Section I.
GENERAL DESCRIPTION

1. **FACILITIES**—Emerson Models 585 and 618 provide complete home entertainment through different mediums, including the following:
   a. TELEVISION: A wide-band video receiver which produces brilliant pictures of high definition and fine detail on a ten or twelve inch electromagnetic picture tube. High fidelity sound resulting from the Emerson "Staticlear" circuit accompanies the video images.
   b. STANDARD BROADCAST: All AM broadcast stations are received and reproduced with excellent fidelity.
   c. FREQUENCY MODULATION: FM reception of stations in the FM broadcast band provides static-free, high-fidelity programs.
   d. PHONOGRAPH: An automatic record changer plays twelve 10" or ten 12" records through the audio section of the receiver. An extended range, 12" permanent-magnet speaker is used for high quality reproduction of sound for TV, AM, FM, or phonograph.

2. **SPECIFICATIONS**—Models 585 and 618 employ separate chassis for television and for AM-FM reception. Chassis models used in these receivers are tabulated in Table I. Television chassis may use either of two tuners, as indicated in the table.
   b. TUBE COMPLEMENTS: (Table II)
   a. TV and AM-FM CHASSIS MODELS: (Table I).

Chassis Type	Chassis Model	Tuner Type	Model Number
TV — Separate sound i-f	120025B	470233	585
TV — Inter-carrier sound	120088B	470233 or 470452	585
TV — Inter-carrier sound	120090B and 120090D	470233 or 470452	618
AM - FM	120024B	———	585
AM - FM	120081B	———	585 618

Note: TV chassis models 120088B, 120090B, and 120090D are electrically identical. Chassis models 120090B and 120090D accommodate either a ten or twelve inch picture tube. Chassis 120090D differs from chassis 120090B only in that it is provided with a different horizontal output transformer.

* Tuner 470452 uses Type 6AG5 as the r-f amplifier (V27) and Type 6J6 as the oscillator and converter (V26).

† Chassis 120090B or 120090D may use Type 12LP4 or 12QP4 as the picture tube (V25).

PRODUCTION CHANGES—During production of Models 585 and 618, changes were instituted to further improve the performance of the various chassis employed.

a. CONTRAST CONTROL: The circuit of the contrast control was changed from the grid to the cathode circuit of V5 to improve operation. These changes are shown on the schematic diagram, figure 5-19, and apply only to chassis 120088B, 120090B, and 120090D.

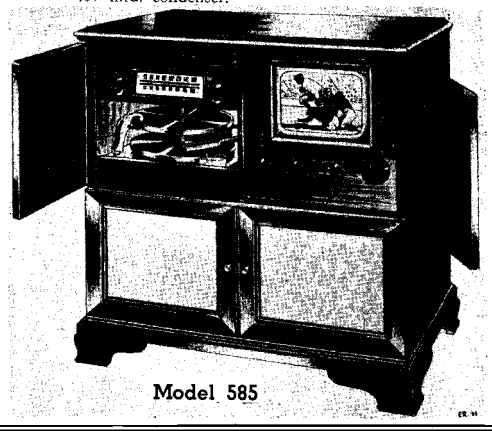
Model 618

b. LARGE PICTURE MASKS: Chassis 120090D is used with a larger picture mask and employs a different horizontal output transformer, part number 738015. This chassis is used in Model 618 only.

c. USE OF TYPE 12QP4 PICTURE TUBES: Chassis 120090B and 120090D may use Type 12QP4 as the picture tube, V25. The focus coil connections are different, due to the need for higher focus current. The revised schematic is shown in figure 5-15.

d. INADEQUATE HOR. WIDTH: Due to aging and other factors, the horizontal width on chassis 120025B may be insufficient. A .05 mfd. condenser is added across the Horizontal Size coil, L9, to correct this condition.

e. LP RECORD CHANGER: Chassis 120081 may be provided with a second phono jack for use with an LP record changer. The jack is connected to pin 3 of SW1 (1-F) through a 1 meg-ohm resistor, and returned to chassis through a .05 mfd. condenser.



Model 585

1) TV CHASSIS

Chassis Model: 120025B			Chassis Models: 120088B, 120090B, 120090D		
Symbol	Type	Circuit Function	Symbol	Type	Circuit Function
V1	6AG5	1st Video I-F Amp.	V1	6AG5	1st Video I-F Amp.
V2	6AG5	2nd Video I-F Amp.	V2	6AG5	2nd Video I-F Amp.
V3	6AG5	3rd Video I-F Amp.	V3	6AU6	3rd Video I-F Amp.
V4	6AL5	Video Det. and A.G.C.	V4	6AL5	Video Det. and A.G.C.
V5	6SN7GT	1st and 2nd Video Amp.	V5	6AU6	1st Video Amp.
V6	6AU6	Sync. Sep. and D.C. Rest.	V6	12AU7	2nd Video Amp., Sync. Sep., D.C. Restorer
V7	6BA6	Audio I-F Amp.	V7	6BA6	Audio I-F Amp.
V8	6AU6	Audio Limiter	V8	6AU6	Audio Limiter
V9	6H6	Audio Discriminator	V9	6H6	Audio Discriminator
V11	6SN7GT	Sync. Amp., Hor. Phase Inv., D.C. Amp.	V11	6SN7GT	Sync. Amp., Hor. Phase Inv., D.C. Amp.
V12	6AL5	Phase Detector (A.F.C.)	V12	6AL5	Phase Detector (A.F.C.)
V13	6SN7GT	Hor. Osc. and Disch.	V13	6SN7GT	Hor. Osc. and Disch.
V14	6SN7GT	Vert. Osc. and Disch.	V14	6SN7GT	Vert. Osc. and Disch.
V15	6SN7GT	1st and 2nd Sync. Amp.	V15	12AU7	1st and 2nd Sync. Amps. and Clipper
V16	6K6GT	Vertical Output	V16	6K6GT	Vertical Output
V17	6BG6G	Horizontal Output	V17	6BG6G	Horizontal Output
V18	1B3GT	High Voltage Rect.	V18	1B3GT	High Voltage Rect.
V19	5V4G	Horizontal Damper	V19	5V4G	Horizontal Damper
V20	25Z6GT	Low Volt. Rect. (Pos.)	V25†	10BP4	Picture Tube
V21	25Z6GT	Low Volt. Rect. (Pos.)	V26*	6J6	Oscillator
V22	25Z6GT	Low Volt. Rect. (Pos.)	V27*	6J6	Converter
V23	25Z6GT	Low Volt. Rect. (Neg.)	V28*	6J6	R-F Amplifier
V24	25Z6GT	Low Volt. Rect. (Neg.)	V29	Sel. Rect.	Low Volt. Rect. (Pos.)
V25	10BP4	Picture Tube	V30	Sel. Rect.	Low Volt. Rect. (Pos.)
V26	6J6	Oscillator	V31	Sel. Rect.	Low Volt. Rect. (Neg.)
V27	6J6	Converter	V32	Sel. Rect.	Low Volt. Rect. (Neg.)
V28	6J6	R-F Amplifier			

2) AM-FM CHASSIS

Chassis Model: 120024B			Chassis Model: 120081B		
Symbol	Type	Circuit Function	Symbol	Type	Circuit Function
V100	6SB7Y	FM and AM Converter	V100	6SB7Y	FM and AM Converter
V101	6SG7	FM and AM 1st I-F Amp.	V101	6SG7	FM and AM 1st I-F Amp.
V102	6SG7	FM 2nd I-F Amp.	V102	6SG7	FM 2nd I-F Amp.
V103	6SH7	FM Limiter	V103	6SH7	FM Limiter
V104	6S8GT	FM Disc., AM Det., A.V.C., Audio Amp.	V104	6S8GT	FM Disc., AM Det., A.V.C., Audio Amp.
V105	6AT6	Phase Inverter	V105	6AT6	Phase Inverter
V106	25L6GT	Push-pull Output	V106	25L6GT	Push-pull Output
V107	25L6GT	Push-pull Output	V107	25L6GT	Push-pull Output
V108	25Z6GT	Rectifier	V108	6BA6	R-F Amplifier
			V109	25Z6GT	Rectifier

c. RECEIVER CHARACTERISTICS: (Table III).

Item	Description
Voltage Rating	105-125 volts, 60 cycles a.c. only
Power Consumption	Chassis 120024B— 90 watts Chassis 120081B— 90 watts Chassis 120025B—285 watts Chassis 120088B—240 watts Chassis 120090B—240 watts Chassis 120090D—240 watts Record changer—25 watts
Current Drain (Max.)	3.2 amps. at 117 volts a.c.
Channel Selection	Tuner 470233—12 position rotary switch Tuner 470452—12 position rotary turret
Fine Tuning Range	Channel 2—App. ± 300 KC. Channel 13—App. ± 750 KC.
Intermediate Freqs.	Chassis 120025B—Video 25.75 MC., Audio 21.25 MC. Chassis 120088B, 120090B, and 120090D—Video 25.75 MC., Audio 4.5 MC.
Input Impedance	300 ohms, balanced
Audio Power Output	3.5 watts
Chassis Freq. Range	Television — 54-88 MC., 174-216 MC. AM — 540-1620 KC. FM — 88-108 MC.

Section II.
INSTALLATION

1. RECEIVER LOCATION — Careful consideration should be given to the placement of the receiver in the home. Allowance must be made for several factors, including maximum visibility, access to a power outlet, and room lighting.
   a. LOCATION: Locate the set where a minimum of bright light will fall on the television screen. Do not place the receiver in front of a window or other source of direct light. Avoid glare and reflections resulting from nearby lamps. Select the location which enables maximum visibility for the seating arrangement of the room.
   b. VENTILATION: Models 585 and 618 have been designed with adequate allowance for ventilation to insure long-lasting, trouble-free operation. Do not obstruct any of the ventilating openings when installing the receiver. Allow at least one inch wall space for ventilation as the heat produced by a television chassis is considerably more than the average broadcast receiver.
2. ANTENNA INSTALLATION—The antenna and transmission line to the set are the most important factors in securing good television reception. For best results use Emerson high-gain Tele-Ray antennas. The very high frequencies used in telecasting introduce new problems not encountered in broadcast reception, making the antenna and its installation the primary consideration for good video reception.
   a. PROPERTIES OF TV WAVES: Unlike broadcast waves, television signals travel in straight line paths, called "line of sight" propagation. The television wave does not follow the curvatures of the earth's surface and thus reliable reception beyond the horizon is not possible. The broadcast can be intercepted by a hill or other obstruction, thus preventing reception by a receiver located behind such an obstruction. For this reason, it is necessary to locate the antenna as high as possible. Another peculiarity of television waves is that they reflect from solid objects. By this action, a television signal can reach a receiver antenna from more than one direction, often resulting in reception of the same signal at slightly different times. This effect produces multiple pictures, or "ghosts" on the television screen. If reflections are encountered, it may be possible to eliminate them by rotation of the antenna, by adding reflectors, by changing to a more directive type of antenna, or by moving the position of the antenna.
   b. TYPES OF TV ANTENNAS: The properties of television waves makes necessary the use of special antennas. The most common type is the half wave dipole, consisting of two rods, each a quarter wave long, separated by an insulating member. This type of antenna is bi-directional and is indicated where signals are to be received from two directions and where "ghosts" are not prevalent. Where interference may take place it becomes necessary to use an antenna with a reflector. Moreover, the dipole with reflector will provide a stronger received signal.
   c. DIPOLE AND REFLECTOR ELEMENTS: (Table IV).

The following table shows the length of the dipole (consisting of two quarter-wave elements) and the reflector, for each of the present channels.

Channel	Freq. (MC.)	Total Length (Ft.)	
		Dipole	Reflector
2	54-60	8.20	8.60
3	60-66	7.50	7.85
4	66-72	6.80	7.15
5	76-82	5.90	6.20
6	82-88	5.50	5.80
7	174-180	2.65	2.78
8	180-186	2.56	2.69
9	186-192	2.48	2.60
10	192-198	2.40	2.52
11	198-204	2.33	2.44
12	204-210	2.26	2.37
13	210-216	2.17	2.30

   d. TRANSMISSION LINES: Models 585 and 618 are designed for use with a 300-ohm balanced transmission line. Keep the line away from the antenna mast, parapet, and walls by means of stand-off insulators. Make certain that the line is held firmly in place and will not move about due to wind or other causes. It is suggested that the line be twisted one turn for each foot of length to minimize noise pickup.
   e. GENERAL PRECAUTIONS: The following points should be carefully observed for any type of antenna installation:
      1) The antenna must be placed in a high position, clear of all obstructions, and in line of sight of the transmitting station.
      2) The antenna must be properly aimed to obtain maximum signal strength and freedom from echoes and interference.
      3) In areas of low signal strength, it may be necessary to use an antenna of specific length to obtain best results.
      4) The use of special upper and lower band antennas, one for the low frequency band and the other for the high frequency band, may be necessary for sufficient signal strength where conditions are unfavorable.
   f. AM-FM ANTENNAS: Self-contained antennas are provided for AM and for FM reception.
      1) A self-contained loop antenna is used for reception in the broadcast band. To improve reception of weak stations, an additional outdoor antenna may be used. Connect the outdoor antenna to the screw on the AM-FM chassis terminal strip marked "AM".
      2) An internal power line antenna is provided for FM operation in relatively strong signal areas. The line cord should be completely uncoiled for effective operation of this antenna. A separate FM dipole is recommended for maximum FM reception. To connect the dipole, first remove the wire from the screw on the AM-FM chassis terminal strip marked "FM" and connect the dipole leads to the "FM" terminal and the terminal marked "G". The television dipole may be used for FM reception, if desired. Connect a short length of transmission line to the "FM" terminal and "G" and loosely couple to the TV transmission line by wrapping one or two turns around the latter.

CAUTION

Do not couple the FM antenna input directly to the TV input as the former is an unbalanced input and will cause undesirable loading and possible hum modulation.

3. ADJUSTMENTS—After installation of the receiver and before placing it in operation, proceed to make the following checks and adjustments.

CAUTION

Only experienced personnel should attempt to make these adjustments. Extreme care is necessary if the picture tube is to be handled. Goggles and gloves should be worn and the tube should not be held close to the body.

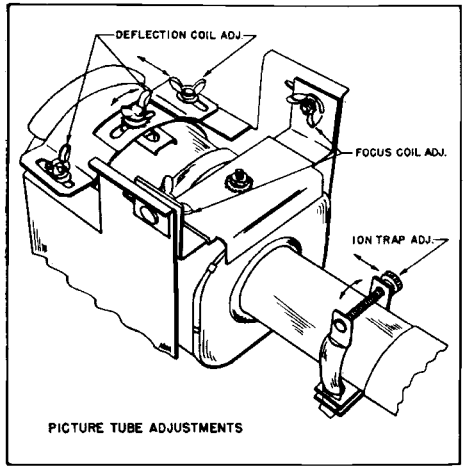


Figure 2-1—Ion Trap, Deflection, and Focus Coil Adjustments

   a. MECHANICAL: Before plugging the line cord into the power outlet, make the following mechanical adjustments, if necessary:
      1) Check to see that the high-voltage lead is firmly in its receptacle on top of the picture tube. If it has come unplugged, lift the rubber insulator away from the lead contact and insert contact in the receptacle, then release the rubber. This will cause a slight vacuum to hold the contact in place.
      2) The ion spot trap, I1, should be positioned behind the focus coil with the permanent magnets down. The poles with the blue covering must be toward the picture tube face, and the poles with the black covering should be over the two "flags" which extend from each side of the electron gun assembly. This is an approximate setting. Final positioning should be made as indicated under ELECTRICAL adjustments.
      3) The deflection coils, L7 and L8, (chassis 120025B) or L8 and L9 (chassis 120088B and 120090B), as well as the focus coil, L6 (chassis 120025B) or L10 (chassis 120088B, 120090B, and 120090D), have been adjusted at the factory. Check the position of the rubber edges of the deflection coil holder. They should be snug against the picture tube. If they are not, the tube may have slipped forward. The rim of the picture tube face should not extend past the front edge of the chassis more than 3/8". If it does, loosen the two wingnuts holding the band around the picture tube and slide the tube back. Do not exert more than a slight pressure. If tube binds, the neck of the tube may break. After tube is properly positioned on the chassis, loosen the two wingnuts on each side of the deflection yoke and slide yoke holder forward until rubber edges are snug against the picture tube. The wingnut on top of the yoke holder controls the final adjustment described under ELECTRICAL adjustments.
   b. ELECTRICAL: After completing whatever mechanical adjustments may be necessary, plug the line cord into an outlet supplying 105 to 125 volts, 60 cycles a.c. Do not use an outlet which is heavily loaded with other appliances as it must be capable of supplying 375 watts (3.2 amps.). Make certain that all tubes and plugs are firmly seated in their sockets, before inserting the line cord plug. It is recommended that the operating instructions furnished with the receiver be read thoroughly before turning the set on. Proceed with the following adjustments:
      1) Turn the OFF-VOLUME control on the AM-FM receiver clockwise approximately a quarter of a turn and set the band switch to TEL. Allow the tubes to warm up.
      2) Set the TUNING control on the television receiver to an active channel and turn the CONTRAST control to the maximum counter-clockwise position. Rotate the BRIGHTNESS control clockwise until light is visible on the screen.
      3) Adjust the FINE TUNING control for best sound quality for chassis 120025B or best picture for chassis 120088B, 120090B and 120090D.
      4) Adjust the ion spot trap by slowly moving back and forth along the axis of the picture tube and rotating slightly until maximum brightness is obtained on the screen of the picture tube. After completing the adjustment, tighten the thumbnut on the ion trap magnet frame.
      5) The deflection coil and focus coil have been adjusted at the factory and if the high voltage control contact is facing up, the raster should adequately fill the opening. If the rectangular raster is cut off on one side, slight movement of the focus coil should fill in the raster. The focus coil is held by two thumb nuts which, when loosened, will allow for this adjustment. Check all thumb screws and thumb nuts to make sure they are tight after these adjust-

ments. If the raster is not complete after above adjustments, slight movement of the deflection coil may be required. If the lines on the tube face are not horizontal, rotate the deflection yoke around the tube to correct the condition.

6) All adjustments on the rear of the chassis have been set at the factory and in the event they have been disturbed, they must be carefully readjusted. Each control is labelled as to its function. When adjustments are required, these should be made on a transmitting station "pattern." Most stations transmit such a pattern prior to each scheduled program. These adjustment are outlined in Section V., Maintenance and Alignment.

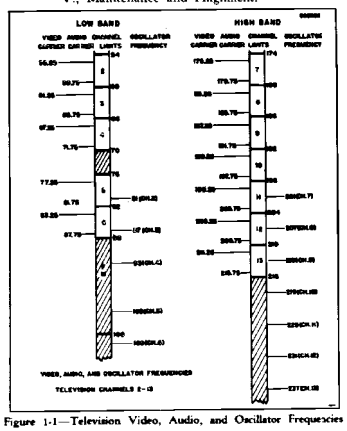


Figure 1-1—Television Video, Audio, and Oscillator Frequencies

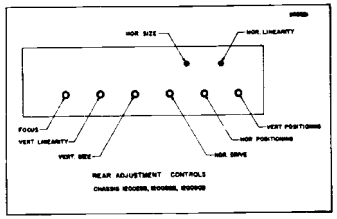


Figure 2-2—Television Rear Adjustment Controls

Section III.
OPERATION

1. **OPERATING CONTROLS**—The front panel controls for the TV and AM-FM receivers are shown in the following figures. The function of all controls, both front and rear, is outlined in Section IV, CIRCUIT DESCRIPTION. Operating controls are grouped on two front panels, as shown. Note that the ON-OFF and VOLUME controls for television are located on the AM-FM receiver front panel. Selection of TEL, PHONO, AM, or FM, is also controlled by this receiver.

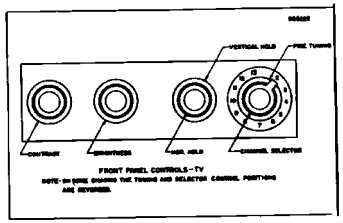


Figure 3-1—Television Front Panel Controls

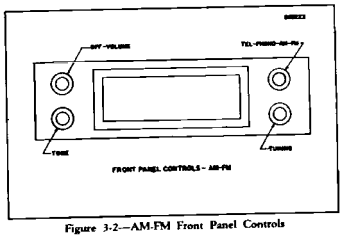


Figure 3-2—AM-FM Front Panel Controls

a. TELEVISION: The television chassis is provided with the controls shown in Figure 3-1. The function of these controls is given in the following table.

FUNCTION OF TEL. CONTROLS: (Table V).

Control	Function
Channel Selector (Outer control)	Selects the desired station.
Fine Tuning (Inner control)	Adjusts receiver for best sound (chassis 120025B) or best picture pattern (chassis 120088B, 120090B and 120090D).
Vertical Hold	Prevents up and down motion of picture.
Horizontal Hold	Prevents side to side motion of picture.
Contrast	Adjusts average brightness of picture
Brightness	Adjusts contrast between light and dark picture areas.

b. AM-FM CHASSIS: The AM-FM receiver controls the power and sound volume of the TEL receiver and PHONO, as well as AM or FM reception.

FUNCTION OF AM-FM CONTROLS: (Table VI).

Control	Function
On-Off Volume	Controls operation of both chassis and record changer. Controls sound volume for TV, AM, FM, and PHONO.
Tone	Adjusts tone for all sound.
TEL-PHONO-AM-FM Switch	Selects type of operation.
Tuning	Tunes AM-FM receiver.

2. **TUNING**—The following tuning procedure will result in the most satisfactory picture and sound reception. Note that the operation of the FINE TUNING control differs depending on the type of television chassis present in the receiver.

a. PROCEDURE:

1) Turn the ON-OFF VOLUME control clockwise approximately one quarter of a turn. Set the control switch to the TEL position. Move the CHANNEL SELECTOR on the television front panel to the desired station.

2) Allow about a minute for the tubes to warm up. If the desired station is broadcasting, music or speech will be heard.

3) Rotate the CONTRAST control to the maximum counter-clockwise position. Rotate the BRIGHTNESS control to the maximum counter-clockwise position and then adjust slowly clockwise, until light is just visible on the screen. Adjust the CONTRAST control until a picture appears on the screen and the desired contrast is attained.

4) If the picture moves up or down adjust the VERTICAL HOLD control until the picture stops moving. If the picture moves from side to side adjust the HORIZONTAL HOLD control until the motion stops.

5) Readjust the CONTRAST control until the desired contrast is obtained. It may be necessary to readjust the BRIGHTNESS control slightly at the same time.

6) It may be desirable to readjust the FINE TUNING control to make sure that the sound and picture are tuned for the best quality. After the receiver has been in operation for some time, readjust the FINE TUNING to maintain the best sound quality (for chassis 120025B) or best picture pattern(for chassis 120088B, 120090B, and 120090D).

7) Because of the automatic control circuits embodied in the television receiver, readjustment of the VERTICAL HOLD and HORIZONTAL HOLD controls is normally not necessary, if the other control settings for proper operation are not disturbed.

b. CHANGING CHANNELS DURING OPERATION: To select another station during operation of the television receiver, move the CHANNEL SELECTOR to the new station and readjust the FINE TUNING control for the best sound or picture (depending on chassis type). Then readjust the CONTRAST and VOLUME controls to obtain the desired picture quality and sound volume.

3. **CHECKING OPERATION**—The following figures indicate correct and incorrect adjustment of the various controls. Correction may be obtained by operation of the associated control.

4. **INTERFERENCE**—Emerson Models 585 and 618 have been designed to include all known means of suppressing interference from the many possible sources. Static, which manifests itself audibly in radio reception, appears visually as well, in television. The possible sources of excessive interference in a locality must be studied and checked before installation is made. The antenna installation must take these facts into consideration.

a. SIGNAL-TO-NOISE RATIO: The signal-to-noise ratio is dependent upon the signal strength as well as the noise level in the immediate vicinity of the installation. Where the signal is weak, a normal noise level will be sufficient, in comparison, to act the same as a high noise level for normal signal strength. It is possible to solve this problem either by increasing signal strength through relocation of the antenna or by using a high gain and/or directive antenna; or to eliminate the noise at its source through filtering, shielding, bonding, etc.

b. TYPES OF INTERFERENCE: Some typical types of interference which may be encountered include:

1) Radio frequency interference from transmitting and receiving short wave equipment may cause interference in the form of moving diagonal lines through the picture.

2) Automobile ignition interference causes speckles on the picture and when this effect is severe, it may cause vertical picture movement. Electrical motor-driven appliances cause similar effects.

3) Electrically operated medical equipment, such as diathermy, will cause a herringbone pattern across the screen. Proximity to such equipment may obliterate part of the picture.

4) Reflections or ghosts, which appear as multiple images, are caused by signals arriving at the receiver from different points—one usually directly from the transmitter, and others by reflections from buildings, mountains, large bridges, etc. Proper antenna installation will minimize this effect.

Several of these forms of interference, as well as other reception difficulties are illustrated in the following figures.

c. WAVE TRAPS: Radio frequency interference, which manifests itself as vertically or horizontally moving lines across the screen, can be eliminated by wave traps. Variations in the pattern of interference will depend on the modulation of the interfering signals. Unmodulated carrier interference causes a "spotty" or "herring-bone" pattern on the screen.

1) The wave trap required to remove this interference (generally from an FM, undesired television or amateur transmitter) must be a tuned circuit that resonates at the image frequency caused by the interfering station. The trap should be either a parallel circuit in series, with the ungrounded side of the antenna lead in, or a series circuit placed across the lead in (on the terminal board at the rear of the set).

2) If the interference is at the same frequency as the desired television station, a trap will eliminate both the wanted and unwanted signals unless the interfering signal is weaker than the wanted signal. In this case the interference can be attenuated until it no longer causes difficulty. Relocation and the use of a more directive antenna may also be effective in such cases.

It can readily be seen from this discussion of interference how important a part the antenna can play in achieving satisfactory results from the television receiver.

Adjustment of wave traps is detailed in Section V, Maintenance and Alignment.

d. WEAK PICTURES: When an installation is made near the limit of the service of area of a transmitter, the picture may become speckled, having a "snow" effect, with the background very light, even with the "Contrast" control at full clockwise position. Further, the picture may not hold steady on the screen. This is caused either by lack of signal strength from the transmitter or a defective antenna, which should be checked.

5. **AM-FM TUNING**—Operation of the AM-FM receiver for reception in the broadcast or frequency modulation bands is controlled by the TEL-PHONO-AM-FM switch. The television receiver is inoperative for AM or FM reception. After selecting the type of reception desired, refer to the proper section of the illuminated dial (upper for AM, lower for FM) and tune in the desired station. Adjust the VOLUME and TONE controls to obtain the volume and tone balance desired.

6. **PHONOGRAPH OPERATION**—Model 585 and 618 may be equipped with either of two types of automatic record changers; changer 819039 is GI Model 700FS; changer 919044 is Webster Model 146. The installation and operation of each type is outlined below:

a. INSTALLATION: For shipping purposes, the metal motor panels of the record changers are fastened to the sliding shelf. Before operating the receiver, loosen the changer panel by screwing down the mounting screws on top of the panel, as far as they will go. This will enable the panel to float freely on its mounting.

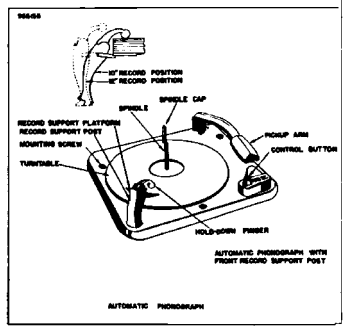


Figure 3-15—Operation of Record Changer 819039 (GI)

b. OPERATION: Either type of record changer may be operated either manually or automatically, as desired. The operation of each type of changer is detailed below:

1) Changer 819039 — For automatic operation, first turn the ON-OFF Volume Control clockwise and allow the receiver to warm up. Set the TEL-PHONO-AM-FM switch to PHONO position, and adjust the record support post for either ten or twelve inch records. The support post should be tilted towards the center spindle for ten inch records and away from the spindle for twelve inch records. Raise the hold-down finger and place a maximum of twelve ten inch or ten twelve inch records over the spindle cap and on the edge of the record support platform. Mixed sizes of records cannot be played in sequence automatically. Lower the hold-down finger over the top of the record stack and start the record player by depressing the control button. Records will be played automatically until the completion of the last record. The pickup will then return to its rest position and the motor will automatically stop.

2) CHANGER 99044—For automatic operation, first turn the OFF-VOLUME control clockwise and allow the receiver to warm up. Set the TEL-PHONO-AM-FM switch to PHONO position and adjust the record support shelf for either ten or twelve inch records. The shelf should be tuned towards the center spindle for ten inch records or away from the spindle for twelve inch records. Raise the ballast weight, turn forward and place a maximum of twelve ten inch or ten twelve inch records on the spindle. Mixed sizes of records cannot be played in sequence automatically. Turn the ballast weight back and lower it over the top of the knob to the START-REJECT position. The knob will drop back to the AUTOMATIC position and the records will be played automatically. Upon completion of the last record, move the control knob to the STOP position.

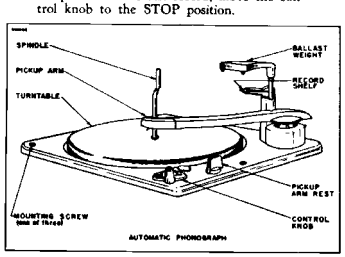


Figure 3-16—Operation of Record Changer 919044 (Webster)

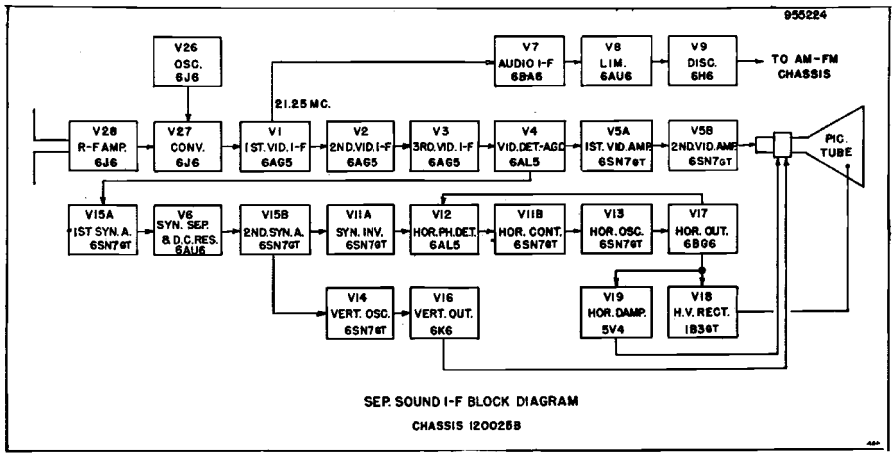


Figure 4-1—Functional Block Diagram—Chassis 120025B

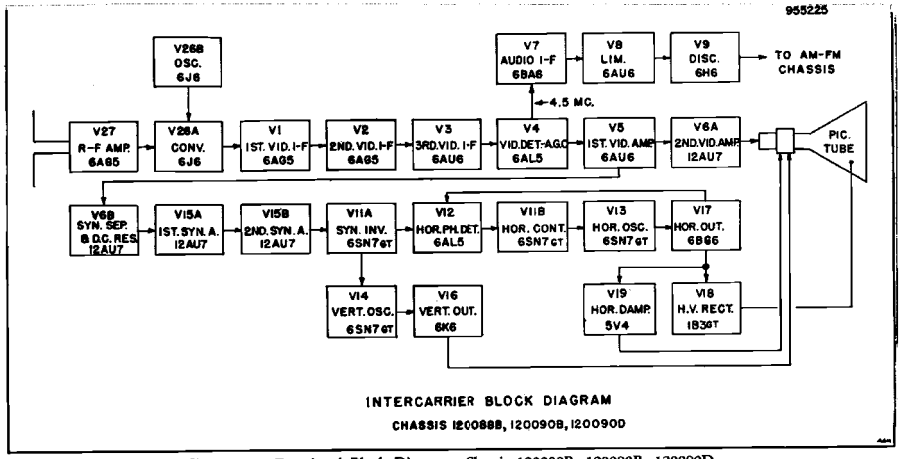


Figure 4-2—Functional Block Diagram—Chassis 120088B, 120090B, 120090D

Section IV.
CIRCUIT DESCRIPTION

1. FUNCTIONAL BLOCK DIAGRAMS—The television chassis used in Models 585 and 618 may be either of two types. Chassis 120025B employs a separate sound i-f system, operating at 21.25 MC., and fed from the first video i-f amplifier. In addition, this chassis employs Type 25Z6GT rectifiers in a voltage doubling circuit. Chassis 120088B, 120090B, and 120090D make use of the intercarrier type of sound separation, with the audio i-f stages operating at 4.5 MC. These chassis use selenium rectifiers in the low voltage power supply circuits. With the intercarrier type of circuit, the sound i-f is automatically maintained in synchronism with the video i-f since it is obtained by heterodyning the sound carrier with the video carrier prior to the video detector.

   For either type of chassis, the receiver can be considered to consist of five major sections which are detailed in the following paragraphs. These sections comprise the tuner, video stages, audio stages, sync and sweep stages, and power supplies.

   AM-FM chassis 120024B and 120081B are essentially alike, the major difference being the additoin of an r-f stage to the latter.

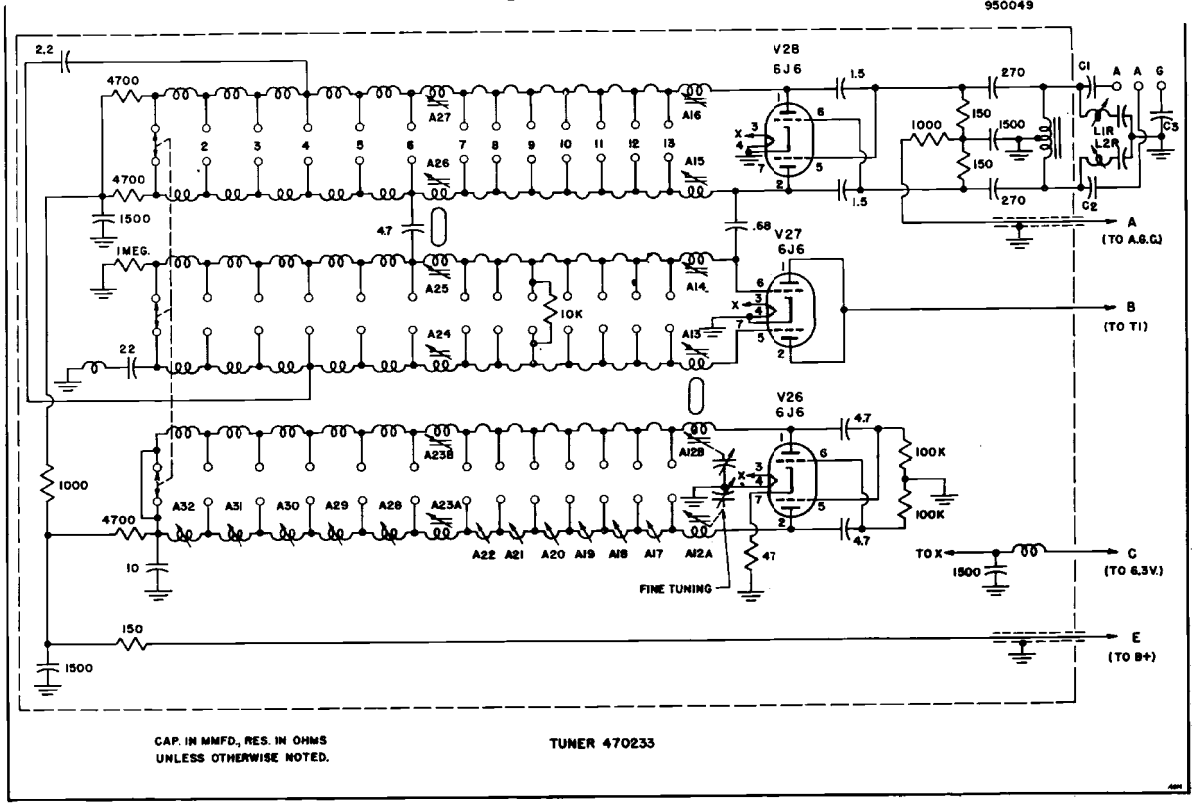


Figure 4-3—Schematic Diagram—Tuner 470233

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 modulated carriers and convert them to the i-f frequencies of 25.75 MC. for video and 21.25 MC. for audio. For the intercarrier type of receiver, no separation of these i-f frequencies is made at the first video i-f stage, and the audio i-f frequency is 4.5 MC.

   a. EMERSON TYPE 470233: This tuner uses three Type 6J6 tubes as the r-f amplifier, oscillator; and converter respectively. Each tube is used in a push-pull circuit and employs the equivalent of a quarter-wave line as the tuned circuit. The r-f amplifier, V28, has an interference trap connected across the 300 ohm balanced input. The plate circuit of V28 is tuned by the twelve position rotary switch to any desired channel. The converter, V27, uses a similar tuned line in its grid circuit which is link coupled to the r-f amplifier. The output of V27 is connected to the primary of the first video i-f transformer, T1. For chassis 120025B, the secondary of T1 is tuned to the audio i-f, 21.25 MC. and directly coupled to the grid of the first audio i-f, V7. The oscillator, V26, uses a quarter-wave tuned line, in a Hartley circuit. A split stator condenser is used for the fine tuning adjustment. Slugs are used for oscillator alignment. Both the r-f and converter stages have a band width of six megacycles to pass the complete video and audio carriers.

   b. EMERSON TYPE 470452: This tuner uses a Type 6AG5 as the r-f amplifier and a Type 6J6 as the converter and oscillator. The r-f amplifier, V27, is a wideband, tuned stage whose output is inductively coupled to the first section of the 6J6 converter stage, V26. The r-f amplifier, converter, and oscillator (second section of the 6J6), are tuned by means of a twelve position rotary turret, carrying separate coils for each channel. The oscillator, V26, operates in a Colpitts circuit. Individual slugs are used for alignment of the various channels. A variable—dielectric type of condenser is used for fine tuning of the oscillator. The output of the converter, V26, is connected to a double-tuned i-f transformer T1, (L7 and L9). This tuner is used only with the intercarrier type of chassis; 120088B, 120090B, or 120090D. The first video i-f, as well as all succeeding video i-f transformers, have wide band-pass characteristics to accomodate both video and audio carriers.

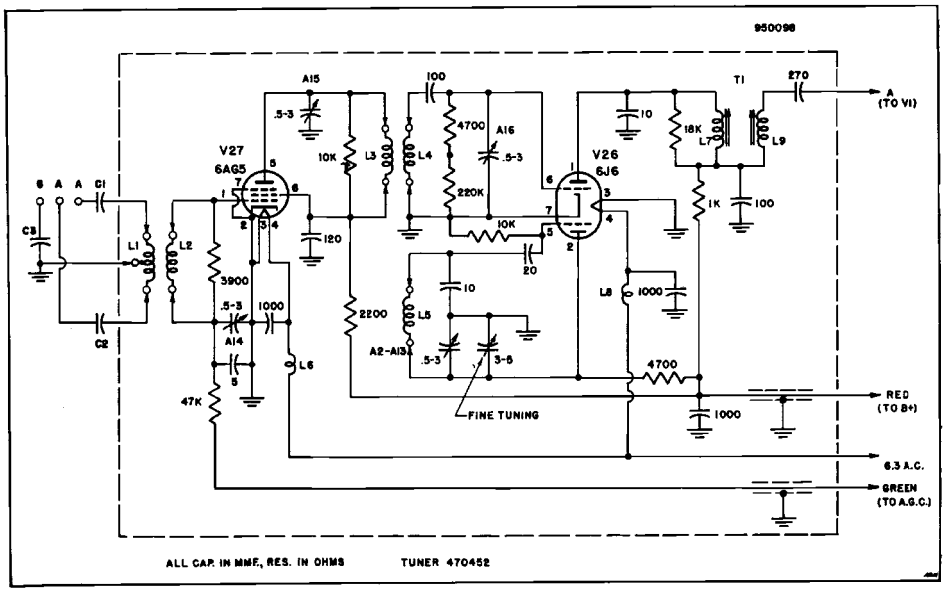


Figure 4-4—Schematic Diagram—Tuner 470452

3. **VIDEO SECTION**—The video section consists of three stages of stagger-tuned i-f amplification, the video detector, and two stages of video amplification. In chassis 120025B, the i-f signals from the converter stage are amplified in the first video and sound stage of the video i-f section. The audio i-f trap in the output of the first i-f video and sound amplifier rejects the sound signal and passes only the composite video i-f signal to the second video i-f amplifier. The trap in the input of the third video i-f amplifier removes the adjacent sound i-f signal, allowing only the composite video signal of the desired station to be amplified. In the video detector stage, the negative portion of the video i-f signal is rectified and the resultant signal is amplified in the video amplifier and then applied to the control grid of the picture tube. In the second portion of the video detector, the video i-f signal is rectified and used as an automatic gain control bias for the preceding stages.

   In the intercarrier type chassis 120088B, 120090B, and 120090D, both video and audio i-f frequencies are amplified together through the successive video i-f stages. The heterodyne between the video and audio i-f frequencies, 4.5 MC., is produced by a tuned circuit preceding the video detector and fed to the input of the audio i-f stages.

4. **AUDIO SECTION**—The audio section comprises an i-f stage, limiter, and discriminator, for both types of chassis. For the 120025B chassis, the i-f frequency is 21.25 MC.; for the 120088B, 120090B, and 120090D chassis the i-f frequency is 4.5 MC. The limiter prevents amplitude modulation noise from reaching the discriminator, which acts as a demodulator in a conventional circuit. The output of the discriminator is fed to the audio amplifier section of the AM-FM chassis.

5. **SYNC AND SWEEP SECTION**—The sweep and sync circuits for both television chassis are basically alike. However, where the particular tube functions and circuit connections differ, each type of chassis is detailed separately.

   a. D.C. RESTORER: The output of the video detector, V4, contains both the A.C. and the D.C. components of the video signal, corresponding to the video signal variations and the average level of these variations respectively, as well as the blanking and sync pulses. However, since the video amplifiers, V5 in chassis 120025B, and V5 and V6 in 120088B, 120090B, and 120090D, will not pass the D.C. component which represents the average illumination, the background level will vary. In addition, the blanking and sync pulses will vary in level. For any given scene, the brightness control could be used to adjust the illumination level. The D.C. restorer, V6, automatically reinserts the missing D.C. component and maintains the correct brightness level by providing bias to the grid of the picture tube. This bias, which varies with the individual scene, is developed across R28 in chassis 120025B and across R24 in chassis 120088B, 120090B, and 120090D. The bias is directly coupled to the grid of the picture tube.

   b. SYNC CIRCUITS:

      1) Chassis 120025B—The output signal from the video detector, V4, is coupled to the sync amplifier. V15, where it is amplified and inverted. The output of V15 is coupled to the sync separator, V6, which also acts as the D.C. restorer. The cathode voltage of V6 varies with the average level of illumination and is directly coupled through R26 to the grid (pin 2) of the picture tube for D.C. reinsertion. The negative sync pulse ouput of V6 is then amplified by the second sync amplifier V15B. The output of V15, in the form of positive pulses, is fed through R87 and R68 to the horizontal and vertical sync circuits.

      2) Chassis 120088B, 120090B, and 120090D—The output of the first video amplifier, V5, is coupled to the sync separator, V6B, which also acts as the D.C. restorer. The sync pulse output of V6 is amplified by the first and second sync amplifiers, V15A and V15B. The output of V15 is coupled to the sync inverter, V11A whose output is fed through an integrating network to vertical oscillator V14.

      3) Since the pulse width of the vertical sync pulses is about thirty-five times as great as that of the horizontal sync pulses, the time constants of the horizontal and vertical sync circuits have been designed to enable them to accept only the sync pulse desired. The horizontal sweep generator is thus controlled by the narrow horizontal sync pulses and the vertical sweep generator by the wider vertical sync pulses.

   c. SWEEP SECTION: The sweep circuits produce saw-tooth shaped currents of proper frequency to perform vertical and horizontal scanning of the electron beam by the deflection coils. To produce such saw-tooth currents in an inductance requires a voltage of somewhat different wave shape, due to the combined resistance and reactance of the coils. This voltage wave shape is produced by a capacitor in combination with a resistor (C54 and R76 in chassis 120025B; C73 and R98 in chassis 120088B, 120090B, and 120090D).

      The vertical oscillator and discharge tube, V14, together with its associated components, forms a blocking oscillator and discharge circuit. V14 is a free-running oscillator, operating at a frequency determined by C51, R71, and R72 (chassis 120025B) or C71, R95, and R94 (chassis 120088B, 120090B and 120090D) in the absence of a vertical sync pulse. The sixty-cycle sync pulse, derived from the video signal during reception, 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 the VERTICAL HOLD control is correctly adjusted.

The output of V14 is fed to the vertical output stage, V16. Variable resistor R79 (chassis 120025B) or R100 (chassis 120088B, 120090B, and 120090D) varies the gain of V16 by varying the bias. This acts as the VERTICAL LINEARITY control and is necessary due to the non-linearity of the Eg-Ip curve, over its operating range. The control varies the shape of the sweep current by changing the operating point on the tube characteristic. The sweep output of V16 is coupled to the deflection coils L8 by means of a transformer, T8 (chassis 120025B) or T11 (chassis 120088B, 120090B and 120090D).

d. HORIZONTAL DEFLECTION SECTION: The horizontal deflection circuits contain an automatic frequency stabilizing arrangement which improves stability and ease of operatoin. The sync phase inverter, V11A, amplifies the horizontal sync pulses and feed them to the sync discriminator (horizontal phase detector), V12. These pulses are 180° out of phase, with respect to plate and cathode. At the same time, V12 receives voltages fed back from the horizontal output tube, V17, through C71 (chassis 120025B) or C58 (chassis 120088B, 120090B, and 120090D). Any phase shift between the horizontal sync pulses and the horizontal oscillator frequency will cause the input voltage applied to one diode section of the V12 to differ from that of the other and result in a D.C. bias voltage on the grid of the second section of V11. This bias voltage will be proportional to the phase displacement between the incoming sync pulses and the horizontal oscillator wave and of a polarity determined by the lead or lag of the oscillator frequency. Since the plate resistance of this tube is part of the bias network of the grid circuit of horizontal oscillator V13, the output of the phase detector, V12, will synchronize the oscillator to the horizontal pulses of the video signal from the transmitter.

The horizontal oscillator and discharge tube, V13, is similar to the vertical oscillator and operates at a frequency determined by C59, R84, and R95, (chassis 120025B) or C57, R76, and R75 (chassis 120088B, 120090B, and 120090D). The horizontal sync pulse causes V13 to lock in at the sync frequency when the HORIZONTAL HOLD control is properly adjusted. The output of V13 is fed to the horizontal output tube, V17.

V17 supplies the required driving power for the horizontal deflection coils, L7 (chassis 120025B) or L8 (chassis 120088B, 120090B, and 120090D), and for the high voltage rectifier circuit. The output of the horizontal output tube is coupled to the horizontal deflection coils by transformer T10 (chassis 120025B) or T9 (chassis 120088B, 120090B, and 120090D). A portion of the output transformer is shunted by HORIZONTAL SIZE control L9 (chassis 120025B) or L6 (chassis 120088B, 120090B or 120090D), varying the inductance and thus regulating the horizontal sweep current.

The horizontal damper tube, V19, acts to damp out oscillations which occur over part of the horizontal scanning cycle and helps provide a linear trace.

6. **POWER SUPPLIES**—Two power supplies are used to supply the required voltages. The low voltage supply is of the transformerless, voltage-doubler type. The high voltage supply for the picture tube accelerating anode is of the flyback type and is energized by the horizontal output tube.

a. LOW VOLTAGE SUPPLY: The 120025B chassis employs two voltage doubler circuits, with Type 25Z6GT tubes as rectifiers. The positive doubler uses three rectifier tubes in parallel, V20, V21, V22, to supply the necessary current; the negative doubler uses two rectifiers, V23, and V24. Each doubler circuit supplies approximately 200 volts, resulting in a total of 400 volts from B— to B+. Chassis 120088B, 120090B, and 120090D also use voltage doubler circuits. The positive doubler uses two selenium rectifiers, V29, and V30; the negative doubler uses selenium rectifiers V31 and V32. The output of the combined doubler circuits is about 400 volts, from B— to B+. The focus coil for the picture tube, L6 (chassis 120025B) or L10 (chassis 120088B, 120090B, and 120090D), is connected in the negative section of the low voltage power supply. The FOCUS CONTROL, R53 (chassis 120025B) or R55 (chassis 12008B, 120090B, and 120090D) is shunted across this coil and varies the current through the coil thus controlling the focusing action. A separate filament transformer, T11 (chassis 120025B) or T12 (chassis 120088B, 120090B, 120090D), supplies 6.3 volts to all tubes except V19. A separate winding is necessary for this damper tube because of the presence of B+ voltage on the heater. The ballast tube contains protective and filter resistors for the rectifier circuits.

b. HIGH VOLTAGE SUPPLY: The high voltage power supply makes use of the energy supplied to the horizontal output transformer by V17, the horizontal output tube. 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 increased by auto-transformer action of the primary of the horizontal output transformer and applied to the high voltage rectifier, V18. The rectified voltage is filtered and applied to the second anode of the picture tube, V25. Due to the relatively high frequency (15,750 cycles) of the power supply, and the light load, an RC filter using the external coating of the picture tube as the filter condenser, is adequate.

7. **CIRCUIT CONTROLS**—The various controls for the television chassis are grouped into operating controls on the front panel and adjustment controls at the rear of the chassis.

a. FRONT PANEL CONTROLS: (Table VII).

Control	Symbol: Chassis 120025B	Symbol: Chassis 120088B 120090B 120090D	Function	Action
Contrast	R21	R19	Controls input to video amplifier V5.	Adjusts difference in black-to-white range of picture.
Brightness	R99	R88	Controls average D.C. bias to picture tube V25.	Adjusts average level of illumination.
Vertical Hold	R72	R94	Controls free-running frequency of vertical oscillator V14.	Locks V14 into vertical sync, preventing up and down motion of picture.
Horizontal Hold	R85	R75	Controls free-running frequency of horizontal oscillator V13.	Locks V13 into horizontal sync, preventing side to side motion of picture.
Channel Selector			Connects proper coils into circuits of r-f amp. V28, conv. V27, and osc. V26.	Selects desired channel.
Fine Tuning			Adjusts frequency of osc. V26 by varying circuit capacity.	Adjusts for best sound (chassis 120025B) or best picture (chassis 120088B, 120090B, and 120090D).

b. REAR ADJUSTMENT CONTROLS: (Table VIII).

Control	Symbol: Chassis 120025B	Symbol: Chassis 120088B 120090B 120090D	Function	Action
Focus	R53 L6	R55 L10	Controls current in focusing coil.	Adjusts focusing action.
Vertical Size	R74	R96	Controls vertical deflection signal to vert. output V16.	Adjusts vertical picture size.
Vertical Linearity	R79	R100	Controls operating point of vertical output V16, by varying bias.	Adjusts relative proportions of different portions of the picture (upper, central, lower).
Horizontal Size	L9	L6	Controls inductance shunted across hor. output transformer, regulating current in hor. deflection coil.	Adjusts horizontal picture size.
Horizontal Linearity	L10	L7	Controls inductance in cathode of V19, regulating phase of ripple voltage in cathode circuit.	Adjusts relative proportions of ends of horizontal scan to central portion of picture.
Horizontal Drive	R90	R80	Controls ratio of saw-tooth to peak voltage applied to V17, regulating point on hor. trace at which tube conducts.	Adjusts maximum picture width without crowding right side of picture.
Vertical Centering	R81	R104	Controls size and polarity of D.C. centering current in vertical deflection coil.	Adjusts vertical position of picture.
Horizontal Centering	R80	R103	Controls size and polarity of D.C. centering current in horizontal deflection coil.	Adjusts horizontal position of picture.

8. **AM-FM RECEIVER**—The AM-FM chassis, 120024B or 120081B, are superheterodyne receivers provided with a dual i-f system and bandswitch for AM or FM reception. Both chassis are basically alike; chassis 120081B uses an additional untuned i-f stage, for FM operation only.

Pentagrid converter V100 produces the i-f frequency of 455KC. for AM or 10.7MC. for FM. For AM operation, the output of V100 is coupled to T2, the first AM i-f transformer. The output of the first i-f stage, V101, is fed through the second i-f transformer, T4, to one diode section (B) of the combined detector, discriminator, a.v.c., and a-f amplifier V104. The output of V104 is connected through the bandswitch to the phase inverter, V105, and push-pull audio output stage consisting of V106 and V107.

For FM operation, a second i-f stage, V102 is provided. The output of V102 is fed to limiter V103, through i-f transformer T5. V103 is coupled to the discriminator V104(A) whose output is connected through the bandswitch to the audio stage.

For television operation, the audio signal from the TV discriminator, V9, is connected through the input jack by bandswitch to the audio amplifier. Similarly, for phonograph operation, the bandswitch feeds the signal from the phono pickup through the phono jack to the audio system.

The power supply for the AM-FM chassis consists of a half-wave rectifier, V108 in chassis 120024B, or V109 in chassis 120081B, and associated filter circuits.

Section V.
MAINTENANCE AND ALIGNMENT

1. GENERAL—Adjustments inside the cabinet must be made only by **qualified television service technicians.** If reception difficulty is experienced, first tune in another station or turn off the receiver and try it again and at a later time, as the faulty performance may be due to technical difficulties at the transmitter. Of the eight labeled controls at the rear of the cabinet, only the FOCUS control should be adjusted by other than competent service personnel. Periodic adjustment of FOCUS may be required to compensate for aging of tubes, changes in line voltage, etc. Although it is possible to write volumes on trouble-shooting any equipment as complex as a television set, it is important to emphasize that the nature, location, and correction of troubles must be **analyzed** by the repairman. To do this requires a good working knowledge of the circuits of the inoperative television set, as well as an understanding of television principles. Circuits should not be tested indiscriminately; be logical, and from the symptoms, isolate and localize the trouble in the particular circuit or stage involved. In any case, the picture tube itself often offers the best means of seeking a clue to the trouble. When one can actually see the effect of a receiver fault, rather than having to listen to it, the fault can usually be more easily located, provided, of course, the observed condition is properly interpreted.

CAUTION—High voltage of approximately 9000 volts is used for picture tube accelerating potential in this receiver. Always turn off ALL power before soldering, making connections, removing the chassis, or doing any work on the receiver. Use only one hand in making adjustments. Always wear gloves and safety goggles when handling the picture tube. Do not use tools near the tube; do not bump tube against hard objects. Stand tube on its face on a thick piece of felt, or insert it in a tube carton if it is removed from the cabinet.

2. PICTURE TUBE REPLACEMENT — To remove and replace the picture tube use the following procedure:

   a. REMOVAL: Observe the cautions noted in paragraph 1.
      1) Remove the bolt holding the front band in place.
      2) Remove the socket and loosen and slide off the ion trap.
      3) Remove the high voltage lead and ground it to the chassis, for safety.
      4) Carefully slide the tube forward, out of the deflection and focus coil assembly.
      5) Stand tube on its face, on a thick piece of felt or insert the tube in a carton, for protection.

   b. REPLACEMENT: To replace the tube, use the reverse procedure to removal. Center the tube axially, with the high voltage lead opening on top. Slide the tube into the deflection and focus coil assembly until it is snug against the rubber edges of the assembly.

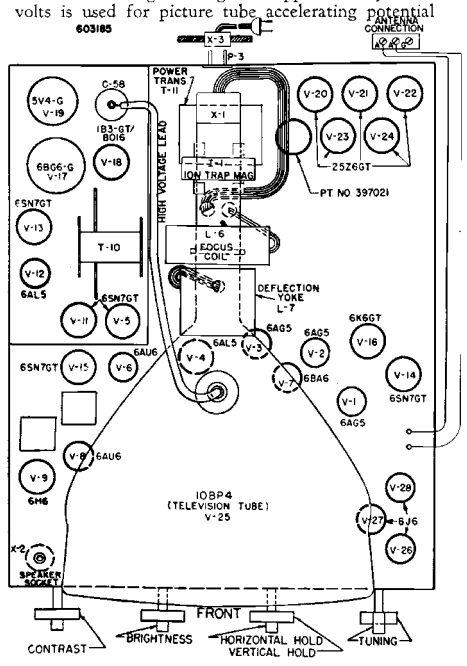


Figure 5-1—Tube Location Diagram—Chassis 120025B

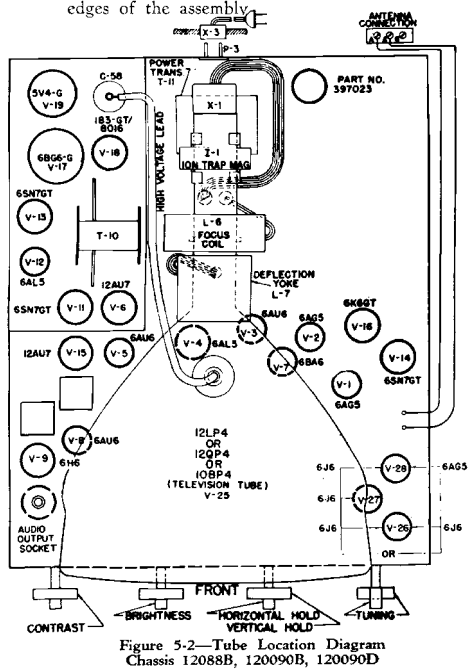


Figure 5-2—Tube Location Diagram Chassis 12088B, 120090B, 120090D

3. TEST EQUIPMENT REQUIRED—Alignment of circuits and diagnosis of faulty operation of a television receiver should not be attempted unless the service technician has available the proper test equipment. Proper alignment of Model 585 and 618 requires the following equipment:

TEST EQUIPMENT: (Table IX).

Type	Characteristics	Remarks
Sweep Generator	Frequency Ranges— a) 18MC. to 30MC. b) 40MC. to 90MC. c) 170MC. to 225MC. Sweep Width—Variable to 10 MC. Output—a) One volt max. desirable. b) 300 ohms balanced output c) Output attenuator	The output should be constant over the sweep width at any output frequency. The output should be flat on all ranges and at all attenuator positions. The "Mega-Sweep" manufactured by the Kay Electric Co. or equivalent, is a satisfactory instrument if accompanied by a marker frequency generator or accurately calibrated signal generator. This instrument has a maximum output of approximately .1 volt.
Marker Generator	Frequency Range— a) 4MC. to 30MC. b) 45MC. to 220MC. Output—a) Low impedance b) Output attenuator c) Accurately calibrated	The marker generator must provide frequencies of 4.5 MC. and 21.25 MC. for audio i-f alignment, 25.75 MC. for video i-f alignment and the video and audio carrier frequencies indicated in figure 1-1. The marker frequencies from 18 to 30 MC. may be provided by a crystal calibrated generator similar to the "Mega Marker" of the Kay Electric Company. The 45 MC. to 220 MC. marker pips can be provided by an accurately calibrated signal generator or a heterodyne frequency meter with crystal calibrator. The accuracy of reading and re-settability of the marker source should be ± .05 MC. or better.
Vacuum-Tube Voltmeter	Frequency Range—Up to 225 MC. (by means of diode probe) desirable. Input—High impedance. Ranges—Low range (3 volts) desirable.	A vacuum-tube voltmeter is required for the measurements of operating voltages, especially those occurring in high resistance circuits. Many good instruments are available. It is desirable to provide an instrument with a high voltage multiplier probe to permit measurements of picture tube accelerating potentials.
Oscilloscope	Vertical Sensitivity—.07 volts per inch, if sweep generator provides .1 volt output; .2 volts per inch, if sweep generator provides 1 volt output. Vertical Band Width—If used only for r-f and i-f alignment a wide-band scope is not necessary. In this instance, the sweep frequency is between 50 and 150 cycles and high frequency response is not required. The vertical amplifier frequency response should be flat. Input—Calibrated input attenuator desirable.	The scope vertical amplifier should have good low frequency response and not cause excessive phase shift of the very low frequencies, with respect to the middle audio frequencies. Such phase shift results in a distorted curve and the receiver is actually misaligned to compensate for the oscilloscope phase shift.
Oscilloscope Probe	Detector—1N34 Geranium crystal. Schematic—See figure 5-4.	Alignment of the video i-f stages requires a detector for use with the scope.
Dummy Mixer Tube	Schematic—See figure 5-5. (For use with Tuner 470233). Tube—Type 6J6. The components and associated wiring are shown in the schematic. The miniature size components can be fastened to the tube envelope with strips of cellulose tape. Care should be taken in bending tube pin 7 so that the glass header, or tube base, is not damaged.	In alignment of the video i-f transformer and sound traps, it is necessary to connect the sweep generator to the input of the mixer. The "tuned line" type input circuit used in tuner 470233, would act as a vertual short circuit for the i-f frequency voltage. For this reason, it is necessary for the service technician to construct a dummy tube in which the cathode pin is bent out and does not make contact with the socket clips or chassis.

4. SWEEP CIRCUIT ADJUSTMENTS—The sweep circuits may be adjusted, using the test pattern transmitted by a station as the signal source. The adjustments outlined in the following table should be made in the sequence indicated. These adjustments should be made when any of the controls involved have been replaced, after realignment of the video, audio and r-f circuits, upon completion of repairs to the sync and sweep circuits, or after replacement of the picture tube.

SWEEP CIRCUIT CONTROL SETTINGS: (Table X).

Step	Control	Symbol: Chassis 120025B	Symbol: Chassis 120088B 120090B 120090D	ADJUSTMENT
1	Horizontal Drive	R90	R80	Set control to maximum counter-clockwise position.
2	Brightness	R99	R88	Starting from counter-clockwise position turn control until picture tube starts to brighten (raster appears).
3	Contrast	RZ1	R19	Turn control carefully (to avoid overload) until test pattern appears.
4	Horizontal and Vertical Hold	R85 R72	R75 R94	Adjust horizontal and vertical hold controls for desired hold, keeping contrast control at minimum signal position. The horizontal control should then be turned rapidly to either side of hold postion to ascertain positioning (near center). It should again be checked by slow rotation to determine control voltage capabilities (AFC). A 40° rotation to either side of hold position should be obtained. The vertical control should also hold near the central position.
5	Focus	R53	R55	Adjust control for best definition, making certain defocusing occurs to either side of optimum setting.
6	Horizontal and Vertical Centering	R80 R81	R103 R104	Adjust controls for best centering of test pattern.
7	Horizontal Size	L9	L6	Adjust control to obtain horizontal width one-half inch short of picture tube mask.
8	Horizontal Drive	R90	R80	Position control to obtain picture width to cover edge of mask.
9	Horizontal Linearity	L10	L7	Adjust for best horizontal linearity of test pattern. This conrol will affect horizontal linearity at the left side of the test pattern.
10	Vertical Linearity and Vertical Size	R79 R74	R100 R96	Adjust controls for proper vertical picture size and maximum linearity. The linearity control will affect the top of the test pattern.

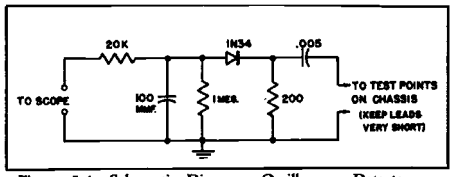


Figure 5-4—Schematic Diagram—Oscilloscope Detector

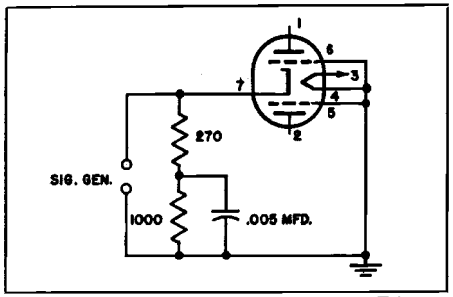


Figure 5-5—Schematic Diagram—Dummy Mixer Tube
Note—Carefully bend pin 7 of 6J6 at right angles. Connect pins 5 and 6 to pin 4, which is grounded at the socket.

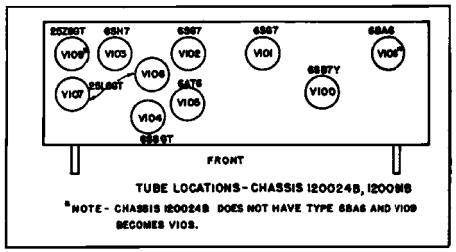


Figure 5-3—Tube Location Diagram—Chassis 120024B, 120081B

5. ALIGNMENT — Alignment of the television receivers differs for the two types of chassis employed, particularly in the video i-f and audio i-f sections. The video i-f coupling units are peaked at the specified frequencies, to obtain the overall response curves indicated in figures 5-7 and 5-10. The order of alignment of the various stages is as follows: video i-f traps, video i-f coupling impedances, audio i-f transformers, audio f-m discriminator, r-f, converter, and oscillator stages. Before proceeding with alignment carefully remove the picture tube, V25. Ground the high voltage lead for safety.

a. VIDEO I-F AND TRAP ALIGNMENT (Chassis 120025B): (Table XI).
1) Waveforms shown may be inverted, depending on the number of amplifying stages in the vertical amplifier of the scope being used. See figure 5-7.
2) In the alignment notes the sweep width is given. Some generators are calibrated in deviation. The frequency deviation, which is plus and minus, is, by definition, half the sweep width.
3) The marker pip signal required in steps 9, 10, and 11 is coupled to one of the antenna terminals. This signal should be unmodulated and derived from an accurately calibrated signal generator. Attenuate the signal so that a small pip is visible. A strong signal will cause undesirable AGC action and will distort or swamp the picture.
4) Connect the sync sweep voltage from the sweep signal generator to the horizontal input of the scope for horizontal deflection.
5) Set the channel selector to channel three, for all alignment steps.
6) Refer to figure 5-6 for all alignment points.
7) Note that the first video i-f transformer, T1, is single tuned, for use with this type of chassis.

VIDEO I-F AND TRAP ALIGNMENT (Chassis 120025B): (Table XI).

Step	Signal Generator Unit: Connection	Signal Generator Unit: Frequency	Measuring Instrument Connection	Adjust	Procedure
1	High side through .005 mfd. to cathode (pin 7) of dummy mixer tube. Low side to chassis.	21.25 MC. (Unmod.)	V. t. v. m. D. C. probe to point A (pin 7 of V4). Common to chassis.	T2 (Bottom) and T3 (Top).	Adjust for minimum deflection. (Audio i-f traps).
2	"	27.25 MC. (Unmod.)	"	T4 (Bottom)	Adjust for minimum deflection.
3	"	23.0 MC. (Unmod.)	"	T1	Adjust for maximum deflection.
4	"	25.25 MC. (Unmod.)	"	T3 (Bottom)	"
5	"	23.4 MC. (Unmod.)	"	T2 (Top).	"
6	"	24.5 MC. (Unmod.)	"	T4 (Top).	"
7	"	21.25 MC. (Unmod.)	"	T2 (Bottom) and T3 (Top).	Repeat steps 1 and 2 after removing dummy mixer tube and replacing with 6J6 conv.
8	Connect high side directly to one antenna terminal. Low side to chassis. Use 10 MC. sweep and leave generator connected, in following steps 9 through 12.	63.0 MC. (10 MC. sweep mod.)	Remove v.t.v.m. probe and connect vertical input of scope to point A (pin 2 of V4), in series with 22K carbon resistor. Connect low side to chassis.	—	Connect sweep generator as indicated. Keep at 63.0 MC. setting through steps 9-12.
9	Connect marker generator to other antenna terminal. Low side to chassis.	Sweep-63.0 MC. (10 MC. mod.) Marker-65.75 MC. (Unmod.)	"	—	Adjust fine tuning control for placement of marker pip (21.25 MC.) as shown in fiure 5-7A. Keep control at this setting for steps 10 and 11.
10	"	Sweep-63.0 MC. (10 MC. mod.) Marker-61.25 MC. (Unmod.)	"	T3 (Bottom)	Adjust for placement of marker pip (25.75 MC) as shown in figure 5-7A.
11	"	Sweep-63.0 MC. (10 MC. mod.) Marker-64.5 MC. (Unmod.)	"	T1	Adjust for placement of marker pip (22.5 MC) as shown in fig. 5-7A.
12	"	Sweep-63.0 MC. (10 MC. mod.)	"	T2 (Top) and T4 (Top).	Make minor adjustments, if necessary, for proper slope shape and band width, as per figure 5-7A.

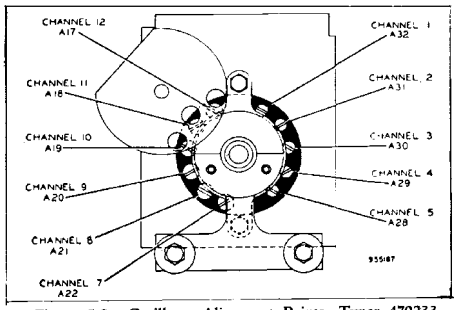


Figure 5-9— Oscillator Alignment Points—Tuner 470233

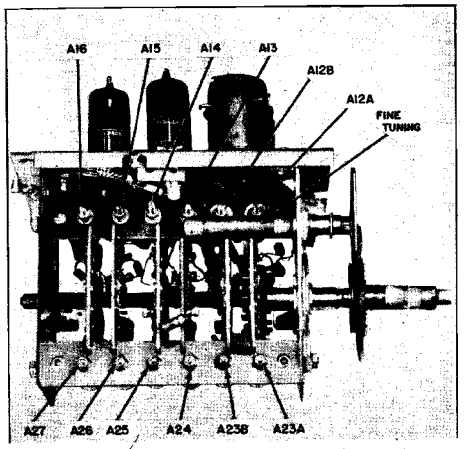


Figure 5-8—Location of Alignment Points—Tuner 470233

c. R-F, CONV., AND OSC. ALIGNMENT (Tuner 470233): (Table XIII).

1) Set fine tuning control to a position approximately 140° from its full counterclockwise position. This aligns the holes in the drive disc with the adjustment screws on the oscillator switch wafer. Do not change this setting during entire r-f alignment.
2) Attenuate signal from marker generator to give as small a pip as possible, to prevent AGC action.
3) Use 300 ohm carbon resistor as a dummy antenna.
4) Connect vert. input of scope to point A (pin 2 of V4) in series with 22K resistor.
5) Refer to figurse 5-8 and 5-9 for location of alignment points.

Step	Signal Generator Input		Channel	Adjust	Procedure
	Sweep Gen.	Marker Gen.			
1	213.0 MC. (10 MC. sweep)	215.75 MC. (Unmod.)	13	A12A A12B	Adjust for proper placement of sound marker pip (21.25MC.), as shown in figure 5-7A.
2	"	"	13	A13, A14, A15, A16	Adjust shape of response curve, as shown in figure 5-7A, for maximum amplitude and band width.
3	207.0 MC. (10 MC. sweep)	209.75 MC. (Unmod.)	12	A17	Adjust for proper placement of sound marker pip (21.25MC.), as shown in figure 5-7A.
4	201.0 MC. (10 MC. sweep)	203.75 MC. (Unmod.)	11	A18	"
5	195.0 MC. (10 MC. sweep)	197.75 MC. (Unmod.)	10	A19	"
6	189.0 MC. (10 MC. sweep)	191.75 MC. (Unmod.)	9	A20	"
7	183.0 MC. (10 MC. sweep)	185.75 MC. (Unmod.)	8	A21	"
8	177.0 MC. (10 MC. sweep)	179.75 MC. (Unmod.)	7	A22	"
9	85.0 MC. (10 MC. sweep)	87.75 MC. (Unmod.)	6	A23A A23B	"
10	"	"	6	A24, A25, A26, A27	Adjust shape of response curve, as shown in figure 5-7A, for maximum amplitude and band width.
11	79.0 MC. (10 MC. sweep)	81.75 MC. (Unmod.)	5	A28	Adjust for proper placement of sound marker pip (21.25MC.), as shown in figure 5-7A.
12	69.0 MC. (10 MC. sweep)	71.75 MC. (Unmod.)	4	A29	"
13	63.0 MC. (10 MC. sweep)	65.75 MC. (Unmod.)	3	A30	"
14	57.0 MC. (10 MC. sweep)	59.75 MC. (Unmod.)	2	A31	"

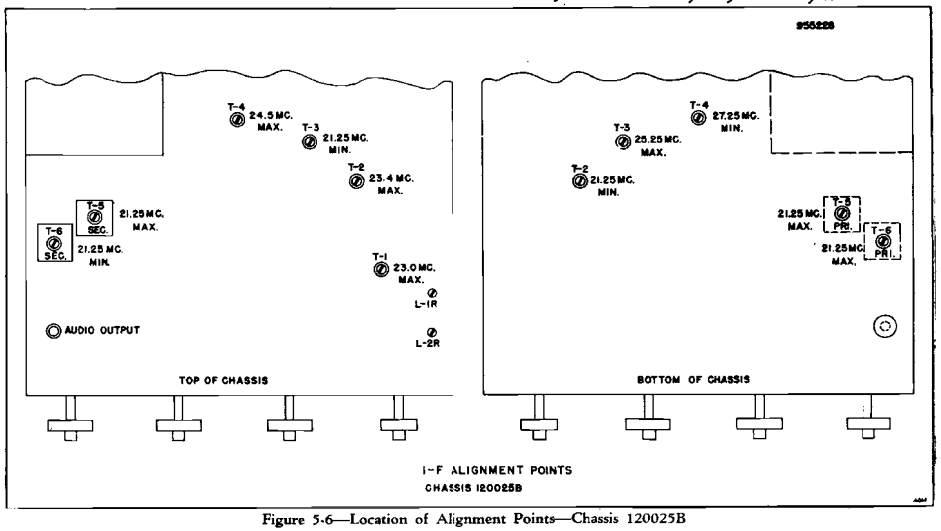


Figure 5-6—Location of Alignment Points—Chassis 120025B

b. AUDIO I-F AND DISC. ALIGNMENT (Chassis 120025B): (Table XII).

1) Couple the signal from the marker generator to the receiver input, by placing the output lead near the sweep generator output lead. Use only enough signal to produce a visible pip.
2) Set the marker generator to produce a 21.25 MC. unmodulated signal for the following alignment steps.

Step	Signal Generator Input		Measuring Instrument Connection	Adjust	Procedure
	Connection	Frequency			
1	Connect high side of sweep generator through .005 mfd. to grid (pin 1) of V1. Low side to chassis.	Sweep-21.25 MC. (450 KC. mod.) Marker-21.25 MC. (Unmod.)	Connect vertical input of scope to point B, in series with 22K carbon resistor. Connect low side to chassis.	T5 (Top and bottom)	Adjust for maximum amplitude and symmetry. Center marker pip at top of curve, as shown in figure 5-7B.
2	"	"	"	T2 (Bottom)	"
3	"	"	Vertical input to point C. Low side to chassis.	T6 (Bottom)	"
4	"	"	Vertical input to point H (pin 8 of V9). Low side to chassis.	T6 (Top)	Adjust for maximum straightness of diagonal line, with marker pip at center of line, as shown in figure 5-7C. Repeat step 3.

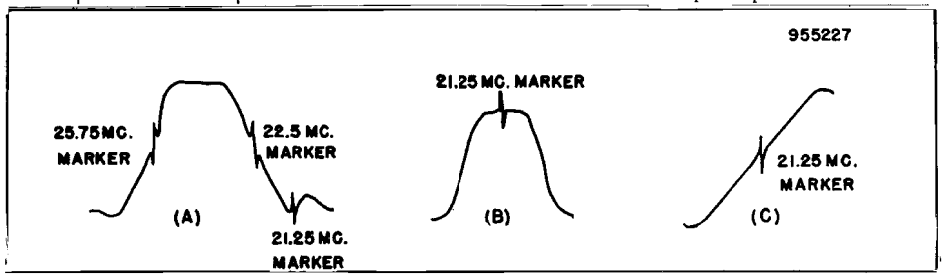


Figure 5-7—I-F Response Curves—Chassis 120025B

e. AUDIO I-F AND DISC. ALIGNMENT (Chassis 120088B, 120090B, 120090D): (Table XV).

1) Couple the marker generator in parallel with the sweep generator for steps 3 and 4.

2) Refer to figure 5-10 for location of alignment points and figure 5-11 for response curves.

Step	Signal Generator Input		Measuring Instrument Connection	Adjust	Procedure
	Connection	Frequency			
1	Connect high side of sweep generator through .001 mfd. to point A (cathode, pin 7 of V4). Low side of chassis.	4.5 MC. (Unmod.)	Connect v.t.v.m. D.C. probe to point B. Low side to chassis.	Trimmer C-79	Adjust for maximum response.
2	"	"	"	T5	Adjust primary and secondary for maximum response.
3	"	Sweep 4.5 MC. (450 KC. mod.) Marker—4.5 MC. (Unmod.)	Connect vertical input of scope in series with 22K resistor to point C. Low side to chassis.	T6 (Top)	Adjust T6 primary for maximum response.
4	"	"	Connect vertical input to point H, (pin 8 of V9). Low side to chassis.	T6 (Bottom)	Adjust T6 secondary for maximum straightness of diagonal line, with marker pip at center, as shown in figure 5-11F. Repeat step 3.

f. R-F, CONV., AND OSC. ALIGNMENT (Tuner 470452): (Table XVI).

1) Set fine tuning control to maximum clockwise position. This setting will expose the oscillator tuning slugs for each channel, as the turret is rotated. Do not change this setting during the entire r-f alignment.

2) Use 300 ohm carbon resistor as a dummy antenna.

3) Couple the marker generator to the receiver input by placing the output lead near the sweep generator output lead.

4) Connect vert. input of scope through 22K resistor to point E.

5) Refer to figure 5-12 for location of alignment points.

Step	Signal Generator Input		Channel	Adjust	Procedure
	Sweep Gen.	Marker Gen.			
1	207.0 MC. (10 MC. Sweep)	209.75 MC. (Unmod.)	12	A12	Adjust for proper placement of sound marker pip, as shown in figure 5-11D.
2	"	"	12	A14, A15, A16	Adjust shape of response curve, for maximum amplitude and band width, as shown in figure 5-11E.
3	213.0 MC. (10 MC. Sweep)	215.75 MC. (Unmod.)	13	A13	Adjust for proper placement of sound marker pip, as shown in figure 5-11D.
4	201.0 MC. (10 MC. Sweep)	203.75 MC. (Unmod.)	11	A11	"
5	195.0 MC. (10 MC. Sweep)	197.75 MC. (Unmod.)	10	A10	"
6	189.0 MC. (10 MC. Sweep)	191.75 MC. (Unmod.)	9	A9	"
7	183.0 MC. (10 MC. Sweep)	185.75 MC. (Unmod.)	8	A8	"
8	177.0 MC. (10 MC. Sweep)	175.95 MC. (Unmod.)	7	A7	"
9	85.0 MC. (10 MC. Sweep)	87.75 MC. (Unmod.)	6	A6	"
10	79.0 MC. (10 MC. Sweep)	81.75 MC. (Unmod.)	5	A5	"
11	69.0 MC. (10 MC. Sweep)	71.75 MC. (Unmod.)	4	A4	"
12	63.0 MC. (10 MC. Sweep)	65.75 MC. (Unmod.)	3	A3	"
13	57.0 MC. (10 MC. Sweep)	59.75 MC. (Unmod.)	2	A2	"

d. VIDEO I-F ALIGNMENT (Chassis 120088B, 120090B, 120090D): (Table XIV).

1) Waveforms shown may be inverted, depending on the number of amplifying stages in the vertical amplifier of the scope being used. See figure 5-11.

2) The marker pip signed is coupled in parallel with the sweep generator. This signal should be unmodulated and attenuated so that only a small pip is visible.

3) Connect the sync sweep voltage from the sweep signal generator to the horizontal input of the scope for horizontal deflection.

4) Refer to figure 5-10 for location of alignment points and to the schematic diagram, figure 5-19, for location of chassis reference points.

5) Note that the first video i-f transformer, T1, is a double-tuned transformer for use with this type of chassis.

Step	Signal Generator Input		Channel	Measuring Instrumet Connection	Adjust	Procedure
	Connection	Frequency				
1	Connect high side of sweep generator through .001 mfd. to point D (pin 1 of V3). Low side to chassis.	Sweep-24.5 MC. (10 MC. mod.) Marker 25.75 MC. (Unmod.)	3	Connect vertical input of scope through 22K carbon resistor to point E. Connect low side to chassis.	T4 (Top and bottom)	Adjust both windings for response as shown in figure 5-11A. Marker pip should be approximately 10% from top of response curve.
2	Connect sweep generator through .001 mfd. to point F (pin 1 of V2). Low side to chassis.	Sweep-24.5 MC. (10 MC. mod.) Marker 25.25 MC. (Unmod.)	3	"	T3	Adjust for response curve as shown in figure 5-11B. Marker pip should be in position indicated.
3	Loosely couple sweep generator to converter V27 by bringing high side lead near tube.	Sweep-24.5 MC. (10 MC. mod.) Marker 25.75 MC. (Unmod.)	13	Connect vertical input of scope through detector network, shown in figure 5-4, to point F (grid, pin 1 of V2). Low side to chassis.	T1	Adjust for response curve as shown in figure 5-11C. Marker pip should be approximately 10% from top of response curve.
4	"	Sweep-24.5 MC. (10 MC. mod.) Marker 22.8 MC. and 21.25 MC. (Unmod.)	13	Connect vertical input of scope through detector network to point D (grid, pin 1 of V3). Low side to chassis.	T2	Adjust T2 (Top) to position 22.8 MC. marker and T2 (Bottom) to position 21.25 MC. marker as shown in figure 5-11D. Repeat primary and secondary adjustments to obtain desired shape and marker positions.
5	Retain sweep generator coupling to converter V27. Connect-2.0 volts d.c. between point G and chassis.	Sweep-24.5 MC. (10 MC. mod.) Marker 25.75 MC. and 25.25 MC. (Unmod.)	13	Connect vertical input of scope through 22K carbon resistor to point E. Low side to chassis.	T2 and T3	Adjust T2 (Top) and T3 to produce overall response curve, as shown in figure 5-11E. Adjustment of T2 primary controls band width; T3 controls placement of video carrier, depending on accuracy of 25.75MC. marker obtained in step 3, (figure 5-11C).

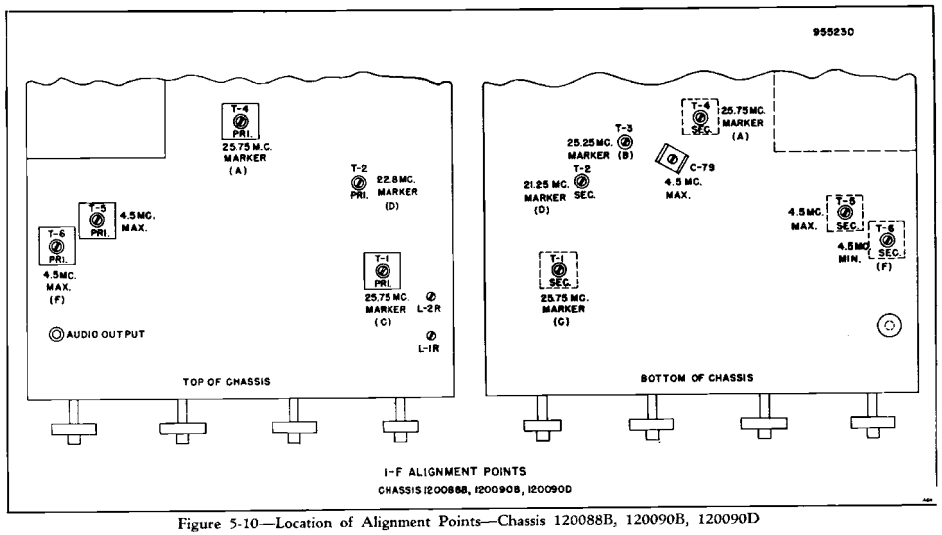


Figure 5-10—Location of Alignment Points—Chassis 120088B, 120090B, 120090D

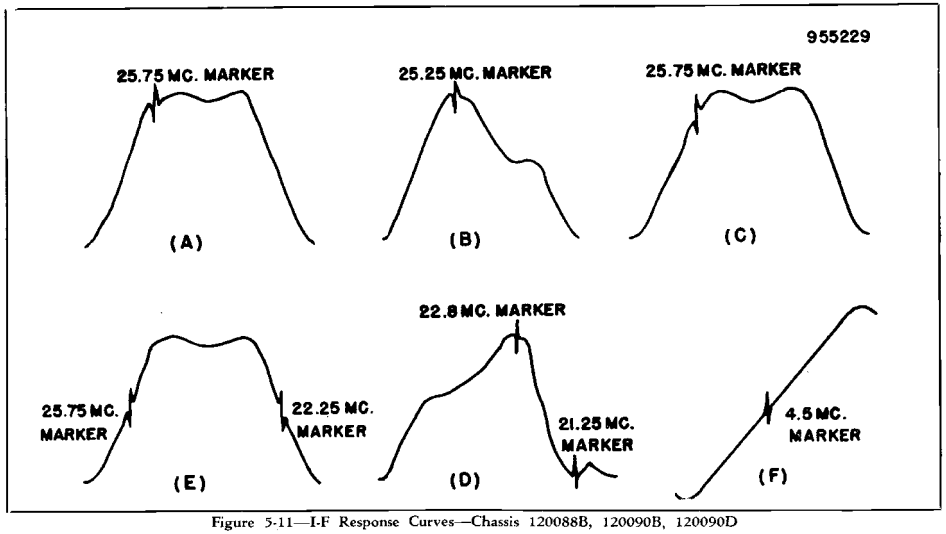


Figure 5-11—I-F Response Curves—Chassis 120088B, 120090B, 120090D

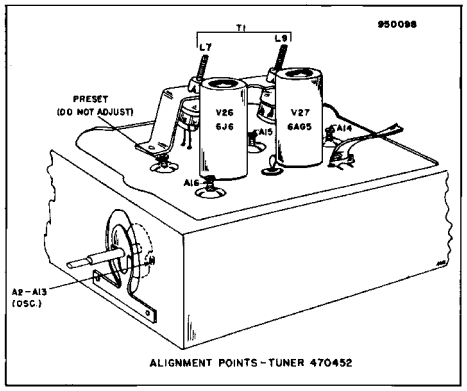


Figure 5-12—Location of Alignment Points—Tuner 470452

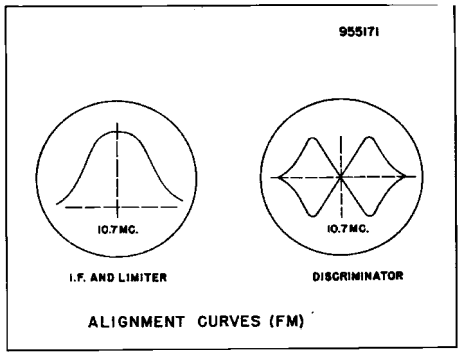


Figure 5-13—I-F and Discriminator Response Curves Chassis 120024B, 120081B

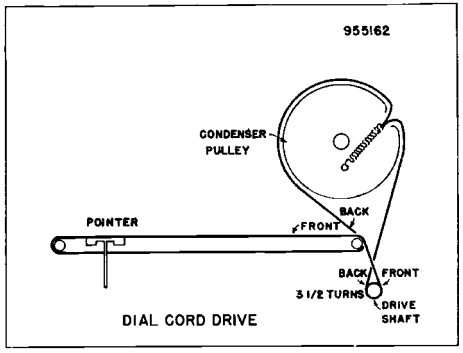


Figure 5-14—Dial Cord Drive—Chassis 120024B, 120081B

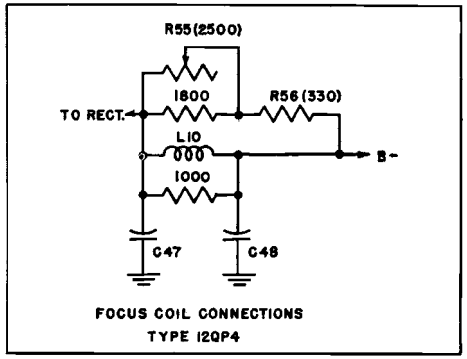


Figure 5-15—Focus Coil Wiring for Type 12QP4 Picture Tube

g. AM ALIGNMENT (Chassis 120024B, 120081B): (Table XVII).

1) To position pointer, turn variable condenser fully closed and set pointer to reference mark on dial backplate, at low frequency end of dial.

2) Set volume control at maximum. Attenuate output of signal generator as alignment proceeds.

3) Set variable condenser fully open for steps 1 and 2.

Step	Signal Generator Input		Bandswitch Position	Measuring Instrument Connection	Adjust	Procedure
	Connection	Frequency				
1	Connect high side of generator through .001 mfd. to pin 8 (grid) of V100. Low side to chassis.	455 KC. (400 cycle mod.)	BC	Connect v.t.v.m. across voice coil.	T4 and T2	Adjust for maximum response.
2	Form loop of several turns of wire. Radiate signal into receiver loop.	1620 KC. (400 cycle mod.)	BC Receiver tuned to 1620KC.	"	Trimmer C24	" (Oscillator trimmer)
3	"	1450 KC. (400 cycle mod.)	BC Receiver tuned for maximum output.	"	Trimmer C32	" (Antenna trimmer)

h. FM I-F AND DISC. ALIGNMENT (Chassis 120024B, 120081B):

1) Use 60 cycle modulation for sweep generator and 120 cycle sweep voltage for horizontal deflection in scope.

2) Set variable condenser fully open.

3) Refer to figure 5-13 for response curves.

Table XVIII.

Step	Signal Generator Unit		Bandswitch Position	Measuring Instrument Connection	Adjust	Procedure
	Connection	Frequency				
1	Connect high side of sweep generator through .01 mfd. to pin 4 (grid) of V101. Low side to chassis.	Sweep-10.7 MC. 450 KC. sweep). Marker-10.7 MC. (Unmod.)	FM	Connect vertical input of scope to junction of R6 and C30. Low side to chassis.	T5 and T3	Adjust for maximum response and symmetry, as shown in figure 5-13.
2	Connect high side of sweep generator through .01 mfd. to pin 8 (grid) of V100. Low side to chassis.	"	"	"	T1	"
3	Connect high side of sweep genertor through .01 mfd. to pin 4 (grid) of V103. Low side to chassis.	"	"	Connect vertical input of scope to pin 5 of V104. Low side to chassis.	T7	Adjust T7 primary (Top) for maximum amplitude and T7 secondary (Bottom) for maximum straightness. Center pip by adjustment of secondary as shown in figure 5-13.

i. FM R-F, CONV., AND OSC. ALIGNMENT (Chassis 120024B, 120081B): (Table XIX).

Step	Signal Generator Unit		Bandswitch Position	Measuring Instrument Connection	Adjust	Procedure
	Connection	Frequency				
1	Remove antenna connections. Conenct 150 ohm carbon resistor in series with each generator lead to FM antenna terminal and to chassis.	108.0 MC. (Unmod.)	FM Receiver tuned to 108.0 MC.	Connect v.t.v.m. D.C. probe to junction of R6 and C30. Low side to chassis.	Trimmer C11	Adjust for maximum response. (Oscillator trimmer)
2	"	106.0 MC. (Unmod.)	FM Receiver tuned for max. output.	"	Trimmer C4	" (Antenna trimmer)

6. **WAVE TRAP ADJUSTMENT**—Tuner 470233 is provided with a tunable wave trap, designed to remove various types of interference.

a. TYPES OF INTERFERENCE:

1) Image interference on Channels 2-6, due to FM stations, VHF aircraft beacon transmitters, and airport blind landing systems.

2) Inter-channel interference caused by Channel 7 interfering with reception on Channel 5, or a Channel 10 station interfering with reception on Channel 6.

3) Interference from adjacent receivers on Channel 2 due to another receiver tuned to Channel 6.

b. TRAP ADJUSTMENT: These traps consist of two tunable coils, located at the rear of the tuner. They have been adjusted to eliminate interference between channels 5 and 7. To adjust the traps for various interference conditions, follow the procedure outlined below.

1) To adjust the trap in the field, tune in the station on which interference is observed. Tune the cores of L1R and L2R for maximum rejection of interference in the picture. Keep the stud extensions of the cores approximately the same by visual inspection. If this does not completely eliminate the interference turn one core (L1R) ½ turn clockwise and readjust L2R for minimum interference in the picture. If this adjustment reduced the interference still further, continue until the greatest rejection is obtained. If, however, the interference becomes worse, then turn L1R counter clockwise ½ turn and readjust L2R. Continue until maximum rejection is obtained.

2) When the receiver is aligned in the shop, the antenna trap should be adjusted to reject the type of interference encountered at the customer's home. It can be adjusted by actual observation of the interference condition or by rejection of the signal fed in from a signal generator. Two methods of adjustment are possible if a signal generator is employed. Select the method and the frequency to suit the test equipment available and the channel on which the interference is obtained. Method A is the most direct, but is subject to difficulty if the adjustment is made in a location where the signal from the station (5 or 6 as the case may be) is on very strong at the time the adjustment is made.
Method B may also be subject to difficulty if a very strong signal is received on the channel on which the receiver channel switch is set. Between the two methods, however, one method undoubtedly will be workable.

3) Method A for channels 6-10 interference. Switch the receiver to Channel 6 and tune the receiver to the Channel 6 station. The oscillator will then be at 109.0 MC. (See figure 1-1). Connect a VTVM to the video detector and set it on the three or ten volt scale. Connect the signal generator to the receiver antenna terminals, and feed in a Channel 10 picture carrier frequency signal (193.25 mc.) Set the contrast control for the maximum gain possible without overloading the receiver. Adjust L1R and L2R for minimum reading on the VTVM keeping both core stud extensions about the same by visual inspection. For a final touch adjust one core ½ turn clockwise and readjust the other for maximum rejection. Repeat as described previously for maximum rejection.

4) Method B for Channels 6-10 interference. With the same set up as described in Method A, switch the receiver to Channel 3 and tune the receiver oscillator to 87 mc. Feed in a signal at 109 mc. from the signal generator and adjust the trap as before for minimum reading on the VTVM.

5) Method A for Channels 5-7 interference. With the same set up as above, set the receiver oscillator to 103 mc. (Channel 5). Feed in a Channel 7 sound carrier frequency signal (179.75 mc.) and adjust the trap as before.

6) Method B for Channels 5-7 interference. With the same set up as above, set the receiver to Channel 2 and tune the receiver from the generator and adjust the trap as before.

7) Method for FM image interference. With the same set up as above, switch the receiver to Channel 2 and tune the receiver oscillator to 81 mc. Feed in a signal of the frequency of the interfering FM station and adjust the trap as before.

c. EFFECT OF TRAPS ON RECEIVER: The preceding steps 2) through 7) apply to shop methods of eliminating the various types of interference. In cases of severe interference it may be necessary to retouch these adjustments when the receiver is installed in the customer's home.

When a complete receiver alignment is necessary in the shop it is advisable to detune the antenna trap by screwing the L1R and L2R cores all the way counter clockwise to prevent the trap adversely affecting the Channel 6 response shape. After the receiver has been completely aligned, the trap should then be retuned.

With the trap tuned to eliminate the Channel 5-7 interference, the Channel 6 sensitivity of the receiver is reduced somewhat. This reduction in sensitivity, however, is tolerable in practically all instances.

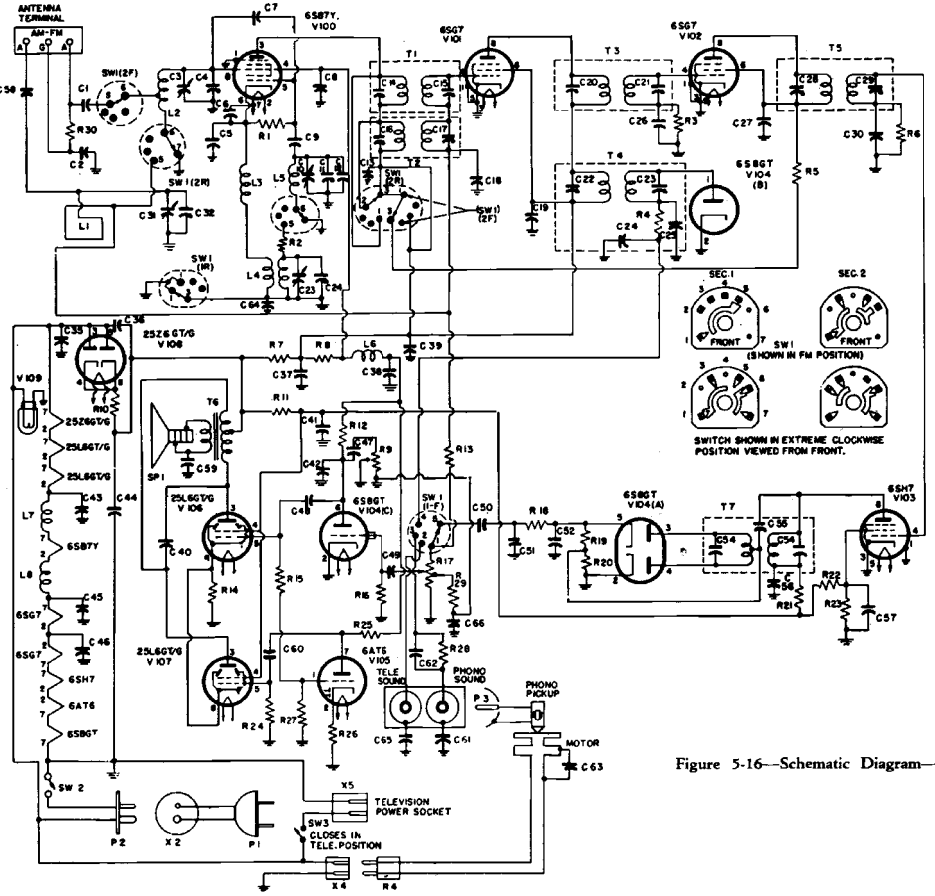


Figure 5-16—Schematic Diagram—Chassis 120024B

7. VOLTAGE AND RESISTANCE ANALYSIS — Voltage and resistance readings are provided for all chassis used in Models 585 and 618.

a. ANALYSIS CONDITIONS:

1) D.C. Voltage measurements are at 20,000 ohms per volt; A.C. Voltages measured at 1,000 ohms per volt.

2) Socket connections are shown at bottom views.

3) Measured values are from socket pin to common negative, unless otherwise stated.

4) Line voltage maintained at 117 volts for voltage readings.

5) No signal applied for voltage measurements.

6) Maximum readings are given where two readings are possible, depending on rear panel control settings.

7) Readings made with all controls in normal position, and selector on empty channel.

8) Resistance readings made with pin 4 of ballast tube grounded, for television chassis.

b. VOLTAGE AND RESISTANCE READINGS (Chassis 120025B): (Table XX).

SYMBOL	TUBE TYPE	VOLTAGE								RESISTANCE							
		PIN 1	PIN 2	PIN 3	PIN 4	PIN 5	PIN 6	PIN 7	PIN 8	PIN 1	PIN 2	PIN 3	PIN 4	PIN 5	PIN 6	PIN 7	PIN 8
V1	6AG5	.6	.8	0	6.3AC	125	125	.8	—	10K	80	0	.1	1700	1700	80	—
V2	6AG5	-1.3	.2	0	6.3AC	125	125	.2	—	3M	31	0	.1	1700	1700	31	—
V3	6AG5	0	1.4	0	6.3AC	125	125	1.4	—	10K	130	0	.1	6K	1700	130	—
V4	6AL5	-1.3	-.8	0	6.3AC	0	0	-.8	—	100K	4.6K	0	.1	.2	0	2M	—
V5	6SN7GT	1.6	250	13.5	-1.3	0	0	6.3AC	0	1M	6.8K	6.8K	1M	1700	0	.1	0
V6	6AU6	0	0	0	6.3AC	125	125	4.5	—	1M	0	0	.1	2.5M	0	24K	—
V7	6BA6	0	0	0	6.3AC	130	130	1.5	—	0	0	0	.1	1700	1700	64	—
V8	6AU6	-.75	0	0	6.3AC	105	105	0	—	44K	0	0	.1	1700	3500	0	—
V9	6H6	0	6.3AC	-.9	-.2	0	0	0	-.2	0	.1	Inf.	Inf.	Inf.	Inf.	0	Inf.
V11	6SN7GT	-170	160	-175	-190	-185	-185	6.3AC	0	1M	6800	4K	Inf.	100K	4K	.1	0
V12	6AL5	-190	-190	0	6.3AC	-190	-190	-200	—	Inf.	Inf.	0	.1	140K	4K	140K	—
V13	6SN7GT	-280	145	-190	-280	-190	-190	6.3AC	0	200K	4500	2900	200K	470K	2900	.1	0
V14	6SN7GT	-310	-60	-190	-310	-190	-190	6.3AC	0	2.2M	2.4M	4K	2.2M	120K	4K	.1	0
V15	6SN7GT	-2.7	90	0	-1.3	0	0	6.3AC	0	1M	10K	0	1M	27K	0	.1	0
V16	6K6GT	NC	0	90	90	0	0	6.3AC	-150	NC	0	15K	15K	4.2M	17K	.1	9.5K
V17	6BG6G	NC	0	-185	-195	-190	-190	6.3AC	40	NC	0	4.5K	4.2K	450K	4.2K	.1	9.5K
V18	1B3GT	—	9500	—	—	—	—	9500	—	—	Inf.	—	—	—	—	Inf.	—
V19	5V4G	NC	275	NC	180	NC	180	NC	275	NC	7500	NC	160	NC	160	NC	7500
V20	25Z6GT	NC	68AC	0	120	120	NC	45AC	230	NC	22	0	80K	80K	NC	20	150
V21	25Z6GT	NC	45AC	0	120	120	NC	22AC	230	NC	20	0	80K	80K	NC	14	150
V22	25Z6GT	NC	0	0	120	120	NC	22AC	230	NC	0	0	80K	80K	NC	14	150
V23	25Z6GT	NC	92AC	-240	-125	-125	NC	68AC	0	NC	15	240	100K	100K	NC	20	0
V24	25Z6GT	NC	92AC	-240	-125	-125	NC	120AC	0	NC	15	240	100K	100K	NC	3	0
V26	6J6	75	75	6.3AC	0	-11*	-11*	.2	—	6K	6K	.1	0	100K	100K	47	—
V27	6J6	130	130	6.3AC	0	-3.1	-4.3	0	—	1800	1800	.1	0	1M	1M	0	—
V28	6J6	105	105	6.3AC	0	-.7	-.7	0	—	4500	4500	.1	0	3M	1M	0	—

SYMBOL	TUBE TYPE	VOLTAGE					RESISTANCE				
		PIN 1	PIN 2	PIN 10	PIN 11	PIN 12	PIN 1	PIN 2	PIN 10	PIN 11	PIN 12
V25	10BP4	0	3.2	250	41	6.3AC	0	700K	11K	35K	1
V17	6BG6G	420 (Cap)					7500 (Cap)				
V18	1B3GT	510 (Cap)					7300 (Cap)				

Notes: * Measured with VTVM.
NC = no connection; K = kilohms.
M = megohms; Inf. = infinity.
Resistance readings made with B+ shorted.

Record Changer: See Gen. Instr. 700FS, RCD.CH.19-1,2 to RCD.CH.19-9.

SYMBOL	TUBE TYPE	VOLTAGE PIN 1	PIN 2	PIN 10	PIN 11	PIN 12	RESISTANCE PIN 1	PIN 2	PIN 10	PIN 11	PIN 12
V25	10BP4 or 12LP4 or 12QP4	0	3.2	250	41	6.3AC	0	700K	11K	35K	.1

V6 12AU7 Pin 9 V=6.3AC R=.1
V15 12AU7 Pin 9 V=6.3AC R=.1
V17 6BG6 Cap V=— R=7500
V18 1B3GT Cap V=— R=7800

K = Kilohms
M = Megohms
NC = No connection

Inf. = Infinity
† = Tuner 470233
* = Tuner 470452

c. VOLTAGE AND RESISTANCE ANALYSIS (Chassis 120088B, 120090B, 120090D): (Table XXI).

SYMBOL	TUBE TYPE	VOLTAGE PIN 1	PIN 2	PIN 3	PIN 4	PIN 5	PIN 6	PIN 7	PIN 8	RESISTANCE PIN 1	PIN 2	PIN 3	PIN 4	PIN 5	PIN 6	PIN 7	PIN 8
V1	6AG5	-.9	.6	0	6.3AC	120	120	.6	—	3.2M	70	0	.1	1700	1700	70	—
V2	6AG5	-.9	.4	0	6.3AC	120	120	.4	—	3.2M	35	0	.1	1700	1700	35	—
V3	6AU6	0	0	0	6.3AC	160	160	1.7	—	2.5	0	0	.1	11.5K	11.5K	160	—
V4	6AL5	0	-.6	0	6.3AC	1.7	0	-.4	—	.4	2.2M	0	.1	100K	0	5K	—
V5	6AU6	-1.2	.7	0	6.3AC	145	158	.7	—	1M	0	1K	.1	2K	700	1K	—
V6	12AU7	208	-7	0	0	0	37	0	3.3	15K	1M	0	0	0	15K	0	500K
V7	6BA6	0	0	0	6.3AC	130	138	1.1	—	4	0	0	.1	1800	1800	65	—
V8	6AU6	-.4	0	0	6.3AC	145	50	0	—	100K	0	0	.1	1800	3500	0	—
V9	6H6	0	6.3AC	0	0	0	0	0	0	0	.1	Inf.	Inf.	Inf.	Inf.	0	Inf.
V11	6SN7GT	-98	125	-110	-118	-84	-120	6.3AC	0	1M	6800	4K	Inf.	100K	4K	.1	0
V12	6AL5	-120	-120	0	6.3AC	-102	-120	-124	—	Inf.	Inf.	0	.1	140K	3K	140K	—
V13	6SN7GT	-180	145	-120	-180	-30	-120	6.3AC	0	200K	4500	2900	200K	470K	2500	.1	0
V14	6SN7GT	-350	40	-200	-350	92	-200	6.3AC	0	2M	2M	4K	2M	100K	4K	.1	0
V15	12AU7	175	-24	0	0	0	54	0	0	11K	180K	0	0	0	18K	1M	0
V16	6K6	0	0	53	53	-200	-175	6.3AC	-178	Inf.	0	15K	15K	4.7M	17K	.1	9K
V17	6BG6	0	0	195	0	-210	0	6.3AC	53	Inf.	0	4500	Inf.	470K	4400	.1	11K
V18	1B3GT	—	—	9500	—	—	—	9500	—	—	—	—	—	—	—	—	—
V19	5V4G	0	245	0	165	0	165	0	245	Inf.	7500	Inf.	160	Inf.	160	Inf.	7500
V26†	6J6	80	80	6.3AC	0	-1	-.9	0	—	6K	6K	.1	0	100K	110K	45	—
V27†	6J6	120	120	6.3AC	0	-3.2	-5	0	—	1800	1800	.1	0	1M	1M	0	—
V28†	6J6	102	102	6.3AC	0	-.7	-.7	0	—	4500	4500	.1	0	3M	3M	0	—
V26*	6J6	80	100	6.3AC	0	-1.7	-4.5	-1.7	—	3M	0	.1	0	38K	38K	0	—
V27*	6AG5	0	-.5	6.3AC	0	80	80	0	—	6.6K	2600	.1	0	200K	10K	0	—

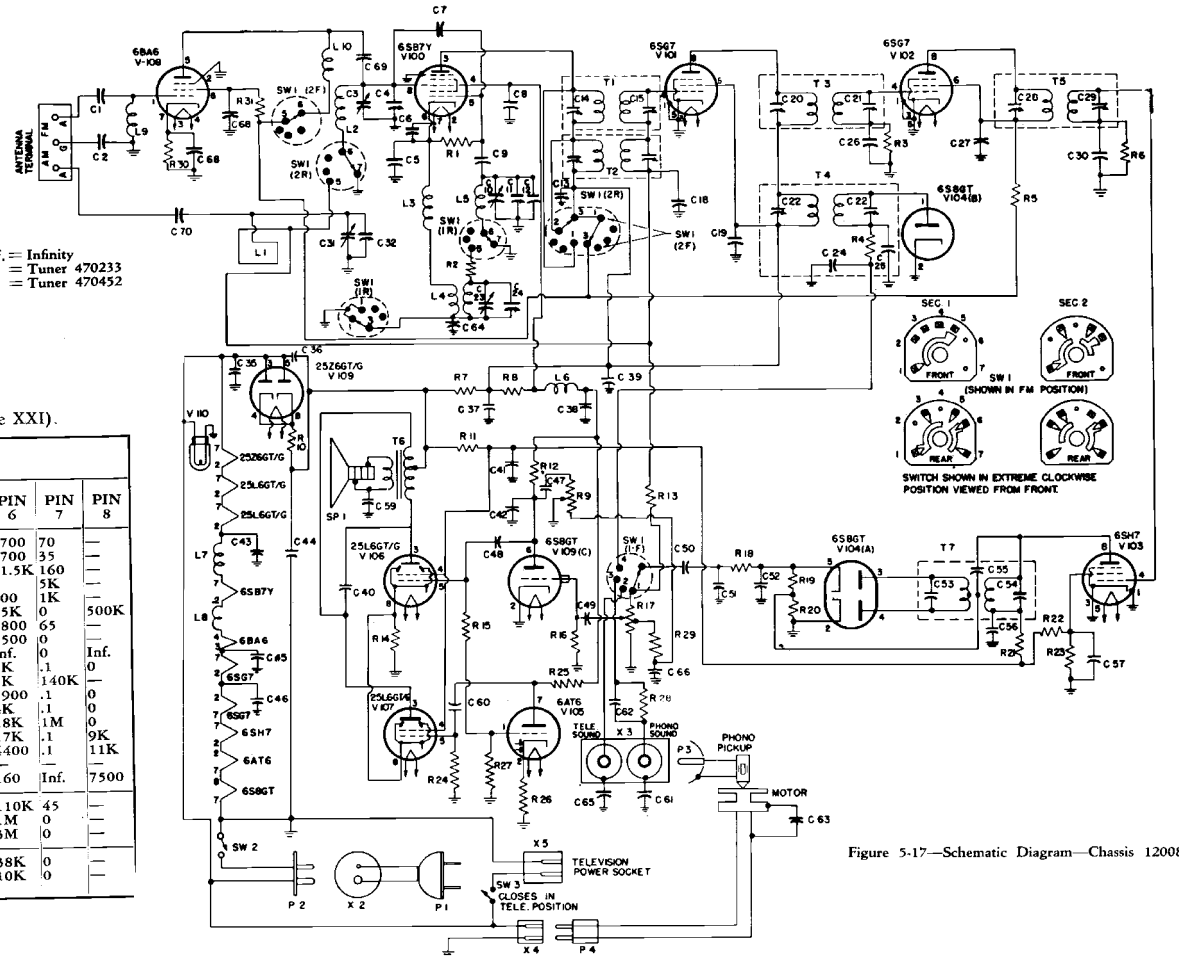


Figure 5-17—Schematic Diagram—Chassis 120081B.

d. VOLTAGE AND RESISTANCE ANALYSIS (Chassis 120024B, 120081B): (Table XXII).

SYMBOL	TUBE TYPE	VOLTAGE PIN 1	PIN 2	PIN 3	PIN 4	PIN 5	PIN 6	PIN 7	PIN 8	RESISTANCE PIN 1	PIN 2	PIN 3	PIN 4	PIN 5	PIN 6	PIN 7	PIN 8
V100	6SB7Y	0	37AC	100	92	-.5	0	44AC	-.5	0	29	30K	33K	25K	1	30	0
V101	6SG7	0	95	0	0	0	95	31AC	95	0	22	0	4M	0	30K	26	30K
V102	6SG7	0	25AC	0	-.4	0	78*	19AC	78*	0	22	0	2M	0	30K*	15	30K*
V103	6SH7	0	12AC	0	0	0	22	19AC	45	0	10	0	46K	0	8K	15	80K
V104	6S8GT	-.5	0	0	0	5.5*	42	0	6AC	450K	0	100K	100K	200K	550K	0	5
V105	6AT6	0	.8	6AC	12AC	0	0	74	—	68K	1200	5	10	Inf.	Inf.	50K	—
V106	25L6GT	89	44AC	107	100	0	110	70AC	7.6	30K	35	30K	30K	500K	30K	51	90
V107	25L6GT	0	70AC	107	100	0	74	95AC	7.6	Inf.	51	30K	30K	500K	65K	68	90
V108	6BA6	0	0	37AC	31AC	82*	80*	.7*	—	0	0	26	20	30K*	30K*	68	—
V109	25Z6GT	107	95AC	117AC	107	117AC	83	117AC	107	30K	68	86	30K	86	30K	86	40K

Notes: * For bandswitch in FM position.
K = Kilohms; M = Megohms.
Inf. = Infinity.

MODELS 585, Ch. 120025B, 120088B;
618, Ch. 120090B, 120090D

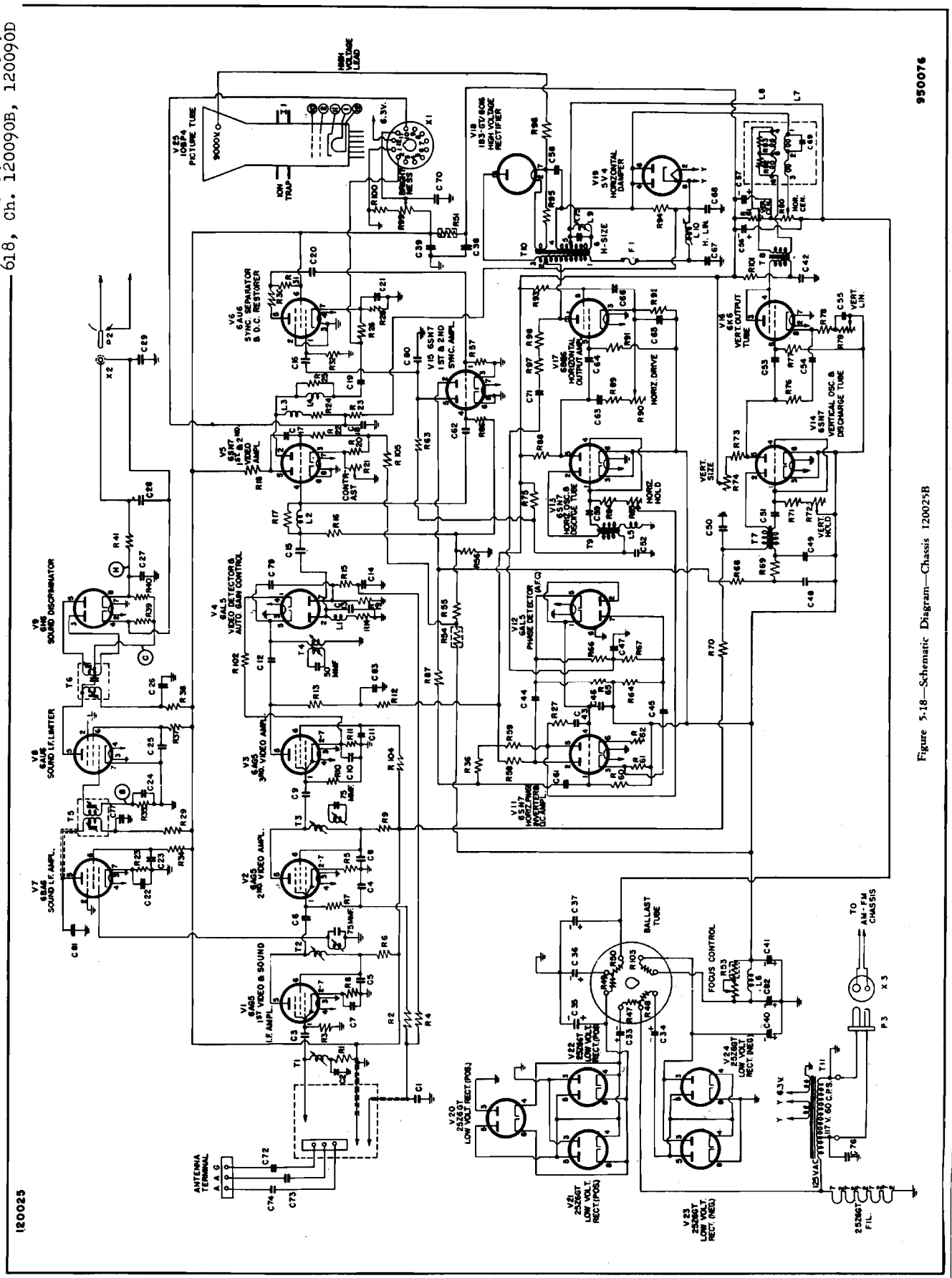


Figure 5-18—Schematic Diagram—Chassis 120025B

MODELS 585, Ch. 120025B, 120088B;
618, Ch. 120090B, 120090D

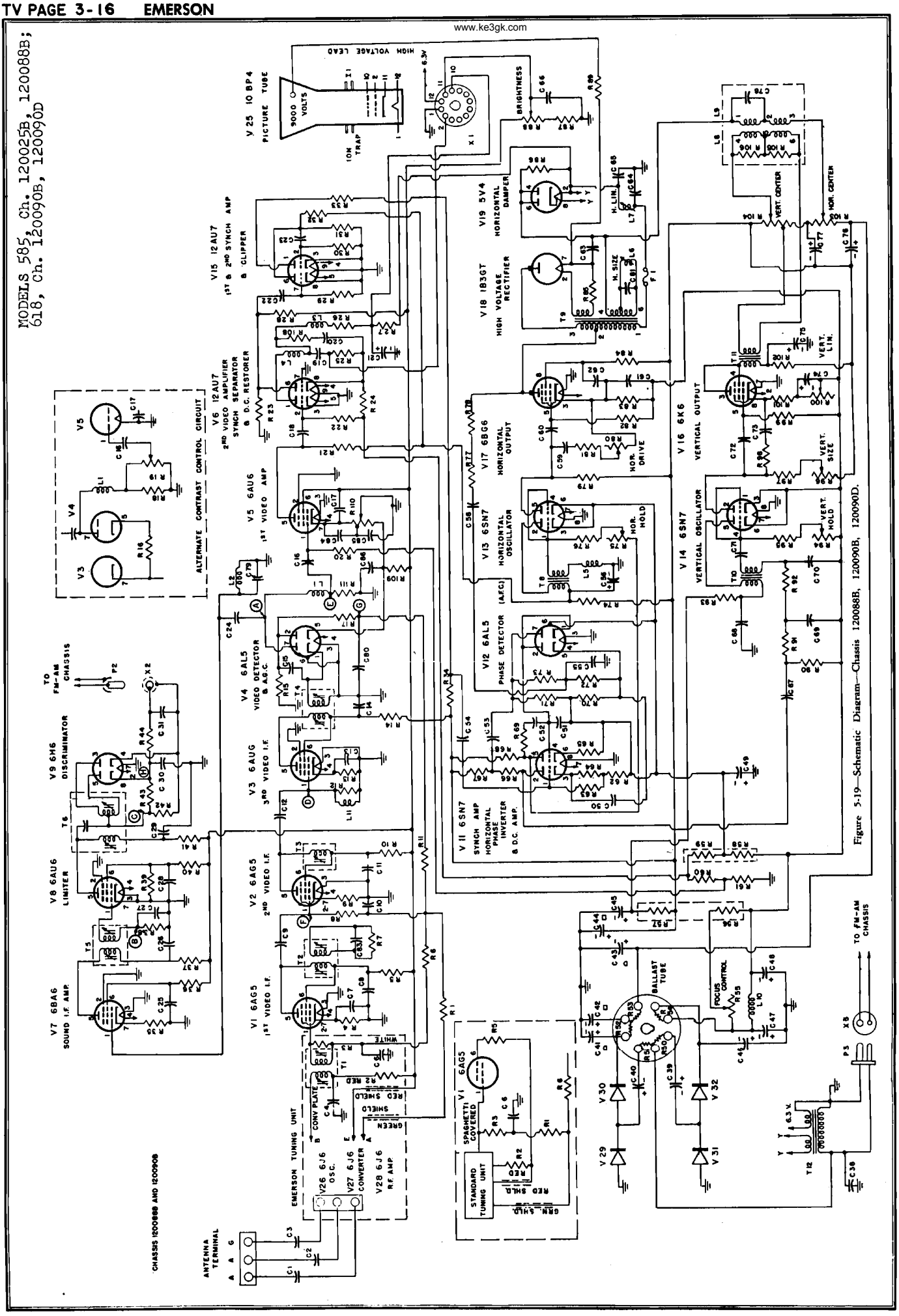


Figure 5-19—Schematic Diagram—Chassis 120088B, 120090B, 120090D.

REPLACEMENT PARTS LIST (Chassis 120025B): (Table XXIII)

SYMBOL	†PART No.	DESCRIPTION
V1	800535	Tube, 6AG5
V2	800535	Tube, 6AG5
V3	800535	Tube, 6AG5
V4	800541	Tube, 6AL5
V5	800380	Tube, 6SN7GT
V6	800533	Tube, 6AU6
V7	800531	Tube, 6BA6
V8	800533	Tube, 6AU6
V9	800330	Tube, 6H6
V11	800380	Tube, 6SN7GT
V12	800541	Tube, 6AL5
V13	800380	Tube, 25Z6GT
V14	800380	Tube, 25Z6GT
V15	800380	Tube, 25Z6GT
V16	800016	Tube, 6K6GT
V17	800004	Tube, 6BG6G
V18	800450	Tube, 1B3GT
V19	800011	Tube, 5V4G
V20	800480	Tube, 6SN7GT
V21	800480	Tube, 6SN7GT (Alt. part 928003)
V22	800480	Tube, 6SN7GT
V23	800480	Tube, 25Z6GT (Alt. part 928003)
V24	800480	Tube, 25Z6GT
V25	810000	Tube, 10BP4
V26	800536	Tube, 6J6
V27	800536	Tube, 6J6
V28	800536	Tube, 6J6
C1	928006	1500 mmf., ceramic
C2	928006	1500 mmf., ceramic
C3	910015	270 mmf., mica
C4	928006	1500 mmf., ceramic
C5	928006	1500 mmf., ceramic
C6	910015	270 mmf., mica
C7	928006	1500 mmf., ceramic
C8	928006	1500 mmf., ceramic
C9	910015	270 mmf., mica
C10	928006	1500 mmf., ceramic
C11	928006	1500 mmf., ceramic
C12	910015	270 mmf., mica
C13	910130	10 mmf., mica
C14	923067	.1 mfd., 200 volt
C15	923080	.25 mfd., 200 volt
C16	923062	.05 mfd., 400 volt
C17	923062	.05 mfd., 400 volt
C18	925111	8 mfd., 250 volt
C19	923062	.05 mfd., 400 volt
C20	923062	.05 mfd., 400 volt
C21	925072	10 mfd., 25 volt
C22	928006	1500 mmf., ceramic
C23	928006	1500 mmf., ceramic
C24	910031	68 mmf., mica
C25	928006	1500 mmf., ceramic
C26	928006	1500 mmf., ceramic
C27	910010	110 mmf., mica
C28	923071	.001 mfd., 400 volt
C29	910110	200 mmf., mica
C33	925099	80 mfd., 175 volt
C34	925098	80 mfd., 150 volt
C35	925086	80 mfd., 300 volt
C36		80 mfd., 300 volt
C37	925096	80 mfd., 350 volt
C38		80 mfd., 350 volt
C39		80 mfd., 350 volt
C40	925091	80 mfd., 250 volt
C41	925093	80 mfd., 250 volt
C42	925111	8 mfd., 250 volt
C43	923072	1 mfd., 200 volt
C44	910027	.001 mfd., 500 volt
C45	910027	.001 mfd., 500 volt
C46	923068	.05 mfd., 200 volt
C47	910010	110 mfd., mica
C48	923078	.005 mfd., 400 volt
C49	923078	.005 mfd., 400 volt
C50	923066	.25 mfd., 400 volt
C51	923069	.003 mfd., 600 volt
C52	925111	8 mfd., 250 volt
C53	923075	.01 mfd., 600 volt
C54	923073	.05 mfd., 600 volt
C55	925072	10 mfd., 25 volt
C56	925097	1000 mfd., 25 volt
C57		1000 mfd., 25 volt
C58	923003	500 mmf., ceramic
C59	910023	780 mmf., mica
C61	923079	.001 mfd., 600 volt
C62	923062	.05 mfd., 400 volt
C63	910017	470 mmf., mica
C64	923079	.001 mfd., 600 volt
C65	923067	.1 mfd., 200 volt
C66	923073	.05 mfd., 600 volt
C67	923074	.035 mfd., 600 volt
C68	923073	.05 mfd., 600 volt
C69	910090	50 mmf., mica
C70	923067	.1 mfd., 200 volt
C71	923077	.005 mfd., 600 volt
C72	922101	.05 mfd., 400 volt
C73	910013	1000 mfd., mica (Alt. part 928003)
C74	910013	1000 mmf., mica (Alt. part 928003)
C75	923062	.05 mfd., 400 volt
C76	923062	.05 mfd., 400 volt
C77	928006	1500 mmf., ceramic
C79	910100	100 mmf., mica
C80	910010	110 mmf., ceramic
C81	928017	5 mmf., ceramic
C82	925093	80 mfd., 250 volt
C83	928003	1000 mmf., ceramic
F1	808050	.25 amp. fuse, 250 volt (Type 3AG).
I1	708084	P.M. Ion trap
L1	708093	Peaking coil, 35 uh.
L2	708094	Peaking coil, 125 uh.
L3	708093	Peaking coil, 35 uh.
L4	708095	Peaking coil, 180 uh.
L5	705009	R-f choke, 3 mh.
L6	708141	Focus coil
L7	708130	Defl. coil., hor.
L8		Defl. coil, vert.
L9	708082	Size coil
L10	708003	Linearity coil
P2	505040	Audio output plug (Alt. part 505048)
P3	505007	Interlock plug
R1	340492	1000 ohms, ½ w.
R2	340972	100 kilohms, ½ w.
R3	330732	10 kilohms, ½ w.
R4	340972	100 kilohms, ½ w.
R5	340132	33 ohms, ½ w.
R6	340492	1000 ohms, ½ w.
R7	340632	3900 ohms, ½ w.
R8	340232	82 ohms, ½ w.
R9	340492	1000 ohms, ½ w.
R10	330732	10 kilohms, ½ w.
R11	340292	150 ohms, ½ w.
R12	340292	1000 ohms, ½ w.
R13	330652	4700 ohms, ½ w.
R14	330652	4700 ohms, ½ w.
R15	341212	1 megohm, ½ w.
R16	341212	1 megohm, ½ w.
R17	340812	22 kilohms, ½ w.
R18	330532	1500 ohms, ½ w.
R19	341292	2.2 megohms, ½ w.
R20	340772	15 kilohms, ½ w.
R21	390055	10 kilohms, Contrast Cont.
R22	341212	1 megohm, ½ w.
R23	340612	3300 ohms, ½ w.
R24	340632	3900 ohms, ½ w.
R25	340812	22 kilohms, ½ w.
R26	341212	1 megohm, ½ w.
R27	340892	47 kilohms, ½ w.
R28	340812	22 kilohms, ½ w.
R29	340492	1000 ohms, ½ w.
R30	341032	180 kilohms, ½ w.
R31	340892	47 kilohms, ½ w.
R32	341212	1 megohm, ½ w.
R33	340212	68 ohms, ½ w.
R34	340492	1000 ohms, ½ w.
R35	340892	47 kilohms, ½ w.
R36	340732	10 kilohms, ½ w.
R37	340732	10 kilohms, ½ w.
R38	340492	1000 ohms, ½ w.
R39	330972	100 kilohms, ½ w.
R40	340972	100 kilohms, ½ w.
R41	340932	68 kilohms, ½ w.
R47	Ballast	10 ohms, 3 w.
R48	Tube	10 ohms, 3 w.
R49	397021	75 ohms, 5 w.
R50		75 ohms, 5 w.
R51	394035	600 ohms, 5 w.
R52		330 ohms, 3 w.
R53	390037	1500 ohms, Focus Control
R54	394036	4250 ohms, 10 w.
R55	370312	180 ohms, 1 w.
R56	340132	33 ohms, ½ w.
R57	341212	1 megohm, ½ w.
R58	330572	2200 ohms, ½ w.
R59	360972	100 kilohms, 1 w.
R60	341212	1 megohm, ½ w.
R61	330572	2200 ohms, ½ w.
R62	330492	1000 ohms, ½ w.
R63	370812	22 kilohms, ½ w.
R64	341052	220 kilohms, ½ w.
R65	341052	220 kilohms, ½ w.
R66	330972	100 kilohms, ½ w.
R67	330972	100 kilohms, ½ w.
R68	340812	22 kilohms, ½ w.
R69	340652	4700 ohms, ½ w.
R70	370972	100 kilohms, 1 w.
R71	331252	1.5 megohms, ½ w.
R72	390036	1 megohm, Vert. Hold Control
R73	341132	470 kilohms, ½ w.
R74	390038	2 megohms, Vert. Size Control
R75	370652	4700 ohms, 1 w.
R76	340672	5600 ohms, ½ w.
R77	341372	4.7 megohms, ½ w.
R78	340352	270 ohms, ½ w.
R79	390039	5 kilohms, Vert. Lin. Control
R80	390033	30 ohms, Hor. Cent. Control
R81	390033	30 ohms, Vert. Cent. Control
R82	340432	560 ohms, ½ w.
R83	340432	560 ohms, ½ w.
R84	340892	47 kilohms, ½ w.
R85	Pt. of R72	50 kilohms, Hor. Hold Control
R86	341212	1 megohm, ½ w.
R87	340732	10 kilohms, ½ w.
R88	331132	470 kilohms, ½ w.
R89	340792	18 kilohms, ½ w.
R90	390035	20 kilohms, Hor. Drive Control
R91	341132	470 kilohms, ½ w.
R92	370252	100 ohms, 1 w.
R93	397014	10 kilohms, 2 w.
R94	394007	7500 ohms, 25 w.
R95	397041	3.3 ohms, 1 w.
R96	371212	1 megohm, 1 w.
R97	371132	470 kilohms, 1 w.
R98	371132	470 kilohms, 1 w.
R99	390032	100 kilohms, Brightness Control
R100	340652	4700 ohms, ½ w.
R101	370732	10 kilohms, 1 w.
R102	340972	100 kilohms, ½ w.
R103	Pt. of Ballast	75 ohms, 3 w.
R104	340492	1000 ohms, ½ w.
R105	340772	15 kilohms, ½ w.
Tuner	470233	Emerson
Trap	470366	Wave trap (L1R and L2R)
T1	720041	First video i-f trans.
T2	720042	Second video i-f trans.
T3	720043	Third video i-f trans.
T4	720044	Fourth video i-f trans.
T5	720027	Audio i-f trans. (21.25MC)
T6	708008	Disc. trans. (21.25MC)
T7	738004	Vert. osc. trans.
T8	738010	Vert. output trans. (Alt. part 738011)
T9	738008	Hor. osc. trans.
T10	738000	Hor. output trans. (Alt. part 738009)
T11	730007	Power transformer
X1	470232	Cable assembly socket
X2	508100	Speaker socket
X3	470339	Shell holder assembly

REPLACEMENT PARTS LIST (Chassis 120088B, 120090B, 120090D): (Table XXIV).

SYMBOL	†PART No.	DESCRIPTION
V1	800535	Tube, 6AG5
V2	800535	Tube, 6AG5
V3	800533	Tube, 6AU6
V4	800541	Tube, 6AL5
V5	800533	Tube, 6AU6
V6	800026	Tube, 12AU7
V7	800531	Tube, 6BA6
V8	800533	Tube, 6AU6
V9	800330	Tube, 6H6
V11	800380	Tube, 6SN7GT
V12	800541	Tube, 6AL5
V13	800380	Tube, 6SN7GT
V14	800380	Tube, 6SN7GT
V15	800026	Tube, 12AU7
V16	800016	Tube, 6K6GT
V17	800004	Tube, 6BG6G
V18	800450	Tube, 1B3GT/8016
V19	800011	Tube, 5V4G
V25*	810000	Tube, 10BP4
V26	800536	Tube, 6J6
V27*	800536	Tube, 6J6
V28	800536	Tube, 6J6
V29	817004	Sel. Rect. (250 ma.)
V30	817004	Sel. Rect. (250 ma.)
V31	817005	Sel. Rect. (250 ma.)
V32		Sel. Rect. (250 ma.)
C1	928006	1500 mmf., ceramic
C2	928006	1500 mmf., ceramic
C3	922101	.05 mfd., 400 v.
C4	928006	1500 mmf., ceramic
C6	928006	1500 mmf., ceramic
C7	928109	.005 mfd., 400 volt
C8	928006	1500 mmf., ceramic
C9	910015	270 mmf., mica
C10	928006	1500 mmf., ceramic
C11	928006	1500 mmf., ceramic
C12	910015	270 mmf., mica
C13	928006	1500 mmf., ceramic
C14	928006	1500 mmf., ceramic
C15	910290	30 mmf., mica
C18	923062	.05 mfd., 400 volt
C19	923062	.05 mfd., 400 volt
C20	923064	.1 mfd., 400 volt
C21	925114	8 mfd., 400 volt
C22	923061	.01 mfd., 400 volt
C23	923062	.05 mfd., 400 volt

REPLACEMENT PARTS LIST (Chassis 120088B, 120090B, 120090D): (Table XXIV). (Continued)

SYMBOL	†PART No.	DESCRIPTION
C24	910130	10 mmf., mica
C25	928006	1500 mmf., ceramic
C26	928006	1500 mmf., ceramic
C27	910031	68 mmf., mica
C28	928006	1500 mmf., ceramic
C29	928006	1500 mmf., ceramic
C30	910010	110 mmf., mica
C31	923079	.001 mfd., 600 volt
C38	922101	.05 mfd., 400 volt
C39	925099	80 mfd., 150 volt
C40	925128	80 mfd., 150 volt
C41, C42, C43, C44	925129	80 mfd., 300 volt
C45	925131	80 mfd., 300 volt
C46	925134	60 mfd., 300 volt
C47, C48	925132	80 mfd., 300 volt
C49	925133	80 mfd., 300 volt
C50	925114	8 mfd., 350 volt
C51	910027	.001 mfd., mica
C52	923062	.05 mfd., 400 volt
C53	923080	.25 mfd., 200 volt
C54	910027	.001 mfd., mica
C55	923062	.05 mfd., 400 volt
C56	910010	110 mmf., 400 volt
C57	925111	8 mfd., 250 volt
C58	910023	780 mmf., mica
C59	923077	.005 mmf., mica
C60	910017	470 mmf., mica
C61	923079	.001 mfd., 600 volt
C62	923067	.1 mfd., 200 volt
C63	923073	.05 mfd., 600 volt
C64	923003	500 mmf., 10 kilovolt
C65	923074	.035 mfd., 600 volt
C66	923073	.05 mfd., 600 volt
C67	923064	.1 mfd., 400 volt
C68	923075	.01 mfd., 600 volt
C69	923066	.25 mfd., 400 volt
C70	923078	.005 mfd., 400 volt
C71	923078	.005 mfd., 400 volt
C72	923085	.003 mfd., 600 volt
C73	923073	.05 mfd., 600 volt
C74	923073	.05 mfd., 600 volt
C75	925072	10 mfd., 50 volt
C76	925111	8 mfd., 250 volt
C77	925097	1000 mfd., 15 volt
C78	910090	1000 mfd., 15 volt
C79	900044	50 mmf., mica
C80	923067	3-35 mmf., trimmer
C81	923062	.1 mfd., 200 volt
C83	Pt. of T-2	.05 mfd., 400 volt
C84	910028	75 mmf., ceramic
C85	910029	220 mmf., mica
C86	923067	150 mmf., mica
F1	808050	.1 mfd., 200 volt
		.25 amp. fuse, 250 volt (Type 3AG)
I1	708084	PM Ion trap
L1	708096	Peaking coil, 75 uh.
L2	708097	Peaking coil, 45 uh.
L3	708095	Peaking coil, 180 uh.
L4	708095	Peaking coil, 180 uh.
L5	705009	R-F choke, 3 mh.
L6	708082	Size coil
L7	708083	Linearity coil
L8, L9	708130	Vert. Defl. coil Hor. Defl. coil
L10	708141	Focus coil
L11	705014	R-F choke, 20 uh.
P2	505040	Audio output plug (Alt. part 505048)
P3	505007	Interlock plug
R1	340972	100 Kilohms, ½ w.
R2	340492	1000 ohms, ½ w.
R3 #	340732	10 Kilohms, ½ w.
R4	340212	68 ohms, ½ w.
R5	340492	1000 ohms, ½ w.
R6	330492	1000 ohms, ½ w.
R7	340732	10 Kilohms, ½ w.
R8	340652	4700 ohms, ½ w.
R9	340132	33 ohms, ½ w.
R10	340492	1000 ohms, ½ w.
R11	340492	1000 ohms, ½ w.
R12	340632	39 ohms, ½ w.
R13	340292	15 0ohms, ½ w.
R14	340492	1000 ohms, ½ w.
R15	341292	2.2 megohms, ½ w.
R17	341212	1 megohm, ½ w.
R20	341212	1 megohm, ½ w.
R21	330532	1500 ohms, ½ w.
R22	341212	1 megohm, ½ w.
R23	340812	22 Kilohms, ½ w.
R24	341132	470 kilohms, ½ w.
R25	341052	220 Kilohms, ½ w.
R26	340632	3900 ohms, ½ w.
R27	340612	3300 ohms, ½ w.
R28	340892	47 Kilohms, ½ w.
R29	341212	1 megohm, ½ w.
R30	341032	180 Kilohms, ½ w.
R31	340892	47 kilohms, ½ w.
R32	370812	22 kilohms, 1 w.
R33	370732	10 kilohms, 1 w.
R34	340492	1000 ohms, ½ w.
R35	340212	68 ohms, ½ w.
R36	340492	1000 ohms, ½ w.
R37	340492	1000 ohms, ½ w.
R38	340972	100 kilohms, ½ w.
R39	340652	4700 ohms, ½ w.
R40	397014	10 kilohms, ½ w.
R41	340492	1000 ohms, ½ w.
R42	340972	100 kilohms, ½ w.
R43	340972	100 kilohms, ½ w.
R44	340932	68 kilohms, ½ w.
R50, R51	Ballast	30 ohms, 12 w.
R52, R53	Tube	30 ohms, 20 w. 75 ohms, 5 w.
	397022	75 ohms, 5 w.
R54	390037	75 ohms, 3 w. 1500 ohms, 4 w. Focus Control (Rear)
R56, R57, R58, R59	394035	330 ohms, 3 w. 600 ohms, 6 w. 1550 ohms, 7 w. 3100 ohms, 7 w.
R60	370312	180 ohms, 1 w.
R61	340132	33 ohms, ½ w.
R62	340292	150 ohms, ½ w.
R63	341212	1 megohm, ½ w.
R64	330492	1000 ohms, ½ w.
R65	330492	1000 ohms, ½ w.
R66	330652	4700 ohms, ½ w.
R67	340572	2200 ohms, ½ w.
R68	397029	100 kilohms, 2 w.
R69	340892	47 kilohms, ½ w.
R70	341052	220 kilohms, ½ w.
R71	341052	220 kilohms, ½ w.
R72	340972	100 kilohms, ½ w.
R73	340972	100 kilohms, ½ w.
R74	370652	4700 ohms, 1 w.
R75	390036	50 kilohms, Hor. Hold Control (Front)
R76	340892	47 kilohms, ½ w.
R77	371132	470 kilohms, 1 w.
R78	371132	470 kilohms, 1 w.
R79	341132	470 kilohms, ½ w.
R80	390035	20 kilohms, Hor. Drive Control (Rear)
R81	340972	18 kilohms, ½ w.
R82	341132	470 kilohms, ½ w.
R83	370252	100 ohms, 1 w.
R84	397044	10 kilohms, 4 w.
R85	397041	3.3 ohms, 1 w.
R86	394007	7500 ohms, 25 w.
R87	340652	4700 ohms, ½ w.
R88	390032	100 kilohms, Brightness Cont. (Front)
R89	371212	1 megohm, 1 w.
R90	340812	22 kilohms, ½ w.
R91	340812	22 kilohms, ½ w.
R92	340652	4700 ohms, ½ w.
R93	370972	100 kilohms, 1 w.
R94	Pt. of R75	1 megohm, Vert. Hold Control
R95	331252	1.5 megohms, ½ w.
R96	390038	2 megohms Vert. Size Control (Rear)
R97	341132	470 kilohms, ½ w.
R98	340712	8200 ohms, ½ w.
R99	341372	4.7 megohms, ½ w.
R100	390039	5 kilohms, Vert. Linearity, Cont. (Rear)
R101	340352	270 ohms, ½ w.
R102	397043	10 kilohms, 3 w.
R103	390054	30 ohms, Hor. Cent. Control (Rear)
R104	390033	30 ohms, Vertical Cent. Control (Rear)
R105	340432	560 ohms, ½ w.
R106	340432	560 ohms, ½ w.
R108	340572	2200 ohms, ½ w.
R109	340932	68 kilohms, ½ w.
R110	390069	1000 ohms, Contrast Control (Front)
R111	340652	4700 ohms, ½ w.
Tuner	470233	Emerson
Tuner	470452	Standard
T1	720056	1st Video I-F trans.
T2	720042	2nd Video I-F trans.
T3	720073	3rd Video I-F trans.
T4	720057	4th Video I-F trans.
T5	720081	Audio I-F trans. (4.5 MC)
T6	708017	Disc. coil (4.5 MC) (Alt. part 708018)
T8	738008	Hor. Osc. trans.
T9	738000	Hor. Output trans. (Alt. part 738009)
T10	738004	Vert. Osc. trans.
T11	738010	Vert. Output trans. (Alt. part 738011)
T12	730015	Power trans.
X1	470232	Cable Assembly Socket
X2	508100	Speaker Socket
X3	470339	Shell Holder Assembly

NOTES:

I. V25 Chassis 120090B may use types 12LP4,
II. V27* 12QP4, or 12JP4 as the picture tube.
III. R3# Tuner 470452 uses type 6AG5, Part no. 800535.
IV. Tuner 470452 uses 5600 ohms, part no. 340672.
Alternate contrast Control circuit, used on earlier production uses following parts:
C16 923062 .05 mfd., 400 volt
C17 928006 150 mmf., ceramic
R16 340972 100 kilohms, ½ w.
R18 340732 10 kilohms, ½ w.
R19 390055 10 kilohms, Cont. Control (Front)

(Chassis 120024B, 120081B): (Table XXV).

SYMBOL	†PART No.	DESCRIPTION
V100	800014	Tube, 6SB7Y
V101	800310	Tube, 6SG7
V102	800310	Tube, 6SG7
V103	800420	Tube, 6SH7
V104	800015	Tube, 6S8GT
V105	800001	Tube, 6AT6
V106	800490	Tube, 25L6GT
V107	800490	Tube, 25L6GT
V108#	800480	Tube, 25Z6GT
V108*	800531	Tube, 6BA6
V109*	800480	Tube, 25Z6GT
V109#	807003	Dial light, 115 volt
V110*	807003	Dial light, 115 volt
C1	928006	1500 mmf., ceramic
C2	928006	1500 mmf., ceramic
C3#	900400	Two gang, four section variable cond.
C3*	900046	Two gang, four section variable cond.
C4	Pt. of C3	Trimmer, FM
C5	928016	15 mmf., ceramic
C6	928014	50 mmf., ceramic
C7	915005	2.2 mmf., molded
C8	928109	5000 mmf., ceramic
C9	928015	75 mmf., ceramic
C10	Pt. of C3	Variable condenser, FM osc.
C11	Pt. of C10	Trimmer, 1-8 mmf., FM osc.
C12	928028	5 mmf., ceramic
C13	923076	.01 mfd., 400 volt
C14	Pt. of T1	I-f trimmer, FM
C15	Pt. of T1	I-f trimmer, FM
C16	Pt. of T2	I-f trimmer, AM
C17	Pt. of T2	I-f trimmer, AM
C18	923068	.05 mfd., 200 volt
C19	923926	.01 mfd., 200 volt
C20	Pt. of T3	I-f trimmer, FM
C21	Pt. of T3	I-f trimmer, FM
C22	Pt. of T4	I-f trimmer, AM
C23	Pt. of T4	I-f trimmer, AM
C24	Pt. of T4	110 mmf., mica
C25	Pt. of T4	110 mmf., mica
C26	923076	.01 mfd., 200 volt
C27	923076	.01 mfd., 200 volt
C28	Pt. of T5	I-f trimmer, FM
C29	Pt. of T5	I-f trimmer, AM
C30	928102	50 mmf., ceramic
C31	Pt. of C1	Variable cond., AM ant.
C32	Pt. of C11	Trimmer, AM ant.
C33	Pt. of C1	Variable cond., AM osc.
C34	Pt. of C13	Trimmer, AM osc.
C35	923082	.05 mfd., 400 volt
C36	923078	.005 mfd., 400 volt
C37, C38	925115	100 mfd., 400 volt 50 mfd., 15 volt
C39	910014	470 mmf., mica
C40	923082	.02 mfd., 400 volt
C41	925101	50 mfd., 150 volt
C42	910014	470 mmf., mica
C43	923061	.01 mfd., 400 volt
C44	Pt. of C41	50 mfd., 150 volt
C45	923061	.01 mfd., 400 volt
C46	923061	.01 mfd., 400 volt
C47	923083	.002 mfd., 400 volt
C48	923061	.01 mfd., 400 volt
C49	923061	.01 mfd., 400 volt
C50	923076	.01 mfd., 200 volt
C51	923071	.001 mfd., 400 volt
C52	910010	110 mmf., mica
C53	Pt. of T7	Trimmer, disc.
C54	Pt. of T7	Trimmer, disc.
C55	Pt. of T7	50 mmf.
C56	928109	5000 mmf., ceramic
C57	923076	.01 mfd., paper
C58	915005	2.2 mmf., molded
C59	923061	.01 mfd., 400 volt
C60	923061	.01 mfd., 400 volt
C61	923062	.05 mfd., 400 volt
C62	923071	.001 mfd., 400 volt
C63	922101	.05 mfd., 400 volt
C64	923076	.01 mfd., 200 volt
C65	923062	.05 mfd., 400 volt
C66	923084	1500 mmf., ceramic
C67*	928006	1500 mmf., ceramic
C68*	928006	1500 mmf., ceramic
C69*	928006	1500 mmf., ceramic
C70*	Pt. of L1	2.2 mmf., molded
L1	700011	Antenna loop
L2	713008	FM r-f coil
L3	705002	FM oscillator choke
L4	716015	AM oscillator coil
L5	716013	FM oscillator coil
L6	.....	R-f choke, B+
L7	705011	R-f choke, filament
L8	705011	R-f choke, filament
L9	710019*	FM antenna coil
L10	705002*	FM r-f choke
P1	583022	Line cord and plug
P2	505008, 470398	Line interlock plug
P3	505040	Phono pickup plug
P4	505047	Phono motor plug
R1	340810	22 kilohms, ½ w.
R2	350290	150 ohms, ½ w.
R3	351290	2.2 megohms, ½ w.
R4	Pt. of T4	27 kilohms, ½ w.
R5	350450	680 ohms, ½ w.
R6	340890	47 kilohms, ½ w.
R7	370450	680 ohms, 1 w.
R8	340450	680 ohms, ½ w.
R9	390046	2 megohms, tone control
R10	380050	15 ohms, 1 w.
R11	340490	1000 ohms, ½ w.
R12	351130	470 kilohms, ½ w.
R13	351330	3.3 megohms, ½ w.
R14	370230	82 ohms, 1 w.
R15	351130	470 kilohms, ½ w.
R16	351290	2.2 megohms, ½ w.
R17	390056	.5 megohm, volume control
R18	350930	68 kilohms, ½ w.
R19	340970	100 kilohms, ½ w.
R20	340970	100 kilohms, ½ w.
R21	350890	47 kilohms, ½ w.
R22	340810	22 kilohms, ½ w.
R23	340690	6800 ohms, ½ w.
R24	351130	470 kilohms, ½ w.
R25	350810	22 kilohms, ½ w.
R26	340510	1200 ohms, ½ w.
R27	350930	68 kilohms, ½ w.
R28	351290	2.2 megohms, ½ w.
R29	350810	22 kilohms, ½ w.
R30†	350610	3300 ohms, ½ w.
R30*	340210	68 ohms, ½ w.
R31*	340450	680 ohms, ½ w.
SP1	180042	P.M. speaker, 12"
SW1†	510026	Band switch
SW1*	510039	Band switch
SW2	Pt. of R17	On-off switch
SW3	510035	Television on-off switch
T1	720024	First i-f trans., FM
T2	720031	First i-f trans., AM
T3	720025	Second i-f trans., FM
T4	720032	Second i-f trans., AM
T5	728026	Third i-f trans., FM
T6	734028	Output transformer
T7	708005	Disc. trans., FM (Alt. parts 807012, 708013)
X2	508005, 470302	Line interlock socket
X3	508002	Phono socket, dual
X4	585073	Phono motor socket
X5	585019	Television switch socket
	507008	Dial light socket

(Models 585 and 618): (Table XXVI).

†Part No.	Description
140180	Cabinet—for 819039 changer (Model 585)
140243	Cabinet—for 819039 changer (Model 618)
140231	Cabinet—for 819044 changer (Model 585)
140244	Cabinet—for 819044 changer (Model 618)
620091	Cabinet back—TV section (Model 585)
560078	Cabinet back—TV section (Model 618)
560058	Cabinet back—FM section (Model 585)
560077	Cabinet back—FM section (Model 618)
560067	Cabinet back—Phono section (Model 585)
560076	Cabinet back—Phono section (Model 618)
240171	Plug assembly—FM section
635010	Safety glass—TV section (Model 585)
635015	Safety glass—TV section (Model 618)
410352	Bezel—TV section (Model 585)
410534	Mask—TV section (Model 618)
470339	Shell holder assembly—TV section
500005	Interlock socket—TV section
505011	Television switch plug
505040	Speaker plug
520103	Selector escutcheon (Model 585)
520084	Selector escutcheon (Model 618)
450044	Knob—fine tuning
450046S	Knob—brightness, contrast
450041S	Knob—dual, small
450045	Knob—dual, large
450049S	Knob—selector, with hole
450042S	Knob—selector
460470	Knob—push-on
460041	Knob—indicator push-on
819044	Record changer—Webster Type 146
819039	Record changer—GI Type 700 FS
520087	Dial crystal
410177	Dial back plate
280039	Dial drive shaft
530002	Dial drive cord
587070	Dial cord spring
525017	Pointer

† Specify part number when ordering.
‡ Chassis 120024B only.
* Chassis 120081B only.