★ ☆ ★ RCA ★ ☆ ★

RADIO SERVICE NEWS

VOLUME XIII, No. 3 EDITORIAL OFFICES, RCA, HARRISON, NEW JERSEY May-June, 1948

TWO RCA BATTERY PUBLICATIONS AID SALES AND SERVICE

New Battery Catalog and Quick Selection Guide Have Latest RCA Battery Information

Two of the service-dealers' most useful battery data booklets have been completely revised to include the very latest information. They are "The RCA Battery Catalog" and the "Quick Selection Replacement Guide".

The RCA Battery Catalog contains up-to-the-minute data on RCA's comprehensive line of batteries for radios, flashlights, and industrial applications—"Radio Engineered for Extra Listening Hours." Nearly seventy different batteries are listed with tabular data on voltage, type of service, dimensions, type of connectors, and packaging information. Each type of battery is illustrated, including a diagram of the socket or terminal connections.

The "Quick Selection Replacement Guide" is an informative booklet cataloging battery and portable sets by manufacturer and model number, with the correct RCA battery replacements for each set. It tells at a glance which types of RCA batteries are required for almost every type of receiver and eliminates guesswork when making battery replacement in old models.

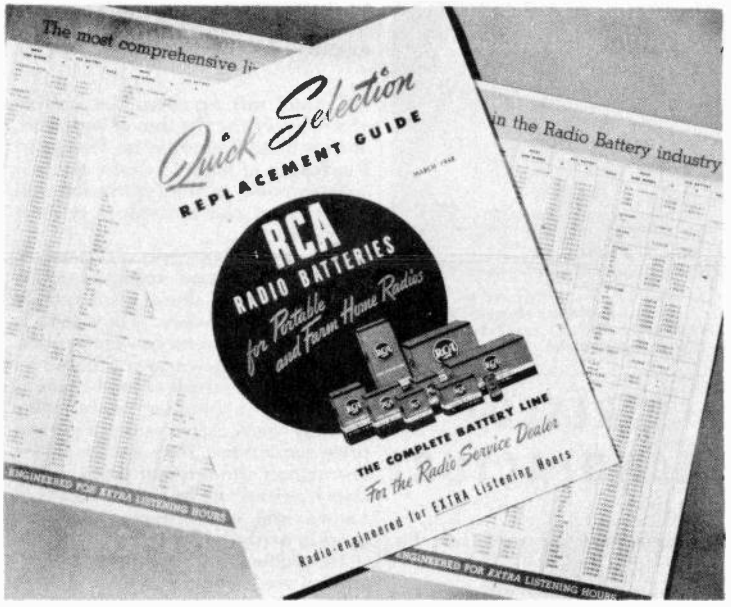
Every service-dealer will find frequent occasion to refer to one or both of these valuable publications. See your RCA Battery distributor today for your copies of "The RCA Battery Catalog" (2F134-R), and the "Quick Selection Replacement Guide" (2F589). Both are yours without charge.

PLENTY OF RC-15'S AGAIN

In the last issue of RADIO SERVICE NEWS we told you that a plentiful supply of the new RC-15 Receiving Tube Manual was again available. The ink had hardly dried when this second printing was also depleted. That brought the grand total sold to date to a quarter-million copies.

Now, a third big printing has been completed and they are again available. If you are still looking for a copy of the RC-15, please try your distributor once again. The price—still only 35c.

THE RCA BATTERY REPLACEMENT GUIDE



A comprehensive survey of battery replacements for nearly 2000 different models of portable and farm home battery powered receivers. Ask your RCA Battery distributor for your copy today.

JOHN R. MEAGHER AUTHORS TELEVISION SERVICE SERIES

Expert on TV Receiver Maintenance Describes Use of Test Patterns as an Aid in Diagnosis

RCA RADIO SERVICE NEWS is proud to feature an exclusive series of articles on Television Service, prepared by John R. Meagher, one of the country's outstanding authorities in this field.

Mr. Meagher has recently joined the Renewal Sales Section of the RCA Tube Department as a specialist on television matters. Previous to this he was Field Supervisor of Television Service for the RCA Service Company. Author of innumerable authoritative volumes and articles on television and other types of radio servicing, lecturer, and teacher of radio, Mr. Meagher is perhaps best known for his development of the now famous "Dynamic Demonstrator" panels. His broad experience and background in television makes him well qualified for this responsible position, and RADIO SERVICE NEWS feels it is fortunate in being able to bring its readers his informative articles.

The first part of the "Television Service" series, appearing in a special supplement of this month's issue, analyzes television test patterns and how specific receiver faults may be diagnosed by observing this pattern. Additional articles will appear in subsequent issues of the publication.

Because every reader, and especially those actively engaged in television servicing, will find invaluable information in this new series, it is recommended that issues of RCA RADIO SERVICE NEWS containing Mr. Meagher's articles be saved for future reference. It is further suggested that readers insure receiving copies by asking their RCA distributors to reserve one for them.

LIST OF RECEIVING TUBES IN TV SETS PREPARED BY RCA

Tube Complement Chart Covers Nineteen Television Receivers of Nine Manufacturers

A compilation of television receiver tube complements, listing the tube types used in nineteen different models of television receivers, has been prepared by the RCA Tube Department.

In view of the rapid growth of the television industry and the increasing number of areas that have, or shortly will receive, television service, service-dealers will find this information especially helpful in ordering and stocking tubes for television sales and service.

An analysis of the tube complements listed points up two striking facts:

1. The extensive use of miniature tubes in television receivers. The advantages of small size, excellent high-frequency performance, and other outstanding characteristics, make miniatures a natural for television, as well as for many standard AM and FM receivers. RCA engineers have pioneered in the development of miniature tubes.
2. Unparalleled acceptance on the part of equipment manufacturers for RCA-designed types and the incorporation of such tubes in their television receivers. RCA picture tube types such as the 10BP4, 7DP4, 7JP4, and 5TP4, as well as miniatures and other types, are being used by the nation's leading producers of video instruments.

The expanding demand for miniature receiving types and cathode-ray kinescopes for television is one of the most significant trends in the electron tube business today. These types will continue to play a growing part in the tube business.

Service-dealers may obtain a copy of the TV Receiving Tube Chart, Form No. 2F820 from their nearest RCA Tube distributor.

Don't miss the July issue of RADIO NEWS, soon to appear on your newsstand. The cover photo and lead story introduce RCA's line of "New AM/FM/TV Test Instruments."

QUALITY CONTROL EMBRACES MANY FIELDS

No minute step of kinescope manufacturing escapes the watchful eye of "Quality Control" at RCA's modern tube plant in Lancaster, Pennsylvania. Here in the mixing room, samples of the screen materials are carefully analyzed to help prevent screen blemishes on the finished tube.

QUALITY CONTROL STRESSED IN KINESCOPE MANUFACTURE

By G. G. THOMAS

Quality Control Section, RCA Tube Department, Lancaster, Pa.

In the past decade great strides have been taken toward making the television picture kinescope a rugged tube giving a brilliant, well-defined picture with life-like clarity. Today, expert engineering design, good materials, new tools and processes, a well-trained and quality-minded organization, and superior quality controls, have made practicable the mass production of kinescopes which meet the standards of the most discriminating.

Since the end of the war the facilities of RCA's Lancaster plant, which so successfully produced top-quality radar and television tubes to supply nearly half the war-time requirements of the armed forces, have been converted to the manufacture of kinescopes for modern television sets.

The old plant layout was entirely inadequate. It has therefore been completely modernized with new, massive, automatic machines replacing the old. Where hand methods were used before, conveyors now carry the tubes from operation to operation. Automatic equipment, mechanically and electrically controlled processes, and decreased handling of material, parts and assemblies in process, have reduced variations in kinescope quality to a minimum.

Incoming materials are given statistical sampling checks or, where necessary, 100% inspection. A check on screen materials to guarantee that impurities do not exceed one part in thirty million is an example of the sampling procedure. The inspection of every kinescope bulb for blisters, stones, chill wrinkles, and other possible defects in the face plate is an example of the 100% check method. No materials or parts entering the plant escape the quality control dragnet.

Quality control charts are used to advantage wherever practicable. The tolerances set up on these charts show with uncanny accuracy that the process is in control if the plotted points are within the limit lines. This minimizes inspection work and prevents scrap because it warns of trouble before it occurs.

In the mounting operations where cathode-ray guns are made, inspections and controls are maintained every step of the way as well as on the finished mounts. For example, the spacing between the cathode and the grid aperture is accurately held by special fixtures and gauges within limits of plus or minus 0.0005". This is verified on every cathode-grid assembly by a precision electronic test instrument.

The bulb preparation processes are intricate, but every machine and operation is kept under close quality control. When a bulb reaches the giant high-voltage-button insertion machine, it is gauged to assure that not a single out-of-specification bulb will enter this operation. Pyrometers and polaroscopes are used on the machine to verify proper fire settings and temperatures. The overhead annealer through which the bulbs are then automatically fed is controlled and protected by complex mechanical and electronic devices.

(Continued on Page 3, Column 1)

Talking Things Over

With W. L. ROTHENBERGER

Manager, Renewal Sales

Everyone knows and acknowledges the value of a good personal name—it is one of our most priceless possessions. It determines our status in social and community life. Similarly, the name of a business bears a heavy responsibility; it establishes the character of each transaction and is projected in every commercial nook and cranny. In many ways it can be listed first in the assets column.

I'm not talking about the spelling of a name or the rhythm of its sound, or how long or short it is. The point I'm trying to make is that a name is only as good as the reputation and integrity of the individual or firm behind it.

To cite a remarkable case of "name" value and acceptance, I'd like to tell you about a large New York furniture store. They took a stock of well known mattresses, placed an unknown brand name on half of them and advertised them as equal to the popular brand they actually were. After many tries and price reductions, they finally sold a few at half the original price. What does it prove?—The simple fact that known and established names are quickly accepted by the public.

In today's buyer's market, consumers are becoming more and more brand conscious and less willing to accept inferior or little known brands, even at a few cents saving. A case in point is the recent tide of "unknown-brand" radio receivers which have been glutting the market at reduced prices but which, nevertheless, are taking a back seat in movement to brand name sets.

It's the same way with your store or shop. Once a name is established as representing good workmanship and good materials, consumer acceptance is strong. Just as an individual is judged by the friends he keeps, so also a service shop or store reflects the reputation of the manufacturer whose products it uses and sells.

No better example of this can be given than the public acceptance accorded the RCA monogram and the products on which it appears. The familiar RCA symbol on your window, the stock of RCA tubes and batteries on your shelf, and RCA test equipment on the bench, are factors which will aid immeasurably in building consumer acceptance. The buyer knows of RCA's quarter century of leadership in radio and electronics.

Extensive and arresting RCA advertising and promotions—directed at the consumer—are helping you tie in with the great public widespread and continually growing demand of RCA products.

Build your business on a sound basis, with a solid background—and make the most of the valuable assistance offered by radio's finest brand—RCA. Make the customer know your name means good business.

EVERY STEP MUST PASS RIGID TESTS

A special lighting fixture is used to clearly show up face plate defects on a 10BP4 bulb during incoming inspection. The screen has not yet been applied at this point.

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RCA SERVICE SUPPLEMENT

RADIO SERVICE NEWS

VOL. XIII, No. 3 EDITORIAL OFFICES, RCA, HARRISON, NEW JERSEY May-June, 1948

TELEVISION SERVICE

By JOHN R. MEAGHER

Television Specialist, RCA Renewal Sales

PART 1, USING THE TEST PATTERN

When something goes wrong in a television receiver, it generally shows up as a definite symptom in the picture. In no other type of electronic equipment are the troubles and symptoms so clearly displayed before our eyes.

If we learn to recognize these visible symptoms, we can quickly localize the trouble to a particular portion of the set. Even the complete absence of picture and raster tells us to suspect certain definite parts.

For those who hope to become expert in television service, it will pay to study, observe, and learn how to analyze symptoms in the television picture.

There are several text books that cover television principles, the action of television circuits, and the effects of some interference conditions, but there is practically no information that correlates specific troubles with the visible symptoms.

So in this series of articles, we will concentrate on diagnosing and localizing troubles by analyzing their effects on the picture.

However, in order to build a foundation for subsequent articles, it is logical and necessary to start with a discussion on how to interpret and use the television test pattern. This includes much practical service information.

Typical test patterns

There is no standard test pattern in general use. The nearest thing to a standard is the RCA "Indian head" monoscope, which is used by a number of TV stations. RMA has proposed a standard "resolution chart", but for various reasons it has not been adopted by TV stations for air use.

Many TV stations have designed their own test patterns, which, although differing in appearance, are all intended to facilitate adjustments and checks in both the transmitting equipment and in the receivers.

Two typical test patterns, the NBC, and the RCA Indian head, are shown in figures 1 and 2. The various elements are named in figure 1, and these names will be referred to in the following discussion.

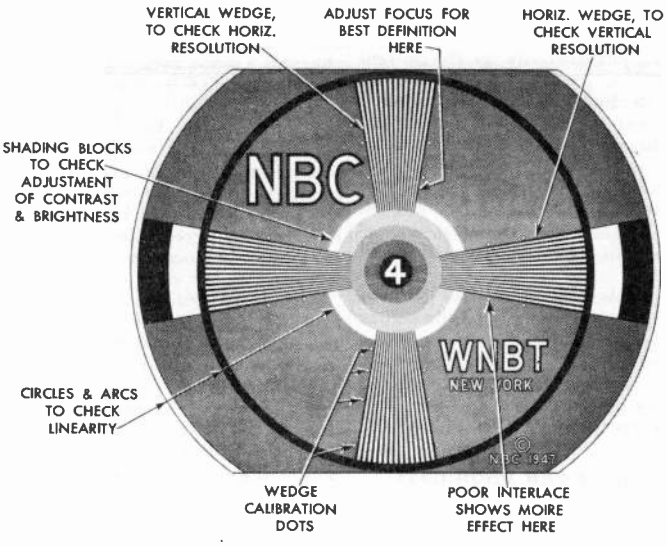


Figure 1. The NBC Television Test Pattern.

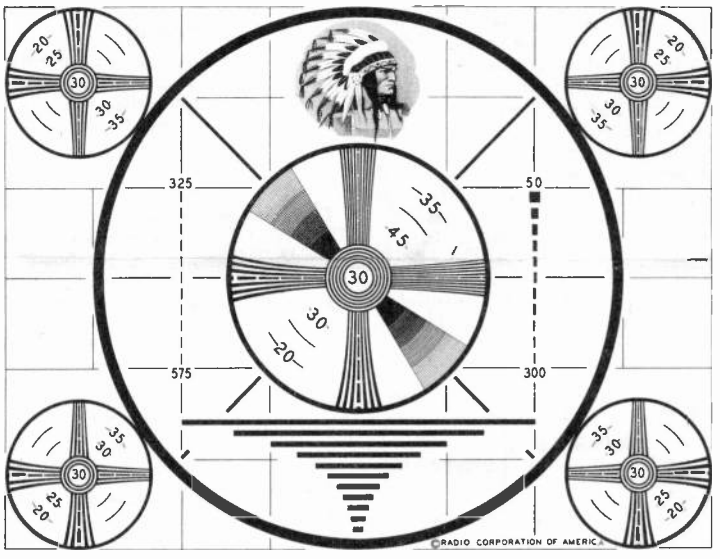


Figure 2. The RCA Indian Head Test Pattern.

Size and linearity

The controls for width, horizontal drive, and horizontal linearity, and the controls for height and vertical linearity should be adjusted so that:

1. The circles in the test pattern are as round as possible, and
2. The test pattern is slightly larger than the mask appearing in front of the kinescope.

If linearity is not correct, the circles will be flattened or egg-shaped.

In judging *vertical* linearity, it helps if you lay your head on your shoulder and look sideways at the picture. This makes vertical nonlinearity more apparent.

Many TV owners are extremely fussy about having the circles exactly round. Some of them check the circles by holding a small plate in front of the screen, and others measure the wedges to see if they are equal lengths. In some TV areas, this makes life extremely difficult for the television technicians, because it is an unfortunate fact that some stations do not transmit good linearity. Also, the linearity may be different from one camera to another. In one particular city, if the receiver is adjusted so the test-pattern circle is round on the first station, the second station will be egg-shaped vertically, and the third station will be egg-shaped horizontally.

In the latter case, it is sometimes necessary for the technician to adjust the receiver for the best compromise linearity on all stations in the area. But it is preferable to select the station that is most likely to have correct linearity, and adjust the receiver on this station, because in time the other stations will correct their nonlinearity.

Frequently, it is necessary to install and adjust TV receivers at night or when there are regular programs, but no test patterns on the air. In such cases, it is possible to use a "bar generator" which produces a number of vertical and horizontal bars on the picture. These bars are "synced" by the sync. pulses so that the bars remain stationary on the picture. The set is then adjusted for equal spacing between the bars.

A very useful hint for checking and adjusting vertical linearity when there are only programs and no test patterns on the air, is to turn the vertical-hold control so the picture keeps rolling slowly from top to bottom. If the vertical linearity is good, the black vertical-blanking bar will remain the same thickness in all positions from the top to the bottom. This is shown in Figure 3. There is no similar easy way to check horizontal linearity.

In a few test patterns, all circles are intentionally omitted: regularly spaced horizontal and vertical lines are used to check and adjust linearity, as shown in Figure 4. This de

(*Continued on Page 2S, Column 1.*)

TELEVISION SERVICE

(*Continued from Page 1S*)

sign of test pattern is the answer to the technician's prayers, because it avoids the trouble of the fussy customer who insists that the circles be exactly round, yet it provides a satisfactory means for adjusting linearity within reasonable limits.

Of course nothing that has been stated here should be used as an alibi to excuse poor linearity that is caused by incorrect adjustment of the receiver, or by failure or change in value of components, in the deflection circuits of the receiver. The question of whether the station or the receiver is at fault can be determined by experience with a number of different receivers, or by the use of a bar generator.

Most TV set owners complain if the picture does not completely fill the mask, but they do not complain if a small portion of the picture is hidden behind the mask.

It would seem reasonable to make the picture exactly the same size as the mask, but this is impractical for several reasons:

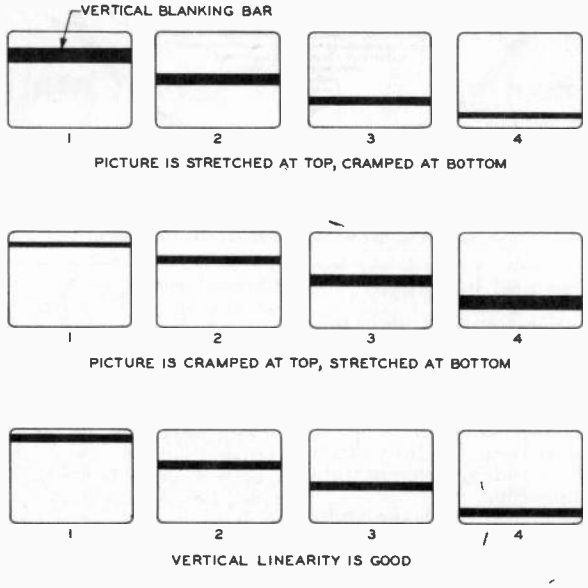


FIGURE 3. Checking Vertical Linearity with Vertical Blocking Bar.

1. There is considerable variation in the horizontal and vertical blanking time on different stations, and on different sync. generators in the same stations. Actually there may be as much as ¼-inch difference in height or width on a 10-inch set when the station changes from one sync. generator to another, or from a local to a relay program.
2. The line voltage at the receiver may change. This changes the deflection voltages and high-voltages, both of which affect the picture size. (For this reason also, a TV set that is adjusted in the service shop for correct size may be found to have a smaller or larger picture on the owner's power supply.)
3. There may be some drift in the picture size or centering during the first hour of operation.

For these and other reasons, experience has taught that it is a practical necessity to make the picture extend slightly beyond the mask.

The test pattern should be designed with this in mind. For example, if the pattern has small circles or other information too close to the corners, it may cause unnecessary headaches for the technician, because when the picture is made larger than the mask, the designs in the corner may be partly hidden. Some TV owners want to know why.

Centering

The two arcs of circles in the NBC pattern, Figure 1, are an aid in adjusting horizontal centering. The main black circle is used in adjusting vertical centering.

Focus

The television signal controls the intensity of the electron beam in the kinescope. This beam produces a fluorescent spot of light on the inner face of the kinescope. It is this spot that "paints" the picture.

For good definition or resolution, or ability to make very small details evident and distinct in the picture, the spot must be small and round. It should be small enough so that the horizontal line structure can be seen distinctly, and it should be round in order to get the best definition from top to bottom and from left to right.

If the spot is slightly elliptical or oval shaped, instead of round, it may be rotated by adjusting the focus control, as described below.

The vertical and horizontal wedges are used in adjusting focus; they provide a check on the shape of the kinescope spot, as follows:

Closely examine the separate lines toward the narrow end of the vertical wedge, and adjust the focus control so these lines are in best focus, or sharpest.

Then look at the lines toward the narrow end of the horizontal wedge, and see if a slight readjustment of focus improves the focus on these lines.

If best focus on both the vertical and horizontal wedges is obtained at the same setting of the focus control, it may be assumed that the spot is round.

If the setting for best focus is slightly different for the two wedges, it indicates that the spot is oval. In this case it is generally *preferable to adjust the control for best focus on the vertical wedge.*

In most test patterns, the narrow ends of the wedges are intentionally placed near the center of the test pattern. By focusing here, it ensures that the picture will be in best focus at the center, which is desirable.

Some test patterns, such as Figure 1, provide additional wedges in the corners to show whether the focus is good on the sides and top and bottom, compared with the center.

If focus is not reasonably uniform over the entire picture, it may indicate need for repositioning of the ion-trap magnet, or the focusing coil and focusing control.

If the test pattern does not have wedges in the corners, the horizontal scanning lines can be observed to check focus over the entire screen.

When focus must be adjusted on a program, without the help of a test pattern, it is generally satisfactory to adjust for the finest scanning lines near the center of the picture.

In projection receivers, there is the usual electrical focus control for the kinescope, and the mechanical focusing adjustments for the optical system. To prevent confusion, and to get the best possible pictures, it is important to adjust the electrical focus first while looking at the kinescope, or at the reflection of the kinescope in the spherical mirror. The optical system should not be touched until the test pattern as seen on the kinescope is sharp and clear.

If the test pattern has crossed lines in the corners and in the center of each side, and in the center of the top and bottom, they are very helpful in adjusting the reflective optical systems that are used in some projection receivers.

FIGURE 4. Horizontal and Vertical Lines instead of circles for Linearity Check.

Contrast and brightness

Almost all test patterns include some form of shading blocks to assist in correctly adjusting contrast and brightness.

The shading blocks have at least five shades, black, dark grey, medium grey, light grey, and white. The contrast and brightness should be adjusted so that each shade is distinguishable. With contrast too high, the darker greys become black, and with contrast too low, the lighter greys become washed out.

If brightness and contrast are set too high, the definition will suffer, owing to "blooming" of the kinescope spot. When the spot is too bright, it grows larger, and best definition depends on a small spot.

Instead of shading blocks, some test patterns have a section of light grey background with white lettering, and a section of darker grey background with black lettering. This serves the same purpose on the shading blocks, and is more foolproof, because few persons are aware of the significance of the shading blocks.

Many test patterns are designed with a grey background to secure an average modulation of 50%. This reduces the need for readjusting brightness and contrast when the station switches from the test pattern to an average program. It is a desirable feature (except when photographing a pattern).

Interlacing

The horizontal wedges show lack of interlacing by a moire pattern, or wavy effect, toward the narrow end of the horizontal wedges. A moire pattern is somewhat similar to the effect that is seen when looking through two pieces of window screening, or at a piece of satin.

The appearance of poor interlacing can usually be duplicated by turning the vertical-hold control slowly until the picture is just beginning to move down. At this point the moire effect will be seen on the horizontal wedges. Also the horizontal scanning lines, instead of interlacing, will lay over each other, or "pair". This pairing can be observed by the increased dark space between the horizontal scanning lines, particularly near the top of the picture.

Lack of correct interlace also produces a jagged or saw-tooth effect ondiagonal lines and on the circles. The Indian-head test pattern has diagonal lines for this reason.

Some test patterns have closely-spaced concentric circles which show the moire effect if interlacing is poor.

On some TV stations, all receivers may show evidence of poor interlace

(*Continued on Page 3S, Column 3*)

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.

CARDBOARD STRIP PROTECTS SPEAKER

When servicing a radio with the speaker attached to the chassis, I always put a piece of cardboard over the front of the speaker to protect the cone from damage. A set of several sizes, including the oval shapes, were cut slightly larger than the speaker rim, and are kept handy. Using scotch or masking tape mounts them quickly.

Shep Clark
c/o Clark Radio Co.
246 Clinton St.
New York, N. Y.

THREE OLD TIMERS WORTH REPEATING

An ordinary pipe cleaner does a quick job of cleaning between variable condenser plates.

Donald F. Burke
887 Stafford Road
Fall River, Mass.

For hard-to-see places, I use a dental mirror to check connections and read color codes.

C. B. De Munbrun
1504 Hayes Street
Muskogee, Okla.

A set of small glass jars, such as those mayonnaise or mustard come in, makes a perfect small parts storage bin. I fasten the lids to the underside of the shelf—a quick twist removes or replaces the jar, and parts are always in view.

J. A. Johnson
Johnson Radio
302 Oakwood St.
Austin, Minn.

NOTES ON HANDLING TRANSMISSION LINES

Although transmission lines of the phenolic ribbon variety should not be spliced, if perfect match is to be maintained, it sometimes becomes necessary to do this. If so, use extra caution to make small neat soldered joints in as straight a line as possible, maintaining the separation between conductors.

For insulation of the splice, avoid using friction tape. Cut several small patches of the phenolic from the loose end of the line and place about the joint. Applying heat with a soldering iron or clothes iron will make a homogenous, water tight bond. Do not apply too much heat since this will burn the phenolic material.

Wentworth Bros.
36 Washington Ter.
East Orange, N. J.

BOOSTER MAGNET HOLDS HARD-TO-REACH SCREWS

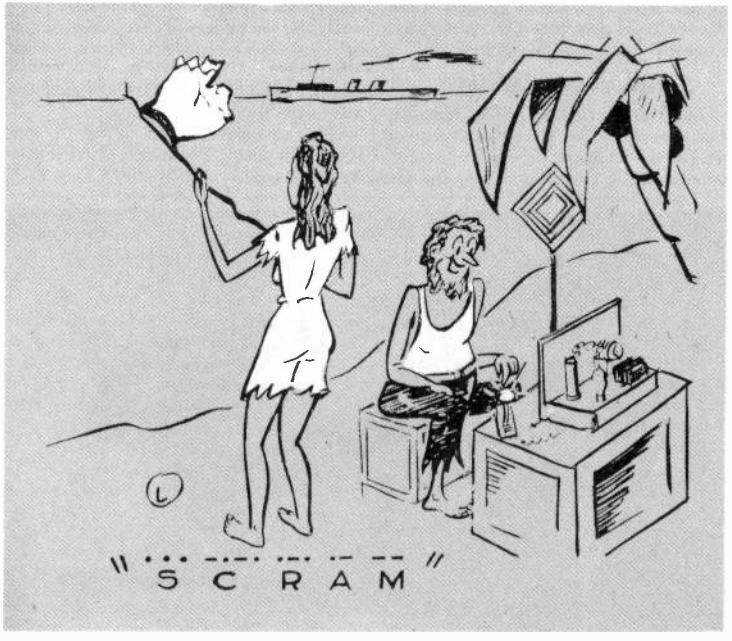
I have removed the magnet from a discarded P-M speaker and consider it an important tool on my bench. Whenever there's a hard-to-reach screw or nut, I slip a screwdriver through the center hole of the magnet. The added magnetism of the alnico does a perfect job of energizing the screwdriver and holding the screw until it is started.

Harry C. Wenzel
Wenzel's Radio Service
224 Main Street
Windsor Locks, Conn.

CIGAR BOX FILE KEEPS PARTS INVENTORY HANDY

To help me in reordering parts and tubes, I keep a cigar box on the work bench. Whenever a part is used, I tear off the carton lid and drop it in my "inventory" box. When the salesman calls, I need only check the box for parts and tubes I need, saving valuable time for myself as well as the salesman.

William L. Kimmons
Oxford Electric Co.
Box 406
Oxford, Mississippi



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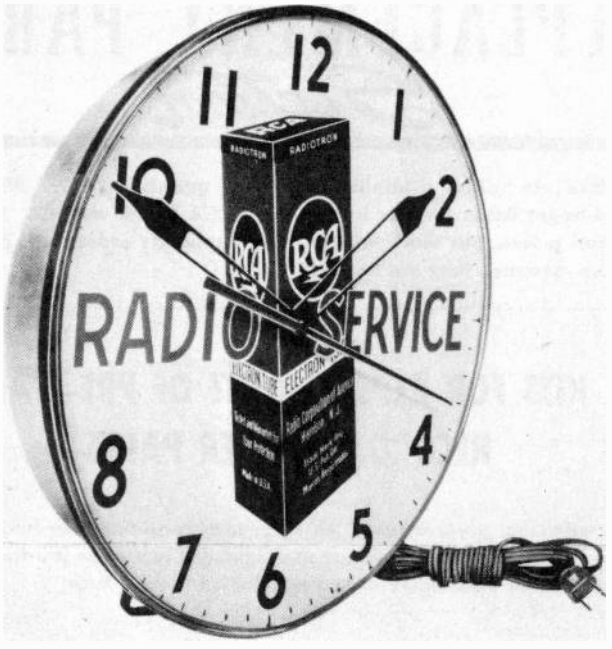
on the horizontal wedges. In this case there is no need to worry about the receivers. It is likely that there will be no evidence of poor interlacing when the station switches to a program. In looking at a test pattern on a kinescope, there may be an optical illusion of vertical jitters. By looking at a small part of the scanning lines through a ¼-inch hole in a piece of thin cardboard held against the face of the kinescope, it is possible to determine whether the jitter is an optical effect, or real.

Ed. Note: The July-August issue of RCA RADIO SERVICE NEWS will continue this thorough coverage of the use of the test pattern, taking up "Low Frequency Phase Shift, Vertical, and Horizontal Resolution." Part II of the "Television Service" series will appear in the Sept.-Oct. issue. Don't miss these coming issues.



A NEW CLOCK FOR SERVICE-DEALERS

Improved Time-Ad Display Only $9.50; for Window or Store

A new RCA commercial-size clock, designed for functional service as well as attractive point-of-sale identification, has been made available by the Tube Department to meet a long felt need for a dependable low-cost time device. Better materials, lower price and exceptional eye-appeal are among its top features.

It's housed in a metal case, with a translucent, indirectly lighted face that's easy to read from a distance. Across the center of the face, in large black letters, is the simple message —"Radio Service". Vertically down the center is the familiar RCA or Cunningham tube carton in its distinctive colors.

The synchronous clock movement is quiet and dependable—designed to operate on 110 volts at 60 cycles. The hour and minute hands are of open frame work with solid pointers, designed not to obstruct the view of the face. There's also sweep-second hand in red.

The big news is the low price—only $9.50 including tax! Here's a constant servant, attracting attention. That's good advertising for any service-dealer—and at a minimum of expense.

The clock is available in both RCA and Cunningham brands—RCA stock number 2F519; Cunningham stock number 2F520. See your RCA or Cunningham distributor and place your order today.

REPLACEMENT PARTS Section

Here are values available in limited quantities only. Many are hard-to-get items for use in the older RCA Victor models. At these special prices, our stock will soon be depleted; orders will be filled in the sequence they are received.

KITS FOR REPLACEMENT OF PRE-WAR RECORD CHANGER PARTS

In order that pre-war record changers may continue in service, several kits have been assembled and are now available to replace pre-war record changer parts, which have been unavailable for some time.

Kit Stock No.	*Old Stock No.*	*Description of Part*
73647—replaces—	39671	—Pickup Arm for RP-160
	or	
	38650	—Pickup Arm for RP-160
73648—replaces—	38603	—Pivot Arm for RP-160 (Aluminum Arm)
73649—replaces—	38627	—Cam & Pawl for RP-158, RP-160 and RP-162
	and	
	38656	—Ratchet Lever for RP-158, RP-160, RP-161 and RP-162
73650—replaces—	38466	—Record Separator Shelf and Shaft for RP-151
73652—replaces—	38651	—Pickup Arm Trip Lever for RP-151
73655—replaces—	38652	—Record Separator Shelf and Shaft for RP-151
73657—replaces—	38632	—Trip Lever for RP-158, RP-160, RP-161 and RP-162
73660—replaces—	38618	—Return Lever for RP-158, RP-160 and RP-162
	or	
	39751	—Return Lever for RP-158, RP-160, RP-161 and RP-162
	and	
	38619	Pickup Arm Cam for RP-158, RP-160 and RP-162

Following is a breakdown of the kits listed, parts for which are available from stock separately

STOCK NO. 73647—KIT—CONSISTS OF THE FOLLOWING:

Stock No.	*Description*	*Stock No.*	*Description*
1	—73426—Pickup Arm	1	—38609—Set Screw
1	—73427—Pivot Arm	1	—38605—Set Screw
1	—73428—Cable	1	—39674—Rivet
2	—38458—Speed Nuts	1	—30585—Spring
1	—38608—Set Screw	1	—70332—Crystal

STOCK NO 73648—KIT—CONSISTS OF THE FOLLOWING:

Stock No.	*Description*	*Stock No.*	*Description*
1	—73427—Pivot Arm	1	—30585—Spring
1	—39674—Rivet	1	—Instruction Sheet

STOCK NO. 73649—KIT—CONSISTS OF THE FOLLOWING:

Stock No.	*Description*	*Stock No.*	*Description*
1	—80853—Cam & Pawl	1	—72359—Spring
1	—73053—Ratchet Lever	1	—Instruction Sheet

STOCK NO. 73650—KIT—CONSISTS OF THE FOLLOWING:

Stock No.	*Description*	*Stock No.*	*Description*
2	—73651—Shaft & Shelf	2	—72414—Screw
2	—72416—Knife	2	—70895—Spring
2	—72415—Cap		

STOCK NO. 73652—KIT—CONSISTS OF THE FOLLOWING:

Stock No.	*Description*	*Stock No.*	*Description*
1	—73653—Trip Lever	1	—73654—Collar
1	—73556—Split Bushing	2	—10941—Ball
	1—Instruction Sheet		

STOCK NO. 73655—KIT—CONSISTS OF THE FOLLOWING:

Stock No.	*Description*	*Stock No.*	*Description*
1	—73656—Shaft & Shelf	1	—72414—Screw
1	—72416—Knife	1	—70895—Spring
1	—72415—Cap		

STOCK NO. 73657—KIT—CONSISTS OF THE FOLLOWING:

Stock No.	*Description*	*Stock No.*	*Description*
1	—70856—Trip Lever	1	—73556—Split Bushing
	1—Instruction Sheet		

STOCK NO. 73660—KIT—CONSISTS OF THE FOLLOWING:

Stock No.	*Description*	*Stock No.*	*Description*
1	—70847—Return Lever	1	—7355—Cam
	1—Instruction Sheet		

RCA PHONOGRAPH PICKUP ARM ASSEMBLY FEATURES MAGIC TONE CELL CRYSTAL

A precision-made Crystal Phonograph Pickup Arm Assembly, designed for the RCA Magic Tone Cell, has just been announced by the Tube Department. The lightweight aluminum tone arm has been especially engineered for maximum performance of the already well-known Magic Tone Cell crystal cartridge.

Versatility is one of the prime considerations of the new pickup assembly (209X1). It may be mounted and used with a manual record player, making it an excellent unit for those constructing their own instruments, or it may be used as a direct replacement with improved response for pickup arms in such automatic record changers as RCA Models V135, V140, V175, V209, V210, and VHR212. It is also a direct replacement for the pickup arm assembly of record changer R556P.

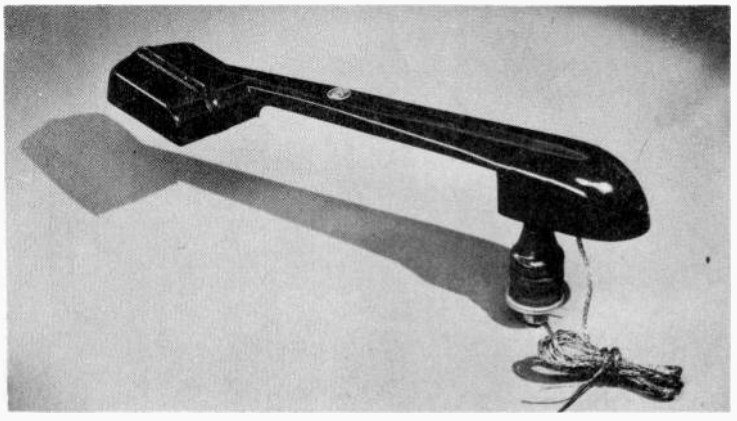
The Magic Tone Cell, which is fitted with a permanent-type sapphire stylus, has a low noise-level and provides improved record reproduction and decreased record wear. The stylus is protected from damage in use by a permanent guard.

Application Notes

Installation of the 209X1 Pick-up arm assembly as a replacement in automatic changers requires reference to RCA Service Notes for the particular record-changer involved. Basic electrical connections are the same as for original arms. When the 209X1 is used with an audio amplifier, the output of the crystal is applied to the grid of the first stage in the conventional manner. Care must be taken to prevent a large dc grid bias voltage from appearing across the crystal, since if this precaution is not taken, the crystal may be damaged.

Various types of compensation circuits, as shown in the instructions accompanying each unit, give differing tonal quality to the reproduced sound. The choice of circuit and electrical values depends on individual preference, and will vary with the installation. In general, decreasing the shunt resistance across the pick-up decreases bass response and increasing the shunt resistance increases bass response.

The suggested list price of the RCA Crystal Phonograph Pickup Arm Assembly, RCA-209X1, is $13.



QUALITY CONTROL

(*Continued from Page 2, Column 2*)

Constant quality control continues through bulb washing, screen settling, application of the inside conductive coating, and bulb bake-out. For example, the completed bulb assembly with its screen is evacuated and fluoresced by means of a spark coil in a dark room to prevent any defective assemblies from being made into finished tubes. The gun or mount structure comes together with the finished bulb assembly at the multihead automatic sealing machines. Statistical sampling checks are maintained here, too. Seal shape, glass strain, and metallurgical tests are made to control the results from this operation.

The straight-line exhaust is the next step in the process. Statistical sampling checks are made every four hours on tubes from each one of the units in this machine to insure that they have been properly pumped out and are free from gas. If the readings on the tubes from any unit exceed the control limits, that unit is taken from the machine to be repaired and a spare unit takes its place to prevent any slowing down of production.

Threading of the stem wires through the base pins after exhaust is facilitated by a cleverly designed "needle threader" tool which prevents errors in pin connections. Infra-red bake-out of the base cement and pin soldering under controlled conditions follow. Base torsion tests are made on the spot, to prove the strength of basing; also, samples are sent from this point to the laboratory where they are soaked in water at a temperature of 50° Centigrade for eighteen hours and then given a torsion test. This latter control is a safeguard against base loosening in the field under hot, humid conditions.

After getter flashing and aging, the tube is ready for final inspections and tests. Contour, plug and ring gauges are used to check mechanical dimensions on a 100% basis. Appearance and workmanship items are scanned critically. Tubes passing the mechanical inspection are then subjected to some eighteen electrical tests for characteristics such as light output, beam current, cathode condition, spot cutoff, and other factors.

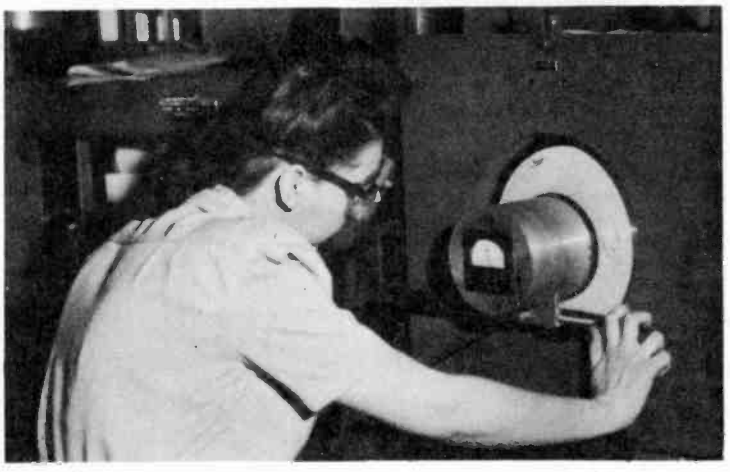
To round out the quality control picture, random-selected, finished tubes are periodically sent to the laboratory for recorded readings and life tests. Some 29 design and operating characteristics are checked with precision laboratory equipment.

The credit for the highly developed quality controls which we have described, goes to the engineers and the supervisors of the RCA Lancaster plant, who know that customer satisfaction comes first. Their inbred quality-mindedness is perhaps the greatest assurance the customer has that RCA kinescopes will always be top-quality tubes.

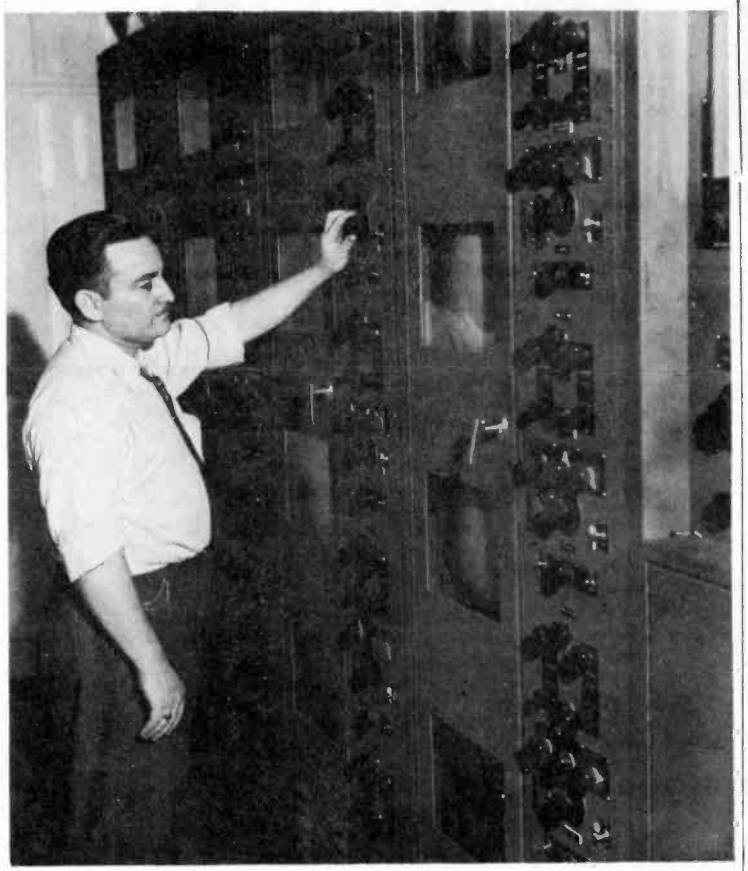
(Photographs accompanying this article are by G. W. Hemmerly, RCA, Lancaster, Pa.)

FINISHED PRODUCT CHECKED CAREFULLY

A precision electronic test set assures that the cathode-grid spacing is held to ±.0005 inch—a quality control step in the process within the factory.



One of the 100% factory test operations is the measurement of light output and color of an RCA-10BP4 kinescope. Here, again, close tolerances must be met if the kinescope is to become part of a finished TV receiver.



Final life tests are made on a sampling basis. 10BP4 kinescopes are operated day and night in these elaborate life test racks under simulated operating conditions more severe than might be encountered in the field.

BATTERY SUMMER SALES CAMPAIGN MEETS WIDE TRADE ENTHUSIASM

Biggest Battery Promotional Program Ever Introduced Hits Stride

The RCA "Summer Battery Sales Campaign", utilizing one of the most comprehensive arrays of sales promotional material ever to hit the radio battery field, has set a terrific pace of sales activity. Designed to help dealers and servicemen obtain their share of the lucrative "portable radio" business through active merchandising and balanced inventories, the success of the campaign has been overwhelming.

Outstanding among the many new promotional pieces featured in the RCA program are such novel items as the metal Counter Merchandiser and the Carry-Kit.

The all-steel Counter Merchandiser, a powerful, silent salesman, holds several combinations of portable A and B batteries. Set prominently on your counter, it places RCA batteries where they can be seen—a reminder to your customers that the portable radio season is in full swing.

The Carry-Kit is the new, handy way to sell VS036 "A" batteries. There are eight of these popular batteries in a neat little case with a convenient handle—eight Radio 'A' cells of the type used in many of the small portables.

Are you enjoying your full share of the battery business? Why not ask your RCA Battery distributor for full details on these and other exciting "personalized" Sales Promotion pieces, and cash in on an unequalled sales campaign designed exclusively for you by RCA.

Push RCA Tubes and Watch Your Business Grow!

All RCA tubes are backed by dramatic sales displays that lead more customers your way.

In tubes for television...it's RCA

• RCA makes the tubes that create profitable, new markets. Television . . . with its great business opportunities . . . is an example.

You can always count on RCA to provide you with the greatest line of miniature, metal, and glass tubes . . . and a powerful array of sales promotion material to help you sell them.

When you push RCA tubes you're selling the brand that holds No. 1 customer acceptance. RCA tubes help your business grow because they build store traffic . . . lead customers to count on you for *all* their radio needs.

Get the full details on RCA tubes and sales promotion material from your local RCA Tube Distributor today.

THE FOUNTAINHEAD OF MODERN TUBE DEVELOPMENT IS RCA

RADIO SERVICE NEWS

RCA Radio Service News is published by the RCA Tube Department in the interest of radio servicemen and dealers everywhere. It is distributed free of charge to members of the radio-service fraternity through the courtesy of RCA and its tube, battery, test equipment and parts distributors.