# INTRODUCTION

The installation of the Trans-Vue Model 160-L consists of two units, (namely the remote tuner and the deflection chassis), and its antenna installation should be made under the supervision of a qualified serviceman.

## THE ANTENNA

Use an antenna with a balanced 300 ohm impedance.

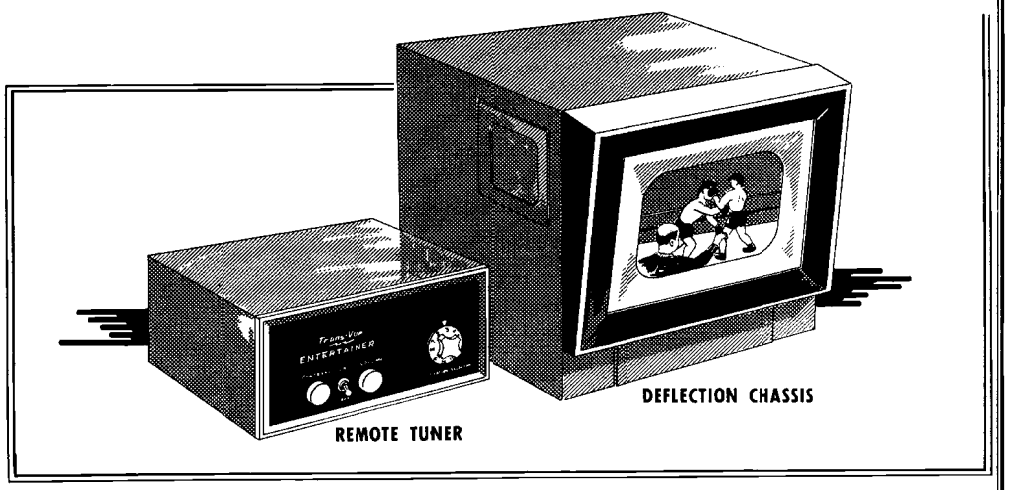
Instructions for installing the antenna should be included with that unit. However, it is well to remember; Television signals, unlike standard radio broadcast signals, travel only in a straight line. Consequently, obstacles such as tall buildings, hills, bridge structures, and even the curvature of the earth (if the transmitting and and receiving antennas are far enough apart) hinder the reception of good, strong signals. Therefore, it is advisable to erect the receiving antenna as high as possible. If it is higher than any other surrounding objects connect the antenna mast through a heavy conductor to a ground rod to reduce the lightning hazard.

## POWER

The set should be operated from a 105-125 volt source, alternating current, 50-60 cycles. The Deflection Chassis derives its A. C. supply through the long cord which connects it to the rear of the Remote Tuner where there are four A. C. outlets. One or more deflection units can be used with one Remote Tuner, and all sets will be simultaneously turned off with the On-Off switch on the Remote Tuner (see fig. 1).

## CONTROLS

The controls on the Deflection Unit have been properly pre-set at the factory, however due to rough or improper handling in shipping they may need slight readjustment. Although these controls have been intended primarily for the serviceman, it would be well to have him acquaint you with them. This is best done with the help of page 4, "Test Patterns".




# INSTALLATION

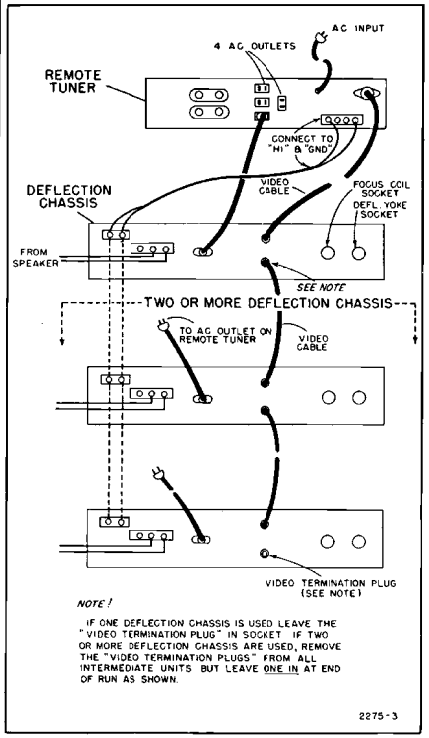



**Fig. 1. Connecting the remote tuner to one or more deflection chassis.**

## ANTENNA CONNECTIONS

1. For those who use separate Hi and Low Band antennae, with two lead-in cables, connect the Hi-Band leads to the two top terminals marked Hi-Band, connect the Lo-Band leads to the two bottom terminals marked Lo-Band. See fig. 2, sketch A.
2. For those who use a combined Hi-Lo Band antenna, better known as a "All Wave Antenna" with one lead-in cable, connect as shown in fig. 2, sketch B.
3. In some cases due to location or environment of the Receiving antennae, better results can be had by connecting the lead-in as shown in fig. 2, sketch C.
4. Ar alternate arrangement for those who receive from Hi-Band stations only (Channels 7 thru 13), the All Wave Antenna lead-in may be connected to the two top terminals marked Hi-Band, with no strap or connection to the Lo-Band terminals.
5. Use the arrangement which gives the most satisfactory results.

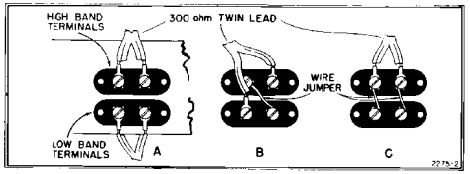


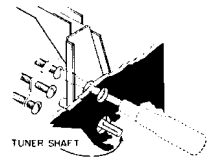

**Fig. 2. Alternate antenna connections**

# ADJUSTMENT OF STATION SELECTOR

The station selector of your television set has been partially pre-set at the factory, but readjustment of the settings may have to be made at the time of the initial installation. This should be done by the serviceman.

If at a later time a new station comes on the air, or if the receiver is moved to a locality where other stations can be received, adjust the station selector in the following manner.

1. Turn the set on. Allow the set to warm up for 20 minutes.
2. Turn the contrast control approximately two-thirds of the way toward its full clockwise position.
3. Turn the volume control approximately to its mid-position.
4. Set the station selector knob to the desired channel.
5. Grasp the station selector knob around its edge and, while rocking it slightly, pull it off its shaft. It may be necessary to slide a cloth, such as a handkerchief, behind the knob to pull it away from the cabinet.
6. Insert a screwdriver into the hole near the station selector knob shaft (see illustration). Turn the screw slowly counter-clockwise (and then clockwise, if necessary) until maximum sound is heard. This may require several turns in one direction or the other. Turn up the volume control if necessary. (Do not at any time turn the screw in either direction more than 3 revolutions. Do not force it if turning becomes difficult as the screw has then reached the end of its travel in that direction and its direction should be reversed.)




7. When the sound is at maximum, the picture will appear on the screen but "sound bars" (dark horizontal bars of varying width) will be seen traveling vertically from bottom to top across the picture. With the screwdriver, turn the station selector screw counter-clockwise only far enough to remove the sound bars from the picture.
8. If after the seven steps above, you cannot receive a proper picture consult your serviceman.

## PICTURE ADJUSTING CONTROLS ON THE DEFLECTION CHASSIS

**Width**—adjusts picture width only.

**Height**—adjusts picture height only.

**Focus**—varies current through focus coil. Focus must be adjusted by means of this control in conjunction with focus coil orientation.

**Briliance**—controls brightness of picture.

**Vert. Linearity**—provides correct vertical distribution of picture.

**Horz. Hold**—synchronizes picture horizontally.

**Vert. Hold**—synchronizes picture vertically.

**Volume**—controls sound at each deflection unit (also see SOUND).

**Deflection Yoke** * —Provides horizontal and vertical deflection of electron beam.

**Focus Coil** * — Focuses electron beam on face of picture tube and centers picture on screen.

**Ion Trap** * — Prevents ions from reaching the picture tube screen.

* Located on neck of picture tube.

## WARNING!

DO NOT PUT YOUR HAND INTO THE REAR OF THE DEFLECTION UNIT UNTIL YOU HAVE READ "DEFLECTION CHASSIS ADJUSTMENT PROCEDURE".

### SOUND

After the units have been inter-connected (as shown in fig. 1), to get "sound" the Volume Control on the Deflection Unit should be turned completely clockwise and left in this position, that is, when only one Deflection Unit is being used. When two or more Deflection Units are used and have been set in their respective places, turn the Volume Control on the Remote Tuner to its mid-position, then adjust the volume on each Deflection Unit so that sound from one Unit does not conflict or clash with the sound of the other, thereafter the volume is controlled only at the Remote Tuner. This is called "Phasing of the sound". If sound from two or more units is improperly "Phased" there will be "dead spots" in the room where no sound will be heard, and other spots where sound from one Unit will arrive later than sound from another Unit causing "Clashing".

### DEFLECTION CHASSIS ADJUSTMENT PROCEDURE

All adjustments are made from the front of the unit, with the exception of ion trap and centering. The following procedure should be followed step by step for best results.

## WARNING!

IN MAKING ADJUSTMENTS ON ION TRAP, FOCUS COIL AND YOKE, EXERCISE GREAT CAUTION NOT TO TOUCH THE METAL SHELL OF THE PICTURE TUBE. THIS SHELL IS AT A 12,000 *VOLT* POTENTIAL. ALSO AVOID TOUCHING THE PORTION OF THE TUBE WHICH LIES BETWEEN THE METAL SHELL AND THE NECK. THIS IS COVERED WITH AN INSULATING COATING, AND SHOULD NOT BE SMEARED BY HAND OR FINGER PRINTS.

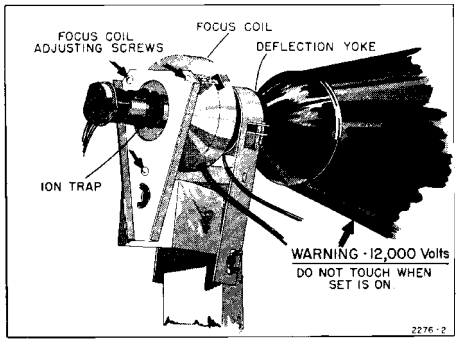



**Fig. 3. Picture-tube accessories**

1. Make sure that yoke and focus coil plugs and picture tube socket are properly inserted on deflection chassis.
2. On the tuner, rotate channel selector to a station channel which is "on the air".
3. Turn CONTRAST control on tuner to extreme counter-clockwise position, (left).
4. Turn VOLUME control on tuner to counter-clockwise position, (left).
5. Turn BRILLIANCE control on deflection unit to extreme right. Remove perforated metal back on cabinet.
6. Make sure that the deflection yoke is pushed forward on the neck of the tube as far as possible. If not, loosen clamping screw on the side of the yoke bracket and move the yoke forward. Tighten screw partially.
7. Turn on tuner with ON-OFF switch. After set is warmed-up, note if a white raster has appeared on screen.

   (A mirror is helpful in the following adjustment.)
8. Adjust ion trap for maximum brightness on screen. This is done by gently rotating the ion trap and pushing it forward and back slowly on the tube neck until the best position is found. The best position is that in which the screen is evenly and brightly illuminated and no edges of the raster are shaded or cut-off.
9. Now observe whether the top and bottom edges of the raster are parallel to the edge of the mask or (if the unit has been taken out of its cabinet) to the table. If not, adjust this by rotating the deflection yoke slightly until this condition is obtained. Tighten yoke clamp. *Do not squeeze yoke unnecessarily.*
10. Reduce the brilliance of the raster with the BRILLIANCE control until light is barely visible.
11. Increase the CONTRAST at the tuner to secure a picture on the screen. Advance this control just enough to give good graduations of black, gray and white.
12. If the picture is out of sync horizontally, adjust the FINE HORIZONTAL HOLD control to stop picture. If this does not work, set FINE control to mid-position and adjust COARSE.
13. Adjust VERTICAL HOLD control to stop vertical motion, if necessary.
14. Focus picture with the FOCUS control. Try to obtain as uniform a focus as possible across the tube face.

    (The following steps are best accomplished with a station test pattern.)
15. If picture is not fairly well centered, adjust centering roughly by loosening focus coil supporting bracket wing nut, and move focus coil to center the picture. Readjust FOCUS control for sharpest picture. If shadow appears at picture edge, adjust ion trap.
16. Rotate FINE H. HOLD control quickly from left to right and back again. Picture should go out of sync on both ends of the control range. If not, set control to mid-position and adjust COARSE control. Repeat these operations until picture goes out of sync at both ends of FINE control.
17. Set FINE control so that picture is properly phased. This is where vertical lines in the picture are straight and no folding of the picture is seen at either edge.
18. Adjust VERTICAL HOLD control for best interlace, that is, where the scanning lines are least distinct.
19. Adjust WIDTH control until picture fills mask opening horizontally.
20. Adjust HEIGHT and VERTICAL LINEARITY controls together to fill mask opening vertically and to achieve best linearity.
21. Center the picture finally with the three focus coil supporting and adjustment screws. Move these one at a time so as to learn the general direction of picture movement with each.
22. Readjust WIDTH, HEIGHT and V. LINEARITY controls if necessary.

    DO NOT USE FINE HORIZ. HOLD CONTROL FOR CENTERING PURPOSES.

    Make final adjustment of FOCUS control.

    Make final adjustment of ION TRAP.

NOTE: As this unit employs a magnetically deflected tube, there will be some centering effects due to the earth's magnetic field. This effect will vary according to the location of the unit geographically and its position with respect to the earth field. If centering requires much tilting of the plane of the focus coil face relative to the tube neck, easier centering may usually be obtained by *rotating the picture tube* in its mounting so as to require less tilting of the focus coil. This can be done by loosening the wire clamp around the front of the tube. DO NOT ATTEMPT THIS WITHOUT TURNING OFF THE UNIT AND MOMENTARILY SHORT CIRCUITING THE HIGH VOLTAGE TO GROUND. After adjustment has been made, tighten the wire clamp. DO NOT TIGHTEN UNNECESSARILY. About ¾" of thread should protrude from the nut.

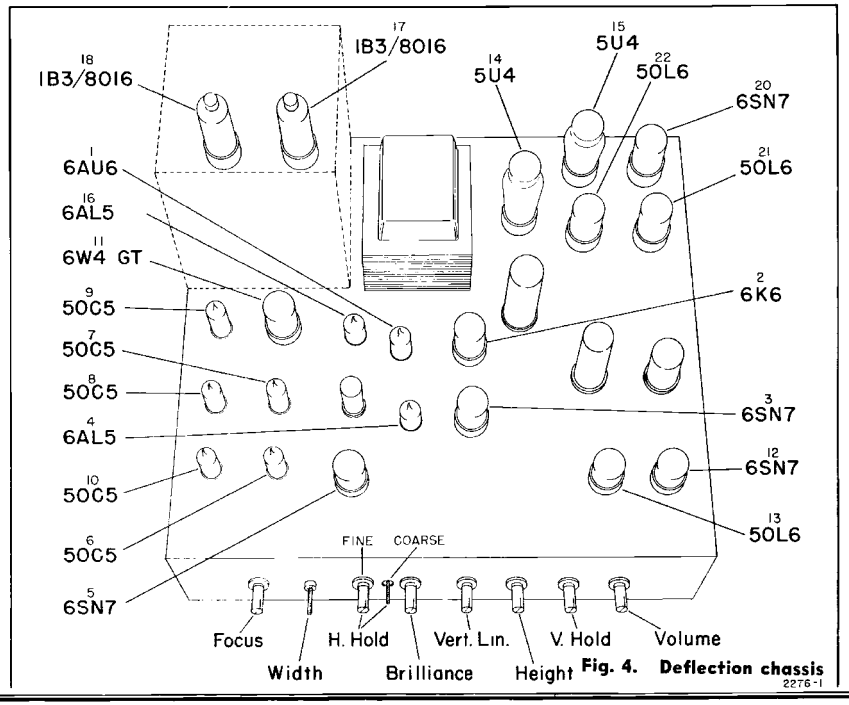



**Fig. 4. Deflection chassis**

# ALIGNMENT PROCEDURE

## TELEVISION FREQUENCY RANGES

*(All figures represent megacycles)*

| Channel | Channel Frequencies | Picture Carrier Frequency | Sound Carrier Frequency | Receiver RF Oscillator Frequency |
|---|---|---|---|---|
| Low Band | | | | |
| 2 | 54-60 | 55.25 | 59.75 | 82 |
| 3 | 60-66 | 61.25 | 65.75 | 88 |
| 4 | 66-72 | 67.25 | 71.75 | 94 |
| 5 | 76-82 | 77.25 | 81.75 | 104 |
| 6 | 82-88 | 83.25 | 87.75 | 110 |
| High Band | | | | |
| 7 | 174-180 | 175.25 | 179.75 | 202 |
| 8 | 180-186 | 181.25 | 185.75 | 208 |
| 9 | 186-192 | 187.25 | 191.75 | 214 |
| 10 | 192-198 | 193.25 | 197.75 | 220 |
| 11 | 198-204 | 199.25 | 203.75 | 226 |
| 12 | 204-210 | 205.25 | 209.75 | 232 |
| 13 | 210-216 | 211.25 | 215.75 | 238 |

EQUIPMENT REQUIRED:

| | |
|---|---|
| 3-volt bias battery | Signal generator (4.5 to 220 mc) |
| DC vacuum-tube voltmeter (Voltohmyst or equivalent) equipped with high-frequency probe | Sweep generator (4.5 to 220 mc with 10-mc sweep) |
| | Oscilloscope (2.5-mc bandwidth) |

## VIDEO I-F ALIGNMENT

1. Connect the 3-volts bias battery from AVC to B- (positive to B-).
2. Connect the signal generator, thru a 1000-mmf capacitor to the converter. Ground the generator to the tuner cover. The converter connection may be made thru a hole in the tuner cover (fig. 7, sketch A).
3. Connect the voltmeter across R38 (contrast control), positive to B- side.
4. Switch the tuner to any high band channel.
5. With the signal generator set at the specified alignment frequencies, tune the corresponding coils for maximum or minimum response on the output meter, as indicated below. All the coils are slug tuned, with the exception of the 1st IF secondary, which is trimmer tuned.

| Stage | Frequency (mc) | Adj. | Response |
|---|---|---|---|
| Converter | 26.3 | L12 | Maximum |
| 1st IF Primary | 23.2 | L13 | Maximum |
| 1st IF Secondary | 21.8 | C36 | Minimum |
| 2nd IF | 26.3 | L14 | Maximum |
| 3rd IF Primary | 23.2 | L15 | Maximum |
| 3rd IF Secondary | 22.6 | C46 | Minimum |
| 4th IF | 24.7 | T1 | Maximum |

6. Remove bias battery. Connect a sweep generator to the converter and an oscilloscope across diode load, R38. (Fig. 5.)
   Check the peaks of the response for symmetry. Readjust 4th IF slug if necessary. (The signal generator and meter may be used for this purpose.)
7. With the signal generator, check the IF sensitivity. At peak response this should be 80 microvolts ±50% for 1 volt dc across diode load.
8. Check the IF video-carrier to sound-carrier ratio. Make the measurement as follows: At maximum response, determine the average sensitivity between peaks and valley of the response curve, for an output of 1 volt. Next set the generator input to twice this sensitivity figure and detune the generator, in the high frequency direction, until the meter reading returns to 1 volt. Record this generator input, the "video carrier sensitivity". Now decrease the frequency of the signal generator 4.5 megacycles and again adjust the generator input to give a meter reading of one volt. This input is the "sound-carrier sensitivity". The ratio of sound carrier sensitivity to video-carrier sensitivity should be between 5:1 and 10:1.

   In the event the signal generator output is not calibrated in microvolts, the following procedure may be employed: Short the AVC to B- by connecting a clip lead in shunt with capacitor C57. Adjust the signal generator to a frequency corresponding to the average output level between the peaks and valley. Adjust the signal generator output level to produce 4 volts dc across the contrast control. Next detune the signal generator in the high frequency direction until the meter reading falls to 3.4 volts. Now decrease the frequency of the signal generator 4.5 megacycles and note the dc voltage across the contrast control. The dc voltage should be between 1-1/2 and 2-1/2 volts which corresponds to a ratio of between 5:1 and 10:1.

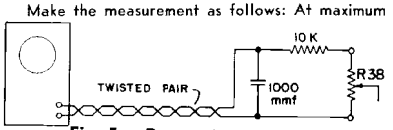



**Fig. 5. Connection of the oscilloscope**

9. Connect the sweep generator to the antenna terminals. (If the sweep generator available does not have a balanced output, connect it as shown in Figure 6.) Check channels 2, 4, 6, 7, 9, 13 for overall response, keeping the generator output at a level which will provide approximately a 2-volt peak-to-peak output across diode load. If the set does not track properly, refer to step 8 of Tuner Alignment Procedure.
10. Connect the signal generator (see fig. 6 for the antenna terminals and the voltmeter across the diode load (R38 contrast control).
11. Check the overall sensitivity. At frequency corresponding to the average response, the sensitivity, for a 1-volt output across the diode load, should be between 50 and 200 microvolts for both bands. This measurement is taken with the contrast control on full.
12. Check the overall video-carrier to sound-carrier ratio. Use the procedure described in step 8, except that the generator should be detuned in the *low* frequency direction for the video carrier and the frequency should be *increased* from there for the sound carrier. The overall ratio should be 5:1 to 15:1.

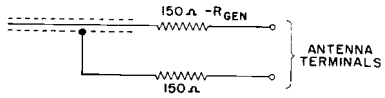



**Fig. 6. Connection of generator**

## SOUND IF ALIGNMENT

1. Connect the CW signal generator across the contrast control. Turn the contrast control on full. Short the antenna input.
2. Connect the voltmeter across electrolytic capacitor C74.
3. With the generator "hi-side" connected to top of contrast control apply a 4.5-megacycle CW signal. Adjust the input for a meter reading of approximately one-half volt above contact potential.
4. Turn the slug of the ratio detector transformer, (T5) secondary, all the way out.
5. Tune pick-off coil and driver transformer primary and secondary for maximum reading on meter.
6. Connect the oscilloscope across volume control and the sweep generator in place of the CW generator.
7. Apply a signal which will sweep approximately 100 kilocycles above and below 4.5 megacycles. Turn in the slug of the ratio detector (T5) secondary (top core) until the ratio detector curve appears. Adjust this slug for maximum linearity.
8. Adjust the primary of the ratio detector (T5) transformer (bottom core) for symmetry of the ratio detector curve around the 4.5 megacycle center.
9. Connect a calibrated oscilloscope or VTVM across volume control. Reduce deviation of 4.5 mc signal to ±25KC and adjust generator output for about 20 K microvolts. Audio output should not be less than 1.5 volts R.M.S.
10. Connect oscilloscope or voltmeter to audio terminal board at Hi terminal (rear flange tuner chassis). Set volume control at maximum. Audio output should not be less than 8 volts R.M.S.
11. It may be necessary to retouch the sound I.F. alignment, with the tuner chassis connected to the deflection chassis, where the transmitted video carrier has imperfections that cause an intermodulation product similar to a low frequency buzz to appear along with the true audio signal. If any station in the immediate area is observed to fall in this catagory, tune it in with the normal tuning procedure, and readjust slugs of the ratio detector secondary, driver primary, and driver secondary (T4) for minimum buzz and maximum audio from the speaker.

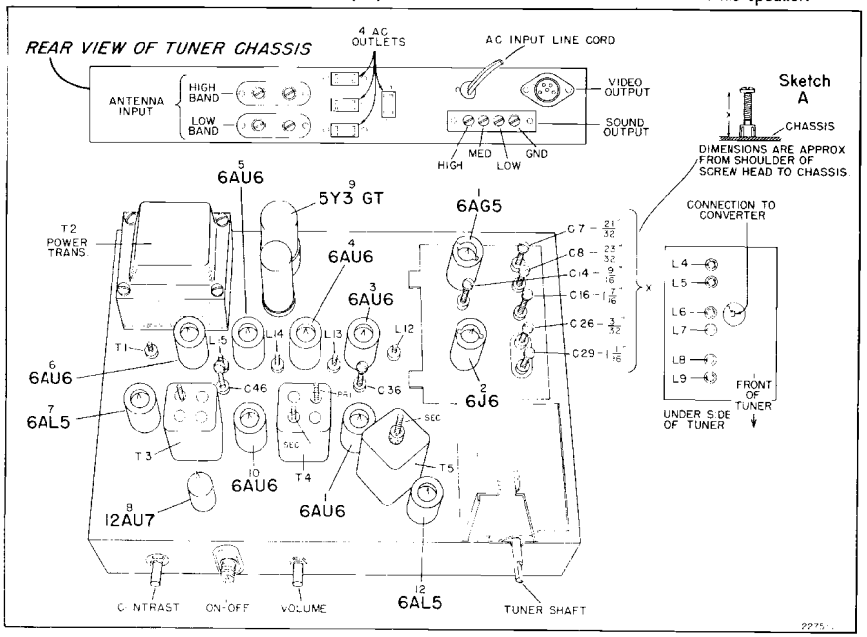



**Fig. 7. Remote tuner chassis view**

## LOW AND HIGH BAND TRACKING ALIGNMENT PROCEDURE

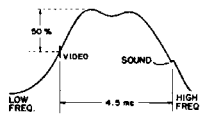
**Visually set trimmers (high band and low band).** *(See Figure 7, sketch A.)*

### Low band tracking alignment procedure:

1. Set tuner to top of stroke on low band .
2. Connect an oscilloscope across diode load R38, (contrast control), as shown in figure 5.
3. Connect a sweep generator to the antenna terminals and adjust the generator until a response curve (may vary somewhat from figure at bottom of this page) appears on the oscilloscope screen. The generator should have a balanced output; if it does not, connect it as shown in figure 6.
4. Adjust all cores so they just *begin* to affect picture on scope (aprox. Channel 6).
5. Adjust core plate by channel 6 station selector screw so that all cores enter coils an additional 3/16".
6. Turn channel 6 picture carrier marker on and adjust low band oscillator trimmer C29, so channel 6 picture carrier marker beats with 26.75 Mc I.F. marker.
7. Adjust low band primary C8, and secondary trimmer C16 so response is maximum and flat, and the 26.75 Mc markers and channel 6 picture marker appears 50% down edge of response.
8. Switch to each of the other channels on the low band and check the symmetry of the response curve for each switch position. (The sweep generator will have to be reset for each channel). Use trimmers C8 and C16 to effect a compromise which will give the best overall response across the band. The important thing is that deviations from a flat top be kept to a minimum. This may mean that the response for some channels will have to be improved at the expense of others.
9. Switch to channel 2, apply a 55.25 megacycle signal, and note the position of the marker on the response curve. If the marker can be moved to the 50% point by adjustment of the channel 2 station selector screw (with the screw still at least 2 turns in from its maximum "out" position), the alignment of the low band has been properly completed.

### High band tracking alignment procedure:

1. After low band has been tracked, switch tuner to top of its stroke on high band.
2. Readjust the sweep generator so that the response curve appears on the screen. (Approx. channel 13.)
3. Adjust all cores so that they just *begin* to affect picture on scope. (Approx. channel 13.)
4. Adjust core plate by channel 13 station selector screw so that all cores enter coils an additional 1/8".
5. Turn channel 13 picture carrier marker on and adjust high band oscillator C26 trimmer so channel 13 picture carrier marker beats with 26.75 Mc. I.F. marker.
6. Adjust high band primary C7, and secondary trimmer C14 so response is maximum and flat, and the 26.75 Mc markers and channel 6 picture marker appears 50% down edge of response.
7. Switch to each of the other channels on the high band and check the symmetry of the response curve for each switch position. (The sweep generator will have to be reset for each channel.) Use trimmers C7 and C14 to affect a compromise which will give the best response curve across the band. (See step 8 of the low band alignment.)
8. Switch to channel 7, apply a 175.25 megacycle signal, and note the position of the marker on the response curve. If the marker can be moved to the 50% point by adjustment of the channel 7 station selector screw (with the screw still at least one turn in from its maximum "out" position), the alignment of the high band has been properly completed.



IDEAL RESPONSE CURVE

## DEFLECTION CHASSIS

### Capacitors

| Ref. Symbol | Part No. | Description |
|---|---|---|
| C1,3,5,20 | C-8D-17260 | .5 mf, 200 volts +30% —10%, min. |
| C2,-A,B,C,D | B-8C-17570 | Electrolytic, 20 mf x 200 volts, 250 mf x 25 volts; 10 mf x 350 volts, 10 mf x 200 volts |
| C4,28,29,30,36 | C-8D-17785 | .005 mf, 200 volts,+50% —25%, paper, miniature |
| C6,22 | C-8F3-113 | 100 mmf, 500 volts, ±10%, mica |
| C7,8 | C-8F3-125 | 1000 mmf, 300 volts, ±10%, mica |
| C9,31 | C-8D-11304 | .02 mf, 200 volts, ±20%, paper |
| C10 | C-8D-14460 | .05 mf, 200 volts, +30% —10%, paper, miniature |
| C11 | C-8D-10992 | .03 mf, 200 volts ±20%, paper min. |
| C12 | C-8F11-132 | 3900 mmf, 500 volts, ±10%, mica |
| C13 | C-8F3-119 | 330 mmf, 500 volts, ±10%, mica |
| C14,41 | C-8D-10771 | .1 mf, 200 volts, +30% —10%, paper |
| C15 | C-8F3-120 | 390 mmf, 500 volts, ±10%, mica |
| C16 | C-8D-10761 | .01 mf, 400 volts, ±20%, paper |
| C17 | C-8F1-109 | 47 mmf, 300 volts, ±10%, mica |
| C18 | A-8C-17280 | Electrolytic (1 ohm at 15750 cycles) |
| C19,26,39 | C-8D-10775 | .25 mf, 200 volts, +30% —10%, paper |
| C21 | C-8D-17784 | .25 mf, 400 volts, +30% —10%, paper, miniature |
| C23,24,25 | C-8D-10770 | .05 mf, 200 volts, ±20%, paper |
| C32 | C-8D-17270 | .01 mf, 400 volts, +30% —10%, paper, miniature |
| C33,38 | C-8D-13439 | .25 mf, 400 volts, +30% —10%, paper |
| C34 | C-8D-17257 | .2 mf, 200 volts, +30% —10%, paper, miniature |
| C35 | C-8D-17783 | .25 mf, 200 volts, +30% —10%, paper, miniature |
| C40 | C-8G-12198 | 47 mmf, ±10%, ceramic |
| C42-A,B | B-8C-17567 | Electrolytic, 200 mf x 200 volts, (2 sections) |
| C43,44 | A-8C-11495 | Electrolytic, 10 mf x 150 volts |
| C45 | A-8G-17179 | H.V. 500 mmf, 20,000 volts |
| C46,47 | A-8G-17221 | H. V. 500 mmf, 10,000 volts |

### Resistors

| Ref. Symbol | Part No. | Description |
|---|---|---|
| R1,13 | C-9B1-33 | 2.2 megohms, 1/2 watt, ±20% |
| R4 | C-9B2-70 | 4700 ohms, 1 watt, ±10% |
| R5 | C-9B2-19 | 10,000 ohms, 1 watt, ±20% |
| R6,59,61 | C-9B1-29 | 470,000 ohms, 1/2 watt, ±20% |
| R7,8,50,86 | C-9B4-66 | 2200 ohms, 2 watts, ±10% |
| R11,14,56,75 | C-9B1-31 | 1 megohm, 1/2 watt, ±20% |
| R12,37 | C-9B1-74 | 10,000 ohms, 1/2 watt, ±10% |
| R15 | C-9B1-82 | 47,000 ohms, 1/2 watt, ±10% |
| R16,52,66, 67,74 | C-9B1-70 | 4700 ohms, 1/2 watt, ±10% |
| R17,23,27,28, 33,38,55,73, 82 | C-9B1-86 | 100,000 ohms, 1/2 watt, ±10% |
| R18 | C-9B1-69 | 3900 ohms, 1/2 watt, ±10% |
| R19,24 | C-9B1-63 | 1200 ohms, 1/2 watt, ±10% |
| R20 | C-9B1-67 | 2700 ohms, 1/2 watt, ±10% |
| R25 | C-9B1-73 | 8200 ohms, 1/2 watt, ±10% |
| R26 | C-9B1-35 | 4.7 megohms, 1/2 watt, ±20% |
| R29 | C-9B1-94 | 470,000 ohms, 1/2 watt, ±10% |
| R30,79,84 | C-9B1-80 | 33,000 ohms, 1/2 watt, ±10% |
| R31 | C-9B1-71 | 5600 ohms, 1/2 watt, ±10% |
| R32,81 | C-9B1-66 | 2200 ohms, 1/2 watt, ±10% |
| R34 | A-10B-16167 | Horiz. Hold, 50,000 ohms |
| R35 | C-9B1-90 | 220,000 ohms, 1/2 watt, ±10% |
| R36 | C-9B1-68 | 3300 ohms, 1/2 watt, ±10% |
| R39,40,42,43, 44,45,46,47, 48,49 | C-9B1-7 | 100 ohms, 1/2 watt, ±20% |
| R41 | C-9B4-43 | 27 ohms, 2 watts, ±10% |
| R51 | A-10B-17062 | Volume control, 1 megohm |
| R53,89 | C-9B1-25 | 100,000 ohms, 1/2 watt, ±20% |
| R54 | C-9B1-27 | 220,000 ohms, 1/2 watt, ±20% |
| R57 | C-9B1-78 | 22,000 ohms, 1/2 watt, ±10% |
| R58 | C-9B1-85 | 82,000 ohms, 1/2 watt, ±10% |
| R60 | C-9B2-48 | 68 ohms, 1 watt, ±10% |
| R62 | C-9B2-67 | 2700 ohms, 1 watt, ±10% |
| R63 | C-9B4-75 | 12,000 ohms, 2 watts, ±10% |
| R68 | C-9B1-62 | 1000 ohms, 1/2 watt, ±10% |
| R69 | C-9B1-93 | 390,000 ohms, 1/2 watt, 10% |
| R70,72 | A-10B-17006 | Vertical hold, Height, 500,000 ohms |
| R71 | C-9B1-88 | 150,000 ohms, 1/2 watt, ±10% |
| R76 | C-9B1-77 | 18,000 ohms, 1/2 watt, ±10% |
| R77,90 | C-9B1-10 | 330 ohms, 1/2 watt, ±20% |
| R78 | A-10B-17005 | Vertical linearity, 2000 ohms |
| R79 | C-9B2-90 | 220,000 ohms, 1 watt, ±10% |
| R83 | A-10B-17007 | Brightness, 100,000 ohms |
| R85-A,B | B-10B-17096 | Focus, (dual) 300 ohms, 10,000 ohms |
| R87,88 | C-9B1-54 | 220 ohms, 1/2 watt, ±10% |
| R91 | C-9B1-21 | 22,000 ohms, 1/2 watt, ±20% |
| R92,93,94,95, 96,97 | C-9B2-94 | 470,000 ohms, 1 watt, ±10% |
| R98 | C-9B2-134 | 91 ohms, 1 watt, ±5% |

### Coils, Transformers, Chokes

| Ref. Symbol | Part No. | Description |
|---|---|---|
| T1 | B-12C-17572 | Output transformer |
| T2 | B-12C-16999 | Vertical output transformer |
| T3 | C-12A-17566 | Power transformer |
| T4 | A-201-17196 | H. V. Coil assembly |
| L1 | A-16A-17859 | Video choke coil (incl. R2) |
| L2 | A-16A-17857 | Video choke coil (incl. R3) |
| L3 | A-16A-17857 | Video choke coil (incl. R10) |
| L4 | A-16A-17858 | Video choke coil (incl. R9) |
| L5 | A-13D-16943 | Locked oscillator coil |
| L6 | A-13M-17199 | Width control |
| L7 | B-16A-17166-1 | Filter choke |

### Miscellaneous

| Ref. Symbol | Part No. | Description |
|---|---|---|
| | R-24D-17791 | Cabinet |
| | A-30M-17144 | Picture glass |
| | C-6M-17012 | Mask |
| | B-18A-17573 | 8-inch PM speaker |
| P1 | A-19A-17759 | Video output plug (Less 91 ohm resistor) |
| | B-201-17774 | Video cable and plugs |
| | B-14M-17577 | Line cord and plugs |
| | A-15C-16007 | Tube socket, miniature, 7-pin wafer |
| | A-15C-10717 | Tube socket, miniature, 7-pin molded |
| | A-15B-10440 | Tube socket, octal |
| | A-15B-14274 | Yoke socket |
| | A-19B-12468 | Focus coil socket |
| | A-19A-17578 | A.C. socket |
| | A-19B-17757 | Video socket |
| | B-9M-17571 | Ballast tube asembly |
| | A-16M-17024 | Ion trap magnet |
| | B-13M-17004 | Focus coil |
| | B-13M-13590 | Deflection yoke (less resistors and capacitor) |
| | A-15B-17201 | Tube socket, octal (H. V. power supply) |
| | A-51A-16945 | Iron cores for L5, L6 |

## REMOTE TUNER

### Capacitors

| Ref. Symbol | Part No. | Description |
|---|---|---|
| C3 | A-8G-13962 | .005 mf, ceramic |
| C4,30,31,32 | C-8G-16045 | 220 mmf, ±20%, ceramic |
| C5,12,15,21,33 | C-8G-13201 | 1000 mmf, ceramic |
| C6 | C-8G-17305 | 12 mmf, ±10%, ceramic |
| C7,8,14,16, 26,29 | B-201-15142 | Trimmer capacitor |
| C9,10 | A-8G-12495-7 | .5 mmf, ceramic |
| C11 | A-8G-12495-3 | 1.5 mmf, ceramic |
| C13 | C-8G-11893 | 4 mmf, ±1/4 mmf, ceramic |
| C18,22,25,28 | C-8G-11891 | 51 mmf, ±5%, ceramic |
| C19,20 | A-8G-12495-4 | 2.2 mmf, ceramic |
| C23 | C-8G-15737 | 2.5 mmf, ±20%, ceramic |
| C24,27 | C-8G-15224 | 7 mmf, ±1/2 mmf, ceramic |
| C35,39,40,41, 42,44,45,48, 50,51,52,53, 55,56,59,60, 63,65,66,71,77 | C-8G-13201 | 1000 mmf, ceramic |
| C36,46 | B-201-15142 | Trimmer condenser assembly |
| C38 | C-8F3-113 | 100 mmf, 10%, mica |
| C43,49,54 | C-8F3-109 | 47 mmf, 10%, mica |
| C57,75 | C-8D-10771 | .1 mf, 200 volts, paper |
| C58 | C-8G-11734 | 100 mmf, ceramic |
| C61 | C-8G-12199 | 10 mmf, ceramic |
| C62-A,B,C | B-8C-17621 | Electrolytic, 40 mf, 40 mf, 10 mf, 200 volts |
| C64,67,69,73 | C-8G-11731 | 1500 mmf, ceramic |
| C68 | C-8F3-119 | 330 mmf, 10%, mica |
| C70,72 | C-8D-11738 | .01 mf, 200 volts, paper |
| C74 | A-8C-13132 | Electrolytic, 10 mf, 50 volts |
| C76 | C-8G-12166 | 5 mmf, ceramic |

### Resistors

| Ref. Symbol | Part No. | Description |
|---|---|---|
| R1 | C-9B1-60 | 680 ohms, 1/2 watt, 10% |
| R4 | C-9B1-86 | 100,000 ohms, 1/2 watt, 10% |
| R5 | C-9B1-48 | 68 ohms, 1/2 watt, 10% |
| R6 | C-9B1-13 | 1000 ohms, 1/2 watt, 20% |
| R7,9 | C-9B1-71 | 5600 ohms, 1/2 watt, 10% |
| R10 | C-9B1-54 | 220 ohms, 1/2 watt, 10% |
| R12,13 | C-9B1-38 | 10 ohms, 1/2 watt, 10% |
| R16,19,21,23, 24,27,31,32, 41,48 | C-9B1-13 | 1000 ohms, 1/2 watt, 20% |
| R18,26 | C-9B1-71 | 5600 ohms, 1/2 watt, 10% |
| R20,25,29 | C-9B1-49 | 82 ohms, 1/2 watt, 10% |
| R22 | C-9B1-73 | 8200 ohms, 1/2 watt, 10% |
| R33 | C-9B1-48 | 68 ohms, 1/2 watt, 10% |
| R34,45 | C-9B1-31 | 1 megohm, 1/2 watt, 20% |
| R35 | C-9B1-30 | 680K ohms, 1/2 watt, 20% |
| R36 | C-9B1-85 | 82K ohms, 1/2 watt, 10% |
| R37 | C-9B1-66 | 2200 ohms, 1/2 watt, 10% |
| R38 | A-10B-17789 | 8000 ohms, Contrast control |
| R39 | C-9B2-181 | 8200 ohms, 1 watt, 5% |
| R40 | C-9B2-187 | 15K ohms, 1 watt, 5% |
| R42,51 | C-9B1-78 | 22K ohms, 1/2 watt, 10% |
| R43 | A-10B-17062 | 1 megohm, Volume control |
| R44 | C-9B1-22 | 33K ohms, 1/2 watt, 20% |
| R46 | C-9B1-57 | 390 ohms, 1/2 watt, 10% |
| R47,52 | C-9B1-74 | 10K ohms, 1/2 watt, 10% |
| R49 | C-9B1-72 | 6800 ohms, 1/2 watt, 10% |
| R50 | C-9B1-84 | 68K ohms, 1/2 watt, 10% |

### Coils, Transformers, Chokes

| Ref. Symbol | Part No. | Description |
|---|---|---|
| T1 | B-201-16410 | IF coil assembly (includes 6800 ohm, 47 mmf) |
| T2 | C-12A-17000 | Power transfromer |
| T3 | C-201-17041 | Sound IF pick-off coil (includes 2.2 mmf, 47 mmf, 47 mmf, 470K ohm) |
| T4 | C-201-17051 | Sound IF driver coil (includes 33 mmf, 33 mmf, 47 mmf, 1000 ohm, 47K ohm) |
| T5 | B-13M-17015 | Ratio detector coil (includes 10 mmf, 91 mmf) |
| L1,2 — (Incl. C1,2;R2,3) | B-201-17143 | Antenna transformer assembly |
| L3 | A-16A-17128 | R.F. choke |
| L4,6,8 | B-13E-17140 | High band coils, Osc., R.F. pri., R.F. sec. |
| L5,7 | B-13E-12046 | Low band coils, R.F. pri., R.F. sec. |
| L9 | B-13D-12155 | Low band coil, oscillator |
| L12 | B-13M-18026 | Converter coil |
| L13 | B-201-17066-1 | Coil and trap assembly (includes C37, R17) |
| L14 | B-201-15612 | Stagger tuned coil assembly |
| L15 | B-201-17066 | Coil and trap assembly (includes C47, R28, R30) |
| L16 | A-201-15608 | Plate choke coil |
| L17 | A-16A-17048 | Peaking coil |
| L18 | B-16A-16998 | Filter choke |
| L19 | A-16A-17937 | RF choke coil |
| L20 | A-16A-18025 | Converter plate choke |

### Miscellaneous

| Ref. Symbol | Part No. | Description |
|---|---|---|
| | A-51A-15715 | Iron core, for L5 |
| | A-51A-17162 | Iron core, for L6 |
| | A-51A-17161 | Iron core, for L7 |
| | A-51A-17513 | Iron core, for L4, 8, 9 |
| | A-51A-11761 | Iron core for T3 |
| | A-51A-11761-1 | Iron core for T4 |
| | A-51A-16693 | Iron cores for T1, L12, 13, 14, 15 |
| | A-15C-10717 | Tube socket, 7-prong, miniature |
| | A-2M-16276 | Core mounting clip |
| | A-2M-15504 | Leaf spring |
| | A-2H-11494 | Tube shield |
| | A-49A-15977 | Coil spring |
| | C-5M-15487 | Treadle bar, bakelite |
| | A-49A-15988 | Tuner shaft spring |
| | A-49A-15837 | Detent spring |
| | A-49A-15993 | Take-up spring |
| | B-200-15987 | Tuner shaft assembly |
| | R24D-17056 | Cabinet |
| | C39A-17849 | Front panel |
| | B5B-17799-5 | Knob (tuner) |
| | B5B-17795-5 | Knob (volume or contrast) |
| | A15C-16007 | Tube socket, 7-pin wafer |
| | A-2H-17008 | Shield base |
| | A-15D-16772 | Octal tube socket |
| | A-15C-15606 | Tube socket, 9-pin wafer |
| | A-19B-17757 | Video output socket |
| | A-19B-17045 | AC socket |
| | A-7B-13050 | Antenna terminal board |
| | A-7B-17071 | Audio terminal board |
| | B-14M-11479-4 | Line cord and plug, 9 ft. |
| S1 | A-20C-17147 | Toggle switch |
| | A-2H-10974 | Tube shield |

MODEL 160-L,
Ch. 12AX21

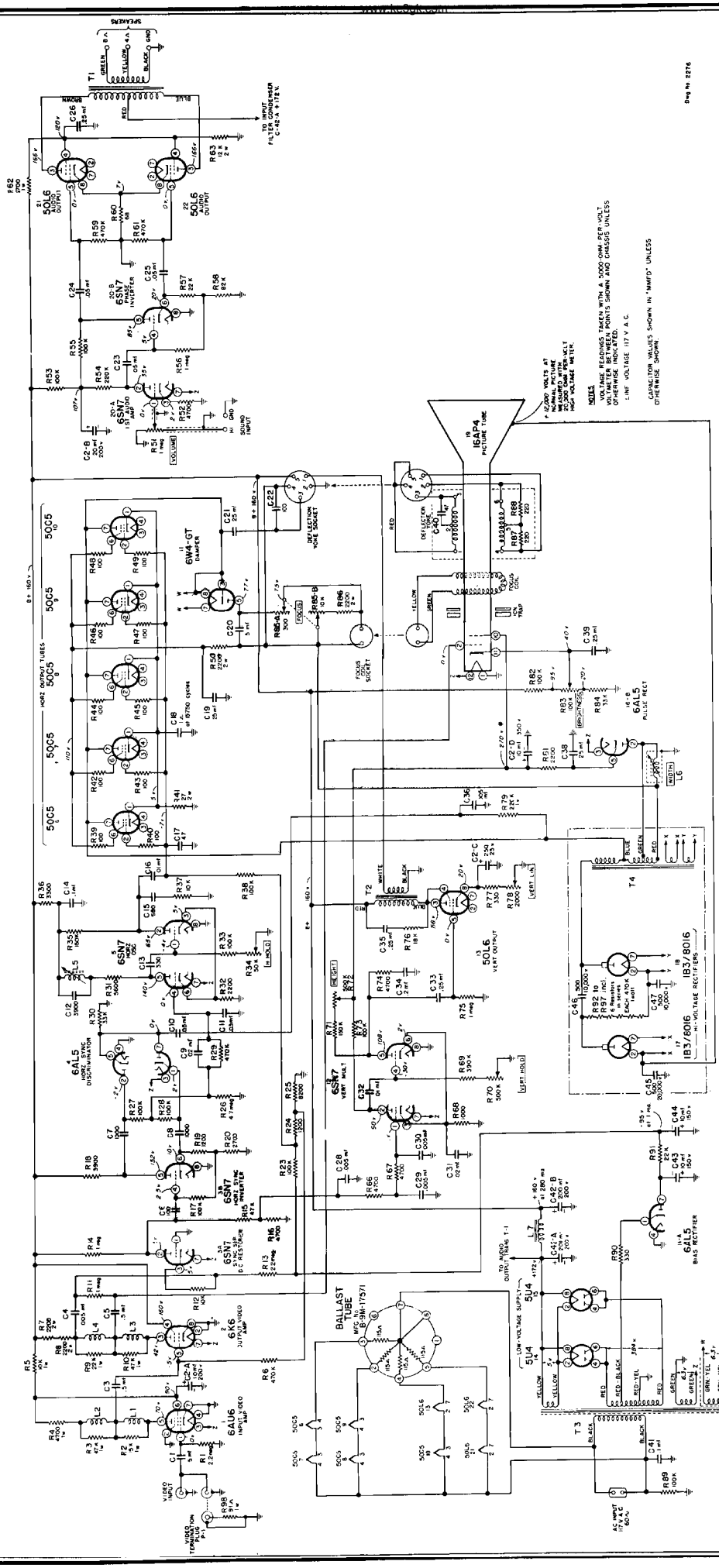


Fig. 8. Schematic diagram of Deflection Chassis
Chassis Model No. 16AXD22
(with voltage readings at tube sockets.)

NOTE: Voltage readings measured on 250 volt scale.
* Measured on 1000 volt scale.

SCHEMATIC CHANGES:
Change value of R35, from 150K to 220K.
Change value of C15 from 680 mmf to 390 mmf.

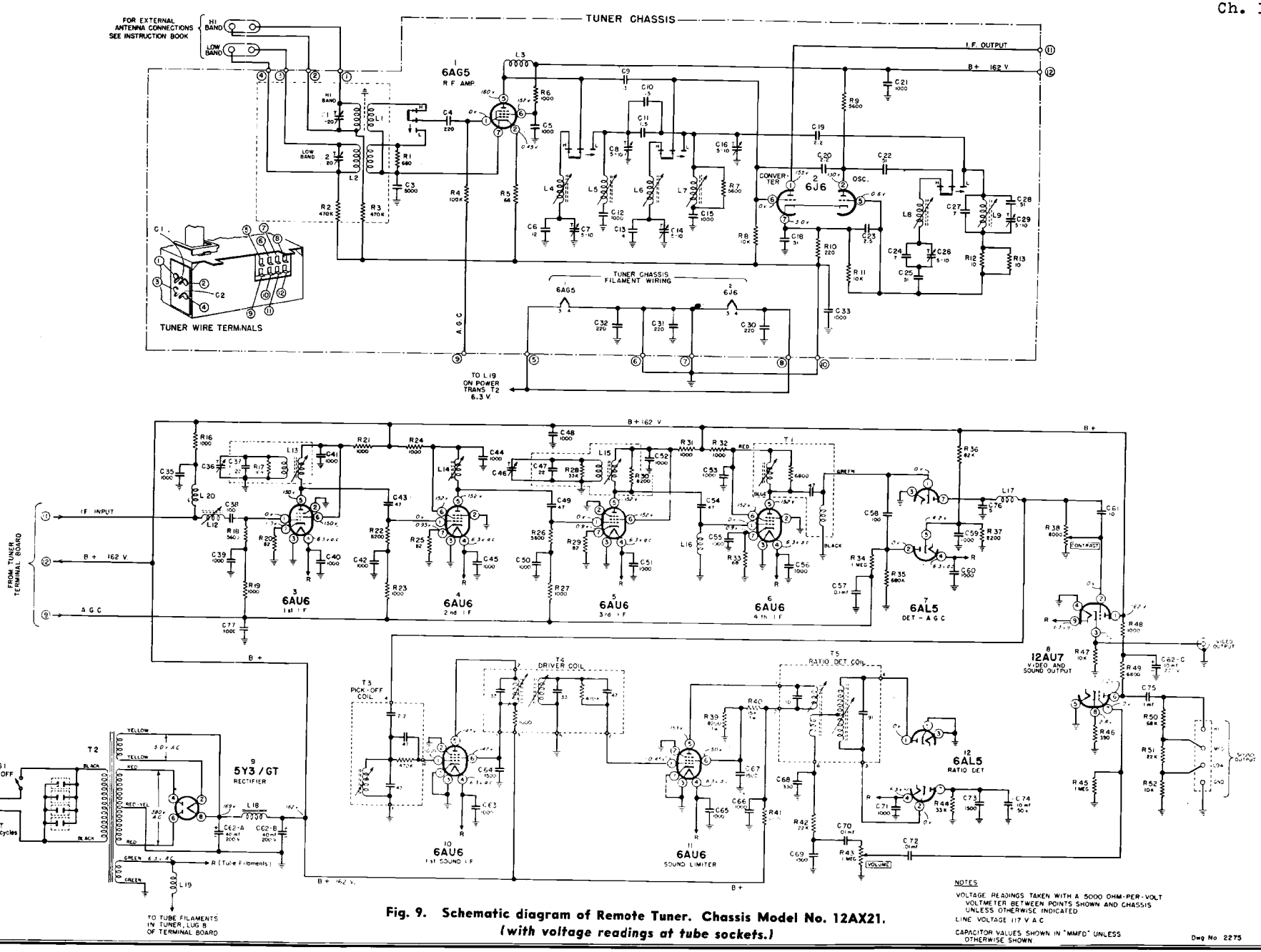



**Fig. 9. Schematic diagram of Remote Tuner. Chassis Model No. 12AX21.** ***(with voltage readings at tube sockets.)***