



TELEVISION Service Manual

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1956 Supplement No. 23

GORDON OLIVER TELEVISION

INDEX RADIO SERVICE

ADMIRAL 15 923 CALVERHALL ST.

Model NORTH VANCOUVER B.C.

19Y4PRX Same as 19Y4RFX.	
19Y4RFX Circuit	47, 48
19Y4RFX Alignment (partial)	3
19Y4RFX Chassis layouts	2, 4, 5
19Y4RFX All other data see 20Y4EX in Supp. No. 20.	

CBS-COLUMBIA

Chassis	Page
921 Circuit	49, 50
921 Tuner circuit	8
921 Alignment	5, 7
921 Chassis layouts	8, 9
921 Coil identification	8
921-2 Same as 921.	
921-6 Same as 921.	

DUMONT

Chassis	Page
CD-356 Circuit	51, 52
CD-356 Tuner circuits	10
CD-356 Alignment	13, 14
CD-356 Chassis layout	12
CD-356 Resistances	15
CD-356 Voltages	11
CD-356 Coil identification	15

Models:

Carlisle	Uses chassis CD-356.
Hampton	Uses chassis CD-356.
Pembroke	Uses chassis CD-356.

ELECTROHOME

Chassis	Page
Electromatic "90" Series "D" Circuit	53, 54
Electromatic "90" Tuner circuit	18
Electromatic "90" Alignment	16, 17
Electromatic "90" Radio circuit	20
Electromatic "90" Chassis layouts	19
Electromatic "90" Coil identification	16

Models:

CHT221-515-Z	See Capalano in Supp. #18.
CHT221-515Z	See Electromatic "90" in Supp. No. 21.
Balfour	Uses Series "D" chassis above.
Bavarian	Uses Series "D" chassis above.
Berkley	Uses Series "D" chassis above.
Keltic	Uses Series "D" chassis above.
Saxony	Uses Series "D" chassis above.

EMERSON

Chassis	Page
TV-V-288 Circuit	61, 62
TV-V-288 Alignment	25 to 30
TV-V-288 Voltages	25
TV-V-288 Chassis layout	25
TV-V-288 Coil identification	30
TV-V-358 Same as TV-V-288.	

Models:

EM-3009	Uses chassis TV-V-288.
EM-3010	Uses chassis TV-V-358.
EM-3011	Uses chassis TV-V-358.

HALLICRAFTERS

Chassis	Page
412M6 Run 1 Circuit	55, 56
412M6 Run 2 Circuit 60 cy.	57, 58
412M6 Run 2 25-60 cy. Circuit	59, 60
412M6 Alignment	21 to 23
412M6 Chassis layout	24
412M6 Coil identification	21

Models:

621-H-20	Uses chassis 412M6.
621-H-22	Uses chassis 412M6.
621-H-25	Uses chassis 412M6.
621-H-26	Uses chassis 412M6.

MARCONI

Chassis	Page
TV-V-288 Circuit	61, 62
TV-V-288 Alignment	25 to 30
TV-V-288 Voltages	25
TV-V-288 Chassis layout	25
TV-V-288 Coil identification	30
TV-V-338 Same as TV-V-288.	
TV-V-358 Same as TV-V-288.	

Models:

TV-2332	Uses chassis TV-V-358.
TV-2552	Uses chassis TV-V-358.
TV-2632	Uses chassis TV-V-288.
TV-2752	Uses chassis TV-V-338.

PHILCO

Chassis	Page
TV-332 Circuit	63, 64
TV-332 Tuner wiring	38
TV-332 Alignment	31 to 33
TV-332 Chassis layouts	34, 35
TV-332 Coil identification	35
TV-332 Waveforms	37
TV-332 Automatic tuning system	36, 38
TV-332 25 cycle power supply	38
TV-332-25 Same as TV-332.	

RCA-VICTOR

See Chassis Identification Codes pages 96 to 98.
See Retrace Line Suppression on 1956-57 chassis on page 98.

Chassis	Page
CT1708 Circuit	69, 70
CT1708 Tuner circuit	85
CT1708 Alignment	82
CT1708 Chassis layout	83, 84
CT1708 Coil identification	82
CT1709 Circuit	67, 68
CT1709 Tuner circuit	81
CT1709 Alignment	45
CT1709 Sound strip circuit	46
CT1709 Deflection circuit	46
CT1709 Printed circuit assemblies	46
CT1709 Chassis layouts	79, 80
CT1709 Coil identification	45
CT1710 Same as CT1709.	
CT2119 Circuit	65, 66
CT2119 Tuner circuit	39
CT2119 Alignment	40 to 42
CT2119 Chassis layouts	43, 44
CT2119 Coil identification	39
CT2120 Same as CT1708.	
CT2124 Same as CT1709.	
CT2125 Same as CT1709.	
CT2130 Same as CT1709.	
CT2405 Same as CT1708.	
KCS100B (Personal) Circuit	71, 72
KCS100B Alignment	92, 93 & 95
KCS100B Installation	86
KCS100B Chassis layouts	88 to 91
KCS100B Voltages	94, 95
KCS100B Coil identification	87

Models:

8-PT-7030	Uses chassis KCS100B.
8-PT-7031	Uses chassis KCS100B.
8-PT-7032	Uses chassis KCS100B.
8-PT-7034	Uses chassis KCS100B.
17T166 (Martel)	Uses chassis CT1708.
17T220 (Vista)	Uses chassis CT1709.
17T221 (Wyman)	Uses chassis CT1709.
17T222 (Arden)	Uses chassis CT1710.
17TC177 (Errol)	Uses chassis CT1708.
17TC250 (Hanson)	Uses chassis CT1710.
21T163 (Arden)	Uses chassis CT2119.
21T165 (Townsmen 21")	Uses chassis CT2120.
21T191A (Wayland)	Uses chassis CT2124.
21T223 (Compton)	Uses chassis CT2124.
21T224 (Allison)	Uses chassis CT2124.
21T225 (Townsmen)	Uses chassis CT2125.
21TC171 (Goodwin)	Uses chassis CT2119.
21TC172 (Bartram)	Uses chassis CT2119.
21TC175 (Devlin)	Uses chassis CT2120.
21TC178 (Radnor)	Uses chassis CT2120.
21TC179 (Brookton)	Uses chassis CT2119.

21TC212 (Fillmore)	Uses chassis CT2125.
21TC251 (Vincent)	Uses chassis CT2125.
21TC252 (Spencer)	Uses chassis CT2125.
21TC254 (Greenwich)	Uses chassis CT2130.
21TC255 (Chatfield)	Uses chassis CT2119.
24TC243 (Blake)	Uses chassis CT2405.

SIMPSON'S-SEARS

Model	Page
C817.6000 Circuit	73, 74
C817.6000 Tuner circuit	100
C817.6000 Alignment	101
C817.6000 Chassis layouts	99, 100
C817.6000 Coil identification	99
C819.5306 Circuit	75, 76
C819.5306 Alignment	104
C819.5306 Circuit description	103
C819.5306 Chassis layout	102
C819.5306 Coil identification	102
C819.5307 Same as C819.5306.	

SPARTAN

Chassis	Page
24E1 Circuit	77, 78
24E1 Alignment	105
24E1 Chassis layouts	106
24E1 Coil identification	105

Models:

24E1-T	Uses chassis 24E1.
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TRAV-LER

Chassis	Page
412M6 Run 1 Circuit	55, 56
412M6 Run 2 Circuit 60 cy.	57, 58
412M6 Run 2 25-60 cy. Circuit	59, 60
412M6 Alignment	21 to 23
412M6 Chassis layout	24
412M6 Coil identification	21

Models:

621-T-20	Uses chassis 412M6.
621-T-22	Uses chassis 412M6.
621-T-25	Uses chassis 412M6.
621-T-26	Uses chassis 412M6.

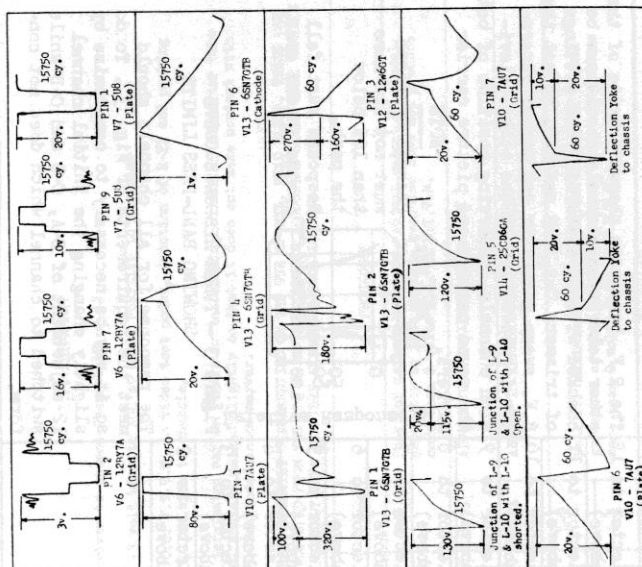
VIKING

Chassis	Page
Ultronic "90" Series "D" Circuit	53, 54
Ultronic "90" Tuner circuit	18
Ultronic "90" Alignment	16, 17
Ultronic "90" Radio circuit	20
Ultronic "90" Chassis layouts	19
Ultronic "90" Coil identification	16

Models:

TCD-246R	Uses Series "D" chassis above.
TCD-254	Uses Series "D" chassis above.

RCC
TELEVISION
Supplement
No. 23



WAVE SHAPE ANALYSIS CHART

CONDITIONS FOR TAKING WAVE SHAPES

The wave shapes and the peak to peak voltage values shown in the "WAVE SHAPE ANALYSIS CHART" were taken on a TEXTONIX 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 voltage given may vary slightly depending on signal strength and component variations.

To accurately observe the wave shapes, use relatively high input capacity and high impedance. The oscilloscope should be set for "AC" position, Local-Suburban switch on "LOCAL", other controls normal.

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 turned to minimum.

NOTE: A wave shape seen in your oscilloscope may be upside down (inverted) from the one shown here; this will depend on the number of stages of amplification in the oscilloscope used.

TUBE SOCKET WIRING CHART									
TUBE	PIN NUMBER								
	1	2	3	4	5	6	7	8	9
V1 3B5									REMARKS
V2 5Y6									B+ SUPPLY = 120V.
V3 3B6	-7	-7			117	117	117	0	-1
V4 3B6	-7	-7			117	120	112	132	0
V5 508	-75	0	120				112	132	0
V6 12BY7A	2.1	2.2					123	132	0
V7 508	140	0	80				126	65	0
V8 3AL6	-14				126	65	0	-7	56
V9 5Y6								8.5	
V10 7AU7	56	0	100	110	0		28	-12	-3
V11 12L6GT			120	130	0			111.5	
V12 12L6GT	-66	200	0	-20	130/220	1		105	
V13 6SN7GTB			0	0	-23				
V14 25D6CA			0	0	130				
V15 12AU6TA			0	0	130				
V16 12AU6TA			0	0	130				
V17 6SN7GTB			0	0	130				
V18 6SN7GTB			0	0	130				
V19 6SN7GTB			0	0	130				
V20 6SN7GTB			0	0	130				
V21 6SN7GTB			0	0	130				
V22 6SN7GTB			0	0	130				
V23 6SN7GTB			0	0	130				
V24 6SN7GTB			0	0	130				
V25 6SN7GTB			0	0	130				
V26 6SN7GTB			0	0	130				
V27 6SN7GTB			0	0	130				
V28 6SN7GTB			0	0	130				
V29 6SN7GTB			0	0	130				
V30 6SN7GTB			0	0	130				
V31 6SN7GTB			0	0	130				
V32 6SN7GTB			0	0	130				
V33 6SN7GTB			0	0	130				
V34 6SN7GTB			0	0	130				
V35 6SN7GTB			0	0	130				
V36 6SN7GTB			0	0	130				
V37 6SN7GTB			0	0	130				
V38 6SN7GTB			0	0	130				
V39 6SN7GTB			0	0	130				
V40 6SN7GTB			0	0	130				
V41 6SN7GTB			0	0	130				
V42 6SN7GTB			0	0	130				
V43 6SN7GTB			0	0	130				
V44 6SN7GTB			0	0	130				
V45 6SN7GTB			0	0	130				
V46 6SN7GTB			0	0	130				
V47 6SN7GTB			0	0	130				
V48 6SN7GTB			0	0	130				
V49 6SN7GTB			0	0	130				
V50 6SN7GTB			0	0	130				
V51 6SN7GTB			0	0	130				
V52 6SN7GTB			0	0	130				
V53 6SN7GTB			0	0	130				
V54 6SN7GTB			0	0	130				
V55 6SN7GTB			0	0	130				
V56 6SN7GTB			0	0	130				
V57 6SN7GTB			0	0	130				
V58 6SN7GTB			0	0	130				
V59 6SN7GTB			0	0	130				
V60 6SN7GTB			0	0	130				
V61 6SN7GTB			0	0	130				
V62 6SN7GTB			0	0	130				
V63 6SN7GTB			0	0	130				
V64 6SN7GTB			0	0	130				
V65 6SN7GTB			0	0	130				
V66 6SN7GTB			0	0	130				
V67 6SN7GTB			0	0	130				
V68 6SN7GTB			0	0	130				
V69 6SN7GTB			0	0	130				
V70 6SN7GTB			0	0	130				
V71 6SN7GTB			0	0	130				
V72 6SN7GTB			0	0	130				
V73 6SN7GTB			0	0	130				
V74 6SN7GTB			0	0	130				
V75 6SN7GTB			0	0	130				
V76 6SN7GTB			0	0	130				
V77 6SN7GTB			0	0	130				
V78 6SN7GTB			0	0	130				
V79 6SN7GTB			0	0	130				
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V85 6SN7GTB			0	0	130				
V86 6SN7GTB			0	0	130				
V87 6SN7GTB			0	0	130				
V88 6SN7GTB			0	0	130				
V89 6SN7GTB			0	0	130				
V90 6SN7GTB			0	0	130				
V91 6SN7GTB			0	0	130				
V92 6SN7GTB			0	0	130				
V93 6SN7GTB			0	0	130				
V94 6SN7GTB			0	0	130				
V95 6SN7GTB			0	0	130				
V96 6SN7GTB			0	0	130				
V97 6SN7GTB			0	0	130				
V98 6SN7GTB			0	0	130				
V99 6SN7GTB			0	0	130				
V100 6SN7GTB			0	0	130				

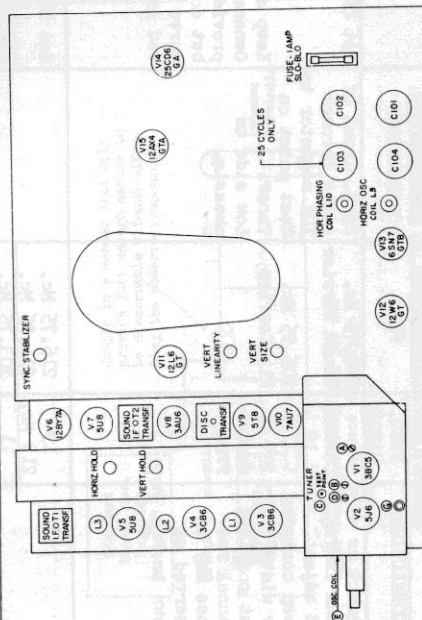


FIGURE 1. CHASSIS LAYOUT REAR-VIEW.

SWEEP & MARKER GENERATOR		MARKER GEN. FREQ.	OSCILLOSCOPE CONNECTIONS	MISCELLANEOUS INSTRUCTIONS	TRIMMER OR SLUG	TYPE OF ADJUSTMENT AND OUTPUT INDICATION
CONNECTIONS	FREQ. RANGE					
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. 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-A R.F. Amp. Input Trimmer C-B R.F. Plate Trimmer C-D Mixer Grid Trimmer	Adjust Trimmers C-A, C-B and C-D to obtain response shown in Fig. 3. IMPORTANT: When adjusting trimmers C-A, C-B and C-D it will be noted that the band pass characteristic 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.	215.75 Mc.	Same as Above	Set Channel Selector to 13 (See Note above)	The R.F. band pass characteristic of the other television channels should now be checked without disturbing the settings of trimmers C-A, C-B and C-D. Adjust the R.F. sweep generator and marker generator for operation on the other television channels, observing position of both the sound carrier and picture carrier markers. NOTE Figure 3 - TUNER RESPONSE CURVE SHOWING BAND-PASS LIMITS 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 12 adjustment of C-A, C-B and C-D while switched to channel which does not conform.	
	11 201 Mc.	203.75 Mc.		Set Channel Selector to 11 (See Note above)		
	10 195 Mc.	197.75 Mc.		Set Channel Selector to 10 (See Note above)		
	9 189 Mc.	191.75 Mc.		Set Channel Selector to 9 (See Note above)		
	8 183 Mc.	187.25 Mc.		Set Channel Selector to 8 (See Note above)		
	7 177 Mc.	185.75 Mc.		Set Channel Selector to 7 (See Note above)		
	6 85 Mc.	179.75 Mc.		Set Channel Selector to 6 (See Note above)		
	5 79 Mc.	175.25 Mc.		Set Channel Selector to 5 (See Note above)		
	4 69 Mc.	87.75 Mc.		Set Channel Selector to 4 (See Note above)		
	3 63 Mc.	83.25 Mc.		Set Channel Selector to 3 (See Note above)		
	2 57 Mc.	81.75 Mc.		Set Channel Selector to 2 (See Note above)		
		77.25 Mc.				
		71.75 Mc.				
		67.25 Mc.				
		65.75 Mc.				
		61.25 Mc.				
		59.75 Mc.				
		55.25 Mc.				

I.F. ALIGNMENT

1. Tune receiver to unused Channel 10 or 12.
2. Connect -3 volt bias to AGC at C-11. Positive to chassis.
3. Connect D.C. V.T.V.M. to video test point, junction of R-21 and peaking coil L-5, low side to chassis.
4. Connect terminated marker generator to floating shield of converter tube Y-2, 546. (Shield raised slightly so that it does not make contact with chassis). Use unmodulated marker.

NOTE:- WE HAVE RECENTLY STANDARDIZED ON THE USE OF HEX. HEAD SLUGS, THESE CAN BE ADJUSTED FROM THE TOP OR BOTTOM. BEFORE ADJUSTING SLUGS MAKE CERTAIN THE CORRECT TYPE OF FIBRE ALIGNMENT TOOL IS USED.

MARKER GENERATOR	ADJUST	PROCEDURE
25.1 Mc. Unmodulated	L-3	Peak for maximum response. Adjust output of signal generator so that maximum response does not produce more than 2 volts D.C. on V.T.V.M.
21.75 Mc. Unmodulated	L-2A	ADJUST TO APPROXIMATE FREQUENCY
27.75 Mc. Unmodulated	L-1A	ADJUST TO APPROXIMATE FREQUENCY
23.3 Mc. Unmodulated	L-2	Peak for maximum response. Adjust output of signal generator so that maximum response does not produce more than 2 volts D.C. on V.T.V.M.
26.0 Mc. Unmodulated	L-1	
24.1 Mc. Unmodulated	G	For alignment point "G", see CHASSIS LAYOUT - REAR VIEW
21.75 Mc. Unmodulated	L-2A	Adjust trap 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
27.75 Mc. 400 cycles Amp. Mod.	L-1A	With signal generator set at maximum output, adjust for minimum vertical response on scope.

To improve Audio hum level the filament of V-7 (578) has been relocated between V-1 (3805 or 48Q7A) and V-17 (Pix Tube).

17" and 21" chassis incorporating the above changes have the Code Letter "M" and 24" chassis the Code Letter "Y".

To improve vertical hold, resistor R-36, 33K was changed to 27K and resistor R-37, 10K to 15K.

Chassis incorporating the above changes have the Code Letter "Y".

ALIGNMENT

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, 20 to 28 and 50 to 60 Mc.

b. Alignment Points - The location of all I.F. coils, tuned circuits and trimmers are shown in Figure 1.

R.F. AND MIXER ALIGNMENT

Connect 3 volt bias to AGC, positive terminal to chassis, negative terminal to C-11.

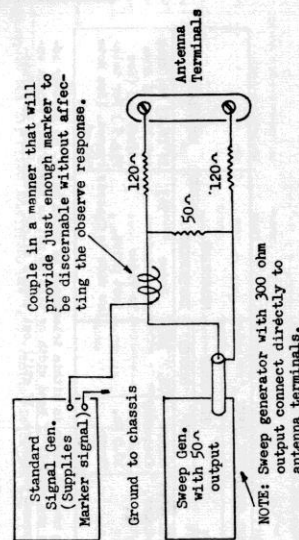


Figure 2 . GENERATOR CONNECTIONS FOR TELEVISION R.F. CHANNEL ALIGNMENT

R.F. OSCILLATOR ALIGNMENT

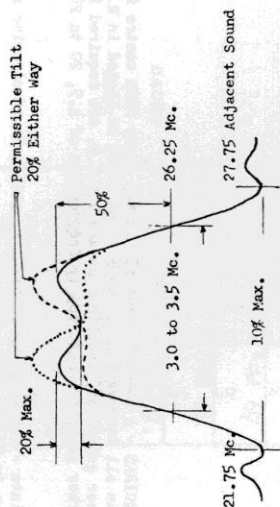
1. Connect marker and sweep generator as shown in Fig. 2, low side to chassis.
2. Connect scope to junction of R-21 and peaking coil L-5, low side to chassis.
3. Connect -3 volt bias to AOC at C-11. Positive to chassis.
4. Before undertaking oscillator alignment be sure I.F. circuits are correctly aligned for band pass characteristic and trap settings.
5. During oscillator alignment, it is necessary to set the fine tuning control in mid-position.

SIGNAL GENERATOR INPUT			MEASURING INSTRUMENT	ADJUST	PROCEDURE
CONNECTION	FREQUENCY	SWEEP MARKER			
Connect terminated sweep and marker. See Note 4.	Centre frequency 24.0 Mc. 10.0 Mc. Sweep	26.25 Mc.	Scope connected to Video test point. Low side to Chassis	T-3	If 26.25 Mc. does not lie 50% down adjust T-3 (See Fig. 5) For tolerance. (See Note below).

Providing overall curve is within tolerances as shown below, 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.

TRAPEZ L-1A AND L-2A MUST BE ADJUSTED AS INDICATED ABOVE. DO NOT RE-ADJUST WHILE OBSERVING OVERALL I.F. RESPONSE CURVE.

NOTE: Keep 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.



NOTE: It may be impossible to observe the 27.75 Mc. marker with the average service equipment due to the high attenuation of trap L-1A (Adjacent Sound).

Figure 5. OVERALL I.F. RESPONSE CURVE

MARKER SIGNAL GENERATOR FREQUENCY	SWEEP GENERATOR FREQUENCY	MISCELLANEOUS INSTRUCTIONS	SLUG	TYPE OF ADJUSTMENT AND OUTPUT INDICATION
209.75 Mc. 205.25 Mc.	Channel 12 CENTRE Frequency 207 Mc. 10 Mc. Sweep	Be sure that fine tuning control has been properly positioned. (See Note 5 above)		NOTE:- Before making the following adjustments, advance the vertical gain control on the scope in order to magnify the sound trap portion on the response curve.
		NOTE During this step and thru-out succeeding steps it is necessary to:		Then, use a non-metallic tool to adjust channel 12 oscillator slug (Accessible thru hole on front of r-f tuner unit) and shift response curve so that sound carrier marker is located at the position indicated below.
		1. Keep output of sweep generator at a level that does not allow the reading on a V.I.V.M. to exceed minus 1 volt when connected across video detector load at minimum sweep width.	Adjust Slug E-12	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 50 and 50% down from peak response.
		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.		
215.75 Mc. 211.25 Mc.	Channel 13 213 Mc.	Set Channel Selector to 13 (See Note above)		Adjust the r-f sweep generator and marker generator for operation on other television channels; set the marker generator to sound carrier frequency. After setting Channel Selector to corresponding channel, adjust oscillator slug thru hole on front of r-f tuner unit.
203.75 Mc. 199.25 Mc.	Channel 11 201 Mc.	Set Channel Selector to 11 (See Note above)		
197.75 Mc. 195.25 Mc.	Channel 10 195 Mc.	Set Channel Selector to 10 (See Note above)		
183.75 Mc. 181.25 Mc.	Channel 9 185 Mc.	Set Channel Selector to 9 (See Note above)		This permits response curve to be shifted so that sound carrier marker will appear at the position indicated below.

SOUND ALIGNMENT

4.5 MC. VIDEO TRAP ALIGNMENT (BOTTOM OF T-1)

1. Connect crystal controlled 4.5 Mc. signal generator through a .01 mf. condenser to the grid of the video amplifier tube (pin 9 of V5B, 50B). Low side to chassis.
2. Set contrast control for maximum contrast (fully clockwise)
3. Connect a V.T.V.M. (D.C. scale) through an R.F. probe to the cathode of the picture tube (pin 11, yellow lead). Low side to chassis.
4. Adjust the 4.5 Mc. trap (bottom of T-1) for minimum reading on the meter.

If a crystal controlled generator is not available the video trap can be adjusted in the field by setting the fine tuning control for maximum 4.5 Mc. in picture and adjusting the 4.5 Mc. trap (bottom of T-1) until this 4.5 Mc. beat note is reduced. Be sure that video ringing is not introduced from this adjustment since this indicates the trap was aligned at too low a frequency.

4.5 MC. SOUND I.F. ALIGNMENT

(A) USING 4.5 MC. UNMODULATED SIGNAL GENERATOR

1. Short pin 2 of V5A - 50B, to chassis with short jumper wire.
2. Keep output of signal generator low so as to produce a sharp meter indication with adjustment of transformers.

(B) USING TRANSMITTED TV AIR SIGNAL

1. Connect antenna and tune to a good on the air TV station.
2. Adjust the fine tuning control for best picture.
3. Adjust antenna coupling for moderate signal so as to provide a sharp meter indication with adjustment of transformers.
4. Meter readings may pulsate due to changes in signal strength; do not confuse with a peak adjustment.

R.F. OSCILLATOR ALIGNMENT

TYPE	CHANNEL	FUNCTION	TEST POINT	TEST POINT
185.75 Mc.	Channel 8	Set Channel Selector to 8	50B-4	V5B
181.25 Mc.	133 Mc.	(See Note above)	7A7-4	V5B
179.75 Mc.	Channel 7	Set Channel Selector to 7	7A7-4	V5B
175.25 Mc.	177 Mc.	(See Note above)	12A2	V11
87.75 Mc.	Channel 6	Set Channel Selector to 6	13A2	V12
83.25 Mc.	85 Mc.	(See Note above)	60B7B-4	V13A
81.75 Mc.	Channel 5	Set Channel Selector to 5	60B7B-4	V13B
77.25 Mc.	79 Mc.	(See Note above)	25C506A	V14
71.75 Mc.	Channel 4	Set Channel Selector to 4	13A2C7A	V15
65.75 Mc.	Channel 3	Set Channel Selector to 3	13A2C7A	V16
61.25 Mc.	63 Mc.	(See Note above)	17A5B	V17 (Chassis T-1-28)
59.75 Mc.	Channel 2	Set Channel Selector to 2	21A7A	V17 (Chassis T-1-28 & T-1-29)
55.25 Mc.	57 Mc.	(See Note above)		

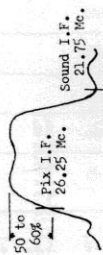


Figure 6.

TYPICAL OVERALL RESPONSE CURVE

NOTE:- Make sure that the fine tuning control remains properly positioned during this step (See Note 5 above).

NOTE:- If an unsatisfactory overall response is obtained for a particular channel, observe R.F. amplifier and Mixer response curve for that channel (as described in R.F. Amp. and Mixer Alignment Table). If characteristic curve does not conform reasonably well within the typical curve shown in Fig. 6, then do the following things:

1. Check method of connecting scope, voltmeter and generators leads to eliminate possible distortion or observe response, or:
2. Attempt to obtain a better compromise for R.F. response on all channels by re-aligning R.F. Amp. and Mixer circuits, or:
3. Try replacing Antenna, R.F. and Oscillator coils for the particular channel.

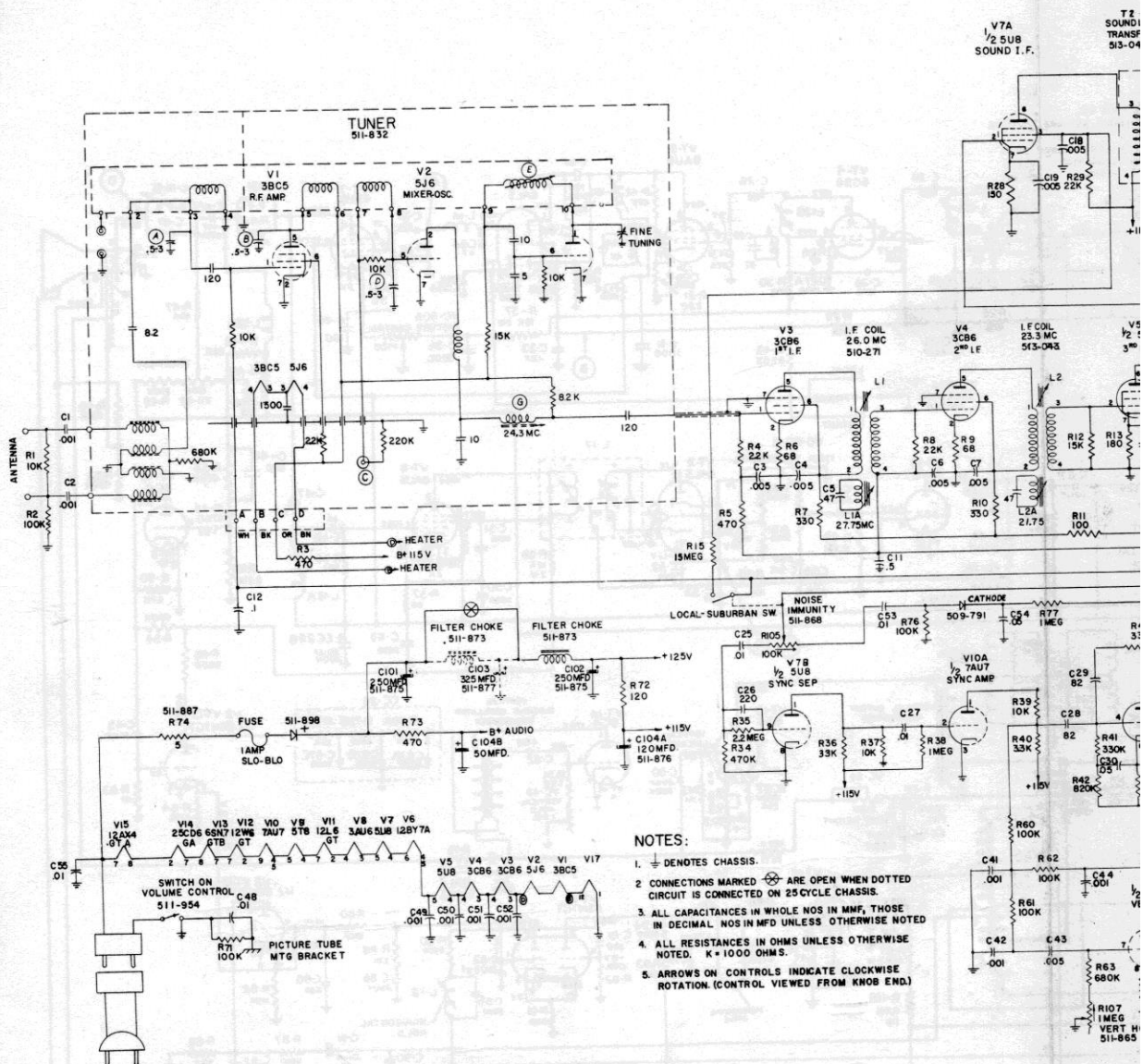
TYPE	CHANNEL	FUNCTION	TEST POINT	TEST POINT
185.75 Mc.	Channel 8	Set Channel Selector to 8	50B-4	V5B
181.25 Mc.	133 Mc.	(See Note above)	7A7-4	V5B
179.75 Mc.	Channel 7	Set Channel Selector to 7	7A7-4	V5B
175.25 Mc.	177 Mc.	(See Note above)	12A2	V11
87.75 Mc.	Channel 6	Set Channel Selector to 6	13A2	V12
83.25 Mc.	85 Mc.	(See Note above)	60B7B-4	V13A
81.75 Mc.	Channel 5	Set Channel Selector to 5	60B7B-4	V13B
77.25 Mc.	79 Mc.	(See Note above)	25C506A	V14
71.75 Mc.	Channel 4	Set Channel Selector to 4	13A2C7A	V15
65.75 Mc.	Channel 3	Set Channel Selector to 3	13A2C7A	V16
61.25 Mc.	63 Mc.	(See Note above)	17A5B	V17 (Chassis T-1-28)
59.75 Mc.	Channel 2	Set Channel Selector to 2	21A7A	V17 (Chassis T-1-28 & T-1-29)
55.25 Mc.	57 Mc.	(See Note above)		

STEP	SIGNAL GENERATOR INPUT		MEASURING INSTRUMENT	ADJUST	PROCEDURE
	CONNECTION	FREQUENCY			
1	Marker generator through .01 Mf. to Pin 9 of VSB. Low side to chassis. -or- Connect antenna and tune in a good transmitted TV signal. (Any channel).	4.5 Mc. (Unmodulated) -or- A good on the air TV signal.	Connect D.C. V.T.V.M. (Negative scale) through 10K resistor to junction of C21, R30, R31. Low side to chassis.	T-1 Top T-2 Top	Peak for maximum voltage. Adjust output of signal generator to produce about a one volt D.C. rise on meter (1 volt above noise voltage - See note below). If TV signal is used adjust antenna coupling to receiver to produce about the same voltage rise.
2	Same as above.	Same as above.	Connect V.T.V.M. through 10K resistor to junction of R87, R104 and C22. Low side to chassis.	T-6 Top and Bottom (Secondary on Top.	A) Detune Discriminator secondary T-6 for maximum negative meter reading. B) Adjust Discriminator primary T-6 for maximum negative meter reading. C) Readjust Discriminator secondary (towards original setting) for zero D.C. reading on V.T.V.M. D) Check audio, if distorted repeat steps A - C.

NOTE:- The noise voltage is measured under no signal conditions (Antenna terminals shorted directly at tuner by means of a short jumper wire; or disconnect 4.5 Mc. generator if procedure (A) is followed.

CHASSIS PARTS LIST

PART NO.	DESCRIPTION	PART NO.	DESCRIPTION
511-804	Vertical Output Transformer - T-5	511-954	Resistor - Variable (Vol. & On/Off Sm.) (Chassis TV-V-288 & 358)
511-805	Horizontal Output Transformer - T-3	511-955	Resistor - Variable (Vol. & On/Off Sm.) (Chassis TV-V-338)
511-806A	Horizontal Output Transformer - T-4	511-956	Resistor - Variable (Vol. & On/Off Sm.) (Chassis TV-V-358)
511-807	Filter Choke	511-957	Condenser D.E. C-102 - 250 Mf. 150 V.V.
511-808	Selenium Rectifier - 350 Ma.	511-958	Condenser D.E. C-103 - 305 Mf. 150 V.V. (25 cycle only)
511-809	Interlock plug Assy.	511-959	Condenser D.E. C-104, B ₁ C ₁ D ₁ - 25 Mf. 150 V.V. (25 cycle only)
511-810	I.F. coil & Trap - L-1 & L-1A (26.0 & 21.75 Mc.)	511-960	Tube Retainer & Strap Assy. (Chassis TV-V-338 & 358)
511-811	I.F. coil & Trap - L-2 & L-2A (23.3 & 27.75 Mc.)	511-961	Felt Tape (1/4" long) Used on tube retainer
511-812	I.F. coil - L-3 (25.1 Mc.)	511-962	Oscillator Keying Long (Chassis TV-V-358)
511-813	I.F. Filter Cond. - C-101	511-963	Rubber Channel (1 1/2" long) (Chassis TV-V-288)
511-814	Sound I.F. Transformer - T-1	511-964	Ion Trap
511-815	Sound I.F. Transformer - T-2	511-965	Grounding Spring
511-816	Discriminator Transformer - T-6	511-966	Tube Retainer Bracket
511-817	Feeding Coil - L-4 (Red)	511-967	Resistor - 10K (Chassis TV-V-358)
511-818	Feeding Coil - L-5 (Black)	511-968	Rubber Pad (Chassis TV-V-358)
511-819	Horizontal Phasing Coil - L-10	511-969	Felt Tape (1 3/4" long)
511-820	Horizontal Oscillator Coil - L-9	511-970	Tuner - Pentode
511-821	Screening Coil - L-11	511-971	Pin Gear Assy. (Baculite) (Chassis TV-V-338)
511-822	Screening Coil - L-12	511-972	Pin Gear Assy. (Baculite) (Chassis TV-V-358)
511-823	Fuse Holder - Picture Tube	511-973	Pin Gear Assy. (Baculite) (Chassis TV-V-338)
511-824	Fuse, 1 Amp. Littelfuse 3AG *SLO-BLO*	511-974	Pin Gear Assy. (Baculite) (Chassis TV-V-358)
511-825	Knob - Local-Search Switch	511-975	Bracket - Rear (Chassis TV-V-338)
511-826	Germanium Diode	511-976	Bracket - Rear (Chassis TV-V-358)
511-827	Resistor - Variable (Vert. Slide)	511-977	Outer Shaft (Chassis TV-V-338)
511-828	Resistor - Variable (Vert. Lin.)	511-978	Outer Shaft (Chassis TV-V-358)
511-829	Resistor - Variable (Hor. Hold)	511-979	Mounting Plate (Chassis TV-V-338)
511-830	Resistor - Variable (Hor. Hold)	511-980	Cover (Chassis TV-V-338)
511-831	Resistor - Variable (Brightness)	511-981	Collar - Outer Shaft (Chassis TV-V-338)
511-832	Resistor - Variable (Contrast)	511-982	Collar - Tuner Shaft (Chassis TV-V-338)



PRODUCTION CHANGES - To improve Audio hum level the filament of V-7 (5T8) has been relocated between V-1 (3BC5) and V-17 (Pix Tube). 17" and 21" chassis incorporating these changes have the Code Letter "W" and 24" chassis the Code Letter "Y". To improve vertical hold, resistor R-36, 33K was changed to 27K and resistor R-37, 19K to 15K. Chassis incorporating the above changes have the Code Letter "X".

MARCONI

EMERSON TV-V-288, 358, 338

