

ER-S-803

GENERAL ELECTRIC

SERVICE DATA

FOR

TELEVISION RECEIVER

MODEL 803

SPECIFICATIONS

OVER-ALL DIMENSIONS:

Height	17 ³ / ₈ inches
Width	23 ¹ / ₂ inches
Depth	19 ¹ / ₈ inches

ELECTRICAL RATING:

Frequency	60 cycles
Voltage	105-125 volts
Wattage (Radio)	100 watts
Wattage (Television)	225 watts

R-F FREQUENCY RANGE:

Service Selector Switch	Freq. Range	Picture Carrier	Sound Carrier
Radio	540-1600 kc		
FM	88-108 mc		
No. 1	44-50 mc	45.25	49.75
No. 2	54-60 mc	55.25	59.75
No. 3	60-66 mc	61.25	65.75
No. 4	66-72 mc	67.25	71.75
No. 5	76-82 mc	77.25	81.75
No. 6	82-88 mc	83.25	87.75
No. 7	174-180 mc	175.25	179.75
No. 8	180-186 mc	181.25	185.75
No. 9	186-192 mc	187.25	191.75
No. 10	192-198 mc	193.25	197.75
No. 11	198-204 mc	199.25	203.75
No. 12	204-210 mc	205.25	209.75
No. 13	210-216 mc	211.25	215.75

INTERMEDIATE FREQUENCIES:

Television Video (Carrier Freq. Equivalent)	26.4 mc
Television and FM Audio (1st Conversion)	21.9 mc
Television and FM Audio (2nd Conversion)	4.5 mc
Broadcast Radio	455 kc

TUBES (25, including rectifiers):

Symbol	Purpose	Type
V1	Television R-F Amplifier	6AU6
V2	Television Converter-Oscillator	7F8
V3	1st Video I-F Amplifier	6AC7
V4	2nd Converter	6BE6
V5	1st Audio I-F Amplifier	6SC7
V6	2nd Audio I-F Amplifier	6SV7
V7	Audio Discriminator-Amplifier	6AQ7GT
V8	Audio Output	6V6GT
V10	Low Voltage Rectifier	5Y3GT
V11	Low Voltage Rectifier	5U4G
V12	2nd Video I-F Amplifier	6AC7
V13	3rd Video I-F Amplifier	6AC7
V14	Video Amplifier	6AC7
V15	Video Detector—D-c Restorer	6AL5
V16	Clipper—Hor. Sync. Amplifier	6SN7GT
V17	Hor. Discriminator—D-c Amplifier	6SL7GT
V18	Hor. Discriminator—Vert. Sync. Amplifier	6SL7GT
V19	Vertical Multivibrator	6SN7GT
V20	Vertical Sweep Output Amplifier	6V6GT
V21	Horizontal Multivibrator	6SN7GT
V22	Horizontal Sweep Output Amplifier	6BG6G
V23	Horizontal Damping	6AS7G
V24	Picture Tube	10BP4
V25	High Voltage Rectifier	8016/1B3GT
V26	Broadcast Mixer	6BE6

AUDIO POWER OUTPUT:

Undistorted	3 watts
Maximum	4.5 watts

LOUDSPEAKER:

Type	Alnico "PM" Dynamic
Size	4 inches x 6 inches
Voice Coil Impedance (400 cycles)	3.2 ohms

PICTURE SIZE:

Height	6 ¹ / ₂ inches
Width	8 ¹ / ₂ inches

ANTENNA REQUIREMENTS:

Type	Folded Dipole
Impedance	300 ohms

PILOT LAMPS:

Dial (2)	6-8 v., G.E. No. 44 Frosted
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CAUTION NOTICE

THE REGULAR B+ VOLTAGES ARE DANGEROUS AND PRECAUTIONS SHOULD BE OBSERVED WHEN THE CHASSIS IS REMOVED FROM THE CABINET FOR SERVICE PURPOSES. THE HIGH VOLTAGE SUPPLY (8000 V.) AT THE PICTURE TUBE ANODE WILL GIVE AN UNPLEASANT SHOCK BUT DOES NOT SUPPLY ENOUGH CURRENT TO GIVE A FATAL BURN OR SHOCK. HOWEVER, SECONDARY HUMAN REACTIONS TO OTHERWISE HARMLESS SHOCKS HAVE BEEN KNOWN TO CAUSE INJURY. SINCE THE HIGH VOLTAGE IS OBTAINED FROM THE B+ VOLTAGE, CERTAIN PORTIONS OF THE HIGH VOLTAGE GENERATING CIRCUIT ARE DANGEROUS AND EXTREME PRECAUTIONS SHOULD BE OBSERVED.

THE PICTURE TUBE IS HIGHLY EVACUATED AND IF BROKEN, GLASS FRAGMENTS WILL BE VIOLENTLY EXPELLED. IF IT IS NECESSARY TO CHANGE THE PICTURE TUBE, USE SAFETY GOGGLES AND GLOVES.

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GENERAL INFORMATION

The General Electric Model 803 television receiver is a table model, 25-tube instrument providing reception of all 13 commercial television channels and radio reception in the Broadcast and FM bands. The television picture is reproduced on a 10-inch electromagnetically deflected picture tube. All electrical components are mounted on a single chassis, permitting optimum ease in adjustment and service.

Features of the television receiver include a constant input impedance r-f amplifier, ion trap, safe high voltage power supply,

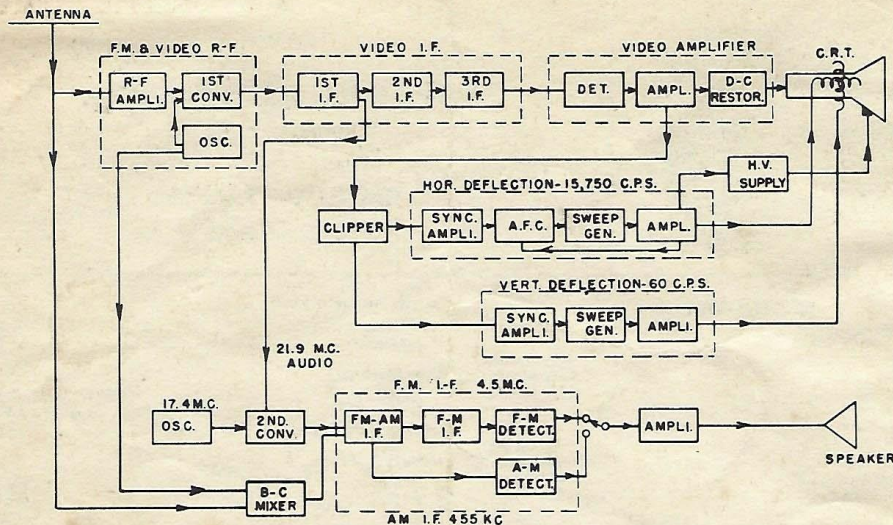


Fig. 1. Block Diagram, Model 803

automatic frequency control for horizontal synchronization, ten-inch picture tube, and high fidelity FM audio system.

INSTALLATION AND OPERATING INSTRUCTIONS

Installation and operating instructions for the Model 803 receiver are supplied in separate pamphlets, as follows:

1. Installation Instructions.....ER-A-803
2. Operating Instructions.....ER-I-803

DESCRIPTION—TELEVISION AND RADIO CIRCUITS

The receiver circuits are divided into the following sections:

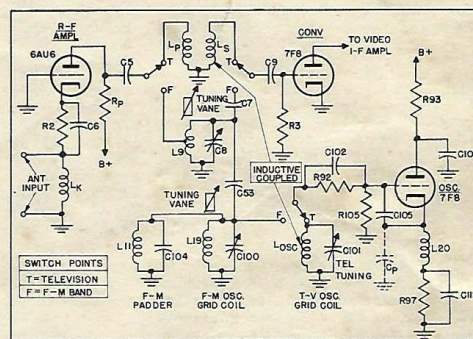
1. R-F amplifier, converter and oscillator.
2. Video and audio i-f amplifier.
3. Video detector and amplifier.
4. Sync pulse clipper-amplifier.
5. Horizontal multivibrator and AFC sync.
6. Horizontal sweep output.
7. Vertical multivibrator and sweep output.
8. High voltage power supply (H.V. supply).
9. Low voltage power supply (L.V. supply).

A brief description of the operation of each section is described in the following paragraphs. This will be supplemented by a comprehensive television training course in the publication, RSM-4-TV.

A block diagram of the complete receiver is shown in Figure 1 to assist in signal tracing and to better visualize the operation of the receiver as a whole.

1. R-F AMPLIFIER, CONVERTER AND OSCILLATOR (SEE FIGURES 2 AND 3)—The television and FM r-f amplifier makes use of a Type 6AU6 tube connected as a triode grounded-grid amplifier. The antenna is connected into the cathode circuit so as to provide a substantially constant input impedance of 300 ohms to the antenna at all frequencies. With a 300-ohm antenna and transmission line system, this coupling arrangement permits optimum transfer to signal from antenna to r-f amplifier for all 13 channels and also prevents reflections from being set up on the transmission line. R2 is the normal bias resistor. A choke, L_k , is placed in series with this cathode resistor to prevent the input impedance from being lowered by the shunting effect of the total stray capacity to ground of the cathode of the tube. The choke value is changed for different channels.

For television operation, the r-f amplifier is coupled to the converter tube by a wide band transformer consisting of windings L_p and L_s . The windings are overcoupled and self-tuned by



the distributed and tube capacities to provide optimum gain and band width. On channels No. 1 and No. 2, the transformer is triple tuned to prevent the image frequencies of the 88 to 108 mc FM band from interfering with these two channels. For FM reception in the 88-108 mc band, the r-f amplifier is coupled to the converter through the Guillotine Tuner Unit, L9. This unit operates as an autotransformer, the inductance, and therefore frequency, of which is varied by the tuning vane which travels in and out of L9. L9 is tuned to resonance by the stray and tube capacities, as well as by a trimmer, C8.

The triode converter is one section of a Type 7F8 dual triode, V2. Bias for this tube section is provided by the oscillator voltage appearing in the grid of the converter tube, causing grid rectification charging the grid resistor-condenser combination, R3 and C9.

The oscillator makes use of the remaining half of the Type 7F8 tube, V2B, and for television operation, the oscillator voltage is coupled inductively to the converter grid by locating the oscillator grid coil, L_{osc} , adjacent to the converter grid coil, L_c . For FM operation, the oscillator voltage is coupled through capacitor C53 into the grid circuit tuning circuit, L9. The oscillator is a modified Colpitts oscillator, oscillation being produced by the cathode-to-grid, C_g , and cathode-to-plate, C_k , interelectrode capacities of the oscillator tube. C105 shunts C_g to provide uniform operation. The choke, L20, provides, a d-c ground to the cathode of the oscillator tube but maintains the cathode off-ground at the r-f frequencies. The oscillator operates on the high frequency side of the r-f signal on all bands.

For broadcast reception, no r-f amplifier stage is used, the r-f signal being applied directly to a Type 6BE6 mixer, V26. Here the broadcast signal is converted to 455 kc in the plate circuit. The oscillator section of V2 operates as the local oscillator for broadcast, operating on the high frequency side of the incoming signal. The oscillator is connected in a Hartley circuit by taking off the cathode tap on L18 which forms part of the grid tank circuit. The oscillator voltage is capacity coupled to mixer grid through C52. Tuning through the broadcast band is accomplished by moving powdered iron cores in the mixer and oscillator grid tank coils which are ganged to the tuning control and dial scale.

The r-f unit, including the r-f amplifier, converter and oscillator tubes and their associated components, is constructed as a complete unit subassembly which can be demounted from the main chassis.

2. VIDEO AND AUDIO I-F AMPLIFIERS (SEE FIGURE 4)—The video i-f amplifier consists of a three-stage band-pass amplifier using three Type 6AC7 tubes. The transformers, T15, T17, and 18, are overcoupled and then loaded with resistance to give adequate (approx 4 mc) band-pass frequency characteristic. A series tuned trap consisting of L32, C127 and C126 tuned to 27.9 mc is connected in the 1st i-f amplifier grid circuit to provide rejection of the adjacent channel sound. T16 is a broad band, single tuned inductance with two 21.9 mc traps coupled to it, which are used to provide rejection of the channel audio. A series tuned 21.9 mc trap is used at the diode stage (T18).

Bias for the video i-f is taken from the horizontal multivibrator. This bias is shorted out on FM to prevent positive voltage from appearing on the grid of V3. The horizontal multivibrator does not operate on FM so that the bias circuit is returned to B+.

The audio i-f frequency is developed by taking the 21.9 mc sound i-f signal from across one of the traps at T16 and applying

it to the 2nd converter tube, V4. At this tube, the 17.4 mc local oscillator combines with the 21.9 mc to form a difference frequency of 4.5 mc. At this frequency it is amplified by V5, applied to the limiter tube V6 and then detected. Since the audio channel of the television is frequency-modulated, the transformer T24 functions with sections of V7A as the discriminator. This double conversion used to receive the 88 to 108 mc FM band, provides high gain and selectivity necessary for tuning of the FM stations.

3. VIDEO DETECTOR AND AMPLIFIER (SEE FIGURE 5)—The video i-f amplifier output is applied to a diode rectifier, V15A, and the diode load, R18, is connected so as to develop a negative-going signal at this point. This signal is amplified by the pentode amplifier, V14, and then applied to the cathode of the picture tube, V24, through the coupling capacitor C3. The remaining diode section of V15 is used to provide d-c reinsertion to the picture at the picture tube.

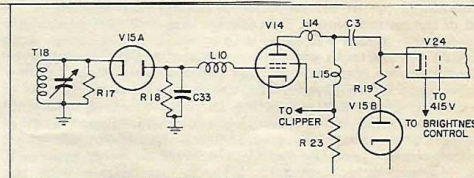


Fig. 5. Video Detector and Amplifier

The chokes L10 and L14 are series-peaking chokes, while L15 is a shunt-peaking choke. These are used to obtain good-high-frequency response. L10 in combination with C33 also prevents harmonics of the i-f frequency from being passed through the video amplifier. R23 is the V14 tube plate load resistor.

Since the cathode of the picture tube is normally at a positive voltage, by the fact that it is returned to a B+ source, a variable positive voltage is also applied to the grid of V24 for control of the brightness or beam current. As long as this grid voltage is less positive than the cathode voltage, the tube beam current will be within its rating. This positive voltage on the grid is controlled by Brilliance control potentiometer, R108B.

4. CLIPPER AND SYNC AMPLIFIER—The triode section, V16A, of a Type 6SN7GT tube is used to separate the sync pulses from the composite video signal taken off at the load resistor, R23. The clipper tube, V16A, is operated at a very low plate voltage and its bias is derived by grid rectification of the positive polarity video signal applied to the grid. Thus, conduction in V16A will occur only during the sync pulse intervals which are the most positive component of the video signal.

Tube V16B is a horizontal synchronizing amplifier which operates into the AFC input transformer, T19. This transformer by virtue of its low inductance acts as a differentiator; that is, in the secondary, the original sync signals become positive and negative pips. Only the pip that is representative of the leading edge of the synchronizing pulse is used.

The vertical synchronizing amplifier tube, V18B, receives the sync pulse at its grid circuit through an integrator circuit consisting of R30 and C136. This integrating circuit accepts the wide vertical pulses and further amplifies them while the horizontal pulses do not have sufficient energy to charge the integrating circuits and are, therefore, attenuated. The tube V18B is operated as a cathode follower and further integration of the sync signal is provided in its cathode circuit.

5. HORIZONTAL MULTIVIBRATOR AND AFC SYNC (SEE FIGURE 6)—The horizontal sawtooth oscillator makes use of a Type 6SN7GT tube, V21, in a conventional cathode-coupled multivibrator circuit. Instead of its frequency being controlled directly by the horizontal sync pulses, it is controlled by a d-c voltage on its controlling grid, the d-c voltage being a resultant of the phase error between the incoming sync signal and a sawtooth voltage derived from the output of the horizontal sweep amplifier. This voltage is called an automatic frequency control (AFC) voltage.

The AFC voltage is developed by the diode-connected triodes V17A and V18A by mixing the horizontal sync pulses at the secondary of transformer T19 with a sawtooth voltage waveform derived at the output of the sweep amplifier tube, V22. When the sync pulse occurs at the time "a" shown in the sawtooth waveform drawing in Figure 6, no voltage will be developed at the output of the filter. However, if the multivibrator runs faster or slower so that the pulse falls at a point other than at "a," a

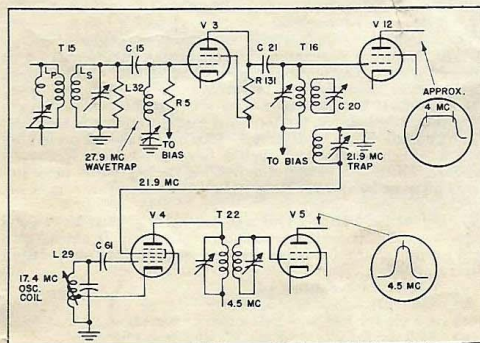


Fig. 4. Video and Audio I-F Amplifier

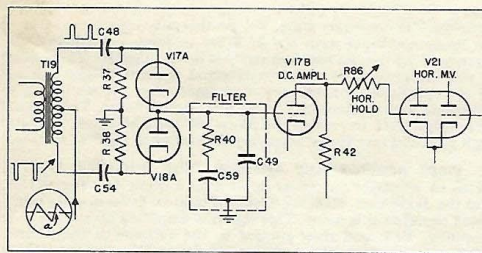


Fig. 6. Hor. Multivibrator and Sync

positive or negative voltage will appear at the filter, which will be amplified by the d-c amplifier V17B and then applied to the grid of the multivibrator. This change in d-c voltage on the grid of the multivibrator will cause it to speed up or slow down so as to cause the sawtooth wave to combine with the incoming sync pulses until the correction voltage becomes zero. With the filter consisting of R40, C59, and C49, the change is relatively slow in controlling the speed, permitting the equivalent of individual frame synchronization instead of each component line. This gives a picture characterized by greater detail than is possible where random noise triggers the directly synchronized sweep generator. The Horizontal Hold control, R86, in conjunction with the cathode tuned circuit C99 and L33, control the free-running speed of the multivibrator. They are adjusted near to the correct frequency during the time when no sync pulses are available.

6. HORIZONTAL SWEEP OUTPUT (SEE FIGURE 7)—The horizontal sawtooth voltage generated by the multivibrator, V21, is shaped and then amplified by a Type 6BG6G tube, V22. The output of this tube is coupled to the horizontal deflection coils through an impedance-matching transformer, T25. An oscillatory voltage, as shown in the dotted line in the waveshape at the upper left of Figure 7, which results from the rapid retrace in the transformer T25, is removed by the damping tube, V23. This tube is a dual triode, Type 6AS7G, and by its use the transient may be damped, linearity controlled, and the positive overshoot voltage retained for use in the high voltage supply. The linearity of the horizontal trace is controlled by varying the voltage waveshape applied to the grid of V23 by potentiometer, R115. The horizontal size is controlled by the adjustable iron core inductance, L23, which is in series with the output to the yoke.

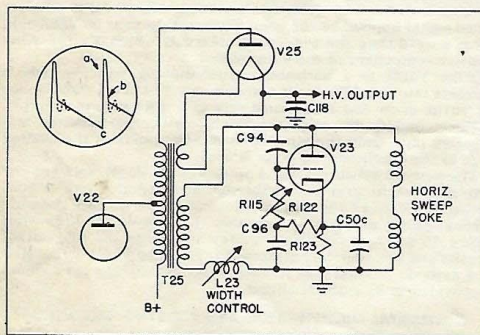


Fig. 7. Horizontal Sweep Output

7. VERTICAL MULTIVIBRATOR AND SWEEP OUTPUT (SEE FIGURE 8)—The vertical sawtooth voltage is generated by a Type 6SN7GT tube, V19, connected as a multivibrator. This voltage is coupled directly to a Type 6V6G vertical sweep output tube, V20, and then to the vertical sweep coils through the impedance-matching transformer, T20. Vertical speed is controlled by changing the time constant of the multivibrator grid circuit by the potentiometer, R46. Sweep size is changed by the potentiometer, R49, which changes B+ voltage applied to the charging network of tube V19 simultaneously with the screen voltage on tube, V20. Vertical linearity is controlled by a correction voltage developed in the cathode of V20 being fed back through C92 to

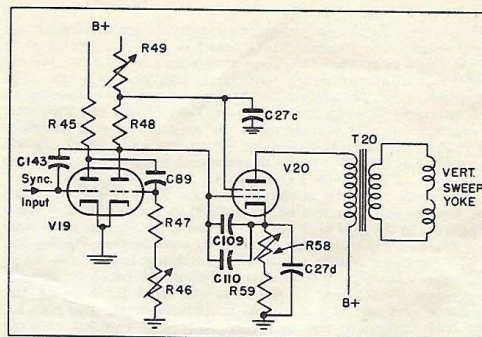


Fig. 8. Vertical M.V. and Sweep Output

the grid of the output tube. The amount of correction voltage is varied by the variable cathode resistor, R58.

8. HIGH VOLTAGE SUPPLY (SEE FIGURE 7)—The high voltage is derived by making use of the inductive "kick" voltage produced during retrace in the horizontal output transformer. This "kick" voltage is shown in the waveshape shown as "c to b" in Figure 7. This voltage is generated in the primary winding and is further increased by an additional winding added to the transformer which connects to the rectifier tube plate of V25. The rectifier tube, V25, is a Type 8016 which derives its filament voltage from the horizontal sweep transformer T25 by a single turn around the transformer. Because of the high frequency (15,750 cps) which is rectified, a 500 mmf. capacitor is more than sufficient for filtering purposes.

9. LOW VOLTAGE POWER SUPPLY—Two rectifiers are used to supply the required plate current for the television and radio receiver. A Type 5U4G tube, V11, supplies the bulk of the current and makes use of a choke, L21, and capacitor, C106 and C45A filter. Type 5Y3GT, V10, is used to supply higher voltage to the horizontal output, horizontal multivibrator, and the picture tube 1st anode. This is followed by a choke-capacitor filter. All filament supply leads except for tubes V26, V4, V3, V5, V2, V1, V8, V6 and V7 and the rectifier filaments pass through the band switch so that tubes are switched ON or OFF when switching from radio to television.

CIRCUIT ALIGNMENT

GENERAL—A complete alignment of the Model 803 television receiver consists of the following individual alignment procedures. These are listed below in the correct sequence of alignment. However, any one alignment may be performed without the necessity of realignment of any one of the other sectional alignments, provided the signal source for television traps and video i-f amplifier is accurately calibrated.

1. Broadcast i-f amplifier.
2. Broadcast r-f amplifier.
3. FM and television sound i-f amplifier.
4. Video i-f traps.
5. Video i-f amplifier.
6. FM r-f amplifier.
7. Television oscillator adjustments.
8. Television r-f amplifier.

The alignment procedure is in table form on pages 9 through 13. The following paragraphs are important suggestions to be followed when attempting alignment and should be read thoroughly before alignment is attempted.

TEST EQUIPMENT REQUIREMENTS—To provide the over-all alignment as outlined above, the following test equipment is required.

1. Cathode Ray Oscilloscope—This scope should preferably have a 5-inch screen and should have good high frequency response, which will be useful in making the waveform measurements on page 20 and 21. Note—High frequency response is not essential for alignment.

2. Signal Generator—This signal generator must have good frequency stability and be accurately calibrated. It should give good output at the following frequencies with tone modulation where desired.

- (a) 455 kc for broadcast i-f.
- (b) 550-1620 kc for broadcast.
- (c) 4.5 mc for FM and Tel. audio i-f marker.
- (d) 21.9 mc for sound i-f marker and trap alignment.
- (e) 27.9 mc for trap alignment.

- (f) 23.0 mc for video i-f marker.
- (g) 25.65 mc for video i-f marker.
- (h) 26.4 mc for video i-f marker.
- (i) 44-130 mc and 174-238 for FM r-f alignment and for oscillator adjustment and markers for the r-f channel bandwidth measurements.

3. **R-F Sweep Generator**—This should give at least 0.1 volt output with adjustable attenuation of the output. The output should be flat over wide frequency variations. The frequency coverage should be:

- (a) 4.5 mc, with 1.0 mc sweep width.
- (b) 21.9 mc with 1.0 mc sweep width.
- (c) 20 to 30 mc, with 15 mc sweep width.
- (d) 40 to 90 mc, with 25 mc sweep width.
- (e) 170 to 220 mc, with 25 mc sweep width.

4. **Output Meter**—An output meter with a voltage range of 0-2.5 volts a-c.

5. **Wavetraps**—Accurately calibrated wavetraps may be used to supply markers in place of the signal generator for video i-f and r-f alignment purposes.

ALIGNMENT SUGGESTIONS—All trimmer locations are shown in the drawings of Figures 14 or 17. Remove the chassis from the cabinet and turn it on its side with the power transformer down. This is the only safe position in which the chassis will rest and leave all adjustments accessible. The following suggestions apply to each individual alignment procedure.

1. **Broadcast I-F Alignment**—(a) Although the oscilloscope is recommended in the table for indicating the output voltage during alignment, an output meter may be connected across the speaker voice coil as an alternate output indicating device. When this is used, the volume control should be set for maximum volume and then attenuate the signal generator output so as not to cause audio overload.

(b) Use a 500 mmf. mica capacitor between the high side of the signal generator and the signal input point, as indicated in the Alignment Table.

2. **Broadcast R-F Alignment**—Apply signal generator input to one of dipole input terminals (No. 1 or No. 2) through a 500 mmf. mica capacitor or IRE standard dummy antenna. An output meter across the speaker may be used in place of the oscilloscope for indicating output. The moving iron cores of the r-f and oscillator coils are adjusted by the hex head adjusting screw located on the elevator cross-arm to which the cores are mounted.

3. **FM and Television Sound I-F Alignment**—Amplification of the incoming sound signal is accomplished at 21.9 mc and then through double conversion is reduced to 4.5 mc and then further amplified. The tuned circuit consisting of L29 and C62 is not adjusted to 17.4 mc directly but is tuned to provide the proper output of 4.5 mc when a 21.9 mc signal is applied to the mixer grid of V4.

Since the sound i-f for FM and television makes use of slightly over-coupled transformers, a sweep generator is necessary. For alignment, connect the generator through a 500 uuf. capacitor to the input points as indicated in the table. Connect the oscilloscope across the limiter grid resistor, R69, through a 100,000-ohm resistor for steps 1 through 4. For the discriminator alignment, the oscilloscope is connected across the volume control and the series resistor to the scope is reduced to 10,000 ohms.

For steps 1 and 2, insert a 4.5 mc marker signal from an unmodulated signal generator into the same point of input as the sweep generator. This input, however, must be very loosely coupled so that it doesn't affect the response curve. See Figure 9A for curve for step 1.

Keep the input of the sweep generator low enough so that the sound i-f amplifier does not overload. To check for overload; the response curve should increase proportionally as the sweep output is increased. If it flattens off and won't increase in size, the amplifier is overloaded.

The response curve narrows up somewhat as more transformers are aligned and should appear as in figure 9B for steps 2, 3, and 4.

For discriminator alignment, the secondary trimmer C140 of T24 is aligned by using a tone-modulated 4.5 mc signal and listening to the tone at the loudspeaker or observing it on an oscilloscope. The trimmer is adjusted for minimum output. If a



Fig. 9. FM Audio I-F Curves

sweep is used for the secondary trimmer alignment, the cross-over should be symmetrical about a 4.5 mc marker and should be a straight line between the alternate negative and positive peaks, as shown in Figure 9C. With the same sweep input as in step 1, adjust the primary trimmer, C80 of T24, for maximum peak-to-peak amplitude and symmetry of peaks above and below the baseline, as shown in Figure 9C.

4. **Video I-F Trap Alignment**—The video i-f traps are used to attenuate the sound i-f of the same and adjacent channels from being detected and reproduced on the picture tube. Misalignment of these traps results in interference patterns which have the appearance of horizontal bars or as a very fine pattern which spoils the contrast.

Set the Contrast control at maximum. Turn the Service Selector control to channel 13. Connect the oscilloscope through a 10,000-ohm resistor to the top of the video load resistor, R23.

Connect the output of an accurately calibrated signal generator (with tone modulation) to the grid of the converter tube V2A, through a 500 mmf mica capacitor. The alignment frequencies are:

- (C127)—27.9 mc
- T17 (C29)—21.9 mc
- T18 (C34)—21.9 mc

The trap trimmers C20 and C22 were aligned during "FM and Television Sound I-F Alignment" and should not be readjusted.

The trimmers should be aligned for minimum output, care being taken to get the lowest possible indication at the output. The input signal should be attenuated below saturation of the i-f amplifier tubes at start, then raised as signal is attenuated during alignment.

5. **Video I-F Alignment**—The video i-f amplifier uses transformers which are coupled and loaded to give the proper band-pass characteristics. Before attempting alignment of the video i-f, the sound i-f traps should be aligned as in (4), then do not touch the trap trimmers when making the video i-f alignment.

One-stage-at-a-time alignment should be performed so as to duplicate the curves, as shown in Figure 10. The markers are used to establish the correct bandwidth and frequency limits.

The trap formed by L24 and C131 in the cathode of V12 is tuned to reduce the overshoot which appears at a frequency of approximately 21.4 mc and which is caused by the 21.9 mc traps. Adjust the spacing of turns comprising L24 by either pushing the turns together or separating them so as to give a minimum amplitude to the overshoot.

Connect the sweep generator to the tube grid preceding the transformer to be aligned. Adjust the sweep width for a minimum of 15 mc about the center frequency of the video i-f frequency. The marker frequencies are supplied by a signal generator and sufficient marker signal may be supplied in most cases except at last stage by merely connecting the high side of the signal generator to the television chassis. At last stage couple marker generator through a small capacitor in parallel with sweep.

The primary of the transformer preceding the grid where the signal is applied will act as a tuned trap, putting a hole in the alignment curve as viewed on the scope unless it is short-circuited or detuned. Place a temporary short across the primary as indicated in steps 1, 4 and 5. *Be sure to remove the short after the stage is aligned.*

Keep the input to the sweep generator low so as not to overload the video i-f amplifier.

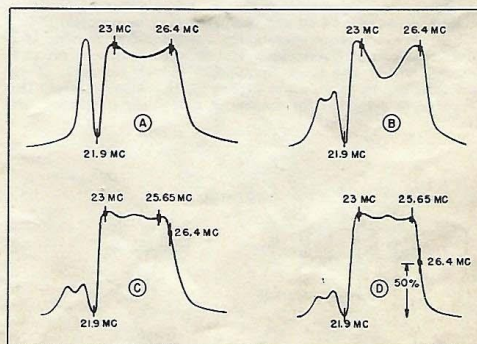


Fig. 10. Video I-F Alignment Curves

The response curves shown in Figure 10 are obtained on an oscilloscope at the junctions of R23 and L15. Use a 10,000-ohm resistor in series with the input lead to the scope for isolation. Set contrast control to position as indicated under "Remarks" for each step.

The Service Selector switch should be in the AM position for all i-f alignment. Use a temporary jumper across Section S1D wafer of the switch so as to keep the television tubes lit while in this position. If a television position is used for i-f alignment, the i-f curve may be affected by the interaction from the r-f coil in the converter tube grid.

In the AM or broadcast switch position, the cathodes (Pins 3 and 6) of V21 are grounded by a section of S1E. In order to develop contrast bias for i-f alignment, it is necessary to disconnect the lead from the selector switch to Pin 3 of V21.

When the sweep input is connected to the converter grid, it is necessary to ground the oscillator coil (L17) in order to "kill" the broadcast oscillator.

6. FM R-F Amplifier—Apply the signal generator input with tone modulation to the antenna dipole terminals. Connect an oscilloscope or output meter across the limiter grid resistor, R69.

The scale is checked at the low and high frequency ends of the band for calibration and alignment. The oscillator range is either expanded or contracted by adjusting the paddler coil inductance L11. To spread out the scale, it is necessary to decrease inductance of L11. This is done by moving the shorted turn on L11 towards the color dot. When contracting the scale; that is, when the reference frequencies are off scale, the reverse procedure should be followed. Always recheck and readjust, if necessary, trimmer C100 for 88 mc calibration after adjusting L11.

When installing new tuner vanes in L9 and L19, the vanes should be adjusted to seat at the bottom of travel when the dial pointer is at extreme clockwise position.

7. Television Oscillator Adjustment—The oscillator coils must be adjusted so that the Television Tuning Condenser, C101, will tune the sound carrier of the television signal at the middle of its range. Set the condenser, C101, to mid-position. Then adjust oscillator coil for channels No. 1 through No. 7 by spreading turns to raise frequency or compressing turns to lower frequency. For channels No. 8 through No. 13, the oscillator coil consists of a single turn. Adjust these coils by spreading the gap to lower frequency or closing the gap to raise frequency in the leads of the coil which run to the terminals.

Apply the signal generator with tone modulation to the antenna input terminals and set the generator to the sound carrier frequency for the channel under alignment. The signal generator must be very accurately calibrated. This can be done by beating its output against a known channel carrier or use a station operating on the channel and tune in the sound.

For output indication, advance the volume control about to mid-position so that the tone modulation or audio modulation on the channel station may be heard through the loudspeaker.

The oscillator coil is located on the coil form or assembly nearest to the front of the switch assembly and is wound of heavier wire than the other coils. This is shown in Figure 11.

8. R-F Coil Alignment—The r-f coil assembly is designed for stable, band-pass operation and under normal conditions will seldom require adjustment. In cases where it is definitely known that alignment is necessary (such as when the present coil is damaged and has been changed), do not attempt the adjustment unless suitable equipment is available. When tubes V1 or V2 are changed, alignment of r-f and oscillator may be necessary.

The minimum requirements for correct r-f alignment is to provide the correct band width, and for the response curve to be centered within the limit frequencies shown for each of the individual bands, as shown in Figure 12. It is also necessary that the curve be adjusted for maximum amplitude consistent with

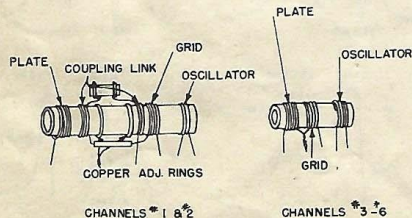


Fig. 11. R-F Coil Assembly

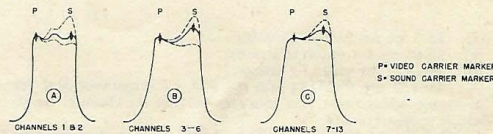


Fig. 12. R-F Alignment Curves

correct band width. To provide these minimum requirements, the r-f coils are overcoupled in a very similar manner to the video i-f transformers. However, instead of adjusting capacity to tune the coils, the inductance is varied by moving a few turns. Coupling is also adjustable by moving the entire coil either away from or toward the adjacent coil on the form.

The physical assembly of the coils in the band switch locates the r-f amplifier plate coil at the rear of the switch and the oscillator coil towards the front end. Two types of coils are used—the Channel No. 1 and No. 2 coils have an additional link circuit between the grid and plate coils to provide better image rejection of the FM band (88 to 108 mc) signals on these two channels. These links are tuned by means of two copper rings which are moved along the coil forms for adjustment.

The input sweep signal is applied to the antenna terminal board at the r-f unit. The 300-ohm cable between the antenna terminal board and r-f amplifier input must be disconnected at the r-f unit when making r-f alignment. The marker signal generator may be coupled loosely to the antenna input terminals.

The output r-f response curve is taken off at the junction of R4 and a terminal of the 1st video i-f transformer. The Contrast control should be set for minimum for all r-f alignment.

For Channels No. 1 and No. 2, the r-f coils should be aligned to give approximately the curve shown in Figure 12-A. The "P" marker represents the video carrier marker while the "S" marker is the high frequency or sound marker. As shown in dash lines, the amplitude limits of the curves, with the "P" marker as reference no portion of the curve should be any more than 25 per cent higher or 12 per cent lower than this reference point. The markers should be located on the inside of the humps of the curves. Adjustment of the bandwidth is made by moving the plate coil closer to the grid coil or vice versa. In most cases, the sliding of the copper rings will give both the required bandwidth and the frequency adjustment. Spread or squeeze turns in plate and grid coils if the frequency cannot be obtained by sliding the rings. Spreading turns results in a raising of the frequency; while squeezing turns lowers the frequency.

For the remainder of the channels, the adjustment of the plate coil in relation to the grid coil changes the bandwidth, while the spreading or squeezing of the plate and grid coil results in the raising or lowering of frequency. Only when the plate and grid coils are tuned to the same frequency will the amplitude be greatest with the correct bandwidth. The outside peaks of the r-f response curve should be aligned to the carrier markers.

The upper channel coils (No. 12 and No. 13) have the plate winding reversed from the winding direction of the plate coil of the other transformers. In this case, the bandwidth will be increased by separating the plate and grid coils.

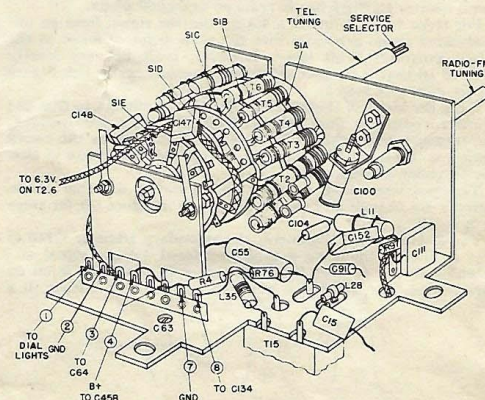
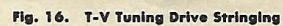


Fig. 13. R-F Head-end Assembly



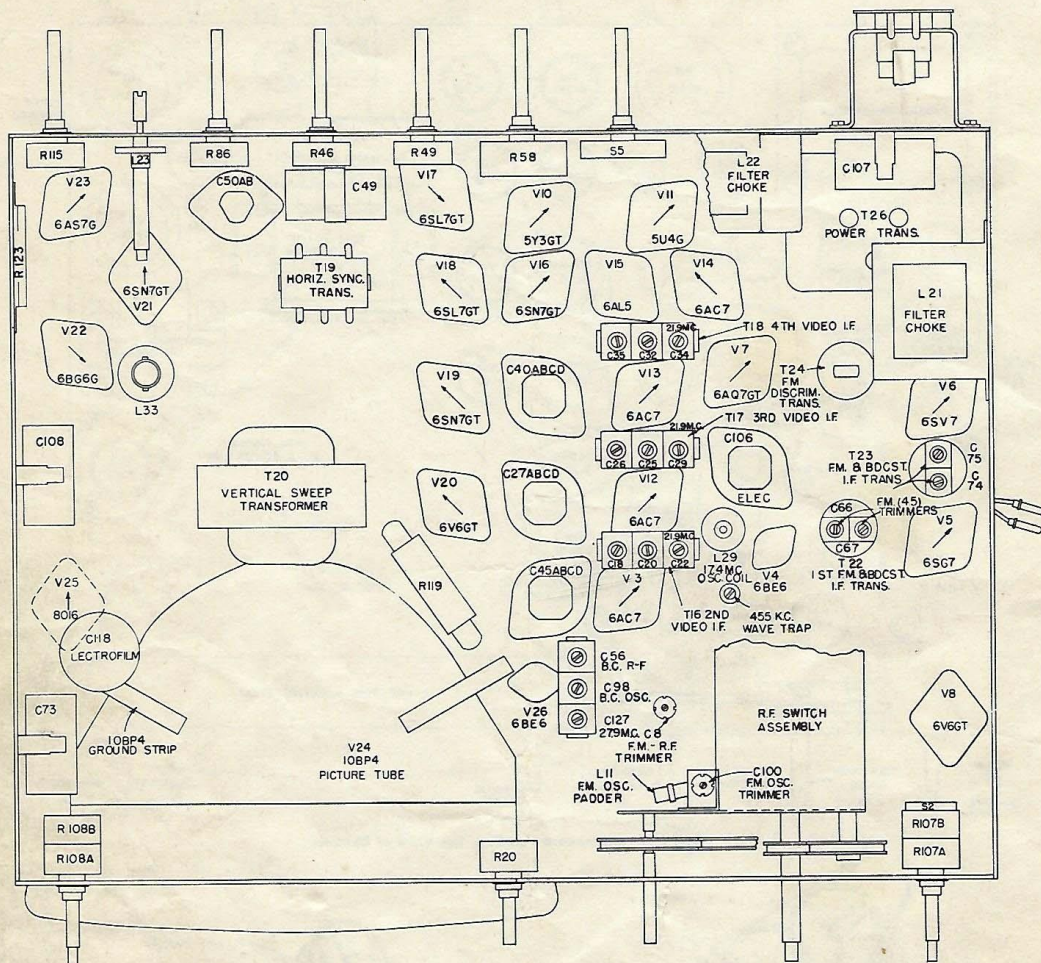


Fig. 17. Component Location, Bottom View of Chassis

ALIGNMENT TABLE

Before attempting the following tubular alignment procedure, read the preceding section "ALIGNMENT SUGGESTIONS" on pages 5 and 6.

STEP NO.	GENERATOR FREQUENCY		SIGNAL INPUT POINT	CONNECT OSCILLOSCOPE TO CHASSIS &	STATION SELECTOR SWITCH	DIAL SETTING	ADJUST	REMARKS
	SIGNAL	SWEEP						
(1) BROADCAST I-F AND WAVETRAP ALIGNMENT								
1	455 kc with tone modulation	Not used	Grid (4) of V5 through 500 mmf.	Junction of C84 & R135	AM	550 kc	C77 & C78 for max. output	
2	455 kc with tone modulation	Not used	Grid (7) of V26 through 500 mmf.	Junction of C84 & R135	AM	550 kc	C68 & C69 for max. output	
3	455 kc with tone modulation	Not used	Antenna terminals No. 1 or No. 2 & Gnd.	Junction of C84 & R135	AM	550 kc	C63 for minimum output	
(2) BROADCAST R-F ALIGNMENT								
1	1620 kc with tone modulation	Not used	Antenna terminal No. 1 or No. 2	Junction of C84 & R135	AM	Pointer at extreme clockwise position	C98 (Osc.) & C56 (R-F) for maximum	
2	1500 kc with tone modulation	Not used	Antenna terminal No. 1 or No. 2	Junction of C84 & R135	AM	Pointer at 1500 kc	L17 core for maximum*	*After alignment, check calibration at 600 kc. Adjust L17 for best compromise calibration at 600 kc and 1500 kc.
3	1620 kc with tone modulation	Not used	Antenna terminal No. 1 or No. 2	Junction of C84 & R135	AM	Pointer at extreme clockwise position	C98 (osc.) for maximum	
4	1000 kc with tone modulation	Not used	Antenna terminal No. 1 or No. 2	Junction of C84 & R135	AM	*See Remarks	L16 core for maximum	*Rock tuning pointer through approx. 1000 kc point while aligning.
5	Repeat Step 1 and Step 4.							
(3) FM AND TELEVISION SOUND I-F ALIGNMENT								
1	4.5 mc without modulation for marker	4.5 mc with approx. 1 mc sweep	Grid (4) of V5 through 500 mmf.	Junction R69 & C70 through 100K resistor	FM	—	C74 and C75 for max. amplitude and symmetry at 4.5 mc. See Fig. 9-A.	Remove V7 before making adjustments. Keep input signal low to prevent overload. Couple marker signal loosely.
2	4.5 mc without modulation for marker	4.5 mc with approx. 1 mc sweep	Grid (7) of V4 through 500 mmf.	Junction R69 & C70 through 100K resistor	FM	—	C66 & C67 of T22 for max. amplitude and symmetry* at 4.5 mc. See Fig. 9-B.	*It is usually necessary to readjust C74 to obtain symmetry.
3	21.9 mc without modulation for marker	21.9 mc with approx. 1 mc sweep	Grid (7) of V4 through 500 mmf.	Junction R69 & C70 through 100K resistor	FM	—	L29 for centering of marker and symmetry of curve. See Fig. 9-B.	Same as 1.
4	21.9 mc without modulation for marker	21.9 mc with approx. 1 mc sweep	Grid (4) of V3 through 500 mmf.	Junction R69 & C70 through 100K resistor	FM	—	C20 & C22 of T16 for max. amplitude and symmetry of curve about marker. See Fig. 9-B.	Same as 1.

ALIGNMENT TABLE (Cont'd)

STEP NO.	GENERATOR FREQUENCY		SIGNAL INPUT POINT	CONNECT OSCILLOSCOPE TO CHASSIS &	STATION SELECTOR SWITCH	DIAL SETTING	ADJUST	REMARKS
	SIGNAL	SWEEP						
(3) FM AND TELEVISION SOUND I-F ALIGNMENT (Cont'd)								
5	4.5 mc with tone modulation	Not used	Grid (4) of V5 through 500 mmf.	Junction R135 & C84 through 10K resistor	FM	—	C140 of T24 for null point of modulation on scope.	Replace V7. Keep input signal low enough to prevent overload.
6	Not used	4.5 mc with approx. 1 mc sweep	Grid (4) of V5 through 500 mmf.	Junction R135 & C84 through 10K resistor	FM	—	C80 of T24 for max. peak-to-peak amplitude and symmetry of peaks above and below baseline. See Fig. 9-C.	—
7	Repeat Steps 5 and 6.							
(4) VIDEO I-F TRAP ALIGNMENT								
1	21.9 mc with tone modulation	Not used	Grid (4) of V3 through 500 mmf.	Junction L15 & R23 through 10K resistor	Channel No. 13	—	C34 of T18 for minimum response.	Contrast control at maximum. Input low enough to prevent overload.
2	21.9 mc with tone modulation	Not used	Grid (4) of V3 through 500 mmf.	Junction L15 & R23 through 10K resistor	Channel No. 13	—	C29 of T17 for minimum response.	
3	27.9 mc with tone modulation	Not used	Grid (8) of V2 through 500 mmf.	Junction L15 & R23 through 10K resistor	Channel No. 13	—	C127 for minimum response.	
(5) VIDEO I-F AMPLIFIER ALIGNMENT								
1	23.0 mc & 26.4 mc marker	20-30 mc sweep	Grid (4) of V13 through 500 mmf.	Junction L15 & R23 through 10K resistor	AM Position. Disconnect lead from Pin 3 of V21 to selector switch. Use temporary jumper across Section S1D wafer of switch to keep television tubes lit while in this position	—	C32 & C35 of T18 for max. amplitude, band width and correct position of markers. See Fig. 10-A.	Short C25 on T17 primary with jumper.
2	23.0 mc & 26.4 mc marker	20-30 mc sweep	Grid (4) of V12 through 500 mmf.	Junction L15 & R23 through 10K resistor	Same as 1.	—	C25 & C26 of T17 for max. amplitude, band width and correct position of markers. See Fig. 10-B.	Remove short across C25. Contrast control set at mid-position.
3	23.0 mc & 26.4 mc marker	20-30 mc sweep	Grid (4) of V12 through 500 mmf.	Junction L15 & R23 through 10K resistor	Same as 1.	—	L24 for min. overshoot. See Fig. 10-B.	L24 is adjusted by spreading or squeezing turns for min. amplitude of overshoot.
4	23.0 mc & 26.4 mc marker	20-30 mc sweep	Grid (4) of V3 through 500 mmf.	Junction L15 & R23 through 10K resistor	Same as 1.	—	C18 of T16 for flat-top of response curve and position markers as shown in Fig. 10-C.	Short primary of T15 with jumper. Contrast control set at about mid-position.
5	23.0 mc & 26.4 mc marker	20-30 mc sweep	Grid (4) of V3 through 500 mmf.	Junction L15 & R23 through 10K resistor	Same as 1.	—	Readjust L24 for minimum amplitude of overshoot.	Same as Step 3.
6	23.0 mc & 26.4 mc marker	20-30 mc sweep	Grid (8) of V2 through 500 mmf.	Junction L15 & R23 through 10K resistor	Same as 1.	—	C12 & C14 of T15 for max. amplitude, band width and correct position of markers. See Fig. 10-D.	Remove short across T15 primary. Contrast control set at mid-position. Ground L17.

ALIGNMENT TABLE (Cont'd)

STEP NO.	GENERATOR FREQUENCY		SIGNAL INPUT POINT	CONNECT OSCILLOSCOPE TO CHASSIS &	STATION SELECTOR SWITCH	DIAL SETTING	ADJUST	REMARKS
	SIGNAL	SWEEP						
(6) FM R-F AMPLIFIER ALIGNMENT								
1	88 mc with tone modulation	—	Antenna terminals	Junction R69 & C70 through 100K resistor	FM	88 mc	Adjust C100 for max.	
2	98 mc with tone modulation	—	Antenna terminals	Junction R69 & C70 through 100K resistor	FM	Tune carrier.* See Remarks.	Adjust shorted turn on L11*.	*Observe calibration; if pointer falls below 98 mc, move shorted turn on L11 towards color dot; if high, reverse procedure.
3	Repeat 1.							
4	Repeat Step 2.							
5	108 mc with tone modulation	—	Antenna terminals	Junction R69 & C70 through 100K resistor	FM	Check that you can tune through carrier*	No adjustment.	*If not, compress scale by moving shorted turn on L11 away from color dot. If this adjustment is made, repeat Step 1.
6	98 mc with tone modulation	—	—	—	FM	Tune carrier	Adjust C8 for maximum.	

(7) TELEVISION OSCILLATOR ADJUSTMENTS

1	49.75 mc with tone modulation	—	Antenna terminals	—	Channel No. 1	—	Turns of osc. coil T1.	Volume control at mid-position. Make sure C101 is at mid-position of travel. Use sound output as indicator.
2	59.75 mc with tone modulation	—	Antenna terminals	—	Channel No. 2	—	Turns of osc. coil T2.	
3	65.75 mc with tone modulation	—	Antenna terminals	—	Channel No. 3	—	Turns of osc. coil T3.	
4	71.75 mc with tone modulation	—	Antenna terminals	—	Channel No. 4	—	Turns of osc. coil T4.	
5	81.75 mc with tone modulation	—	Antenna terminals	—	Channel No. 5	—	Turns of osc. coil T5.	
6	87.75 mc with tone modulation	—	Antenna terminals	—	Channel No. 6	—	Turns of osc. coil T6.	
7	179.75 mc with tone modulation	—	Antenna terminals	—	Channel No. 7	—	Turns of osc. coil T7.	
8	185.75 mc with tone modulation	—	Antenna terminals	—	Channel No. 8	—	Lead gap of osc. coil, T8.	
9	191.75 mc with tone modulation	—	Antenna terminals	—	Channel No. 9	—	Lead gap of osc. coil, T9.	
10	197.75 mc with tone modulation	—	Antenna terminals	—	Channel No. 10	—	Lead gap of osc. coil, T10.	

ALIGNMENT TABLE (Cont'd)

STEP NO.	GENERATOR FREQUENCY		SIGNAL INPUT POINT	CONNECT OSCILLOSCOPE TO CHASSIS &	STATION SELECTOR SWITCH	DIAL SETTING	ADJUST	REMARKS
	SIGNAL	SWEEP						

(7) TELEVISION OSCILLATOR ADJUSTMENTS (Cont'd)

11	203.75 mc with tone modulation	—	Antenna terminals	—	Channel No. 11	—	Lead gap of osc. coil, T11.	
12	209.75 mc with tone modulation	—	Antenna terminals	—	Channel No. 12	—	Lead gap of osc. coil, T12.	
13	215.75 mc with tone modulation	—	Antenna terminals	—	Channel No. 13	—	Lead gap of osc. coil, T13.	

(8) TELEVISION R-F COIL ALIGNMENT

1	Markers 45.25 mc & 49.75 mc	Channel No. 1 with 25 mc sweep	Antenna terminals at r-f amplifier	Junction of R4 and T15	Channel No. 1	—	For max. amplitude and recommended response with correct marker placement.	See Fig. 12-A for resultant alignment curve.
2	Markers 55.25 mc & 59.75 mc	Channel No. 2 with 25 mc sweep	Antenna terminals at r-f amplifier	Junction of R4 and T15	Channel No. 2	—	For max. amplitude and recommended response with correct marker placement.	See Fig. 12-A for resultant alignment curve.
3	Markers 61.25 mc & 65.75 mc	Channel No. 3 with 25 mc sweep	Antenna terminals at r-f amplifier	Junction of R4 and T15	Channel No. 3	—	For max. amplitude and recommended response with correct marker placement.	See Fig. 12-B for resultant alignment curve.
4	Markers 67.25 mc & 71.75 mc	Channel No. 4 with 25 mc sweep	Antenna terminals at r-f amplifier	Junction of R4 and T15	Channel No. 4	—	For max. amplitude and recommended response with correct marker placement.	See Fig. 12-B for resultant alignment curve.
5	Markers 77.25 mc & 81.75 mc	Channel No. 5 with 25 mc sweep	Antenna terminals at r-f amplifier	Junction of R4 and T15	Channel No. 5	—	For max. amplitude and recommended response with correct marker placement.	See Fig. 12-B for resultant alignment curve.
6	Markers 83.25 mc & 87.75 mc	Channel No. 6 with 25 mc sweep	Antenna terminals at r-f amplifier	Junction of R4 and T15	Channel No. 6	—	For max. amplitude and recommended response with correct marker placement.	See Fig. 12-B for resultant alignment curve.
7	Markers 175.25 mc & 179.75 mc	Channel No. 7 with 25 mc sweep	Antenna terminals at r-f amplifier	Junction of R4 and T15	Channel No. 7	—	For max. amplitude and recommended response with correct marker placement.	See Fig. 12-C for resultant alignment curve.
8	Markers 181.25 mc & 185.75 mc	Channel No. 8 with 25 mc sweep	Antenna terminals at r-f amplifier	Junction of R4 and T15	Channel No. 8	—	For max. amplitude and recommended response with correct marker placement.	See Fig. 12-C for resultant alignment curve.
9	Markers 187.25 mc & 191.75 mc	Channel No. 9 with 25 mc sweep	Antenna terminals at r-f amplifier	Junction of R4 and T15	Channel No. 9	—	For max. amplitude and recommended response with correct marker placement.	See Fig. 12-C for resultant alignment curve.
10	Markers 193.25 mc & 197.75 mc	Channel No. 10 with 25 mc sweep	Antenna terminals at r-f amplifier	Junction of R4 and T15	Channel No. 10	—	For max. amplitude and recommended response with correct marker placement.	See Fig. 12-C for resultant alignment curve.
11	Markers 199.25 mc & 203.75 mc	Channel No. 11 with 25 mc sweep	Antenna terminals at r-f amplifier	Junction of R4 and T15	Channel No. 11	—	For max. amplitude and recommended response with correct marker placement.	See Fig. 12-C for resultant alignment curve.

after the raster becomes illuminated.

4. Turn power off for three or four minutes and then turn "ON." The picture should lock-in horizontally within ten seconds immediately upon showing raster.

3. Turn the Station Selector to the AM or FM position and allow the television receiver to transfer for two or three minutes to Radio reception, and then return to the television channel transmitting a picture. The picture should synchronize.

2. With a picture being received, turn the television receiver to channel having no program and then turn it back "on." The picture should immediately lock into position.

1. With a picture being received, switch the Service Selector and passes the following tests:

Check on Alignment—With a normal television signal being received, free from excessive noise, turn the horizontal hold control to the position where the picture locks in horizontally and passes the following tests:

The horizontal hold control is a preset adjustment on the rear of the chassis which is used to adjust the speed. In addition, L33 changes the speed but is only used for supplemental adjustment when initially adjusting the circuit operation. For complete alignment both controls must be adjusted. Check operation first as follows:

Check on Alignment—With a normal television signal being received, free from excessive noise, turn the horizontal hold control to the position where the picture locks in horizontally and passes the following tests:

HORIZONTAL (HOLD) OSCILLATOR SPEED ADJUSTMENT

Three set screws permit the deflection yoke to be loosened, permitting limited turning in either direction. If the picture does not line up horizontally or square with the picture tube mask, rotate the yoke until this condition is remedied, then tighten the set screws. On late production sets the deflection yoke is pre-vented from rotating by a clamp secured by two hex head cap screws located at the top center of the yoke mounting bracket. To rotate the yoke, loosen both screws not more than two full turns. Rotate yoke as desired and tighten screws to secure in place.

DEFLECTION YOKES ADJUSTMENT

The four focus coil adjustment screws should all be tightened sufficiently so that the springs are always under tension. Too loose pressure on the springs will result in the picture centering being unstable and possible neck shadowing. These adjustments are not readily available with the back cover in place unless a long screwdriver is used. Since each screw adjustment reacts in both the horizontal and vertical directions, a maladjustment of the centering may have to be corrected by the adjustment of one to four screws.

CENTERING (FOCUS COIL) ADJUSTMENT

assembly can also cause neck shadowing. The focus coil should be symmetrical and straight before starting the ion trap adjustment.

MISCELLANEOUS INSTALLATION AND SERVICE ADJUSTMENTS

STEP NO.	GENERATOR FREQUENCY	SIGNAL	SWEEP	POINT INPUT SIGNAL	CONNECT OSCILLOSCOPE TO CHASSIS & STATION SELECTOR SWITCH	DIAL SETTING	ADJUST	REMARKS
12	Markers 209.75 mc	Channel	25 mc sweep	Antenna terminals at r-f amplifier	Function of R4 and T15	Channel No. 12	For max. amplitude and recommended response with correct marker placement.	See Fig. 12-C for resultant alignment curve.
13	Markers 211.25 mc	Channel	25 mc sweep	Antenna terminals at r-f amplifier	Function of R4 and T15	Channel No. 13	For max. amplitude and recommended response with correct marker placement.	See Fig. 12-C for resultant alignment curve.

(8) TELEVISION R-F COIL ALIGNMENT (Cont'd)

REPLACEMENT OF PICTURE TUBE

To remove the picture tube from the television chassis, remove the picture tube socket and then untape and slide off the ion trap adjustment assembly. The ion trap can be removed readily, if the gap in the assembly is pulled apart slightly with the fingers while attempting to slide it. Loosen the two set screws partially that clamp the strap behind the picture tube mounting strap, then slide the strap backward from the top-front rim of the picture tube until the rim of the tube is free from the strap. Carefully pull the tube out through the focus and deflection coils.

To replace a picture tube the reverse procedure should be followed, being careful never to force the picture tube if it sticks or fails to slip into place readily. Investigate and remove the source of the trouble. The picture tube should be oriented so that the anode cap is adjacent to the H.V. rectifier, V25, and the high voltage lead.

Wipe the screen surface of the tube to remove finger marks and dust. **PRECAUTION—Do not handle, remove, or install a picture tube unless shatterproof goggles and heavy gloves are worn.**

ION TRAP ADJUSTMENT

The ion trap may be approximately located as shown in Figure 18; however, its final adjustment must be made with the television receiver operating.

NOTE—Some ion traps have been magnetized so that it is necessary to rotate the small magnet at 180 degrees to this normal position. Then slide the assembly onto the picture tube neck so that the ion trap assembly sits at the bottom or top (dependent upon picture tube) and lines up approximately with pin No. 12 or No. 6. Slide the assembly forward on the picture tube until it is about the position shown in the illustration. **NOTE—The wider of the two magnets should be located at the rear or the base end of the picture tube. The final following steps should be taken with the television receiver operating:**

1. With Brilliance control advanced, turn ion trap assembly so that gap in rubber holder is faced up or down and lines up with either pin No. 6 or pin No. 12. Whichever way gives some illumination is the correct approximate orientation of assembly. If the tube, V19, is removed, it will be found much easier to adjust for maximum illumination since the resultant thin line adjustment.

2. Move assembly back and forth and rotating it while viewing screen, adjust for maximum brightness.

3. If illuminated area gets very bright, reduce brightness with control and repeat Step 2. If tube V19 was removed as suggested in Step 1, replace it before proceeding with Step 4.

4. If any shadowing of the tube neck is present after completing Step 3, rotate the small (front) magnet to correct shadow and repeat Step 2 and 3. **NOTE—Badly out-of-line focus coils or when the focus coil is too far away from the deflection coil**

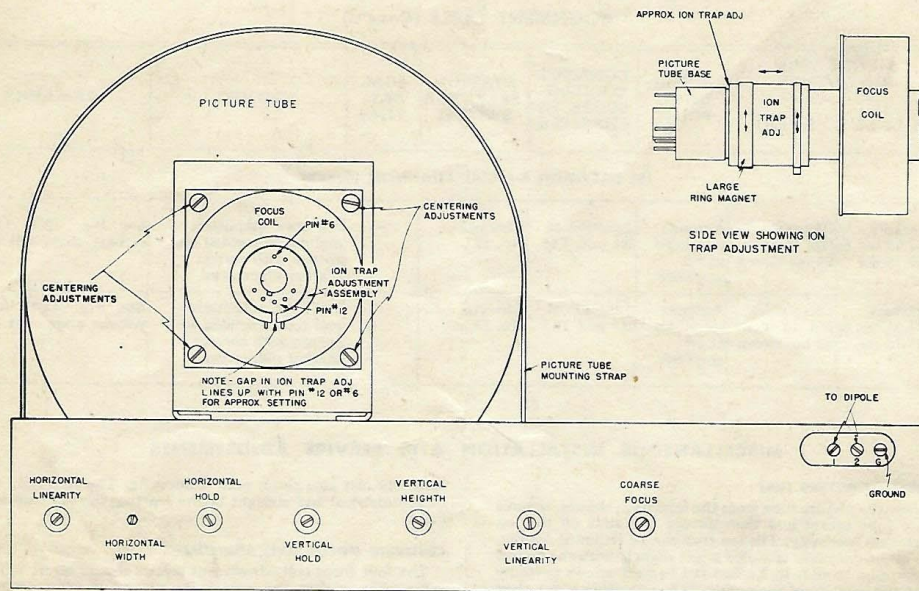


Fig. 18. Location of Preset Adjustment Controls

Minor Adjustments—The Horizontal Speed control should normally take care of any changes necessary to permit the circuit adjustment to pass the tests under "Check on Alignment." If attempted adjustment of the hold control will not permit all these checks to be met, then make the adjustment as outlined under "Complete Realignment."

Complete Realignment—Tune in a television signal for optimum sound and adjust for normal contrast.

1. Remove clipper tube, V16A.
2. Short L33 out of circuit by placing a clip lead across its terminals.
3. Adjust the Horizontal Hold control until the picture is approximately held in frame horizontally. **NOTE**—With clipper tube V16A removed, the multivibrator is free-running and must be manually controlled vertically and horizontally.
4. Remove short circuit across L33.
5. Adjust iron core in L33 until the picture is approximately held in frame horizontally.
6. Replace clipper tube, V16A; then readjust Horizontal Hold control if necessary until all tests underlined under "Check on Alignment" are fulfilled.

HORIZONTAL LINEARITY AND WIDTH CONTROL

These controls react on each other so that when one control is adjusted the other may have to be. The adjustment of the linearity control should only be made on a test pattern signal. First, obtain the correct width by adjusting the width control, L23, until the picture extends approximately $\frac{1}{8}$ inch outside the edge of the mask on both sides. Next, adjust the Horizontal Linearity control, R115, until the test pattern is symmetrical in the left and right direction. A slight readjustment of the Width control may now be necessary, as well as touching up of the centering adjusting screws.

VERTICAL (HOLD) OSCILLATOR SPEED ADJUSTMENT

This control, R46, is used to lock the picture in synchronism with the transmitted picture in the vertical direction. When the control is maladjusted the picture will slide vertically out-of-frame or lock out-of-frame, giving overlapping vertical images or even double images in the vertical direction. After the picture is locked in vertically on a normal picture, reduce the contrast control until the picture is barely visible, then readjust the control until the picture holds in frame.

VERTICAL LINEARITY AND HEIGHT CONTROL

The Height control, R49, is adjusted until the picture extends approximately $\frac{1}{8}$ inch outside the edge of the mask on both top and bottom. Next, adjust the Vertical Linearity control, R58, until the test pattern is symmetrical from top and bottom. Readjustment of the Height and Vertical Hold controls as well as the centering adjustments may be necessary.

COARSE FOCUS

This control is a three-position switch and it is adjusted to the position which permits the Focus control on the front panel to go through focus at about its mid-position.

TROUBLE SHOOTING

The following is a listing of possible troubles and their cures. This is not intended as a comprehensive coverage of all possible failures but serves to point out some of the more difficult troubles that may be experienced. From time to time this information will be expanded as information becomes available.

1. NO RASTER ON PICTURE TUBE

- (a) Ion trap adjustment incorrectly made. Assembly on backward or improperly oriented. See ion trap adjustment under "Miscellaneous Preset and Service Adjustments."
- (b) Check for waveform at output of T25. If present, the trouble is probably in the Type 8016 rectifier tube or filter circuit. Check for open in high voltage winding of T25. If the V25 tube filament glows yellow, high-voltage is being generated and the trouble will possibly exist in the picture tube, V24.
- (c) If there is no waveform at output of T25, check operation of V22, and multivibrator V21 by oscilloscope waveform measurement.
- (d) Check that high voltage anode cap is contacting the anode terminal of V24.
- (e) Open Brightness control R108B, R60, or R111.
- (f) No B+ voltage at cathode of V24.
- (g) If only 2000 or 3000 volts are generated, check deflection yoke, L12, and Width control, L23, for continuity.

TROUBLE	CURE
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ADDITIONAL TROUBLES & CURES

2. **RASTER NORMAL, NO PICTURE OR SOUND**
 - (a) Oscillator V2 defective, or oscillator coil resonates out of band.
 - (b) Defective antenna or lead-in.
 - (c) Converter, r-f amplifier, or first video i-f amplifier stage defective.
3. **PICTURE NORMAL, NO SOUND**
 - (a) 4.5 mc audio i-f amplifier, V4, oscillator circuit, discriminator, or audio amplifier defective.
 - (b) Oscillator V2 off frequency.
 - (c) Defective speaker.
4. **RASTER NORMAL, SOUND NORMAL, NO PICTURE**
 - (a) Video i-f amplifier (after 1st i-f) inoperative.
 - (b) Resistor R100 in contrast control defective or open.
 - (c) Screen by-pass C40C open or shorted.
5. **NORMAL PICTURE AND SOUND, NO HORIZONTAL OR VERTICAL SYNC.**
 - (a) Check for signal input waveform at grid (1) of V16A.
 - (b) Defective V16A or plate circuit components.
 - (c) Operation of receiver with Contrast control advanced too far.
6. **PICTURE NORMAL, NO VERTICAL SYNC.**
 - (a) Check grid of V18B for normal waveform.
 - (b) Check speed of vertical multivibrator. Should be capable of free running speed less than 60 cps.
 - (c) Check V18A circuit components.
7. **PICTURE NORMAL, NO HORIZONTAL SYNC.**
 - (a) Check AFC transformer, T19.
 - (b) Check alignment of L33.
 - (c) Check socket voltages and waveforms of V17B and V21.
 - (d) Check resistors R39 and R136 for correct value.
8. **NO VERTICAL OR NO HORIZONTAL DEFLECTION**
 - (a) Check waveform and socket voltages of output and multivibrator tubes of respective sweep circuits.
 - (b) Check output transformer and yoke for continuity.
9. **RIPPLE ON EDGE OF PICTURE**
 - (a) Reflections on antenna lead-in.
 - (b) Defective capacitor, C59.
10. **RASTER EDGE NOT STRAIGHT—KEYSTONING**
 - (a) Defective yoke.
 - (b) Defective sweep transformer.
 - (c) Improperly adjusted ion trap adjustment assembly.
11. **PICTURE JUMPY**
 - (a) Operation at too high contrast control setting.
 - (b) If left of picture jitters, change 6BG6G sweep tube.
 - (c) Noisy sweep or sync circuit tubes.
12. **POOR PICTURE DETAIL**
 - (a) Mismatch in antenna or lead-in.
 - (b) Misalignment of i-f or r-f circuits.
 - (c) Defective chokes L10, L14, or L15 in video amplifier.
 - (d) Make sure that focus control operates on both sides of proper focus point.
 - (e) Overload of video amplifier, check contrast control operation.
13. **PICTURE CANNOT BE CENTERED**
 - (a) Move focus coil back by loosening all four adjustment screws.
14. **HOWL ON FM BAND**
 - (a) Move lead weight on oscillator tuner vane so that it mounts tightly against textolite crossarm.
 - (b) Use two polyethylene spacers in oscillator guillotine windows.
 - (c) Add Vistac "C" to oscillator vane.
15. **INTERFERENCE IN PICTURE DUE TO AUDIO OUTPUT FROM SPEAKER**
 - (a) Microphonic 6AC7 Video Amplifier (V14) will give audio interference patterns in picture.
 - (b) Microphonic 6SN7 (V19 or V21) or 6V6 (V20) will give wiggles in the picture at high volume control settings.

SOCKET VOLTAGE CHART

NOTE—All d-c measurements taken by a 20,000 ohm/volt meter. Service selector switch at Channel No. 1 unless noted. Contrast control at maximum. Brilliance at minimum.

SYM- BOL	TUBE TYPE	PLATE		SCREEN		CATHODE		GRID		PLATE M.A.	SCREEN M.A.	NOTES
		PIN	VOLTS	PIN	VOLTS	PIN	VOLTS	PIN	VOLTS			
V1	6AU6	5	130	6	130	7	1.4	1	0	7	—	
V2A	7F8	6	95	—	—	5	0	8	—	2.7	—	
V2B		3	140	—	—	4	0.8	1	—	6	—	
V3	6AC7	8	137	6	157	5	2.1	4	0	10.3	2.6	
V4	6BE6	5	202	6	33	2	0	7	0	1.0	1.6	
V5	6SG7	8	183	6	120	5	1.3	4	0	7.0	2.6	
V6	6SV7	6	215	4	31	3	0	2	-.58	.5	.2	
V7A	6AQ7GT	1 & 3	—	—	—	2	—	—	—	—	—	
V7B		5	88	—	—	6	0	4	-.47	1.2	—	
V8	6V6GT	3	233	4	212	8	11	5	0	34	2.3	
V10	5Y3GT	4 & 6	285AC	—	—	2	440	—	—	93 *	—	* Cathode current
V11	5U4G	4 & 6	228AC	—	—	2	270	—	—	175 *	—	* Cathode current
V12	6AC7	8	155	6	158	5	2	4	0	10.4	1.6	
V13	6AC7	8	115	6	170	5	2.2	4	0	10.5	2.7	
V14	6AC7	8	201	6	113	5	0	4	-.7	13	2.9	
V15A	6AL5	2	—	—	—	5	0	—	—	—	—	
V15B		7	150	—	—	1	155	—	—	—	—	
V16A	6SN7GT	2	14.3	—	—	3	0	1	-7	.2	—	
V16B		5	117	—	—	6	9.7	4	8.5	9.6	—	
V17A	6SL7GT	2	-6.4	—	—	3	.15	1	-6.4	0	—	
V17B		5	40.7	—	—	6	.68	4	.15	.5	—	
V18A	6SL7GT	2	.18	—	—	3	7	1	.18	0	—	
V18B		5	108	—	—	6	9.2	4	3	.9	—	
V19	6SN7GT	2	14	—	—	3	0	1	-.45	.8	—	
		5	7	—	—	6	0	4	-1.05	0	—	
V20	6V6GT	3	200	4	215	8	24	5	7	21	1.9	
V21A	6SN7GT	5	245	—	—	6	5	4	-31.5	2	—	
V21B		2	230	—	—	3	5	1	0	2.8	—	
V22	6BG6G	CAP	425	8	350	3	17	5	5.6	73	11.6	
V23	6AS7G	2	-.83	—	—	3	32	1	-6.5	—	—	
		5	-.83	—	—	6	32	4	-6.5	—	—	
V24	10BP4	CAP	8200 *	10	425	11	157	2	80	—	—	* Use multiplier with 20,000 ohm/volt meter
V25	8016	CAP	—	—	—	2	8200 *	—	—	—	—	* Use multiplier with 20,000 ohm/volt meter
V26	6BE6	5	205	6	55	2	.7	7	—	2.5	7.6	

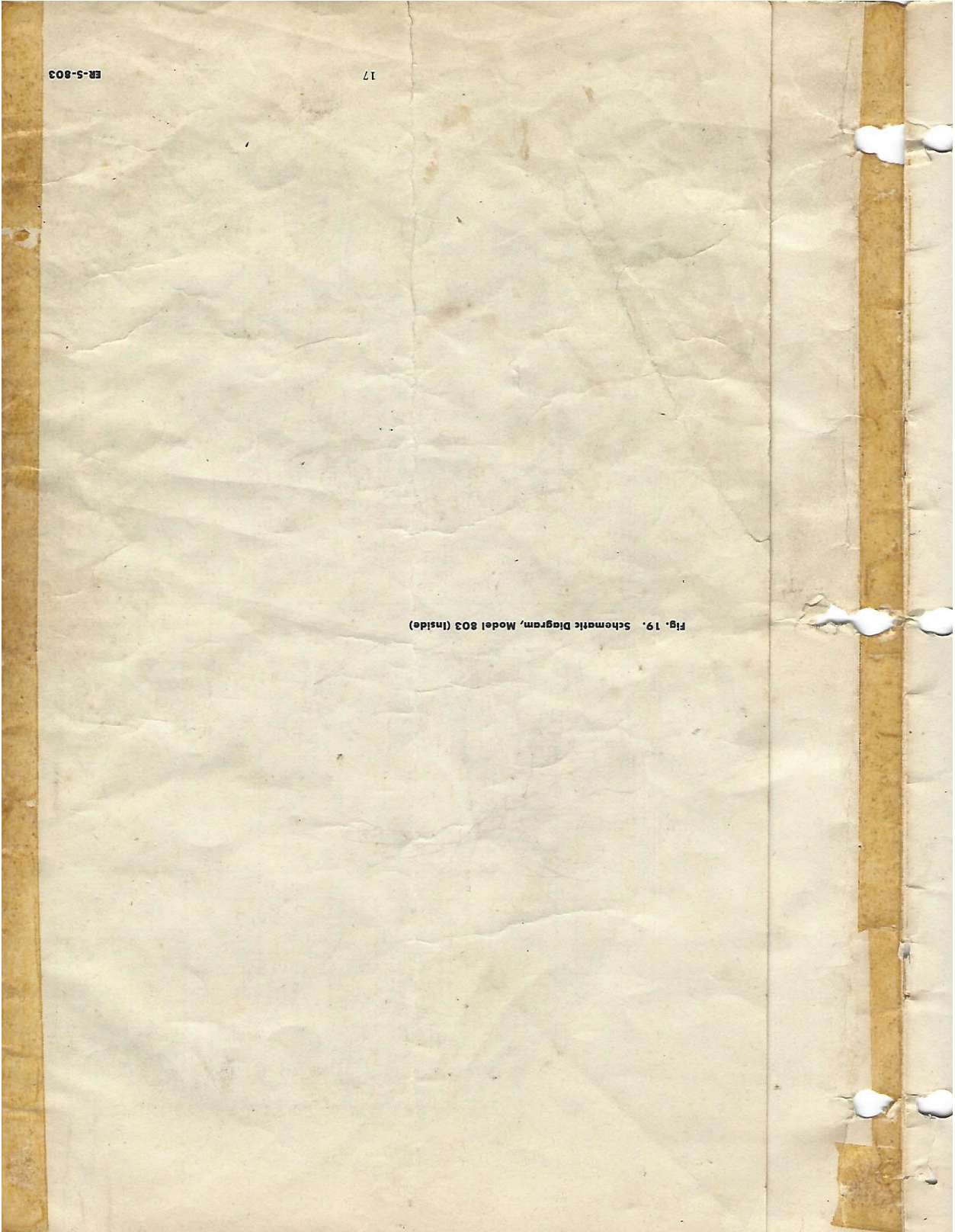


Fig. 19. Schematic Diagram, Model 803 (Inside)

19. Schematic Diagram, Model 803

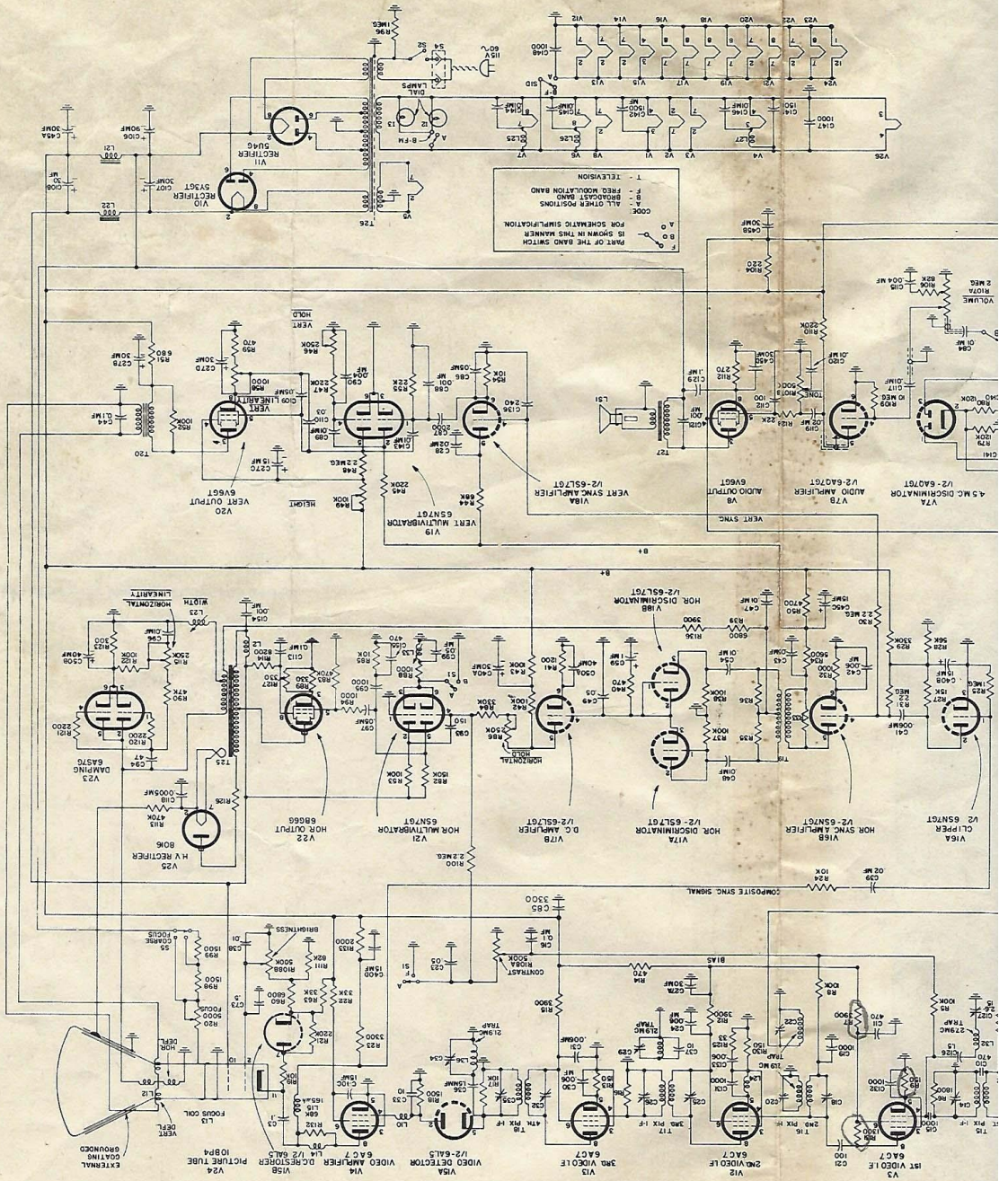
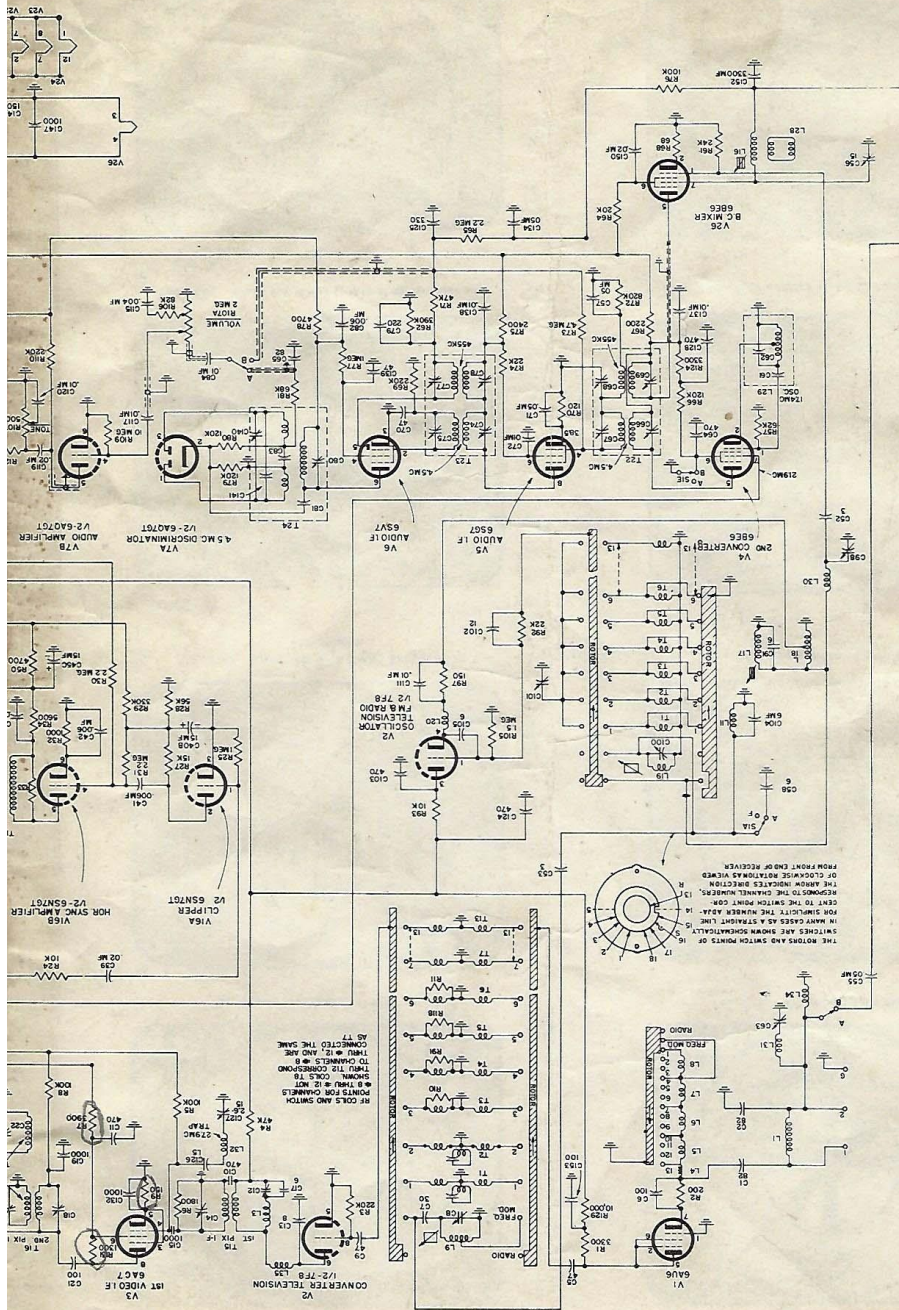


Fig. 19. Schematic Diagram, Model



PICTURE MALADJUSTMENT OR INTERFERENCE

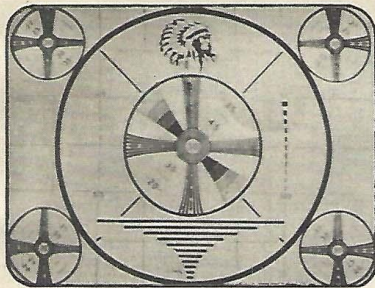


Fig. 20. Normal Picture

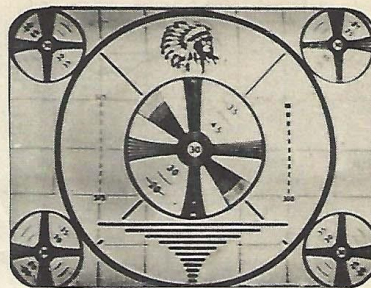


Fig. 21. Contrast Too High

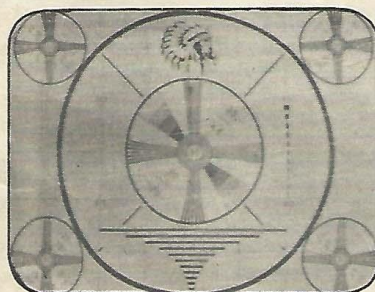


Fig. 22. Contrast Too Low, Brightness Too High

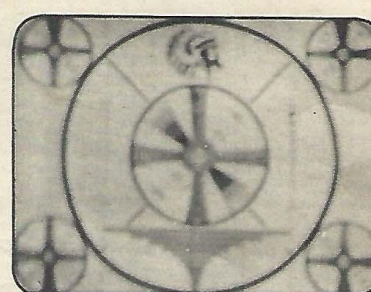


Fig. 23. Focus Control Misadjusted

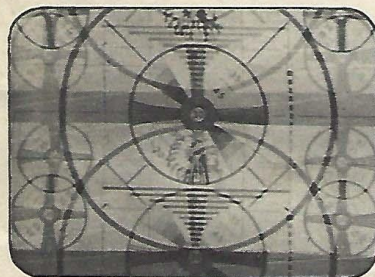


Fig. 24. Vertical Hold Control Misadjusted



Fig. 25. Horizontal Hold Control Misadjusted

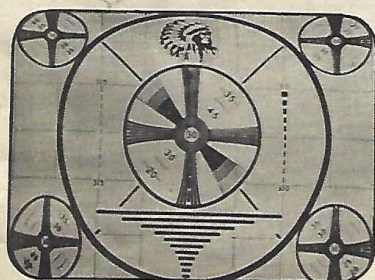


Fig. 26. Vertical Linearity Control Misadjusted

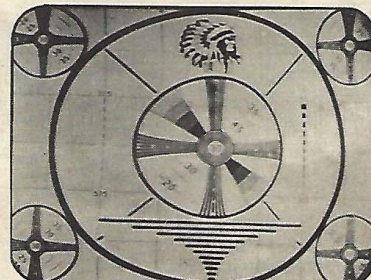


Fig. 27. Horizontal Linearity Control Misadjusted

PICTURE MALADJUSTMENT OR INTERFERENCE (Cont'd)

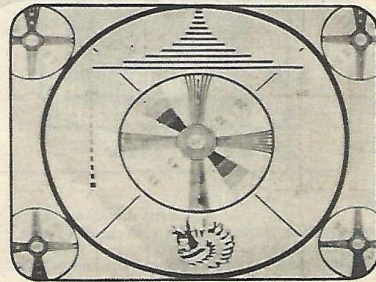


Fig. 28. Horizontal Width Control Misadjusted

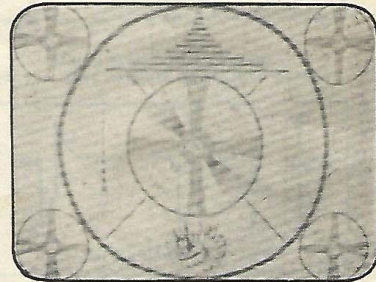


Fig. 30. R-F Interference Pickup on Antenna

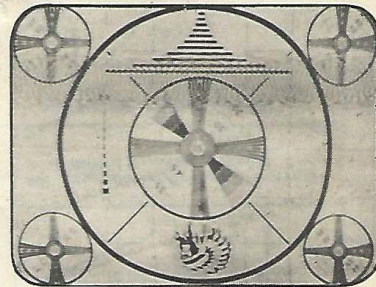


Fig. 32. Weak Diathermy Interference

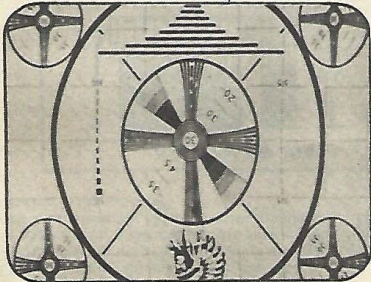


Fig. 29. Vertical Height Control Misadjusted

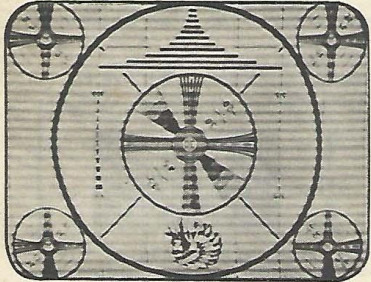


Fig. 31. Sound Bar Interference Such as Adjacent Channel or Microphonics

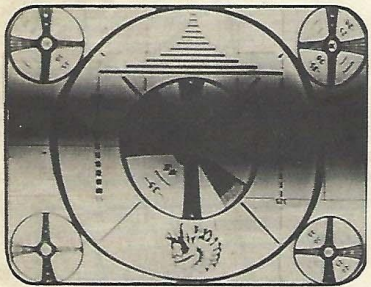


Fig. 33. Strong Diathermy or Hum in Video I-F, Detector, or Video Output

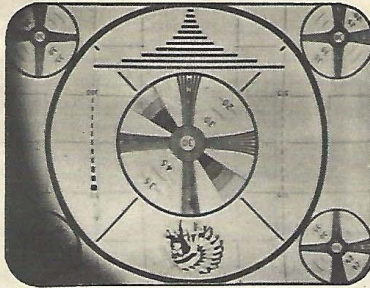


Fig. 34. Ion Trap or Focus Coil Not Properly Adjusted

WAVEFORM MEASUREMENTS

The waveform shown in Figures 35 through 55 represent measurements on an average receiver wherein the controls have been adjusted for a normal picture with correct Contrast, Height, Width and Linearity. Most measurements must be made when a signal is being received.

An oscilloscope where the vertical deflection amplifier has been pre-calibrated is used to take measurements at the point indicated in the waveform boxes. The oscilloscope sweep frequency is indicated in the waveform title.

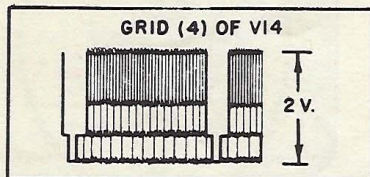


Fig. 35. Video Output of Detector (Osc. Synced at Half of Vert. Speed)

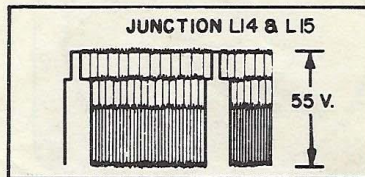


Fig. 36. Video Output of V14 (Osc. Synced at Half of Vert. Sweep Speed)

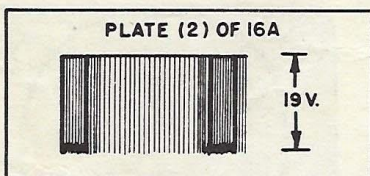


Fig. 37. Clipper Output (Osc. Synced at Half of Vert. Sweep Speed)

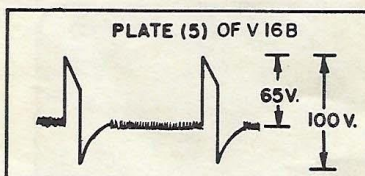


Fig. 38. Sync Amplifier Output (Osc. Synced at Half of Hor. Sweep Speed)

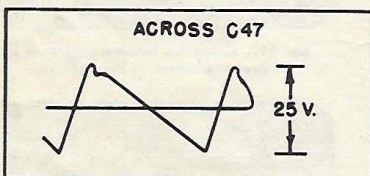


Fig. 39. A.F.C. Sawtooth (Osc. Synced at Half of Hor. Sweep Speed)

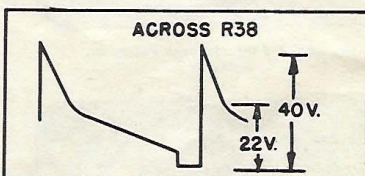


Fig. 40. Discriminator Voltage (Osc. Synced at Half of Hor. Sweep Speed)

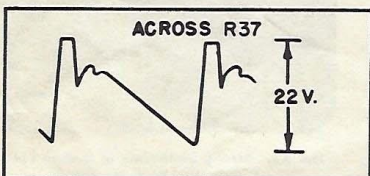


Fig. 41. Discriminator Voltage (Synced at Half of Hor. Sweep Speed)

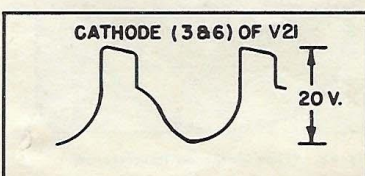


Fig. 42. Hor. M-V Cathode (Osc. Synced at Half of Hor. Sweep Speed)

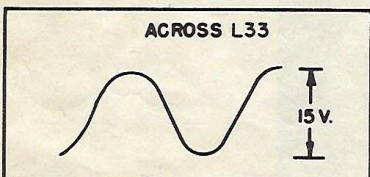


Fig. 43. Cathode Tuned Circuit (Synced at Half of Hor. Sweep Speed)

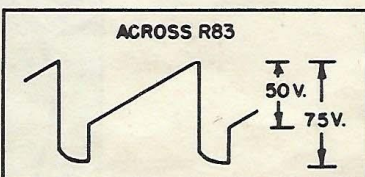


Fig. 44. Hor. M-V Output (Osc. Synced at Half of Hor. Sweep Speed)

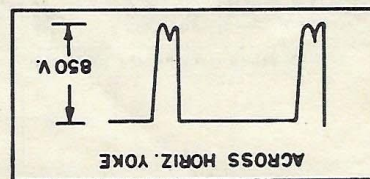


Fig. 45. Horiz. Yoke Input (Osc. Synced at Half of Horiz. Sweep Speed)

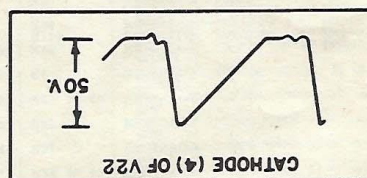


Fig. 47. 6B66 Cathode (Osc. Synced at Half of Horiz. Sweep Speed)

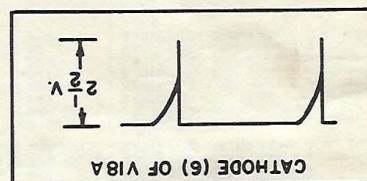


Fig. 49. Vertical Sync at Cathode V18A (Osc. Synced at Half of Vert. Sweep Speed)

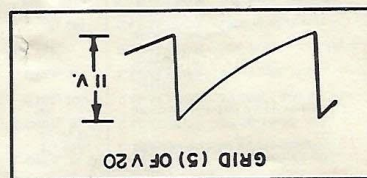


Fig. 51. Vert. M-V Output (Osc. Synced at Half of Vert. Sweep Speed)

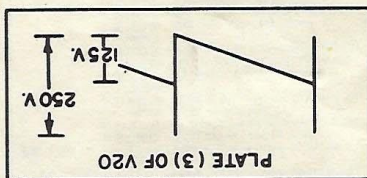


Fig. 53. Vert. Output of V20 (Osc. Synced at Half of Vert. Sweep Speed)

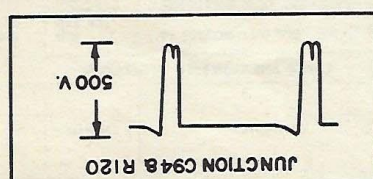


Fig. 46. V14 Control Voltage (Osc. Synced at Half of Horiz. Sweep Speed)

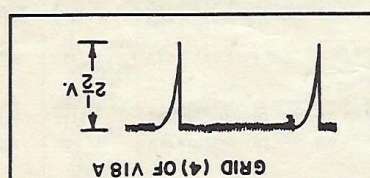


Fig. 48. Vert. Sync at V18A (Osc. Synced at Half of Vert. Sweep Speed)

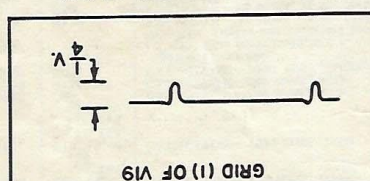


Fig. 50. Vert. Sync at Grid of M-V (Osc. Synced at Half of Vert. Sweep Speed)

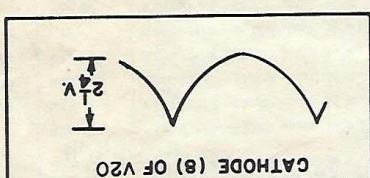


Fig. 52. Vert. Output Cathode (Osc. Synced at Half of Vert. Sweep Speed)

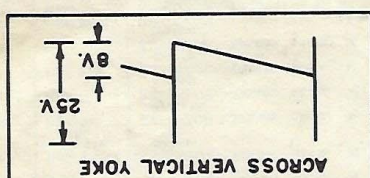


Fig. 54. Vert. Yoke Input (Osc. Synced at Half of Vert. Sweep Speed)

MODEL 803—REPLACEMENT PARTS LIST

Cat. No.	Symbol	Description	Sug- gested Unit List Price	Cat. No.	Symbol	Description	Sug- gested Unit List Price
UNIVERSAL REPLACEMENT PARTS				UNIVERSAL REPLACEMENT PARTS (Cont'd)			
UCC-017	C59	CAPACITOR—1.0 mfd., 200 v., paper	\$0.75	URD-145	R109	RESISTOR—10 meg., ½ w., carbon	\$0.13
UCC-620	C88, 121, 154	CAPACITOR—.001 mfd., 600 v., paper	.25	URD-1027	R76	RESISTOR—120 ohms, ½ w., carbon	.17
UCC-624	C90	CAPACITOR—.004 mfd., 600 v., paper	.25	URD-1032	R2	RESISTOR—200 ohms, ½ w., carbon	.17
UCC-626	C30, 42, 133, 24, 31, 41, 82	CAPACITOR—.006 mfd., 600 v., paper	.25	URD-1041	R40	RESISTOR—470 ohms, ½ w., carbon	.17
UCC-630	C115, 117, 48, 54, 114, 38, 47, 72, 89, 96, 120, 137, 143, 138	CAPACITOR—.01 mfd., 600 v., paper	.30	URD-1049	R88	RESISTOR—1000 ohms, ½ w., carbon	.17
UCC-631	C28, 39, 119, 150	CAPACITOR—.02 mfd., 600 v., paper	.30	URD-1052	R131	RESISTOR—1200 ohms, ½ w., carbon	.17
UCC-633	C110	CAPACITOR—.03 mfd., 600 v., paper	.35	URD-1053	R18	RESISTOR—1300 ohms, ½ w., carbon	.17
UCC-635	C49, 55, 57, 71, 134, 109, 23, 43, 97, 86	CAPACITOR—.05 mfd., 600 v., paper	.40	URD-1063	R16	RESISTOR—1500 ohms, ½ w., carbon	.17
UCC-640	C16, 44, 113, 129, 3	CAPACITOR—.1 mfd., 600 v., paper	.45	URD-1073	R17	RESISTOR—3900 ohms, ½ w., carbon	.17
UCU-1036	C79	CAPACITOR—220 mmf., mica	.25	URD-1081	R35, 36, 92	RESISTOR—22,000 ohms, ½ w., carbon	.17
UCU-1064	C111, 144, 145, 146	CAPACITOR—3300 mmf., mica	.70	URD-1082	R61	RESISTOR—24,000 ohms, ½ w., carbon	.17
UCU-1076	C70, 94, 155, 139	CAPACITOR—10,000 mmf., mica	1.25	URD-1092	R57	RESISTOR—62,000 ohms, ½ w., carbon	.17
UCU-1504	C33	CAPACITOR—10 mmf., mica	.35	URD-1097	R37, 38, 42, 43	RESISTOR—100,000 ohms, ½ w., carbon	.17
UCU-1520	C21, 2, 65	CAPACITOR—47 mmf., mica	.30	URD-1105	R3	RESISTOR—220,000 ohms, ½ w., carbon	.17
UCU-1528	C125	CAPACITOR—100 mmf., mica	.30	URD-1127	R48	RESISTOR—1.8 meg., ½ w., carbon	.17
UCU-1540	C11, 64, 103, 124, 128	CAPACITOR—330 mmf., mica	.35	URE-035	R112	RESISTOR—270 ohms, 1 w., carbon	.17
UCU-1544	C15, 19, 60, 131, 132, 147, 148, 95	CAPACITOR—470 mmf., mica	.35	URE-041	R59	RESISTOR—470 ohms, 1 w., carbon	.17
UCU-2532	C93	CAPACITOR—150 mmf., mica	.35	URE-045	R51	RESISTOR—680 ohms, 1 w., carbon	.17
UCU-2538	C136	CAPACITOR—2000 mmf., mica	.40	URE-065	R50	RESISTOR—4700 ohms, 1 w., carbon	.17
UCU-2559	C87	CAPACITOR—2000 mmf., mica, low power factor 500	.60	URE-067	R34	RESISTOR—5600 ohms, 1 w., carbon	.17
UDL-005		LAMP—Dial scale lamp, 6-8 v.	.15	URE-089	R4, 90	RESISTOR—47,000 ohms, 1 w., carbon	.17
URD-004		BOARD—Dipole ant. terminal board	.20	URE-097	R53, 122	RESISTOR—100,000 ohms, 1 w., carbon	.17
URD-013	R125	RESISTOR—33 ohms, ½ w., carbon	.13	URE-099	R66	RESISTOR—120,000 ohms, 1 w., carbon	.17
URD-021	R68	RESISTOR—68 ohms, ½ w., carbon	.13	URE-1056	R133	RESISTOR—2000 ohms, 1 w., carbon	.23
URD-029	R9, 13, 97, 130	RESISTOR—150 ohms, ½ w., carbon	.13	URE-1058	R75	RESISTOR—2400 ohms, 1 w., carbon	.23
URD-049	R32, 94	RESISTOR—1000 ohms, ½ w., carbon	.13	URE-1068	R12, 15, 136	RESISTOR—3900 ohms, 1 w., carbon	.23
URD-055	R6	RESISTOR—1800 ohms, ½ w., carbon	.13	URE-1073	R93, 129	RESISTOR—10,000 ohms, 1 w., carbon	.23
URD-057	R67, 120, 121	RESISTOR—2200 ohms, ½ w., carbon	.13	URF-033	R104	RESISTOR—220 ohms, 2 w., carbon	.25
URD-061	R1, 124	RESISTOR—3300 ohms, ½ w., carbon	.13	URF-037	R89, 127	RESISTOR—330 ohms, 2 w., carbon	.25
URD-065	R33, 60	RESISTOR—4700 ohms, ½ w., carbon	.13	URF-041	R14	RESISTOR—470 ohms, 2 w., carbon	.25
URD-069	R54, 85, 10, 11, 19, 91, 118, 24	RESISTOR—6800 ohms, ½ w., carbon	.13	URF-053	R98, 99	RESISTOR—1500 ohms, 2 w., carbon	.25
URD-077	R27	RESISTOR—10,000 ohms, ½ w., carbon	.13	URF-071	R114	RESISTOR—8200 ohms, 2 w., carbon	.25
URD-081	R55, 74	RESISTOR—15,000 ohms, ½ w., carbon	.13	URF-1061	R23	RESISTOR—3300 ohms, 2 w., carbon	.30
URD-085	R63, 22	RESISTOR—22,000 ohms, ½ w., carbon	.13	URF-1063	R7	RESISTOR—3900 ohms, 2 w., carbon	.30
URD-089	R71	RESISTOR—33,000 ohms, ½ w., carbon	.13	URF-1080	R64	RESISTOR—20,000 ohms, 2 w., carbon	.30
URD-091	R28	RESISTOR—47,000 ohms, ½ w., carbon	.13	RAB-059		BACK—Cabinet-back	\$1.40
URD-093	R44, 81	RESISTOR—56,000 ohms, ½ w., carbon	.13	RAV-055		CABINET—For Model 803	62.50
URD-095	R106, 111	RESISTOR—68,000 ohms, ½ w., carbon	.13	RCC-086	C99	CAPACITOR—.05 mfd., 200 v., oil filled	.30
URD-097	R5, 8, 52, 76	RESISTOR—82,000 ohms, ½ w., carbon	.13	RCE-017	C106	CAPACITOR—90 mfd., 450 v., electrolytic	3.85
URD-099	R79, 80	RESISTOR—100,000 ohms, ½ w., carbon	.13	RCE-043	C27A, B, C, D; 45A, B, C, D	CAPACITOR—30, -30-15-30 mfd., 300-300-300-50 v., electrolytic	3.25
URD-101	R82	RESISTOR—120,000 ohms, ½ w., carbon	.13	RCE-044	C40A, B, C, D	CAPACITOR—30-30-15-15 mfd., 300-300-300-300 v., electrolytic	3.50
URD-105	R21, 45, 47, 69, 110, 126	RESISTOR—150,000 ohms, ½ w., carbon	.13	RCE-045	C107, 108	CAPACITOR—30 mfd., 300 v., electrolytic	1.45
URD-109	R29, 84	RESISTOR—220,000 ohms, ½ w., carbon	.13	RCE-054	C50A, B	CAPACITOR—40-40 mfd., 25 v., electrolytic	1.85
URD-111	R62	RESISTOR—330,000 ohms, ½ w., carbon	.13	RCN-011	C118	CAPACITOR—500 mmf., electrofilm, high voltage	3.00
URD-113	R83, 113	RESISTOR—390,000 ohms, ½ w., carbon	.13	RCW-026	C142, 149	CAPACITOR—1500 mmf., ceramic	.60
URD-119	R72	RESISTOR—470,000 ohms, ½ w., carbon	.13	RCW-1002	C58	CAPACITOR—6 mmf., ceramic	.60
URD-121	R77, 96, 25	RESISTOR—820,000 ohms, ½ w., carbon	.13	RCW-1047	C6, 153	CAPACITOR—100 mmf., ceramic	.60
URD-125	R105	RESISTOR—1 meg., ½ w., carbon	.13	RCW-1045	C126, 36	CAPACITOR—1.5 mmf., ceramic	.60
URD-129	R30, 31, 65, 100	RESISTOR—1.5 meg., ½ w., carbon	.13	RCW-2006	C102	CAPACITOR—12 mmf., ceramic	.35
URD-137	R73	RESISTOR—2.2 meg., ½ w., carbon	.13	RCW-2010	C5, 9	CAPACITOR—47 mmf., ceramic	.60
		RESISTOR—4.7 meg., ½ w., carbon	.13	RCW-2029	C52, 53	CAPACITOR—3 mmf., ceramic	1.15
				RCW-2030	C91, 104, 105	CAPACITOR—6 mmf., ceramic	.60
				RCW-2033	C13	CAPACITOR—8 mmf., ceramic	.60
				RCY-015	C101	CAPACITOR—Television tuning capacitor	1.95
				RCY-029	C8, 100	CAPACITOR—1 to 8 mmf. trimmer	1.00
				RDC-032		CORD—Dial drive cord in bulk	.10 yd
				RDD-007		DRUM—Television tuning condenser drive drum assembly	.95
				RDD-010		DRUM—Tuner plate drive drum (large drum)	.70
				RDK-100		KNOB—Television tuning knob	.20
				RDK-101		KNOB—Radio and FM tuning, focus	.20
				RDK-102		KNOB—Volume control, contrast control	.20
				RDK-103		KNOB—Service selector knob	.25
				RDM-011		KNOB—Off tone, Brightness control	.15
				RDM-012		MASE—For picture tube	6.00
				RDP-033		KNOB RING—With F.M., A.M. and Television channel numbers	.55
						POINTER—Radio dial pointer	1.05

SPECIALIZED REPLACEMENT PARTS (Cont'd)

84	CORD—Power cord assembly, in-	1.75
85	FORMER—117 v, 60 cycles	32.50
86	TRANSFORMER—2 w	17.50
87	TRANSFORMER—Horizontal sweep	3.55
88	TRANSFORMER—Audio output	9.55
89	TRANSFORMER—Vertical output	9.45
90	TRANSFORMER—Horizontal AFC	3.25
91	TRANSFORMER—4th video I-F	3.95
92	TRANSFORMER—3rd video I-F	3.50
93	TRANSFORMER—2nd video I-F	3.50
94	TRANSFORMER—1st video I-F	5.95
95	TRANSFORMER—2nd FM and BC	5.95
96	TRANSFORMER—1st FM and BC	7.00
97	TRANSFORMER—FM discriminator	1.05
98	SWITCH—Coarse focus control switch	2.45
99	POTENTIOMETER—5000 ohms, 1/2 w.	.75
100	RESISTOR—300 ohms, w. w.	2.50
101	POTENTIOMETER—5000 ohms, dual, contrast and brightness control	3.15
102	POTENTIOMETER—50,000 ohms, dual, volume-tone control	1.50
103	POTENTIOMETER—1000 ohms, 2 w, (Variable brightness control)	1.25
104	POTENTIOMETER—100,000 ohms, (Horizontal linearity and Vertical hold control)	1.25
105	POTENTIOMETER—250,000 ohms, (Vertical Height and Horizontal size control)	1.75
106	SWITCH—Variable choke (horizontal)	8.05
107	SWITCH—Oval speaker	.70
108	PULLEY—Includes "C" washer	.65
109	SHAE—Television tuning shaft and driver strap drive drum	.95
110	SHAE—Television tuning shaft and driver strap (at top of gullionette)	.85
111	PULLEY—Idle pulley for elevator tuning members	.05
112	STRAP—Tuning strap, including elevator platforms for B-C and FM	1.15
113	SPRING—Picture tube external coat-	1.90
114	SPRING—Radio tuning drive tension	.05
115	STRAP—Picture tube clamping strap	.15
116	SPRING—Focus coil tension spring	.05
117	SPRING—Focusing screw	.35
118	SCREW—Iron core B-C tuning coils	.35
119	SPRING—Television tuning drive	.55
120	WANE and wire assembly	.05
121	WANE—B-C potentiometer (1.9)	.60
122	WANE—Oscillator gullionette (1.9)	.60
123	WANE—Oscillator gullionette (1.9)	.60
124	WANE—Oscillator gullionette (1.9)	.60
125	WANE—Oscillator gullionette (1.9)	.60
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186	WANE—Oscillator gullionette (1.9)	.60
187	WANE—Oscillator gullionette (1.9)	.60
188	WANE—Oscillator gullionette (1.9)	.60</

SPECIALIZED REPLACEMENT PARTS (Cont'd)

[illegible]

SPECIALIZED REPLACEMENT PARTS (Cont'd)

8	COIL—R-F and oscillator coil (Chn 8)
9	COIL—R-F and oscillator coil (Chn 9)
10	COIL—R-F and oscillator coil (Chn 10)
11	COIL—R-F and oscillator coil (Chn 11)
12	COIL—R-F and oscillator coil (Chn 12)
13	COIL—R-F and oscillator coil (Chn 13)
12-18	LOOP—Broadcast dummy loop
118	COIL—R-F-C padding coil
119	COIL—R-F-C padding coil
127, 95, 98, 99	OSCILLATOR—R-F-C padding coil and 27.9 mc trap trimmer coil assembly
136	COIL—21.9 mc trap coil
	SPACER—R-F-C padding coil
	STAND-OFF—R-F-C padding coil
	VANE—Oscillator guillotine
	VANE—R-F-C guillotine (19) tuning yoke and wire assembly
	SPRING—Television tuning disc spring
	SCORD SPRING—Television tuning disc spring
	SCREENING—Focus coil (B-C tuning coil) and shielding screen
	STRAP—Picture coil tension spring
	STRAP—Picture tube clamping spring
	SPRING—Radio tuning drive tension spring
	SPRING—Picture tube external coil spring
	IN ground spring
	STRAP—Tuning strap, including tuning members
	PULLER—Idle pulley for elevator drive strap (at top of guillotine)
	SHUNT—Idle pulley for elevator drive strap drive
	SHUNT—Television tuning shaft pulley, includes (C) washer
123	SPRINGER—Oval spring (horizontal) for variable choice (horizontal) control
86, 84, 85	POTENTIOMETER—100,000 ohm size control
115, 84	POTENTIOMETER—100,000 ohm (vertical) Height and Horizontal linearity and Vertical controls
858	POTENTIOMETER—1000 ohm (Horizontal linearity and Vertical controls)
8107A, B, S2	POTENTIOMETER—2 meg, 50,000 ohm, dual, Volume-to-focus
8108A, B	POTENTIOMETER—5000 ohm, push-on-off, dual, Volume-to-focus
8123	RESISTOR—300 ohm, w. w. dual, contrast and brightness control
820	POTENTIOMETER—5000 ohms, w. w.
85	SWITCH—Coarse focus control
124	TRANSFORMER—M discriminator
122	TRANSFORMER—1st FM and 1st IF
123	TRANSFORMER—2nd FM and 1st IF
115	TRANSFORMER—1st video 1-F
116	TRANSFORMER—2nd video 1-F
117	TRANSFORMER—3rd video 1-F
118	TRANSFORMER—4th video 1-F
120	TRANSFORMER—Horizontal linearity transformer
127	TRANSFORMER—Vertical linearity transformer
125	TRANSFORMER—Horizontal linearity transformer
126	TRANSFORMER—Horizontal linearity transformer
84	CORD—Power cord assembly, 117 v., 60 cycles

SPECIALIZED REPLACEMENT PARTS (Cont'd)

[illegible]

ER-S-803

GENERAL ELECTRIC COMPANY
ELECTRONICS DEPARTMENT
RECEIVER DIVISION
ELECTRONICS PARK, SYRACUSE, N. Y.

3-48 (16M)



CONVERSION KIT, STOCK RKT-002

USED WITH RTO-071 SUBSTITUTE TRANSFORMER IN PLACE OF RTO-048 OR RTO-060

IN
MODELS 802 OR 803 TV RECEIVERS

This kit contains the following parts:

- 1 - RLD-017 - Width Control (includes AFC winding)
- 1 - UCU-1544 - 470 mmf., 500 v., mica
- 1 - UCU-2534 - 180 mmf., 500 v., mica
- 1 - URD-073 - 10,000 ohms, 1/2 w., carbon
- 2 - UCU-1052 - 1000 mmf., 500 v., mica

PROCEDURE (Refer to the diagram below and the Models 802 or 803 Service Note Schematic):

The circuit revisions are made as follows. The numbers in the squares shown in the diagram below, correspond to the steps in the procedure.

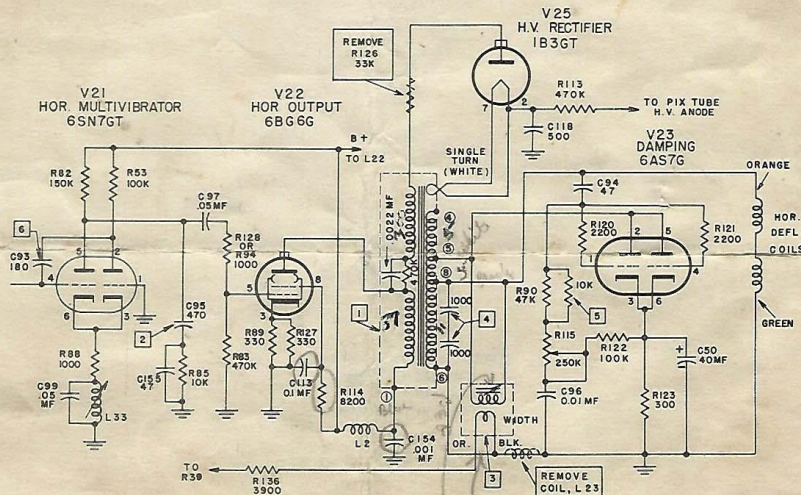
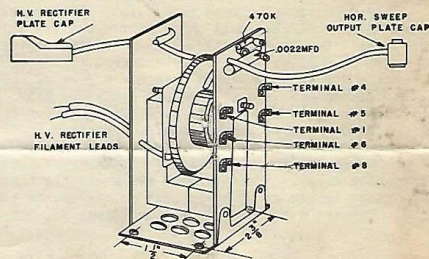
1. Remove defective transformer (T25) from chassis. Remove and discard the Width Control (L23) and the 1B3GT rectifier plate resistor (R126). Mount new transformer on chassis. See sketch for lead identity to effect most satisfactory placement of transformer. NOTE: - The H. V. rectifier filament lead on the new transformer is not long enough and a new H. V. insulated lead (approximately 3 inches longer) must be installed.
2. Remove the 1000 mmf. capacitor (C95) and replace it with the 470 mmf. capacitor (UCU-1544). This capacitor is in the plate circuit of V21.
3. Install new width control (RLD-017). It will be necessary to enlarge the mounting hole to accommodate the new control. Wire the red and blue leads to terminals #8 and #5 of the sweep output transformer. Connect the black lead to chassis ground and the orange lead to the 3900 ohm resistor, R136.
4. Connect the two 1000 mmf. capacitors (UCU-1052) in series and wire between terminals #8 and #6 of the sweep transformer. Make the remaining connections of the component wiring to the sweep transformer as shown in the diagram.
5. Connect the 10,000 ohm resistor (URD-073) in parallel with R90.
6. Remove C93 and replace by a 180 mmf. capacitor (UCU-2534). This capacitor connects between pins #4 and #2 of V21.

SERVICE SUGGESTIONS.

Insufficient High Voltage - (1) Check the setting of the Horizontal Linearity control. Over its range, it will change the high voltage output by approximately 2.0 kv. At the position of best linearity, this h-v produced is usually at its highest value. Always check the effect of the linearity control before assuming that the conversion is faulty. (2) If the above suggestion does not give sufficient high voltage (approximately 8.0 kv), change the Type 5Y3GT rectifier tube (V10) to a Type 5Y4G tube. (3) Instead of connecting the ground return of capacitor C118 to ground; by reconnecting this capacitor to tap #4 of the sweep output transformer, it will increase the high voltage by approximately 1000 volts. The ground side of the capacitor C118 must be insulated by a suitable bracket to provide this circuit revision.

To Change Picture Width Beyond Range of Size Control - By changing the value of the series capacitors (two - 1000 mmf. capacitors) which were connected between terminals #6 and #8 in Step 4, the sweep width may be altered as follows: Increasing the value of the capacitors will increase the sweep width; while decreasing the value of the capacitors will decrease the sweep width. This change in capacitor value will also influence the high voltage output to the picture tube as the higher the value of capacity shunted between terminals #6 and #8; the lower will be the high voltage output to the ptx tube.

(See Additional Suggestions on Opposite Side)



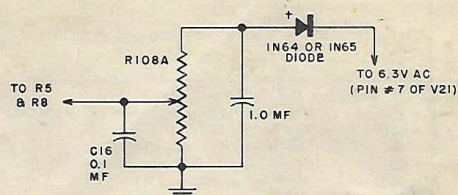
Linearity - On some receivers, in order to have the Horizontal Linearity Control reach optimum linearity, it may be necessary to add a 68 ohm, 2 w. carbon resistor (Stock URF-021) in series with the cathode resistor, R123.

Contrast Control Change - In a few early production Model 802 receivers, the voltage for the Contrast control operation was obtained from the grid circuit of the damper tube, V23. This bias source has not proved satisfactory when the RT0-071 transformer is substituted, as in many cases the bias is too low or may even be positive, dependent upon tube characteristic and voltage variations between receivers. It is suggested that a germanium diode be used to rectify the 6.3 volt a-c filament voltage. It is connected as shown in the rectifier schematic. Proceed as follows with the conversion. Note that the parts required for this conversion are not a part of this kit.

1. Disconnect the 1.0 megohm resistor, R134, which connects between the grid of V23 and the Contrast control, and discard it. Also, remove the 0.05 mfd. capacitor (C23) from the same circuit.

2. Reconnect the high side of the Contrast Control, R108A, to the positive (+) terminal of a 1N48, 1N64, or 1N65 germanium diode. These diodes are available through the normal tube distribution channels. Connect the other side of the diode to pin #7 of horizontal multivibrator tube, V21.

3. Connect a 1.0 mfd. capacitor (Stock No. UCC-017) across the Contrast Control (R108A) as shown.



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RECEIVER DIVISION
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