

H.G.Cisin's

Vol. 4

NEW 1955 MODELS

T7-4

# TV TROUBLE TRACER

FIND IT  
AND FIX IT

50¢

NEW

TUBE CHARTS OF 500 MODELS!

# TV TROUBLE TRACER

## SYMPTOM-CAUSE-REMEDY Instruction Charts

### Combined with New Copyrighted

### "TROUBLE INDICATING" TUBE LOCATION GUIDES

Trouble	Page	Trouble	Page
Absent picture, absent sound	41	Jittery	27
Absent picture, normal sound	41	Light horizontal streaks	27
Absent, horizontal sloping lines	13	Meshed diagonal or vertical lines across picture	43
Actors have short legs and long necks	36	Momentary reduction in size	40
Alternate dark and light hori- zontal bars	40	Moves up and down	27
Bright horizontal line instead of picture	9	Multiple images	45
Bright spot after turning set off	26	Normal picture, sound weak or absent	45
Bright vertical line instead of picture	11	Off center horizontally	21
Brightness reduced	34	Off center vertically	19
Brown or yellow spot	39	Pie-crust edges	44
Circles egg shaped in horizontal direction	42	Pulls horizontally	7
Circles egg shaped in vertical direction	36	Reduced brightness	40
Darkened	32	Reduced height and width	40
Dark horizontal streaks	43 & 27	Reflections	45
Diagonal lines across picture	43	Return traces unduly noticeable	25
Dwarfed	37 & 40	Reversed picture	30
Enlarged abnormally	34	Right portion on left side	28
Flashes, intermittent	27	Rolls vertically	17
Folded over at both sides	38	Shading poor	32
Folded over at left side	24	Shadow at corner	23
Ghosts	45	Side edges wavy	15
Height insufficient	29	Snow	42
Herringbone effect	44	Sound weak or absent, picture normal	45
Horizontal bars, alternately dark and light	40	Streaks, intermittent	27
Horizontally off center	21	Tears, pulls or weaves horizon- tally	7
Horizontal picture lines wavy	31	Tears vertically	27
Horizontally squeezed or stretched	42	Top and bottom parts of picture interchanged	39
Horizontal sloping lines	13	Unstable	27
Interference	43	Vertical dark faint line at left	33
Intermittently smaller	43	Vertically jittery	27
Intermittent streaks and flashes	43	Vertically off center	19
Insufficient height	29	Vertically squeezed or stretched	36
Insufficient width	35	Vertical ripple or wrinkle	25
Ion spot	39	Wavy at sides	15
		Weaves horizontally	7
		Width insufficient	35
		Width excessive	34

HOW TO USE TV TROUBLE TRACER INSTRUCTION CHARTS:  
OBSERVE PICTURE -- LISTEN TO SOUND  
SWITCH CHANNEL SELECTOR TO AN UNUSED CHANNEL AND  
OBSERVE BRIGHT AREA  
THEN CONSULT ABOVE LIST

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# TV TROUBLE TRACER, VOL. 4

By H.G.Cisin, Consulting Engineer

(Vol. 4 models different from Vol. 1, 2 & 3  
and TV TUBE LOCATOR)

It is possible to work wonders with these new copyrighted "TROUBLE INDICATING" Guides. All tubes on these guides are plainly marked with a letter which indicates the actual effect each tube has on the performance of the television set.

For example, a tube which affects the picture is marked "P". One which affects sound is marked "S". If a tube affects both picture and sound, it is marked "PS".

The following table shows how the various tubes in a television set are designated on the newly devised "TROUBLE INDICATING" TUBE LOCATION GUIDES:

Picture -----	P
Sound -----	S
Picture and sound -----	PS
Bright area -----	B
Horizontal movement -----	H
Vertical movement -----	V
Horizontal and vertical movement -----	HV or VH
Horizontal movement and bright area -----	BH or HB
Picture, sound and bright area	D
Background -----	G
Focus -----	F
Contrast -----	C

Certain tubes which function to supply suitable operating voltages to the various tubes in the set, are so important that if they are removed or become defective, they

will cause the entire set to go dead. Such tubes are designated in the "TROUBLE INDICATING" TUBE LOCATION GUIDES by the letter "D".

An asterisk (\*) near a tube on the tube location guide, indicates the presence of high voltage. If the proper precautions are observed, it is not dangerous to handle these tubes. Before removing or coming near a tube marked with an asterisk, read carefully the safety rules given at the back of this book.

It is readily apparent that every tube has a definite job to perform. When a tube becomes weak or fails to operate, that job is no longer handled properly and you SEE and/or HEAR the difference. For example, if one of the tubes affecting sound only should become defective, the picture and the bright area will remain normal, but the sound will become weak, or may disappear entirely. To remedy the trouble, simply refer to the "TROUBLE INDICATING" TUBE LOCATION GUIDE for that particular television model and take out the tubes marked "S". Have these tested and replace the defective tube with a new one.

PRESTO! You have located and remedied the trouble.

Of course, if you take more than one tube out of its socket

at the same time, you must be careful to put the tubes back in exactly the same socket from which they were removed. An easy way to do this is to mark each tube and its respective socket with a distinctive number. Thus, the first tube removed and its socket should be marked with the number "1", the second tube and its socket with the number "2", and so on. A piece of chalk or crayon is suitable for this job.

Each tube has a type designation such as 6AU6, 6AL5, 6AG5, etc. This designation is generally marked on the tube itself. It is important because it enables you to buy a new tube when necessary which has the same electrical properties as the defective tube which you wish to replace. For this reason, the type designation is given on the "TROUBLE INDICATING" TUBE LOCATION GUIDE, along with the letter which symbolizes the job being done by the tube.

For the purpose of simplification, the letters "G" and "GT" have been omitted from the type designations. However, when you remove a tube from the set, note carefully whether the letters "G" or "GT" are stamped on the tube following the regular tube designation. Then be sure to request exactly the same one when purchasing the new tube. For example, if the TUBE LOCATION GUIDE shows a 6SK7 tube and the tube you remove reads 6SK7GT be sure to ask the dealer for a 6SK7GT rather than just a 6SK7 tube when buying the replacement.

When using "TROUBLE INDICATING"

TUBE LOCATION GUIDES, you will observe that the front of each model is plainly marked. In most instances stop views are shown. Certain tubes have more than one effect on the performance of the set. This is especially the case where one tube contains the equivalent of several tubes. Thus it is possible for a tube to affect picture, sound, and background in which case the tube would be marked "PSG", or a tube might affect both horizontal movement and bright area, in which case it would be marked "BH". The order in which the letters are combined has no significance. A tube marked "GPS" would mean the same as "PSG".

On the following pages, you will find "TROUBLE INDICATING" TUBE LOCATION GUIDES covering more than 500 most popular TV models. These are in addition to, and different from those contained in other volumes. These are indexed below for convenience in locating a particular model. If you do not find the model TV set you require in this list, be sure to refer to page 5. This tells you how you can obtain other "TROUBLE INDICATING" GUIDES. This is important, because "TROUBLE INDICATING" GUIDES are copyrighted and can only be obtained from the publisher of this book.

Examination of the tube charts will reveal the fact that three different size circles are used to denote tube locations. In general the smallest circle shows position of miniature tubes; medium size locates GT, octal and metal tubes; and the large circle, the G tubes.

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If the TV Model you are repairing is not listed in this volume, hundreds of other models are listed and their copyrighted TROUBLE INDICATING TUBE LOCATION GUIDES are shown in the following books described on the inside back cover of this book:

TV TROUBLE TRACER, Volume 1  
 TV TROUBLE TRACER, Volume 2  
 TV TROUBLE TRACER, Volume 3  
 TV TUBE LOCATOR

You can obtain a copyrighted TROUBLE INDICATING TUBE LOCATION GUIDE (chart, not a book) for any desired model TV set by writing to HARRY G. CISIN, Publisher, Amagansett, N.Y. giving make and model number of set and including tube layout, stamped self-addressed envelope, plus 50¢ to cover cost. Send chassis number if available. Chassis number is necessary for Maganvox sets. Do not send serial number. If manufacturers tube layout is not available, make a rough layout showing position and type designation of each tube.

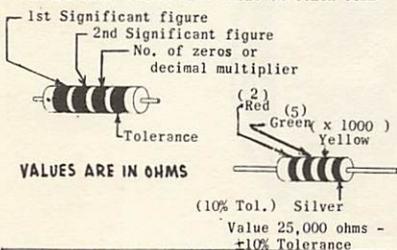
## HOW TO READ COLOR CODED MOLDED RESISTORS AND CAPACITORS

Due to present manufacturing methods, molded composition resistors, molded wire-wound resistors, molded condensers and molded r.f. chokes are almost identical in appearance. The first problem therefore is how to distinguish one type of component from another.

Molded composition resistors employ a single width band as the first significant figure. In counting bands, start at the band closest to the end of the component, or if distance is the same at each end due to use of four or more bands, start to count at the band furthest from the silver or gold band.

Wire-wound molded resistors employ a double width band as the first significant figure. Molded composition r.f. chokes use three bands only. In older models, r.f. chokes may be marked with a single band and dot. Molded composition capacitors of 10 MMF or more use five bands or dots, whereas resistors never use more than four bands.

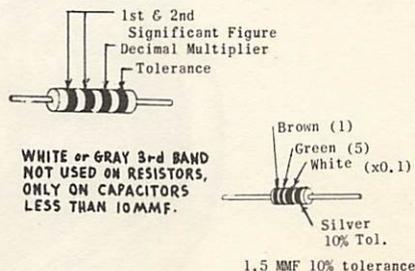
### HOW TO READ COMPOSITION RESISTOR COLOR CODE



Color	1st & 2nd Sig. Figure	Multiply by
Black	0	1
Brown	1	10
Red	2	100
Orange	3	1000
Yellow	4	10000
Green	5	100000
Blue	6	1000000
Violet	7	10000000
Gray	8	100000000
White	9	1000000000
Gold		+5% Tolerance
Silver		+10% Tolerance
No Color		+20% Tolerance

HOW TO READ MOLDED CAPACITOR COLOR CODE - Condensers less than 10 MMF. Values are obtained in MMF. (Micromicrofarads)

Color	First & 2nd Sig. Figure	Decimal Multiplier	Tolerance Plus or minus
Black	0		
Brown	1		
Red	2		
Orange	3		
Yellow	4		
Green	5		
Blue	6		
Violet	7		
Gray	8	0.01	
White	9	0.1	
Silver			±10%
Gold			±5%
4th Band Absent			±20%



### HOW TO READ COLOR CODING OF MOLDED R.F. CHOKES

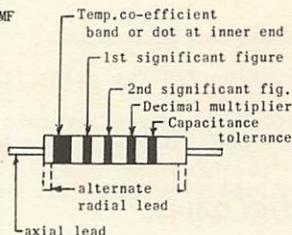
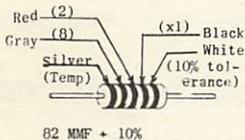
Molded r.f. chokes employ three bands, one at one end and two close together at the other end. Start at the end which has the two close-together bands. The number corresponding to the color of the first band is the first significant figure. The number corresponding to the color of the 2nd band is the second significant figure. The colors and their corresponding numbers are the same as in the resistor color code.

The band separated from the other two is the decimal multiplier. For example, if the first of the close-together bands (or dots) is red and the second is yellow, this gives the number 24. If the separated band at the other end of the choke is silver, this signifies that 24 must be multiplied by .01 and that the r.f. choke has a value of .24 microhenrys.

### HOW TO READ MOLDED CAPACITOR COLOR CODE

Condensers 10MMF or over  
Values obtained are in MMF

Color	1st Sig. Fig.	Multiply by	Tol.	Temp. Coef.
Black	0	1	±20%	0
Brown	1	10	±1%	-33
Red	2	100	±2%	-75
Orange	3	1000	±2%	-150
Yellow	4	10000	-	-220
Green	5	-	±5%	-330
Blue	6	-	-	-470
Violet	7	-	-	-1500
Gray	8	-	±25%	-
White	9	-	±10%	-



# TV TROUBLE NO. 1

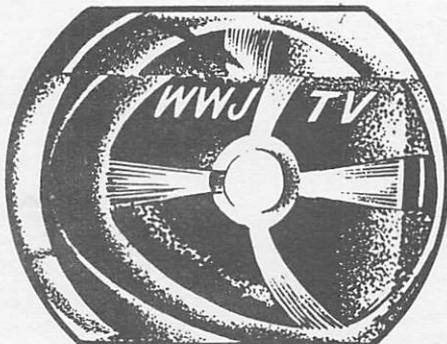
"Find It & Fix It "

## SYMPTOM

**Picture** - Tears, pulls or weaves horizontally.

**Bright Area** - Normal.

**Sound** - Normal.



## CAUSE

Misadjusted horizontal hold, linearity or drive controls, defective video amplifier tube(s) or defective d.c. restorer tube(s). If bright area also shows horizontal pulling and weaving (with set tuned to unused channel) trouble may also be due to misadjusted ion trap, focus coil or defective yoke or to stray magnetic field near picture tube due to poorly positioned speaker.

## REMEDY

Readjust horizontal hold, linearity and drive controls.

Replace video amplifier tube(s). Often used tubes are: 6AC7, 6AH6, 6AC6, 6AQ5, 12AT7, 6CB6, 12AU7, 12BH7, 6SN7.

Video amplifier tubes are marked "P" on special "TROUBLE INDICATING" TUBE LOCATION GUIDES.

Replace d.c. restorer tube. Often used tubes are 6AL5 and 12AU7.

D.C. restorer tubes are marked "G" on "TROUBLE INDICATING" TUBE LOCATION GUIDES.

Check adjustment of ion trap, focus coil, deflection yoke. Check positioning of speaker.



# TV TROUBLE NO. 2

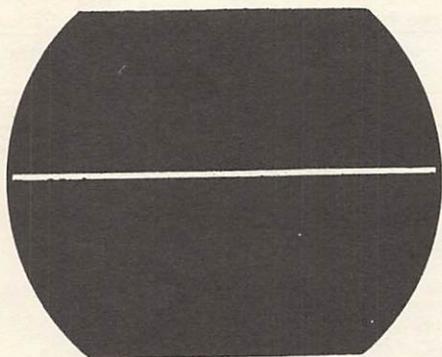
"Find It & Fix It "

## SYMPTOM

**Picture** - Absent, bright horizontal line.

**Bright Area** - Absent, except for bright horizontal line.

**Sound** - Normal.



## CAUSE

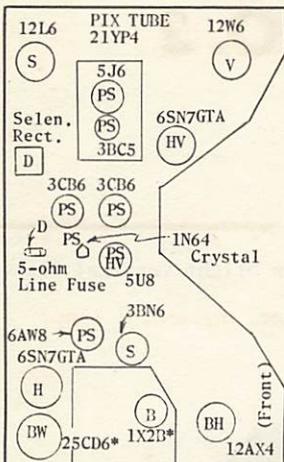
No vertical deflection. May be caused by defective vertical oscillator or defective vertical output tube.

## REMEDY

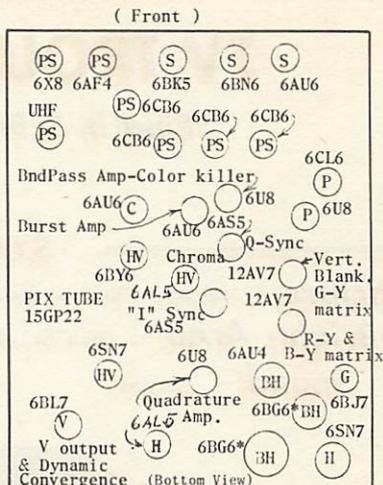
Replace vertical oscillator tube. Often used types are 6SN7 or 6SN7GT, 12AU7, 12SN7GT, 6J5GT, or 6J5, 6SL7, 12AU7.

Replace vertical output tube. Often used types are 6V6, 6V6GT, 6K6, 6K6GT, 6S4, 6W4, 6AQ5, 12AU7.

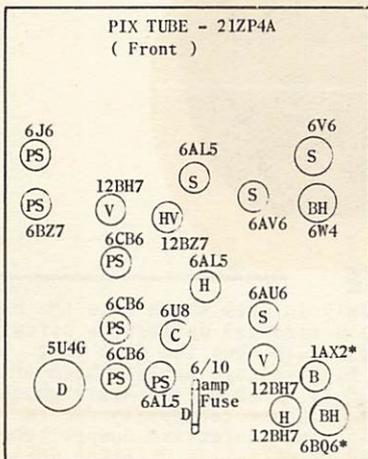
Vertical oscillator and vertical output tubes are marked "V" on special "TROUBLE INDICATING" TUBE LOCATION GUIDES.



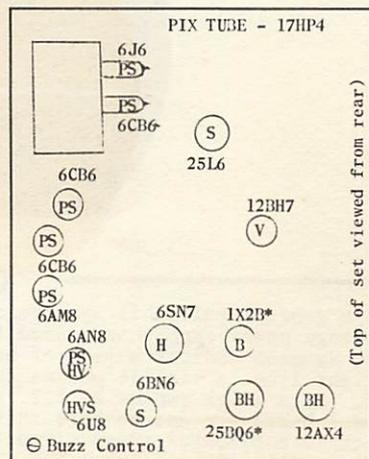
ARVIN (1)



ARVIN (2)



CBS COLUMBIA



CROSLLEY (1)

Picture ----- P Horizontal Movement ----- H Pix, S'nd & Br. Area - D  
 Sound ----- S Vertical Movement ----- V Background ----- G  
 Picture & Sound --- PS Horizontal & Vertical Movement -- HV or VH Focus ----- F  
 Bright Area ----- B Horiz. Movement & Br. Area ----- BH or HB Contrast ----- C  
 High Voltage Warning ----- (\*) Asterisk

# TV TROUBLE NO. 3

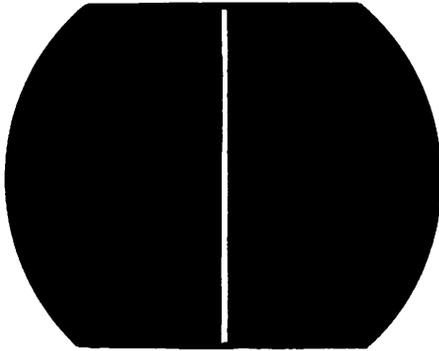
"Find It & Fix It "

## SYMPTOM

**Picture** - Absent. Only indication is a thin bright vertical line.

**Bright Area** - Thin bright vertical line.

**Sound** - Normal.



## CAUSE

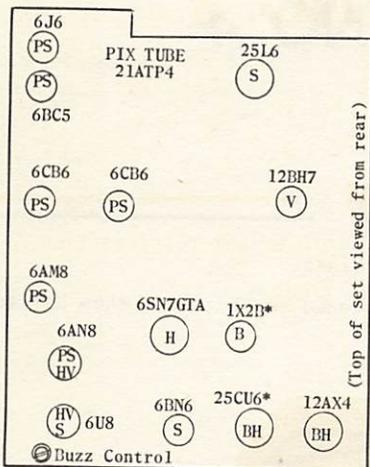
As a general rule this symptom occurs only in sets which have the high voltage power supply separated from the horizontal deflection circuit. The symptom indicates lack of horizontal sweep, but the fact that a bright line is visible proves that the high voltage has not been affected. Sets which employ an r.f. power supply, such as the Westinghouse Model H-223 are apt to have this trouble. Cause is usually due to defective horizontal sweep circuit tubes or to a defective damper tube.

## REMEDY

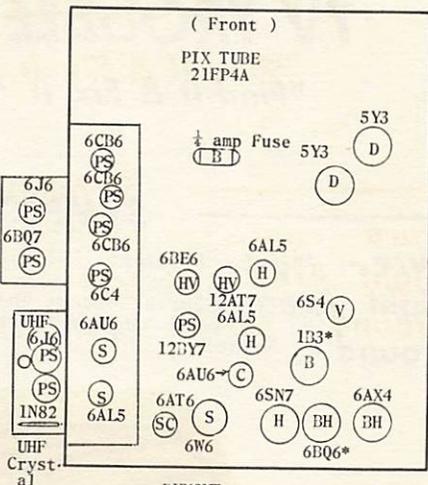
Replace horizontal deflection tubes. These include: (Horizontal oscillator) Often used types are 6K6GT, 6SN7 or 6SN7GT, 6AK6, 12AU7 and 12SN7. (Horizontal output) Often used types are 6GB6G, 25BQ6, 50B5, 6CD6G, 6AU5GT, 6AV5GT, 6SN7GT, 12SN7GT, 19BT6G.

Replace damper. Often used types are 5V4G, 6W4GT, 6AS7G, 25W4GT and 25Z6.

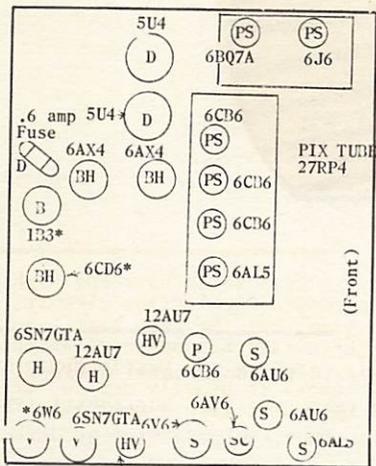
Horizontal deflection circuit tubes are all marked "H" on special copyrighted "TROUBLE INDICATING" TUBE LOCATION GUIDES. Horizontal output tubes are distinguished from other "H" tubes, since they are marked "HB" and also are followed by an asterisk (\*). This calls attention to the fact that special high voltage precautions must be observed when changing or handling these tubes.



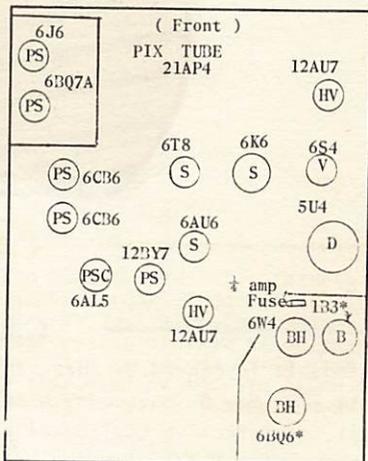
CROSLY (2)



DUMONT



EMERSON



FADA

- |                     |    |                                   |              |                          |
|---------------------|----|-----------------------------------|--------------|--------------------------|
| Picture -----       | P  | Horizontal Movement -----         | H            | Pix, S'nd & Br. Area - D |
| Sound -----         | S  | Vertical Movement -----           | V            | Background -----         |
| Picture & Sound --- | PS | Horizontal & Vertical Movement -- | HV or VH     | Focus -----              |
| Bright Area -----   | B  | Horiz. Movement & Br. Area -----  | BH or HB     | Contrast -----           |
|                     |    | High Voltage Warning -----        | (*) Asterisk |                          |

# TV TROUBLE NO. 4

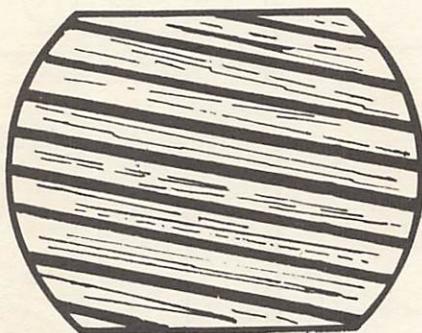
"Find It & Fix It"

## SYMPTOM

**Picture** - Absent. Horizontal sloping lines.

**Bright Area** - Normal except when tuned to station, then horizontal sloping lines.

**Sound** - Normal.



## CAUSE

This trouble is caused by defective timing in the horizontal deflection circuit. It may be caused by a defective tube in the horizontal sync circuit, a defective horizontal oscillator tube, misadjusted or defective horizontal hold control or defective tubes in the AFC (automatic frequency control) system.

## REMEDY

Readjust horizontal hold control.

Replace horizontal sync circuit tubes. Often used tubes are: 6SN7, 12SN7, 6BN6, 6SH7, 6SK7, 12AU7, 6AU6.

Replace horizontal oscillator tube. Often used tubes are: 6K6GT, 6SN7 or 6SN7GT, 6AK6, 12AU7, 12SN7.

Replace horizontal AFC tubes. Often used tubes are: 6AL5, 6AC7, 6SN7, 12XN7, 6SL7.

All above tubes when used in horizontal deflection circuits are marked "H" on the special copyrighted "TROUBLE INDICATING" TUBE LOCATION GUIDES.



# TV TROUBLE NO. 5

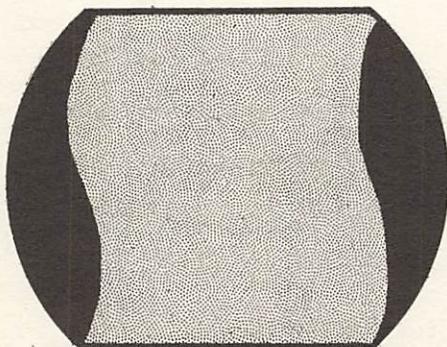
"Find It & Fix It "

## SYMPTOM

**Picture** - Side edges wavy or "S" shaped.

**Bright Area** - Side edges wavy or "S" shaped.

**Sound** - Normal.



## CAUSE

60 cycle hum in horizontal deflection circuit which may be due to defective tubes in this circuit. Tubes may test O.K. on mutual conductance tester or on emission test, but must be tested specifically for "heater-cathode leakage."

## REMEDY

Replace horizontal deflection tubes. These include: (Horizontal oscillator) Often used types are 6K6GT, 6SN7 or 6SN7GT, 6AV6, 12AU5, 12SN7. (Horizontal output) Often used types are 6BT6G, 6BQ6GT, 6CD6G, 6AU5GT, 6AV5GT, 6SN7GT, 12SN7GT, 19BG6G, 25BQ6, 50B5.

Horizontal deflection tubes are all marked "H" on special "TROUBLE INDICATING" TUBE LOCATION GUIDES.

Horizontal output tubes are distinguished from other "H" tubes since they are marked "HB" and are followed by an asterisk (\*). This calls attention to the fact that special high voltage precautions must be observed when replacing or handling them.



# TV TROUBLE NO. 6

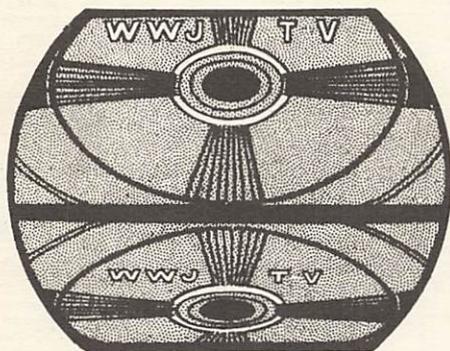
"Find It & Fix It "

## SYMPTOM

**Picture** - Rolls vertically.

**Bright Area** - Normal.

**Sound** - Normal.



## CAUSE

Defective vertical sync tubes.

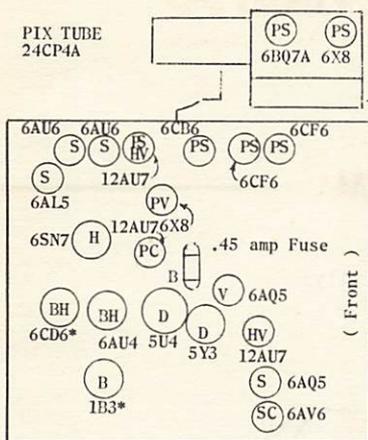
Defective vertical oscillator tube.

## REMEDY

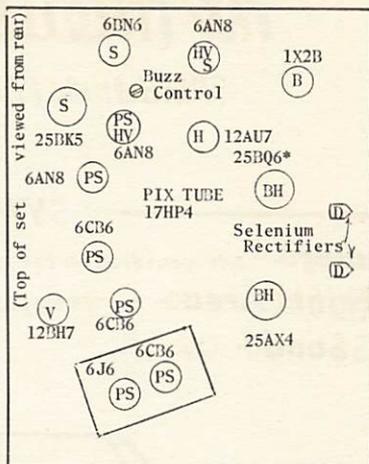
Replace vertical sync tubes. Often used types are 12AU7, 6SN7, 6SL7.

Replace vertical oscillator tube. Often used types are 6SN7 or 6SN7GT, 6C4, 12AU7, 12SN7GT and 6J5GT.

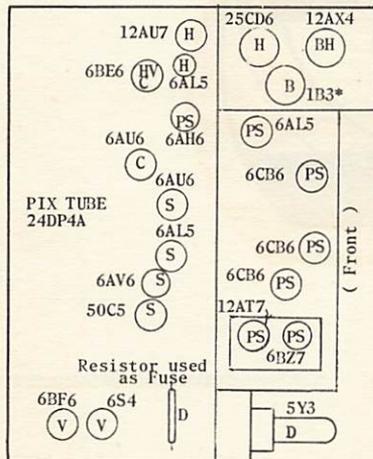
Vertical sync tubes and vertical oscillator tubes are marked "V" on special copyrighted "TROUBLE INDICATING" TUBE LOCATION GUIDES.



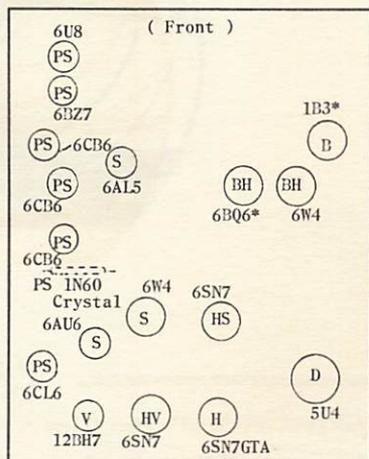
RCA VICTOR (3)



RAYTHEON (1)



RAYTHEON (2)



SENTINEL

Picture ----- P Horizontal Movement ----- H  
 Sound ----- S Vertical Movement ----- V  
 Picture & Sound --- PS Horizontal & Vertical Movement -- HV or VH  
 Bright Area ----- B Horiz. Movement & Br. Area ----- BH or HB  
 High Voltage Warning ----- (\*) Asterisk  
 Focus ----- F  
 Background ----- G  
 Contrast ----- C

# TV TROUBLE NO. 7

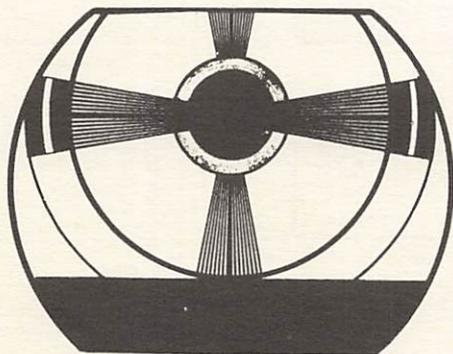
"Find It & Fix It "

## SYMPTOM

**Picture** - Not centered vertically.

**Bright Area** - Not centered vertically.

**Sound** - Normal.



## CAUSE

Misadjusted vertical centering control.

Misadjustment of mechanical centering devices.

## REMEDY

Readjust vertical centering control, if one is provided. Some sets have no centering control, but depend on adjustment of focus coil. Other sets depend on correct adjustment of height and linearity control combined with correct positioning of focus coil on neck of tube. Still other sets use a special adjustment on the focus coil assembly which holds a solid metallic shield in position. A wing nut on the focus coil permits position of shield to be changed, thus accomplishing centering.



# TV TROUBLE NO. 8

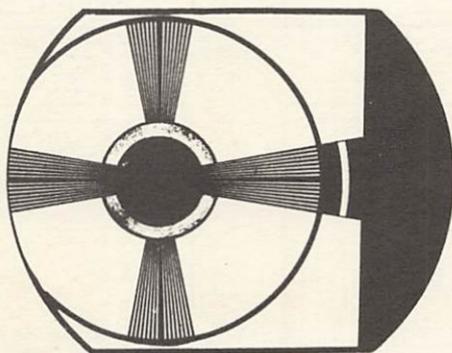
"Find It & Fix It "

## SYMPTOM

**Picture** - Off center horizontally.

**Bright Area** - Off center horizontally.

**Sound** - Normal.



## CAUSE

Misadjusted horizontal centering control.

Misadjusted or weak centering magnet.

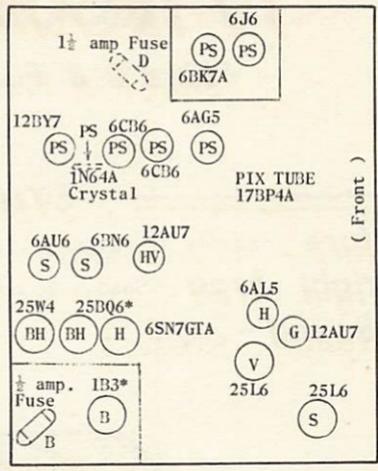
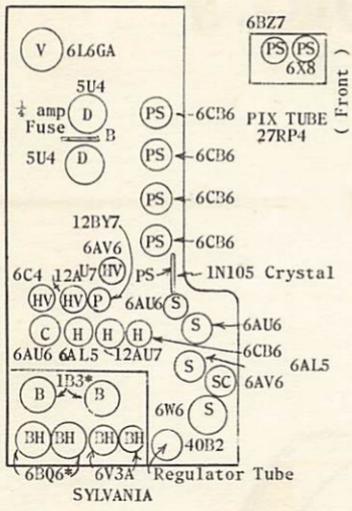
Misadjusted focus device.

## REMEDY

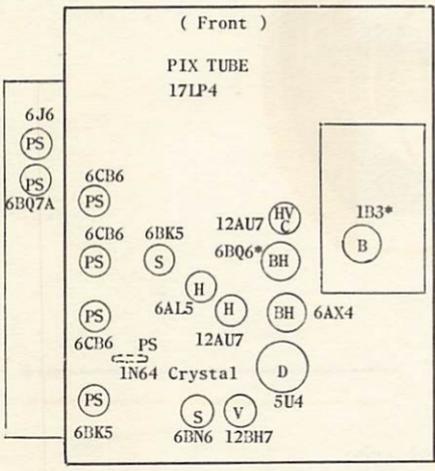
Readjust horizontal centering control.

If set uses centering magnet, readjust position of centering magnet or if necessary, replace magnet.

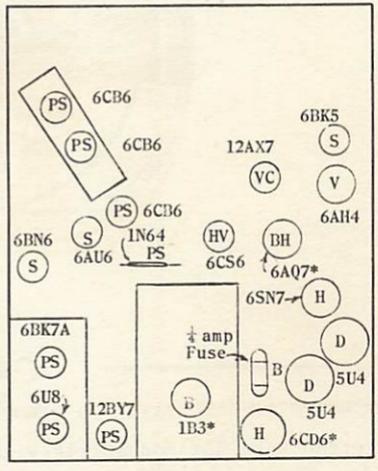
In sets which center picture by positioning of focus coils, readjust focus coil. Where electrostatic focusing is employed, center by changing position of centering magnet, adjusting field to required strength.



TELE-KING - Macy's



WESTINGHOUSE



ZENITH

Picture ----- P Horizontal Movement ----- H Pix, S'nd & Br. Area - D  
 Sound ----- S Vertical Movement ----- V Background ----- G  
 Picture & Sound --- PS Horizontal & Vertical Movement -- HV or VH Focus ----- F  
 Bright Area ----- B Horiz. Movement & Br. Area --- BH or HB Contrast ----- C  
 High Voltage Warning ----- (\*) Asterisk

# TV TROUBLE NO. 9

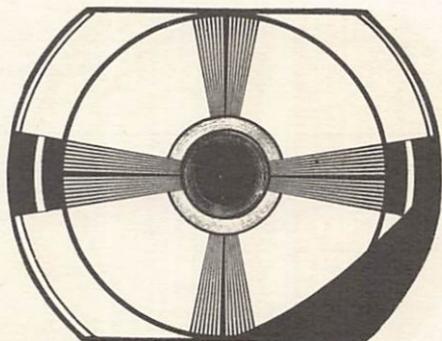
"Find It & Fix It "

## SYMPTOM

**Picture** - Shadow at corner.

**Bright Area** - Shadow at corner.

**Sound** - Normal.



## CAUSE

Misadjusted or defective ion trap.

Deflection yoke not concentric with neck of tube.

Deflection yoke not close enough to bell of tube.

Focus assembly not concentric with neck of tube.

## REMEDY

Readjust ion trap moving it slightly backward and forward and at same time rotating it slightly.

Readjust deflection yoke to make it concentric with neck of tube. Try moving yoke closer to bell of tube.

Readjust focus assembly so that it is concentric with neck of tube.

# TV TROUBLE NO.10

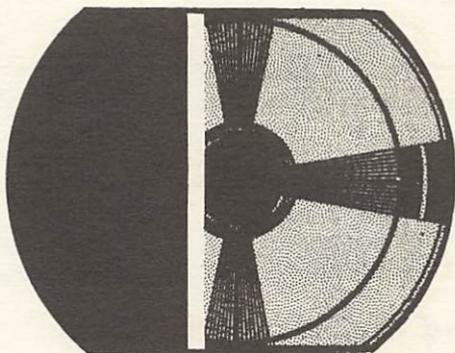
"Find It & Fix It"

## SYMPTOM

**Picture** - Folded over at left side.

**Bright Area** - Folded over at left side.

**Sound** - Normal.



## CAUSE

Defective damper tube.

Defective horizontal oscillator tube.

Improper adjustment of phase control, in sync lock system.

## REMEDY

Replace damper tube. Often used types are 5V4G, 6W4GT, 6AS7G, 25W4GT, 25Z6.

Replace horizontal oscillator tube. Often used types are 6K6GT, 6SN7 or 6SN7GT, 6AK6, 12AU7, 6SN7.

Damper tubes are marked "BH" and horizontal oscillator tubes are marked "H" on special "TROUBLE INDICATING" TUBE LOCATION GUIDES.

# TV TROUBLE NO. 11

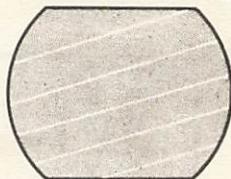
"Find It & Fix It "

## SYMPTOM

**Picture** - Return traces unduly noticeable.

**Bright Area** - Normal.

**Sound** - Normal.



## CAUSE

May result from incorrectly adjusted contrast and brightness controls.

May be due to improperly adjusted ion trap.

## REMEDY

Try to blank out return lines by readjusting contrast and brightness controls.

Try readjusting ion trap. Do this by moving trap slightly backward and forward and at same time, rotate clockwise and counter-clockwise.

# TV TROUBLE NO. 12

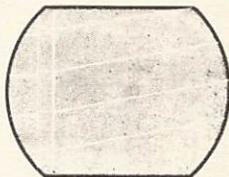
"Find It & Fix It "

## SYMPTOM

**Picture** - Vertical ripple or wrinkle, changing only when volume control adjustment is changed.

**Bright Area** - Vertical ripple or wrinkle, changing only when volume control adjustment is changed.

**Sound** - Normal.



## CAUSE

Defective (microphonic) tube in video amplifier which vibrates in time with speaker.

Loud speaker leads too close to video amplifier or picture tube lead.

## REMEDY

Replace video amplifier tubes. Often used types are 6AC7, 6AH6, 6BA6, 6AQ5, 12AT7, 6CB6, 12AU7, 6SN7, 6K6, 6AU6, 7C5, 6BF5, 6AG7.

Video amplifier tubes are marked "P" on special "TROUBLE INDICATING" TUBE LOCATION GUIDES.

Move Loud speaker leads to a new position.

# TV TROUBLE NO. 13

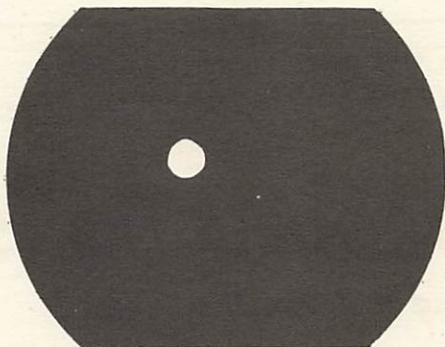
"Find It & Fix It "

## SYMPTOM

**Picture** - Bright spot on screen after turning set off.

**Bright Area** - Normal with picture tuned out.

**Sound** - Normal.



## CAUSE

High voltage filter condensers hold charge after set is turned off. Trouble is in the design of many sets. This bright spot may cause injury to picture tube.

## REMEDY

In many sets, this afterglow may be eliminated by turning brightness control full on, an instant before set is turned off.

In some sets, a slight readjustment of the ion trap will remedy or lessen this trouble.

# TV TROUBLE NO. 14

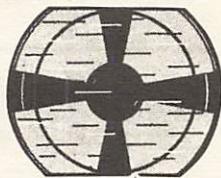
"Find It & Fix It "

## SYMPTOM

**Picture** - Thin dark and/or light horizontal streaks.

**Bright Area** - Thin dark and/or light horizontal streaks.

**Sound** - Normal.



## CAUSE

Automobile or other ignition interference.

## REMEDY

Relocate antenna away from road or source of trouble.

Use a shielded (coaxial) lead-in, in place of flat "twin-lead" type.

# TV TROUBLE NO. 15

"Find It & Fix It "

## SYMPTOM

**Picture** - Moves up and down vertically, sometimes tears vertically. (Vertically jittery).

**Bright Area** - Normal.

**Sound** - Normal.



## CAUSE

Vertical hold control misadjusted.

Defective vertical oscillator.

## REMEDY

Readjust vertical hold control.

Replace vertical oscillator. Often used types are 6SN7 or 6SN7GT, 6C4 12AU7, 12SN7GT, 6J5GT. Vertical oscillator tubes are marked "V" on special copyrighted "TROUBLE INDICATING" TUBE LOCATION GUIDE.

# TV TROUBLE NO. 16

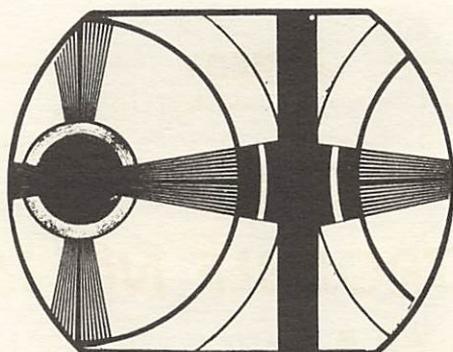
"Find It & Fix It"

## SYMPTOM

**Picture** - Right portion on left side.

**Bright Area** - Normal.

**Sound** - Normal.



## CAUSE

Misadjusted phase control.

Misadjusted horizontal hold control.

Defective tubes in horizontal AFC (automatic frequency control) system.

## REMEDY

Readjust phase control.

Readjust horizontal hold control.

Replace horizontal AFC tubes. Often used types are 6AL5, 6AC7, 6SN7GT, 6SN7, 12SN7. These tubes are marked "H" on "TROUBLE INDICATING" TUBE LOCATION GUIDES.

# TV TROUBLE NO. 17

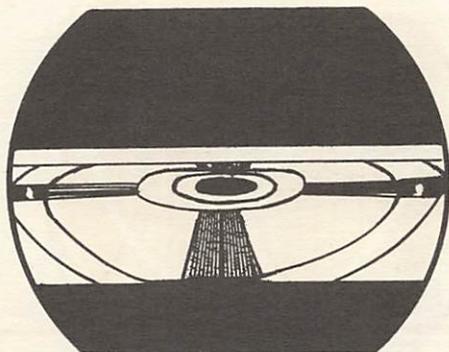
"Find It & Fix It"

## SYMPTOM

**Picture** - Height insufficient to fill screen between top and bottom.

**Bright Area** - Height insufficient to fill screen between top and bottom.

**Sound** - Normal.



## CAUSE

Misadjusted height and vertical linearity controls.

Weak vertical output tube.

Weak vertical oscillator-discharge tube.

## REMEDY

Readjust height control. This may necessitate readjustment of vertical linearity control to preserve correct picture proportions.

Replace vertical output tube. Often used types are 6V6, 6V6GT, 6K6, 6S4, 6K6GT, 6W4, 6A05, 12AU7.

Replace vertical oscillator-discharge tube. Often used types are 6SN7 or 6SN7GT, 6C4, 12AU7, 12SN7GT, 6J5GT.

All above-mentioned tubes used in vertical sweep circuits are marked "V" on "TROUBLE INDICATING" TUBE LOCATION GUIDES.

# TV TROUBLE NO. 18

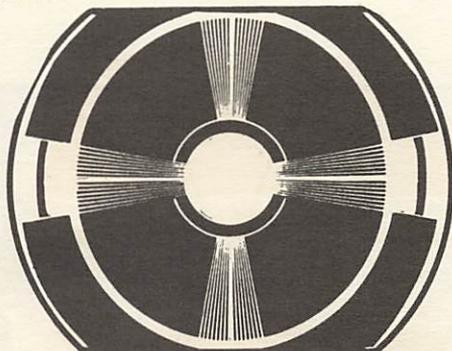
"Find It & Fix It "

## SYMPTOM

**Picture** - Reversed or negative picture.

**Bright Area** - Normal with picture tuned out.

**Sound** - Normal.



## CAUSE

Defective AGC (automatic gain control) tube.  
Defective video IF amplifier tube.  
Defective video detector.  
Misadjusted contrast control.  
Defective video amplifier tube.

If on one channel only, may be due to excessively strong signal on that channel.

## REMEDY

Replace AGC tube. Often used types are: 6AU6, 6AL5, 12AT7, 6SL7, 12BZ7, 6AH6, 12AU7. Where double function tubes are used, only one section serves as the AGC tube, marked "C" on TUBE LOCATION GUIDES.

Replace video IF tube. Often used types are 6BA6, 6AU6, 6AG5, 6CB6, 6BC5.

Replace video detector. Often used types are 6AL5 and 12AL5. Note that some sets use crystal detector such as 1N34, 1N60, or 1N64.

Readjust contrast control.

Replace video amplifier tube. Often used types are 6AC7, 6AH6, 6BA6, 6AQ5, 12AT7, 6CB6, 12AU7, 12BH7, 6SN7, 6K6, 6AU6, 7C5, 6BF5, 6AG7.

Video IF, video detector and video amplifier tubes are marked "P" or "PS" on "TROUBLE INDICATING" TUBE LOCATION GUIDES.

If on one channel only, try indoor antenna.

# TV TROUBLE NO. 19

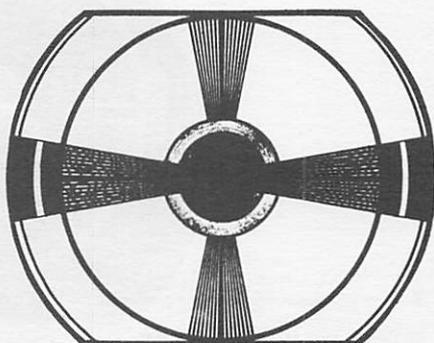
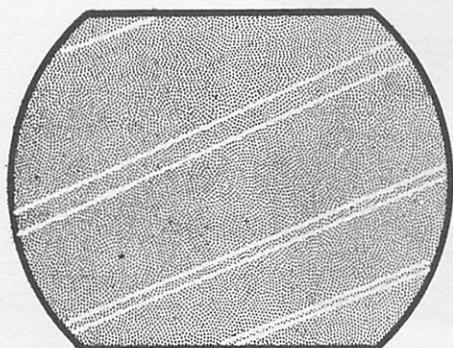
"Find It & Fix It "

## SYMPTOM

**Picture** - Horizontal lines throughout picture are noticeably wavy.

**Bright Area** - Return traces unequally spaced.

**Sound** - Normal.



## CAUSE

In some cases the trouble may be due to a misadjustment of vertical hold control particularly if this control is set too close to the point where picture starts to roll downward.

Where trouble occurs on only one channel, the fault is with the broadcast transmitter rather than with the TV set.

## REMEDY

Readjust vertical hold control.

# TV TROUBLE NO. 20

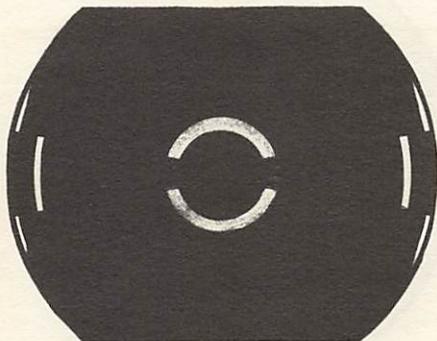
"Find It & Fix It "

## SYMPTOM

**Picture** - Darkened, shading poor.

**Bright Area** - Normal with picture tuned out.

**Sound** - Normal.



## CAUSE

Poor shading generally indicates trouble in contrast control circuits. There is also the possibility that focus is defective.

Trouble may be due to misadjusted or defective contrast control, to defective AGC (automatic gain control) tube, to incorrect adjustment of bias, to misadjusted or defective focus control or to defective focus rectifier tube. Latter tube is used only in sets employing electrostatic focusing such as the 21J series Zenith sets.

## REMEDY

Change setting of contrast control. If set has threshold adjustment of bias, readjust this control.

Replace AGC tube. Often used tubes are: 6AL5, 12AL5. AGC tubes are marked "C" on special "TROUBLE INDICATING" TUBE LOCATION GUIDES.

Readjust focus control.

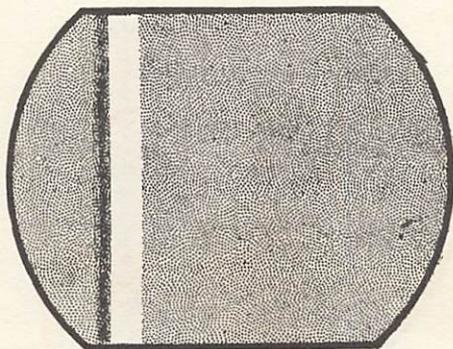
If set uses focus rectifier tube, change this. Tube generally used is 5642. Focus rectifier tube is marked "F" on "TROUBLE INDICATING" TUBE LOCATION GUIDES.

# TV TROUBLE NO. 21

"Find It & Fix It "

## SYMPTOM

- Picture** - Vertical dark faint line or lines on left side of picture, followed by bright area.  
**Bright Area** - Vertical dark faint line or lines on left side of picture, followed by bright area.  
**Sound** - Normal.



## CAUSE

Interference due to oscillations set up in horizontal output tube picked up by tuner.

## REMEDY

Tune to high frequency channel, turn contrast control clockwise as far as possible and replace horizontal output tube. Often used types are: 6BG6G, 6BQ6GT, 6CD6G, 6AU5GT, 6AV5GT, 6SN7GT, 12SN7GT, 19BG6G, 25BQ6, and 50B5. Horizontal output tubes are marked "HB" on special copyrighted "TROUBLE INDICATING" TUBE LOCATION GUIDES. These tubes are also marked with an asterisk (\*) to indicate that special precautions are necessary when handling them. In some cases a small magnet fastened to the side of horizontal output tube will eliminate this trouble.

# TV TROUBLE NO.22

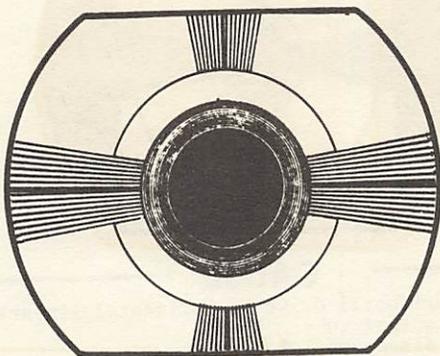
"Find It & Fix It "

## SYMPTOM

**Picture** - Expanded or enlarged abnormally and accompanied by loss of brightness.

**Bright Area** - Expanded or enlarged abnormally and accompanied by loss of brightness.

**Sound** - Normal.



## CAUSE

Reduction of high voltage applied to picture tube often caused by defective high voltage rectifier or damper tube.

## REMEDY

Replace high voltage rectifier tube. Often used tubes are 1B3GT, 8016, 1V2, 1X2, 1X2A. High voltage rectifier tubes are marked "B" on special "TROUBLE INDICATING" TUBE LOCATION GUIDES. An asterisk (\*) also marks such tubes to indicate the fact that special precautions must be observed when they are replaced.

Replace damper tube. Often used types are 5V4G, 6W4GT, 6AS7G, 25W4GT and 25Z6. Damper tubes are marked "BH" on "TROUBLE INDICATING" TUBE LOCATION GUIDES.

# TV TROUBLE NO. 23

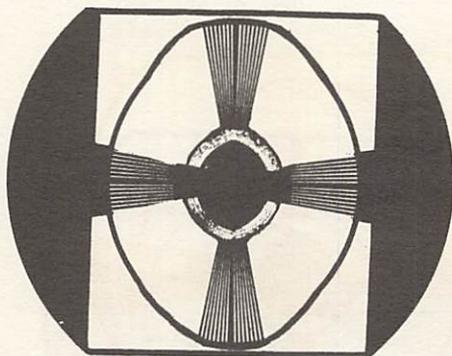
"Find It & Fix It "

## SYMPTOM

**Picture** - Width insufficient to fill screen.

**Bright Area** - Width insufficient to fill screen.

**Sound** - Normal.



## CAUSE

Misadjusted width, horizontal drive or horizontal linearity controls.  
Defective horizontal output tube.  
Defective horizontal discharge tube.  
Defective damper tube.

## REMEDY

Readjust width control. Slightly readjust horizontal drive control. If necessary, readjust horizontal linearity control. Alternate readjustments of drive and linearity controls may be necessary.

Replace horizontal output tube. Often used types are 6BG6G, 6BQ6GT, 6CD6G, 6AU5GT, 6AV5GT, 6SN7GT, 12SN7GT, 19GB6G, 25BQ6, 50B5.

Replace horizontal discharge tube. This is generally, but not always, combined in one glass envelope with the horizontal oscillator. Often used types are 6SN7 or 6SN7GT, 12AU7, 12SN7, 6K6GT.

Replace damper tube. Often used types are 5V4G, 6W4GT, 6SA7G, 25W4GT, 25Z6.

All horizontal sweep tubes are marked "H" on special copyrighted "TROUBLE INDICATING" TUBE LOCATION GUIDES. Horizontal output tubes can also be distinguished from other "H" tubes, since these are marked "BH" and also have an asterisk (\*). This serves to indicate the need for special precautions when making replacement.

Damper tubes are marked "HB" on TUBE LOCATION GUIDES.

# TV TROUBLE NO. 24

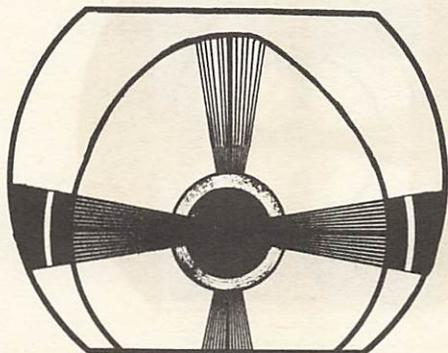
"Find It & Fix It"

## SYMPTOM

**Picture** - Actors appear to have short legs and long necks. Vertically squeezed or stretched.

**Bright Area** - Normal.

**Sound** - Normal.



## CAUSE

Misadjusted vertical linearity control and/or height control.

Defective vertical oscillator, discharge tube, or output tube.

## REMEDY

Try alternate readjustments of height and vertical linearity controls.

Replace vertical oscillator-vertical discharge tube. Often used types are 6SN7 or 6SN7GT, 6C4, 12AU7, 12SN7GT and 6J5GT.

Replace vertical output tube. Often used types are 6V6, 6V6GT, 6K6, 6K6GT, 6S4, 6W4, 6AQ5, 12AU7.

Vertical oscillator, discharge and output tubes are marked "V" on special "TROUBLE INDICATING" TUBE LOCATION GUIDES.

# TV TROUBLE NO. 25

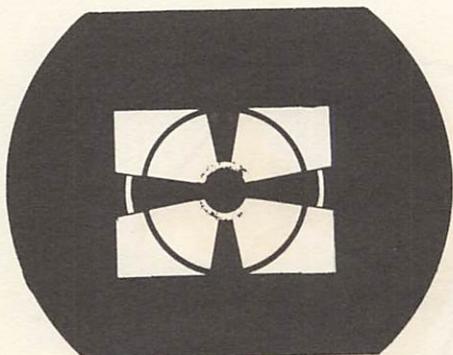
"Find It & Fix It "

## SYMPTOM

**Picture** - Dwarfed horizontally and vertically.

**Bright Area** - Dwarfed horizontally and vertically.

**Sound** - Normal.



## CAUSE

Excessive high voltage.

Improper yoke placement.

## REMEDY

Replace high voltage rectifier tube. Often used types are 1B3GT, 8016, 1V2, 1X2 and 1X2A. These tubes are marked "B" in special "TROUBLE INDICATING" TUBE LOCATION GUIDES and are also marked with an asterisk (\*) to indicate that special precautions must be observed when replacing them.

Replace damper tube. Often used types are 5V4G, 6W4GT, 6A57GT, 25W4GT, and 25Z6. Marked "HB" on TUBE LOCATION GUIDES.

Replace horizontal discharge tube. Often used types are 6A05, 6CD6G, 6BG6G, 6GQ6GT, 6AU5GT, 6AV5GT, 6SN7, 12SN7, 19GB6G, 12BQ6, and 50B5. These tubes are marked "BH" on "TROUBLE INDICATING" TUBE LOCATION GUIDES. They are also marked with an asterisk (\*) to indicate need for special precautions when handling them.

Move deflection yoke closer to bell (flare) of picture tube.

# TV TROUBLE NO. 26

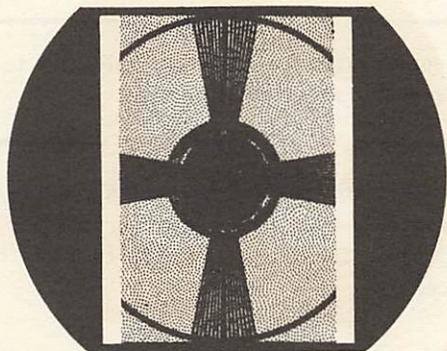
"Find It & Fix It"

## SYMPTOM

**Picture** - Folded over at both sides.

**Bright Area** - Folded over at both sides.

**Sound** - Normal.



## CAUSE

Defective damper tube.

Defective horizontal output tube.

Defective horizontal oscillator and/or discharge tube.

## REMEDY

Replace damper tube. Often used types are 5V4G, 6W4GT, 6AS7G, 25W4GT, 25Z6.

Replace horizontal output tube. Often used types are 6BG6G, 6BQ6GT, 6CD6G, 6AU5GT, 6AV5GT, 6SN7GT, 19BG6G, 25BQ6, 50B5.

Replace horizontal oscillator. Often used types are 6SN7 (or 6SN7GT), 12AU7, 12SN7, 6K6GT.

All above tubes are marked "H" on "TROUBLE INDICATING" TUBE LOCATION GUIDES. Horizontal output tubes are distinguished from other "H" tubes by the fact that they are marked "HB" and are followed by an asterisk (\*). This indicates the need for special precautions when handling.

# TV TROUBLE NO. 27

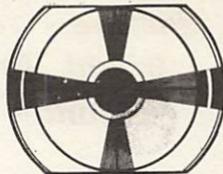
"Find It & Fix It"

## SYMPTOM

**Picture** - Brown or yellowish spot. (Ion spot)

**Bright Area** - Brown or yellowish spot.  
(Ion spot)

**Sound** - Normal.



## CAUSE

A burnt spot in fluorescent coating within tube due to lack of ion trap, weak ion trap, improperly adjusted ion trap.

## REMEDY

If spot is only slightly noticeable, check ion trap adjustment. Make sure correct ion trap is used. Do not turn brightness control too far clockwise while adjusting ion trap. If spot is badly burned, picture tube must be replaced.

# TV TROUBLE NO. 28

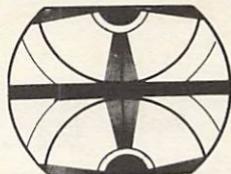
"Find It & Fix It"

## SYMPTOM

**Picture** - Top and bottom portions of picture  
interchanged.

**Bright Area** - Normal.

**Sound** - Normal.



## CAUSE

Misadjusted vertical hold control.

## REMEDY

Readjust vertical hold control.

# TV TROUBLE NO. 29

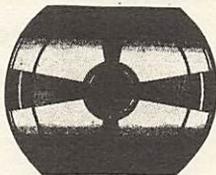
"Find It & Fix It "

## SYMPTOM

**Picture** - Alternate dark and light horizontal bars.

**Bright Area** - Alternate dark and light horizontal bars.

**Sound** - Hum.



## CAUSE

Defective tubes in low voltage power supply.

## REMEDY

Replace tubes marked "D" in "TROUBLE INDICATING" TUBE LOCATION GUIDES.

# TV TROUBLE NO. 30

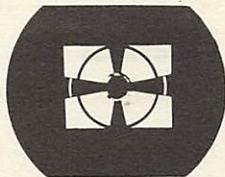
"Find It & Fix It "

## SYMPTOM

**Picture** - Reduced height and width and/or reduced brightness.

**Bright Area** - Same defect as picture.

**Sound** - Weak or absent.



## CAUSE

Insufficient low voltage caused either by defective tubes in low voltage power supply, or by low line voltage.

## REMEDY

Change tubes marked "D" in "TROUBLE INDICATING" TUBE LOCATION GUIDES.  
Have electric company check voltage of power supply.

# TV TROUBLE NO. 31

"Find It & Fix It "

## SYMPTOM

**Picture** - Absent.

**Bright Area** - Absent.

**Sound** - Normal.

## CAUSE

Due either to misadjustments or high voltage failure.

## REMEDY

Turn brightness control to full clockwise position. Check adjustment of ion trap, moving trap slowly backward and forward along neck of tube and at same time turning it slightly clockwise and counter-clockwise. Replace tubes marked "B," "BH" and, finally, replace "H" tubes as shown on "TROUBLE INDICATING" TUBE LOCATION GUIDES.

# TV TROUBLE NO. 32

"Find It & Fix It "

## SYMPTOM

**Picture** - Absent.

**Bright Area** - Absent.

**Sound** - Absent.

## CAUSE

Broken wire at power cord or plug. Plug not fully inserted in outlet. House fuse blown. "On-off" switch defective. Interlock switch at back of set not properly in place. Blown fuse in TV set. In "combination" set, switch not turned to "TV" position. Controls on set not correctly adjusted. Tubes in set power supply burnt out.

## REMEDY

Check power supply cord and plug. Check fuses and switches. Turn Brightness (Brilliance) control and volume control fully clockwise. Replace tubes marked "D" on "TROUBLE INDICATING" TUBE LOCATION GUIDES.

# TV TROUBLE NO. 33

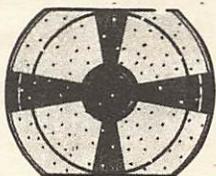
"Find It & Fix It "

## SYMPTOM

**Picture** - Snow.

**Bright Area** - Normal.

**Sound** - Weak.



## CAUSE

Faulty antenna system or weak tubes (Snow on all channels).

Weak incoming signal (Snow on some channels, but not all).

## REMEDY

Inspect antenna system for broken antenna arm or open circuit in lead-in. Change all tubes marked "P" and "PS" on "TROUBLE INDICATING" TUBE LOCATION GUIDE. If snow is due to weak incoming signal, use booster, change direction of antenna or install an improved fringe area antenna.

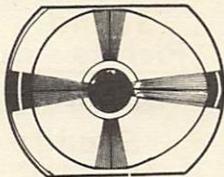
# TV TROUBLE NO. 34

"Find It & Fix It "

## SYMPTOM

**Picture** - Horizontally squeezed or stretched. Circles  
**Bright Area** - egg-shaped in horizontal direction.

**Sound** - Normal.



## CAUSE

Misadjusted controls.

Faulty damper tube.

## REMEDY

Readjust horizontal drive, width control and horizontal linearity control watching station pattern until true circle is obtained.

Replace tube marked "BH" on "TROUBLE INDICATING" TUBE LOCATION GUIDE.

DO NOT replace "BH" tube marked with asterisk.

# TV TROUBLE NO. 35

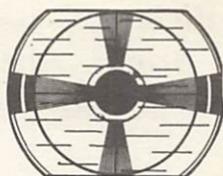
"Find It & Fix It"

## SYMPTOM

**Picture** - Intermittent streaks and flashes.

**Bright Area** - Intermittent streaks.

**Sound** - Noisy.



## CAUSE

Poorly soldered lead-in wire or other defect in antenna system. Could also be caused by electric razors, fluorescent lights, home electrical appliances, noisy motors.

## REMEDY

Inspect entire antenna system from roof installation to set. Check for offending devices by process of elimination, first turning off fluorescent light, then motors, etc.

# TV TROUBLE NO. 36

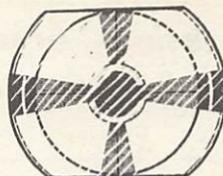
"Find It & Fix It"

## SYMPTOM

**Picture** - Thin weaving meshed diagonal or vertical lines across picture.

**Bright Area** - Normal.

**Sound** - Normal.



## CAUSE

Interference, often from neighboring sets. In some cases due to FM interference.

## REMEDY

Try relocating or rotating antenna or increase antenna height. FM interference may be eliminated by installation of commercial FM wave trap.

# TV TROUBLE NO. 39

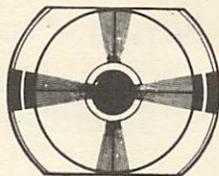
"Find It & Fix It "

## SYMPTOM

**Picture** - Normal.

**Bright Area** - Normal.

**Sound** - Weak or Absent.



## CAUSE

Defective tubes in sound section.

## REMEDY

Replace all tubes marked "S" in "TROUBLE INDICATING" TUBE LOCATION GUIDES.

# TV TROUBLE NO. 40

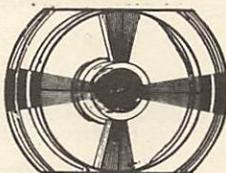
"Find It & Fix It "

## SYMPTOM

**Picture** - Ghosts, Multiple images, Reflections.

**Bright Area** - Normal.

**Sound** - Normal.



## CAUSE

Generally due to reflections from surrounding buildings but in some cases where ghost is very close to desired signal, it may be caused by use of incorrect lead-in..

## REMEDY

If due to reflection, try rotating or relocating antenna. Use a more highly directive antenna. If caused by incorrect lead-in, make sure you purchase 300-ohm lead-in, if antenna supplied is 300-ohm type.

# TV TROUBLE NO. 37

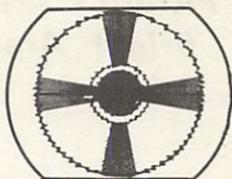
"Find It & Fix It "

## SYMPTOM

**Picture** - Pie-crust edges.

**Bright Area** - Pie-crust edges.

**Sound** - Noisy, crackling, snapping, frying.



## CAUSE

Arc-over at high voltage supply. (corona discharge)

## REMEDY

Spray with anti-corona lacquer.

# TV TROUBLE NO. 38

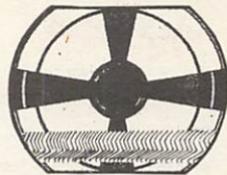
"Find It & Fix It "

## SYMPTOM

**Picture** - Herringbone effect.

**Bright Area** - Herringbone effect.

**Sound** - Normal.



## CAUSE

Interference from diathermy or X-ray apparatus.

## REMEDY

Filtering and shielding of offending apparatus is best remedy.

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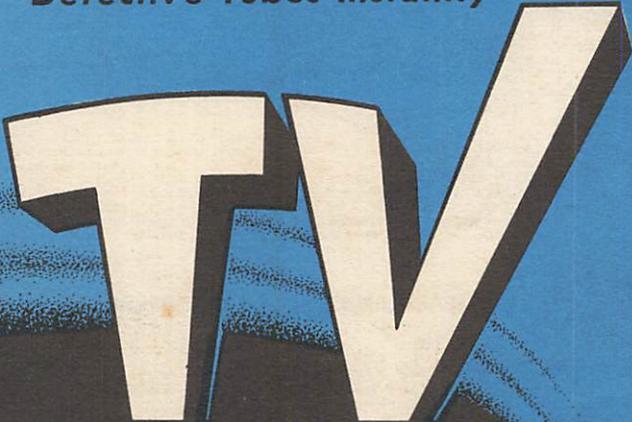
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