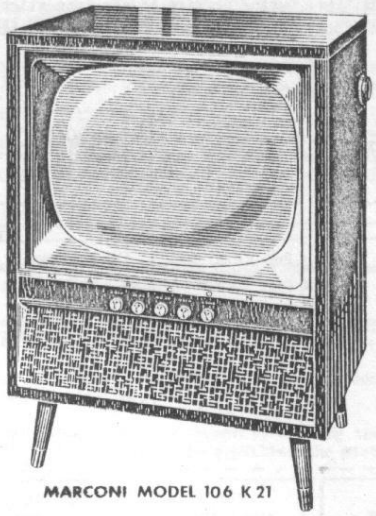
MARCONI TELEVISION

Technical Data and Parts List

MODELS	USING CHASSIS
TV-106T21	TV-502B
TV-106K21	"
TV-103W21	TV-502C
TV-107T21	"
TV-107K21	"
TV-103W21	RADIO 4100



MARCONI MODEL 106 K 21

RECEIVER CHARACTERISTICS

VOLTAGE RATING . . . . . 115v. A.C. - Cycle as marked

POWER CONSUMPTION . . . . . 1.36 Amp.

FREQUENCY RANGE . . . . . 54-88 Mc. - 174-216 Mc.

INTERMEDIATE FREQUENCIES . . . . . VIDEO - 45.75 Mc.
. . . . SOUND (Intercarrier) - 4.5 Mc.

ANTENNA INPUT IMPEDANCE . . . . . 300 Ohms, Balanced

CAUTION NOTICE.

The high voltages required to operate the picture tube are dangerous and extreme precaution should be observed when the chassis is removed from the cabinet for servicing. Adjustments or repairs on this receiver should not be attempted by anyone who is not familiar with the precautions necessary when working on high voltage equipment.

The picture tube is highly evacuated and if broken, glass fragments will be violently expelled. If it is necessary to change the picture tube or to remove the chassis from the cabinet always wear heavy gloves and shatter-proof goggles.

TUBE COMPLEMENT

SYMBOL	TYPE	FUNCTION
V-1	4BZ7	R.F. Amplifier
V-2	5X8	Oscillator-Converter
V-3	3CB6	1st I.F. Amplifier
V-4	3CB6	2nd I.F. Amplifier
V-5 (A)	5U8 (½)	3rd I.F. Amplifier
V-5 (B)	5U8 (½)	Video Detector
V-6 (A)	6AW8 (½)	Video Amplifier
V-6 (B)	6AW8 (½)	Sync Amplifier
V-7	3AU6	Sound I.F. Amplifier
V-8	3AU6	Sound Limiter
V-9	3AL5	Sound Discriminator
V-10	3AV6	1st Audio & AGC Clamping
V-11	5AQ5	Beam Power Audio Output
V-12	3CS6	Sync Separator
V-13	3AL5	Dual Diode Phase Detector
V-14	6SN7GTB	Horizontal Oscillator
V-15	12DQ6A	Horizontal Output
V-16 (A)	6CS7 (½)	Vertical Oscillator
V-16 (B)	6CS7 (½)	Vertical Output
V-17	12AX4GT	Damper Diode
V-18	1B3GT	E.H.T. Rectifier
V-19	21CBP4A	Picture Tube

CANADIAN MARCONI COMPANY

Established 1902

VANCOUVER — WINNIPEG — TORONTO — MONTREAL — HALIFAX — ST. JOHN'S

PICTURE TUBE HANDLING PRECAUTIONS

DO NOT REMOVE THE CHASSIS, INSTALL, REMOVE OR HANDLE THE PICTURE TUBE IN ANY MANNER UNLESS SHATTERPROOF GOGGLES ARE WORN. PEOPLE NOT SO EQUIPPED SHOULD BE KEPT AWAY WHILE HANDLING PICTURE TUBE. KEEP THE PICTURE TUBE AWAY FROM THE BODY WHILE HANDLING.

The picture tube bulb encloses a high vacuum and, due to its large surface area, is subjected to considerable air pressure. For this reason, the picture tube must be handled with more care than ordinary receiving tubes.

The large end of the picture tube bulb - particularly that part of the rim of the viewing surface - must not be struck, scratched or subjected to more than moderate pressure at any time. During service if the tube sticks or fails to slip smoothly into its socket, or deflection yoke, investigate and remove the cause of the trouble. DO NOT FORCE THE TUBE.

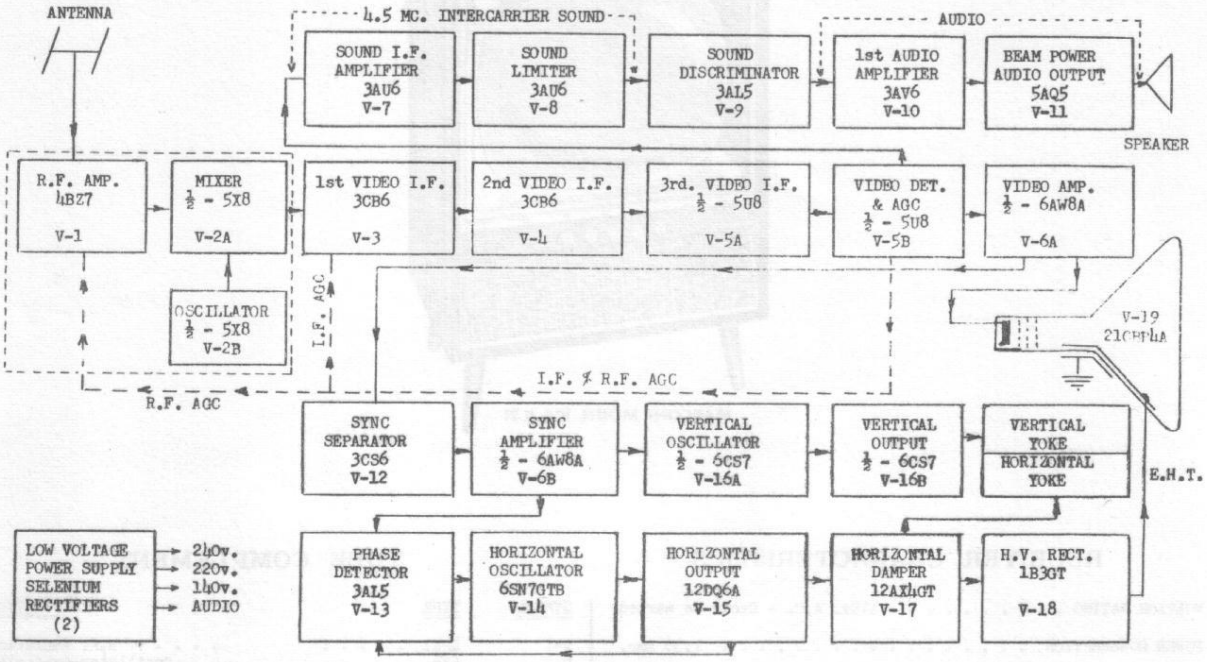


FIGURE 1 - BLOCK DIAGRAM

GENERAL CHASSIS DESCRIPTION

Chassis TV-502B and TV-502C are direct viewing television receivers with a 21" picture tube and differ only in the location of the operating controls.

These receivers consist of one complete unit and are normally operated by the use of six controls located as follows: channel selector and fine tuning on right hand side of cabinet on all receivers; on receivers using chassis TV-502B the remaining five operating controls are located below the picture tube from right to left - signal monitor, vertical hold, brightness, contrast and volume control and on/off switch; on receivers using chassis TV-502C these controls are located above the picture tube. A built-in dipole antenna permits reception in good areas without requiring outdoor antenna.

CHASSIS OPERATION

After the tuner selects the desired channel and heterodyne it down to the I.F. frequencies of 45.75 mc., video and 41.25 mc., sound, it is fed to the I.F. string.

Stagger tuned I.F. coils are used along with three I.F. tubes to provide the proper gain and band width. A sound carrier trap (L-2B, 41.25 mc.) an adjacent channel sound trap (L-1B, 47.25 mc.) and an adjacent picture trap (L-3, 38.25 mc.) are used to provide the proper sound and picture rejection and adjacent channel selectivity. The 45.75 mc. video and 41.25 mc. sound carriers are fed to the detector V-5B (½ 5U8).

The detector not only demodulates the video information, but also provides the 4.5 mc. intercarrier sound (as a result of the beat between the picture and sound I.F.) which is picked off the secondary of T-1. The cathode-plate section of the triode (V-5B) portion of the 5U8 is used to supply full AGC to the R.F. tube and the 1st I.F. tube with the Signal Monitor in the "OFF" position. Delayed AGC to the R.F. tube is obtained with the Signal Monitor in the "ON" position so that maximum gain is realized at low signal levels.

CHASSIS OPERATION *(continued)*

The 4.5 mc. intercarrier beat is fed to the first I.F. tube 3AU6 (V-7) where it is amplified and then fed to the sound limiter tube 3AU6 (V-8), discriminator tube 3AL5 (V-9), audio amplifier tube 3AV6 (V-10) and audio output tube 5AQ5 (V-11) in the conventional manner.

The detected composite video signal is fed to the video amplifier tube ½ 6AW8 (V-6A) where it is amplified so that it can properly modulate the beam of the picture tube. This composite video signal is also fed to the sync separator tube 3CS6 (V-12) which passes only vertical and horizontal sync information. This sync is then used to control the frequency of the horizontal and vertical oscillators.

Noise immunity in electrically noisy areas is assured by means of a Signal Monitor (R-105) and a Local-Suburban switch (part of R-105) in conjunction with a 3CS6 (V-12) pentagrid tube used as a sync separator and noise gating. This is accomplished as follows:

When a burst of electrical interferences is picked up by the receiver, noise limiting is accomplished by feeding the negative peak noise pulse appearing in the video detector load through C-22 (100 Mmfd) to the gating tube grid, pin no. 1, 3CS6 (V-12).

These peak noise pulses are also amplified by the video amplifier tube ½ 6AW8 (V-6A) and fed to the sync separator grid, pin no. 7, (V-12). The Signal Monitor (R-105) is set so that noise pulses of sufficient amplitude appearing at the limiter grid will cut-off the tube, preventing these pulses to appear in the output. Sync stability is obtained by rotating the Signal Monitor in a clockwise direction, varying the bias voltage on gating grid pin no. 1 of tube 3CS6 (V-12) in order to maintain a sync output of constant amplitude.

SIGNAL MONITOR

The Signal Monitor control provides an adjustment to give optimum picture quality and stability under various conditions of signal strength and electrical interference. The control should be adjusted as follows:

(a) Medium Signals (average Suburban installation with indoor antenna). The control should be turned counter-clockwise to a position just before the switch is actuated.

(b) Strong Signals (Metropolitan areas or Suburban areas when using an outdoor antenna). The control should be turned completely counter-clockwise with the switch actuated.

(c) Weak Signal areas or where electrical interference is present, causing the picture to "roll" or "jitter", the control should be turned clockwise only as far as is necessary to stabilize the picture.

HIGH VOLTAGE SUPPLY

High voltage is supplied by the horizontal deflection system. During horizontal retrace the magnetic field within the horizontal output transformer suddenly collapses and causes a very high R.F. voltage to be induced in the high voltage winding of the transformer. This voltage is rectified by the 1B3GT tube (V-17) and filtered by the capacity formed between the second anode internal coating and the external grounded conductive coating of the picture tube. Filament power for this tube (1B3GT) is obtained from a winding on the output transformer. Approximately 14 KV is generated in this manner. The damper tube 12AX4GT (V-16) is effectively across the horizontal deflection yoke winding. This damps out oscillations which tend to occur after retrace. The energy from these damped oscillations are added to the B+ to form a boosted B+ supply. This B+ boost is then used for the horizontal output tube and vertical oscillator tube to insure linear sweeps.

LOW VOLTAGE SUPPLY

Two selenium rectifiers in a voltage doubler circuit are used to supply the proper D.C. voltages to the receiver from the applied A.C. power. Filtering of the rectified current is accomplished by a two stage condenser input circuit providing voltages of plus 240 volts, 220 volts and 140 volts. A 1½ ampere fuse is placed in series with the selenium rectifiers to protect the receiver in the event a short in the high B+ circuit should occur.

A 5 ohm resistor (R-89) is used in series with the selenium rectifiers to limit the charging surge current of the input filter condenser. The filament of all tubes are in series and operate directly fron the line supply.

FOCUS AND CENTERING

The picture tube (21CBP4A) used in this chassis is pre-focuses electrostatically by means of a focus electrode in the gun assembly operating at a voltage which gives the best Focus. (See Note No. 6 on the Diagram of Connections). The use of electrostatic focus insures good results under wide variations of line voltages.

Centering is accomplished by means of a centering unit placed on the neck of the picture tube behind the yoke. This device consists of two magnetized rings which when rotated together cause the electron beam to shift thus centering the picture. If the centering range is not sufficient a slight rotation of one of the rings with respect to the other will vary the amount of range until the right point is reached.

BEAM BENDER (ION TRAP)

A single magnet type of beam bender is used and should always be adjusted by sliding and rotating the unit for maximum brightness. The adjustment of the beam bender can effect picture focus. You will usually find that only one setting of the beam bender will yield both maximum brightness and optimum focus (sharp raster lines). Do not adjust this device for removing corner shadows or improving focus if in so doing the brightness is reduced.

If two positions of maximum brightness are found use the one closer to the picture tube socket.

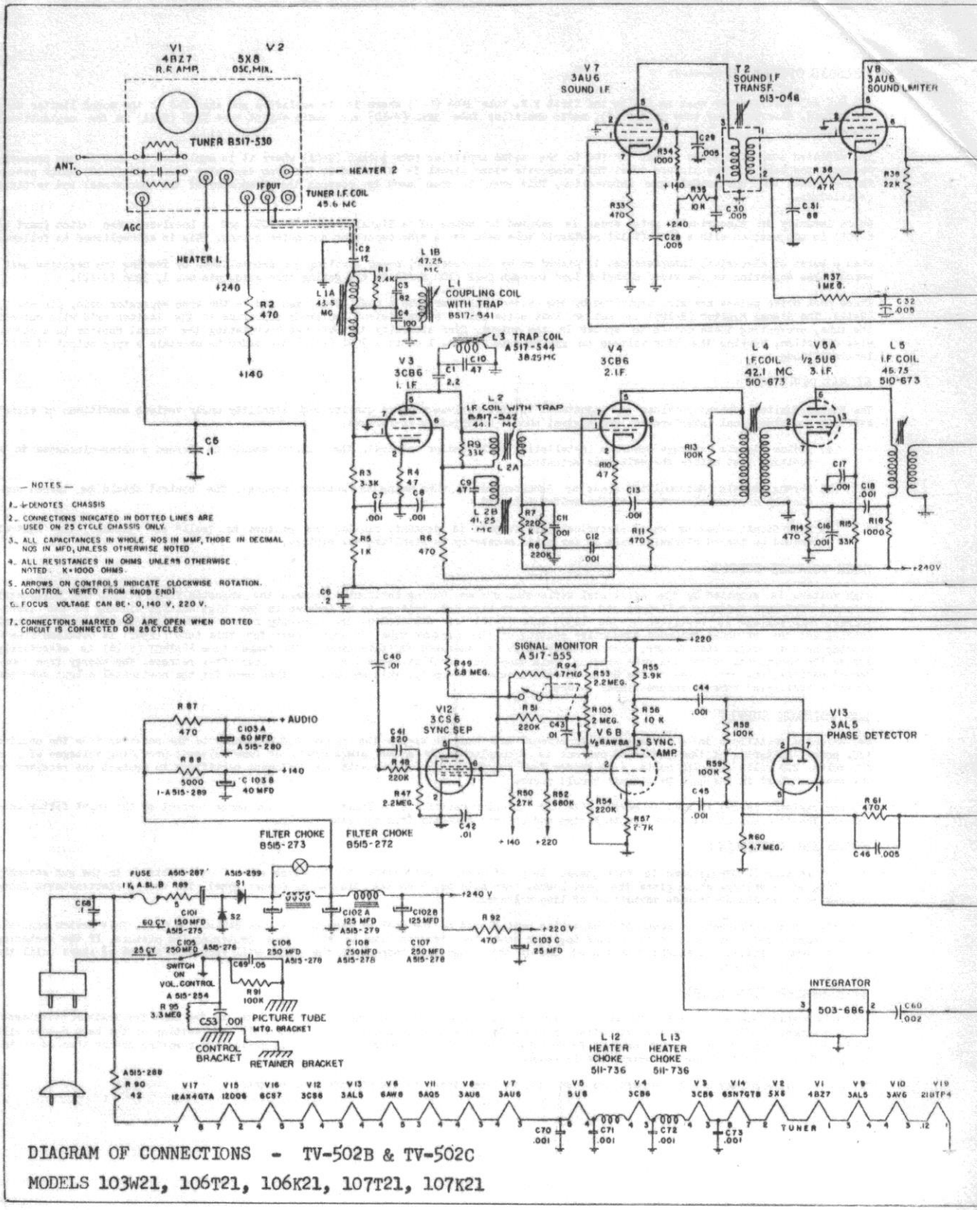
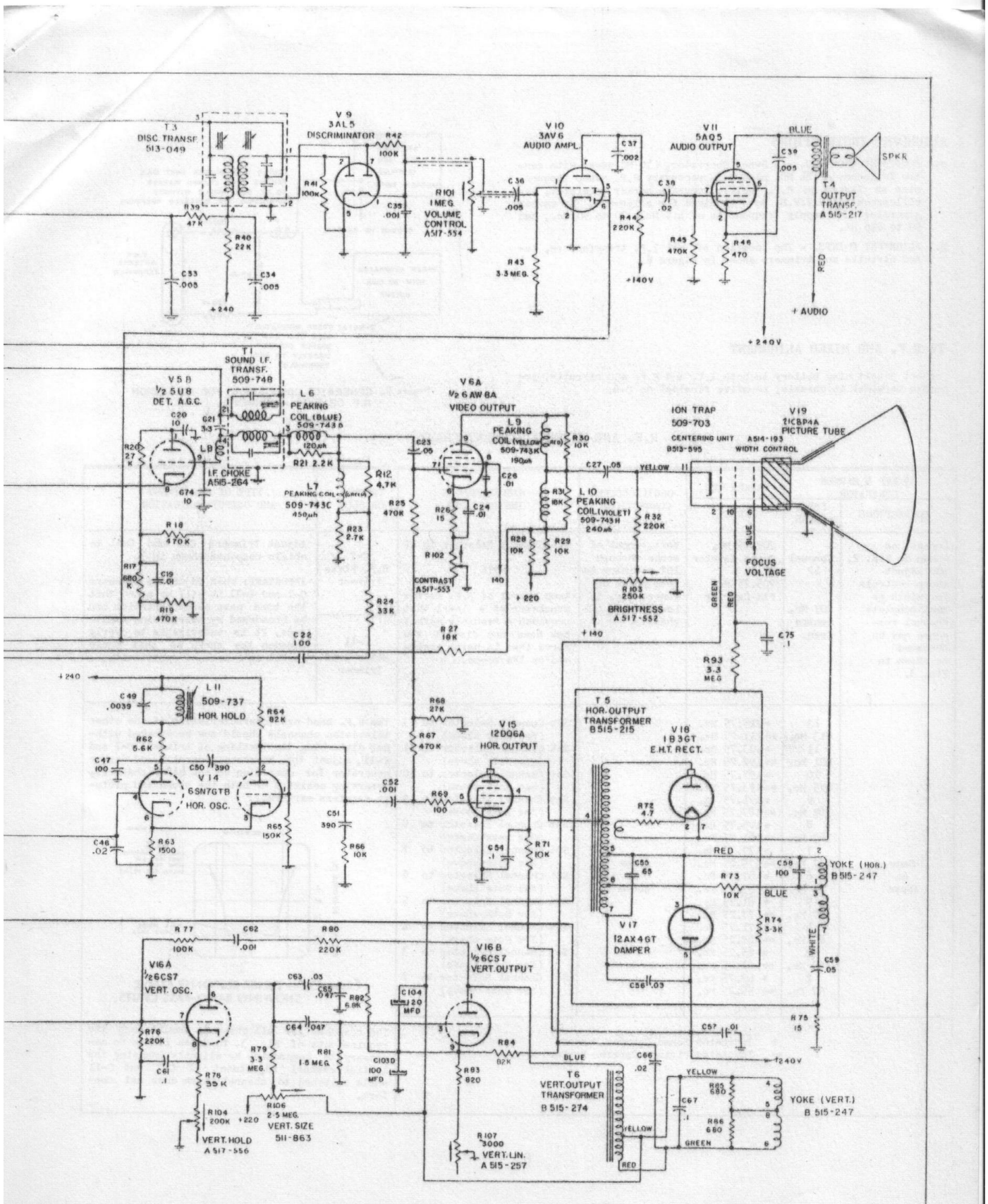


DIAGRAM OF CONNECTIONS - TV-502B & TV-502C

MODELS 103W21, 106T21, 106K21, 107T21, 107K21


T3
DISC. TRANSF.
513-049
V9
3AL5
DISCRIMINATOR
R42
100K
R41
100K
C35
.001
R39
47K
R40
22K
C33
.005
C34
.005
+240
R101
1 MEG.
VOLUME
CONTROL
A517-554
C36
.005
V10
3AV6
AUDIO AMPL.
C37
.002
R43
3.3 MEG.
R44
220K
+140V
V11
5AQ5
AUDIO OUTPUT
C38
.02
C39
.005
R45
470K
R46
470
BLUE
SPKR
T4
OUTPUT
TRANSF.
A515-217
RED
+ AUDIO
+240V
T1
SOUND I.F.
TRANSF.
509-748
V5B
½ 5U8
DET. A.G.C.
C20
10
C21
3.3
L6
PEAKING
COIL (BLUE)
509-743B
120 μh
R21 2.2K
LB
I.F. CHOKE
A515-264
C74
10
R20
27
K
R18
470K
R17
680
K
C19
.01
R19
470K
L7
PEAKING COIL (GREEN)
509-743C
450 μh
R12
4.7K
R25
470K
R23
2.7K
R24
33K
C22
100
C23
.05
V6A
½ 6AW8A
VIDEO OUTPUT
L9
PEAKING
COIL (YELLOW)
509-743K
190 μh
R30
10K
R31
18K
L10
PEAKING
COIL (VIOLET)
509-743H
240 μh
C26
.01
C24
.01
R26
15
R102
CONTRAST
A517-553
140
R28
10K
R29
10K
+220
ION TRAP
509-703
CENTERING UNIT
B513-595
A514-193
WIDTH CONTROL
V19
21CBP4A
PICTURE TUBE
C27
.05
YELLOW
R32
220K
R103
250K
BRIGHTNESS
A517-552
BLUE
FOCUS
VOLTAGE
GREEN
RED
+140
C75
.1
R93
3.3
MEG
R27
18K
+240
L11
509-737
HOR. HOLD
R64
82K
C49
.0039
R62
5.6K
C47
100
C50
390
V14
6SN7GTB
HOR. OSC.
C46
.02
R63
1500
R65
150K
C51
390
R66
10K
R68
27K
R67
470K
C52
.001
R69
100
V15
12DQ6A
HOR. OUTPUT
C54
.1
R71
10K
T5
HOR. OUTPUT
TRANSFORMER
B515-215
V16
1B3GT
E.H.T. RECT.
R72
4.7
RED
C55
.65
R73
10K
BLUE
C58
100
YOKE (HOR.)
B515-247
V17
12AX4GT
DAMPER
R74
3.3K
WHITE
C59
.05
C56
.03
R75
15
C57
.01
+240V
R77
100K
C62
.001
R80
220K
V16A
½ 6CS7
VERT. OSC.
C63
.03
C65
.047
R82
6.8K
C64
.047
R76
220K
C61
.1
R78
33 K
R79
3.3
MEG.
R81
1.5 MEG.
C104
120
MFD
C103D
100
MFD
R104
200K
+220
R106
2.5 MEG.
VERT. SIZE
511-863
VERT. HOLD
A517-556
V16B
½ 6CS7
VERT. OUTPUT
R84
82K
R83
820
R107
3000
VERT. LIN.
A515-257
T6
VERT. OUTPUT
TRANSFORMER
B515-274
BLUE
C66
.02
YELLOW
C67
.1
R85
680
R86
680
GREEN
YELLOW
RED
YOKE (VERT.)
B 515-247

ALIGNMENT INSTRUCTIONS

a. EQUIPMENT REQUIRED. - A Sweep Generator, (10 MC sweep with centre frequency of 24 MC. plus all necessary R.F. sweep frequencies as listed in R.F. table), accurate marker generator, oscilloscope and V.T.V.M. are required for alignment. The marker generator must supply frequencies of 4.5 Mc., 20 to 50 Mc., and 50 to 216 Mc.

b. ALIGNMENT POINTS. - The location of all I.F. transformers, tuned circuits and trimmers shown in Figure 6.

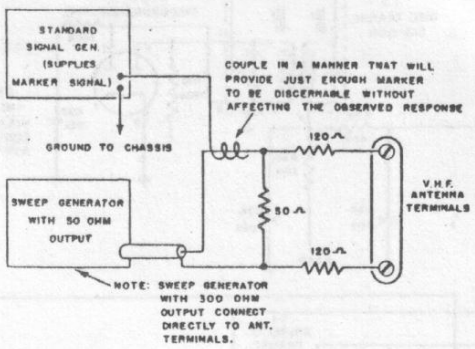


Figure 2. GENERATOR CONNECTIONS FOR TELEVISION R.F. CHANNEL ALIGNMENT.

TV R.F. AND MIXER ALIGNMENT

Connect 3 volt bias battery to both I.F. and R.F. AGC circuits, positive terminal to chassis, negative terminal to C-6.

R.F. AND MIXER ALIGNMENT CHART

SWEEP & MARKER GENERATOR		MARKER GEN.	OSCILLOSCOPE CONNECTIONS	MISCELLANEOUS INSTRUCTIONS	TRIMMER OR SLUG	TYPE OF ADJUSTMENT AND OUTPUT INDICATION
CONNECTIONS	FREQ. RANGE	FREQ.				
Connect as shown in Fig. 2. and adjust sweep controls for width so that complete channel response may be observed as shown in Fig. 3.	Channel 12 207 Mc. Centre Freq.	209.75 Mc. Sound Carrier 205.25 Mc. Pix Carrier	Vert. input of scope through 10K resistor to test point on Tuner, Fig. 5. Low side to chassis.	Set Channel Selector to 12 NOTE Keep output of R.F. Marker Generator at a level that provides a readable marker but does not distort the curve that is being observed on the scope.	C-7 R.F. Plate Trimmer C-11 Mixer Grid Trimmer	Adjust Trimmers C-7 and C-11 to obtain response shown in 3. IMPORTANT: When adjusting trimmers C-7 and C-11 it will be noted that the band pass characteristics can be broadened by sacrificing amplitude. It is undesirable to overly broaden the curve as that would result in a loss of sensitivity.
Same as Above	13 213 Mc. 11 201 Mc. 10 195 Mc. 9 189 Mc. 8 183 Mc. 7 177 Mc. 6 85 Mc. 5 79 Mc. 4 69 Mc. 3 63 Mc. 2 57 Mc.	*215.75 Mc. **211-25 Mc. *203.75 Mc. **199.25 Mc. *197.75 Mc. **193.25 Mc. *191.75 Mc. **187.25 Mc. *185.75 Mc. **181.25 Mc. *179.75 Mc. **175.25 Mc. * 87.75 Mc. ** 83.25 Mc. * 81.75 Mc. ** 77.25 Mc. * 71.75 Mc. ** 67.25 Mc. * 65.75 Mc. ** 61.25 Mc. * 59.75 Mc. ** 55.25 Mc.	Same as Above	Set Channel Selector to 13 (See Note above) Set Channel Selector to 11 (See Note above) Set Channel Selector to 10 (See Note above) Set Channel Selector to 9 (See Note above) Set Channel Selector to 8 (See Note above) Set Channel Selector to 7 (See Note above) Set Channel Selector to 6 (See Note above) Set Channel Selector to 5 (See Note above) Set Channel Selector to 4 (See Note above) Set Channel Selector to 3 (See Note above) Set Channel Selector to 2 (See Note above)	The R.F. band pass characteristics of the other television channels should now be checked without disturbing the setting of trimmers C-7 and C-11. Adjust the RF sweep generator and marker generator for operation on the other channels, observing position of both the sound and picture carriers markers.
		* Indicates Sound Carrier Marker ** Indicates Picture Carrier Marker				The response for all channels should meet the requirements of Fig. 3. To do so it may be necessary to compromise by slightly changing the initial channel adjustment of C-7 and C-11 while switched to channel which does not conform.

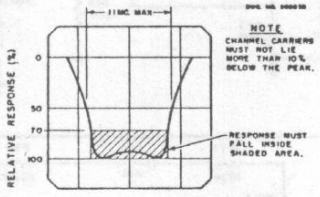


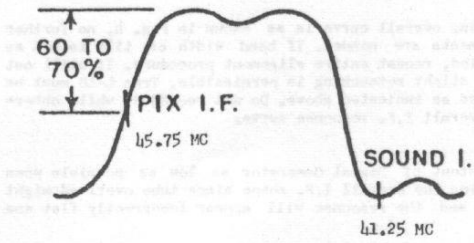
Figure 3. -- TUNER RESPONSE CURVE SHOWING BAND-PASS LIMITS.

R.F. OSCILLATOR ALIGNMENT

1. Connect marker and sweep generator as shown in Fig. 2, low side to chassis.
2. Connect scope to video I.F. align point .
3. Connect 3 volt bias battery positive terminal to chassis, negative terminal to top of C-6 .
4. Before undertaking oscillator alignment be sure I.F. circuits are correctly aligned for band pass characteristic and trap settings.
5. During oscillator alignment, it is necessary to set the fine tuning control to the centre of its capacity range.

R.F. OSCILLATOR ALIGNMENT CHART

MARKER SIGNAL GENERATOR FREQUENCY	SWEEP GENERATOR FREQUENCY		TRIMMER OR SLUG	TYPE OF ADJUSTMENT AND OUTPUT INDICATION
*215.75 Mc. **211.25 Mc.	Channel 13 Centre Frequency 213 Mc. 10 Mc. Sweep	Be sure that fine tuning control has been properly positioned (See step 5, above). NOTE During this step and thru-out all succeeding steps it is necessary to: 1. Keep output of sweep generator at a level that does not allow the reading on a V.T.V.M. to exceed minus 1 volt when connected across video detector load at minimum sweep width. 2. Keep output of standard signal generator at a level that provides a readable marker but does not distort the curve that is being observed on the scope.	Adjust Slug 13	NOTE: Before making the following adjustments, advance the vertical gain control on the scope in order to magnify the sound trap portion of the response curve. Then, use a non-metallic screwdriver to adjust channel 13 oscillator slug (accessible thru hole on front of RF tuner unit) and shift response curve so that sound carrier marker is located at the position indicated below. Now reduce gain control setting of scope to restore pattern to normal amplitude and observe position of picture carrier marker. This marker should appear on the high frequency side of the characteristic curve. The amplitude of the picture carrier should be between 60 and 70% down from peak response.
* 87.75 Mc. ** 83.25 Mc.	Channel 6 Centre Frequency 85 Mc. 10 Mc. Sweep		Adjust Slug 6	Repeat above procedure for Channel no. 6.
* 209.75 Mc. ** 205.25 Mc.	Channel 12 207 Mc.	Set Channel Selector to 12 (See Note above)		Adjust the RF sweep generator and marker generator for operation on other television channels (marker generator to sound carrier frequency). Observe response curve for each channel (2 thru 5 and 7 thru 12). Sound carrier should appear at the position indicated below. NOTE: Make sure that cam on fine tuning control shaft remains properly positioned during this step. (See step 5 above).
* 203.75 Mc. ** 199.25 Mc.	Channel 11 201 Mc.	Set Channel Selector to 11 (See Note above)		
* 197.75 Mc. ** 193.25 Mc.	Channel 10 195 Mc.	Set Channel Selector to 10 (See Note above)		
* 191.75 Mc. ** 187.25 Mc.	Channel 9 189 Mc.	Set Channel Selector to 9 (See Note above)		
* 185.75 Mc. ** 181.25 Mc.	Channel 8 183 Mc.	Set Channel Selector to 8 (See Note above)		
* 179.75 Mc. ** 175.25 Mc.	Channel 7 177 Mc.	Set Channel Selector to 7 (See Note above)		
* 81.75 Mc. ** 77.25 Mc.	Channel 5 79 Mc.	Set Channel Selector to 5 (See Note above)		
* 71.75 Mc. ** 67.25 Mc.	Channel 4 69 Mc.	Set Channel Selector to 4 (See Note above)		
* 65.75 Mc. ** 61.25 Mc.	Channel 3 63 Mc.	Set Channel Selector to 3 (See Note above)		
* 59.75 Mc. ** 55.25 Mc.	Channel 2 57	Set Channel Selector to 2 (See Note above)		



* Denotes Sound Carrier Marker
** Denotes Picture Carrier Marker

TYPICAL OVERALL RESPONSE CURVE

If an unsatisfactory overall response is obtained for a particular channel, observe RF Amp. and Mixer response curve for that channel (as described in RF Amp. and Mixer Alignment Table). If characteristic curve does not conform well within the typical curve shown in Fig. 3 then do the following:-

1. Check method of connecting scope, voltmeter and generator leads to eliminate possible distortion of observed response, or:-
2. Attempt to obtain a better compromise for RF response on all channels by realigning RF Amp. and Mixer circuits.

I.F. ALIGNMENT

1) Tuner receiver to channel 13.
2) Connect 3 volt bias battery with negative terminal to AGC (Top of C-6), positive terminal to chassis.
3) Connect D.C. V.T.V.M. to junction of R-23 and L-7. Low side to chassis.
4) Connect Signal Generator to floating shield of converter tube V-2 (5X8). (Shield raised slightly so that it does not make contact with chassis). Use unmodulated signal.

MARKER GENERATOR	ADJUST	PROCEDURE
45.60 Mc.	Tuner	Peak for maximum response. Adjust output of signal generator so that maximum response does not produce more than -1v. D.C. on V.T.V.M.
41.25 Mc. 47.25 Mc. 38.25 Mc.	L-2B L-1B L-3	Adjust to approximate frequency. Adjsut to approximate frequency. Adjust to approximate frequency.
43.50 Mc. 44.10 Mc. 42.10 Mc. 45.60 Mc.	L-1A L-2A L-4 L-5	Peak for maximum response. Adjust output of signal generator so that maximum response does not produce more than -1v. D.C. on V.T.V.M.
41.25 Mc. 47.25 Mc. 38.25 Mc.	L-2B L-1B L-3	Adjust traps for minimum response. Increase output from signal generator so that a true minimum position can be found.

5) Connect vertical input of an oscilloscope instead of V.T.V.M. to video test point with vertical scope gain set at, or near, maximum. (Horizontal scope sweep set at 400 cycles).

MARKER GENERATOR	ADJUST	PROCEDURE
47.25 Mc. 400 Cycles Amp. Mod.	L-1B	With signal generator set at maximum output, adjust L-1B for minimum vertical response on scope.

6) Now that all the I.F. coils have been set, the overall response can be observed and adjusted if necessary.

SIGNAL GENERATOR INPUT			MEASURING INSTRUMENT	ADJUST	PROCEDURE
CONNECTION	FREQUENCY				
	SWEEP	MARKER			
Connect terminated sweep and marker as in step 4.	Centre Frequency 45.0 Mc. 10.0 Mc. Sweep	45.75 Mc.	Scope connected through 15K resistor to junction L-7 & R-23	L-1A L-2A L-4 L-5	If 45.75 Mc. does not lie 55% to 60% down adjust Tuner (See Fig. 4).

Providing overall curve is as shown in Fig. 4, no further adjustments are needed. If band width or tilt is not as specified, repeat entire alignment procedure. If still out then a slight retouching is permissible. Trap L-1B must be adjusted as indicated above. Do not re-adjust while observing overall I.F. response curve.

Kepp output of Signal Generator as low as possible when observing the overall I.F. shape since tube overload might result and the response will appear incorrectly flat and wide.

All instrument leads should be kept as short as possible to prevent interaction between input and output leads. Failure to do this may result in an unstable response indication.

NOTE: It is important that the output cable of the sweep and marker generator be properly terminated in their characteristic impedance which is usually from 50 to 70 ohms. If this termination has not been built into the end of the cable by the instrument manufacturer, then a reisitor of the proper value (characteristic impedance) should be connected as shown in Fig. 2.

If in doubt check your instruction book which is issued by test equipment manufacturer.

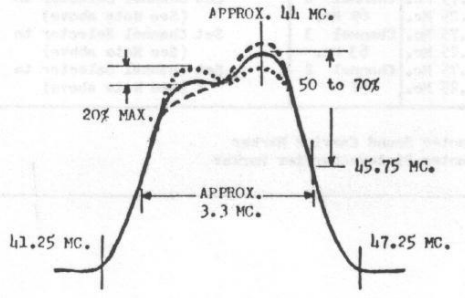
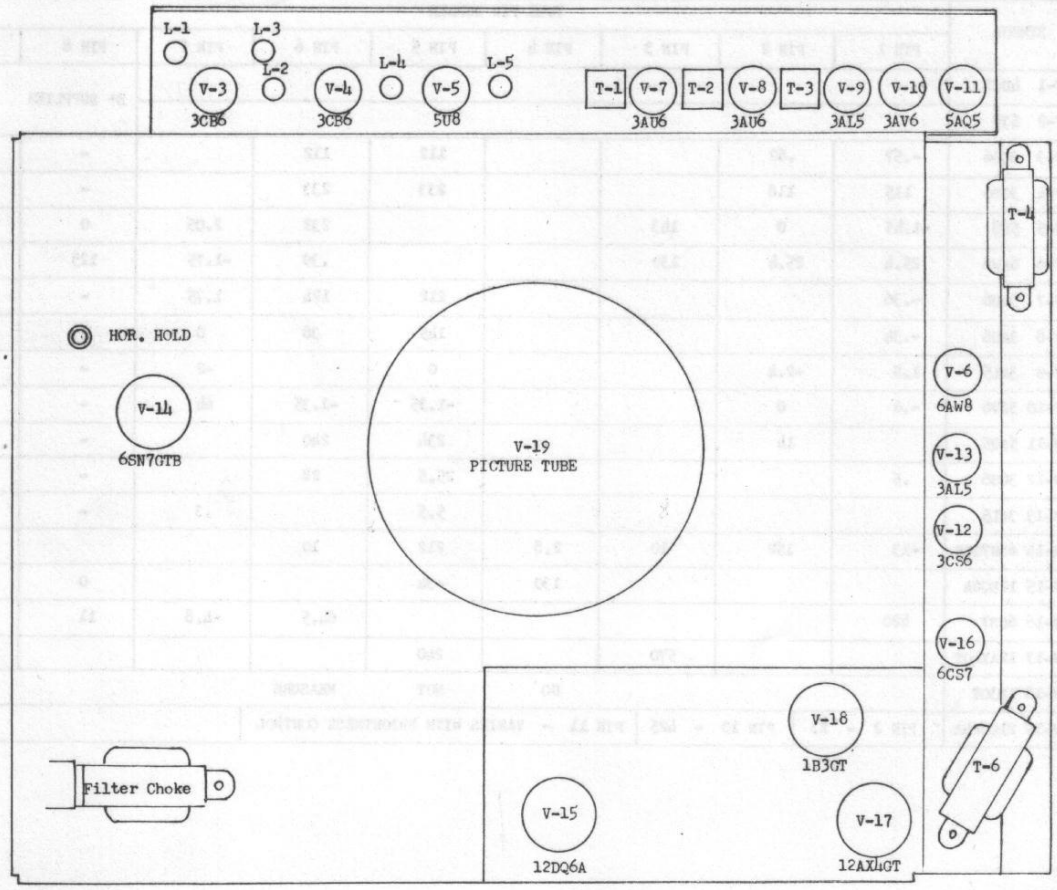


Figure 4. OVERALL I.F. RESPONSE CURVE

SOUND I.F. ALIGNMENT

STEP	GENERATOR INPUT		MEASURING INSTRUMENT	ADJUST	REMARKS
	CONNECTION	FREQUENCY			
1	Signal Generator to Pin 9 of V-5, 5U8. Low side to chassis.	4.5 Mc. AM Mod.	Connect A.C. probe of V.T.V.M. to pin 11 of V-19. (Picture Tube)	Bottom Core of T-1	Set Signal Generator to high output. Adjust for minimum reading on V.T.V.M.
2			Connect C.R.O. to pin 7 of V-11. (5AQ5)	T-1 Top and T-2 & T-3 Bottom	Set Top core of T-3 (Secondary) all the way up. Set volume control at maximum and Signal Geberator to lowest output that will provide a useble signal. Adjust for maximum.
3				T-3 Top	Set Signal Generator to high output. Adjust for minimum.



TUBE AND TRIMMER LOCATION DIAGRAM

ADJUSTMENT OF SIGNAL MONITOR

Before adjusting make sure the picture lock has been properly adjusted. This control (R-105) should normally be set at the extreme counter-clockwise position with the Local-Suburban switch in the "Local" position. If sync improvement is required in electrically noisy fringe areas, rotate the control R-105 clockwise for best picture stability.

CONDITIONS FOR VOLTAGE READINGS

Due to component varistions, voltage readings may vary slightly from those given here. The picture tube, deflection yoke and high voltage circuits were connected to take the following readings.

1) Antenna disconnected and antenna terminal shorted on tuner and connected to chassis (Use short leads).

2) Line voltage maintained at 117 volts A.C.

3) All controls in position for normal picture. (Varies when it directly effects reading).

4) All measurements taken with a vacuum tube voltmeter.

5) All readings listed in table were taken between points shown unless otherwise noted.

VOLTAGE READINGS

SYMBOL	TUBE PIN NUMBER								
	PIN 1	PIN 2	PIN 3	PIN 4	PIN 5	PIN 6	PIN 7	PIN 8	PIN 9
V-1 4BZ7								B+ SUPPLIES	140 & 240
V-2 5X8									
V-3 3CB6	-.57	.62			112	112		-	-
V-4 3CB6	115	118			233	233		-	-
V-5 5U8	-1.45	0	143			232	2.05	0	-.47
V-6 6AW8	25.4	25.4	130			.39	-1.75	125	160
V-7 3AU6	-.36				212	124	1.75	-	-
V-8 3AU6	-.34				145	38	0	-	-
V-9 3AL5	1.5	-2.4			0		-2	-	-
V-10 3AV6	-.6	0			-1.35	-1.35	64	-	-
V-11 5AQ5		14			234	240		-	-
V-12 3CS6	.5				25.5	28		-	-
V-13 3AL5					5.5		.3	-	-
V-14 6SN7GTB	-13	152	10	2.8	212	10			-
V-15 12DQ6A				130	-34			0	-
V-16 6CS7	420					64.5	-4.8	11	
V-17 12AX4GT			570		240				
V-18 1B3GT	DO NOT MEASURE								
V-19 21CBP4A	PIN 2 - 23	PIN 10 - 425	PIN 11 - VARIES WITH BRIGHTNESS CONTROL						

WAVE SHAPE ANALYSIS

The wave shapes and the peak to peak voltage values shown in the "WAVE SHAPE ANALYSIS CHART" were taken on a TEKTRONIX OSCILLOSCOPE

NOTE: It may be impossible to observe the full amplitude of the wave shapes or to read the same peak to peak voltage values shown with average service equipment due to the low sensitivity found in some oscilloscopes.

The peak to peak voltages given may vary slightly depending on signal stregth and component variations.

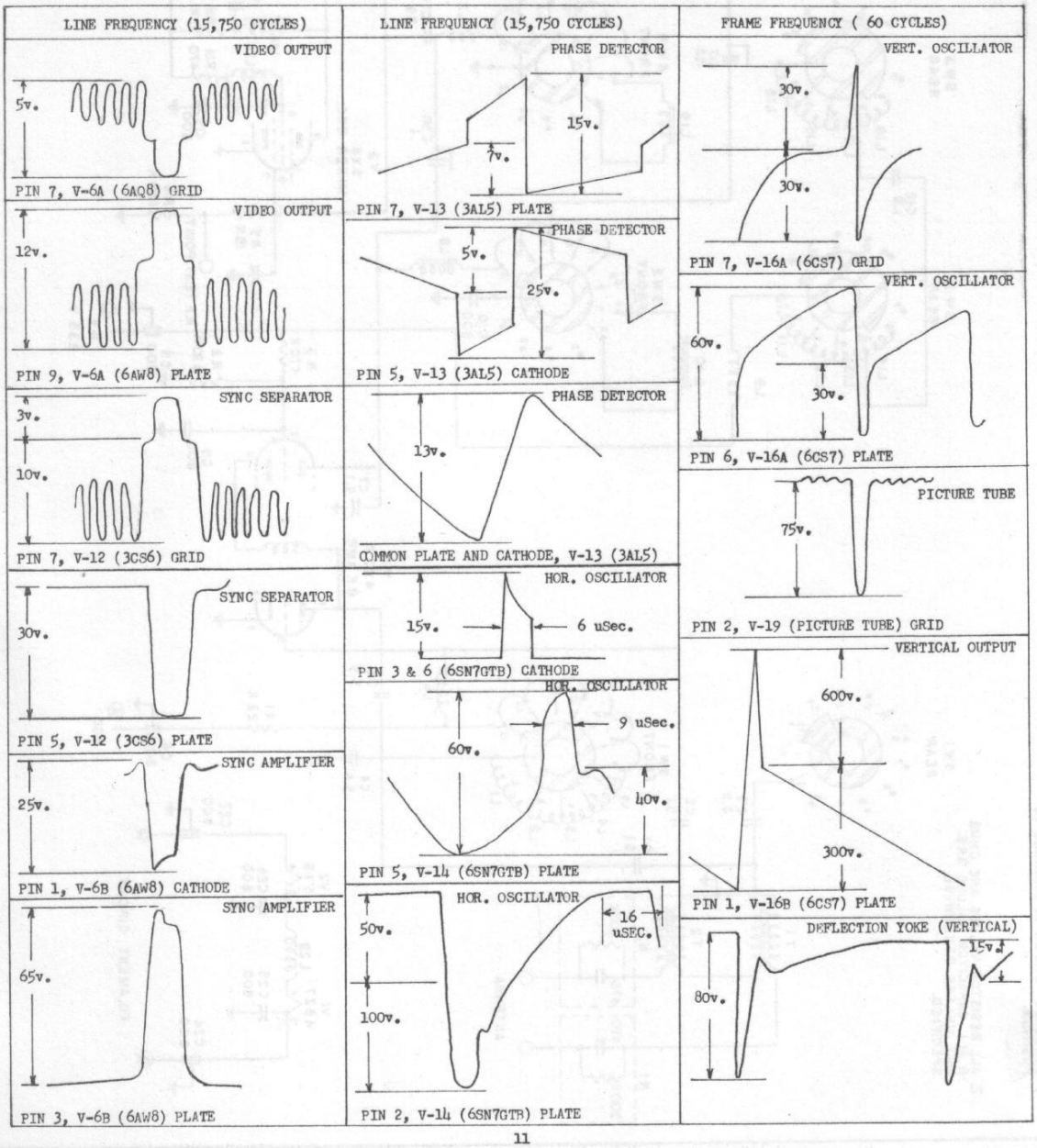
To accurately observe the wave shapes, the relatively high input capacity of an oscilloscope must be reduced so as not to change the operating characteristics of the television set. Failure to do this will result in wrong shape readings. This is accomplished by using a low capacity probe.

1. Connect antenna and tune receiver to a channel where best reception has been obtained in the past.

2. Low end of probe is connected to chassis and the contrast control is set to maximum counter-clockwise position. Signal Monitor switch on "LOCAL", other controls normal.

NOTE: A wave shape seen on your oscilloscope may be upside down from same wave shape shown here. This will depend on the number of stages of amplification in the oscilloscope.

WAVE SHAPE CHART



NOTES:

1 SWITCHES SHOWN IN CHANNEL 13 POSITION.

2 ALL RESISTOR VALUES ARE OHMS & ALL CAPACITOR VALUES ARE MMF UNLESS OTHERWISE SPECIFIED.

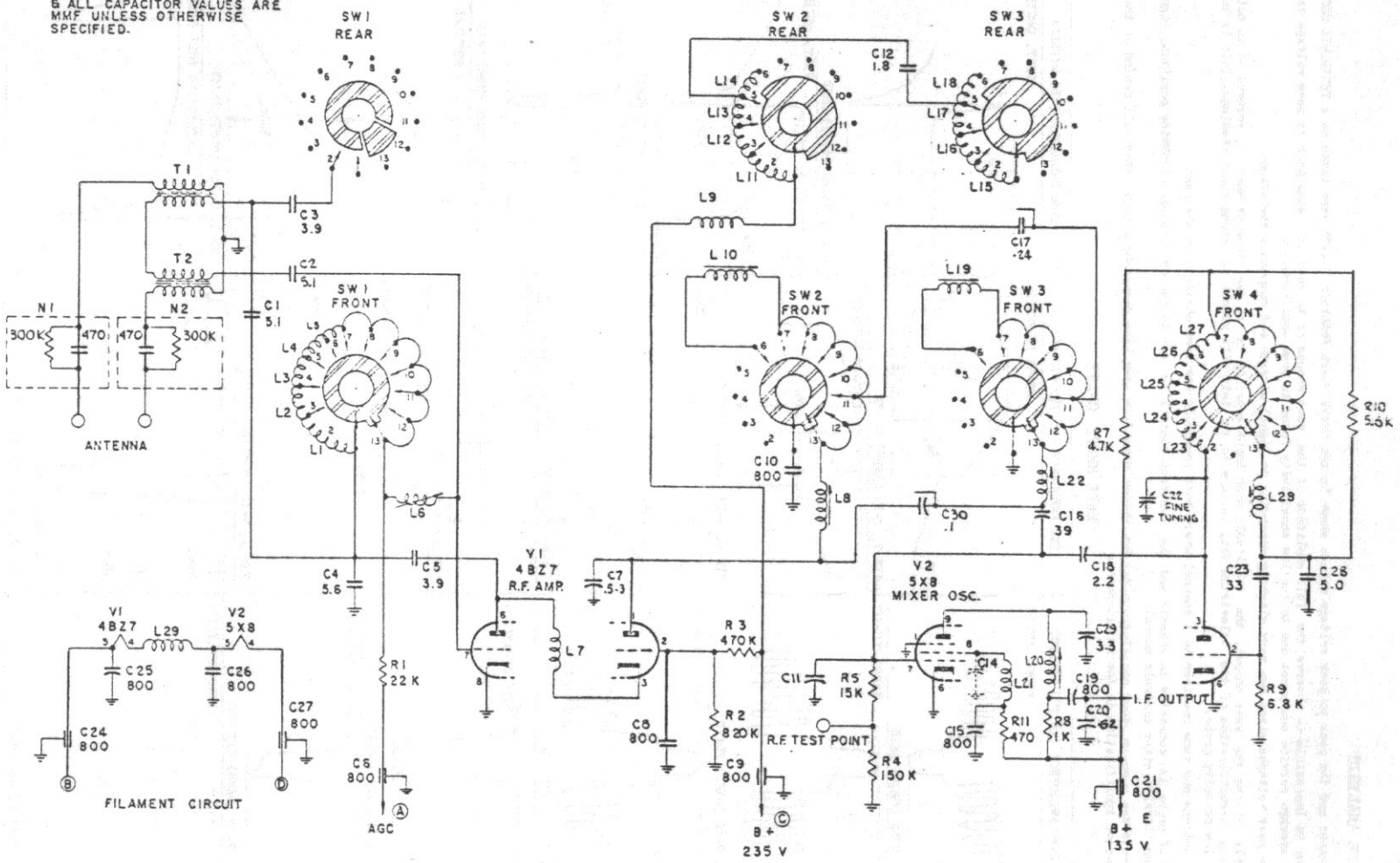


DIAGRAM OF CONNECTIONS
TV TUNER PART NO. B517-530

PARTS LIST

CABINET PARTS LIST

PART NO.	DESCRIPTION	MODEL NO.
519-109	Cabinet - Walnut	103W21
1-519-109	Cabinet - Mahogany	"
2-519-109	Cabinet - Limed Oak	"
517-378	Cabinet - Walnut	106T21
1-517-378	Cabinet - Mahogany	"
2-517-378	Cabinet - Limed Oak	"
517-356	Cabinet - Walnut	106K21
1-517-356	Cabinet - Mahogany	"
2-517-356	Cabinet - Limed Oak	"
519-108	Cabinet - Walnut	107T21
1-519-108	Cabinet - Mahogany	"
2-519-108	Cabinet - Limed Oak	"
519-110	Cabinet - Walnut	107K21
1-519-110	Cabinet - Mahogany	"
2-519-110	Cabinet - Limed Oak	"
1-517-365	Knob - Channel Selector	All Models
2-513-523	Knob - Fine Tuning	"
517-226	Knob	103W21-107T21-107K21
515-427	Knob	106T21-106K21

PART NO.	DESCRIPTION	MODEL NO.
2-514-345	Mask - Bronze Gold	All Models
581-001	Safety Glass	"
519-120	Loudspeaker, 6" x 9" - Less O.T.	103W21-107K21
519-121	Loudspeaker, 6" x 9" - Less O.T.	103W21
512-671	Loudspeaker, 3½" - Less O.T.	103W21
511-123A	Loudspeaker, 4" x 6" - Less O.T.	107T21-106T21
511-320	Loudspeaker, 8" - Less O.T.	106K21
1-515-726	"U" Channel	All Models
519-138	Back Plate	103W21
517-366	Back Plate	106K21
517-384	Back Plate	106T21
519-137	Back Plate	107T21-107K21
516-461	Lead Assembly & Retainer Clip	All Models
519-145	Retainer Strip - Top	103W21-107T21-107K21
517-394	Retainer Strip - Top	106T21-106K21
517-377	Retainer Strip - Bottom	All Models
1-514-282	Shaft - Horizontal Hold	"
1-515-484	Cup	"

CHASSIS PARTS LIST

PART NO.	DESCRIPTION	MODEL NO.
515-264	Choke - I.F. Filter	502B-502C
515-272	Choke - Filter	"
515-273	Choke - Filter (25 cycle only)	"
511-736	Choke - Heater	"
515-274	Transformer - Vertical Output	"
515-215	Transformer - Horizontal Output	"
515-217	Transformer - Audio Output	"
509-748	Transformer - Sound I.F.	"
513-048	Transformer - Sound I.F.	"
513-596	Cup - H.V.	"
515-247	Yoke Assembly	"
509-737	Coil - Horizontal Oscillator	"
510-673	Coil - I.F.	"
517-544	Coil - Trap (38.25 Mc.)	"
517-541	Coil - Coupling & Trap	"
517-542	Coil - I.F. & Trap	"
509-743D	Coil - Peaking	"
509-743C	Coil - Peaking	"
509-743K	Coil - Peaking	"
509-743H	Coil - Peaking	"
511-863	Control - Vertical Size - R-106	"
517-522	Control - Brightness - R-103	"
517-533	Control - Contrast - R-102	"
517-556	Control - Vertical Hold - R-104	"
517-555	Control - Signal Monitor - R-105	"
503-686	Integrator	"
513-049	Discriminator - Sound	"
580-004	Fuse - 1.6 Amp.	"

PART NO.	DESCRIPTION	MODEL NO.
513-953	Holder - Fuse	502B-502C
515-258	Socket Assembly - Pix Tube	"
513-688	Terminal - Antenna	"
2-515-221	Tube Retainer & Strap Assembly	"
511-710	Tube Mtg Bracket (L.H.)	"
511-710A	Tube Mtg Bracket (R.H.)	"
513-595	Centering Unit	"
515-291	Spring - Centering Unit Mtg.	"
513-615	Spring - Grounding	"
509-703	Ion Trap	"
514-193	Width Control	"
511-846	Foot - Plastic	"
515-229	Chassis Support Assembly	"
517-527	Shield Assembly - H.V.	"
513-870	Door - H.V. Compartment	"
515-299	Rectifier	"
517-530	Tuner	"
2-515-489	Lead - Antenna	"
513-519	Plug Assembly	"
509-705C	Connector Assembly - H.V.	"
515-275	Condenser, D.E. C-101	"
515-279	Condenser, D.E. C-102	"
515-280	Condenser, D.E. C-103	"
513-875	Condenser, D.E. C-104	"
515-278	Condenser, D.E. C-106, C-107, C-108 (25 cycle only)	"
515-276	Condenser, D.E. C-105 (25 cycle only)	"

All Parts Subject to Change or Withdrawal Without Notice