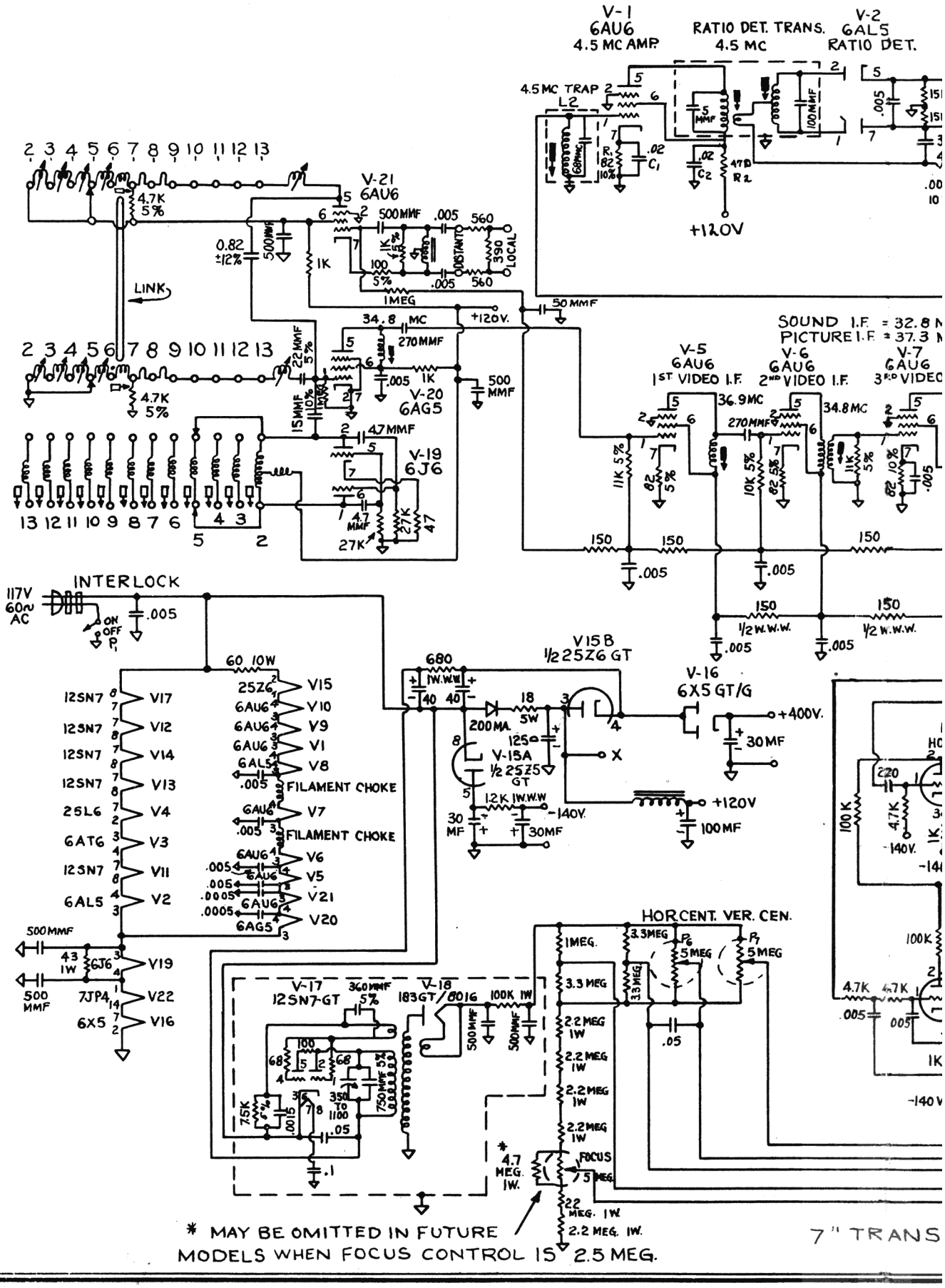
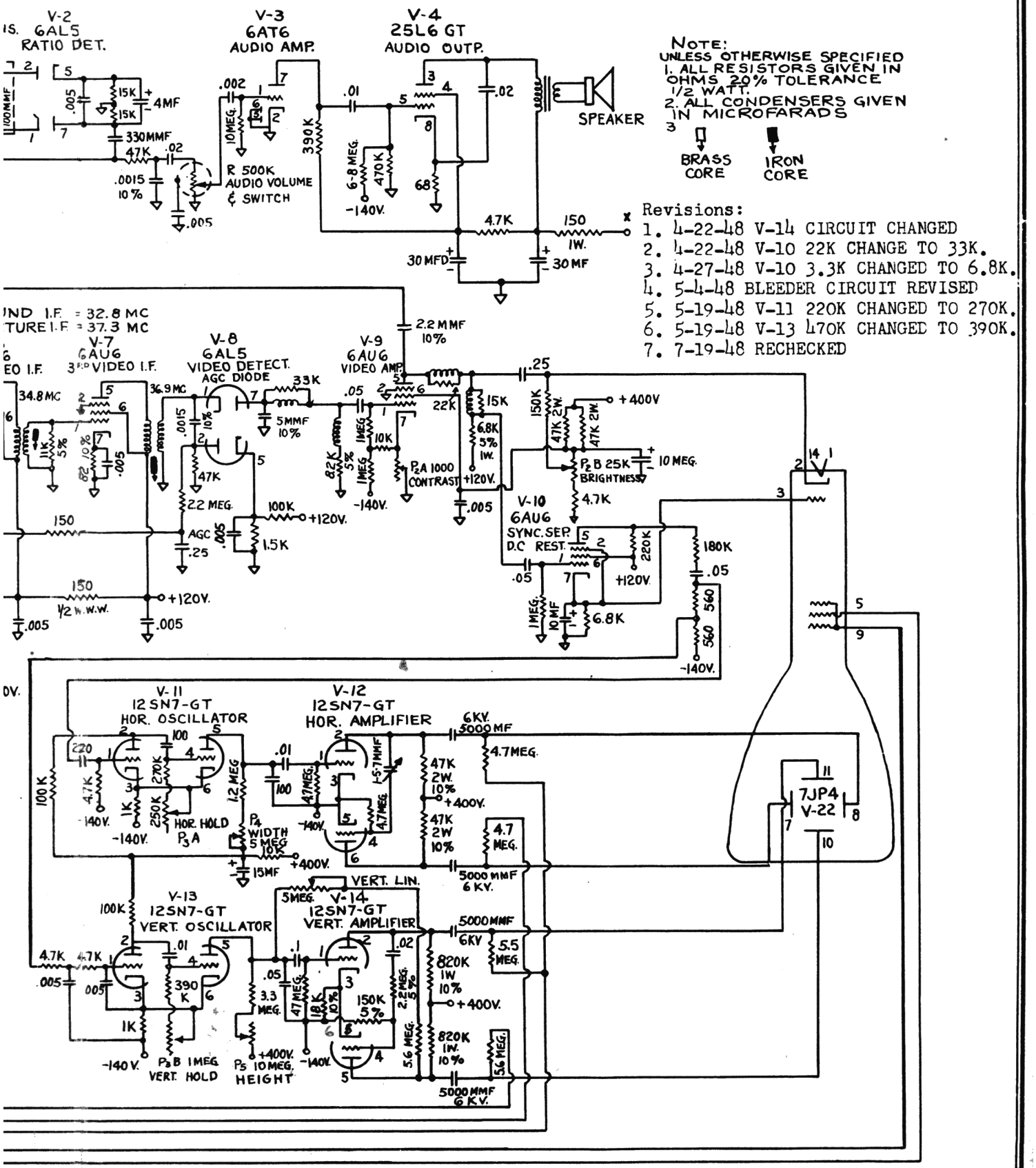
MODEL TV-149

TELE-TONE RAD

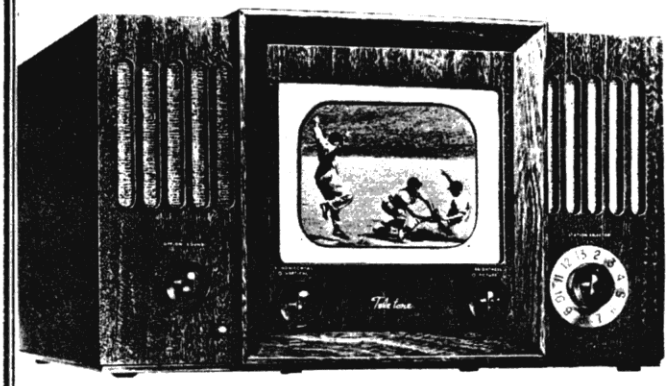




7" TRANSFORMERLESS TELEVISION RECEIVER

MODEL TV-149 TELE-TONE RADIO CORP.

SPECIFICATIONS



Power Consumption—
105 Watts at 110V 60 cycle AC

Power Output (Audio)—
.5 Watts undistorted

Input Impedance—
300 Ohms Balanced

Picture Size—
5½" x 4¼"

Speaker—
1 oz. P.M. - 3" – Voice Coil 3 Ohms

Dimensions—
18¼" Wide, 16½" Deep, 11-1/6" High

Shipping Weight—
App. 38 lbs.

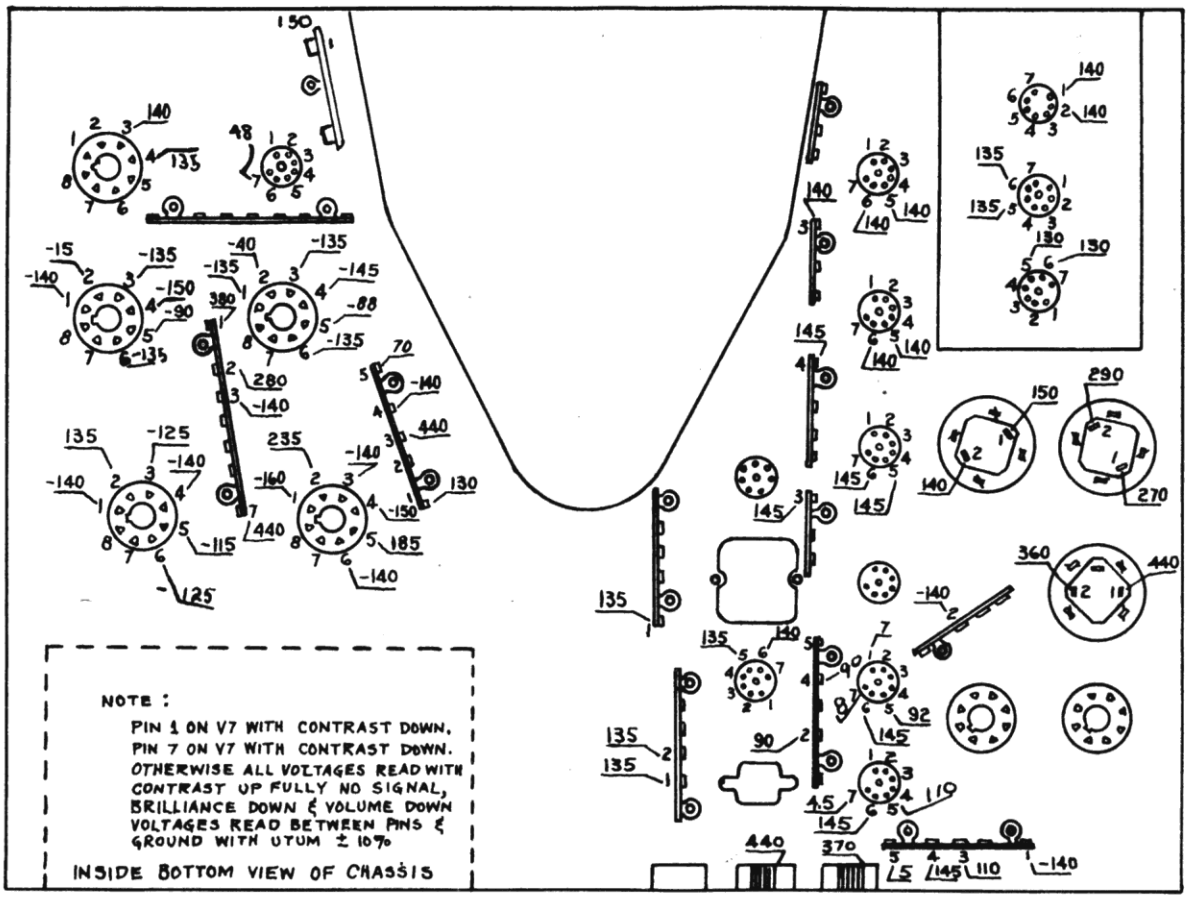
TUBE COMPLEMENT

1	6AU6	RF Amplifier
2	6AG5	Converter
3	6J6	RF Oscillator
4	6AU6	1st Video IF Amplifier
5	6AU6	2nd Video IF Amplifier
6	6AU6	3rd Video IF Amplifier
7	6AL5	Video Detector
8	6AU6	Video Amplifier
9	6AU6	4.5 MC Amplifier
10	6AL5	Ratio Detector
11	6AT6	Audio Amplifier
12	25L6	Audio Output
13	6AU6	Synch Separator and D.C. Restorer
14	12SN7	Horizontal Sweep Oscillator
15	12SN7	Horizontal Sweep Amplifier
16	12SN7	Vertical Sweep Oscillator
17	12SN7	Vertical Sweep Amplifier
18	12SN7	High Voltage Oscillator
19	IB3/8016	High Voltage Rectifier
20	25Z6	Low Voltage Rectifier
21	6X5	Voltage Doubler
22	7JP4	Cathode Ray (Picture) Tube

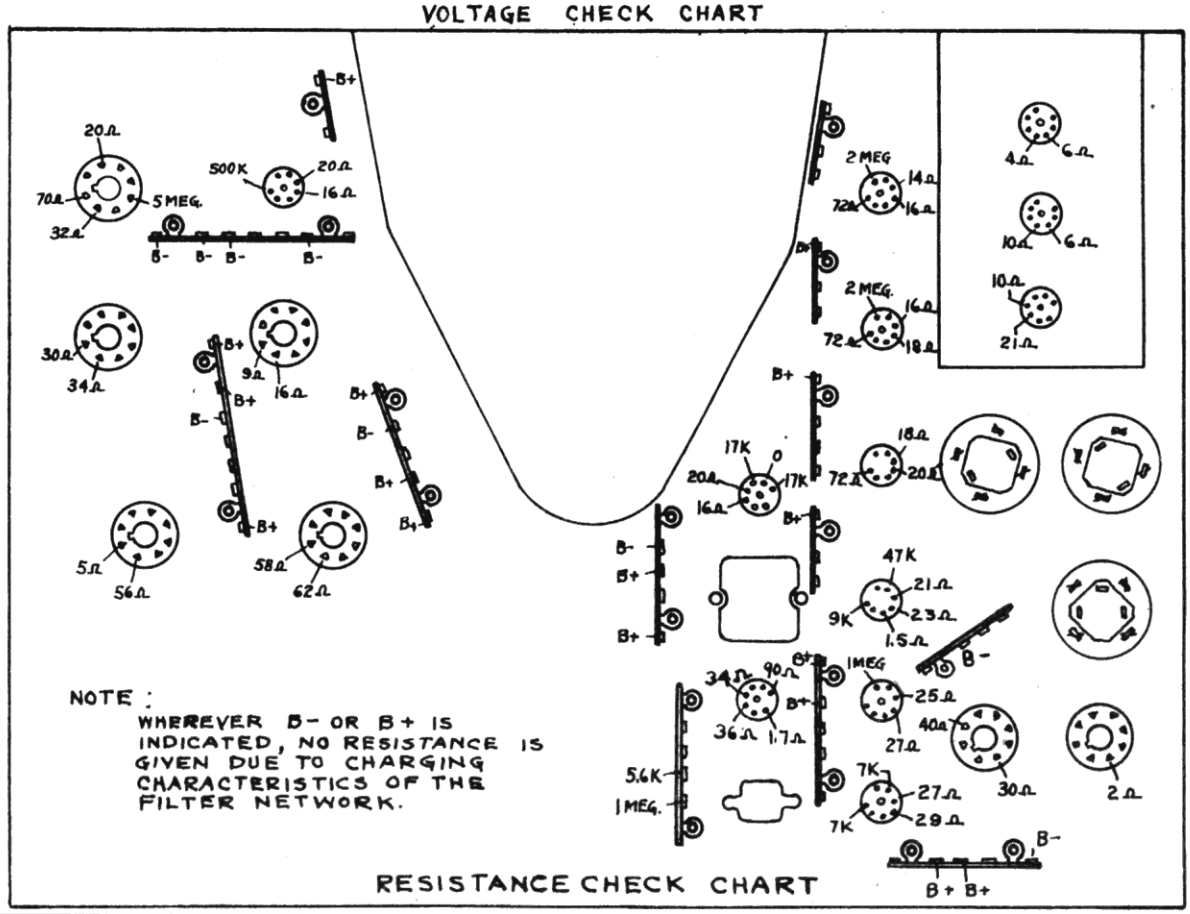
IF FREQ. SOUND - 32.8 PICTURE - 37.3

CHANNEL	FREQUENCY	PICTURE FREQUENCY	SOUND FREQUENCY	RF OSCILLATOR FREQUENCY
2	54-60	55.25	59.75	92.55
3	60-66	61.25	65.75	98.55
4	66-72	67.25	71.75	104.55
5	76-82	77.25	81.75	114.55
6	82-88	83.25	87.75	120.55
7	174-180	175.25	179.75	212.55
8	180-186	181.25	185.75	218.55
9	186-192	187.25	191.75	224.55
10	192-198	193.25	197.75	230.55
11	198-204	199.25	203.75	236.55
12	204-210	205.25	209.75	242.55
13	210-216	211.25	215.75	248.55

TELE-TONE RADIO CORP. MODEL TV-149



VOLTAGE CHECK CHART



RESISTANCE CHECK CHART

and fed through a 4.5 MC Amplifier to the Ratio Detector, and then to the sound amplifier, audio output and speaker.

HIGH VOLTAGE POWER SUPPLY — The High Voltage Power Supply is of the RF type. The Oscillator is free running and independent of other circuits in the set. It is NOT a fly-back power supply. The Oscillator is essentially a tuned plate circuit fed through a typical rectification and filter network. The oscillator is a 12SN7 and the rectifier is a 1B3/8016.

A G C — The receiver uses an AGC circuit operating on the RF and the first 2 IF stages. While it is quite effective in most locations, the receiver may overload in regions of very high field intensity. The contrast can generally be adjusted for a normal picture under such conditions but spurious beats, jagged vertical lines (i.e. poor resolution) and a "Moire" pattern may appear. These effects can be eliminated by the use of a resistor network of 3 to 10 d b attenuation in series with the antenna lead in at the point where it is connected to the receiver. In the absence of such a network temporarily disconnecting one side of the lead-in may serve to reduce the signal strength to a satisfactory level.

GENERAL — The filaments (with the exception of the High voltage rectifier) are hooked up in three series banks. Two of the filament banks are hooked in parallel to one another and both are in series with the third bank. In the accompanying "Filament Diagram" these three banks have been designated as "A" "B", and "C" respectively. For ready reference the filament pin numbers of the individual tubes have been indicated as well as their approximate location on the chassis.

A selenium rectifier, a 25Z6 and a 6X5 (doubler) are used to supply all circuits with three "B" voltages; plus 400, plus 120 and minus 140 volts with respect to ground, (chassis) and plus 250 volts with respect to the hot side of the line. This latter voltage is fed solely to the High Voltage Power Supply.

PRECAUTIONS — Do not remove any tube before first disconnecting the receiver from the power line as damage to other tubes may result. On this model the chassis is returned to one side of line. Care should be taken to avoid grounding receiver. As the antenna terminals are isolated from chassis no damage will result if the antenna is accidentally grounded. Where severe line noise is encountered reversing the AC plug may be advantageous.

ALIGNMENT PROCEDURE

The alignment of a Teletone Television Receiver can be broken down into three basic parts.

1 — Video IF Alignment **2 — RF Alignment** **3 — Sound Alignment**

TEST EQUIPMENT

CATHODE RAY OSCILLOSCOPE — The main requirement in a Cathode Ray Oscilloscope is that it should have a good high frequency response up to 1 mc. The tube size is relatively unimportant, however, anything under 5" usually makes fine adjustment quite difficult.

SWEEP GENERATOR —The sweep generator used should have linear coverage of a center range from 30 to 220 megacycles. The output should be fairly flat over wide frequency variation of the sweep. It should be capable of an output of about 0.1 volt with attenuation. It is preferable that the generator have a deflection output for the test oscilloscope.

AM SIGNAL GENERATOR — This generator should have a frequency range of from 4.5 to 220 megacycles. As this generator is used occasionally as a marker generator, accuracy is an important factor. It should be capable of 0.1 volt output with attenuation and should be linear through the range.

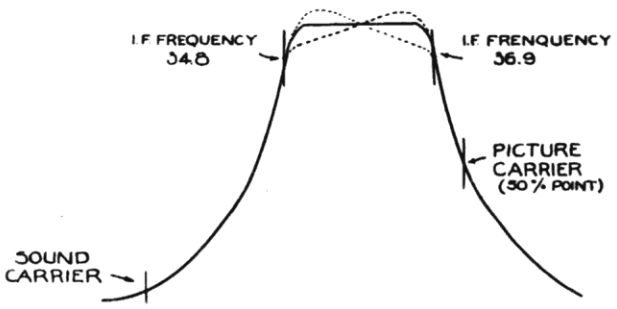
VACUUM TUBE VOLTMETER — Almost any standard make VTVM will do. It should have reversible polarity switch and should be roughly comparable to the RCA junior volt ohmyst.

VIDEO IF ALIGNMENT

An adequate signal can be fed through the video IF string by feeding the output of the sweep generator into a tube shield placed over the mixer tube (V-20). Care should be taken that this shield is NOT grounded. The ground side of the output can be connected to the grounded shield of the adjacent oscillator tube (V-19). This method will be found to be convenient and practicable, especially where a simple jig has been prepared.

The oscilloscope should be connected between the grid circuit of the video amplifier (V-9) and ground.

Adjust the first and third video IF transformers for the proper response on the lower or sound end of the



curve and the second and fourth IF transformers for high frequency or picture response.

By substituting an AM generator for the sweep generator and vacuum tube voltmeter for the oscilloscope, using the procedure above, the receiver can be aligned **without** the use of the sweeper. In this case, the generator output is adjusted so that the response is about minus one volt at the plate of the second detector, with AVC shorted out. With a 34.8 megacycle signal unmodulated fed in this manner the first and third video IF transformers should be aligned, and with a 36.9 megacycle signal the second and fourth video IF transformer should be adjusted for maximum deflection of the VT voltmeter.

RF ALIGNMENT

RF AMPLIFIER AND MIXER — These stages are factory adjusted normally and do not require readjustment in the field. If misalignment of these circuits is suspected contact:

Service Manager
Teletone Radio
540 West 58th Street
New York 19, New York

RF OSCILLATOR — Connect the oscilloscope input to the grid of the video amplifier (Pin 1 of V9)

Feed the sweep signal generator into the antenna terminal. Connect the AM Generator across the output of the sweep generator using this voltage as your marker.

Adjust the slug in the oscillator coil until the picture marker is at a point on the response curve that represents 50% of the amplitude of that curve and the sound marker is at a point at the other end of the curve that would represent roughly 20 db down. It should be kept in mind that:

1 — The final oscillator adjustment check should be made with a signal received on an antenna from the transmitting station and

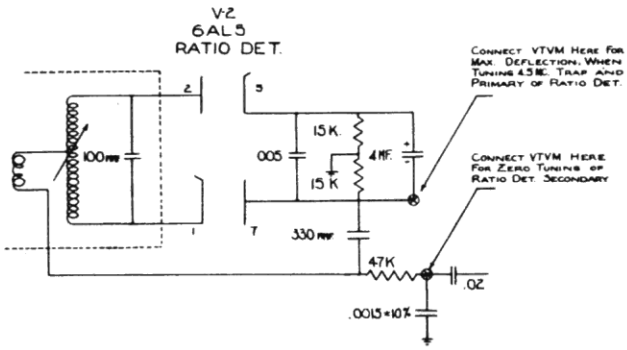
2 — That the channel 2 oscillator coil is in parallel with all other oscillator coils for the various channels. Channel 2 should be adjusted first and then the remaining channels adjusted in any order and thereafter any readjustment of channel 2 will require additional readjustment of the remaining channels.

NOTE: 1 — Care should be taken that the alignment tool used on the oscillator coil adjustments should be no larger than 3/16" diameter. Serious damage to the oscillator coils may result if this precaution is not observed.

2 — In order to avoid circuit overload, it is recommended, that the sweep amplitude be reduced to a point where the selectivity curve does not change appreciably with further reduction of the input voltage.

SOUND ALIGNMENT

The sound alignment of this receiver is best done with an AM generator and a vacum tube voltmeter. By feeding a 4.5 megacycle signal into the grid (pin 1) of the video amplifier (V-9) and placing the vacuum tube voltmeter at pin 7 of the ratio detector (V-2) the 4.5 megacycle trap and the primary of the ratio detector can be adjusted. In both cases the generator should be attenuated so that the reading on the voltmeter is between minus 3 and minus 4 volts, and both adjustments are for maximum deflection of the meter. The meter should then be connected to the junction of the .0015 condenser, from ground, and the 47,000 ohm resistor, from the center top of the secondary of the ratio detector transformer. The secondary should then be adjusted for a zero reading. (See diagram) The primary of the ratio detector transformer is found on the underside of the chassis, the secondary on top.



SERVICE NOTES

R. F. SECTION

1 — Channel 2 oscillator coil shunts the remaining oscillator coils. As a result, in RF aligning it is necessary that channel 2 be aligned first and 3 to 13 in any order thereafter. Tuning channel 2, oscillator coil, will effect all other oscillator coils.

2 — When aligning oscillator coil for any channel, it should be noted that as the slug is tuned through the oscillator coil there will be two points at which a satisfactory picture will result. Only one of them is correct. To determine the correct position of the slug, start with the slug at the extreme end of the coil closest to you as you face the set, the first peak that you reach is the proper one.

3 — A study of the schematic will show that the filament of 6J6 RF oscillator tube is shunted by a 43 ohm 1 watt resistor. An open filament or removal of the oscillator tube will cause this resistor to smoke but will cause no appreciable damage. The 6J6 may be replaced and the set will function normally without replacing the resistor in most cases.

VIDEO IF SECTION

1 — If regeneration is noted in the TV-149 video IF section, poor quality pictures may result. To rectify this condition a .005 condenser should be run from the B plus supply for the video IF string to ground. A convenient point is from the shield of the 3rd video IF tube in the center of the tube socket on the under side of the chassis to B plus terminal adjacent thereto.

2 — Some trouble has been noted in the AGC circuit of early models where one of the components changed in value resulting in over action. This can be checked by shorting out AGC and noting the results in the picture. A check of all component parts in the AGC circuit should show the defect.

3 — On a complaint of weak pictures where aligning and tube changing is to no avail, a good point to check is the continuity of the peaking coils. These coils are wound on resistors which shunt them in all cases and sometimes when a coil is open a weak signal will feed through the resistor.

SOUND

1 — When a buzzing is noted in the sound section of a TV-149 and it cannot be cured by adjusting the 4.5 megacycle trap or RF oscillator adjustment, it is probably due to the fact that the discriminator has been aligned with too strong a signal. When feeding an AM signal at 4.5 megacycle into the grid of the video amplifier, the voltage at pin 7 of the ratio detector must not exceed minus 5 volts. By adjusting the 4.5 megacycle trap and the primary of the ratio detector in the above stated manner, this trouble will be eliminated. As a further precaution the vacuum tube voltmeter should be connected at the junction of the 47,000 ohm resistor and the .0015 condenser and the secondary of the ratio detector should be tuned for zero with the same signal input as above. (See figure 7)

NOTE: 1 — The above adjustment can be made by feeding a signal from a transmitting station into the antenna terminals, provided, there is some method of attenuating the incoming signal so that the voltage at pin 7 of the ratio detector tube does not exceed minus five volts.

2 — Occasionally AC hum will be noted which is caused by heater to cathode leakage in the ratio detector tube. This condition can be cured by shunting the filament with a 120 ohm ½ watt 20% resistor.

3 — Another cause of hum in the sound is found in the grounding of the volume control. Care should be taken that the volume control is not grounded at the same point as one side of the AC switch.

SYNC CIRCUIT

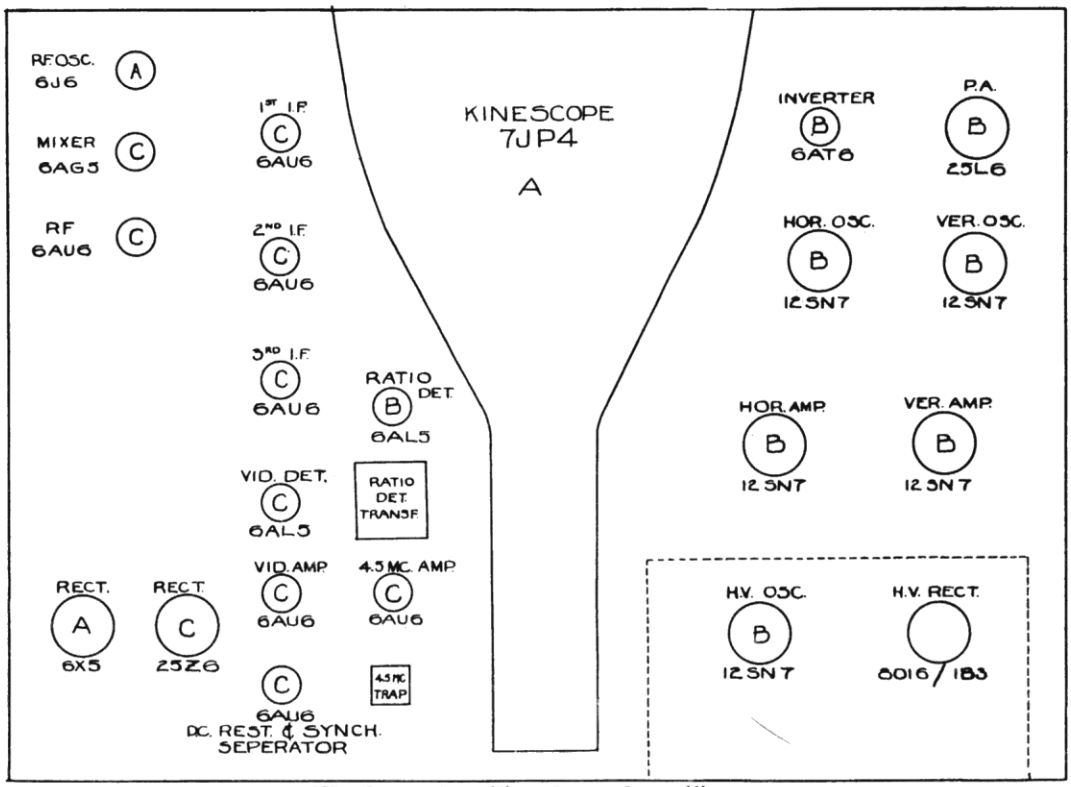
1 — In areas of extreme interference causing vertical roll (this will only be required in most extreme cases) shorting the cathode (pin 7) of the sync separator to ground will give the required stability.

FILAMENT CIRCUIT

1 — A study of the circuit diagram will show that the filaments of (a) the cathode ray tube (b) the RF oscillator and (c) the 6X5 doubler are in series with one another and as a group are in series with two other filament banks. An open filament in any one of the above mentioned tubes will cause all the tubes in the set to fail to light, whereas an open filament in any other tube will only extinguish its own particular bank.

H. V. POWER SUPPLY

1 — In early models a short in B plus in the high voltage power supply will usually result in the 680 ohm filter resistor in the B plus supply smoking. It is advisable that when this occurs the resistor be replaced.



NOTE: FILAMENT CIRCUIT 'B' AND FILAMENT CIRCUIT 'C' ARE IN PARALLEL TO ONE ANOTHER AND BOTH ARE IN SERIES WITH FILAMENT CIRCUIT 'A'. HENCE AN OPEN FILAMENT IN 'B' OR 'C' WILL ONLY EFFECT THE TUBES IN THAT CIRCUIT, WHEREAS AN OPEN IN 'A' WILL CAUSE ALL TUBES TO FAIL.

SWEEP CIRCUITS

1 — There are two resistors running to the two plates (pin 2 and pin 6) of the horizontal sweep amplifier. Their value is 47,000 ohms each. In some early models these resistors were rated at one watt, but since has been changed to 2 watts. In cases of horizontal shrinkage, the value of these two resistors should be checked and if replaced should be replaced by two watt resistors.

2 — A trapezoidal pattern can usually be traced to a failure in the B minus circuits feeding the horizontal or vertical sweep.

BRIEF CIRCUIT ANALYSIS

The Teletone Television Receiver Model TV 149 uses the Inter-Carrier system on Video and sound IF. In this system the picture and sound carriers are both sent through a single IF string and are separated AFTER the second detector. The sound is taken off the plate of the Video Amplifier and fed through a 4.5 Megacycle Trap into a 4.5 Mc. amplifier and then through the ratio detector.

The Synchronization circuits use ordinary triggered synch into a multivibrator sweep oscillator. The Vertical and Horizontal sweep systems are very much the same, the main difference being in the frequencies involved.

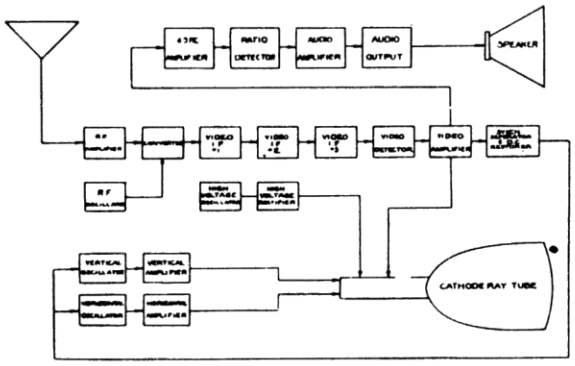


FIG. 3

TUNER — The tuner in this model covers 12 channels (2 to 13 inclusive). The local oscillator is tuned to the high side on all channels and is adjusted to provide a picture I.F. of 37.3 Mc. and a sound I.F. of 32.8 Mc.

The tuning inductance for channel 2 is across the oscillator at all times. The tuning inductances for channels 3 to 13 respectively is shunted across the channel 2 inductance as these channels are selected.

In aligning the receiver channel 2 must first be adjusted and channel 3 to 13 then adjusted. Misalignment of channel 2 will detune the other channels. Appreciable readjustment of channel 2 may require retuning of several of the low frequency channels. This effect is of less importance on channels 7 to 13. Alignment should be attempted only after the receiver has been operating for 5 minutes.

R. F. AMPLIFIER — The antenna is fed between the grid and cathode of the RF Amplifier. The input circuit of this stage is not tuneable. The RF stage is tuned by what is, electrically speaking a single tapped inductance. Mechanically, this coil takes the form of several individual coils which are cut in or out of the plate circuit by the band switch. These coils as well as the Mixer coils will rarely need touching.

MIXER — The output of the RF Amplifier and the Local Oscillator are condenser fed into the Control Grid of the Mixer Stage. This circuit is tuned in much the same manner as the output of the RF Amplifier, previously described.

OSCILLATOR — The RF Oscillator is fairly straightforward in operation. Its main peculiarity is that the coil for Channel 2 is permanently parallel to all other Oscillator coils from 3 to 13. It is therefore necessary, when aligning the oscillators to ALIGN CHANNEL 2 FIRST and the rest of the coils in any order thereafter. They are tuned by brass slugs accessible from the outside of the cabinet by removing the Station Selector knob and the channel Escutcheon. Channel two is found at the top of the right hand slot and the others follow in regular order in a clockwise direction finishing with channel thirteen at the top of the left hand slot.

NOTE: THE CHANNEL NUMBERS ON THE ESCUTCHEON DO NOT CORRESPOND TO THE LOCATION OF THE OSCILLATOR COILS.

VIDEO IF — Each Video IF transformer has only one adjustment, a powdered iron slug accessible from the top of the chassis. The Video IF String is stagger tuned to two frequencies. The first and third IF transformers are tuned to 34.8 Megacycles and the second and fourth are tuned to 36.9 megacycles. The response curve is fairly flat topped and should produce a picture with good definition.

VIDEO AMPLIFIER — The output of the Video amplifier is fed to three separate circuits. It is here that the separation of picture and sound takes place. It supplies (1) The cathode ray tube with picture intelligence and blanking (2) the grid of the synch separator with the incoming synch pulses and (3) the 4.5 Mc. Trap with the sound carrier.

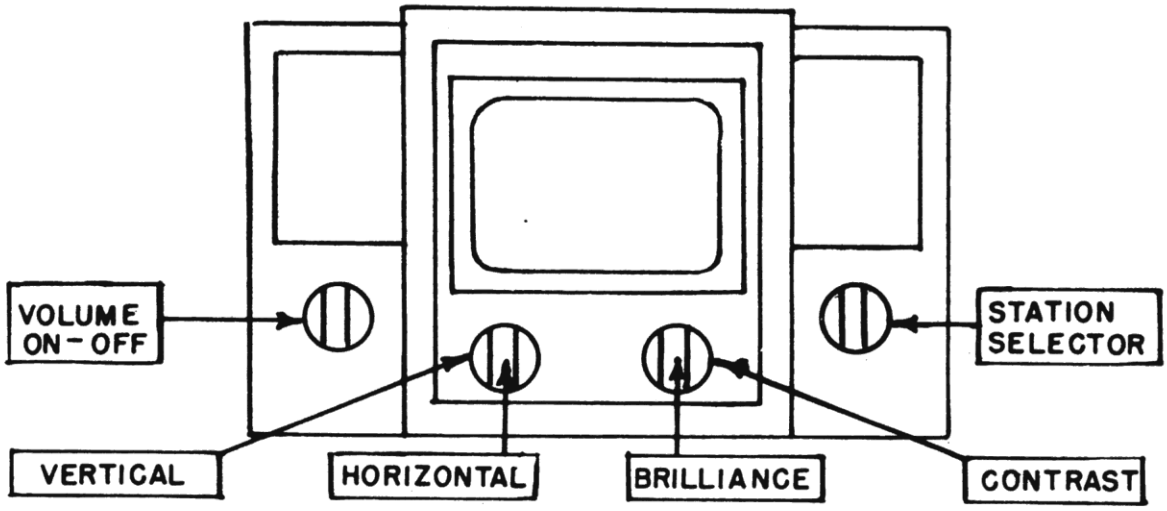
SYNCH SEPARATOR AND DC RESTORER—The synch pulses fed from the Plate of the Video Amplifier to the grid of the Synch Separator are taken off the plate of the Synch Separator (at which point they are of negative polarity) and trigger the sweep oscillators in much the normal manner. There is a sufficient amount of limiting action to remove whatever static interference may ride in on the pulses. DC restoration voltage is developed across the Cathode resistor and fed to the Control grid of the Cathode Ray Tube.

SWEEP AMPLIFIERS AND OSCILLATORS — Both the Horizontal and the Vertical sweep oscillators and amplifiers are very much the same in general operation. The Oscillators are of the Multi-vibrator type and the amplifiers are 12SN7's (twin triodes) operating push pull. Centering in both cases is accomplished by varying the DC voltage on one of the deflection plates and maintaining a constant DC potential on the opposing plate.

SOUND SYSTEM — The sound Carrier is taken off the plate of the Video Amplifier by a 4.5 Megacycle trap

TELE-TONE RADIO CORP. MODEL TV-149

FRONT PANEL



REAR OF CHASSIS

HIGH VOLTAGE ADJUSTMENT —

This is a "screwdriver" adjustment. It is not necessary to use special screwdrivers (bakelite or plastic) to adjust this control. It will not "detune" nor is the trimmer above ground potential. It will increase or decrease the High Voltage applied to the Second Anode of the Cathode Ray Tube. An increase in High Voltage will make the picture smaller by accelerating the electron beam and thereby making it harder to deflect. When the adjustment is rotated in a clockwise direction, it will decrease the High Voltage.

There is one additional control which will very rarely need adjustment. That is the horizontal linearity control. It is a condenser located on the underside of the chassis from pin 4 to pin 2 of the Horizontal Sweep Amplifier and cannot be reached without first removing the chassis from the cabinet.