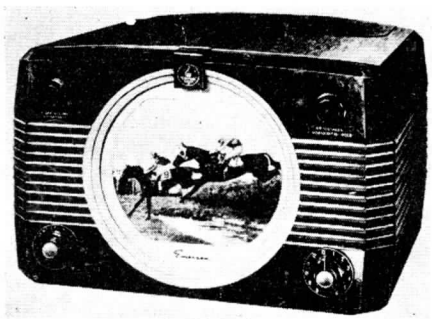
Emerson Radio

Television

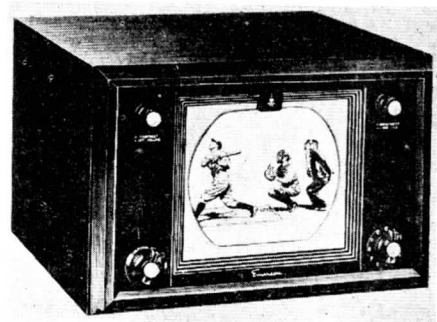
SERVICE MANUAL

MODELS 614-637-644-647

MODEL 644



MODEL 614



MODEL 637

MODEL 647

Television Receivers

EMERSON RADIO AND PHONOGRAPH CORPORATION

111 EIGHTH AVENUE **NEW YORK 11, N. Y.**

TABLE OF CONTENTS

Par.		Page
	SECTION 1—GENERAL DESCRIPTION	
1	Facilities	3
2	Specifications	4
	SECTION 2—INSTALLATION	
1	Preparation for Installation	4
2	Antenna Installation	4
3	Receiver Installation	5
	SECTION 3—OPERATION	
1	Operating Controls	5
2	Tuning	5
	SECTION 4 — CIRCUIT DESCRIPTION	
1	General	7
2	Tuner	8
3	Video Section	8
4	Deflection Section	9
5	Power Supplies	9
6	Intercarrier Sound	10
7	Deflection Yoke and Focus Coil Assembly	10
	SECTION 5—MAINTENANCE AND ALIGNMENT	
1	General	10
2	Chassis Removal	10
3	Kinescope Replacement	10
4	Mechanical Deflection Adjustments	10
5	Electrical Deflection Adjustments	11
6	Alignment Test Equipment	14
7	Alignment	14
8	Voltage and Resistance Analysis	17
9	Deflection Circuit Waveforms	17
10	Production Changes	19
11	Secondary Area Reception	21
12	Cabinet Parts List	21
13	Chassis Parts List	22

LIST OF TABLES

Table	DESCRIPTION	Page
I	Tube Complements	3
II	Receiver Characteristics	4
III	Adjustments Control Settings	11
IV	Generator Frequencies	14
V	Audio I-F Alignment	15
VI	Video I-F Alignment	16
VII	Tuner Alignment	17
VIII	Deflection Waveform Test Points	18

LIST OF ILLUSTRATIONS

Fig.	DESCRIPTION	Page
1-1	Front View of Chassis 120098B	3
1-2	Tube Location Diagram	4
1-3	Video, Audio, and Oscillator Frequencies	4
3-1	Front Panel Controls	5
3-2	Test Pattern, Correctly Adjusted	6
3-3	Test Pattern, Tuning Misadjusted	6
3-4	Test Pattern, Excessive Contrast	6
3-5	Test Pattern, Excessive Brightness	6
3-6	Test Pattern, Vertical Hold Misadjusted	6
3-7	Test Pattern, Horizontal Hold Misadjusted	6
3-8	Test Pattern, Focus Misadjusted	6
3-9	Test Pattern, Weak Signal	6
4-1	Block Diagram—Chassis 120110B, 120113B	7
4-2	Schematic Diagram of Tuner	8
5-1	Deflection Yoke and Focus Coil Adjustments Combined Mechanical and Electrical Centering	11
5-2	Focus Coil Adjustments, Mechanical Centering	11
5-3	Schematic Diagram Chassis 120110B	12,13
5-4	Rear Deflection Adjustments	14
5-5	Generator Matching Network	14
5-6	Scope Detector Network	14
5-7	Location of Alignment Points	15
5-8	Tuner Alignment Points	16
5-9	Side View of Tuner	17
5-10	Voltage and Resistance Diagram	18
5-11	Sweep Circuit Waveforms	19
5-12	High Voltage Power Supply, Chassis 120113B	20
5-13	Bottom View of Chassis	21

Section 1.

GENERAL DESCRIPTION

1. FACILITIES—Emerson Models 614, 637, 644, and 647 are wide-band video receivers, providing direct-view high-definition pictures on ten or twelve-inch electro-magnetic deflection kinescopes. All models incorporate several design features including intercarrier sound, AFC in the horizontal sync circuits, automatic gain control, a series-type transformer power supply, and internal antennas.

Models 614 and 637 employ Chassis 120110B; Models 644 and 647 use Chassis 120113B. Both chassis are basically alike; the latter is modified to accommodate the larger kinescope, type 12LP4 or 12QP4. Model 614 is housed in a plastic cabinet, and Model 637 is contained in a wooden cabinet; both are table model receivers using a type 10BP4 picture tube. Model 644 is housed in a table model cabinet; Model 647 uses a consolette-type of cabinet.

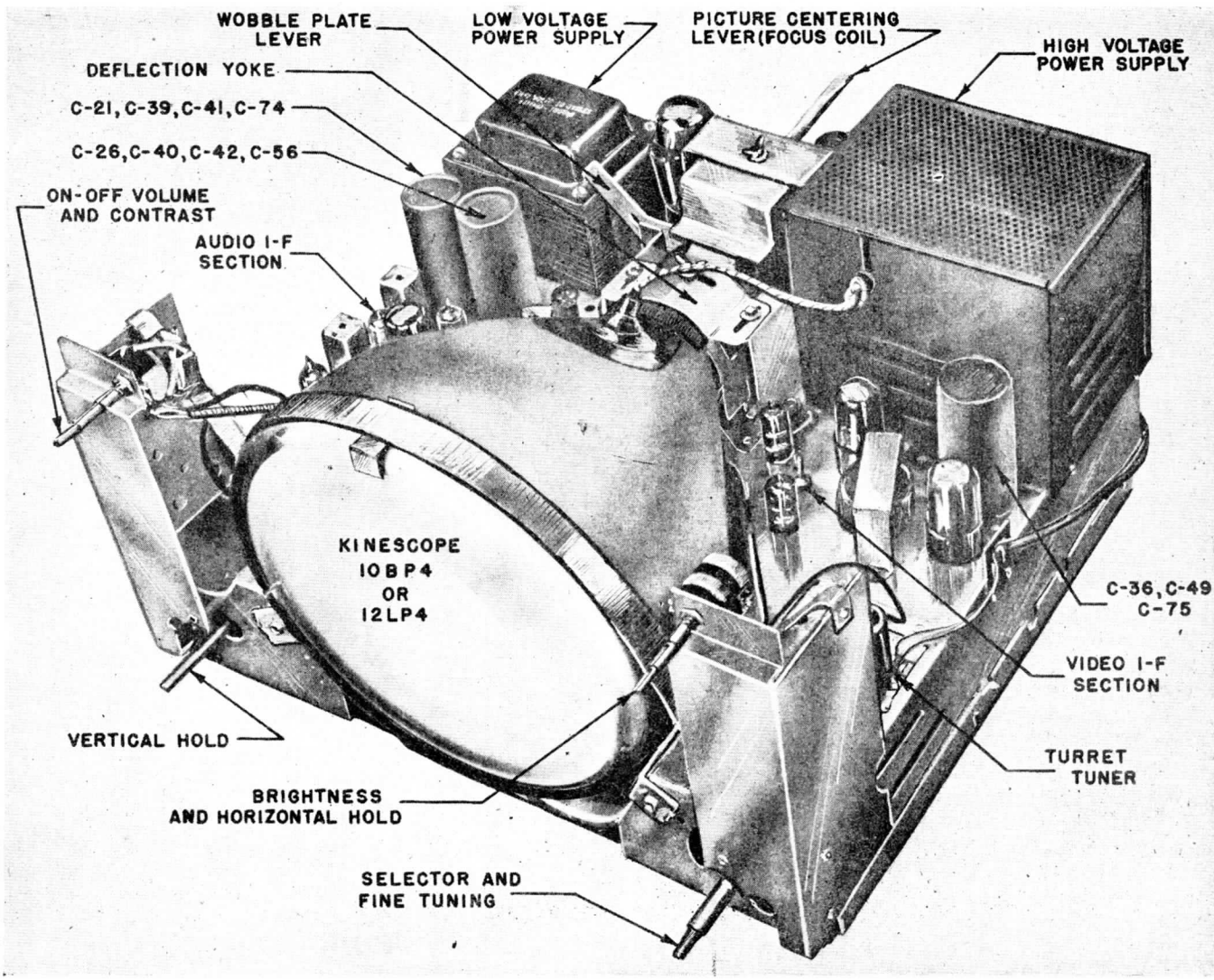
2. SPECIFICATIONS—

a. TUBE COMPLEMENTS: (Table 1).

NOTE: The tube complements of both chassis are alike, except for the kinescope. Chassis 120113B uses type 12LP4 kinescope; some chassis may be equipped with a type 12QP4.

SYMBOL	TUBE TYPE	FUNCTION
V1	6AG5	First video i-f amplifier
V2	6AG5	Second video i-f amplifier
V3	6AU6	Third video i-f amplifier
V4	6AL5	Video detector and AGC
V5	6AU6	First video amplifier
V6	12AU7	Second video amplifier; second sync amplifier
V7	6AU6	Sound i-f amplifier
V8	6AU6	Sound limiter
V9	6T8	Sound disc. and audio amp.
V10	6V6GT	Audio output
V11	6SN7GT	Hor. phase invert.; horizontal control (d.c. amp.)
V12	6AL5	Hor. phase det. (sync disc.)
V13	6SN7GT	Hor. oscillator and discharge
V14	6SN7GT	Vert. oscillator and discharge
V15	12AU7	Sync sep. and d.c. restorer; first sync. amplifier
V16	6K6GT	Vertical output
V17	6BG6G	Horizontal output
V18	1B3GT	High-voltage rectifier
V19	6W4GT	Horizontal damper
V25	10BP4* or 12LP4#	Kinescope
V27	6J6	Oscillator and converter
V28	6AG5	R-f amplifier
V29	5U4G	Low-voltage rectifier

* Chassis 120110B # Chassis 120113B



Figude 1-1—Front View of Chassis 120110B

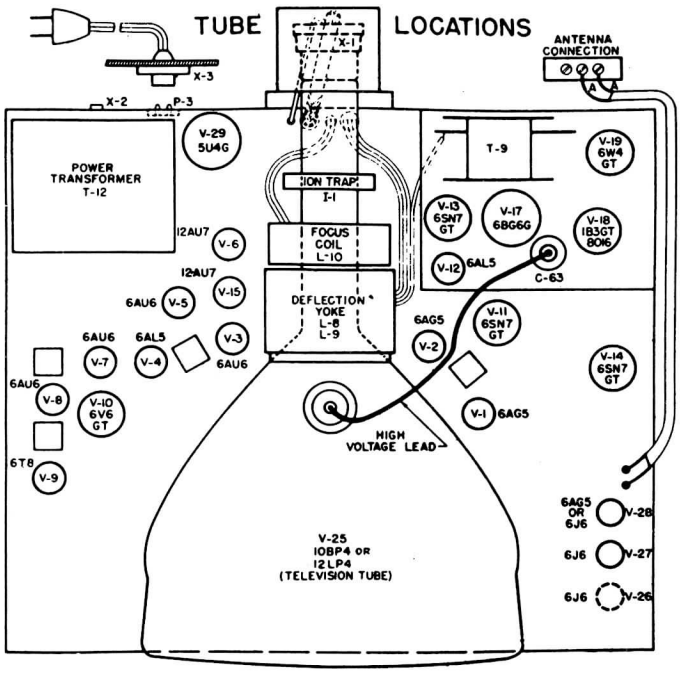


Figure 1-2 Tube Location Diagram

b. RECEIVER CHARACTERISTIS: (Table II).

ITEM	DESCRIPTION
Voltage Rating	105-125 volts, 60 cycles a.c.
Power Consumption	All models—190 watts
Current Drain (At 117 volts a.c.)	All models — 1.7 amps.
Frequency Range	54-88 MC.; 174-216 MC.
Intermediate Frequencies	Video — 25.75 MC. Audio — 4.5 MC.
Input Impedance	300 ohms, balanced
Channel Selection	Twelve position, rotary turret
Chassis Models	Models 614, 637 — Chassis 120110B Models 644, 647 — Chassis 120113B
Audio Output	2.5 watts

955220

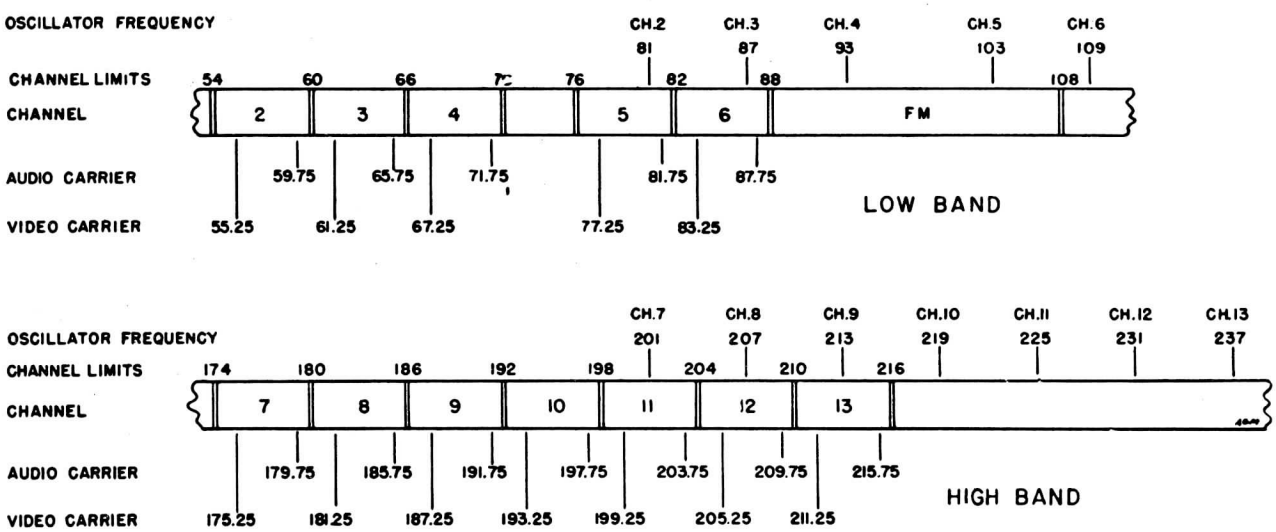


Figure 1-3—Video, Audio, and Oscillator Frequencies

Section 2.

INSTALLATION

1. PREPARATION FOR INSTALLATION — All models are shipped complete, with the kinescope in place and all adjustments properly set. Present models are equipped with internal antennas and mechanical deflection centering. Initial production models do not include the built-in antenna and make use of combined electrical and mechanical centering.

2. ANTENNA INSTALLATION—Chassis 120110B and 120113B are designed to operate with high sensitivity and will provide excellent reception in many areas with the internal antenna. If performance in a particular locality is unsatisfactory disconnect the internal antenna and install a portable or an outdoor antenna, depending on reception conditions.

a. PORTABLE ANTENNA: Since surrounding buildings and other objects can block out television signals, an indoor antenna should be tried in different locations before deciding on a permanent position. Uncoil the transmission line from the antenna base and connect to the terminals at the rear of the chassis. Tune the antenna, after turning on the receiver and adjusting the controls, by rotating and varying the length of the telescopic arms for best reception. Both arms should be adjusted to the same angular position and extended to the same length.

b. PERMANENT ANTENNA: For outdoor antenna installations, use a dipole or an array with a combination of elements. An Emerson Tele-Ray antenna is recommended, for best results. A 300-ohm transmission line is required for connection to the receiver.

3. RECEIVER INSTALLATION — Locate the receiver where a minimum of bright light falls directly on the screen, although complete darkness is not recommended. Provide adequate ventilation by keeping the back of the receiver away from the wall. Do not obstruct the ventilating slots at the rear of the cabinet.

All models are provided with a protective enclosure for the end of the kinescope. The enclosure is fastened to the rear of the chassis. Care should be exercised during installation so as not to strike or jar the enclosure.

After completion of antenna and power connections, operate the receiver as outlined in Section III. If a receiver fails to operate, or if operation is unsatisfactory, proceed with the following checks and adjustments.

CAUTION

Only experienced personnel should attempt to make these adjustments, as high voltage of ten kilovolts is present at the kinescope.

a. MECHANICAL ADJUSTMENTS: For all models, remove the chassis back and check all tubes to make certain they are firmly seated in their sockets. Remove the kinescope enclosure and check the seating of the base plug. Inspect the high-voltage anode connector.

The deflection yoke and focus coil have been properly positioned at the factory. The kinescope should be seated back against the edges of the deflection yoke assembly. Inspect the assembly to make certain that all adjustment wingnuts are tight. The ion trap should be positioned approximately over the two internal flags near the base of the kinescope.

b. ELECTRICAL ADJUSTMENTS: An adapter line cord is required to operate the receiver for the following preliminary adjustments.

1) Turn the OFF-VOLUME control a quarter-turn clockwise to turn on the receiver. Set the BRIGHTNESS control a half-turn clockwise and turn the CONTRAST control counter-clockwise. Allow the tubes to warm up.

2) Set the SELECTOR control to an active channel and adjust the TUNING control for best picture quality. A test pattern is preferable for these adjustments.

3) Adjust the ion trap magnet by moving slowly forward or backward while rotating slightly around the neck of the kinescope to obtain maximum picture brightness. Reduce the BRIGHTNESS control setting until the pattern is at approximately normal brilliancy. Adjust the FOCUS control, at the rear of the chassis, for maximum sharpness of raster lines. Then readjust the ion trap for maximum brilliancy.

4) Adjustment of the deflection yoke assembly is required if the raster is not horizontal. Loosen the center wingnut and rotate the assembly slightly to correct this condition.

5) Centering of the raster in the mask is controlled by both electrical and mechanical adjustments, or by mechanical adjustments alone. If this adjustment is required, refer to Section V for operation of the chassis controls and positioning of the focus coil.

6) All electrical adjustments at the rear of the chassis have been set at the factory. If the settings have been disturbed or if the kinescope requires replacement, they must be carefully readjusted in accordance with the procedure outlined in Section V.

Section 3.
OPERATION

1. OPERATING CONTROLS—The operation and function of the front-panel controls is identical for all models. Seven controls are provided, as shown in figure 3-1.

2. TUNING—Tuning the receiver initially requires operation of the various controls as indicated.

a. STATION SELECTION:

1) Turn the OFF-VOLUME control clockwise approximately a quarter-turn. This turns the receiver on and sets the sound volume to a reasonable level.

2) Set the SELECTOR control so that the desired channel number is indicated on the edge of the control. This control may be rotated in either direction.

3) Allow approximately 15 seconds for warmup. (This time is necessary to allow the tubes to attain the proper temperature for operation.)

4) If the desired station is broadcasting, music or speech will be heard. Adjust the TUNING control for best picture quality. Readjust the VOLUME or desired sound level.

5) Rotate the CONTRAST control to its extreme counter-clockwise position.

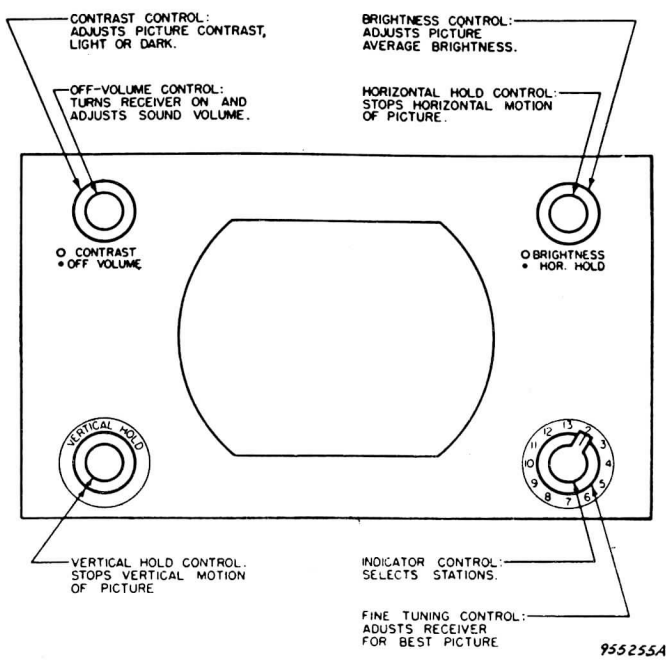


Figure 3-1—Front Panel Controls

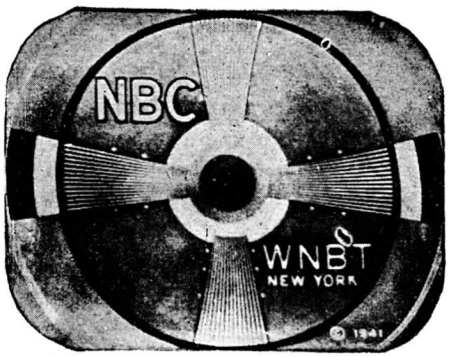


Figure 3-2—Test Pattern
Correctly Adjusted

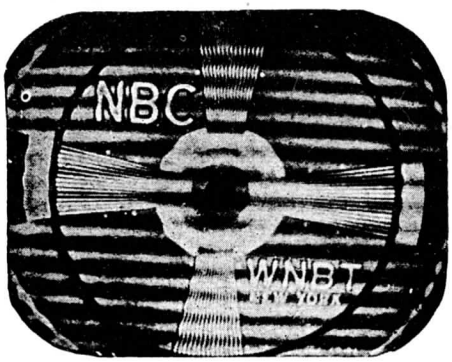


Figure 3-3—Test Pattern
Tuning Misadjusted

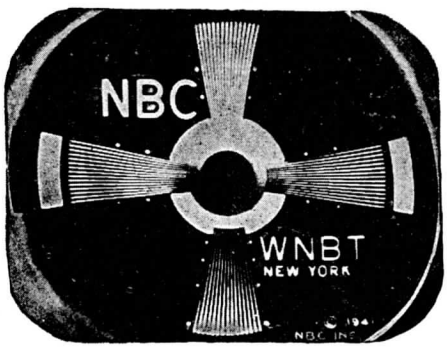


Figure 3-4—Test Pattern
Excessive Contrast

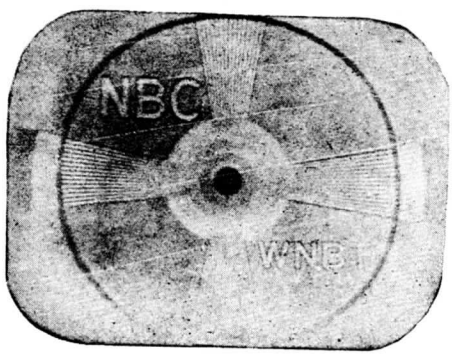


Figure 3-5—Test Pattern
Excessive Brightness

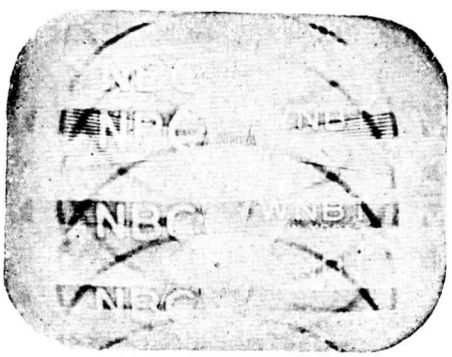


Figure 3-6—Test Pattern
Vertical Hold Misadjusted

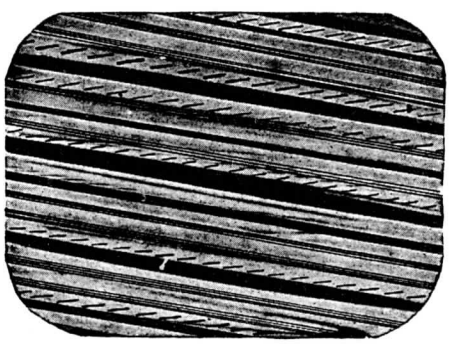


Figure 3-7—Test Pattern
Horizontal Hold Misadjusted

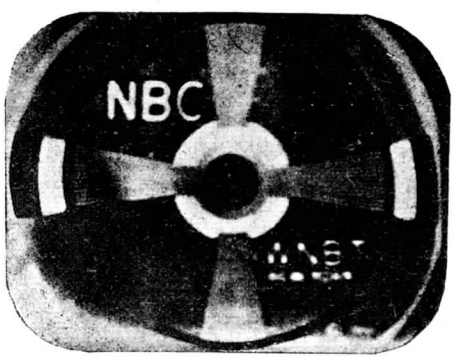


Figure 3-8—Test Pattern
Focus Misadjusted

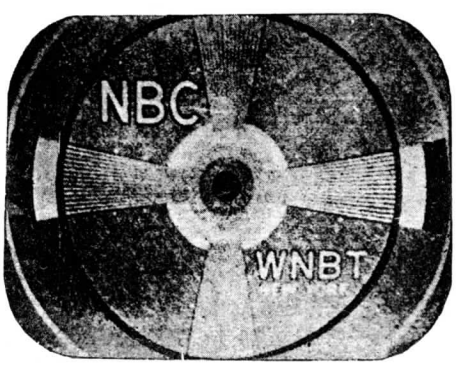


Figure 3-9—Test Pattern
Weak Signal

6) Rotate the BRIGHTNESS control to the maximum counter-clockwise position and then adjust slowly clockwise until light is just visible on the screen. Rotate in reverse direction until light just vanishes.

7) Adjust the CONTRAST control until a picture appears on the screen and desired contrast is attained. A further reduction in the BRIGHTNESS control setting may improve the apparent contrast of the picture.

8) If the picture moves vertically or horizontally, make the adjustment indicated in steps 9 and/or 10.

9) Adjust the VERTICAL HOLD control until the picture stops moving up or down. Proper operating setting of this control is in the center of the range over which the picture remains stationary.

10) Adjust the HORIZONTAL HOLD control until picture stops moving from side to side.

11) Readjust the CONTRAST control until the desired picture intensity is obtained. It may be necessary o readjust the BRIGHTNESS control slightly at the same time for optimum brilliance.

12) After the receiver has been operating for some time, it may be necessary to readjust the TUNING control slightly for best picture quality.

b. CHANGING STATION DURING OPERATION:

1) Set the SELECTOR control to the proper channel number.

2) Readjust the TUNING control if necessary to obtain best picture quality.

3) Readjust the CONTRAST control slowly until the desired picture quality is obtained.

4) Readjust VOLUME to suitable level.

5) Readjust BRIGHTNESS control for desired brilliancy.

c. CHECKING OPERATION: The use of automatic frequency control in the sync circuits of the receiver makes readjustments of the VERTICAL HOLD and HORIZONTAL HOLD controls infrequent provided the control settings for proper operation are not disturbed. Figures 3-2 through 3-9 indicate correct and incorrect adjustment of the various controls. Proper operation may be obtained by operation of the associated control.

Section 4.

CIRCUIT DESCRIPTION

1. GENERAL—Chassis 120110B and 120113B are basically alike; the latter is modified to accommodate a 12-inch kinescope and contains some changes in the high-voltage power supply circuits. Both chassis contain twenty-three tubes including the kinescope and low-voltage rectifiers. The chassis use the intercarrier method of sound reception, with the 4.5 mc. audio i-f produced by heterodyning the video and audio carriers at the output of the video detector. The various stages of the receivers are indicated in the block diagram, figure 4-1.

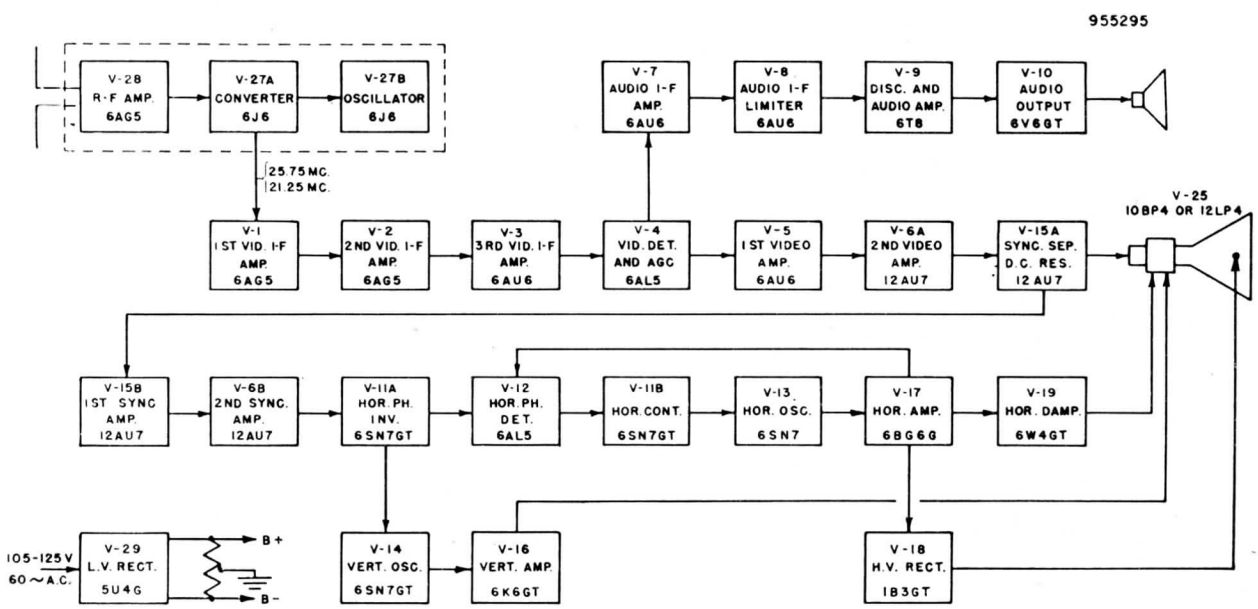


Figure 4-1—Block Diagram, Chassis 120110B, 120113B

2. TUNER — The r-f. unit constitutes a separate sub-chassis of the receiver. This sub-chassis contains the r-f amplifier, converter, and oscillator stages. The channel switch, fine tuning control, tuned circuits, and first video i-f transformer are also contained on this chassis. Tuning and tracking adjustments for all twelve channels currently in use are provided. The tuner serves to select and amplify the desired video and audio frequencies and convert them to the carrier i-f frequencies of 25.75 mc. for video and 21.25 mc. for audio. No separation of these two intermediate frequencies is made, and the complete signal is fed to the first video i-f stage.

The tuner uses a rotary turret carrying individual coils for each tuned circuit, for each channel setting. A type 6AG5 (V28) serves as the r-f amplifier and a type 6J6 (V27) as the converter and oscillator. The r-f amplifier is a wideband, tuned stage whose output is inductively coupled to the converter (V27). The oscillator (V27B) operates in a Colpitts type circuit. Individual slugs provide for alignment of the oscillator on the various channels. A variable-dielectric type of condenser is used for fine tuning of the oscillator. The output of the converter is conected to double-tuned first i-f transformer (T1).

The center-tapped primary (L1) of the r-f coil is designed to match a balanced 300-ohm line. The secondary (L2) is tuned by the input capacity of V28 in series with the parallel combination of trimmer A14 and a 5 mmf. condenser. The output of V28 is coupled to V27A by L3, which is tuned by trimmer A15 and the output capacity of the tube. A 10K resistor loads L3 to provide the required band pass.

The input capacity of V27A and trimmer A16 tune the converter coil (L4). The oscillator coil (L5) is wound on the same form with L3 and L4, for inductive coupling. The initial oscillator frequency is fixed by permeability tuning of L5 and the preset .5-3 mmf. trimmer. The frequency is varied by means of the TUNING control (3-5 mmf. trimmer) which consists of a spiral-shaped dielectric disc rotating between fixed stator plates.

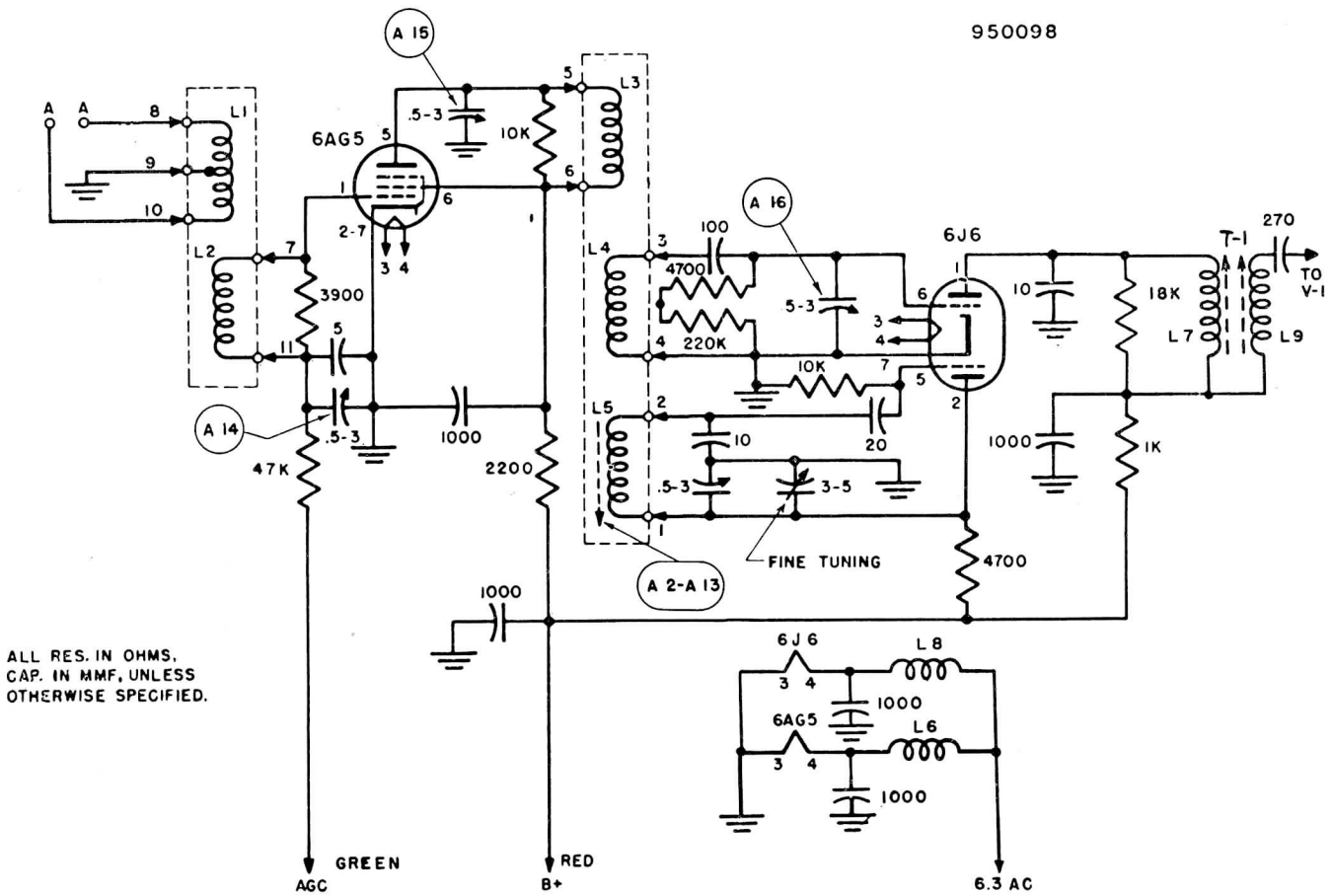


Figure 4-2 Schematic Diagram of Tuner

3. VIDEO SECTION—The video section consists of the following sections: video i-f; video detector and automatic gain control; video amplifier and d.c. restorer.

a. VIDEO I-F: Both the 25.75 mc. video carrier and 21.25 mc. audio carrier are amplified by three wide-band i-f stages. The four tuned cicruits are peaked at different frequencies, forming a stagger-tuned system of relatively flat overall response to produce the required bandpass.

Self-resonant, slug-tuned coils are used in the i-f transformers. Two stagger-tuned i-f transformers (T2, T3) follow the overcoupled first i-f (T1). T2 is provided with a 21.25 mc. trap to

attenuate the audio i-f. An overcoupled i-f (T4) completes the amplifier stages and feeds the video detector (V4).

The audio level is maintained just below the point of interference with the video i-f. However, the audio i-f is not completely rejected, as the audio signal is recovered (at the output of the video detector) by heterodyning with the video i-f. The 4.5 mc. beat between the video and audio intermediate frequencies is obtained from the shunt-tuned circuit consisting of L2 and C79 and is fed to the first audio i-f amplifier (V7).

b. VIDEO DETECTOR AND A.G.C.: The video detector (V4A) rectifies the negative portion of the video i-f. The resultant signal is coupled through peaking coil L1 to the grid of the first video amplifier (V5). V5B acts as the automatic gain control and develops a delayed negative A.G.C. voltage which is used to bias the first two video i-f stages and the r-f amplifier.

c. VIDEO AMPLIFIER: The video amplifier consists of two stages (V5 and V6A). The second stage is series-peaked and is coupled to the grid of the kinescope (V25) and the sync separator and d. c. restorer (V15A). The output signal of V5 is varied by the CONTRAST control (R19) which varies the bias of V5, to control the signal input to V6A.

d. D. C. RESTORER AND SYNC CLIPPER: The output of the video detector contains both a.c. and d.c. components of the video signal, as well as the blanking and sync pulses. Since the video amplifiers will not pass the d.c. component of the video signal, the background level of the picture will vary. The d.c. restorer (V15A) develops a bias voltage across R24 which varies with the average video signal level. This bias voltage is fed to the grid of the kinescope, thus maintaining the proper brightness level. The video sync pulse output of V15A, developed across R28, is coupled through C22 to the first sync amplifier (V15B).

4. DEFLECTION SECTION—The sync and sweep stages produce and control the deflection of the electron beam in the kinescope. The horizontal sweep circuits incorporate a horizontal phase detector (sync discriminator) to maintain automatic sync with the horizontal pulses of the video signal.

a. SYNC AMPLIFIER AND INVERTER: The sync pulse output of V15A is amplified by two triode stages (V15B and V6B) and fed to the horizontal phase inverter (V11A). The integrating network of the vertical deflection circuit is coupled to the output of V11A, which provides push-pull output for the horizontal sync discriminator (V12).

b. HORIZONTAL SWEEP: The horizontal deflection circuits contain an automatic frequency stabilizing arrangement which improves stability and ease of operation. The phase inverter (V11A) feeds the horizontal sync pulses to the horizontal phase detector (V12). At the same time, V12 receives voltages fed back from the horizontal out put (V17) through C58. Any phase shift between the horizontal sync pulses and the horizontal oscillator signal will cause the input voltage applied to one diode section of V12 to differ from that of the other and result in a d.c. bias voltage on the grid of the horizontal control tube (V11B). This bias voltage will be proportional to the phase displacement between the incoming sync pulses and the horizontal oscillator voltage and of a polarity determined by the lead or lag of the oscillator frequency. The plate resistance of V11B is part of the bias network of the grid circuit of the horizontal oscillator (V15). The output of the phase detector (V12) will thus synchronize the oscillator to the horizontal pulses of the video signal.

The horizontal blocking oscillator (V13) operates at a frequency determined by C57, R75, R76, and the plate resistance of V11B. The horizontal sync pulses cause V13 to lock in at the sync frequency when the HORIZONTAL HOLD control (R75) is properly adjusted. The sweep voltage output of V13 is developed across R79 and is fed to the horizontal output tube (V17). The signal level to the horizontal output tube is adjusted by the HORIZONTAL DRIVE control, R80.

V19 supplies the required driving power for the horizontal deflection coils (L9). The output of V17 is coupled to the horizontal deflection coils through output transformer T9. A portion of the output transformer secondary is shunted by the HORIZONTAL SIZE control L6. By varying the inductance of L6, the horizontal sweep current may be controlled.

The horizontal damper tube (V19) acts to damp out oscillations which occur over part of the horizontal scanning cycle. The HORIZONTAL LINEARITY control (L7) helps provide a linear trace. V19 is a type 6W4 to eliminate the need for a separate damper filament winding.

c. VERTICAL SWEEP: Vertical oscillator V14 is free-running and operates at a frequency determined by C71, R95, and the VERTICAL HOLD control (R94), in the absence of a vertical sync pulse. The integrated sixty-cycle sync pulse derived from the video signal reaches the grid of V14 just before it would normally trip. This sync pulse is great enough to drive the tube to conduction and cause it to lock-in at the sync frequency. The sync pulse thus maintains control of the vertical oscillator sweep frequency when R94 is correctly adjusted.

The output of V14 is fed to the vertical output stage (V16) through C72. The output of V14 is controlled by the VERTICAL SIZE control (R96). R100 varies the operating point of V16 by varying the bias, acting as the VERTICAL LINEARITY control. The sweep voltage of V16 is coupled to the vertical deflection coils (L8) by means of the vertical output transformer (T11).

5. POWER SUPPLIES — Two power supplies are used to supply the required voltages. The low voltage supply uses a transformer and full-wave rectifier. The high voltage supply for the kinescope is of the fly-back type and is energized by the horizontal output tube.

a. HIGH VOLTAGE SUPPLY: The high voltage power supply makes use of the energy supplied to the horizontal output transformer by V17. When the plate current of V17 is cut off at the instant

of retrace of horizontal scanning, the field built up in the primary collapses and induces a high-voltage. This voltage is applied to the high-voltage rectifier (V18). From 8.5 to 10 kilovolts is produced by the power supply. The rectified voltage is filtered by C63 and R89, and applied to the second anode of the kinescope. Chassis 120113B differs from Chassis 12011B in that C63 is returned to B—, instead of the plate of V19.

b. LOW VOLTAGE SUPPLY: The low-voltage supply uses a full-wave rectifier (V29) and transformer (T12). A series arrangement is used to supply plate voltage, to reduce current requirements. As a result, separate filament windings are used to keep the heater-cathode potentials within ratings, and the electrolytic filter condensers are not grounded to the chassis. The center-tap of T12 is not grounded but is negative (B—) with respect to ground. The cathodes of the sweep circuit and video amplifier tubes are negative to ground (about -205 volts) and the heaters are conected to the ungrounded filament winding (Y).

6. INTERCARRIER SOUND—The audio circuits are conventional. The 4.5 mc. heterodyne between the video and audio i-f carriers is taken from the shunt-tuned circuit (L2, C79) at the output of the video detector (V4). The 4.5 mc. signal is amplified by the audio i-f amplifier (V7), whose output is coupled to the limiter (V8). V8 feeds the discriminator (V9A); the output of the discriminator is amplified by V93, and the audio output (V10).

7. DEFLECTION YOKE AND FOCUS COIL ASSEMBLY: The deflection yoke and focus coil form a complete assembly. The yoke contains the vertical and horizontal deflection coils (L8 and L9). The focus coil (L10) combines a permanent magnet with the electromagnet (PM and EM). The yoke and focus coil are independently adjustable.

Vertical centering is accomplished by mechanical adjustment of the focus coil; horizontal centering is done electrically by the HOR. CENTERING control (R103). Later production of Chassis 120110B and 120113B makes use of a pivoted mounting for the EM-PM focus coil, together with a "wobble plate" to provide for mechanical adjustment of horizontal and vertical centering.

The "wobble plate" consists of a ring of permeable material (steel) surrounding the neck of the kinescope, adjacent to the EM-PM focus coil. The plate may be moved in a plane at right-angles to the axis of the kinescope, both vertically and horizontally, by means of a slotted section and lever. In addition, the focus coil may be tilted in both directions by means of a second lever which is adjustable from the rear of the cabinet, without removing the back. This enables precise mechanical control of centering.

Section 5.

MAINTENANCE AND ALIGNMENT

1. GENERAL—All adjustments must be made only by qualified service technicians. Unsatisfactory operation should be analyzed and circuits checked systematically to locate and correct sources of trouble.

WARNING

High voltages in excess of 8000 volts are present in the chassis, during operation. Exercise care in servicing the receiver, when energized. Do not remove, handle, or replace the kinescope unless gloves and goggles are worn.

2. CHASSIS REMOVAL—To remove the chassis, follow the outlined procedure.

a. Pry off all control knobs.
b. Remove the six screws which fasten the back in place.
c. Remove the speaker plug.
d. Remove the four chassis bolts and carefully slide the chassis from the cabinet. When inverting the chassis, place a supporting block under the power transformer.

3. KINESCOPE REPLACEMENT —

CAUTION

Before removing the kinescope, discharge the tube by connecting an insulated test prod to the chassis and to the high-voltage anode. Wear gloves and goggles before handling the tube.

To remove the tube, proceed as follows:

a. Disconnect the high-voltage lead at the top of the kinescope and discharge the tube.
b. Remove the enclosure which protects the base of the kinescope.
c. Remove the tube socket and slide off the ion trap.
d. Loosen the hold-down strap at the front of the tube and carefully withdraw the kinescope forward from the deflection yoke and focus coil assembly.

To install a new kinescope, follow the above procedure in reverse. Make certain that the tube is seated against the edges of the deflection yoke assembly, with the high-voltage anode connection at the top. In replacing the ion trap, position the unit so that the arrow points towards the front of the chassis.

NOTE

Whenever the kinescope is removed or replaced, the mask should be carefully cleaned with a soft, lintless cloth. Do not use carbon tetrachloride or any cleanser containing abrasive material. The face of the kinescope should also be wiped clean, before replacing the chassis in the cabinet.

4. MECHANICAL DEFLECTION ADJUSTMENTS — See figure 5-1. Replacement of the kinescope or of any of the components of the deflection system will require readjustment of the deflection yoke assembly, focus coil, and ion trap.

NOTE

Before making any deflection adjustments, make certain that the enclosure is in place, covering the base of the kinescope, and is firmly fastened. The adjustments to the focus coil can be made through openings provided in the enclosure.

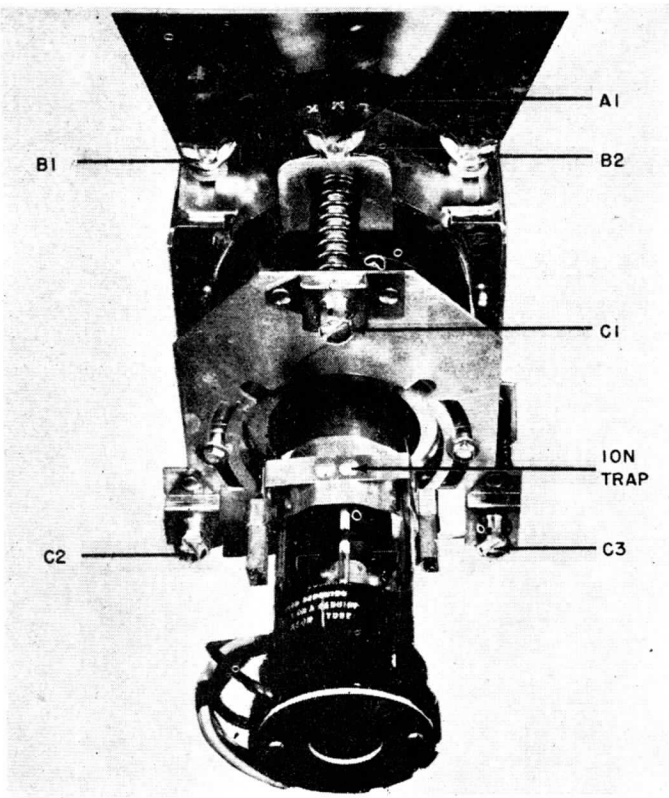


Figure 5-1—Deflection Yoke and Focus Coil Adjustments, Combined Mechanical and Electrical Centering

a. DEFLECTION YOKE: If the raster lines are not horizontal, loosen the center wingnut (A1) and rotate the yoke coil assembly to correct the condition. Tighten the wingnut firmly.

The position of the assembly along the axis of the kinescope is fixed by the two outer wingnuts (B1, B2). The yoke should be positioned approximately at the center of the slots.

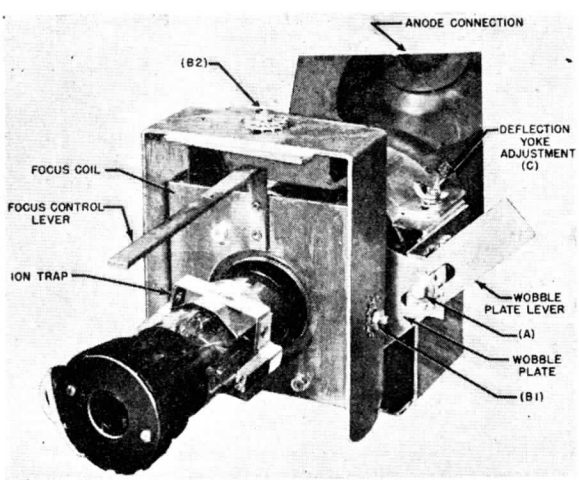


Figure 5-2—Focus Coil Adjustments, Mechanical Centering

b. EM-PM FOCUS COIL: For models not provided with a "wobble plate," adjust the upper screw (C1) of the focus coil to center the raster vertically. Slight variation of the two side screws (C2, C3) may be required to complete the adjustment. The focus coil should not be positioned too close to the deflection yoke as the range of adjustment of the FOCUS control (R55) will be limited.

To center the raster for models provided with a "wobble plate" and focus levers, proceed as follows (See figure 5-2):

1) Adjust the focus lever to make the focus coil concentric with the neck of the kinescope. Loosen the three mounting nuts (B1, B2, B3) slightly, if required.
2) Loosen the single wobble-plate mounting screw (A) and slide the plate vertically or horizontally, by means of the lever, to approximately center the raster. Tighten the mounting screw.
3) Readjust focus coil lever, if required, to exactly center the raster in the mask. Both horizontal and vertical adjustments are made simultaneously. Tighten the mounting nuts (B1, B2, B3) after positioning.
4) Note that normally only the vernier adjustment (focus coil lever) is required, unless the kinescope has been replaced. The wobble-plate lever has been initially positioned at the factory and usually will not require readjustment.

c. ION TRAP: Adjust the position of the ion trap as outlined in Section II.

5. ELECTRICAL DEFLECTION ADJUSTMENTS

— The electrical adjustment controls are located at the rear of the chassis. For access to the adjustment controls, remove the cabinet back. Use an adapter line-cord to complete the a-c. power connections, with the back removed.

Before proceeding with adjustment of the rear controls, tune in a test pattern and set the front panel controls for the best picture, as outlined in Section III. Complete the adjustments of the deflection yoke and focus coil before setting the electrical controls. Adjust the controls in the order indicated.

a. ADJUSTMENT CONTROL SETTINGS: (Table III).

STEP	CONTROL	SYMBOL	ADJUSTMENT
1	Vertical Size	R-96	Affects bottom section of raster and overall size. Adjust to fill the mask vertically (height).
2	Vertical Linearity	R-100	Affects top section of raster and overall size. Adjust for best linearity.
3	Horizontal Drive	R-80	Controls signal to horizontal output V-19. Adjust for best linearity.
4	Horizontal Linearity	L-7	Affects linearity of left and center sections of raster. Adjust in conjunction with R-80, for best linearity.
5	Horizontal Size	L-6	Adjust to fill the mask horizontally (width).
6	Horizontal* Centering	R-103	Adjust to center raster horizontally.
7	Focus	R-55	Controls current through focus coil L-10. Adjust for sharpest line detail.

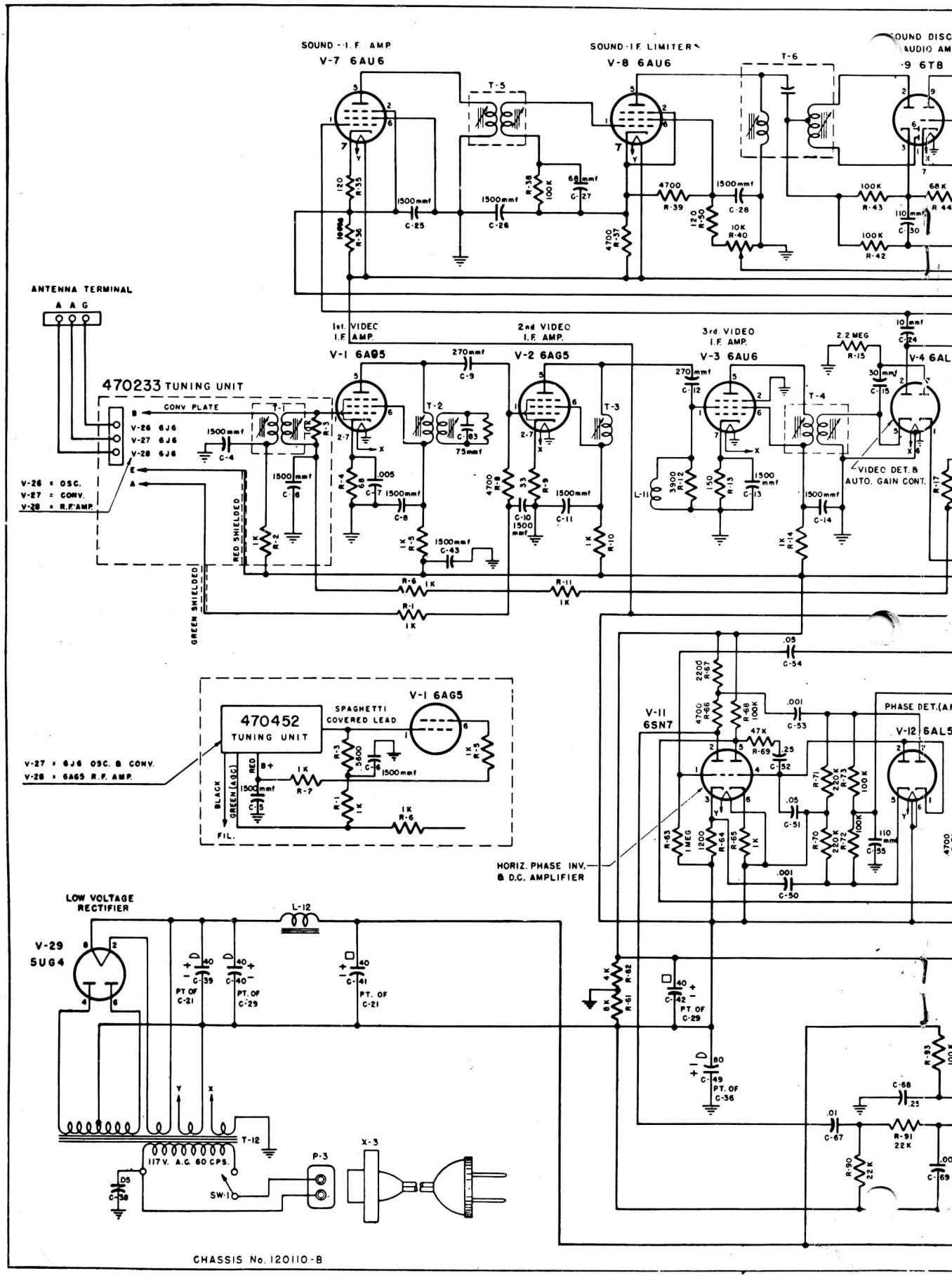
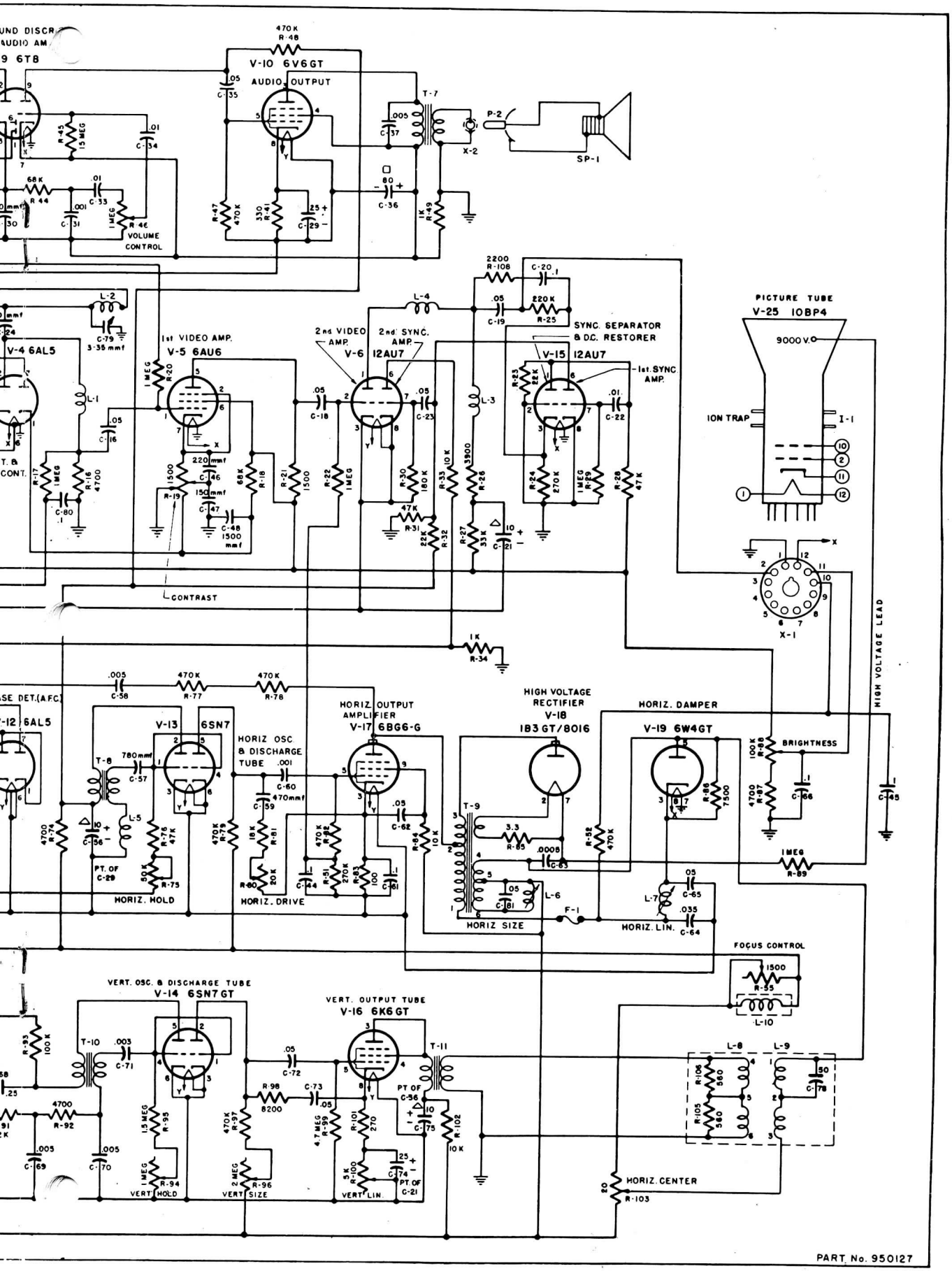


Figure 5-3—Schematic Diagr



Diagram, Chassis 120110B

Proper adjustment of the HORIZONTAL and VERTICAL LINEARITY controls, and the SIZE controls should result in test patterns in which the circles are round and the wedges are linear and equal. The test pattern circles should be concentric with the curved sides of the mask.

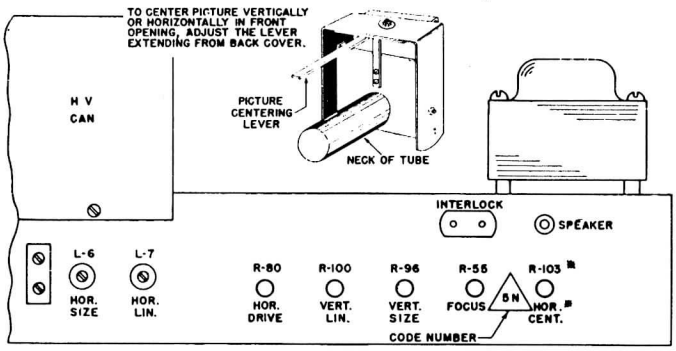


*Figure 5-4—Rear Deflection Adjustments, *For chassis not equipped with wobble plate and centering lever.*

6. ALIGNMENT TEST EQUIPMENT — Proper servicing and alignment of Chassis 120110B and 120-113B requires the equipment indicated.

a. SWEEP GENERATOR:
   1) Frequency ranges of 18 to 30 MC., 50 to 90 MC., and 170 to 225 MC.
   2) Sweep width variable to 10 MC.
   3) Output of at least 0.1 volt, with an attenuator for adjustment of output.
   4) Constant output over sweep width, with flat output on all ranges and at all attenuator positions.
   5) Output impedance of 300 ohms, for r-f alignment, or matching network. See figure 5-5.

b. MARKER GENERATOR:
   1) Frequency ranges of 4 to 30 MC. and 50 to 225 MC., for i-f and r-f alignment. The marker generator must provide an accurate (crystal calibrated) frequency of 4.5 MC. for audio i-f alignment, and accurate frequencies from 21.25 MC., to 25.75 MC., for video i-f alignment. The required r-f requencies from 50 to 225 MC., as tabulated below, may be provided by a calibrated signal generator or a heterodyne frequency meter with crystal calibrator.
   2) Output of at least 0.1 volt, with an attenuator for adjustment of output.

GENERATOR FREQUENCIES: (Table IV).

CHANNEL	VIDEO CARRIER MC.	AUDIO CARRIER 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	213.25	215.75

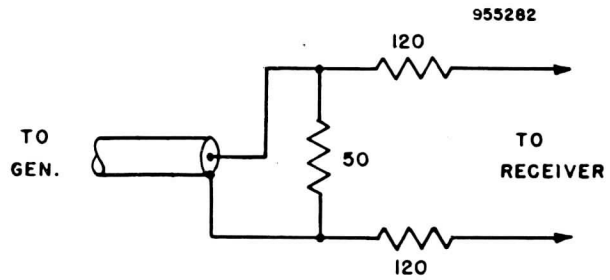


Figure 5-5—Generator Matching Network

c. VACUUM-TUBE VOLTMETER:
   1) A diode probe for high-frequency measurements is desirable.
   2) High input impedance with provision for low-voltage measurement (three or five volt scale).

d. OSCILLOSCOPE:
   1) Vertical input should be provided with a calibrated attenuator and low-capacity probe.
   2) Flat vertical amplifier frequency response, with good low frequency response.
   3) Adequate vertical sensitivity.

e. SCOPE DETECTOR: Required for alignment of over-coupled first i-f T1. See figure 5-6.

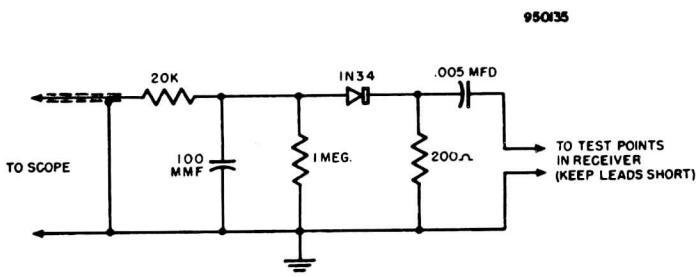


Figure 5-6—Scope Detector Network

7. ALIGNMENT—

a. AUDIO I-F ALIGNMENT:
   1) Disconnect the antenna and remove the chassis from the cabinet. Use an adaptor line cord to operate the receiver.
   2) Set the CONTRAST control at the center of rotation and retain at this setting for all i-f adjustments.
   3) The waveforms shown in the response curves may be inverted depending on the number of amplifying stages in the vertical amplifier of the scope being used.
   4) When the marker signal is coupled in parallel with the sweep generator, the signal should be unmodulated and attenuated so that only a small pip is visible. Use an accurate, crystal-controlled marker generator.
   5) Connect the sync sweep voltage from the sweep signal generator to the horizontal input of the scope for horizonal deflection.
   6) Refer to figure 5-7 for location of alignment points; figure 5-3 for the schematic diagram.
   7) Set the receiver to Channel 3.

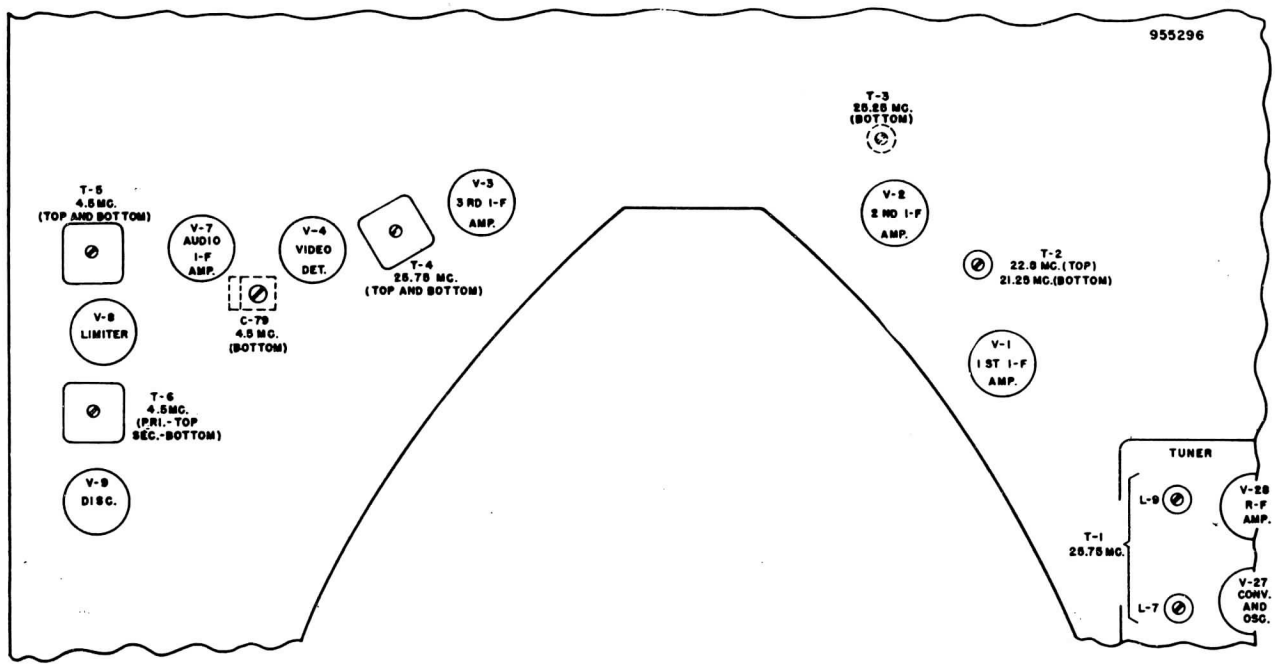
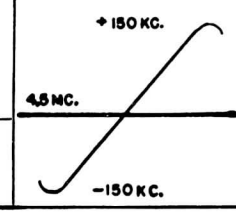


Figure 5-7—Location of Alignment Points

AUDIO I-F ALIGNMENT: (Table V).

STEP	SIGNAL GENERATOR INPUT		MEASURING INSTRUMENT	ADJUST	PROCEDURE	RESPONSE CURVES
	CONNECTION	FREQUENCY				
1	Marker generator through .001 mfd. to pin 2 of V4. Low side to B—.	Marker—4.5 MC.	Connect v.t.v.m. Connect v.t.v.m. to junction of R38 and C27. Low side to B—.	C79	Peak for maximum response. Adjust generator input to produce one volt reading on v.t.v.m.	
2	"	Marker—4.5 MC.	"	T5 (Top and bottom)	Peak for maximum response	
3	Connect sweep generator in parallel with marker gen.	Sweep—4.5 MC. (450 KC. sweep) Marker —4.5 MC.	Replace v.t.v.m. with scope connected through 10K resistor to junction of R44 and C31.	T6 (Bottom)	Position 4.5 MC. marker at center of S-curve, by adjusting secondary bottom.	
4	"	"	"	T6 (Top)	Peak primary for maximum amplitude and linearity. Repeat step 3.	

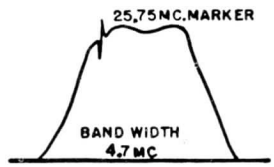
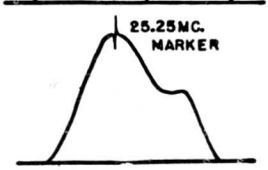
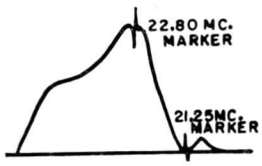
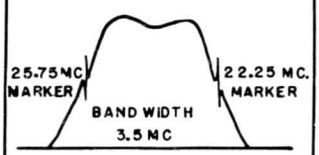
b. VIDEO I-F ALIGNMENT:

1) Retain the control settings used for audio i-f alignment.

2) Connect a 3 volt bias battery from the junction of R1, R6, and R11 (negative terminal), to chassis (positive terminal) for step 5.

3) Shape the overall response curve, after individual peaking of stagger-tuned and over-coupled i-f transformers. Maintain output of the sweep and marker generators at a minimum, to prevent distortion of the response curve.

VIDEO I-F ALIGNMENT: (Table VI).

STEP	SIGNAL GENERATOR INPUT		MEASURING INSTRUMENT	ADJUST	PROCEDURE	RESPONSE CURVES
	CONNECTION	FREQUENCY				
1	Lightly couple marker gen. to pin 1 of V3; Sweep gen. from pin 1 to chassis, through .001 mfd.	Sweep-23.5 MC. (10 MC. sweep) Marker-25.75 MC.	Connect vertical input of scope through 10K resistor to junction of L1, R16, and C16. Low side to chassis.	T4 (Top and bottom)	Set marker as shown on response curve; marker should be 10% down. Adjust sweep generator input to produce one volt at junction of L1, R16, and C16.	
2	Connect marker and sweep generators to pin 1 of V2, through .001 mfd. Low side to chassis.	Sweep-23.5 MC. (10 MC. sweep) Marker-25.25 MC.	"	T3	Set 25.25 MC. marker as shown on response curve.	
3	Sweep generator coupled to converter (V27) input, using three turn loop slipped over tube. Marker gen. in parallel. Low side to chassis.	Sweep-23.5 MC. (10 MC. sweep) Marker-25.75 MC.	Connect scope through detector network to pin 1 of V2. Low side to chassis.	T1 (L7 and L9)	Set marker as shown on response curve.	
4	"	Sweep-23.5 MC. (10 MC. sweep) Markers-22.8 and 21.25 MC.	Connect scope through detector network to pin 1 of V3. Low side to chassis.	T2 (Top and bottom)	Adjust primary of T2 (top) to position 22.8 MC. marker; adjust T2 trap (bottom) to position 21.25 MC. marker.	
5	" Connect AGC bias battery as indicated above.	Sweep-23.5 MC. (10 MC. sweep) Markers-25.75 MC. and 22.25 MC.	Connect scope through 10K resistor to junction of L1, R16 and C16. Low side to chassis.	T2, T3	Adjust T2 (top) and T3 to give overall response shown. T2 (top) adjusts bandwidth; T3 positions video carrier (25.75 MC.) depending on accuracy of adjustment of T1 (25.75 MC. marker).	

VIDEO I-F ALIGNMENT: (Table VI).

c. TUNER ALIGNMENT:

1) Set fine tuning control to center of rotation. Retain this setting or entire r-f alignment.
2) Retain control settings previously used.
3) Couple marker generator in parallel with sweep generator.
4) Use 10 mc. sweep for sweep generator. Couple generator to antenna terminals of receiver. If the sweep has a 50 ohm, unbalanced output, connect to the antenna terminals through network shown in figure 5-5.
5) Connect vertical input of scope in series with 10K resistor to junction of L1, R16, and C16.
6) Refer to figure 5-8 for tuner alignment points, and figure 4-12 for the tuner schematic.
7) A14, A15, A16 are r-f amplifier and converter trimmers and are adjusted on Channel 12; A13-A2 are oscillator slugs for the corresponding channels.

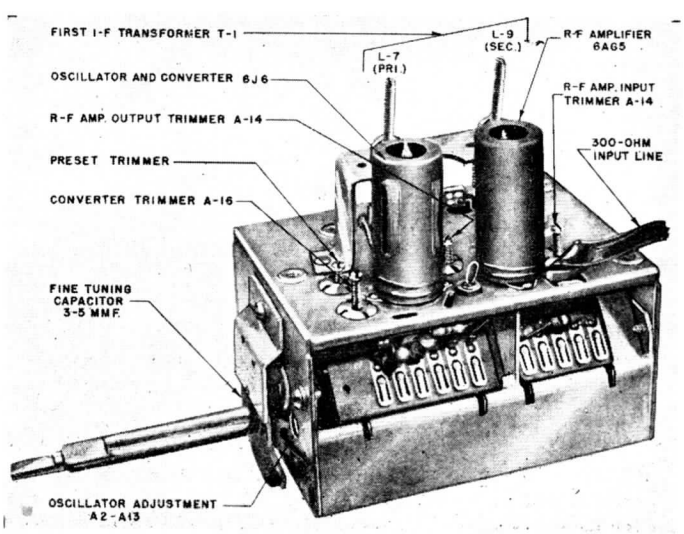


Figure 5-8—Tuner Alignment Points

TUNER ALIGNMENT: (Table VII).

STEP	SIGNAL GENERATOR INPUT		CHANNEL	ADJUST	PROCEDURE
	SWEEP GEN.	MAR. GEN.			
1	207.0 MC.	209.75 MC.	12	A12	Adjust for placement of 21.25 MC. marker as per overall response curve.
2	"	"	12	A14, A15, A16	Adjust shape of overall response curve for maximum amplitude and bandwidth.
3	213.0 MC.	215.75 MC.	13	A13	Adjust as in Step 1.
4	201.0 MC.	203.75 MC.	11	A11	"
5	195.0 MC.	197.75 MC.	10	A10	"
6	189.0 MC.	191.75 MC.	9	A9	"
7	183.0 MC.	185.75 MC.	8	A8	"
8	177.0 MC.	179.75 MC.	7	A7	"
9	85.0 MC.	87.75 MC.	6	A6	"
10	79.0 MC.	81.75 MC.	5	A5	"
11	69.0 MC.	71.75 MC.	4	A4	"
12	63.0 MC.	65.75 MC.	3	A3	"
13	57.0 MC.	59.75 MC.	2	A2	"

NOTE: **The r-f response curve of the tuner, on each channel may be observed by connecting the scope in series with a 10K resistor to the test point shown in figure 5-9. The curves should have maximum amplitude and flatness, consistent with proper placement of the 21.25 mc. marker on the i-f response curve.**

8. VOLTAGE AND RESISTANCE ANALYSIS— Voltage and resistance readings are indicated in figure 5-10, to aid in servicing the chassis. The diagram indicates typical values obtained under the following conditions.

a. ANALYSIS CONDITIONS:

1) Line voltage maintained at 117 volts for voltage readings.
2) Measurements made with voltohmyst or equivalent.
3) All voltage measurements are in + d.c. volts and resistance in ohms, unless otherwise noted.
4) Socket connections are shown as bottom views. Measured values are from socket pin to B—, unless otherwise stated.
5) Readings made with antenna disconnected, no signal applied and controls at normal.
6) Readings marked * are measured to ground.

9. DEFLECTION CIRCUIT WAVE FORMS — See figure 5-11. The sweep voltages produced in the horizontal and vertical sweep circuits may be used in locating defects in the deflection section of the chassis. Two separate wave forms are shown at various test points up to the output of the second sync amplifier (V6B), as both horizontal and vertical pulses are present. Different sweep frequencies are required at the scope to distinguish between the sync pulses.

a. ANALYSIS CONDITIONS:

1) Line voltage maintained at 117 volts.
2) Controls at normal; no signal input.
3) Peak-to-peak values indicated may vary due to component tolerances and response of scope. Readings are obtained by calibration of scope, prior to observation of waveforms.

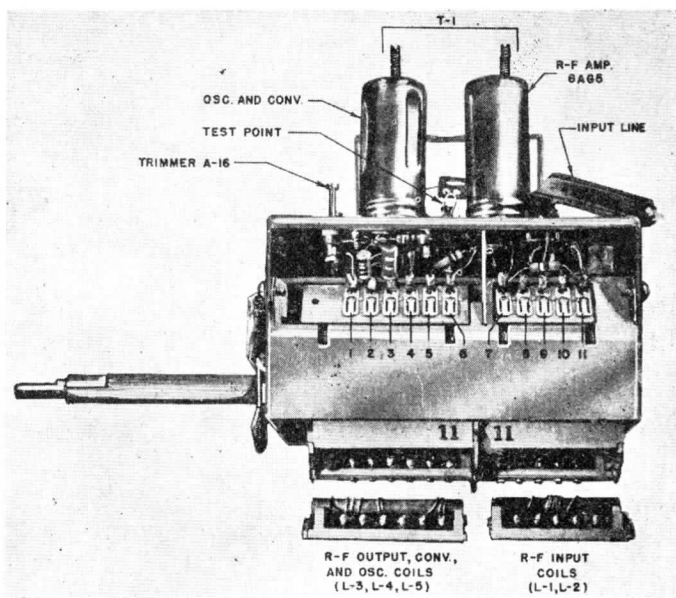


Figure 5-9—Side View Tuner

10. PRODUCTION CHANGES—Several changes have been incorporated in the chassis used in Models 614, 637, and 644, during production. These changes may be identified by code markings consisting of a triangle containing a particular number, stamped at the rear of the chassis. Presence of a particular marking indicates that the revisions described *have* been made in the chassis. The various revisions are summarized below. Unless otherwise noted, the changes have been added to *all* subsequent models.

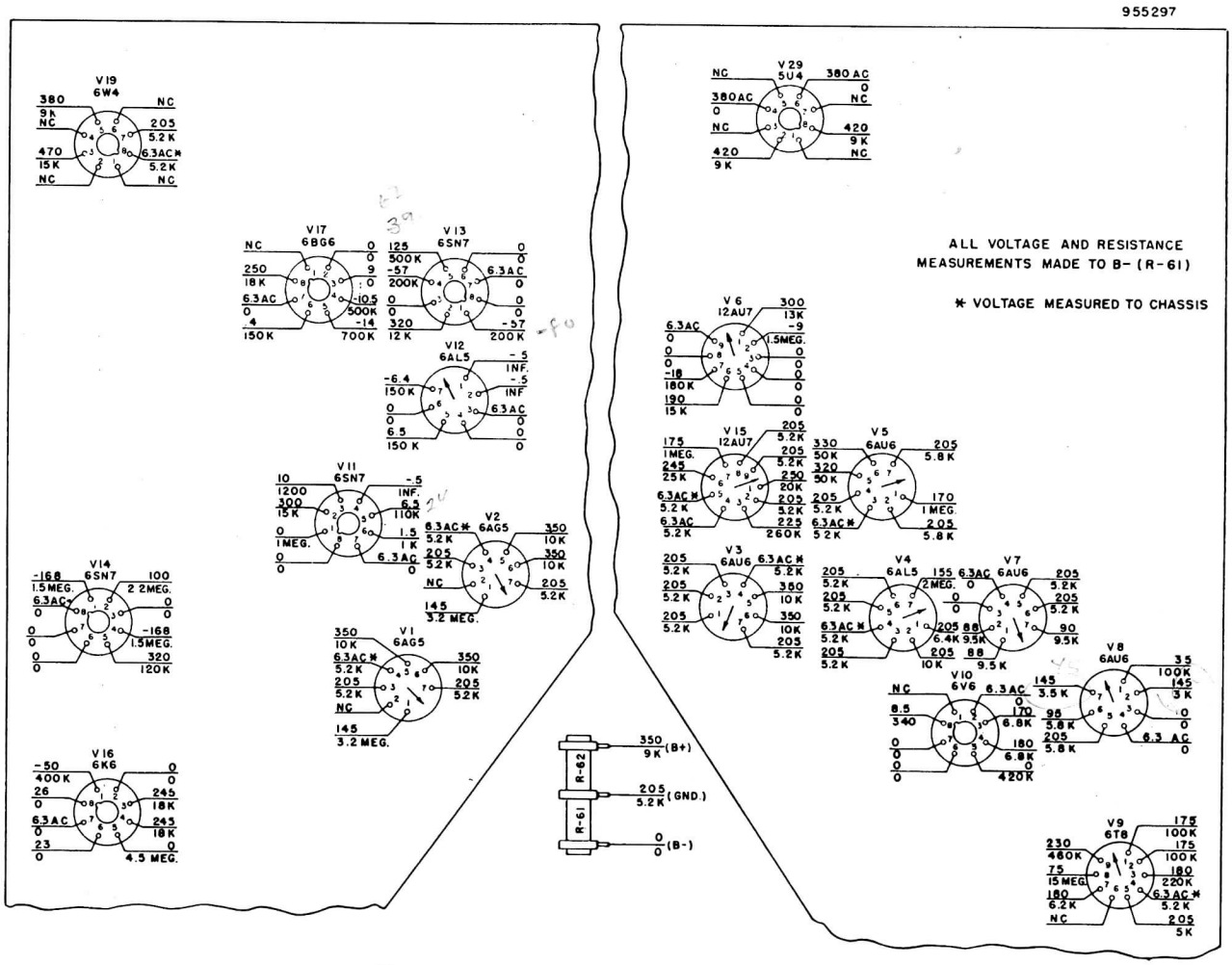


Figure 5-10—Voltage and Resistance Diagram

DEFLECTION WAVEFORMS: (Table VIII).

TUBE	TEST POINT	HORIZONTAL		VERTICAL	
		KEY LETTER	PEAK to PEAK VOLTAGE	KEY LETTER	PEAK to PEAK VOLTAGE
Sync Separator V-15A	Pin 3	AH	22.3	AV	36.6
	Pin 1	BH	8.9	BV	11.3
First Sync. Amp. V-15B	Pin 6	CH	11.4	CV	18.5
Second Sync. Amp. V-6B	Pin 6	DH	77.4	DV	117
Hor. Phase Inv. V-11A	Pin 2	EH	19.0	EV	40.2
Phase Det. V-12	Pin 5	GH	8.7	GV	9.7
	Pin 7	HH	6.0	HV	9.2
Hor. Control V-11B	Pin 5	IH	14.5	—	—
Hor. Osc. V-13	Pin 5	JH	55.4	—	—
	Pin 1	KH	53.5	—	—
Vert. Osc. V-14	Pin 4	—	—	LV	178
	Pin 2	—	—	MV	100
Vert. Output V-16	Pins 3, 4	—	—	NV	303

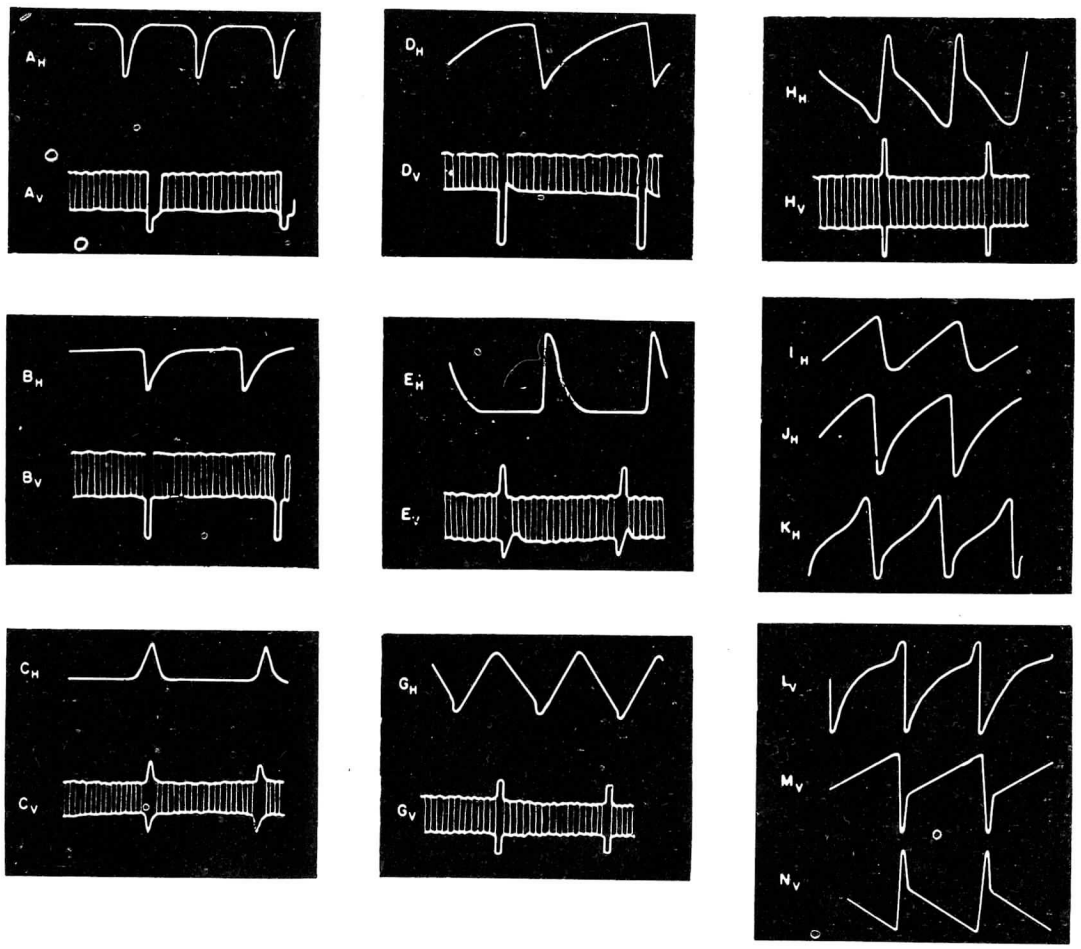


Figure 5-11—Deflection Circuit Waveforms

a. CODE MARKING — E: Part No. 925162, C21, C36, and C49; C49 (80 mfd.) is marked △, and C21 (10 mfd.) is marked ⏢ due to incorrect condenser marking, instead of markings shown on schematic diagram.

b. CODE MARKING — C: No Pyramid paper tubular condensers used.

c. CODE MARKING-TRIANGLE 1: Revisions to correct picture flicker.

1) Removed red lead from B+ 125-volt point on terminal strip near fourth i-f and from pin 6 of V-5 (6AC6). Removed red lead from the 40 mfd. (□) terminal of C-42 and from pin 6 of V-5 (6AU6).

2) Inserted a jumper from the B+ 125-volt point on the terminal strip near fourth i-f to the 40 mfd. (□) terminal of C-42.

3) Removed one end of R-28 (47K) from pin 6 of V-5 (6AU6); rewired to B+ 125-volt point on terminal strip near fourth i-f.

4) Removed R-27 (33K) from B+ 125-volt point on terminal strip near V-12 and V-13, and from the junction of the blue lead with the 10 mfd. (△) terminal of C-21, on the terminal strip near V-6 and V-15. Rewired R-27 between pin 6 of V-5 (6AU6) and the empty lug on the terminal strip adjacent to the power transformer; added a wire from this point to the junction of R-52, 470,000 ohms, and the green lead from the fuse holder.

5) Opened junction of blue lead from C-21 with R-26 (3900 ohms) on the terminal strip near V-6 and V-15.

6) Rewired R-26 to chassis; rewired blue lead from C-21 to pin 6 of V-5.

d. CODE MARKING — TRIANGLE 1J: Includes revisions covered by code marking *Triangle 1,* plus changes to correct picture weave as detailed in code marking *Triangle 4.*

e. CODE MARKING — TRIANGLE 2: Includes revisions covered by code marking *Triangle 2,* plus changes in vertical deflection circuit detailed under code marking *Triangle 4.*

f. CODE MARKING — TRIANGLE 3: Same as for code marking *Triangle 2,* but includes both horizontal and vertical circuit revisions outlined in code marking *Triangle 4.*

g. CODE MARKING — TRIANGLE 4: Includes revisions covered by code marking *Triangle 1,* plus additional changes to eliminate picture weave, as follows:

1) Added a single lug terminal strip between sockets V-1 and V-11.
2) Transferred junction of R-66 (4.7K), R-67 (2.2K), and C-53 (.001 mfd. mica) from dummy lug under vertical output transformer to new dummy lug terminal.
3) Transferred wiring from lug 8 of V11 socket to the empty lug on terminal strip under vertical output transformer.
4) Removed jumper wire connecting lugs 3 and 4 of V-6 socket.
5) Transferred jumper wire located between center shield pin and lug 4 of V-6 socket to lug 3 of V-6 socket.
6) Transferred yellow lead from lug 5 to lug 3 of V-6 socket.
7) Removed yellow lead between lug 3 of V-13 socket and lug 2 of V-17 socket.
8) Transferred R-51 (270K) from lug 2 of V-17 Socket to lug 3 of V-13 socket.
9) Cut jumper between center shield pin and lug 4 of V-12 socket.
10) Transferred all wiring from lug 4 of V-12 socket to lug 6 of V-12 socket.
11) Transferred yellow lead from lug 8 to lug 6 of V-13 socket.
12) Removed spaghettied jumper between lugs 6 and 8 of V-13 socket.
13) Removed jumper wire between lugs 6 and 7 of V-14 socket.
14) Transferred yellow lead from lug 7 to lug 3 of V-14 socket (lengthened wire).
15) Transferred jumper wire from lug 7 to lug 6 of V-14 socket.
16) Removed wire between lug 2 of V-16 socket and lug 6 of V-14 socket.
17) Transferred R-99 (4.7 meg.) from lug 2 of V-16 to lug 3 of V14 socket.
18) Transferred R-37 (4.7K), from lug V-8 socket to the electrolytic shield lug (B-).
19) Transferred all wiring from lug 7 to lug 6 of V-10 socket except the yellow lead between lug 3 of V-8 socket and lug 7 of V-10 socket.
20) Added a yellow lead between lug 6 of V-10 socket and electrolytic shield lug (B-).
21) Removed jumper wire between lugs 6 and 7 of V-10 socket.
22) Inserted new leads between the following points:
   a) Lugs 4 and 5 of V-6 socket to lug 8 of V-13 socket.
   b) Lug 8 of V-13 socket to lug 2 of V-17 socket.
   c) Lug 8 of V-13 socket to lug 4 of V-12 socket.
   d) Lug 4 of V-12 socket to lug 8 of V-11 socket.
   e) Lug 8 of V-1 socket to lug 7 of V-14 socket.
   f) Lug 7 of V-14 socket to lug 2 of V-16 socket.

h. CODE MARKING — TRIANGLE 4A: Same as for code marking *Triangle 4,* but includes built-in (internal) antenna and following revisions:
   1) Replaced jumper lead between pin 7 (cathode) of V-9 and terminal strip with r.f. choke L-1 part no. 705002.
   2) Inserted C-17 (1500 mmf.) between pin 7 of V-8 and chassis.

i. CODE MARKING — TRIANGLE 4W: Same as for code marking *Triangle 4,* but includes improved mechanical focus and centering using "wobble plate," and following revisions:
   1) Removed end of R-26 (3.9K) connected to chassis; rewired to B+ 125-volt point.
   2) Transposed grid resistors R-51 (270K) and R-82 (470K) of V-17.
   3) Removed R-102 (10K) from B+ 180-volt point; rewired to B+ 125-volt point.

j. CODE MARKING — TRIANGLE 5: Includes all revisions listed under code markings *triangle* 4, *Triangle* 4A, *and Triangle* 4W.

k. CODE MARKING — TRIANGLE 4N or 5N: Same as for code markings *Triangle 4* or *Triangle 5,* but with different horizontal output transformer T-9, part no. 738026, replacing part no. 738038, and following change:
   1) R-102 (10K) wired to B+ 180-volt point.

l. CODE MARKING — QP: Chassis 120113B, used in Models 644 and 647, may use a type 12-QP4 in place of the type 12LP4 kinescope. The letters QP stamped next to the triangular code marking denote the use of this tube. The components used in such receivers will differ to the extent indicated below:

SYMBOL	PART	PART NO.	
		12LP4	12QP4
L-10	Focus coil	708025	708033
L-8, L-9	Deflection yoke	708130 or 708130R	708036
V-25	Kinescope	810003	810017
——	Anode cap	440011	470490
I-1	Ion trap	708086 (Double)	708085 (Single)
C-36, C-49	Filter condenser* (Electrolytic)	925162	925165
C-81	Condenser (.05 mfd.)	923062	Not used

***Note that the markings on filter condenser C-36, C-49, part no. 925165 differ from those used on part no. 925162, shown in the schematic diagram.**
Circuit changes include the following:
1. C-81 (.05 mfd.) disconnected from hor. size coil L-6.
2. C-63 (.0005 mfd.) returned to pin 5 of V-19, instead of B—.

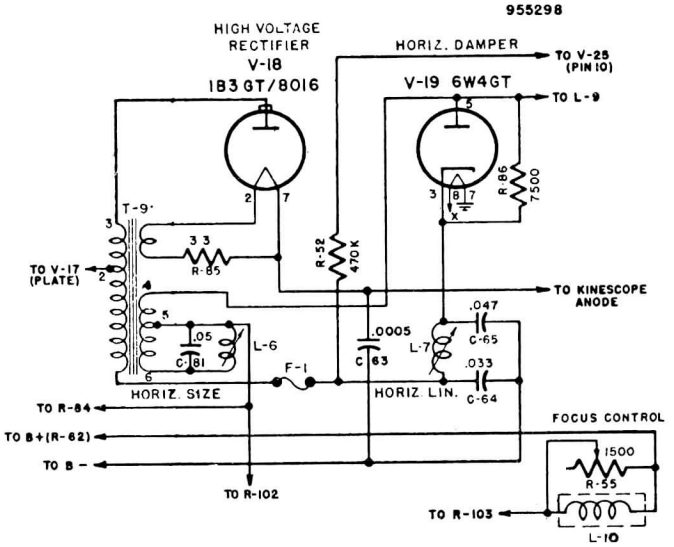


Fig. 5-12—High Voltage Power Supply—Chassis 120113B

11. SECONDARY AREA RECEPTION — Noise conditions in secondary areas of signal reception (fringe areas), or in areas where noise is excessive compared to signal level, give rise to problems of sync stability. For such areas only, the following simple changes should be made in the circuit. References are to the schematic diagram.

a. Remove end of R8 connected to C10 and the AGC bus; reconnect to chassis.

b. Remove end of R17 connected to pin 7 of V4; reconnect to junction of L1, C16, and R16.

c. Do not make this change for sets operating in primary signal areas.

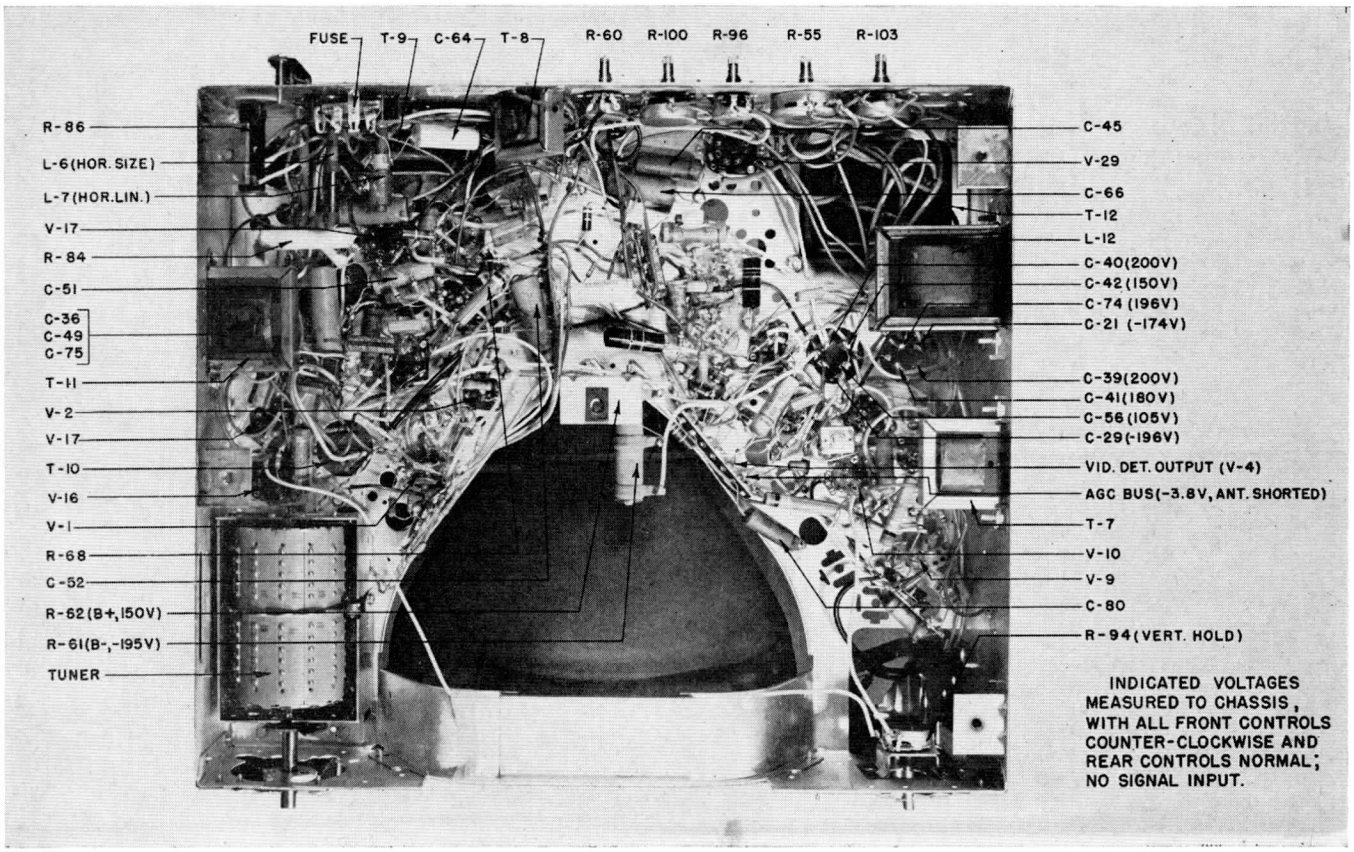


Figure 5-13—Bottom View of Chassis

12. CABINET PARTS LIST (Models 614, 637, 644, 647).

ITEM	PART NO.			
	MODEL 614	MODEL 637	MODEL 644	MODEL 647
Cabinet	**140279**	**140276**	140320	140325
Cabinet back	560097	560108	560109	560115
Safety glass	635023	635020	520119	520119
Mask	410805	—	410859	410859
Mask extrusion	—	—	591014	591014
Panel gasket	—	445008	445009	445009
Cabinet feet	—	445017	—	—
Selector escutcheon	520103	—	—	—
Bakelite front	—	450062	—	—
Knob — Fine Tuning	450044	450044	450044	450044
Knob — Selector	450051S	450051S	450045	450051S
Knob — Contrast	450045	450045	450045	450045
Knob — Brighntess	450045	450045	450046S	450045
Knob — Vert. Hold	450046S	450046S	450041S	450046S
Knob — Off-Volume	450041S	450041S	450041S	450041S
Knob — Hor. Hold	450046S	450041S	450051S	450041S
Spring insert—1/4 shaft	587011	587011	587011	587011
Spring insert—3/8 shaft	587012	587012	587012	587012
Spring insert—3/16 shaft	587013	587013	587013	587013

13. PARTS LIST — Chassis 120110B, 120113B.

SYMBOL	PART NO.	DESCRIPTION	LIST PRICE
C-4	928006	1,500 mmf, 400V	.30
C-5	928006	1,500 mmf, 400V	.30
C-6	928006	1,500 mmf, 400V	.30
C-7	928109	.005 mf, 400V	.35
C-8	928006	1,500 mmf, 400V	.30
C-9	910015	270 mmf, 400V	.25
C-10	928006	1,500 mmf, 400V	.30
C-11	928006	1,500 mmf, 400V	.30
C-12	910015	270 mmf, 400V	.25
C-13	928006	1,500 mmf, 400V	.30
C-14	928006	1,500 mmf, 400V	.30
C-15	910290	30 mmf, ±10%	.25
C-16	923062	.05, 400V	.25
C-17	928006	1,500 mmf, 400V	.30
C-18	923062 or 922025	.05 mf, 400V	.25 .35
C-19	923062	.05 mf, 400V	.25
C-20	923064	.1 mf, 400V	.30
C-21	925161	10 mf, 450V	4.60
C-22	923061	.01 mf, 400V	.25
C-23	923062	.05 mf, 400V	.25
C-24	910130	10 mmf, 400V	.30
C-25	928006	1,500 mmf, 400V	.30
C-26	928006	1,500 mmf, 400V	.30
C-27	910031	68 mmf, ±20%	.20
C-28	928006	1,500 mmf, 400V	.30
C-29	925161	25 mf, 50V	4.60
C-30	910010	110 mmf, ±20%	.25
C-31	923079	.001 mf, 600V	.25
C-33	923061	.01 mf, 400V	.25
C-34	923061	.01 mf, 400V	.25
C-35	923062 or 922025	.05 mf, 400V	.25 .35
C-36	925162	80 mf, 250V	4.60
C-37	923078	.005 mf, 400V	.25
C-38	922101	.05 mf, 400V	.30
C-39	Pt. of C-21	40 mf, 450V	
C-40	Pt. of C-29	40 mf, 450V	
C-41	Pt. of C-21	40 mf, 450V	
C-42	Pt. of C-29	40 mf, 450V	
C-43	928006	1,500 mmf, 400V	.30
C-44	923067	.1 mf, 200V	.30
C-45	923064	.1 mf, 400V	.30
C-46	910028	220 mmf, ±10%	.30
C-47	910029	150 mmf, ±10%	.30
C-48	928006	1,500 mmf, 400V	.30
C-49	Pt. of C-36	80 mf, 250V	
C-50	910027	.001 mf, 500V	.35
C-51	923068	.05 mf, 200V	.25
C-52	923080	.25 mf, 200V	.35
C-53	910027	.001 mf, 500V	.35
C-54	923062 or 922025	.05 mf, 400V	.25 .35
C-55	910010	110mmf, ±10%	.25
C-56	Pt. of C-29	10 mf, 450V	
C-57	910023	780 mmf, 400V	.35
C-58	923077 or 922027	.005 mf, 600V	.25 .35
C-59	910017	470 mmf, 400V	.25
C-60	923079	.001 mf, 600V	.25
C-61	923067	.1 mf, 200V	.30
C-62	923073	.05 mf, 600V	.30
C-63	923003	.0005 mf, 10KV	1.50
C-64	923074 or 922024	.035 mf, 600V	.30 .35
C-65	923073 or 922023	.05 mf, 600V	.30 .35
C-66	923064	.1 mf, 400V	.09
C-67	923075	.01 mf, 600V	.25
C-68	923066	.25 mf, 400V	.50
C-69	923078	.005 mf, 400V	.25
C-70	923078	.005 mf, 400V	.25
C-71	923085	.003 mf, 600V	.25
C-72	923073	.05 mf, 600V	.30
C-73	923073	.05 mf, 600V	.30
C-74	Pt. of C-21	25 mf, 50V	
C-75	Pt. of C-36	10 mf, 450V	
C-78	910090	50 mmf, 500V	.30
C-79	900064	3-35 mmf, Trimmer	.30
C-80	923067	.1 mf, 200V	.30
C-81	923062	.05 mf, 400V	.25
C-83	Pt. of T-2	75 mmf, 300V	
F-1	808050 or 808170	Fuse, ¼A. 250V Fuse ¼A. 250V	.20 .35
I-1	708084	Ion Trap — P.M.	2.80
L-1	708096	Peaking Coil — 75 uh	.45
L-2	708097	Peaking Coil—45 uh ±10%	.45
L-3	708095	Peaking Coil — 180 uh	.50
L-4	708095	Peaking Coil — 180 uh	.50
L-5	705009	R.F. choke—3.0 mh ±10%	.60
L-6	708082	Size coil	1.40
L-7	708003	Linearity coil	1.50
L-8	708130 or	Deflection yoke—Vert. coils	16.30
L-9	708130-R	Deflection yoke—Horiz. coils	
L-19	708025	Focus coil	7.00
L-11	705014	R.F. choke—20 uh	.45
L-12	737011	Filter choke—6h	4.15
P-2	505040 or	Connector plug—Speaker	.15
	505048	Connector plug—Speaker	.15
P-3	505014	Plug—Interlock switch	.30
R-1	340492	1,000 ohm, ½w, ±10%	.17
R-2	340492	1,000 ohm, ½w, ±10%	.17
R-3	340672	5,600 ohm, ½w, ±10%	.17
R-4	340212	68 ohm, ½w, ±10%	.14
R-5	340492	1,000 ohm, ½w, ±10%	.17
R-6	340492	1,000 ohm, ½w, ±10%	.17
R-7	340732	10,000 ohm, ½w, ±10%	.17
R-8	340652	4,700 ohm, ½w, ±10%	.17
R-9	340132	33 ohm, ½w, ±10%	.17
R-10	340492	1,000 ohm, ½w, ±10%	.17
R-11	340492	1,000 ohm, ½w, ±10%	.17
R-12	340632	3,900 ohm, ½w, ±10%	.17
R-13	340292	150 ohm, ½w, ±10%	.17
R-14	340492	1,000 ohm, ½w, ±10%	.17
R-15	341292	2.2 megohm, ½w, ±10%	.17
R-16	340652	4,700 ohm, ½w, ±10%	.17
R-17	341212	1 megohm, ½w, ±10%	.14
R-18	340932	68,000 ohm, ½w, ±10%	.14
R-19	Pt. of R-46	1,500 ohm, Contrast contro	
R-20	341212	1 megohm, ½w, ±10%	.14
R-21	330532	1,500 ohm, ½w, ±5%	.17
R-22	341212	1 megohm, ½w, ±10%	.14
R-23	340812	22,000 ohm, ½w, ±10%	.17
R-24	341072	270,000 ohm, ½w, ±10%	.14
R-25	341052	220,000 ohm, ½w, ±10%	.17
R-26	370632	3,900 ohm, 1w, ±10%	.16
R-27	370852	33,000 ohm, 1w, ±10%	.16
R-28	340892	47,000 ohm, ½w, ±10%	.17
R-29	341212	1 megohm, ½w, ±10%	.14
R-30	341032	180,00 ohm, ½w, ±10%	.14
R-31	340892	47,000 ohm, ½w, ±10%	.17
R-32	370812	22,000 ohm, 1w, ±10%	.16
R-33	370732	10,000 ohm, 1w, ±10%	.19
R-34	340492	1,000 ohm, ½w, ±10%	.17
R-35	340272	120 ohm, ½w, ±10%	.17
R-36	397014	10,000 ohm, 1w, ±10%	.20
R-37	397110	4,700 ohm, 2w, ±20%	.20
R-38	340972	100,000 ohm, ½w, ±10%	.17
R-39	340652	4,700 ohm, ½w, ±10%	.17
R-40	397014	10,000 ohm, 2w, ±10%	.20
R-41	340372	330 ohm, ½w, ±10%	.17
R-42	330972	100,000 ohm, ½w, ±5%	.14
R-43	340972	100,000 ohm, ½w, ±10%	.17
R-44	340932	68,000 ohm, ½w, ±10%	.14

PARTS LIST — Chassis 120110B, 120113 B. (cont.)

SYMBOL	PART NO.	DESCRIPTION	PRICE LIST
R-45	351492	15 megohm, ½w, ±20%	.14
R-46	390111	1 megohm, Volume Control & Switch	3.85
R-47	341132	470,000 ohm, ½w, ±10%	.17
R-48	341132	470,000 ohm, ½w, ±10%	.17
R-49	370492	1,000 ohm, 1w, ±10%	.16
R-51	341072	270,000 ohm, ½w, ±10%	.14
R-52	341132	470,000 ohm, ½w, ±10%	.17
R-55	390106	1,500 ohm, w.w., Focus control (rear)	2.30
R-61	394078	8,000 ohm, w.w., 10w ±10%	1.55
R-62		4,000 ohm, w.w., 10w, ±10%	
R-63	341212	1 megohm, ½w, ±10%	.14
R-64	330512	1,200 ohm, ½w, ±5%	.14
R-65	330492	1,000 ohm, ½w, ±5%	.17
R-66	330652	4,700 ohm, ½w, ±5%	.14
R-67	330572	2,200 ohm, ½w, ±5%	.17
R-68	397029	100,000 ohm, 2w, ±5%	.55
R-69	340892	47,000 ohm, ½w, ±10%	.17
R-70	341052	220,000 ohm, ½w, ±10%	.17
R-71	341052	220,000 ohm, ½w, ±10%	.17
R-72	330972	100,000 ohm, ½w, ±5%	.14
R-73	330972	100,000 ohm, ½w, ±5%	.14
R-74	370652	4,700 ohm, 1w, ±10%	.16
R-75	390075	50,000 ohm, Hor. Hold cont.	2.20
R-76	340892	47,000 ohm, ½w, ±10%	.17
R-77	371132	470,000 ohm, 1w, ±10%	.16
R-78	371132	470,000 ohm, 1w, ±10%	.16
R-79	331132	470,000 ohm, ½w, ±5%	.14
R-80	390102	20,000 ohm, Hor. Drive control	.90
R-81	340792	18,000 ohm, ½w, ±10%	.14
R-82	341132	470,000 ohm, ½w, ±10%	.17
R-83	370252	100 ohm, 1w, ±10%	.19
R-84	397044	10,000 ohm, 4w, ±10%	.85
R-85	394066	3.3 ohm w.w., ½w, ±10%	.10
R-86	394007	7,500 ohm, w.w., 25w. ±5%	1.25
R-87	340652	4,700 ohm, ½w, ±10%	.17
R-88	Pt. of R-75	100,000 ohm, Brightness cont.	
R-89	371212	1 megohm, 1w, ±10%	.16
R-90	340812	22,000 ohm, ½w, ±10%	.17
R-91	340812	22,000 ohm, ½w, ±10%	.17
R-92	340652	4,700 ohm, ½w, ±10%	.17
R-93	370972	100,000 ohm, 1w, ±10%	.16
R-94	390112	1 megohm, Vert. Hold cont.	.95
R-95	331252	1.5 megohm, ½w, ±5%	.17
R-96	390038	2 megohm, Vert. Size cont.	.85
R-97	341132	470,000 ohm, ½w, ±10%	.17
R-98	340712	8,200 ohm, ½w, ±10%	.14
R-99	341372	4.7 megohm, ½w, ±10%	.14
R-100	390039	5,000 ohm, Vert. Lin. cont.	1.75
R-101	340352	270 ohm, ½w, ±10%	.14
R-102	397043	10,000 ohm, 3w, ±10%	.30
R-103	390107	20 ohm, Horiz. Cent. cont.	1.50
R-105	340432	560 ohm, ½w, ±10%	.14
R-106	340432	560 ohm, ½w, ±10%	.14
R-108	340572	2,200 ohm, ½w, ±10%	.14
Tuner*	470452	Tuner Assy. — Standard	50.00
Tuner#	470604	Tuner Assy. — Standard	50.00
SP-1	180047	Speaker — 6" P.M.	6.00
SW-1	Pt. of R-46	On-off Switch	
T-1	720056	1st video I.F. transformer	1.90
T-2	720042	2nd video I.F. transformer	2.45
T-3	720109	3rd video I.F. transformer	.90
T-4	720057	4th video I.F. transformer	1.90
T-5	720081	Sound I.F. transformer—4.5 mc.	1.75
T-6	708017 or	Discriminator coil—4.5 mc.	4.10
	708018	Discriminator coil—4.5 mc.	3.35
T-7	734051	Sound output transformer	1.40
T-8	738008	Horiz. oscillator transformer	3.00
T-9	738028	Horiz. output transformer	11.40
T-10	738004	Vert. oscillator transformer	5.50
T-11	738026 or	Vert, output transformer	5.70
	738026a or	Vert, output transformer	5.70
	738027	Vert. output transformer	
T-12	730018	Power transformer	30.00
V-1	800535	Vacuum tube, 6AG5	
V-2	800535	Vacuum tube, 6AG5	
V-3	800533	Vacuum tube, 6AU6	
V-4	800541	Vacuum tube, 6AL5	
V-5	800533	Vacuum tube, 6AU6	
V-6	800026	Vacuum tube, 12AU7	
V-7	800533	Vacuum tube, 6AU6	
V-8	800533	Vacuum tube, 6AU6	
V-9	800035	Vacuum tube, 6T8	
V-10	800270	Vacuum tube, 6V6GT	
V-11	800380	Vacuum tube, 6SN7GT	
V-12	800541	Vacuum tube, 6AL5	
V-13	800380	Vacuum tube, 6SN7GT	
V-14	800380	Vacuum tube, 6SN7GT	
V-15	800026	Vacuum tube, 12AU7	
V-16	800016	Vacuum tube, 6K6GT	
V-17	800004	Vacuum tube, 6BG6G	
V-18	800450	Vacuum tube, 183-GT/8016	
V-19	800037	Vacuum tube, 6W4-GT	
V-25*	810000	Kinescope, 10BP4	
V-25#	810003	Kinescope, 12LP4	
V-27	800536	Vacuum tube, 6J6	
V-28	800535	Vacuum tube, 6AG5	
V-29	800290	Vacuum tube, 5U4-G	
X-1	470232	Socket—Cable assembly	3.05
X-2	508010	Socket—Speaker	.20
X-3	583206	Socket—Interlock switch	1.00

*Chassis 120110B #Chassis 120113B


Emerson
Radio and
Television

CABLE ADDRESS: EMPHONOCO NEW YORK CODES: BENTLEYS ABC 5TH EDITION IMP

Emerson
RADIO AND PHONOGRAPH CORPORATION
111 EIGHTH AVENUE NEW YORK CITY, 11

January 30,1950

TO ALL EMERSON TELEVISION DISTRIBUTORS:

Field Service Bulletin #5

Subject: Changes in Model 648 Chassis 120110E

Chassis coded with Triangle 1 incorporate the following changes to improve vertical linearity.

1. R98 changed to 1 meg. ½ watt.
2. R106 has been transferred from the lug where R86 is tied, to the B plus point on the terminal strip near the 3rd I.F.
3. R67 has been transferred from the junction of R60 and R90 to the B plus point on terminal strip near V1.
4. Resistor R60 has been transferred from the B plus point on terminal strip near Tube V1 to the B minus point of the terminal strip near Tube V14.
5. Resistor R64 has been transferred from the B minus point on terminal stip near V14 to the junction of R60 and R90 on the terminal strip near the 2nd I.F.

The suffix letter "C" added to the Triangle 1 code indicates the use of electrolytic condenser part #925165 in place of #925162. The terminal markings of these condensers are as follows:

#925162		#925165
80 mfd. - 250 V DC		
80 mfd. - 250 V DC		
10 mfd. - 450 V DC		

Very truly yours,

EMERSON RADIO & PHONOGRAPH CORPORATION

George Cohen
General Manager of Parts
Sales & Service Division

GC:VA

NE CHELSEA 2-1800 CABLE ADDRESS, EMPHONOCO NEW YORK CODES BENTLEYS ABC 5TH EDITION IMP

Emerson
RADIO AND PHONOGRAPH CORPORATION
111 EIGHTH AVENUE NEW YORK CITY, 11

December 28, 1949

TO ALL EMERSON TELEVISION DISTRIBUTORS:

Field Service Bulletin #1

Subject: Revision to eliminate picture flutter caused by line voltage variation.

Models 614C, 637C, 644C, 647C using chassis 120110C and 120113C having triangle codes 1 and 2. (Sets already manufactured incorporating this change will be identified by code triangle 3.)

Models 614B, 637B, 644B, 647B using chassis 120110B and 120113B having triangle code number 8.

1. Cut wire between triangle lug and square lug of C-41, part #925166.
2. Remove lead (blue) from pin #6 of 6AU6 first video amplifier going to the triangle lug of C21. Strip end of this (blue) lead and connect to the last empty lug on the terminal strip near C21.
3. Cut one end of R21 -- 1500 ohm from pin #6 and extend this resistor to the same lug of terminal strip near C21 in step #2.
4. From this same empty lug, run a jumper lead, approximately 16" long to another empty lug on the terminal strip near the 6W4. On this new terminal lug, connect a 10K, 1 watt resistor to the junction of the 3300 ohm, 1 watt, R-102 and the resistor 7500 ohm, R86. (Boostered B plus point.)
5. Connect pin #6 of the 6AU6 first video amplifier to the square of C41.
6. Replace .047, C-19 kinescope coupling with a .01 mf. condenser (400V).

Models 614B, 637B, 644B, 647B using chassis 120110B and 120113B having triangle codes 1, 4 and 5.

1. Remove 33K, 1 watt between pin #6 of V-5 and terminal board and replace with a 10K, 1 watt resistor.
2. Remove all connections from pin #6 of V-5, 6AU6 leaving all connections intact but away from pin #6 (blue lead, 10K, 1500 ohm).
3. Connect a jumper wire from pin #6 of V-5 to C-41 (square terminal electrolytic).
4. Connect a jumper wire (16") from junction of lug on terminal board and 10K ohm resistor from step #1 to junction of the damper resistor

PHONE CHELSEA 2-1800 CABLE ADDRESS, EMPHONOCO NEW YORK CODES BENTLEYS ABC 5TH EDITION IMP

Emerson

RADIO AND PHONOGRAPH CORPORATION

111 EIGHTH AVENUE NEW YORK CITY, 11

September 13, 1949

TO ALL EMERSON DISTRIBUTORS:

In order to keep you advised of circuit changes in Emerson Television Receivers, a simple code identifying system has been put into effect. A triangle with a number inside it will be inked on the rear wall of the chassis next to the AC power input.

Each time any change is made in production, the number within the triangle will change and, automatically, a field service bulletin will be issued to you so that you may keep up to date on all such circuit changes.

It is also important that you keep a record of these changes and file them properly for future reference.

This bulletin is the first in this new series and pertains to the Model 637 chassis model 110. Chassis bearing the code Triangle 1 have the following revisions incorporated:

Circuit Revisions to Correct Picture FLICKER or BOUNCE

1. Remove red lead from the B plus 125 volt point on terminal strip near 4th I.F. and from Pin #6 of the 6AU6 (V-5).

2. Remove red lead from the ▭ terminal of C-42 and from Pin #6 of the 6AU6 (V-5).

3. Insert a wire between the B plus 125 volt point and the ▭ terminal of the C-42 above.

4. Remove the 47,000 ohm resistor (R-28) from Pin #6AU6 (V-5) then wire it to the B plus 125 point on terminal strip near the 4th I.F.

5. Remove the 33,000 ohm resistor (R-27) from the B plus 125 volt point on terminal strip near V-12 and V-13 and from the junction of the blue lead △ C-21 on terminal strip near V-6 and V-15.

6. Wire the 33,000 ohm resistor (R-27) between Pin 6 of 6AU6 (V-5) and the empty lug on terminal strip near the power transformer. Add a wire from

Emerson Radio

ADDENDUM SERVICE NOTE
TELEVISION RECEIVERS
MODELS 614, 637, 644, and 647

CHASSIS MODELS 120110C and 120113C

1. GENERAL

The models listed have been revised both mechanically and electrically. The major mechanical change is the conversion to two dual-controls in place of the original arrangement of four dual-controls. Such models and chassis are identified by the subscript C or BC, as for example Model 644C. The major electrical change is the use of a multivibrator circuit in place of a blocking oscillator, in the vertical deflection circuits. This revision applies to both B and C chassis.

The change in the arrangement of operating controls is illustrated in figure 1. The Vertical Hold control, and Brightness and Horizontal Hold controls, are located at the rear of the chassis, as shown in figure 2. Mechanical centering is provided by use of a movable focus coil controlled by a lever. The centering lever may be tilted both up and down, and side to side.

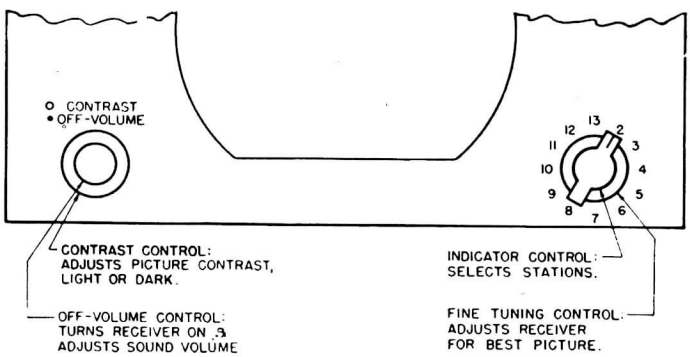


Fig. 1—Operating Controls

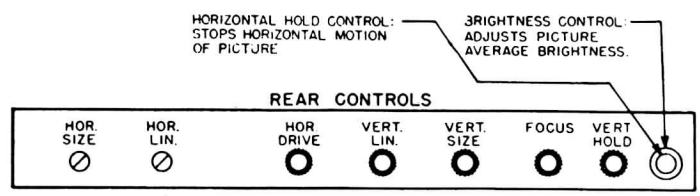


Fig. 2—Rear Adjustment Controls

2. VERTICAL MULTIVIBRATOR

Chassis code marking *Triangle 6*, stamped at the rear of chassis 120110B or 120113B, includes the change of the vertical sweep generator to the multivibrator type, with an auto-transformer in the output circuit. This revision is indicated in the schematic diagram, figure 3. All previous modifications, listed in the present service manual, are included.

3. MECHANICAL CENTERING

Use of mechanical centering controlled by the "wobble" plate and focus coil lever (picture centering lever) is indicated by code marking *Triangle 7*. The Horizontal Centering control, R-103, part no. 390107, is replaced by a 10 ohm, ½ watt resistor.

4. BC and C TYPE CHASSIS

Mechanical revision of chassis 120110B and 120113B, to provide for the control arrangement previously outlined, resulted in chassis 120110C and 120113C. Note that the code markings applicable to the C-type chassis *differ* from those assigned to the B-type chassis. Chassis marked BC are identical in control arrangement with C chassis but make use of extension brackets for several controls.

5. TUNER REVISIONS

The "Standard" turret tuner, part no. 470603, originally used in the models listed, has been modified as to shaft length, and becomes part no. 470607. The C-type chassis may use an alternate tuner, part no. 470605, produced by "Automatic." Such chassis are identified by code marking *Triangle O*. No circuit modifications are entailed; however, the arrangement and location of alignment trimmers and oscillator slugs differs, as shown in figure 4.

EMERSON RADIO & PHONOGRAPH CORPORATION

111 EIGHTH AVENUE NEW YORK 11, N. Y.

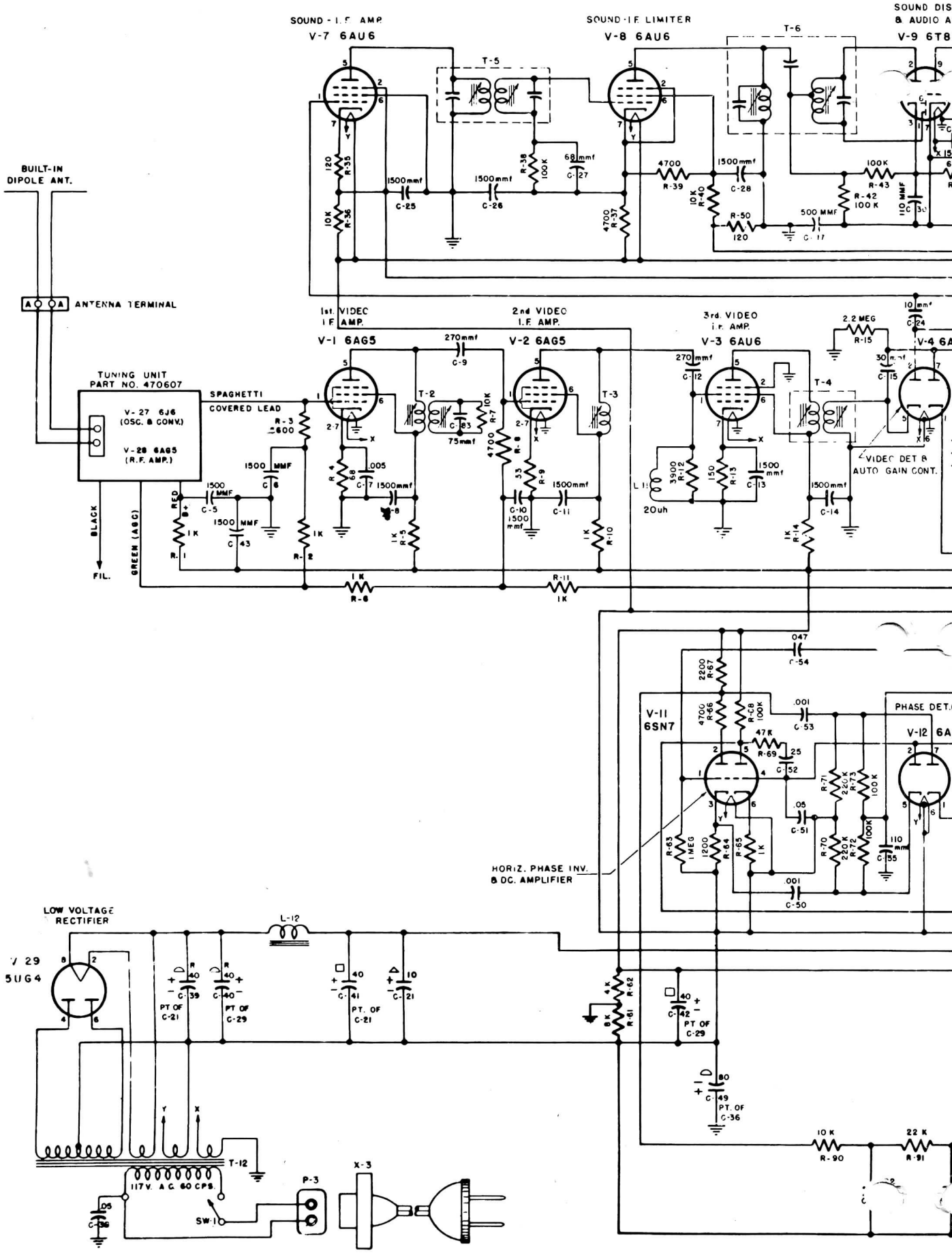
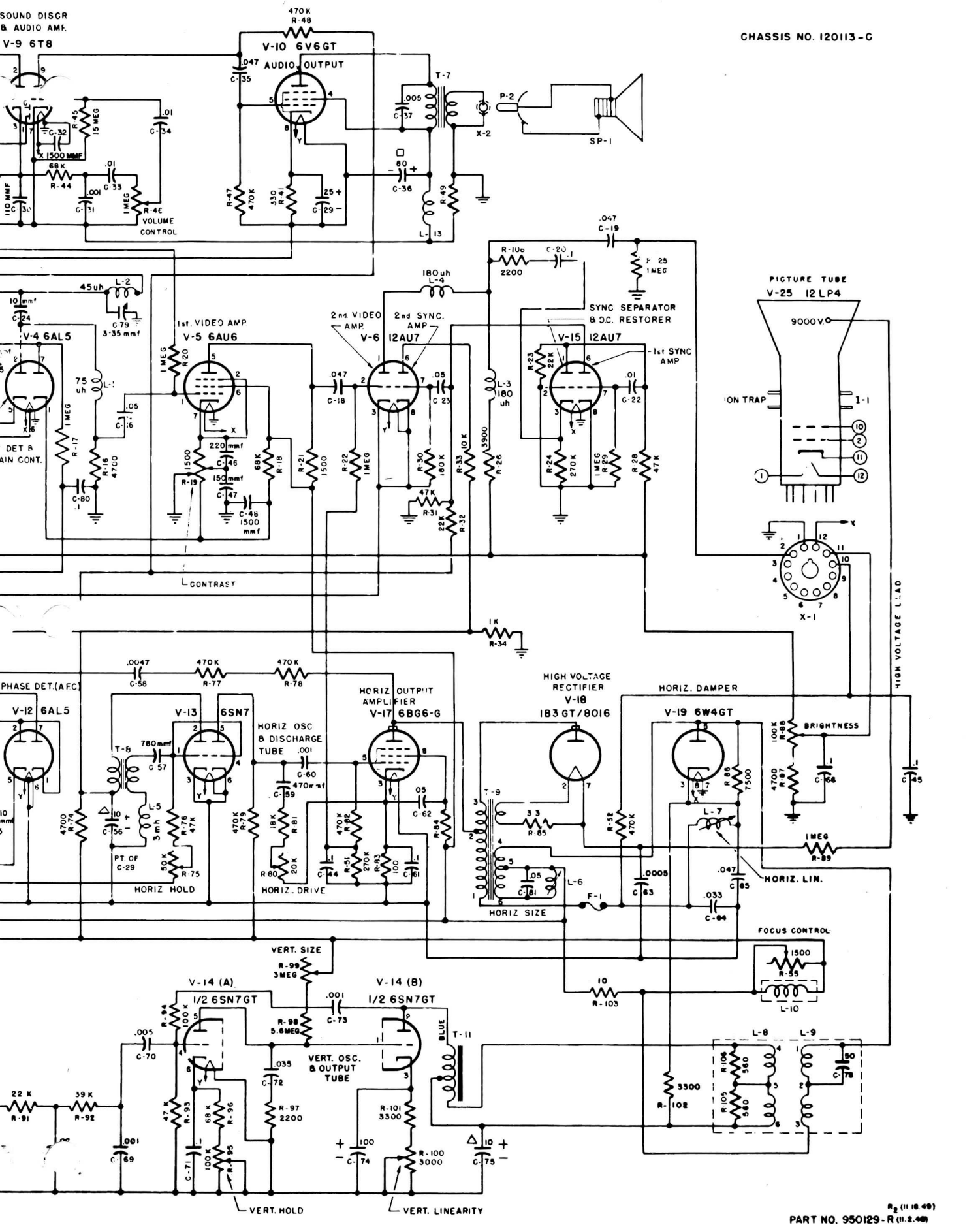


Fig. 3—Schematic Diagra



Diagram—Chassis 120113C

PART NO. 950129-R

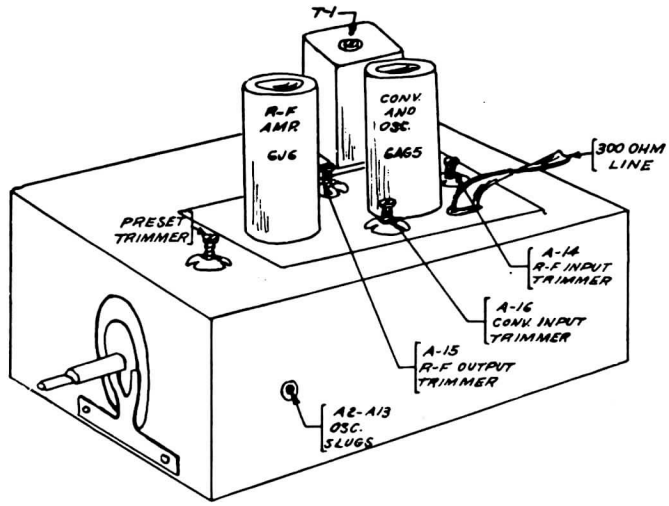


Fig. 4—Automatic Tuner—Part No. 470605

6. PICTURE TEAR

Code markings, *Triangle 8,* on B series chassis, and *Triangle 1* on C series chassis refer to the same circuit modifications to eliminate picture tear. These markings include all previous revisions, plus the following circuit changes:

a. Removed R-27 (33K, 1 watt).

b. Connected pin 6 of V-5 (screen) directly to B+ (output side of filter choke connected to C-41, 40 mfd., marked □).

c. Replaced R-25 (220K) with 1 megohm, ½ watt resistor.

d. Removed lead between pin 4 of V-10 (screen) and junction of L-13, C-31, C-36, and low end of R-46 (Vol. control).

e. Disconnected L-13 from junction point (L-13, C-31, etc.) and rewired to pin 4 of V-10.

f. Added jumper wire between junction point (L-13, C-31, etc.) and pin 7 of V-9 (cathode).

7. PARTS LIST

The parts list included in this addendum note tabulates those components whose values have been changed as a result of the foregoing modifications, plus new components added to the original circuit.

SYMBOL	PART No.	DESCRIPTION	SYMBOL	PART No.	DESCRIPTION
C-32	928006	1500 mmf., 400v	R-94	340972	100,000 ohm, ½w, ±10%
C-37	923088	.002 mf., 600v	R-95	390132	100,000 ohm, Vert. Hold control
C-68	923088	.002 mf., 600v	R-96	340872	39,000 ohm, ½w, ±10%
C-69	923079	.001 mf., 600v	R-97	340572	2,200 ohm, ½w, ±10%
C-70	923079	.001 mf., 600v	R-98	331392	5.6 megohn, ½w, ±10%
C-71	922014	.1 mf., 200v	R-99	390138	3 megohm, Vert. Size control
C-72	922024	.033 mf., 600v	R-100	390135	3,000 ohm, Vert. Lin. control
C-73	910027	.001 mf., mica, 500v	R-101	370612	3,300 ohm, 1w, ±10%
C-74	Pt. of C-21	100 mf., elect., 100v	R-102	370612	3,300 ohm, 1w, ±10%
R-7	340732	10,000 ohm, ½w, ±10%	R-103	340012	10 ohm, ½w, ±10%
R-25	341212	1 megohm, ½w, ±10%	T-11	738029	Vert. output trans.
R-50	340272	120 ohm, ½w, ±10%	Tuner	470605	Tuner ass'y.—Automatic
R-90	340732	10,000 ohm, ½w, ±10%			

For best results replacements should be made with genuine Emerson parts and genuine Emerson tubes.

FOR REPLACEMENT PARTS — SEE YOUR NEAREST EMERSON DISTRIBUTOR OR WRITE DIRECTLY TO

EMERSON RADIO & PHONOGRAPH CORPORATION

111 EIGHTH AVENUE NEW YORK 11, N. Y., U. S. A.

8-241049-5M

HELSEA 2-1800 CABLE ADDRESS: EMPHONOCO NEW YORK CODES: BENTLEYS ABC 5TH EDITION

Emerson

RADIO AND PHONOGRAPH CORPORATION

111 EIGHTH AVENUE NEW YORK CITY, 11

December 15, 1949

Additions to Service Manual, Section 10, Production Changes 110B & 113B Chassis

Triangle 5

Identifying receivers with built-in antenna, improved mechanical focus with wobble plate and included are revisions issued under Code notices Triangle 4 and Triangle 1.

1. Replace the jumper wire between cathode (lug 7) of V-9 and terminal board with R.F. choke, part #925002 between cathode (lug 7) of V-9 and chassis.
2. Insert a 1500 mmfd. condenser, part #928006, between cathode (lug 7) of V-9 and chassis.

Recent Production Change on 120110C and 120113C Chassis

Triangle 2

Identifying Receivers With Circuit Modification To Improve Interlace and Vertical Jitter

Parts to be changed.

1. Change R-96 from 39K to 68K.
2. Change R-93 from 100K ohms to 47K ohms.
3. Change C-70 from .001 mfd. to .005 mf.

Circuit Revisions

1. Transfer yellow wire from dummy lug strip near vertical blocking transformer, junction of R63, R64, R65, R93 and R97 to junction of C51, C61 and C68.
2. Remove yellow wire from the same dummy lug strip, junction of C51, C68, C61 and electrolytic can.
3. Add new yellow wire between same dummy lug at junction of R63, R64, R65, R93, R97, to electrolytic can C29, near V-4, 6AL5 socket.
4. Transfer lead of C68, .002 mfd. 600 volt condenser from same dummy lug, junction of C51, C61, C68, to junction of R63, R64, R93 and R97.

Add The Following Parts To The Addendum Parts List

R-51	341132	470,000 ohm, carbon, ½ watt +/- 10%
R-82	341072	270,000 ohm, carbon, ½ watt +/- 10%
R-26	397039	3,900 ohm, carbon, 2 watt +/- 10%
R-92	340872	39,000 ohm, carbon, ½ watt +/- 10%
R-93	340892	47,000 ohm, carbon, ½ watt +/- 10%
C-67	923088	.002 mf., paper, +/- 20%, 600 volt

Add The Following Corrections To The Addendum Parts List

R-96	340932	68,000 ohm, carbon, ½ watt +/- 10%
C-70	923110	.005 mf., paper, +/- 10%, 600 volts

In service note for 614, 637, 644, 647 page 20, item K, this should read vertical output transformer, (T-11) instead of horizontal output transformer (T-9).