1. WHEN VERTICAL RASTER IS TOO SMALL, CHECK FOR:
(a) Shorted G6L7 vertical amplifier tube, located on picture chassis. CAUTION: Always turn receiver off before removal of this tube or damage to resistors and condensers in this circuit by high voltage may occur.
(b) Weak G6N7 vertical oscillator tube located on picture chassis.

2. WHEN VERTICAL RASTER IS TOO SMALL, WITH BRIGHT LINES OR BARS EITHER ON TOP OR BOTTOM, OR BOTH TOP AND BOTTOM OF RASTER (ALSO MAY OR MAY NOT FOCUS), CHECK FOR:
(a) 4.7 megohm resistors R23 and R26 in the plate circuits of the G6L7 vertical amplifier tube on the picture chassis either open or higher than normal value. Replace with high voltage type resistor only - part number 27E107.
(b) See section 4 (a)
(c) Shorted 1.0 Mfd. 600 Volt condenser C13 in plate circuit of the G6L7 vertical amplifier tube on the picture chassis.
(d) Defective G6N7 vertical oscillator tube on picture chassis.
(e) Defective G6L7 vertical amplifier tube on picture chassis.
(f) Shorted .0 Mfd. or .001 Mfd. condenser C-21 located on picture chassis. Always replace with .0 Mfd. 200 volt condenser --- part number 23822C.
(g) Shorted picture tube 7J9.

3. WHEN HORIZONTAL RASTER IS TOO SMALL, CHECK FOR:
(a) Weak G6N7 horizontal oscillator tube on picture chassis.
(b) Weak G6N7 horizontal amplifier tube on picture chassis.
(c) 100,000 ohm resistors R2 and R5 in plate circuits of G6N7 horizontal oscillator tube on picture chassis open or higher than normal in value. Replace with high voltage type resistor only - part number 27E104-5.
(d) Add 10 MFD condenser in parallel with the 72 MFD condenser C24 which is across the medium high voltage winding located on the high voltage coil L inside shield can on picture chassis.
(e) Open or shorted 10 MFD condenser in parallel with the 72 MFD condenser C-24 which is across the medium high voltage winding located on the high voltage coil L inside shield can on the picture chassis.
(f) Open or high resistance 1 megohm resistor R10 in the plate circuit of the G6N7 horizontal oscillator tube on picture chassis.

4. WHEN PICTURE CANNOT BE BROUGHT IN FOCUS WITH FOCUS CONTROL BUT RASTER, PICTURE AND SOUND APPEAR NORMAL, CHECK FOR:
(a) 4.7 megohm resistors R58 and R59, connected in series in the high voltage divider from the horizontal centering control to the focusing control on the picture chassis, either open or higher than normal in value. Always replace both resistors and use four 2.4 megohm resistors in series of the high voltage type resistor only - assembly part number A27E107-2.
(b) 4.7 megohm resistors R23 and R24 in the plate circuits of the G6L7 vertical amplifier tube on the picture chassis either open or higher than normal in value. Replace with high voltage type resistor only - part number 27E107.

5. NO MASTER BUT SOUND NORMAL, CHECK FOR:
(a) Shorted or open picture tube - 7J8.
(b) Shorted or open 6Y6G high voltage oscillator tube located along the side of the high voltage shield compartment on picture chassis.
(c) Open high voltage oscillator coil L1 located inside shield compartment in high voltage unit on picture chassis.
(d) Shorted Service H.V. Filter J1 consisting of the 750 MFD condensers C-22A, C-22B and the 100,000 ohm resistor R-42 inside the high voltage shield compartment on the picture chassis.
(e) Shorted .001 Mfd. 6000 volt coupling condenser C-1 or C-3 in G6N7 horizontal amplifier plate circuit in picture chassis.
(f) Defective 8013/130T H.V. rectifier tube inside shield compartment on picture chassis.
(g) High voltage breakdown between chassis and high voltage leads caused by wires being dressed too close to chassis.

6. NO MASTER BUT THIN VERTICAL LINE IS VISIBLE ON SCREEN, CHECK FOR:
(a) Shorted .001 Mfd. 6000 Volt condenser C5 between pin 4 of the G6N7 horizontal amplifier tube and the single tie lug on the picture chassis. ALWAYS REPLACE with .01 Mfd. 3000 Volt condenser, part number 23E121.
(b) Defective G6N7 horizontal oscillator tube on picture chassis.
(c) Defective G6N7 horizontal amplifier tube on picture chassis.

7. NO MASTER BUT THIN HORIZONTAL LINE IS VISIBLE ON SCREEN, CHECK FOR:
(a) Improper setting of Vertical Size Control.
(b) Defective G6N7 vertical oscillator tube on picture chassis.
(c) Defective G6N7 vertical amplifier tube on picture chassis.

8. WHEN BOTH VERTICAL AND HORIZONTAL RASTER SIZE IS SMALL ON INTERMITTENTLY SO, TOP AND BOTTOM CURVE IN TOWARD MIDDLE, WILL NOT FOCUS AND BARS APPEARS TO BE BELOW IN COLOR, CHECK FOR:
(a) Shorted or intermittently shorted picture tube - 7J9.

9. MASTER AND PICTURE NORMAL, BRILLIANCE VERY LOW, INCREASING BRIGHTNESS CONTROL PRODUCES NEGATIVE PICTURE, CHECK FOR:
(a) Weak picture tube - 7J9.

10. MASTER STILL BRIGHT WITH BRIGHTNESS CONTROL AT MINIMUM POSITION (PICTURE MAY OR MAY NOTTurn NEGATIVE WITH BRIGHTNESS CONTROL ADVANCED TO MAXIMUM POSITION), TUNE FOR:
(a) Defective picture tube - 7J9.

11. NO PICTURE OR WEAK PICTURE, SOUND WEAK OR NO SOUND, CHECK FOR:
(a) Weak or dead 12AQ7 oscillator tube on tuner chassis.
(b) Weak or dead 6866 R.F. amplifier tube on tuner chassis.
(c) Weak or dead 6A01 modulator tube on tuner chassis.
(d) Weak or dead 6AQ5 video I.F. amplifier tube on tuner chassis.
(e) Weak or dead 6AG7 video detector tube on tuner chassis.
(f) Weak or dead 6A06 video amplifier tube on tuner chassis.
(g) Intermittent contact between eyelet holding switch contact to wafer and switch contact of channel switch assembly in H.F. tuner unit. NOTE: Caution should be used in soldering eyelet to contact - too much applied heat may damage switch assembly.
(h) Open fuse in picture chassis.
12. NO PICTURE OR SOUND AND SET SMOKE, OR PICTURE AND SOUND INTERMITTENT, CHECK FOR:
   (a) Unused ground contact at the third I.F. amplifier socket under the I.F. plate choke L8 on tuner chassis, cutting in to the choke.
   (b) Shorted .005 mfd. condenser C26 in modulator tube plate circuit in tuner chassis.
   (c) Shorted tube in tuner or picture chassis.(d) Shorted .005 mfd. or 680 mfd condenser in R.F. tuner unit.
13. WHEN PICTURE WILL NOT LOCK EITHER HORIZONTALLY OR VERTICALLY, OR
   LOCKING IS VERY CRITICAL, CHECK FOR:
   (a) Defective 6AU6 sync separator tube in tuner chassis.
14. WHEN PICTURE WILL NOT LOCK VERTICALLY; VERTICAL HOLD CONTROL LOCKS
   VERY BROADLY; PICTURE LOCKS VERTICALLY BUT TWO SEPARATE PICTURES ARE
   VISIBLE (JUMPS AT 120 CYCLES), OR TOP HALF OF PICTURES AND BOTTOM
   HALF OF PICTURE ARE SUPERIMPOSED, CHECK EACH OTHER (LOCKING AT 10 CYCLES), CHECK FOR:
   (a) Defective 6SN7 vertical oscillator tube in picture chassis.
15. BAND SWITCH STICKS ON ANY CHANNEL:
   (a) One of the oscillator trimmer adjustment screws on the channel
   selector switch in the tuner unit at the front of the tuner
   chassis may be out too far and may be hitting the stop arm on
   the channel switch.
16. RASTER AND PICTURE NORMAL, NO SOUND, CHECK FOR:
   (a) Defective 6AB6 audio output tube on tuner chassis.
   (b) Defective 6Q7 audio amplifier tube on tuner chassis.
   (c) Defective 6AL5 sound detector tube on tuner chassis.
   (d) Defective 6AU6 sound I.F. amplifier tube on tuner chassis.
   (e) Defective component in sound section in tuner chassis.

The following changes have been made in Models 400 TV and 405TV, as shown in SEMINAR PAGES 2-1 through 2-13.

1. CIRCUIT DIFFERENCES
   (a) Resistor R7 in plate circuit of 12AT7 oscillator tube in tuner
   chassis section of circuit diagram marked 60,000 ohms should
   read 6,8000 ohms.

2. TO PREVENT PICTURE SPEARING WHEN BRIGHTNESS AND CONTRAST CONTROLS
   ARE ADJUSTED TOO FAR
   (a) The 2.2 megohm resistor R51 in the H.V. bleeder circuit in the
   picture chassis has been removed and a direct connection made
   between the two points in the set to which this resistor was
   connected.

3. TO INCREASE THE RANGE OF THE VERTICAL HOLD CONTROL
   (a) The part number 19637, 500,000 ohm Vertical Hold Control R46
   has been changed to a 1 megohm control in the picture chassis,
   and the new part number is 28E36.

4. TO IMPROVE PERFORMANCE FOR LOCKING ON BOTH HORIZONTAL AND VERTICAL:
   (a) The .25 mfd. condenser C-43 by-pass in the A.C. circuit in the
   tuner chassis has been changed to a 1.0 mfd. 250-volt condenser,
   part number 23ES26.

5. TO IMPROVE THE VERTICAL LINEARITY, THE 6SN7GT VERTICAL OSCILLATOR
   CIRCUIT, SHOWN IN FIG. 1, HAS BEEN CHANGED AS SHOWN IN FIG. 2.
   (a) Note that condensers C15, 1 Mfd., C16, .15 Mfd., resistors R20
   100,000 ohms, and R18 100,000 ohms were eliminated. Condenser
   C12, .1 Mfd., and R11 500,000 vertical size control are returned
   to ground, and a .03 Mfd. condenser C32, part number 23ES34 has
   been added. The value of the vertical linearity control R41 has
   been changed to 500,000 ohms, part number 28E37.
SERVICE BULLETIN TV-109

6. TO INCREASE THE AMOUNT OF VERTICAL SYNC VOLTAGE
(a) The 4700 ohm resistor R24, located in the sync separator output circuit on the tuner chassis has been changed to a 10,000 ohm resistor, part number 27E201.

7. TO PREVENT TURNOVER OF EXTREME TOP OF PICTURE - (indicated by top portion of center vertical lines of test pattern curving to left.)
(a) The 470 ohm resistor R6 in the input circuit of the horizontal oscillator on the picture chassis has been replaced with a 820 ohm resistor, part number 27E821.
(b) The .005 MF4, mica coupling condenser C5 in the input circuit of the horizontal oscillator on the picture chassis has been replaced with a 220 MF mica or ceramic, part number 23E641.
(c) The 12,000 ohm resistor R7 in the input circuit of the horizontal oscillator on the picture chassis has been replaced with a 4700 ohm resistor, part number 23E741.

8. TO PREVENT PICTURE WIDTH CHANGING WITH AN INCREASE IN AMBIENT TEMPERATURE
(a) The 1 megohm resistor R10 in series with the horizontal size control on the picture chassis has been replaced with a 1 megohm, 2 watt, resistor, part number 27G105-5.

9. TO ELIMINATE TOO BROAD PEAKS IN THE SOUND I.F. TRANSFORMER TS4, in the tuner chassis, caused by variations in 6AU6 tube in the sound I.F. amplifier circuit.
(a) The 60 ohm resistor R51 in the cathode circuit of the 6AU6 sound I.F. amplifier tube on the tuner chassis has been changed to a 180 ohm, 1/3 watt, resistor, part number 27E821.

SERVICE BULLETIN TV-110

1. TO PREVENT PICTURE TEARING AT THE TOP AND TO INCREASE THE STABILITY OF THE HORIZONTAL OSCILLATOR CIRCUIT; THE FOLLOWING CHANGES HAVE BEEN MADE IN CURRENT MODELS 400 TV AND 60STV.
(a) The .001 MF ceramic condenser C-2 in the Horizontal Oscillator Circuit connected across the socket to pins 2 and 5 in the picture chassis has been changed to a special .001 MF ceramic ±5% 500V, Zero temperature coefficient condenser, part number 23E3.
(b) The 220,000 ohm resistor R-3 in the Horizontal Oscillator Circuit connected between pin 1 on the tube socket and the center lug of the Horizontal Hold Control in the picture chassis has been changed to a special 220,000 ohm ±5% 1/3 W. resistor, part number 27-Z1009-17.
(c) The 660,000 ohm resistor R-15 in the Horizontal Oscillator Circuit connected between the electrolytic C-27 and the lug on the Horizontal Hold Control in the picture chassis has been changed to a special 660,000 ohm ±5% 1/3 W. resistor, part number 27-Z1009-18.
(d) The 33,000 ohm resistor R-16 in the Horizontal Oscillator Circuit connected between the lug on the Horizontal Hold Control and ground in the picture chassis has been changed to a special 33,000 ±5% 1/3W. resistor, part number 27Z1009-18.

2. ALSO AS AN AUDIBILITY AND TO PREVENT PICTURE SPEARING
(a) The 470,000 ohm resistor R-34 in the A.G.C. Circuit, which is connected to the R.F. tuner unit and the second lug (ground lug) on the tie lug strip in the center of the tuner chassis, has been removed.
(b) The .25 MF condenser C-13 by-pass in the A.G.C. Circuit and connected to the tie lug strip near the 6AL5 Video Detectors Tube in the tuner chassis has been charged to a 1.0 MF 200 V. condenser part number 23E226.

SERVICE BULLETIN TV-105

To prevent component damage should a "H" short develop in the 400 TV or 60STV receivers, a 1/4 ampere 250 volt fuse is being used in series with the filter choke, in present production of these models.

To provide this protection in those receivers that were shipped from the factory without the fuse, we recommend that you add the fuse whenever such a receiver is serviced. Diagram below shows where to locate and how to connect the fuse assembly.

A fuse assembly kit consisting of the fuse, terminal strip and self-tapping mounting screw is available directly from Sentinel Radio Corporation's Service Department.

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## TUNER CHASSIS AND MISC. PARTS LIST

### R.F. TUNER UNIT

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<th>Part No.</th>
<th>Description</th>
<th>Number of Items</th>
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<tr>
<td>C-43</td>
<td>Fixed Paper, 1.0 MFD 200 V.</td>
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<td>C-44</td>
<td>Fixed Paper, 0.5 MFD 400 V.</td>
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<tr>
<td>C-46</td>
<td>Fixed Paper, 0.1 MFD 400 V.</td>
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<tr>
<td>C-47</td>
<td>Fixed Paper, 0.2 MFD 500 V.</td>
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<td>C-49</td>
<td>Fixed Paper, 0.25 MFD 500 V.</td>
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<td>C-50</td>
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### MISCELLANEOUS PARTS

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### PICTURE CHASSIS AND CABINET MISC. PARTS LIST

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### TUNER CHASSIS CAPACITORS

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### COILS AND TRANSFORMERS

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<td>L-2</td>
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<td>L-3</td>
<td>R.F. Choke, Filter</td>
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<td>L-4</td>
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### CABINET MISC. PARTS

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