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RADIO SERVICE NEWS

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RCA KINESCOPES' TOP PERFORMANCE LEADS THE FIELD

Design of Kinescopes For Home Receivers Involved Long Years of Research

A more-than-a-million-dollar expansion program nearing completion at the RCA tube plant in Lancaster Pa., enhances still further the extensive television tube production facilities of this modern group of buildings. Installation of new and radically improved equipment on a straight-line assembly basis like that used in automobile manufacture, will raise uniformity standards to new heights.

With its war-time cathode-ray tube organization virtually intact, RCA has been able to combine the experience gained from sixteen years of pioneering with many recent developments and improvements in television tube design.

Brighter Pictures

The earliest television images were about one inch square and were poorly lighted. Today it is possible to obtain a picture area 350 times larger, with illumination that compares favorably with theatre movies and well above that of average home movies. How that progress was made is a story of carefully planned research and development conducted by the RCA Tube Department and RCA Laboratories.

The techniques developed and now used by RCA in obtaining highly polished surfaces on cathode-ray tube metal parts to prevent emission of unwanted electrons—the accurate control of mechanical dimensions on tube parts to insure the precise focusing of the scanning beam—maintaining uniformity in phosphors to withstand high voltages and still give a detailed and clear television image—all involve highly complex machines and skilled operations. Coupled with closely-watched quality control and elaborate inspection techniques, these manufacturing processes are making possible brighter pictures and more sensitive and dependable tubes.

Today RCA cathode-ray tubes—manufactured at RCA'S Lancaster plant—are being used in many of the nation's television receivers, and are seeing increasing application in test equipment and industrial applications. Their potential in the renewal market offers great opportunities.

"This could never happen with RCA batteries."

AN ANALYSIS OF MODERN ANTENNAS FOR FM AND TELEVISION RECEPTION

By MILTON KAUFMAN

RCA Institutes, Inc.

The nature of the ultrahigh-frequency waves used for television and FM broadcasting is such as to pose special problems in the choice and installation of suitable antenna systems. Such factors as broad band response, directional characteristics, and the elimination of unwanted signals and reflections must be taken into consideration if satisfactory reception is to be obtained.

An antenna is a resonant circuit and, as such, possesses a Q which determines its bandwidth. The Q is determined from the approximate formula

$$Q = \frac{XL}{R}$$

Either a decrease in inductance or an increase in resistance will decrease the Q and increase the bandwidth of the circuit. It follows then that for antennas which are to be used for television and FM, a low value of Q is needed if a wide band of frequencies is to be picked up without attenuation at the sides of the band. Therefore, large diameter conductors must be used for the elements of an antenna when wide band requirements are to be met.

Basic Dipole Antenna

The simple dipole antenna is the basis of practically all antenna systems. As shown in Fig. 1, it is an electrical half wave length long. The actual length of a dipole in feet may be computed from the formula.

$$L = 492 \times 0.94 - f\ (Mc)$$
$$= 462 - f\ (Mc)$$

Impedance values measured at any point on an antenna are a function of the magnitude of the current and voltage at that point. At the center of a dipole where the current is a maximum and the voltage a minimum, the impedance is equal to 73 ohms. At the ends, the impedance is about 2500 ohms. Since dipoles are

(*Continued on Page 2, Column 1*)

STANDARD VIDEO COMPONENT PARTS FILL WIDE NEED

RCA's Extensive Line of Television Parts to Play Big Role in Servicing Work

As more and more television receivers leave the production lines and are put into use by a television-hungry public, an increasing need has been developing for quality television parts. To meet the demands of this new market, RCA has made available a comprehensive line of standard television components—the most complete line in the entire industry!

These are the same parts being used today in RCA's famous television receivers—helping to make possible amazingly life-like video reproduction for home entertainment. A growing list of other leading manufacturers are also incorporating RCA components in their instruments. Aside from meeting the servicing requirements of the many different television receivers presently being manufactured, RCA parts are also being used by thousands of hobbyists in the construction of equipment.

Versatile Parts

Among the items which are now available in RCA's line are a kit which contains all of the necessary if and video coils for a complete television receiver, variable reactor width controls, horizontal linearity controls, horizontal sync-discriminators, deflection yokes, yoke mounting hoods, ion-trap magnets, focus coils, horizontal output transformers, vertical output transformers, and horizontal and vertical blocking oscillator transformers. In addition to these, the RCA "All-Channel" antenna and "Bright Picture" transmission line are also available.

These parts are a "must" for modern television needs. They are ideal for the experimenter, schools, the serviceman and dealers, because they are versatile and fit into a wide variety of different television circuits.

Get on the television band wagon today and be the first in your area to take advantage of the rapidly growing television parts business. Ask your RCA Tube and Parts Distributor today for catalog sheet #2F396 which describes RCA's outstanding line of television parts.

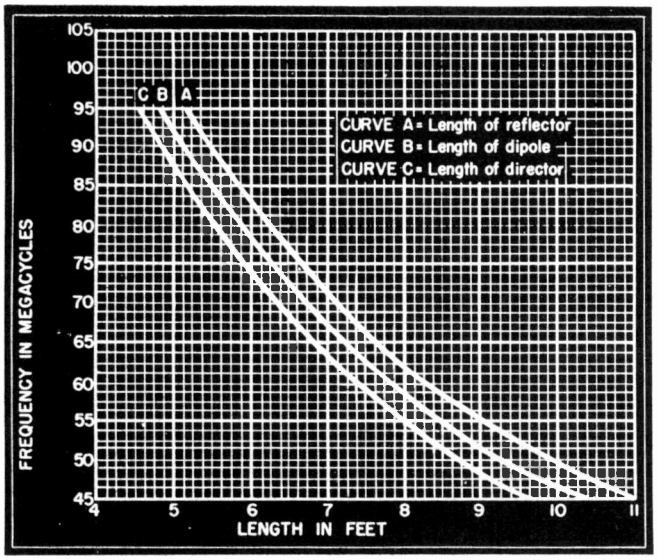


Fig. 2—A curve showing the length in feet of a dipole, a reflector or a director for frequencies from 45 to 95 Mc.

MODERN ANTENNAS

(*Continued from Page1 , Column 3*)

usually fed at the center, the value of 73 ohms is of great importance because it must be matched to the transmission line.

Directional Characteristics

An antenna is said to have directivity when it receives greater signal strength from certain directions than from others. The dipole responds best to signals traveling broadside to

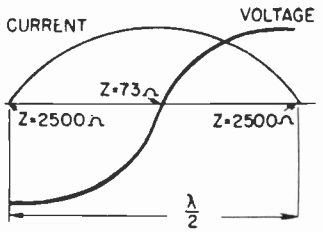


Fig. 1—The voltage and current distribution of a half wave dipole.

the antenna, and will receive equally well to the front or rear. It discriminates greatly against reception off either end. Thus, by rotating the dipole broadside to the desired direction of reception, it is often possible to eliminate unwanted signals coming from other directions.

Reflections can still be received from the rear, however, and they may impair the quality of the picture. Many modern television receivers are designed to receive all of the alloted channels and even the least expensive will cover a minimum of three. Therefore, the antenna must respond properly to all of the stations in each area which are operating. For example, in the New York area, at present, three channels are being used: Channel 3 WCBW, Channel 4 WNBT, and Channel 5 WABD, which cover a range of frequencies from 54 to 82 megacycles. The antenna should be cut to the geometric center of the range, or 67 Mc.

The length is determined to be 6.9 feet.

Folded Dipole

The folded dipole (Fig. 3) has several advantages which make it a popular choice for television and FM reception. It is simple in construction and has an impedance at the center of 300 ohms which matches perfectly to a standard 300-ohm transmission line, and to most television and FM receivers. Since the impedance of this antenna is high, the Q is correspondingly low, thus giving it a band-pass characteristic greatly superior to the simple dipole.

Parasitic Elements

As may often be the case, reflected waves will strike the antenna from the rear. The addition of so-called parasitic elements will remedy this fault. Parasitic elements may take the form of either a reflector or a director or a combination of both. The reflector is an element which is about 5 per cent longer than the dipole and is placed a quarter wave length behind it. It has no electrical connection to the antenna and receives its energy by induction.

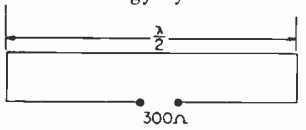


Fig. 3—A folded dipole.

The addition of a reflector has a number of important effects:

1. It will almost completely cancel reception from the rear.
2. Signal strength from the desired direction will be increased considerably.
3. Directivity will be sharpened, making it easier to "tune out" unwanted signals.
4. The band pass of the system will be reduced, making the use of large-diameter conductors imperative.
5. The input impedance of the dipole will be lowered.

The action of a director is similar to that of a reflector, but it is placed a quarter wavelength in front of the

(*Continued on Page 7, Column 1*)

Talking Things Over

With W. L. ROTHENBERGER

Manager, Renewal Sales

Shortly before each issue of RADIO SERVICE NEWS is prepared for the press, I receive a pleasant but firm note from the editorial staff asking me to plan my little talk for this column.

I enjoy having a hand in the preparation of this publication. Not only does it offer an opportunity to discuss matters of mutual interest to you and RCA, but there's a real sense of satisfaction in knowing that through it we maintain a closer, more personal relationship with you. It's the next best thing, perhaps, to visiting each of you regularly.

Our last check on the circulation of RADIO SERVICE NEWS showed that more than 55,000 of you receive this RCA publication. A part of this figure includes experimenters, radio engineers and laboratory technicians—but the majority of its readers are radio servicemen and dealers. That's pretty much as we want it to be—and we slant the publication primarily for those of you who are in the sales and servicing end of this fascinating radio business

A good deal of time and thought goes into the planning of each issue. Fundamentally, our main objective is to give you the kind of articles you will find useful to your work—information that isn't generally available in the trade press. Wherever possible we guide our selection of topics from suggestions contained in letters we receive from you.

Write Us

We're glad to have these not only because it gives our editorial staff the direction they need and want, but because such mail indicates a lively and active reader interest:

There's nothing more natural for those charged with the responsibility of editing a house organ than to go off the deep end occasionally and do a bit of product shouting from the housetops. That has its place because it's good advertising— and every business wants that—but a publication has to offer the constructive, vital type of information its readers want to be worth the paper it's printed on.

Outstanding Authorities

We're fortunate at RCA in having not only a highly interesting group of products to talk about but also some of the world's leading radio authorities to write for our publications. For example, contributions for RADIO SERVICE NEWS are received from the men who are making radio history at RCA's famous Princeton Laboratories, RCA Institutes, the National Broadcasting Company, as well as the RCA Victor Division. There's a combination that's hard to beat.

That doesn't imply the editorial staff is going to sit back in self-complacency—no publication group earning its salt ever gets the time for such comforts. They'll continue to leave no stone unturned in bringing you the stories you want—technical and promotional.

Yet there's only one way for us to know we're really doing the job you expect of us—and that's through your letters. If there's a specific subject you'd like to see in print—if you've run across something in servicing and sales that will interest others—let's hear about it. That request is only fair because we want RADIO SERVICE NEWS to be your publication as well as RCA's.

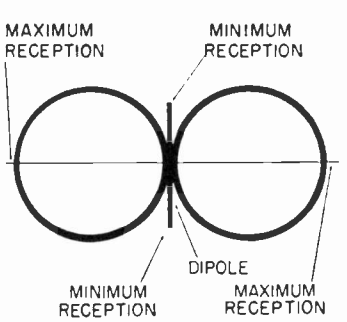


Fig. 3A—The horizontal pattern of a half wave antenna.

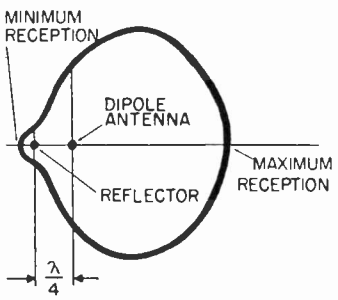


Fig. 3B—The horizontal pattern of a dipole and reflector.

EXPLANATION OF THE RATIO DETECTOR AS AN AID IN FM SERVICING

By JOHN A. CORNELL
RCA Service Company

This is the second part of an article on the Ratio Detectors in RCA FM receivers. The first part appeared in the previous issue of RADIO SERVICE NEWS. The ratio detector is a new device for converting a frequency-modulated carrier to an audio signal, while at the same time offering a high degree of attenuation to any incident amplitude modulation.

A schematic of the fundamental Ratio Detector is shown in Figure 2. C7 and C4 have very little reactance at the intermediate frequency, so it is evident that the parallel resonant circuit L2 C2 is the true load for the driver stage, this stage being shunt fed. A driver stage, in this case, is nothing more than a conventional if amplifier preceding the Ratio Detector.

L1 is inductively coupled to L2 as well as having its center-tap directly coupled to L2. Because magnetic coupling introduces a phase shift of approximately 90° between two loosely coupled circuits which are resonant at the same frequency, the voltage appearing across L1, by virtue of the magnetic coupling, is displaced 90° from the initiating voltage across L2. As the frequency of the driving signal changes at an audio rate, the phase relations of the voltages across L2 and L1 fluctuate to more or less than 90° in synchronism. As the phase difference decreases the voltages tend to add, but as the phase difference increases the voltages tend to cancel out. This causes the voltage across one diode to increase at the same time the voltage across the other diode decreases, and vice versa.

Ratio Dectector Different

The vector diagrams illustrated in Figure 1 can be used to portray the ac voltages across the diodes in Figure 2. However the ratio detector method of extracting intelligence from the FM carrier differs greatly from previously used methods. Diode 1, R3, and diode 2 complete a series circuit fed by the ac voltage across L1. Since the two diodes are in series, they will conduct on the same half cycle, and the rectified current through R3 will cause a negative potential to appear at the plate of diode 1. The time constant of R3 C6 is usually about 0.2 second, so that the negative potential at the plate of diode 1 will remain constant even at the lowest audio frequencies to be reproduced.

C3 will be charged by the rectified current through diode 1 to a voltage proportional to the voltage represented by vector E diode 1 (figure 1), and C4 will be charged through diode 2 in proportion to the vector E diode 2. Since the magnitudes of these vectors differ according to the instantaneous frequency of the carrier, the voltages across C3 and C4 will differ proportionately, the voltage across C3 being the larger of the two voltages at carrier frequencies below the if, and the smaller at frequencies above the if.

Voltage Sum Constant

Note that the voltages across C3 and C4 are additive and that their sum is fixed by the constant potential across R3. Therefore, while the ratio of these voltages will vary at an audio rate, their sum will always be constant and equal to the voltage across R3. The potential at the junction of C3 and C4 will vary at an audio rate when an FM carrier is applied to the detector, hence the audio voltage is extracted at this point and fed into the audio amplifier.

There is no direct dc return path across either C3 or C4; the reason for this is two-fold. First, a direct return path is not needed because whenever the potential of the junction of C3 and C4 is raised or lowered in accordance with the frequency of the voltage applied to the detector, there will be a point on R3 having a potential equal to the voltage across C4. This point will shift up and down on R3 in synchronism with the audio voltage across C4. If this point could be connected to the junction of C3 and C4, a dc return for each diode would be provided but no current would flow through the connection because there would be no difference of potential between the point on R3 and the junction of C3 and C4. Since no current would flow through this connection, a direct return path would be useless.

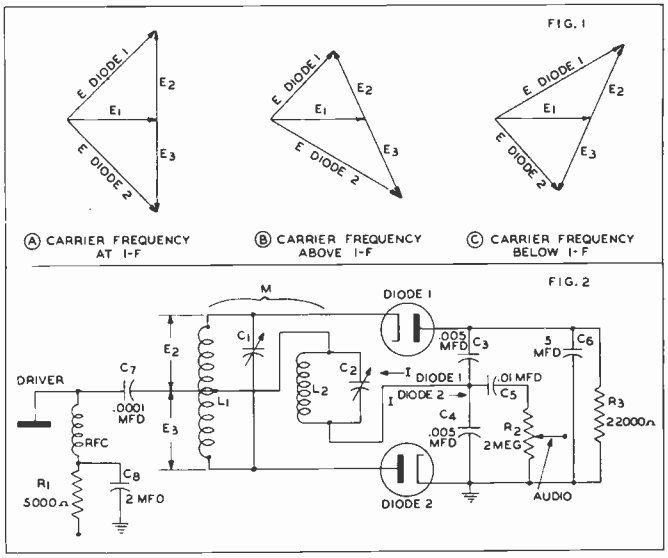


Fig. 1—Vector diagrams showing carrier frequencies in three stages.
Fig. 2—Fundamental Ratio Detector Circuit.

Secondly, a peculiar form of distortion, apparent at low carrier levels, is evident if a resistance is connected directly across C4. This distortion is caused by C4 discharging through the resistance whenever the carrier level falls below the level at which the diodes are biased off by the voltage across R3. The effect of the distortion is to add a long peak to one loop of the audio cycle.

The rejection of amplitude modulation in the ratio detector may be explained as follows: A rapid increase in the amplitude of the carrier applied to the ratio detector will tend to increase the dc voltages across C3 and C4. The sum of these voltages must always be equal to the voltage across C6. The voltage across C6 cannot change with a rapid increase in the amplitude of the carrier, due to the large time constant of R3 and C6. Therefore, this constant potential across C6 prevents the voltages across C3 and C4 from rising with an increase in the strength of the carrier. A reduction in carrier amplitude is prevented from appearing as a reduction in the voltage across C4 in the same way. The constant voltage across C6 can be considered to be a stabilizing voltage; i.e., it stabilizes the ratio detector output against amplitude modulation of the applied carrier.

The time constant of R3 C6 is not too large to prevent average changes in carrier level, from appearing as changes in voltage across R3; in other words the voltage across R3 is proportional to the average strength of the received carrier. Thus, this voltage serves as an excellent a-v-c voltage.

There is no "threshold" effect apparent in the ratio detector; i.e., there is no minimum carrier level which must be applied to the detector to cause noise attenuation as in other types of FM detectors requiring the use of a limiter stage.

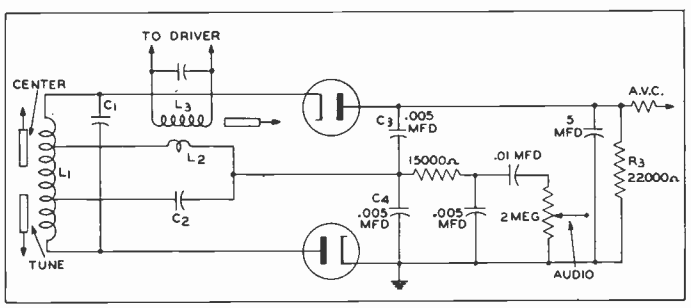
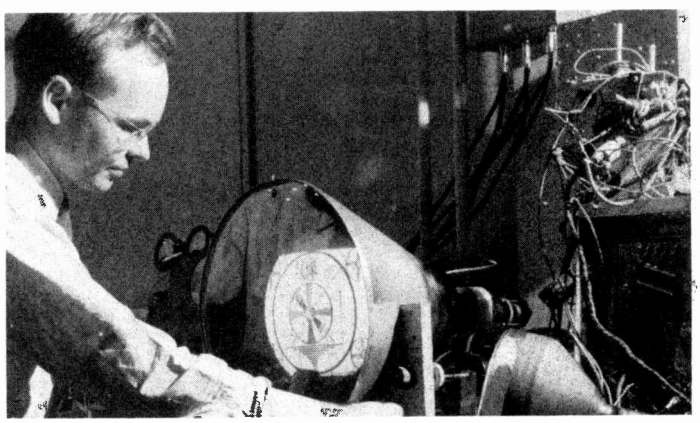


Fig. 3—Ratio Detector used in RCA Victor FM receivers.

A STEP IN KINESCOPE PRODUCTION



This is not an exhibition of modern design, but the testing of an RCA kinescope by means of a standard television test pattern—part of the painstaking procedure followed at RCA's Lancaster, Pa., tube plant to insure the quality of television picture tubes. Partially shielded from outside light by the cone-shaped enclosure, the test pattern is being studied to determine screen quality, focus, and performance of the electron current in the tube.

This attractive battery merchandiser will help you get your share—and more—of the summer battery business for portable radios. Order one from your distributor today. Ask for form No. 2F415.

CAPITALIZE ON VACATION TIME BY PROMOTING SERVICE WORK

By LLOYD R. DAY

Advertising & Sales Promotion Section
Tube Department

Summertime usually brings a decrease in radio program activity. Many "big-name" shows leave the air during the hot months, and John Q. Radio-Listener deserts his favorite easy chair next to the console for the cool, fresh air of the mountains, lake or seashore.

But what does summer mean to the radio serviceman? Should he pack up his bags and follow John Q. to the country? The answer is an emphatic "No"!

Now is the logical time for ambitious radio servicemen to get themselves a heap of business—and here's how.

Start today to tailor a campaign to fit the vacation habits of your customers. Start now to sell them on the convenience of having radios checked during their vacations. Point out to those who spend their vacations at home that summer-service will put their radios in shape for the World Series, football games, and return of "Big-name" programs in September.

There are a number of things you can do to increase the effectiveness of your summer-service promotion.

Mail reminder postcards well in advance of the vacation period. Tell your customers *why* vacation is the logical time for a radio check-up, stressing the convenience of having their sets serviced by experts while they are away. You can then make arrangements to pick up the sets just before the customers leave town and plan to deliver them on the days they return.

Feature Check-ups

Slant the copy of your advertisement in the local paper this month by saying: "Going on Vacation? While you're away, let our experts put your radio in tip-top shape for the fall andwinter listening seasons."

Feature the fact that radios, like people, need periodic check-ups. And that there's no more convenient time for a radio check-up than during the customer's vacation!

Ask your customers to let you check their portable and midget radios before they take them along on vacation. A fresh set of RCA Radio Batteries, and the replacement of any worn out tubes, will assure your customers of "Extra Hours of Leisure Listening"—and repeat business for you.

Use RCA Sales Aids

Above all, pack your plans with local appeal. Aim your shots carefully to hit the greatest number of customers. Then follow through on your ideas with direct-mail postcards, newspaper advertisements, and personal telephone follow-ups.

For help in planning your summer program, see your RCA Tube Distributor today. Ask him for the new RCA Battery window streamers and counter cards—keyed to boost your summer sales of RCA portable and midget radio batteries.

In addition, your RCA Distributor will be glad to show you a copy of the new "Display Planning Guide Book" (Form No. 2F9). It's packed with pictures and applications of exciting new RCA Comuras and displays designed to give *your* store "more sell per square foot".

By making the most of what is normally a slow season, you can build steady summer sales into a profitable, year-round volume.

THE PROBLEM OF FREQUENCY DRIFT IN HIGH-FREQUENCY RECEIVERS

By D. P. HEACOCK

RCA Application Engineering Section
Tube Department

In the local oscillator circuits of high-frequency receivers, trouble may be encountered with frequency drift during warm-up. This drift falls into two general classes: the first may be attributed to the oscillator tube and its socket and is characterized by a short-time frequency drift as the tube warms up; the second may be caused by the rest of the oscillator circuit and is characterized by a longer time drift as the chassis comes up to temperature. Both types of drift generally tend to lower the oscillator frequency.

There are two significant causes for the short-time frequency drift during the warm-up cycle of the tube. First, as the elements of the tube heat up, physical changes in the internal structure of the tube take place as a result of expansion of the elements of the tube. This manifests itself as a small change in the interelectrode capacitances of the tube. Since some of these capacitances are effectively part of the oscillator tank-circuit capacitance, a change in the oscillator frequency occurs during warm-up.

The second is because that heat is conducted through the internal connecting leads from the tube elements to the base pins. This heats up the oscillator tube socket. The value of the dielectric content of the socket dielectric material may change during warm-up, causing the effective socket capacitance to change and the oscillator frequency to drift during warm-up.

Temperature a Factor

The long-time frequency drift caused by the chassis coming up to temperature may be caused by almost any of the critical components of the oscillator circuit such as the oscillator coil, tuning capacitor, trimmer capacitor, or band switch. A change in the temperature of the component may result in a change in its electrical characteristics which may cause a drift in the oscillator frequency. The most serious offender in this class is probably the tuning capacitor. As its temperature changes there is a change in the physical size of the plates and often a slight displacement of the rotor relative to the stator. This causes a change in circuit capacitance with resulting frequency drift.

The design of a local oscillator circuit to have low frequency drift requires a careful selection of circuit components. Circuits often use some component or components whose effect is to compensate the drift caused by other components of the circuit. A capacitor with a negative temperature coefficient somewhere in the circuit may serve this purpose.

Careful Servicing

Experience with frequency drift problems indicates that the correction of frequency drift in a receiver is a difficult problem. In many cases the drift is inherent in the receiver design and may result not from one factor alone but from a combination of factors.

These same considerations show that the serviceman must exercise a great deal of care in servicing the local-oscillator circuits of high-frequency receivers. For example, acceptable frequency drift in a set may depend upon a critical balance of temperature effects in the circuit components. When replacing defective parts in the oscillator circuit, it is essential to use a replacement with the same electrical characteristics as the one being replaced or severe frequency drift may result.

USE THESE IN YOUR WORK

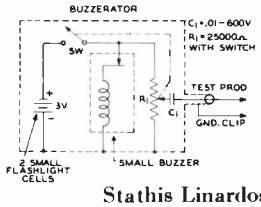
These new tube booklets, recently added to RCA's group of authoritative technical publications, may be obtained from your distributors. They're just what you've been waiting for!

SALES *and* SERVICE TIPS

Once again you can win a handsome RCA Resistor-Code Pencil by sending tips to RCA Radio Service News, Harrison, New Jersey . . . All tips become the property of RCA to be used as it sees fit . . . Service Tips are our readers' ideas, not ours. While we believe they are worthwhile, we cannot be responsible for them.

HOME-MADE SIGNAL TRACER HANDY IN SIMPLE REPAIRS

Here is the circuit of a little device that I use instead of a signal generator for simple servicing and signal tracing. It consists of a small buzzer, 3-volt battery, volume control, and blocking condenser mounted in a coil shield. I find the unit useful for point-to-point tracing. The blocking condenser makes it possible to apply the test prod to any part of a circuit without danger of shorting.



Stathis Linardos
190 Wadsworth Ave.
New York 33, N. Y.

DICE USED TO REPLACE AUTO ANTENNA BUTTON

In a good many instances static in auto-radios may be caused by a missing knob or button which originally was mounted on the tip of a whip antenna. This usually results in a sharp, jagged point which allows a corona discharge, and contributed to noisy reception.

We have found colored dice, purchased at a local ten cent store, to be a suitable substitute button. Drill half-way through one corner of the dice and glue it on the antenna with speaker cement. Body static will be cleared up, the job will look good, and the over-all cost is small.

J. M. Selph
Radio Service Dept.
Goodyear Service Stores
1535 Canal Street
New Orleans, La.

HOW TO ELIMINATE HUM IN RCA-55U AND 65U SETS

When the hum in these sets is louder than normal with the volume control turned down to a minimum, we have found the following remedy to be effective. Solder a length of wire to the negative terminal of the volume control, run it along the outside front of the chassis and then in through the hole intended for entry of an i-f alignment tool. Finally, solder the free end of the wire to the lug which holds the negative lead from the filter condenser.

Mike Clamer
Parts and Service Dept.
RCA Victor Dist. Co.
Chicago, Illinois

TELEVISION COMES OF AGE

. . . and it's so much more interesting than the designs shown in the pattern book.

RCA COMURAS AT WORK

Here's the way one alert radio service shop uses Cunningham Comuras to create an attractive, eye-catching window display! Mr. and Mrs. W. Studeman, proprietors of the well known Radio Service Associates, East Orange, N. J., find these new murals are paying dividends in bigger and better sales.

LOCATING FM ANTENNAS WITH AN RCA VOLTOHMYST

There are many ways of locating and orienting FM antennas to obtain optimum reception performance. We have found the following method to be both simple and economical. Connect an RCA Volt-Ohmyst across the ratio-detector load of the receiver and vary the location and position of the antenna until a maximum voltage indication is obtained.

Leo Tropea
Radio Parts Dept.
Bruno-New York
460 W. 34th St.
New York, N. Y.

MODULATION HUM CURED BY EASY CIRCUIT CHANGE

The following procedure has been found helpful in eliminating modulation hum in ac–dc receivers. In some sets the ground-side decoupling condenser is connected to the chassis. The chassis, in turn, is grounded through a condenser and resistor to the floating ground of the radio circuit. Removing the ground side decoupling condenser from the chassis and connecting it to the floating ground of the circuit, will eliminate the hum.

Frank Papkiewiez
Montgomery Ward Radio Service
4957—31st Street
Detroit, Michigan

UNBALANCED TRANSFORMER PRIMARY DISTORTS AUDIO

A troublesome case of distortion in the RCA series V-205 was traced to the output transformer. After finding all voltages and coupling condensers to be O.K., a resistance measurement was taken of the output transformer's primary which read ,300 ohms from center-tap to one side and 500 ohms from center-tap to the other side. Removing the transformer and replacing it with one having a balanced center-tap rectified the distortion.

Andrew F. Lippel
92J E. Scattergood St.
Philadelphia, Pa.

VOLUME CONTROL DATA FOR RCA 56X, 61- SERIES

On some models the 500,000 ohm volume control is not furnished with a stop 50,000 ohms from the high end of the control. Volume controls having no stop can be identified by a dot of red lacquer on the left side of the control, viewing the shaft end with terminals up. In models using this control, a 56,000 ohm ½ watt resistor, completely covered with spaghetti tubing is connected between the high end of the control and the yellow lead on the second if transformer.

Replacement controls equipped with a stop do not need this external 56,000 ohm resistor. So, when replacing a volume control, check the resistance between the arm and the high end of the replacement control with the arm turned fully clockwise. A reading of 50,000 ohms will indicate that the control is equipped with a stop and that the 56,000 ohm resistor in the set should be removed before installing the new control.

RCA Supplementary
Information No. 10

REPLACEMENT PARTS Section

RCA 72898 ADAPTOR PLATE FOR USE WITH RCA 70338 LOW NOISE CRYSTAL

Here is an extra-profit tip: RCA Crystal No. 70338 can now be used to replace the crystal on the 55U Instrument. A special adaptor plate, stock No. 72898, is available to facilitate the mounting. This adaptor plate is shipped in a standard package of ten. Each plate is individually packed in a separate envelope on which is printed installation instructions. The wide-awake dealer will place his order early and be ready for any replacement job.

The suggested list price for adaptor plate No. 72898 is $.25 each.

This plate is designed to replace the RCA 71173 crystal unit as well as many additional types of crystals manufactured by companies other than RCA.

1. Remove original pickup from tone arm and remove any connectors from the ends of leads.
2. Assemble adaptor plate into tone arm using the two flat-head screws supplied.
3. Attach pickup unit to adaptor plate using the two round-head screws supplied.
4. Connect leads to pickup either by soldering directly to the spring terminals or by stripping and tinning approximately ¼ inch of the leads and plugging this tinned end into the pickup between the curved spring and the bakelite mounting plate. A small lump of solder near the end of the tinned portion may be used to prevent the lead from working out during operation.
5. In some instruments "feed-back" howl due to motor-board resonance may be experienced at maximum volume. It is suggested that a ¼-watt resistor of some value between 150,000 and 300,000 ohms be connected in parallel with the crystal pickup to reduce the low-frequency response. As high a resistance value as possible is desirable. It may be conveniently connected to the terminal board at the chassis end of the pickup cable.

INITIALS FOR PORTABLE PERSONAL SETS

An excellent way for servicemen to boost their profits is to attach initials to portable personal sets when repaired. An assortment of these initials is available under RCA stock No. 71635 which includes approximately 100 letters and blanks. They are easily installed in only a couple of minutes. Just clean the space provided on the receiver and attach the initials by means of Duco Household Cement (or equivalent). To capture extra business, display a 54B with initials installed. Call them to the attention of customers. Suggest them on repair jobs. The result is extra income and satisfied customers.

The suggested list price for RCA stock No. 71635 initials is $1.75.

RCA SPEAKER REACTOR

Here's an opportunity to reduce the number of different speakers on your shelf. Stock RCA PM speakers, and use them to replace the electromagnetic types. The RCA speaker reactor takes the place of the field coil. This reactor is excellent for use with PM speakers type 305S1 or 405S1. The combination replaces any electromagnetic speaker with 350- to 450-ohm field coils rated for not more than 50 ma. current.

Here is a list of the RCA electromagnetic speakers that this combination will replace:

Stock No.

70321 stamped 92560-1
34450 stamped RL86-1
39446 stamped RL86B1, B4
37332 stamped RL86-1, -2, -3, -4, A1, A2, and 39223-1
38902 stamped RL86-A1, A3

Suggested list price for the speaker reactor No. 72934—$1.60.

DRY-ELECTROLYTIC CAPACITORS

RCA announces the availability of a complete line of dry-electrolytic capacitors. With them, you can make practically any replacement that comes to your bench. And you can still hold your stock to a minimum number of items. The entire line is comprised of only 10 distinct sizes—each suited to a wide variety of applications. Use them with confidence; they won't let you down.

RCA Stock No.	*Rating*	*Suggested List*
70111	100 ufd., 25 volt.	$.65
70112	10 ufd., 50 volt.	.40
70113	20 ufd., 150 volt.	.55
70114	20-20 ufd., 150 volt.	1.10
70115	50 ufd., 150 volt.	.95
70116	20 ufd., 250 volt.	.85
70117	10 ufd., 450 volt.	.65
70118	10-10 ufd., 450 volt.	1.20
70119	40 ufd., 450 volt.	1.50
70120	25 ufd., 25 volt.	.50

NEW 4 X 6-INCH PM SPEAKERS

RCA presents the popular size 4 x 6-inch speakers specially suited to a wide variety of uses. With these units, the dealer can hold his stock to a minimum number of different items, and still carry a complete line. These speakers meet RMA mounting specifications and have two modes of installation which add to their versatility. Type 446S1 replaces No. 70470 and 71058 RCA speakers as well as many other makes.

Both type 346S1 and 446S1 are accurately designed and built of the finest components. They are carefully tested before packing and must meet RCA's rigid requirements.

A supply of the 4 x 6-inch speakers can save the dealer untold time, expense, and trouble. These efficiently designed units are now available through RCA distributors.

RCA ORTHOPHONIC SOUND BOX

Another hard-to-get item is available. It's the RCA sound box No. 72929. This is your answer to the demand for a replacement unit that can be used in the Orthophonic Victrola. Install this sound box in all Orthophonic models except the VV2-35. It's your opportunity to solve another replacement problem.

NEW, SMALL "IKE" FOR INDUSTRY

Industrial television will be given a good "shot-in-the-arm" by this new two-inch diameter camera tube—the RCA-5527 Iconoscope. The equipment required for its operation is relatively simple and inexpensive. Using electrostatic deflection, the "Small Ike" eliminates the need for costly deflection coils and circuits as well as keystoning and shading circuits. It has a resolution capability of approximately 250 lines.

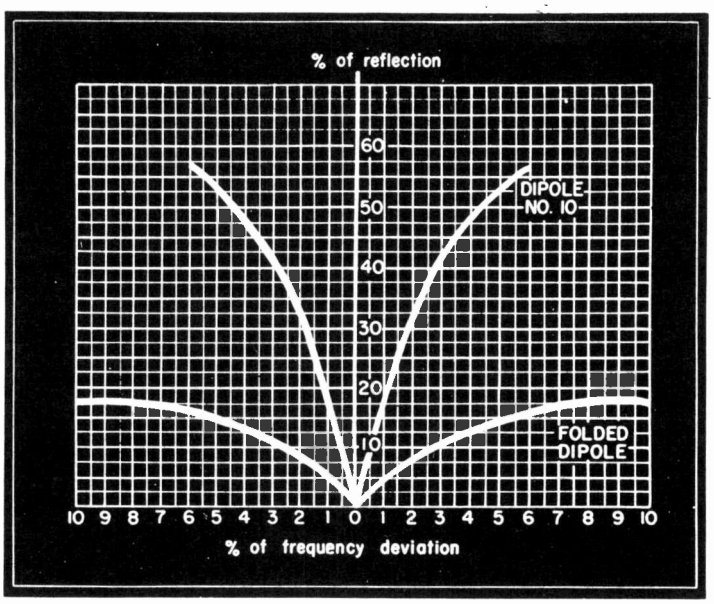


Fig. 4—Curves showing the comparative band widths of a folded dipole constructed of 1-inch tubing and a simple dipole constructed of No. 10 wire.

MODERN ANTENNAS

(*Continued from Page 2, Column 2*)

antenna. The director is made shorter than the antenna by about 4 per cent.

Stacked Array

The stacked array is constructed by mounting one dipole above the other, and is generally used with a reflector mounted behind each dipole. Such a combination has some decided advantages. By stacking dipoles, directivity is obtained in the vertical plane. Since only a line of sight path is useful at television frequencies, it is desirable to confine reception to low vertical angles. Signals arriving from high vertical angles, which may be in the form of noise pulses or undesired reflections, will be discriminated against, resulting in greatly improved reception.

Antenna Installation

Both the position of the antenna and its directional orientation are of the greatest importance. The antenna should not be permanently installed until the optimum location has been predetermined. A simple two-way telephone system with about 200 feet of wire is very useful for antenna installations. If constant communication is maintained with a competent person observing the effects on the receiver, the most suitable arrangement of the antenna can be quite easily determined.

A change of antenna position of only a few feet may result in a great improvement of reception. Use a temporary transmission line to allow the antenna to be moved to different positions. The antenna should be installed at the greatest practical height to obtain line-of-sight conditions, and must be kept at least ten feet from conducting objects in its vicinity. Since neither the eye nor the ear is particularly sensitive to small variations of signal intensity, it is highly desirable, when the antenna is being oriented, to make use of some form of indicator at the receiver, such as an output meter in the audio system following the discriminator, to produce a more accurate indication of maximum performance.

Transmission-Line Installation

If the transmission line is of the balanced type, such as the two-wire parallel line, care must be taken to see that the line does not run close to conducting surfaces such as rain gutters since this will cause unbalancing effects. Whatever the type, it should be securely fastened about every ten feet of its length to prevent chafing of the insulation. Extremely sharp bends are to be avoided especially with coaxial line, where breakage of the dielectric might occur. With the two-wire parallel type of line, it will be found that a twist of about one turn for each one or two feet of line will help to overcome local interference.

Whenever possible, the line should lead directly to the receiver without breaks or splices. If it should be necessary to splice a transmission line, do not use ordinary tape which has a high loss, but obtain the special splicing tape now available. The ground terminal should be connected to a cold-water pipe or other good ground. When bringing the transmission line into the house, a hole may be cut through the window sill or frame and the line run through a piece of insulating tubing. When inside of the house, the line should be kept away from exposed wiring or metal baseboards.

It must be remembered that no matter how much money is spent, if the selection and orientation of the antenna are not appropriate to the needs of the installation, unsatisfactory reception will result.

Reprinted through courtesy of "Radio Maintenance"

NEW BATTERY OPERATED VOLTOHMYST USEFUL FOR FIELD MEASUREMENTS

The RCA WV-65A Battery-Operated VoltOhmyst brings the serviceman a new and different version of his most used test instrument. It will enable him to make field measurements in areas remote from electrical outlets or where outlets are other than 110 ac.

With more than 40,000 ac-operated VoltOhmysts presently in use, the many owners of this fine instrument have become accustomed to its outstanding features such as its high input impedance and its high resistance measuring capability. Now with the advent of the Battery VoltOhmyst, these same features are made available to thousands of new users and for hundreds of new applications. Like other VoltOhmysts, the new instrument is one of the most useful—and one of the most versatile—of all voltage testing devices.

The new VoltOhmyst is especially suitable for making field measurements on aircraft radio equipment, auto radio, railroad signal equipment, and industrial electronic devices operated on other than 110 volts ac or remote from 110-volt ac outlets.

Has New Features

The WV-65A is a self-contained electronic dc voltmeter weighing approximately 15 pounds and measuring 9-5/8" high, 6-3/8" wide, 6-3/4" deep. It measures ac in five ranges up to 1000 volts with an isolated copper-oxide rectifier circuit and, for the first time in VoltOhmyst history, measures direct current in six ranges up to 10 amperes.

The WV-65A can be used to make all measurements in radio receivers including power transformer voltages, power supply voltages, oscillator grid voltages, and output voltages, besides serving to check any resistance values commonly found in receivers. It is also useful in checking dc measurements directly at the grid, plate, screen, or cathode terminal, as well as bias-cell voltages, the voltage values of the Automatic Frequency Control, and FM discriminator voltages.

A neon flasher type-pilot light is employed because of its extremely low drain on the battery complement consisting of four 1½-volt flashlight cells and two 45-volt B batteries. Tests prove that the batteries will last five to ten months under normal use.

The RCA Crystal Probe, MI-8263, can be conveniently used with the WV-65A to make audio- or radio-frequency measurements up to 100 Mc and to convert this popular test equipment for use in FM, television, and other high-frequency measuring applications. With a maximum input of 20 volts from its germanium crystal detector, the Probe will read in terms of RMS voltage on the lower dc scale ranges. Since the half-wave crystal rectifier involves no heater, it eliminates a possible source of hum and provides a rectifier which can be operated above ground potential.

The VoltOhmyst has been improved time and time again to keep pace with modern developments in Test and Measuring Equipment. Many owners of the ac-operated VoltOhmyst will welcome the battery VoltOhmyst as an auxiliary equipment for "out of the shop" servicing problems.

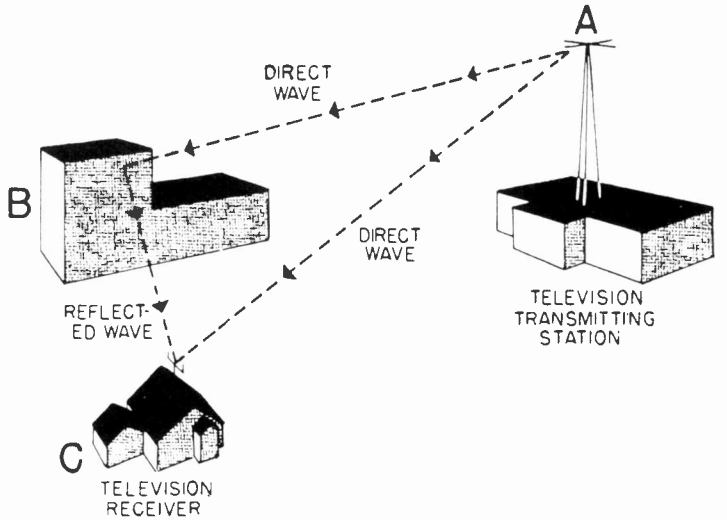
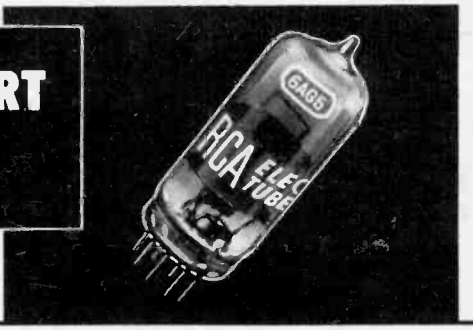


Fig. 5—As shown above, a reflected wave reaching the antenna of a television receiver follows a longer path than the direct wave. When this phenomenon takes place, the result is a distortion of the picture which is commonly known as a ghost.

RCA QUICK-REFERENCE CHART MINIATURE TUBES



RCA Miniatures make practical, compact, lightweight designs. Often, they provide superior performance at less cost.

Type No.	Class	Performance Equivalent	Applications
OA2	Voltage Regulator	OD3/VR150	Cold-Cathode Glow-Discharge Type.
1A3	H-F Diode	—	Heater-Cathode type. Discriminator for battery-operated FM receivers; portable h-f measuring equipment. Resonant frequency about 1,000 Mc.
1L4	R-F Amplifier Pentode	1U4	Filamentary type. Sharp cutoff characteristic. For battery-operated portables.
1R5	Pentagrid Converter	—	Filamentary type. Mixer tube and oscillator in superheterodyne circuits. For portable receivers.
1S4	Power Amplifier Pentode	3S4	Filamentary type. For battery receivers.
1S5	Diode-Pentode	—	Filamentary type. High voltage gain. For broadcast receivers.
1T4	Super-Control R-F Amplifier Pentode	—	R-F or i-f amplifier in battery-operated receivers.
1U4	R-F Amplifier Pentode	1N5-GT	Sharp cutoff characteristic. For low-drain battery-operated receivers.
2D21	Thyratron Tetrode	2050	Relay tube and grid-controlled rectifier. Will operate directly from high-vacuum phototube.
3A4	Power Amplifier Pentode	—	Filamentary type. A-F output of 700 milliwatts, or r-f output of 1.2 watts at 10 Mc.
3A5	H-F Twin Triode		Filamentary type. For use in h-f applications. Class C output about 2 watts at 40 Mc.
3Q4	Power Amplifier Pentode	3Q5-GT	Filamentary type. For 3-way battery portable receivers.
3S4	Power Amplifier Pentode	1S4	Filamentary type. For battery portable equipment.
3V4	Power Amplifier Pentode	3Q4	Filamentary type. Similar to 3Q4, but has preferable basing arrangement. For 3-way battery portable receivers.
6AG5	R-F Amplifier Pentode	—	Sharp cutoff characteristic. High transconductance and low input and output capacitance. t-F video amplifier or r-f amplifier up to 400 Mc.
6AK5	R-F Amplifier Pentode	—	Sharp cutoff characteristic. High transconductance, low input and output capacitance, and low input conductance at high frequencies.
6AK6	Power Amplifier Pentode	6G6-G	Singly or in push-pull in output stage. A-F power output 1.1 watts per tube.
6AL5	H-F Twin Diode	—	High perveance makes it particularly useful as an F-M detector.
6AQ5	Beam Power Amplifier	6V6	For automobile and ac-operated receivers.
6AQ6	Duplex-Diode High-Mu Triode	6SZ7	Combined detector, a-f amplifier, and avc tube.
6AT6	Duplex-Diode High-Mu Triode	6SQ7	Combined detector, amplifier, and avc tube.
6AU6	R-F Amplifier Pentode	6SH7	Sharp cutoff characteristic. High transconductance and low grid-plate capacitance. Limiter for FM receivers.
6BA6	R-F Amplifier Pentode	6SG7	Remote cutoff characteristic. High transconductance and low grid-plate capacitance. For r-f and i-f stages of FM and AM receivers.
6BE6	Pentagrid Converter	6SA7	Mixer tube and oscillator in superheterodyne circuits. For FM and AM receivers.
6BF6	Duplex-Diode Triode	6SR7	For use as a combined detector, amplifier, and avc tube. For auto and ac-operated receivers.
6C4	V-H-F Power Triode	—	Class C amplifier and oscillator. Class C output about 5.5 watts at moderate frequencies, 2.5 watts at 150 Mc.
6J4	U-H-F Amplifier Triode	—	Primarily for use as grounded-grid amplifier up to 500 Mc. Transconductance 12000 micromhos, mu 55, low capacitances.
6J6	Twin Triode	—	Particularly useful as mixer or oscillator up to 600 Mc.
6X4	Full-Wave Rectifier	6X5	High-vacuum type. For use in auto and ac-operated receivers.
12AT6	Duplex-Diode High-Mu Triode	12SQ7	For use in compact ac/dc receivers.
12AU6	R-F Amplifier Pentode	12SH7	Sharp cutoff characteristic. Limiter tube for ac/dc FM receivers.
12AU7	Twin Triode Amplifier	12SN7-GT	Separate terminals for each cathode, and mid-tapped heater for 6.3- or 12.6-volt operation. Mixer oscillator, multivibrator.
12AW6	R-F Amplifier Pentode	6AG5	Sharp cutoff characteristic. R-F amplifier for ac/dc FM receivers.
12BA6	R-F Amplifier Pentode	12SG7	Remote cutoff characteristic. For use in compact ac/dc receivers.
12BE6	Pentagrid Converter	12SA7	For use in compact ac/dc receivers.
26A6	R-F Amplifier Pentode	12BA6	Remote cutoff characteristic. Features high transconductance. For 12-cell storage-battery operation.
26C6	Duplex-Diode Triode	12AT6	Combined detector, amplifier, and avc tube. For 12-cell storage-battery operation.
26D6	Pentagrid Converter	12BE6	Mixer tube and oscillotar. For 12-cell storage-battery operation.
35B5	Beam Power Amplifier	35L6-GT	High power sensitivity and high efficiency for use in output stages of ac/dc receivers.
35W4	Half-Wave Rectifier	35Z5-GT	High-vacuum type. Heater top for panel lamp. For use in compact ac/dc receivers.
45Z3	Half-Wave Rectifier	—	High-vacuum type. Heater rating, 0.075 ampere at 45 volts. For 3-way battery portable receivers.
50B5	Beam-Power Amplifier	50L6-GT	For output use in ac/dc receivers. Maximum-signal power output, 1.9 watts.
117Z3	Half-Wave Rectifier	—	High-vacuum type. For supplying rectified power to 3-way battery portable equipment.
1654	Half-Wave Rectifier	—	High-vacuum, filamentary type. Maximum peak inverse rating 7000 volts, filament current 0.05 ampere.
9001	Sharp Cutoff U-H-F Pentode	—	R-F amplifier or detector in U-H-F service.
9002	U-H-F Triode	—	U-H-F detector and amplifier. May be used as oscillator in superheterodyne receivers at frequencies up to 500 Mc.
9003	Remote Cutoff U-H-F Pentode	—	Useful as a mixer or as an r-f or i-f amplifier in U-H-F service.
9006	U-H-F Diode	—	For U-H-F service as rectifier, detector, or measuring device. Resonant frequency, about 700 Mc.

For additional technical data on these types, refer to the RCA HB-3 Handbook, or write RCA, Commercial Engineering, Harrison, N.J.

THE FOUNTAINHEAD OF MODERN TUBE DEVELOPMENT IS RCA

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