ALIGNMENT PROCEDURE AND SERVICE INFORMATION

I. F. AMPLIFIER

The I. F. amplifier in this receiver is a four stage, stagger tuned circuit and when properly aligned, it will have a response curve similar to that shown in figure 1. The coils indicated as L-13A, L-13B, L-13C, L-13D and L-13E on the schematic and tube layout chart are the adjustments for this circuit.

A signal generator covering a frequency range from 20 MC to 28 MC, a high resistance DC voltmeter (at least 20,000 ohms per volt) and a 3 volt battery are required to check the I. F. alignment.

The three volt battery is connected with the negative terminal to test point B and the positive terminal to chassis. The voltmeter is connected between test point A and chassis. The signal generator is inductively coupled to L-13A as shown in figure 2. Set the signal generator frequency to 24 MC and adjust its output so that the meter reads about 2 volts. While observing the voltmeter reading, slowly vary the signal generator frequency through a range from 20 MC to 28 MC. Since the voltmeter reading for any particular frequency setting of the generator is proportional to the gain at the frequency, the response curve of the I. F. amplifier can be checked.

The response curve of the I. F. amplifier when aligned is shown in figure 1. It will be noted that the curve is double peaked and has a 20% to 30% valley near 24 MC. At 21.75 MC the response should be down to 5% or 10% the peak value and at 26.25 MC, the response should be down to about half the peak value. If the shape of the response curve is not seriously off it can be corrected by a slight adjustment of one or more of the coils. L-13A and L-13B will have their greatest effect on the shape of the top of the curve; L-13C and L-13E affect the high frequency side and L-13D will affect the low frequency side.

If the I. F. amplifier is seriously out of adjustment, tune L-13A to 22.9 MC, L-13B to 24.4, L-13C to 26.4, L-13D to 23 MC and L-13E to 25.9 MC before proceeding with the "touch up" adjustment.

Sound Circuits

This receiver uses the intercarrier sound system. In this system, both the picture and the sound signals come through the I. F. amplifier and to the diode detector. This diode in addition to performing its usual function as a detector will produce a signal at a frequency equal to the difference between the frequency of the picture signal and sound signal.

The mean frequency of this signal will always be 4.5 MC and it will be frequency modulated to the same degree as the sound carrier. The 4.5 MC signal is amplified in the video amplifier and fed through a 4.5 MC trap circuit to a ratio detector where it is detected.

A simple method for adjusting the sound circuits is to tune the receiver to a television station. Connect a high resistance voltmeter between test points C and D. Adjust sound trap (L-16) and primary of the ratio detector (bottom adjustment L-17) for maximum reading on voltmeter. After making these adjustments connect the voltmeter between test points D and E, then set the secondary of ratio detector (top adjustment of L-17) for zero reading on voltmeter.

If a signal generator is used to make these adjustments, it is connected between test point A and the chassis. The frequency of the generator is set to exactly 4.5 MC and the generator output level is set to a value which gives a convenient reading on the voltmeter. The adjustment procedure is exactly as described above.

TUNER UNIT

Since the tuner unit is a fairly complex assembly, it is recommended that any adjustments other than oscillator trimmer settings not be made unless the need for such adjustments has definitely been ascertained and adequate equipment is available.

The circuits which operate on the 5 low frequency channels are independent of those for the 7 high frequency channels. Each of the two groups has a broad band antenna circuit covering its frequency range and separate R. F. amplifier tubes are used. One section of the dual triode oscillator tube is for the high frequency channels and the other sections for the low frequency channels.

The oscillator adjustments are accessible through holes in the front flange of the tuner chassis. These adjustments are most easily set with the receiver operating and tuned to a station. With the fine tuning control set near the center of its range, the adjustment for that channel is set at the position which gives the best sound and picture quality.

Another method for setting the oscillator adjustments is with two signal generators. One of these generators must cover the television picture carrier frequencies and the other must cover 26.25 MC. The 26.25 MC generator is coupled to L-13A as shown in figure 2, and the other generator is connected to the antenna terminals. The receiver is switched to the channel to be set and the high frequency generator is set at the picture carrier frequency for that channel. As the oscillator adjustment is turned, various patterns will be seen on the picture tube. At the correct oscillator setting, the pattern on the picture tube will be a series of horizontal bars.

The antenna circuits are adjusted with TC-1 and TC-2. To set these adjustments connect a signal generator to the antenna terminals through a dummy antenna (see figure 4). Connect a high resistance voltmeter between test point A and chassis. Switch receiver to channel 10; set signal generator to 195 MC and tune TC-1 for maximum reading on voltmeter. Switch receiver to channel 4 and set signal generator to 69 MC. Adjust TC-2 for maximum reading on voltmeter.

R. F. Amplifier Adjustment

To properly adjust the R. F. amplifier circuits, a sweep generator covering the television channel frequencies with an output voltage of at least 0.1 volt and a high gain oscilloscope are required. The generator should have a sweep width of at least 8 megacycles.

After adjusting antenna circuits, as described above, remove VT-5 and VT-9 from their sockets and short L-13A. Connect the negative terminal of a 1.5 volt battery to test point G and the positive to the chassis. The oscilloscope is connected to test point F and the sweep generator is connected to the antenna terminals through a 300 ohm dummy antenna (see figure 4). The output of the sweep generator is increased until a pattern is seen on the oscilloscope screen. When properly adjusted, the high frequency channels will have a pattern similar to that shown in figure 3A or B and the low frequency channels will have patterns similar to figure 3B or C. Make these adjustments for the condition which gives the greatest and most nearly uniform gain over the region between the sound and picture carrier on any particular channel.

FIGURE-1
I.F. RESPONCE CURVE

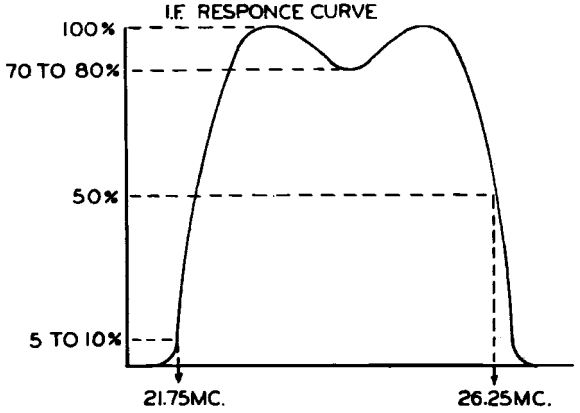


FIGURE-2
DETAIL OF SIGNAL GENERATOR CONNECTION FOR I.F. ALIGNMENT.

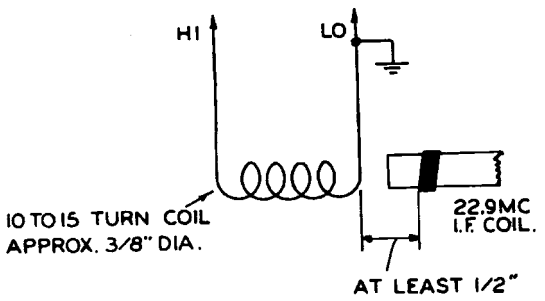


FIGURE-3
RF CIRCUIT RESPONCE CURVE

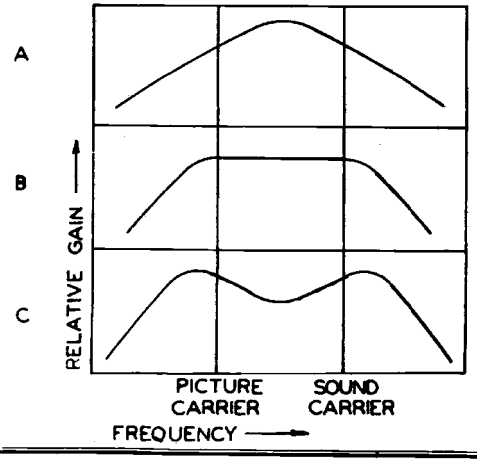
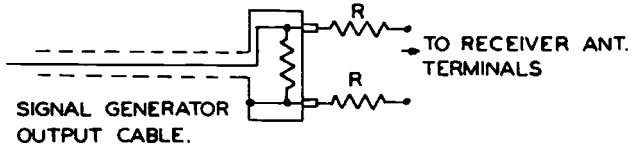
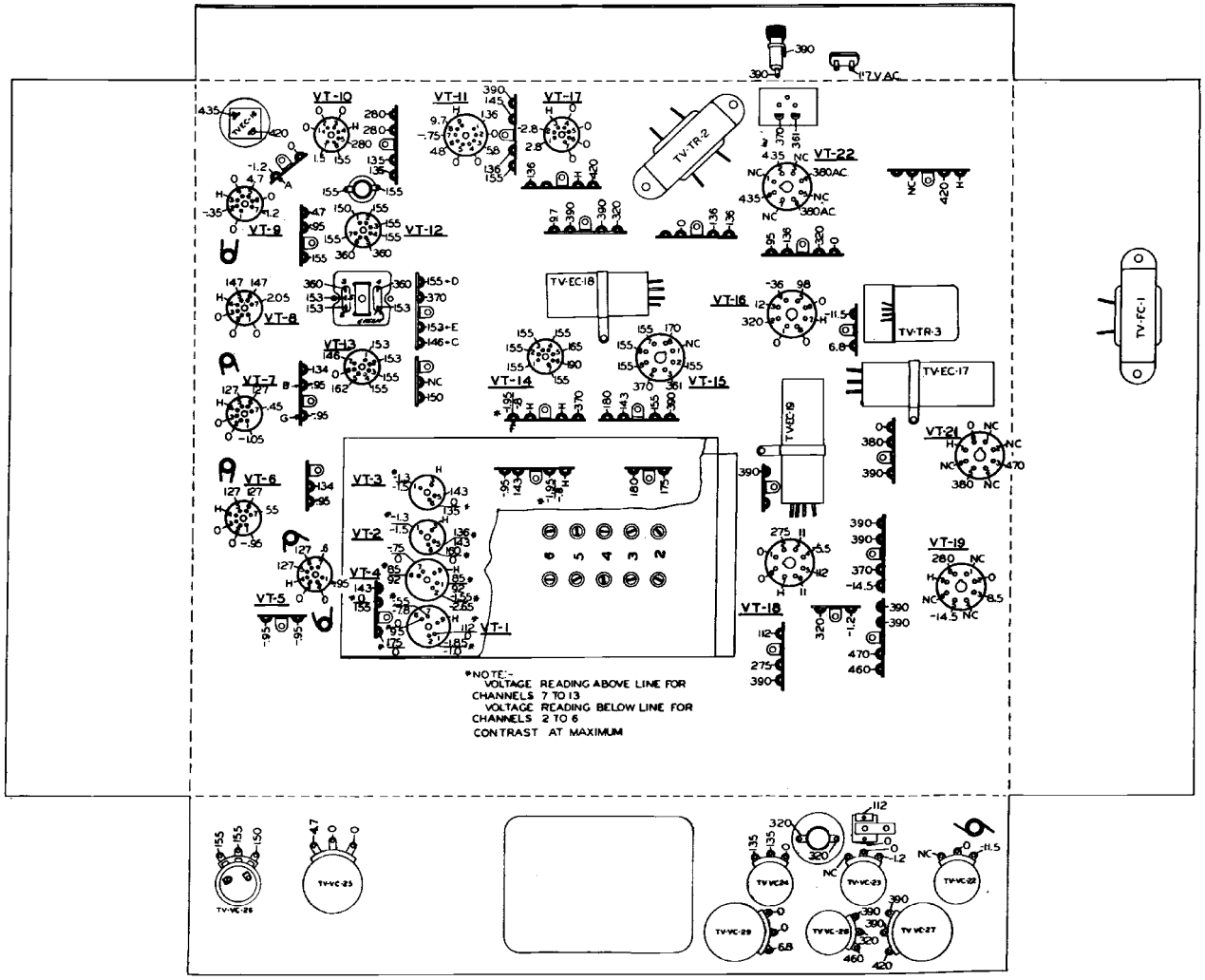
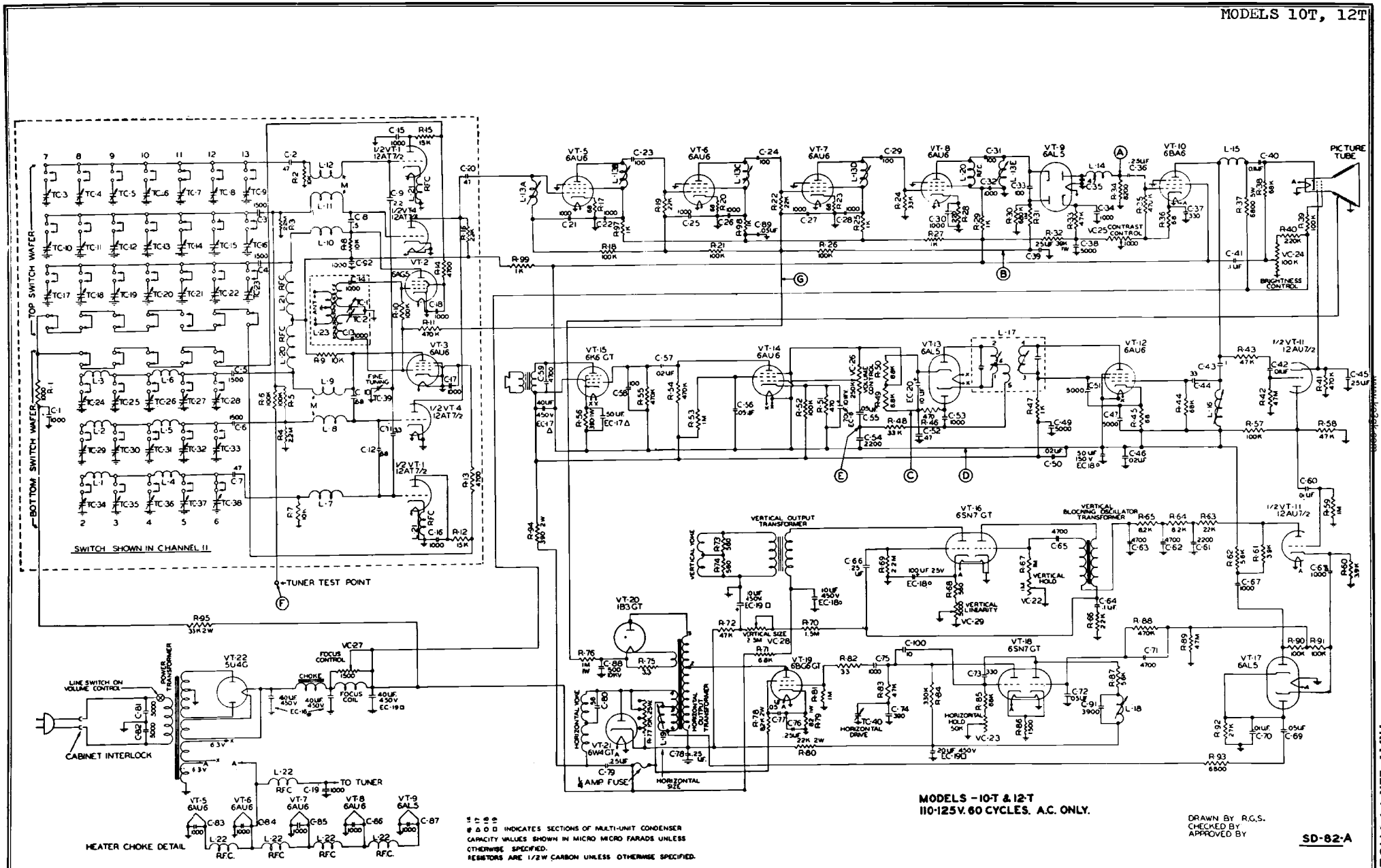


FIGURE-4
DUMMY ANTENNA DETAIL



R = 150 OHMS LESS HALF THE OUTPUT IMPEDANCE OF SIGNAL GENERATOR.





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