

RADIO SERVICE NEWS

PUBLISHED · IN · THE · INTEREST · OF · RADIO · SERVICE · SALES · ENGINEERS

JANUARY, 1941

CAMDEN, NEW JERSEY

Vol. VI, No. 2

NEW CATALOG IS BEING RELEASED BY DISTRIBUTORS

Amateur Equipment and Parts Guide Included

The most complete showing of RCA test equipment ever compiled is presented in the 1941 edition of the RCA Radio and Television Test Equipment Catalog (No. 105), according to L. A. Goodwin, Jr., in charge of Test Equipment and Accessories Sales. Several outstanding new radio and television test equipments, and phonograph modernization assemblies, are included.

The catalog of 28 pages—printed in two colors on heavy coated paper—opens with a presentation of the popular RCA Dynamic Demonstrator, which dramatizes radio circuit theory and action to show how complicated circuits operate. It concludes with another new feature—a listing of transmitting and special purpose tubes. The new test equipment items include the Junior Volt-Ohmyst, low-cost electronic voltmeter-ohmmeter; a Deluxe Tube Tester and Pre-heater; the newly-styled 3-inch Cathode-Ray Oscillograph, No. 155; and the A-C Test Oscillator, No. 167.

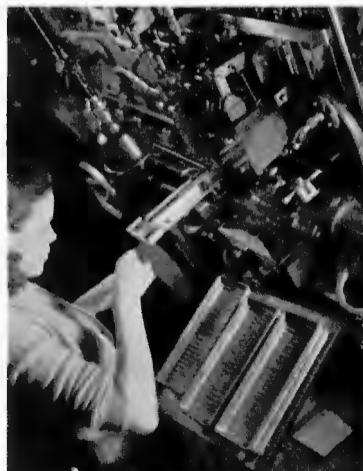
Amateur Items Listed

Another new feature is the inclusion of a complete series of transmitting-tube sockets, coinciding with the announcement of substantially lower prices on six popular types.

Most notable addition to the pages devoted to parts and accessories is a home recorder and automatic record player unit designed for phonograph modernization. In addition, RCA's popular replacement parts guide, included in the 1940 catalog, has been brought up to date.

The catalog also shows microphones, radio, FM, and television antennas, radio and television parts and accessories, and devotes a full page to the new AR-77 Communication Receiver, which marks an important advance in receiver design for amateur and general communication services.

"Grids"



This radio tube grid winder spins out perfectly wound grids at the rate of 500 an hour! This machine, made up of 450 individual parts, turns out finished grids to fit any receiving tube and with the windings pitched to meet the geometric requirements of any individual type.

A New Model



"Jinx" Falkenburg, who was voted one of New York's most popular models, is here presenting the Radiola Model 515. The Model 515, the newest of the Radiola line, is a six tube, two band instrument and is rapidly gaining in popularity. However if you are the type that becomes confused when two such popular models are in one picture, turn to page two.

Extra Mailings for Owners of RCA Equipment

Latest Information Will Be Sent Direct to Purchasers

After an extensive survey made by W. H. Bohlke, director of Test Equipment Sales for the RCA Manufacturing Co. it was discovered that the testing instruments made by his company had opened up a wider range of possibilities than had at first been imagined. In order that all owners of RCA testing instruments may profit by the newly devised applications as soon as they are reported, RCA intends to mail this information direct to all registered owners of RCA Test Equipment. Many owners, purchasers of Chanalysts especially, have already registered. Those who have not previously registered or have purchased additional RCA Test Equipment since registering may have their names placed on this mailing list by filling in and mailing the coupon which has been inserted for their convenience on page 2 of this issue.

This procedure has been found advisable because of the comparatively unexplored field that has been opened up by the new RCA instruments such as the Chanalyst and the VoltOhmyst. Signal tracing with such instruments as these, if conscientiously applied need only be limited by the imagination because the instruments themselves seem to be able to register every rational application. Instead of letting knowledge of these new applications be spread slowly this mailing will keep these RCA instrument owners informed as rapidly as possible.

Jobbers Attend "Know Your Stuff" Sales Schools

Series of Meetings Will Train Salesmen in Equipment Selling

Because of the rapid advance made in the past two years, in test equipment products, a series of meetings are being held by the RCA Manufacturing Co. in an effort to acquaint the parts distributor's salesmen with the latest equipment applications and servicing methods. These meetings are designated as "Know Your Stuff" meetings and as an educational medium, really live up to the name. The meetings were planned and are being directed by L. W. Teegarden, sales manager for the Tube and Equipment Division of the RCA Manufacturing Co. He states that the distributors are welcoming the opportunity being offered and are determined to "know their stuff".

Meetings have already been held in Philadelphia, New York and Boston. Three meetings have been scheduled for January. Cleveland, Jan. 6; Detroit, Jan. 8, and Chicago, Jan. 10. Other meetings will be scheduled later.

The real benefits of these meetings will go to the servicemen who purchase test equipment. They will be able to get proper and accurate instruction on equipment applications from their distributor. By means of the "Dynamic Demonstrator" they will be able to see any test instrument actually used in any application. This means that no serviceman need buy blindly, but can select his equipment by actual proof of operation.

NEW RCA JUNIOR VOLTOHMYST STARTS NEW ERA IN METERS

Compact Low-cost Servicing Instrument Has A-C Scales in Addition to Famous Rider Circuit

The famous Rider VoltOhmyst circuit, providing a convenient push-pull electronic DC Voltmeter-Ohmmeter with a resistance range ratio wide enough for engineering and servicing requirements for years to come, has been applied to a compact, low-cost instrument known as the RCA Junior VoltOhmyst. Its price, \$34.95, has initiated a new era of high quality, low cost equipment for radio service and general electrical industries.

3,666,666 Ohms Per Volt

The RCA Junior VoltOhmyst incorporates every feature required for the ideal testing unit of its type. It is extremely useful for servicing radio and television receivers, transmitters, aircraft radio, sound amplification and reinforcement systems, facsimile and other types of equipment. Its features are similar to the laboratory type RCA 163 Volt-Ohmyst.

The new instrument offers servicemen many of the high quality features of the 163 VoltOhmyst, with the addition of an isolated AC voltmeter circuit. It's most appreciated feature is the complete meter overload protection on the DC voltage and Ohm scales. No damage can be done if the probe slips to a high voltage point when a low DC voltage is being measured.

The input resistance for measuring DC voltages is constant at 11,000,000 Ohms, allowing voltages to be read in high resistance circuits. On the 3 volt scale this gives a meter with a sensitivity of 3,666,666 ohms per volt! This feature permits the serviceman to read AVC, FM Discriminator, and many other voltages which are impossible with the ordinary meter. A Signal Tracing type probe lead is provided.

Meter is Protected

The DC voltmeter circuit has six ranges—0 to 3, 10, 30, 100, 300, and 1000 volts. It is not necessary to guess what scale is required before the leads are connected. The leads can be put in place, and then the range switch may be turned until the meter reads on scale. Considerable saving in time results.

This feature is also of value when resistance is being measured. In an effort to save time, resistances are

(Continued on page 8)

1939 RCA DATA SHEETS BOUND IN ONE VOLUME

Is Latest Addition to RCA Servicing Library

The largest and most complete bound volume of service notes ever issued by RCA Victor, covering all 1939 radio and radio-phonograph instruments and a number of 1940 models, has been made available for dealers and servicemen. The 480-page book, including more than 500 illustrations, has a net price to Service Dealers of \$1.50. It is the eleventh in a series dating back to 1923.

More than 150 circuits are shown with schematic diagrams, or nearly double the number included in the 1938 edition. The volume also includes complete instruction books on new RCA test equipment, a new index for all bound RCA Victor service notes, and a special supplementary data section for receiver and equipment models covered in the 1939 and preceding volumes.

Television Included

All service information is presented in the original, unabridged form, including complete alignment data. The volume also includes television service notes on the latest type receivers. The test equipment instruction-service notes cover such up-to-the-minute instruments as the Signalyst, VoltOhmyst, Five-inch CRO, Television Sweep Oscillator, Crystal Calibrator, and Tube Tester. In addition, one of the most valuable inclusions in the bound volume is the 48-page new edition of the famous RCA Rider Chanalyst instruction book. These notes themselves represent a storehouse of practical technical information on radio testing methods.

RECORD SALES ARE ON THE INCREASE

Record sales during the month of October set a new 17-year high, it was announced last week by RCA Victor.

Total sales of all classifications topped every similar period since 1924 with a large share of the increase due to extreme activity in the Red Seal division where "album sets are going like single records", officials said.

In particular, "The Heart of the Symphony" album has broken every existing album sales record for the first month and a half of sale.

"Can Take It"

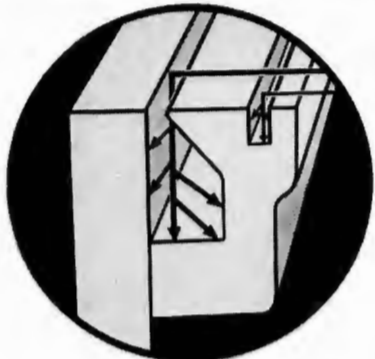


Showing the New Junior Volt-Ohmyst which really has what it takes. Built to withstand terrific punishment yet is accurate.

RCA TONE GUARD KEEPS UNWANTED SOUNDS INSIDE

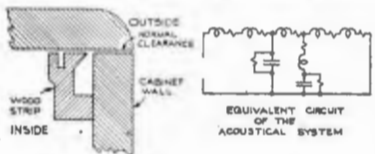
Acoustically Absorbs All Mechanical Reproduction Reaching the Lid Opening

There has been built into a number of the new 1941 RCA Victrola phonographs and radio-phonograph combinations a feature known as the "Tone Guard." Its function is to absorb undesirable sounds that originate in the phonograph compartment. The principle of operation is an advanced development of a principle discovered by Hiram Percy Maxim which was applied to the silencing of gunfire. The Maxim silencer, as it was called, is no doubt familiar to most persons.



This cross-section shows the grooves or "moats" which trap and extinguish high-frequency sounds inherent in all record-playing instruments.

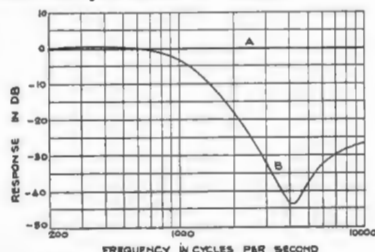
One problem with electrical phonograph reproducers has been the mechanical reproduction of sound by the vibrating parts of the electrical pickup head. These sounds are high in frequency and very distracting, especially when the electrical system is operated at too low a volume to drown them out. Various methods have been used in the past to overcome this difficulty. These methods were more or less effective, but not until electrical filtering principles were applied acoustically in the form of the RCA Tone Guard was real progress made.



The troublesome sounds escape from the phonograph compartment by means of the crack between the lid and the cabinet. Instead of trying to make this an air-tight seal, it has proved to be simpler and more effective to place expansion grooves leading off from this crack which will effectively absorb the undesirable sounds. They act as a low pass filter and function in a manner similar to an electrical low pass filter.

All other opportunities for these sounds to escape must be blocked. The bottom of the phonograph compartment is completely sealed. A soundproof covering fixed to the motorboard shelf completely encloses the motor and mechanical parts of record changer. When this is done, the only remaining escape for this sound is the lid crack which is acoustically sealed by the Tone Guard.

A cross-section view of the Tone Guard and the equivalent electrical circuit are shown. The series elements are formed by the normal slit between the cabinet and the lid. The shunt elements are formed by slots in the wood strip. That the filtering action is very effective is shown by curve "B" below.



Curve "A" — Response frequency characteristic of conventional door and cabinet (Taken as unity).

Curve "B" — Response frequency characteristic of Tone Guard relative to "A", showing reduction of high-frequency noise.

RADIOLA MODEL 515 NEWEST ADDITION TO FAMOUS LINE

Makes More Popular Than Ever the Only Group of Radios Made for Servicemen Exclusively



The newest Radiola, Model 515, has six tubes and a short wave band. Its exceptionally fine performance and attractive appearance will make it the leader of the Radiola line.

The Radiola line of receiving instruments, the only line of radio receivers designed, manufactured and marketed for servicemen only, has been further enhanced by the addition of the Model 515.

Servicemen have long needed a small, lightweight radio receiver with a sales structure that would meet their requirements. The need for such an instrument was twofold. First, servicemen needed a receiver to lend to their customers while repairs were being made in the shop on the customer's instrument, or for the housewife who did not want to miss her daily stories while repairs were being made in the home. Second, many sales opportunities are uncovered by servicemen, especially for a "second set." These second receivers are usually small and are used in the kitchen or bedroom. It was to fill these requirements that the Radiola line of instruments was created.

To expedite the transportation of these receivers, a sturdy carrying case is available. It is 10 inches high, 11 inches wide, and 7 inches deep which gives room enough to accommodate four instruments with

extra room for literature that can be left with the customers.

The Radiola line was announced in June, 1940. It now consists of 12 instruments. There are 8 5-tube, AC-DC models; 1 AC-DC Battery model; 1 conventional Record Player; 1 wireless Record Player; and now the latest member, the Model 515.

The Model 515 is a two-band, 6-tube model, operating on either AC or DC. Its complement of 6 RCA Preferred Type Tubes consists of 2-12SK7, 1-12SA7, 1-12SQ7, 1-35L6GT, and 1-35Z5GT. Some of its other features are, one stage of RF amplification, special built-in loop for foreign reception, magnetite core IF transformers, vernier tuning, 5-inch PM loudspeaker, tone control, AVC, underwriters' approval, etc. Aside from the electrical considerations, it is housed in an attractive cabinet as can be seen in the illustration. Those servicemen who have need for a table model that is above the average in performance will find the Model 515 very interesting, especially as its price is only \$24.95.

Sealed in Silence

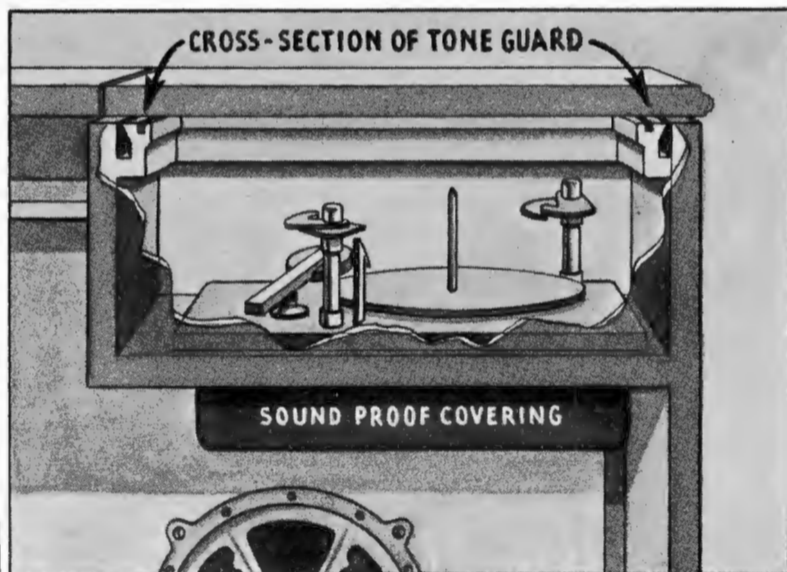


Diagram showing how turntable and Automatic Record-changer mechanism are "sealed in silence" by special sound proofed covering.

USEFUL BOOKLET INCLUDED WITH JR. VOLTOHMYST

Helpful Information by Use of Typical Circuits

There is packed with each Junior VoltOhmyst an instruction book that the purchaser will find of great value. Because of the unique circuit of the instrument a complete schematic diagram and a discussion of the theory of operation is given. The schematic diagram is exception-

ally well drawn so that the theory of operation will be apparent. In the text the push pull bridge type of circuit is explained. A considerable portion of the book is devoted to applications. A typical radio receiver schematic is shown and typical measurements indicated. As can be seen from this diagram the points at which voltages can be measured are numerous. Bias voltages, etc. can be measured through tuned circuits without detuning the circuit. All these various points are shown on the typical schematic.

Aside from being useful for guidance in the operation of the instrument the instruction book can prove to be educational. The VoltOhmyst circuit is somewhat unique and much can be learned about measuring circuits by studying the schematic and the explanatory text.

RCA TUBE PREFERENCE LIST IS REDUCED FROM 36 TO 31

Future Benefits to Servicemen Will Result from Manufacturers Using Fewer Tube Types

The RCA Preferred Type Tube Program passes its first anniversary this month with the announcement



L. W. TEEGARDEN was made to the Industry at the Institute of Radio Engineers Convention at Rochester, N. Y., Nov. 11, 12, 13.

L. W. Teegarden, Manager of the RCA Tube and Equipment Division, made the announcement after pointing to the Program's first year of fulfilled promises of greater economy and higher quality, to its reception by a total of 19 radio set manufacturers, and to its direct benefit to every tube jobber and serviceman.

Three types, 1G4G, 1G6G and 6N7G, have been eliminated from the preference list as the result of a

in the AC-DC set field for seven and eight tube receivers. The tube complement for such a receiver, if drawn from 150 milliamper tubes on the preference list, adds up to a greater heater voltage than the normal line voltage. So 6.3 volt 300 milliamper tubes must be substituted, although there have been no power output and rectifier types on the preference list useful for this purpose. Thus it is that types 25L6GT and 25Z6GT have been substituted on the list for types 12SJ7 and 12C8.

"Some order has come out of the chaos in the tube industry in the past year," Mr. Teegarden declared. "Nearly a score of radio manufacturers have supported the RCA Preferred Type program by designing their receivers around the preferred type tubes. Results have been important in lowered costs all along the line, and in better tubes.

"Now the RCA Preferred Type program assumes more importance than ever before. The total number of tube types in the renewal market has passed 500, despite the fact that every type of radio can be designed around the comparative handful on the preference list. The RCA pro-

RECEIVING TUBE TYPES

PREFERENCE LIST

RECTIFIERS	INDICATOR TUBE	CONVERTERS	VOLTAGE AMPLIFIERS			DIODE DETECTOR	POWER AMPLIFIERS
			Single	Twin	with Diode(s)		
		1A7-GT	1N5-GT		1H5-GT		3Q5-GT
5U4-G	6U5/6G5	6SA7	6AB7	6SC7	6BB-G	6H6	6F6-G
5Y3-G			6J5		6SQ7		6K6-GT
6X5-GT			6SF5		6SR7		6V6-GT
			6SJ7				
			6SK7				
25Z6-GT		12SA7	12SK7	12SC7	12SQ7		25L6-GT
35Z5-GT							35L6-GT
							50L6-GT

RCA MANUFACTURING COMPANY, INC.

swing away from type "B" audio systems by design engineers throughout the radio industry. Type 2A3 is becoming less and less popular with engineers, too, so that it has been dropped. The fifth deletion was accomplished by the program itself. It was found necessary to include both types 6J5 and 6J5GT in the original list because of a price difference. Increased volume of orders for the 6J5 has made possible manufacturing economies to bring its cost into competition with the 6J5GT, which has been deleted from the list.

Two changes of types on the list were caused by a growing tendency

gram moves into its second year to the betterment of the manufacturer, distributor, serviceman and public."

Mr. Teegarden also said, "Nearly three quarters of all receiving tubes produced by RCA are concentrated in the preference list. Tube parts are now produced by mass production methods never before possible, and such parts as bases, shells, heaters, and cathodes have been standardized to affect further economies. In addition, manufacturers endorsing the program have watched their own costs go down substantially as they were able to standardize on tube sockets and other component parts."

MAILING LIST COUPON

I wish to have my name placed on the RCA mailing list to receive mailings on RCA Test Equipment. I own the following RCA instruments:

Stock No. Serial No.

.....

.....

.....

.....

.....

Name.....

St. and No.....

City.....

State.....

Mail coupon to:

Tube & Equipment Division
RCA Manufacturing Co., Inc.
Camden, New Jersey

Charming



Bea Wain, Victor Record artist, is also an amateur photographer. However, we vote for her to stay in front of the lens.

RCA ELECTRON MICROSCOPE IS TRIUMPH OF RESEARCH

Revealing New Worlds Hitherto Unknown Will Be Invaluable Aid to Science and Industry

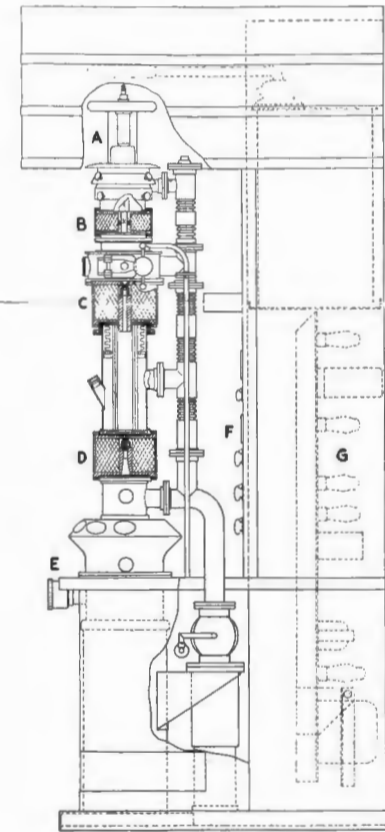
It is not probable that any radio service man will be called upon to make repairs on an RCA Electron Microscope at the present time. However this latest product of RCA research is likely to open the way to such sensational new developments and is so important from a scientific standpoint, that everyone associated with electronic devices should take an interest in it.

To understand the role that the electron microscope will play, requires delving into one of the most interesting chapters of science, which is the development of means for penetrating the world of the infinitely small.

Microscope Vital to Research

The science of medicine was revolutionized when it was discovered that many diseases were caused by bacteria which could be seen under the microscope but whose existence had hitherto been unsuspected. Specific cures were found and treatments for maladies developed through the use of the microscope. Science and industry also benefited as the microscope opened up avenues of research which led to a better understanding of processes and fundamentals.

As the microscope became more generally used, it became apparent that there were many things too small to be seen, even with the finest instruments.



Simplified drawing showing the construction of the electron microscope. A—Electron Source; B—Condenser Coil; C—Objective Coil; D—Projection Coil; E—Fluorescent Screen or Photographic Plate; F—Control Panel; G—Electrical Supply.

The development of microscopical research seemed, therefore, to be a closed chapter. The seriousness of this limitation was evident to the bacteriologist in that tiny, unseen particles were the cause of many ailments. In the industrial field the problem was also present because the structures of colloids and finely divided particles could not be thoroughly understood because they were invisible.

Need Vision Without Light

Although many ingenious indirect methods for exploring the world lying beyond the limits of the microscope in atomic and nuclear physics, in physical chemistry, biology, etc., were invented, they could not fill the need for visual observation. Recent discoveries now have shown a new way open for obtaining visual observation.

Within the last few years a new branch of physics has been developed, known at present by the name of "electron optics" or "geometric electron optics." It is based mainly on the recognition of analogies in the behavior of light and electron

beams, and is another example of the well known fact that a fresh viewpoint on old observations may help start an unforeseen development in the particular field involved.

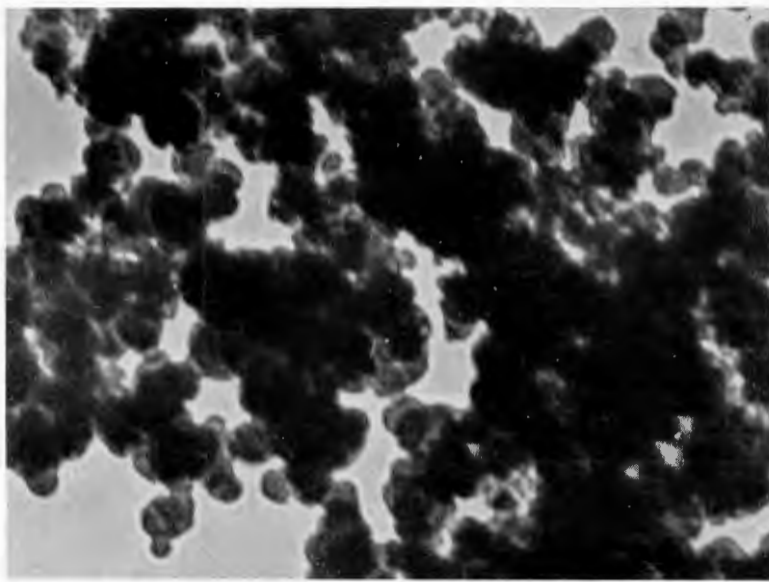
Among the new instruments made possible by electron optics, one, the electron microscope, is of great importance.

It is based on the fact that highly magnified images could be made with such electron optical systems by combining two or more electronic "lenses." The great advantage of such a microscope lies in the fact that the limit is no longer the wavelength of visible light. Modern physicists consider the electron as a particle having a wave nature, the wavelength being a function of the electron velocity. For electron velocities between 30,000 and 100,000 volts the wavelength is only 1/100,000th of the wavelength of visible light. That means that we can have optical systems with incomparably better resolving powers. Theoretically, atomic dimensions should be resolved with this new kind of microscope. The practical form of the new instrument is not yet perfected to such a degree, but even the present instruments allow magnification more than fifty times that of the best imaginable light microscope. Taking the useful limit of a light microscope as being 2,000, a comparison gives us 100,000 as a useful limit of the magnification of the present day electron microscopes, and there is no doubt that further research will increase the frontiers of observation.

Description of the RCA Electron Microscope

In designing the RCA electron microscope great stress was put on producing an instrument of utmost simplicity—one easy to operate, in-

Extreme Magnification



Photograph of carbon black. Magnification: 72,000 times.



Photograph of organisms causing green pus formations in flesh wounds showing unstained flagella. Magnification: 26,500 times.

stall, and transport. The result is a very compact, self-contained instrument which is especially suitable as a research tool. The electron source is operated at voltages between 30,000 and 60,000, and, to provide ample protection of the operator from the high voltage and X-rays, is enclosed in a lead encased upper hood. The electron beam coming from this source is concentrated on the specimen by the field produced in the condenser lens coil. The

specimen, which is supported on a very thin nitrocellulose membrane suspended across the opening of a fine mesh screen, is clamped in the tip of a cartridge very close to the second fields lens produced in the objective coil. A plate which supports the specimen cartridge constitutes the movable stage. The specimen motion is transmitted to this plate from the exterior of the evacuated system by means of fine screws and metal flexible bellows.

Provides Visual Observation

The electrons, after passing through the specimen, are focused by the object lens coil into an intermediate image and the projection lens coil produces a further magnified image on the large fluorescent screen in the final viewing chamber. Six observation windows, which are placed to allow binocular vision for careful observation, enable a number of spectators to view the image simultaneously. After a selected field of view is focused, and the magnification adjusted to the desired value, a photographic record may be made by merely removing the fluorescent screen and allowing the electron image to strike a photographic plate, which is carried in a holder in the vacuum, immediately below the screen. Magnifications from 1500 to 25,000 are obtainable and the definition obtained in the photographs is sufficiently fine to allow further optical enlargement to obtain full

useful magnification. Specimens and photographic plates are easily and quickly interchangeable without breaking the vacuum of the main body of the instrument. This has been accomplished by the use of the "air-lock" principle. A new departure, however, is the use of inter-connected operations to reduce the chance of unintentionally breaking the vacuum of the main system by mistaken operation of the vacuum valves, and to speed up the interchanging of plates or specimens by reducing the number of operations necessary. For instance, to change a specimen, the operation of one handle lifts the specimen from the objective lens, places it in a separate compartment, and isolates the compartment from the main body of the instrument; the operation of a second handle releases the outside door to the compartment and breaks the vacuum in the compartment simultaneously. The specimen cartridge can then be replaced by an already loaded second cartridge and the reverse procedure followed. The operation of the second handle clamps the outside door, closes the inlet valve and opens a valve which connects the compartment with an auxiliary pumping system. After an interval of about thirty seconds an additional manipulation of this second handle isolates the compartment from the auxiliary pumping system, and a final manipulation of the first handle opens the compartment, removes the cartridge, and places it in the objective field ready for operation.

Accurate Specimen Replacement

So exact is the replacement that if a specimen is removed for additional experiments and replaced, the same field is obtained and only a slight adjustment of the focus, if any, is necessary. In order to facilitate the initial adjustment of the specimen, three ports are provided for viewing the intermediate image on a fluorescent screen close to the plane of the projection lens coil. The relatively low magnification (about 100 diameters) of this image makes it easy to select the most interesting or pertinent part of the specimen and move it into position to be magnified further by the projection lens. The reloading of the photographic chamber is carried out in a very similar manner. A new feature of the photographic chamber is the use of a photographic plate long enough to record a number of large images. This effects a great saving of loading time per picture, and enables series exposures to be taken quickly and under stable conditions.

Aid to Science

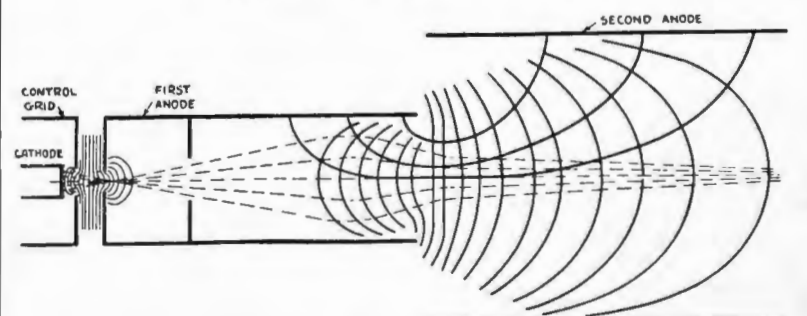
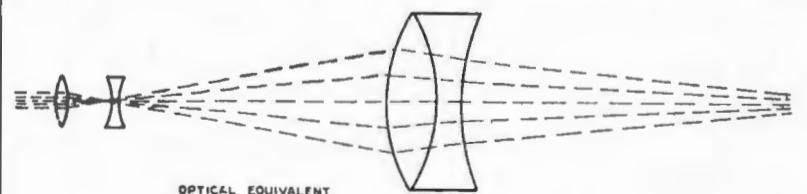
Photographs taken with the RCA electron microscope prove that the instrument is a very valuable research tool, not only in the fields of bacteriology, but also in any field where small particles, at the limit of visibility of light microscopes, are investigated. This includes the study of a great number of industrial materials, as for instance, colloidal particles of any kind, fine fibers, pigments, etc. In bacteriology, internal structures of bacteria which had not been known before have been revealed. Filterable viruses causing a number of unexplained diseases offer an important field.

Thus the electron microscope opens up a new world, a world of the infinitely small, whose very existence could only be surmised with other instruments. RCA's development work has provided a valuable tool for science and industry—one which may be used with the same facility as an optical microscope, but whose scope extends into the region of things more minute than the very wavelength of light.

RCA Jobbers See Microscope



H. M. Carpenter, center, of Thuro Radio Distributors in Tampa, and Fred Morris, right, of the Specialty Distributing Company in Atlanta, two of America's best-known operators—look over one of America's best known inventions... the RCA Electron Microscope. At left is Dr. V. K. Zworykin, internationally known physicist and Associate Director of the RCA Research Laboratories.



The television electron gun illustrates an important application of electron optics.

RCA RADIO SERVICE NEWS

Published in the interest of the Radio

Service - Sales - Engineers

by

RCA MANUFACTURING COMPANY, INC.

Tube and Equipment Division

Camden, New Jersey

Volume VI

JANUARY, 1941

Number 2

RADIO'S TWENTIETH ANNIVERSARY

This fall marked the end of two decades of radio broadcasting. Just twenty years ago station KDKA in Pittsburgh inaugurated the art of radio broadcasting by transmitting the results of the election at which Warren G. Harding was elected to the presidency of the United States. For many miles throughout the adjacent countryside pioneer listeners strained at their earphones to hear the news. With a deft adjustment of a variocoupler, and a jiggle of a catwhisker, they initiated an industry that in twenty years has become so vast that it provides livelihood for hundreds of thousands of workers. It has so become a part of everyone's daily life that it is taken for granted and depended upon for news and entertainment. Millions are spent yearly by program sponsors to bring to the public the best in the entertainment world.

It is not until these services fail that the owner of a receiving instrument really appreciates its use. From the humble beginnings of the crystal and catwhisker the radio receiving instrument has developed into a highly scientific electrical mechanism. No longer can the average owner push this and pull that and restore the receiver to operation. It requires a competent technician equipped with technical instruments to repair and readjust the modern radio receiver. As radio receivers increase in complexity so must the radio serviceman's equipment be made adaptable to accommodate these advances.

The RCA Manufacturing Co. maintains laboratories where the development of testing equipment for the radio serviceman is the only consideration. Not only are they designed for present requirements but as far as possible they are designed to work with receiving instruments that will be marketed next year and the year after. This insures the serviceman of MINIMIZED OBSOLESCENCE which is so vital to profitable enterprise. These instruments are adaptable to new jobs and are designed to do old jobs better. It behooves all enterprising servicemen to study all new circuits and to keep their measuring equipment up to date. It is up to the individual to do the first and the RCA Manufacturing Co. provides testing equipment that will do the latter.

It Comes Out Here—on WEA F



Station WEA F's powerful new transmitter, New York's clearest voice, went on the air Friday evening, Nov. 8. Here are some of its ultra-modern features. It's at Port Washington, L. I., and NBC engineers say it will set a new standard of service to listeners in crowded, noisy New York.

Then and Now



The first election broadcast. This broadcast was transmitted by America's pioneer station KDKA. Note the microphone being used. The entire transmitter sits on the bench in the corner.



Studio 8H at Radio City in New York during the recent election. Here returns were received, compiled and broadcast to the entire nation. More than three thousand spectators jammed into the studio to watch and listen.

FLOOD AND FIRE CONTROL HANDLED VIA SHORT WAVE

Network of Radio Stations Helps Prevent Disasters

The Commonwealth of Pennsylvania now has the largest and most complete radio system in the world for forest fire and flood control, according to G. Albert Stewart, secretary of the Department of Forests and Waters.

Built by the RCA Manufacturing Company and designed and installed by the Raymond Rosen Company, Philadelphia distributors for RCA, the low power, high frequency equipment provides instantaneous communication for the entire state east of Altoona. Line of eight difficulties of high frequency equipment were solved by the installation of six automatic, unattended relay stations located at strategic points on mountain tops.

Although both the fire and flood control systems to a great extent use the same towers and equipment, actually they function independently. Available for both systems are approximately 100 "pack-a-back" transceivers for emergency work and about 200 stationary transmitter and receiver units. All equipment is battery operated.

For flood prediction and control, men stationed at 32 points along the Susquehanna, Juniata and Delaware River watersheds report twice daily (hourly during emergencies) to Harrisburg via the relay stations. Headquarters at Harrisburg collects the data, makes up and sends out forecasts and warnings. By means of these continuous reports, the Department of Forests and Waters can predict flood stages 24 hours in advance.

For fire prevention, 97 fire towers, each with radio receiving and transmitting equipment, are divided into 16 districts, inter-related and nominally subject to control from Harrisburg but with enough authority to handle fires in their own districts.

Commonwealth spokesmen announced the system was far superior and more economical than the previous phone connections which were not always immediately available and which might be disrupted during violent fires or floods. Also, they pointed out, telephone service is not available in many remote locations.

The automatic relay is a simplex, two-way installation capable of picking up signals of low power from surrounding transmitters, and retransmitting them at higher power in the 30 to 41 megacycle band.

The portable transceiver, RCA Model MI-7597, consists of a four tube chassis housed in a leather

carrying case, a second leather battery case, half-wave antenna, carbon button microphone and a pair of head receivers: total weight about 30 pounds. The flexible wire antenna is put in service simply by throwing its far end over a tree branch.

The chassis contains a two-stage audio amplifier utilizing a type 30 input tube and type 31 output tube. It is switched to serve as microphone input and modulation amplifier for transmission and as an audio amplifier during reception.

The same push-pull r-f stage serves as both modulated oscillator for transmission and self-quenched super regenerative detector for reception. It employs a pair of type 30 tubes. Terminal output power is about one-half watt.

The tower transmitter-receiver, RCA Model MI-7595, consists of two distinctly separate sections built on a single chassis and housed in a small desk cabinet. Crystal controlled carrier power is approximately two watts. Both transmitter and receiver sections are operated in conjunction with a common antenna system and switching is arranged so that the receiver, normally connected to the antenna, is in continuous operation. A single self-restoring key permits rapid change-over to transmitter operation. The transmitter is normally inoperative and arranged to consume no battery power when not in actual use.

Need for the installation was driven home after the famous St. Patrick's Day flood of 1936 which destroyed more than \$212,000,000 worth of Pennsylvania property and crippled communication lines. Work was begun in February, 1939, after an intensive investigation by the Pennsylvania Department of Forests and Waters, the United States Department of Agriculture and the U. S. Department of the Interior.

PIPER COUPE NOW USES RCA RADIO

Built-in at Factory to Safeguard Air Traveler

The Piper Aircraft Corporation and the RCA Manufacturing Company have completed arrangements for the installation of two-way RCA radio equipment in the famed two-place Piper Coupe at the former Company's Lock Haven, Pa. factory. Transmitting and receiving equipment and a new type of antenna reel system are supplied with the fast-selling Coupes for \$466.25.

The custom-fitted radio installation was on display in a Piper Coupe in the RCA Exhibit at the New York World's Fair.

The coupes may also be purchased with factory-installed radio receivers alone, or with a receiver

equipped with a radio range filter which enables the pilot to listen to range signals, voice broadcasts, or both together.

The complete two-way equipment includes the RCA AVR-15A receiver, Model AVT-15A 7½-watt transmitter, and Model AVA-41 Antenna Reel System. All three units have CAA type certification. The range is over 100 miles under ordinary conditions, satisfying CAA requirements for instrument flight.

The equipment is installed complete with headphones, microphones, etc., and includes shielding of electrical wiring and complete bonding of the plane. The receiver alone is priced at \$148.75 when installed at the Piper factory, while the transmitter antenna reel system is \$61 installed. The range filter is \$33.50.

The Civil Aeronautics Authority recently purchased twelve of these planes, equipped with RCA two-way radio.

The AVT-15A transmitter is an extremely lightweight unit incorporating the power supply and transmitter in one case. The power supply is arranged to operate the receiver as well, further reducing overall equipment weight.

The AVR-15A receiver is the result of over a year of engineering effort to design a receiver approaching the standards of airline equipment in performance, yet small enough for easy installation in light aircraft.

It is tunable over the radio range and weather broadcast band of 200 to 410 kc, and has a separate traffic control channel. A switch is provided for instant change over to the traffic control frequency of 278 kc. This feature is of great importance when approaching an airport with the receiver tuned to the radio range station. Selection of either radio range or traffic control is accomplished by flipping a switch on the control panel. Large specially selected tuning knobs permit easy adjustment even with gloved hands.

The RCA AVA-41 transmitter antenna system is an improved type of retractable aircraft antenna. In addition to a simplified reeling system which automatically locks when the handle is released, it has another important feature in its ability to radiate a signal over a short distance when reeled in. This is a necessity when flying in formation or close to other planes.

RECORD PLAYER FOR THEATRES IS ANNOUNCED

Magnetic Type Pickup Is Made to Match Film Sound

A new record player unit especially designed for use in motion picture theatres in conjunction with film sound reproducing equipment is being announced by the Photophone Division of the RCA Manufacturing Company. It is ideal for providing music between shows, or in making special announcements with the aid of recordings.

Housed in an attractively finished all-metal fire proof cabinet that bears full Underwriters approval, the new unit provides special compensation in the pickup circuit so that the same characteristics are obtained from the average record as are obtained from the average film sound track. Comparable sound quality between records and film sound tracks is assured.

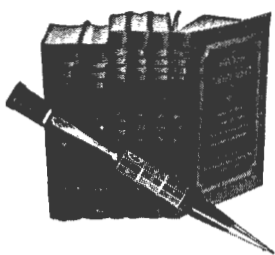
The record player's volume control permits adjustment of the turntable output so that it may be maintained at the same output level as that of the soundhead. Uniform operation over wide variations in temperature and humidity is obtained through the use of a magnetic-type pickup.

A self-starting, synchronous motor is employed. A rubber-cushioned, rim-driven turntable protects against variations in speed and mechanical vibrations. The cabinet is provided with adjustable shockproof mountings to reduce vibrations still further.

The unit weighs 25 pounds, measures 9 inches high, 16 inches wide and 12¼ inches deep. It is designated as Model MI-9730.

A letter arrived in the RCA Victor offices the other day from the heart of bomb-torn London, creased and soiled and marked by the censor. The writer apologized for his presumption, then asked if he could have a list of all fretted instrument records issued since 1900. Chin up, old boy, carry on.

Service Tips



Now you can win your choice of a handsome RCA Service Engineer's Pencil or any volume of RCA Victor Service Notes by sending tips to RCA Radio Service News, Camden, New Jersey . . . Service Tips must be acceptable for either RCA Radio Service News or the RCA Radio Service Tip File. . . . All tips become the property of RCA to be used as they see fit. . . . Service Tips are our readers' ideas, not ours. While RCA Radio Service News believes they are worthwhile, we cannot be responsible for results.

Stromberg-Carlson 520 PL—1941 Model

Webster Phono unit trips half way through playing of record. We have found that in assembling this automatic record changer, the fork-like piece on which the adjusting screw underneath the mechanism is located was not inserted in the protruding pin but was on the outside of the pin. Remedy: Remove screw, washer and large spring from bottom arm assembly and engage fork in pin and reassemble.

Ted J. Telaak,
657 Broadway,
Buffalo, New York.

Another Dial Light Tester

On my service panel I mount a standard flush receptacle, and just above it a socket for a standard seven and one-half watt Mazda lamp. An adaptor, candelabra size socket to two-prong standard plug, a pair of test leads, male cap on one end, alligator clips on the other, and a seven and one-half watt Mazda lamp completes the equipment.

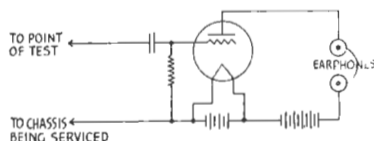
All dial lights and flash light bulbs will go in a candelabra size socket. Simply press in and touch the side contact. By removing the candelabra adaptor and plugging in the test leads, I have a fairly low current continuity indicator.

Henry Lichtman,
c/o Shearn's Radio Service,
775 Allerton Avenue,
Bronx, New York.

Elementary Signal Tracer

Editor's Note—It was the utility of such devices that led John Rider on in his search for the ideal Signal Tracing instrument. The result was the famous RCA Rider Chanalyst. If you haven't tried Signal Tracing with the Chanalyst, you should.

In servicing receivers, the voltage test method is found inadequate because it does not show up trouble in the antenna coil primary, open or shorted secondary, shorted tuning condenser and trimmers, open by-pass condensers, I.F. trimmers, etc.



This "Signal Test" Unit (diagram above) is very cheap to make and very effective. It is a one-tube grid leak detector with earphones, but minus the tuning coil and condenser. With it, I can follow the signal from the 1st grid lead to the 1st R.F. tube. Shorts and opens would be found immediately. The test prod goes to the plate of that tube, and so on to the other tubes, all the way down to the output tube and output transformer. In this way, I can locate weak stages, track down sources of excessive hum and find out sources of distortion, etc. The tester is small and light.

Use a type 30 tube, or one of the new battery types. Use anywhere from a 12-22 V "B" Battery. Grid leak—1 to 3 meg. Grid condenser—100 to 250 mmf.

Harold Abrahams,
600 West 162nd Street,
New York City, New York.

RCA Radio 45X11

Severe distortion, stations peak at two places. No A.V.C.

Cause: Points No. 5 and No. 3 on loop connections tied together which grounded grids of 12SA7 and 12SK7 tubes. Refer to diagram.

Remedy: Cut wire across these two points and realign set.

William O. Moore,
Moore's Radio Service,
11 Delmar Street,
Houston, Texas.

Smoke Them Out

Sometimes a troublesome intermittent cut-off of signal, either part or all volume, is caused by an open in one of the coil circuits.

A six volt battery, an ammeter and a rheostat to control the current from zero to the maximum amount wanted has helped me on these jobs. An 0-5 amp meter reads high enough to test wire up to No. 18.

Determine the size of wire on the suspected coil; then consult your tables to find the safe current carrying capacity of that size wire. Connect the test leads to the leads from the coil (which must be disconnected from the receiver) and gradually turn the rheostat from zero position until the meter shows that about fifty percent overload is being put on coil. This will usually show up a broken wire or defective joint.

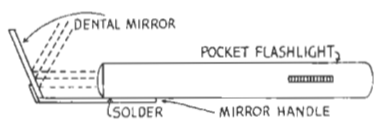
Overloads higher than above recommended may be applied for flash periods, being careful that the insulation is not damaged.

Bernard M. Wills,
Oroville, Wash.

Periscope

This kink will find a ready use around the service man's shop. It can be made up in a few minutes and is excellent for visual inspection, especially in midget sets.

With this gadget, hidden parts are easily seen through the reflecting mirror that cannot be otherwise seen.

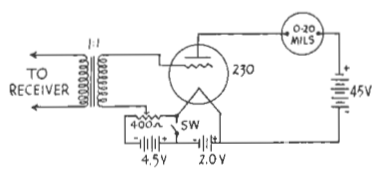


A small pocket flashlight is used. This is of the pencil variety and should have a metal case. The dental mirror can be obtained for a dime at the local drug store. Part of the handle of the dental mirror is cut off and soldered to the flashlight case as shown above.

Herman R. Wallin,
231 Centre Street,
New York City, New York.

Sleuthing Interference

I have a visual interference indicating device which I think can be used by fellows in the interference elimination work.

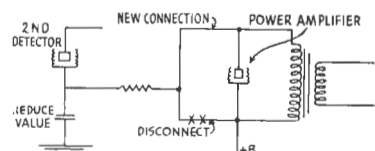


Since the output of the receiver may indicate audibly in the headphones or speaker the same apparent strength over a considerable area on each side of the interference source, this device will indicate the proximity of the noise.

James Marek,
2523 So. 58th Avenue,
Cicero, Illinois.

Bass Compensation AC-DC Midgets

Many small sets can have their tone improved considerably merely by connecting the detector screen-grid resistor to the output tube plate instead of to the B+ of the set. The screen-grid is then by-passed to

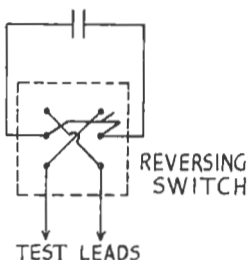


ground through as small a condenser as possible, just enough capacity to keep the set from oscillating. The best value for resistor and condenser vary in different sets so a little experimentation is necessary.

A. A. Burkmann,
59-18 57th Street,
Maspeth, Long Island,
New York.

Third Degree for Condensers

In checking intermittent by-pass condensers, I have found the illustrated "tool" of great help. It is made up of a high voltage, high capacity paper condenser and a double pole, double throw non-shorting switch. In use put the leads across the condenser to be tested, in the set, with the set turned on; then throw the switch back and forth.

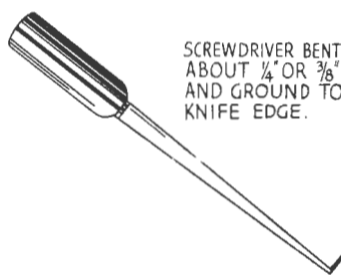


In one position the condenser in the unit takes on a charge and discharges in the opposite direction with a high surge. A few shocks and the faulty condenser often breaks down. A good condenser is not affected.

Lawrence L. LaZelle,
3649 - 45th Street,
San Diego, California.

Tube Remover

I have a handy tool to remove metal tubes. Also, it will remove



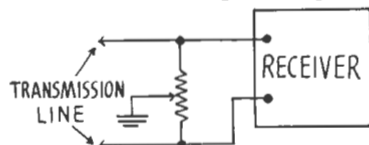
SCREWDRIVER BENT ABOUT 1/4" OR 3/8" AND GROUND TO KNIFE EDGE.

tubes from car sets which are quite unhandy to get at.

C. W. Jones,
Jones Radio Service,
Riverton,
Wyoming.

Noise Reducer

By putting a 70 ohm potentiometer across the leads of most double antennas and grounding the



center tap, nearly all noise is eliminated. This control is set only once.

Morse Radio Service,
126—4th Avenue,
Moline, Illinois.

Hum and Smoke

The set is an RCA Victor T8-14 and the complaint was overheating and hum. The smoke was caused by the heating of Resistor R-15. Upon checking the primary windings of the power transformer the static shield inside the transformer was found to be shorting both the high voltage and the 6 volt filament winding. The trouble was remedied by removing the lead that grounded the static shield to the chassis.

William Athas,
Bill's Radio Service,
3 Church Street,
Westbrook, Maine.

This Fits That

In a recent repair job I had a Majestic Model 181 Combination radio with a defective first audio transformer. I could not procure an exact duplicate from any distributor here, but found that the Jefferson No. 467-402 input transformer performed perfectly in the set.

W. O. Smitha,
5165 Baltimore Avenue,
Indianapolis, Indiana.

SIGNAL TRACING SERVICE TIPS

The Service Tips column in this publication has proved its popularity by the overwhelming response of our readers. Enough Service Tips have been received to fill many times the available space. We have conscientiously tried to pick the best and as many as possible. As a result, many engineer's pencils, volumes of Service Notes, etc. have been sent to contributors.

Now we wish to ask for a new variety of Service Tips, Service Tips which involve Signal Tracing. For such contributions involving the use of Signal Tracing and which are worthy of publication, we will up the ante a little. There are available an engineer's fountain pen and a tri-point pencil, both with the resistor code bands. The pencil is so designed that it carries three leads of different color and any color desired can be used. For your contributions of Signal Tracing Service Tips that merit publication, we will award either the fountain pen or the tri-point pencil.

Now, let's see what you can do. We hope you will display some real ingenuity because the pens and pencils are all wrapped, ready to go.

NEW MOVIE SOUND SCREEN EXCEEDS SMPE STANDARDS

Scientific Perforations Increase Light and Sound

Designed to obtain maximum efficiency in both light reflection and sound transmission characteristics through the employment of entirely new principles, the RCA Magic Screen is one of the most outstanding advances in the motion picture equipment business in many years, according to E. C. Cahill, Manager of the RCA Photophone Division.

Mr. Cahill said that scores of exhibitors had ordered the new screen sight unseen, and that the advance demand has been such that deliveries have fallen somewhat behind. He added that increased factory capacity has been arranged for to take care of all orders.

The screen has a plasticized surface, made up of a specially treated fibre pulp, on cloth backing. Years of research and experimentation have gone into determining the number and size of the perforations. As a result sound passes through the screen with maximum efficiency, yet light reflecting and picture detail qualities are outstanding.

Tests indicate that the Magic Screen's light reflection and sound transmission characteristics are superior to any other type of screen now available. Each Magic Screen is guaranteed to surpass the S.M.P.E. standard for sound transmission.

Stays Clean Longer

The smooth surface resists dust accumulation, hence stays clean longer. The surface is barren of aluminum, titanium, zinc, or other pigments, and incorporates none of the chemically unstable or highly evaporative compounds commonly used to treat ordinary screen surfaces. Thus it is unaffected by evaporation, and does not discolor or shed due to chemical reactions caused by atmospheric gasses or moisture.

The low cost of the RCA Magic Screen makes yearly replacement economically possible. In fact, a new screen every year may be had for approximately the same cost as would be entailed in resurfacing a screen of the ordinary type three or four times and then replacing it.

While contributing immensely to its sound transmission qualities, the Magic Screen's light weight also simplifies the job of hanging. A self-equalizing lacing cord automatically equalizes the tension on all sides of the screen and thus makes it unnecessary to readjust the lacings. The screen's lighter weight also makes possible a revolutionary new type of shipping container made of fibre, tubular in shape and with sturdy wooden ends. It is stronger than former wooden containers and reduces shipping costs materially.

"And to top off all these other advantages, there is still another of tremendous importance to every theatre exhibitor," Mr. Cahill pointed out. "Tests prove that the plasti-

DR. T. F. ANDERSON WILL STUDY NEW RCA MICROSCOPE

Scientist Will Attempt to Identify New Worlds Seen by New Instrument

Dr. Thomas F. Anderson, known in the scientific world for his research in biology, surface chemistry, and spectroscopy, has been named by a committee of distinguished scientists to receive the RCA Electron Microscope Fellowship.

Dr. Anderson, a native of Manitowoc, Wisconsin, took his Bachelor of Science degree at the California Institute of Technology in 1932. Following a year of graduate work in Munich, he returned to the United States and the California Institute, where he received his Ph.D. in 1936.

Since then he has done scientific research at the University of Chicago (1936-37) and the University of Wisconsin, where he was Investigator in Botany for two years previous to his appointment as instructor in Physical Chemistry. He has published a total of 13 technical papers on a wide variety of subjects.

In collaboration with the RCA Fellowship Committee, by whom he was appointed, Dr. Anderson is devoting a year to research with the electron microscope which was recently developed in the RCA research laboratories, and has now been made available for research workers in every field.

The terms of the Fellowship provide for investigation of biological problems with the RCA electron microscope, and for experimentation to develop techniques for obtaining the fullest benefits from the electron microscope.

TUBE PRICES ARE REVISED

A general revision in the prices of RCA radio receiving tubes to bring them into line with current manufacturing costs has been announced by L. W. Teegarden, Manager of the Tube and Equipment Division of the RCA Manufacturing Company. Net prices of some types have been increased slightly, while others have been reduced.

The price revision has given RCA the opportunity to re-classify some tube types in such a way that a better price structure results. New price brackets have also been set up.

The new prices concentrate approximately 40% of the renewal tube business in the 90 cent and \$1 list price brackets. Slightly less than 28% of the renewal business is now in the 60-cent to 80-cent bracket, while the balance of 32% is in the \$1.20 to \$2.75 category.

The price revision was first announced to all RCA receiving tube distributors in mid-October, to take effect November 1. New price list schedules are in the hands of jobbers handling the Cunningham, Radiotron and Victor brands.

cised surface permits superior reproduction from color film, sepia tones and black and white photography as well. This is possible because the screen is not color selective, and thus reflects efficiently all light reaching it."

Among the Magic Screen's many other features are superior flame-proof qualities; even distribution of light for all viewing angles, so that uniform picture brightness is made possible from all seats; soft, non-glaring picture reflection which enhances vision and facilitates observation of photographic depth and detail; and a saving on the amount of light required for normal picture brilliance.

The RCA Magic Screen is also available, at slight extra cost, with the patented "Evenlite" gradational perforation pattern. This provides normal perforations in the center panels of the screen, smaller perforations in a scientifically determined gradational series in adjacent panels, and a solid surface at the sides. This arrangement compensates for the lesser brightness at the sides of any projected picture resulting from inherent characteristics of all projection lenses. Thus with an "Evenlite" screen, patrons see pictures which are more uniformly bright from side to side.

Extremely Popular



Listening to the Voice of Experience on the beach is only one of the many uses of the RCA Personal Radio. They can be seen on trains, at picnics, ball games, or most anywhere.

RCA PERSONAL RADIO ENJOYS VOLUME SALES

Sensational Demands Retard Distribution

The RCA Victor Personal Radio, object of the most enthusiastic buyer's rush in radio history, has at last achieved distribution throughout the country after an unprecedented demand retarded its advance on new markets for several months.

First announced in the New York area in June, the Personal Radio set up sales records in virtually every marketing area when it was introduced. While buyers were still clamoring for it in New York, stocks in dealers' hands on the West Coast were exhausted in a matter of hours after its official debut in that area. The same thing happened in Boston, Detroit, Cleveland, Chicago, Pittsburgh and an ever-lengthening chain of new markets.

RCA Manufacturing Company plants at Camden and Bloomington, Ind., are now operating every available facility at capacity to keep up with the continuing demand for the tiny instrument. Deliveries are being made at present at a rate considerably above 500,000 sets a year.

RCA dealers and distributors report a tremendous interest in the Personal Radio as a gift item. Thousands of football enthusiasts and followers of other sports have made it a "must" item for themselves. New sales increases were evident as the Christmas season approached. Dealers tell of numerous "repeat" sales to owners presenting the tiny instrument to their friends.

Used by Celebrities

The phenomenal public interest in the Personal Radio has been heightened by the enthusiasm with which well known figures in virtually every walk of life have publicized it. Newspaper photographs of film and stage stars listening to the Personal Radio, and of prominent public officials such as Mayor La Guardia with it on their desks, has brought the utility of the instrument, and its truly "personal" character, home to the public.

This Mighty Midget goes by the model number of BP-10. Having four tubes powered by small batteries, it pulls in stations with surprising ease. The antenna loop is in the lid and by simply opening the lid the power is turned on automatically. Its weight is only four pounds. Such a receiver would not be possible were it not for the development of the tubes it uses. These tubes aside from having small glass envelopes do not have a base. The socket prongs are sealed directly into the glass of the tube. Its popularity is proven by the voluminous orders that the RCA factory is working overtime to fill. These little receivers can be seen on the streets, beaches and practically everywhere. A handle makes them as easy to carry as a camera. A shoulder strap can be attached if desired.

DISNEY PICTURE GIVEN REALISM BY "FANTASOUND"

RCA Third Dimensional Sound System Gives Directional Effect

The first public showing of Walt Disney's "Fantasia" in the Broadway Theatre in New York City, unveiled an entirely new type of motion picture sound recording and reproduction system which projects a complete third-dimensional effect of sound and music.

The system by which this has been made possible has been christened RCA "Fantasound" because, like the picture itself, represents an entirely new equipment arrangement and operational technique. To give direction to the sound, loudspeaker groups are placed at points from where it is desired to have sound emanate. Each loudspeaker group is driven from a separate amplifying system. Each amplifying system in turn has its individual sound track. In addition, a monitor sound track is employed to control the volume and turn on and off the various systems.

The application of multiple sound tracks in this manner has required several years to perfect. Leopold Stokowski, director of the Philadelphia Orchestra, who keenly appreciates the possibilities of the recording art, has been a moving force during the development of the multiple track sound recording process. RCA engineers, cooperating with Stokowski and Disney have perfected the RCA "Fantasound" equipment which is having its first public use in the showing of Disney's "Fantasia".

"Fantasia" is a screen play in the true Disney style that capitalizes on every possibility that RCA Fantasound has to offer. The music of the 103-piece Philadelphia Orchestra under the direction of Stokowski is the chief and sometimes the only actor. Mickey Mouse also has a stellar role and the picture combined with the unique sound effects are destined to inaugurate a new era in motion picture presentations.

The results can best be described as surprisingly delightful. The Disney experts who produced the picture had difficulty in believing their own ears when they first beheld their handiwork. They heard screen sounds come forth with flexibility for the first time. They followed the music with their ears and eyes all over the screen. In addition, they heard it coming from all around them in certain of the more exciting or dramatic parts.

"Fantasound" should prove an important step forward for the motion picture art. At present limited to "Fantasia" because of the elaborate sound reproducing system required for the theatre, it is expected nevertheless to form the basis for further research and development in the realm of sound on film.

Novel Display



In this novel display is shown the Radiola Model 515. It has six tubes, a short wave band and is the newest of the Radiola line.

REFERENCE DATA

(cut on dotted line and file)

7QB

Transformer Polarity:

On some production receivers, the leads from the primary winding of the output transformer are color-coded in a manner reverse to that shown in the Service Notes wiring diagram. That is, the red lead and the black-with-red tracer lead are interchanged.

1939 BOUND VOLUME

Contains 2nd-Production Notes:

Service Notes for the 2nd Production of the following models are not available separately, but are included in the 1939 Bound Volume.

- Models 45X-1, 45X-2.
- Models 45X-11, 45X-12, 45X-13.
- Models 46X-1, 46X-2, 46X-3.
- Model 94BP-1 Series.

The "Supplementary Data" section in the 1939 Bound Volume contains information on the 2nd Production of Models 5Q5, 5Q8, 6QU, U-10, U-12, and VA-22. Also information on Models 6QK8, BK-42, 45X, T-55 S, T-56, K-62, T-65, K-82, R-93F, and the "RCA Victrola Junior." Separate Service Notes will not be issued on these models.

GAIN DATA

Using 3-volt Fixed Bias:

To provide more definite operating conditions, the R-F and I-F gain data for RCA Victor Service Notes is now obtained with a fixed 3-volt bias on the A.V.C. bus.

To duplicate this gain data, it is necessary to connect a 3-volt bias battery temporarily to the set as indicated in the service notes. The negative side of the 3-volt battery should be connected to the A.V.C. bus, and the positive side of the battery should be connected to the chassis. (In a.c.-d.c. receivers, the positive side of the battery should be connected to the common negative wiring.)

The battery may consist of two small flashlight cells connected in series.

Use of the fixed bias eliminates necessity for shorting out the A.V.C. circuit, and minimizes difficulty due to over-loading with resultant grid current.

PHONOGRAPH MOTORS

Identifying Colors:

In order to facilitate identification in respect to frequency, Phonograph motors are marked either on the bottom or side with a large spot of paint as follows:

- 60 cyclesno mark
- 50 cyclesgreen
- 25 cycleswhite

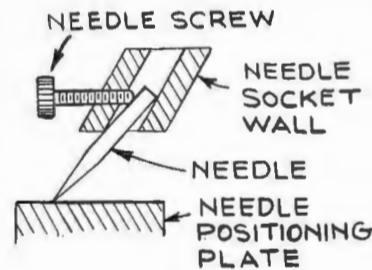
INSERTING PHONO NEEDLE

In RCA-Victor Top-Loading Pickups:

If when inserting a new needle in the pickup, the needle screw is loosened too much the needle may take up a cocked position in the needle socket when first dropped in through the loading hole, as shown in the sketch.

Under this condition if the screw is tightened while too heavy a pressure is applied to the top of the tone arm it is possible for the screw to be tightened against the needle without actually gripping the needle in the socket. If this occurs the needle will drop out when the tone arm is raised from the positioning plate.

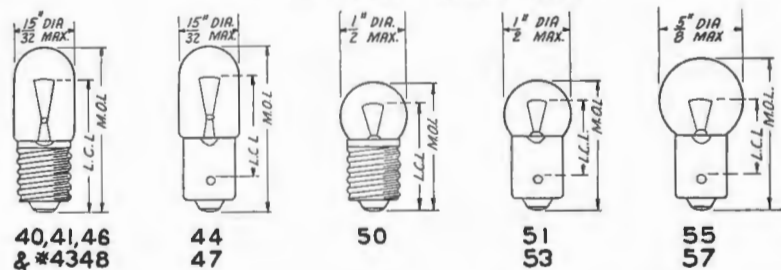
It will be found that if the screw is loosened only just far enough to permit the old needle to drop out, the new needle



Incorrect Needle Position in Top-Loading Pickups

inserted (over the positioning plate), and the screw tightened without pressing on top of the tone arm, the needle will be properly gripped in the socket and its tip will be clear of the positioning plate. If these directions are followed any RCA Victor Needle will be held tightly in the pickup socket and will not be injured on the positioning plate.

PILOT LAMPS AND DIAL LAMPS



RCA Stock No.	Mazda Type No.	Volts	Amps.	Normal Candle Power	Bulb	Base	Max. Over-all Length	Light Center Length
2755	41	2.5	0.5	0.5	T-3 1/4, Clear	Min. Screw	1 1/8	1 5/16
4340	40	6-8	0.15	0.5	T-3 1/4, Clear	Min. Screw	1 1/8	1 5/16
4348	—	2.0	0.06	—	T-3 1/4, Clear	Min. Screw	1 1/8	1 5/16
4991	50	6-8	0.2	1.0	G-3 1/2, Clear	Min. Screw	1 5/16	2 3/16
5117	55	6-8	0.4	1.5	G-4 1/2, Clear	Min. Bay	1 1/16	1/2
5226	46	6-8	0.25	0.75	T-3 1/4, Clear	Min. Screw	1 1/8	2 9/32
10438	—	120	0.08	—	S-11, White	Int. Screw	2 3/16	1 5/8
11765	51	6-8	0.2	1.0	G-3 1/2, Clear	Min. Bay	1 5/16	1 1/2
11891	44	6-8	0.25	0.75	T-3 1/4, Clear	Min. Bay	1 1/8	2 3/16
13186	63	6-8	0.54	3.0	G-6,	Cand. Bay	1 1/16	3/4
13952	53	12-16	0.1	—	G-3 1/2, Clear	Min. Bay	1 5/16	1/2
18981	—	130	—	—	S6, Clear	Cand. Screw	1 3/8	—
23216	—	120	0.05	—	S6, Clear	Cand. Screw	1 3/4	—
28351	46	6-8	0.25	—	T-3 1/4, Frosted	Min. Screw	1 3/8	2 9/32
30691	57 (frosted)	12-16	0.2	1.5	G-4 1/2, Clear	Min. Bay	1 1/16	1/2
31480	47	6-8	0.15	0.5	T-3 1/4, Clear	Min. Bay	1 1/8	5/8
35976	51	6-8	0.2	1.0	G-3 1/2, Frosted	Min. Bay	1 5/16	1 1/2
36728	—	118	0.06	—	C-7, white	Cand. Screw	2 1/8	—
43101	—	2.0	0.06	—	T-3 1/4, Clear	Min. Bay	1 1/8	5/8

The figure in "bulb" column indicates diameter of bulb in eighths of inches.

Turning Out "Guns" of Peace



They're assembling the electron guns of RCA Television Kinescopes. Every Kinescope part is chemically clean. All electron gun parts are mounted on manual jigs. These insure accuracy of assembly. Spacing of parts in a Kinescope must be held to .001 inch in order to produce a properly proportioned picture squarely on the screen of the tube. The assembly of Television Kinescopes include some of the most highly skilled operations in tube manufacture. Every Kinescope is built with the use of a micrometer and a microscope.

NEW VOLTOHMYST NOW READY AT DISTRIBUTORS

(Continued from page 1)

often measured when the power is still applied to the receiver under test. Though this procedure is not recommended because of the false readings that might be obtained, there is no danger of meter damage even if the ohms measuring leads are applied to a "hot" plate resistor. The extended range of the ohm scales allow measurement of resistance values heretofore impossible except with costly equipment. Also there is no zero resetting or leads to short when changing ranges, resulting in faster measurements.

A-C Voltage Scale

Aside from the electronic DC voltage and ohms measuring circuits, the Junior VoltOhmyst is equipped to make isolated AC voltage measurements as well. These are read on five scales: 0 to 10, 30, 100, 300 and 1000 with a sensitivity of 1000 ohms per volt.

The sensational RCA Junior Volt-Ohmyst may be seen at RCA Tube and Equipment Distributors.

TELEVISION FOR THE AMATEUR IS NOW A REALITY

(Continued from page 6)

like a tapering drinking glass with the top sealed.

In operation, the new tube is placed behind a small lens which focuses the scene upon the front surface of the mosaic. The light strikes through the transparent surface to the back surface which is scanned by an electron gun shooting a stream of electrons across it in horizontal lines at the rate of 300 miles an hour. Scanning the mosaic a line at a time, the electrons transmit thirty complete pictures in the form of electrical impulses every second. Each picture is actually millions of tiny dots, each of which is transmitted separately.

In the demonstration transmitter built by RCA to test the new tube, a cathode-ray tube is placed behind the iconoscope to serve as a monitor—corresponding to the viewfinder on a camera. The operator sees in the monitor the same scene being televised by the iconoscope, and trains and focuses the camera at will.

As in the case of the big television transmitters, the range of an

amateur television station is determined by the horizon, because of a peculiarity of the ultra-high-frequency radio waves on which the pictures must be transmitted. The height of the transmitting antenna largely determines the range of the station.

Amateurs Helped Develop Radio

The new iconoscope opens to amateurs the third step in the development of their field. The first step was the "code" stage when "hams" flashed telegraph signals around the world. Then came the "phone" stage when a microphone replaced the telegraph key, and amateurs were able to chat with each



Unretouched photograph taken from end of amateur kinescope showing clarity of reproduction.

other. Now the means is placed at their disposal to add sight transmission. Thus, they may see each other while talking, and may train their home made television cameras on their own equipment to give the other chap a look.

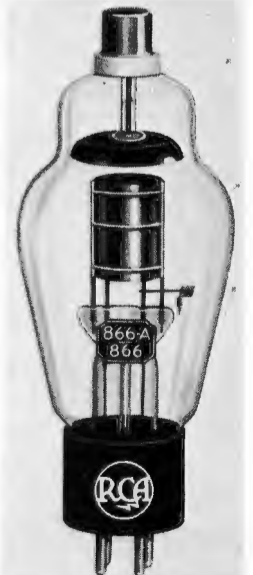
It is anticipated that the unplumbed genius of the 55,000 American radio amateurs, when applied to the complex problems of television, may produce important developments. Existing amateur radio licenses permit television transmissions on the 2 1/2-meter band and shorter waves, so that the way is already open for their participation in the new art.

NEW RECTIFIER HAS IMPROVED CHARACTERISTICS

Combines the Best Features
of Two Former Popular Types

Those service engineers who work with high powered audio equipment such as large public address equipment, etc. and those who are amateur operators will be interested in the RCA 866A/866 a half wave mercury vapor rectifier tube that has been recently announced.

This new tube combines the desirable features of the former 866 and the 866-A. It has the high conductivity of the 866 at low plate voltages and the ability of the 866-A to withstand high peak inverse voltages. The secret of this tube lies in the improved edgewise-wound filament. This type of winding combined with the use of a new alloy gives the filament tremendous electron-emitting capabilities, without requiring any more filament power.



This new tube combines the best features of the former 866 and 866-A.

Important among the other features of the 866-A/866 are its ceramic cap insulator and its new dome-top bulb. This construction minimizes the danger from bulb cracks caused by corona discharge and electrolysis.

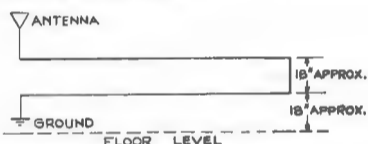
January, 1941

REFERENCE DATA

LOOP RECEIVERS

Store Demonstration:

It is sometimes difficult, if not impossible, to obtain satisfactory radio reception on loop receivers in dealer's store because of "shielding" caused by metal structure of the particular building. This handicap can be conveniently and effectively overcome by installing an antenna, which will be loosely coupled to the receivers. The coupling should be in the form of a long loop, attached to, or concealed in, a wall, and connected to an external antenna and a ground as illustrated.



Antenna to Aid Store Demonstration of Loop Receivers

Any loop receiver(s) placed adjacent to this "long loop" will have ample signal strength induced by transformer action or magnetic coupling. The receiver loop should be turned in a direction parallel to the antenna loop.

RCA 156 TUBE TESTER

1T5GT Data:

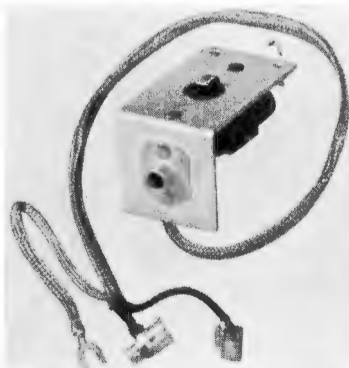
There has been some question as to the correct settings for testing 1T5GT tubes. On charts earlier than that included in the 156-D and E, the information is incorrect. Correct test data follows:

Tube	Fil.	Class	Type	Test Buttons
1T5GT	1.5	A	21	3, 4, 5

NEW SIMPLIFIED RECORD-PLAYER SWITCH

Stock No. 9824A:

This new switch is recommended for quickly connecting Record Players, Television Attachments, Frequency-Modulation Attachments, Microphones, and similar devices into the audio amplifier of existing radio receivers.



The great majority of receivers in use have a grid-cap type 1st-audio tube, and the new switch is designed for rapid connection to the grid cap, without removing the chassis from the cabinet. On other receivers, the switch can be readily installed by means of socket adapters or connection into the audio circuit.

The new switch is designed to provide:

1. Changeover from radio to record player, with retention of the original

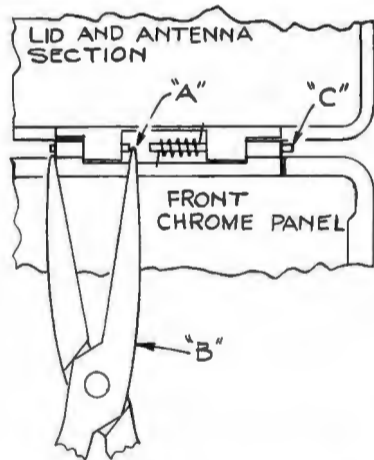
2. Suppression of radio on the "phono" position.
3. Maintenance of all original bias conditions in the radio circuit.

Complete instructions are furnished with the switch.

BP-10

Replacing Lid or Front Panel:

When the molded lid (which contains the loop antenna), or the chrome front panel requires replacement, it is not necessary to replace the complete assembly of lid and front panel, as either one may be replaced separately in a few minutes by taking out the hinge pins as described below.



Replacing Lid or Chrome Panel on Model BP-10

Installation Instructions:

First remove the three self-tapping screws that hold the chassis in the center case, and remove the case. Unsolder the leads from the loop lugs.

- (a) With lid closed, cut hinge pins at point "A" with sharp cutters.
- (b) Start removal of pin sections as shown, using long-nose pliers.
- (c) Grasp end of pin section with long-nose pliers and pull out of hinge.
- (d) Install new lid, or new front panel, using the replacement hinge pins and springs that are provided with replacement lids and panels. Arrange springs as shown. Apply a small amount of "Thermoplastic Cement" (G.E. ZV 5057) near outer end of each pin to insure tight and permanent fit.

The following parts are available for this purpose:

RCA Stock No.	Description
37855	Lid and antenna (type without lid support)
37856	Chrome front panel (type without lid support)
37853	Lid and antenna (type with lid support)
37854	Front chrome panel (type with lid support)
37857	Two hinge pins and two hinge springs for BP-10

The following parts are discontinued:

RCA Stock No.	Description
36510	Antenna loop and cover (discontinued)
36511	Lid and chrome panel (discontinued)

DECALCOMANIA REPLACEMENT

Instructions for installation or replacement of decalcomania transfers on RCA Victor wood cabinets are as follows:

- (a) Remove old decal using benzine and a block of felt, rubbing in the direction of the wood grain. Clean surface thoroughly.
- (b) Apply thin coat of "Meyercord Cement" (clear varnish) on the back side of the decal. Let dry until it becomes tacky.
- (c) Apply decal to cabinet, rubbing gently over decal, making sure it is in complete contact with cabinet surface.
- (d) Remove top layer of paper, immediately after decal has stuck, by peeling off, after starting with finger nail.
- (e) Apply water to last "tissue" of decal with a sponge or rag, until the tissue can be rolled off.
- (f) Use a slight amount of benzine on a cloth to remove excess varnish film from the cabinet. DO THIS GENTLY!
- (g) Use dry cloth to wipe decal and cabinet surface clean.

Replacement decals are listed in Service Notes, and may be obtained under the correct stock numbers.

DIAL DRIVE CORD

Stock No. 32635:

Stock No. 32635 covers a 5-foot length of "phosphor bronze" dial cord, together with 10 clips. This may be used for making up any length of dial cable required.

MODELS 16K and 16T3

2,400 KC Police Band:

Where desirable, reception of a police station in the 2,400 kc band may be obtained by adding a jumper connection from trimmer C-3 to trimmer C-40, and lining up push button No. 5 to the desired police station. Re-alignment of C-3 at 1,500 kc will be necessary.

CHANGES IN PARTS LISTS

Model	New Stock No.	Old Stock No.	Description
QU3C, M	33640	5148	Capacitor, C-41
4QB, -4, 15BT, 14BT1-2, 14BK	M18128		Special adaptor cable for 3 separate batteries
QU5		34792	Motorboard gasket (rubber) (Delete)
14BT1-2, 14BK	37814		Capacitor (9 mmfd.)
15BP	37681		Resistance power cord
15BP	12720	13894	Capacitor, C-15
15X, 16X1-2-3	34662	32634	Drive cord
15X, 16X1-2-3	36153	35069	Push-on fastener for backs
16X3	37831		Fastener, set of 4 push fasteners for cabinet back
19K	36802	36007	Conical spring for loop bracket
Q20	37662	35679	Knob (tuning, range, or volume)
K-105	37687		Rubber cushion for tuner push rods
110-K	36802	36007	Conical spring for loop bracket
111-K	36802	36007	Conical spring for loop bracket
V-300, 301, 302	36455	36455	Escutcheon (Walnut)
V-300, 301, 302	37805		Escutcheon (Mahogany)
111-K	36803	36203	Capacitor, C-54