

H.G. Cisin's

Vol. 7

NEW 1958 MODELS

TV

**TROUBLE
TRACER**

FIND IT
AND FIX IT

50¢

NEW

TUBE CHARTS OF 1200 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	
Actors have short legs and		across picture -----	43
long necks -----	36	Momentary reduction in size -----	40
Alternate dark and light hori-		Moves up and down -----	27
zontal bars -----	40	Multiple images -----	45
Bright horizontal line instead		Normal picture, sound weak or	
of picture -----	9	absent -----	45
Bright spot after turning set off	26	Off center horizontally -----	21
Bright vertical line instead of		Off center vertically -----	19
picture -----	11	Pie-crust edges -----	44
Brightness reduced -----	34	Pulls horizontally -----	7
Brown or yellow spot -----	39	Reduced brightness -----	40
Circles egg shaped in horizontal		Reduced height and width -----	40
direction -----	42	Reflections -----	45
Circles egg shaped in vertical		Return traces unduly noticeable -	25
direction -----	36	Reversed picture -----	30
Darkened -----	32	Right portion on left side -----	28
Dark horizontal streaks ---	43 & 27	Rolls vertically -----	17
Diagonal lines across picture --	43	Shading poor -----	32
Dwarfed -----	37 & 40	Shadow at corner -----	23
Enlarged abnormally -----	34	Side edges wavy -----	15
Flashes, intermittent -----	27	Snow -----	42
Folded over at both sides -----	38	Sound weak or absent, picture	
Folded over at left side -----	24	normal -----	45
Ghosts -----	45	Streaks, intermittent -----	27
Height insufficient -----	29	Tears, pulls or weaves horizon-	
Herringbone effect -----	44	tally -----	7
Horizontal bars, alternately		Tears vertically -----	27
dark and light -----	40	Top and bottom parts of picture	
Horizontally off center -----	21	interchanged -----	39
Horizontal picture lines wavy --	31	Unstable -----	27
Horizontally squeezed or		Vertical dark faint line at left	33
stretched -----	42	Vertically jittery -----	27
Horizontal sloping lines -----	13	Vertically off center -----	19
Interference -----	43	Vertically squeezed or stretched	36
Intermittently smaller -----	43	Vertical ripple or wrinkle -----	25
Intermittent streaks and flashes	43	Wavy at sides -----	15
Insufficient height -----	29	Weaves horizontally -----	7
Insufficient width -----	35	Width insufficient -----	35
Ion spot -----	39	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. 7

By H.G.Cisin, Consulting Engineer

(Vol. 7 models differ from those in Vol's. 1,2,3,4,5 & 6 and TV TUBE LOCATOR Vol's. 1 & 2)

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
Horizontal movement and bright area -----	BH
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".

The letter "D" is also used to mark a fuse which would cause set to become inoperative if it blows out. An asterisk (*) near a tube on the tube location guide indicates the presence of very high voltage. If the proper precautions are observed, it is not dangerous to handle these tubes.

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". Test these tubes and replace the defective tube with new one.

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, in the case of the newer tubes having suffixes such as "GA", "GTA", "GTB" etc., these have been included in the type designations. In purchasing a tube to replace defective one in the TV set it is of the utmost importance that the replacement has the identical type designation as the one which has been removed. Thus, a 6SN7GTA tube should be replaced by one with this exact designation, not simply by a 6SN7GT tube.

When using "TROUBLE INDICATING"

TUBE LOCATION GUIDES, you will observe that the front of each model is plainly marked. In most instances top 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.

On the following pages you will find "TROUBLE INDICATING TUBE LOCATION GUIDES" covering many of the new portable TV models of various makers from Admiral to Zenith. At the time this volume went to press several additional portables had been announced, but charts were not available. Hence, if you do not find the model TV set you require in the following list, be sure to refer to page 6, which tells how you can obtain it.

It should be noted that many of the newer sets use selenium rectifiers which if defective will result in a "dead" set. In many sets a fuse or fusible resistor is used to protect the selenium rectifier. In such sets, the first step is to check fuse or resistor. Sets with heaters in series may become dead due to an open heater in a single tube or to an open protective resistor in series in the heater circuit.

INDEX

ADMIRAL - Page 8	<u>Guide</u>	ADMIRAL - Page 8	<u>Guide</u>	EMERSON - Page 10	<u>Guide</u>
16AB1 -----	(1)	LA21E22 -----	(1)	120351E -----	(2)
16AB1C -----	(1)	LA21E23 -----	(1)	120352G -----	(2)
16AD1 -----	(1)	P17D21 -----	(2)	120353E -----	(2)
16AD1C -----	(1)	P17D22 -----	(2)	120354G -----	(2)
16AE1 -----	(1)	P17D23 -----	(2)	120407S -----	(2)
16AE1C -----	(1)	P17D24 -----	(2)	120417S -----	(2)
16AF1 -----	(2)	PA17D21 -----	(2)	120420S -----	(2)
16AG1 -----	(1)	PA17D22 -----	(2)	120422S -----	(2)
16AG1C -----	(1)	PA17D23 -----	(2)	120408U -----	(2)
16AL1 -----	(1)	PA17D24 -----	(2)	120418U -----	(2)
16AL1C -----	(1)	T21E1 -----	(1)	120421U -----	(2)
16B1 -----	(1)	T21E2 -----	(1)	120422U -----	(2)
16B1C -----	(1)	T21E3 -----	(1)		
16D1 -----	(1)	T21E21 -----	(1)		
16D1C -----	(1)	T21E22 -----	(1)		
16E1, C -----	(1)	T21E23 -----	(1)		
16F1 -----	(2)	TA21E1 -----	(1)	GENERAL ELECTRIC-Page10	<u>Guide</u>
16G1, C -----	(1)	TA21E2 -----	(1)	14P1209, UHF -----	(1)
16J1, C -----	(1)	TA21E3 -----	(1)	14P1210, UHF -----	(1)
16K1, C -----	(1)	TA21E21 -----	(1)	14P1211, UHF -----	(1)
16L1, C -----	(1)	TA21E22 -----	(1)	14P1212, UHF -----	(1)
19AZ4D -----	(3)	TA21E23 -----	(1)	21C1536, UHF -----	(2)
19AZ4DF -----	(3)	TR21E21 -----	(1)	21C1540, UHF -----	(2)
19AZ4DT, ES -----	(3)	TR21E22 -----	(1)	21C1542, UHF -----	(2)
19SZ4D, DF, DT, ES -----	(3)	TR21E23 -----	(1)	21C1548, UHF -----	(2)
19SZ4FS, PS -----	(3)	TS23A1 -----	(3)	21C1549, UHF -----	(2)
19Z4DF, DT -----	(3)	TS23A2 -----	(3)	21C1551, UHF -----	(2)
19Z4PRS, RS -----	(3)	TS23A3 -----	(3)	21C1553, UHF -----	(2)
C21E2 -----	(1)	TS23A6 -----	(3)	21C4554, UHF -----	(2)
C21E3 -----	(1)	TS23A7 -----	(3)	21C1555, UHF -----	(2)
C21E6 -----	(1)	TS23A7 -----	(3)	21C1556, UHF -----	(2)
C21E7 -----	(1)	TS323A1 -----	(3)	21C1560, UHF -----	(2)
C21E12 -----	(1)	TS323A2 -----	(3)	21C1562, UHF -----	(2)
C21E13 -----	(1)	TS323A3 -----	(3)	21C1564, UHF -----	(2)
C21E14 -----	(1)	TS323A3, LN -----	(3)	21T1539, UHF -----	(2)
C21E16 -----	(1)			21T1540, UHF -----	(2)
C21E17 -----	(1)	DUMONT - Page 8		21T1541, UHF -----	(2)
C21E22 -----	(1)	RA406 -----		21T1542, UHF -----	(2)
C21E23 -----	(1)	RA407 -----		21T1543, UHF -----	(2)
C21E24 -----	(1)	Sportsman -----		21T1544, UHF -----	(2)
CA21E2 -----	(1)			24C1660, UHF -----	(2)
CA21E3 -----	(1)	EMERSON - Page 10		24C1661, UHF -----	(2)
CA21E12 -----	(1)	1212 -----	(1)	24C1670, UHF -----	(2)
CA21E13 -----	(1)	1213 -----	(1)	24C1671, UHF -----	(2)
CA21E14 -----	(1)	1228 -----	(1)	Q2 Chassis -----	(1)
CA21E22 -----	(1)	1229 -----	(1)	U2 Line -----	(2)
CA21E23 -----	(1)	1238 -----	(1)		
CA21E24 -----	(1)	1239 -----	(1)	HOTPOINT -Page 10	<u>Guide</u>
CR21E12 -----	(1)	1244 -----	(1)	14S206, UHF -----	(1)
CR21E13 -----	(1)	1245 -----	(1)	14S207, UHF -----	(1)
CR21E14 -----	(1)	1246 -----	(1)	14S208, UHF -----	(1)
CS23A11 -----	(3)	1247 -----	(1)	14S209, UHF -----	(1)
CS23A12 -----	(3)	1272 -----	(1)	21S406 -----	(2)
CS23A13 -----	(3)	1273 -----	(1)	21S455 -----	(2)
CS23A25 -----	(3)	1274 -----	(1)	21S456 -----	(2)
CS23A26 -----	(3)	1275 -----	(1)	21S507 -----	(2)
CS23A27 -----	(3)	1280 -----	(1)	21S508 -----	(2)
CS23B16C -----	(3)	1281 -----	(1)	21S555 -----	(2)
CS23B17C -----	(3)	1414 -----	(2)	21S556 -----	(2)
CS323A6 -----	(3)	1415 -----	(2)	21S605 -----	(2)
CS323A7 -----	(3)	1432 -----	(2)	21S606 -----	(2)
CS323A16 -----	(3)	1433 -----	(2)	Q3 Chassis -----	(1)
CS323A17 -----	(3)	1434 -----	(2)		
CS323A19 -----	(3)	1435 -----	(2)		
CS325A6 -----	(3)	1438 -----	(2)		
CS325A7 -----	(3)	1439 -----	(2)	MAGNAVOX - Page 12	<u>Guide</u>
L21E22 -----	(1)	1440 -----	(2)	21 Series -----	(1)
L21E23 -----	(1)	1441 -----	(2)	24 Series -----	(2)

MAGNAVOX - (Continued)	PHILCO - Page 14	Guide	RCA -- Guide in Parenthesis	
Page 12			Page 14 16 18	
U21-01AA	(1)	7H20, U	(1) 21D9187, U	(3) ---
U21-02AA	(1)	7H22	(1) 21D9195, U	(3) ---
U21-03AA	(1)	8L41	(2) 21D9197, U	(3) ---
U21-04AA	(1)	8L41B, BU, U	(2) 21D9475, U	(3) ---
U24-01AA	(2)	8L42, U	(2) 21D9477, U	(3) ---
U24-02AA	(2)	8L43, U	(2) 21D9495, U	(3) ---
U24-03AA	(2)	8P51, A, U	(2) 21D9496, U	(3) ---
U24-04AA	(2)	4630, L	(2) 21D9497, U	(3) ---
U24-06AA	(2)	E3021, R	(1) 21D9516, U	(3) ---
V21-01AA	(1)	E3032I, R	(1) 21D9534, U	(3) ---
V21-02AA	(1)	E3034, B, SA, SS	(1) 21T9132, U	(4) ---
V21-03AA	(1)	F4210E, L, X	(2) 21T9135, U	(4) ---
V21-04AA	(1)	F4212, L	(2) 21T9137, U	(4) ---
V24-C1AA	(2)	F4214STM, STN	(2) 21T9152, U	(4) ---
V24-02AA	(2)	F4618, L	(2) 21T9155, U	(4) ---
V24-03AA	(2)	F4620SL, SM	(2) 21T9156, U	(4) ---
V24-04AA	(2)	F4621S, SL	(2) 21T9157, U	(4) ---
V24-06AA	(2)	F4622, L	(2) 21T9215, U	(4) ---
		F4624	(2) 21T9216, U	(4) ---
		F4625S, SL	(2) 21T9217, U	(4) ---
		F4628, L	(2) 21T9225, U	(4) ---
MOTOROLA - Page 12	Guide			
17P1-1	(2)	F4630, L	(2) 21T9226, U	(4) ---
17P1-2	(2)	F4632	(2) 21T9227, U	(4) ---
17P2-1	(2)	F4634, L	(2) 21T9235, U	(4) ---
17P3-1	(3)	F4636, L	(2) 21T2936, U	(4) ---
17P3-2	(3)	F6206SL, SM	(2) 21T9237, U	(4) ---
17P3-3	(3)	F6620SL, SM	(2) 21T9238, U	(4) ---
17T30CH	(2)	UC4618	(2) 21T9255, U	(4) ---
17T31GP	(2)	UE3021, R	(1) 21T9256, U	(4) ---
21F8B, BA	(1)	UE3032I, R	(1) 21T9257, U	(4) ---
21F8W, WA	(1)	UE3034	(1) 21T9258, U	(4) ---
21K73B, M	(1)	UE3034B, SA, SS	(1) 21T9315, U	(4) ---
21K75B, CW, M	(1)	UF4210, E, L, X	(2) 21T9316, U	(4) ---
21K76B, CW, M	(1)	UF4212, L	(2) 21T9317, U	(4) ---
21K77B, M	(1)	UF4214STM, STN	(2) 21T9318, U	(4) ---
21K80CW, CWA	(1)	UF4618, L	(2) 21T9355, U	(4) ---
21K81B, M	(1)	UF4620, SL, SM	(2) 21T9356, U	(4) ---
21T40BG, MG	(1)	UF4621S, SL	(2) 21T9357, U	(4) ---
21T42B, M	(1)	UF4622, L	(2) 21T9375, U	(3) ---
21V1W, WA	(1)	UF4624	(2) 21T9376, U	(3) ---
TR89R, T	(1)	UF4625S, SL	(2) 21T9377, U	(3) ---
TS426, Y	(2)	UF4628, L	(2) 21T9378, U	(3) ---
TS428, Y	(2)	UF4632	(2) 21T9396, U	(4) ---
TS544, Y	(1)	UF4634, L	(2) 21T9397, U	(4) ---
WTS544, Y	(1)	UF4636, L	(2) 21T9398, U	(4) ---
Y17P1-1A	(2)	UF6206SL, SM	(2) 21T9399, U	(4) ---
Y17P1-2A	(2)	UF6620SL, SM	(2) 21T9415, U	(4) ---
Y17P2-1A	(2)		21T9417, U	(4) ---
Y17P3-1	(3)		24T8325, U	(5) ---
Y17P3-2	(3)	RCA -- Guide in Parenthesis	24T8327, U	(5) ---
Y17P3-3	(3)	Page 14 16 18	24T8335, U	(5) ---
Y17T30CHA	(2)	17PD9062, U	24T8337, U	(5) ---
Y17T31GPA	(2)	17PD9064, U	5377	(1) ---
Y21F8B, BA	(1)	17PD9072, U	5378	(1) ---
Y21F8W, WA	(1)	17PD9074, U	KCS113M, N	(5) ---
Y21K73B, BA	(1)	17PD9079, U	KCS116A, B, C, D	(6) ---
Y21K73M, MA	(1)	17PT9041, U	KCS118A, B, C, D	(2) ---
Y21K75B, BA	(1)	17PT9042, U	KCS121A, B, C, D, E	(3) ---
Y21K75CW, CWA	(1)	17PT9050, U	KCS121F, H, J, P, R	(3) ---
Y21K75M, MA	(1)	17PT9054, U	KCS122A, AD, AE, B	(4) ---
Y21K76B, BA	(1)	17PT9059, U	KCS122C, D, E, F, H	(4) ---
Y21K76CW, CWA	(1)	17S7092, U	KCS122J, K, L, M, N, P, R	(4) ---
Y21K76M, MA	(1)	17S7093, U	Ashton	(4) ---
Y21K77B, M	(1)	17S7097, U	Barton	(4) ---
Y21K80CW, CWA	(1)	17S7099, U	Beaumont	(3) ---
Y21K81B, M	(1)	21D8281, U	Benson	(4) ---
Y21T40BG, BGA	(1)	21D8282, U	Bromley	(4) ---
Y21T40MG, MGA	(1)	21D8305, U	Brookfield	(4) ---
Y21T42B, BA	(1)	21D8306, U	Colby	(3) ---
Y21T42M	(1)	21D8307, U	Donley	(4) ---
Y21T42MA	(1)	21D8628, U	Dorsey	(2) ---
Y21V1W	(1)	21D9182, U	Fairway	(2) ---
Y21V1WA	(1)	21D9185, U	Farrell	(3) ---

RCA -- Guide in Parenthesis Page 14 16 18	WESTINGHOUSE - Page 20 Guide	ZENITH - Page 22	Guide
Hillsdale ----- (3) ---	H17T241 ----- (1)	15Z30, U ----- (1)	
Jamison ----- (4) ---	H17T242 ----- (1)	15Z31, U ----- (1)	
Kentwood ----- (3) ---	H17T243 ----- (1)	16Z25, U ----- (2)	
Lansford ----- (3) ---	H17T244 ----- (1)	17Z20, U ----- (3)	
Lindale ----- (3) ---	H17T245 ----- (1)	17Z21, U ----- (3)	
Randolph ----- (5)	H17TU241 ----- (1)	17Z22, Q, U, QU ----- (3)	
Rockwell ----- (5)	H17TU242 ----- (1)	17Z23, Q, QU, U ----- (3)	
Talisman ----- (2) ---	H17TU243 ----- (1)	19A20, Q, U ----- (4)	
Trafton ----- (4) ---	H17TU244 ----- (1)	A2329J ----- (4)	
Sophisticate ----- (2) ---	H17TU245 ----- (1)	A2329JU ----- (4)	
Wayne ----- (4) ---	H21K223 ----- (2)	A2330E, EU ----- (4)	
	H21K224 ----- (2)	A2330H, HU, R, RU ----- (4)	
	H21K225 ----- (2)	A2358E, EU ----- (4)	
SILVERTONE - Page 18 Guide	H21K226 ----- (2)	A2358R, RU ----- (4)	
8190, A -----	H21K227 ----- (2)	A2359E, EU, H, HU, R, RU ----- (4)	
8193, A -----	H21K228 ----- (2)	A2362M, MU, R, RU ----- (4)	
528, 52100 -----	H21K229 ----- (2)	A3010E, H, R ----- (4)	
528, 52101 -----	H21K232 ----- (2)	A3011, E, Y ----- (4)	
528, 52102 -----	H21K233 ----- (2)	A3012H, R ----- (4)	
528, 52110 -----	H21KU223 ----- (2)	A3013H ----- (4)	
528, 52111 -----	H21KU224, A ----- (2)	A3014H, R ----- (4)	
528, 52112 -----	H21KU225, A ----- (2)	A4007E ----- (4)	
	H21KU226, A ----- (2)	Z1510L, LU ----- (2)	
	H21KU227, A ----- (2)	Z1511B, BU ----- (2)	
SYLVANIA - Page 18 Guide	H21KU228, A ----- (2)	Z1512J, JU ----- (2)	
21C407 Series -----	H21KU229, A ----- (2)	Z1812RZ ----- (1)	
21C408 Series -----	H21KU232, A ----- (2)	Z1817GZ ----- (1)	
21C409 Series -----	H21KU233, A ----- (2)	Z1817L ----- (1)	
21C512 Series -----	H21T201, B ----- (2)	Z2220R, RU ----- (3)	
21C513 Series -----	H21T202, A, B ----- (2)	Z2220Y, YU ----- (3)	
21P101 Series -----	H21T218, A ----- (2)	Z2221RU, RZ ----- (1)	
21T113 Series -----	H21T219, B ----- (2)	Z2221YU, YZ ----- (1)	
21T114 Series -----	H21T220, A ----- (2)	Z2222C, CU ----- (3)	
21T115 Series -----	H21T221, A ----- (2)	Z2222E, EU ----- (3)	
21T213 Series -----	H21T222, A ----- (2)	Z2222R, RU ----- (3)	
	H21T223 ----- (2)	Z2222Y, YU ----- (3)	
	H21T224 ----- (2)	Z2223EZ, YZ ----- (1)	
TRAV-LER- Page 20 Guide	H21T225 ----- (2)	Z2247E, EU, H, HU, R, RU ----- (3)	
621-740, U -----	H21TU201 ----- (2)	Z2248ED, RD ----- (3)	
621-750, U -----	H21TU202 ----- (2)	Z2249E, R ----- (3)	
721-R-400, U -----	H21TU218, A, B, C ----- (2)	Z2258E, EU, H, HU, R, RU ----- (3)	
	H21TU219, A, B, C ----- (2)	Z2282E, EU ----- (3)	
	H21TU220, A, B, C ----- (2)	Z2337E, EU, R, RU, Y, YU ----- (3)	
TRUETONE -- Page 20 Guide	H21TU221, A, B, C ----- (2)	Z2637E, EU, R, RU, Y, YU ----- (3)	
2D1840A -----	H21TU222, A, B, C ----- (2)	Z2671E, R ----- (3)	
2D1841A -----	H21TU223 ----- (2)	Z2672E, EU, R, RU ----- (3)	
2D1942A -----	H21TU224 ----- (2)	Z3000E, EU, R, RU ----- (3)	
2D1843A -----	H21TU225 ----- (2)	Z3001E, R ----- (3)	
2D1844A -----	V2372-27, -67 ----- (2)	Z3004E, EU, R, RU ----- (3)	
2D1845A -----	V2373-1 ----- (1)	Z3006E, EU, R, RU ----- (3)	
2D2840A, 2D2841A -----	V2382-202, 204 ----- (2)	Z3008E, EU, R, RU ----- (3)	
2D2842A, 2D2843A -----	V2382-602, 604 ----- (2)	Z4000E, EU, R, RU ----- (3)	
	V2383-1 ----- (1)	Z4006, E, R, ----- (3)	

If the Trouble Indicating Tube Location Guide for the TV receiver you are repairing is not listed in the above index, you can obtain a separate copyrighted chart (not a book) for this desired model, similar to the guides in this book, 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 Magnavox sets. Do not send serial number, except in case of Muntz sets. If manufacturer's tube layout is not available, make a rough layout showing approximate position and type designation of each tube.

If you do not find the RCA or Admiral TV models you require in the above Index, you will find hundreds of RCA models from the earliest 1947 sets to 1956 models in our RCA TV TUBE LOCATION GUIDES book (\$1) and over 1150 Admiral TV models covering sets produced up to early 1957 in our ADMIRAL TV TUBE LOCATION GUIDES (\$1). Guides of RCA and Admiral TV models, as well as of most other TV models produced since the publication of this book may be obtained as directed in the preceding paragraph.

If you are unable to obtain a schematic diagram of any radio or TV set, old or new, we will supply such diagrams for \$2 per diagram or if unobtainable, will refund money.

TV TROUBLE NO. 1

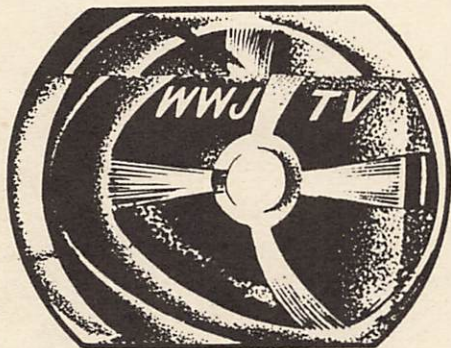
"Find It & Fix It"

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 badly positioned speaker.

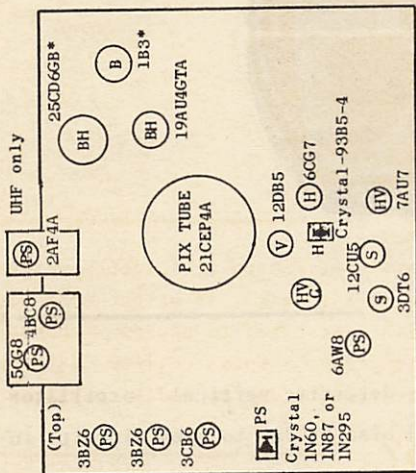
REMEDY

Readjust horizontal hold, linearity and drive controls.

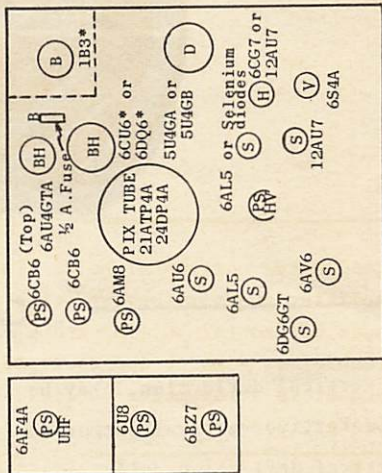
Replace video amplifier tube(s). Often used tubes are: 12BY7, 6AW8, 6AQ5, 12BY7A, 6CB6, 6AH6, 6AC6, 12AT7, 12AU7, 12BH7, 6AU8. Video amplifier tubes are marked "P" or "PS" on "TROUBLE INDICATING" TUBE LOCATION GUIDES

Replace d.c. restorer tube. Often used tubes are 6AL5 and 12AU7. These are seldom used on newer sets. They are marked "G" on TUBE LOCATION GUIDES.

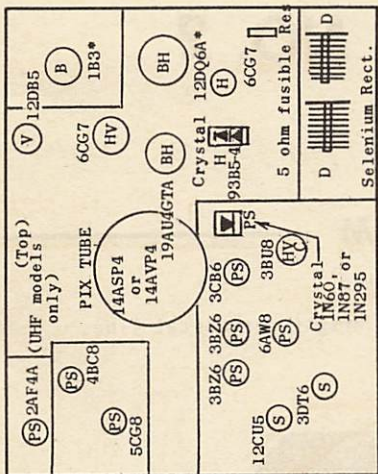
Check adjustment of ion trap, focus coil, deflection yoke. Check positioning of speaker.



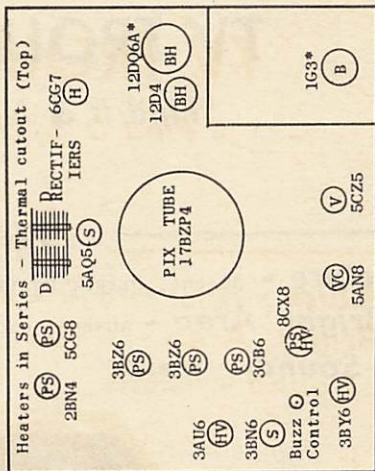
ADMIRAL (1)



ADMIRAL (3)



ADMIRAL (2)



ADMIRAL (2)

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. 2

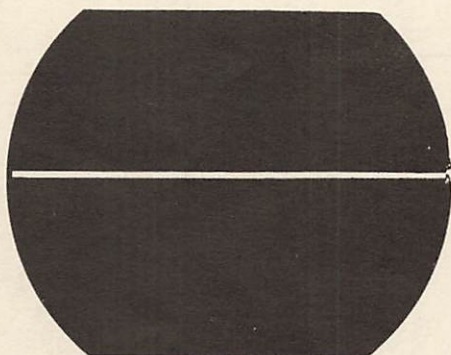
"Find It & Fix It "

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. Could also be due to open circuit in vertical deflection coil, or in vertical output transformer secondary.

REMEDY

Replace vertical oscillator tube. Often used types are: 12BH7, 12BH7A, 6C4, 6BH8, 6CS7, 12AU7, 12AU7A, 6SN7, 6SN7GTA or GTB, 7AU7, 12SN7, 6SL7.

Replace vertical output tube. Often used types are: 6S4, 6S4A, 12BH7, 6CM6, 12AU7, 12AU7A, 6AQ5, 6BL7, 25L6, 5V6, 6AH4, 6CS7, 12W6, 12B4A, 10DE7.

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

For additional often used types refer to table on page 46.

TV TROUBLE NO. 3

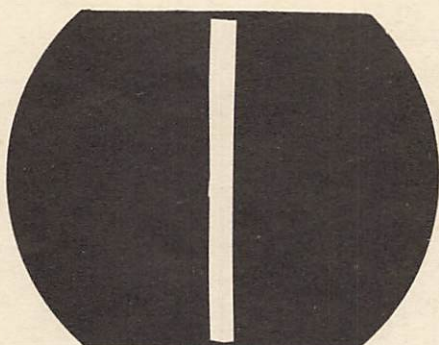
"Find It & Fix It "

SYMPTOM

Picture - Absent.

Bright Area - Thin bright vertical line.

Sound - Normal.



CAUSE

No horizontal deflection, due to an open circuit in one or both horizontal deflection coils.

REMEDY

Check horizontal deflection coils and replace if necessary.

TV TROUBLE NO. 4

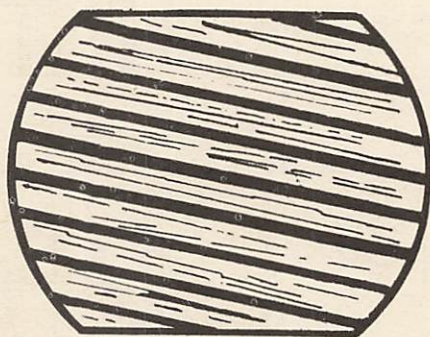
"Find It & Fix It "

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 sync circuit tubes. Often used tubes are: 6SN7GT, 6SN7GTA, 12SN7, 6SN7GTB, 7AU7, 12AU7, 6BY6, 6AW8, 6CG7, 6CS6, 6AN8, 6BK7A, 6BN6.

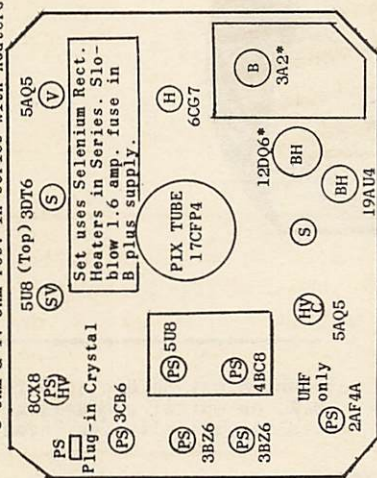
Replace horizontal oscillator tube. Often used tubes are 6SN7GT, 6SN7GTA, 12AU7, 12AU7A, 7AU7, 6AU7, 6AU7A, 6SN7GTB, 12AT7.

Replace horizontal AFC tube. Often used tubes are 6AL5, 5U8, 12SN7, 6SL7, 6SN7GT, 6SN7GTA, 6SN7GTB.

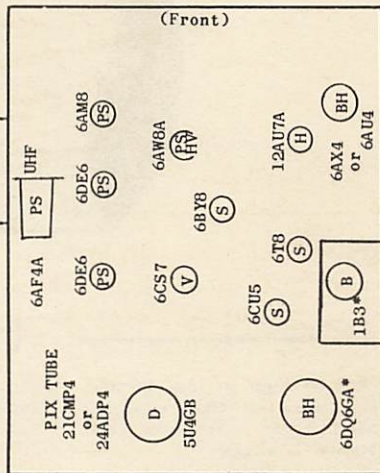
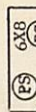
Sync circuit tubes are marked "HV", horizontal oscillator tube and horizontal AFC tube are marked "H" on copyrighted "TROUBLE INDICATING" TUBE LOCATION GUIDES.

Other often used sync circuit tubes are: 4BU8, 5AV8, 6BA8, 6AU8 and 12CT8. Also refer to table of tube functions on page 46.

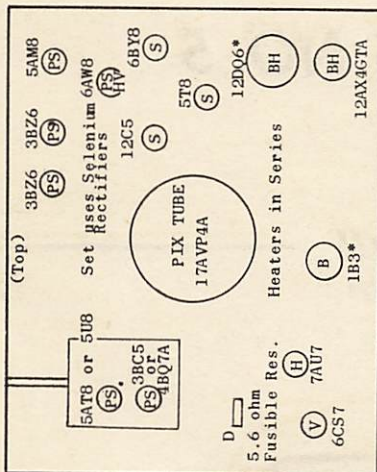
6 ohm & 47 ohm res. in series with heaters



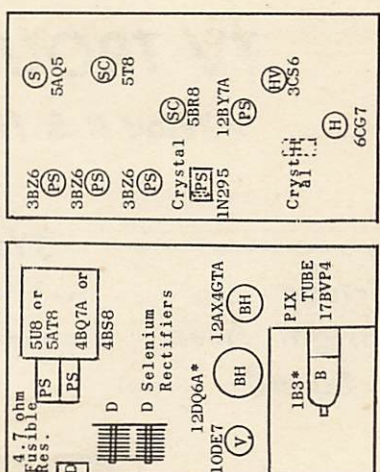
MOTOROLA (3)



PHILCO (2)



PHILCO (1)



RCA VICTOR (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. 5

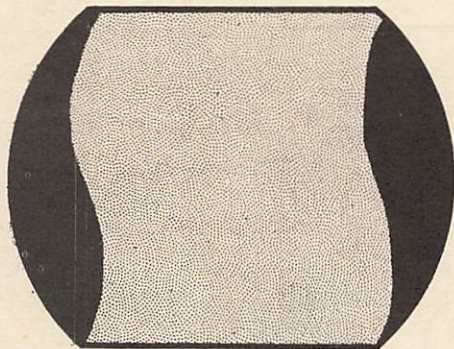
"Find It & Fix It "

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."

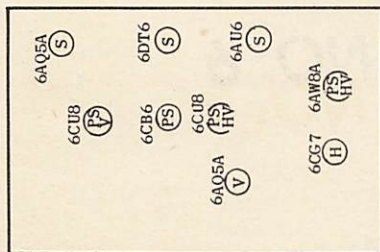
REMEDY

Replace horizontal deflection tubes. These include: Horizontal oscillator tubes such as 6SN7GT, 6SN7GTA, 6SN7GTB, 6AU7, 6AU7A, 12AU7, 12AU7A, 12AT7, 7AU7 and horizontal output tubes. Often used horizontal output tubes are: 6CD6, 6CU6, 6DQ6, 12CU6, 12DQ6, 25BQ6, 6BQ6, 6AU5.

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

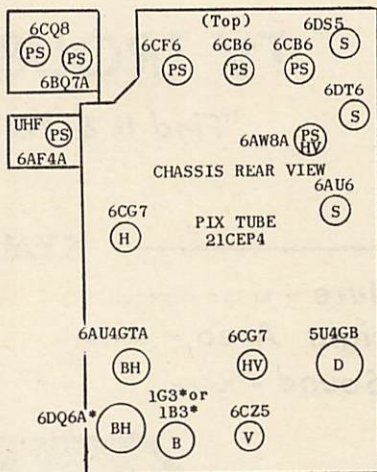
Horizontal output tubes are distinguished from other "H" tubes since they are marked "BH" and are followed by an asterisk (*). This calls attention to the fact that special high voltage precautions must be observed while replacing or handling them.

Additional often used horizontal output tubes are 6DQ6A, 12DQ6GTB, 17DQ6, 18A5, 25CD6GA and 25DN6. Also refer to list on page 46.

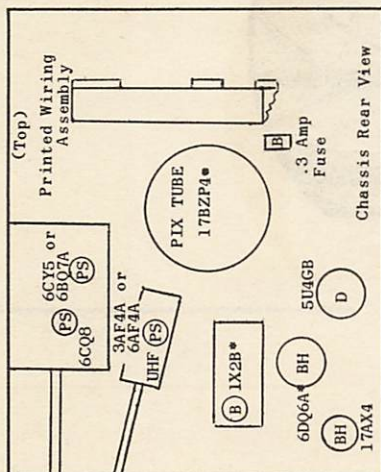


PRINTED
WIRING
ASSEMBLY

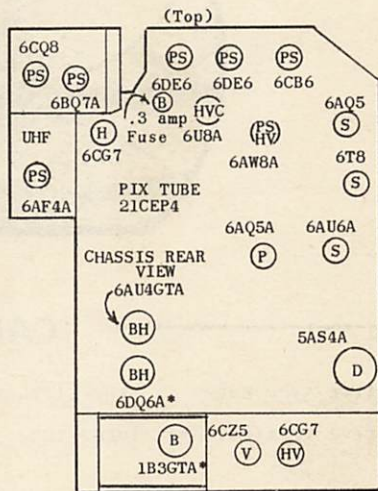
RCA VICTOR (2)



RCA VICTOR (4)



RCA VICTOR (2)



RCA VICTOR (3)

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. 6

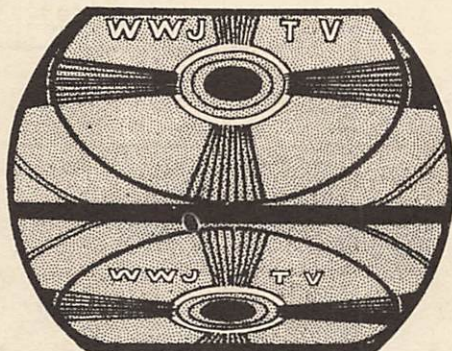
"Find It & Fix It "

SYMPTOM

Picture - Rolls vertically.

Bright Area - Normal.

Sound - Normal.



CAUSE

Defective sync tubes or sync circuit.

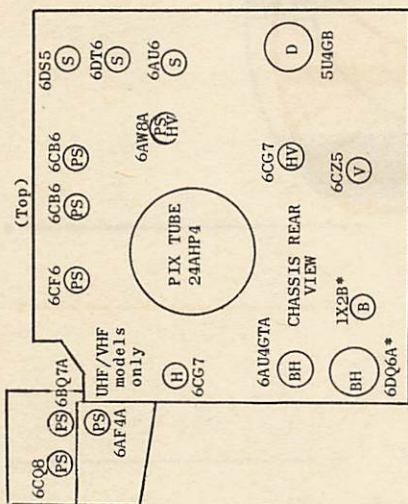
Defective vertical oscillator tube.

REMEDY

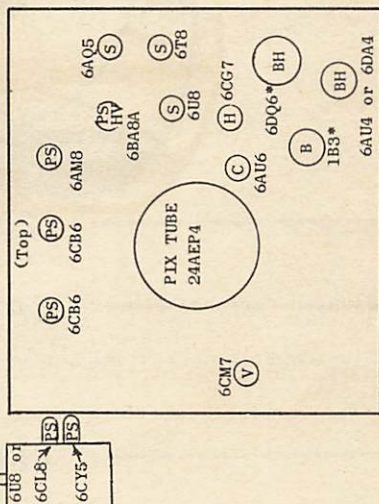
Replace sync tubes. Often used types are 6SN7, 12SN7, 7AU7, 12AU7, 12AU7A, 6BY7, 6AW8, 6CG7, 6CS6, 6AN8, 6BL7, 6BK7A, 6BN6, 4BU8, 5AV8, 6BA8, 12CT8.

Replace vertical oscillator tube. Often used types are 12BH7, 12BH7A, 6C4, 6BH8, 6CS7, 12AU7, 12AU7A, 6SN7GT, 6SN7GTA, 6SN7GTB, 7AU7, 12SN7, 6SL7, 6CG7. Also, refer to list of often used tubes on page 46.

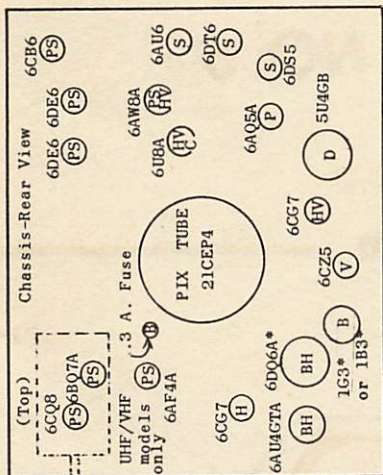
Sync tubes are marked "HV" and vertical oscillator tubes are marked "V" on on copyrighted "TROUBLE INDICATING" TUBE LOCATION GUIDES.



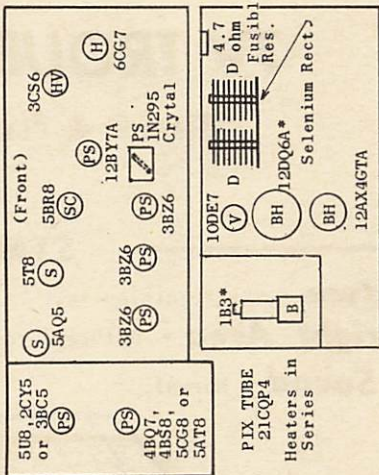
RCA VICTOR (5)



SILVERTONE



RCA VICTOR (6)



SILVERTONE

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. 7

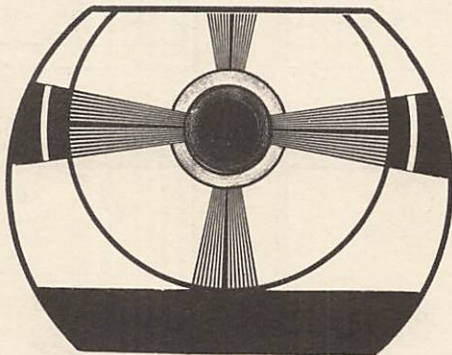
"Find It & Fix It "

SYMPTOM

Picture - Not centered vertically.

Bright Area - Not centered vertically.

Sound - Normal.



CAUSE

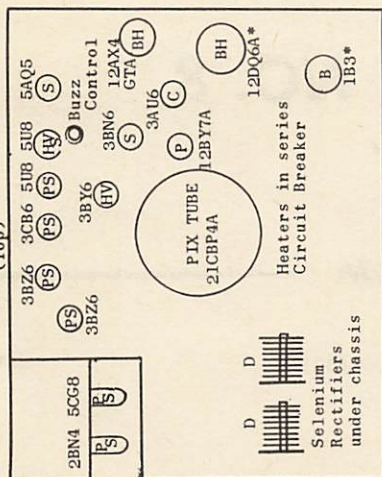
Misadjusted vertical centering control.

Misadjustment of mechanical centering devices.

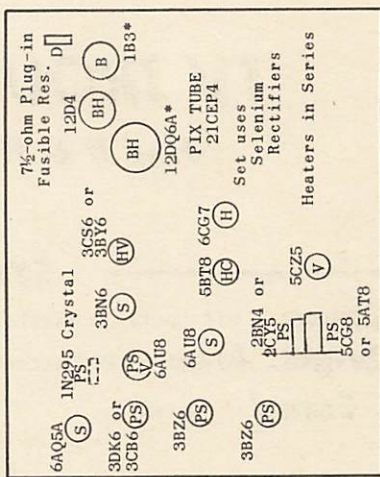
REMEDY

Readjust vertical centering control, if one is provided. Some sets have no centering control, but depend on adjustment of focus coil. Others depend on correct adjustment of height and linearity controls combined with correct positioning on neck of tube. Still others use a separate centering plate mounted on the focus magnet. A locking lever on this plate must be loosened before centering. Sidewise adjustment moves the picture up and down. In some sets centering is accomplished by rotating the centering magnet adjusting rings located on the back of the deflection yoke.

(Top)

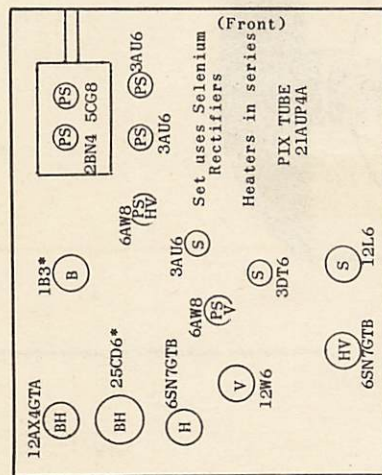


TRUETONE



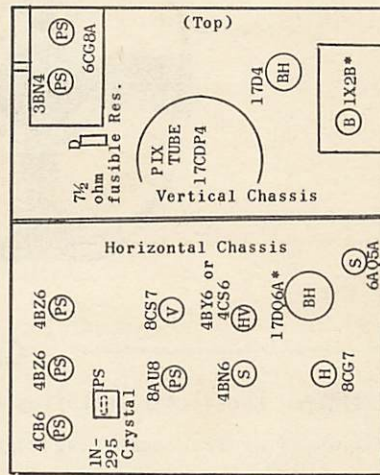
WESTINGHOUSE (2)

(Front)



TRAV-LER

(Top)



WESTINGHOUSE (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. 8

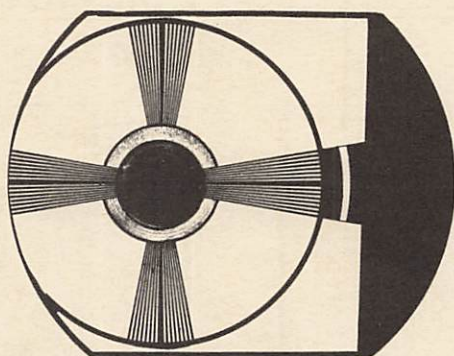
"Find It & Fix It"

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 centering control.

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

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.

TV TROUBLE NO. 9

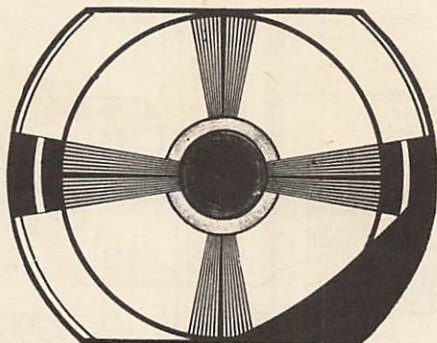
"Find It & Fix It "

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

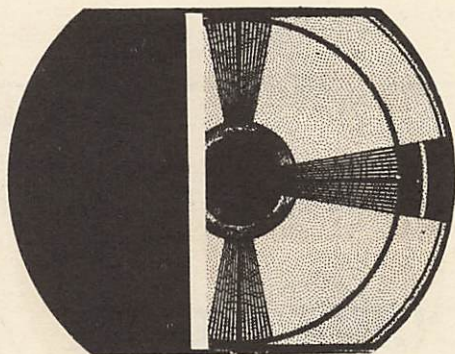
"Find It & Fix It"

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 horizontal AFC or sync discriminator

REMEDY

Replace damper tube. Often used types are 12AX4GT, 12AX4GTA, 5AU4, 25AX4, 6AU4, 25W4, 6W4, 6AX4, 19AU4GTA.

Replace horizontal oscillator tube. Often used types are 6SN7GT, 12AU7, 12AU7A, 7AU7, 6SN7GT, 6SN7GTA, 6SN7GTB, 6AU7, 6AU7A, 12AT7.

Readjust AFC control in accordance with set manufacturers directions.

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

For additional often used horizontal oscillator tubes refer to page 46.

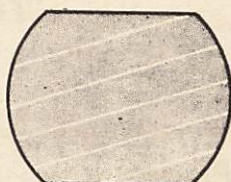
TV TROUBLE NO. 11

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.

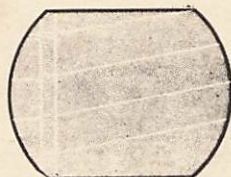
TV TROUBLE NO. 12

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 tubes are: 12BY7, 6AW8, 6AQ5, 12BY7A, 6CB6, 6AH6, 6AC6, 12AT7, 12AU7, 12BH7, 6AU8.

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

Move loud speaker leads to new position.

TV TROUBLE NO. 13

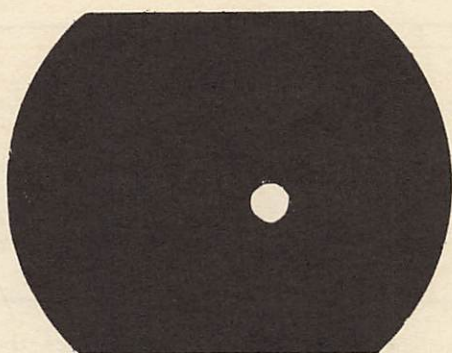
"Find It & Fix It "

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

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

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.

Additional often used vertical oscillator tubes are 6AU8 (triode sect.), 6B8A (Triode sect), 6B18 (triode sect.), 6CG7, 6CM7 (sect.1), 6SN7GTB, 7AU7.

TV TROUBLE NO. 16

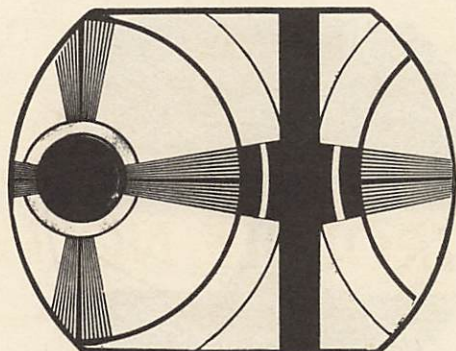
"Find It & Fix It "

SYMPTOM

Picture - Right portion on left side.

Bright Area - Normal.

Sound - Normal.



CAUSE

Misadjusted AFC or horizontal discriminator control.

Misadjusted horizontal hold control.

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

REMEDY

Readjust horizontal automatic frequency control system.

Readjust horizontal hold control.

Replace horizontal AFC tubes. Often used types are 6AL5, 6AC7, 6SN7, 12SN7, 6SL7, 5U8, 6SN7GTA, 6SN7GTB. These tubes are marked "H" on "TROUBLE INDICATING" TUBE LOCATION GUIDES. Other often used AFC tubes are 3AL5, 6BV8 and 6CN7.

TV TROUBLE NO. 17

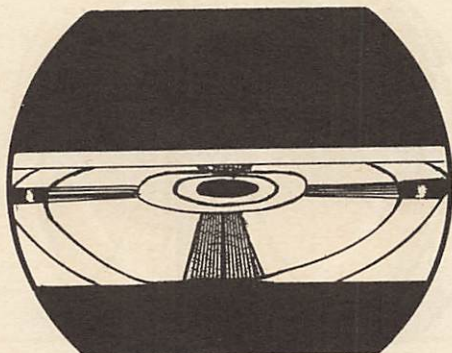
"Find It & Fix It "

SYMPTOM

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

Bright Area - Same fault as picture.

Sound - Normal.



CAUSE

Misadjusted height and vertical linearity controls.

Weak vertical output tube.

Weak vertical oscillator or 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: 6S4, 6S4A, 12BH7, 6CM6, 12AU7, 12AU7A, 6AQ5, 6BL7, 25L6, 5V6, 6AH4, 6CS7, 12W6, 12B4A.

Replace vertical oscillator tube. Often used types are: 12BH7, 12BH7A, 6C4, 6BH8, 6CS7, 12AU7, 12AU7A, 6SN7GT, 6TA or 6TB, 7AU7, 12SN7, 6SL7.

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

For additional often used vertical output tubes and vertical oscillator tubes, see page 46.

TV TROUBLE NO. 18

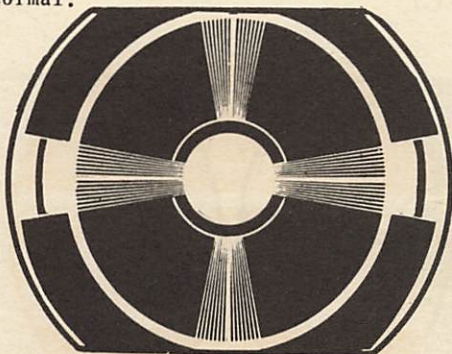
"Find It & Fix It "

SYMPTOM

Picture - Reversed or negative picture.

Bright Area - Normal with picture tuned out.

Sound - Normal.



CAUSE

- Defective AGC (Automatic gain control) tube
- Defective I.F. video amplifier tube.
- Defective video detector.
- Misadjusted contrast control.
- Defective video amplifier tube or tubes.

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

REMEDY

- Replace AGC tube. Often used types are: 6AU6, 12C5, 6AL5, 12AT7, 6AH6, 12BZ7. Only one section of double function tube used for AGC. Marked "C" on GUIDES.
- Replace video I.F. Tubes. Often used types: 3CB6, 4BC8, 3BZ6, 6CB6, 6BZ6, 6AU6, 6BA6, 5U8 (one sect.), 5AM8 (one sect.), 3CF6, 6AM8 (one sect).
- Replace video detector. Often used types: 5U8, 5AM8, 6AM8, 5AV8 (one sect), 3AL5, 6AL5, 12AL5. Crystal video det. used in some sets such as 1N64.
- Replace video amplifier tube. Often used types: 6AW8, 12BY7A, 6BK5, 6AU8, 6AU6, 6AN8, 6AQ5, 5AQ5, 6AH6.

All above mentioned tubes are marked "P" or "PS" on "TROUBLE INDICATING" TUBE LOCATION GUIDES. If reversed picture appears on one channel only, try indoor antenna. Readjust contrast control if necessary.

Additional often used AGC tubes, coded "C" on Guides are 3AU6, 3BU6 and 5U8.

TV TROUBLE NO. 19

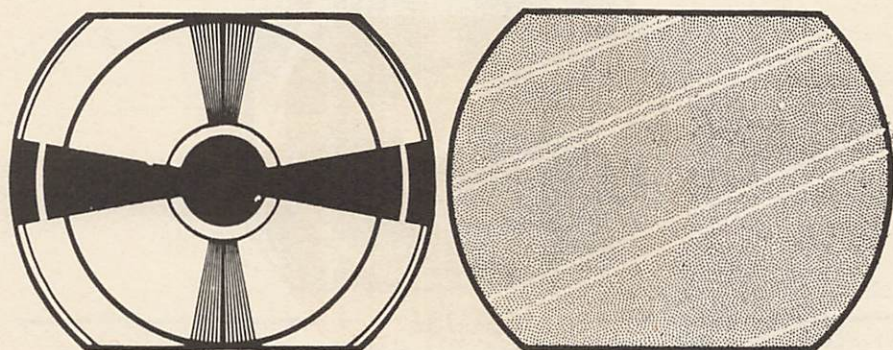
"Find It & Fix It "

SYMPTOM

Picture - Horizontal lines throughout picture are noticeably wavy.

Bright Area - Return traces are unequally spaced.

Sound - Normal.



CAUSE

In some cases, this 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

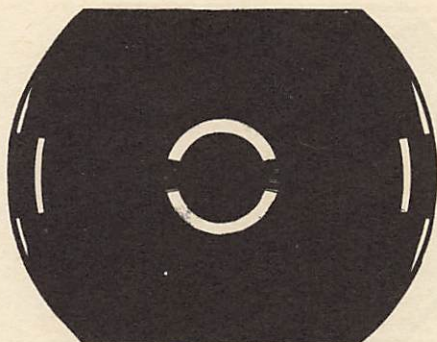
"Find It & Fix It "

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.

REMEDY

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

Replace AGC tube. Often used tubes are: 6AU6, 12C5, 6AL5, 12AT7, 6AH6, 12BZ7. AGC tubes are marked "C" on "TROUBLE INDICATING" TUBE LOCATION GUIDES. Other AGC tubes are 3AU6, 3BU8, 5U8 (Pentode Section)

Readjust focus control.

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

TV TROUBLE NO. 21

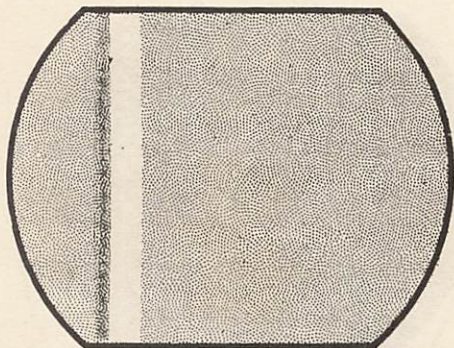
"Find It & Fix It "

SYMPTOM

Picture - Vertical dark faint lines or line at left, often followed by bright area.

Bright Area - Vertical dark faint lines or line at left side of area, often followed by bright space.

Sound - Normal.



CAUSE

Interference due to oscillations set up in horizontal output tube picked 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: 6CD6, 6CU6, 6DQ6, 12CU6, 12DQ6, 25BQ6, 6BQ6, 6AU5, 6BG6, 19BG6.

Horizontal output tubes are marked "BH" on "TROUBLE INDICATING" GUIDES. They are also marked with an asterisk (*) to indicate the necessity of special precautions when changing them.

In some cases a small magnet fastened to the side of the horizontal output tube will eliminate this trouble.

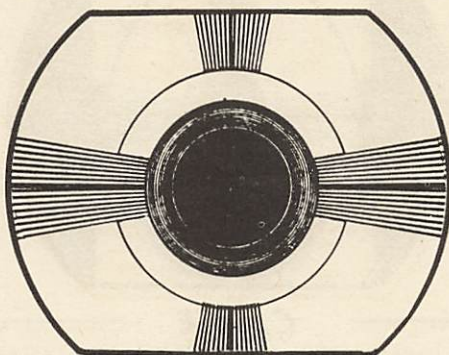
See page 46 for additional often used horizontal output tubes.

TV TROUBLE NO. 22

"Find It & Fix It "

SYMPTOM

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



CAUSE

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

REMEDY

- Replace high voltage rectifier tube. Often used tubes: 1B3GT, 8016, 1X2B, 1X2A, 1X2, 1V2. High voltage rectifier tubes are marked "B" on "TROUBLE INDICATING" TUBE LOCATION GUIDES. An asterisk (*) also marks such tubes, to indicate the fact that special care must be observed when they are replaced.
- Replace damper tube. Often used types are 12AX4GT, 12AX4GTA, 6AU4, 5AU4, 25AX4, 5V4G, 6W4GT, 6AS7G. Damper tubes are marked "BH" on "TROUBLE INDICATING" TUBE LOCATION GUIDES.

TV TROUBLE NO. 23

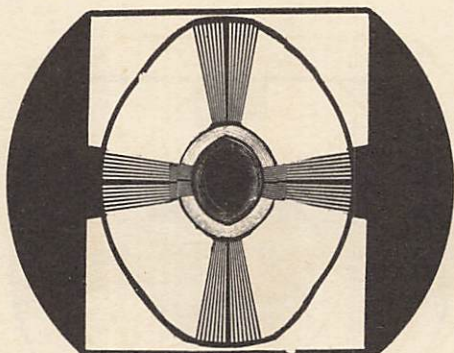
"Find It & Fix It "

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 section of horizontal oscillator 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 6CD6, 6CU6, 6DQ6, 6BQ6, 12CU6, 12DQ6, 25BQ6, 6BQ6, 6AU5, 6BG6, 6AV5. Horizontal output tubes are marked "H" and also have an asterisk (*) mark to indicate need for special precautions when making replacements. These marks are used on the special "TROUBLE INDICATING" TUBE LOCATION GUIDES.

Replace horizontal discharge tube. This is generally combined in same envelope with horizontal oscillator. Often used types are 6SN7GT, GTA, or GTB, 12AU7, 12AU7A, 6AU7, 6AU7A, 7AU7, 12AT7. Marked "H" on GUIDES.

Replace damper tube. Often used types: 12AX4GT, 12AX4GTA, 25AX4, 6AU4, 5AU4, 5V4, 6W4GT, 6AS7G. Damper tubes are marked "BH" on "TROUBLE INDICATING" TUBE LOCATION GUIDES.

See page 46 for additional often used H and BH tubes.

TV TROUBLE NO. 24

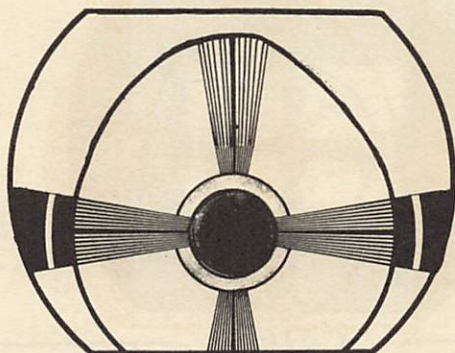
"Find It & Fix It "

SYMPTOM

Picture - Actors appear to have short legs and long necks.

Bright Area - Normal.

Sound - Normal.



CAUSE

Misadjusted vertical linearity control and/or height control.

Defective vertical oscillator or vertical output tube.

REMEDY

Try alternate readjustments of height and vertical linearity controls.

Replace vertical oscillator tube. Often used types are: 12BH7, 12BH7A, 6C4, 6BH8, 6CS7, 12AU7, 12AU7A, 6SN7, 6SN7GT or GTB, 7Au7, 12SN7, 6SL7.

Replace vertical output tube. Often used types are: 6S4, 6S4A, 12BH7, 6CM6, 12AU7, 12AU7A, 6AQ5, 6BL7, 26L6, 5V6, 6AH4, 6CS7, 12W6, 12B4A.

Vertical oscillator and vertical output tubes are marked "V" on "TROUBLE INDICATING" TUBE LOCATION GUIDES. See page 46 for additional often used "V" tubes.

TV TROUBLE NO. 25

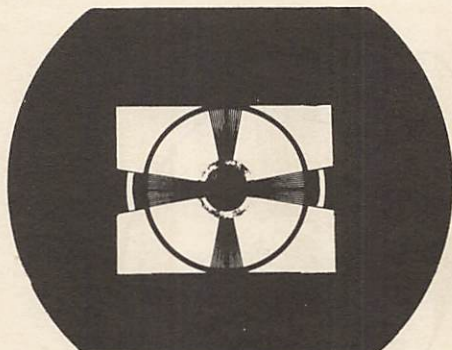
"Find It & Fix It"

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, 1X2B, 1X2A, 1V2. These tubes are marked "B" on "TROUBLE INDICATING" GUIDES. They are also marked with an asterisk (*) to indicate need for special precautions when they are being changed.

Replace damper tube. Often used types are: 12AX4GT, 12AX4GTA, 5AU4, 25AX4, 6AU4, 25W4, 6W4, 6AX4. They are marked "BH" on "TROUBLE INDICATING" GUIDES.

Replace horizontal output tube. Often used types are: 6CD6, 6CU6, 6BG6, 6DQ6, 12CU6, 12DQ6, 25BQ6, 6BQ6, 6AU5, 19BG6. These tubes are marked "BH" on "TROUBLE INDICATING" GUIDES and in addition are marked with an asterisk (*) to indicate need for special handling precautions.

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

See page 46 for additional often used BH tubes.

TV TROUBLE NO. 26

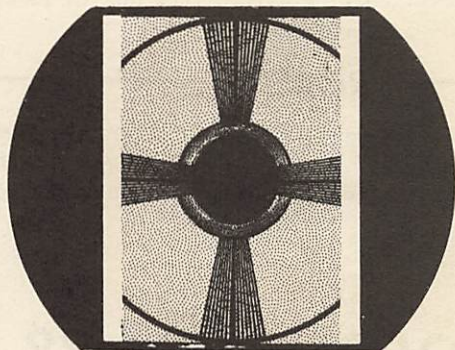
"Find It & Fix It"

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 tube.

REMEDY

Replace damper tube. Often used types are: 12AX4GT, 12AX4GTA, 5AU4, 25AX4, 6AU4, 24W4, 6AX4, 6AS7, 5V4. Damper tubes are marked "BH" on "TROUBLE INDICATING" TUBE LOCATION GUIDES.

Replace horizontal output tube. Often used types are 6CD6, 6CU6, 6BG6, 6DQ6, 12CU6, 12DQ6, 25BQ6, 6BQ6, 6AU5, 19BG6. Horizontal output tubes are distinguished from damper tubes by the fact that the marking "BH" is followed by an asterisk (*) which indicates the need for special precautions when making replacements.

Replace horizontal oscillator. Often used types are 6SN7GT, 6SN7GTA, GTB, 12AU7, 12AU7A, 7AU7, 6AU7, 6AU7A, 12AT7. Horizontal oscillator tubes are marked "H" on "TROUBLE INDICATING" LOCATION GUIDES.

See page 46 for additional often used BH and H tubes.

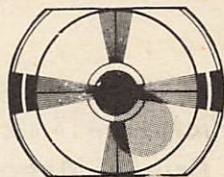
TV TROUBLE NO. 27

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.

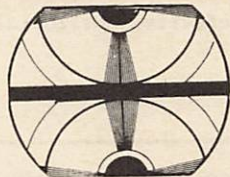
TV TROUBLE NO. 28

SYMPTOM

Picture - Top and bottom portions of picture
interchanged.

Bright Area - Normal.

Sound - Normal.



CAUSE

Misadjusted vertical hold control.

REMEDY

Readjust vertical hold control.

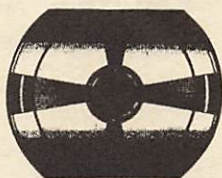
TV TROUBLE NO. 29

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.

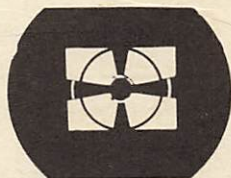
TV TROUBLE NO. 30

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

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

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.

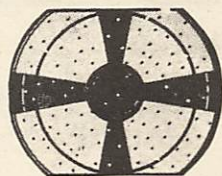
TV TROUBLE NO. 33

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.

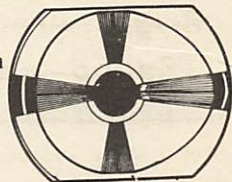
TV TROUBLE NO. 34

SYMPTOM

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

Bright Area - Normal.

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.

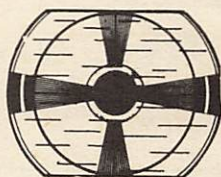
TV TROUBLE NO. 35

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.

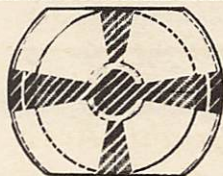
TV TROUBLE NO. 36

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.

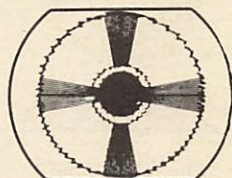
TV TROUBLE NO. 37

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.

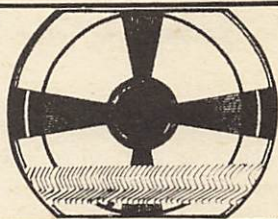
TV TROUBLE NO. 38

SYMPTOM

Picture - Herringbone effect.

Bright Area - Herringbone effect.

Sound - Normal.



CAUSE

Interference from diathermy or X-ray apparatus.

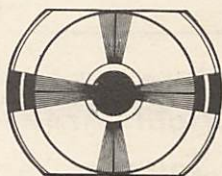
REMEDY

Filtering and shielding of offending apparatus is best remedy.

TV TROUBLE NO. 39

SYMPTOM

Picture - Normal
Bright Area - Normal.
Sound - Weak or absent.



CAUSE

Defective tubes in sound section.

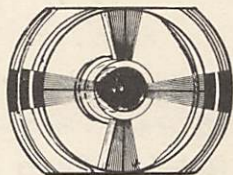
REMEDY

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

TV TROUBLE NO. 40

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 use 300-ohm lead-in, if antenna supplied is 300-ohm type.

FUNCTIONAL CLASSIFICATION
OF 600-MA SERIES STRING TUBES WITH
CONTROLLED WARM-UP TIME

<u>UHF OSCILLATOR</u> (PS)	<u>AUDIO AMPLIFIER</u> (S)	<u>VERTICAL OSCILLATOR</u> (V)
2AF4	3BN6	6A08 (Triode)
2AF4A	3DT6	6BA8A (Triode)
<u>VHF R.F. AMPLIFIER</u> (PS)	5T8	6BH8 (Triode Section)
2BN4	6BV8	6CG7
4BC8	6CN7	6CM7 (Section 1)
4BQ7A	<u>AUDIO OUTPUT</u> (S)	6SN7GTB
4BZ7	5A05	7AU7
5BK7A	5V6GT	<u>VERTICAL OUTPUT</u> (V)
3BZ6	12BK5	5A05
3CB6	12C5	5V6GT
3CE5	12CA5	6CM7 (Section 2)
<u>VHF OSCILLATOR</u> (PS)	12L6GT	6S4A
2BN4	12W6GT	6SN7GTB
5CL8	AGC (Automatic Gain Control) (C)	7AU7
5J6		12B4A
5X8 (Triode Section)	3AU6	12BH7A
6CL8	3BU8	12W6GT
<u>VHF MIXER</u> (PS)	5U8 (Pentode Section)	<u>HORIZONTAL REACTANCE TUBE</u> (H)
5CL8	<u>SYNC AMPLIFIER</u> (HV)	6CN7
5J6	5U8 (Triode Section)	<u>HORIZONTAL OSCILLATOR</u> (H)
5X8 (Pentode Section)	6A08 (Triode Section)	6A08 (Triode Section)
6CL8	6AW8A (Triode Section)	6BA8A (Triode Section)
<u>VIDEO I.F. AMPLIFIER</u> (PS)	6BA8A (Triode Section)	6BH8 (Triode Section)
3AU6	6BH8 (Triode Section)	6CG7
3BC5	6CG7	6SN7GTB
3BZ6	6SN7GTB	7AU7
3CB6	6BV8	12BH7A
3CE5	7AU7	<u>HORIZONTAL OUTPUT</u> (BH*)
<u>VIDEO DETECTOR</u> (PS)	<u>SYNC SEPARATOR OR CLIPPER</u> (HV)	12AV5GA
3AL5	3BY6	12BQ6GA
<u>VIDEO AMPLIFIER</u> (PS or P)	3CS6	12CU6
6A08	5U8 (Triode Section)	12DQ6
6AW8A	6A08 (Triode Section)	25CD6GB
6BA8A	6AW8A (Triode Section)	<u>DAMPER</u> (BH)
6BH8	6BA8A (Triode Section)	12AX4GTA
12BY7A	6BH8 (Triode Section)	19AU4GTA
<u>SOUND I.F. AMPLIFIER</u> (S)	6BV8	
3AU6	6CG7	
5U8 (Pentode Section)	6SN7GTB	
<u>SOUND I.F. LIMITER</u> (S)	7AU7	
3AU6	<u>SYNC INVERTER</u> (HV)	
3BN6	5U8 (Triode Section)	
3DT6	6BA8A (Triode Section)	
<u>SOUND DETECTOR (DISCRIMINATOR)</u> (S)	6BH8 (Triode Section)	
3AU6	6A08 (Triode Section)	
3BN6	6AW8A (Triode Section)	
3DT6	6BV8	
<u>SOUND DETECTOR (DISCRIMINATOR)</u> (S)	6CG7	
3AL5	6SN7GTB	
3BN6	7AU7	
3DT6	<u>HORIZONTAL CONTROL TUBE</u> (H)	
5T8	3AL5	
6BV8	6BV8	
	6CN7	

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