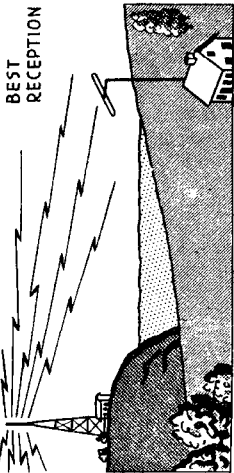
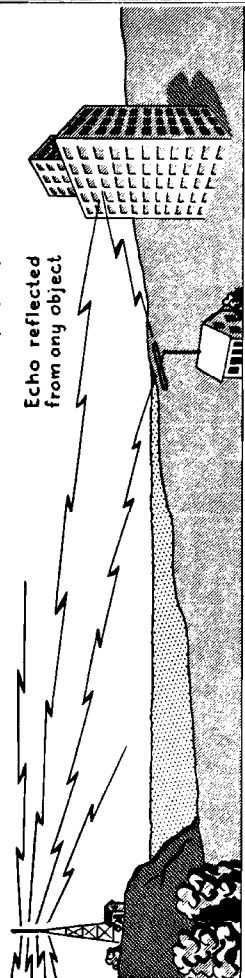


MODELS KA-12, 932, Ch. CA-12;
XT-12, 936, Ch. CT-12



After the best possible signal is obtained your receiver is dependent upon two other things to operate at optimum efficiency. One of these is the current to light the tubes and to develop voltages needed.

Your Midwest Television receiver will operate on the usual home lighting current provided it is AC with frequency between 50 and 60 cycles per second and is kept within 105 and 125 volts. Even if you feel sure that your electric supply is satisfactory, it will do no harm to call your Electric Company. Explain that you have a television receiver, that they are sensitive to as little as 5% change in voltage and to any change in frequency, and ask them if your location might be subject to any variations in the electric supply.

Most Electric Companies supply 120 volts 60 cycles to very close tolerance and variations noticed must then be due to the electrical wiring within your home.

The receiver was adjusted to 120 volts supply at the factory. When the line voltage dropped the picture became smaller and dimmer, when the line voltage increased the picture grew and the screen became too bright. You can readjust the CONTRAST and BRIGHTNESS controls to regain the proper light and detail but the adjustment for size is not quickly made.

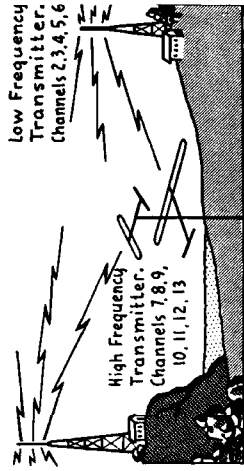
Thus you can see that the receiver will not operate satisfactorily when the home lighting supply is varying although you can use the receiver at any one stable voltage between 105 and 125 volts.

When the line voltage drops below 105 volts it may be impossible to readjust the size of the picture to fill the screen. Any electrical device will operate within very wide variations of line voltage, the most noticeable effect occurs in the case of electric lights where the

This would be the best position for the antenna to reject the echo. When there is more than one echo you may compromise on direct signal strength in favor of least echos.

Since the television stations may transmit in either one of the two frequency bands it is necessary to provide another set of elements in the antenna. Your Midwest Television Antenna provides this and allows independent orientation of the high and low band di-poles.

Low Frequency Transmitter. Channels 2, 3, 4, 5, 6



There are five low frequency channels and seven high frequency channels.

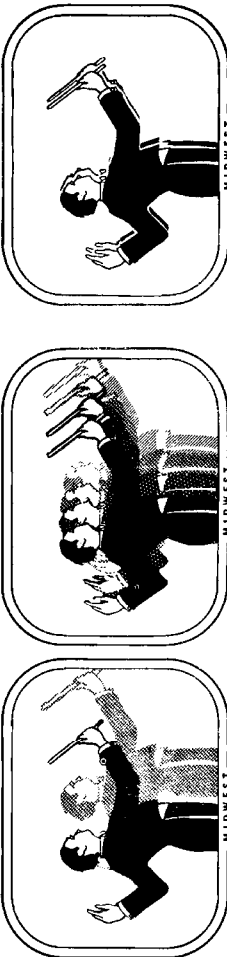
As is true of any antenna, better signal strength is obtained when the di-pole is raised, thus more advantage than the directional effect is achieved when the outside antenna is installed in the highest suitable location. You will obtain a stronger signal from the station for a much better ratio of signal to unwanted interference, in areas close to the transmitter this may be an advantage even though the signal must be attenuated before it is used by the receiver.

INSTALLATION

Unlike any modern radio, the best television receiver manufactured today must be installed with many precautions taken against interference. The reason is fundamental and is because a distorted picture is immediately recognized as such, all of the forms of interference common to radio, and often not noticed, at once make their presence known, and cannot be tolerated in a picture.

Your Midwest television receiver, when used with Midwest Model HL antenna, or equivalent, properly installed will pick up sufficient signal for good sound reception and picture reproduction as far as 20 to 100 miles from the transmitter, depending on the terrain and transmitter power and frequency. In many cases, although there is enough signal pick-up, the picture will be unsatisfactory. The most common trouble is a repetition of an identical but fainter, ghost picture shifted to the side of the stronger picture.

will probably locate the antenna in some position which does not seem to agree with the best theoretical placement.



There may be one or many ghosts and the spacing may be any distance.

These ghosts are caused by echos created just as voice echos are made, because some object reflects the signal back to the receiver at a different time than the direct signal, so that the ghost picture arrives at a later time and is displaced on the screen. Buildings, foliage, hills, signboards and other masses may reflect the television signal and may thus cause an echo of the picture. Of course the same thing occurs with the sound but cannot be heard because the time between these visible echos is extremely small and an audible echo must have time intervals a million times longer to be heard.

Since the echos are quite likely to arrive at the receiver from a different direction than the direct signal, you may discriminate against them, and favor the direct signal by changing the position of the antenna. The reason this may be effective is that the di-pole antenna is directional, it receives best when broadside to the station and less when either end is pointed at the signal source.

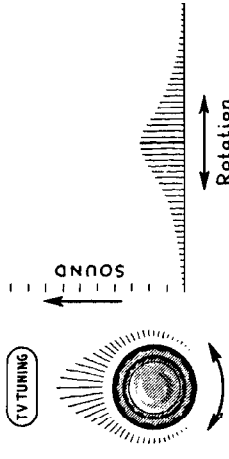
It may be more important to discriminate against the echo than to favor the direct signal, for this reason you



MODELS XA-12, 932, Ch. CA-12; XT-12, 936, Ch. CT-12

Turn the **CONTRAST** and **BRILLIANCE** controls full counter-clockwise. These are combined in a dual control. The purpose of this step is to remove any distracting influence the light on the screen might have on your performance of the following adjustments, in particular the tuning of the sound. Turn the **VOLUME** control clockwise until some definite hiss or noise is heard.

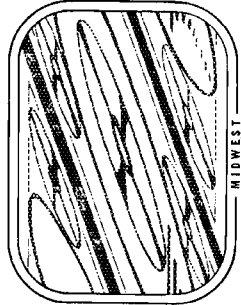
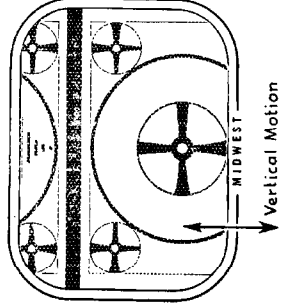
If there is enough signal strength being received on the channel selected to make any sort of picture at all you will be able to tune in the sound with good clarity and volume. Turn the **TV TUNING** control to the position giving the most volume and clearest tone. It may be necessary to reduce the volume control setting to find the best position since this setting is not well defined. Make this adjustment several times and leave the control set approximately in the center of the segment of rotation where good sound is heard.



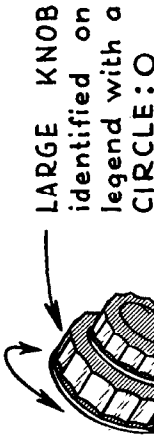
TV TUNING control is a vernier adjustment so that it is large angle of rotation and the best setting of the control is in the center of this arc.

When this control has been set to your satisfaction, there is no need to touch it again unless the sound is distorted, when it may be readjusted as described above; it must not be used to change the picture. Turn the **BRILLIANCE** control slowly clockwise until the picture screen begins to glow.

Now advance the **CONTRAST** control until the screen brightens. Do not turn more than is necessary to produce visible evidence of a pattern in black and white, because when too much signal is used the next step is very difficult. Too much contrast, even after everything is adjusted will cause the picture to be poor in detail and may cause flickering and distortion or complete loss of holding so that it moves sidewise. The pattern then will probably be unintelligible because of rapid motion up and down and sidewise, and there may be multiple patterns.



The controls in front are two nickel plated levers, three dual purpose knobs and one single purpose knob. This last knob is the **TV TUNING** control and appears like the other three but is actually one piece. The **tone** & **VOLUME**, the **HOR HOLD** & **VERT HOLD** and the **BRILLIANCE** & **CONTRAST** controls are actually two knobs in one. There is a small knob in the center of the larger knob and these two can be turned separately. In the small window above each control is a legend describing the control, the dot before the name refers to the small center knob whereas the circle refers to the larger part of the knob.



SMALL CENTER KNOB identified on legend with a DOT: •

Dual control made of two concentric knobs which are rotated independently.

Until you have used the receiver enough to know what each control does it will be best to follow a step by step procedure. This is given in skeleton form on the card which is attached to the receiver. These same steps are described here in greater detail, with suggestions and further information about the use of the controls.

To turn the receiver **ON** rotate the **tone** control knob clockwise. The **OFF-ON** switch is operated by the first few degrees of rotation of the **tone** control after which it serves to change the tone, reducing bass and boosting high frequencies as it is rotated clockwise. Since the best fidelity is obtained when this control is at the brilliant, full clockwise position, it is best to leave it in this position until all adjustments are completed after which it may be returned to the setting most pleasing to you. This will depend somewhat upon the kind of program being received.

The Federal Communications Commission has designated twelve bands of frequencies for use by television broadcasters. Since there are two carriers involved, one for sound and one for picture, it is much simpler to refer to these frequency bands, which are six megacycles wide, as channels. There were originally 13 channels assigned by the Communications Commission and when channel number 1 was discontinued the remaining numbers 2 to 13 inclusive were retained. Your local television station, or stations, will be shown in the newspapers as operating on some channel number between 2 and 13. After consulting the newspaper for channel number and time of broadcast to make sure the station is on the air turn the **CHANNEL** selector lever so that the desired channel number appears in the window above this control.

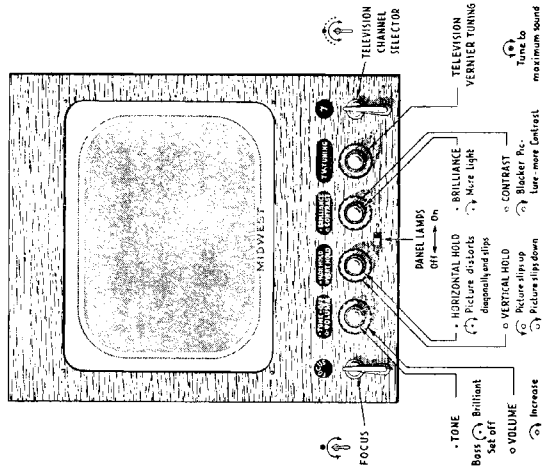
change in light can be seen. If this low voltage remains constant, however, you will become accustomed to the dimmer light and feel that it is normal. But your television receiver has the screen size definitely outlined and the lack of line voltage becomes noticeable because the picture does not fill the screen. There is no cure for this trouble except the obvious one: the line voltage must be brought up to normal.

Model 932. Adapter, must be connected to your present radio for television sound reproduction. To connect to Midwest 1948 and 1949 model receivers simply plug the shielded lead, from the television chassis, into the jack on the radio receiver marked **TELEVISION**. The radio must be turned **ON** and the selector on the radio turned to **TELEVISION** when you use the television adapter.

When the radio receiver has a phono jack and a switch on the radio to select phonograph, your television adapter shielded lead can be plugged into the receiver in place of the phono lead, and is now ready to operate by being turned **ON** and the radio selector switched for phonograph reproduction. When the phono switch and phono jack are not part of the radio receiver they must be added; the work should be done by your local radio service technician because of the necessity for good soldered connections. The principle involved is simply this: connection must be made from the television-adapter shielded sound cable to the input of the audio system of the radio.

The third, and last condition, necessary to best operation is the proper and careful adjustment of the receiver controls. There is no requirement for great skill but since this is a new and unfamiliar receiver, we will outline the use of the controls in some detail.

OPERATION



Before the **HOLD** controls are adjusted these motions are combined on the screen. The result is an appearance of violent motion. You must first stop the vertical motion with the **VERT HOLD** control. Beginning with it in the full counter clockwise position turn it slowly to the right until the horizontal black bar has slowed enough to be seen. Then proceed carefully to turn the control further until it stops altogether. At this setting you will notice that the bar has been pulled into the top or bottom of the screen, and slight movement of the **VERT HOLD** control does not set it in motion again.

The **HOR HOLD** may now be rotated towards the position where horizontal motion slows down. The first effect will be a reduction in the number of diagonal lines, nearer to correct setting results in an upright pattern which may still be sliding to left or right. As the proper setting is reached a vertical black bar, much larger than the one observed in adjustment of the **VERT HOLD**, may be seen. This black area will slip into the left or right side of the picture screen. Further adjustment should then stabilize the picture so that no flicker or bending occurs.

If there is trouble reaching a steady picture, reduce the **CONTRAST** control again until the screen is dim and advance the **BRILLIANCE** for visibility. During the first few minutes the **HOLD** controls may let loose of the picture and require readjustment but the new setting will be close and much more easily found. Once they are set and the receiver has been on for some time neither hold control should need further adjustment, since both the vertical and horizontal circuits lock in with the transmitter.

You have, of necessity, become familiar to some degree with the purpose of the **CONTRAST** and **BRILLIANCE** controls, while setting the **HOLD** controls. When the **CONTRAST** is turned clockwise the **BRILLIANCE** control may need adjustment counter-clockwise, as this direction of adjustment is continued, in small steps, the picture becomes more black and white with less of the grey tones which give you details in shadow and highlight areas. Note again that if too much contrast is used the picture will bend and distort. You must choose, by repeated trial settings of the **BRILLIANCE** and **CONTRAST**, the best degree of contrast for your normal viewing distance, if you become lost or confused in this step start all over by turning the **CONTRAST** completely counter-clockwise and setting the **BRILLIANCE** control so that the screen is almost dark. Then advance the **CONTRAST** until a picture appears.

MODELS XA-12, 932, Ch. CA-12; XT-12, 936, Ch. CT-12

WARNING
It is here necessary to warn you against reaching into the receiver past the rear apron. It is necessary to use voltages which can be deadly if contacted and in any case would result in an unpleasant shock, every precaution has been taken for your safety by enclosing the high voltage, 10,000 volts, in a metal cage, using low regulation of voltage and by using high safety factor wire for the lead to the kinescope. This is a bright red wire which is plugged into the side of the picture tube, if it has come loose the open end, although hooded by a rubber cup, may be dangerous. Other voltages do not exceed 400 volts but will supply considerable current and can also be dangerous; these voltages are carried in the cables connecting the two chassis together and in the speaker cable.

The **FOCUS** control can be turned to any position without affecting the other controls. At one certain position there will appear very fine horizontal lines in the picture screen; at a viewing distance of several feet these would not be visible and this may be the best setting. If you prefer, however, a small amount of rotation in either direction will cause the picture to smooth out and appear slightly better if you are going to watch the screen from a distance of less than three feet. There may be need for readjustment when switching from one station to another. This should not involve more than a resetting of the **CONTRAST CONTROL**, and **TV TUNING** if the sound is distorted. This initial adjustment may seem involved at first. Actually it involves only these steps:

1. Turn receiver **ON** by turning the **tone** control clockwise.
2. Select the **CHANNEL** on which the desired television program is being broadcast.
3. Turn **CONTRAST**, **BRIGHTNESS** full counter-clockwise.
4. Advance the **VOLUME** control and tune in the sound with the **TV TUNING** control.
5. Advance the **BRIGHTNESS** control clockwise until the picture screen barely glows, then advance the **CONTRAST** control until the screen brightens.
6. Stop movement of the picture with the **HOLD** control.
7. Adjust **CONTRAST** and **BRIGHTNESS** for the desired detail and set the **FOCUS** control for desired sharpness.

After this, adjustments necessary when the receiver is used again need only involve:

1. Turn the receiver **ON**.
2. Select the desired **CHANNEL**.
3. Adjust **VOLUME** and **TV TUNING** since these may be slightly different on each channel.
4. Adjust **CONTRAST**.

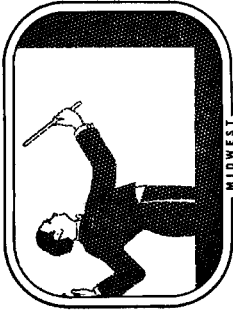
The **HOLD** controls should not be touched unless necessary.

There is sufficient brightness available on the screen for comfortable viewing inside the home during daylight, unless in direct sun or skylight and in the usual home illumination at night. If you desire to dim the room lights the picture will appear much brighter and in that case the panel lamps might be too noticeable, the **PANEL LAMP** switch is provided so that these may be turned **OFF**.

In the section following are described various controls not on the front panel which you can adjust to cure certain faults or failure. Even though you may feel there is no fault in the performance of the receiver, please continue to read this manual for the information alone.

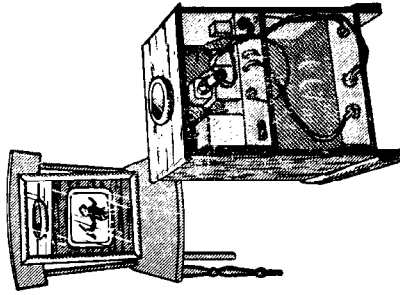
NON-OPERATING ADJUSTMENTS

There are a number of seldom used adjustments for centering the picture, correcting distortion in the picture, changing the size of the picture and for rotating the picture to line up square on the screen. Some of these controls may never be needed but they must be available when aging of the parts, tube changes or some actual physical change is caused by violence (as may occur in shipment) makes it necessary to correct any of the things mentioned above.



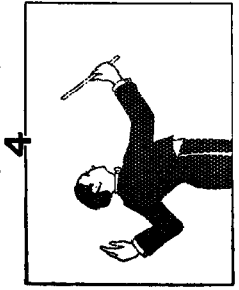
VERT CENT — Control moves picture up or down

HORIZONTAL SYNC. The horizontal hold control on the front panel is a vernier control and is not too critical in adjustment. The **HOR SYNC** control on the rear apron of the chassis is critical and some care should be used in its adjustment. As long as the panel control, **HOR HOLD**, can be used, do not touch the **HOR SYNC** but when the panel control must be turned full left or right then, in small adjustments, rotate the **HOR HOLD** towards a center position and follow it with compensating adjustments of the **HOR SYNC** needed to keep the picture steady.



WIDTH. When the picture is too small or too large, both width and height can be adjusted within limits. When the

VERT LIN control actually has most effect on the top half of the pattern, as this control is turned to increase the height, the top half of the pattern is stretched more than the bottom. This sort of adjustment can be



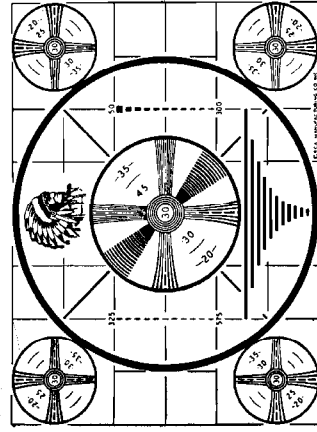
This aspect ratio is transmitted by all stations.

The same ratio must be used in the receiver.

picture is too small because of low line voltage, weak tubes or mechanical reasons there may not be enough adjustment. The **WIDTH** control is a threaded screw and as it is screwed in the picture will slowly increase in width.

HEIGHT. To increase or decrease the size of the picture vertically rotate the **HEIGHT** control. Although the width and height are adjusted separately the final adjustment must result in a ratio of 4 units wide to 3 units high, or there will be distortion of the picture.

LINEARITY. Distortion of the picture proportions may still occur even with the correct aspect ratio in use. This distortion may occur in either the transmitter or receiver; this you can check if there is more than one television transmitter in your locality by comparing the test patterns to see if the same sort of distortion occurs on both. When this distortion is determined to be in the receiver, and is pronounced, correction may be undertaken, the work must be done when there is a pattern being transmitted. Each station has a variation of the fundamental pattern; one of these is shown below but any pattern having a large circle will provide a picture where non-linearity is easily noticed in the distortion of the circle.



VERT LIN control interacts with the **HEIGHT** adjustment so that each control affects both height and linearity. You will find that with increased height caused by advancing the **HEIGHT** control the pattern is stretched slightly more at the bottom.

The **VERT LIN** control actually has most effect on the top half of the pattern, as this control is turned to increase the height, the top half of the pattern is stretched more than the bottom. This sort of adjustment can be

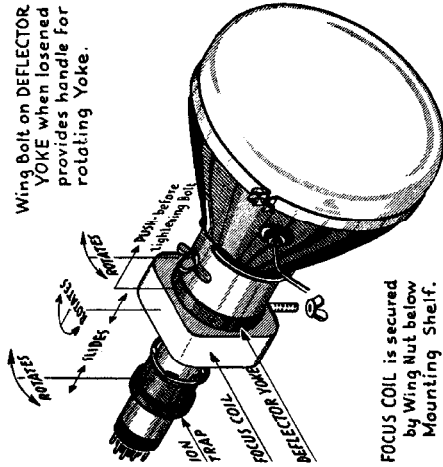


Otherwise — this occurs

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THE FOCUS COIL produces a noticeable effect on centering of the picture and very little effect upon its primary function, that is, to focus the horizontal lines which make up the picture. Therefore, when the factory adjustment has been disturbed as by shock or vibration in shipping, the noticeable effect will be a displacement of the picture in the frame.

Wing Bolt on DEFLECTOR YOKE when loosened provides handle for rotating Yoke.

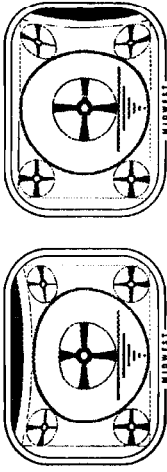


FOCUS COIL is secured by Wing Nut below Mounting Shelf.

Here are the mechanical adjustments that can be used to rotate the picture in the frame, center the picture, correct focus and corner cutting and adjust the ion trap. To make them accessible when the receiver is in the cabinet, you will remove the wood strip holding the metal box over the small end of the kinescope.

TO ROTATE the picture in the frame you simply loosen the **WING BOLT** one half turn and, using it as a handle, rotate the **DEFLECTION YOKE** in the metal tube to straighten up the picture. The receiver must be operating for you to observe the correction being made; otherwise you will need to make a number of trial adjustments. Each time the **WING BOLT** is loosened the yoke must be pushed forward, using the paper collar which is exposed between the metal yoke mounting tube and the **FOCUS COIL**. The relation between the rotation of the picture and the yoke is direct, being in the same direction and amount; be sure to tighten the bolt only after the yoke has been pushed forward against the kinescope.

done most easily by reducing one of these controls for minimum height and then setting the other for correct height. Now advance the first control in small steps, at each step reducing height with the second control, as the pattern approaches good vertical linearity; the adjustments should be made in still small steps. You must use your judgment as to the best relative setting of **HEIGHT** and **VERT LIN**.

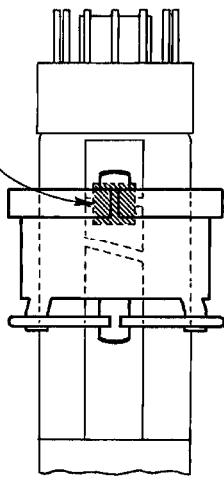


HOR LIN is a screw adjustment which will stretch the pattern just to right of center as it is turned out. The **HOR DRIVE** has a much more pronounced effect on linearity but also determines the picture width and the amount of high voltage. Because of the added complication of high voltage change this control should be rotated only counter-clockwise from the factory setting unless equipment is used to measure the high voltage or observe the voltage wave form at the grid of the δ CGAG tube. Counter-clockwise rotation will widen the picture, stretch the center and crowd the left quarter slightly, whereas the **WIDTH** control affects linearity only on the right half of the picture and in such a manner that when it is used to reduce width the right half of the pattern is compressed. There is further control over linearity, in the left half, possible by changes in the circuit parameters of the reaction scanning circuit. The only control over rotation of the picture is a mechanical one, and as a corollary, if the picture is not square in the frame there has been a disturbance of the mechanical adjustments. Besides this mechanical control, focus, centering and ion trap adjustments are made with mechanically operated controls. To make these changes it is necessary to reach past the rear of the chassis, where an additional hazard is encountered in addition to the possibility of shock.

FURTHER WARNING

The kinescope (picture tube) being a large glass bottle with the inside evacuated, has a few tons of pressure over its surface because of atmospheric pressure. The face and sides are thick but if a fracture of the glass is started by a blow or scratch so that a sudden collapse occurs, the force of the resulting implosion may throw all sizes of pieces of glass with dangerous violence and in every direction. The violence of the implosion can not be predicted and it may result merely in no more damage than would occur when a small lamp bulb is broken, further, the amount of abuse that the kinescope will withstand is likewise not predictable. Some of these large tubes have collapsed even when no visible or known force was used. To be safe, never hold the tube against the body or handle it without gloves and eye-glasses or goggles.

FLAG



ION TRAP

THE ION TRAP is a device for removing ions from the electron beam generated in the gun of the kinescope. The ions removed are molecules of matter which have been excited by electron bombardment so as to have a negative charge and if allowed to remain in the electron beam will eventually cause a dark spot in the center of the kinescope tube face since they continually strike a small area, not being as easily bent from their path by the magnetic fields used to bend the electron beam. This function is not demonstrable but you may be sure it is operating if there is a picture on the screen, since wrong placement of the ion trap, or no trap, on tubes designed for them results in no picture or light on the screen or in a corner of the picture being cut off. The aluminized kinescope and hard vacuum kinescopes do not use ion traps.

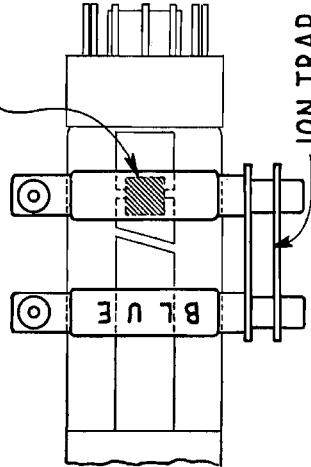
There are numerous types of ion traps, all differing in appearance but identical in action. Two types are illustrated here, showing approximate location on the gun of the kinescope.

The principle involved is the same one used by the mass spectrograph where isotopes are separated. If the ion trap is placed on the kinescope as shown here, only slight movement will be needed to give you the desired results. First, rotation will show that light intensity is peaked at one point and second, longitudinal movement will show a cutting of picture corners except at one point, by combining the back and forth motion with rotation side to side will quickly show you the optimum setting.

The picture moves diagonally with rotation of the FOCUS COIL.

The position of the focus coil along the neck of the tube affects the focus of the spot which draws the horizontal lines on the face of the kinescope and is not critical within the amount of movement allowed. There will be no distinct gain in picture quality with any new placement of the focus coil as long as the front panel **FOCUS** control will reach a point where the horizontal lines are resolved. Furthermore the wing nut which holds the focus coil in place is below the mounting shelf and is difficult to tighten with the fingers because of its location.

FLAG



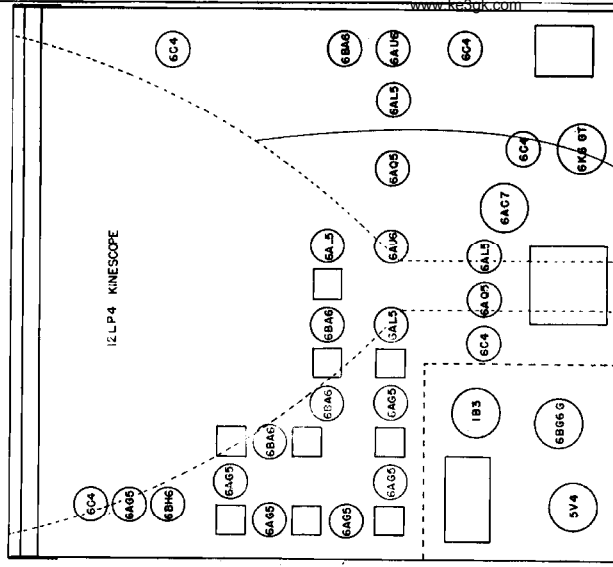
ION TRAP



MIDWEST
The picture may be cut off or very dim, even entirely gone, if the ion trap is improperly adjusted.

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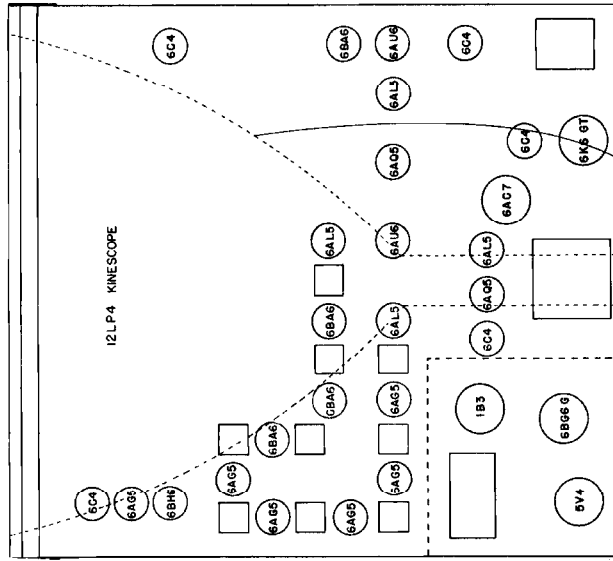
MODEL 932



TUBE MAP

YT-25

MODEL 936



TUBE MAP

YT-24

There are no more corrective adjustments unless the interference from unwanted signals, such as the image chassis is removed from the cabinet and these adjustments are made. If the image chassis is removed, the image adjustment is used to make and check them. However, you should use the image adjustment as a last resort. In the case of following section on service and we suggest that you should finish reading this manual.

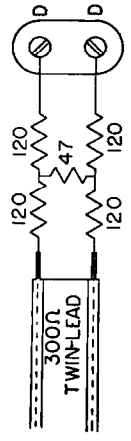
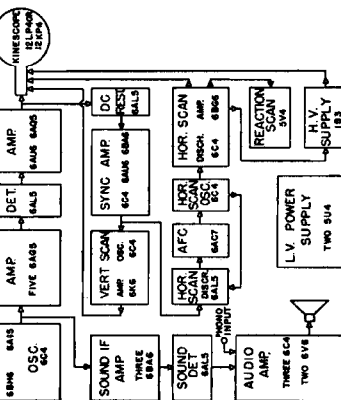
SERVICE ADJUSTMENTS

WARNING - DANGER

This receiver uses voltages which can be fatal and appropriate caution should be exercised. When it is necessary to operate on the receiver with voltage ON, keep one hand in your pocket, the kinescope may shatter upon very little abuse and your eyes should be protected by goggles. Do not handle the tube without gloves nor hold it against your body. Read the complete warnings in the preceding section of this manual and use the caution your life and health deserve.

The servicing of this receiver for defects, as in all radio services, may involve only correction of its installation or correction of the readily available controls described in the sections on OPERATION and NON-OPERATING ADJUSTMENTS, or replacement of defective tubes or finally may require shop service because of component failure or drift in some tuned circuits.

Installation has been described in detail in the first part of this manual, and even though this has not been done in technical language the information is good and should be used. Where too much signal is picked up, resulting in overload, the picture shows only the edges of black areas; this is the result of loss of all low video frequency detail. To correct this trouble insert an attenuator pad in the 300 ohm line to the receiver antenna terminals. The values shown here are recommended, using only carbon resistors and adding sections until detail is obtained in the picture.



Herringbone effect - caused by radio frequency only
Sound bars - caused by modulated carrier
Loss of detail - caused by excessive signal

MODELS XA-12, 932, Ch. CA-12;
XT-12, 936, Ch. CT-12

detector is applied to the first and second sound IF tubes. The audio system has three stages, with a continuously variable double tone control in the first stage for full control over both bass and treble, degeneration circuit for maximum correction of distortion. The first, second and inverter audio tubes are 6CA5 triodes followed by push pull class AB prime 6AV5 beam power pentodes. The speaker is a 12 inch electro-dynamic. In the Model 932 (adapter) the 2nd AF, Inverter, output stage and speaker are omitted. The Fix IF amplifier is a five stage stagger tuned wide band amplifier, substantially flat from 25.75 to 32 megacycles; two traps are used for attenuation of the sound IF carrier and one additional trap, each for adjacent sound and adjacent picture frequencies. The Fix picture contrast control voltage is applied to the control grids in the first four stages. The Fix detector is a 6AL5.

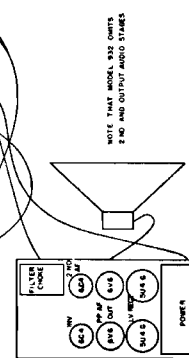
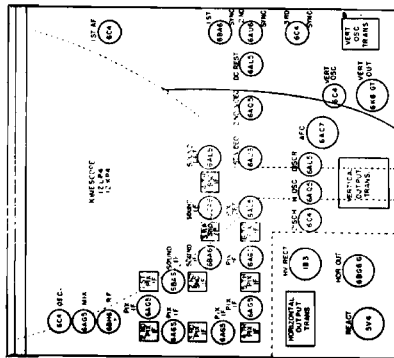
The video amplifier is a two stage wide band amplifier using series and parallel peaking coils to hold the response flat from 40 cycles to 4 megacycles. The first stage has a 6AU6 sharp cut-off pentode and the second stage uses a 6AC5 beam power amplifier.

At this point the "black level" is automatically set (brightness level) is thus automatically established for each scene by the dc restorer circuit, one 6AL5 diode. The three stages synchronizing signal amplifier amplifies the sync signals, limits the noise, removes the blanking and picture signals, and shapes the sync signals. Three tubes are used: 6BA6 amplifier pentode, 6AU6 sharp cut-off pentode and one 6CA triode.

The vertical scanning generator consists of a triggered blocking oscillator, discharge and peaking circuit, followed by a power output stage, transformer coupled to the deflection yoke on the kinescope. The self blocking oscillator is a 6CA triode which is triggered by the vertical pulse formed by an integrating network directly across the amplifier output, connected as a diode.

The horizontal scanning generator consists of a diode, automatic frequency controlled oscillator, a discharge and peaking stage and the power amplifier. The horizontal oscillator is a 6AO5 beam power pentode in an extremely stable circuit. The automatic frequency control tube is a 6AC7 television amplifier pentode used as a reactance tube across the horizontal oscillator tuned discriminator circuit which compares the sync signal and horizontal scan oscillator signal to produce a dc control voltage which operates the reactance tube. A 6CA high frequency triode is used in the discharge and peaking stage. The horizontal scanning output stage uses a 6AV5 beam power pentode. The kinescope driver is a 5VAC full-wave high-vacuum rectifier, is used as a damper load in the output circuit to prevent shock excited oscillation after retrace, to partially shape the sawtooth scanning current and to salvage some power for reuse by the output tube.

For brilliance and definition the kinescope requires a minimum of 10,000 volts at the anode. To provide this voltage the peak voltage produced in the output transformer during field collapse is rectified and filtered. A 1B3 half-wave high-vacuum rectifier is used.



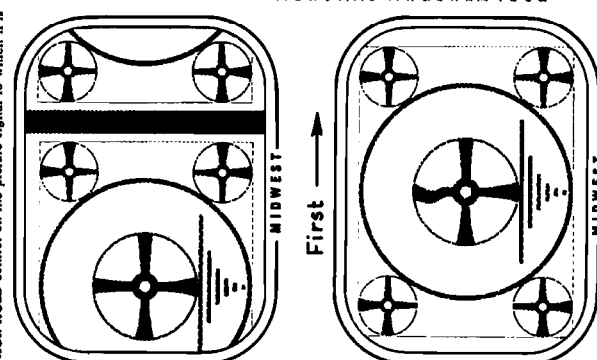
NOTE: PART MODEL 932 OWETS
2ND AND OUTPUT AUDIO STAGES

The following description will supplement the block diagram with some detail about the type of circuits used.

The television carrier is amplitude modulated with the signal and is frequency modulated with the sound. The sound frequency is always higher. Our local oscillator is always 57.75 megacycles above the picture carrier and thus produces two beats, one for the Fix intermediate frequency amplifier and one for the sound intermediate frequency amplifier. The front end is a completely shielded unit containing an untuned balanced 300 ohm input to a 6BE6 pentode RF amplifier, with automatic contrast control voltage applied to its grid, the coupling from the mixer to the mixer grid is made with tuned, over-coupled circuits for wide band flat top response, the mixer tube is a 6CG sharp cut-off pentode and the local oscillator is a 6CA high frequency triode.

The sound IF amplifier has three transformer coupled, tuned stages using three 6BA5 remote cut-off pentodes followed by a ratio detector, which is a 6AL5 diode-pentode. Automatic volume control voltage generated in the

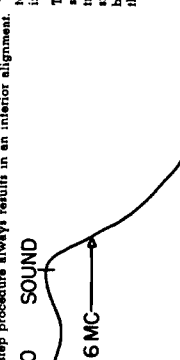
the HOR SYNC so that the picture holds on weak signals by turning contrast control for weak picture, readjust the phase so that picture moves towards the left side of the screen but does not fold over when the HOR HOLD is turned full counter-clockwise. Bands in the picture are held over the entire range of the control. When the HOR SYNC is well adjusted the HOR HOLD control on the picture signal to which it is



adjusted and should pull in the picture to sync one quarter turn either side of center position when the channel selector is turned away from and back to the active channel.

Drift in the tuned circuits should be minor, even over a long period of time and with tube changes. When the alignment of the receiver is indicative of drift the appropriate sweep oscillograph, using accurate, preferably crystal controlled, markers to determine the limits of the bands covered. Extra play equipment and attempts to align with step by step procedure always results in an inferior alignment in this Manual.

The curves for the IF stages are shown with the traps shorted. When the picture IF has been inoperably treated or extensively retuned you should peak each stage as shown, after which the response should be observed and small adjustments made to reproduce this curve.



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1) General purpose voltmeter, with probe for 30 KV dc.

(2) Oscilloscope.

(3) The oscilloscope need only to have 15 cycles to 32 KC sweep frequency and vertical amplifier response to 70 KC to observe wave forms in the sync circuits and the response of the IF and Video amplifiers using RF sweep generator. The 30 KV dc probe may be built by soldering in series enough 10 megohm 1/2 watt resistors and sealing them in a bakelite tube roughly 1/2 diameter with the diameter hole, this being cut then be used for the 30 KV probe.

To multiply the voltmeter readings by 100 use megohm resistors to multiply by 10 use 100 megohm resistors. This probe used here are terminated at the ends with phone tip and phone tip jack so that the completed probe can be quickly attached to the dc probe of the VTVM and as easily removed when not in use.

Width and horizontal center can be affected by the resistor which shunts the 5V4 reaction scanning tube, a smaller value decreases the width, mostly on the left half of the picture and a larger resistance stretches the linearity in cases where a low line voltage makes it necessary but lack of width when the supply is normal should not be caused by this method.

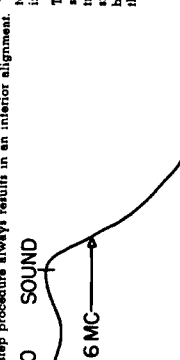
When adjusting horizontal linearity and width the position of the horizontal drive control will be found to affect the high voltage control. The setting of this control so that the wave form above below remains some of the downward dip at the start of the linear rise. With 100 volt line and dark screen the high voltage will read between 10 KV and 13KV. The horizontal scanning oscillator-discriminator transformer may require adjustment of the discriminator tuning if the circuit components or the 6AL5 is changed. The symptoms are shown here.

First stabilizes the picture movement with the HOR HOLD and HOR SYNC controls, then turn the phase adjustment screw (discriminator tuning) until the vertical bar moves to the right and off the screen. Readjust

PLATE OF 6CA HORIZONTAL DISCHARGE TUBE

When adjusting horizontal linearity and width the position of the horizontal drive control will be found to affect the high voltage control. The setting of this control so that the wave form above below remains some of the downward dip at the start of the linear rise. With 100 volt line and dark screen the high voltage will read between 10 KV and 13KV. The horizontal scanning oscillator-discriminator transformer may require adjustment of the discriminator tuning if the circuit components or the 6AL5 is changed. The symptoms are shown here.

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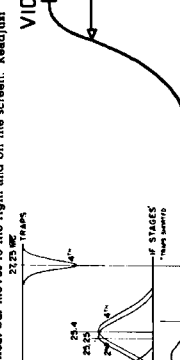
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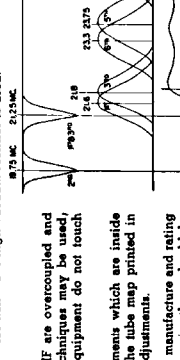
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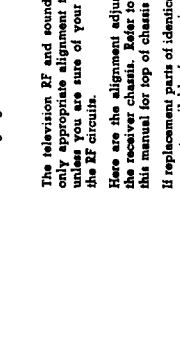
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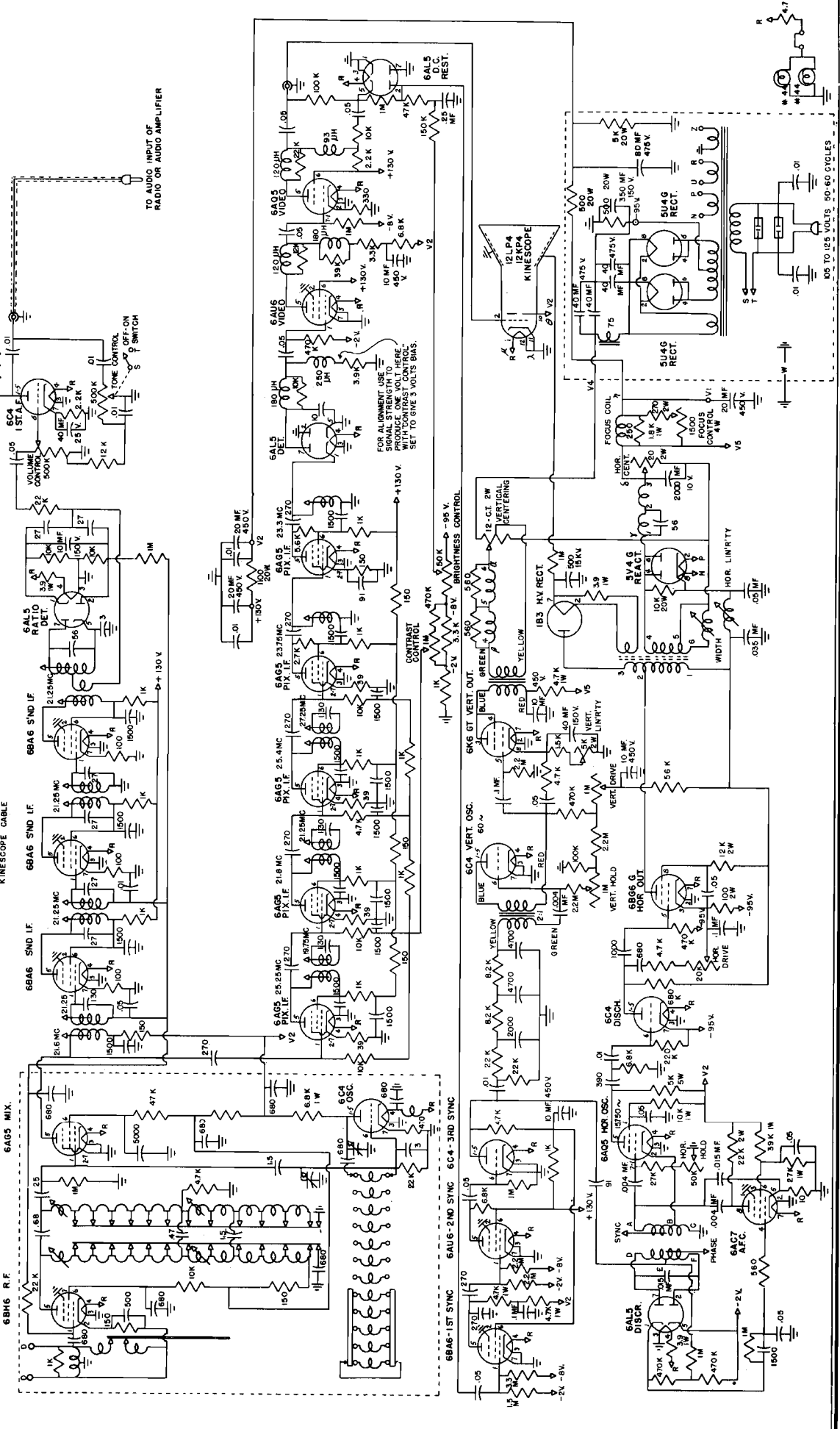
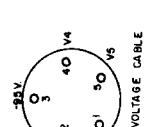
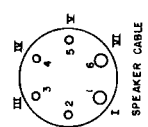
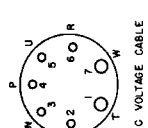
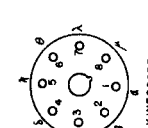


MODELS XA-12, 932, Ch. CA-12

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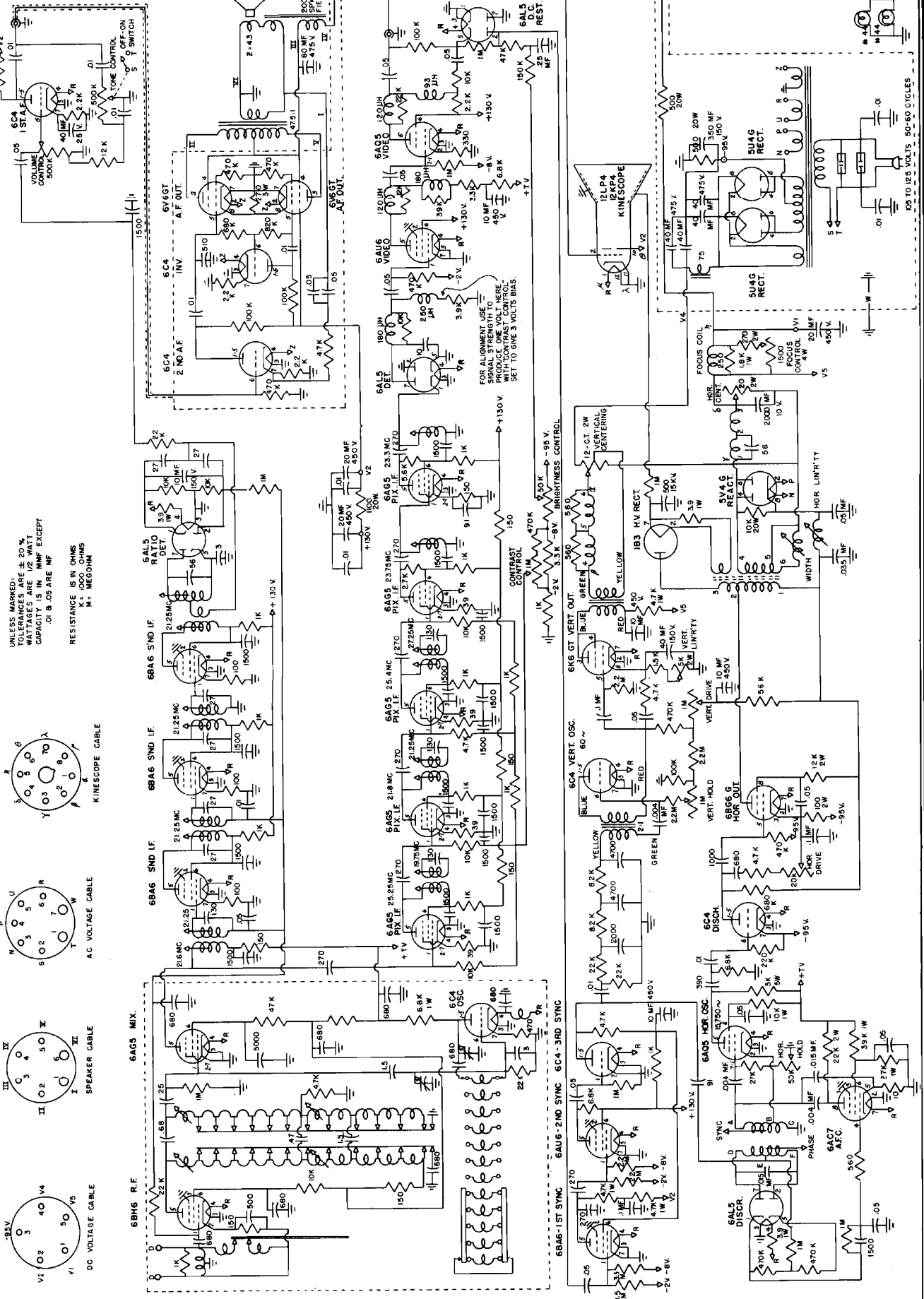
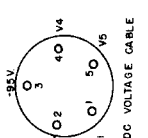
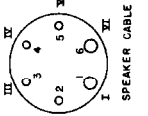
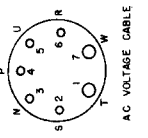
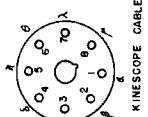
UNL. S.S. MARKED.
 IN PLACE ARE ± 20%
 TOLERANCE PARTS.
 CAPACITY IS IN MF EXCEPT
 .01 & .05 ARE MF

RESISTANCE IS IN OHMS
 K = 1000 OHMS
 M = MEGOHM



MODELS XT-12, 936, Ch. CT-12

UNLESS MARKED:
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