

OPERATING INSTRUCTIONS
STROMBERG-CARLSON NO. 112-M TELEVISION AND RADIO RECEIVER

Stromberg-Carlson Telephone Manufacturing Co.
Rochester, New York

IMPORTANT

In the interest of safety and to insure best performance of your television receiver, be sure that it is installed and serviced by a competent technician from an authorized Stromberg-Carlson dealer.

Cooperate with the man who installs your receiver in helping him locate a good ground connection.

Do not expect to see with your television receiver what is going on in the studio of every radio broadcasting station to which you listen. You can receive pictures only if you are within range of a television broadcasting station and then only when this station is on the air.

If a new television transmitter is put in operation in your vicinity on a channel to which your receiver is not tuned, notify your authorized Stromberg-Carlson dealer. Your receiver will be modified to receive this station for a nominal charge. Thus, your receiver will be kept up-to-date.

Read the section entitled, "Notes on Television Reception".

INSTALLATION

Caution.

High voltages are used in the operation of every television receiver. The picture tube used in every television receiver is a large, high vacuum tube. Hence, these two sources of possible danger are present in every television receiver.

In the Stromberg-Carlson Model 112-M Television and Radio Receiver, all precautions are taken and many safety devices are employed to eliminate any dangerous hazard to the user; and in normal operation, there is absolutely no danger. However, in the course of installation, certain precautions should be taken. These precautions are well known to all authorized Stromberg-Carlson technicians. It is imperative that the installation of television receivers be done by such men and not by the customer.

Location

Like any radio receiver, the No. 112-M Television and Radio Receiver should be located near the antenna and ground connections and an electrical outlet. Since television pictures are viewed to best advantage in subdued light, the receiver should be placed so that direct window light does not fall on the viewing mirror. To lessen eye fatigue, the receiver should be placed so that the field of view of the viewer does not include a bright light source.

Antenna

A television receiver will not operate satisfactorily on an ordinary radio antenna. A special antenna is a necessity if good results are to be obtained. The proper installation of such an antenna requires a considerable amount of specialized knowledge and experience. In unfavorable locations,

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the entire operation of a television receiver may depend on the proper antenna installation. Hence, it is essential that the antenna installation be made by an authorized Stromberg-Carlson technician.

The proper television antenna for use in the great majority of locations is the type known as the horizontal dipole. It consists of two horizontal rods, each usually 58 3/8 inches long, placed end to end and insulated from each other. A lead-in wire is attached to the inner end of each rod. The wires are twisted together to form a transmission line leading from the antenna to the receiver. The proper length of the horizontal rods depends upon the frequency assignments of the television stations within receiving range. The service man will cut the rods to the proper length. In some cases, a second pair of rods similar to the first pair, but not connected to them or to the receiver, must be located at the proper distance from the first pair to insure satisfactory reception. In exceptional cases, two separate television antennas may be required.

The Stromberg-Carlson Television Antenna Kit and the Stromberg-Carlson Television Antenna Reflector, if the latter is found necessary, are recommended as the solution to television antenna problems. They may be easily installed by any authorized Stromberg-Carlson technician.

A separate antenna system is required for the operation of the radio receiver. For best reception on both of the ranges covered by the radio receiver, a Stromberg-Carlson Broadcast and Short-Wave Antenna Kit is recommended. For proper installation of the antenna system, see the instructions accompanying each kit. For good practical results a simple "L" type antenna about 75 feet in length can be used for both tuning ranges. Good antenna materials such as insulators, wire, etc., must be used to secure best results.

As the efficiency of an antenna varies greatly with the frequency of the received waves, a given length may be excellent at certain frequencies and relatively poor at others. Therefore, to secure uniform results, an antenna of adjustable length would be theoretically desirable. However, if it is desired, a long antenna for the Standard Broadcast range and a short antenna for the Short-Wave range may be used. If this is done it will be necessary to use a good low capacity switch for switching these antennas.

Do not use the short-wave tuning range in conjunction with a shielded lead-in or with a transmission line system designed for the standard broadcast range only.

Ground

It is imperative that the television receiver be connected to a good ground. A good ground is needed for best operation of any radio receiver but it is essential in all television receiver installations as complete high voltage protection depends upon the grounding of the receiver. Best results will be insured by grounding the receiver to a water pipe, radiator, or to a metallic pipe or stake driven from five to eight feet into the soil. The ground lead should be short, preferably not more than fifteen feet in length, and connected to a clean portion of the pipe or stake surface by means of an approved ground clamp.

Power Supply

The No. 112-M Television and Radio Receiver is designed for operation on an alternating current power supply circuit. The correct operating voltage and frequency are specified for each receiver. Therefore, before connecting the receiver to the house lighting circuit, examine the marking label located inside the cabinet in order to be sure that the receiver is the correct one for use on the particular local power supply circuit. The connection to the power supply circuit should be made after the antenna and ground leads are connected.

For completely satisfactory operation of a television receiver, it is important not only that the user's power supply be of the correct frequency but that it also be connected to or "synchronized" with the power supply at the television transmitter. If the frequencies at the transmitter and receiver differ by even a small amount, the operation will not be as perfect as when the power supplies are synchronized.

OPERATION OF THE TELEVISION RECEIVER.

Procedure

The No. 112-M Television Receiver is so designed that good pictures can be obtained by an inexperienced user by carefully following these instructions. The operation of this television receiver is no more difficult than that of a standard radio receiver.

1. Rotate the "Off-On-Tone" control knob on the radio receiver from its complete counterclockwise position slightly clockwise (to the right). This turns the power on and the radio receiver dial will be illuminated.
2. Depress the "Telev" (extreme left) push button on the radio receiver. This turns on the television receiver.
3. Rotate the "Volume" control knob on the radio receiver in a clockwise direction (to the right) for about half or three quarters of its rotation.
4. On the television (or right-hand) side of the cabinet, depress the push button corresponding to the desired television station.
5. Rotate the "Contrast" control to its extreme clockwise (or right hand) position.
6. Rotate the "Brightness" control nearly to its extreme clockwise (or right-hand) position.
7. The receiver is now ready to receive television signals. After a few seconds delay, during which the various circuits become energized, a picture will appear on the screen if the station to which the receiver is tuned is in operation. The following additional adjustments are to improve the quality of the received picture.
8. Adjust the "Tuning" control until maximum sound output is obtained. The setting of this control determines the exact tuning of both the television picture and sound channels. When maximum sound output is obtained, the picture channel is correctly tuned. Note that this is not the position at which maximum picture brightness is obtained.

9. Adjust the "Volume" control to give the desired volume level as in normal operation of the radio receiver. The automatic volume control circuit built into the receiver will maintain the volume level substantially constant.
10. Adjust the "Tone" control and "Bass" control to give the desired quality of sound reproduction as in normal operation of the radio receiver.
11. Rotate the "Contrast" control counterclockwise (to the left) until the picture contrast is correct.
12. The picture will now contain several extraneous straight lines. These will extend across the picture from left to right, but are not horizontal. As viewed in the mirror, the left-hand ends of the lines will be lower than the right-hand ends. Rotate the "Brightness" control counterclockwise (to the left) until these lines just disappear. If the lines should not be visible rotate the "Brightness" control clockwise (to the right) until they do appear and then back until they just disappear.
13. The picture now should be satisfactory. However, slight readjustments may be required, due to the fact that adjustment of the "Brightness" control often makes a readjustment of the "Contrast" control advisable. If this is the case, rotate the "Contrast" control slightly and then repeat operation 12.

The "correct" setting of the "Contrast" control (and the consequent setting of the "Brightness" control) depends somewhat upon what the viewer desires. The black portions of a scene should be as dark as incidental room lighting will permit. The white portions should be bright, but not so bright as to produce an excess of light or "blooming" of the tube and consequent loss of detail. It is usually the case that a number of combinations of settings of the "Contrast" and "Brightness" controls will give entirely satisfactory pictures and consequently these adjustments are not critical. After the "Contrast" control has been set, the automatic gain control circuits in the receiver maintain the correct contrast level.

14. Two additional controls are provided near the rear of the television panel. These are the "Horizontal" and "Vertical Hold" controls. These will not require frequent adjustment provided the receiver is tuned properly (operation 8). However, if the power supply voltage fluctuates greatly, readjustment may be necessary.

If these controls are not set correctly, the picture will appear scrambled. This is a condition difficult to describe, but very easy to recognize. If only the "Vertical" control is out of adjustment, the entire picture will be visible but will move vertically up or down the screen. The "Vertical Hold" control is then rotated until the picture is stationary (and is properly centered on the screen). It will be found that this will occur over a considerable range of setting of the control. That setting should be used which results in the least apparent line structure of the picture (the lines can be seen least readily). This gives maximum picture detail.

If only the "Horizontal" control is incorrectly set, usually no complete picture can be seen, though occasionally two (or even three) complete pictures may appear side by side or overlapping each other. The more usual appearance is that of a number of irregular vertical bars. In any case, the "Horizontal Hold" control is adjusted until one complete, stationary picture is obtained. Unlike the "Vertical Hold" control, this setting may be somewhat critical. Adjustments should continue until no "tearing" or distortion of the picture is present. If both "Hold" controls are not properly adjusted, the above effects will be combined. In this case, both the "Horizontal Hold" and "Vertical Hold" controls must be reset.

15. A number of additional controls are located at the bottom of the back of the television (or right-hand) side of the cabinet. These will be correctly set by the technician who installs the receiver, and should require no further adjustment. Do not touch them.
16. The position of the mirror may be adjusted by raising or lowering the right-hand lid of the cabinet. This should be set so that all viewers can see the picture comfortably.
17. The proper distance from which to view the television picture in the No. 112-M Receiver is approximately four to six feet. At greater distances, detail is lost. At shorter distances, the line structure of the picture becomes apparent.
18. To turn "off" the receiver completely, rotate the "Off-On-Tone" control knob to its maximum counter-clockwise position. Illumination of the radio dial then ceases. To change from television to standard radio reception, depress any of the radio station push buttons. This cuts off the power from the television receiver, but leaves the power connected to the radio receiver. Since the picture tube does not have unlimited life, it is recommended that the television section of the receiver be turned "off" when it is not in use.

Warning

Like any radio receiver, a television receiver may require occasional attention from the service man. Never attempt to service this receiver yourself. High voltage power supplies are included in the receiver. Every competent Stromberg-Carlson technician knows what precautions to take. Always avail yourself of his knowledge and ability.

ADDITIONAL TELEVISION CHANNELS

The No. 112-M Television Receiver is adjusted to receive stations assigned to the first five television channels. These are the only ones on which programs are now available or upon which programs will be available for some time. When television stations are put in operation in your vicinity using other channels, it is a simple matter to have the receiver converted to receive such stations. In any such case, call your authorized Stromberg-Carlson Dealer. He will remove the small chassis and return it to the factory where all necessary readjustments will be made for a nominal charge. In this way, your television receiver can easily be kept up-to-date.

NOTES ON TELEVISION RECEPTION

TELEVISION STATION SCHEDULES

At the present time, all television stations operate on quite restricted schedules. It is highly improbable that in the near future any television station will transmit continuously for 19 hours a day as do many radio broadcasting stations. In England, even after three years of operation, the London television transmitter is on the air only three hours a day. In the New York area, it is probable that programs will be available a few hours a day in the relatively near future. However, the television receiver operator cannot expect to turn on his receiver at any hour of the day and obtain pictures. Local newspapers should be consulted for program schedules.

TELEVISION PROGRAMS

Three distinct types of programs are being used for television transmission. These are motion pictures, studio programs and remote pick-ups. In the first of these, regular sound motion picture film is run through the television camera. In studio programs, the performers and the television cameras are in regular television studios near the transmitter. In both of these types of program, the electrical signals produced by the camera are sent to the rest of the transmitting equipment over special transmission cables.

In remote pick-ups, a complete portable television transmitter is taken to the point from which the picture is to be sent. The subject may be in a complete studio, in an improvised studio or outdoors. The picture and accompanying sound are transmitted from the remote point to the main studios where they are received on a special receiver, then sent to the main transmitter and rebroadcast. Thus, remote pick-ups involve two complete transmissions and receptions of the television signals. It would be expected, therefore, that the quality of the picture might not be as high as that of those received directly from the studios and in many cases this is true.

Another factor which may react adversely on the quality of pictures obtained by remote pick-up is lighting. To produce a good television picture, the subject must be very strongly illuminated. Banks of electric lamps, using 50 to 100 times the power taken by an ordinary 100 watt lamp, are necessary to supply this light. In remote pick-ups, the lighting may or may not be adequate. In outdoor scenes, natural lighting is used. This may vary quickly over wide limits when clouds drift across the sky.

Considering the number of adverse factors involved, the television broadcasters are doing excellent work with their remote pick-ups. However, it must not be expected that such pictures will always be as good as those obtained under more favorable studio conditions.

RANGES

The range of television transmitters is limited by certain fundamental physical considerations. In order to produce television pictures having sufficient detail, it is necessary that ultra-high-frequencies (ultra short waves) be used for transmission. These waves are the same electromagnetic waves used in normal radio broadcasting and differ from them only in length. These radio waves are also the same as light waves, the only difference being again one of wave length, the wave length of light waves being extremely short. As radio waves become shorter and shorter, the more nearly do their properties approach those of light.

The ultra-short waves used in television transmission have many of the properties of light. For example, light does not bend around corners appreciably, but forms sharp shadows of opaque objects. In the same way television waves do not readily bend around corners. The result is that reception behind large objects, such as hills or large buildings, is usually poor. The most serious difficulty, however, is that the waves bend but little over the horizon; or, the range of a television transmitter is limited by the curvature of the earth. In fact, since television waves and light waves behave so similarly, the range of a television transmitter is approximately equal to the distance one can see from the transmitting antenna or to the

optional range from the antenna. This is the reason that television transmitting antennas are located on the tops of high buildings, such as the Empire State Building and the Chrysler Building. It is also the reason for installing television receiving antennas as high as is practicable, as then they may be brought into the line of sight from the transmitting antenna.

In ordinary radio broadcasting, two types of waves are present - the ground wave and the sky wave (see Notes on Short Wave Radio Reception). The ground wave is used in receiving nearby stations and the sky wave in receiving distant stations. In television transmission, however, the sky wave is entirely absent except under very exceptional circumstances. Hence, long distance transmission does not exist and, as pointed out above, local transmission is limited "line of sight" distances.

REFLECTION ECHOES

Another light-like property of television waves is a source of some annoyance. Just as light is reflected from mirrors, so television waves are reflected from large, relatively smooth surfaces such as the sides of large buildings, the sides of cliffs, etc. If such a reflecting surface is unfortunately located with respect to the transmitting and receiving antennas, the television waves will arrive at the receiver by two paths, directly and after reflection. Since the reflected waves traverse a longer path, they arrive at the receiving antenna slightly later than those which come by the direct path. The result is that two distinct pictures are produced at the receiver and one is displaced slightly to the right of the other or is an echo of the other picture. The two pictures may be of approximately the same or of greatly different intensities. Frequently, two or more reflected paths may be present, resulting in three or more pictures. In some cases, the echo may be a negative picture.

Occasionally, as in reflection from moving airplanes or from moving automobiles, the reflected waves vary rapidly in intensity. The automatic gain control circuits in the receiver help to smooth out such variations in signal strength.

ELECTRICAL INTERFERENCE

STATIC

True static practically does not exist at the wave lengths used in television communication. Even during severe thunderstorms, the static interference is small. However, several types of man-made interference are troublesome.

IGNITION

The ignition systems in automobiles and airplanes are potent sources of television interference. Such interference causes a loud noise in the sound channel as well as causing variations in picture brightness, tearing of the picture, or even momentary loss of synchronization or slipping of the picture.

RADIO STATIONS

Nearby strong radio stations - broadcasting, commercial or amateur - may cause considerable trouble. In extreme cases, operation of television receivers may be seriously hampered. In usual cases, the result is the

production of a fine pattern on top of the picture. This pattern may be stationary, but usually is moving. The pattern usually is not visible at distances of three or four feet from the receiver, but it does cause an appreciable loss in picture detail.

DIATHERMY

The diathermy machines used by doctors in the treatment of certain diseases are among the worst offenders from the standpoint of television interference. The effect is similar to that produced by a radio station except that the "pattern" is always irregular and moving.

NOISE

At moderately great distances from a television transmitter, the electrical noise due to random motion of the electrons in resistors and vacuum tubes may become somewhat comparable to the strength of the television signal. The result is a "snow storm" on the television picture. The "snow" is usually black instead of white.

RECEIVING ANTENNA

From the foregoing discussions of television wave propagation and electrical interference, it may be seen why the proper construction and installation of the television receiving antenna are of such great importance. The antenna must be so adjusted that maximum picture signal is obtained and that undesired echos and interference are minimized. There are many locations near the extreme limits of transmission and at unfavorable locations nearer the transmitter where the answer to the question as to whether or not satisfactory television reception can be obtained depends entirely on the antenna. In some cases, rotating the antenna slightly or moving it a few feet makes a tremendous difference in the performance of the receiver. It is for these reasons that the antenna should be installed by an experienced technician.

INSTRUCTIONS FOR REWINDING #112-N TELEVISION RECEIVER

Remove Coils A and B, as shown in Fig. 2, and replace with the new coils A and B. If difficulty is experienced in removing the coils, it may be necessary to run a thin bladed knife between the inside of the coil form and the paper shield on the copper slug. The coil form was glued to the paper shield. This is not necessary when making the replacement.

It is important to be sure that the coil is pushed down as far as possible, so that the copper slug may be turned fully into the winding.

After the coils have been installed, it will be necessary to tune them to the proper frequencies. Make sure that the trimmer condenser, Fig. 2, is 50% engaged as shown on drawing. Then with the receiver properly connected up and operating on C.B.S., turn the oscillator tuning screw No. 1 until the sound signal is at its maximum. Now the interlock switches on the back can be strapped down so that the receiver is completely operating. Modulation filter and Antenna filter Nos. 1 are now adjusted until the picture reaches its maximum detail. USE EXTREME CAUTION. WHEN THE INTERLOCK SWITCHES ARE CLOSED, THE HIGH VOLTAGE IS ON.

If a peak cannot be reached when tuning the oscillator and modulator coils, it may be necessary to spread the turns on the coil slightly. This may only be necessary on the modulator.

Before the receiver has been reinstalled in the cabinet, the black and green wires on the motor switch, Fig. 2, should be reversed. After this, N.B.C. will come in on Button No. 1 and C.B.S. on Button No. 2, etc.

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