RCC TELEVISION Service Manual

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INDEX

ADMIRAL

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SIMPSONS-SEARS

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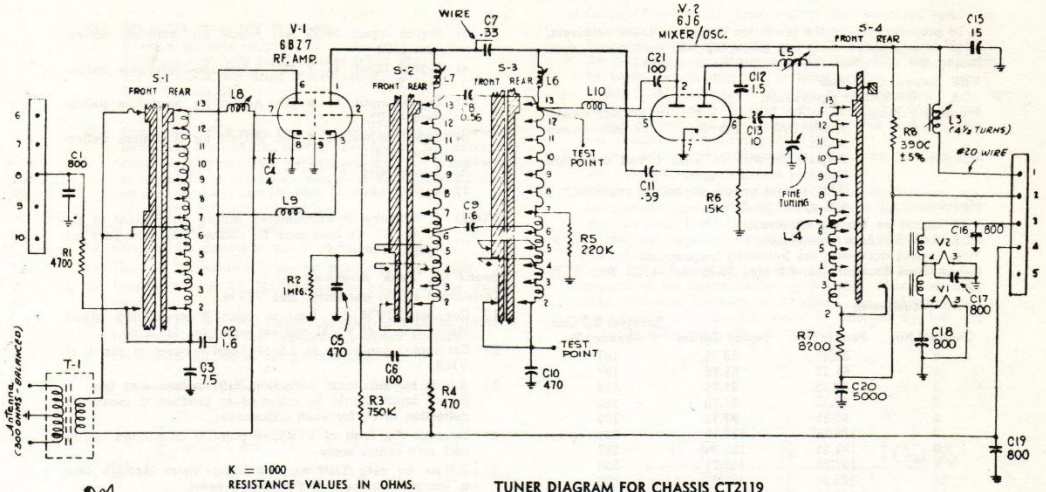
TRAV-LER

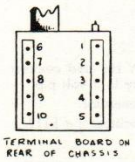
VIKING

RCC TELEVISION Supplement No. 23



K = 1000
RESISTANCE VALUES IN OHMS.
CAPACITANCE VALUES IN uuf.

TUNER DIAGRAM FOR CHASSIS CT2119



L-1	S-10138	Coil - Choke Filament
L-2	S-10206	Coil - Choke Filament
L-3	S-20210	Coil - IF input coil in S-9956
L-4	S-10208	Coil - Coil Assembly
L-5	S-10209	Coil - Coil Assembly
L-6	S-10159	Coil - Coil Assembly
L-7	S-10160	Coil - Coil Assembly
L-8		
L-9	S-10161	Coil - Coil Assembly
L-10	S-10211	Coil - Choke Coil
L-11	S-10769	Coil - Choke Coil

L-101	*S-10499	Coil-47.25 Mcs. Trap
L-102	*S-10498	Coil-39.25 Mcs. Trap
L-103		
L-104	73477	Coil-Filament Choke in Z102
L-105	73477	Coil-Filament Choke in Z102
L-106	*S-10505	Coil-IF Choke Coil 12 mh.
L-107	73477	Coil-Peaking Coil 250 mh.
L-108	S-9244	Coil-Peaking Coil 180 mh & 12000 ohm Resistor
L-109	*S-10651	Coil-Peaking Coil 250 mh & 6800 ohm Resistor
L-110	71526	Coil-Peaking Coil 180 mh
L-111	*S-10652	Coil-Peaking Coil 750 mh. & 2200 ohm
L-112	S-9244	Coil-Peaking Coil 250 mh. & 12000
L-113	S-10653	Coil- 4.5 Mcs. Trap
L-114	*S-10513	Coil-Reactor Choke 60 cycle
L-114	*S-10514	Coil-Reactor Choke 25 cycle
L-115	S-10239	Coil-Horizontal Hold Coil
L-116	S-9944	Coil-Horizontal Frequency (Sine wave)
L-117	S-9657	Coil-Width Coil
L-118	S-9656	Coil-Horizontal Linearity
L-119	S-9545	Coil-RF Choke 1.5 mh.
L-120		Coil-in vertical yoke
L-121		Coil-in vertical yoke
L-122		Coil-in horizontal yoke
L-123		Coil-in horizontal yoke

T-1	S-10174	Transformer - Antenna matching

T-101	*S-10518	Transformer-Sound Take Off
T-102	S-9946	Transformer-Ratio Detector
T-103	*S-10508	Transformer-Audio Output
T-104		
T-105	*S-10519	Transformer-1st IF grid coil
T-106	S-9971	Transformer-1st Pix I. F.
T-107	S-9971	Transformer-2nd Pix I. F.
T-108	S-9971	Transformer-3rd Pix I. F.
T-109		
T-110	*S-10509	Transformer-Vertical Output
T-111		
T-112	*S-10516	Transformer-Power Transformer (60 cycle)
T-112	*S-10517	Transformer-Power Transformer (25 cycle)
T-113	*S-10515	Transformer-Hi-voltage Transformer
CR101	*S-10655	Diode - Crystal Diode
PC101	S-10510	Strip - Sound I. F. Strip
Z102	S-10204	Strip - I.F. Strip

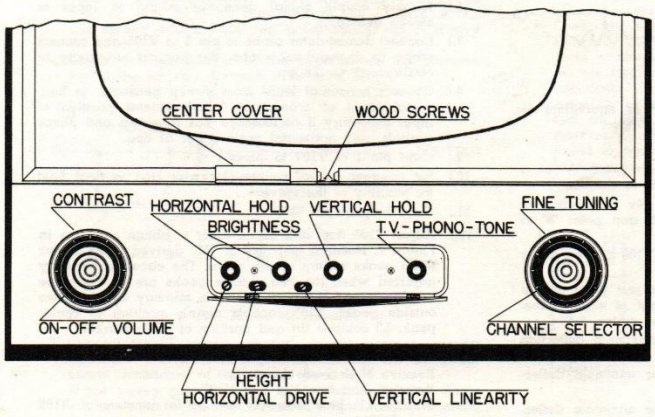
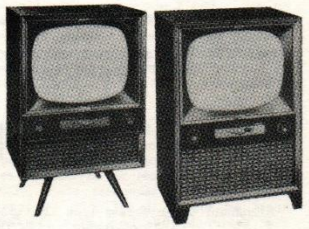
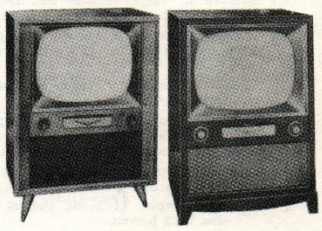


Fig. 1—Receiver Operating Controls



MODEL 21T163 MODEL 21TC171



MODEL 21TC172 MODEL 21TC179

ALIGNMENT PROCEDURE

To properly service the television chassis of these receivers, it is recommended that the following test instruments combining the described requirements be available.

VHF Sweep Generator
RCA — WR-59C or equivalent.
Frequency Range: 35 to 90 Mc. — 1 Mc. to 12 Mc. sweep width. 170 to 225 Mc. — 12 Mc. sweep width.
Output: Adjustable with at least 1 volt maximum Constant on all ranges.
'Flat' output on all attenuator positions.
Modulation: 400 cycles at 30%

VHF Signal or Marker Generator
RCA — WR-89A or equivalent.
With crystal accuracy, the following frequencies:
Intermediate Frequencies: 4.5 Mc., 39.25 Mc., 41.25 Mc., 47.25 Mc.

Radio Frequencies

Channel No.	Picture No.	Sound Carrier	Receiver R-F Osc. Frequency Mc.
2	55.25	59.75	101
3	61.25	65.75	107
4	67.25	71.75	113
5	77.25	81.75	123
6	83.25	87.75	129
7	175.25	179.75	221
8	181.25	185.75	227
9	187.25	191.75	233
10	193.25	197.75	239
11	199.25	203.75	245
12	205.25	209.75	251
13	211.25	215.75	257

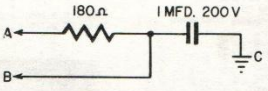
Output: Adjustable with at least .1 volt maximum.

Cathode Ray Oscilloscope
RCA — WO-56A or WO-88A or equivalent.
Sensitivity: 50 millivolt per inch or better.
Accessories: Demodulator probe, low capacitance probe.

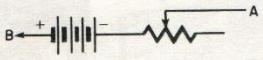
Vacuum Tube Voltmeter. (VTVM)
RCA — WV-77A or WV-97A or equivalent.
Sensitivity, 3 volt DC full scale or better.

Jig Bias and Tool Requirements

'M' derived circuit jig:



Bias: 2 — 7.5 volt batteries with 1000 ohm poteniometer to adjust to desired voltage.



Tools

Alignment Tools: Screw type GC #5003 or equivalent for adjustment or I.F. Transformer.

Video I.F. 'Peak' Alignment

1.) Remove RF amplifier tube and connect point 'A' of a -3v bias to pin 6 of V-103 and point 'B' to chassis.
2.) Connect point 'A' of second bias of -4v to junction of R169 and C163 (First I.F. grid circuit) and point 'B' to chassis.
3.) Connect DC lead of VTVM to pin 1 of V108 and set meter on -5v DC range.
4.) Connect signal generator to mixer grid test point on top of tuner. During alignment adjust output of signal generator to produce 3 volts of deflection on meter.
5.) a) Signal input: 44 Mc. Adjust for maximum deflection T105 top and L-3 (on tuner).
b) Signal input: 41.25 Mc. Adjust for minimum deflection T105 bottom.
c) Signal Input: 47.25 Mc. Adjust for minimum deflection L101.
d) Signal input: 39.25 Mc. Adjust for minimum deflection L102.
e) Signal input: 42. 7 Mc. Adjust for maximum deflection T-106.
f) Signal input: 45. 6 Mc. Adjust for maximum deflection T-107.
g) Signal input: 44. 4 Mc. Adjust for maximum deflection T108.
h) Repeat step 'b'.
i) Repeat steps 'C' and 'd'.

NOTE: If difficulty is encountered during adjustment of set 'c' or 'd', -4v bias may be changed to -1.5v only for steps 'c' and 'd'.

Sound I.F. 'Peak' Alignment

Disconnect signal generator and VTVM.
1.) Connect VTVM d.c. lead to point E on printed sound circuit (pin 1 of V102) and set meter on -5v scale.
2.) Set signal generator to 4.5 Mc. and connect to pin 1 of V108.
3.) Adjust for maximum deflection T101 bottom and top. Signal input should be adjusted to produce a maximum deflection of 5v for each adjustment.
4.) Transfer d.c. lead of VTVM to point D on printed circuit and zero center scale.
5.) Adjust for zero T102 top, swinging meter through zero to ensure alignment at the correct point.
Disconnect VTVM.

4.5 MC SOUND TRAP ALIGNMENT

1.) Connect demodulator probe to pin 5 of V-109 and connect oscilloscope to probe. Set scope sensitivity to 3 volt p.p.
2.) Add 400 cycles modulation to signal generator.
3.) Adjust for minimum amplitude on the oscilloscope L113.
4.) Disconnect signal generator, VTVM.

VIDEO I.F. SWEEP ALIGNMENT

1.) Complete 'peak' alignment procedure.
2.) Connect points A of -3v bias to pin 6 of V-103 and point B to chassis.
3.) Connect point A of a second bias of -4v to junction of R169 and C163 and point B to junction of R170 and R171.
4.) Connect sweep generator to mixer grid test point on top of tuner. Set sweep to I.F. position.
5.) Connect points of M derived circuit jig as follows:—
Point A to pin 5 of V105
Point B to pin 6 of V105
Point C to chassis.
6.) Loosely couple signal generator output to input of sweep generator.
7.) Connect demodulator probe to pin 5 of V105 and connect scope to demodulator probe. Set vertical sensitivity of oscilloscope to .2v pp.
8.) Connect horizontal leads from sweep generator to horizontal input of scope and set horizontal position to input necessary if oscilloscope has a sweep and phase controls, and horizontal position set at line.
9.) Short pin 1 of V107 to chassis.
10.) Set contrast control counter-clockwise and vertical hold for stability of the curve.
11.) Set sweep output.
12.) Adjust T105 (top) and L3 on tuner to obtain curve as in Figure 2. Nominal response of "M" derived stage shows three peaks on top of the curve. The circuit is properly adjusted when the two outside peaks are at the same amplitude and the center peak is midway between two outside peaks. T105 controls mainly position of center peak. L3 controls tilt and position of 45.75 marker.
13.) Transfer oscilloscope to pin 1 of V108.
Remove M derived circuit jig.
Remove short from pin 1 of V107.
Change I.F. bias from -.4v to -.5v (at junction of R169 and C163).

ALIGNMENT PROCEDURE

14.) Set scope sensitivity to 4v pp.

15.) Position markers as in fig. 2
T106 controls right hand marker (42.25 Mc.)
T107 controls left hand marker (45.75 Mc.)
T108 controls tilt.

16.) Disconnect I.F. sweep and connect RF sweep to antenna terminals and check overall curves on all channels, checking also oscillator setting, retouch T108 if necessary to correct for a tilt which would be essentially the same on all channels. See Fig. 3.
Disconnect all leads except bias.

Sound I.F. Sweep Alignment

1.) Connect 4.5 sweep to pin 1 of V108.

2.) Connect oscillatoscope to test point on sound strip.

3.) Loosely couple 4.5 Mc. marker to output of the sweep generator.

4.) Adjust T101 top and bottom for response as in figure 4 trying to acheive the maximum possible amplitude.

5.) Disconnect all leads, cables and bias.

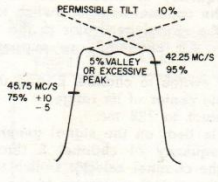


FIG. 1

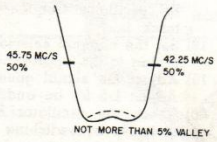


FIG. 2

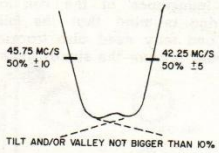


FIG. 3

FIG. 4

R.F. TUNER ALIGNMENT

Important:—Best alignment results can be obtained if the RF unit is mounted on the chassis.

1) With the AGC control turned fully clockwise, apply -3 volts of the bias between C-171, R175 and ground. The positive lead is to be connected to the chassis. A 7.5 volt battery with a 1,000 ohm potentiometer across it may be used.

2) Connect the oscilloscope to the mixer anode test point on top of the RF unit, through a detector jig.

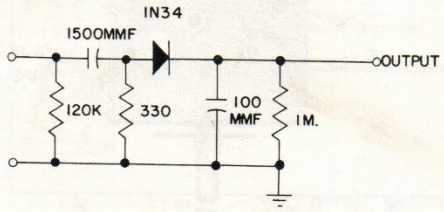


Figure 16—Tuner Alignment Jig

3) Connect the RF sweep generator to the receiver antenna terminals. The method of connection depends upon the output impedance of the sweep generator.
If the sweep generator has a 50 ohm or 72 ohm single ended output, a 300 ohm balanced output can be obtained **by connecting as shown on Fig. 17.**

4) Connect the signal generator to the matching pad by clipping it over one of the resistors.

5) Tune the signal generator to 211.25 MC. and 215.75 MC., the picture carrier markers of Channel 13. This step can be performed in any one of three ways.

A If the RCA Television Calibrator WR39B is used:
Set the calibrator to either 211.25 mc. or 215.75 mc. and beat with the 4.5 mc. crystal so that both markers are obtained simultaneously.

B If any other type generator is used, the markers can be injected alternately.

C If two signal generators are available, the markers can be injected simultaneously at the same injection point, one marker from each generator.

6) Set channel selector switch and sweep generator to Channel 13.

7) Adjust L-7, L-6 and C7 to obtain a curve as nearly identical to the figure below as possible. Maximum amplitude between markers is obtained by adjusting the antenna coil L-8. The frequency is affected by L-6 and L-7 while C7 affects the bandwidth.

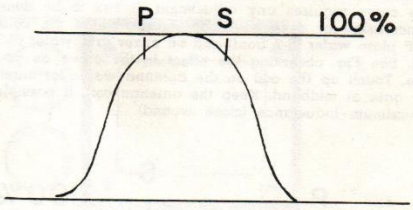


Figure 18

NOTE: Due to the nature of the "pi" network coupling between triode 1 plate, and triode 2 cathode, a tilt will be present on channels 8, 9 and sometimes 10, if these channels are flat topped. In an effort to reduce this effect and to achieve maximum gain, the tuner is designed to be slightly "round nosed" on these channels. It will help in achieving the desired response if channel 13 is not made wider than necessary.

8) Check the response of each channel, 13 through 7, by switching the receiver and sweep generator to each of these channels, and tuning the signal generator to the marker frequencies. OBSERVE the response and marker injections. COMPARE these responses with the ideal response of channel 13 (Fig. 19). It should be found that all these channels have well shaped curves with markers above 70% response. Channel 12 to 7 are supposed to track in relatively well and should not require touching up of any of the coils.

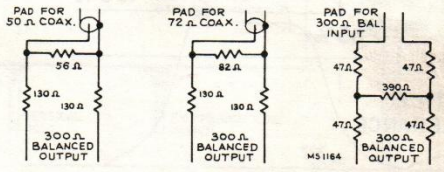


Figure 17—Sweep Attenuator Pads

ALIGNMENT PROCEDURE

TUNER ALIGNMENT (Cont'd.)

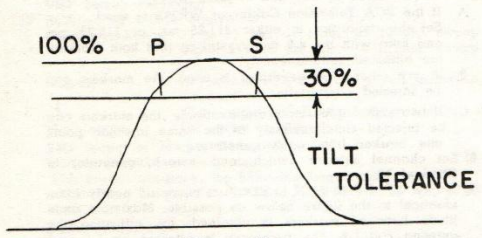


Figure 19

9) Set the channel selector switch and sweep generator to channel 6.
10) Set the signal generator to the markers of channel 6 (82.25 mc. and 97.75 mc.).
11) Compare the response of channel 6 with the figure below. If the curve requires any adjustment, it has to be done by increasing or decreasing the inductance of the coils on RF plate wafer (S-2 front) and on mixer grid wafer (S-3 front). See Fig. observing the effect in the curve as you do so. Touch up the coil on the antenna wafer for maximum gain at midband. Keep the antenna coil, if possible at maximum inductance (close wound).

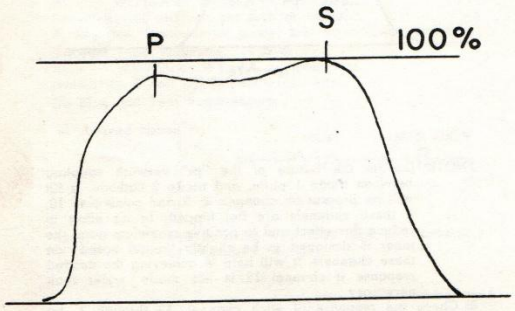


Figure 20

12) Switch the chanel selector switch and the sweep generator 6 to 2 inclusive and check the response shown below. If any adjustments are required, they must be done by increasing or decreasing the inductance of the plate coil, mixer coil and antenna coil belonging to the channel under test.

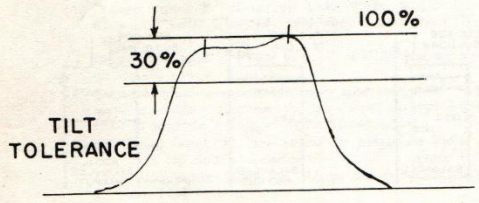


Figure 21

NOTE: Always start on channel 6 when adjustments are required as other channels will track in.

13) Remove the sweep generator.
14) Set the receiver channel selector switch to 13 and the fine tuning to the approximate center of its range.
15) Insert an insulated lead into the R.F. unit and connect this lead to the signal generator RF input terminal. Adjust the signal generator to 257 mc.
16) Adjust L5 for an audible beat on the signal generator.
NOTE: If an RCA Television Calibrator WR39B is not available, the following method can be used.
A—Couple the signal generator to the antenna terminals.
B—Connect the oscilloscope to the test point on top of the tuner. Set gain to maximum.
C—Adjust the signal generator to 257 mc.
D—Vary L-5 until a beat pattern is visible on the scope. Adjust for zero beat point.
17) Check the oscillator frequency of channel 12 through 7 inclusive by switching the channel selector switch to each of these channels and the signal generator to the proper RF oscillator frequency. All channels are supposed to track in.
18) Set the channel selector switch to channel 6, and the fine tuning to the approximate center of its range.
19) Adjust the signal generator to 129 mc.
Adjust L-5 for an audible beat on the signal generator.
20) Check the oscillator frequency of channel 5 through 2 inclusive by switching the channel selector switch to each of those channels and the signal generator to the proper RF oscillator frequency. If adjustments are required, increase or decrease the inductance of the coil for that particular channel, bearing in mind that the following channels will track in, and may need also tracking up.
21) Remove the insulated lead, remove the signal generator.

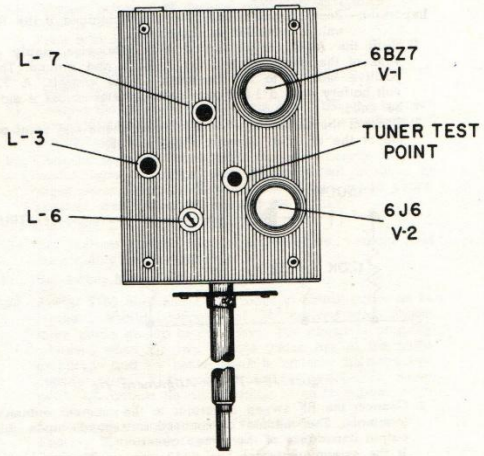


Figure 22—Tuner Top View Showing Adjustment Points

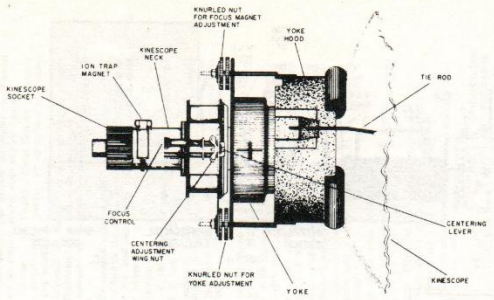


Fig. 3—Yoke and Focus Magnet Adjustment

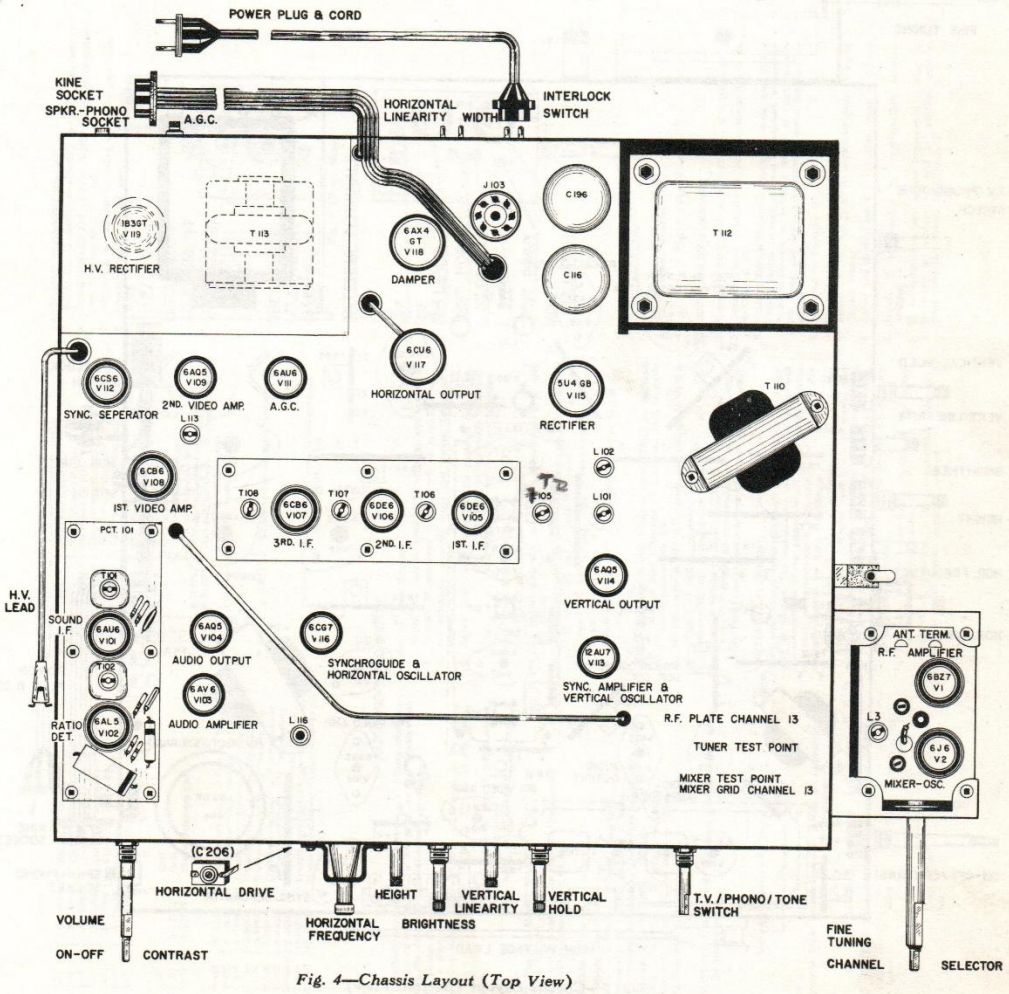


Fig. 4—Chassis Layout (Top View)

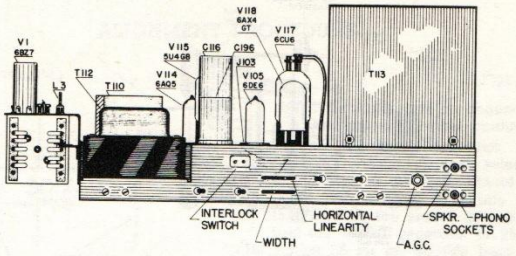


Fig. 2—Rear Chassis Layout

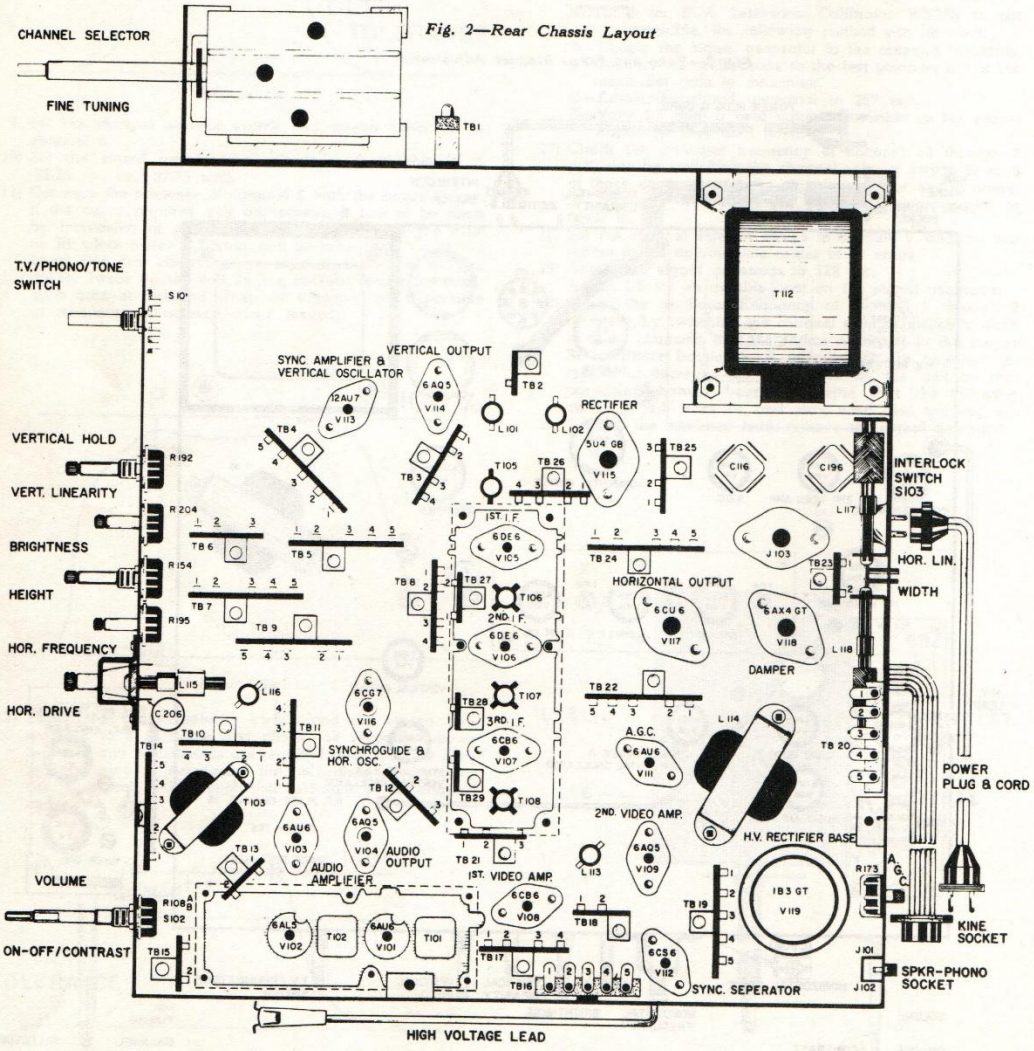
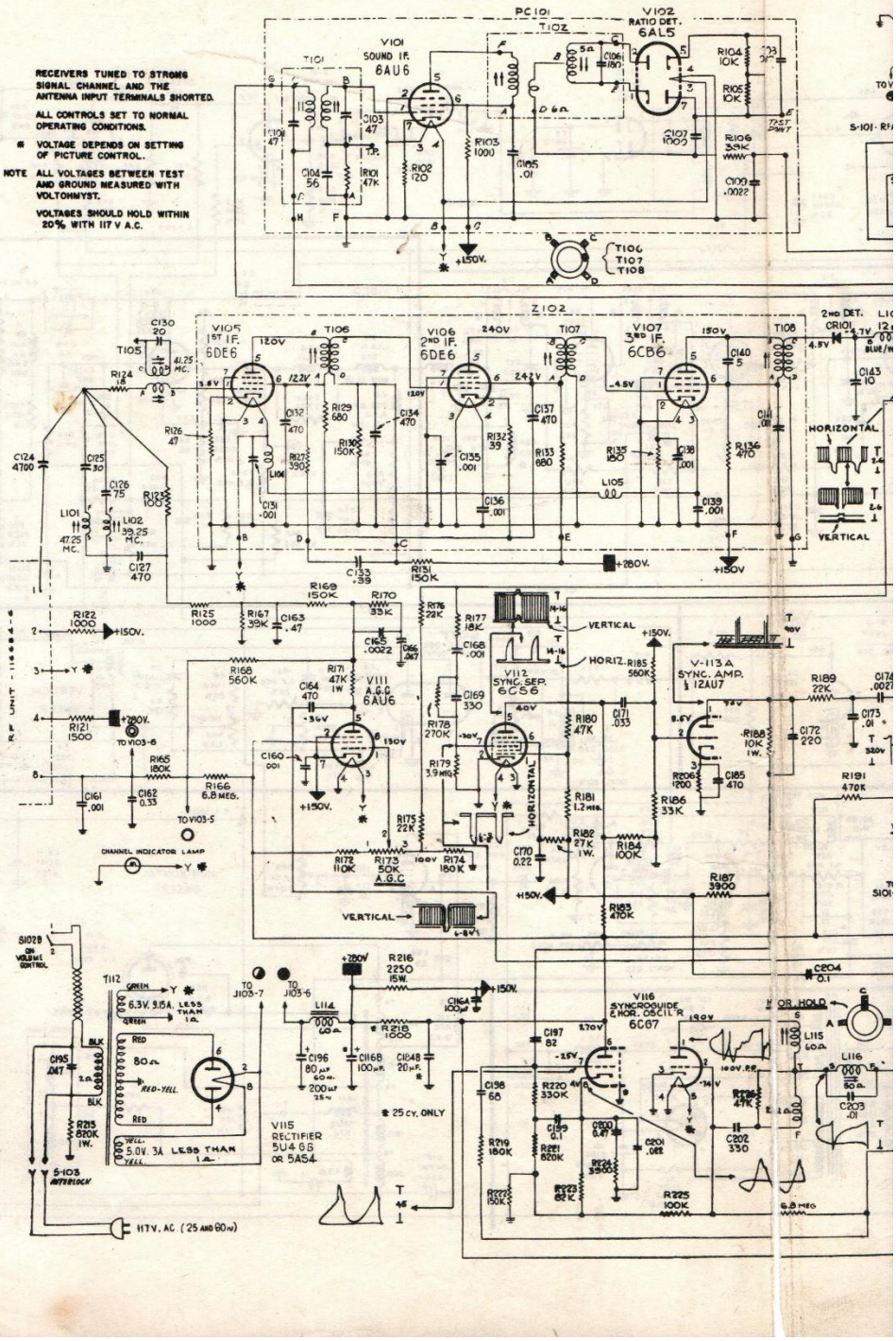
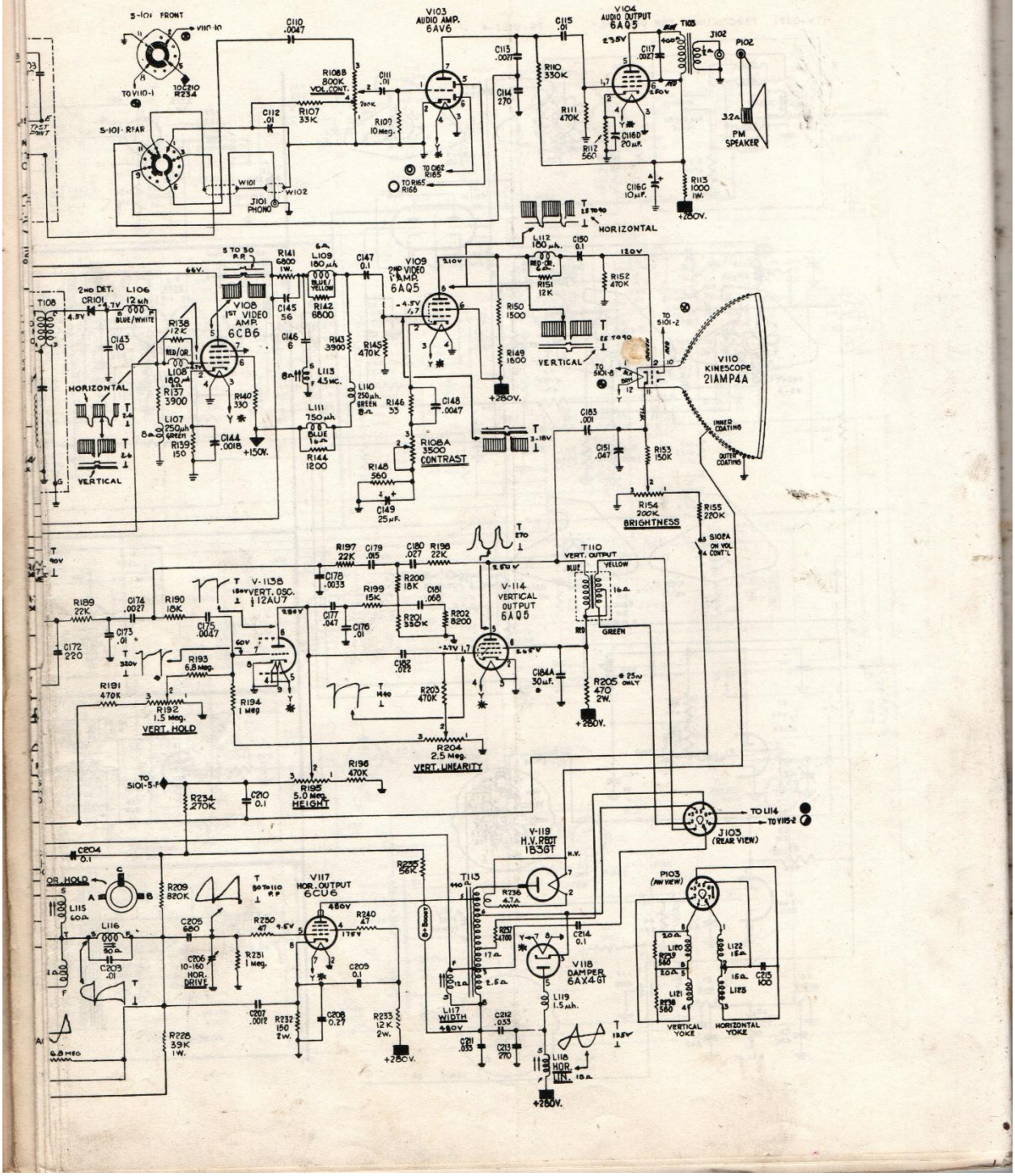


Fig. 5—Chassis Layout (Bottom View)



TUNER CIRCUIT ON PAGE 39


S-101 FRONT
S-101 REAR
TO V110-10
TO V110-1
10C210
R234
C110
.0047
R108B
800K
VOL. CONT.
C111
.01
R107
33K
R109
10 Meg.
C112
.01
W101
W102
J101
PHONO
TO C162
R165
TO R165
R166
V103
AUDIO AMP.
6AV6
C113
.0027
C114
270
C115
.01
R110
330K
R111
470K
R112
560
V104
AUDIO OUTPUT
6AQ5
T105
J102
P102
C117
.0027
C116D
20 µF.
C116C
10 µF.
R113
1000
1W.
+280V.
3.2Ω
PM
SPEAKER
HORIZONTAL
VERTICAL
L112
180 µh.
C150
0.1
R151
12K
R152
470K
R150
1500
R149
1800
TO
S101-2
V110
KINESCOPE
21AMP4A
INNER
COATING
OUTER
COATING
C183
.001
C151
.047
R153
150K
R154
200K
BRIGHTNESS
R155
220K
SIGRA
ON VOL.
CONT'L
T108
2ND DET.
CR101
L106
12 µh
BLUE/WHITE
C143
10
R138
12K
RED/OR
L108
180 µh
R137
3900
L107
250µh
GREEN
R139
150
C144
.0018
+150V.
V108
1ST VIDEO
AMP.
6CB6
R140
330
L109
180 µh
BLUE/
YELLOW
R141
6800
1W.
C145
56
R142
6800
C146
6
L113
4.5 MC.
L111
750 µh
R144
1200
C147
0.1
R143
3900
R145
470K
L110
250 µh.
GREEN
R146
33
C148
.0047
R108A
3500
CONTRAST
R148
560
C149
25 µF.
V109
2ND VIDEO
AMP.
6AQ5
R147
1500
R149
1800
+280V.
T110
VERT. OUTPUT
BLUE
YELLOW
GREEN
V-114
VERTICAL
OUTPUT
6AQ5
V-113B
VERT. OSC.
½12AU7
R197
22K
C179
.015
C180
.027
R198
22K
C178
.0033
R199
15K
R200
18K
C181
.068
R201
330K
R202
8200
C177
.047
C176
.01
C182
.022
R203
470K
C184A
30 µF.
R205
470
2W.
+280V.
R204
2.5 Meg.
VERT. LINEARITY
R189
22K
C174
.0027
R190
15K
C175
.0047
C172
220
C173
.01
R193
6.8 Meg.
R191
470K
R192
1.5 Meg.
VERT. HOLD
R194
1 Meg.
R196
470K
R195
5.0 Meg.
HEIGHT
TO
S101-5-F
R234
270K
C210
0.1
TO L114
TO V115-2
J103
(REAR VIEW)
V-119
H.V. RECT
1B3GT
C204
0.1
OR. HOLD
R209
820K
L115
60 Ω
L116
50 Ω
C205
680
C206
10-160
HOR.
DRIVE
C203
.01
R231
1 Meg.
R228
3.9K
1W.
6.8 MEG
V117
HOR. OUTPUT
6CU6
R230
47
R240
47
C207
.0018
R232
150
2W.
C208
0.27
C209
0.1
R233
12K
2W.
+280V.
T113
R235
56K
R236
4.7Ω
R237
4700
C214
0.1
V118
DAMPER
6AX4-GT
L117
WIDTH
C212
.033
C211
.033
C213
270
L119
1.5 mh.
L118
HOR.
LIN.
15Ω
+280V.
P103
(RW VIEW)
L120
L121
L122
L123
C215
100
VERTICAL
YOKE
HORIZONTAL
YOKE