV set — illustrations show resulting faulty TV pictures. Sect. 2 explains hundreds of TV terms in non-technical language. **SPEEDS UP TV SERVICING — HELPS YOU DO A BETTER JOB FASTER!** **Only...\$1**



A new method of servicing TV sets which enables the novice to diagnose TV troubles as rapidly as an expert. Enables you to locate faults in record-breaking time, regardless of make or model. Trains you to be a TV diagnostician.

13 important preliminary checks need no instruments! Of the 69 Rapid Checks, over 65 also require no instruments! Rapid checks include emergency checks for distorted pictures, defective tubes including pix tube, plus 57 others. All explained in simple language.

Here's how the Cisin method works: You inspect the picture, you inspect the raster, you listen to the sound. Troubles are listed alphabetically; each listing has a code number or letter. When these three are put together they tell you exactly where the trouble is. Then step-by-step instructions enable you to find the faulty part.

Price: \$1



70 Common TV troubles traced to source and cured. Copyrighted trouble indicating tube location guides covering over 500 most popular TV models. Many models different from those shown in TV TUBE LOCATOR.

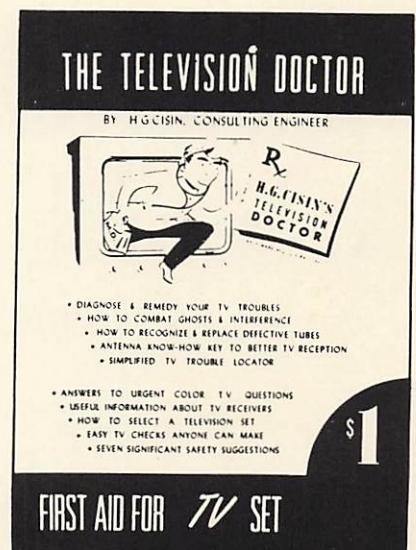
Contains over 70 illustrations and tube location guides. Forty most common picture troubles illustrated, with symptoms described, causes given and remedies prescribed.

TV TROUBLE TRACER @ 50¢ - Vol. 1
TV TROUBLE TRACER @ 50¢ - Vol. 2
TV TROUBLE TRACER @ 50¢ - Vol. 3

HARRY G. CISIN

AMAGANSETT
NEW YORK

AMAGANSETT 7-3852



Eleven money-saving, fact-cramped, illustrated chapters include practical ways to combat ghosts and interference, how to appraise and buy a TV set, valuable information on antennas, lead-ins, color TV, names and addresses of manufacturers, over 123 trouble conditions, many illustrations of various types of picture troubles.

Simplified trouble shooting method applies to all sets. Trouble tracing guide pin-points hundreds of troubles.

Written in non-technical language specifically for the novice. Reveals many closely guarded trade secrets. Includes valuable safety suggestions.

Price: \$1

H. G. CISIN'S

PIX GUIDE

combined with

TV TERMS

NEW

TROUBLE INDICATING TUBE LOCATION GUIDE

OF TYPICAL SET PIN-POINTS TROUBLE SPOTS
AND ILLUSTRATES RESULTANT FAULTY PICTURES

NEW

TV DICTIONARY

TV TERMS EXPLAINED
WITHOUT TECHNICAL "DOUBLE-TALK"

NEW

TV PIX GUIDE

OVER 70 PIX FAULTS ILLUSTRATED
PLUS CAUSE AND CURE

NEW

LATEST UHF

TERMS AND CONCEPTS

Published by

H. G. CISIN

AMAGANSETT

NEW YORK