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 50 to 100 miles from the transmitter, depending on the terrain and transmitter power and frequency. In many cases, although there is enough signal pickup, 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.

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 echoes.

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 dipoles.

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

As is true of any antenna, better signal strength is obtained when the dipole 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 radio 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.

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

These ghosts are caused by echoes created just as voice echoes 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 a later time and is displaced on the screen. Buildings, street lights, signboards and other masses may reflect the television signal and may thus cast an echo of the picture. Of course the same thing occurs but with the sound but cannot be heard because the time between these visible echoes is extremely small and an audible echo must have time intervals a million times longer to be heard.

Since the echoes 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 dipole antenna is directional, it receives best when broadside to the station and least 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...
The controls in front are two nickel-plated layers, three dual purpose knobs and one single purpose knob. This last knob is the TV TUNING control and appears like the other two, but is separate. Of the large knobs, these two can be turned separately. In the small window above each control is a legend designating the control. Marked before the name refers to the small center knob whereas the circle refers to the larger part of the knob.

LARGE KNOB identified on legend with a CIRCLE: •

SMALL CENTER KNOB identified on legend with a DOT: •

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

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 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 this range where good sound is heard.

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 controls further until it stops stoppex. At this setting you will notice that the bar has been pulled into the top or bottom of the screen, and slight movement the VERT HOLD control does not set it in motion again.

The HORIZ 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. This effect is easier 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 one observed in adjustment of the VERT HOLD, may be seen. This black bar will slip into the left or right side of the picture screen. Further adjustment should then stabilize the picture so that no flicker or banding 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 more stable and much more easily found. Once they are set and the receiver has been as 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 procedure is repeated 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 should, by repeated trials settings of the CONTRAST and BRILLIANCE, 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 and BRILLIANCE control clockwise and setting the BRILLIANCE control so that the screen is almost dark. Then advance the CONTRAST until a picture appears.

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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 sitation 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, BRILLIANCE full counter-clockwise.
4. Advance the VOLUME control and tune in the sound with the TV TUNING control.
5. Advance the BRILLIANCE 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 BRILLIANCE for the desired detail and set the FOCUS control or desired sharpness.

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

1. Turn the receiver ON.
2. Select 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 it is 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, changing the size of the picture and for rotating the picture 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.

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 in 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 high quality regulation and using high quality safety factor wiring to 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 at the end, although hooded by a rubber cup, may be dangerous. Other voltages do not exceed 400 volts but will supply considerable current and may also be dangerous, these voltages are carried in the cables connecting the two chassis together and in the speaker cable.

VERT CENT Control moves picture sideways

HORIZONTAL SYNC. The horizontal hold control on the front panel is a veezer control and is not too critical in adjustment. The HOSYNC control on the rear apron of the chassis is critical and some care should be used in its adjustment. As a general panel control, HOR HOLD can be used, or not touch the HOR SYNC but when the panel control must be turned fully left or right then, small adjustments, rotate the HOR HOLD towards a center position and follow the instructions listed above for adjusting the HOR SYNC needed to keep the picture steady.

These are the non-operating controls for electrical adjustments.

The metal chassis and the controls on the rear apron of the chassis may be adjusted in complete safety if you do not at the same time handle any of the cables or wiring connected to the chassis, or when the receiver is disconnected or turned off.

CENTERING. There is a mechanical adjustment for centering as well as the two centering controls on the rear apron marked VERT CENT and HCR CENT. As long as there is enough range in those mechanical adjustments it is preferable to avoid the procedure described after under mechanical adjustments. These electrical adjustments are easily turned with the fingers.

Rotate the HOR CNT apron control for sideways shift of the picture and to obtain up or down movement of the picture use the VERT CENT control.

To observe the screen while adjusting the controls on the rear of the chassis you will find the use of a mirror is very helpful.

WIDTH. When the picture is too small or too large, both width and height can be adjusted within limits. When the picture is too small because of low line voltage, weak tubes or mechanical reasons there may be enough adjustment. The WIDTH control is a threaded screw and as it is turned it 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, but you can check if there is more than one television transmitter in your locality by comparing the last pattern to see if the same sort of distortion occurs on both. When this distortion is determined to be in the receiver, and 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
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 ad-
justments should be made in 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 LIN has a much more pronounced effect on
linearity but also determines the picture width and the
amount of high voltage. Because of the added compi-
lcation 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
6C8G 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 mecha-
nical one, and as such, if the picture is not
square in the frame there has been a disturbance of the
mechanical adjustments. Besides this mechanical con-
trol, 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
dry 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 col-
lapsed 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.

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 by shock or vibration
in shipping, the noticeable effect will be a displacement
of the picture in the frame.

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 DEFLECTOR YOKE in the metal tube to
straighten up the picture. The receiver must be oper-
ating 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.

The position of the focus coil along the neck of the
tube affects the focus of the spot which draws the hori-
zon tal 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
shell and is difficult to tighten with the fingers because
of its location.

The picture moves diagonally with rotation of the FOCUS COIL.

THE ION TRAP is a device for removing ions from the
electron beam generated in the gun of the kinescope.
The ions are removed from the 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 spectrometer 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 move-
ment 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
correcting.
There are no more corrective adjustments unless the chassis is removed from the cabinet and these adjustments must then be moved only when service equipment is used to make and check them. However, you will find some information of interest to you in the 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 voltages present, 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 tubes 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 equipment, may involve only correction of the installation or connection of the readily available controls described in the sections on **OPERATION** and **NON-OPERATING ADJUSTMENTS**, or replacement of defective tubes or available.

Finally, the block diagram and the tube map provide the information necessary to locate physically the sections of the receiver where tube trouble may be found. Not all tubes are shown in this diagram, but the ones that are shown are essential for trouble-free operation. This block diagram and the tube map provide the information necessary to locate physically the sections of the receiver where tube trouble may be found. Not all tubes are shown in this diagram, but the ones that are shown are essential for trouble-free operation.

Herringbone effect - caused by radio frequency only. Sound bars - caused by modulated arrner. Loss of detail - caused by excessive signal.
The low voltage power supply is designed for consistent service at the rated 310 milliamperes current and 12VDC output. The two small transistors in each of the output stages are in a 180° angle to each other, providing a stable bias for the speaker for maximum correction of distortion. The first and second transistors in each output stage are in 90° angles to each other and each other, providing a stabilized bias for the speaker for maximum correction of distortion. The first stage of each output stage is in 90° angles to each other and each other, providing a stabilized bias for the speaker for maximum correction of distortion. The second stage of each output stage is in 90° angles to each other and each other, providing a stabilized bias for the speaker for maximum correction of distortion.