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Electronic TUBES
Techni-talk on AM, FM, TV Servicing

REPORT ON UHF RECEPTION

There are now a considerable number of UHF stations transmitting regularly scheduled programs. An even greater number of UHF stations are in various stages of building and testing and will be "on the air" in the near future. In view of this, it was felt that a field report based on actual installation and servicing experience on receivers obtained from technicians in several operating UHF areas would be of particular value to other service technicians.

This kind of report it was felt would be of more value to the technician than a report of various tests conducted experimentally in one or more locations. This feeling was verified by most technicians in operating UHF areas who stated that most of the earlier articles, many of which were written as a result of tests made in the Bridgeport, Conn. area, were "way off" when compared with their actual experience. This is normal and should be expected of most new developments particularly in the TV field.

Allentown, Pa., Reading, Pa., and Atlantic City, N. J. were the areas covered since these cities were among the first to have UHF reception. Allentown and Reading are located about twenty-five miles apart and receive three VHF channels (3, 6 and 10) from Philadelphia which is about fifty miles away. The reception from these VHF stations ranges from "good" to "fair."

Both Allentown and Reading receive UHF reception from WHUM on channel 61 (752–758 mc). This transmitting antenna is located on top of a mountain 1766 ft above average terrain and about the same distance from each city. Reading also has a second UHF station WEEU on channel 33 (584–590 mc). This transmitting antenna is somewhat lower than the WHUM antenna 1030 ft above average terrain and is located just outside Reading.

Atlantic City is located about fifty miles from Philadelphia which provides VHF reception on the three channels previously mentioned. VHF

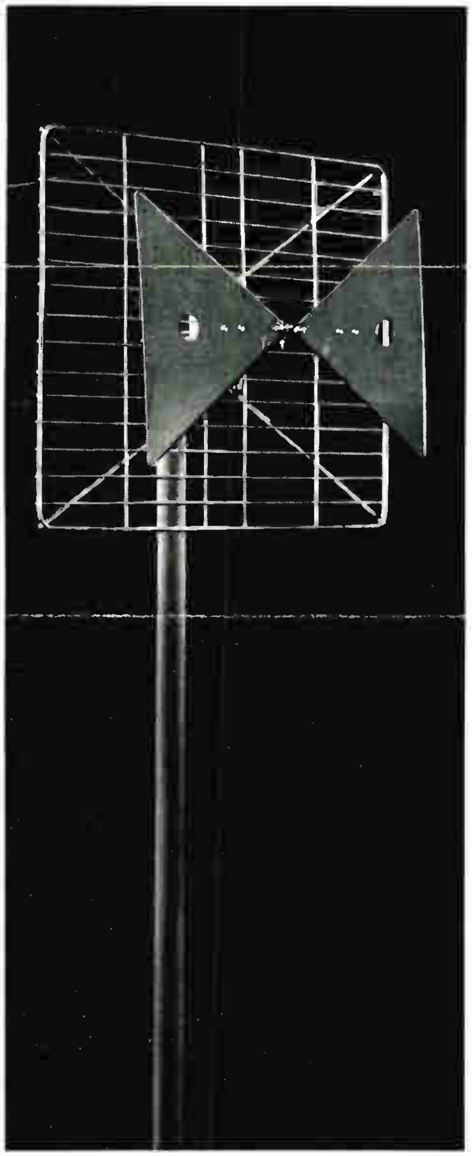

Fig. 1. The bow-tie or di-fan type antenna used in many UHF installations.

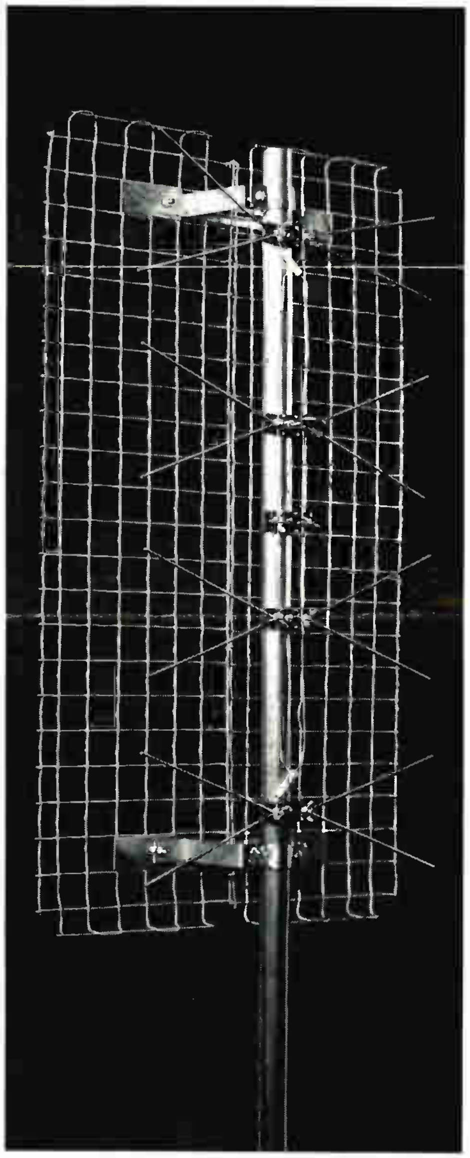

Fig. 2. The stacked bow-tie UHF antenna used in many low signal or fringe area installations.

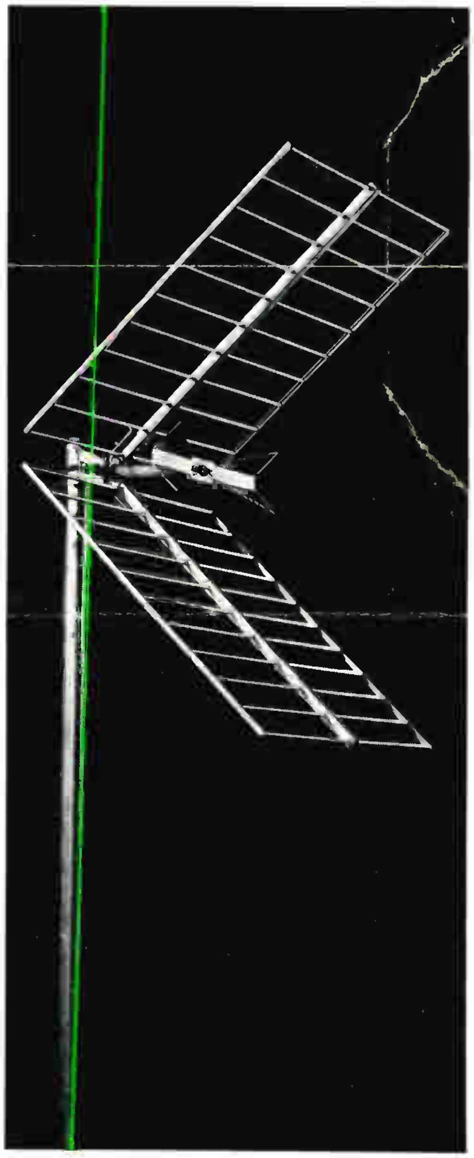

Fig. 3. The corner reflector type UHF antenna also used in many fringe area installations.

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reception was about the same here as in Allentown and Reading. UHF reception is provided by station WFPG channel 46 (662–668 mc). The transmitting antenna for WFPG is 426 ft above average terrain and is located on the outskirts of Atlantic City.

This report is separated into three sections which are further broken down into individual questions. There may be a considerable number of questions which have been overlooked in this issue. If any occur to you, just send them in to this publication. If a sufficient number is received to indicate a general interest, they will be included in another issue.

I ANTENNAS

1. What UHF antennas work the best?

Most UHF type antennas provided satisfactory reception in good signal level areas. The bow-tie or di-fan type shown in Fig. 1 was used extensively in the three UHF areas covered. If additional signal strength was required, either two or four of these individual units were stacked. Two or four bay stacked units such as the four bay unit shown in Fig. 2 were used in low signal level areas. The corner array type antenna shown in Fig. 3 is another high gain type of antenna which also covers the complete UHF range of frequencies. All three of the antennas shown are commercially available types.

A single or stacked multi-element "Yagi" can also be used in areas of low signal strength. These are usually cut to cover only a portion of the UHF band which may tend to limit their use. This factor may not be too important since a UHF "Yagi" is low in cost and a second UHF station may be located in a direction somewhat different from the first and on a channel widely separated. In this case either a rotator or a second UHF antenna may be required anyway. Reports indicate that the "Yagi" works the best when a "ghost" problem is encountered. In this instance as in quite a few other instances, UHF reception follows the same general pattern as VHF reception.

Some technicians reported sales resistance whenever a "Yagi" antenna was suggested. It was a general opinion that this feeling was not due in any way to performance limitations but instead was due to appearance. It seems that the "Yagi" just doesn't have the "new look."

There are a number of other types of UHF antennas, some similar in appearance to VHF antennas and others somewhat different. Most any of these types can be used in high signal strength areas and some in "fringe" areas. Generally the manufacturer's data can be depended upon for gain comparisons.

There is one feature in the design of UHF antennas which has caused trouble in certain areas. This is the material and spacing between the antenna terminals. In some instances, dirt and foreign material have collected on the insulating material and caused a considerable loss in signal strength. Periodic cleaning and in some cases drilling several holes in this material has usually restored the signal level to normal. It has been noticed that in most of the newly designed antennas the trend is toward air spacing. A solid dielectric is more efficient when clean, but when contaminated, it has proven to be inferior.

2. Are combination UHF-VHF antennas effective?

This type of antenna can be used to receive both UHF and VHF stations if both type stations are received with a high signal level and from the same direction. If both of these conditions are not present, it will be necessary to use either a rotator, separate antennas or both. Since in each of the areas checked the VHF signals were low level and received from a direction somewhat different than the UHF signal, there was very little acceptance of combination UHF-VHF antennas.

3. Is probing usually necessary when installing a UHF antenna?

Here again the signal level was important. In areas where the signal level was adequate, a UHF antenna was installed and the picture observed. If the picture was normal, the antenna was left "as is" since any additional signal strength would probably produce little if any improvement in picture quality. Whenever the picture was "snowy" or below average for that particular area, the technician tried "probing" with considerable success.

The UHF "probing" operation follows a slightly different pattern than that usually followed for VHF signals. Bear in mind that when probing for a UHF signal, positioning the antenna in *three* different ways is important. First the antenna should be rotated for the maximum signal strength. This will vary considerably with different type antennas. Some have only one major lobe whereas others have several lobes which are almost equal in signal level. It may be difficult to choose the best lobe without the use of a field strength meter.

Second, after locating the proper direction, the signal may be improved by moving the antenna on a horizontal plane. In most areas, the signal strength varies as the antenna is moved a few inches either to the right or to the left. As the antenna is moved along a horizontal plane, the signal will change in amplitude and produce a variation similar to a sine wave. In some instances as the antenna is moved horizontally, the high and low signal level points will remain the same. The signal will vary similar to a sine wave but always return to the same level. In this case, any position can be chosen where a peak signal is present. In other instances, the signal peaks will not be the same but will vary in amplitude at different locations. The position should be chosen which produces the maximum signal. This point should be marked for a permanent location.

Third, as the antenna is raised or lowered, the signal may vary in the same way as when the antenna is moved horizontally and produce a signal level which varies in the form of a sine wave. The signal level ordinarily increases as the height of the antenna is increased by any appreciable amount. Since the signal may change from a high to a low level every few inches, it is important that the level of maximum signal be chosen for permanent installation. Obviously, if the correct point is not chosen, the effect of additional height can be nullified.

It was found that UHF fringe area installations usually must be "probed" for maximum signal. This same condition has been observed in some VHF fringe installations where "probing" increased the signal level considerably.

4. Is the "ghost" problem better or worse on UHF?

The general opinion seemed to be that the "ghost" problem was about the same on UHF as was found on VHF. This will, of course, depend primarily on the terrain as well as the presence of large buildings or other reflective objects. In instances where a "ghost" problem did exist, it could usually be eliminated by proper antenna selection. Most of the lower gain antennas have several major lobes. One of these lobes could usually be selected which produced a "clean" signal. As mentioned previously, the "Yagi" was found to be the most effective antenna to use due to the narrow, single, high-level lobe.

5. Are built-in UHF antennas effective?

Some locations were found where a built-in antenna would work satisfactorily. Generally they did not provide a satisfactory picture. The principal disadvantage has been changes in signal level which occurred because of the movement or location of people or furniture in the room. This condition was reasonably common with VHF built-in antennas but it was found to be many times more pronounced with UHF.

It was also found that the location of the built-in antenna was much more critical with UHF than with VHF. The relocation of a receiver in a room frequently changed "good" reception to practically "no" reception. This peculiarity should be kept in mind by the technician and the fact that a built-in antenna was used should be noted on the customer's record. The customer should also be advised of this condition to prevent complaints and unnecessary service calls.

6. Are attic antenna installations satisfactory in all weather conditions?

Very few attic installations were used or tried in the areas checked. One reason for this was the existing installations of outdoor VHF antennas. This made the installation of a UHF antenna on the same mast reasonably easy. We have heard reports that in some areas the presence of rain or snow on the roof would considerably reduce the signal level from an indoor attic antenna. We were unable to verify this in the areas checked.

It is generally believed that the trend in antenna installations in UHF areas will follow a similar pattern to that followed by VHF. Practically all of the early VHF antenna installations even in primary signal areas were outdoor types. There has been a gradual change to attic or indoor VHF antenna installations except in those cases where an outdoor installation is absolutely necessary.

II TRANSMISSION LINES

1. What transmission line works the best regardless of weather conditions?

It was reported that the line least affected by moisture or contamination was the UHF line commonly known as ATV-270. This type transmission line, shown next to the bottom of Fig. 4, is furnished with a weatherproof tape to seal the exposed end.

There is a newly developed line known as No. ATV-270-Foam. This line, shown at the bottom of Fig. 4, uses two single conductor wires firmly enclosed and accurately spaced within "foamed polyethylene." It is claimed that the use of this compound results in lower cost and lighter weight. The manufacturer also claims that the performance is practically equal to that of No. ATV-270. Due to the newness of the "foam" line, it was not possible to obtain any reports from individual technicians in the field. All information was obtained from the manufacturer's bulletins.

	ATV-270	ATV-270-Foam
Characteristic Impedance	270 ohms	270 ohms
Attenuation (dry):		
100 MC	1.5 db/100 ft	1.5 db/100 ft
500 MC	3.6 db/100 ft	3.6 db/100 ft
900 MC	5.1 db/100 ft	5.0 db/100 ft
Dimensions Approx	3/8" x 1/2"	.30" x .45"

The manufacturer claims that the attenuation characteristics for both of the above lines are practically unaffected by moisture.

There are several other commercially available

(Cont'd on page 4)

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- Tell in the space provided on the blank how you would spend $2,500 to increase service business. Would you buy new equipment . . . remodel your store . . . run a hard-hitting advertising campaign . . . or invest the money in some other way?
- Fill out and mail as many entries as you choose. They must be postmarked not later than midnight, August 31, 1953.
- Winners will be selected on the basis of originality, business judgment, and clear thinking. An impartial board of judges will make the selections.

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transmission lines which are somewhat lower in price. Some of these were reported to have very little loss due to weather conditions. Among these is a type which has a hollow space in the center. This type is made in different forms, round, double barrel and oval as shown in Fig. 4. When a hollow type line is used, certain precautions must be followed. The exposed end can be sealed by melting some of the insulating material with a flame or soldering iron and then formed while hot so the exposed end is tightly sealed. This has the disadvantage of not allowing the line to "breathe." Temperature changes may cause condensation which is slow to disappear because of an end seal.

The preferred method is to mount the *antenna* end of the transmission line in the form of a loop with the open end pointing down. The ends are not sealed. At the lowest point which is usually the point just before the line enters the house, a hole is punched through the insulating material at the *bottom* to allow for drainage. This is known as a "drip loop." The hole should be large enough to allow any water which might collect inside to drip out. This drip hole provides ventilation as well as drainage for the inside area of the line. If this procedure to allow for drainage is not followed, moisture will usually accumulate at the lowest point and seriously affect the signal level. If the lowest point is inside the house and outside drainage is not provided, the line may act as a pipe and allow the moisture to drip out of the open end which is inside the house. Obviously every precaution should be taken to prevent signal loss or property damage.

Another type transmission line is the solid oval type line shown as the heavy-duty jumbo type in Fig. 4. This is somewhat more expensive than the hollow type but eliminates any internal moisture problem.

Open line is very efficient for UHF and is practically unaffected by weather conditions. It does have several disadvantages. Rather frequent breaks at the antenna terminals have been experienced, due primarily to the high wind resistance which caused strain and swinging. The solid wire is more subject to breakage than stranded wire. High wind resistance sometimes caused the wire to separate from the insulators which caused shorts and impedance changes. The correct spacing between wires is also difficult to maintain both during and after installation. A complete line of stand-off insulators suitable for fastening the line to the mast as well as wood or concrete walls cannot be readily obtained in some areas.

The general opinion is that flat twin-lead can seldom be used on outdoor UHF installations. This is due to exceptionally high losses when wet which in many instances destroy reception even in high signal areas.

2. Are separate transmission lines required when both UHF and VHF antennas are used?

The answer to this was found to depend primarily on the UHF signal level. There are a number of coupler units available which are designed to couple a UHF and a VHF antenna together. In this way only one transmission line need be used from the antenna to the receiver. The general opinion was that some degree of UHF attenuation resulted whenever one of these units was used. If the UHF signal level was high, a coupler was ordinarily used with a single transmission line. In these installations general practice was to replace the original line, which was ordinarily the flat ribbon type, with a new low loss transmission line.

Couplers were found to vary considerably due to weather conditions. If a coupler is used on an outdoor installation, make sure it is either a sealed-in plastic type or otherwise air-tight. Most of the units now available are of the "printed circuit" type. If air can get in or out, moisture can also. The presence of any moisture will ordinarily cause considerable losses at ultra-high frequencies. Another consideration is to make sure the terminals are not close enough together to allow dirt accumulation which might cause a considerable loss of signal.

Another factor which determined whether a single line should be used was the input connections on the receiver. Some UHF-VHF receivers have a single input. If there was only one antenna connection, the coupler had to be used either at the antenna or at the receiver. Since the losses occur in the coupler, it was more practical and easier to install the coupler at the antenna and use only one line from that point to the receiver.

It has been found that the transmission line carrying UHF must be kept away from other transmission lines as well as the building and other objects. The effect of transmission line "dress" is much more pronounced with UHF than with VHF signals. Every effort should be made when installing a UHF line to use a sufficient number of standoff insulators to keep the line at least three or four inches away from all foreign objects. Also do not let UHF and VHF transmission lines run close together or cross unless separated by several inches.

3. Does tuning the antenna lead-in via foil strips improve UHF signals?

Reports on this varied considerably. Some technicians had not tried this, others stated it had little or no effect. If the signal is adequate, there would be little advantage in trying to improve the signal level since the AGC voltage in the receiver would compensate for small changes. If the signal level is low, every effort should be made to increase it. The use of a piece of foil wrapped around the antenna line near the receiver and moved along the line until the maximum signal level is found is probably the easiest and cheapest method for the technician to try.

4. Is lead length between the UHF converter and the receiver critical?

The general opinion was that no difference in the signal level could be noticed regardless of the connecting lead length. Occasionally a customer had been found who insisted that the converter be located in a spot somewhat removed from the receiver for sake of appearance. In these instances where the connecting line was quite a few feet long, no change in signal level was noticed.

When connecting the transmission line either to a converter or to a receiver, be sure that the connections are clean and tightly made. Sloppy connections with the ends of the wire not tightly twisted and securely fastened under the terminals will cause UHF signal losses. It is also important to maintain the original spacing between the two transmission line conductors. It is advisable to strip or cut back only enough of the outside covering to make a good solid connection.

III UHF CONVERTERS OR TUNERS

1. What proportion of VHF receivers already in use have been converted to UHF?

Unfortunately the areas covered had reasonably good VHF reception. Due partly to this and partly to the fact that the UHF stations have only been in operation a few months, the percentage of conversions to UHF has been small (under 10%). During this short period of operation, difficulties have been experienced both at the transmitting and the receiving end. Transmitters have had trouble getting their signal into the important areas and in obtaining complete coverage in these areas. The transmitted signal has in some instances "overshot" areas close to the transmitter. In these locations, the UHF signal was not much better than VHF reception. Since the installation of an additional outdoor UHF antenna and transmission line plus a converter may run between $30 and $100 depending on the parts required, the public has taken a "wait and see" attitude before changing over to UHF. Some difficulty was also experienced with older model receivers. These will be described under other question headings.

The opinion in the report area was that the demand for UHF reception would increase tremendously if new UHF stations carried programs not already available from VHF stations. This would be particularly true of sports programs. Another factor it was believed would be additional UHF stations. As long as a considerable portion of the viewing time was spent watching a selection of VHF stations, there was not too much enthusiasm for a single UHF station which carries only a few of the programs already receivable from a VHF station.

2. Are converters selling best because of price or performance?

Price was reported as a more important factor in sales than performance. This statement may be somewhat misleading since performance did not vary in the same proportion as price. Generally the lowest price unit was sold which provided satisfactory UHF reception.

This same trend held true in those receivers which could accommodate UHF strips. If a UHF strip could be installed for a price which was considerably less than a separate converter unit, it was usually preferred. A customer could in many instances be sold a separate converter in preference to a UHF strip when it was pointed out that a converter would receive all future UHF stations whereas an additional strip would be required for each new UHF station.

3. Are most set owners having built-in converters (not strips) installed in receivers designed for them?

Yes, particularly in receivers sold within the past year. In older receivers separate converters were generally sold. This may be due to the owner's not knowing or remembering that a converter could be built in. It could also be due to cost or to the salesman or technician not trying to sell the owner a built-in job.

4. Are factory built receivers incorporating UHF tuners superior to receivers which have had a UHF converter built-in by a service technician?

No, unless major improvements have been made in the design of the VHF tuner or converter. When a UHF converter was properly installed there did not seem to be any difference when compared with a similar model with factory assembled UHF coverage. It should be pointed out, however, that many of the newer model receivers are using head-ends which have a lower noise figure. These will provide better reception particularly in the fringe areas.

5. Are UHF tuner strips which can be inserted in place of VHF strips providing satisfactory UHF reception?

Generally yes, although some technicians reported insufficient gain in older model receivers. Some strips had to be "touched up" after installation. Since the top adjustments cannot be reached when the strip is operating, these adjustments must be made from underneath the chassis. This operation can be performed by removing the strips for two or three other channels. The adjustments can then be made with a plastic alignment tool while the UHF strip is in operation. These adjustments should only be made when a picture can be seen. Considerable care should be exercised when making these adjustments since in most instances only a slight change is necessary.

TELE-CLUES SHEET NOT INCLUDED IN THIS ISSUE

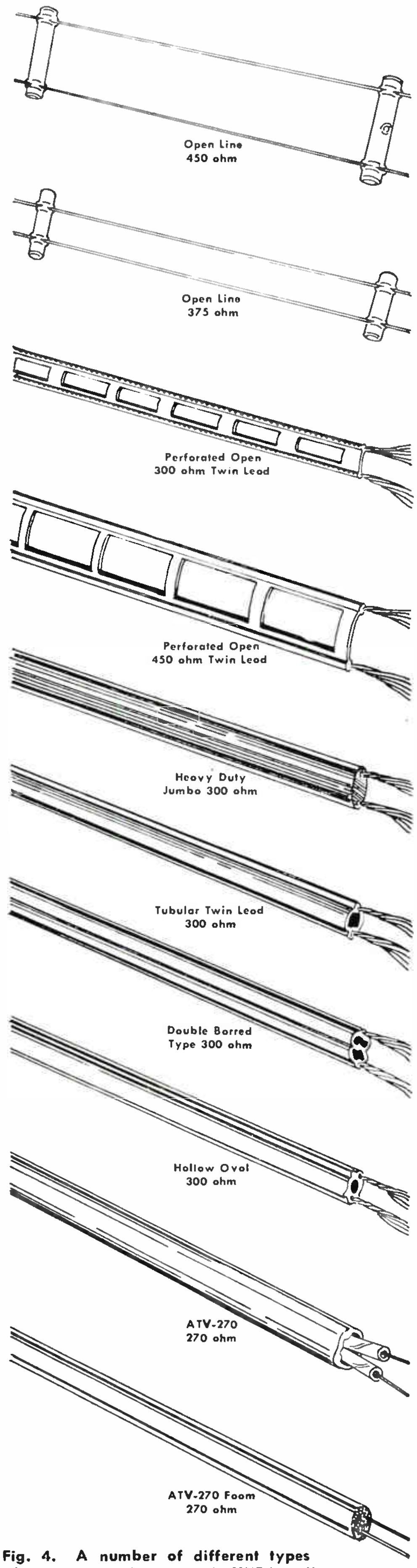


Fig. 4. A number of different types of transmission lines used in UHF installations.

6. How stable are separate converters—do they require additional adjustment as the receiver and converter warm up?

A number of answers were obtained to this question. Generally UHF converters are reasonably stable. Some have a short warm-up time (about 5 min.) after which no further adjustment is necessary. Others do not stabilize for quite a long time (15–30 min.). The degree of frequency shift also varied in different converters. In intercarrier type receivers (4.5 mc sound), the drift is not nearly as noticeable as in other type receivers. Incidentally these older type receivers which use separate sound carrier i-f amplifiers (sound comes in at only one point on fine tuning control) do require considerable adjustment even with the most stable converters. This is an important point which should be explained to the owner before a converter is installed on these older receivers. This explanation will help to prevent complaints which might occur as a result of conversation or comparison by set owners who do not understand the difference in sound circuits.

7. How stable are built-in converters—do they require readjustment due to frequency drift?

There are two types of built-in converters. One is the continuous tuner type similar to an external converter except that it is mounted inside the cabinet. This type has given very little trouble since it is reasonably stable and is usually installed in receivers which have intercarrier sound.

The other is the fixed frequency type which may be either a separate tuner with fixed positions or the strip type for use in turret type tuners. This type requires a screwdriver adjustment if the oscillator drifts beyond the range of the fine tuning control. Drift may, therefore, cause some concern to both the technician and the customer. Improvements in design have been made by the manufacturers and the newer type units have not presented any significant drift problem.

8. Have there been many service calls due to converter failure?

Very few service calls have been due to component failures in the converter. There have been a few cases of oscillator tubes not oscillating. This is to be expected particularly at these frequencies and in areas which have low line voltage. Replacement with a new tube usually restores the unit to normal operation.

9. Is it usually necessary to readjust the oscillator when the oscillator tube is replaced?

In most instances, it is necessary to change the oscillator frequency setting. This is unimportant in continuous tuner type converters. In fixed frequency type converters, the technician may have to slightly readjust the oscillator whenever the oscillator tube is changed.

10. Do customers object to a separate UHF converter unit because of appearance?

Customers generally do not approve of having a separate converter on top of their TV receiver. It is considered a "necessary evil" which must be accepted if UHF reception is desired. Customers who were already used to a "booster" or "rotator control box" seldom objected.

11. Are converters installed either in the back or side of cabinet to eliminate objection to separate unit?

Very few converters are designed for this type of mounting. The General Electric converter Model UHF 103 is designed for mounting on the side in some older model G-E receivers. Customers objected in a few instances to drilling the necessary holes in the side of the cabinet. In these cases a separate converter which could be placed anywhere the customer preferred was used.

12. How much is the customer charged for a UHF antenna installation?

If a VHF antenna installation was already in operation, the only additional material required was a UHF antenna and UHF transmission line. The type of antenna as well as the type of line used will affect the price. There may be other factors also such as location, length of line, etc., which will also cause a considerable variation in cost. The average cost for this type of installation was about \$20–\$25.

If a complete new UHF antenna installation was required (antenna, line, mast, brackets, etc.) the cost was generally between \$30.00 and \$40.00. If a VHF antenna and/or a rotator was required, the cost was higher depending of course on the price of the additional material.

13. How much is the customer charged for different type UHF converters?

Separate continuous tuning converters have a considerable price range of from \$30.00 to \$70.00. Built-in converters which are mounted inside the cabinet as a separate unit are usually in the same price range.

UHF channel strips vary in price from about \$6.00 to \$16.00 plus installation. Installation charges usually varied from \$5.00 to \$10.00 depending on the time required to install and adjust different type units.

14. Have converters caused interference problems due to oscillator radiation?

Some interference has been caused by converters. In most cases, however, it was due to low-price types (under \$30.00) which were poorly designed. In some instances, dealers purchased converters which operated very well as far as individual reception was concerned. Oscillator radiation, however, destroyed reception on nearby receivers resulting in numerous complaints and refunds. Most of the converters in \$30.00–\$70.00 price range were well designed and did not cause radiation problems.

15. Since most converters are designed to operate into either channels 5 or 6, is it ever necessary or possible to use a lower channel?

Yes, in some locations and with some converters, it was not practical to use either channels 5 or 6 due to interference problems. It was found that the frequency could be shifted to a lower channel but with a considerable loss in signal. This would tend to limit this type of operation to areas with a high UHF signal level. In some cases where interference was noticed, when the converter was fed into channel 5, it could be completely eliminated by using channel 6 and adjusting the converter accordingly.

16. Are boosters ever used between the converter and the receiver?

In some areas where UHF signal level is very poor, boosters had been used in this manner. The only objection was the increase in "snow" due to additional amplification. The booster obviously had to be set on the same channel as the receiver.

17. Does the reception of UHF signals vary to the same degree as VHF in fringe areas?

Reports indicate that UHF signals follow about the same pattern as VHF signals. The lower UHF channels can generally be received over a larger area than the higher UHF channels if all other conditions are the same. The area covered by UHF stations seems to be somewhat greater than originally anticipated.

BENCH NOTES

Contributions to this column are solicited. For each question, short-cut or chronic-trouble note selected for publication, you will receive $10.00 worth of electronic tubes. In the event of duplicate or similar items, selection will be made by the editor and his decision will be final. The Company shall have the right without obligation beyond the above to publish and use any suggestion submitted to this column. Send contributions to The Editor, Techni-talk, Tube Department, General Electric Company, Schenectady 5, N. Y.

NO SOUND—NO PIX—NO FILTER

We had several G-E Model 20C105 receivers which would operate normally for two or three days, then the sound and picture would disappear with the raster remaining normal. The sound and picture would come back in by advancing the contrast control all the way. This condition was intermittent and very difficult to locate.

After spending considerable time in trouble shooting, we found that the 6SL7GT sync separator tube was oscillating causing AGC voltage on pin No. 1 to be around 30 to 50 volts negative. This was due to condenser 379A (10mfd 450V) in plate circuit of 6SL7GT opening up intermittently. When that section was replaced the AGC voltage returned to normal and remained that way.

Nathon Johnson
720 So. 28th St.
Omaha, Nebr.

PICTURE CENTERING

Since we have been servicing and selling the General Electric Model 20T2 receiver, we have found in some instances when it was extremely difficult to get the picture to move far enough to the right (looking at the screen). After checking several components which could possibly give us this condition, we found nothing to be out of order. We tried everything to move the picture, but each time the raster developed neck shadow when it got close to being centered.

Here is what we found to be a definite corrective measure. Turn the picture tube around so that the high-voltage anode connection is on the opposite side from its original position. Unless there is trouble in the receiver, this will correct this condition.

Richard J. Albright
J. Fegely & Son Co.
Pottstown, Pa.

WIRING TIP

Sometimes difficulty will arise when trying to put three or four wires in one terminal lug for any certain pin connection. I have found a method which will save time and make the job less tedious.

Cut a slit in the terminal lug and spread the opening apart.

Place all wires inside of hole and squeeze opening back together again.

Apply solder and you will not only have a neat wiring job but good contact will result for all connections.

Carl J. Kraft
9305 Dorchester
Detroit 14, Mich.

DE-GAUSSER

An easy "de-gaussing" coil to use is an electromagnetic type focus coil used in some TV receivers. One with several turns shorted from a Motorola Model 17T4 was removed from the scrap box. A line cord was attached and energized with 117 volts *A.C.*

My wrist watch, which had been severely magnetized by strong magnetic fields encountered in servicing television was de-magnetized in a few seconds using this arrangement. Make sure the watch is several feet away from the coil before pulling the plug.

I keep it handy around the work bench to use on screwdrivers and other ferrous metal tools which get magnetized during use.

Gayheart C. Kleykamp, Jr.
2224 Hilton Avenue
Ashland, Kentucky

What's new!

24TP4

The 24TP4 is a magnetic-focus and magnetic-deflection, direct-view all-glass picture tube for television applications. It provides a $21\frac{7}{16}$ by $17\frac{1}{8}$-inch picture and has an electron gun which is used with an external single-field ion-trap magnet. Other features of this tube include a high-quality gray face plate which increases picture contrast and detail under high ambient light conditions, a reflective metal-backed screen to increase light output, and a space-saving rectangular face shape. An external conductive coating serves as a filter capacitor when grounded.

Heater Voltage	6.3 Volts
Heater Current	0.6 ±10% Amperes
Deflection Angle, approximate	
Horizontal	85 Degrees
Diagonal	90 Degrees
Over-all Length	$21\frac{1}{8} \pm \frac{3}{8}$ Inches
Greatest Bulb Dimensions	
Diagonal	$24 \pm \frac{3}{16}$ Inches
Width	$22\frac{43}{64} \pm \frac{3}{16}$ Inches
Height	$18\frac{7}{16} \pm \frac{3}{16}$ Inches
Screen Dimensions	
Width	$21\frac{7}{16}$ Inches
Height	$17\frac{1}{8}$ Inches

RECOMMENDED OPERATING CONDITIONS

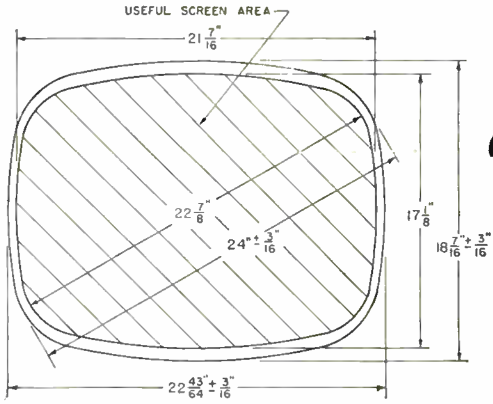
Anode Voltage§	16,000 Volts
Grid No. 2 Voltage	300 Volts
Grid No. 1 Voltage△	−33 to −77 Volts
Focusing-coil Current, approximate♦	119 Milliamperes
Ion-trap Field Intensity, approximateϕ	40 Gausses

△For visual extinction of undeflected focused spot.

§ Brightness and focus quality decrease with decreasing anode voltage. In general, the anode voltage should not be less than 14,000 volts.

♦ For RTMA focus coil No. 109 with the yoke reference line to center of air gap distance equal to $3\frac{3}{4}$ inches.

ϕ Single-field ion-trap magnet adjusted to optimum position.



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(see page 3)

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