VOLTAGE DATA

- Line voltage 117 volts AC.
- Voltages measured with a vacuum tube voltmeter between tube socket terminals and chassis, unless otherwise indicated. Note that the cathodes of V204 (6AS5) and V305 (6UA6) are operated approximately 130 volts above chassis ground.
- Antenna disconnected from set with terminals shorted.
- Speaker must be connected while taking voltages.
- Contrast turned fully clockwise. Channel Selector set on an unused low channel. Other front controls set at approximately half rotation.
- Rear chassis controls should not be disturbed unless otherwise indicated.
- Some tube socket terminals (not connected to tube elements) are used as tie-points and a voltage reading may be present.

CAUTION

Pulsed high voltages are present on the cap of 6BG6G tube, and on the filament terminals and cap of the 1X2 tube. NO ATTEMPT SHOULD BE MADE TO TAKE MEASUREMENTS FROM THESE POINTS UNLESS SUITABLE TEST EQUIPMENT IS AVAILABLE.

Picture tube 2nd anode voltage can be measured at the high voltage cap of picture tube and should be taken only with a high voltage instrument such as a kilovoltmeter. Voltage for 2nd anode is approximately 9 KV. Proper filament voltage check of 1X2 tube may be made by observing filament brilliancy as compared with that obtained with a 1.5 volt dry cell battery.

Sym.	Tube	Function	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V101	6AG5	RF Amplifier	−.1	NC	6.3 AC	0	130	130	0		
V102	6J6	Osc. & Mixer	130	130	6.3 AC	0	0	0	0		
		Voltages at V101 and V102 measured from top of chassis with tubes removed. Point "N" (Fig. 30) is −3 volts measured with tubes in sockets.									
V201	6AU6	Sound IF Amp.	−.6	0	0	6.3 AC	120	120	0		
V202	6AL5	Ratio Detector	.4	−.4	0	6.3 AC	−.2	0	0		
V203	6SN7GT	Sound Amp. & Sync Clip.	−1.2	40	0	−1	22	0	6.3 AC	0	
V204	6AS5	Sound Output	135	120	0	6.3 AC	120	270	260		
V301	6AU6	1st IF Amp.	−.5	0	0	6.3 AC	120	120	.9		
V302	6AU6	2nd IF Amp.	−.5	0	0	6.3 AC	120	120	.6		
V303	6AU6	3rd IF Amp.	0	0	0	6.3 AC	130	130	1.5		
V304	6AL5	Video Detector & AGC	135	0	6.3 AC	0	1.5	0	130		
V305	6AU6	Video Amplifier	115	130	6.3 AC	0	238	273	130		
V401	12AU7	Sync Amp. & Separator	60	−4	0	0	0	6	0	6	6.3 AC
V402	12AU7	Vert. Osc. & Output — 20Y1	100	−34	0	0	0	390	−9	9	6.3 AC
		20X1	100	−34	0	0	0	390	−9	9	6.3 AC
		Voltages measured at V402 (12AU7) taken with vertical linearity and height control turned fully clockwise.									
V403	6SN7GT	Hor. Osc. Cont. & Hor. Osc.	−22	165	−15‡	−85	225	0	6.3 AC	0	
V404	6BG6G	Horizontal Output	NC	0	8	NC	−9	NC	6.3 AC	270	
			Voltage on tube cap: See "CAUTION" note above.								
V405	1X2	2nd Anode Rectifier	See "CAUTION" note above.								
V406	6W4GT	Damper	NC	0	450	NC	375	NC	6.3 AC	0	
V501	5V4G	Low Voltage Rectifier	NC	**400	NC	*400AC	NC	*400AC	NC	**400	
V306	10BP4 / 12LP4	Picture Tube	0	80	NC	NC	NC	NC	NC	NC	NC
		Pin 10: 410V. Pin 11: 110V. Pin 12: 6.3AC 2nd Anode: See "CAUTION" above.									
		Voltages taken at picture tube socket (socket removed from tube).									

* Measured from top of tube socket with 5V4G removed.

** Voltage taken from pin No. 1 of speaker connector socket M201. Filament 5.2 volts AC measured between pins 2 and 8 of 5V4G.

‡ Voltage will vary both positive and negative with setting of slug adjustment for Hor. Freq. T404.

NC—Indicates no connection to tube element.

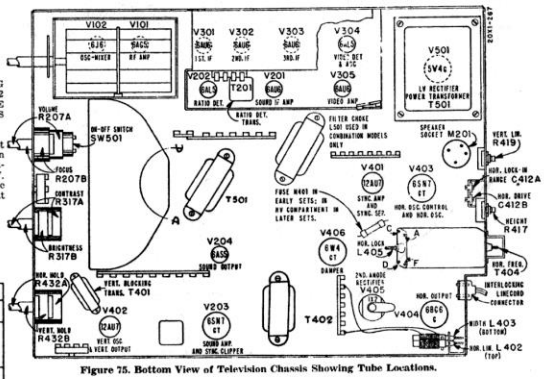


Figure 75. Bottom View of Television Chassis Showing Tube Locations.

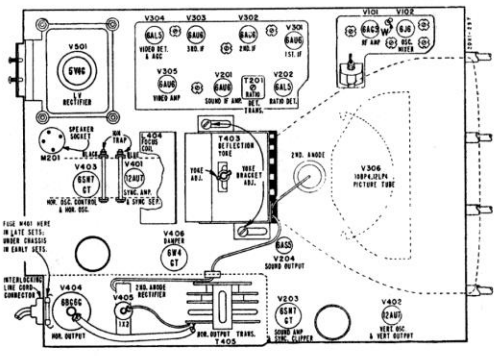


Figure 76. Top View of Television Chassis Showing Tube Locations.

RF AND MIXER ALIGNMENT

- Disconnect antenna from receiver.
- Set contrast control full on (clockwise).
- Before starting alignment, allow 15 minutes for receiver and test equipment to warm up.
- Speaker must be connected to chassis.
- Connect sweep generator to antenna terminals.
- Loosely couple marker generator to antenna terminal (to obtain marker pips of video and sound RF carriers). To avoid distortion of the response curve, keep sweep generator output at a minimum, marker pips just barely visible.
- Connect oscilloscope through 10,000 ohm resistor to point "W" on tuner. Keep oscilloscope leads away from chassis.
- Connecting a 1½-volt bias battery (negative to AGC buss, point "T"; positive to chassis) will allow greater signal input without distorting response curve.
- Alignment adjustments, connection points, and response curve are shown in Figures 29, 30, 31.

Step	Marker Gen. Freq. (MC)	Sweep Gen. Frequency	Adjust
1	*205.25 **209.75	Sweeping Channel 12	Check for curve resembling RF response curve shown in Figure 31. If necessary, adjust A8, A9 and A10 (Figure 30) as required. Consistent with proper band width and correct marker location, response curve should have maximum amplitude and flat top appearance.
2	211.25 215.75	13	Check each channel for curve resembling RF response curve shown in Fig. 31. In general, the adjustment performed in step 1 is sufficient to give satisfactory response curves on all channels. However, if reasonable alignment is not obtained on a particular channel, (a) check to see that coils have not been intermixed, or (b) try replacing the pair of coils for that particular channel, or (c) repeat step 1 for the weak channel as a compromise adjustment to favor this particular channel. If a compromise adjustment is made, other channels should be checked to make certain that they have not been appreciably affected. Full skirt of curve will not be visible unless generator sweep width extends beyond 10 MC.
3	199.25 203.75	11	
4	193.25 197.75	10	
5	187.25 191.75	9	
6	181.25 185.75	8	
7	175.25 179.75	7	
8	83.25 87.75	6	
9	77.25 81.75	5	
10	67.25 71.75	4	
11	61.25 65.75	3	
12	55.25 59.75	2	

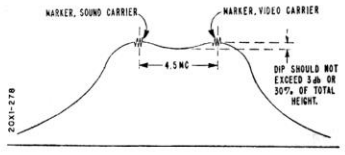
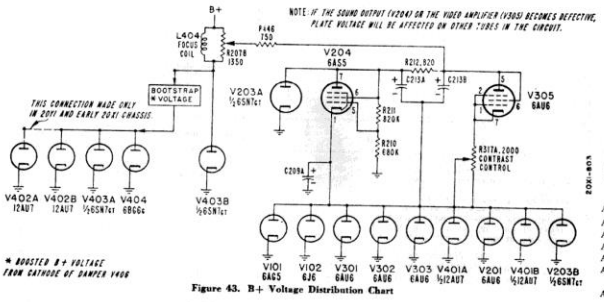


Figure 31. RF Response Curve (see NOTE below).

*Video Carrier Frequency (MC) **Sound Carrier Frequency (MC).



* BOOSTED B+ VOLTAGE FROM CATHODE OF DAMPER V406

Figure 43. B+ Voltage Distribution Chart

OVERALL RF and IF RESPONSE CURVE CHECK (Step 1) and HF OSCILLATOR ALIGNMENT

(Using sweep generator and oscilloscope.

- Disconnect antenna from receiver.
- Disconnect signal generator and VTVM (if used in previous alignment).
- Before starting alignment, allow 15 minutes for receiver and test equipment to warm up.
- Set Contrast and Focus controls full on (clockwise).
- Alignment adjustments, connection points, and response curve shown in Figs. 29 32, 33.
- Connect sweep generator to antenna terminals.
- Loosely couple marker to antenna terminals (to obtain marker pips of video and sound RF carriers). To avoid distorting response curve (overloading the video detector), keep the sweep generator output and the marker generator output at a very minimum. The marker pips should just be barely visible. Connecting a 3-volt bias battery (negative to AGC buss, point "T"; positive to chassis) will allow greater signal input without distorting response curve.
- Connect oscilloscope between point "V" and chassis ground through a decoupling filter (see figure 29). Keep oscilloscope leads away from chassis. Caution: Voltage at point "V" is approximately 130 volts DC.
- Set Sharp Tuning control at half rotation by rotating it approximately 150° as shown in figure 32.
- Speaker must be connected to chassis.
- Use a NON-METALLIC alignment screwdriver with a ¾-inch blade for adjustment of A12.
- If HF oscillator slugs "fall into" coil form, remove the channel coil, move the slug retaining spring aside, and tap the coil assembly until the slug slips forward. Set the coil retaining spring into position; it should rest firmly against the slug.

Step	Marker Gen. Freq. (MC)	Sweep Gen. Frequency	INSTRUCTION
1			While sweeping the RF pass band (channel 13 or other unassigned high channel), check the overall response curve obtained against the ideal curve shown in Figure 33. If shape of curve is not within limits shown, it will be necessary to repeat the IF Amplifier Alignment given on page 16. The IF's must be accurately aligned before correct oscillator adjustment can be made.
2	*211.25 **215.75	Sweeping Channel 13	With correct oscillator alignment, the video carrier marker should be located 6db down (50% point) on the response curve (Figure 33) when the Sharp Tuning Control is set at the center of its range (half rotation). See Figure 32. When checking curve, see "NOTE" on previous page. If adjustment is needed, check to see whether mis-alignment is apparent on channel 13 only or also exists on other channels. If overall adjustment is required, adjust A11. Otherwise make individual HF oscillator adjustments (A12) as instructed in beginning of this paragraph. Check all channels individually for proper marker locations. If overall adjustment has been made, it may not be necessary to make any further adjustments. If necessary, however, make individual HF oscillator adjustment A12. Note that A11 and A12 can be adjusted without removing chassis from cabinet. For details, see Oscillator Adjustment using television signal on page 8.
3	205.25 209.75	12	
4	199.25 203.75	11	
5	193.25 197.75	10	
6	187.25 191.75	9	
7	181.25 185.75	8	
8	175.25 179.75	7	
9	83.25 87.75	6	
10	77.25 81.75	5	
11	67.25 71.75	4	
12	61.25 65.75	3	
13	55.25 59.75	2	

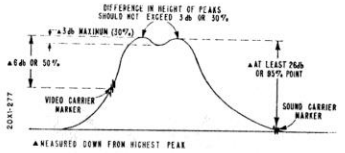


Figure 33. Overall RF and IF Amplifier Response Curve.

*Picture Carrier Frequency (MC). **Sound Carrier Frequency (MC).

Adj.	Symbol	Frequency	Function
A1	T303	25.3 MC	3rd IF Transformer
A2	T301	25.3 MC	1st IF Transformer
A3	T302	23.1 MC	2nd IF Transformer
A4	L105	23.1 MC	Mixer Plate Coil
A5	T201	4.5 MC	Primary of Ratio Detector Transformer
A6	L201	4.5 MC	1st Sound IF Transformer
A7	T201	4.5 MC	Secondary of Ratio Detector Transformer
A8	C102		Trimmer (RF Amplifier)
A9	C104		Trimmer (RF Amplifier)
A10	C107		Trimmer (Mixer)
A11	C109		Trimmer (HF Oscillator)
A12	L102		Slug. HF Oscillator Coils

IF AMPLIFIER ALIGNMENT

IMPORTANT: Before starting alignment, assemble the IF inspection plate (cover shield) to the chassis. In some early sets, the shield was spot soldered to the chassis and, if removed, it must be re-soldered.

- Allow about 15 minutes for receiver and test equipment to warm up.
- Disconnect antenna from receiver.
- Set Channel Selector to channel 13 or other unassigned high channel.
- Connect a wire jumper across antenna terminals (to prevent signal interference during IF alignment).
- Connect signal generator high side to tube shield of 6J6 oscillator-mixer tube. Be sure to insulate tube shield from chassis. Connect generator low side to chassis close to 6J6 tube base.
- Set Contrast control fully clockwise. Retain setting for all IF adjustments.
- Alignment adjustment and connection point locations are shown in Figures 30 and 29.
- Speaker must be connected to chassis.

Step	Signal Gen. Frequency	Connect VTVM To	Instructions	Adjust
1	25.3 MC	High side to point "T"; common to chassis.	Use VTVM 3 volt DC scale. When peaking, keep reducing generator output for VTVM reading of approx. 1 volt or less.	A1 and A2 for maximum.
2	23.1 MC	"	"	A3 and A4 for maximum.
3	To insure proper alignment, make the "Over-all IF Response Curve Check" given below.			

OVERALL IF RESPONSE CURVE CHECK

(Using sweep generator and oscilloscope with sweep input to RF mixer).

Differences in component values affect IF response. These differences are not apparent in alignment of IFs using a signal generator and VTVM (single frequency alignment); hence it is preferable that an IF response curve check be made after completion of the IF amplifier alignment.

Since feeding the sweep signal through the entire RF and IF system provides a better overall response, this check should be made after RF and HF Oscillator alignments as indicated in step 1 of the alignment chart on page 19. However, the procedure is given below if it is desired to take video IF response curve as a check.

If the procedure given below is followed and the response curve obtained differs greatly from the curve shown in figure 28, repeat all IF amplifier alignment steps, making sure generator frequencies are precise and adjustments are accurately made.

a. Make all control settings and connections as given in the IF amplifier alignment chart.

b. Connect oscilloscope* between point "V" and chassis ground through a decoupling filter; see fig. 29. Keep leads away from receiver. Caution: Voltage at point "V" is approximately 130 volts DC.

c. Connect sweep generator high inside to tube shield of 6J6 oscillator tube. Be sure to insulate tube shield from chassis. Connect sweep generator low side to chassis close to 6J6 tube base. Set sweep generator to sweep the IF pass band (19 to 29 MC).

d. Loosely couple marker generator high side to the sweep generator, lead connected to tube shield on tuner; low side to chassis ground.

To avoid distortion of the response curve, keep the sweep generator and marker generator outputs at a very minimum. Marker pips should be just kept barely visible. Setting sweep generator output for VTVM reading from .5 to 1 volt DC, measured between AGC buss (point "T") and chassis, will avoid distortion of response curve. Connecting a 1½ volt battery (negative to point "T", positive to chassis) will allow greater signal input without distorting the response curve.

e. Check curve obtained against the ideal overall IF amplifier response curve shown in figure 28. Since it is not always possible to get ideal curves, it should be noted that the height of opposite peaks should be within 3db or 30 per cent of each other. The dip or valley in the center of the curve should not be greater than 3db or 30 per cent down the highest peak of the curve. Check video and sound IF carrier points by means of marker generator. It is important that marker pips be in the proper location on the response curve. The 25.75 MC marker, should be 6db below the highest peak (50 per cent point on the high frequency side of the curve). The 22MC marker should be at the opposite side of response curve, located approximately 18db (85 per cent) below the highest peak. The 21.25 MC marker should be located at least 28db (95 per cent) below the highest peak, and may or may not be visible.

Consistent with proper band width and correct location of markers, the response curve should preferably have maximum amplitude, symmetry, and flat top appearance. If correct response is not obtained, repeat the "IF Amplifier Alignment."

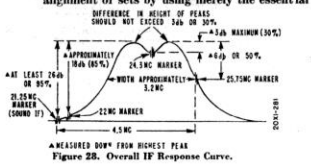
f. Remove wire jumper from across antenna terminals.

*In dealing with RF and IF response curves, it is well to remember that an inverted or mirror image may result, depending on the sweep generator and oscilloscope used. The general waveform should still be identical.

When using a wide band oscilloscope for alignment, marker pips will be more distinct if condenser from 100 to 1,000 mmfd. is connected across the oscilloscope input. Caution: Use the lowest capacity condenser possible, since too high a capacity will affect the shape of the response curve.

ALIGNMENT HINT

After becoming familiar with alignment procedure, some servicemen simplify subsequent alignment of sets by using merely the essential alignment data given in figures 29 and 30.



▲MEASURED DOWN FROM HIGHEST PEAK

Figure 28. Overall IF Response Curve.

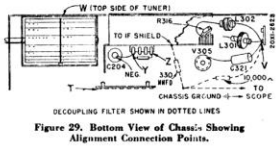


Figure 29. Bottom View of Chassis Showing Alignment Connection Points.

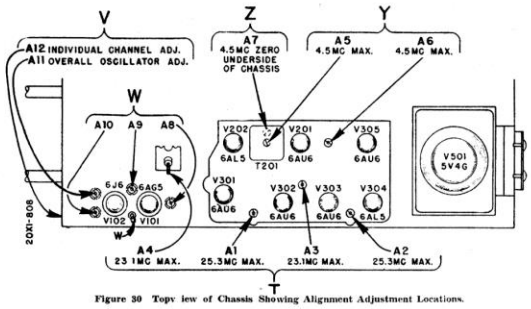


Figure 30 Topv iew of Chassis Showing Alignment Adjustment Locations.

4.5 MC SOUND IF ALIGNMENT

- Disconnect antenna from receiver.
- Set contrast control fully clockwise.
- Connect signal generator high side to point "V" through a .01 mfd. condenser.
- Before starting alignment, allow 15 minutes for receiver and test equipment to warm up.
- Speaker must be connected to chassis.
- Alignment adjustment and connection point are shown in figures 29 and 30.

Step	Signal Gen. Frequency	Connect VTVM to	Instructions	Adjust
	Important: Before proceeding, be sure to check the signal generator used in alignment against a crystal calibrator or other frequency standard for absolute frequency calibration at the 4.5 MC alignment point required for this operator. Accuracy required within one kilocycle. If a frequency standard is not available for a 4.5 MC frequency check, it is recommended that touch-up of zero setting adjustment A7 in step 2 be made using a television signal rather than the 4.5 MC signal from a signal generator. This "touch-up" adjustment procedure is given on page 8 and should be made after checking (and aligning where necessary) the IF Amplifier, Tuner RF and Mixer, and HF oscillator.		
1	†4.5 MC	VTVM (3 volt DC scale) to point "Y".	Use 3 volt scale on VTVM. Keep VTVM leads well separated from signal generator and chassis driving. A non-metallic screwdriver will be required for aligning slug adjustment A5.	A5 and A6 for maximum (keep reducing generator output to keep VTVM at approx. 1 volt).
2	†4.5 MC	VTVM to point "Z".	Use 3 volt zero center scale on VTVM, if available. Keep VTVM leads well separated from signal generator and chassis wiring. A non-metallic screwdriver will be required for aligning slug adjusmtent A7.	**A7 for zero on VTVM (the correct zero point is located between a poseitive and a negative maximum).

‡Signal may be unmodulated or 400 cycle AM modulated. **If A7 was far off, readjust A5 and repeat A7.

OSCILLOSCOPE NOTE

In dealing with RF and IF response curves, it is well to remember that an inverted or mirror image may result, depending on the sweep generator and oscilloscope used. The general waveform should still be identical.

When using a wide band oscilloscope for alignment, marker pips will be more distinct if condenser from 100 to 1,000 mmfd. is connected across the oscilloscope input. Caution: Use the lowest capacity condenser possible, since too high a capacity will affect the shape of the response curve.

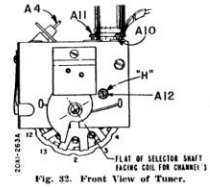
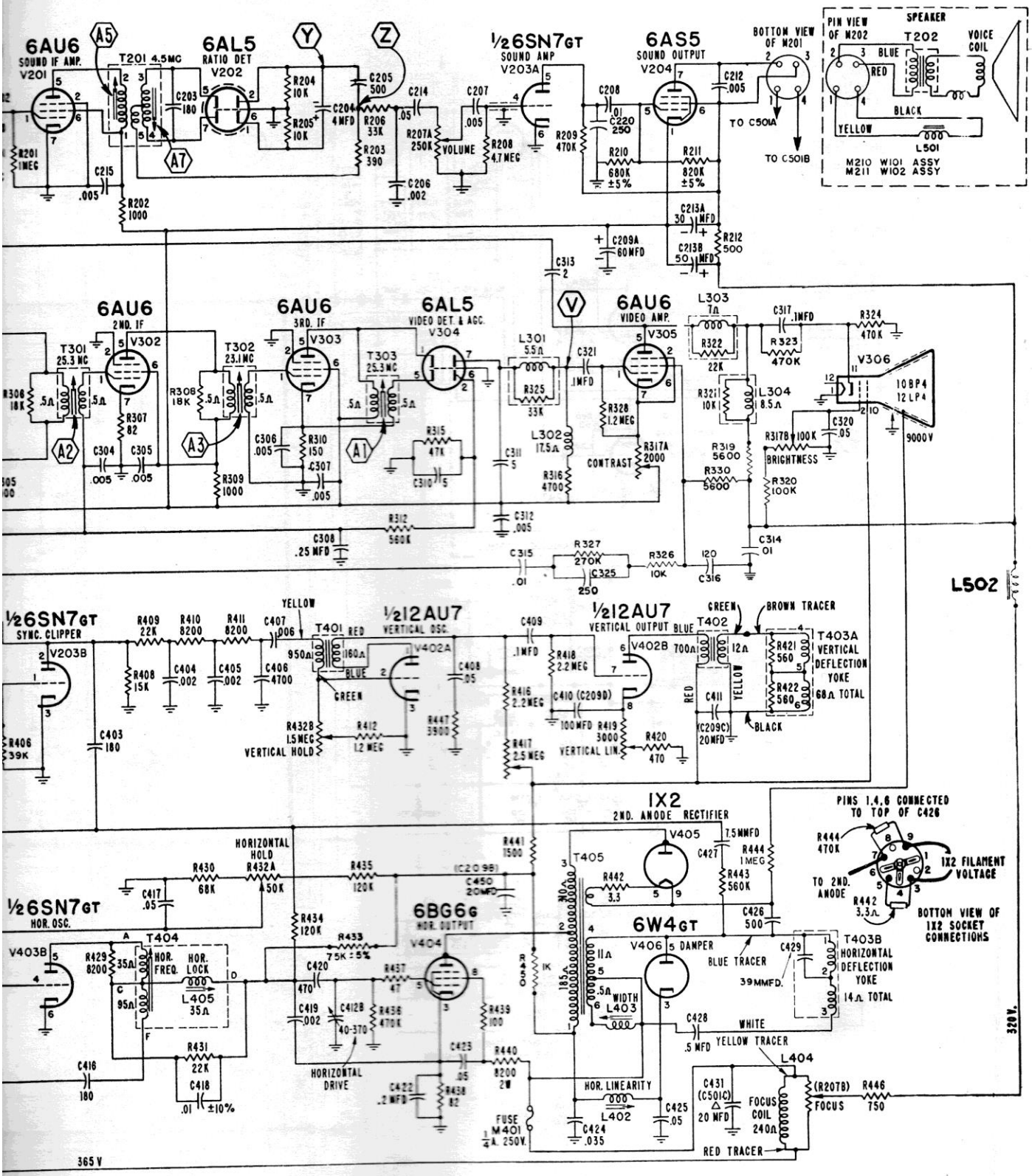
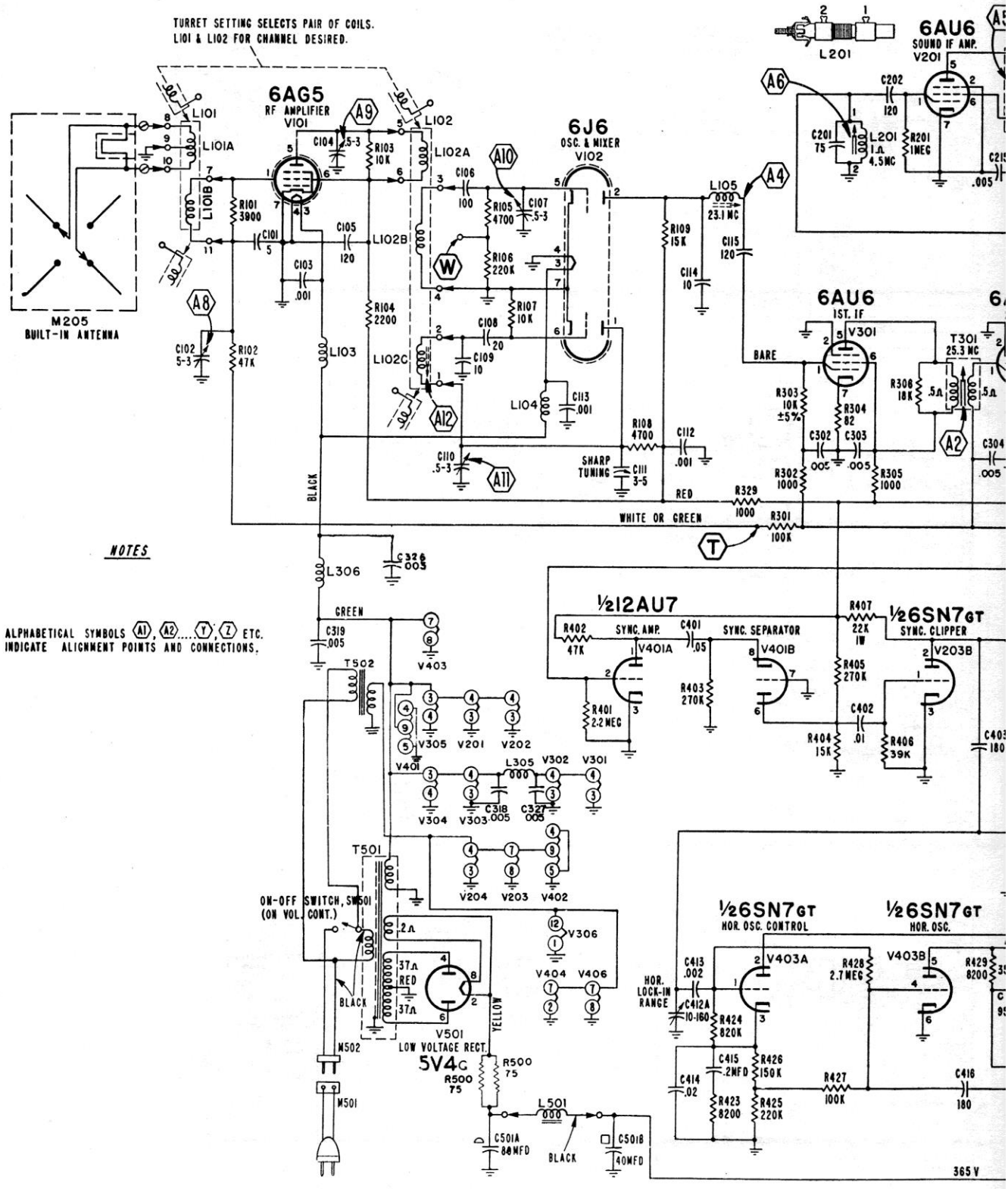


Fig. 32. Front View of Tuner.

ADMIRAL
20X12 X




TURRET SETTING SELECTS PAIR OF COILS. L101 & L102 FOR CHANNEL DESIRED.
6AG5 RF AMPLIFIER V101
6J6 OSC. & MIXER V102
6AU6 SOUND IF AMP. V201
6AU6 1ST. IF V301
½12AU7 SYNC. AMP. SYNC. SEPARATOR
½6SN7GT SYNC. CLIPPER
½6SN7GT HOR. OSC. CONTROL
½6SN7GT HOR. OSC.
5V4G LOW VOLTAGE RECT.
M205 BUILT-IN ANTENNA
L201
L101
L101A
L101B
L102A
L102B
L102C
L103
L104
L105
L306
T502
T501
T301
V403
V305
V201
V202
V401
V304
V303
V302
V301
V204
V203
V402
V306
V404
V406
V501
V401A
V401B
V203B
V403A
V403B
M502
M501
L501
ON-OFF SWITCH, SW501 (ON VOL. CONT.)
HOR. LOCK-IN RANGE
BARE
BLACK
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GREEN
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SHARP TUNING
NOTES
ALPHABETICAL SYMBOLS (A1), (A2)....(Y), (Z) ETC. INDICATE ALIGNMENT POINTS AND CONNECTIONS.
365 V

RCC TELEVISION Service Manual

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WESTINGHOUSE

NOTE: RE INDEXING

Since most TV circuits require fold pages for clear reproduction, it is necessary to bind them as a group in the middle of the book. As a result, related data such as alignment, voltages etc., may be widely separated in some cases. To avoid confusion, use your index to locate ALL data.

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