RCC TELEVISION Service Manual

PUBLISHED BY RADIO COLLEGE OF CANADA, TORONTO

1954-55 Supplement No. 13

INDEX

ADDISON

ADMIRAL

CBS-COLUMBIA - See Addison

ELECTROHOME

HALLICRAFTERS

MOTOROLA

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RACINE

RCA-VICTOR

SPARTON

SYLVANIA NORTHERN ELECTRIC

VIKING

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GENERAL INFORMATION

RECEIVER MODEL BREAKDOWN CHART

Model	Description	TV Chassis
MK-17T15	Table, Plastic	TK-712-01
MK-17T19	Table, Mahogany	WTK-712
MK-17T19W	Table, Walnut	WTK-712
MK-17T19B	Table, Limed Oak	WTK-712

TV CHASSIS—Chassis WTK-712 contains 16 circuit tubes plus a 17HP4B 17" glass, rectangular, spherical face, electrostatically focused picture tube. Chassis TK-712-01 contains a 17LP4 17" glass, cylindrical face, electrostatically focused picture tube. The picture, sound, and scanning circuits, together with a selenium rectifier half-wave doubler "B" supply, are contained on a single chassis. A series heater circuit is used.

TUNING RANGE. VHF Tuner: channels 2 through 13; switch type.

TV IF FREQUENCY. Sound: 21.9 Mc and 4.5 Mc. Picture: 26.4 Mc.

TV ANTENNA INPUT IMPEDANCE. 300 ohms.

FUSE. B+ and initial surge; 7.5 ohm special resistor. This fuse is of the plug-in type and is accessible by removing the cabinet back. See Figure 2 for location.

POWER SUPPLY. 117 volts, 25-60 cycle AC only.

POWER CONSUMPTION. VHF TV Chassis 155 watts.

TUBE COMPLEMENT

Ref. No.	Tube	Function
V - 1	6CB6	RF Amplifier
V - 2	6U8	Mixer-Oscillator
V - 3	6CB6	1st IF Amplifier
V - 4	6CB6	2nd IF Amplifier
V - 5	6CB6	3rd IF Amplifier
V - 6	6AH6	Video Amplifier
V - 8	6AU6	FM Driver-Limiter
V - 9	6AL5	Ratio Detector
V - 10A	½ 6SN7GT	1st Audio Amplifier
V - 10B	½ 6SN7GT	Phase Detector
V - 11	25L6GT	Audio Output
V - 12	12SN7GT	1st & 2nd Clippers
V - 13A	½ 12BH7	Vertical Blocking Oscillator
V - 13B	½ 12BH7	Vertical Output
V - 14	6SN7GT	Horizontal Oscillator
V - 15	25BQ6GT	Horizontal Output & High Voltage Generator
V - 16	12AX4GT	Damping Diode
V - 17	1B3GT	High Voltage Rectifier
V - 18	17HP4B	Picture tube: rectangular; glass; spherical face; aluminized; electrostatic focus
	17LP4	Picture tube: rectangular; glass; cylindrical face; electrostatic focus

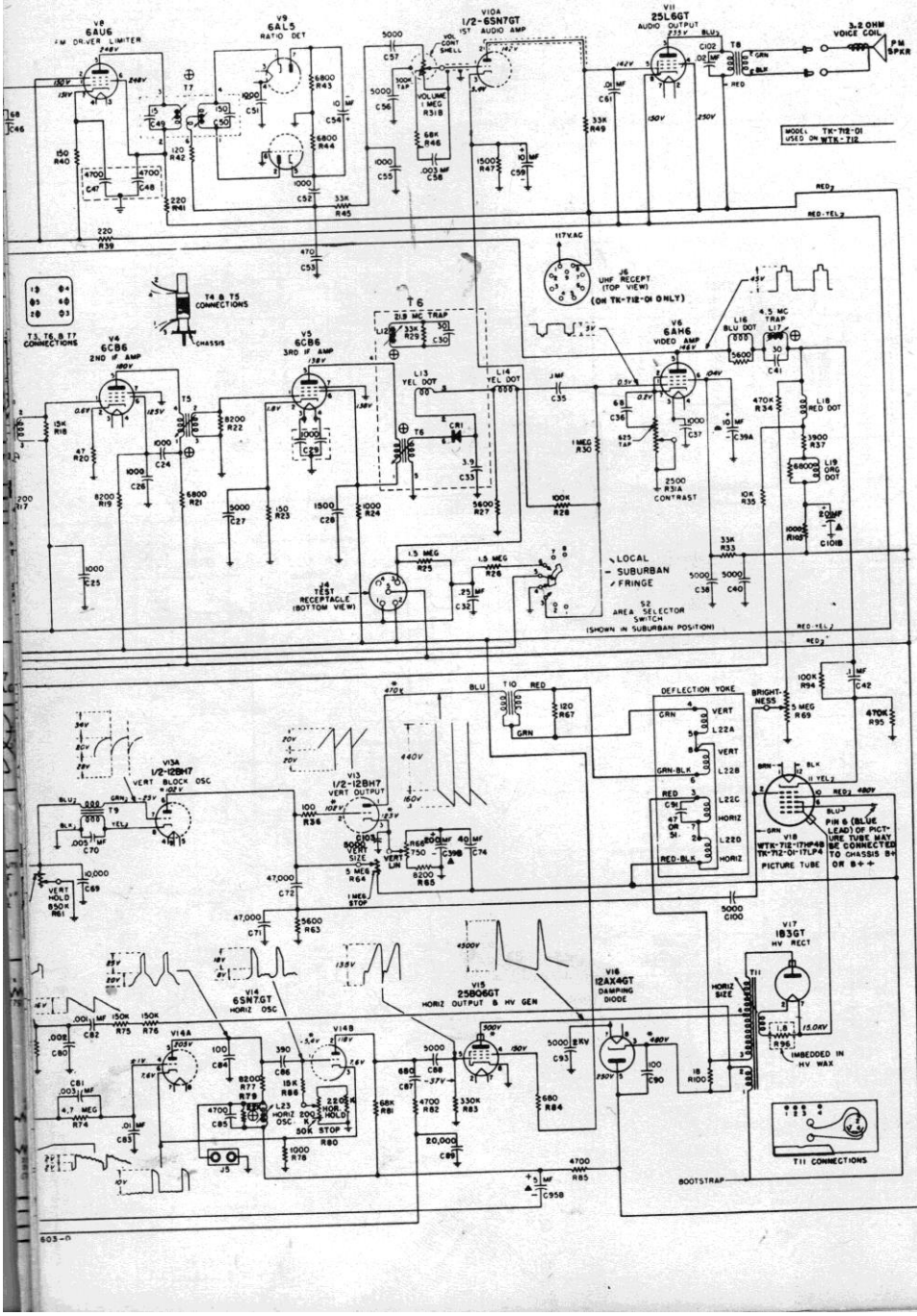
HIGH VOLTAGE WARNING

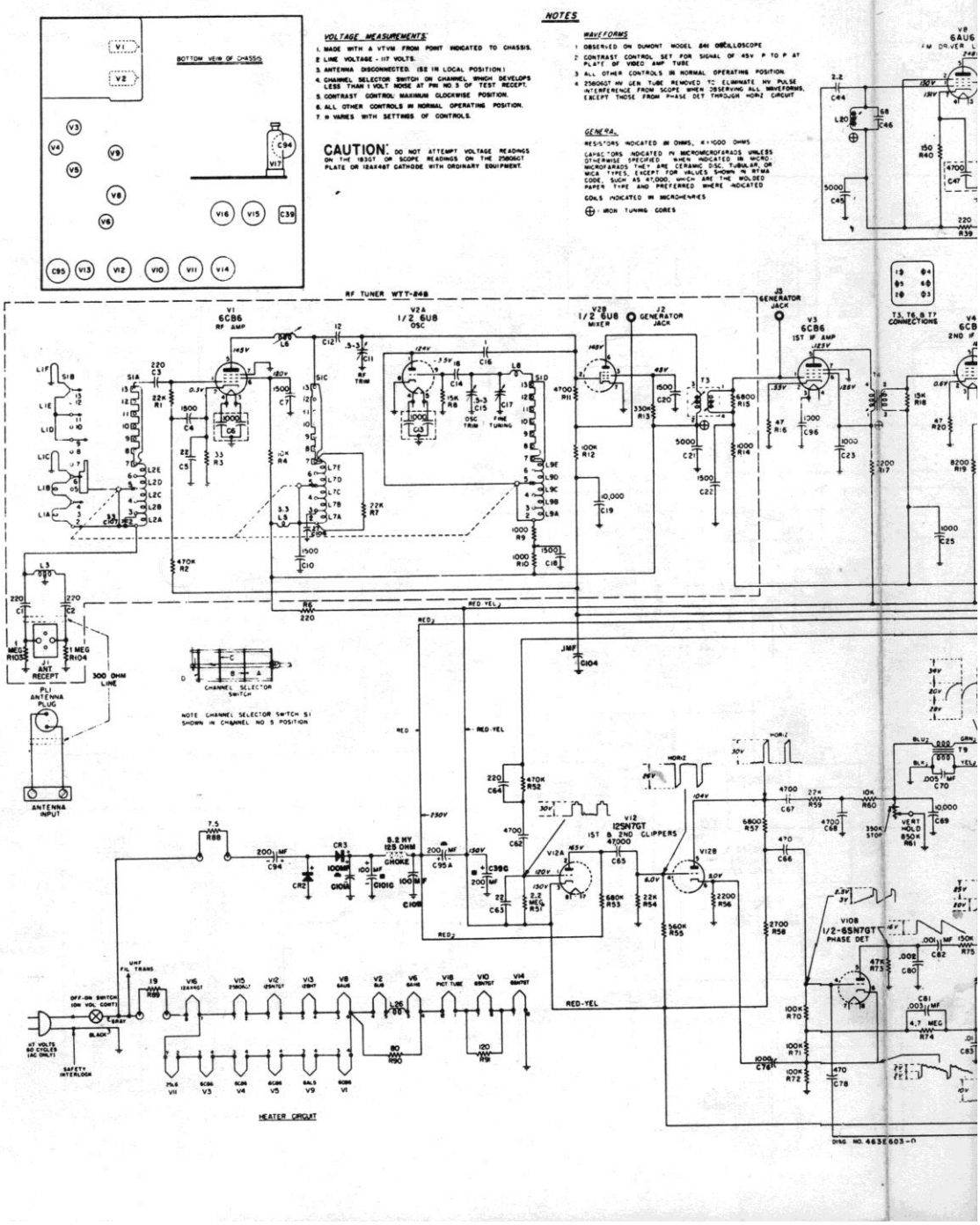
Operation of this receiver outside its cabinet or with covers removed involves a shock hazard from the power supplies. No work should be attempted on this receiver by anyone not thoroughly familiar with the precautions necessary when working on high voltage equipment. As one side of the power line is connected directly to chassis, it is important that an isolation transformer be used when servicing the receiver.

PRODUCTION CHANGES

Chassis Coding	
WTK-712-02	All chassis stamped WTK-712-02 will have the following production changes added: C-76 becomes 470 mmf 500V, part number 21R115856. One Cer. Tub. 1000 mmf 500V capacitor relocated, part number 21R115860.
WTK-712-03	To decrease Horizontal Oscillator Sensitivity: R-73 changes 47000-10-½, part number 6R6048 to 22000-10-½, part number 6R6397. C-80 Cap. Ppr. Tub. .002-600M, part number 8R9867 changes to Cap. Mld. Tub. 3300-20-600SP, part number 8K490247. Omit 22K-10-½ resistor, part number 6R6397 from across Horiz. Osc. Coil. R-77 changes 8200-10-½, part number 6R2004 to 5600-10-½, part number 6R6117. R-86 changes 15K-10-½, part number 6R6477 to 22K-10-½, part number 6R6397. Omit 220K-10-½, part number 6R6407 from across Horiz. Hold Control. C-87 changes 680-10-500 Red 20, part number 21R114781 to 390-10-500 Red 15, part number 21R114740. C-89 changes .02-400M, part number 8R9859 to 39000-10-400 SP, part number 8R490231.

L-1A, B, C	24K703079	Coil, antenna primary: low frequency
L-1D, E, F	24K703078	Coil, antenna primary: high frequency
L-2	24K703002	Coil, antenna: channels 2 thru 6; includes L-2A thru L-2E (high channel coils are part of switch)
L-3	24A790033	Coil, antenna: impedance matching
L-5	24K792577	Choke, RF
L-6	24C703076	Coil, RF: channel 13
L-7	24K703002	Coil, RF: channels 2 thru 6; includes L-7A thru L-7E (high channel coils are part of switch)
L-8	24K703097	Coil, oscillator: channel 13
L-9	24C703001	Coil, oscillator: channels 2 thru 6; includes L-9A thru L-9E (high channel coils are part of switch)
L-12	—	21.9 Mc Trap (part of T-6)
L-13	24B711413	Choke, RF: yellow dot
L-14	24B711413	Choke, RF: yellow dot
L-16	24K712101	Coil, compensating: wound on 5600 ohm resistor; blue dot
L-17	24B792735	4.5 Mc Trap: with core & mtg clip
L-18	24K710140	Coil, compensating: red dot
L-19	24K712102	Coil, compensating: orange dot; wound on 6800 resistor
L-20	1V790341	Coil, sound take off: with core & mtg nut
L-22	24K720155	Yoke, deflection: 70°; complete less cover & centering device; includes octal plug
L-23 or	24K701558 24K721064	Coil, horizontal oscillator: with core & clip
L-24	24A733225	Choke, RF
L-25	24A733225	Choke, RF
L-26	24A720110	Choke, filament
L-27	25B721106	Choke, filter


V8 6AU6 FM DRIVER LIMITER
V9 6AL5 RATIO DET
V10A 1/2-6SN7GT 1ST AUDIO AMP
VOLUME 1 MEG R318
V11 25L6GT AUDIO OUTPUT
3.2 OHM VOICE COIL
PM SPKR
MODEL TK-712-01 USED ON WTK-712
T4 & T5 CONNECTIONS
T3, T6 & T7 CONNECTIONS
CHASSIS
J6 UHF RECEPT (TOP VIEW) (ON TK-712-01 ONLY)
V4 6CB6 2ND IF AMP
V5 6CB6 3RD IF AMP
T6
21.9 MC TRAP
V6 6AH6 VIDEO AMP
4.5 MC TRAP
L13 YEL DOT
L14 YEL DOT
L16 BLU DOT
L17
L18 RED DOT
L19 ORG DOT
2500 R31A CONTRAST
J8 TEST RECEPTACLE (BOTTOM VIEW)
LOCAL
SUBURBAN
FRINGE
S2 AREA SELECTOR SWITCH
(SHOWN IN SUBURBAN POSITION)
V13A 1/2-12BH7 VERT BLOCK OSC
V13 1/2-12BH7 VERT OUTPUT
VERT SIZE
VERT HOLD 650K R61
VERT LIN
DEFLECTION YOKE
BRIGHT-NESS
V18 WTK-712-17HP4B TK-712-01-17LP4 PICTURE TUBE
PIN 6 (BLUE LEAD) OF PICTURE TUBE MAY BE CONNECTED TO CHASSIS OR B++
V14 6SN7GT HORIZ OSC
V15 25B06GT HORIZ OUTPUT & HV GEN
V16 12AX4GT DAMPING DIODE
V17 1B3GT HV RECT
HORIZ SIZE
HORIZ HOLD 50K STOP R80
HORIZ OSC
T11
IMBEDDED IN HV WAX
T11 CONNECTIONS
BOOTSTRAP
603-n


BOTTOM VIEW OF CHASSIS
V1
V2
V3
V4
V5
V9
V8
V6
V16
V15
C39
C94
V17
C95
V13
V12
V10
V11
V14
NOTES
VOLTAGE MEASUREMENTS
1. MADE WITH A VTVM FROM POINT INDICATED TO CHASSIS.
2. LINE VOLTAGE - 117 VOLTS.
3. ANTENNA DISCONNECTED. (BE IN LOCAL POSITION.)
4. CHANNEL SELECTOR SWITCH ON CHANNEL WHICH DEVELOPS LESS THAN 1 VOLT NOISE AT PIN NO 3 OF TEST RECEPT.
5. CONTRAST CONTROL MAXIMUM CLOCKWISE POSITION.
6. ALL OTHER CONTROLS IN NORMAL OPERATING POSITION.
7. ⊕ VARIES WITH SETTINGS OF CONTROLS.
CAUTION: DO NOT ATTEMPT VOLTAGE READINGS ON THE 1853T OR SCOPE READINGS ON THE 2580G1T PLATE OR 12AX4GT CATHODE WITH ORDINARY EQUIPMENT.
WAVEFORMS
1 OBSERVED ON DUMONT MODEL 84K OSCILLOSCOPE
2 CONTRAST CONTROL SET FOR SIGNAL OF 45V P TO P AT PLATE OF VIDEO AMP TUBE
3 ALL OTHER CONTROLS IN NORMAL OPERATING POSITION
4 2580G1T HV GEN. TUBE REMOVED TO ELIMINATE HV PULSE INTERFERENCE FROM SCOPE WHEN OBSERVING ALL WAVEFORMS, EXCEPT THOSE FROM PHASE DET THROUGH HORIZ CIRCUIT
GENERAL
RESISTORS INDICATED IN OHMS, K=1000 OHMS
CAPACITORS INDICATED IN MICROMICROFARADS UNLESS OTHERWISE SPECIFIED. WHEN INDICATED IN MICRO MICROFARADS THEY ARE CERAMIC DISC, TUBULAR, OR MICA TYPES, EXCEPT FOR VALUES SHOWN IN RETMA CODE, SUCH AS 47,000, WHICH ARE THE MOLDED PAPER TYPE AND PREFERRED WHERE INDICATED
COILS INDICATED IN MICROHENRIES
⊕ - IRON TUNING CORES
RF TUNER WTT-848
V1 6CB6 RF AMP
V2A 1/2 6U8 OSC
V2B 1/2 6U8 MIXER
J2 GENERATOR JACK
J3 GENERATOR JACK
V3 6CB6 1ST IF AMP
T3, T6, & T7 CONNECTIONS
V4 6CB 2ND IF
S1A S1B S1C S1D
L1F L1E L1D L1C L1B L1A
L2E L2D L2C L2B L2A
L7F L7D L7C L7B L7A
L9F L9D L9C L9B L9A
L3 L4 L5 L6
ANT RECEPT
300 OHM LINE
FU1 ANTENNA PLUG
ANTENNA INPUT
CHANNEL SELECTOR SWITCH
NOTE CHANNEL SELECTOR SWITCH S1 SHOWN IN CHANNEL NO 5 POSITION
V12 12SN7GT 1ST & 2ND CLIPPERS
V12A
V12B
V10B 1/2-6SN7GT PHASE DET
HORIZ
VERT HOLD 850K R61
CR1 CR2 CR3
8.8 HY 125 OHM CHOKE
OFF-ON SWITCH ION VOL CONT
UHF FIL TRANS
V16 12AX4GT
V15 2580A1T
V12 12SN7GT
V13 2B4Y
V8 6AU6
V2 6U8
V5 6AU6
V9 6CB6
PICT TUBE
V10 6BM7GT
V14 6BM7GT
117 VOLTS 60 CYCLES (AC ONLY)
SAFETY INTERLOCK
HEATER CIRCUIT
DWG. NO. 463E603-O

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1953 Supplement No. 7

INDEX

ADMIRAL

ELECTROHOME

MARCONI

MOTOROLA

NORTHERN ELECTRIC

NOTE: The foregoing is preliminary data. Alignment information not yet available from manufacturer.

PHILCO

VIKING

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. This is particularly true in this supplement because some models have as many as three different circuit diagrams which makes the fold section larger than normal. To avoid confusion, use your index to locate ALL data.

Gordon Oliver

R.C.C. TELEVISION Supplement No. 7

TONE CONTROL LINKAGE SETTING

If, for any reason, it becomes necessary to replace the tone control linkage, the following procedure should be followed:

1. Set the tone control potentiometer at zero ohms (maximum counterclockwise).

2. Place the linkage over the TONE and CONTRAST-VOLUME shafts in such a manner that the arms and link are below the shafts.

3. Move the arms counterclockwise as far as possible and tighten the setscrew on the TONE control shaft.

4. Replace chassis in cabinet and:

a. If receiver uses TONE control lever, place the lever over the CONTRAST-VOLUME shaft so that the lever points approximately toward four o'clock. The swing of the lever should then be between four and eight o'clock.

b. If receiver uses a TONE control knob, push the knob over the CONTRAST-VOLUME shaft so that the lettering is toward the top.

CHANGING OF TUBES

1. The power should be turned off when changing tubes.

2. Indiscriminate changing or interchanging of tubes should be avoided for the following reasons:

a. A change of IF or RF tubes or crystal detector can cause loss of sensitivity or poor picture quality. Check alignment and sensitivity.

b. A change of limiter or ratio detector tubes can cause distorted audio, buzz, or loss of audio sensitivity. Check audio alignment and sensitivity.

c. Changing horizontal oscillator tube can result in poor noise rejection or cause the horizontal hold control to be out of range. This may necessitate readjustment of the horizontal oscillator coil.

ALIGNMENT

GENERAL

The chassis should be mounted on angle iron brackets so that all connections and adjustments may be made easily.

Since the power cord circuit is broken by the interlock when the cabinet back is removed, it will be necessary to obtain an extra power cord with the female interlock receptacle in order to make a power connection to the receiver. Order Motorola Part No. 30B470756.

As one side of the power line is connected directly to the chassis, it is important that an isolation transformer be used between the receiver and the line when any test equipment is attached to the chassis. This precaution is especially important if grounded test equipment is used. NEVER GROUND THE RECEIVER CHASSIS DURING TESTING OPERATIONS OR INSTALLATION UNLESS AN ISOLATION TRANSFORMER IS USED.

ORDER OF ALIGNMENT

A complete receiver alignment can be most conveniently performed in the following order:

1. IF & Mixer Transformers.
2. Oscillator & RF Sections.
3. 4.5 Mc Trap.
4. Audio Take-Off & Ratio Detector.

IF AMPLIFIER ALIGNMENT

Equipment Required:

IF Sweep Generator meeting the following requirements:

1. 18 to 30 mc, approximately 12 mc sweep width.
2. Output constant and adjustable to at least 0.1 volt maximum.
3. Accurately calibrated, adjustable markers.

Cathode Ray Oscilloscope—preferably one with a calibated attenuator.

AM Signal Generator —Adjustable output.

NOTE: If there is no built-in marker in the sweep generator, loosely couple the output of an accurately calibrated AM signal generator to the IF strip. At all times, keep the marker output low enough to prevent the marker from distorting the response curve.

If a wide band scope is used, the marker will be more distinct if a capacitor of 100 to 1000 mmf is placed across the scope input. Use the smallest size possible, since too large a value will affect the shape of the curve.

If necessary, use a variac to obtain input of 117 volts.

Procedure:

1. Remove the horizontal output tube, V-15, to eliminate RF interference in the oscilloscope. Replace the tube with an 80 ohm, 10 watt resistor connected across pins 2 and 7 of the socket, or use a tube of similar type with all pins clipped off except the heaters.

2. By means of an external battery, apply a negative 3 volt bias, through a decoupling resistor of 47K ohms, to the AGC line, which is connected to pin 1 of the test receptacle (J-4). See Figure 4 for receptacle location.

3. Through a 47K ohm decoupling resistor, connect the osciloscope across the video detector load resistor R-27 (5600) which may be reached from pin 3 of test receptacle. If a stronger output is required, connect the scope between picture tube cathode (yellow lead) and chassis. The curve seen at this position will be the reverse of the polarity shown in Figures 5 and 6.

4. Turn Area Selector Switch (S-2, Figure 2) to LOCAL position.

5. Using leads as short as possible, connect the sweep generator, through a 1000 mmf capacitor, to jack J-3, feeding into the grid of 1st IF tube V-3. See Figure 4. (Do not use the loose or "Spraying" method of coupling.) Set the generator center frequency to 24.6 mc, with a sweep deviation of 10 mc.

6. Tune trap L-12 for maximum attenuation on the curve at 21.9 mc, as in Figure 5. Make sure the core is toward the outside of the trap winding (toward the top).

7. Tune the 1st IF transformer, T-4, to place a 26.6 mc marker on the high side of the response curve 50% down from maximum response. At the same time, adjust T-6 to provide a flat top or symmetrical response curve. Tuning the two transformers together will make for proper marker placement and "jacking" action of T-6. See Figure 5.

NOTE: If a distorted or unstable curve is seen on the scope during alignment, it may be necessary to stop the oscillator by placing a shunt wire across the oscillator inductance (from position 2 to position 13 on the bandswitch).

CAUTION: A. Set input so between 1.0 and 1.5V DC is maintained at detector load resistor.

B. The dressing of plate and grid components in the IF circuit affects tuning. Do not move indiscriminately.

C. The resonance point of the IF coils and the trap will be found at two settings of the core. The correct setting is the one with the core at the outer end of the winding.

8. Tune the 2nd IF transformer, T-5, to place a 22.9 mc marker on the low side of the response curve 50% down from maximum response. At the same time, adjust T-6 to provide a flat top or symmetrical response curve as in step 6. See Figure 5.

9. Move the generator and capacitor to jack J-2. See Figure 7. Short out R-11 (4700) located between the jack and the mixer grid.

10. Tune the primary and secondary of the mixer IF transformer T-3 so that the bandpass appears as in Figure 6.

NOTE: This is a double-tuned circuit. Make sure the slugs are tuned away from the center of the coil.

BANDWIDTH

The IF bandwidth may be checked with an AM signal generator, if desired. Connect the generator, through a 1000 mmf capacitor, to jack J-2 in the grid circuit of the mixer tube, V-2B, and an electronic voltmeter across the video detector load resistor R-27 (5600). Short out R-11 (4700), set the generator frequency to 24.6 mc, and adjust its output for a 1 volt reading on the meter. Double the output of the generator. Tune to both sides of 24.6 mc and note the frequencies at which the meter again reads 1 volt. These frequencies indicate the 6 db bandwidth points and should be 22.9 mc and 26.4 mc. By watching the meter while tuning slowly through the band, any serious peaks or holes in the response curve can be detected.

REGENERATION

After the mixer and IF stages have been aligned, a check for regeneration in the IF strip should be made as follows:

1. Remove the battery bias and observe the response curve on the scope as taken between the picture tube cathode (yellow lead) and chassis. The bandwidth may change with the bias removed, but should not change more than 0.2 mc. If the bandwidth does change more than 0.2 mc, check the cathode resistors or change tubes.

2. Set the contrast control at maximum gain (fully clockwise).

3. Decrease the generator input until the output signal shows a marked decrease.

4. Any regeneration present will be indicated by sharp peaks on the overall response curve.

NOTE: The oscillator should be stopped, as described above, during this procedure.

CAUTION: Do not inject too much marker signal.

MIXER SENSITIVITY MEASUREMENTS

1. Connect an AM signal generator, set at 24.6 mc, modulated 30% with 400 cycles, to jack J-2 through a capacitor of 1000 mmf. Short out R-11 (4700).

2. Remove the battery bias from the AGC line.

3. Put the oscillator back into the circuit.

4. Connect the oscilloscope to the cathode of the picture tube. Turn contrast control to maximum.

5. Turn the station selector switch to the low channel position which gives the lowest noise reading on the meter.

6. The signal required to produce 20 volts peak-to-peak on the scope should be less than 100 microvolts.
NOTE: To calibrate scope, connect it across the 6.3 volt filament supply. The peak-to-peak amplitude on the screen will then be approximately 18V (6.3 x 2.8).

IF SENSITIVITY MEASUREMENT

1. Move generator to jack J-3 feeding into the grid of the 1st IF tube (V-3, 6CB6).
2. Connect the electronic voltmeter, through a 100K decoupling resistor, across the video detector load resistor R-27 (5600).
3. The signal required to produce 1 volt on the voltmeter should be less than 600 microvolts.

ANTENNA, RF & OSCILLATOR ALIGNMENT

NOTE: The IF circuits must be aligned before the oscillator section can be properly phased.

Equipment Required:

Sweep generator having:—
1. Frequency range 40-220 mc.
2. 10 mc sweep width.
3. Output constant and adjustable.
4. Adjustable markers (markers should be calibrated occasionally by checking against an accurate signal generator).

Oscilloscope: Preferably one with a calibrated input attenuator.

AM Signal Generator having:
1. Frequency range 40-220 mc.
2. Accurate frequency and attenuator calibration.
3. 400 cycle, AM modulation.

FREQUENCY CHART

Chan	Frequency	Picture	Sound	Oscillator
2	54-60	55.25	59.75	81.65
3	60-66	61.25	65.75	87.65
4	66-72	67.25	71.75	93.65
5	76-82	77.25	81.75	103.65
6	82-88	83.25	87.75	109.65
7	174-180	175.25	179.75	201.65
8	180-186	181.25	185.75	207.65
9	186-192	187.25	191.75	213.65
10	192-198	193.25	197.75	219.65
11	198-204	199.25	203.75	225.65
12	204-210	205.25	209.75	231.65
13	210-216	211.25	215.75	237.65

ANTENNA & RF ALIGNMENT PROCEDURE

1. Remove the horizontal output tube V-15, to eliminate RF interference in the oscilloscope. Replace the tube with an 80 ohm, 10 watt resistor connected across pins 2 and 7 of the socket, or use a tube of similar type with all pins clipped off except the heaters.
2. Remove the antenna lead-in from the chassis, and connect the sweep generator to the antenna receptacle. Keep the leads from the generator to the socket short. Use internalmarkers or an accurately calibrated external signal generator for markers.
3. Connect the oscilloscope, through a decoupling resistor of 47K ohms to jack J-2 in the grid circuit of the mixer tube V-2B. See Figure 7.
4. Short the AGC line to chassis by turning Area Selector switch (S-2) to SUBURBAN position.
5. Stop the oscillator by placing a shunt wire across the oscillator inductance (from position 2 to position 13 on the bandswitch).
6. Refer to Figure 7 for the location of the trimmers and coils. The chart listed above gives the picture and sound carrier frequencies.
7. The antenna coils are tuned to the video carrier frequency and the RF coils are tuned to the sound carriers. Figure 8 shows the shape of the curve which should appear on the oscilloscope.
8. Set the screw in channel 13 RF coil, L-6 midway in the coil.
9. Turn the station selector switch to channel 7. Set the center frequency of the sweep generator to the center frequency of channel 7 (177 mc).
10. Adjust ceramic trimmer, C-11, so that the video and sound markers appear on the response curve within the limits shown in Figure 8.
11. Move the station selector switch to channel 13, and set the generator to the center frequency of the channel (213 mc). Adjust the screw in coil L-6 for the proper response on channel 13 (see Figure 8).
12. Recheck channel 7 for proper response. Readjust trimmer C-11, if necessary.
13. Check channels 13 through 7 and compare with curves in Figure 8. The peak of the curves may be sharpened or broadened by changing the position of the grounded end of the high frequency matching bus L-1F. It should be approximately 3/16" from the switch shield. Note the response curve.
NOTE: If the response is checked with the cover on the tuner, the picture marker will move up the left side of the curve a short distance, but the markers should be within tolerance.
14. Move the station selector switch to channel 6 and set the generator to the center frequency of the channel (85 mc).
15. Compress or spread the channel 6 antenna coil L-2E and RF coil L-7E to obtain the proper response. See Figure 7 for coil locations and Figure 8 for response curve. The antenna coil affects the video carrier and the RF coil affects the sound carrier.
16. Align channels 5 through 2, in that order, in the same manner as channel 6. As the coils are in series, the proper phasing of channel 6 will simplify the alignment of the lower channels.
CAUTION: Make certain the bandswitch is on the correct channel before checking bandpass.

OSCILLATOR ADJUSTMENT

NOTE: The IF and mixer circuit must be aligned before the oscillator is adjusted.
1. Put the oscillator back into the circuit.
2. Connect the oscilloscope, through a 47K ohm resistor, across the video detector load resistor R-27 (5600).
3. Refer to Figure 7 for the locations of the trimmers and coils. The sound carrier frequencies may be obtained from the preceding chart.
4. Set fine tuning trimmer for mid-capacity.
5. Turn the station selector switch to channel 10.
6. Set the sweep generator to channel 10, with a center frequency of 195 mc. Keep the output low enough to show no evidence of limiting in the overall response curve.
NOTE: The curve should be substantially that of the mixer as in Figure 6. Any consistent tilting of the response curve indicates that the mixer and IF stages are not properly aligned.
7. Introduce a marker corresponding to the sound carrier of channel 10 (197.75 mc). Keep marker signal as low as possible.
8. Adjust the oscillator trimmer C-15 to place the sound marker slightly higher in frequency than the 21.9 mc trap dip. This allowance must be made for the shift caused by the bottom shield being off. When the shield is replaced, the sound marker will move down into the trap dip. The picture marker will then be approximately one-fourth to one-half down from the base line on the opposite side of the curve.
9. Check channels 7 through 13, noting whether the sound marker falls just above the trap dip, with the fine tuning trimmer at approximately mid-capacity.
10. If more than a 30 degree change in the fine tuning trimmer was needed in step 8, adjust the channel 13 oscillator coil L-8 by spreading or compressing the turns. If L-8 is adjusted, it may be necessary to readjust trimmer C-15 on channel 10. Coil L-8 has more effect on channels 10 to 13 than on channels 7 to 9.
11. Turn the station selector switch to channel 6, and set the sweep generator center frequency to 85 mc.
12. Set the fine tuning trimmer to 15° of mid-capacity as in Figure 9.

NOTE: It is important that the rotor be set as nearly as possible to the drawing. Otherwise, the fine tuning trimmer may not have sufficient range to suitably tune a weak signal.

13. Introduce a marker corresponding to the sound carrier of channel 6 (87.75 mc).
14. Compress or spread the channel 6 oscillator coil L-9E until the sound marker is placed just above the dip in the 21.9 mc trap.
15. Align channels 5 through 2, in that order, in the same manner as channel 6, so that the sound marker falls just above the trap dip, with the fine tuning trimmer within 15 degrees of initial setting in step 12.
NOTE: Since the oscillator coils are in series, it is necessary to adjust the high channel coils first, before proceeding to a lower channel.

OVERALL SENSITIVITY MEASUREMENTS

An overall measurement of sensitivity is made as follows:

1. Connect an AM signal generator to the antenna receptacle on the receiver chassis, matching the generator to the receiver with a resistor network. In the case of a generator with a 50 ohm output impedance, insert a 100 ohm resistor in series with the output terminal, and a 150 ohm resistor in series with the ground terminal.
2. From the cathode of the picture tube (yellow lead) to chassis, connect a calibrated oscilloscope. Note: To calibrate scope, connect it across the 6.3 volt filament supply. The peak-to-peak amplitude on the screen will then be approximately 18V (6.3 x 2.8).
3. Set the contrast control for maximum sensitivity (fully clockwise).
4. Set the signal generator for 30% modulation at 400 cycles, tune it to the mid-carrier frequency of the channel being checked, and rotate the fine tuning trimmer for maximum output.
5. The generator signal necessary to produce 20 volts peak-to-peak on the scope should be less than:

(a) 20 microvolts for channels 2 through 6.
(b) 35 microvolts for channels 7 through 13.

4.5 MC TRAP ALIGNMENT

Equipment Required:

AM Signal Generator:	Accurately calibrated at 4.5 mc Adjustable output.
DC Meter:	Low range electronic voltmeter.

Procedure:

1. Connect the signal generator, through a 5000 mmf (minimum) capacitor, to the grid (pin 1) of V-6, the video amplifier tube.
2. Connect the voltmeter and a germanium crystal detector, as shown in Figure 10, between the cathode of the picture tube (yellow lead) and chassis.
3. With the signal generator accurately set at 4.5 mc and maximum output, adjust trap L-17 for minimum reading on the lowest voltage scale of the meter.

AUDIO TAKE-OFF & RATIO DETECTOR

Refer to Figure 4 for location of adjustments.

1. If possible, it is desirable to align the audio section from an actual station signal, since the 4.5 mc alignment frequency will be exact. To permit operation below the limiting level of the audio driver tube, for sharp alignment, the fine tuning trimmer should be turned off the station slightly so that there is between 6 and 8V as measured from one side of C-54 and chassis.

2. If a signal generator is used, tune it accurately to 4.5 mc, and adjust the output to approximately 10,000 microvolts. Connect the high side of the signal generator through a 5000 mmf (minimum) capacitor to the grid (pin 1) of the video amplifier tube V-6, and the low side to chassis. The following steps apply whether the station signal or signal generator is used.

3. From either side of electrolytic capacitor C-54 (10 mf) through a 10K ohm decoupling resistor, connect an electronic voltmeter to chassis.

4. Set CONTRAST control for maximum gain (fully clockwise).

5. Peak audio take-off coil L-20 for maximum reading on meter.

NOTE: As adjustments are brought to resonance, it is advisable to reduce the signal generator output to prevent overloading.

6. Peak ratio detector (T-7) primary (top core) for maximum reading on meter.

NOTE: Both the primary and secondary of the ratio detector transformer have two tuning points. Only one, with the cores at the outer end of the windings, is the proper point.

7. Move the meter and decoupling resistor from C-54 to the junction of R-45 (33K) and C-55 (1000 mmf).

8. Adjust T-7 secondary (bottom core) for zero response on the lowest scale of the meter. This corresponds to the cross-over point of the FM detector curve. If desired, the symmetry of the curve may be checked by tuning the signal generator 25 kc above and below 4.5 mc and noting the plus and minus voltage produced, reversing the meter connections, as necessary. For proper balance of the ratio detector system, the voltages in each direction should be approximately equal. If not, check the tuning of L-20 and both the primary and secondary of T-7, the ratio detector transformer. If necessary, replace the ratio detector tube V-9.

AUDIO SENSITIVITY MEASUREMENT

1. Connect the signal generator to the grid (pin 1) of V-6 the video amplifier tube, through a 5000 mmf (minimum) capacitor.

2. Turn CONTRAST control fully clockwise.

3. Connect the electronic voltmeter from either side of electrolytic capacitor C-54, through a 10K ohm decoupling resistor, to chassis.

4. Set the generator at 4.5 mc.

5. With a 10,000 microvolt signal, the AVC voltage read on the meter should be greater than 5 volts.

Coils

L-1 to L-9		Tuner
L-12		21.9 mc trap (part of T-6).
L-13	24B711413	RF choke: yellow dot.
L-14	24B711413	RF choke: yellow dot.
L-16	24K712101	
or	24K712110	Compensating coil: blue dot (wound on R-34).
L-17	1V792736	4.5 mc trap: with core and mtg nut.
L-18	24K710140	
or	24B711875	Compensating coil: red dot.
L-19	24K712102	
or	24K712111	Compensating coil: orange dot (wound on R-36).
L-20	1V790341	Sound take-off: with core and mtg nut.
L-22	24K720155	Deflection yoke: 70°; complete less cover & centering device.
L-23	24K701558	Horizontal oscillator: with core & clip.
L-24	24A710751	Horizontal linearity (wound on C-92).
L-26	24A720110	Filament choke.
L-27	25B721106	Filter choke.

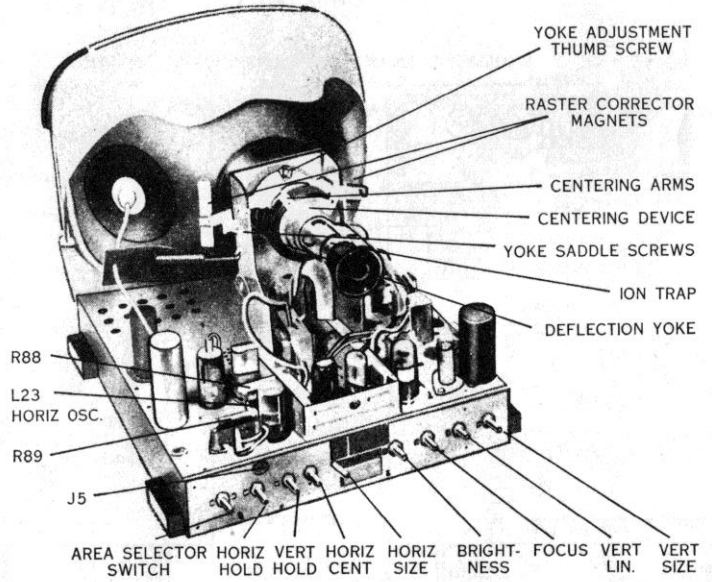

FIGURE 2. SERVICE ADJUSTMENT CONTROLS