



WARNING!

In this AC-DC television set, B- is connected directly to one side of the AC power line. If test equipment ground is connected to B-, the equipment may be at line-voltage potential above ground (depending on how the line plug is inserted.) Therefore, contact between equipment and ground may result in severe shock.

Use an isolation transformer between the television AC cord and the power receptacle. This is the best safeguard.

If an isolation transformer is not available, make the following check before any test equipment is connected: Put an AC voltmeter between B- of the set and a good ground connection (radiator, water pipe, etc.). Plug the line cord in. If the meter reading is not zero, reverse the plug in the receptacle.

GENERAL DESCRIPTION

The Model P-301 Television Receiver is an 18-tube, direct-view, 7-inch portable model which may be operated on either alternating or direct current. The receiver is complete in one unit and is operated by the use of five front-panel controls. Features of the receiver include; complete coverage of all 12 television channels; FM sound system; and reduced-hazard high voltage supplying 5000 volts to the second anode of the picture tube.

SPECIFICATIONS

Sensitivity at the Antenna

Video—100 microvolts (200 with full contrast)
Audio—100 microvolts for 50-milliwatt output

Power-Supply Rating

105-125 volts, 50-60 cycle AC or DC, 120 watts.

Audio Power Output Rating

Undistorted—1.5 watts
Maximum—4 watts

Antenna Impedance Requirements

Balanced 300-ohm

Speaker

Type—4-inch P.M.
Voice Coil Impedance (400 cycles)—3.2 ohms

Picture Size

30 square inches

Dimensions

Cabinet—17½" x 9½" x 16"
Chassis—15" x 8½" x 14¾"

Tube Complement

6AG5, R-F Amplifier	12AU6, Sync Separator
6J6, Oscillator-Converter	12AU6, Video Amplifier
25L6, Audio Output	12SN7, Horizontal Multivibrator
19T8, Discriminator and Audio Amplifier	50L6, Horizontal Output
12AU6, Limiter	12SN7, Vertical Multivibrator
6AG5, I-F Amplifier	12SN7, Vertical Output
6AG5, I-F Amplifier	50L6, High-Voltage Oscillator
6AG5, I-F Amplifier	1B3/8016, High-Voltage Rectifier
6AL5, 2nd Detector	7JP4, Picture Tube

TELEVISION FREQUENCY RANGES

(All figures represent megacycles)

Channel	Channel Frequencies	Picture Carrier Frequency	Sound Carrier Frequency	Receiver RF Oscillator Frequency
Low Band				
2	54-60	55.25	59.75	82
3	60-66	61.25	65.75	88
4	66-72	67.25	71.75	94
5	76-82	77.25	81.75	104
6	82-88	83.25	87.75	110
High Band				
7	174-180	175.25	179.75	202
8	180-186	181.25	185.75	208
9	186-192	187.25	191.75	214
10	192-198	193.25	197.75	220
11	198-204	199.25	203.75	226
12	204-210	205.25	209.75	232
13	210-216	211.25	215.75	238

All the controls are on the front of the receiver. After installation, they may require slight re-adjustment. The controls are required by replacement of the power-line voltage. The function of each control is as follows:

OPERATION

Volume-Off—Turn the volume control to the "off" position.

V. Hold—Stops picture for a moment.

H. Hold—Stops picture for a moment.

Contrast—Varies the contrast of picture.

Station Selector—Selects the station to be received.

1. Turn the VOLUME control on. Allow one-half hour for the picture to stabilize.
2. Rotate the STATION SELECTOR knob to the desired channel.
3. Turn the CONTRAST control to the "off" position.
4. Turn the BRIGHTNESS control (set) fully clockwise. Then turn it clockwise until the picture is clear.

The station selector knob is partially pre-set at factory settings. After installation, it may require adjustment.

For each station selected, adjust the station selector knob. The adjustment must be made so that the station is known the station is in the program or a test pattern.

1. Turn the set on.
2. Turn the contrast control to the "off" position.
3. Turn the brightness control to its extreme clockwise position.
4. Turn the station selector knob to the desired station.
5. Turn the volume control to the "off" position.
6. Set the station selector knob to the desired station.
7. Grasp the station selector knob shaft and pull it off its shaft.
8. Insert a screwdriver into the station selector knob shaft and turn it slowly counterclockwise (until maximum contrast is obtained).

* If the set is being operated on a test pattern, let it wait 15 minutes.

** If a steady picture is obtained, the station selector knob is properly adjusted.

OPERATION OF THE RECEIVER

FUNCTIONS OF THE CONTROLS

All the controls normally used in tuning in a program—both picture and sound—are located on the front of the receiver. On the rear of the set are several controls which are preset at the factory and may need slight re-adjustment at the time of installation. After installation, they should not be adjusted further, unless required by replacement or aging of tubes, variations in power-line voltage, or other external conditions. The function of each of the controls is described below.

OPERATOR'S CONTROLS

Volume-Off—Turns set on or off and adjusts sound volume.

V. Hold—Stops pictures from moving up or down.

H. Hold—Stops pictures from moving left or right.

Contrast—Varies contrast between light and dark portions of picture.

Station Selector Knob—Tunes set to desired channel (station). May be turned in either direction.

TUNING PROCEDURE

1. Turn the VOLUME control clockwise to turn the set on. Allow one-half minute for the set to warm up.
2. Rotate the station selector knob to the desired channel.
3. Turn the CONTRAST control fully counter-clockwise.
4. Turn the BRIGHTNESS control (on the rear of the set) fully clockwise, and then turn it slowly counter-clockwise until the picture tube just becomes dark. For any particular installation this adjustment of the

ADJUSTMENT OF STATION SELECTOR

The station selector of your television set has been partially pre-set at the factory, but readjustment of the settings may have to be made at the time of the initial installation.

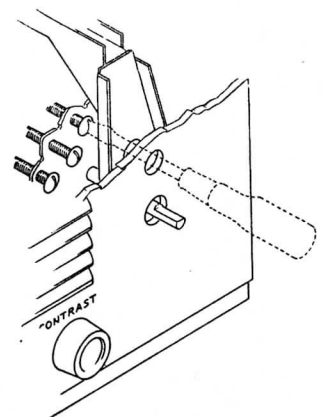
For each station which you expect to receive on your set, adjust the station selector in the following manner. The adjustment must be made at some time when you know the station is transmitting either its regular program or a test pattern.

1. Turn the set on. Allow the set to warm up for 20 minutes.
2. Turn the contrast control fully counter-clockwise.
3. Turn the brightness control (on the rear of the set) to its extreme clockwise position.* Then turn it slowly counter-clockwise until the picture tube just becomes dark.
4. Turn the contrast control fully clockwise.
5. Turn the volume control almost to its full clockwise position.
6. Set the station selector knob to the desired channel.
7. Grasp the station selector knob around its edge and pull it off its shaft.
8. Insert a screwdriver into the hole above the station selector knob shaft (see illustration). Turn the screw slowly counter-clockwise (and then clockwise, if necessary) until maximum sound is heard. This may require

several turns in one direction or the other. (However, do not at any time force the screw in either direction if it becomes difficult to turn. The screw has then reached the end of its travel in that direction and its direction should be reversed.)

9. When the sound is at maximum, the picture** will appear on the screen but "sound bars" (dark horizontal bars of varying width) will be seen travelling vertically from bottom to top across the picture. With the screwdriver, turn the station selector screw counter-clockwise only far enough to remove the sound bars from the picture.

10. The station selector has now been properly adjusted for this particular channel. Replace the station selector knob and repeat the procedure for all other stations within range of your receiver.



*If the set is being operated on direct current, and at this time the picture tube does not light up, reverse the line plug in the electric outlet. Then wait 15 minutes before proceeding.

**If a steady picture is not obtained, adjust the H. HOLD and V. HOLD controls.

connected directly to equipment ground is at line-voltage power the line plug is ground

the television AC the best safeguard. ble, make the fol- is connected: Put and a good ground Plug the line cord se the plug in the

CAUTION

over is an 18-tube, which may be oper- current. The re- operated by the res of the receiver television channels; high voltage sup- de of the picture

Sync Separator
Video Amplifier
Horizontal Multivibrator
Horizontal Output
Vertical Multivibrator
Vertical Output
High-Voltage Oscillator
6, High-Voltage Rectifier
Picture Tube

RF
frequency

INSTALLATION AND GENERAL INFORMATION

Raytheon Portable P-301 requires no installation, other than the connecting of the power cord to an ac or dc supply, and the connecting of the antenna to the set.

- The set should be operated from a 105-125 volt source, either alternating or direct current. The power consumption is 120 watts. If the set does not operate on direct current, reverse the line plug in the electric outlet.

- This Television Receiver is designed to provide the best possible reception in areas of low signal strength. A number of alternative methods are provided for connecting the antenna in order to provide the most efficient operation for a variety of conditions.

In some locations it may be found advisable to use an outside antenna. Instructions for installing the antenna are usually included with that unit. For connecting the lead-in to the set see "Antenna Connections" below.

- After removing the telescopic antenna from the case in the television set, the transmission wire should be uncoiled. Attach two wires of this transmission wire to the terminals of the bakelite strips on the rear of the set as shown in Fig. 3, A or B below. Use arrangement giving best reception.

- For different channels it is necessary to vary the length of the two rods. These rods are telescopic and may be pushed in and out. Both rods must at all times be of equal length.

- For channels 7, 8, 9, 10, 11, 12 and 13 the two rods should be all the way in. For channels 2, 3, 4, 5, and 6 these rods should be varied in length for each of these channels. Lengthen or shorten these rods until you have the best results.

- Television reception depends upon the direction in which the antenna faces as well as the length of the arms. Try both, rotating the Antenna as well as lengthening or shortening the arms. In some cases the arms may be in a V shape for clearer pictures.

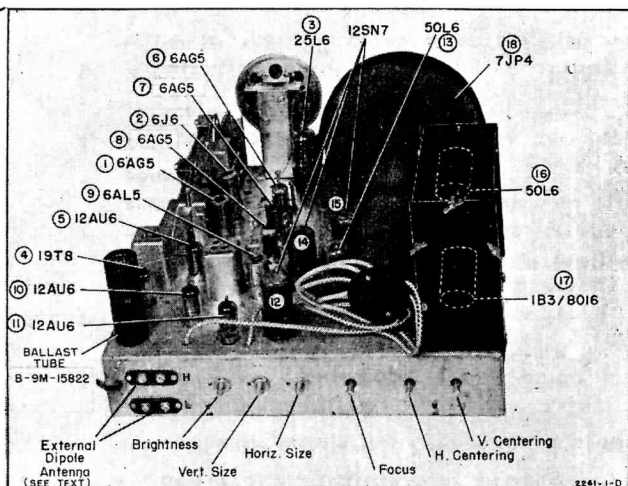


Figure 1. Tube Layout

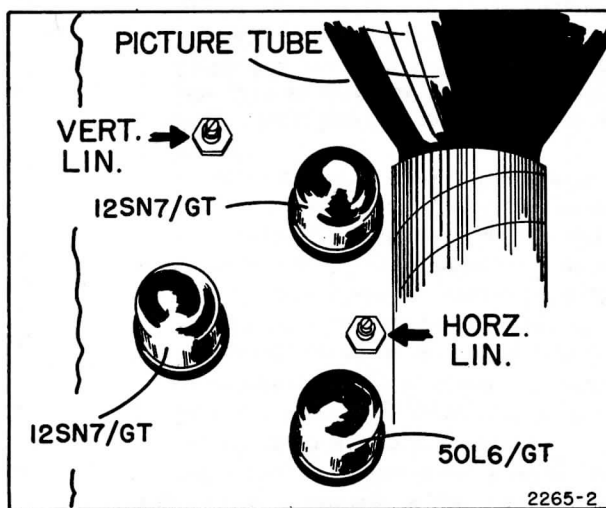


Figure 2. Control Location

ANTENNA CONNECTIONS

- 1 For those who use separate Hi and Low Band antennae, with two lead-in cables, connect the Hi-Band leads to the two top terminals marked Hi-Band, connect the Lo-Band leads to the two bottom terminals marked Lo-Band. See fig. 3, sketch A.
- 2 For those who use a combined Hi-Lo Band antenna, better known as a "All Wave Antenna" with one lead-in cable, connect as shown in fig. 3, sketch B.
- 3 In some cases due to location or environment of the Receiving antennae, better results can be had by connecting the lead-in as shown in fig. 3, sketch C.
- 4 An alternate arrangement for those who receive from Hi-Band stations only (Channels 7 thru 13), the All Wave Antenna lead-in may be connected to the

two top terminals marked Hi-Band, with no strap or connection to the Lo-Band terminals.

- 5 Use the arrangement which gives the most satisfactory results.

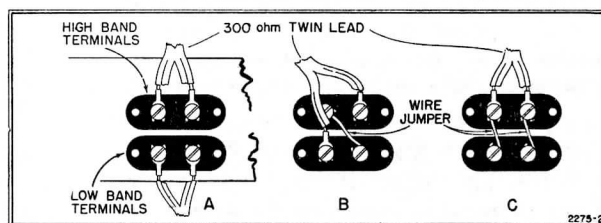


Figure 3. Alternate antenna connections

EQUIPMENT REQUIRED

DC voltage
Signal

1. Connect the signal generator, to the antenna terminals on the tuner cover. Turn the antenna thru a hole in the cover.
2. Connect the signal generator to the antenna terminals. Turn the control knob to the maximum response.
3. Switch the tuner to the maximum response.
4. With the signal generator, adjust the maximum response to the frequency indicated below. (See Figure 4.)

Stage

- 1st IF (Converter)
- 2nd IF
- 3rd IF
- 4th IF (Diode)

5. Connect a switch to the antenna terminals. Check the response. Re-adjust T12 and meter maximum response.

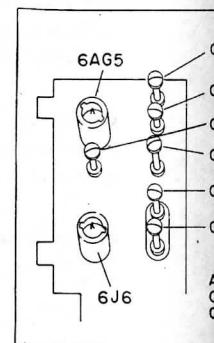


Fig. 4

6. With the signal generator, adjust the maximum response to the frequency indicated below. (See Figure 4.)
7. Check the IF response. Make the measurement, determine the peaks and valleys. The output of .5 volt. this sensitivity the high frequency returns to the "video carrier frequency of the signal and again adjust the meter reading carrier sensitivity.

ALIGNMENT PROCEDURES

EQUIPMENT REQUIRED:

DC vacuum-tube voltmeter

Sweep generator (4.5 to 220 mc with 10-mc sweep).

Signal generator (4.5 to 220 mc).

Oscilloscope

VIDEO I-F ALIGNMENT

1. Connect the signal generator, thru a 47-mmF capacitor, to the converter. Ground the generator to the tuner cover. The converter connection may be made thru a hole in the tuner cover (figure 4).
2. Connect the voltmeter across contrast control R41. Turn the contrast control full on.
3. Switch the tuner to the high band.
4. With the signal generator set at the specified alignment frequencies, tune the corresponding coils for maximum response on the output meter, as indicated below. All the coils are slug tuned. (See figure 4.)

Stage	Frequency (mc)	Adjustment
1st IF (Converter)	23.0	T15
2nd IF	24.0	T10
3rd IF	26.4	T11
4th IF (Diode)	25.45	T12

5. Connect a sweep generator to the converter and an oscilloscope in place of the meter. (See figure 5.) Check the peaks of the response for symmetry.

Re-adjust T12 if necessary. (The signal generator and meter may be used for this purpose.)

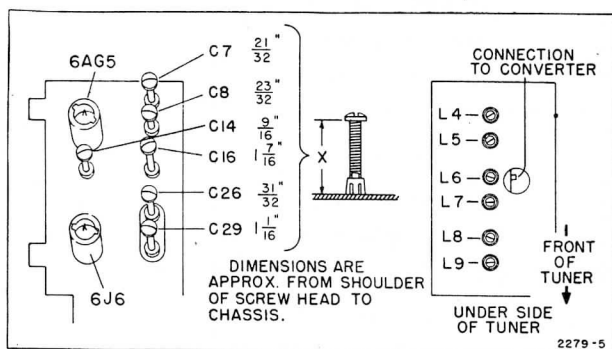


Fig. 4. Tuner Adjustment

6. With the signal generator and meter, check the IF sensitivity. At peak response this should be 1000 microvolts $\pm 50\%$ for .5 volt dc on the meter.
7. Check the IF video-carrier to sound-carrier ratio. Make the measurement as follows: At maximum response, determine the average sensitivity between peaks and valley of the response curve, for an output of .5 volt. Next set the generator input to twice this sensitivity figure and detune the generator, in the high frequency direction, until the meter reading returns to .5 volt. Record this generator input, the "video carrier sensitivity." Now decrease the frequency of the signal generator 4.5 megacycles and again adjust the generator input to give a meter reading of .5 volt. This input is the "sound-carrier sensitivity." The ratio of sound carrier sensi-

tivity to video-carrier sensitivity should be between 5:1 and 10:1.

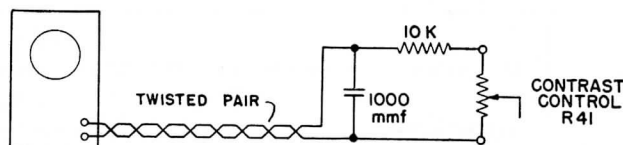


Fig. 5.

In the event the signal generator output is not calibrated in microvolts, the following procedure may be employed: Short the AVC to B- by connecting a clip lead in shunt with capacitor C61. Adjust the signal generator to a frequency corresponding to the average output level between the peaks and valley. Adjust the signal generator output level to produce 4 volts dc across the contrast control. Next detune the signal generator in the high frequency direction until the meter reading falls to 2 volts. Now decrease the frequency of the signal generator 4.5 megacycles and note the dc voltage across the contrast control. The dc voltage should be between $\frac{1}{2}$ and $\frac{1}{4}$ volts, which corresponds to a ratio of between 5:1 and 10:1.

8. Connect the sweep generator to the antenna terminals. (If the sweep generator available does not have a balanced output, connect it as shown in figure 3.) Check channels 2, 4, 6, 7, 9, 13 for overall response, keeping the generator output at a level which will provide approximately a 2-volt peak-to-peak output. If the set does not track properly, refer to the tuner alignment procedure.

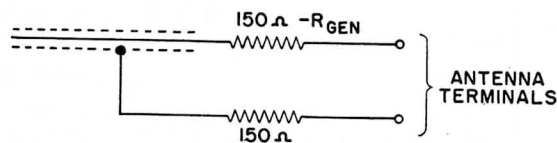


Fig. 6.

9. Connect the signal generator (see figure 6) to the antenna terminals and the voltmeter in place of the oscilloscope.
10. Check the overall sensitivity. At a frequency corresponding to the average response, the sensitivity, for a .5-volt output across the diode load, should be between 200 and 800 microvolts for the low band and between 200 and 1200 microvolts for the high band.
11. Check the overall video-carrier to sound-carrier ratio. Use the procedure described in step 7, except that the generator should be detuned in the low frequency direction for the video carrier and the frequency should be increased from there for the sound carrier. The overall ratio should be between 5:1 and 15:1.

MODEL P-301,
Series B, Ch. 7DX22P

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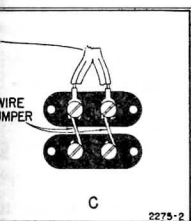
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connections

SOUND I-F ALIGNMENT

1. Connect the CW signal generator across the contrast control. Turn the contrast control on full. Turn volume control on full. Short the antenna input.
2. Connect the voltmeter from pin 8 of tube 19T8 to B- (negative side to B-).
3. With the generator apply a 4.5-megacycle CW signal. Adjust the input for a meter reading of approximately .5 volt.
4. Turn the slug in the secondary of ratio detector transformer T8 all the way out.
5. Tune primary and secondary of pick-off coil T9 for maximum reading on the meter.
6. Connect the oscilloscope in place of the meter and the sweep generator in place of the CW generator.
7. Apply a signal which will sweep 500 kilocycles above and below 4.5 megacycles. (The sound IF selectivity response curve of coil T9 will be seen.)
8. Turn in the slug of the ratio detector secondary (T8) until the ratio detector curve appears. Adjust this slug for maximum linearity.
9. Adjust the primary of ratio detector transformer T8 for symmetry of the ratio detector curve about the 4.5-megacycle center.

LOW AND HIGH BAND TRACKING ALIGNMENT PROCEDURE

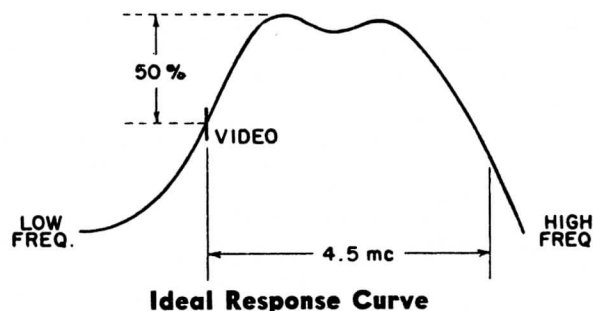
Visually set trimmers (high band and low band). (See Figure 4.)

Low band tracking alignment procedure:

1. After the IF system has been aligned properly, set tuner to top of stroke on low band.
2. Connect an oscilloscope across diode load R41, (contrast control), as shown in figure 5.
3. Connect a sweep generator to the antenna terminals and adjust the generator until a response curve (may vary somewhat from figure at bottom of this page) appears on the oscilloscope screen. The generator should have a balanced output; if it does not, connect it as shown in figure 6.
4. Adjust all cores so they just *begin* to affect picture on scope (approx. Channel 6).
5. Adjust core plate by channel 6 station selector screw so that all cores enter coils an additional $3/16''$.
6. Turn channel 6 picture carrier marker on and adjust low band oscillator trimmer C29, so channel 6 picture carrier marker beats with 26.75 Mc I.F. marker.
7. Adjust low band primary C8, and secondary trimmer C16 so response is maximum and flat, and the 26.75 Mc markers and channel 6 picture marker appears 50% down edge of response.
8. Switch to each of the other channels on the low band and check the symmetry of the response curve for each switch position. (The sweep generator will have to be reset for each channel). Use trimmers C8 and C16 to effect a compromise which will give the best overall response across the band. The important thing is that deviations from a flat top be kept to a minimum. This may mean that the response for some channels will have to be improved at the expense of others.
9. Switch to channel 2, apply a 55.25 megacycle signal, and note the position of the marker on the response curve. If the marker can be moved to the 50% point by adjustment of the channel 2 station selector screw (with the screw still at least 2 turns in from its maximum "out" position), the alignment of the low band has been properly completed.

High band tracking alignment procedure:

1. After low band has been tracked, switch tuner to top of its stroke on high band.
2. Readjust the sweep generator so that the response curve appears on the screen. (Approx. channel 13.)
3. Adjust all cores so that they just *begin* to affect picture on scope. (Approx. channel 13.)
4. Adjust core plate by channel 13 station selector screw so that all cores enter coils an additional $1/8''$.
5. Turn channel 13 picture carrier marker on and adjust high band oscillator C26 trimmer so channel 13 picture carrier marker beats with 26.75 Mc. I.F. marker.
6. Adjust high band primary C7, and secondary trimmer C14 so response is maximum and flat, and the 26.75 Mc markers and channel 6 picture marker appears 50% down edge of response.
7. Switch to each of the other channels on the high band and check the symmetry of the response curve for each switch position. (The sweep generator will have to be reset for each channel.) Use trimmers C7 and C14 to affect a compromise which will give the best response curve across the band. (See step 8 of the low band alignment.)
8. Switch to channel 7, apply a 175.25 megacycle signal, and note the position of the marker on the response curve. If the marker can be moved to the 50% point by adjustment of the channel 7 station selector screw (with the screw still at least one turn in from its maximum "out" position), the alignment of the high band has been properly completed.



TRUBLE-SHOOTING

Trouble	Probable Location
No raster Sound normal	<ul style="list-style-type: none"> a. Improper high voltage (approximately 5000 volts is normal). b. Check voltage between grid and cathode of picture tube; should be only about 40 volts dc. c. Check output of tubes 13 and 15. d. Defective picture tube.
No picture No sound Raster normal	<ul style="list-style-type: none"> a. Defective antenna or lead-in connections. b. Defective tubes 1, 2, 5 thru 10. c. Defective band switch. d. Check resistances and voltages at sockets of tuner and i-f tubes. e. Check alignment.
No sound Picture normal	<ul style="list-style-type: none"> a. Defective tubes 3, 4, 5. b. Check coil T9 for continuity. c. Check alignment of ratio detector coil T8 and pick-off coil T9.
No picture Sound normal Raster normal	<ul style="list-style-type: none"> a. Defective capacitor C69.
No sync.	<ul style="list-style-type: none"> a. Defective tubes 11, 12, 14. b. Defective resistors R44, R46, R73, R76 or capacitor C91. c. Check voltages and resistances at sockets of tubes 11, 12, 14.
No vertical sync. Picture normal	<ul style="list-style-type: none"> a. Defective tube 14. b. Defective resistors R73, R76, R77 or capacitors C98, C99, C112. c. Check resistances and voltages at socket of tube 14.
No horizontal sync.	<ul style="list-style-type: none"> a. Defective tube 12. b. Defective resistors R66, R67, R68 or capacitor C90. c. Check resistances and voltages at socket of tube 12.
No vertical sweep	<ul style="list-style-type: none"> a. Improper high voltage (should be approximately 5000 volts). b. Defective tube 15. c. Check output of tube 14. d. Defective capacitors C104, C106, C107.
No horizontal sweep	<ul style="list-style-type: none"> a. Defective tube 13. b. Check output of tube 12. c. Defective capacitors C93, C96, C97.

scope in place of the meter and in place of the CW generator. The sweep will sweep 500 kilocycles to 5 megacycles. (The sound IF curve of coil T9 will be seen.) Adjust the ratio detector secondary (T8) until the curve appears. Adjust this for clarity.

Adjust the ratio detector transformer T8 until the ratio detector curve about the

PROCEDURE

(Figure 4.)

Alignment procedure:

When the response has been tracked, switch tuner to high band.

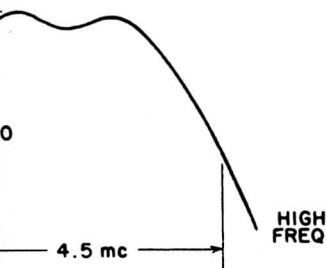
Adjust the sweep generator so that the response curve is on the screen. (Approx. channel 13.) Adjust the response so that they just begin to affect the response curve (approx. channel 13.)

Adjust the channel 13 station selector so that the response curve enters coils an additional $\frac{1}{8}$ ". Adjust the carrier marker on and adjust the C26 trimmer so channel marker beats with 26.75 Mc. I.F.

Adjust the primary C7, and secondary trimmer so that the response is maximum and flat, and the response curve and channel 6 picture marker are at the edge of response.

Adjust the other channels on the high band. Check the symmetry of the response curve on each channel. (The sweep generator will sweep each channel.) Use trimmers to adjust to a compromise which will give a good response across the band. (See step 10 for alignment.)

Apply a 175.25 megacycle signal to the marker. The position of the marker on the response curve can be moved to the position of the channel 7 station selector by turning the screw still at least one turn "out" position), the alignment is properly completed.



Response Curve

TROUBLE-SHOOTING, (continued)

REPLACEMENT

Ref. Symbol Part No.

Trouble	Probable Location
Bunching at side of picture	<ul style="list-style-type: none"> a. Defective tube 13. b. Defective capacitors C83, C95 or resistor R105. c. Misadjustment of horizontal linearity control.
Bunching at top or bottom of picture	<ul style="list-style-type: none"> a. Defective tube 15. b. Defective resistors R82, R83, R97 or capacitors C106, C108. c. Misadjustment of vertical linearity control.
Audio in picture	<ul style="list-style-type: none"> a. Check ratio measurements. b. Check alignment.
Picture cannot be centered vertically	<ul style="list-style-type: none"> a. Check range of vertical centering control R91. b. Defective resistors R88, R90. c. Leakage in capacitors C104, C105.
Picture cannot be centered horizontally	<ul style="list-style-type: none"> a. Check range of horizontal centering control R86. b. Defective resistors R87, R89. c. Leakage in capacitors C96, C97.
Insufficient vertical sweep size	<ul style="list-style-type: none"> a. Check voltage at junction of resistors R98 and R99; should be between 600 and 700 volts. b. Defective tubes 14 and 15. c. Defective resistors R82, R83.
Insufficient horizontal sweep size	<ul style="list-style-type: none"> a. Defective tubes 12 and 13. b. Defective capacitors C93, C96, C97. c. Check resistances and voltages at sockets of tubes 12 and 13.
Inability to focus picture	<ul style="list-style-type: none"> a. Check voltage range on focus control; should be between 1500 and 2000 volts. b. Defective picture tube.
Streaks in picture	<ul style="list-style-type: none"> a. Check lead dress in high-voltage supply to prevent corona or arcing. b. Check antenna system to minimize effects of external electrical disturbances. c. Noisy or gassy tubes. d. Check rubber insulation on rear picture-tube support.
High voltage below normal	<ul style="list-style-type: none"> a. Defective tubes 16, 17. b. Defective capacitors C85, C87 or resistor R61.
RF in Picture	<ul style="list-style-type: none"> a. Check for short between r-f power supply shield and chassis.

C3	A-8G-13962	C
C4-30-31-32	C-8G-16045	C
C5-12-15-17-21	C-8G-13201	C
C6	C-8G-17305	C
C7-8-14-16-26-29	B-201-15142	T
C9-10	A-8G-12495-7	C
C11	A-8G-12495-3	C
C13	C-8G-11893	C
C18-22-25-28	C-8G-11891	C
C19-20	A-8G-12495-4	C
C23	C-8G-15737	C
C24-27	C-8G-15224	C
R1	C-9B1-60	68
R4	C-9B1-86	10
R5	C-9B1-48	68
R6	C-9B1-13	10
R7-9	C-9B1-71	54
R8-11	C-9B1-74	10
R10	C-9B1-54	22
R12-13	C-9B1-38	10

C26	C-8D-10992	.01
C27-A, -B, -C	B-8C-15948	El
C28	A-8C-11495	El
C29-31-32-62-71-83-89-99-110	C-8D-11738	.01
C30	C-8G-11733	22
C33-72	A-8C-13132	El
C34-38	C-8G-11731	15
C35-43-52-56-57-58-66-68-84-102	C-8G-13201	10
C36	C-8D-10778	.00
C37-49-92	C-8F3-119	33
C39	C-8F3-109	47
C40-44-50-53	C-8F3-109	47
C41-42	A-8G-13962	.00
C45-46-55-60-65-88-113	C-8G-12198	47
C59	C-8D-10771	.1
C61-95	C-8G-12166	5
C67	C-8D-10775	.25
C69	C-8D-10770	.05
C70-91	B-8C-15664	El
C73	C-8G-11734	10
C74-75-76	C-8G-11789	10
C77	C-8F3-111	68
C90	C-8F3-241	47
C93	C-8F3-246	75
C94	C-8J-18364	.00
C96-97	C-8D-10935	.00
C98	B-8D-16578	.02
C101-107	C-8D-17555	.08
C103	C-8J-18365	.00
C104-105	B-8D-16577	.01
C106	C-8D-10983	.1
C111	B-8D-16576	.00
C108	C-8D-11304	.02
C112		
R13	C-9B2-59	56
R14	C-9B2-53	18
R15-16-22-38	C-9B1-94	47
R-17-99	C-9B1-37	10
R18	C-9B1-80	33
R19	A-10A-15666	Vo
R20-51	C-9B1-78	22
R21-23-29-30-33	C-9B1-13	10

* Order core with same color

REPLACEMENT PARTS

Ref. Symbol Part No. Description

TUNER

Capacitors

C3	A-8G-13962	Ceramic, .005 mfd
C4-30-31-32	C-8G-16045	Ceramic, 220 mmf, 20 %
C5-12-15-17-21	C-8G-13201	Ceramic, 1000 mmf
C6	C-8G-17305	Ceramic, 12 mmf, 10 %
C7-8-14-16-26-29	B-201-15142	Trimmer capacitor
C9-10	A-8G-12495-7	Ceramic, .5 mmf
C11	A-8G-12495-3	Ceramic, 1.5 mmf
C13	C-8G-11893	Ceramic, 4 mmf, $\pm 1/4$ mmf
C18-22-25-28	C-8G-11891	Ceramic, 51 mmf, 5 %
C19-20	A-8G-12495-4	Ceramic, 2.2 mmf
C23	C-8G-15737	Ceramic, 2.5 mmf, 20 %
C24-27	C-8G-15224	Ceramic, 7 mmf, $\pm 1/2$ mmf

Resistors

R1	C-9B1-60	680 ohms, $1/2$ watt, 10 %
R4	C-9B1-86	100,000 ohms, $1/2$ watt, 10 %
R5	C-9B1-48	68 ohms, $1/2$ watt, 10 %
R6	C-9B1-13	1000 ohms, $1/2$ watt, 20 %
R7-9	C-9B1-71	5600 ohms, $1/2$ watt, 10 %
R8-11	C-9B1-74	10,000 ohms, $1/2$ watt, 10 %
R10	C-9B1-54	220 ohms, $1/2$ watt, 10 %
R12-13	C-9B1-38	10 ohms, $1/2$ watt, 10 %

Coils, Transformers, Chokes

L1-2 (Incl. C1-2 R2-3)	B-201-17143	Antenna transformer assembly
L3	A-16A-17128	R.F. choke
L4-6-8	B-13E-17140	High band coils, Osc., RF pri., RF sec.
L5-7	B-13E-12046	Low band coils, RF pri., RF sec.
L9	B-13D-12155	Low band coil, oscillator

Miscellaneous

A-51A-15715	Iron core, for L5
A-51A-17162	Iron core, for L6
A-51A-17161	Iron core, for L7
A-51A-17513	Iron core, for L4-8-9
A-15C-10717	Tube socket, 7-prong, miniature
A-2M-16276	Core mounting clip
A-2M-15504	Leaf spring
A-2H-11494	Tube shield
A-49A-15977	Coil spring
C-5M-15487	Treadle bar, bakelite
A-49A-15837	Detent spring

MAIN CHASSIS

Capacitors

C26	C-8D-10992	.03 mf, 200 volts, 20 %
C27-A, -B, -C	B-8C-15948	Electrolytic, 20 mf-25 volts, 120 mf-150 volts, 60 mf-150 volts
C28	A-8C-11495	Electrolytic, 10 mf-150 volts
C29-31-32-62-71-83-89-99-110	C-8D-11738	.01 mf, 200 volts, 20 %
C30	C-8G-11733	220 mmf, ceramic
C33-72	A-8C-13132	Electrolytic, 10 mf-50 volts
C34-38	C-8G-11731	1500 mmf, ceramic
C35-43-52-56-57-58-66-68-84-102	C-8G-13201	1000 mmf, ceramic
C36	C-8D-10778	.002 mf, 600 volts $\pm 40-15$ %
C37-49-92	C-8F3-119	330 mmf, 500 volts, 10 %, mica
C39		See transformer T8
C40-44-50-53	C-8F3-109	47 mmf, 500 volts, 10 %
C41-42		See coil assembly T9
C45-46-55-60-65-88-113	A-8G-13962	.005 mf, ceramic
C59	C-8G-12198	47 mmf (part of coil T14)
C61-95	C-8D-10771	.1 mf, 200 volts, $\pm 30-10$ %
C67	C-8G-12166	5 mmf, ceramic
C69	C-8D-10775	.25 mf, 200 volts, $\pm 30-10$ %
C70-91	C-8D-10770	.05 mf, 200 volts, 20 %
C73	B-8C-15664	Electrolytic, 120 mf, 150 volts
C74-75-76	C-8G-11734	100 mmf, ceramic
C77	C-8G-11789	10 mmf, ceramic
C90	C-8F3-111	68 mmf, 500 volts, 10 %, mica
C93	C-8F3-241	470 mmf, 500 volts, ± 5 %
C94	C-8F3-246	750 mmf, 300 volts, 5 %, mica
C96-97	C-8J-18364	.001 mf, 6000 volts
C98	C-8D-10935	.005 mf, 600 volts, $\pm 40-10$ %
C101-107	B-8D-16578	.02 mf, 1600 volts
C103	C-8D-17555	.08 mfd, 400 volts, ± 10 %
C104-105	C-8J-18365	.005 mf, 6000 volts
C106	B-8D-16577	.01 mf, 1600 volts
C111	C-8D-10983	.1 mf, 600 volts, $\pm 30-10$ %
C108	B-8D-16576	.0014 mf, 1600 volts
C112	C-8D-11304	.02 mf, 200 volts, 20 %

Resistors

R13	C-9B2-59	560 ohms, 1 watt, 10 %
R14	C-9B2-53	180 ohms, 1 watt, 10 %
R15-16-22-38	C-9B1-94	470,000 ohms, $1/2$ watt, 10 %
R17-99	C-9B1-37	10 megohms, $1/2$ watt, 20 %
R18	C-9B1-80	33,000 ohms, $1/2$ watt, 10 %
R19	A-10A-15666	Volume control and switch (1 megohm)
R20-51	C-9B1-78	22,000 ohms, $1/2$ watt, 10 %
R21-23-29-30-33	C-9B1-13	1000 ohms, $1/2$ watt, 20 %

R24-40	C-9B1-68	3300 ohms, $1/2$ watt 10 %
R25-37-46-107	C-9B1-27	220,000 ohms, $1/2$ watt, 20 %
R26,34,35	C-9B1-127	47 ohms, $1/2$ watt, 5 %
R27-36-75	C-9B1-19	10,000 ohms, $1/2$ watt, 20 %
R28-49-65	C-9B1-82	47,000 ohms, $1/2$ watt, 10 %
R31	C-9B1-83	56,000 ohms, $1/2$ watt, 10 %
R39-42-106	C-9B1-86	100,000 ohms, $1/2$ watt, 10 %
R41	A-10B-15272	Contrast control (5000 ohms)
R43-52	C-9B1-26	150,000 ohms, $1/2$ watt, 20 %
R44	C-9B1-89	180,000 ohms, $1/2$ watt, 10 %
R45-63	C-9B1-73	8200 ohms, $1/2$ watt, 10 %
R47-105	C-9B1-31	1 megohm, $1/2$ watt, 20 %
R48	A-10B-15672	Brilliance control (50,000 ohms)
R50	C-9B1-55	270 ohms, $1/2$ watt, 10 %
R53	C-9B4-49	82 ohms, 2 watts, 10 %
R54	C-9B4-51	120 ohms, 2 watts, 10 %
R55	C-9B4-5	47 ohms, 2 watts, 20 %
R58	C-9B2-8	150 ohms, 1 watt, 20 %
R64	A-10B-15614	Horizontal size control (250,000 ohms)
R66	C-9B1-77	18,000 ohms, $1/2$ watt, 10 %
R67	C-9B1-59	560 ohms, $1/2$ watt, 10 %
R68	C-9B1-161	1200 ohms, $1/2$ watt, 5 %
R69	B-10B-15670	Horizontal hold control (100,000 ohms)
R70	C-9B1-210	130K ohms, $1/2$ watt, 5 %
R71-87-88-89-90	C-9B1-102	2.2 megohms, $1/2$ watt, 10 %
R72	A-10B-17318	Horizontal linearity (3 megohm)
R73-76	C-9B1-70	4700 ohms, $1/2$ watt, 10 %
R74	C-9B2-77	18,000 ohms, 1 watt, 10 %
R77	C-9B1-159	1000 ohms, $1/2$ watt, 5 %
R78	C-9B1-92	330K ohms, $1/2$ watt
R79	B-10B-15671	Vertical hold control (250,000 ohms)
R80	C-9B1-100	1.5 megohms, $1/2$ watt, 10 %
R81-85	C-9B1-37	10 megohms, $1/2$ watt, 20 %
R82-97	C-9B1-245	3.9 megohms, $1/2$ watt, 5 %
R83	C-9B1-249	5.6 megohms, $1/2$ watt, 5 %
R84	A-10B-16259	Vertical size control (2 megohms)
R86-91-96	B-10B-15627	Horizontal centering, vertical centering, and focus controls (2 megohms each)
R92-93-94	C-9B2-239	2.2 megohms, 1 watt, 5 %
R98	C-9B2-241	2.7 megohms, 1 watt, 5 %
R100-101-102-103	C-9B1-35	4.7 megohm, $1/2$ watt, 20 %
R115	A-10B-17318	Vertical linearity, (3 megohm)
R116	C-9B1-67	2700 ohms, $1/2$ watt, 10 %

* Order core with same color end as the one being replaced.

MODEL P-301, Series B, Ch. 7DX22P

REPLACEABLE PARTS LIST (continued)

Coils and Transformers

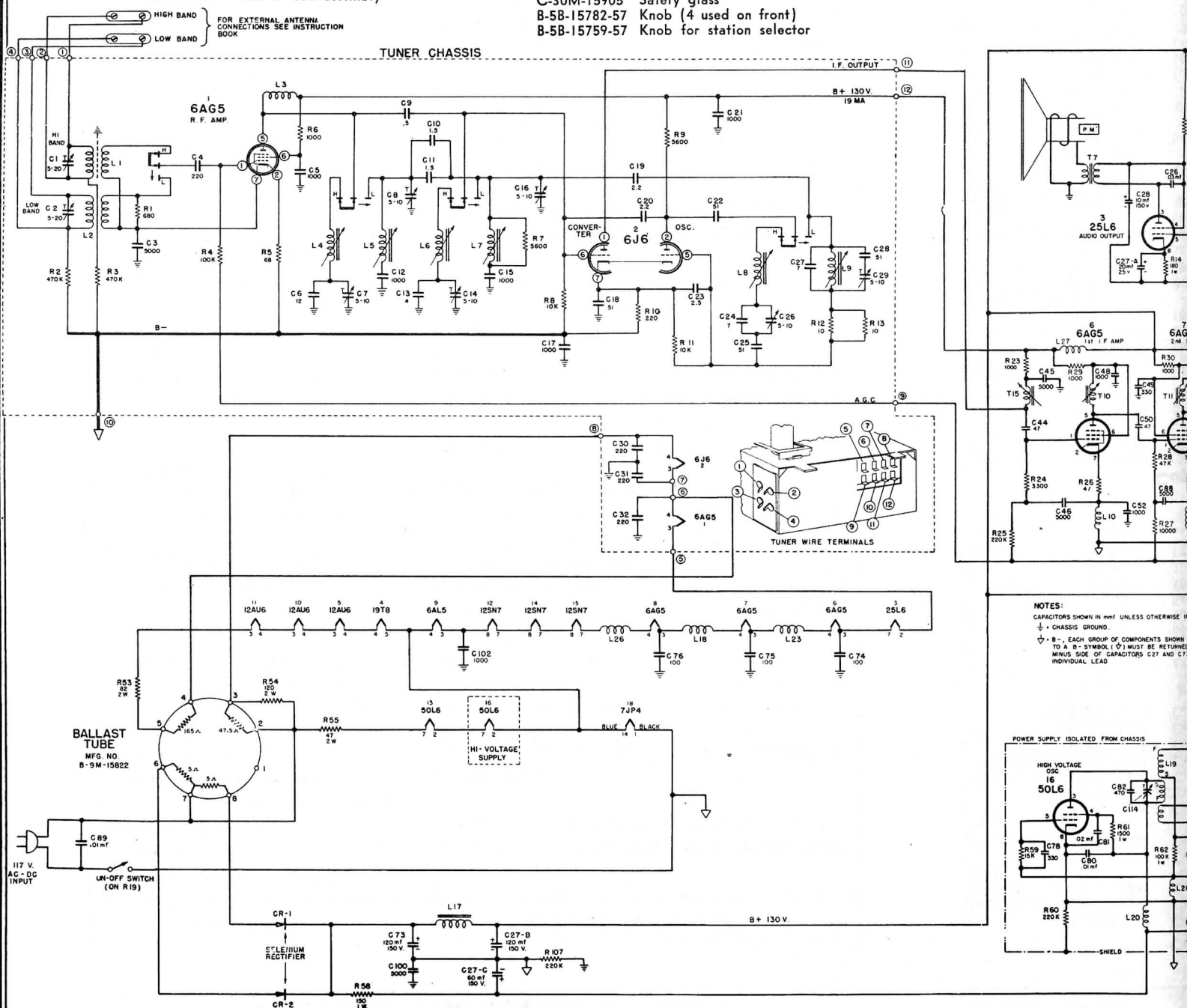
L10-11-14-18-22-23-26-27	A-16A-16637	Filament choke coil
L12	A-201-15608	Plate choke coil
L13	A-201-15608	Plate choke coil (part of coil T14)
L15	A-201-16170	Peaking coil No. 1
L16	A-201-16172	Peaking coil No. 3
L17	C-16A-15624	Filter choke
L24	A-201-16171	Peaking coil No. 2
T7	B-12C-10074-4	Output transformer
T8	C-201-15717	IF transformer assembly (includes capacitor C39 [120 mmf] and C77 [10 mmf])
T9	C-201-16155	Sound pick-off coil assembly (includes capacitors C41 and C42, 47 mmf each)
T10-11-15	B-201-15612	Stagger tuned coil assembly
T12	B-201-15612	Stagger tuned coil (part of coil T14)
T13	B-12M-15662	Horizontal deflection transformer
T14	B-201-15945	Last IF coil assembly

Miscellaneous

A-15B-10440	Tube socket, 8-prong
A-15C-13174	Tube socket, 7-prong, miniature
A-15C-16297	Tube socket, 9-prong, miniature
B-15B-13785	Electrolytic mounting plate
B-14M-11085-1	Line cord and plug
B-21J-15661	Selenium rectifier
B-18A-15618	Speaker, 4-inch, P.M.
A-200-15732	Strap assembly for front of picture tube
B-200-16300	Strap assembly for rear of picture tube
B-15B-15622	Cable assembly and socket for picture tube
B-9M-15822	Ballast tube
A-51A-16693	Iron core for stagger tuned coil assembly (part No. B-201-15612)
A-25B-10736	Rubber foot for cabinet
C-2M-15904-2	Escutcheon mask
C-30M-15905	Safety glass
B-5B-15782-57	Knob (4 used on front)
B-5B-15759-57	Knob for station selector

C78	C-8F3-119
C80	C-8D-117
C81	C-8D-113
C82	C-8F3-12
C84	C-8G-132
C85-87	C-8J-183
C86	A-8G-160
C114	A-8E-155

R59	C-9B1-76
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NOTE: C10 is a .5 mmf, ceramic capacitor instead of 1.5 mmf and in some chassis C101 is a .026 mfd capacitor.

POWER SUPPLY

Capacitors

C78	C-8F3-119	330 mmf, 500 volts, 10%, mica
C80	C-8D-11738	.01 mf, 200 volts
C81	C-8D-11304	.02 mf, 200 volts
C82	C-8F3-121	470 mmf, 500 volts, 10%, mica
C84	C-8G-13201	1000 mmf, ceramic
C85-87	C-8J-18364	1000 mmf, 6000 volts
C86	A-8G-16019	.01 mf, ceramic
C114	A-8E-15555	Trimmer

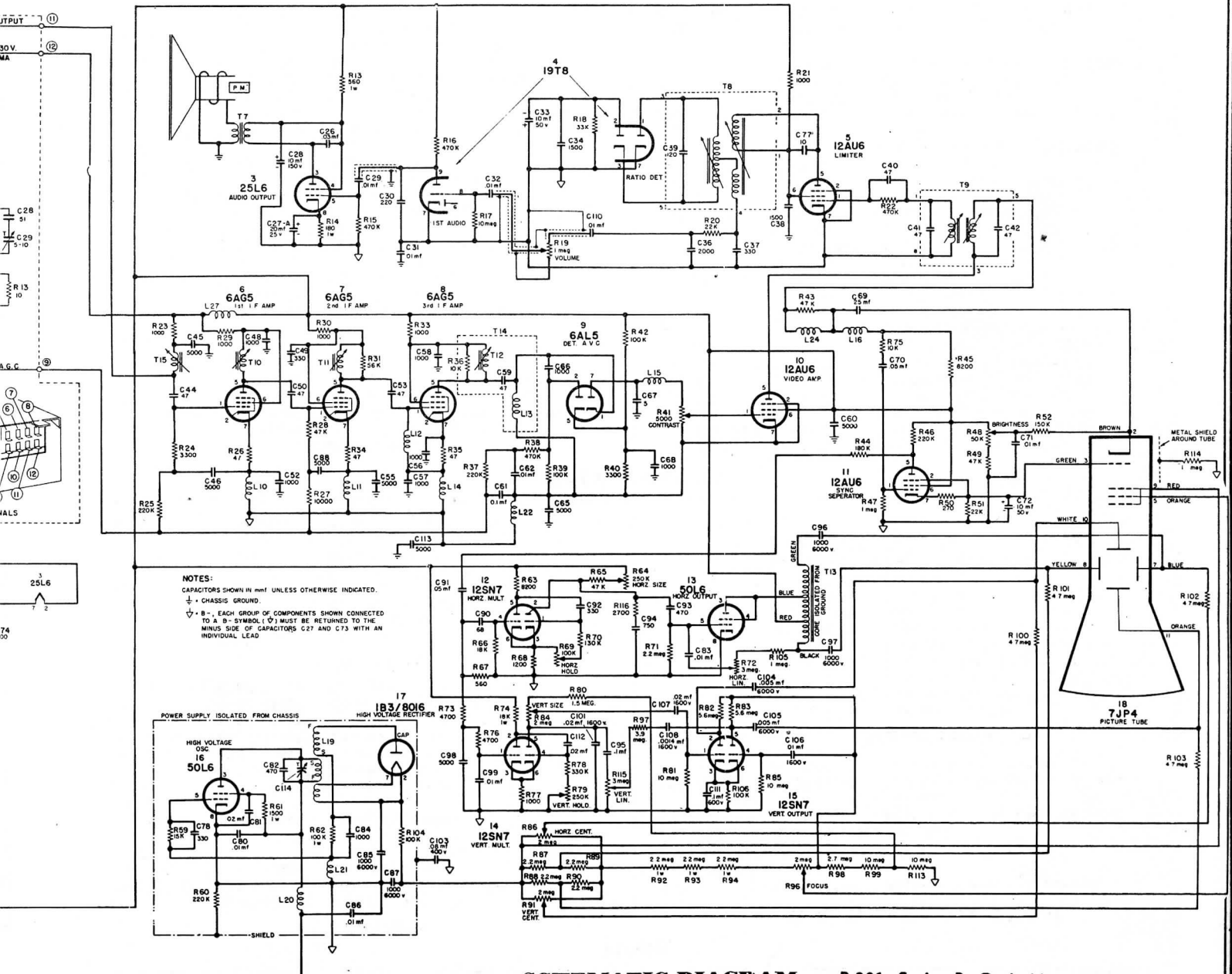
Resistors

R59	C-9B1-76	15,000 ohms, 1/2 watt, 10%
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R60	C-9B1-27	220,000 ohms, 1/2 watt, 20%
R61	C-9B2-66	2200 ohms, 1 watt, 10%
R62	C-9B2-25	100,000 ohms, 1 watt, 20%
R104	C-9B1-25	100,000 ohms, 1/2 watt, 20%

Miscellaneous

L19	B-201-15557	High-voltage oscillator coil
L20	B-16A-13524	RF choke coil
L21	A-201-15556	Grid choke coil assembly
	A-15B-10440	Tube socket, octal



SCHEMATIC DIAGRAM - P-301, Series B, Code No. 1.