Practical Installation Problems

By
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Undoubtedly there are many servicemen with the fatalistic opinion that television will always be "Greek" to them. Anticipation of April 30, when television will officially be placed on the market, has most servicemen really worried. However, such should not be the case.

In reality, television naturally will require additional study on the part of the serviceman; but only to a slightly greater extent than new radio circuits have in the past. Anyone with a good radio background can, with a little effort, become a successful television servicer.

CONSIDERING television problems in their proper order, installation is of immediate importance. Sets to be made by various manufacturers are basically similar. Except for a few external controls, all adjustments are made at the factory. Setting of these external controls can best be made by watching an image on the screen and following procedure outlined in the instruction booklets. Thus the receiver itself should offer no serious problem during installation.

The Antenna

Simple, but far more important than normally realized, the antenna of a television receiver requires special care on installation. The half-wave horizontal type has been adopted almost universally as a standard receiving antenna. Fig. 1 illustrates this type. For installations remote from the transmitting station a unidirectional or "beam" type has been devised to provide more signal pickup. Fig. 2 shows this.

Since all horizontal antennas are directional it is important that they are erected with the broadside of the antenna in the direction of the transmitting station. In other words, the antenna must run at right angles to the path of the signals from the transmitter. A typical installation can be seen in Fig. 3.

Of paramount importance, the exact position of the antenna must be determined by experiment. Normally, the strongest signal will flow in direct line

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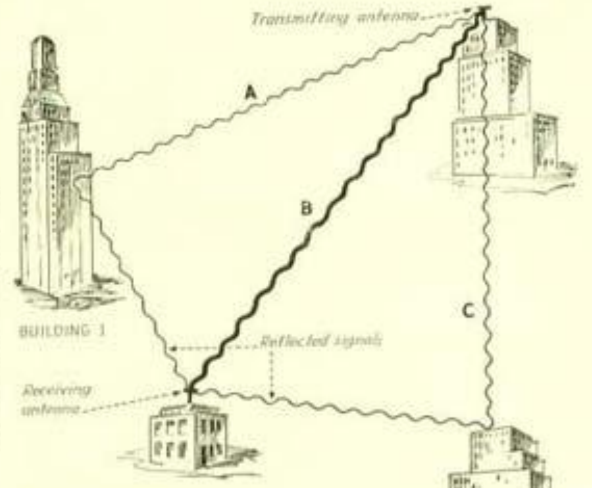

Fig. 4. Double images appear on the screen when the reflected signals are not considered in an installation. By moving the receiving antenna position to the left or right, reflections will be minimized when the correct position is found

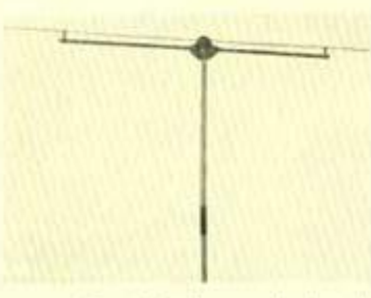

Fig. 1. Typical half wave horizontal doublet antenna useful for television reception. Maximum pickup results when either broadside is facing the transmitting antenna

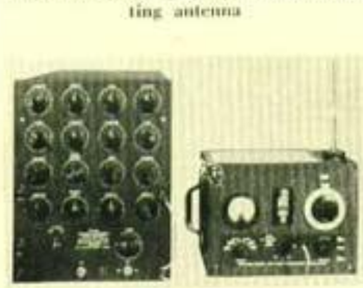

Fig. 5. High frequency signal generator (right) and Phasmajector (Monoscope)

Fig. 3. A good antenna installation. Mounted in the clear and securely fastened by expansion bolts. Twisted-pair feeder is used

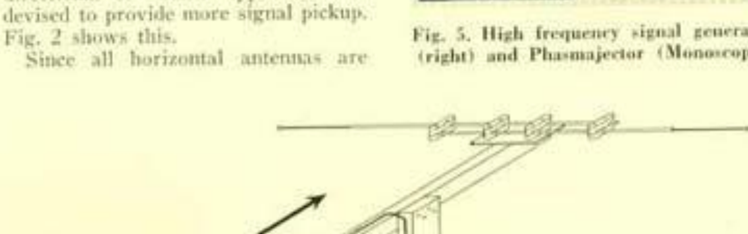

Fig. 2. Unidirectional "beam" antenna desirable in low signal areas. Front rods serve as antenna, back rods as reflector. Direction of reception is indicated by arrow

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from the transmitting antenna. However, in many cases signals are simultaneously reflected from nearby buildings or other obstructions and appear at the receiving antenna either weaker or stronger than the direct signal. Since they usually are out of phase (due to the longer path of travel) with the direct signal, they appear on the screen as double images displaced either side of the main image. They may be more properly called "echo signals," or "ghost" images.

To remedy this it becomes necessary to move the antenna position, a little at a time, while someone watches the screen. A position will be found where the double images will disappear or become very weak. It should seldom be necessary to change the antenna position more than a quarter-wave. (Approximately 3 feet for present frequencies).

Action of reflected signals is shown in Fig. 4. In this instance both A and C are reflected signals. Signal B is the direct signal and will always be stronger than reflections when the transmitting antenna is in line of sight. When the transmitting antenna is shielded by an obstruction, reflected signals may be stronger. To overcome reflections in the case of Fig. 4, move the whole receiving antenna system to the right or left, attempting to find a null point in the reflection.

Conventional radio antennas and single wire feeder systems are about as useful for television as a far-lined vacuum tube. Ultra-high frequencies demand a low-loss and noise-free connecting link between the antenna and receiver. A good grade of twisted pair, properly matched to antenna and receiver is generally satisfactory for lengths up to 150 feet. If feeder lengths much greater than this are necessary, or in low signal areas, a concentric feeder should probably be used. One manufacturer is experimenting with a booster r.f. amplifier inserted at the antenna to increase the signal sufficiently to overcome feeder losses. This might be desirable in certain locations.

One point that is best left unanswered is the position of the receiver in the home. Electrically it makes little difference where the receiver is placed providing the feeder isn't lengthened considerably.

Test Equipment

For the many television installations no test equipment will be necessary. The alignment of r.f. circuits will usually be sufficiently permanent to hold over a long period. This is partially due to the fact that most

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circuits have a broad band-width, and any slight drift is proportionally small.

Occasionally it will be necessary to delve into the circuits in order to locate a breakdown. No attempt will be made here to list common headaches since even meager field experience is lacking at present. However, test equipment for checking all circuits is either on the market already, or in production.

For aligning r.f. circuits, a signal generator tuning from approximately 30 to 150 mc. will be essential. One such instrument is shown at the right of Fig. 5. Along with this, naturally, would go a wobbulator for checking band-width of tuned circuits.

Another extremely useful item of television test equipment is a monoscope (Fig. 5 left). It consists of a special cathode ray tube with a test image printed on the screen end, along with associated equipment to produce a source of v.f. (video frequency) test voltage. This is used to test and align video circuits in the same manner as a signal generator is used on r.f. circuits. It does this by supplying, when used with or without a signal generator, a standard test pattern on the screen of the receiver.

Another valuable test instrument is an oscillograph with wide band amplifiers permitting measurements up to 1 mc. Measurements higher in frequency than this can be made directly on the receiver screen.

Further television service problems and the use of new test instruments will be discussed in coming issues.

DANGER-HIGH VOLTAGE

Manufacturers of television receivers have endeavored to make danger from shock to the public and serviceman as remote as possible. Little or no danger can approach the user. However, the serviceman should exercise extreme caution when protecting cabinet and covers are removed.

Receivers use up to 5000 volts, the lethal power of which should be unquestioned. Do not attempt to remove a chassis from its cabinet without thoroughly reading the instruction pamphlet first. It will seldom be necessary to service with the chassis exposed and high voltage applied. When it becomes necessary to do so, always keep one hand in your pocket, eliminating danger of shocks from hand to hand, which are most dangerous since the circuit flows through the heart area. *Form Good Safety Habits early.*

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