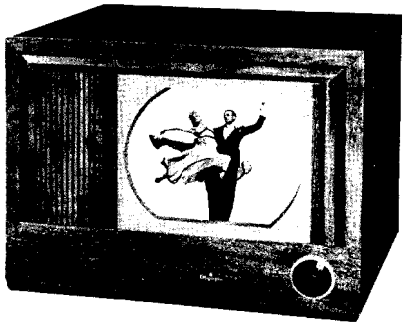
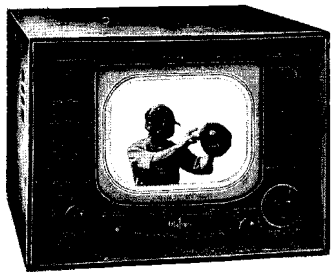
Cruzair



THE BEVERLY Model TV944

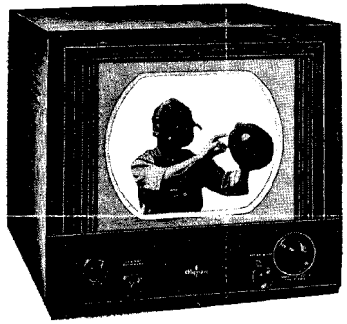
Pacemaker

THE PLAZA
Model TV945



Challenger

THE DELUXE TEN
Model TV922L



Champion

OLYMPIC TELEVISION RECEIVERS

Models TV-104; TV-105; TV-106; TV-107; TV-108; TV-922L; TV-944; TV-945; TV-946.

During the course of production of the above models several circuit changes have been incorporated from time to time and the circuit diagrams accompanying these instructions apply to the serial numbers as shown in the table below. The circuit applicable to these receivers can also be readily determined by the type of tuner, number of sound I-F stages and whether same is provided with a sensitivity switch located at the rear of the chassis.

MODEL NO.	SERIAL NUMBERS	TUNER	SOUND I-F STAGES	SENSITIVITY SWITCH	CIRCUIT DIAGRAM	TUBE LAYOUT CHART
TV-922	E-1000 to E-10,000 inc.	CL-1428 CL-1633 CL-1677	2	NO	DG-1563	LB-1565-1
TV-922L; TV-944; TV-945; TV-104; TV-105.	E-10,001 to E-13,499 inc.	CL-1677	3	NO	DG-1716	LB-1717-2
TV-922L; TV-944; TV-945; TV-946; TV-104; TV-105; TV-108	E-13,500 to E-26,000 inc.	CL-1677	3	NO	DG-1716-1	LB-1717-2
TV-106; TV-107; TV-108.	E-30,000 & over	CL-1677	3	YES	DG-1716-2	LB-1717-2
TV-944; TV-945; TV-946	F-50,000 & over	CL-1677	3	YES	DG-1716-2	LB-1712-2

Part CL-1428 is the RCA KRK2 tuner using 3 - 6J6 tubes
Part CL-1633 is the General Instrument Tuner using 3 - 6J6 tubes
Part CL-1677 is the Standard Coil Turret tuner using 1 - 6J6 and 1 - 6AG5 tubes

The above models are twenty-two tube direct viewing television receivers using picture tubes as shown below:

MODEL NO.	CABINET	FM SPEAKER	PICTURE TUBE NUMBER	PICTURE TUBE SIZE
TV-104	Table Model	4" x 6"	10BP4	10"
TV-105	Console	8"	10BP4	10"
TV-106	Table Model	5"	10BP4	10"
TV-107	Table Model	5"	10BP4	10"
TV-108	Table Model	5"	10BP4	10"
TV-922	Table Model	4" x 6"	10BP4	10"
TV-922L	Table Model	4" x 6"	10BP4	10"
TV-944	Table Model	6"	12LP4	12 1/2"
TV-945	Console	8"	12LP4	12 1/2"
TV-946	Table Model	5"	12LP4	12 1/2"

Electrical and Mechanical Specifications

Radio Frequency Ranges

Channel Number	Channel Freq. MC	Picture Carrier Freq. MC	Sound Carrier Freq. MC	Receiver RF Osc. Freq. MC
2	54-60	55.25	59.75	81
3	60-66	61.25	65.75	87
4	66-72	67.25	71.75	93
5	76-82	77.25	81.75	103
6	82-88	83-25	87.75	109
7	174-180	175.25	179.75	201
8	180-186	181.25	185.75	207
9	186-192	187.25	191.75	213
10	192-198	193.25	197.75	219
11	198-204	199.25	203.75	226
12	204-210	205.25	209.75	231
13	210-216	211.25	215.75	237

Power Supply----------105-125 volts 60 cycles 240 watts
Speaker, TV-922L & TV-104----------4" x 6" PM 1.47 oz. Alnico 5
Speaker, TV-944----------6" PM 3.16 oz. Alnico 5
Speaker, TV-945 & TV-105----------8" PM 3.16 oz. Alnico 5
Voice Coil Impedance----------3.2 ohms at 400 cycles
Receiver Antenna Input Impedance---300 ohms balanced

Tube Complement

		FUNCTION
1) 6AG5	(V1)	RF Amplifier
2) 6J6	(V2)	RF Oscillator and Converter
3) 6BA6	(V4)	1st Sound IF Amplifier
4) 6BA6	(V5)	2nd Sound IF Amplifier
5) 6AU6	(V6)	3rd Sound IF Amplifier
6) 6AL5	(V7)	Sound Discriminator
7) 6AT6	(V8)	1st Audio Amplifier and Sync Limiter
8) 6K6GT	(V9)	Audio Output
9) 6AG5	(V10)	1st Pix IF Amplifier
10) 6AG5	(V11)	2nd Pix IF Amplifier
11) 6AG5	(V12)	3rd Pix IF Amplifier
12) 6AG5	(V13)	4th Pix IF Amplifier
13) 6AL5	(V14A & V14B)	Video 2nd Detector & Automatic Gain Control (AGC)
14) 12AU7	(V15)	1st and 2nd Video Amplifier
15) 6SN7/GT	(V17)	Sync Amplifier and Sync Separator
16) 6SN7/GT	(V18)	Vertical Sweep Oscillator
17) 6SN7/GT	(V19)	Horizontal AFC and Horizontal Oscillator Sweep
18) 6BG6/G	(V20)	Horizontal Sweep Output
19) 1B3GT/8016	(V21)	High Voltage Rectifier
20) 6W4GT	(V22)	Damper
21) 5U4G	(V23)	Power Supply Rectifier
22) 10BP4 or 22) 12LP4	(V16)	Kinescope (Picture Tube) on Model TV-922 L, TV-104 and TV-105 Kinescope (Picture Tube) on Models TV-944 and TV-945

The above tube complement prevails with tuner CL-1677. Where tuners CL-1428 and CL-1633 are used, V1 is replaced by a 6J6; V2 functions as a converter only and an additional tube V3 (6J6) is used as an RF Oscillator.

Picture Intermediate Frequencies
Picture carrier frequency---------- 25.75 MC
Accompanying Sound Traps---------- 21.25 MC

Sound Intermediate Frequencies
Sound Carrier frequency ---------- 21.25 MC
Sound Discriminator Band Width (Between peaks) 350 KC

Operating Controls (front Panel)
Channel Selector, Fine Tuning — Dual Control Knobs
Sound Volume and ON-OFF Switch -- Single Control Knob
Horizontal Hold, Vertical Hold — Dual Control Knobs
Background, Contrast — Dual Control Knobs

Non-Operating Controls

Horizontal and Vertical Centering	Three wing nuts on focus coil mounting plate
Width	Rear power supply cage screwdriver adjustment
Height	Rear chassis adjustment
Horizontal Linearity	Rear chassis screwdriver adjustment
Vertical Linearity	Rear chassis adjustment
Horizontal Drive	Rear chassis screwdriver adjustment
Horizontal Oscillator Frequency (Fine)	Rear chassis screwdriver adjustment
Horizontal Oscillator Frequency (Coarse)	Bottom chassis screwdriver adjustment (L14)
Horizontal Locking Range	Rear chassis screwdriver adjustment
Focus	Rear chassis adjustment
Focus Coil	Top chassis wing screw adjustment
Ion trap magnet	Top chassis (on neck of picture tube) adjustment
Deflection Coil	Top chassis wing screw adjustment

ALIGNMENT

Equipment Required

1) RF signal generator to provide the following accurate frequencies. If the accuracy of the generator frequencies is not known, some type of crystal calibrator should be utilized to check the correct settings of the RF generator for each particular frequency.

(a) IF Frequencies

21.25 MC	Sound IF, Sound Discriminator and Sound Traps
21.3 MC	Converter Transformer
22.3 MC	Second Pix IF Coil
23.4 MC	Fourth Pix IF Coil
25.2 MC	Third Pix IF Coil
25.3 MC	First Pix IF Coil
25.75 MC	Picture Carrier

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(b) RF Frequencies

Channel Number	Picture Carrier Freq. MC	Sound Carrier Freq.MC
2	55.25	59.75
3	61.25	65.75
4	67.25	71.75
5	77.25	81.75
6	83.25	87.75
7	175.25	179.75
8	181.25	185.75
9	187.25	191.75
10	193.25	197.75
11	199.25	203.75
12	205.25	209.75
13	211.25	215.75

(c) Output on these ranges should be adjustable and capable of providing at least .1 volt.

2) Electronic Voltmeter
3) Cathode Ray Oscilloscope, 3" minimum screen
4) RF Sweep Generator, meeting the following requirements:

(a) Frequency Ranges
15 to 30 MC., 1 MC. sweep width
40 to 90 MC.,10 MC. sweep width
170 to 225 MC., 10 MC. sweep width

(b) Output adjustable to .1 volt.

The chassis may be removed from the cabinet with the kinescope tube in place and servicing and alignment work can be accomplished without removing the kinescope tube. This work is most conveniently performed by placing the chassis on its left side (power supply cage resting on work bench) and the controls facing the operator

To remove chassis from cabinet remove
(1) Line cord from power outlet
(2) Masonite back
(3) Antenna Lead-in from terminal posts
(4) Speaker plug from rear of chassis
(5) Knobs from front of cabinet
(6) Four mounting screws and washers from bottom of cabinet

In sliding chassis out of cabinet be careful that the kinescope tube does not strike against cabinet or any other obstruction.

Order of Alignment

When complete receiver alignment is necessary it should be performed in the following sequence:

(1) Pix IF traps
(2) Sound IF Transformers
(3) Sound Discriminator
(4) Pix IF coils
(5) Retouch Pix IF Transformers

After removing chassis from cabinet, connect power plug and speaker plug.

If a local station is not operating on channel #9 set the tuner to this channel, turn on power switch and proceed as follows: (If #9 is a local station channel use channel #8 or #10).

Picture I-F Trap Adjustment

Connect hot lead of electronic voltmeter to Pin #7 of V14(A) with meter range switch set to lowest scale and observing polarity for negative readings.

Couple hot lead of RF Signal Generator to converter tube V2 by means of a loop consisting of two turns of insulated hook-up wire. Connect ground lead of RF Signal Generator to chassis.

Note: If the converter tube V2 is shielded - remove same.

Set the generator frequency accurately to 21.25 MC. and adjust L314 converter sound trap located at top of tuner (see tube and trimmer layout drawing) for minimum reading on voltmeter.

Increase generator output to maximum (recheck 21.25 MC. generator setting) and adjust L9 for minimum reading of voltmeter.

Sound IF Transformer Adjustment

Change hot lead connection of electronic voltmeter to terminal marked "C" and sound discriminator transformer. Reduce output of the signal generator to give approximately 2 volts reading on voltmeter scale.

Adjust for maximum reading in order named: L18, L1, L2, and L3.

Sound Discriminator Adjustment

Change hot lead connection of voltmeter to pin #1 of V7 and adjust L4 for zero reading on voltmeter. This zero setting is very critical and the adjustment must be made with extreme care.

Repeat adjustments for L3 and L4 in the same manner indicated above.

Pix IF Coil Adjustment

Connect hot lead of voltmeter to pin #7 of V14(A) and adjust the following slugs for maximum output at frequencies indicated:

L301 ----------21.0 MC.
L5 ----------25.3 MC.
L6 ----------22.3 MC.
L7 ----------25.2 MC.
L8 ----------23.1 MC.

Retouch Pix IF Transformer Adjustment

Disconnect RF signal generator leads and connect hot lead of sweep generator to coupling loop on convertor tube and ground lead to chassis.

Connect vertical input terminal of oscilloscope to pin #7 of V14(A) (Pix Detector) and connect ground lead of scope to chassis.

Connect 1 1/2V flashlight battery with positive terminal to chassis and negative terminal to #2 pin of V14B.

Set tuner to channel 9 unless local station is operating on this frequency, in which case an adjacent channel should be used.

Set sweep generator frequency to IF sweep on the 20 to 30 MC. range.

Adjust sweep generator output to produce a curve on the scope which is approximately 2/3 of the screen diameter.

Loosely couple output of RF signal generator to hot lead of sweep generator and set frequency of RF signal generator to 25.75 MC. (marker).

Curve shown on scope should be similar to the standard response curve shown below. For proper setting of the pix carrier the 25.75 MC. marker should appear on the curve at a point approximately 50% to 60% of the vertical height of the curve.

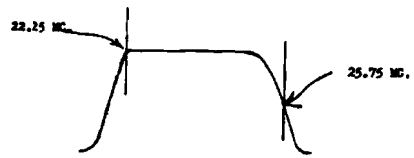
To obtain this setting retouch L5 and L7.

Reset RF signal generator frequency to 22.25 MC. and retouch L301 and L6 for correct positioning of marker on shoulder of curve.

The curve may now be flat topped by retouching L8.

Recheck setting of 25.75 MC. marker to make sure that position has not shifted on curve.

Disconnect bias battery.



Tuner Adjustments for Models Using Tuner Part #CL-1677

Note: Before making a complete tuner adjustment it is essential that the Sound I.F. and discriminator circuits be aligned at their proper frequencies as described above. WHEN CHANGING THE CONVERTER TUBE IT IS NECESSARY TO REALIGN THE OSCILLATOR ADJUSTMENT ON ALL CHANNELS WITH THE V2 TUBE SHIELD IN PLACE.

RF and Converter Alignment

1) Set channel selector switch to #12.
2) Connect oscilloscope through 10,000 ohms to test point on tuner (bare tinned copper loop wire located between V1 and V2)
3) Connect 1 1.2V bias battery. * Set fine tuning control at approximate midpoint of its tuning range. See Note A at bottom of page.
4) Feed sweep generator into antenna terminals, sweeping channel 12.
5) Adjust C301, C302, and C304 for flat top response curve. Check picture and sound carrier markers corresponding to frequencies shown on Page 1 for all respective channels.

* In same manner as described on previous page under "Retouch Pix I-F Trans. Adj."

Oscillator Alignment

1) Set channel selector switch to #12.
2) Connect signal generator to one antenna terminal and ground. Set to sound carrier frequency 209.75 MC.
3) Connect electronic voltmeter to pin #1 of V7 (6AL5) sound discriminator.
4) Adjust C303 for zero reading on electronic voltmeter between a positive and negative peak.
5) Check all channels for zero reading on voltmeter. It is usually not necessary to make any further adjustments. If it is found necessary to touch up the oscillator coils, the following procedure should be observed. Disconnect bias battery.

Oscillator Coil Touch-Up

(a) Center fine tuning control, as described in Note A below.
(b) Place a non-metallic screwdriver through opening, and adjust oscillator coil on channel 12 (L312).
(c) Turn channel selector switch to channel 13 and adjust L313.
(d) This Adjustment can be repeated for all channels or if necessary on any single channel.

Note A - Two types of CL-1677 tuners are used on these models which differ only in the mechanical design of the fine tuning elements. The settings of the midpoint positions differ on each type tuner as follows:

Type 1 - Fine tuning bakelite disc (attached to fine tuning control) located in back of the oscillator slug and adjustment hole. Midpoint of tuning range attained when fine tuning shaft is turned completely counter-clockwise.

Type 2 - Fine tuning bakelite disc (attached to fine tuning control) located in front of the oscillator slug adjustment hole. Midpoint of tuning range attained when bakelite disc faces directly downward.

ADJUSTMENTS

Ion Trap Magnet Adjustment:

Turn the background control fully clockwise and the contrast control fully counter-clockwise. Adjust the ion trap magnet by moving it forward or backward and at the same time rotating it slightly around the neck of the kinescope until the raster on the screen is brightest. Reduce the background control setting until the raster is slightly above average brilliance. Adjust focus coil (rear of chassis) until the line structure of the raster is clearly visible (sharp). Readjust the Ion trap magnet again for maximum raster brilliance. The final touches on this adjustment should be made with the background control at the maximum position with which good line focus can be maintained.

Focus Coil Adjustments:

Adjust three wing nuts in the rear of the focus-coil-mounting-plate so that the plate is approximately parallel to the tube face. Loosen the 3 screws holding the focus coil to the focus-coil-mounting-plate and adjust coil by moving it up and down or to the sides until the picture is approximately centered within the mask - the entire raster visible on the screen and without shadows in the corners. Then retighten these three screws very securely in this position and make all further adjustments to center the picture on the face of the kinescope tube by manipulating the three wing nuts.

Deflection Yoke Adjustment:

If the lines of the raster are not horizontal or squared with the picture mask, loosen the deflection yoke adjustment screw and rotate the deflection yoke until this condition is obtained, and retighten the yoke adjustment screw.

Check of Horizontal Oscillator Alignment:

Obtain a test pattern and turn the horizontal hold control to the extreme counter-clockwise position. The picture should remain in synchronization. Turn channel selector switch OFF and immediately back ON again. Normally, the picture will now be out of synchronization. Turn the control clockwise. The picture will slowly begin to synchronize, and will in one moment pull into synchronization. This should occur when the control is approximately 90 degrees from the extreme counter-clockwise position. It should now remain in synchronization for approximately 90 degrees additional clockwise rotation of the control. At the extreme clockwise position, the picture should again pull out of synchronization and should show from 3 1/2 to 4 1/2 bars sloping downward to the right.

If the receiver passes this test and the picture is normal and stable, the horizontal oscillator is properly adjusted. Skip the "Alignment of Horizontal Oscillator" and proceed with "Focus"adjustment.

Alignment of Horizontal Oscillator:

If in the above test, the receiver fails to hold synchronization with the hold control at the extreme counter-clockwise position or fails to hold synchronization for at least 60 degrees of clockwise rotation of the control from the point of "pull in" it will be necessary to make the following adjustment:

Horizontal Frequency Adjustment:

Turn Horizontal hold control to the extreme clockwise position. Tune in a television station and adjust the "horizontal frequency" trimmer C65 (rear of chassis) until the picture is out of synchronization and shows 3 1/2 to 4 1/2 bars sloping downward to the right. If the trimmer has insufficient range, set the trimmer to mid position (one turn from tight) and adjust the horizontal oscillator coil L14 (consult circuit diagram) until this condition is obtained.

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Horizontal Locking Range Adjustment:
Set the horizontal hold control to the extreme counter-clockwise position. Switch channel selector OFF channel and back.
Slowly turn the horizontal hold control clockwise and note the least number of diagonal bars obtained just before the picture pulls into synchronization. If more than 4 1/2 bars are present just before the picture pulls into synchronization, adjust the "horizontal lock" trimmer C59 (rear of chassis) slightly clockwise. If less than 3 1/2 bars are present, adjust the trimmer slightly counter-clockwise. Turn the contrast control counter-clockwise and switch channel selector OFF channel and back again. Recheck the number of bars at the "pull-in" point. Repeat this procedure until 3 1/2 to 4 1/2 bars are present.
Repeat the adjustments of the horizontal frequency adjustment and horizontal locking range adjustment until the conditions specified above are fulfilled. When the horizontal hold operates as outlined in "Check of Horizontal Oscillator Alignment" the oscillator is properly adjusted.

Height and Vertical Linearity Adjustments:
Adjust the height control on the rear of chassis until the picture fills the mask vertically. Adjust vertical linearity (rear of chassis) until the test pattern is symmetrical from top to bottom.
Adjustment of one control will require readjustment of the other. Then adjust wing nuts on focus coil mounting plate to align the picture with the mask.

Width, Drive and Horizontal Linearity:
Turn the width control L16 (accessible through a hole in the upper right hand corner on the rear wall of the high voltage compartment) to the maximum clockwise position. Adjust the trimmer "Horizontal drive" C69 (rear of chassis) to give the best degree of brightness and linearity. Adjust the horizontal linearity control L15 (rear of chassis) for best linearity. Adjust the horizontal linearity control L15 (rear of chassis) for best linearity of the right half of the picture. Readjust the width control until the picture just fills the mask and again adjust the wing nuts on the focus coil mounting plate to align the picture with the mask.

Focus:
Adjust the focus control (rear of chassis) for maximum definition of the vertical wedge and the test pattern.

CHECK TO SEE THAT YOKE THUMB SCREWS ARE TIGHT.

SERVICE AND TROUBLE SHOOTING PROCEDURE
FOR MODELS TV-922L, TV-944, TV-945, TV-104, and TV-105

HORIZONTAL SWEEP CIRCUIT

1) No Light on CR Tube
(a) Ion trap misplaced. (Very critical). Move trap.
(b) Ion trap de-magnetized. Replace.
(c) CR Socket loose. Check whether CR Filament lights up.
(d) No High Voltage. After checking fuse, check these symptoms:

6SN7 Horizontal Oscillator Tube not oscillating. Determine by measuring pin 5. If +78 volts, tube oscillates. If negative voltage, tube is not oscillating, so that Horizontal Output tube 6BG6 is not excited and HV cannot be developed.
Possible cause of 6SN7 not oscillating:
Defective 6SN7. Replace.
" C64, 180 mmf (at Horizontal oscillator can.) Replace.
" C66, 2200 " " " " " "
" R72, 3.3 Megohms (at tube socket 6SN7).
" R71, 150,000 ohms " " " "
Shorted C59, Trimmer at back of chassis (Horizontal Lock Control). Remove short.

After 6SN7 has been found oscillating, or if oscillation has been restored and still no HV is being developed, check these symptoms:

6BG6 not being driven. Determine by measuring across R84 (1 Megohm between Horizontal Drive Trimmer and Terminal Strip). Drive is sufficient if -5.0 to -7.5 volts. Insufficient drive can be caused by:

Defective C70, 390 mmf (at Horizontal Oscillator Can or Horizontal Drive Trimmer). Replace.
Shorted C59 (Horizontal Drive Trimmer.) Remove short.

After 6BG6 has been found being driven or its drive restored, check whether screen (pin 8) reads +175 volts, grid (pin 5) -93 volts, plate (read return via flyback-transformer at any lug of HV fuse) +330 volts. Low plate reading indicates current consumption of 6BG6 is too high. Replace 6BG6.
Low grid reading indicates shorted or leaky C70 (390mmf). High screen and no plate voltage indicates open flyback-transformer. Hot or burnt out R86 (82 ohms at cathode of 6BG6) indicates usually C70 (390 mmf) shorted or leaky.

After all voltages of 6BG6 have been found correct, and still no HV, replace 1B3-8016 HV rectifier. Do not interchange plate leads for 1B3 (red tracer) and 6BG6 (black tracer).

(e) Brightness control defective. Check how voltage at arm (centerpoint of Brightness control changes with respect to CR tube grid. The latter - measured at peaking coil 120 microhenry (pin 6) 12AU7 video output tube should read +90 volts. The voltage at arm of Brightness control should vary from +100 to +240 volts. If this voltage cannot be brought down to at least +110 volts, CR tube is at cutoff and therefore dark.

PICTURE ON CR TUBE (For "no picture" see under "Video")

(a) Picture appears in duplicate, triplicate or more: Horizontal Frequency too high. If readjusting of Horizontal Lock and Horizontal Frequency Controls or of threaded slug of Horizontal Frequency Can (inside chassis) does not change this condition sufficiently, replace 6SN7, C64 - 180 mmf or C66 - 2200 mmf. In some cases, the Horizontal Frequency Can L14 may have to be replaced.
(b) Picture appears half or less or folded over. Horizontal Frequency too low. Same procedure as under (a).
(c) Picture not wide enough: If adjustment of drive control not sufficient, measure voltage at HV Fuse. If less than +330 volts, horizontal sweep will be insufficient. Replace 6BG6, 6W4GT. Observe all voltages of 6BG6. Check Width Control (at flyback-transformer). Check whether B+ of set is +225 volts and B- 85 volts.
(d) Incorrect horizontal linearity. Linearity coil may have to be shorted out, or shorting bar may have to be removed. Try increasing capacity of C75 (.035 mf) by adding from .05 to .1 mf. Reset drive control.
(e) White vertical line or lines on left side: Damper-circuit not working properly. Replace 6W4GT. Check linearity coil and C74-C75 (.1 and .035 mf). Check setting of drive control.
(f) Black vertical line on left side (when upper channels are being switched in). Barkhausen-effect. Redress plate leads to 1B3 and 6BG6. If no improvement, replace 6BG6.
(g) Horizontal flashes at sides of picture if no outside noise present: 6SN7 horizontal oscillator defective. Replace.
(h) Picture sloping over left or right, or shifting so that black blanking bar, dividing picture, can be seen: See under "Sync circuit".

3) Vertical Sweep Circuit

1) CR Tube shows horizontal line only: No vertical sweep.
(a) Defective 6SN7. Replace.
(b) 6SN7 not oscillating. Determine by measuring plate pin 2. If +14 volts, tube oscillates. If negative voltage, tube does not oscillate.
Symptoms:
Defective C43 4700 mmf ceramic condenser. Replace.
Vertical Hold Control open or shorting against ground.
Vertical Height Control open or shorting against ground.
Blocking Transformer open.

6SN7 oscillating, but still no sweep indicates defective vertical output transformer. Check voltage at pin 5 of 6SN7 for open transformer.
Picture Linearity Incorrect: Check R57 560 ohm at cathode of 6SN7 and Vertical Linearity Control.
Picture Folding on top or bottom: Frequency incorrect. Check R56 1 Megohm, R54 100,000 ohms, C43 4700 mmf.
Picture movement up and down cannot be stopped. See under "Sync Circuit".

4) Sync Circuit

Picture moves in all directions, cannot be stopped: No vertical nor horizontal sync. Symptoms:

(a) Defective 6SN7 Sync amplifier. Replace.
(b) Plate pin 2 should read +140 volts. If higher, ground connection may be loose (tube not drawing current). Pin 5 should read +225 volts. Check whether C41 390 mmf (cathode) leaks.
(c) C36 100 mmf condenser to sync amplifier may be defective. Replace.
(d) 6AL5 (1/2 AGC, 1/2 video detector) defective. Replace
(e) 6AT6 (1/2 1st audio, 1/2 sync limiter) defective. Replace

No Vertical Sync:
(a) Defective vertical hold control.
(b) Sync pulses too weak. Increase contrast. If vertical locks in, but horizontal tears, realign I-F.

No Horizontal Sync:
(a) Check C58 120 mmf coupling Sync Amplifier to Horizontal oscillator
(b) Check C59 Trimmer Horizontal Lock Control
(c) Check C60 120 mmf parallel to Lock Control
(d) Check R89 560,000 ohms
(e) Check C77 5 mmf (in series with R89)

Weak Vertical Sync (slipping):
Sync pulses weak. Check I-F alignment.

Weak Horizontal Sync (picture holds only at very small portion of Hold Control range:
(a) B+ low at output plate (pin 5) of 6SN7 Sync amplifier.
(b) Defective 6AT6 (sync limiter)
(c) Defective C77 5 mmf
(d) Defective C58 120 mmf

Upper edge of picture bends to one side:
(a) Replace C77 5 mmf
(b) Replace C58 120 mmf
(c) Reset L14 (oscillator can)
(d) Reset C55 Horizontal Frequency Control
(e) Reset C59 Horizontal Lock Control

Test Pattern Distorted:
(a) Sync pulses too weak. Realign I.F. Check 6SN7 Sync amplifier voltages. Check for defective 6AT6 (sync limiter).
(b) Sync pulses too strong. Check I.F. Alignment. Check for defective 6AT6 (sync limiter).

Picture does not fall into Sync after change of station:
Reset C55 Horizontal Frequency Control
Reset C59 Horizontal Lock Control

5) Video

Raster on CR Tube, but No picture, no sound

If noise (spots and streaks travelling over tube face) is visible:
(a) Check R.F. Tuner for defective or loose 6J6 oscillator tube.
(b) Antenna-connections.
If sound is audible, but no picture visible:
(a) Check video I.F. for B+ voltages.
(b) Check Video I.F. for defective 6AG5 tubes.
(c) Check for defective 6AL5 detector tube.
(d) Check for defective 12AU7 video output tube.
(e) Check for shorts in I.F. section.
(f) Check for open peaking coils.

Note: Realignment is not always necessary if I.F. tubes are changed. Only in case of greater differences in tute capacities (lack of band width - vertical lines on test pattern not reaching middle at low contrast, or breaking into oscillation - wavy vertical lines or black smudges) realignment should take place. For procedure, see under "Alignment".

Picture gray at full contrast, while neighboring sets show strong black-white pictures in same area:
(a) Check for defective I.F. tube 6AG5.
(b) Check for insufficient B+ in I.F. (100 to 135V with bias battery connected across C18 as indicated on circuit diagram.
(c) Misalignment
(d) Check for defective 6AG5 R.F. tube in Tuner.

Picture smears (letters, etc. having tails to the right)
(a) Check for open peaking coil
(b) Check alignment, especially at 25.2 and 25.3 MC.

6) Sound

If picture appears, but no sound:
(a) Check audio output section (6AT6, 6K6)
(b) Check tubes in Sound I.F.
(c) Check B+ voltages in Sound I.F.

If sound weak: Realign Sound I.F.

If noise comes through at sound peak:
Realign Discriminator Transformer at Zero

If Sound does not coincide with picture:
(a) I.F. Misaligned (b) Tuner

7) Pix I.F. Oscillation
Indicated by reading of approximately -3.0 volts of more at pin #7 of V14 video detector with no signal input. Realign Pix I.F. with 3 volt bias battery instead of 1 1/2 volt battery.

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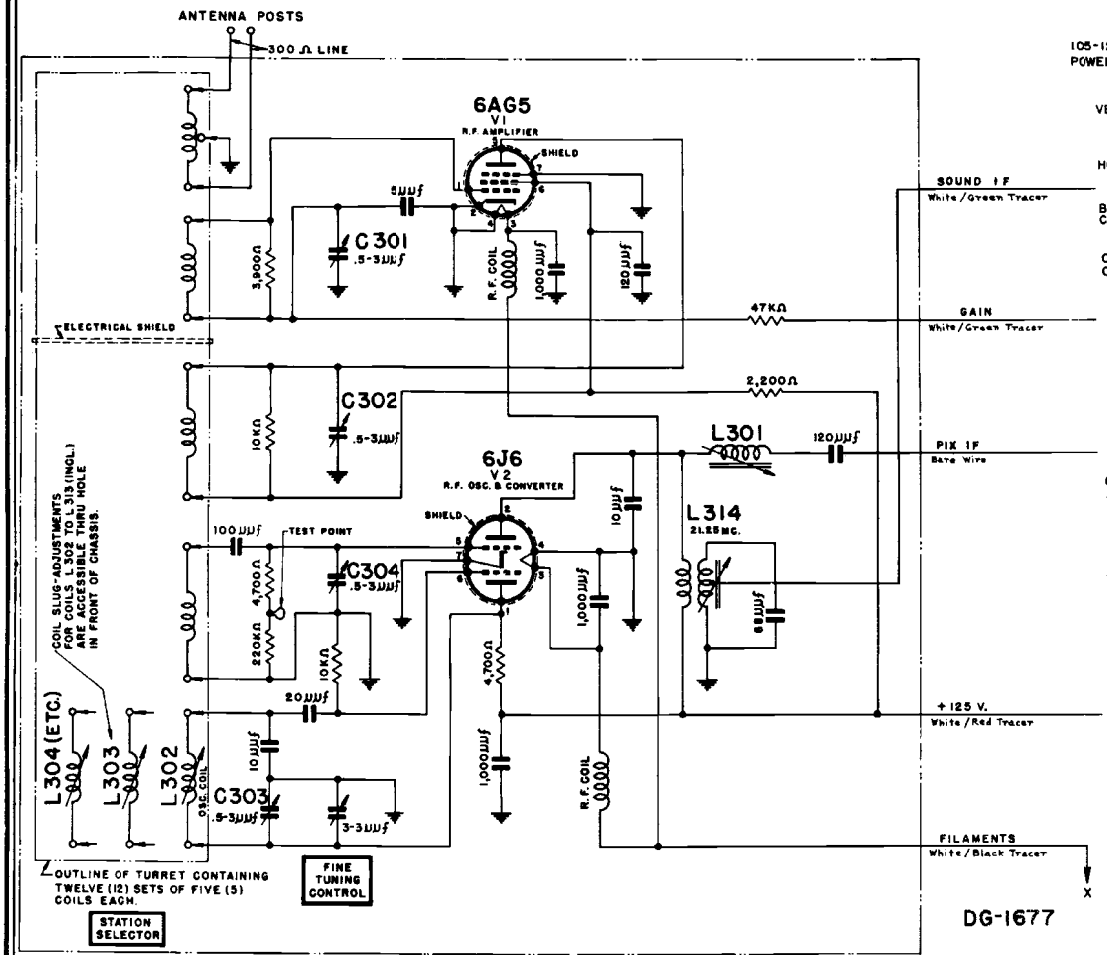
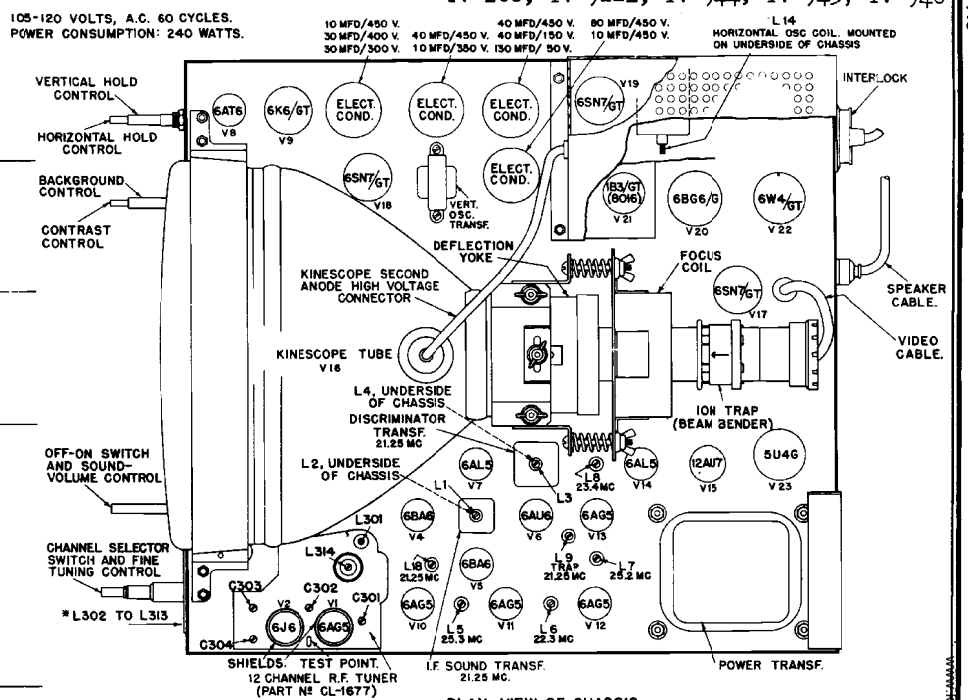
MODELS TV-104, TV-105, TV-106, TV-107, TV-108, TV-922L, TV-944, TV-945, TV-946





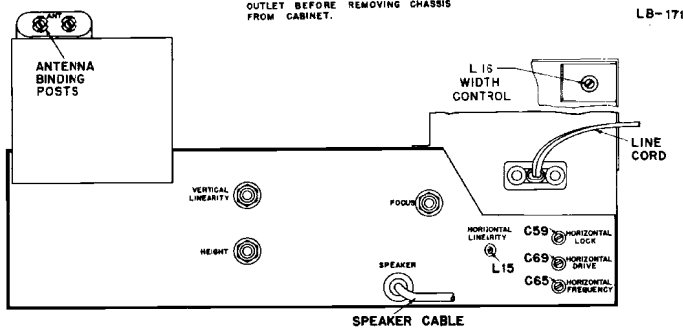
PLAN VIEW OF CHASSIS

* SLUG ADJUSTMENTS L302 TO L313 INCLUSIVE, ARE ACCESSIBLE THRU HOLE IN FRONT OF CHASSIS.

CAUTION

DO NOT USE ON DIRECT CURRENT (D.C.). DISCONNECT LINE CORD FROM POWER OUTLET BEFORE REMOVING CHASSIS FROM CABINET.

LB-1717-2



REAR VIEW OF CHASSIS

RESISTORS

Description	Part Number
8200-35-100 ohm (R67-R68-R69)	RE-150L
1125-610 ohm (R65-R70)	RE-150S
10 ohm±10% 2 watt (R93)	RED100K
39 ohm ±10% 1/2 watt (R21-R25-R29)	RSB390K
47 ohm ±20% 1/2 watt (R14-R85)	REB147M
82 ohm ±10% 1/2 watt (R1)	RSB820K
82 ohm ±10% 1 watt (R86)	REC820K
150 ohm ±10% 1/2 watt (R32-R12)	RSB151K
560 ohm ±10% 1/2 watt (R57-R91-R92)	RSB561K
680 ohm ±10% 1 watt (R61-R62-R63)	REC681K
1000 ohm ±10% 1/2 watt (R44)	RSB102K
1000 ohm ±20% 1/2 watt (R13-R22-R23-R26-R27-R30-R33)	RSB102M
1000 ohm ±20% 1 watt (R11)	REC102M
1200 ohm ±10% 1/2 watt (R2)	RSB122K
2200 ohm ±10% 1/2 watt (R41)	RSB222K
2700 ohm ±5% 1/2 watt (R31)	RSB272J
3300 ohm ±20% 1/2 watt (R59)	RSD332M
3300 ohm ±10% 1 watt (R42)	REC332K
3900 ohm ± 5% 1/2 watt (R35)	RSD392J
4700 ohm ± 5% 1/2 watt (R28)	RSD472J
4700 ohm ±10% 1 watt (R67)	REC472K
5600 ohm ± 5% 1/2 watt (R15-R34)	RSD562J
6800 ohm ±20% 1/2 watt (R52)	RSB682M
8200 ohm ±10% 1/2 watt (R50-R51-R74)	RSB822K
10,000 ohm ± 5% 1/2 watt (R24)	RSD103J
10,000 ohm ±10% 1/2 watt (R37-R70-R83-R5)	RSB103K
10,000 ohm ±20% 1/2 watt (R19)	RSB103M
15,000 ohm ±20% 1 watt (R16)	REC153M
22,000 ohm ±20% 1/2 watt (R49)	RSB223M
33,000 ohm ±20% 1/2 watt (R79)	RSB333M
56,000 ohm ±10% 1/2 watt (R68)	RSB563K
100,000 ohm ± 5% 1/2 watt (R6-R7)	RLB104J
100,000 ohm ±10% 1/2 watt (R54)	RSB104K
100,000 ohm ±20% 1/2 watt (R45)	RSB104M
100,000 ohm ± 5% 1 watt (R76-R77)	REC104J
120,000 ohm ±10% 1/2 watt (R60-R82)	RSB124K
150,000 ohm ±10% 1/2 watt (R71)	RSB154K
180,000 ohm ±10% 1/2 watt (R75)	RSB184K
270,000 ohm ±10% 1 watt (R81)	REC274K
330,000 ohm ±10% 1/2 watt (R9)	RSB334K
470,000 ohm ±20% 1/2 watt (R3-R10-R16)	RSB474M
560,000 ohm ± 5% 1/2 watt (R73)	RSB564J
560,000 ohm ±10% 1/2 watt (R39)	RSB564K
1 Megohm ± 5% 1/2 watt (R58)	RLB105J
1 Megohm ±20% 1/2 watt (R95)	RSB105M
1 Megohm ±20% 1/2 watt (R36-R40-R47-R64-R94)	RSB105M
1 Megohm ±20% 1 watt (R90)	REC105M
1.5 Megohm ±20% 1/2 watt (R53)	RSB155M
2.2 Megohm ±20% 1/2 watt (R48)	RSB225M
3.3 Megohm ±10% 1 watt (R72)	REC335K
3.9 Megohm ±10% 1/2 watt (R46)	RSB395K
6.8 Megohm ±10% 1/2 watt (R55)	RSB685K
10 Megohm ±20% 1/2 watt (R87)	RSB106M
120,000 ohm ±20% 1 watt (R87)	REC124M

CONDENSERS

10 mfd/450 W.V. +30 mfd/400 W.V. +30mfd/300 W.V. electrolytic (C56-C57-C66)	CO-1496
20 mfd/300 W.V. electrolytic (C16)	CO-1493
40 mfd/450 W.V. +10 mfd/350 W.V. electrolytic (C47-C54)	CO-1497
40 mfd/450 W.V. +40 mfd/150 W.V. +130 mfd/50 W.V. electrolytic (C44-C52-C53)	CO-1494
80 mfd +10 mfd/450 W.V. electrolytic (C51-C42)	CO-1495
5 mmfd ±20% 1500 W.V. mica (C77)	CO-1512
53-370 mmfd dual trimmer (C55-C69)	CT-1476
500 mmfd 15,000 W.V. ceramic (C76)	CO-1528
1500 mmfd ±20% ceramic (C1-C2-C6-C9-C20-C22-C23-C25-C26-C30-C71-C77-C81)	COR152M
4700 mmfd ±10% ceramic (C43)	CCR472K
10-160 mmfd trimmer (C50)	CT-1485
.002/600 W.V. paper (C12-C14-C40-C61)	CO-M-6202
.005/600 W.V. paper (C17-C39-C38)	CO-M-6502
.035/1000 W.V. oil imp. paper (C75)	CO-O-X353
.01/600 W.V. paper (C13-C15-C49-C50-C51)	CO-M-6103
.02/600 W.V. paper (C63)	CO-M-6203
.05/400 W.V. paper (C33-C34-C37-C67-C73)	CO-M-4503
.25/400 W.V. paper (C18-C35-C45-C62-C72)	CO-M-4254
.1/1000 W.V. oil imp. paper (C46-C74)	CO-O-X104
13 mmfd ±5% 500 W.V. mica (C32)	RCM20A100J
47 mmfd ±10% 500 W.V. mica (C78)	RCM20A470K
130 mmfd ±20% 500 W.V. mica (C29-C36)	RCM20A101M
120 mmfd ±10% 1000 W.V. mica (C58-C60)	SCM10A121K
180 mmfd ± 5% 1000 W.V. mica (C64)	SCM10C181J
270 mmfd ±10% 1000 W.V. mica (C11-C21-C24-C27-C31)	SCM10A271K
330 mmfd ±20% 1000 W.V. mica (C5-C48)	RCM20A331M
390 mmfd ±10% 1000 W.V. mica (C41-C70)	SCM10A391K
2200 mmfd ±5% 1000 W.V. mica (C68)	SCM10A222J
220 mmfd ±20% 500 W.V. mica (C80)	RCM20A221M

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OLYMPIC MODELS TV-922L, TV-944, TV-945, TV-104 & TV-105 (SEE CHART)

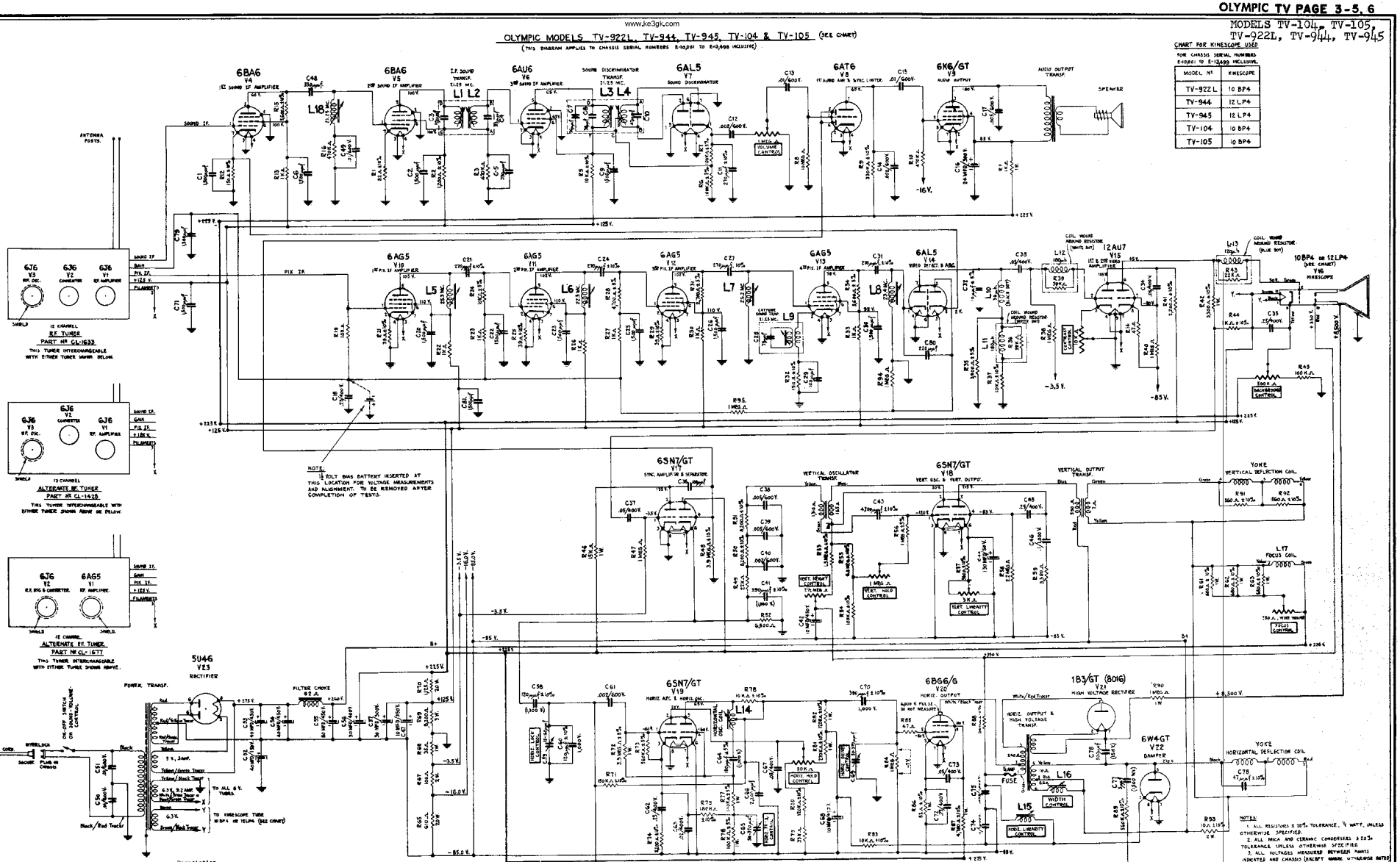
(THIS DIAGRAM APPLIES TO CHASSIS SERIAL NUMBERS E-10001 TO E-13,499 INCLUSIVE)

MODELS TV-104, TV-105, TV-922L, TV-944, TV-945

CHART FOR KINESCOPE USED

FOR CHASSIS SERIAL NUMBERS E-10001 TO E-13499 INCLUSIVE.

MODEL Nº	KINESCOPE
TV-922 L	10 BP4
TV-944	12 LP4
TV-945	12 LP4
TV-104	10 BP4
TV-105	10 BP4



COILS AND TRANSFORMERS

Choke		CK-1346
Deflection Yoke		CL-1325
Fix I-F Coil	(L5-L6-L7-L8-L18)	CL-1327
Cathode Trap	(L9 +L28)	CL-1328
Width Control	(L16)	CL-1502
Horizontal Linearity Control (L15)		CL-1503

Description	
36 microhenries ±10% Video Peaking Coil (L10)	CL-1536
120 " ±10% " " " (L12 #339)	CL-1536
180 " ±10% " " " (L13 #343)	
	L13 #343 CL-1537
Focus Coil	CL-1687
Vertical Output Transformer	TR-1342
Discriminator Transformer (L3-L4-C7-C8-C10)	TR-1699
Sound I-F Transformer (L1-L2-C1-C4)	TR-1679
Vertical Blocking Oscillator Transformer	TR-1677
Power Transformer	TR-1698
Horizontal Oscillator Transformer (L14)	TR-1475
Horizontal Deflection and High Voltage Transformer for Model TV-104	TR-1342
Horizontal Deflection and High Voltage Transformer Models TV-105, TV-922L, TV-944 and TV-945	TR-1492
Speaker Output Transformer	TR-1300

CONTROLS

Volume Control and Switch
Dual Control Contrast and Background
Dual Control Horizontal and Vertical Hold
Vertical Linearity
Height
Focus

MISCELLANEOUS

PT-1477	Cabinet for Model TV-104
PT-1478	Cabinet for Model TV-105
PT-1479	Cabinet for Model TV-922L
PT-1480	Cabinet for Model TV-944
PT-1481	Cabinet for Model TV-945
PT-1684	RF Tuner (12 channels - 2 tubes)
	RF Tuner (12 channels - 3 tubes)
	Alternate RF Tuner (13 channels - 3 tubes)
	Plastic Dial used with GL-1663
	13 channel escutcheon used with GL-1428
	Metal escutcheon used with GL-1677
	1/4 Amp. Fuse

CA-1702	Mahogany Outer knob
CA-1727	" Inner "
CA-1467	" volume control knob
CA-1706	Tan outer knob
CA-1968	" inner "
	" volume control knob
CK-1677	6ft Line Cord with Interlock
CL-1633	Ion trap magnet (Beam Bender)
CL-1628	2nd Anode connector assembly
KA-1447	Safe-ty Glass for Model TV-922L & TV-105
KA-1522	Safe-ty Glass for Models TV-944 and TV-945
KS-1078	Safe-ty Glass for Model TV-104
FU-1683	Masonite Back for Model TV-922L & TV-104
	Masonite Back for Models TV-944, TV-945 and TV-105ST-1713

KN-1516	
KN-1517	
KN-1518	
KN-1586	
KN-1587	
KN-1588	
LK-1523	
PP-1367	
PP-1368-1	
PP-1527	
PP-1712	
PP-1703	
ST-1505-1	
Masonite Back for Models TV-944, TV-945 and TV-105ST-1713	

Description	
Rectifier mounting plate	SP-1558
Perforated masonite bottom shield	SP-1566
300 ohm transmission line	WI-1079
Mahogany channel selector knob	KN-1514
Mahogany fine tuning knob	KN-1515
Tan channel selector knob	KN-1584
Tan fine tuning knob	KN-1585
Focus Coil Spring	SP-1690
Speaker for Model TV-922L & TV-104	SK-1521
Speaker for Model TV-944	SK-795
Speaker for Model TV-945 & TV-105	SK-1694-1

used with CL-1677 and CL-1428

NOTES:
1. ALL RESISTORS ± 20% TOLERANCE, ½ WATT, UNLESS OTHERWISE SPECIFIED.
2. ALL MICA AND CERAMIC CONDENSERS ± 20% TOLERANCE UNLESS OTHERWISE SPECIFIED.
3. ALL VOLTAGES MEASURED BETWEEN POINTS INDICATED AND CHASSIS (EXCEPT WHERE OTHERWISE NOTED) AND WITH VOLUME CONTROL FULL ON AND ALL CONTROLS TURNED COUNTER-CLOCKWISE, USING AN ELECTRONIC TYPE VOLTMETER. ALSO WITH 1½ VOLT DRY BATTERY INSERTED ACROSS CONDENSER C48 AS INDICATED. ALL VOLTAGE READINGS ±15%, MEASURED WITH INPUT VOLTAGE OF 117 VOLTS, 60 CYCLES, A.C.

REVISED 7-21-49

DWG DG-1716

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MODELS TV-104, TV-105, TV-108,
TV-922L, TV-944, TV-945, TV-946

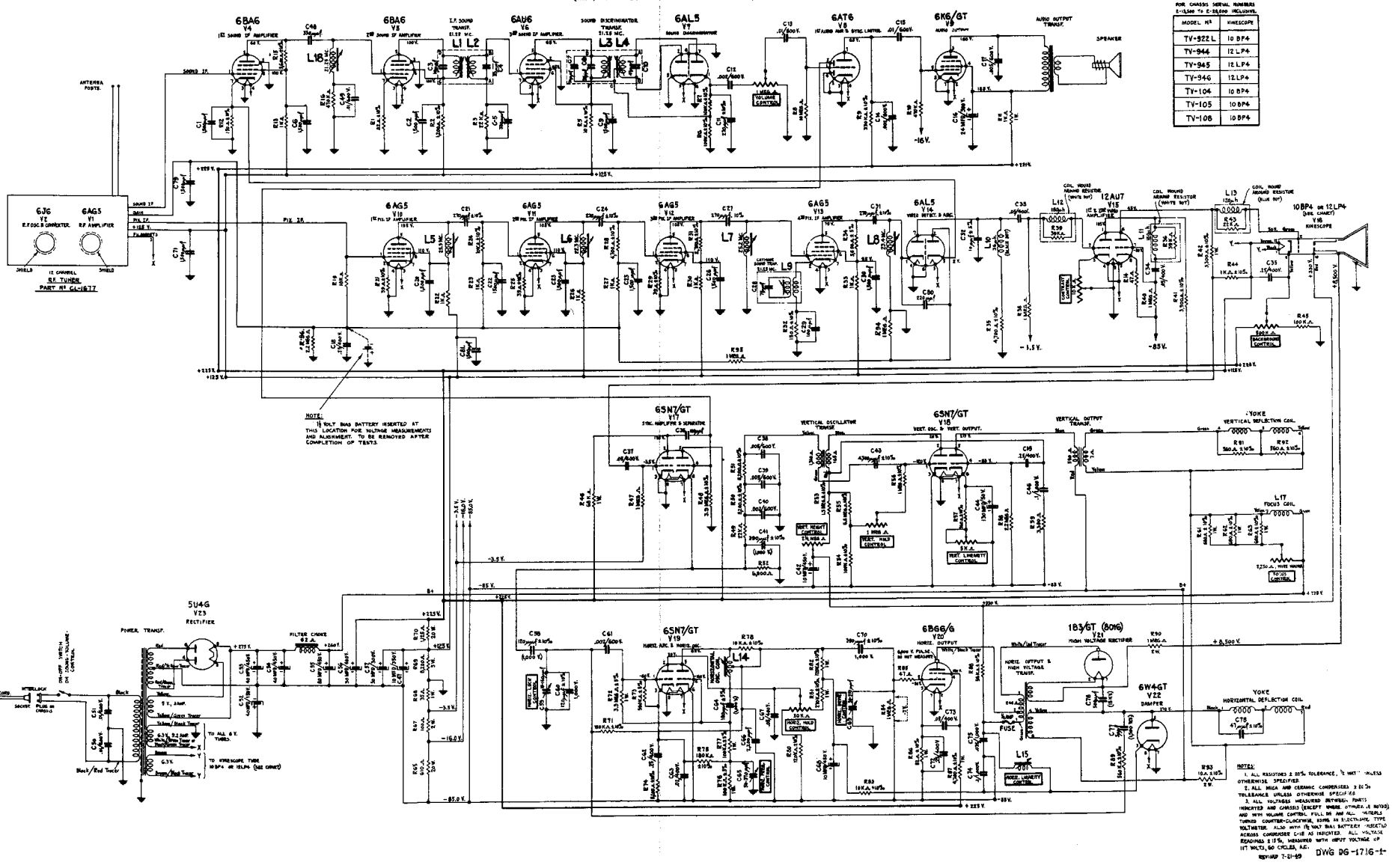
OLYMPIC MODELS TV-922L, TV-944, TV-945, TV-946, TV-104, TV-105 & TV-108 (SEE CHART)

(THIS DIAGRAM APPLIES TO CHASSIS SERIAL NUMBERS E-13,500 TO E-28,000 INCLUSIVE)

CHART FOR KINESCOPE USED

FOR CHASSIS SERIAL NUMBERS E-13,500 TO E-28,000 INCLUSIVE.

MODEL NO.	KINESCOPE
TV-922L	10BP4
TV-944	12LP4
TV-945	12LP4
TV-946	12LP4
TV-104	10BP4
TV-105	10BP4
TV-108	10BP4



NOTES:
1. ALL RESISTORS ± 20% TOLERANCE, ½ WATT UNLESS OTHERWISE SPECIFIED.
2. ALL MICA AND CERAMIC CONDENSERS ± 10% TOLERANCE UNLESS OTHERWISE SPECIFIED.
3. ALL VOLTAGES MEASURED BETWEEN POINTS INDICATED AND CHASSIS (EXCEPT WHERE OTHERWISE NOTED) AND WITH VOLUME CONTROL FULL ON AND ALL INSTRUMENTS TUNED COUNTER-CLOCKWISE, USING AN ELECTRONIC TYPE VOLTMETER. ALSO WITH 1½ VOLT BIAS BATTERY INSERTED ACROSS CONDENSER C-18 AS INDICATED. ALL VOLTAGE READINGS ± 15%, MEASURED WITH INPUT VOLTAGE OF 117 VOLTS, 60 CYCLES, A.C.

REVISED 7-21-49

DWG DG-1716-t-

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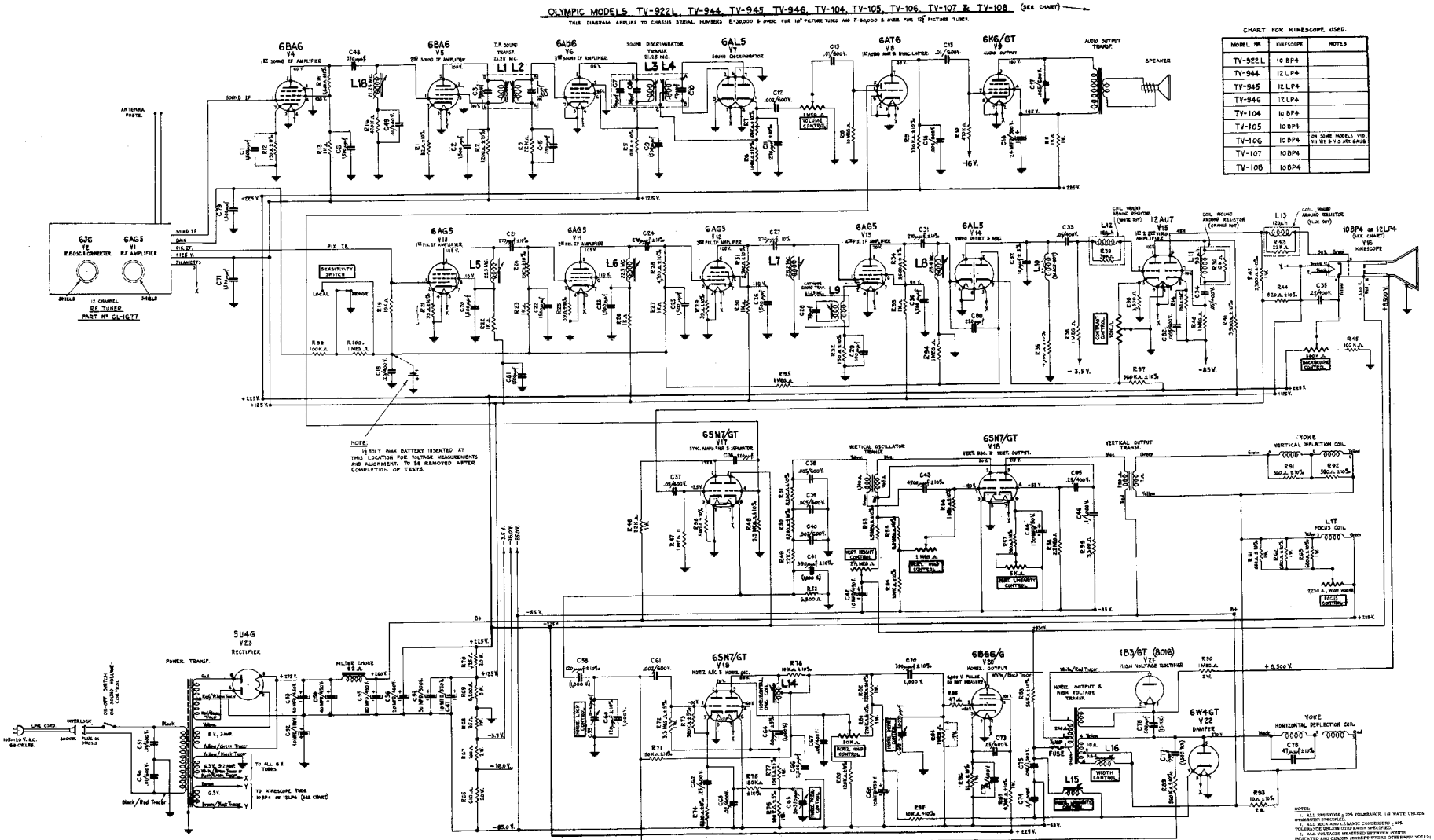
MODELS TV-104, TV-105, TV-106, TV-107,
TV-108, TV-922L, TV-944, TV-945, TV-946

OLYMPIC MODELS TV-922L, TV-944, TV-945, TV-946, TV-104, TV-105, TV-106, TV-107 & TV-108 (SEE CHART)

THIS DIAGRAM APPLIES TO CHASSIS SERIAL NUMBERS E-30,000 & OVER FOR 16" PICTURE TUBES AND F-50,000 & OVER FOR 12" PICTURE TUBES.

CHART FOR KINESCOPE USED.

MODEL NR	KINESCOPE	NOTES
TV-922L	10 BP4	
TV-944	12 LP4	
TV-945	12 LP4	
TV-946	12 LP4	
TV-104	10 BP4	
TV-105	10 BP4	
TV-106	10 BP4	ON SOME MODELS V10, V11 V15 & V16 ARE 6AU6
TV-107	10 BP4	
TV-108	10 BP4	



NOTE:
½ VOLT BIAS BATTERY INSERTED AT THIS LOCATION FOR VOLTAGE MEASUREMENTS AND ALIGNMENT. TO BE REMOVED AFTER COMPLETION OF TESTS.

NOTES:
1. ALL RESISTORS ± 20% TOLERANCE, ½ WATT, UNLESS OTHERWISE SPECIFIED.
ALL CAPACITORS ± 10% TOLERANCE CONDENSERS ± 20% VOLTAGE RATING OTHERWISE SPECIFIED.
3. ALL VOLTAGES MEASURED BETWEEN POINTS INDICATED AND CHASSIS (EXCEPT WHERE OTHERWISE NOTED) AND WITH VOLUME CONTROL FULL ON AND ALL CONTROLS TURNED COUNTER-CLOCKWISE, USING AN ELECTRONIC TYPE VOLTMETER, ALSO WITH 117 V. 60 CYCLE POWER SUPPLY ACROSS CONDENSER MARKED "LINE VOLTAGE". ALL VOLTAGES MEASURED WITH INPUT VOLTAGE OF 117 V.A.C., 60 CYCLES, A.C.

REVISED 7-21-48 DWG. NO. 1716-3-

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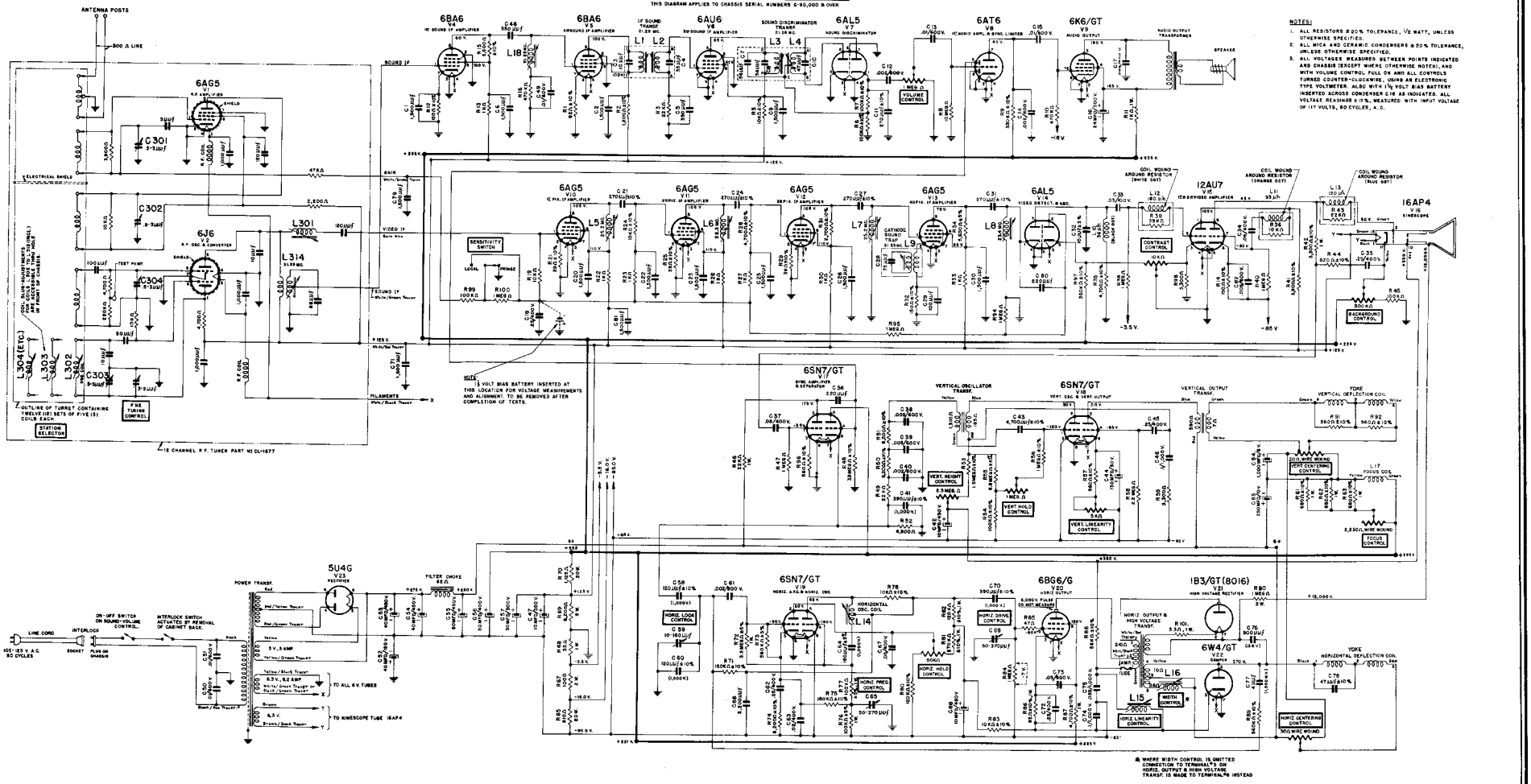
OLYMPIC MODELS TV-947, TV-949 & TV-950

THIS DIAGRAM APPLIES TO CHASSIS SERIAL NUMBERS 0-90,000 & OVER



NOTES:

1. ALL RESISTORS ±20% TOLERANCE, ½ WATT, UNLESS OTHERWISE SPECIFIED.
2. ALL MICA AND CERAMIC CONDENSERS ±20% TOLERANCE, UNLESS OTHERWISE SPECIFIED.
3. ALL VOLTAGES MEASURED BETWEEN POINTS INDICATED AND CHASSIS (EXCEPT WHERE OTHERWISE NOTED), AND WITH VOLUME CONTROL FULL ON AND ALL CONTROLS TURNED COUNTER-CLOCKWISE, USING AN ELECTRONIC TYPE VOLTMETER. ALSO WITH 1½ VOLT BIAS BATTERY INSERTED ACROSS CONDENSER C 81 AS INDICATED. ALL VOLTAGE READINGS ±10%, MEASURED WITH INPUT VOLTAGE OF 117 VOLTS, 60 CYCLES, A.C.

* WHERE WIDTH CONTROL IS OMITTED CONNECTION TO TERMINAL "L" ON HORIZ. OUTPUT & HIGH VOLTAGE TRANSF. IS MADE TO TERMINAL "G" INSTEAD

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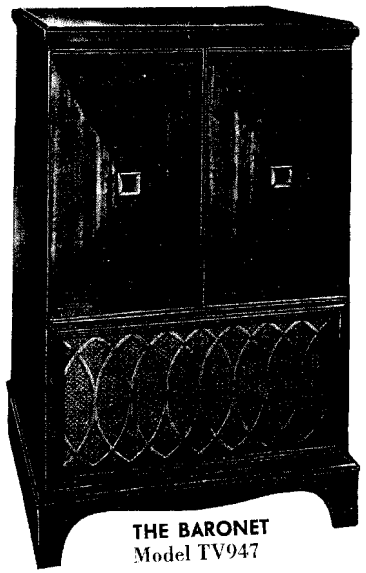

THE BARONET
Model TV947

OLYMPIC TELEVISION RECEIVERS MODELS TV-947, TV-949, & TV-950

These instructions apply to serial numbers G-90,001 to G-100,000 inclusive.

These models are twenty-two tube direct viewing 16" picture tube television receivers differing essentially in size of speaker and styling of cabinet.

Electrical and Mechanical Specifications

Radio Frequency Ranges

Channel Number	Channel Freq.Mc	Picture Carrier Freq. MC	Sound Carrier Freq. MC	Receiver RF Osc.Freq.Mc
2	54-60	55.25	59.75	81
3	60-66	61.25	65.75	87
4	66-72	67.25	71.75	93
5	76-82	77.25	81.75	103
6	82-88	83.25	87.75	109
7	174-180	175.25	179.75	201
8	180-186	181.25	185.75	207
9	186-192	187.25	191.75	213
10	192-198	193.25	197.75	219
11	198-204	199.25	203.75	225
12	204-210	205.25	209.75	231
13	210-216	211.25	215.75	237

Power Supply----------105-125 volts 60 cycles 240 watts
Speaker, TV-947 ----------10" PM 3.16 oz. Alnico 5
Speaker, TV-949 ----------10" PM 3.16 oz. Alnico 5
Speaker, TV-950 ----------
Voice Coil Impedance ----------3.2 ohms at 400 cycles
Receiver Antenna Input Impedance-----300 ohms balanced

Tube Complement		Function
1) 6AG5	(V1)	RF Amplifier
2) 6J6	(V2)	RF Oscillator and Converter
3) 6BA6	(V4)	1st Sound IF Amplifier
4) 6BA6	(V5)	2nd Sound IF Amplifier
5) 6AU6	(V6)	3rd Sound IF Amplifier
6) 6AL5	(V7)	Sound Discriminator
7) 6AT6	(V8)	1st Audio Amplifier and Sync Limiter
8) 6K6GT	(V9)	Audio Output
9) 6AG5	(V10)	1st Pix IF Amplifier
10) 6AG5	(V11)	2nd Pix IF Amplifier
11) 6AG5	(V12)	3rd Pix IF Amplifier
12) 6AG5	(V13)	4th Pix IF Amplifier
13) 6AL5	(V14)	Video 2nd Detector & Automatic Gain Control (AGC)
14) 12AU7	(V15)	1st and 2nd Video Amplifier
15) 6SN7/GT	(V17)	Sync Amplifier & Sync Separator
16) 6SN7/GT	(V18)	Vertical Oscillator & Vertical Output
17) 6SN7/GT	(V19)	Horizontal AFC & Horizontal Oscillator
18) 6BG6/G	(V20)	Horizontal Output
19) 1B3GT/8016	(V21)	High Voltage Rectifier
20) 6W4GT	(V22)	Damper
21) 5U4G	(V23)	Power Supply Rectifier
22) 16AP4	(V16)	Kinescope (Picture Tube)

Picture Intermediate Frequencies

Picture carrier frequency ----------25.75 MC
Accompanying Sound Traps ----------21.25 MC

Sound Intermediate Frequencies

Sound Carrier Frequency ----------21.25 MC
Sound Discriminator Band Width (Between Peaks) 350 KC

Operating Controls (front panel)

Channel Selector, Fine Tuning } Dual Control Knobs

Sound Volume and ON-OFF Switch --- Single Control Knob
Horizontal Hold, Vertical Hold } Dual Control Knobs

Background, Contrast } Dual Control Knobs

Non-Operating Controls

Sensitivity Switch----------Rear Chassis Adjustment
Horizontal & Vertical Centering----------Rear Chassis Adjustment
Width----------Rear power supply cage screwdriver adjustment (omitted on some models)
Height----------Rear chassis adjustment
Horizontal Linearity----------Rear chassis screwdriver adjustment
Vertical Linearity----------Rear chassis adjustment
Horizontal Drive----------Rear chassis screwdriver adjustment
Horizontal Oscillator Frequency (Fine)----Rear chassis screwdriver adjustment
Horizontal Oscillator Frequency (Coarse)--Bottom chassis screwdriver adjustment (L14)
Horizontal Locking Range----------Rear chassis screwdriver adjustment
Focus----------Rear chassis adjustment
Focus Coil----------Top chassis screw adjustment (for preliminary centering of raster)
Ion trap magnet----------Top chassis (on neck of picture tube) adjustment
Deflection Coil----------Top chassis wing screw adjustment

ALIGNMENT

Equipment Required

1) RF signal generator to provide the following accurate frequencies. If the accuracy of the generator frequencies is not known, some type of crystal calibrator should be utilized to check the correct settings of the RF generator for each particular frequency.

(a) IF Frequencies
21.25 MC Sound IF, Sound Discriminator and Sound Traps
21.8 MC Converter Transformer
22.3 MC Second Pix IF coil
23.4 MC Fourth Pix IF Coil
25.2 MC Third Pix IF Coil
25.3 MC First Pix IF Coil
25.75 MC Picture Carrier

(a) RF Frequencies

Channel Number	Picture Carrier Freq.MC	Sound Carrier Freq. MC
2	55.25	59.75
3	61.25	65.75
4	67.25	71.75
5	77.25	81.75
6	83.25	87.75
7	175.25	179.75
8	181.25	185.75
9	187.25	191.75
10	193.25	197.75
11	199.25	203.75
12	205.25	209.75
13	211.25	215.75

(c) Output on these ranges should be adjustable and capable of providing at least .1 volt.

2) Electronic Voltmeter
3) Cathode Ray Oscilloscope, 3" minimum screen
4) RF Sweep Generator, meeting the following requirements:

(a) Frequency Ranges
18 to 30 MC., 1 MC. sweep width
40 to 90 MC.,10 MC. Sweep width
170 to 225 MC., 10 MC. sweep width

(b) Output adjustable to .1 volt

The chassis may be removed from the cabinet with the kinescope tube in place and servicing and alignment work can be accomplished without removing the kinescope tube. This work is most conveniently performed by placing the chassis on its left side (power supply cage resting on work bench) and the controls facing the operator.

To remove chassis from cabinet remove
(1) Line cord from power outlet
(2) Masonite back (Caution: An interlock plug is attached to the back. Do not damage same when removing back.
(3) Antenna lead-in from terminal posts
(4) Speaker plug from rear of chassis
(5) Interlock plug from rear of chassis
(6) Knobs from front of cabinet
(7) Four mounting screws and washers from bottom of cabinet

In sliding chassis out of cabinet be carsful that the kinescope tube does not strike against cabinet or any other obstruction.

Order of Alignment

When complete receiver alignment is necessary it should be performed in the following sequence.

(1) Pix IF traps
(2) Sound IF Transformers
(3) Sound Discriminator
(4) Pix IF coils
(5) Retouch Pix IF Transformers

After removing chassis from cabinet close circuit of primary by soldering a lead across interlock socket. (Be sure to unsolder this lead after servicing). Then connect power plug and speaker plug. Set sensitivity swithh (at rear of chassis) in "Local" position.

If a local station is not operating on channel #9 set the tuner to this channel. turn on power switch and proceed as follows: (If #9 is a local station cnannel use channel #8 or #10).

Picture I-F Trap Adjustment

CAUTION: Before making any adjustments or alignment be sure that sensitivity switch is in "local" position.

Connect hot lead of electronic voltmeter to Pin #7 of V14 with meter range switch set to lowest scale and observing polarity for negative readings.

Couple hot lead of RF Signal Generator to converter tube V2 by means of a loop consisting of two turns of insulated hook-up wire. Connect ground lead of RF Signal Generator to chassis.

Note: If the converter tube V2 is shielded- remove shield.

Set the generator frequency accurately to 21.25 MC, and adjust L314 convertor sound trap located at top of tuner (see tube and trimmer layout drawing) for minimum reading on voltmeter.

Increase generator output to maximum (recheck 21.25 MC. generator setting) and adjust L9 for minimum reading of voltmeter.

Sound IF Transformer Adjustment

Change hot lead connection of electronic voltmeter to terminal marked "G" and sound discriminator transformer. Reduce output of the signal generator to give approximately 2 volts reading on voltmeter scale.

Adjust for maximum reading in order named: L18, L1, L2 and L3.

Sound Discriminator Adjustment

Change hot lead connection of voltmeter to pin #1 of V7 and adjust L4 for zero reading on voltmeter. This zero setting is very critical and the adjustment must be made with extreme care.

Repeat adjustments for L3 and L4 in the same manner indicated above.

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Pix IF Coil Adjustment

Connect hot lead of voltmeter to pin #7 of V14 and adjust the following slugs for maximum output at frequencies indicated:

L301 - - - - - 21.8 MC
L5 - - - - - - 25.3 MC
L6 - - - - - - 22.3 MC
L7 - - - - - - 25.2 MC
L8 - - - - - - 23.4 MC

Retouch Pix IF Transformer Adjustment

Disconnect RF signal generator leads and connect hot lead of sweep generator to coupling loop on converter tube and ground to chassis.

Connect vertical input terminal of oscilloscope to pin #7 of V14 (Pix Detector) and connect ground lead of scope to chassis.

Connect 1 1/2V flashlight battery with positive terminal to chassis and negative terminal to #2 pin of V14.

Set tuner to channel 9 unless local station is operating on this frequency, in which case an adjacent channel should be used.

Set sweep generator frequency to IF sweep on the 20 to 30 MC. range.

Adjust sweep generator output to produce a curve on the scope which is approximately 2/3 of the screen diameter.

Loosely couple output of RF signal generator to hot lead of sweep generator and set frequency of RF signal to 25.75 MC. (marker).

Curve shown on scope should be similar to the standard response curve shown below. For proper setting of the pix carrier the 25.75 MC. marker should appear on the curve at a point approximately 50% to 60% of the vertical height of the curve.

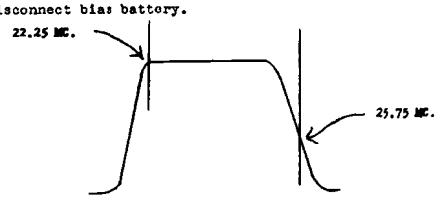
To obtain this setting retouch L5 and L7.

Reset RF signal generator frequency to 22.25 MC. and retouch L301 and L6 for correct positioning of marker on shoulder of curve.

The curve may now be flat topped by retouching L8.

Recheck setting of 25.75 MC. marker to make sure that position has not shifted on curve.

Disconnect bias battery.



Tuner Adjustments for Models using Tuner Part #CL-1677

Note: Before making a complete tuner adjustment it is essential that the Sound I.F. and discriminator circuits be aligned at their proper frequencies as described above. WHEN CHANGING THE CONVERTER TUBE IT IS NECESSARY TO REALIGN THE OSCILLATOR ADJUSTMENT ON ALL CHANNELS WITH THE V2 TUBE SHIELD IN PLACE.

RF and Converter Alignment

1) Set channel selector switch to #12
2) Connect oscilloscope through 10,000 ohms to test point on tuner (bare tinned copper loop wire located between V1 and V2)
3) Connect 1 1/2V bias batter. *Set fine tuning control at approximate mid-point of its tuning range.
4) Feed sweep generator into antenna terminals, sweeping channel 12.
5) Adjust C301, C302 and C304 for flat top response curve. Check picture and sound carrier markers corresponding to frequencies shown previously for all respective channels.

* In same manner as described on previous page under "Retouch Pix I-F Transformer Adjustment."

Oscillator Alignment

1) Set channel selector switch to #12
2) Connect signal generator to one antenna terminal and ground. Set to sound carrier frequency 209.75 MC.
3) Connect electronic voltmeter to pin #1 of V7 (6AL5) sound discriminator.
4) Adjust C303 for zero reading on electronic voltmeter between a positive and negative peak.
5) Check all channels for zero reading on voltmeter. It is usually not necessary to make any further adjustments. If it is found necessary to touch up the oscillator coils, the following procedure should be observed. Disconnect bias battery.

Oscillator Coil Touch-Up

(a) Center fine tuning control, as described in Note A.
(b) Place a non-metallic screwdriver through opening, and adjust oscillator coil on channel 12 (L312)
(c) Turn channel selector switch to channel 13 and adjust L313.
(d) This adjustment can be repeated for all channels or if necessary on any single channel.

Note A - The mid-point of the fine tuning range is attained when the bakelite disc (which is attached to the fine tuning control) faces directly downward.

ADJUSTMENTS

Ion Trap Magnet Adjustment:
Turn the background control fully clockwise and the contrast control fully counter-clockwise. Adjust the ion trap magnet by moving it forward or backward and at the same time rotating it slightly around the neck of the kinescope until the raster on the screen is brightest. Reduce the background control setting until the raster is slightly above average brilliance. Adjust focus control (rear of chassis) until the line structure of the raster is clearly visible (sharp). Readjust the Ion trap magnet again for maximum raster brilliance. The final touches on this adjustment should be made with the background control at the maximum position with which good line focus can be maintained.

Focus Coil Adjustments:
Turn the horizontal and vertical centering controls (rear of chassis) to mid-position. Loosen the three screws holding focus coil mounting plate to studs and bracket and adjust both vertically and horizontally until the entire raster is visible on the screen, approximately centered and without shadows in the corners. It may be necessary to adjust ion trap at the same time to attain this condition. With the focus coil mounting plate set in this position, tighten the above three screws and make all further centering adjustments by means of the horizontal and vertical centering controls at rear of the chassis.

Deflection Yoke Adjustment:
If the lines of the raster are not horizontal or squared with the picture mask, loosen the deflection yoke adjustment screw and rotate the deflection yoke until this condition is obtained, and retighten the yoke adjustment screw.

Check of Horizontal Oscillator Alignment:
Obtain a test pattern and turn the horizontal hold control to the extreme counter-clockwise position. The picture should remain in synchronization. Turn channel selector switch OFF and immediately back ON again. Normally, the picture will now be out of synchronization. Turn the control clockwise. The picture will slowly begin to synchronize, and will in one moment pull into synchronization. This should occur when the control is approximately 90 degress from the extreme counter-clockwise position. It should now remain in synchronization for approximately 90 degrees additional clockwise rotation of the control. At the extreme clockwise position, the picture should again pull out of synchronization and should show from 3 1/3 to 4 1/2 bars sloping downward to the right.

If the receiver passes this test and the picture is normal and stable, the horizontal oscillator is properly adjusted. Skip the "Alignment of Horizontal Oscillator" and proceed with "Focus" adjustment.

Alignment of Horizontal Oscillator:
If in the above test, the receiver fails to hold synchronization with the hold control at the extreme counter-clockwise position or fails to hold synchronization for at least 60 degrees of clockwise rotation of the control from the point of "pull in" it will be necessary to make the following adjustment:

Horizontal Frequency Adjustment:
Turn horizontal hold control to the extreme clockwise position. Tune in a television station and adjust the "horizontal frequency" trimmer C65 (rear of chassis) until the picture is out of synchronization and shows 3 1/2 to 4 1/2 bars sloping downward to the right. If the trimmer has insufficient range, set the trimmer to mid position (one turn from tight) and adjust the horizontal oscillator coil L14 (consult circuit diagram) until this condition is obtained.

Horizontal Locking Range Adjustment:
Set the horizontal hold control to the extreme counter-clockwise position. Switch channel selector OFF channel and back.
Slowly turn the horizontal hold control clockwise and note the least number of diagonal bars obtained just before the picture pulls into synchronization. If more than 4 1/2 bars are present just before the picture pulls into synchronization, adjust the "horizontal lock" trimmer C59 (rear of chassis) slightly clockwise. Turn the contrast control counter-clockwise and switch channel selector OFF channel and back again. Recheck the number of bars at the "pull-in" point. Repeat this procedure until 3 1/2 to 4 1/2 bars are present.
Repeat the adjustments of the horizontal frequency adjustment and horizontal locking range adjustment until the conditions specified above are fulfilled. When the horizontal hold operates as outlined in "Check of Horizontal Oscillator Alignment" the oscillator is properly adjusted.

Height and Vertical Linearity Adjustments:
Adjust the height control on the rear of chassis until the picture fills the mask vertically. Adjust vertical linearity (rear of chassis) until the test pattern is symmetrical from top to bottom.
Adjustment of one control will require readjustment of the other. Then adjust vertical centering control to align the picture with the mask.

Width, *Drive and Horizontal Linearity:
Turn the width control L16 (accessible through a hole in the upper right hand corner on the rear wall of the high voltage compartment) to the maximum clockwise position. Adjust the trimmer "horizontal drive" C69 (rear of chassis) to give the best degree of brightness and linearity. Adjust the horizontal linearity control L15 (rear of chassis) for best linearity of the right half of the picture. Readjust the width control until the picture just fills the mask and adjust the horizontal centering (rear of chassis) to align the picture with the mask.
* This control is omitted on some models.

Focus:
Adjust the focus control (rear of chassis) for maximum definition of the vertical wedge of the test pattern.

CHECK TO SEE THAT YOKE THUMB SCREWS ARE TIGHT.

Sensitivity Switch:
A two-position switch is provided at the rear of the chassis for increasing the gain of the receiver which may be required for proper operation in fringe areas. Where sound and picture reception is weak with the sensitivity switch set in LOCAL position, switching to "FRINGE" position will improve the performance of the receiver.

SERVICE AND TROUBLE SHOOTING PROCEDURE

FOR MODELS TV-947, TV-949 & TV-950

HORIZONTAL SWEEP CIRCUIT

1) No Light on CR Tube
(a) Ion trap misplaced. (Very critical). Move trap.
(b) Ion trap de-magnetized. Replace
(c) CR Socket Loose. Check whether CR Filament lights up.
(d) No High Voltage. After checking fuse, check these symptoms:
6SN7 Horizontal Oscillator Tube not oscillating. Determine by measuring pin 5. If +65 volts, tube oscillates. Determine by voltage, tube is not oscillating, so that Horizontal Output Tube 6BG6 is not excited and HV cannot be developed.
Possible cause of 6SN7 not oscillating:
Defective 6SN7. Replace.
Defective C64, 180 mmf (at Horizontal Oscillator Can.) Replace.
" C66,2200 " " " " " "
Replace.
" R72, 3.3 Megohms (at tube socket 6SN7)Replace
" R71, 150,000 ohms " " " " "
Shorted C59, Trimmer at back of chassis (Horizontal Lock Control)Remove Short.

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After 6SN7 has been found oscillating, or if oscillation has been restored and still no HV is being developed, check these symptoms:

6BG6 not being driven. Determine by measuring across R84 (1 Megohm between Horizontal Drive Trimmer and Terminal Strip). Drive Trimmer and Terminal Strip). Drive is sufficient if -5.0 to -7.5 volts. Insufficient drive can be caused by:
Defective 6SN7 (V19)
Defective C70, 390 mmf (at Horizontal Oscillator Can or Horizontal Drive Trimmer). Replace.
Shorted C69 (Horizontal Drive Trimmer). Remove Short.

After 6BG6 has been found being driven or its drive restored, check whether screen (pin 8) reads +180 volts, grid (pin 5) -80 volts, plate (read return via flyback-transformer at any lug of HV fuse) +330 volts. Low plate reading indicates current consumption of 6BG6 is too high. Replace 6BG. Low grid reading indicates shorted or leaky C70 (390 mmf). High screen and no plate voltage indicates open flyback-transformer. Hot or burnt-out R86 (82 ohms at cathode of 6BG6) indicates C70 (390 mmf) shorted, or shorted C73 (.05-600V). After all voltages of 6BG6 have been found correct, and still no HV, replace 1B3-8016 HV rectifier. Do not interchange plate leads for 1B3 (red tracer) and 6BG6 (black tracer). Dress leads away from all metal parts and surfaces.

(e) Background control defective. Check how voltage at arm (centerpoint) of background control changes with respect to CR tube grid. The latter measured at peaking coil 120 microhenry (pin 6) 12AU7 video output tube should read +45 volts. The voltage at arm of background control should vary from +100 to +225 volts. If this voltage cannot be brought down to at least +110 volts, CR tube is at cutoff and therefore dark.

2) Picture on CR Tube (For "no picture " see under "Video"

(a) Picture appears in duplicate, triplicate or more: Horizontal frequency too high. If readjusting of Horizontal Lock and Horizontal Frequency Controls or of threaded slug of Horizontal Frequency Coil (L14) (inside chassis) does not change this condition sufficiently, replace 6SN7 (V19), C64-180 mmf or C66-2200 mmf. In some cases, the Horizontal Frequency Coil L14 may have to be replaced.

(b) Picture appears half or less or folded over. Horizontal Frequency too low. Same procedure as under (a).

(c) Picture not wide enough: If adjustment of drive control not sufficient, measure voltage at HV Fuse. If less than +330 volts, horizontal sweep will be insufficient. Replace 6BG6, 6W4GT. Observe all voltages of 6BG6. Check width Control (if used). Check whether B+ of set is +225 volts and B- 85 volts. Defective Horizontal Output Transformer or Deflection Yoke. Defective C78 (47 mmf) across half of Horizontal Deflection Coil.

(d) Incorrect horizontal linearity. Linearity coil may have to be shorted out, or shorting bar may have to be removed. Try increasing capacity of C75 (.035 mf) by adding from .05 to .1 mf. Reset drive control. Defective 6BG6G. Defective Horizontal Output Transformer.

(e) White vertical line or lines on left side: Damper-circuit not working properly. Replace 6W4GT. Check linearity coil and C74-C75 (.1 and .035 mf). Check setting of drive control, may be too far counter-clockwise.

(f) Black vertical line on left side (when upper channels are being switched in). Barkhausen-effect. Redress plate leads to 1B3 and 6BG6. If no improvement, replace 6BG6.

(g) Horizontal flashes at sides of picture if no outside noise present: 6SN7 (V19) horizontal oscillator defective. Replace.

(h) Picture sloping over left or right, or shifting so that black blanking bar, dividing picture, can be seen: See under "Sync circuit".

3) Vertical Sweep Circuit
1) CR Tube shows horizontal line only: No Vertical sweep.
(a) Defective 6SN7 (V18). Replace
(b) 6SN7 (V18) not oscillating. Determine by measuring plate pin 2. If +14 volts, tube oscillates. If negative voltage, tube does not oscillate. Symptoms:

Defective C43 4700 mmf ceramic condenser. Replace.
Vertical Hold Control open or shorting against ground.
Vertical Height Control open or shorting against ground.
Blocking Transformer open.

6SN7 (V18) oscillating, but still no sweep indicates defective vertical output transformer. Check voltage at pin 5 of 6SN7 (V18) for open transformer.

Picture Linearity Incorrect: Check R57 560 ohm at cathode of 6SN7 (V18) and Vertical Linearity Control).

Picture Folding on top or bottom: Frequency incorrect. Check R56 1 Megohm R54 100,000 ohms, C43 4700 mmf. Weak 6SN7 (V18).

Picture movement up and down cannot be stopped. See under "Sync Circuit".

4) Sync Circuit
Position of Sensitivity Switch will affect sync stability. Try both settings and use position giving strongest vertical hold.

Picture moves in all directions, cannot be stopped: No vertical nor horizontal sync. Symptoms:

(a) Defective 6SN7 (V17) Sync amplifier, Replace.
(b) Plate pin 2 should read +175 volts. If higher, ground connection may be loose (tube not drawing current). Pin 5 should read +225 volts. Check whether C41 390 mmf is defective.
(c) C36 220 mmf condenser to sync amplifier may be defective. Replace.
(d) 6AL5 (V14) (1/2 AGC, 1/2 video detecotr) defective, Replace.
(e) 6AT6 (1/2 1st audio, 1/2 sync limiter) defective. Replace.

No Vertical Sync:
(a) Defective vertical hold control.
(b) Sync pulses too weak, Increase contrast. If vertical locks in, but horizontal tears, realign I-F.

No Horizontal Sync:
(a) Check C58 120 mmf coupling Sync Amplifier to Horizontal oscillator
(b) Check C59 Trimmer Horizontal Lock Control
(c) Check C60 120 mmf parallel to Lock Control
(d) Check R89 560,000 ohms
(e) Check C77 4 mmf (in series with R89)

Weak Vertical Sync (slipping):
Sync pulses weak. Check I-F alignment.

Weak Horizontal Sync (picture holds only at very small portion of Hold Control range):
(a) B+ low at outplate (pin 5) of 6SN7 (V17) sync amplifier
(b) Defective 6AT6 (sync limiter)
(c) Defective C77 4 mmf
(d) Defective C58 120 mmf

Upper edge of picture bends to one side:
(a) Replace C77 4 mmf
(b) Replace C58 120 mmf
(c) Reset L14 (Horizontal Oscillator Coil)
(d) Reset C65 Horizontal Frequency Control
(e) Reset C59 Horizontal Lock Control
(f) Replace 6SN7 (V17) Sync Amplifier

Test Pattern Distorted:
(a) Sync pulses too weak. Realign I.F. Check 6SN7 (V17) Sync Amplifier voltages. Check for defective 6AT6 (sync limiter).
(b) Sync pulses too strong. Check I.F. Alignment. Check for defective 6AT6 (sync limiter)

Picture does not fall into Sync after change of station:
Reset C65 Horizontal Frequency Control
Reset C59 Horizontal Lock Control

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5) Video

Raster on CR Tube, but no picture, no sound

If noise (spots and streaks travelling over tube face) is visible:

(a) Check R.F. Tuner for defective or loose 6J6 oscillator tube.
(b) Antenna-connections.

If sound is audible, but no picture visible:

(a) Check video I.F. for B+ voltages.
(b) Check video I.F. for defective 6AG5 tubes.
(c) Check for defective 6AL5 detector tube.
(d) Check for defective 12AU7 video output tube.
(e) Check for shorts in I.F. section, and in tuner at 6J6 socket lugs.
(f) Check for open peaking coils.

Note: Realignment is not always necessary if I.F. tubes are changed Only in case of greater differences in tube capacities (lack of band width - vertical lines on test pattern not reaching middle at low contrast, or breaking into oscillation - wavy vertical lines or black smudges) realignment should take place. For procedure, see under "Alignment".

Picture gray at full contrast, while neighboring sets show strong black-white pictures in same area.

(a) Check for defective 6AG5 I.F. tubes (V10; V11; V12; V13)
(b) Check for insufficient B+ in I.F. (115 to 135V with bias battery connected across C18 as indicated on circuit diagram.
(c) Misalignment, particularly L-6 and L-8 Pix I.F. coils.
(d) Check for defective 6AG5 R.F. tube in tuner.
(e) Move Sensitivity Switch to "Fringe" position.

Picture smears (letters, etc. having tails to the right).

(a) Check for open peaking coils (L10; L11; L12; L13)
(b) Check alignment, especially of L5 at 25.3 MC and L7 at 25.2 MC.
(c) Defective C33 or C34 (.05-400) condenser.

6) Sound

If picture appears, but no sound:

(a) Check audio output section (6AT6, 6K6)
(b) Check tubes in Sound I.F. V4; V5; V6.
(c) Check B+ voltages in Sound I.F.

If sound weak:
Realign Sound I.F.
Defective Sound I.F. tube of Discriminator tube V4; V5; V6; V7.
Shorted or open Sound Trap L314 (on tuner).

If noise comes through at sound peak:
Realign Discriminator Transformer at Zero

If sound does not coincide with picture:

(a) I.F. misaligned. Picture carrier (25.75 MC.) too low on I.F. response curve. See "Alignment" data.
(b) Tuner misaligned. See Tuner adjustments.

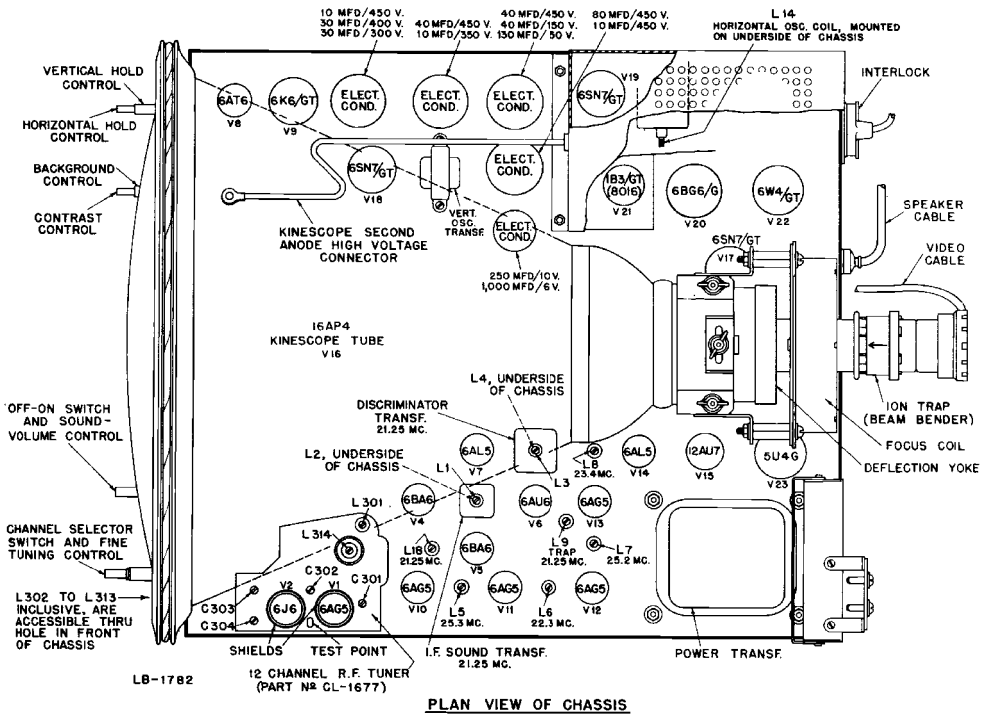
7) Pix I.F. Oscillation

Indicated by reading of approximately -3.0 volts or more at pin #7 of V14 video detector with no signal input. Realign Pix I.F. with 3 volt bias battery instead of 1 1/2 volt battery.

TUBE AND TRIMMER LAYOUT

CHASSIS SERIAL Nos G-90,001 TO G-100,000 INCLUSIVE

105-125 VOLTS, A.C. 60 CYCLES. POWER CONSUMPTION: 240 WATTS.



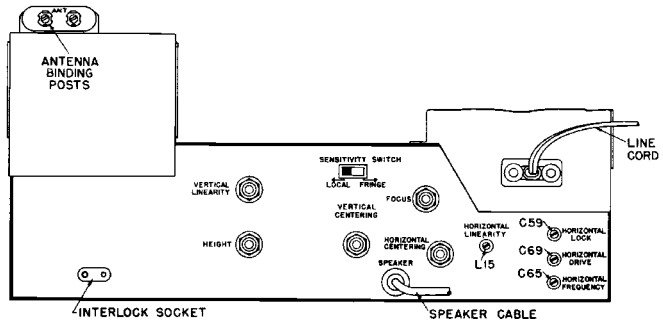
PLAN VIEW OF CHASSIS

(2M79)

CAUTION

DO NOT USE ON DIRECT CURRENT (D.C.) DISCONNECT LINE CORD FROM POWER OUTLET BEFORE REMOVING CHASSIS FROM CABINET.

THIS APPARATUS USES INVENTIONS OF UNITED STATES PATENTS LICENSED BY RADIO CORPORATION OF AMERICA. PATENT NUMBERS SUPPLIED UPON REQUEST.



REAR VIEW OF CHASSIS

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GENERAL INFORMATION

Models 3193TV and 3194TV are table model receivers covering all 12 television channels. Both employ 27 tubes plus three rectifier tubes and an electro-magnetic type television picture tube. A 12½" picture tube is used in the 3194TV while the 3193TV utilizes a 10" picture tube. Other than this, both models are identical.

SPECIAL NOTICE: These models have been designed with virtually the same circuit as the 3381TV Telecaster. In view of this, it is recommended that reference be made to the service notes covering the latter for a detailed outline of the following:

CIRCUIT DESCRIPTION:
Block diagram with a description of the function of the various sections of the circuit.

INSTALLATION INSTRUCTIONS:
Instructions concerning installation of the receiver in the customer's home.
Teletube installation instructions.

SERVICING EQUIPMENT:
Equipment required for aligning, servicing, etc., Packard-Bell Television Receivers.

SERVICING INSTRUCTIONS—GENERAL:
General service notes and suggestions.

ALIGNMENT PROCEDURE:
Step by step alignment charts.

SERVICE INSTRUCTIONS BASED ON PICTURE TUBE OBSERVATION:
Photographic reproductions of television test patterns with various circuit deficiencies present.
Identification of "trouble" by indications noted in picture tube observation.
Waveforms and response curves.

NOTE: It will be noted that the Service Instructions for Model 3381TV contain alignment instructions for Nos. 10520 and 10523 TV R-F Tuners only. Inasmuch as Models 3193TV and 3194TV were produced employing the 10527 Tuner almost exclusively, reference should be made to a supplement sheet titled: SERVICE DATA (SUPPLEMENT) TELEVISION R-F TUNER, PACKARD-BELL PART NO. 10527. This supplement contains alignment instructions, schematic diagram and general information concerning the 10527 Tuner.

Identification of the type tuner being used may be accomplished by examining the unit for its distinct features as follows:

10520 — Wafer Switch Type
10523 — Capacity Inductance Type
10527 — Turret Type

Since the 3381TV contained an FM Tuner, a portion of the Sound I-F and Ratio Detector Alignment was done with the FM Tuner in operation. It will be noted that Step 3 calls for a loose coupling of a signal and sweep generator to the converter grid of the FM Tuner. Inasmuch as Models 3193TV and 3194TV do not contain an FM Tuner, this step should be done with the signal and sweep generators connected (loosely coupled) to the converter grid of the TV R-F Tuner.

SPECIFICATIONS

Electrical Rating:
Line Voltage . . . . . 110-120 volts, 60 cycle AC only
Power Consumption . . . . 280 watts

Tuning Frequency Range:
All 12 television channels

Intermediate Frequency:
Picture Carrier Frequency . . . . 25.75 MC
Accompanying Sound Traps . . . 21.25 MC

Electrical Power Output:
Maximum . . . . . 5 watts
Undistorted . . . . . 2.5 watts

Loudspeaker:
Type . . . . . Permanent Magnet
Outside Cone Diameter . . . . . 5"
Voice Coil Impedance . . . . . 3.2 ohms at 400 cycles
Magnet Rating . . . . . 1.0 Oz. Alnicq V

R-F Frequency Ranges:

Channel Number	Channel Freq. MC	Picture Carrier Freq. MC	Sound Carrier Freq. MC	Receiver R-F Osc. Freq. MC
2	54-60	55.25	59.75	81
3	60-66	61.25	65.75	87
4	66-72	67.25	71.75	93
5	76-82	77.25	81.75	103
6	82-88	83.25	87.75	109
7	174-180	175.25	179.75	201
8	180-186	181.25	185.75	207
9	186-192	187.25	191.75	213
10	192-198	193.25	197.75	219
11	198-204	199.25	203.75	225
12	204-210	205.25	209.75	231
13	210-216	211.25	215.75	237

TUBE COMPLEMENT:

Tubes V-1, V-2 & V-3 are contained in the R-F Tuner Unit. The 10520 & 10523 contain three 6J6's which function as follows:
V-1 — R-F Amplifier
V-2 — Converter
V-3 — Oscillator

The 10527 R-F Tuner utilizes a 6AG5 and a 6J6 which function as follows:
V-1 — 6AG5 — R-F Amplifier
V-2 — 6J6 — Converter

Tube	No.	Function
6BA6	V-4	1st Sound I-F
6BA6	V-5	2nd Sound I-F
6AU6	V-6	Driver
6AL5	V-7	Ratio Detector
6AU6	V-8	1st Audio
6V6-GT	V-9	Audio Output
6AU6	V-10	1st Pix I-F
6AU6	V-11	2nd Pix I-F
6AU6	V-12	3rd Pix I-F
6AU6	V-13	4th Pix I-F
6AL5	V-14	Pix 2nd Detector, A.G.C.
6AU6	V-15	1st Video
6K6-GT	V-16	2nd Video
6AL5	V-17	D.C. Restorer
12QP4 or 12KP4	V-18	Picture Tube (Dumont), 3194TV
10BP4 or 10FP4	V-18	Picture Tube (Rauland), 3194TV
6SK7	V-21	Picture Tube (RCA), 3193TV
6SH7	V-22	Picture Tube (Rauland), 3193TV
6SN7-GT	V-23	Sync. Amplifier
6K6-GT	V-24	Sync. Separator
6AL5	V-25	2nd Sync. Amplifier & Vertical Oscillator Discharge
6AC7	V-26	Vertical Output
6K6-GT	V-27	Horizontal Sync. Discriminator
6J5	V-28	Horizontal Oscillator Control
6BG6-G	V-29	Horizontal Oscillator
1B3-8016	V-30	Horizontal Dischange
5V4-G	V-31	Horizontal Output.
5U4-G	V-32	High Voltage Rectifier
5U4-G	V-33	Reaction Scanning
		Power Rectifier
		Power Rectifier

Picture Size:
3194TV . . . . . Maximum Diameter 10¾"
Minimum Diameter 8½"
3193TV . . . . . Maximum Diameter 8½"
Minimum Diameter 6¾"

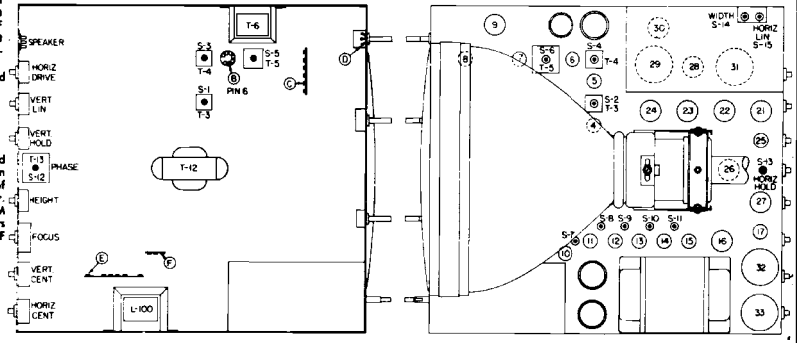

FIGURE 2 — Trimmer Location

S-1 — 1st Sound I-F Secondary
S-2 — 1st Sound I-F Primary
S-3 — 2nd Sound I-F Secondary
S-4 — 2nd Sound I-F Primary
S-5 — Ratio Detector Primary
S-6 — Ratio Detector Secondary
S-7 — 1st Pix I-F, 25.3 MC
S-8 — 2nd Pix I-F, 22.3 MC
S-9 — 3rd Pix I-F, 25.2 MC
S-10 — Pix I-F Cathode Trap, 21.25 MC
S-11 — 4th Pix I-F, 23.4 MC
S-12 — Horizontal Phase Control
S-13 — Horizontal Hold
S-14 — Width
S-15 — Horizontal Linearity

Receiving Antenna Input Impedance . . . . . 300 ohms balanced
Video Response . . . . . 4 MC band width
Focus . . . . . Magnetic
Sweep Deflection . . . . . Magnetic
Scanning . . . . . 525 lines, interlaced
Horizontal Scanning Frequency 15,750 C.P.S.
Vertical Scanning Frequency . . . 60 C.P.S.
Picture Repitition Rate . . . . . 30 C.P.S.

FIGURE 3 — Non-Operating Controls

Socket Voltages:
Measurements taken with:
1. No Signal
2. Brightness & Contrast Controls Minimum

All voltage readings are subject to approximately a 20% variation.

Voltage readings on V-25 (6AL5) and V-23 (6SN7-GT) are subject to a wide variation: the former is dependent on the position of the Phasing Adjustment, and the latter on the position of the Vertical Hold Control.

All voltages measured from tube pin to chassis unless otherwise noted.

Picture Tube Voltages:

Pin No.	Lead Color	Voltage
2	Green	—100 to 0*
10	Orange	300
Cap	Red	8 to 10 KV

*Grid Bias voltage will be maximum for minimum brightness.

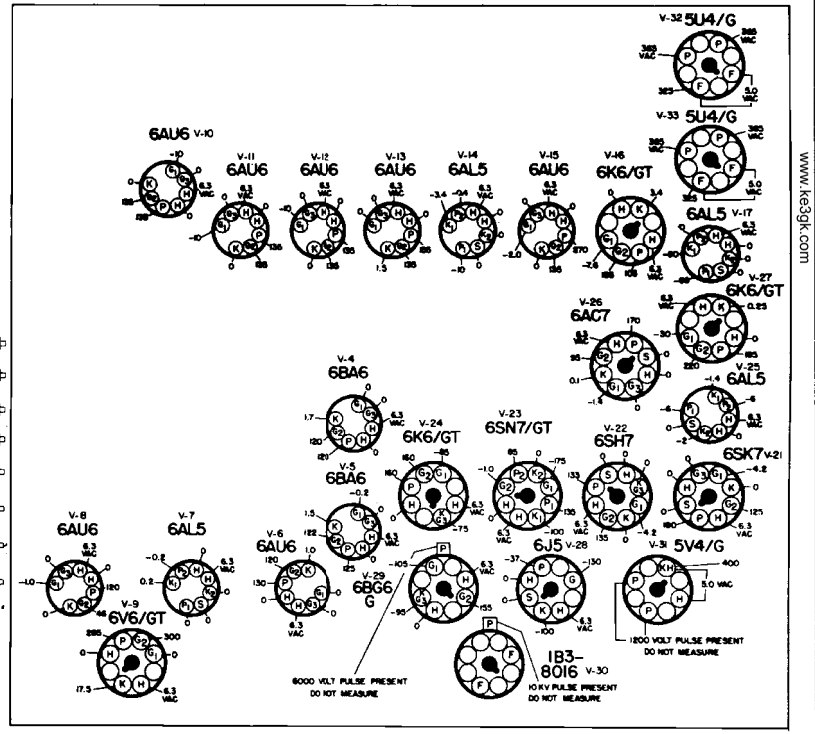

FIGURE 4 — Socket Voltages

CRITICAL LEAD DRESS:
1 — Dress leads of Ratio Detector Transformer, T-5 to V-7, approximately 3/16" above chassis.
2 — Dress video peaking coils up and away from chassis.
3 — Dress video capacitors C-55, C-57 & C-58 up and away from chassis.
4 — Contact between the R-F Oscillator Frequency Adjustment screws and the oscillator coils or channel switch eyelets must be avoided.
5 — Dress T-14 winding leads away from chassis and other components.
6 — If replacement of parts in the high voltage supply becomes necessary, watch lead dress and take extreme care in soldering joints. Keep them all rounded and free from sharp corners.

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HUM IN PICTURE

We have had a few reports from the field on these models where the test pattern seems to expand and contract at a very slow rate of speed. This has been traced to the AC field of the power transformer affecting the deflection yoke. This can be corrected by first loosening the bolts holding the transformer together. In some cases, it has been found it can be corrected by removing the bells from the transformer and putting a wrap of copper shielding approximately 2" wide over the coil and core, being sure to have a well soldered connection between the ends of the wrap, to make one shorted turn.

HIGH FREQUFNCY OSCILLATOR DRIFT

Some cases of drift in the high frequency oscillator have been reported on Models 3193 and 3194 which are using our new type turret tuner. This can be corrected by replacing the 10 MMFD ceramic condenser located near the front end of the tuner with a ceramic N 600, 10 MMFD temperature compensated type. This condenser is connected between contact #2 on the turret tuner, the oscillator coil for each channel is slug tuned, making it possible to set the sound on each channel in the middle of the fine tuning control range.

NOISY VOLUME CONTROLS

On Models 3381, 3091, and 1291, where noise has developed in the volume control, the following engineering change is recommended. At present there is a small DC voltage appearing across the volume control. This should be isolated from the volume control by inserting a .01 200V condenser between the high side of the volume control and the 22K resistor in the out-put of the 6AL5 radio detector.

ADJACENT CHANNEL TRAPS

In some areas interference from commercial radio services above 50 megacycles has been experienced. It is possible in some cases to trap this out by series or parallel traps in the transmission line. However, in most cases this causes quite a loss in signal strength on the affected TV signal. A recent case in a nearby area where a small transmitter on 75.5 megacycles blanketed channel 5 was corrected by installing adjacent channel traps in the IF strip. It is necessary to remove the present first and fourth IF coil, substituting a type which includes a parallel trap, one operating at 19.75 MCS and the other operating at 27.25 MCS. When lining up the traps in the shop, it is suggested your signal generator be set to the frequency which the interfering signal is operating on and adjusting these two traps for minimum response of that frequency. This method has proved quite successful in several applications.

HORIZONTAL OSCILLATOR FEEDBACK

We have experienced a few cases in the table models of horizontal oscillator feedback getting into the picture IF strip, causing a jagged black vertical line of varying widths to appear on the left side of the picture when operating on the high channels. This has been remedied by a redressing of the long red covered wire which runs from the left to the right side of the chassis connecting the B supply filter condensers together. This lead passes quite close to the first IF transformer coil. It should be dressed as far away from the coil and as near the chassis as possible.

TABLE OF REPLACEABLE PARTS

PART NO.	REF. SYMBOL	DESCRIPTION
10520		TV R-F Tuner (RCA)
10523		TV R-F Tuner (GI)
10527		TV R-F Tuner (Std. Coil)
21082		Cabinet
		Capacitor, tubular,
23001	C-102	.001 Mfd., 600 V
23002	C-79	.002 Mfd., 600 V
23004	C-37, 77, 78	.005 Mfd., 600 V
23007	C-35	.02 Mfd., 600 V
23010	C-55, 57, 58, 70, 74, 83, 104, 107, 119	.05 Mfd., 600 V
23011	C-71, 82, 103	.1 Mfd., 400 V
23016	C-32	.003 Mfd., 600 V
23017	C-23, 33, 92, 97, 98	.05 Mfd., 200 V
23021	C-45, 49, 59	.25 Mfd., 200 V
23023	C-24, 76, 100	.01 Mfd., 500 V
23024	C-95	.004 Mfd., 1200 V
23025	C-93, 144	.015 Mfd., 400 V
		Capacitor, mica,
23207	C-80	4900Mmf, 500 V, 10%
		Capacitor, ceramic,
23909	C-53	10 Mmf, 500 V, 20%
23911	C-29, 30	22 Mmf, 500 V, 20%
23914	C-40, 43, 47, 51	100 Mmf, 500 V, 20%
23922	C-109	56 Mmf, 500 V, 10%
23925	C-94	1200 Mmf, 500 V, 20%
23931	C-50	.005 Mfd. 500 V, 10% (disc)
23932	C-110, 111	.01 Mfd. 125 VAC
23935	C-69	82 Mmf, 500 V, 20%
23936	C-22, 25, 26, 27, 28, 38, 39, 41, 42, 44, 46, 48	1500 Mmf, 500 V, 20%
23938	C-105	500 Mmf, 10 Kilovolt
23943	C-72, 73	270 Mmf., 500 V, 20%
23944	C-52, 54	330 Mmf, 500 V, 20%
23945	C-99	390 Mmf, 500 V, 20%
23946	C-101	680 Mmf, 500 V, 20%
23947	C-91, 96	4000 Mmf, 500 V, 20% HI-KAP
		Capacitor; electrolytic,
24002	C-56, 75	10 Mfd., 450 V
24004	C-88, 90	40 Mfd., 350 V
24006	C-36	25 Mfd., 25 V
24030	C-89	40 Mfd., 450 V
24038	C-31	5 Mfd., 50 V
24044	C-87	250 Mfd., 10 V
24045	C-86	1000 Mfd., 6 V
24048	C-81A, B, C	10 X 40 X 40 Mfd., 450 V
24049	C-85A, B, C	10 X 40 X 450 V, 80 Mfd., 150 V
24050	C-84A, B	50 Mfd., 50 V, 80 Mfd., 450 V
		Controls,
25804A	R-95	Vertical Hold, 1 megohm
25805A	R-100	Height, 3 megohm
25807	R-103	Vertical Linearity, 5000 ohms
25808	R-109	Vertical Centering, 20 ohm C.T.
25809C	R-131	Horizontal Drive, 25,000 ohms
25812	R-115	Focus, 1500 ohms
25815	R-72	Contrast, 5000 ohms
25816	R-64	Brightness, 50,000 ohms
25817	R-108	Horizontal Centering, 20 ohms
25022	R-29	Volume, 500,000 ohms
		Coils,
27005	L-100	Choke, filter, 1 Hy. at 320 M.A.-37 ohms
29025	T-3, 4	I-F Sound
29028	L-83, 84, 86, 88	I-F Picture
29030	T-13	Sync. Discrimirator
29031	T-5	Ratio Detector
29115	L-85, 87	R-F Choke, 55 uh
29501	C-97, 98, 103	Yoke
29503	L-102	Width Control
29504	L-102	Horizontal Linearity
29505	L-99	Focus
29506	L-91, 93	Video, 120 uh — Blue
29507	L-92, 94	Video, 93 uh — Red
29508	L-89	Video, 180 uh — White
29509	L-90	Video, 250 uh — Green
29511	T-14	Horizontal Output
29516	T-7	Cathode Trap
32021		Cord, A.C. 6'
41027		Escutcheon, teletube — 10"
41028		Escutcheon, teletube — 12½"
45003		Fuse, ¼ Amp., 250 V. 3AG
45011		Fuseholder
		Resistor, carbon,
73001	R-31, 76	10 ohms, ½ watt, 10%
73008	R-31, 76	39 ohms, ½ watt, 10%
73012	R-37, 42, 46	82 ohms, ½ watt, 10%
73013	R-16, 18, 38, 40, 44, 48	100 ohms, ½ watt, 10%
73014	R-21, 39, 43, 47	120 ohms, ½ watt, 10%
73016	R-48	180 ohms, ½ watt, 10%
73019	R-61	330 ohms, ½ watt, 10%
73021	R-24	470 ohms, ½ watt, 10%
73022	R-106, 107, 121	560 ohms, ½ watt, 10%
73025	R-17, 20, 23, 89	1,000 ohms, ½ watt, 10%
73028	R-104	1,800 ohms, ½ watt, 10%
73029	R-139	2,200 ohms, ½ watt, 10%
73030	R-73, 74	2,700 ohms, ½ watt, 10%
73031	R-19, 58	3,300 ohms, ½ watt, 10%
73032	R-53	3,900 ohms, ½ watt, 10%
73033	R-83, 84, 90	4,700 ohms, ½ watt, 10%
73034	R-22	5,600 ohms, ½ watt, 10%
73035	R-56, 87, 93, 140	6,800 ohms, ½ watt, 10%
73036	R-36, 41, 45, 50, 92, 102, 132	8,200 ohms, ½ watt, 10%
73037	R-17, 20, 23, 89	10,000 ohms, ½ watt, 10%
73041	R-28, 62, 91, 94	22,000 ohms, ½ watt, 10%
73042	R-123	27,000 ohms, ½ watt, 10%
73045	R-67	47,000 ohms, ½ watt, 10%
73046	R-141	56,000 ohms, ½ watt, 10%
73056	R-133	390,000 ohms, ½ watt, 10%
73058	R-51	560,000 ohms, ½ watt, 10%
73121	R-35	68,000 ohms, ½ watt, 20%
73147	R-125	680 ohms, 1 watt, 10%
73149	R-25, 69, 97	100,000 ohms, ½ watt, 20%
73151	R-66	150,000 ohms, ½ watt, 20%
73153	R-101, 129, 75	222,000 ohms, ½ watt, 20%
73157	R-33, 34, 54, 117, 118, 119	470,000 ohms, ½ watt, 20%
73159	R-60, 82, 130	680,000 ohms, ½ watt, 20%
73161	R-59, 68, 85, 88, 120	1 megohm, ½ watt, 20%
73163	R-96	1.5 megohm, ½ watt, 20%
73165	R-32, 98, 99	2.2 megohm, ½ watt, 20%
73169	R-30, 81, 86	4.7 megohm, ½ watt, 20%
73213	R-116	100 ohms, 1 watt, 10%
73231	R-19	3,300 ohms, 1 watt, 10%
73237	R-127	10,000 ohms, 1 watt, 10%
73241	R-124	22,000 ohms, 1 watt, 10%
73243	R-71	33,000 ohms, 1 watt, 10%
73244	R-126	39,000 ohms, 1 watt, 10%
73260	R-136	820,000 ohms, 1 watt, 10%
73279-2	R-137	3.3 ohms, 1 watt, 10%
73431	R-63	3,300 ohms, 2 watt, 10%
73437	R-105	10,000 ohms, 2 watt, 10%
73439-1	R-135	15,000 ohms, 2 watt, 10%
		Resistor, wire wound,
73639	R-128	5,000 ohms, 10 watt, 10%
73661	R-110, 114	1360/25 W — 250/20 W, 10%
73664	R-111, 112, 113	6750/5 W — 12/1 W — 93/5 W, 10%
79002		Socket, tube, octal (Standard)
79051		Socket, tube, miniature
79057		Socket, tube, octal, 1½" Mtg. centers
79059C		Socket, teletube
79064		Socket, filter capacitor
79004		Socket, speaker, 3 prong
83202		Speaker, 5" P.M.
89027A	T-15	Transformer, power
89031	T-11	Transformer, vertical oscillator
89405	T-6	Transformer, output, 5000 to 3.2 ohms
89422	T-12	Transformer, vertical output

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NOTE: THE R-F TUNER SHOWN (10520) WILL NOT BE FOUND IN ALL RECEIVERS. REFER TO TELEVISION R-F TUNER SUPPLEMENT SHEET TO DETERMINE R-F TUNER USED.

TO PRESENT THESE SERVICE INSTRUCTIONS AT THE EARLIEST POSSIBLE TIME, THIS SCHEMATIC DIAGRAM WAS MODIFIED FROM THE MODEL 3381 TV. SINCE THIS RECEIVER HAS NO FM BAND, SOME REFERENCE SYMBOLS HAVE BEEN OMITTED

FIGURE 1 — Cabinet

Production Modifications:

1. In many cases the grid resistors in the Pix I-F Circuit, R-36, R-41 & R-45 (8200 ohms), were changed to 4700 ohms. This was done to improve the I-F response curve.
2. Capacitor C-80 (4900 Mmf.) which runs from the grid of V-23B to T-11 may also be a 5100 or 5700 Mmf. This capacitor was originally ceramic. In later production runs, however, it was changed to mica. This was because of an unfavorable reaction to heat, by the ceramic capacitor, which in turn caused vertical instability.
3. It will be noted that the Schematic Diagram shows an external audio jack which provides for the use of the audio system of another receiver or amplifier if desired. This audio jack was installed in only a very few receivers of an early production run.

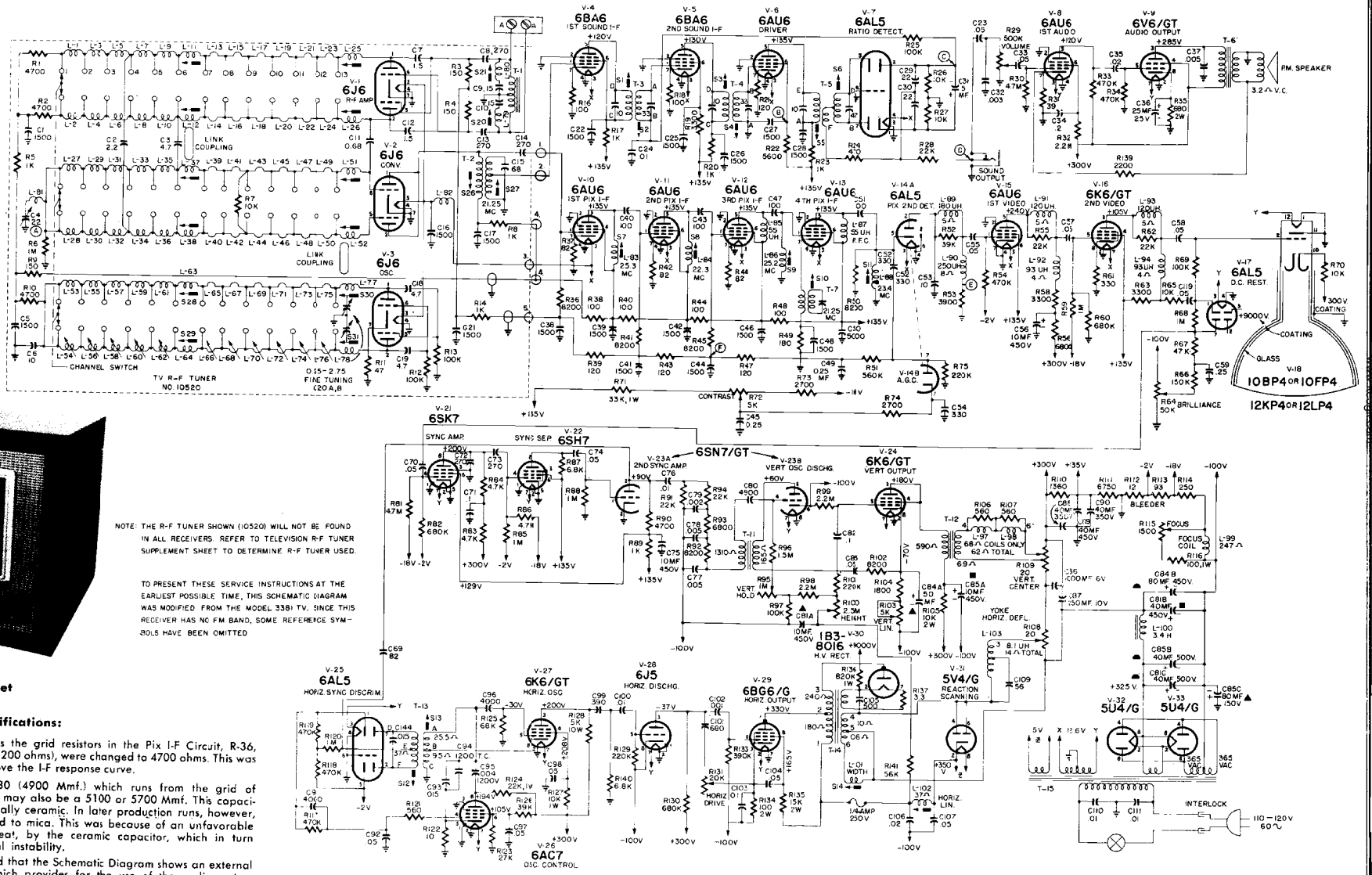

FIGURE 5 — Schematic Diagram

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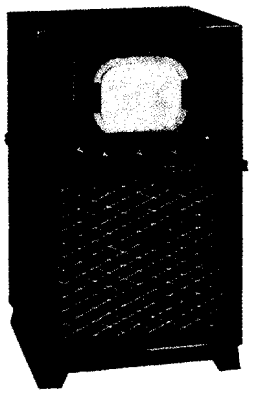

FIG. 1 — CABINET

GENERAL DESCRIPTION

The Model 3381 TV is a combination television receiver, covering all television channels, and an FM band receiver, complete with sound system. An audio jack is provided so that the sound system of another receiver or amplifier may be used if desired.

Mode. 3381 TV has 29 tubes plus a 10" electro-magnetic type television picture tube, and three rectifier tubes.

Some of the outstanding features are:

1. Large casters on the underside of the cabinet which permits moving the instrument for convenient viewing.
2. Switching from TV to FM by push-button operation of FM tuning control.
3. Ratio type detector for FM reception; both FM and Television sound.

SPECIFICATIONS

Overall Dimensions:

Height . . . . 36¾" Shipping Weight . 144 lbs.
Width . . . . . 22" Depth . . . . . 21½"

Electrical Rating:

Line Voltage . . . . . 110-120 volts, 60 cycle AC
Power Consumption . . . . . 280 watts

Tuning Frequency Range:

Frequency Modulation . . . . . 87.5 to 108.5 MC.
Television . . . . . All 12 channels

Intermediate Frequency:

Picture I-F Frequencies:
Picture Carrier Frequency . . . 25.75 MC.
Accompanying Sound Traps . . 21.25 MC.
Sound I-F Frequencies:
Sound Carrier & FM I-F Frequency 21.25 MC.
Video Sound & FM Ratio Detector Band Width . . 350 KCS.

Loudspeaker:

Type . . . . . Permanent Magnet
Outside Cone Diameter . . . . . 6½"
Voice Coil Impedance . . . . . 3.2 ohms at 400 cycles

Electrical Power Output:

Maximum . . . . . 5.0 watts
Undistorted . . . . . 2.5 watts

Tube Complement:

Tube		Function
6J6	V-1	R-F Amplifier
6J6	V-2	Converter
6J6	V-3	Oscillator
6BA6	V-4	1st Sound I-F
6BA6	V-5	2nd Sound I-F
6AU6	V-6	Driver
6AL5	V-7	Ratio Detector
6AU6	V-8	1st Audio
6V6-GT	V-9	Audio Output
6AU6	V-10	1st Pix I-F
6AU6	V-11	2nd Pix I-F
6AU6	V-12	3rd Pix I-F
6AU6	V-13	4th Pix I-F
6AL5	V-14	Pix 2nd Detector, A.G.C.
6AU6	V-15	1st Video
6K6-GT	V-16	2nd Video
6AL5	V-17	D.C. Restorer
10FP4	V-18	Picture Tube (Rcuiand)
or		
10BP4	V-18	Picture Tube (RCA)
6BA6	V-19	R-F Amplifier—FM
6BE6	V-20	Converter Oscillator—FM
6SK7	V-21	Sync Amplifier
6SH7	V-22	Sync Separator
6SN7-GT	V-23	2nd Sync Amp. & Vert. Osc. Discharge
6K6-GT	V-24	Vertical Output
6AL5	V-25	Horiz. Sync Discriminator
6AC7	V-26	Horiz. Osc. Control
6K6-GT	V-27	Horiz. Oscillator
6J5	V-28	Horiz. Discharge
6BG6-G	V-29	Horiz. Output
1B3-8016	V-30	H.V. Rectifier
5V4-G	V-31	Reaction Scanning
5U4-G	V-32	Power Rectifier
5U4-G	V-33	Power Rectifier

Picture Size . . . . . 6¾" x 8½" less 2" radius at corners

R-F Frequency Ranges:

Channel Number	Channel Freq. MC.	Picture Carrier Freq. MC.	Sound Carrier Freq. MC.	Receiver R-F Osc. Freq. MC.
2	54-60	55.25	59.75	81
3	60-66	61.25	65.75	87
4	66-72	67.25	71.75	93
5	76-82	77.25	81.75	103
6	82-88	83.25	87.75	109
7	174-180	175.25	179.75	201
8	180-186	181.25	185.75	207
9	186-192	187.25	191.75	213
10	192-198	193.25	197.75	219
11	198-204	199.25	203.75	225
12	204-210	205.25	209.75	231
13	210-216	211.25	215.75	237

Receiving Antenna Input Impedance . 300 ohms balanced
Video Response . . . . . 4 MC. Band Width
Focus . . . . . Magnetic
Sweep Deflection . . . . . Magnetic
Scanning . . . . . 525 lines, interlaced
Horizontal Scanning Frequency . . . 15,750 C.P.S.
Vertical Scanning Frequency . . . 60 C.P.S.
Picture Repetition Rate . . . . . 30 C.P.S.

CIRCUIT DESCRIPTION

The Television portion of the Model 3381 TV may be divided into ten basic sections. These are:

1. R-F Amplifier, Converter, and Oscillator.
2. Picture I-F Amplifier, Detector, and Automatic Gain Control.
3. Sound I-F and Ratio Detector.
4. Video Amplifier, D.C. Restorer and Picture Tube.
5. Sync Amplifier and Separator.
6. Vertical Sweep.
7. Horizontal Sweep.
8. High Voltage.
9. Audio Amplifier and Speaker.
10. FM Band—R-F Amplifier and Converter.

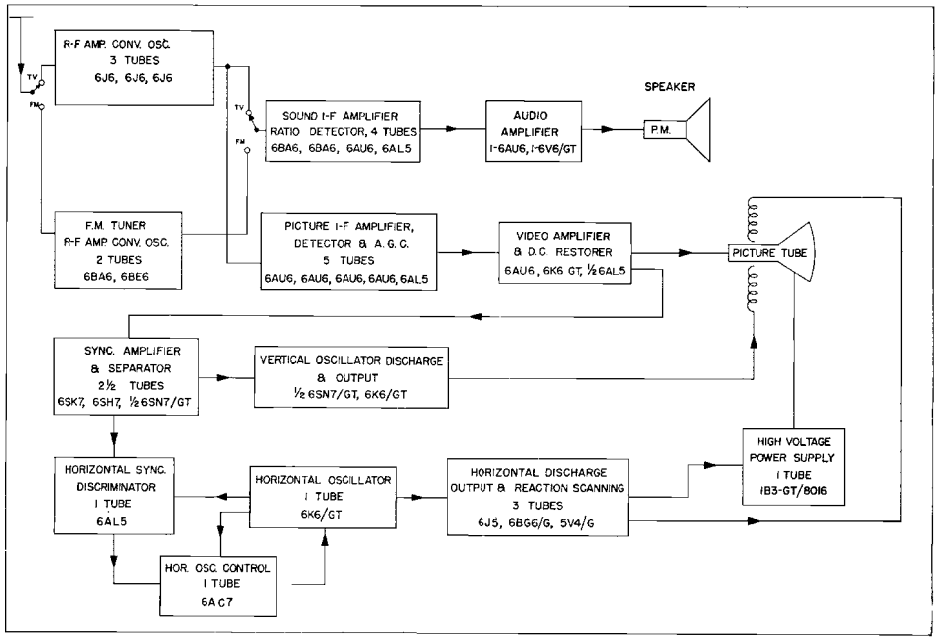

FIG. 2 — BLOCK DIAGRAM

1. R-F Amplifier and Converter:

This section is made up as a separate sub-chassis and utilizes three (3) 6J6 triode tubes connected in push-pull. This arrangement permits gain and conversion for the desired TV signal while tending to cancel noise and undesirable signals.

Switching is accomplished by means of shorting bars across the inductances, which when properly adjusted, tune the circuit to the desired frequency band. The oscillator is on such frequency so as to give a picture I-F of 25.75 MC. and sound I-F of 21.25 MC.

An alternate TV tuner which may be used, accomplishes the desired band switching by varying a ganged capacitor.

2. Picture I-F Amplifier and Automatic Gain Control:

The picture I-F Amplifier consists of four stages, each tuned to a specific frequency to give the desired band pass characteristics. An Automatic Gain Control circuit accomplishes much the same results as automatic volume control does for conventional Amplitude Modulation broadcasting. This permits tuning to different channels with only slight readjustment of the controls. The effects of "fading" are also greatly reduced.

3. Sound I-F Ratio Detector:

The Ratio type Detector permits the use of lower gain I-F stages and makes limiter tubes and circuits unnecessary. Consequently, only four tubes are used in this circuit: two I-F tubes, a Driver, and a Detector. The Amplifier is aligned by means of a sweep generator, set at a center frequency of 21.25 MC., and an oscilloscope.

4. Video Amplifier and Picture Tube:

After the picture signal has been amplified sufficiently, it is rectified, and the radio frequency component eliminated. The resulting signal which contains picture information, blanking, and sync pulses, is further amplified by a two stage video amplifier which has a flat frequency response to 4.0 MC. Inasmuch as these various amplifier stages respond only to A.C. variations, the D.C. component of the video signal, which corresponds to the average lighting of the picture, will not be present. A D.C. restorer is used at this point to change the picture tube grid bias in a manner proportional to the average illumination of the picture. This is accomplished by rectifying a portion of the composite video signal

INTER-CHANNEL INTERFERENCE -- TELEVISION MODELS

In extremely strong signal areas some inter-channel interference has been encountered. Where this condition exists it can usually be corrected by removing the AGC voltage on the RF stage of the tuner. This is to be accomplished by grounding the AGC lead from the TV tuner directly to the chassis. This change applies to both RCA and GI tuners.

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and applying the resultant D.C. voltage with correct polarity to the picture tube grid.

5. Sync Amplifier and Separator:

As the picture signal contains pulses which control the horizontal and vertical sweeps, and blanking, it is necessary to separate these pulses from the picture and from each other. It is the purpose of the Sync Amplifier to amplify the vertical, horizontal, and blanking pulses, and to reduce the effect of extraneous pulses. The Sync Separator serves to remove the video and blanking pulses from the horizontal and vertical pulses. The Sync pulses are then further amplified and separated by means of integrating and differentiating networks.

6. Vertical Sweep Circuit:

Vertical Scanning of a magnetically controlled picture tube requires a saw-tooth waveform of current through the vertical deflection coil. A voltage of the proper waveform and frequency is obtained in the vertical oscillator and discharge tube.

7. Horizontal Sweep Circuit:

This portion of the Model 3381 TV is more complex than the Vertical Sweep Circuit and is made up of the following inter-related circuits:

1. Horizontal Sync Discriminator.
2. Horizontal Oscillator.
3. Horizontal Oscillator Control.
4. Horizontal Discharge Output.
5. Horizontal Output.
6. Reaction Scanning.

The Horizontal Oscillator is a 6K6-GT connected in a very stable Hartley oscillator circuit. In order to maintain the proper frequency (15,750 C.P.S.) and phase relations between this oscillator and the transmitted picture signal, a reactance tube (6AC7) is connected across the oscillator circuit and controlled by means of the Horizontal Sync Discriminator (6AL5) which produces a D.C. voltage proportional to the phase displacement between the oscillator sine wave output and the horizontal sync pulses.

The Horizontal Discharge, Output, and Reaction Scanning circuits convert the sine wave output of the controlled Horizontal Oscillator into a "saw-tooth" of current in the Horizontal Deflection coils to provide horizontal scanning for the picture tube.

8. High Voltage:

The picture tube requires between eight and ten kilovolts on its 2nd anode to give proper picture brilliance. Use is made of the return, or "sweep-back" portion of the horizontal trace voltage. The output of the Horizontal Output tube (6BG6-G) is connected through a transformer to both a high voltage rectifier and to the Reaction Scanning tube. The high voltage winding of the transformer steps up the voltage to the required value. The resultant voltage is then rectified by the 8016 tube and applied to the 2nd anode of the picture tube. Because of the magnitude, and frequency, very little capacitance filtering is necessary to sufficiently "smooth" out this voltage.

The small amount of capacitance in the high voltage circuits does not allow the storage of much energy, thus making this circuit less dangerous than conventional high voltage circuits.

9. Audio Amplifier and Speaker:

A high gain audio stage (6AU6) is coupled to a 6V6-GT type output tube, which in turn is connected to a permanent magnet dynamic speaker. A "feedback" circuit from the voice coil to the cathode of the audio tube assures excellent fidelity of frequency response and negligible distortion.

10. FM Band Tuner:

In addition to receiving Television signals, the Model 3381 TV also permits reception of the FM band. This is done by means of a tuner consisting of an R-F Amplifier, and a Converter-Oscillator which amplifies and converts the incoming FM signal to 21.25 MC. This signal then passes through the same I-F channel as would the picture sound.

A plug is located on the rear of the chassis which permits connecting the audio output of the Ratio Detector to an external amplifier and speaker system.

HIGH VOLTAGE WARNING

OPERATION OF THIS RECEIVER OUTSIDE THE CABINET OR WITH THE COVER REMOVED INVOLVES A SHOCK HAZARD FROM THE RECEIVER POWER SUPPLIES . WORK ON THE RECEIVER SHOULD NOT BE ATTEMPTED BY ANYONE WHO IS NOT THOROUGHLY FAMILIAR WITH THE PRECAUTIONS NECESSARY WHEN WORKING ON HIGH VOLTAGE EQUIPMENT. DO NOT OPERATE THE RECEIVER WITH THE HIGH VOLTAGE COMPARTMENT SHIELD REMOVED.

Non-operating Controls:

Alignment and trap circuit adjustments are not included in this list.

1. Height (rear, extreme left).
2. Vertical Hold (rear).
3. Vertical Linearity (rear).
4. Horizontal Hold (rear).
5. Focus (rear).
6. Horizontal Drive (rear).
7. Vertical Centering (rear).
8. Horizontal Centering (rear).
9. Horizontal Phase (rear, inside chassis).
10. Horizontal Linearity (high voltage cover).
11. Width (high voltage cover).
12. Focus Coil (neck of picture tube; wing nut adjustment).
13. Deflection Coil (neck of picture tube; wing nut adjustment).

*14. Ion Trap (neck of picture tube).

*NOTE: No ion trap is used on Rauland, type 10FP4.

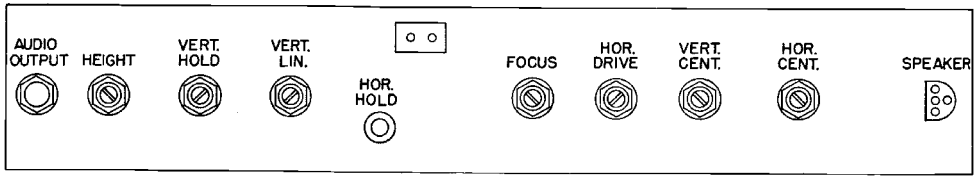

FIG. 3 — NON-OPERATING CONTROLS

TELEVISION TUBE INSTALLATION

The Model .. is delivered with the picture tube ready for operation. If, for any reason, it becomes necessary to remove this tube, the following procedure is recommended:

1. Remove chassis from cabinet and place on a bench or table so that the face of the tube and the control apron of the chassis overhang the table edge by about three inches. PRECAUTION! Make certain that the bench or table is sufficiently solid to support the load.
2. Loosen and remove the two 3/8" nuts that fasten the tube supporting strap with a "spin-tite" wrench from beneath the chassis.
3. Remove strap and sponge rubber protecting piece.
4. Remove socket from the tube base. Also remove the high voltage lead from plug.
5. Remove the picture tube, observing these precautions: **USE GOGGLES OR A MASK, AND GLOVES TO HANDLE TUBE. DO NOT SCRATCH, STRIKE, OR EXERT MORE THAN MODERATE PRESSURE ON TUBE.**
6. To replace tube, reverse the above procedure, taking care to see that the sponge rubber pads are properly positioned. This prevents the tube from touching the metal surface of the chassis.

INSTALLATION INSTRUCTIONS

Before this receiver is installed in a customer's home, the following precautions should be observed:

1. The Model should be so located that light does not fall directly on the picture tube face, thus causing annoying reflections from the safety glass panel.
2. The cabinet should not be closer than two inches from the wall, to permit proper ventilation.
3. Care should be taken in the type, location, and orientation of the antenna so that the best possible results are obtained.

ANTENNA

To insure the best in FM and Television reception, an antenna system has been designed for use with this instrument. This unit will give good signal pickup on all bands and may be purchased from any Packard-Bell dealer.

FM OPERATING INSTRUCTIONS

The FM tuner permits reception of stations within the 88 to 108 MC band.

To receive these stations, push the FM Tuning Control until the engagement of the switch causes the FM tuning dial to light up. The receiver can now be tuned in the usual manner by means of the tuning control and the volume control for desired station and sound level.

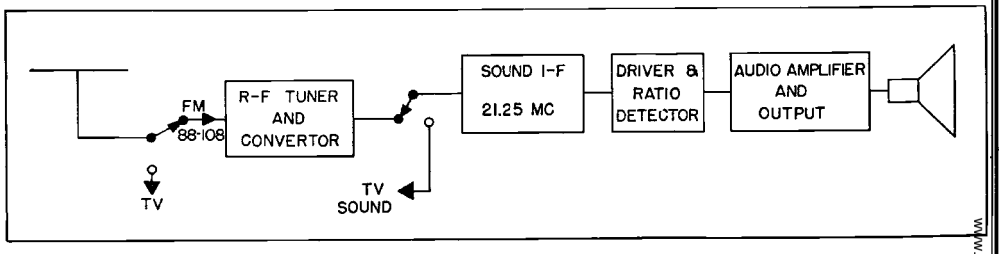

FIG. 4 — F.M. BLOCK DIAGRAM

TELEVISION OPERATING INSTRUCTIONS

The operation of the Television section of the Model 3381 TV is accomplished by means of the controls listed and shown below.

FIG. 5 — OPERATING CONTROLS

Volume Control—For adjusting the sound level, both on Television and FM.

Brilliance Control—For varying the brightness level of the picture.

Contrast Control—For varying the contrast of the picture; gradations of black and white.

FM Tuning and FM-TV Switch—Turning this control tunes the FM section. Pushing the control so as to cause a "catch" to engage, permits switching from TV to FM position. Pushing this control again, releases the catch and operation returns to TV position.

Channel Selector—For selecting desired Television station.

Fine Tuning Control—For obtaining the best sound and picture quality.

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