The Tele-vue Trouble-Shooter Instructions for Using

Simply select the Tele-Vue Trouble Shooter Chart by observing the symptom on the TV Receiver and referring to one of the following groups of troubles:

1. VIDEO
2. SOUND
3. SYNC
4. LO VOLTAGE
5. HI VOLTAGE
6. VERTICAL SWEEP
7. HORIZONTAL SWEEP

After determining the group in which the trouble is occurring, check the group below for the exact symptom, and the chart number.

GROUP 1

	Symptom	Chart No.
1.	Snowy Pix	1
2.	No Pix, No Sound	2
3.	Weak Pix	3 and 7
4.	Drifting	4
5.	No Pix	5 and 6
6.	Fading Pix	8 and 20
7.	Smeared Pix	10
8.	Too Much Contract	11
9.	Bright Pix, No Control	12
10.	Black Bar Across C.R.T.	13
11.	Dark Raster with White Flashes	14

GROUP 2

	Symptom	Chart No.
1.	No Sound	47
2.	Distorted Sound	48
3.	Buzz in Sound	49
4.	Sound in Pix	50

GROUP 3

	Symptom	Chart No.
1.	Loss of Sync with Neg. Pix	18
2.	Loss of Sync on Strong Station	19
3.	Loss of Sync	21
4.	Pix Pull as Scene Change	22
5.	No Vertical Sync.	23
6.	No Horizontal Sync.	30
7.	Poor Horizontal Sync	31
8.	Vertical Blanking Bar at Bottom of Pix	9

GROUP 4

	Symptom	Chart No.
1.	Small Raster	42
2.	120 cps Pull in Pix	43
3.	Short in Power Supply	44
4.	Selenium Rectifier Circuits	45
5.	Poor Focus	16
6.	No Sound Raster or Pix	46

GROUP 5

	Symptom	Chart No.
1.	No Raster	38, 15 and 36
2.	Lo H.V. Weak Raster	39 and 17
3.	Arcing	40
4.	Blooming	41

GROUP 6

	Symptom	Chart No.
1.	No Vertical Sweep	24
2.	Foldover at Bottom of Pix	25
3.	Off Frequency	26
4.	Not Enough Height	27
5.	Too Much Height	28
6.	Poor Linearity	29

GROUP 7

	Symptom	Chart No.
1.	Off Frequency	32
2.	Not Enough Width	33
3.	White Lines on Left of Raster	34
4.	Christmas Tree Raster	35
5.	Vertical White Lines	37

1

Check Antenna Connection and Lead in.

Replace R.F. Amplifier Tube.

Check voltage on plate-screen and Grid of R.F. Amplifier.

If no voltage on plate or screen check R17

If voltage on plate and screen check tuner R.F. contacts.

Clean tuner and look for cold solder joints.

Take resistance checks on cathode and grid of R.F. Amplifier.

A SNOWY PIX MUST BE CAUSED BY EITHER THE R.F. AMPLIFIER STAGE OR THE ANTENNA CIRCUIT. IN SOME RARE CASES THE A.G.C. MAY BE TOO GREAT TO THE GRID OF THE R.F. AMPLIFIER IN WHICH CASE TROUBLE-SHOOTING THE A.G.C. WOULD BE NECESSARY. THIS VOLTAGE WOULD HAVE TO EXCEED −6 VOLTS.

SNOWY PIX

IN A VERY WEAK SIGNAL AREA A SNOWY PIX IS NORMAL, IF A SET WAS WORKING NORMALLY, THEN SOME TROUBLE MUST BE SUSPECTED. WHEN THE R.F. AMP. DOES NOT AMPLIFY, DUE TO SOME DEFECT, OR THE INPUT IS VERY WEAK (POOR ANTENNA) NOISE WILL BE STRONG AS THE SIGNAL, AND WILL APPEAR AS A SNOWY EFFECT OVER THE PICTURE.

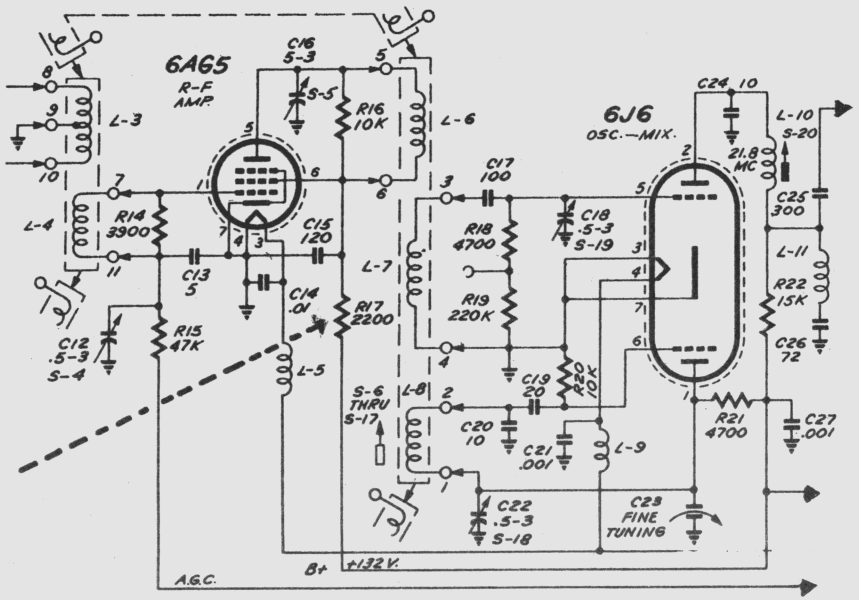
In additive tuner check contacts on switch by pushing them.

Watch Pix as you make check. It may clear as pressure is applied.

If tuner has hi-lo band check contacts on this switch.

Take resistance check of antenna input coil circuit.

If none of the above help, align R.F. stage.



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1

Change R. F. amp-Mixer L.osc. Vid I'Fs Video detector.

Check for loss of voltage on above tubes.

Make special check of A.G.C. Voltage should be 0 volts.

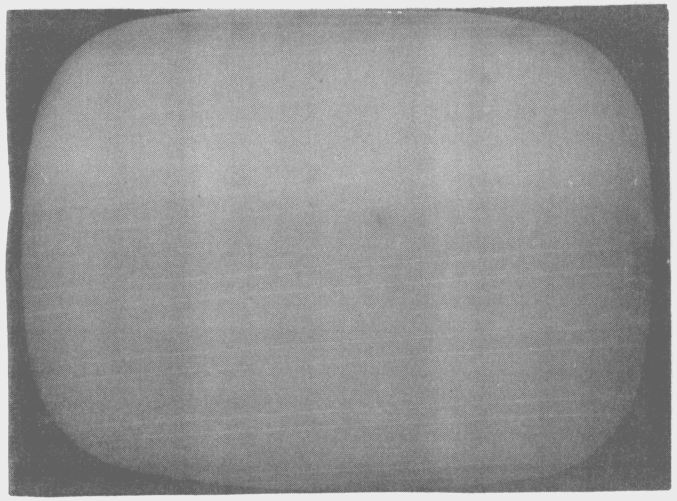
If more than -3 volts check A.G.C. load resistor.

In keyed A.G.C. check bias voltage on A.G.C. tube.

Too much voltage on grid of keyed A.G.C. tube will cause trouble.

If A.G.C. is at 0 volts then use a marker generator as follows.

NO PIX AND NO SOUND WOULD NORMALLY INDICATE A TROUBLE EXISTING IN THE TUNER, SINCE THIS IS COMMON TO BOTH PIX & SOUND. IN AN INTERCARRIER SET THIS TROUBLE WOULD ALSO BE FOUND IN THE VIDEO I.F. AMPLIFIERS. USE OF MARKER GENERATOR IS A GREAT HELP IN FINDING THE SOURCE OF TROUBLE.



NO PIX ... NO SOUND

IF THE A.G.C. VOLTAGE WERE TOO LARGE THE FRONT END AND SOME VIDEO I.F. TUBES WOULD BE CUT OFF. THIS WOULD PREVENT ANY SIGNAL FROM PASSING, AND LOSS OF PIX AND SOUND WOULD RESULT. THE FIRST FEW CHECKS ASSUME THAT THE SET IS AN INTERCARRIER. IF IT ISN'T THEN NO NEED TO CHECK SOME OF THE I.F.'S OR VIDEO DETECTOR.

Connect generator Mod. I.F. to grid of tube before sound takeoff.

Should see black bars on C.R.T. If you do then move generator back.

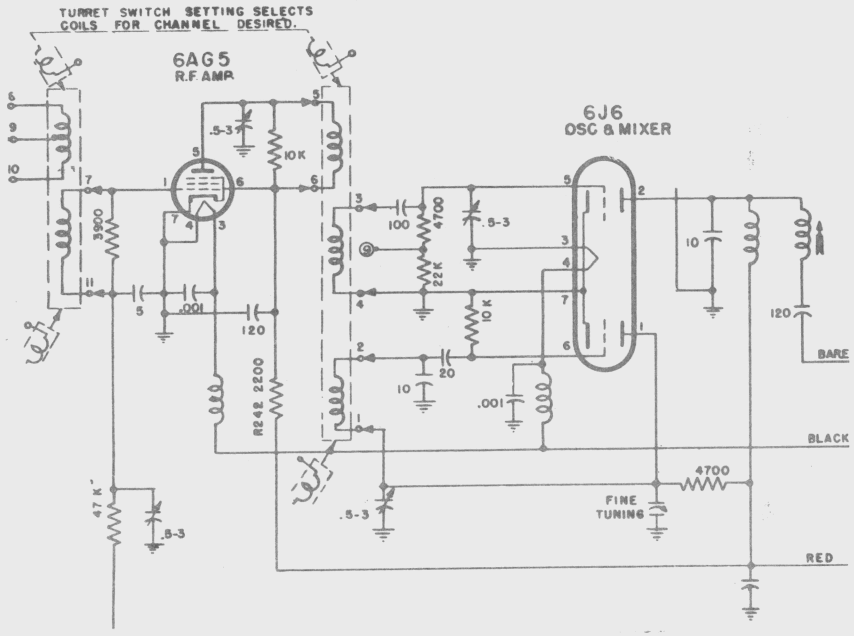
If no black bars. Check that stage for resistance in grid-cathode.

Keep moving generator back to grid of tuues until mixer.

If bars at mixer feed in 55.25 mc. on ch 2 position at mixer grid.

If no black bars, L. osc. is not working check C and R on L. osc.

If black bars at 55.25 mc. then trouble in RF amp. or tuner contacts.



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Change front end. Video I.F. Det and video Amp. tubes.

Check-Voltage on Plate-Screen and Grid of above tubes.

If beyond 20% on any of the above tubes check reason.

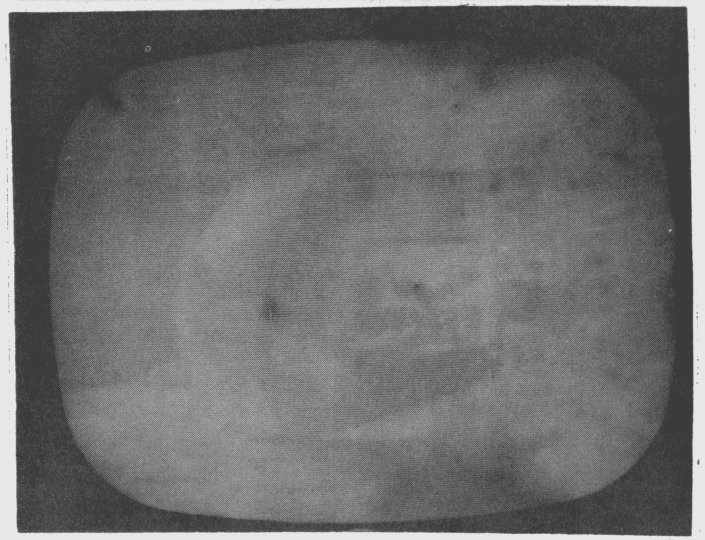
Pay close attention to grid voltages. A.G.C. may be too great.

If all voltage appear normal use a marker Generator as follows.

Connect generator To grid of last I.F. at I.F. modulated.

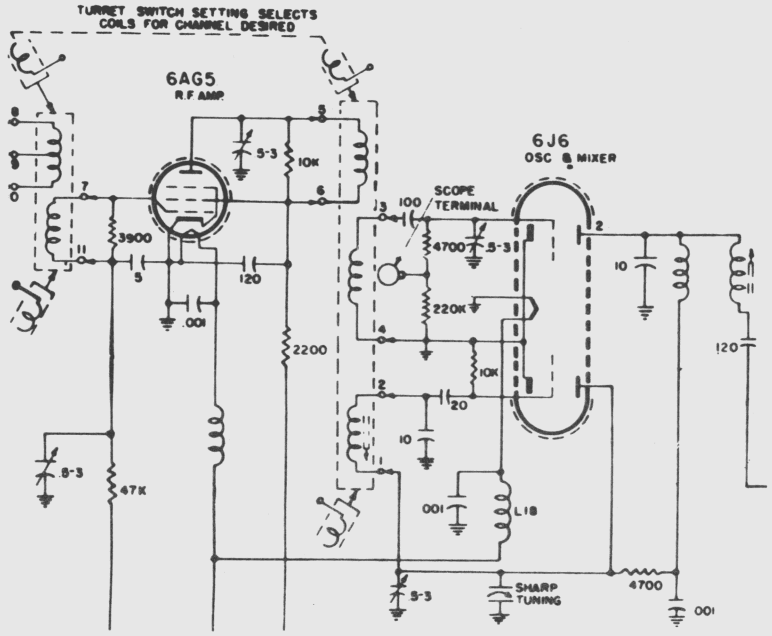
Look for black bars on Pix tube turn down generator till bars are grey.

A WEAK PIX IS CAUSED BY A DEFECT IN THE VIDEO STAGES. THIS MAY BE IN THE TUNER-VIDEO I.F s, OR, THE VIDEO AMPLIFIER CIRCUIT. THE R.F. AMP. COULD NOT BE THE CAUSE SINCE A SNOWY PIX IS NOTICED WITH POOR OPERATION OF THE R.F. ONE OF THE FIRST THINGS TO FIND OUT WITH THIS TROUBLE IS IF THE OUTPUT OF THE VIDEO DET. IS LARGE ENOUGH IN PEAK TO PEAK AMP. THIS SHOULD BE FROM 1 TO 2 VOLTS.



W E A K P I X

THE PEAK TO PEAK AMPLITUDE AT THE VIDEO DET. WILL DETERMINE IN WHICH DIRECTION THE TROUBLE WILL BE. IF MORE THAN 1-2 V. IT WILL MEAN THAT THE SIGNAL REACHING THE DET. IS SUFFICIENT. IN THIS CASE THE TROUBLE MUST BE IN THE VIDEO AMP. IF HOWEVER, THE SIGNAL AT VIDEO DETECTOR IS LESS THAN 1 V.P.P. THE TROUBLE IS IN THE VIDEO I.F.'s OR TUNER. WE WILL ASSUME THAT THE OUTPUT AT THE DET. IS LESS THAN 1 V.P.P.



Move generator back one stage. Bars should now be black.

If black bars seen turn down gen. till bars are grey. Move back one stage.

Continue moving gen. back. If bars grey at any grid check as follows.

Vary frequency of gen. to see if black bars appear at any point on dial.

If they do, it means poor alignment. Check alignment.

If bars remain weak check resistance of that stage or open capacitor.

If trouble is in tuner, check for poor contact on tuner switch or cold solder.

1

D R I F T I N G

THE CONDITION KNOWN AS DRIFTING CAN BE RECOGNIZED BY THE FADING THAT TAKES PLACE IN THE SOUND AFTER THE TV SET IS SWITCHED ON FOR A FEW MINUTES. THE OUTSTANDING FEATURE OF THIS TROUBLE IS THE FACT THAT A READJUSTMENT OF THE FINE TUNING CONTROL WILL BRING BACK THE SOUND FADING MAY CONTINUE IN THE ABOVE FASHION FOR 10 MINUTES IN SOME CASES-FINE TUNING WILL BRING SOUND BACK EVERY TIME.

THE CAUSE OF DRIFTING IS THE LOCAL OSCILLATOR CIRCUIT. AS THE TV SET WARMS UP SOME COMPONENT CHANGES VALUE. THIS IN TURN CAUSES THE LOCAL OSCILLATOR TO CHANGE FREQUENCY SLIGHTLY. SINCE THE SOUND IS MOST CRITICAL IN TV A SLIGHT CHANGE IN LOCAL OSCILLATOR FREQUENCY WILL AFFECT THE SOUND WITHOUT ANY NOTICEABLE EFFECT ON THE PICTURE. THIS CONDITION IS FOUND MAINLY IN SPLIT CARRIER RECEIVERS.

Replace local oscillator tube

In some cases replacing local oscillator will detune front end.

A number of L.O. tubes should be tried.

Dirty tuner contacts or poor soldering should be checked for next.

In tuners with wafer switch, clean only metal contacts

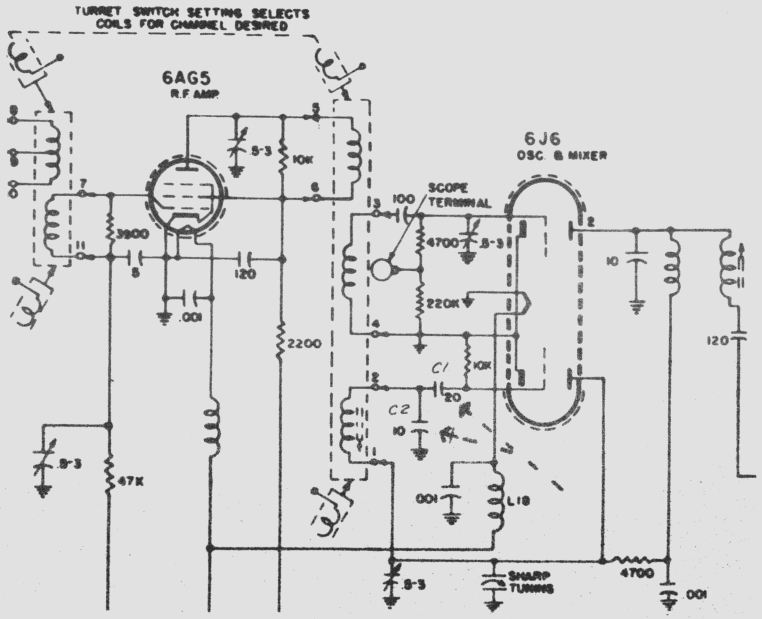
Poor grounding on local osc. circuit may be causing the trouble.

Any capacitor in the L.O. Circuit that changes value as the set warms up.

In the tuner schematic shown this would be C1 and C2. Replace both.

In other tuners replace capacitors in tank circuit and feedback circuit.

Some philco tuners have A.F.C. for L.O. in this case check A.F.C. circuit.



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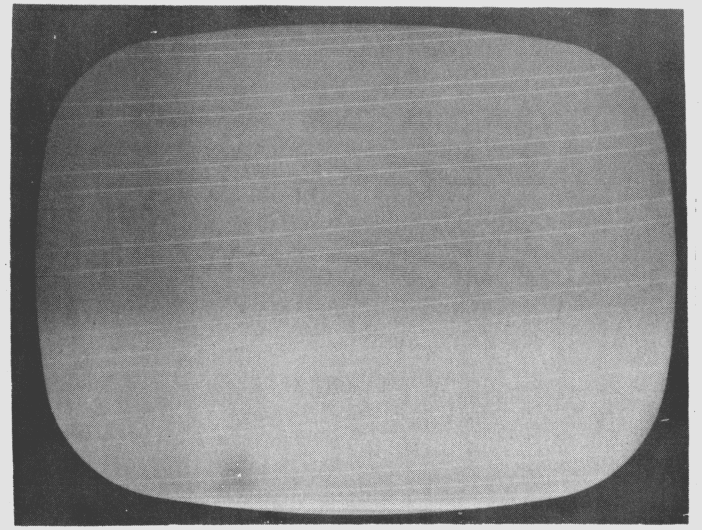
WHEN NO PIX IS ON C. R.T. BUT GOOD SOUND IS NOTICED IT IS MOST LIKELY THAT THE TROUBLE EXISTS AFTER THE SOUND TAKE OFF POINT. IT MAY BE POSSIBLE FOR THE TROUBLE TO BE FOUND BEFORE THE SOUND TAKE OFF, BUT IS MOST UNLIKELY. THIS POSSIBILITY WILL BE COVERED IN THE TROUBLE-SHOOTING PROCEDURE.



NO PIX SOUND NORMAL

THIS TROUBLE COULD BE OCCURING BEFORE OR AFTER THE VIDEO DET. SINCE THE SIGNAL CAN BE SEEN ON THE SCOPE AFTER DETECTION. IT IS MOST CONVENIENT TO START TROUBLE-SHOOTING BY LOOKING AT THE OUTPUT OF THE DET. ON THE SCOPE. WE WILL ASSUME THAT NO OUTPUT IS NOTICED AT THIS POINT. TROUBLE IN THE VIDEO AMPS. WILL BE COVERED ON CHART NO. 6 ON VIDEO AMP. TROUBLES

Replace R.F. amp. mixer. L.O. video I.F. and detector tubes.

With selector on a channel look for composite signal at video det.

If no signal at det. proceed. If signal is present go to Chart No. 6

Place gen. at grid last I.F. Feed in mod. I.F. Should see black bars on C.R.T.

If no black bars check voltage and resistance of this stage.

If bars are seen. Move gen. back to next I.F. grid same input signal.

If no bars at this point then check voltage and resistance of this stage

If bars are seen. move gen. back to next I.F. stage same input signal.

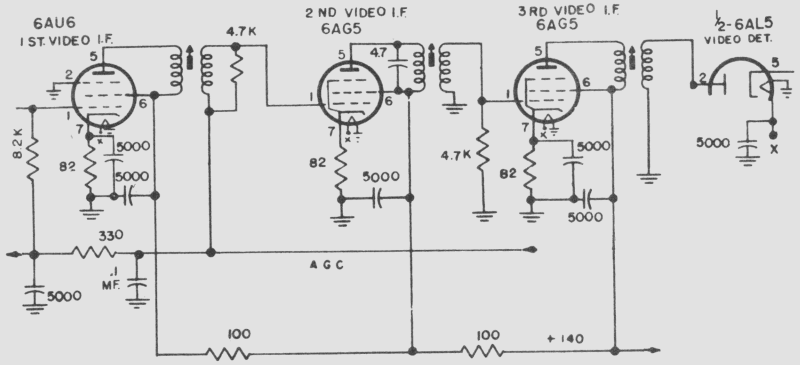
This will probably be 1st I.F. grid. If bars seen then trouble in tuner.

If no bars then check voltage and resistance around this tube.

In tuner feed gen. to mixer grid same signal fed in as before.

If no bars then mixer is bad. Check voltage and resistance.

If black bars are seen then refer to #12 in chart #2.



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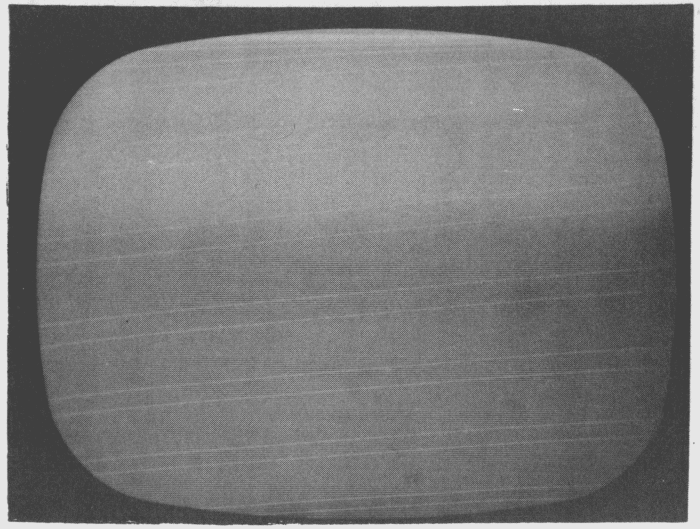
IT WAS MENTIONED IN CHART NO. 5 THAT NO PIX COULD BE CAUSED BY TROUBLES BEFORE OR AFTER THE VIDEO DET. IN THAT CHART WE ASSUMED THE TROUBLE TO BE BEFORE THE VIDEO DET. IN THIS CASE WE WILL TROUBLE-SHOOT FOR TROUBLE AFTER THE VIDEO DET. IN ALL CASES OF NO PIX IT IS ALWAYS BEST TO REPLACE TUBES FIRST SINCE THEY ARE MOST LIKELY TO CAUSE THE TROUBLE THE SCOPE IS THEN USED AT THE VIDEO DETECTOR.



NO PIX SOUND NORMAL

IN TROUBLE-SHOOTING THE VIDEO AMP. THE USE OF THE OSCILLOSCOPE IS MOST IMPORTANT, SINCE WE CAN SEE WHERE THE SIGNAL IS OR IS NOT. ONCE THE LOSS OF SIGNAL IS NOTED ON THE SCOPE, IT NOW BECOMES JUST A QUESTION OF VOLTAGE AND RESISTANCE MEASUREMENTS OF THE STAGE THAT IS NOT PASSING THE SIGNAL A GOOD KNOWLEDGE OF VOLTAGE READINGS EXPECTED AT VARIOUS POINTS IN THE VIDEO AMPLIFIER STRIP WILL BE HELPFUL IN FINDING THE TROUBLE.

Replace front end video I.F.'s det and video amp. tubes.

Check for a signal at the output of the video det. If none present refer to chart No. 5.

If signal at video det. check signal at Grid of 1st video amplifier.

If none check coupling cap. If direct coupled continue with check #5.

If signal at grid of 1st amp. check signal at plate. If none check #6

Check plate screen cathode voltage. If cathode is 20V. or more cathode R is open.

If signal is at plate move scope to grid of 2nd video amp.

If no signal at grid then coupling cap. is open or grid shorted to ground.

If signal at grid of 2nd video amp. move scope to plate. If no signal check as in No. 6

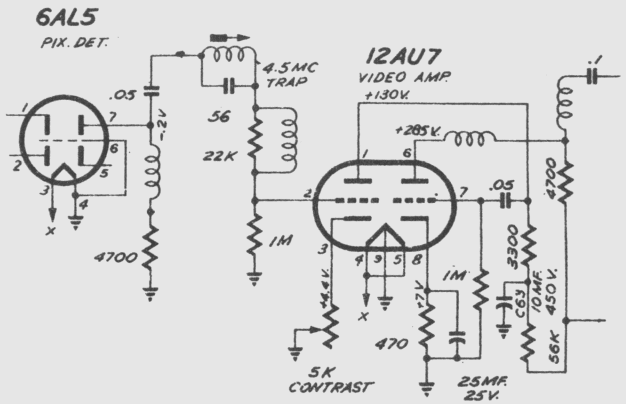
If signal at plate then trouble must be from this point to C.R.T.

Do not be concerned about a poor looking signal, this trouble is a complete loss.

Plate voltages should be within 20%

If a peaking coil is open signal from one side to other will change.

The above check in #13 should be done closely. Amplitude should remain same.



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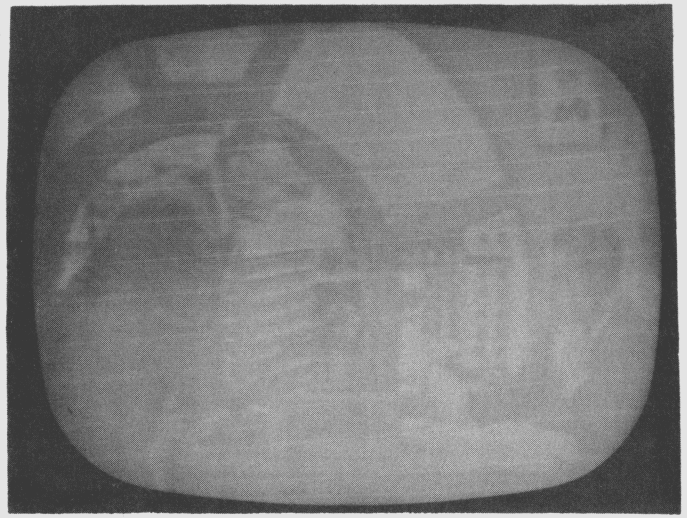
IN THIS PARTICULAR CONDITION OF A WEAK PICTURE WE ARE GOING TO ASSUME THAT THE TROUBLE IS IN THE VIDEO AMP. CIRCUIT. THIS TROUBLE COULD BE CAUSED BY A DEFECT IN THE FRONT END OF VIDEO I.F. AMPLIFIERS ALSO. ONE OF THE MOST IMPORTANT STEPS AT THIS TIME IS TO FIND OUT IF THE SIGNAL REACHING THE VIDEO DETECTOR IS LARGE ENOUGH. WE SHOULD HAVE AT LEAST 1V P.P. THIS CAN BE CHECKED WITH A SCOPE AT THE DETECTOR LOAD. IF SIGNAL IS LESS THEN REFER TO CHART NO. 3.



WEAK PIX

THE USE OF THE SCOPE IN TRACKING DOWN THIS TROUBLE IS A BIG HELP SINCE WE CAN SEE IF THE SIGNAL IS WEAK AT ANY POINT. TUBES ARE THE BIGGEST CAUSE OF A WEAK PIX, BUT MANY TIMES A BAD PEAKING COIL OR COUPLING CAPACITOR MAY BE THE TROUBLE. IT MUST ALSO BE KEPT IN MIND THAT A WEAK C.R.T. MAY CAUSE YOU TO SET THE BRIGHTNESS CONTROL TOO HIGH AND GIVE THE EFFECT OF A WEAK PIX. A 50V P.P. AT C.R.T. GRID WILL BE A GOOD CHECK FOR LARGE ENOUGH SIGNAL TO THE C.R.T.

Replace tubes in front end video I.F., Video Det. and Video amp.

Check peak to peak at video det. load. Should be at least 1v.P.P.

If less than 1v. P.P. refer to Chart No. 3

Check signal at grid of first video amp. Should be same as at det. load.

If less, then check peaking coils and coupling cap. for open.

If normal at grid of 1st video amp. move scope to plate.

If one video amp. is used signal at plate should be 36 times larger.

If two video amp. are used signal should be about 6 times larger.

If signal at plate is small check plate-screen-cathode voltages.

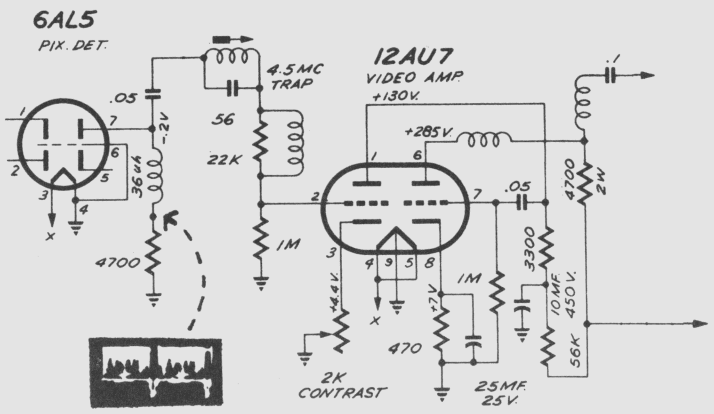
Watch Cathode voltage closely if high. Cathode resistor may be open.

If signal normal at plate. Check grid of 2nd video amp.

If small, check peaking coils and coupling cap. for open.

Move scope to plate. Should be 6 times larger. If not, check voltages.

If good signal at plate trouble is between this point and grid of C.R.T.



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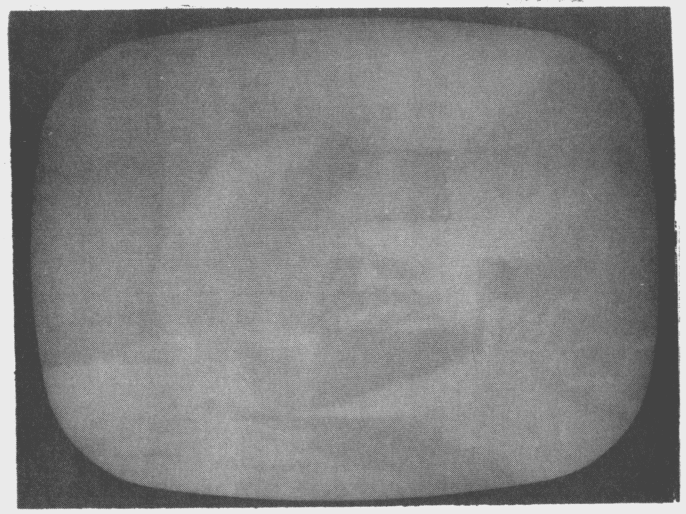
A FADING PICTURE CAN BE A VERY HARD THING TO LOCATE UNLESS YOU USE SOME DEFINITE PROCEDURE. THE CONDITION ITSELF WILL GIVE A PERFECT PICTURE ON THE SCREEN WHEN THE SET IS SWITCHED ON, AND AFTER A WHILE THE PICTURE WILL FADE OUT SLOWLY. THE PICTURE MAY REMAIN OUT FOR QUITE SOME TIME AND THEN IT MAY BEGIN TO APPEAR AGAIN. THE PICTURE MAY LAST FOR SOME TIME OR MAY BEGIN TO FADE ONCE MORE AFTER A FEW MINUTES. THIS WOULD BE THE INDICATION OF A FADING PICTURE.



FADING PIX

THE MOST LIKELY THING TO CAUSE THIS TROUBLE IS A HEATER CIRCUIT IN ONE OF THE TUBES BECOMING OPEN. AFTER WARMING UP. WHEN IT OPENS THE TUBE WILL COOL AND THE HEATERS MAY TOUCH AGAIN THUS MAKING THE TUBE OPERATE ON AND OFF. OTHER CAUSES OF THIS FADING MAY BE OPEN RESISTORS THAT MAY BE MAKING AND BREAKING CONTACT OR A DEFECTIVE COIL IN THE VIDEO I.F. A SIGNAL GENERATOR AND SCOPE WILL HELP IN LOCATING THE TROUBLE TO ONE STAGE AND THEN THE VTVM CAN BE USED TO PIN DOWN THE COMPONENT.

Replace all tubes in the video path.

Place scope at output of video detector.

When Pix fades and signal on scope fades trouble is before Det.

If signal on scope remains trouble is in video amp.

With trouble before det. use a signal gen.

When Pix fades feed in Modulated I.F. signal

Start at last I.F. grid and work back to tuner.

Black bars should be seen on CRT.

If black bars missing at grid of a tube trouble there

Take voltage and resistance reading of bad stage

If signal remains on scope when Pix fades

Use scope to follow signal to CRT.

If signal on scope missing at any tube trouble is there.

Take resistance and voltage readings of bad stage

3

Do not replace any tubes since they do not cause this trouble.

Check signal at video det. and notice size of vertical sync. pulse.

Move scope to grid of 1st video amp. lookfor decrease of vertical sync.

If vertical sync. is smaller, check coupling capaci - toror 4.5 mc coil.

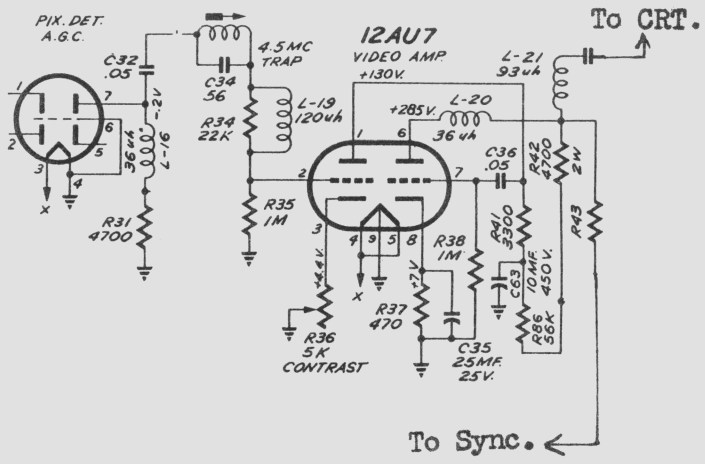
If normal at grid of 1st video amp. move to grid of 2nd video amp.

Note if sync. is reduced. If so check for bad coupling cap or 4.5 mc coil.

If sync is normal at grid of 2nd video amp. check signal at plate.

THIS TROUBLE IS A VERY MISLEADING ONE BECAUSE THE TROUBLE APPEARS TO BE IN THE VERTICAL CIRCUIT. HOWEVER, WE FIND THIS TROUBLE TO BE IN VIDEO AMP. OR IN THE SYNC CIRCUIT. IN MOST CASES A DECREASE IN COUPLING CAPACITOR IS THE TROUBLE, OR SOMETIMES AND OPEN 4.5. MC TRAP COIL. THE SCOPE IS A MUST IN QUICKLY FINDING THIS CONDITION SINCE WE CAN SEE EXACTLY WHERE THE TROUBLE IS OCCURING.

V E R T I C A L
P H A S I N G



VERTICAL PHASING OCCURS WHEN THE VERTICAL SYNC PULSE IS OUT OF PHASE WITH THE ORIGINAL VERTICAL SYNC PULSE SENT FROM THE TRANSMITTER. THIS WILL HAPPEN IF THE 60 CPS SYNC IS PASSED THROUGH A SMALL CAP. BEFORE THE SYNC TAKE OFF POINT OR WHILE PASSING TO THE SYNC OUTPUT CIRCUIT. THIS TROUBLE WILL NOT BE CAUSED BEFORE THE VIDEO DETECTOR. PICTURE IS LOCKED IN AT THIS POINT ON SCREEN AND USUALLY RETRACE LINES ARE NOTICED.

In some rare cases a decrease in cath. ode cap. will cause this condition.

If signal good at grid but vertical is low at plate check cathode cap.

If signal is normal at the sync take off then follow thru sync circuit.

Look for a decrease in vertical sync pulse only

If trouble is in sync circuit it will be caused by a bad coupling cap.

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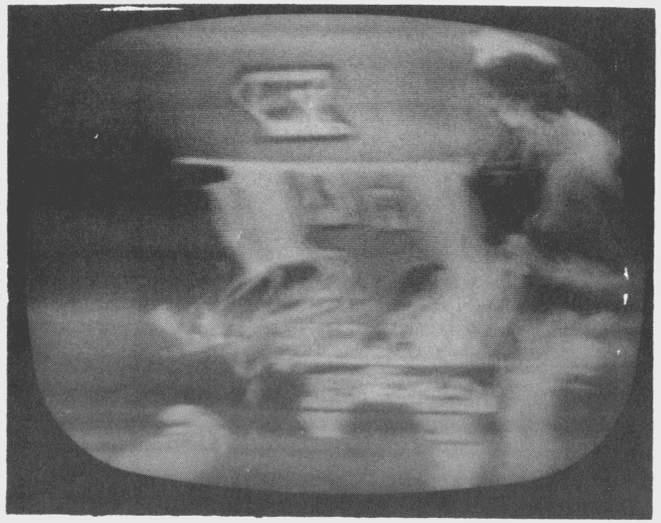
A SMEARED PIX CAN BE CAUSED BY MANY SECTIONS IN A TV RECEIVER. ONE OF THE COMMON DEFECTS IS POOR ALIGNMENT. THIS COULD BE IN THE FRONT END OR THE VIDEO I.F. A QUICK CHECK FOR THIS TROUBLE IS TO VARY FINE TUNING CONTROL. IF THE SMEAR IN THE PIX CLEARS UP A LITTLE, OR GETS WORSE IT WILL INDICATE THAT THE ALIGNMENT IS OFF, SINCE UNDER NORMAL CONDITIONS THE FINE TUNING SHOULD HAVE HARDLY ANY EFFECT ON THE PIX. IF ALIGNMENT IS INDICATED FOLLOW MANUFACTURERS INSTRUCTIONS. IF THE FINE TUNING HAS NO EFFECT ON THE PIX, THEN TROUBLE MUST BE IN THE VIDEO AMP.



SMEARED PIX

IN TROUBLE-SHOOTING THE VIDEO AMP. FOR A SMEARED PIX, ONCE AGAIN THE SCOPE IS NECESSARY. MOST COMMON TROUBLES THAT CAUSE THIS ARE FOUND IN PEAKING COILS AND OPEN BY-PASS CAPACITORS. HOWEVER, BY USING THE SCOPE IT CAN BE DETERMINED EXACTLY WHERE THIS TROUBLE IS OCCURING. VERY SELDOM IS THIS TROUBLE CAUSED BY TUBES. HOWEVER,, THEY MUST BE CHECKED IN CASE THEY ARE CAUSING THIS CONDITION.

Replace all tubes in front end video I.F. and video amp.

Vary fine tuning control. Note if smear changes.

If smear changes greatly check local oscillator adjustments.

If local osc. adjustments do not help, check video I.F. response curve.

If fine tuning has little effect on smear, check signal at video det.

If signal is poor at video det. check peaking coil and det. load.

If signal is normal at video det move scope to grid of 1st video amp.

If normal move scope to plate of 1st video amp. if poor check No. 9.

Check bias and plate voltage. If low, peaking coil at plate may be open.

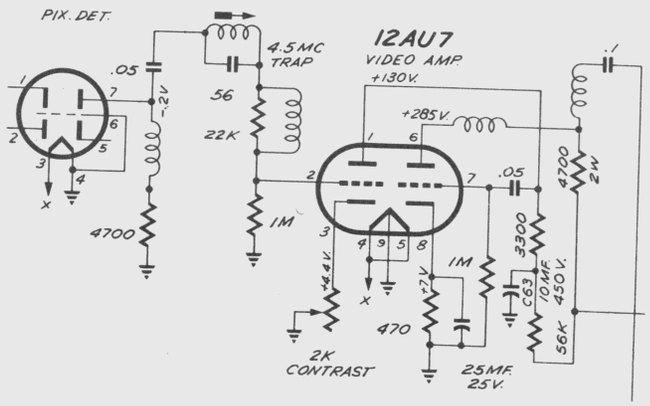
Plate load resistor may have increased or open bypass capacitor. C63.

To check for open cap. bridge with good one or check at cap, with scope.

No signal should be noticed if capacitor is good.

If second video amp. is used then follow above checks 7-12 on 2nd amp.

Signal on both sides of a peaking coil should be same if coil is good.



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A PIX THAT IS TOO DARK CAN BE JUST AS BAD AS A PIX THAT IS VERY WEAK. UNDER THIS CONDITION THE PIX BECOMES TOO CONTRASTY AND THE DIFFERENT SHADES DO NOT STAND OUT AS WELL AS THEY SHOULD IN MOST GOOD OPERATING SETS. WHEN THE CONTRAST IS AT A MAXIMUM THE PIX SHOULD BE TOO DARK TO WATCH. IN SOME CASES THE A. G. C. CONTROL MAY BE SET INCORRECTLY, THIS SHOULD BE CHECKED FIRST. NOT ALL SETS HAVE AN A. G. C. CONTROL.

VERY DARK PIX

TOO DARK A PIX CAN BE CAUSED BY INCORRECT CONTRAST SETTING, OR A. G. C. CONTROL SETTING. THIS SHOULD BE CHECKED FIRST SINCE THIS IS THE EASIEST THING TO CHECK. TUBES MAY ALSO BE INTERNALLY SHORTED CAUSING MAXIMUM GAIN AS THE SIGNAL PASSES THROUGH IT. THESE MUST BE CHECKED BY REPLACEMENT. ALIGNMENT COULD ALSO CAUSE THIS TROUBLE BUT THIS SHOULD ONLY BE SUSPECTED IF THE SET HAS BEEN TAMPERED WITH.

Check setting of contrast and A. G. C. Controls.

Replace all tubes in front end, video I. F. and video amp.

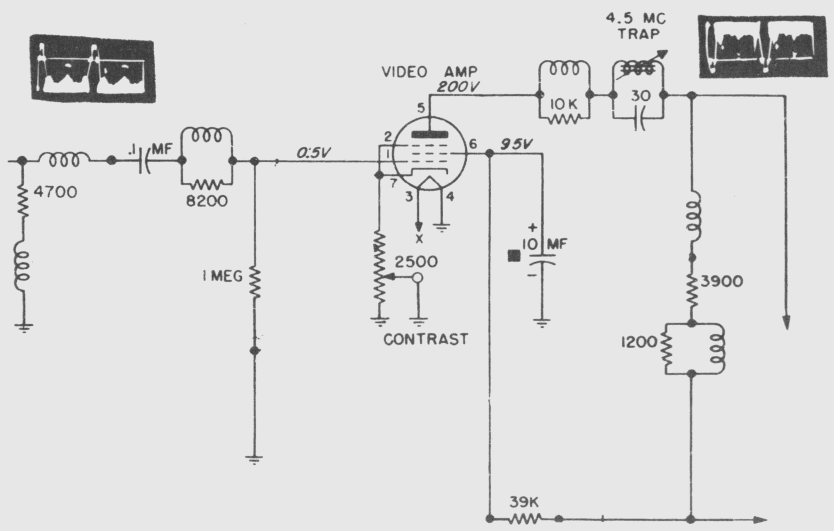
Check A. G. C. voltage. Should be at least -6 volts on all tubes it feeds-

If A. G. C. is low refer to Chart No. 19 on A. G. C.

If A. G. C. voltage is normal check output of video det. for 2v P. P. signal

If signal is very large at det. recheck A. G. C. voltage.

With normal signal at det. Trouble is in video amp.



Check video amp. for shorted cathode cap. or decrease in cathode resistor

Check for open peaking coil at plate of video amp.

If a plate bypass capacitor is used check it for an open.

Look for increase in plate load resistor.

Check contrast control circuit for a decrease in resistance.

If all appear normal, then check alignment of set.

1

Vary brightness control. At minimum setting raster should go black.

If control has little or no effect check No. 3.

Measure voltages at base of C.R.T. with base removed.

Grid zero, screen 300v and cathode varies from 100 v to zero.

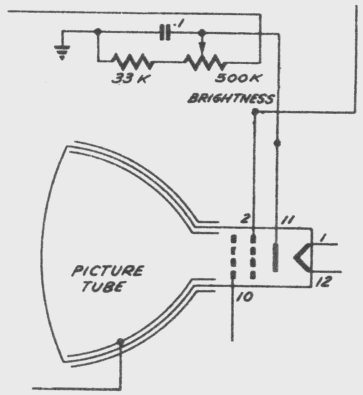
Cathode voltage depends on setting of brightness control.

If cathode voltage does not change check brightness circuit and control

Control may have open center tap or B plus feeding control may be low.

THIS IS AN IMMEDIATE INDICATION THAT THE PIX TUBE IS BAD. ALTHOUGH IN SOME CASES A BAD BRIGHTNESS CONTROL COULD CAUSE THIS CONDITION. IT WILL BE NOTICED THAT IF THE BRIGHTNESS CONTROL DOES AFFECT THE PIX, THAT IT WILL NOT CAUSE THE RASTER TO DISAPPEAR AS FOUND UNDER NORMAL OPERATING CONDITIONS.

PIX BRIGHT - NO CONTROL



AN INTERNAL SHORT BETWEEN ELEMENTS IN THE PIX TUBE WILL PLACE A POSITIVE VOLTAGE ON THE GRID OF THE PIX TUBE. NORMALLY THE GRID HAS ZERO VOLTS AND THE CATHODE VOLTAGE, CONNECTED TO THE BRIGHTNESS CONTROL, CONTROLS THE CONDUCTION OF THE C.R.T. HOWEVER, WITH THE GRID POSITIVE, THE C.R.T. WILL CONDUCT REGARDLESS OF CATHODE VOLTAGE

In some cases Brightness control feeds grid and cathode is constant.

Closely check schematic for above condition.

If this is being used then grid should vary from 0v to -100v.

If grid is positive check coupling cap to grid for short.

If all checks are normal then C.R.T. is bad.

Tap neck of C.R.T. slightly. This may restore normal operation.

1

These first checks assume only one black bar on C.R.T.

WITH A BLACK BAR ON C.R.T. THE TROUBLE IS LIMITED TO THE VIDEO CIRCUITS. THIS COULD BE THE FRONT END -- VIDEO I.F. -- OR VIDEO AMP. INCLUDING THE C.R.T. THIS HOLDS TRUE IF ONE BLACK BAR IS NOTICED. IF TWO BLACK BARS ARE NOTICED THEN TROUBLE IS IN THE POWER SUPPLY. THIS SHOULD BE DETERMINED BEFORE BEGINNING TROUBLE-SHOOTING.

BLACK BAR ON C. R. T.

IN THE CONDITION OF ONE BLACK BAR THE TROUBLE IS A SHORT BETWEEN HEATER AND CATHODE OF ANY VIDEO TUBE. WITH TWO BLACK BARS THE TROUBLE IS AN OPEN FILTER IN THE POWER SUPPLY SINCE TWO BARS INDICATE 120 CPS AND THIS IS FOUND ONLY IN THE POWER SUPPLY.

If last video amp. does not remove bar C.R.T. must have short.

With bar on Pix remove R.F. if bar remains R.F. amp. OK.

Check from cathode to heaters with ohmmeter on C.R.T.

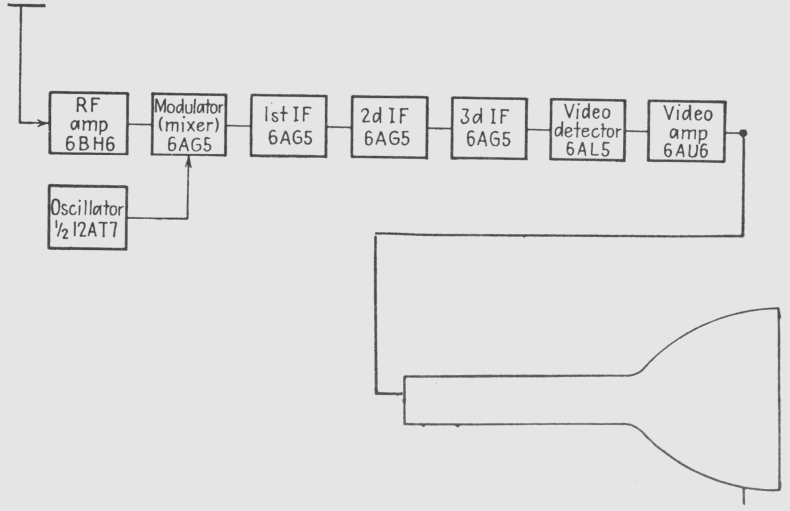
Replace R.F. tube pull L.O. if bar remains L.O. is ok.

Should have infinite resistance if a reading is found replace CRT.

Replace L.O. remove mixer if bar remains mixer ok.

If two black bars are noticed bridge all filter cap.

Continue the above methods pulling one tube at a time.



When open filter cap. is bridged black bars will disappear.

Try 1st I.F., 2nd I.F., etc. Det. tube and video amplifiers.

If at any time bar disappears then the tube pulled is bad.

1

Vary the brightness control to see effect.

If raster remains dim check voltage on grid and cathode.

Grid should be zero and cathode varies from 0v to 100v.

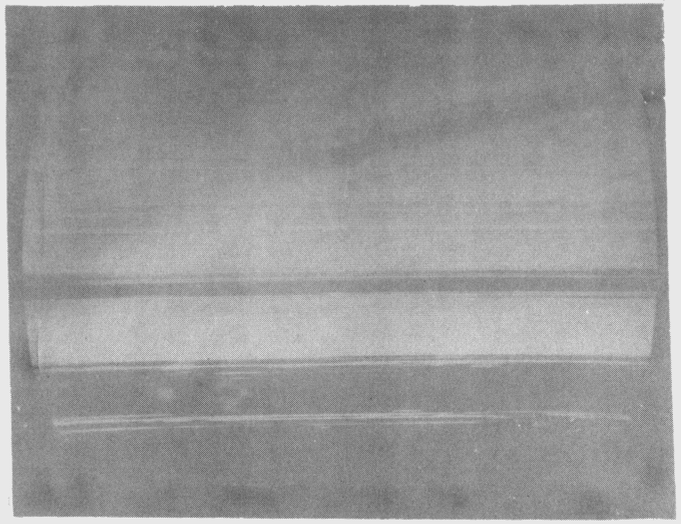
If both are normal then tap all around neck of C.R.T.

Do this tapping gently. If flashes appear as you tap then C,R,T. is bad.

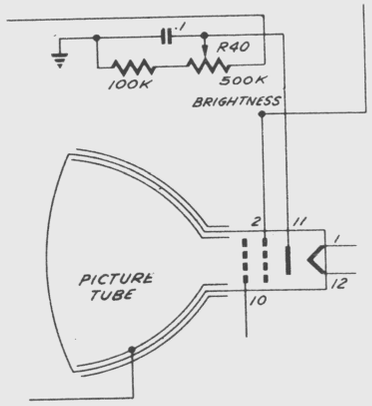
As another check measure H.V. Now check back of C. RT. for voltage.

On C.R.T. grid 0v cathode 0v to 100v and screen 300v

IN THIS TROUBLE THERE IS A DARK OR DIM RASTER AND EVERY NOW AND THEN SOME WHITE STREAKS ARE NOTICED ON THE C.R.T. AT THIS TIME THE BRIGHTNESS CONTROL WILL TELL THE REST OF THE STORY. IF WHEN THE CONTROL IS VARIED NO EFFECT IS NOTICED THEN THIS POINTS TO C.R.T. TROUBLE.



DARK RASTER
WHITE FLASHES



AN OPEN CATHODE INSIDE THE C.R.T WILL CAUSE A VERY DIM RASTER TO BE SEEN BUT THE CONTROLS WILL HAVE NO EFFECT ON THIS. THE FLASHES THAT MAY APPEAR FROM TIME TO TIME ARE CAUSED BY VIBRATION THAT MOMENTARILY CAUSE THE CATHODE WIRES INSIDE THE C.R.T. TO TOUCH.

If H.V. and base pin voltages normal then C.R.T. bad.

In case of lack of voltage on any of the checks find out why.

NO RASTER

THERE ARE MANY CAUSES OF NO RASTER RANGING FROM HORIZONTAL OSCILLATOR TROUBLE TO A BAD C.R.T. THE CAUSE MUST BE FOUND AS SOON AS POSSIBLE. IN THIS SHEET WE WILL DETERMINE IF THE TROUBLE IS IN THE H. VOLTAGE CIRCUITS OR IF THE C.R.T. IS DEFECTIVE AND ASSUME THAT THE TROUBLE IS THE C.R.T. FOR TROUBLES IN THE HIGH VOLTAGE REFER TO CHART NO. 3B

Switch on set and with brightness control at max adjust ion trap.

If ion trap does not bring in raster remove anode cap and arc to chassis.

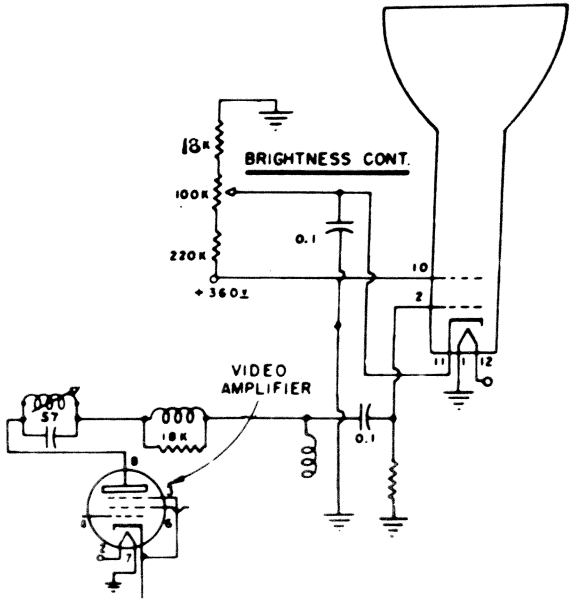
If no arc is noticed then trouble - shoot H.V. circuit in Chart No. 3B.

If arc is present and indicates enough H.V. recheck ion trap.

Measure base pin voltages on C.R.T.

Grid 0 volts cathode 0-100V and screen about 300V.

If these voltages are normal once again check ion trap.



IN CASE OF A BAD C.R.T. CAUSING NO RASTER THE TROUBLE MAY BE OPEN FILAMENT OR LOSS OF EMISSION OF C.R.T. IT SHOULD ALSO BE REMEMBERED THAT AN INCORRECT SETTING ON THE ION TRAP WILL ALSO CAUSE THIS CONDITION AND INCORRECT VOLTAGES AT THE BASE OF THE C.R.T.

If ion trap does not help then C.R.T. is bad.

Some C.R.T. boosters are available but in this case may not help.

4

POOR FOCUS

MANY OF THE LATER MODEL RECEIVERS HAVE NO FOCUS ADJUSTMENTS AT ALL AND DEPEND UPON VOLTAGE APPLIED TO THE FOCUS ANODE OF THE CRT FOR CORRECT FOCUSING. THESE ARE ELECTROSTATIC FOCUS CRT AND MAY CAUSE POOR FOCUS DUE TO INTERNAL ARCING IN THE CRT. IN OTHER CASES WE FIND FOCUS ADJUSTMENTS ON THE NECK OF THE CRT AND IN STILL OTHER CASES WE HAVE A FOCUS CONTROL ON THE BACK OF THE CHASSIS

WITH POOR FOCUS NOTICED ALL ADJUSTMENTS SHOULD BE TRIED FIRST. THE FOCUS COIL ON THE NECK OF THE CRT CAN BE MOVED TO AND FRO TO SEE IF BETTER FOCUS CAN BE OBTAINED. IF THESE ADJUSTMENTS DO NOT HELP THEN RESISTANCE CHECKS SHOULD BE MADE IN THE FOCUS CIRCUIT. SOME RECEIVERS HAVE THE FOCUS CONTROL IN THE AUDIO OUTPUT CIRCUIT AND TROUBLES IN THE AUDIO WILL CAUSE POOR FOCUS RESISTORS IN THE FOCUS CIRCUIT OFTEN CHANGE VALUE.

Check value of resistor in focus circuit .

Focus pot may be open, check carefully.

Disconnect focus coil and check its resistance.

Check resistor in in parallel with focus pot.

Check B + for 20% tolerance.

If B + is low refer to chart # 42..

Check for schematic changes made by manufacturer.

If focus pot in audio circuit check audio tube.

Measure bias on audio output tube.

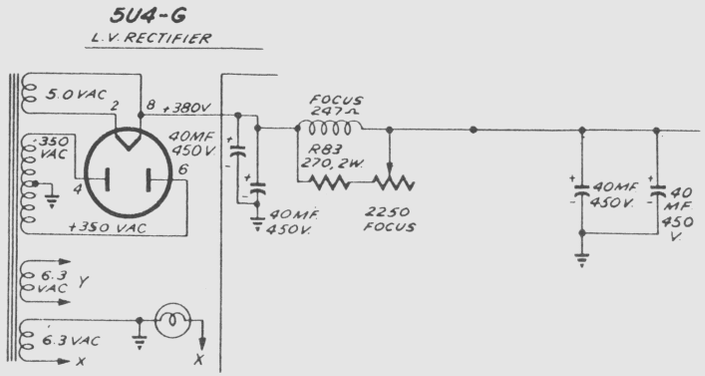
Coupling capacitor to audio output grid may be leaky.

Cathode resistor of audio output may have changed value.

If all checks are normal, replace focus coil.

In CRT with electrostatic focus check voltage on focus pin.

CRT with electrostatic focus may be bad.



5

Turn up brightness control and adjust ion trap.

Measure HV with a HV probe.

If low HV refer to Chart No. 39.

With normal HV Measure CRT base voltages

Grid voltage should be zero.

Cathode voltage should vary from 0 to 100 v with brightness.

Screen voltage should be almost B +

A WEAK RASTER IS A VERY COMMON TROUBLE IN TV SETS. THE CAUSES ARE MAINLY A WEAK CRT OR NOT ENOUGH HV. IF A WEAK CRT IS THE TROUBLE, THEN THE CRT SHOULD BE REPLACED. A NUMBER OF CRT BRIGHTNERS ARE ON THE MARKET THAN CAN RESTORE THE CRT TO A FAIRLY NORMAL CONDITION, BUT IN MOST CASES IT SHOULD BE MENTIONED TO THE CUSTOMER THAT THIS IS A TEMPORARY MEASURE AND THAT THE PIX MAY BE WEAK AGAIN IN A FEW MONTHS AT THE MOST. IN ALL CASES IT IS FAR BETTER TO REPLACE THE CRT.

WEAK RASTER

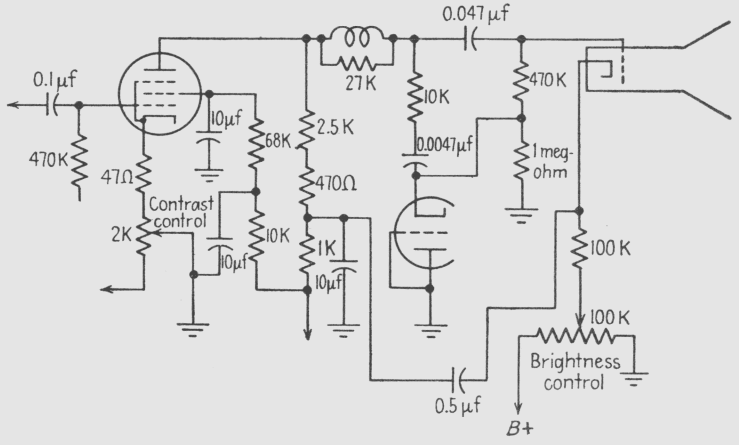
THE CAUSE OF A CRT BECOMING WEAK IS LOW EMMISSION OF THE ELECTRONS IN THE CRT ITSELF. THIS IS CAUSED BY A COATING THAT FORMS ON THE CATHODE OF THE CRT THAT CUTS DOWN ON THE ELECTRON FLOW IN THE TUBE. A CRT BRIGHTNER GIVES A SLIGHTLY HIGHER HEATER VOLTAGE TO THE TUBE WHICH OF COURSE WILL INCREASE THE ELECTRON FLOW IN THE TUBE. IF THE CAUSE OF A WEAK RASTER IS LOW HV AND A BRIGHTNER OR BOOSTER AS IT IS CALLED IS USED THEN THE RASTER WILL GET BRIGHTER WITHOUT CURING THE TROUBLE.

In some cases the grid may vary with the brightness control.

In that case grid should vary from 0 to - 100 v.

If base voltages are normal replace ion trap.

If new ion trap does not help replace CRT.



A booster may be used to see its effect on CRT.

Replace R.F. I.F. and A.G.C. tubes.

Check voltage on I.F. grids. With this trouble it should be almost zero.

Switch set off and check Res. to ground from I.F. grid.

Res. should be high, around 1 meg. Check schematic if available.

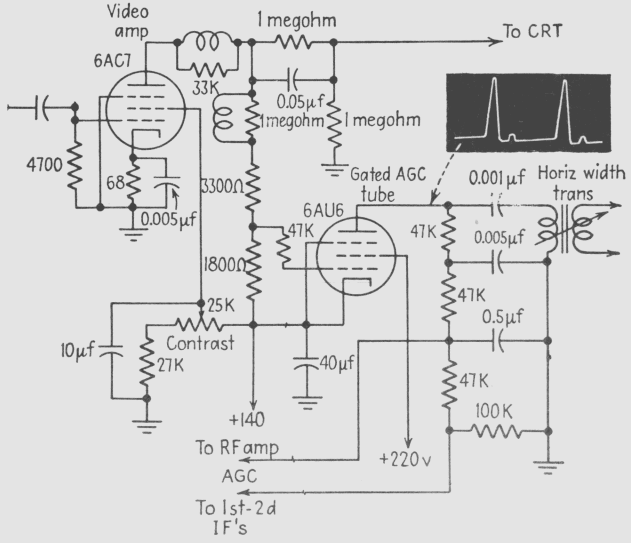
If very low resistance, check for shorted Capacitor in A.G.C.

If resistance is high on A.G.C. line check for open resistor.

If resistance to ground in A.G.C. is normal check A. G. C. tube circuit.

THIS TROUBLE IS COMMON IN CIRCUITS WHERE SEPARATE A.G.C. TUBES ARE USED AS IN KEYED A.G.C. CIRCUITS. TROUBLE CAN BE RECOGNIZED BY NEGATIVE PICTURE. THIS SHOWS EVERYTHING THAT SHOULD BE WHITE AS BLACK AND EVERYTHING BLACK SHOWS WHITE. THIS WILL ALWAYS BE ACCOMPANIED BY ROLLING AND TEARING AS IN LOSS OF SYNC. NOTE THAT BLANKING BAR IS WHITE INSTEAD OF BLACK.

ROLLING-TEARING
NEGATIVE PIX



WITH COMPLETE LOSS OF A.G.C. VOLTAGE THE R.F. AMP. AND VIDEO I. F. TUBES ARE AMPLIFYING WITH MAXIMUM GAIN. THIS WILL CAUSE THE I.F. STAGES TO DETECT THE SIGNAL BEFORE THE DETECTOR AND THE RESULT IS A SIGNAL OF OPPOSITE POLARITY AT THE DETECTOR OUTPUT. THIS WILL ALSO CAUSE NO SYNC. DUE TO WRONG POLARITY OF SYNC PULSE. THUS ROLLING, TEARING & A NEGATIVE PIX.

In keyed A.G.C. Check bias on A.G.C. tube.

Also check for keying pulse on plate of tube.

If keying pulse missing check back to flyback for open lead.

Keying pulse should be 500v peak to peak.

With above checks normal, trouble is in I.F. circuit.

Suspect leaky capacitor to I.F. grids.

3

If any agc controls are used adjust them first.

Replace any agc R.F. or I.F. tubes.

Check negative voltage across agc load resistor.

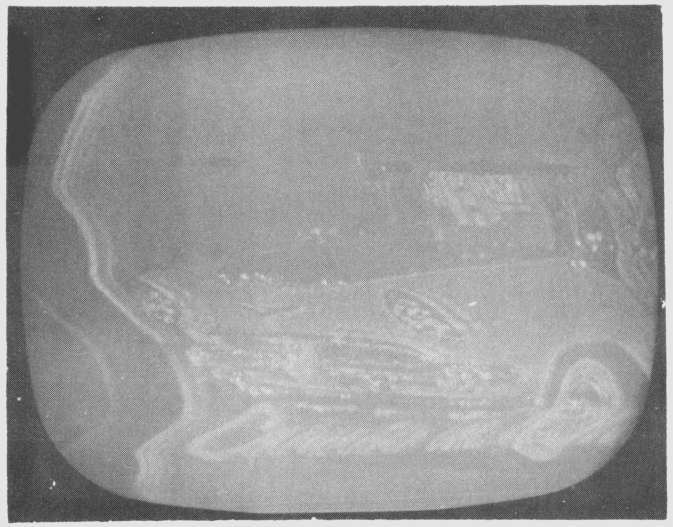
Now check negative voltage on I.F. grids fed by the agc.

AGC voltage should be the same at the I.F. grids as across the agc load.

If the voltage is different check for leaky cap in agc line.

Coupling capacitor may be leaky to an I.F. grid.

THIS CONDITION INDICATES PARTIAL LOSS IF AGC VOLTAGE. THE LOSS OF SYNC WILL OCCUR ONLY ON STRONG CHANNELS SUCH AS TWO OR FOUR. THE SETTING OF ANY AGC ADJUSTMENT SHOULD BE CHECKED FIRST IN CASE IT HAS BEEN MISADJUSTED. IF A CONTROL IS USED IT SHOULD BE SET WHILE WATCHING A STRONG CHANNEL FOR THE BEST PIX.



POOR SYNC ON STRONG CHANNEL

WITH PARTIAL LOSS OF AGC THE INCOMING SIGNAL ON A STRONG CHANNEL WILL OVERDRIVE THE VIDEO I.F. AMPLIFIERS AND CAUSE THE SYNC PULSES TO BE CLIPPED OFF IN THE I.F. STAGES. THIS IN TURN WILL CAUSE POOR SYNC ON THESE CHANNELS AND PICTURE PULL MAY ALSO BE NOTICED. IN AREAS WHERE THE SIGNAL STRENGTH IS WEAK COMPLETE LOSS OF AGC WILL ALSO CAUSE THE SAME CONDITION

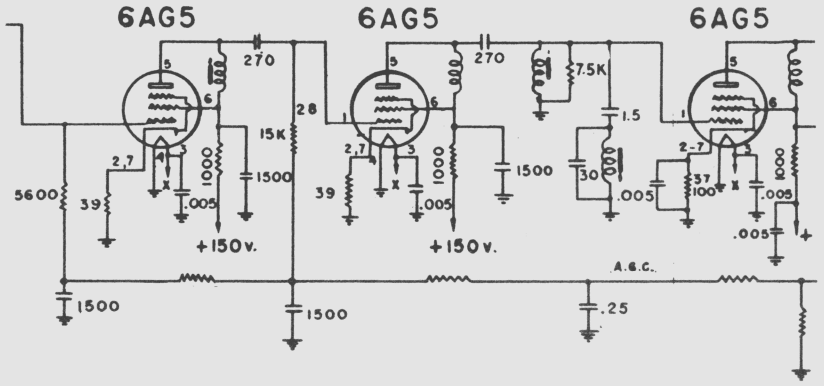
AGC voltage should be about -4 to -6 volts.

If agc voltage low check agc load resistor for a change.

In keyed agc signal at plate of agc tube should be 500V p to p.

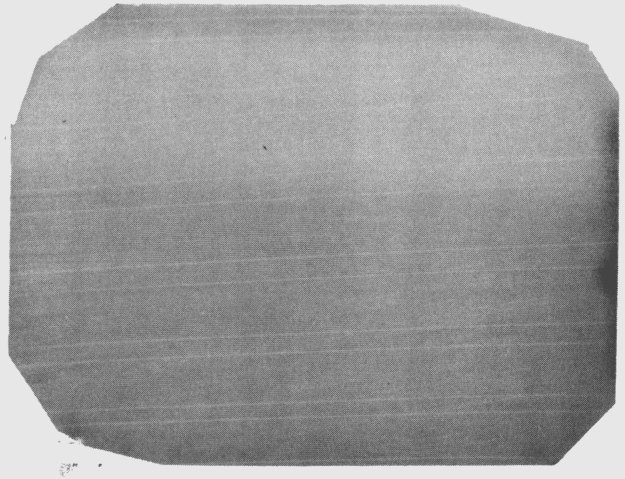
Check correct bias on keyed agc tube.

With all above checks normal refer to chart #18.



1

IN SOME CASES WHERE WE FIND NO PIX BUT NORMAL SOUND THE TROUBLE COULD BE IN THE FRONT END, VIDED I.F. OR VIDEO AMPLIFIER CIRCUITS. HOWEVER IT IS POSSIBLE THAT THE AGC IS DEVELOPING A LARGE AMOUNT OF BIAS ON THE I.F. AND R.F. AMPLIFIERS AND ALMOST CUTTING THEM OFF, SO THAT ONLY SOUND WILL PASS. IN TROUBLE-SHOOTING THIS WE WILL USE NORMAL PROCEDURE TO LOCATE THE TROUBLE.



N O PIX GOOD SOUND

IF SOME CONDITIONS OCCUR THAT WILL CAUSE THE AGC CIRCUIT TO DEVELOPE A LARGE AGC VOLTAGE, LOSS OF PIX WILL RESULT. THIS CONDITION IS FOUND VERY OFTEN IN KEYED AGC CIRCUITS WHERE THE GRID VOLTAGE OF THE AGC TUBE IS DETERMINED BY THE PLATE CIRCUIT OF THE VIDEO AMPLIFIER TUBE. IF ANY TROUBLE OCCURS IN THE VIDEO AMPLIFIER THEN THE AGC CIRCUIT WILL BE AFFECTED.

Replace front end video I.F. and video amp. tubes.

Check for signal at video detector with scope.

If signal is present refer to Chart #6.

If no signal at det. feed marker gen. modulated I.F. to 1st I.F. Grid.

If black bars appear on CRT move gen. back one stage.

Continue this signal injection until black bars do not appear.

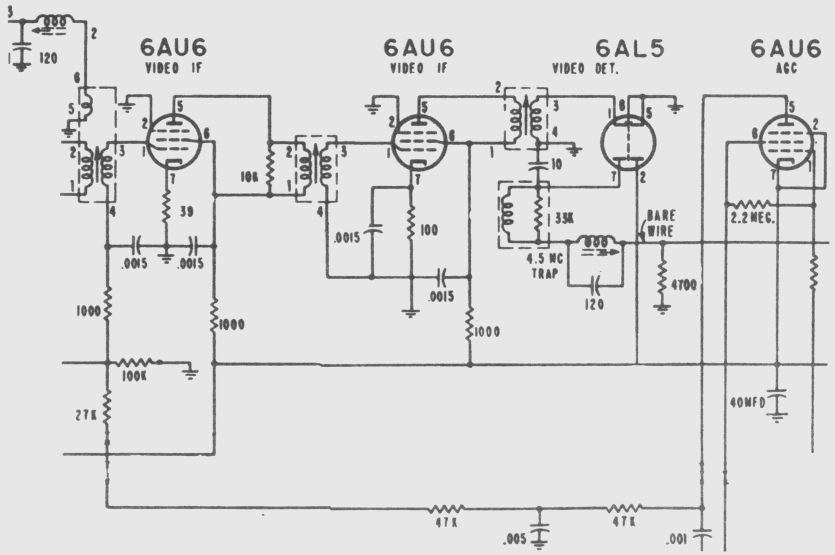
Check stage not passing signal, if grid has zero volts refer to Chart # 5.

If grid at -4 volts or more check agc load resistor.

If load resistor normal check bias on agc tube if used.

If bias is way off check agc tube circuit.

If keyed agc is used check video amp circuit.

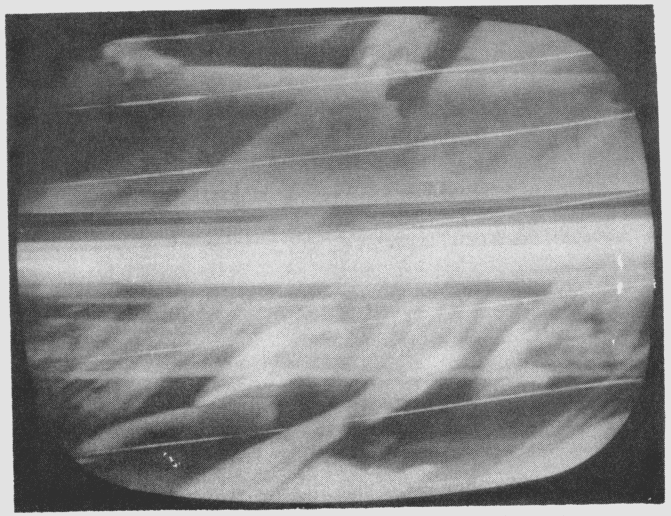


With no picture agc voltage should be zero.

If some voltage is on the agc line then the agc is defective.

3

WITH LOSS OF SYNC, AS THIS TROUBLE INDICATES PICTURE WILL BE ROLLING SIDEWAYS AND DOWNWARD AT THE SAME TIME. IN ORDER TO MAKE SURE THAT THIS IS OCCURING, ADJUST BOTH THE VERTICAL AND HORIZONTAL HOLD CONTROLS AT THE SAME TIME. TO SEE IF THE PICTURE WILL HOLD MOMENTARILY. IF IT DOES, THEN WE HAVE LOSS OF SYNC. MAKE SURE THAT THE PICTURE IS NOT NEGATIVE AT THE SAME TIME SINCE THAT WOULD INDICATE A.G.C. TROUBLE.



COMPLETE LOSS OF SYNC

THE SYNC TUBES SHOULD BE CHANGED FIRST SINCE THEY ARE THE MOST LIKELY CAUSE OF THIS CONDITION. IF THEY DO NOT CLEAR THE TROUBLE THE SCOPE SHOULD BE USED SINCE IT CAN SHOW YOU WHERE THE LOSS OF SIGNAL IS OCCURING. THE TROUBLE CAN BE ANYWHERE FROM THE SYNC TAKE OFF POINT TO THE OUTPUT OF THE SYNC CIRCUITS.

Replace all sync tubes.

With scope check signal at input to first sync tube.

If no signal present, check for open line from sync take off point.

If signal at input, move to plate of first sync tube.

If no signal at plate check plate, screen and cath - ide voltages.

Do not trouble-shoot if a poor signal is at plate.

If no signal at plate then trouble must be in that circuit.

Check for signal at grid of second sync tube.

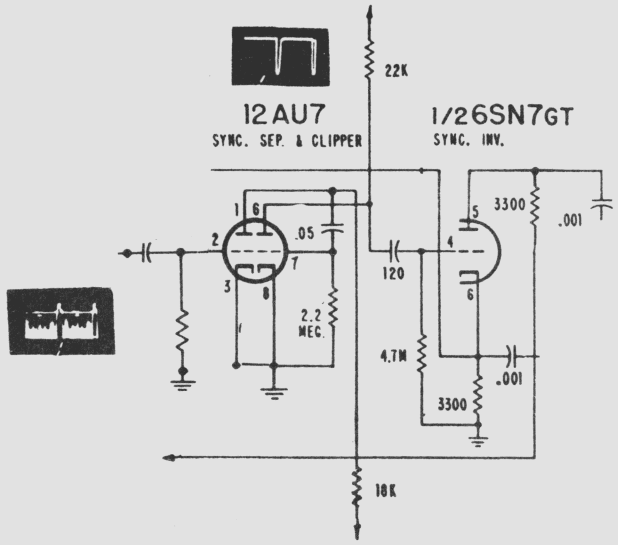
If no signal check coupling cap for open or grid circuit for short.

If signal at grid check for signal at plate.

If no me present at plate check voltage and resistance of this circuit.

Trouble is caused by complete loss of sync.

Signal must be lost in sync circuit use scope to check this.



3

Replace all sync tubes.

If tubes ok check input to the first sync tube.

This signal must be good. if signal is poor check agc or video amp.

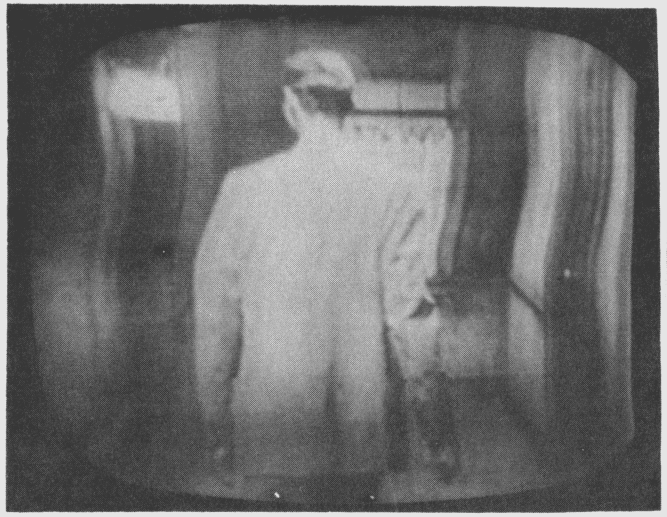
If good signal go to output of first sync tube.

If sync pulses are suppressed at this point check voltage at tube.

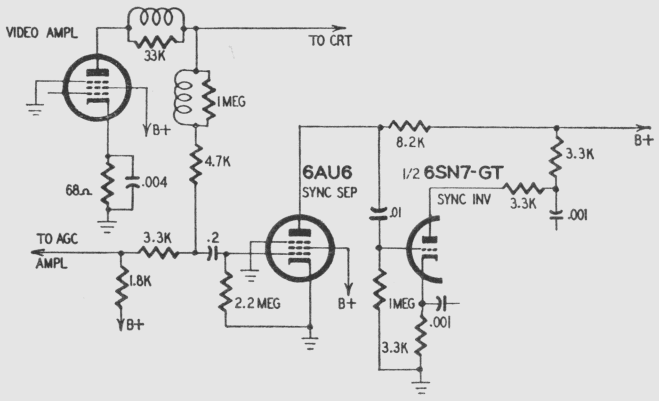
If first tube is sync sep. bias should be -20 volts with signal applied.

If grid voltage on sync sep. is low or zero, check coupling cap for leak.

THIS CONDITION OCCURS WHEN THE SCENE CHANGES OR WHEN A COMMERCIAL IS SHOWN AND THE CAMERA SWITCHES BACK TO THE PROGRAM. IT MAY ALSO BE NOTICED THAT IF VERY LITTLE VIDEO IS ON THE SCREEN, OR THERE IS LITTLE MOVEMENT IN THE SCENE, THE PIX MAY APPEAR VERY GOOD. WITH NO PULLING AT ALL. IF GREAT ACTIVITY IS TAKING PLACE THEN A PIX PULL WILL BE NOTICED.



PICTURE PULL



THIS TROUBLE IS CAUSED BY VIDEO INFORMATION IN THE SYNC TRYING TO TRIGGER THE HORIZONTAL OSCILLATOR. THIS WILL NOT AFFECT THE VERTICAL OSCILLATOR SINCE THE INTEGRATING NETWORK WILL BYPASS ALL VIDEO INFORMATION. USUALLY LEAKY COUPLING CAPACITORS IN THE SYNC CIRCUIT WILL BE THE CAUSE. IN SOME CASES MISADJUSTMENT OF THE A.G.C. CIRCUIT WILL GIVE THE SAME EFFECT.

If signal at plate is normal check at grid of second sync tube.

Watch for loss of amplitude of sync pulse only.

Output of sync separator should be sync pulses only.

With pix pull video will be present at the sync separator output.

Check coupling capacitor and grid resistor of sync sep.

Also check for high plate voltage on sync tubes.

3

WITH THIS TROUBLE THE PICTURE WILL HOLD MOMENTARILY AS THE VERTICAL HOLD CONTROL IS ADJUSTED BUT WILL NOT LOCK INTO SYNC. AS THE PICTURE IS MADE TO ROLL DOWNWARDS IT SHOULD SNAP DOWN AS THE BLANKING BAR NEARS THE BOTTOM, THIS WOULD INDICATE NORMAL OPERATION OF THE VERTICAL SYNC. WITH LOSS OF VERTICAL SYNC THE PICTURE WILL ROLL SLOWLY DOWN ALL THE WAY TO THE BOTTOM.

In some cases a tube is used to amplify only the vertical sync.

If the above tube is used replace it.

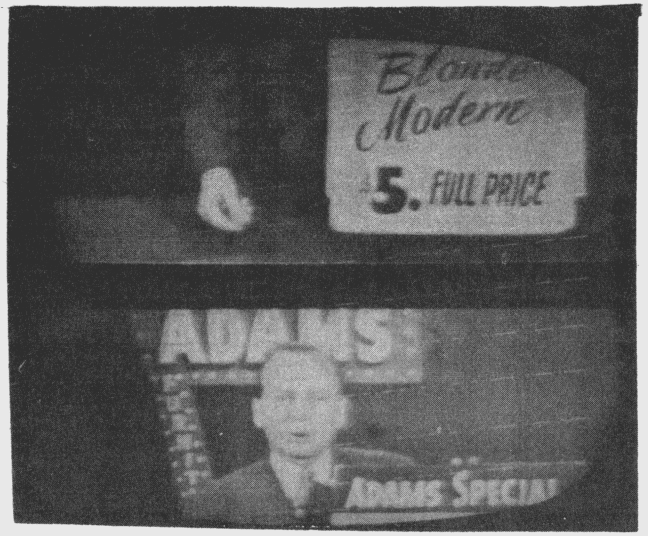
Turn down brightness control and remove vertical osc. tube.

Place scope at oscillator grid to check for loss of signal.

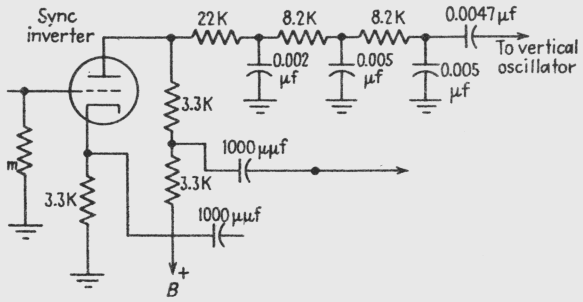
If a signal is at osc grid, it is probably very small.

Check for a shorted integrator capacitor.

If a printed integrator circuit is used replace it.



LOSS OF
VERTICAL SYNC



THE TROUBLE IN THIS SYMPTOM IS LIMITED TO A VERY SMALL SECTION OF THE TV RECEIVER. SOMEWHERE BETWEEN THE OUTPUT OF THE SYNC CIRCUITS, AND THE INPUT TO THE VERTICAL OSCILLATOR. POOR SYNC MAY GIVE ALMOST THE SAME CONDITION AS LOSS OF VERTICAL SYNC EXCEPT THAT THE HORIZONTAL WILL BE VERY TOUCHY AND HARD TO LOCK IN.

Check for an open resistor leading from sync output to vertical osc.

If horizontal is holding good trouble must be in above checks.

If horizontal is poor too, then check Chart on poor sync.

6

Replace the vertical oscillator and output tubes.

With scope check for a signal at the grid of the vertical output tube.

If none present move to the other side of coupling capacitor.

If none at this point oscillator circuit is not working.

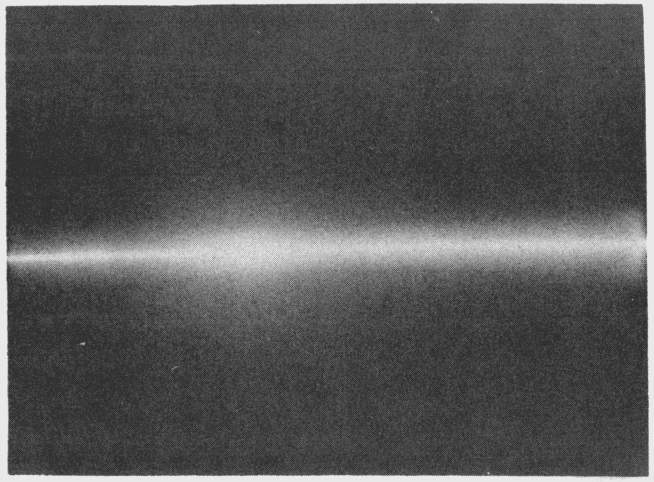
Check for plate voltage on osc tube. If none check plate circuit.

Check grid resistor of osc. tube for open.

Replace capacitor at grid of vertical oscillator.

THIS IS ONE OF THE EASIEST SYMPTOMS TO RECOGNIZE SINCE ALL THAT WILL BE ON THE SCREEN IS A STRAIGHT, HORIZONTAL LINE IN THE CENTER OF THE C.R.T.

THIS LIMITS THE TROUBLE TO THE VERTICAL SWEEP CIRCUIT, SINCE IT SWEEPS THE BEAM FROM TOP TO BOTTOM.



NO VERTICAL SWEEP

WITH THIS SYMPTOM THE VERTICAL SWEEP TUBES SHOULD BE REPLACED FIRST. IF THIS DOES NOT HELP THEN THE SCOPE CAN BE USED TO GREAT ADVANTAGE SINCE IT WILL SPOT THE DEFECTIVE STAGE RIGHT AWAY. ONCE LOCALIZED TO ONE STAGE, VOLTAGE AND RESISTANCE MEASUREMENTS WILL LOCATE THE DEFECTIVE COMPONENT.

If still no sweep, replace osc. trans, former.

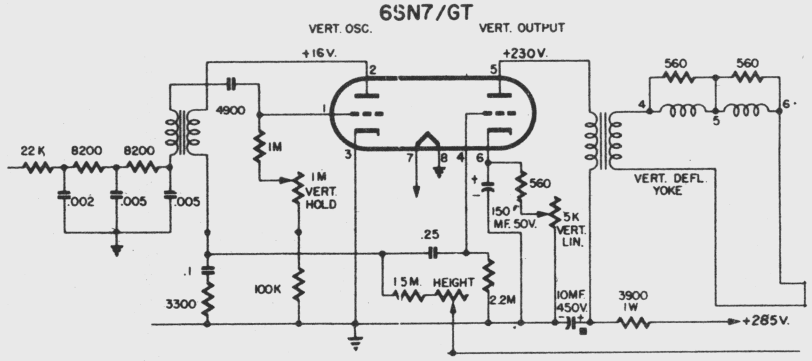
If a signal is at grid of output tube, check signal at plate.

If none at plate check voltages around output tube.

If voltage missing at any point check for open in circuit.

If cathode circuit open a high voltage will be at cathode.

If signal at output plate check transformer or yoke for open.



Replace the vertical oscillator and output tube.

With scope, check signal at grid of output tube.

If a flat top is noticed on signal, trouble is before this point.

Replace coupling capacitor to output tube grid.

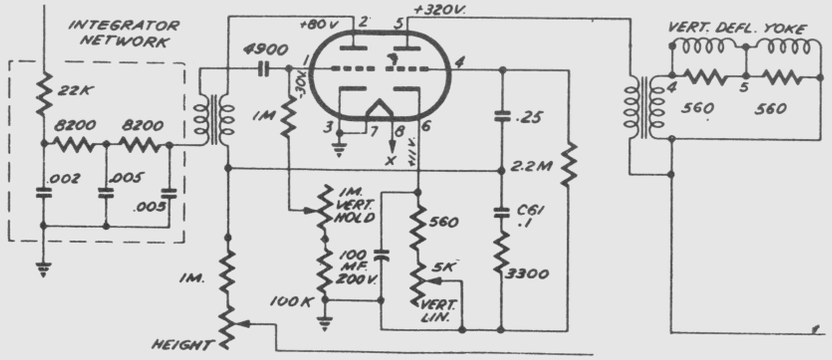
Replace charging capacitor C61.

If above checks do not help, make sure height control works.

It height does not have much control, check plate circuit of osc.

WHEN THIS CONDITION IS NOTICED THE VERTICAL HEIGHT AND VERTICAL LINEARITY CONTROLS SHOULD BE ADJUSTED TO SEE IF THE WHITE LINE, AT THE BOTTOM OF THE PICTURE CAN BE ELIMINATED. ONE THING IS IMPORTANT AT THIS TIME THAT IS IF THE HEIGHT CONTROL IS INCREASED WAY BEYOND NORMAL, THEN THE FOLDOVER WILL BE WAY BELOW THE SCREEN, BUT THE TROUBLE WILL NOT BE ELIMINATED ONLY COMPENSATED FOR, AND THE TROUBLE WILL REAPPEAR AS TIME GOES BY.

FOLDOVER AT
BOTTOM OF PICTURE



THE USE OF THE OSCILLOSCOPE IN FINDING THIS TROUBLE IS VERY HELPFUL SINCE THE SAWTOOTH WILL HAVE A FLAT TOP TO IT. BY OBSERVING THE SIGNAL AT THE GRID OF THE VERTICAL OUTPUT TUBE, WE CAN SEE IF THE TROUBLE IS BEFORE, OR AFTER THIS POINT. IF IT IS BEFORE THIS POINT THEN THE SAWTOOTH WILL HAVE A FLAT TOP TO IT AT THE GRID, AND THE VERTICAL OSCILLATOR CIRCUIT MUST BE DEFECTIVE AND CAUSING FOLDOVER.

With a normal signal at grid of output tube trouble is after this point.

Check cathode circuit of output tube for bad resistor or cap.

Check plate, screen voltages and resistors of output tube for change.

If filter cap is used below output transformer check it for open.

If none of above help, replace output transformer.

Adjust vertical hold control

THIS SYMPTOM IS EASY TO FIND SINCE THE VERTICAL HOLD CONTROL WILL BE UNABLE TO BRING ONE PICTURE ON THE SCREEN. IF ONE PICTURE DOES MOMENTARILY APPEAR, THEN THE TROUBLE IS LOSS OF VERTICAL SYNC, AND YOU SHOULD REFER TO CHART # 23. IN THIS OFF FREQUENCY CONDITION YOU MAY FIND MANY PICTURES ON THE SCREEN, OR LESS THAN ONE PICTURE WHERE PART OF THE PICTURE SEEMS TO LAP OVER THE OTHER PART.

Replace vertical oscillator tube.

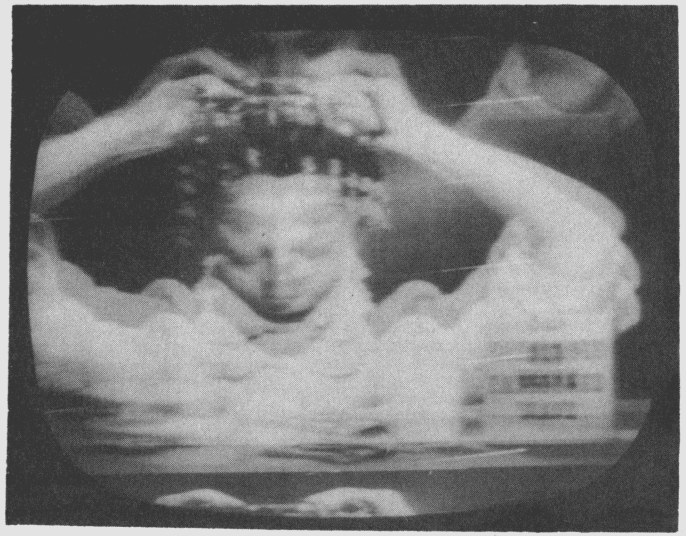
If a blocking osc is used, check grid resistorsand hold control.

If resistors are normal, replace coupling capacitor to osc grid C 58

If still off frequency replace oscillator transformer.

If a multivibrator is used, first check grid resistors.

Now check plate resistors for a change in value.



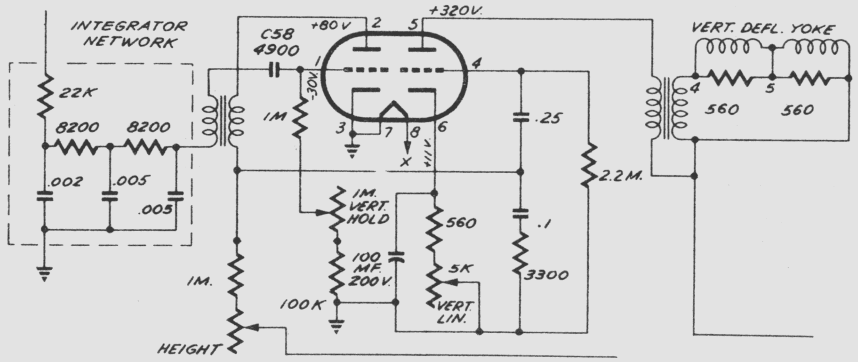
VERTICAL SWEEP
OFF FREQUENCY

6

THIS TROUBLE IS A SIMPLE ONE TO FIND IF A BLOCKING OSCILLATOR IS USED AS THE VERTICAL OSCILLATOR. UNDER THESE CONDITIONS THE DEFECT IS IN THE GRID CIRCUIT OF THE OSCILLATOR TUBE. IF A MULTIVIBRATOR IS USED AS THE VERTICAL OSCILLATOR THEN THE TROUBLE CAN BE ALMOST ANY COMPONENT AROUND THE OSCILLATOR CIRCUIT. THE BLOCKING OSCILLATOR WILL HAVE A TRANSFORMER IN THE GRID PLATE CIRCUIT.

Replace all coupling capacitors to grids of multivibrator.

Replace all capacitors at the plates of multivibrator.



Replace vertical sweep tubes.

Check for peak to peak at grid of vertical output tube, should be 90V.

If very low check for increase in plate load resistor of vertical osc.

If resistors are normal, replace charging capacitor.

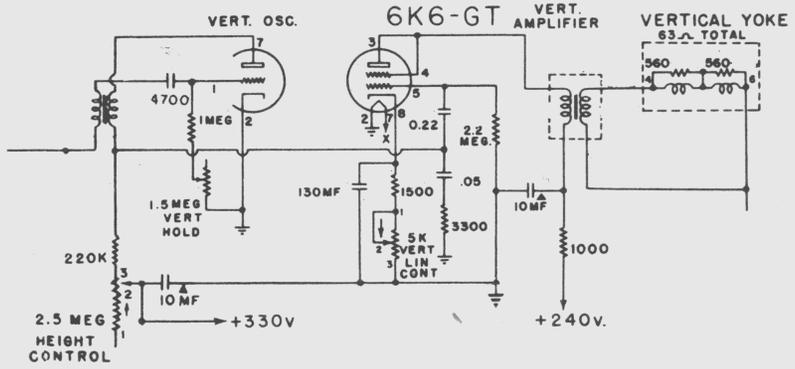
If none of the above help, check the B -/- line to osc. plate.

If peak to peak at grid of vertical output tube is normal check wave at plate.

At plate, wave should be very large, about 1000v peak to peak.

IN MOST TELEVISION RECEIVERS THE VERTICAL HEIGHT CONTROL SHOULD BE CAPABLE OF MAKING THE PICTURE GO WAY BEYOND THE TOP AND BOTTOM OF THE SCREEN. WHEN ADJUSTED CORRECTLY, THE TOP AND BOTTOM OF A TEST PATTERN OUTER CIRCLE SHOULD JUST GO BEYOND THE EDGES OF THE SCREEN. WITH NOT ENOUGH HEIGHT, THE PICTURE WILL NOT TOUCH THE SCREEN TOP OR BOTTOM EVEN WHEN THE CONTROLS ARE SET AT MAXIMUM.

NOT ENOUGH HEIGHT



AMONG THE MOST COMMON TROUBLES OF THIS CONDITION ARE TUBES. THE VERTICAL OUTPUT TRANSFORMER OR YOKE WILL ALSO CAUSE THIS TROUBLE ALONG WITH MANY SMALLER PARTS. THE SCOPE IS A GREAT HELP IN FINDING THIS TROUBLE SINCE WE CAN SEE THE SIZE OF THE SIGNAL AT ANY GIVEN POINT. ONCE THE TROUBLE IS LOCALIZED TO ONE STAGE, THE VTVM CAN BE USED TO FIND THE BAD PART. A CHECK SHOULD BE MADE TO SEE IF THERE IS ENOUGH WIDTH, SINCE LACK OF HEIGHT AND WIDTH INDICATE B + TROUBLE.

If low at plate, check cathode resistors for increases, or open cap.

Also plate resistors may increase, or open capacitor in plate circuit.

If none of these help, replace vertical output transformer.

If wave at plate is normal, output transformer may still be bad.

Replace transformer, if still low in height replace yoke.

Be sure to get exact replacement of transformer or yoke.

Replace the vertical output tube.

Adjust the height and vertical linearity control

If one of them has no effect check as follows.

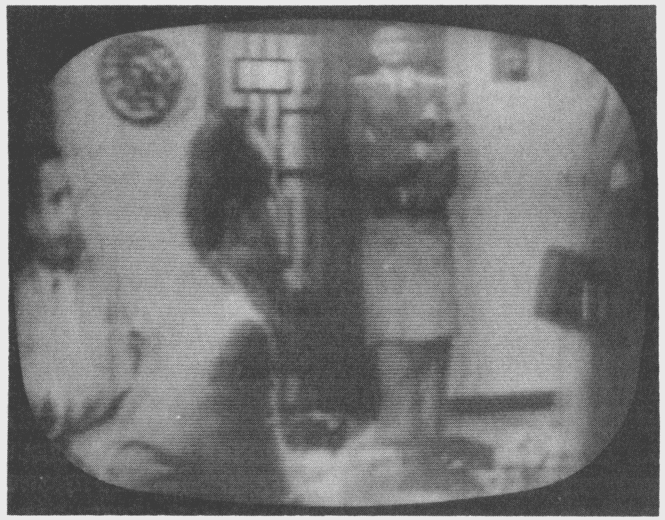
Height control may have open center tap.

Linearity control may be shorted out by capacitor across it.

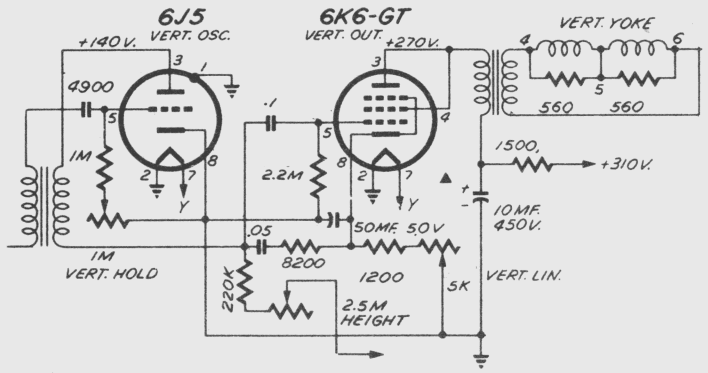
If both controls work check resistor in series wth height.

Resistor in series with linearity may have decreased.

IN A NUMBER OF TV SETS IT WILL BE FOUND THAT THE HEIGHT OF THE PICTURE CANNOT BE ADJUSTED SO THAT IT IS SMALL ENOUGH TO JUST REACH THE TOP AND BOTTOM OF THE SCREEN. IN THIS CASE TOO MUCH HEIGHT IS PRESENT AND WE MUST TROUBLESHOOT THE VERTICAL SWEEP CIRCUIT. NOT TOO MANY COMPONENTS WILL CAUSE SUCH A TROUBLE AND THOSE THAT DO ARE SOON FOUND! ADJUSTMENT OF THE VERTICAL CONTROLS MANY TIMES WILL HELP IN ISOLATING THE TROUBLE



TOO MUCH HEIGHT



Replace charging capacitor.

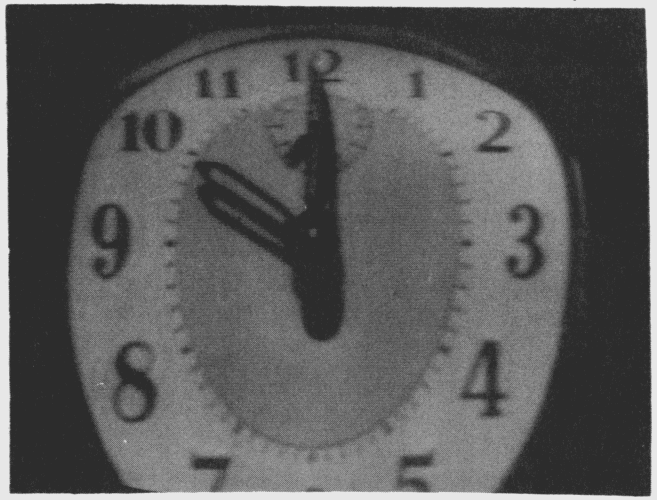
If all parts check normal then output Xfmr is bad.

Be sure to obtain correct replacement of Xfmr.

THE HEIGHT OF THE PICTURE IS OBTAINED BY THE TIME IT TAKES FOR A CAPACITOR TO CHARGE. IF THE RESISTANCE IN THE CIRCUIT IS REDUCED THEN THE CAPACITOR WILL CHARGE QUICKLY AND THE HEIGHT OF THE PICTURE IS INCREASED. IN THE PLATE CIRCUIT OF THE VERTICAL OSCILLATOR WE FIND THE RESISTORS AND CAPACITOR. A CHANGE IN VALUE OF THESE PARTS WILL CAUSE TOO MUCH HEIGHT. INTERNAL SHORT IN THE VERTICAL OUTPUT TUBE MAY ALSO CAUSE THIS TROUBLE.

Adjust vertical linearity and height controls.

THIS CONDITION IS NOTICED QUICKLY IF A TEST PATTERN IS PRESENT. THE CIRCLE IN THE TEST PATTERN WILL APPEAR SQUASHED AT THE TOP OR BOTTOM. IF A TEST PATTERN IS NOT PRESENT POOR LINEARITY MAY BE NOTICED WHEN A BALL OR ANY ROUND OBJECT IS ON THE SCREEN. NOTICE SHOULD BE TAKEN OF THE RATIO BETWEEN THE FACES AND BODIES OF THE PEOPLE. IF IT APPEARS POOR, THEN POOR LINEARITY MAY BE THE CAUSE.



POOR VERTICAL LINEARITY

THE VERTICAL LINEARITY AND HEIGHT CONTROLS SHOULD BE ADJUSTED FIRST IF POOR LINEARITY IS NOTICED. THESE CONTROLS HAVE AN EFFECT ON EACH OTHER, AND WILL BOTH HAVE TO BE ADJUSTED AT THE SAME TIME. THE HEIGHT CONTROL HAS MOST EFFECT ON THE BOTTOM OF THE PICTURE, AND THE LINEARITY CONTROL AFFECTS THE TOP OF THE PICTURE MOST. IF THESE CONTROLS DO NOT HELP THE SITUATION, TUBES SHOULD BE SUBSTITUTED. A CURVE IN THE SAWTOOTH WAVESHAPE IS CAUSING THIS TROUBLE.

If poor wave at plate, check cathode resistor.

Replace vertical osc and output tubes. check B + for normal

Cathode filter capacitor of output may be leaky.

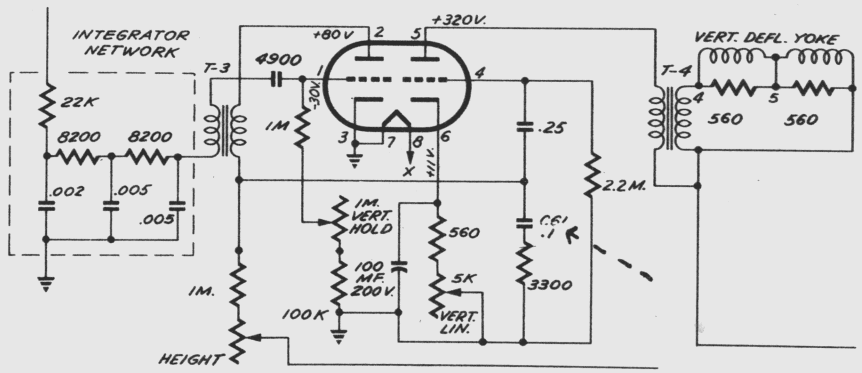
Use scope to check waveshape at grid of vertical output tube.

Measure ohms of output transformer primary and resistor in series with it.

If top of wave squashed, check coupling capacitor for leaky.

Output tube plate filter capacitor may be open, if one is used.

Also check value of grid resistor at output tube.



Replace charging capacitor C 61.

Replace vertical output transformer.

Replace yoke.

If signal normal at grid of output, check wave at plate.

3

Adjust all horizontal controls to try and sync pix.

If one pix will momentarily appear continue, if not check Chart No. 32

Replace AFC tube and oscillator tube.

After replacing above tubes readjust controls.

Check for sync pulses to the a.f.c. tube with scope.

If no sync pulses at a.f.c. check back to sync circuit.

If sync pulses normal, check for reference waveshape to a.f.c.

WITH COMPLETE LOSS OF AFC ACTION THE PICTURE MAY BE SLIPPING SIDEWAYS, OR BE WAY OFF FREQUENCY. THIS DEPENDS ON THE TYPE OF AFC USED, AND THE POSITION OF THE ADJUSTMENT SCREWS. IF LOSS OF AFC ACTION IS NOTICED, THEN THE HORIZONTAL CONTROLS SHOULD BE ADJUSTED TO SEE IF THE PICTURE WILL HOLD EVEN MOMENTARILY. IF IT DOES, IT MEANS THAT THE HORIZONTAL OSCILLATOR CAN OSCILLATE AT THE RIGHT FREQUENCY, AND THE AFC IS NOT CONTROLLING ITS FREQUENCY.

NO HORIZONTAL SYNC

THERE ARE THREE BASIC AFC CIRCUITS, THE SYNCROLOCK, MULTIVIBRATOR, AND SYNCROGUIDE. IF THESE AFC SYSTEMS STOP WORKING, THEN THE HORIZONTAL OSCILLATOR WILL OPERATE ABOVE OR BELOW 15750. THIS WILL CAUSE THE PICTURE TO BE OUT OF HORIZONTAL SYNC SINCE IT WILL HAVE NO CONTROLLING ACTION. ADJUSTMENTS SHOULD CAUSE THE PICTURE TO HOLD BRIEFLY, IF NOT, THEN REFER TO TO CHART NO. 32

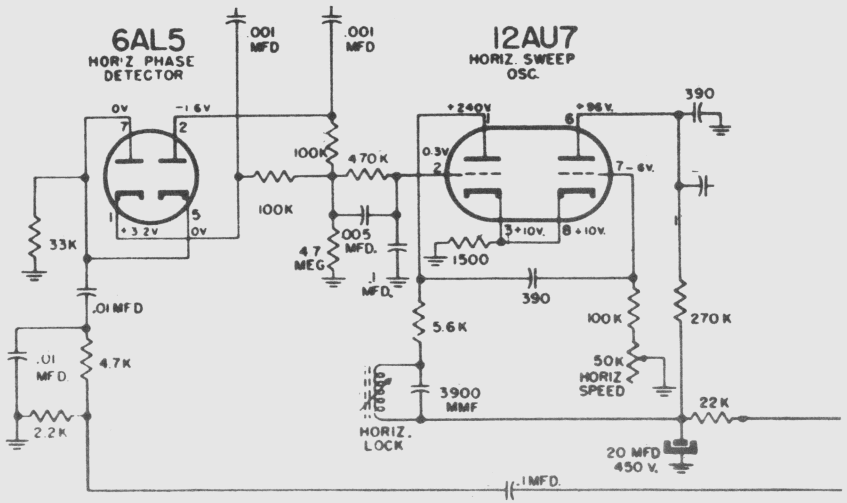
If no reference waveshape, check back for loss of pulse.

If waveshapes normal, check resistance from a.f.c. to osc.

In multivibrator system, check resistors of equal value in a.f.c.

In syncroguide check cathode resistors of a.f.c. tube.

Trouble must be in a.f.c. or in feed from a.f.c. to osc.



Try all horizontal osc adjustments as listed in digest "B"

Switch set off and on to check for improvements as adjustments are made.

Replace horizontal oscillator and any a. f. c. tubes.

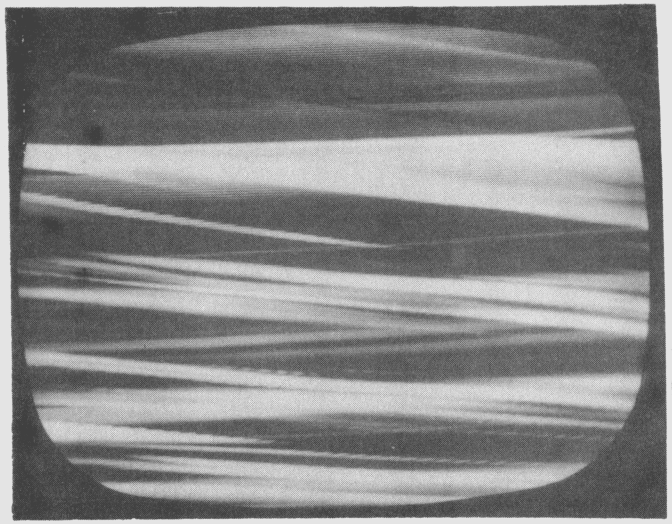
Check for good sync pulses to the a. f. c. circuit

Check comparison waveshape also feeding a. f. c. circuit from hor. osc.

If sync pulses or comparison waveshaps are poor, check why.

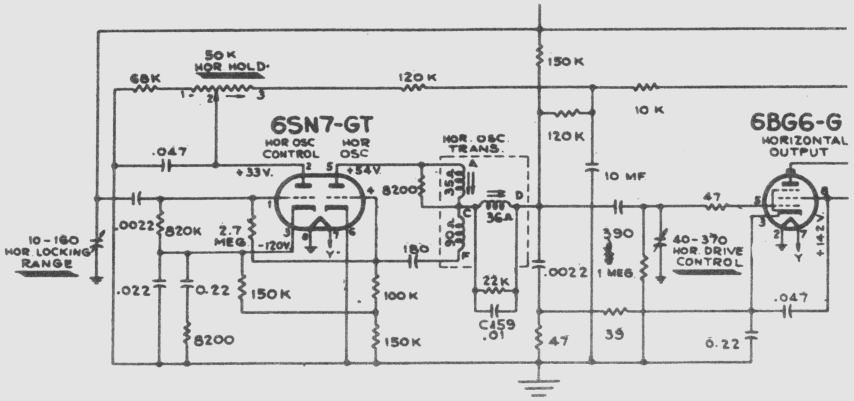
If comparison wave poor, may have bad cap feeding a. f. c. circuit.

POOR AFC ACTION CAN BE NOTICED WHEN THE SET IS FIRST SWITCHED ON, OR AS THE SET IS SWITCHED FROM ONE CHANNEL TO ANOTHER. IN BOTH CASES THE PICTURE WILL GO OUT OF HORIZONTAL SYNC, AND THE HORIZONTAL HOLD MUST BE ADJUSTED TO BRING THE PICTURE BACK INTO SYNC. THE HORIZONTAL CONTROLS SHOULD ALL BE ADJUSTED FIRST IN ORDER TO SEE IF THE CONDITION CAN BE CURED. MANY TIMES A SLIGHT ADJUSTMENT IS ALL THAT IS NECESSARY.



P O O R A. F. C.

SOME OF THE CONTROLS THAT MAY BE OUT OF ADJUSTMENT ARE THE FOLLOWING. HORIZONTAL HOLD. HORIZONTAL FREQUENCY. A. F. C. HORIZONTAL LOCK. HORIZONTAL PHASE. AFTER THESE ADJUSTMENTS HAVE BEEN MADE THE TUBES SHOULD BE REPLACED. IF THIS DOES NOT HELP, THEN THE SCOPE CAN BE USED TO CHECK FOR CORRECT WAVESHAPES IN THE AFC CIRCUIT. THE WAVESHAPES FOUND IN THE VARIOUS AFC CIRCUITS SHOULD BE KNOWN.



If sync pulses are poor, check sync circuit.

With Normal wave shapes check resistors in a. f. c. circuit.

Replace all capacitors around a. f. c. circuit.

Be sure to check a. f. c. filter network at grid of hor. osc.

In syncroguide circuit, hor. locking range cap may be bad.

7

Replace horizontal oscillator and any A.F.C. tubes.

Try all adjustments in the horizontal osc circuit to bring the pix into sync.

These adjustments are horizontal frequency, hor. hold, hor. lock, A.F.C. or hor. phase.

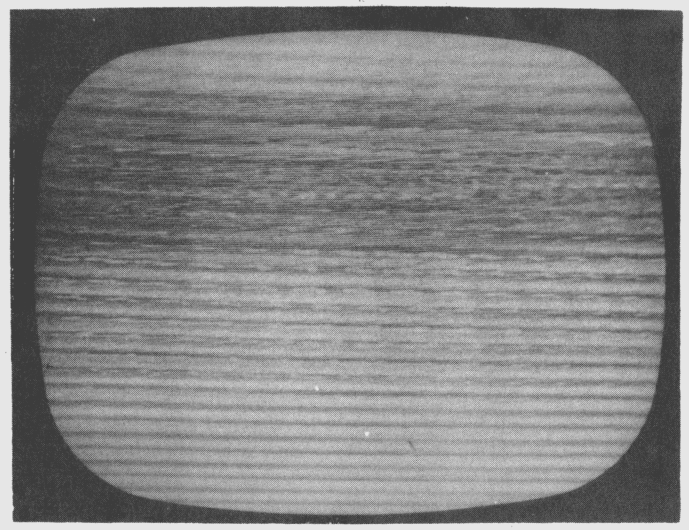
Remove or disable A.F.C. circuit. Try adjustments again.

If pix now holds momentarily A.F.C. circuit should be checked.

If pix still will not sync, then hor. osc. circuit is off frequency.

Check all resistors in the plate grid, and cathode of the hor. osc.

THIS CONDITION IS SIMILAR TO NO A.F.C. CONTROL AS FOUND IN CHART #30. THE BIG EXCEPTION IS THAT NO ADJUSTMENT OF ANY OF THE HORIZONTAL CONTROLS WILL MAKE ONE PICTURE APPEAR ON THE SCREEN. OF COURSE THE ADJUSTMENTS SHOULD BE TRIED FIRST TO SEE IF THEY WILL CAUSE ONE PICTURE TO APPEAR MOMENTARILY. IF THIS DOES OCCUR REFER TO CHART #30. WITH THE OFF FREQUENCY TROUBLE MULTIPLE PICTURES MAY BE NOTICED ON THE SCREEN.



OFF HORIZONTAL FREQUENCY

THE SCOPE DOES NOT HELP IN THIS TYPE OF TROUBLE SINCE THE OSCILLATOR IS WORKING JUST TOO FAST OR TOO SLOW. TUBES CAUSE THIS TROUBLE MANY TIMES AND SHOULD ALWAYS BE REPLACED ONCE THE ADJUSTMENTS HAVE NO NOTICEABLE EFFECT. IT MAY BE FOUND THAT THE ADJUSTMENTS MAY ALMOST BRING THE PICTURE INTO SYNC WHEN ADJUSTED ALL THE WAY IN ONE DIRECTION. A NUMBER OF SPECIFIC COMPONENTS CAUSE THIS TROUBLE, AND ARE ALL IN THE HORIZONTAL OSCILLATOR CIRCUIT.

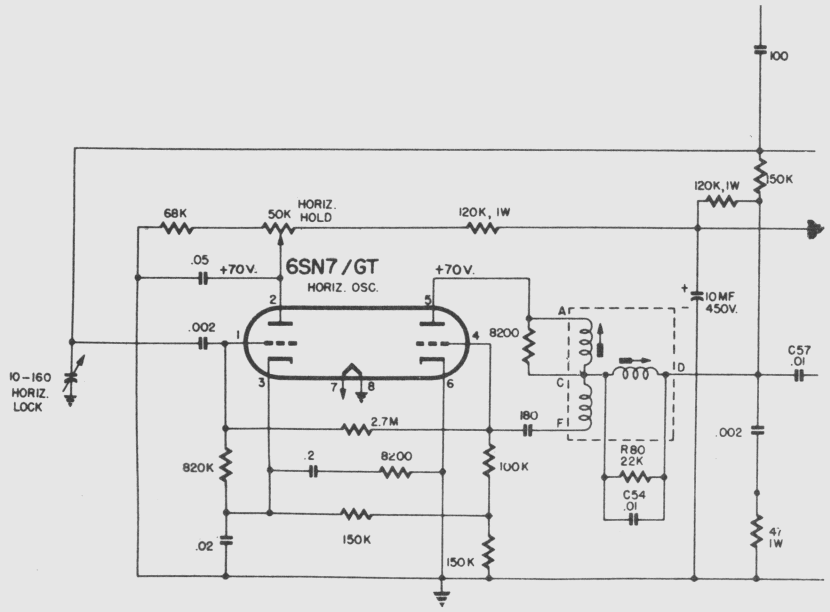
Replace any capacitors around hor. osc. especially grid capacitor.

If lack of width is also noticed, check for low voltage to hor. osc.

An open filter in the B + line to hor. osc may cause this trouble.

If all resistors and capacitors have been checked replace hor. osc. coil.

Make sure that you have checked 4 and 5 of this sheet.



Try adjustment of width control and drive control.

WITH NOT ENOUGH WIDTH THE SIDES OF THE SCREEN WILL BE BLACK, THIS MAY BARELY BE NOTICEABLE, OR IT MAY BE IN AS MUCH AS TWO INCHES ON EACH SIDE. ADJUSTMENT OF THE WIDTH CONTROL SHOULD BE TRIED FIRST BUT USUALLY THIS CONTROL WILL ONLY MOVE THE WIDTH ABOUT HALF AN INCH ON EITHER SIDE. TUBES IN THE HORIZONTAL CIRCUIT WILL VERY OFTEN CAUSE THIS CONDITION.

Replace hor. osc, output, damper, and low voltage rectifier tubes.

If seleniums are used as rectifiers check B + voltage. Should be 265v.

With scope check P to P at grid of hor. output should be from 70-120v.

If low, check hor. osc. circuit for change in resistors or charging cap.

If normal P to P check resistors in hor. output tube.

Check damper voltage, if low replace capacitors at cathode.

NOT ENOUGH WIDTH

WITH A WEAK SIGNAL APPLIED TO THE DEFLECTION YOKE THE HORIZONTAL SWEEP WILL NOT COVER THE ENTIRE SCREEN. THE CAUSE OF THIS CAN BE TUBES. THE FLYBACK CIRCUIT. OR EVEN THE DEFLECTION YOKE ITSELF-MOST COMMON IS TROUBLE IN THE HORIZONTAL OUTPUT TUBE AND ITS ASSOCIATED COMPONENTS-INSUFFICIENT B + WILL ALSO CAUSE LACK OF WIDTH.

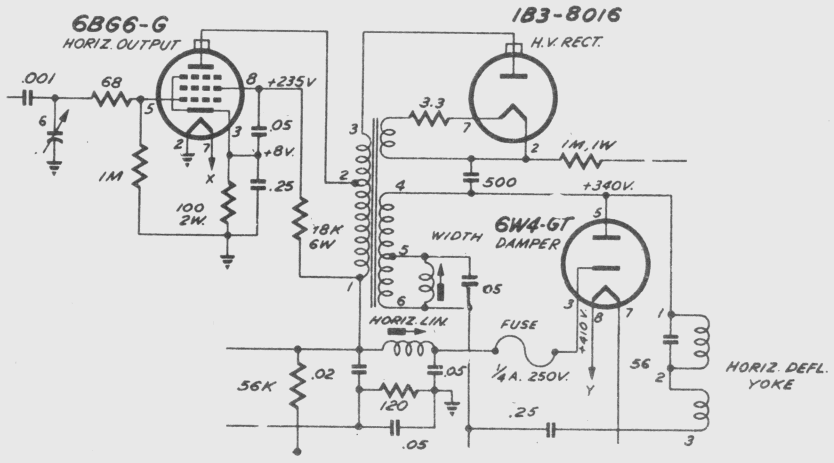
Bridge all capacitors in hor. output tube.

Increase width by placing .05 mfd 600v cap across width coil.

In some cases complete removal of width coil will help slightly.

If none of the above checks help replace flyback or yoke.

The flyback is the more likely of the two, try it first.



Adjust drive control to try and remove white lines.

Replace Hor. output tube and damper. Readjust drive control.

Check grid resistor of the horizontal output for a decrease in value.

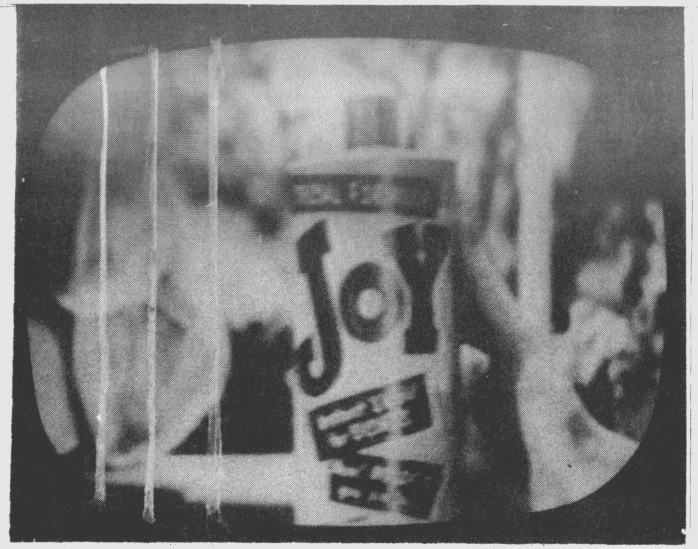
Replace bootstrap capacitor located at the cathode of damper tube.

Replace bootstrap capacitor located at end of linearity coil.

Recheck tubes after capacitors have been replaced.

Replace capacitor across half of horizontal deflection coils.

IN SOME CASES THESE WHITE LINES ON THE LEFT SIDE OF THE RASTER MAY BE VERY BRIGHT OR HARDLY NOTICEABLE THE HORIZONTAL DRIVE CONTROL SHOULD ALWAYS BE CHECKED FIRST FOR CORRECT SETTING SINCE IT WILL CAUSE THESE LINES TO APPEAR THE CORRECT SETTING OF THE DRIVE CONTROL IS WHEN IT IS AT A POINT JUST BEFORE WHITE LINES ARE NOTICED ON THE SCREEN.



WHITE LINES
ON RASTER

MANY TIMES THE DAMPER CIRCUIT IS AT FAULT SINCE IT CONTROLS THE SWEEP ON THE FIRST THIRD OF THE SCREEN IF POOR DAMPING IS OCCURING THE UNWANTED OSCILLATIONS OCCUR IN THE HORIZONTAL SWEEP CIRCUITS AND THE RESULT IS WHITE LINES ON THE LEFT SIDE OF THE SCREEN.

TOO MUCH SIGNAL TO THE HORIZONTAL OUTPUT TUBE WILL ALSO CAUSE WHITE LINES ABOUT ONE THIRD WAY IN FRONT LEFT SIDE OF SCREEN.

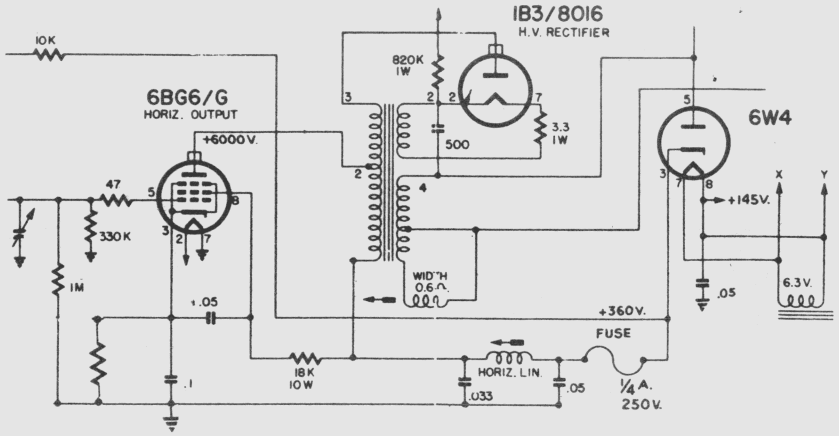
See if yoke or horizontal output trans. have been replaced.

If so make sure correct parts have been used.

A mismatch in these parts will cause white lines on screen.

Replace Yoke

Replace Flyback



Replace Hor. Osc. and a.f.c. tube.

Try adjustment of all hor. controls to lock Pix in.

Switch set on and off to check if adjustments correct the trouble.

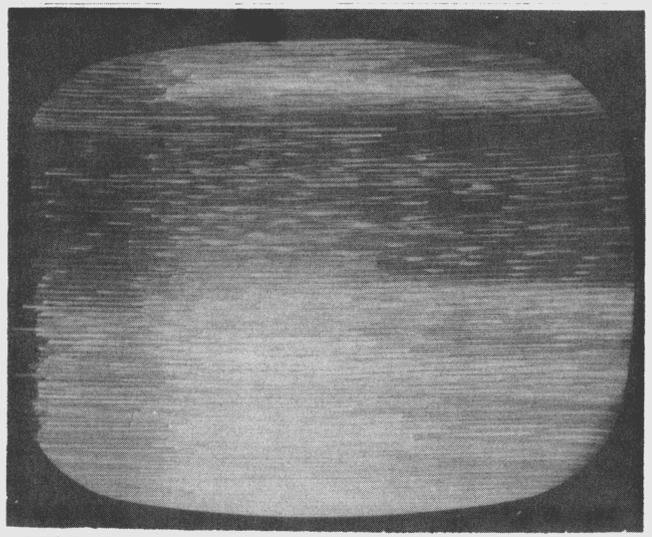
Measure all resistors at the hor. osc circuit for change in value.

Determine if Hor. osc coil has a cracked slug in the core.

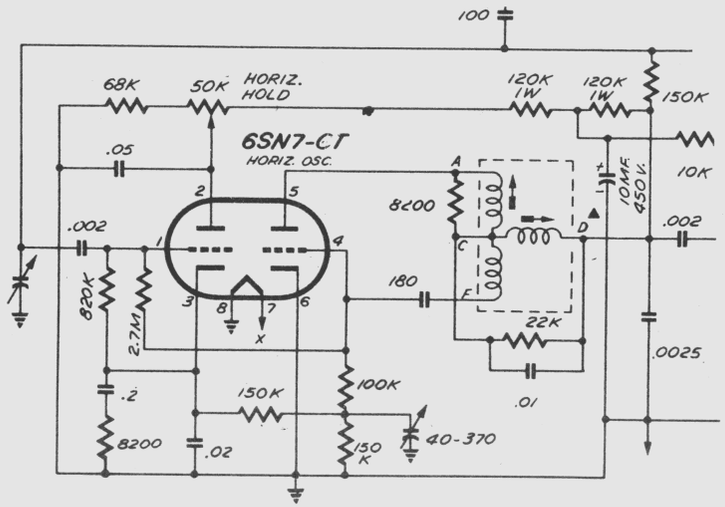
Replace capacitor across osc coil it may be intermittent.

If a syncroguide circuit is used replace capacitor at osc grid.

WITH THIS CONDITION IT MAY BE NOTICED THAT THE TROUBLE WILL OCCUR ONLY WHEN THE SET IS FIRST SWITCHED ON, OR THAT THE TROUBLE MAY APPEAR WHEN THE STATIONS ARE CHANGED. AT OTHER TIMES YOU MAY FIND THAT THE TROUBLE IS CONTINUOUS AND THAT NO ADJUSTMENT OF THE HORIZONTAL HOLD OR FREQUENCY WILL HELP. MOST TIMES IT WILL BE FOUND THAT WHEN THE TROUBLE IS NOTICED THE FREQUENCY OR HOLD CONTROL WILL STOP THIS CONDITION AND THE PICTURE MAY REMAIN NORMAL FOR THE ENTIRE TIME THAT THE SET IS SWITCHED ON.



XMAS TREE EFFECT



A HIGH PITCHED WHISTLE WILL USUALLY BE NOTICED ALONG WITH THIS TROUBLE AND WHAT IS HAPPENING IS THAT THE HORIZONTAL OSCILLATOR IS OPERATING ERRATICALLY, THIS STARTING AND STOPPING CAUSES THE HORIZONTAL SWEEP TO COLLAPSE TO A A THIN LINE BUT BECAUSE IT STARTS TO SWEEP AGAIN ALMOST IMMEDIATELY IT GIVE THE APPEARANCE CALLED XMAS TREE EFFECT WHICH IS REALLY WHITE JAGGED LINES IN THE CENTER OF THE RASTER. THIS TROUBLE THEREFORE MUST BE IN THE HORIZONTAL OSCILLATOR CIRCUIT.

If a multivibrator is used replace cap from plate to grid of osc.

In other type circuits replace capacitors in osc grid and plate.

Resolder all pin contacts in the hor. osc. tube.

Arcing in the damper tube may give the appearance of Xmas tree.

Arcing in the Yoke may also appear as Xmas tree.

Check both yoke and damper for arcing.

Replace the Hor. osc. coil if Xmas tree persists.

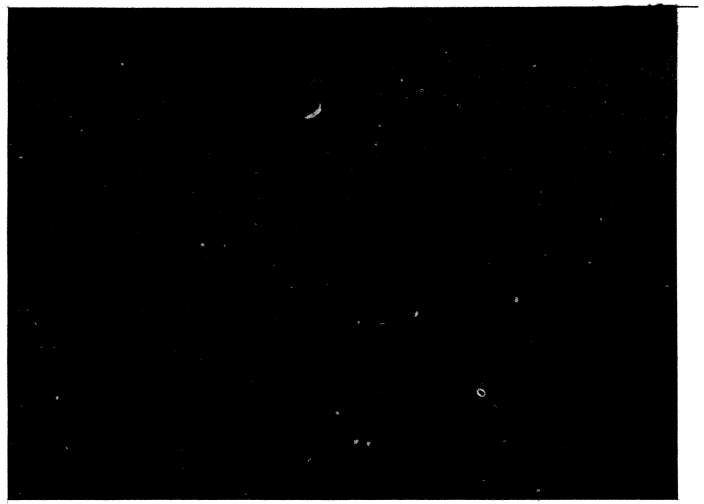
See if HV is present by arcing anode cap to chassis.

If HV is present measure it. If enough refer to Chart No. 15

If no arc check for arc at cap. of HV rectifier

If arc at this point refer to Chart #38. With no arc replace horizontal tubes.

THE LOSS OF SWEEP IN THE HORIZONTAL CIRCUIT WILL CAUSE THE LOSS OF HIGH VOLTAGE IN MOST CASES. THIS OCCURS BECAUSE THE HORIZONTAL SWEEP CIRCUIT CREATES THE HIGH VOLTAGE BY MEANS OF FLYBACK ACTION IN THE HORIZONTAL OUTPUT TRANSFORMER. THIS NOW MEANS THAT THE TROUBLE CAUSING NO SWEEP WILL ALSO CAUSE NO RASTER TO BE SEEN. LOSS OF RASTER MAY BE TROUBLE IN THE HIGH VOLTAGE CIRCUIT ITSELF OR THE HORIZONTAL SWEEP, OR EVEN THE C.R.T. FIRST CHECK WILL INDICATE WHICH SECTION IS AT FAULT.



NO RASTER

IN ORDER TO DETERMINE IF THE C.R.T. IS THE CAUSE OF NO RASTER A QUICK CHECK CAN BE MADE FOR HIGH VOLTAGE, IF NONE IS PRESENT THEN THE CHANCES ARE THAT THE C.R.T. IS O.K. FURTHER CHECKS MUST NOW BE MADE TO DETERMINE IF THE HIGH VOLTAGE IS AT FAULT OR THE HORIZONTAL SWEEP. ONE OF THE SIMPLE WAYS IS TO SEE IF AN ARC CAN BE OBTAINED AT THE CAP OF THE HV RECTIFIER. IF NONE AT THAT POINT IT IS MOST LIKELY THAT THE TROUBLE LIES IN THE HORIZONTAL SWEEP CIRCUIT. USE OF THE SCOPE WILL NOW DETERMINE THE DEFECTIVE STAGE.

With signal at grid of output tube should be 70-120pp.

If very low check all components in hor. osc.

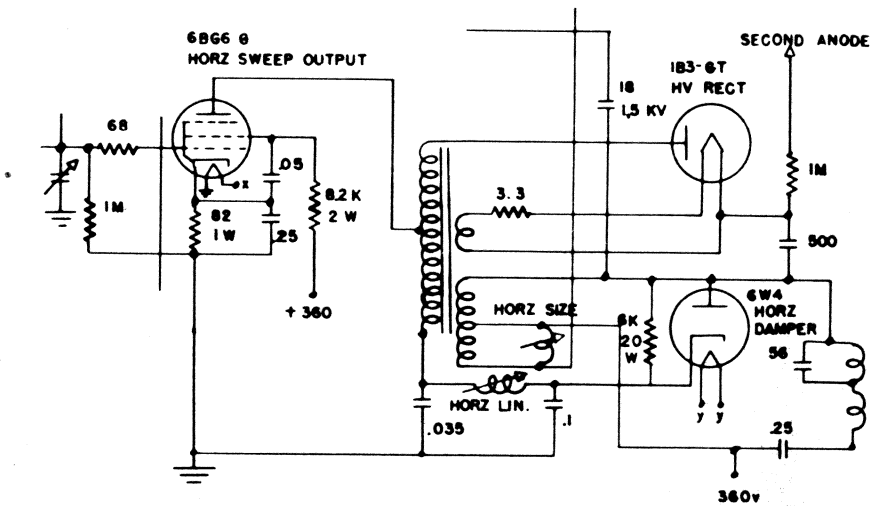
If normal check hor output circuit voltage and resistance.

Remove all capacitors from flyback, try for HV now.

Place scope to grid of Hor. output tube.

With NO signal at this point place scope at output of Hor. osc.

If no output at osc check voltage, resistance or possible open capacitor.



Remove leads from flyback to vertical or a.f.c Try for HV.

If HV with leads removed check disconnected leads for short.

Remove yoke, if HV now, replace yoke. If no HV replace flyback.

If yoke has plug check for open contact.

Unsolder yoke and measure resistance of horizontal windings.

Should have low resistance about 15 ohms.

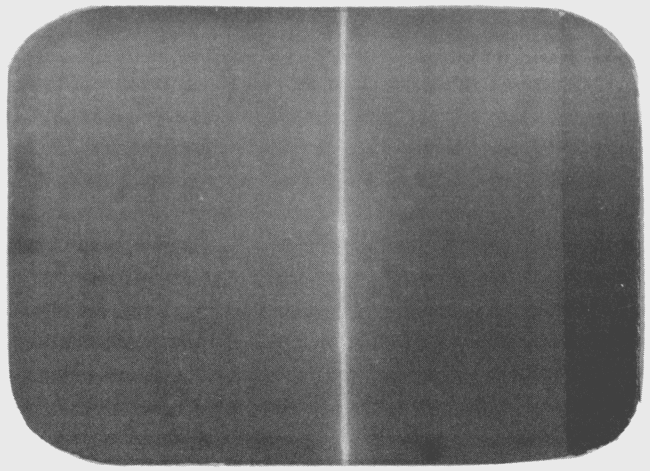
If normal check connections of yoke to circuit.

Take close check of flyback secondary for open.

If yoke has to be replaced be sure to get correct part.

With trouble in 7" sets trouble is in sweep circuit.

IF THE RASTER ON THE SCREEN SHOWS A THIN WHITE LINE IN THE CENTER, THE CAUSE MUST BE LIMITED TO TROUBLE IN THE YOKE OR OUTPUT CIRCUIT OF THE FLYBACK TRANSFORMER. THERE ARE A NUMBER OF SETS ON THE MARKET THAT WILL CAUSE THIS SAME CONDITION TO OCCUR BECAUSE OF TROUBLE IN THE HORIZONTAL SWEEP CIRCUIT, BUT THESE SETS ARE THE 7" SCREEN TYPE AND HAVE ELECTROSTATIC CRT.

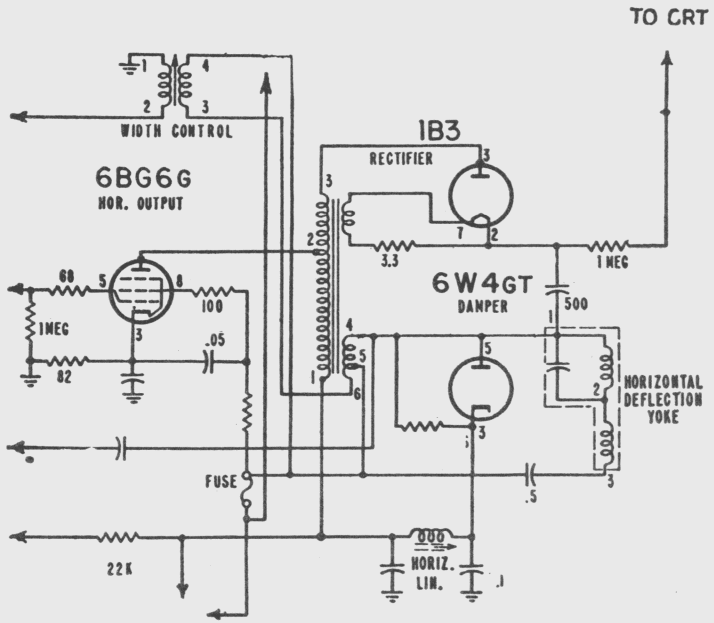


WHITE LINE IN CENTER OF SCREEN

WHEN THE DEFLECTION YOKE IS OPEN, THE SIGNAL THAT COMES FROM THE HORIZONTAL SWEEP CIRCUIT WILL NOT CAUSE THE BEAM TO SWEEP THE CRT SIDEWAYS ALTHOUGH THERE STILL WILL BE HIGH VOLTAGE DEVELOPED. THIS WILL MEAN THAT A SINGLE WHITE LINE WILL BE NOTICED ON THE SCREEN. IN THE SMALL 7" TV SETS THE HV SYSTEM HAD NOTHING TO DO WITH THE HORIZONTAL SWEEP CIRCUIT AND ANY TROUBLE IN THE SWEEP SECTION WOULD IN NO WAY AFFECT THE HV. IN THIS CASE LOSS OF SWEEP WOULD GIVE A WHITE LINE.

Replace tubes in horizontal sweep circuit of 7" sets.

Refer to chart NO. 36 if above check does not help.



Remove HV lead and arc to chassis, if arc present refer to Chart No. 15

If no arc at anode lead check for arc with pencil at HV Rect. plate.

With an arc at this point replace HV rectifier.

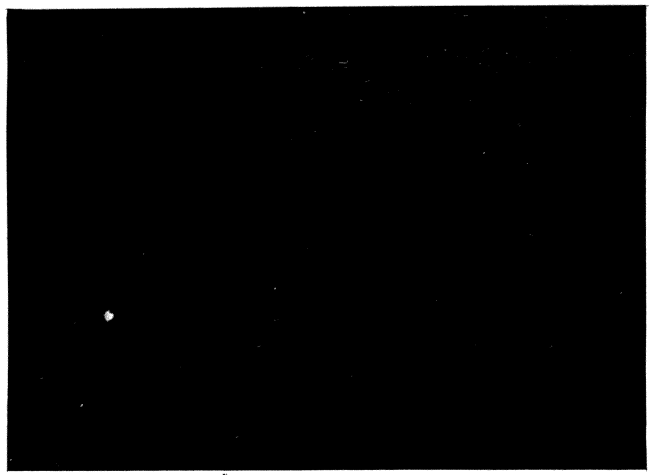
If no HV now check HV filter capacitor and resistor at base of tube.

Also check for poor solder and dirt at HV rect base

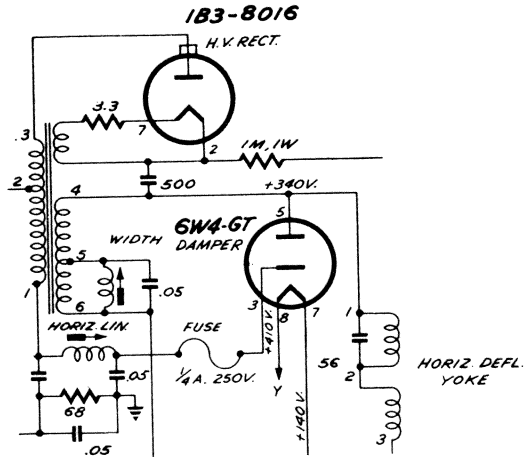
Resistor in series with anode lead may be bad.

Make sure anode lead is not broken

WITH NO HIGH VOLTAGE APPLIED TO THE CRT THERE WILL BE NO RASTER ON THE SCREEN BUT THE SOUND WILL BE NORMAL, UNDER THESE CONDITIONS THE TROUBLE MAY BE IN THE HORIZONTAL SWEEP CIRCUIT, OR IN THE HIGH VOLTAGE CIRCUIT. IN ORDER TO DETERMINE WHICH OF THESE TWO STAGES ARE AT FAULT A FEW SIMPLE CHECKS CAN BE MADE, THESE CONSIST MAINLY OF CHECKING FOR AN ARC FROM THE HV LEAD TO CHASSIS, AND FROM THE CAP OF THE HV RECTIFIER. IF NO ARC IS NOTICED AT THE CAP OF THE HV RECTIFIER, THEN THE TROUBLE WILL BE IN THE HORIZONTAL SWEEP CIRCUIT WHICH IS COVERED IN CHART NO. 36.



NO H. V.
SOUND OK



LOSS OF HIGH VOLTAGE IS A COMMON TROUBLE THAT IS MOST OFTEN CAUSED BY TUBES, IF IT IS CAUSED BY A DEFECT IN THE HV CIRCUIT ONLY, THEN THE ONLY TUBE THAT CAN CAUSE THIS IS THE HV RECTIFIER. WITH NO ARC AT THE PLATE OF THE HV RECTIFIER THE TROUBLE IS IN THE HORIZONTAL SWEEP CIRCUIT SINCE THE HV IS DEPENDANT ON THE SWEEP SECTION WORKING. IF AN ARC IS FOUND AT THE PLATE OF THE HV RECTIFIER AND NO HV IS PLESENT AT THE CRT THEN THE TROUBLE IS LIMITED TO THE HV SECTION. COMMON TROUBLES ARE, BAD RESISTOR IN RECTIFIER CATHODE, HV FILTER CAPACITOR SHORTED AND OF COURSE THE HV RECTIFIER TUBE.

If no arc at HV rect plate remove lead to cap and try for arc on lead.

If still no arc at loose lead refer to Chart #36.

If arc is at loose lead then replace HV rectifier.

If still no HV then check filter capacitor and resistors at base.

Also check for dirt, poor solder or broken anode lead.

5

Readjust the ion trap to make sure its set correctly.

Remove the HV anode lead and with a HV probe measure the HV

The HV should be measured with the HV lead disconnected.

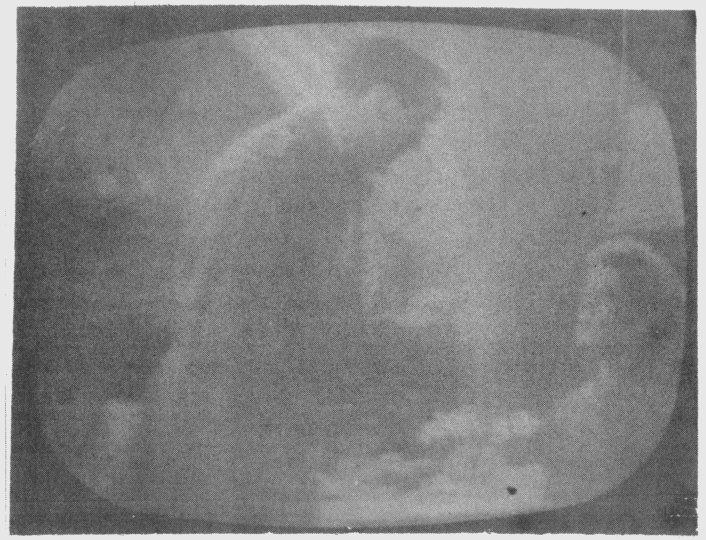
For a 10" CRT the HV should be from 7-9kv.

For a 16" CRT the HV should be from 12-14kv.

For a 21" CRT the HV should be from 14-16kv.

If the HV for the CRT appears to be normal then refer to Chart No. 17.

LOW H.V. WILL USUALLY CAUSE A WEAK RASTER TO BE ON THE CRT. AND IN MANY CASES WILL BE CAUSING BLOOMING. THIS CONDITION MAKES THE RASTER SEEM TO SWELL OUT AS THE BRIGHTNESS CONTROL IS INCREASED. THIS CONDITION MAY BECOME SO BAD THAT THE RASTER WILL COMPLETELY FADE OUT. SOME SIMPLE CHECKS WILL SOON TELL IF THE HV IS AT FAULT, AND IF SO TUBE SUBSTITUTION AND VOLTAGE CHECKS WILL IN MOST CASES LOCATE THE TROUBLE. A DEFECTIVE CRT WILL GIVE THE SAME CONDITION AS LOW HV.



L O W H. V.

IF A LOW AMOUNT OF HV IS APPLIED TO THE SECOND ANODE OF THE CRT THE RASTER WILL BE WEAK BECAUSE THE FORCE OF THE ELECTRON BEAM STRIKING THE PHOSPHOR SCREEN WILL NOT BE STRONG ENOUGH TO ILLUMINATE THE SCREEN TO

THE CORRECT BRIGHTNESS-THE CAUSE OF BLOOMING ALONG WITH A WEAK RASTER WILL OCCUR BECAUSE THE SMALL AMOUNT OF CURRENT FLOWING THROUGH THE HV CIRCUIT WILL DROP THE HV EVEN MORE AND IN SEVERE CONDITIONS THE HV WILL DROP TO A POINT WHERE IT WILL NOT BE ENOUGH TO LIGHT THE CRT AT ALL.

If low HV, replace HV rect, Low voltage rect. and all horizontal tubes.

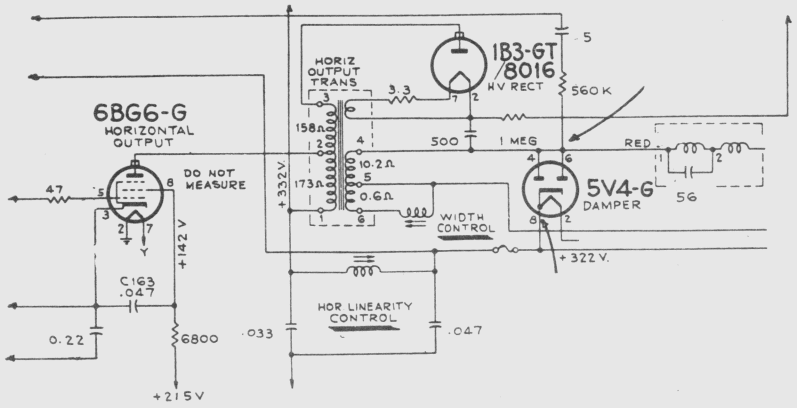
Take voltage and resistance check on horizontal output tube.

Output circuit may have increased screen resistor.

Check resistors at base of HV rectifier for increase.

Replace HV filter cap as the old one may be open.

Replace flyback as the old one may be weak.



If arcing is noticed remove set from cabinet.

Check for poor insulation on HV lead to CRT.

Clean HV lead and place as far from chassis as possible.

Remove HV cage and clean dirt from base of HV rectifier.

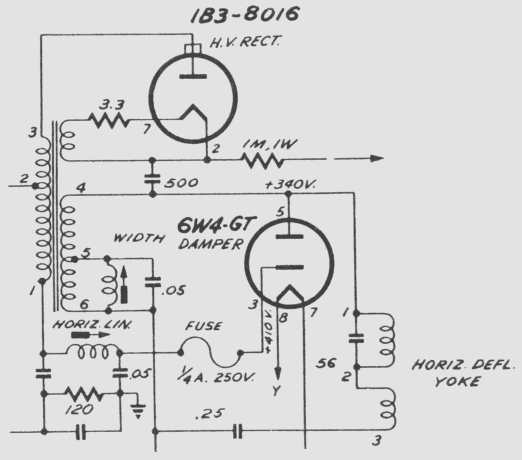
Clean flyback and check for pointed solder connections.

If pointed solder joints are found round them or resolder.

If arcing contines replace HV filter capacitor.

VERY OFTEN HV ARCING OCCURS IN TV RECEIVERS. THIS ARCING WILL OCCUR MORE OFTEN IN THE SUMMER TIME DUE TO THE HUMIDITY IN MANY AREAS. THE ARCING MAY BE NOTICED AS THE SET IS FIRST SWITCHED ON OR DURING THE TIME THE SET IS PLAYING. ARCING MAY REMAIN DURING THE ENTIRE TIME THE SET IS ON AND WILL CAUSE A NUMBER OF FLASHES TO CONTINUALLY BE SEEN ON THE SCREEN, THIS IS VERY ANNOYING TO THE CUSTOMER AND THE SET SHOULD BE CHECKED CAREFULLY FOR THIS TROUBLE BEFORE SENDING BACK AS A FINISHED JOB.

H. V. ARCING



HV ARCING USUALLY OCCURS AT THE BASE OF THE HV RECT. OR IN THE FLYBACK ITSELF AND IN ORDER TO SEE THE ARCING IT MAY BE NECESSARY TO TAKE THE SET INTO A COMPLETELY DARK ROOM AND WATCH THE HV SECTION. THERE ARE MANY HV SPRAYS ON THE MARKET THAT MAY BE USED TO CLEAR UP THIS TROUBLE BUT IN MOST CASES IT HAS BEEN FOUND THAT TO REPLACE THE DEFECTIVE PART IS BY FAR THE BEST SOLUTION. DUST, DIRT, AND POOR INSULATION ARE THE MOST COMMON CAUSES OF THIS TROUBLE.

Arcing may be caused by a cracked resistor in HV rectifier base.

If arcing is in flyback a HV insulating spray may be tried.

If spray does not help a new flyback should be used.

In a number of cases an arc may be heard as set is switched on.

This may be the cause of a poor contact grounding the Crt.

This is done by a spring touching the CRT outer coating.

Make sure this spring is making good contact.

Readjust ion trap for max. brightness.

Replace HV Rectifier and Low voltage rectifier.

Replace all horizontal sweep tubes.

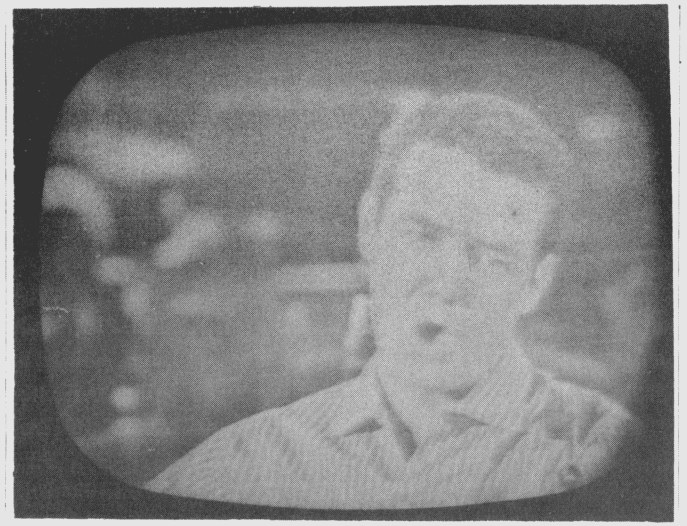
Remove HV anode lead from CRT and Measure HV.

For a 10" CRT the HV should be from 7-9kv.

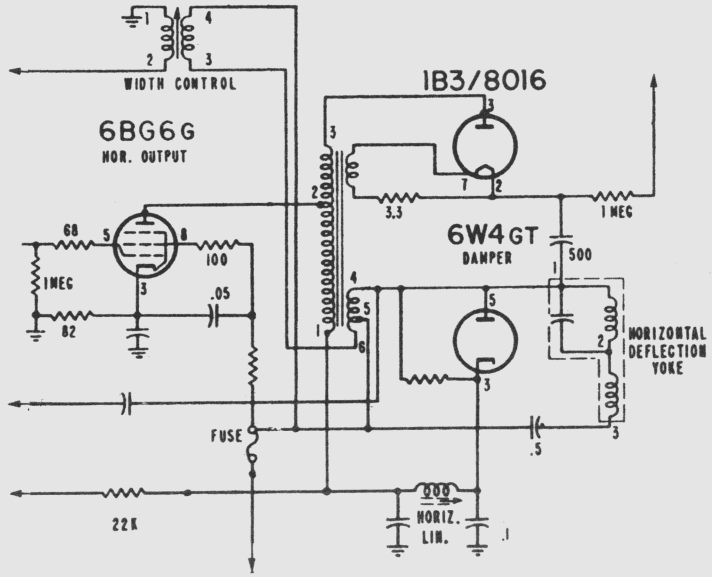
For a 16" CRT the HV should be from 12-14kv.

For a 21" CRT the HV should be from 14-16kcv

BLOOMING IS A CONDITION THAT CAUSES THE RASTER TO ENLARGE AND GET WEAK AT THE SAME TIME. WITH A VERY BAD CASE THE RASTER WILL COMPLETELY DISAPPEAR WITH MAXIMUM SETTINGS OF THE BRIGHTNESS CONTROL. THIS SHOULD BE TAKEN INTO CONSIDERATION WHEN TRYING TO GET A RASTER BY DOING THE FOLLOWING. ADJUST ION TRAP WITH THE BRIGHTNESS SET AT MAXIMUM, THEN IF NO RASTER IS NOTICED DECREASE THE BRIGHTNESS CONTROL SLIGHTLY AND READJUST ION TRAP.



BLOOMING



5

IF WE HAVE INSUFFICIENT HV AND THE BRIGHTNESS CONTROL IS ADVANCED, THE CURRENT PASSING THROUGH THE CRT IS INCREASED AND THE CURRENT IN THE HV CIRCUIT WILL INCREASE ALSO, SINCE THE BEAM CURRENT OF THE CRT MUST PASS THROUGH THE HV CIRCUIT IN ORDER TO RETURN TO THE CATHODE OF THE CRT. THIS WILL NORMALLY LOWER THE HV ABOUT 1KV, IF THE HV IS LOW TO BEGIN WITH THEN A GREAT EFFECT WILL BE NOTICED ON THE WIDTH AND BRIGHTNESS.

If the HV for the size Crt is normal then CRT is bad.

If HV is low refer to Chart No. 39.

Replace Low Voltage rect and damper tubes.

If the low voltage rect is a selenium refer to Chart No. 45.

Measure the output of the low voltage rectifier.

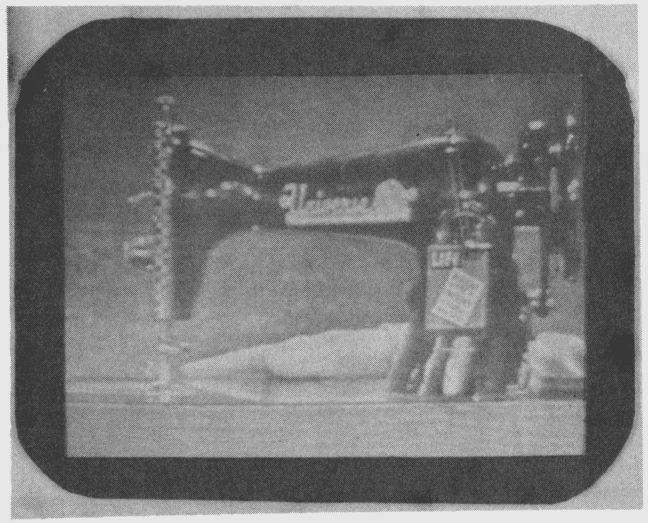
If low, check for open input filter capacitor be replacing it.

Check for a large increase in the resistance of the filter choke.

Check for correct AC voltage at plates of rectifier.

If low then power transformer is bad.

THIS IS A COMMON TROUBLE IN TV SETS TODAY THAT ARE WORKING UNDER TOO MUCH STRESS, OR CLOSE TOLERANCES. THE TROUBLE HERE IS IN MOST CASES THE POWER SUPPLY, AND THE LOW VOLTAGE RECTIFIER TUBE ITSELF IS THE MOST LIKELY CULPRIT. SOME CONDITIONS HAVE BEEN FOUND WHERE THE DAMPER CIRCUIT OF THE YOKE HAVE BEEN FOUND DEFECTIVE, BUT THESE ARE RARE WITH A POSTAGE STAMP RASTER



POSTAGE STAMP RASTER

IF THE LOW VOLTAGE CIRCUIT HAS A LOW OUTPUT, THEN THE HEIGHT AND WIDTH WILL BE AFFECTED THE MOST SINCE THESE RUN WITH CLOSE TOLERANCE ON THE VOLTAGE APPLIED. IT MAY BE FOUND THAT THE HEIGHT CAN BE ADJUSTED TO COVER THE SCREEN BUT THE WIDTH WILL NEVER BE ABLE TO DO IT WITH LOW B +. IN A NUMBER OF SETS THE HORIZONTAL AND VERTICAL OUTPUT TUBES ARE OPERATED BY THE VOLTAGE THAT IS SUPPLIED FROM THE DAMPER TUBE. IN THESE SETS THE DAMPER CIRCUIT WILL ALSO CAUSE THE TROUBLE.

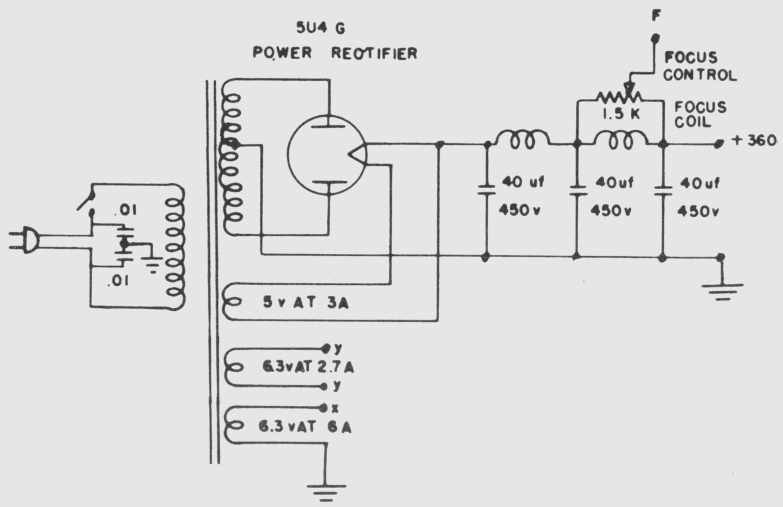
If the correct voltage is at the low voltage output check below.

Find out if damper feeds the vertical output and horizontal.

If it does then check damper cathode circuit for a leaky capacitor.

Also replace all Horizontal sweep tubes.

Replace yoke or flyback as a final possibility.



4

Make sure there is a 120 cps pull and not a 60 cps pull.

Count the number of variations from top to bottom of pix.

Photograph shows a 120 cycle pull.

If a 60 cps pull is noticed refer to Chart No. 45.

If the pull changes as the scene changes then refer to Chart No. 22.

Bridge all electrolytic capacitors with known good ones.

This should be done one at a time.

WITH A 120 CYCLE PULL IN THE PICTURE THE TROUBLE MUST BE IN THE POWER SUPPLY SINCE THIS IS THE ONLY PLACE IN A TV SET THAT HAS 120 CYCLES IN IT. IT SHOULD BE SIMPLE TO TELL IF THERE IS THIS CONDITION OCCURING BECAUSE A CLOSE CHECK ON THE SIDE OF THE PICTURE WILL SHOW IF THERE ARE TWO VARIATIONS IN THE PULL FROM THE TOP OF THE PICTURE TO THE BOTTOM. IF ONLY ONE VARIATION IS NOTICED THEN THE TROUBLE MUST BE CAUSED BY A 60 CYCLE HEATER TO CATHODE SHORT.

120 C.P.S. PULL

IN A FULL WAVE RECTIFIER CIRCUIT THE INPUT FREQUENCY IS DOUBLED BY THE RECTIFYING ACTION IN THE POWER SUPPLY. WITH A 60 CYCLE INPUT TO THE POWER SUPPLY OF A TV SET WE WILL END UP WITH 120 CYCLE OUTPUT. IF POOR FILTERING IS TAKING PLACE, THEN A PULL WILL BE NOTICED IN THE PICTURE. THIS TROUBLE THEREFORE MUST BE CAUSED BY AN OPEN FILTER IN THE B + CIRCUIT.

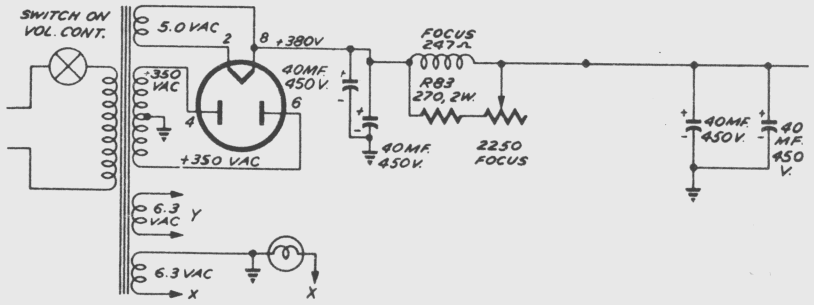
When open filter is bridged pull will clear.

Be sure to use same values as ones in set.

It was found that in some cases wrong values were used.

Check manufacturers schematic for correct values.

Be sure B + is wired correctly.



If smoking, arcing, or overheating switch set off.

ONE OF THE MOST COMMON TROUBLES IN THE B+ CIRCUIT IS A SHORT. THIS OCCURS SO MANY TIMES BECAUSE OF THE MANY SECTIONS THAT THE B+ MUST FEED. IN MANY CASES THE SHORT WILL CAUSE A FIRE TO BREAK OUT UNDER THE CHASSIS AND THE REPAIR BILL IS QUITE HIGH. WHEN A SHORT IS IN THE B+ LINE THE LOW VOLTAGE RECTIFIER WILL ARC INTERNALLY OR SOME RESISTORS IN THE CIRCUIT WILL OVERHEAT AND START TO SMOKE. AS SOON AS THESE CONDITIONS ARE NOTICED THE SET SHOULD BE SWITCHED OFF UNTIL THE TROUBLE IS FOUND

SHORT IN B+

THE MOST IMPORTANT THING TO KEEP IN MIND WITH A SHORT IN THE B+ LINE IS THE NORMAL RESISTANCE THAT IS MEASURED FROM THE CATHODE OF THE RECTIFIER TUBE TO COMMON NEGATIVE. IN MOST CASES THIS IS 20,000 OHMS OR MORE. IF THE SHORT IS PRESENT THEN A READING OF FROM ZERO TO A FEW THOUSAND OHMS MAY BE FOUND. WITH SUCH A LOW RESISTANCE IN THE CIRCUIT A LARGE AMOUNT OF CURRENT WILL BE FLOWING RESULTING IN OVERHEATING OF RESISTORS OR AN ARC IN THE RECTIFIER TUBE. THE POWER XFMR ITSELF MAY START TO SMOKE.

Follow all leads from the filter choke with ohmmeter.

Measure the amount of resistance from rectifier cathode to B -

Look for decrease in resistance until lowest reading.

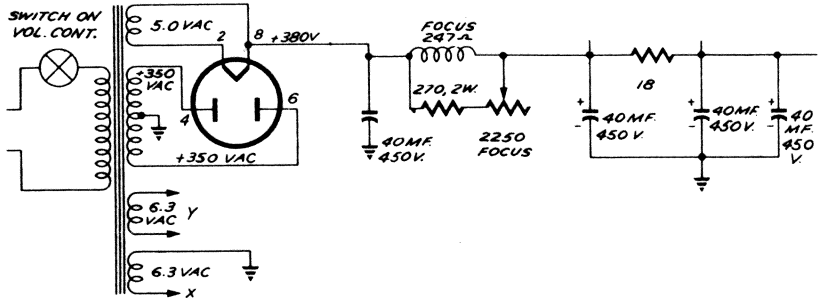
Should be more than 20,000 ohms, with short will be less.

Lowest reading may be zero, or just a few ohms.

With ohm meter at cathode remove rectifier tube.

Remove all parts connected to this point and check for short.

If low reading now increases rectifier tube is bad.



Short in focus control, yoke, or filter capacitor are common.

If no effect is noticed move meter to far side of filter choke.

Follow path of least resistance to locate bad part.

Resistance will probably go down. If it increases check input filter.

4

Voltage output from a set with seleniums is about 265v.

If the output voltage is normal trouble is elsewhere.

Make sure that the pix does not have a 60 cycle pull.

Seleniums are half wave rectifiers thus 60 cycle pull.

If pull is noticed with lack of width, check filter cap for open.

With low output voltage, and no pix pull, replace seleniums.

There is no good check for seleniums except replacement.

A LARGE NUMBER OF TV SETS TODAY ARE USING SELENIUM RECTIFIERS AS A MEANS OF OBTAINING THE LOW VOLTAGE. THIS IS A CHEAPER METHOD THAN THE USUAL 5U4G TUBE, AND WITH NORMAL CARE THE SELENIUM RECTIFIER SHOULD LAST THE LIFETIME OF THE SET. IN MOST CASES HOWEVER THE SELENIUM IS MISUSED IN THAT IT IS OFTEN PLACED UNDER THE CHASSIS WHERE THE MOST HEAT IS PRESENT, AND THE MILLIAMP RATING IS AT A MINIMUM. MOST COMMON TROUBLE IS LOW OUTPUT VOLTAGE CAUSING NOT ENOUGH WIDTH

SELENIUM RECTIFIERS

SELENIUM RECTIFIERS ARE MADE BY COATING A PLATE OF IRON WITH A LAYER OF SELENIUM AND PLACING A NUMBER OF THESE PLATES IN SERIES. IF THE CURRENT PASSING THROUGH THE PLATES IS SMALL ENOUGH FOR THE PLATES TO REMAIN COOL THEN THE RECTIFIER SHOULD LAST FOR MANY YEARS. IT IS ALWAYS ADVISABLE TO REPLACE A SELENIUM RECTIFIER WITH A LARGER CURRENT RATING THAN WAS USED IN THE SET, IF THE SPACE IS AVAILABLE, THAT IS, FOR EXAMPLE, A 250 MA CAN BE REPLACED WITH A 300 MA.

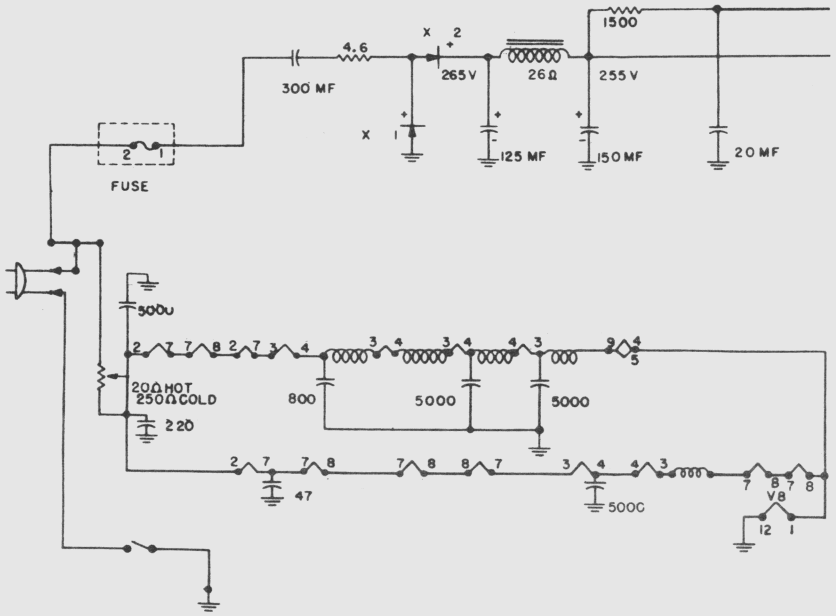
Side of selenium marked + is the cathode.

Replace both seleniums to be safe.

Try to replace with larger milliamp rating.

If there is no B + and seleniums are normal.

Replace electrolytic cap. in series with AC line.



4

With set on check to see if tubes are lit.

If tubes are not lit then trouble is in the Ac input.

Plug may be broken, line may have open. (fuse)

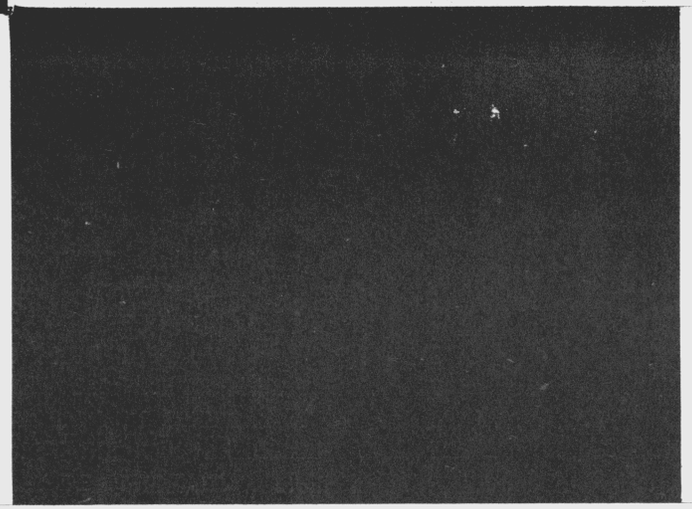
Switch contacts may be bad so jump switch.

Transformer may be bad, check resistance of windings.

In series filament set check all tube filaments.

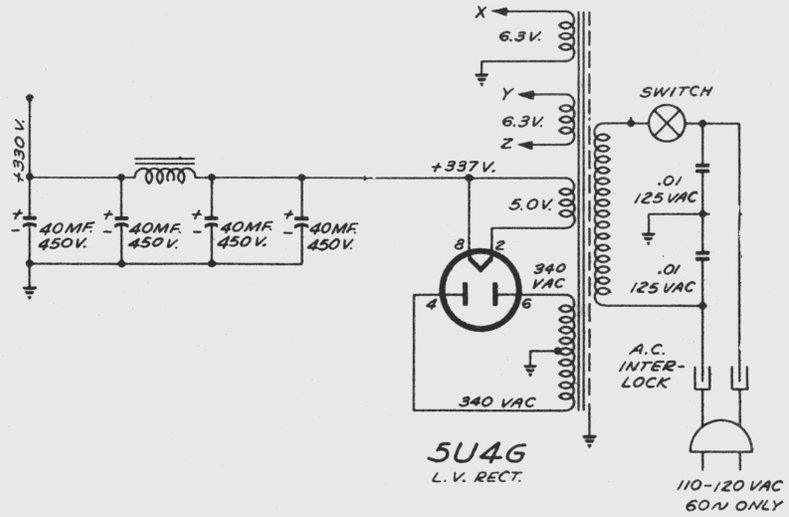
If all tubes light, check fuse, replace rectifier.

WHEN A TV SET HAS NO RASTER PIX OR SOUND THEN THE TROUBLE IS IN THE AC INPUT CIRCUIT OR THE B + CIRCUIT. MOST COMMON IS THE B + LINE SINCE IT FEEDS ALL OF THE CIRCUIT AND SO MUCH STRESS IS PLACED ON IT. IF THE TROUBLE IS IN THE AC LINE THEN A BAD PLUG OR BREAK IN THE LINE CORD IS USUALLY THE FAULT. SOME TIMES WE FIND THAT THE ON-OFF SWITCH MAY BE DEFECTIVE. A QUICK WAY TO TELL IF THE TROUBLE IS IN THE AC LINE IS TO SEE IF THE TUBES LIGHT, IF THEY DO THEN THE TROUBLE IS NOT IN THE AC CIRCUIT.



NO PIX,
RASTER, SOUND

IF THERE IS AN OPEN IN THE AC INPUT CIRCUIT TO THE TV SET THEN OF COURSE THERE WILL BE NO RASTER OR SOUND. ALSO IF THE B + LINE IS OPEN IN ONE WAY OR THE OTHER THEN THE SAME CONDITION WILL RESULT. THE RECTIFIER TUBE ITSELF IS THE MOST COMMON DEFECT UNDER THESE CONDITIONS. WITH THE NEW SERIES FILAMENT SETS ON THE MARKET IF ONE OF THEM OPENS THEN WE WILL HAVE ALL THE TUBES OUT BECAUSE THE FILAMENT CIRCUIT WILL NOW BE OPEN.



May be short in B + line. Check Chart No. 44.

Measure B +, if normal or high suspect open in B + .

Follow B +, along line until no B +.

Open filter choke or speaker field.

If no B+ and tube is good check transformer.

2

Replace all sound tubes.

Touch finger on center tap of volume control.

If a buzz is heard trouble is in IF.

Use a sig. gen. at a little less than IF frequency.

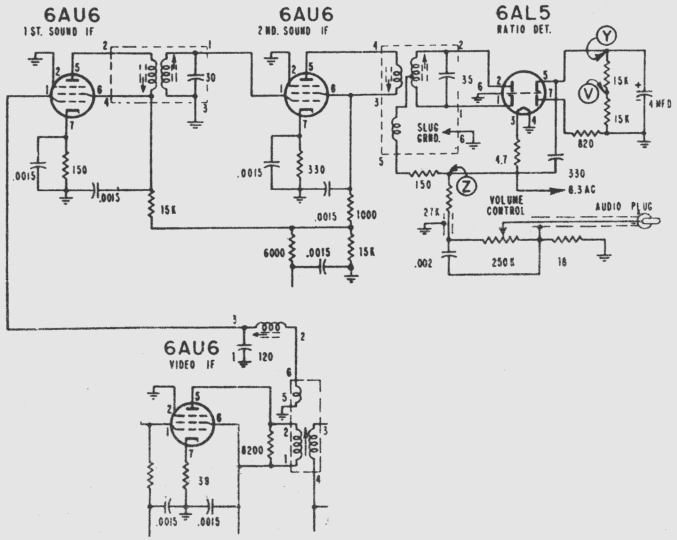
Feed it to grid of IF amp. Modulated signal.

If no Tone in speaker take voltage and resistance check of IF and DET.

Trouble must be between IF grid and volume control.

WITH NO SOUND IN A TV SET THE TROUBLE IS LIMITED TO THE SOUND CIRCUIT ONLY. TUBES SHOULD BE CHECKED FIRST AS THEY ARE THE MOST COMMON TROUBLE. THE CHECKS THAT ARE USED ON A RADIO CAN BE APPLIED AT THIS TIME, SUCH AS TOUCHING THE CENTER TAP OF THE VOLUME CONTROL AND LISTENING FOR A BUZZ FROM THE SPEAKER. REMOVING THE OUTPUT TUBE AND LISTENING FOR A CLICK, ETC. IF THE TROUBLE IS BEFORE THE DETECTOR THEN A GENERATOR MUST BE USED TO LOCALIZE THE TROUBLE.

NO SOUND



THE SOUND CIRCUIT IN A TV RECEIVER IS TAKEN OFF EITHER BEFORE OR AFTER THE VIDEO DETECTOR, IN MODERN SETS IT USUALLY IS AFTER THE DETECTOR. FROM THIS TAKE OFF POINT IT IS FED TO AN I.F. AMP. AND THEN FED TO A SOUND DETECTOR, THIS MAY BE A RATIO DET. OR A DISCRIMINATOR. AFTER DETECTION THE SOUND IS APPLIED TO THE AUDIO AMP CIRCUITS, WHERE IT IS AMP AND PASSED TO THE LOUD SPEAKER. WITH NO SOUND THE TROUBLE CAN BE AT ANY POINT FROM THE SOUND TAKE OFF ON.

If Tone, move gen to sound take off if no tone check Circuit.

If no buzz at tap of volume control Audio amps are bad.

Take voltage of amp circuit and resistance check.

Output transformer or speaker may be open.

2

Replace all sound tubes.

Measure all plate and screen voltages on sound tubes.

Measure bias on audio amp tubes.

Audio output should have 8-12 volts bias.

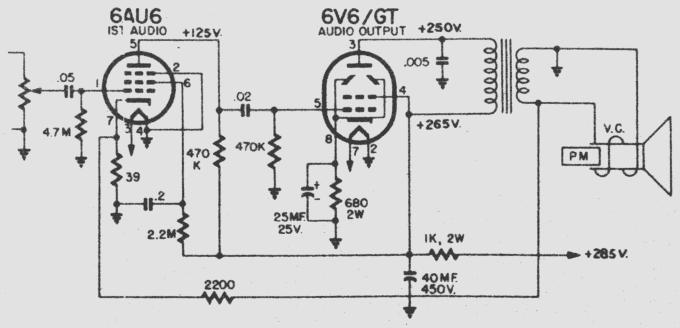
First audio amp. should have almost zero bias.

If bias is way off check coupling cap for leakage.

Also check cathode resistor for change in value.

DISTORTION IN THE SOUND CIRCUITS OF A TV RECEIVER ARE THE SAME TROUBLES THAT CAUSE DISTORTION IN RADIO. THE ONLY DIFFERENCE IN THIS CASE IS THAT MANY TIMES THE DISTORTION IS DUE TO POOR ALIGNMENT. LEAKY COUPLING CAPACITORS AND BAD TUBES ARE BY FAR THE MOST COMMON TROUBLES HOWEVER AND SHOULD BE CHECKED. LOCAL OSCILLATOR ADJUSTMENTS MIGHT BE TRIED FIRST IF THEY ARE KNOWN BECAUSE THE TUNER MAY BE 'JUST' A LITTLE OUT OF ADJUSTMENT. THE FINE TUNING MAY TELL YOU THIS IF VARIED.

D I S T O R T I O N



DISTORTION WILL OCCUR IN THE SOUND CIRCUIT OF TV WHENEVER THE SOUND SIGNAL PASSES THROUGH A TUBE THAT HAS THE WRONG BIAS ON IT THIS WILL HAPPEN MOST OFTEN IN THE AUDIO AMP CIRCUIT SINCE THE BIAS ON THESE TUBES IS FAIRLY CRITICAL. IF THE IF CIRCUITS ARE OUT OF ALIGNMENT IT IS POSSIBLE THAT DISTORTION WILL OCCUR, HOWEVER IN MOST CASES POOR ALIGNMENT WILL CAUSE A BUZZ TO APPEAR IN THE SOUND. TUBES ARE THE MOST COMMON CAUSES OF THIS TROUBLE.

Keep in mind that the speaker may be bad.

If voltage of audio amp is o.k. check into I.F. circuits.

In the I.Fs check plate resistors and cathode circuit.

If all the above checks are normal then align sound I.F.

If trouble still present align video I.F.

Replace all sound, video I. F. and front end tubes.

If 6BN6 is sound det. adjust buzz control on rear panel.

If buzz varies as vert. hold is moved check shielding of sound wiring.

Contrast may be set too high causing buzz.

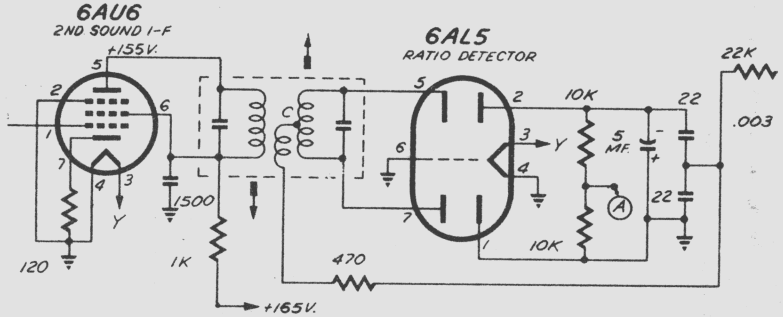
Make sure buzz is on all channels if not, transmitter may cause buzz.

Adjust L.O. to see if buzz fades out.

Measure a. g. c. voltage at video I.F. grids.

MANY TIMES IN A TV SET A BUZZ WILL BE HEARD IN THE SOUND. THERE ARE MANY CAUSES OF THIS CONDITION RANGING FROM ALIGNMENT TO TROUBLES AT THE STATION. CERTAIN STEPS MUST BE TAKEN TO LOCALIZE THIS TROUBLE TO ONE PARTICULAR STAGE OR CIRCUIT. IN THIS CASE THE FRONT PANEL CONTROLS ARE A GREAT HELP. FOR EXAMPLE IF THE VERTICAL HOLD CONTROL IS VARIED AND THE BUZZ INCREASES OR DECREASES IN PITCH, THEN THE TROUBLE IS RADIATION FROM THE VERTICAL CIRCUIT.

BUZZ



BUZZ IN THE SOUND HAS TWO COMMON CAUSES. ONE IS THE VIDEO IF TUBES BEING DRIVEN TO CUTOFF BY THE SIGNAL WHICH WOULD INDICATE SOME A. G. C. TROUBLE. THE OTHER BEING POOR ALIGNMENT WHICH WILL INTRODUCE A BUZZ IN THE SOUND SIGNAL. SOME CASES OF RADIATION FROM THE VERTICAL OUTPUT XFMR FEEDING INTO THE AUDIO AMPLIFIERS HAVE BEEN ENCOUNTERED BUT THIS IS NOT A COMMON TROUBLE. SOME OF THE TV SETS HAVE A BUZZ CONTROL ON THE BACK PANEL THESE SETS USE A 6BN6 AS A SOUND DETECTOR.

Should have -3-6 volts a. g. c.

If a. g. c. is low say zero or 1 volt refer to Chart No. 19.

With normal a. g. c. replace electrolytic at ratio det.

If ratio det. is not used or electrolytic is good, align sound.

If sound will not align replace Detector transformer.

If sound alignment does not help align Video IF.

2

Adjust fine tuning and local osc.

SOUND IN THE PICTURE CAN BE RECOGNIZED BY THE BARS THAT APPEAR IN THE PIX AS THE SOUND IS BEING HEARD IN THE SPEAKER. IN A NUMBER OF CASES THE SOUND BARS WILL APPEAR AS THE VOLUME CONTROL IS INCREASED. OTHER CASES WILL SHOW SOUND BARS WITH JUST A VERY LOW SETTING OF THE VOLUME. BOTH CASES HOWEVER INDICATE THAT THE SOUND IS BEING PICKED UP IN THE VIDEO AMPS AND BEING PASSED TO THE C.R.T. THE TROUBLE ITSELF SHOULD NOT BE CONFUSED WITH 4.5 MC INTERFERENCE WHICH SHOWS UP AS A FINE GRAIN PATTERN ON THE SCREEN.

SOUND BARS IN THE PIX

SOUND BARS IN THE PIX ARE CAUSED BY THE SOUND BEING PICKED UP IN THE VIDEO STRIP. MOST LIKELY CAUSE OF THIS IS AN OPEN FILTER CAPACITOR IN THE B+ LINE THAT FEEDS THE AUDIO STRIP. THE POOR FILTERING THAT RESULTS WILL CAUSE THE SOUND TO FEED THROUGH INTO THE PIX. ANOTHER CAUSE OF THIS TROUBLE IS POOR ALIGNMENT IN THE SOUND CIRCUIT OR IN THE SOUND TRAPS THAT ARE LOCATED IN THE VIDEO STRIP. MISALIGNMENT OF THE LOCAL OSCILLATOR WILL ALSO GIVE SOUND BARS IN THE PIX.

Bridge all filters if not sure which are in audio strip.

Microphonic tube in front end may cause this. Replace tuner tubes.

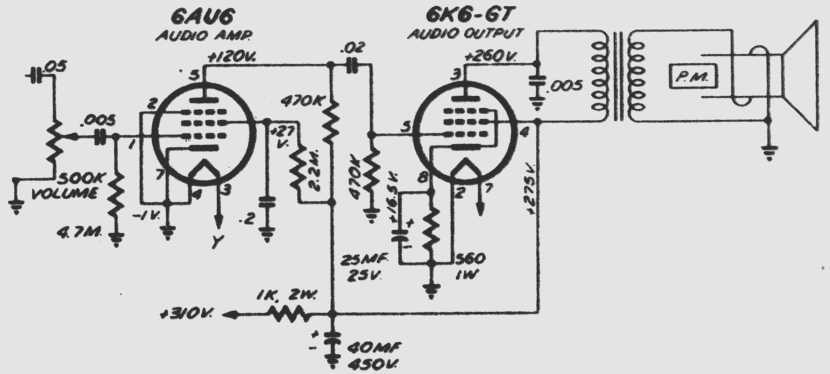
If filters check okay align sound circuit.

If sound traps are used adjust them slightly.

If sound bars change, then continue to adjust traps.

If no change noticed traps are okay.

Bridge all filter capacitors in the audio strip.



Filter below audio output transformer most likely open.