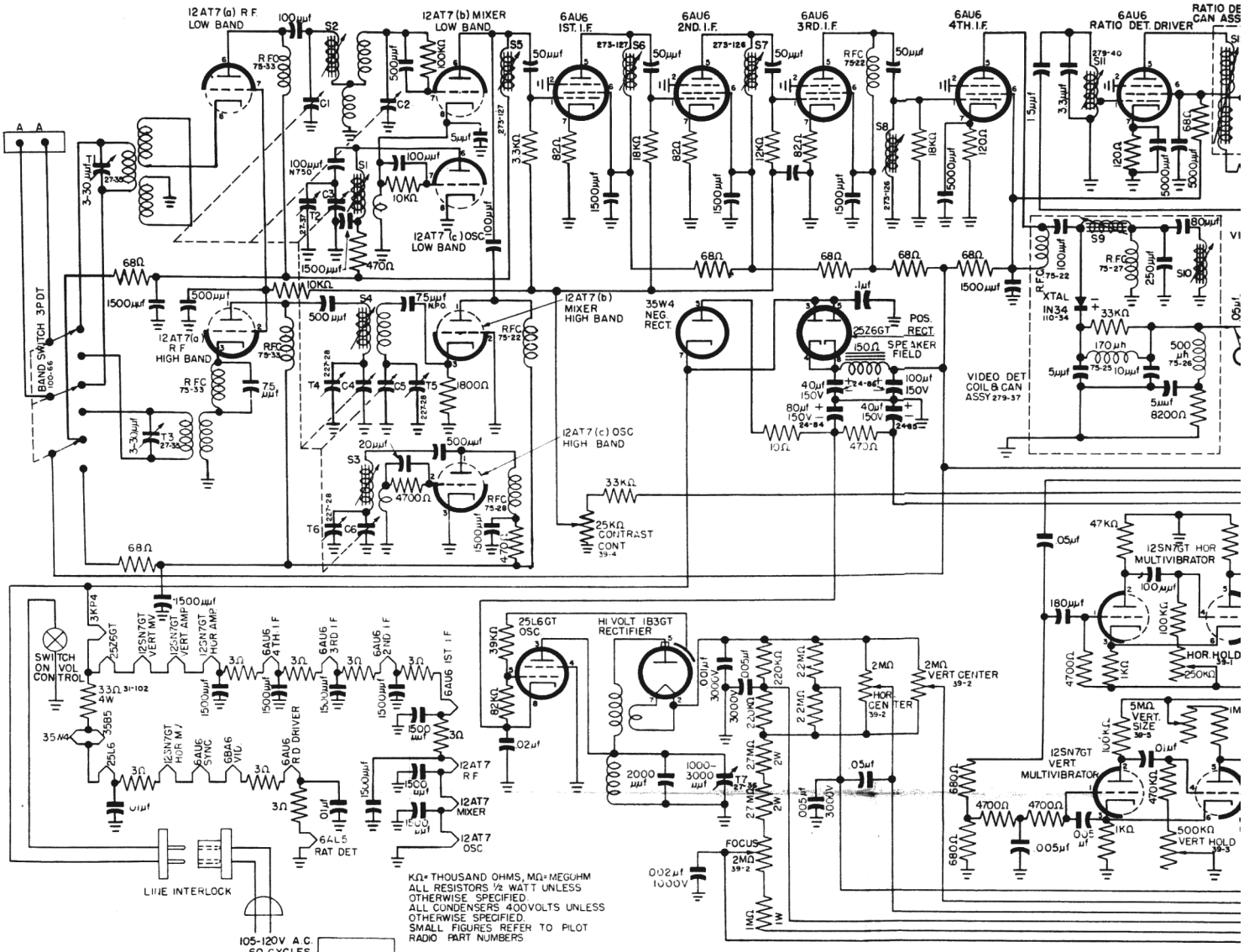


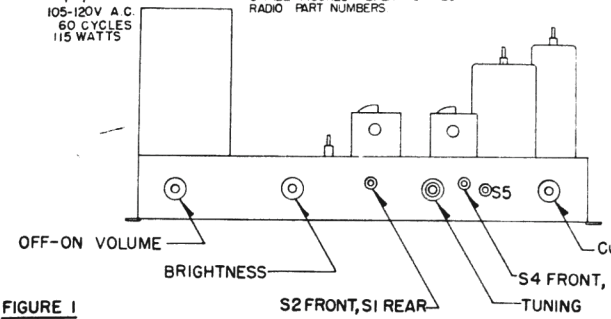
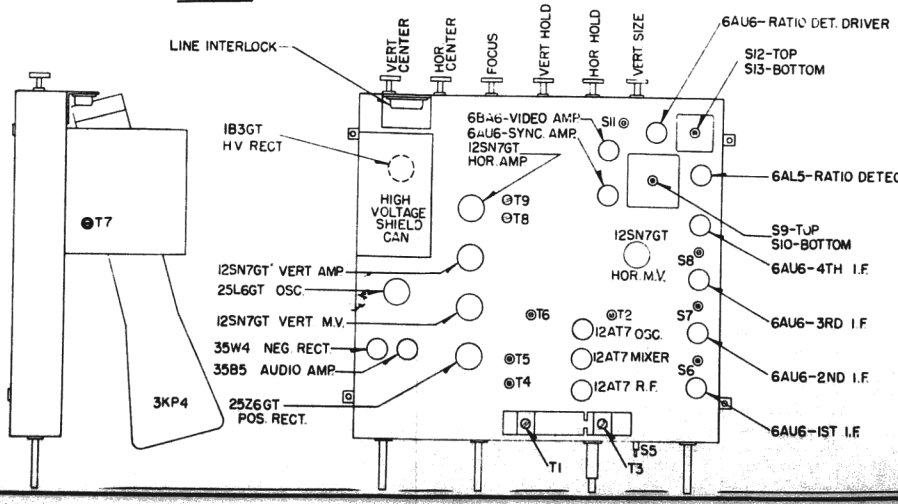
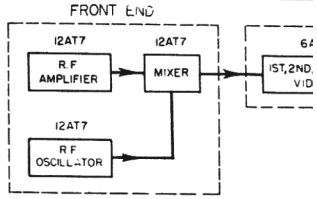
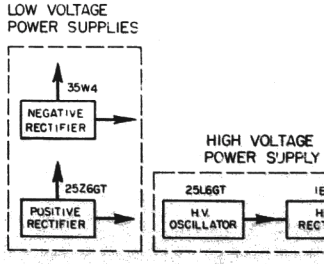
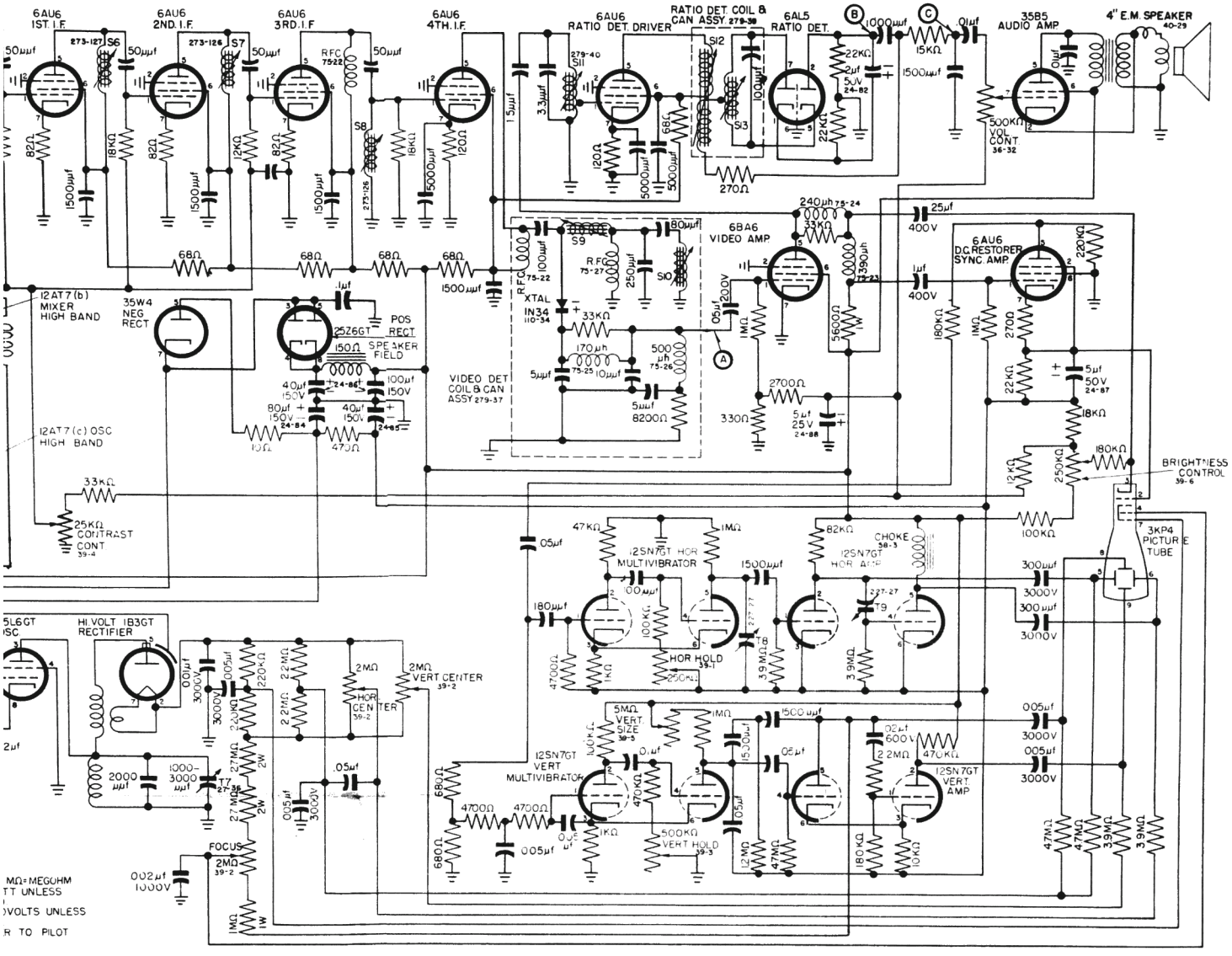


FIGURE 1

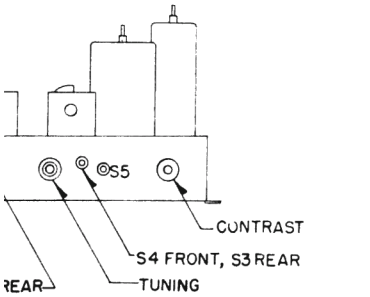


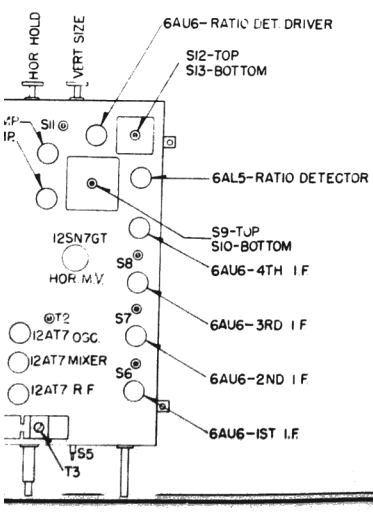






DATE 9-21-48





BLOCK DIAGRAM TV-37

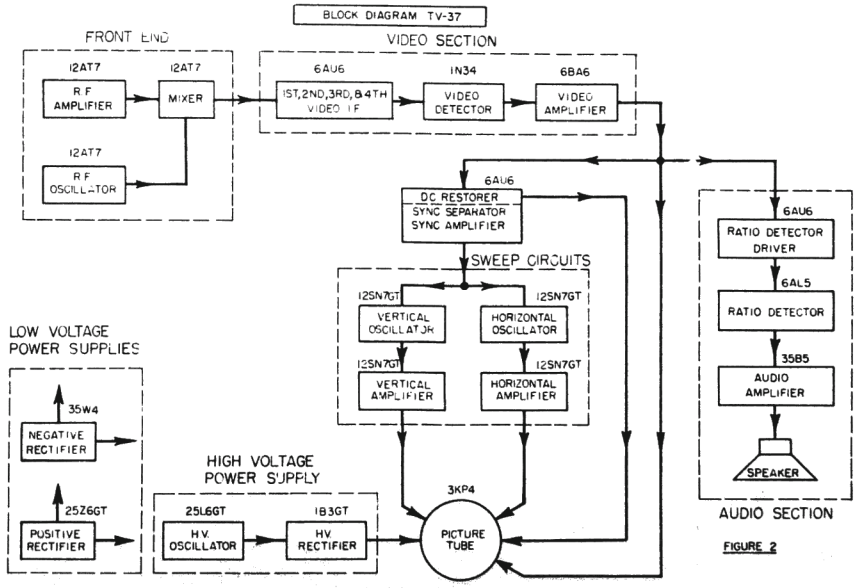


FIGURE 2

FRONT END

The front end is a separate sub-chassis of the receiver. Mounted on this chassis are the RF amplifier, converter and oscillator, bandswitch, all RF and oscillator coils and the converter plate coil. Referring to the schematic diagram, it will be noticed that there are three double triodes available in the front end. One section of each triode is used for high band tuning, and the other section of each triode is used for low band tuning. The switching comprises a changeover in the B plus and antenna coils. The two bands are otherwise completely independent.

With the chassis inverted and the tuning dials facing the operator, all components on the left side of the front end are associated with the low band and all components associated with the high band are located on the right side WITH THE EXCEPTION OF THE LOW AND HIGH BAND ANTENNA TRIMMERS TI and T3 WHICH ARE INVERTED IN THEIR LOCATION. The antenna terminates in a band-pass transformer for the low or high band respectively and is switched to the proper transformer when the bandswitch is set to the desired band. The trimmers TI and T3 adjust these circuits. Tuning in the plate circuit of the RF amplifier and grid circuit of the converter is accomplished through a band-pass transformer which is continuously tuned by means of the 3 gang variable condensers located on the top of the chassis directly above their respective coils. The low band interstage transformer is aligned by iron slug S2. The high band interstage transformer is aligned by iron slug S4 and trimmers T4 and T5. The RF oscillators are of the tickler feedback type, tuned over the bands by means of the rear sections of the variable condensers. The low band oscillator is adjusted by brass slug SI and trimmer T2 and the high band oscillator by brass slug S3 and trimmer T6. The converter plate circuit, common to the low and high band, consists of an RF choke in parallel with the converter coil S5 which is mounted to the left of the bandswitch in a horizontal position.

PICTURE I.F. AMPLIFIER AND DETECTOR

The picture I.F. amplifier is of the conventional stagger tuned type. Its unusual feature for a set in this price range is the use of four stages of I.F. amplification. In order to obtain proper band-pass characteristics, the picture I.F. coils are tuned as follows:

1. Converter coil - 23.5 Mc (iron slug S5)
2. First picture I.F. coil - 25.6 Mc (iron slug S6)
3. Second picture I.F. coil - 22 Mc (iron slug S7)
4. Third picture I.F. coil - 21.6 Mc (iron slug S8)
5. Fourth picture I.F. coil - 24.8 Mc (iron slug S9)

To align the I.F. system, the coils are peaked to the specified frequency with an unmodulated signal generator. The over-all I.F. response is then observed by use of the sweep generator and oscilloscope.

TRAP CIRCUIT

In order to avoid sound carrier interference in the picture, a sound trap is incorporated. It is aligned by iron slug S10 to a frequency of 21.25 Mc to absorb excessive sound energy.

PICTURE SECOND DETECTOR

The detector is a germanium crystal rectifier (1N34) and is contained in Video Detector Can Assembly 279-37.

CONTRAST CONTROL

This control varies the bias on the RF amplifier and on the first, second, and third I.F. amplifiers. When the contrast control is in the maximum gain position, the bias is close to zero volts.

VIDEO AMPLIFIER

This stage is conventional, has a gain of approximately 20 times and a flat frequency response up to 3.8 Mc.

SYNC. AMPLIFIER - SYNC. SEPARATOR - D.C. RESTORER

The sharp cut off pentode (6AU6) used in this circuit discharges a triple function. First, the synchronizing signals are picked up across the load resistor of the video amplifier and amplified. Second, the amplified signals are applied through differentiation and integration networks respectively to the horizontal and vertical saw tooth generators. Finally, since this amplifier works in Class AB to AB2 the DC component in the cathode circuit changes with the peak to peak amplitude of the input signal. Since the magnitude of these peaks represents the DC information, the D.C. voltage drop across all or part of the cathode resistor is equivalent to this DC component. Therefore, connecting the kinescope grid to the cathode resistor of this stage, reinserts the DC component properly.

VERTICAL OSCILLATOR AND OUTPUT CIRCUIT

The function of these circuits is to generate a saw tooth voltage of the proper frequency to perform the vertical scanning. A 12SN7GT dual triode with its associated components form a multi-vibrator and discharge circuit. As can be seen on the schematic diagram, the vertical multi-vibrator circuit is fed from the positive going power supply. It is followed by a balanced output stage (12SN7GT). The cathodes of the output stage are returned to the negative going power supply and the plates to the positive going power supply which, due to the increased plate voltage available, generates a sufficiently large saw tooth voltage to drive the vertical deflection plates of the kinescope. The vertical hold control is located in the grid circuit of the second multi-vibrator triode and controls frequency by changing its time constant. The vertical size control consists of a rheostat that permits changing of the plate load of the second multi-vibrator triode. Linearity of vertical sweep is maintained through a feedback circuit in the input of the vertical amplifier, consisting of two 1500 mmf. condensers and a 1.2 megohm resistor. If the vertical linearity should at any time ne less perfect than desired, an increase or decrease in the value of the above mentioned resistor of 1.2 megohms will restore it to perfection.

HORIZONTAL OSCILLATOR AND OUTPUT CIRCUIT

The horizontal saw tooth voltage is generated in a multi-vibrator circuit whose cathode is tied to the negative going power supply and whose plate is returned to ground. The frequency is adjusted by a variable resistance in the grid circuit of the second multi-vibrator triode. The size of the horizontal raster is controlled by a trimmer T8 across the multi-vibrator output. The horizontal output stage is a balanced amplifier connected between the positive going and negative going power supply. This supplies a total plate voltage of approximately 220 volts which, in connection with an inductive plate load in one of the amplifier tubes, generates sufficient voltage to drive the horizontal deflection plates. A trimmer T9 in the grid circuit of the second output ampli-

fier is used together with the aforementioned trimmer T8 to set horizontal linearity.

HIGH VOLTAGE POWER SUPPLY

The high voltage power supply of a radio frequency oscillator (25L6GT) and a high voltage rectifier (1B3GT). The rectifier and the oscillator coil are enclosed in a shield can on top of the chassis. RF feedback is accomplished by using a spring slip around the glass envelope of the rectifier tube. This clip should be located adjacent to the base of this tube for best operation. The plate voltage of the oscillator is supplied from the negative going power supply ahead of its filter circuit, filtering taking place after rectification of the radio frequency. If a hum component should be found in the raster, it may be due to the opening of a filter condenser in the cathode circuit of the high voltage rectifier. However, a hum component may be introduced if the coupling condensers from the horizontal amplifier to the deflection plates are of unequal value. If a replacement of these condensers should be necessary, check carefully to obtain a pair that do not deviate more than 50 mmf. in value from each other.

LOW VOLTAGE POWER SUPPLY

There are two rectifier circuits that supply the B voltage for the receiver. One has a polarity positive with respect to chassis, the other a polarity negative with respect to the chassis. The positive going supply feeds all the tubes in the receiver except the sync. amplifier, the horizontal multi-vibrator and the high voltage oscillator. The negative going supply feeds the stages excepted above and the cathodes of both sweep amplifiers. Furthermore, this power source is used to obtain bias voltages for the receiver. The speaker field is used as a filter choke for the positive going supply. The filaments of all tubes are connected in two series strings as shown in the schematic diagram.

ALIGNMENT PROCEDURE

TEST EQUIPMENT

To properly service this receiver, it is necessary that the following test equipment be available:

1. RF sweep generator Frequency ranges

   a) 20 to 27 MC b) 50 to 90 Mc (at least 10 Mc sweep width)
   c) 170 to 225 Mc (at least 10 Mc sweep width)

   Output must be adjustable to a maximum of 1 volt

2. Cathode Ray Oscilloscope

   Preferably one with a wide band vertical deflection, an input calibrating source and a low capacity probe.

3. Signal generator to provide frequencies in the following ranges:

   a) 4.4 to 4.6 Mc b) 20 to 27 Mc c) 52 to 90 Mc
   d) 172 to 219 Mc

4. Vacuum tube voltmeter and high voltage multiplier probe for use with this meter to permit measurements up to 3000 volts.

SERVICE PRECAUTIONS

If a defect in this receiver cannot be remedied by the use of the controls accessible at the rear of the cabinet, the cover will have to be removed. To do this, first pull the line cord back in order to disengage the interlock plug. Then, remove the four bottom screws that hold the cover and the screw and clamp in the rear that hold the line cord. The cover then can be easily taken off.
When replacing the cover after servicing the receiver, remember to engage the interlock plug fully before reinserting the screws to hold the cover.

ADJUSTMENTS REQUIRED

Front end - Normally only the RF oscillator coils will require the attention of the service technician. All other circuits are very broad and will therefore only rarely require readjustment. If a realignment should be needed, only those thoroughly familiar with very high frequencies and sweep generators should attempt it. In this case, write for further information. The oscillator coil adjustments are critical and may be affected by a tube change. Low band, as well as high band oscillator, are aligned by a trimmer and padder like a normal AM receiver.

A.) Low band

Switch band selector to the low band, engage variable condenser completely. Then, tune slug S1 until the frequency of the oscillator equals 80 Mc. Disengage variable condenser completely and adjust trimmer T2 for an oscillator frequency of 110 Mc. Repeat this procedure several times to check accuracy.

B.) High band

Throw the band selector switch to high band.. Engage the variable condenser fully and adjust slug S3 until the oscillator frequency equals 200 Mc. Disengage condenser completely and adjust trimmer T6 to an oscillator frequency of 239 Mc. Repeat procedure several times.

The detailed alignment procedure which follows is intended primarily as a discussion of the method used, precautions to be taken and the reasons for these precautions. Then, for more convenient reference during alignment, a tabulation of the method is given. All the information necessary for alignment is given in the table. However, alignment by a table should not be attempted before reading the detailed instructions.

ORDER OF ALIGNMENT

When a complete receiver alignment is necessary, it should be performed in the following order:

A.) Set high voltage trimmer T7 so that DC voltage at cathode of rectifier (1B3GT) reads 2500 volts at 117 volts line voltage after a 30 minute warmup period.

B.) Set size controls for approximately normal raster size.
C.) Align ratio detector as indicated in alignment table at 4.5 Mc.
D.) Set 4.5 Mc trap with slug 11.
E.) Align all I.F. transformers following procedure and table.
F.) Set sound trap to 21.25 Mc with slug S10.
G.) Retouch picture I.F. transformers for full band width as per alignment procedure in table.
H.) Connect receiver to an antenna and tune for a test pattern if possible.
I.) Adjust centering, focusing, and size controls.

J.) Turn contrast control so that the test pattern is hardly visible. Turn horizontal hold control fully counter-clockwise. Slowly advance the horizontal hold control clockwise until the picture starts to "tear", then turn control back approximately one eighth of a turn at which position you will find the most stable picture.
Turn the vertical hold control clockwise fully or until the picture just starts to roll upwards, then turn back this control approximately one eighth of a turn, in which position you will secure the most stable picture. The two last mentioned controls are not critical in adjustment. However, a careful adjustment will help stabilize the picture in very noisy locations.

PICTURE I.F. OSCILLATION

If the receiver is badly misaligned and two or more of the I.F. coils are tuned to the same frequency, or if the sound trap is not set at 21.25 Mc, the receiver may fall into I.F. oscillation. I.F. oscillation shows up as a voltage in excess of a few tenths of a volt at the picture detector load resistor. This voltage is unaffected by RF signal input and sometimes is independent of picture control setting. If such a condition is encountered, it is sometimes possible to stop oscillation by adjusting the coils approximately by setting the adjustment screws to be nearly equal to those of another receiver known to be in proper alignment. If this does not have the desired effect, it may now be possible to stop oscillation by increasing the grid bias with the contrast control. There is little likelihood of any oscillation occurring if the 21.25 Mc trap (adjusted by slug S10) is at its proper frequency, and the third picture I.F. (slug S8) is set at 21.6 Mc or lower. If oscillation persists, check for open by-pass condenser in I.F. strip.

RATIO DETECTOR ALIGNMENT

Set the signal generator for approximately 1 volt output at 4.5 Mc and connect it to the grid of the ratio detector driver. To align the primary of the Ratio Detector, connect the vacuum tube voltmeter to pin No. 2 of the 6AL5 and tune S12 for maximum negative voltage. To balance the secondary of the ratio detector, connect the vacuum tube voltmeter from the junction of the 15,000 ohm resistor and .01 mf. audio coupling condenser to ground. Adjust S13. It will be found that it is possible to produce a positive or negative voltage depending on this adjustment. Obviously, to pass from a positive to a negative voltage, the voltage must go through zero. S13 should be adjusted for zero output.

SOUND I.F. ALIGNMENT

Connect the signal generator to the grid of the video amplifier 6BA6 and maintain it at 4.5 Mc. Connect the vacuum tube voltmeter to pin No. 2 of the 6AL5 and

adjust slug S11 for maximum DC reading. Reduce output of signal generator to a very low level and readjust S11.

WIDTH AND HORIZONTAL LINEARITY ADJUSTMENT

Turn the horizontal linearity control T8 counter-clockwise as far as possible without causing crowding of the left side of the picture. Then, adjust the width control T9 until the picture just fills the mask horizontally.

HEIGHT AND VERTICAL LINEARITY ADJUSTMENT

Adjust the height control until the picture fills the mask vertically. Linearity should then be near perfect. Adjustment of the linearity may be made by exchanging the 1.2 megohm resistor connected between the plate circuit of the first vertical amplifier and the negative going supply for a larger or smaller value.

SERVICE SUGGESTIONS

Following is a list of symptoms of possible failures and an indication of some of the possible faults.

1.) No raster on kinescope
   A.) High voltage failure. Breakdown of high voltage filter, coupling, or by-pass condensers. Defective 25L6GT or 1B3GT tube.
   B.) Open grid or cathode circuit in kinescope
   C.) Defective kinescope
   D.) No receiver plate voltage. Look for defects in low voltage power supply (neg.)

2.) No vertical deflection
   A.) 12SN7 tube defective
   B.) Shorted or open condensers.. Check for tube voltages using voltage chart.

3.) No horizontal deflection
   Same procedure suggested in 2

4.) Small vertical raster
   0.02 mf. condenser in grid circuit of second vertical amplifier shorted or leaky. Check for other coupling condenser trouble.

5.) Poor vertical linearity
   Exchange 1.2 megohm resistor connected between plate circuit of first vertical amplifier and negative going supply, for smaller or larger value.

6.) Poor horizontal linearity
   Trimmer T8 adjusted too far out. Turn clockwise and readjust T9

7.) Raster and signal on kinescope but no sound
   A.) Ratio detector driver, ratio detector or audio output tube inoperative. Check socket voltages and components.
   B.) Speaker defective.

8.) Signal at kinescope grid, but no sync.

A.) Contrast control advanced too far
B.) 6AU6 sync. amplifier inoperative. Check socket voltages and components.

9.) Sound and raster, but no picture
A.) Kinescope defective
B.) One of I.F. amplifier tubes defective

10.)Raster, but no sound or picture
A.) 75-24 plate choke video amplifier open
B.) Open or shorts in video detector can assembly 279-37

11.)Picture instability
A.) Contrast control operated at too high a level
B.) Improper setting of horizontal or vertical hold control

12.)S Shaped raster
A.) Faulty filter condenser in negative going power supply circuit
B.) Unequal high voltage coupling condensers in horizontal sweep amplifiers. 300 mmf. condensers must be matched.
C.) 0.005 mf. or 0.05 mf. by-pass condensers in high voltage bleeder circuit open.

13.)Noise and cross hatch effect over picture
.001 filter condenser at cathode of high voltage rectifier open.

14.)Black band across raster
Filament-cathode leakage in video O.F., video amplifier, or sync. amplifier tubes.

15.)Some of tube filaments lighted and some dead
A.) Open filament of tube in one of the two filament strings (see schematic)
B.) Shorted filament by-pass condenser

ELECTRICAL SPECIFICATIONS

POWER SUPPLY RATING

105-120 volts, 60 cycles, 110 watts

AUDIO POWER OUTPUT RATING

300 milliwatts

RECEIVER ANTENNA INPUT IMPEDANCE

300 ohms balanced

TUNING RANGE

Channel 2-5; 54-88 Mc; Channel 6-13 in two bands 174-216 Mc.

PICTURE I.F. FREQUENCIES

Picture carrier frequency - 25.75 Mc
Accompanying sound trap - 21.25 Mc
Sound I.F. frequency - 4.5 Mc
Sound ratio detector band width (between peaks)
Video response - 3.8 Mc - 150 Kc
Focus - electrostatic
Sweep deflection - electrostatic

LOUDSPEAKER

Type - 4" electro magnetic dynamic
Voice coil impedance - 3.2 ohms at 400 cycles
Field coil resistance - 150 ohms

MODEL TV-37 PILOT RADIO CORP.

TV-37 VOLTAGE CHART

Measurements made with receiver operating on 110 volts A.C. at 60 cycles with no signal input. Volume control set at minimum, brightness at minimum, except where noted.

All voltages are measured with a vacuum tube voltmeter, except where otherwise specified. Voltages are read between indicated pin and chassis except where otherwise noted.

TUBE TYPE	FUNCTION	OPERATING CONDITION	PLATE		SCREEN		CATHODE		GRID**		NOTES ON MEASUREMENTS
			Pin	Volts	Pin	Volts	Pin	Volts	Pin	Volts	
12AT7 (a)	Low Band R.F.	Contrast min.	6	105	-	-	8	0	7	-4.5	Band switch set on low band position
		Contrast max.		100	-	-		0		-1.0	
12AT7 (b)	Low Band Mixer	Contrast min.	6	105	-	-	8	0	7	-2.8	
		Contrast max.		95	-	-		0		-2.5	
12AT7 (c)	Low Band Osc.	Contrast min.	6	105	-	-	8	0	7	-3.0	
		Contrast max.		95	-	-		0		-2.8	
12AT7 (a)	High Band R.F.	Contrast min.	1	105	-	-	3	0	2	-4.5	Band switch set on high band position
		Contrast max.		95	-	-		0		-0.5	
12AT7 (b)	High Band Mixer	Contrast min.	1	105	-	-	3	2	2	-2.0	
		Contrast max.		95	-	-		1.8		-1.8	
12AT7 (c)	High Band Osc.	Contrast min.	1	105	-	-	3	0	2	-4.8	
		Contrast max.		95	-	-		0		-4.2	
6AU6	1st I.F. Amp.	Contrast min.	5	105	6	105	7	0	1	-4.0	
		Contrast max.		95		95		.8		-.8	
6AU6	2nd I.F. Amp.	Contrast min.	5	105	6	105	7	0	1	-4.0	
		Contrast max.		95		95		.8		-.8	
6AU6	3rd I.F. Amp.	Contrast min.	5	105	6	105	7	0	1	-4.2	
		Contrast max.		95		95		.7		-.7	
6Au6	4th I.F. Amp.	Contrast min.	5	105	6	105	7	0.9	1	-.9	
		Contrast max.		95		95		0.8		-.8	
6AU6	Rat. Det. Driver	Contrast min.	5	105	6	105	7	.8	1	-.8	
		Contrast max.		95		95		.8		-.8	
6AL5	Rat. Det.		7	0	-	-	5	0	-	-	
35B5	Audio Amp.		5	98	6	105	2	0	7	-10	
35W4	Neg. Rect.		5	-125	-	-	7	110AC	-	-	
25Z6	Pos. Rect.		3&5	110 AC	-	-	4&8	120	-	-	
6BA6	Video Amp.	Contrast min.	5	62	6	105	7	0	1	-1.2	
		Contrast max.		62		95		0			
6AU6	Sync.Amp. DC Restorer	Brightness min.	5	-23	6	0	7	-115	1	-5	
		Brightness max.		-23		0		-115		-18	
25L6	H.V. Osc.		3	-	4	0	8	-115	5	-7 to -12	
1B3	H.V.Rect.	Brightness min.-	-	-	-	-	-	2550	-	-	At Pin 7 of kinescope
		Brightness max.-	-	-	-	-	-	2400	-	-	

TUBE TYPE	FUNCTION	OPERATING CONDITION	SIGNAL GRID **		CATHODE		FOCUS GRID*		SECOND ANODE		HOR. PLATES				VERT. PLATES			
			Pin	Volts	Pin	Volts	Pin	Volts	Pin	Volts	Pin	Volts	Pin	Volts	Pin	Volts	Pin	Volts
3KP4	Kinescope	Brightness Min.	2	-170	3	55	4	250	7	2550	5	2550	6	2550	8	2550	9	2550
		Brightness Max.	2	-75	3	-35	4	800	7	2400	5	2400	6	2400	8	2400	9	2400

TUBE	FUNCTION	OPERATING CONDITION	PLATES T1		PLATES T2		CATHODE T1		CATHODE T2		GRID ** T1		GRID ** T2	
			Pin	Volts	Pin	Volts	Pin	Volts	Pin	Volts	Pin	Volts	Pin	Volts
12SN7	Hor. Multi-Vibrator	Hor. Min.Res.	2	-60	5	-85	3	-110	6	-110	1	-1.7	4	-3
		Hold Max.Res.		-60		-75		-110		-110		-1.7		-4
12SN7	Hor. Amp.		2	0	5	105	3	-110	6	-110	1	-4	4	-5.5
12SN7	Vert.Multi-Vibrator	Vert Min.Res.	2	28	5	7	3	0	6	0	1	-1	4	-4
		Hold Max.Res.		28		13		0		0		-1		-6
12SN7	Vert.Amp.		2	7	5	23	3	-105	6	-105	1	-6	4	-6

* Focus control varied from minimum to maximum
** Grid voltages are measured between grid and cathode

Note: H.V. measurements taken with an electrostatic type voltmeter. However, these measurements may be taken with a 20,000 ohm per volt meter with but slight loading - reading will then be approximately 50 to 100 volts lower.

"ALIGNMENT CHART"

FUNCTION	CONNECT SIGNAL GENERATOR TO:	CONNECT SIGNAL GENERATOR TO:	UNMODULATED RF SIGNAL USED	CONNECT SCOPE TO:	CONNECT OUTPUT INDICATOR (VTVM) TO:	ADJUST	REMARKS
Video I.F. Spot Frequency Alignment		Antenna terminals	23.5 Mc		Point A on schematic	S5	
		Kill oscillator (short filament to ground)	25.6 Mc		Point A on schematic	S6	To maximum negative voltage
			22.0 Mc		Point A on schematic	S7	
			21.6 Mc		Point A on schematic	S8	
			24.8 Mc		Point A on schematic	S9	
			21.25 Mc		Point A on schematic	S10	Accurately to minimum neg. voltage
Sound I.F. and ratio detector alignment		Junction of .05 mf. video coupling condenser & video detector assembly (point "A")	4.5 Mc		Between negative side of electrolytic condenser at output of ratio detector (part #24-82) and ground. (Point "B" on schematic)	S11 S12	To maximum negative voltage
		Point "A"	4.5 Mc		between junction of 15K resistor, 1500 mmf. condenser, .01 audio coupling condenser and ground. (point "C" on scehmatic)	S13	For zero balance

ALIGNMENT CHART (Continued)

FUNCTION	CONNECT SWEEP GENERATOR TO:	CONNECT SIGNAL GENERATOR TO:	UNMODULATED RF SIGNAL USED	CONNECT SCOPE TO:	CONNECT OUTPUT INDICATOR (VTVM) TO:	ADJUST	REMARKS
Video I.F. Sweep Frequency Alignment	Loosely coupled to 12AT7 mixer tube by means of a metal sleeve at least 1" wide. A miniature tube shield may be used.	Loosely coupled to sweep generator output cable	Signal generator used as marker. From 20 to 27 Mc as needed for markers	Point "A" on schematic (Scope synchronized to sweep generator)		S5,S6,S7,S8, S9 to give following response curve:	Usually, after careful spot alignment, it will be only necessary to slightly touch-up slugs S5 and S9 to achieve the above curve. Note: - Keep input signal at low level to avoid overloading. Set receiver contrast control to approx. 3/4 of maximum position.
High Voltage Oscillator					T7 Second Anode of 3KP4		Use a 5000 volt DC electrostatic voltmeter or a 20,000 ohm voltmeter. Adjust trimmer for peak voltage and then back trimmer out for 2500 V.