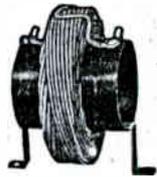


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« THE »  
**"TECHNICIAN"**

AUGUST, 1935

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Official Publication of the Certified Radio Technicians' Association, A Corporation  
A. PAUL, Jr., President JOHN A. ORME, Vice-President  
FRED KNOWLDEN, Secretary-Treasurer

NORMAN B. NEELY  
Editor - Manager  
GRanite 0755



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Los Angeles,  
California

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Vol. II

August, 1935

No. 11

## Get Ready For Fall Business

By The Editor

The old adage "a word to the wise is sufficient" may or may not be true. It also may or may not be true that radio servicemen and technicians are "wise". However, we are going to act with that assumption in mind and make this message brief and to the point.

The slump, slight or otherwise, in radio service and sales, which is supposed to always accompany summer months, should by now be a thing of the past and the fall business, both in sales and service, should keep all radio technicians and dealers busy. People are returning from their vacations and preparing to settle down for the winter.

This is your cue to launch any advertising campaigns you have contemplated. Not only should you get extra business, but you should prepare yourself to handle it more efficiently, quickly and profitably.

Set manufacturers have provided many sales points to help you increase the interest of radio set owners and promote sales of new receivers. Greater interest in foreign reception, new all-metal tubes, improved circuits and many other features of 1936 model radio sets are being advertised in magazines, papers, over the air,

by hand bills and direct contact. Those owners who do not wish to purchase new receivers are being made more conscious of the excellent programs available through the medium of their radio sets. Sell high fidelity modernization for present equipment.

Radio test equipment manufacturers are putting forth every effort to design, manufacture and market more efficient and more helpful service instruments. They are taking advantage of every means at their disposal to bring this improved equipment to you at low prices. A comparatively small investment in new modern test equipment and technical publications will pay you a high dividend, not only in increased number of jobs which you can handle successfully but in the higher quality and greater extent of your modernization and rebuilding jobs.

In summary, put forth greater sales effort, take advantage of all the publicity and ballyhoo on the part of manufacturers, better equip yourself technically, both mentally and with service equipment and get ready for fall business!

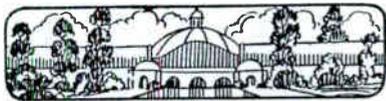
## 36 MODELS — All Wave Lengths and Voltages

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AUTO-HOME



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## RADIO TECHNICIANS OF SAN DIEGO

### DESCRIPTION OF HAMMOND ELECTRONIC ORGAN IN FORD BOWL AT EXPOSITION

By RALPH B. DOHERTY, Western Radio and Electric Co.

#### ACKNOWLEDGEMENT

The author, the Western Radio and Electric Co. and The "Technician," wish to express their sincere and heartfelt appreciation of the kindness and cooperation of Mr. C. W. Thomas of the Ford Motor Co., in supplying the information, data and figures contained in this article. We are sure it will be of great interest to all technical men and are happy to be able to present it in these pages.

The Hammond organ is an invention of Laurens Hammond, of Chicago. It is no doubt called an organ because of some similarity to a pipe organ. However, it deserves a name of its own because of its ability to produce an infinite number of tones. Most electronic instruments of this sort are definitely limited in this respect.

In comparing this instrument to a pipe organ, it is similar in that it has two manuals of five octaves each, pedals of two octaves, and preselection keys which may be termed stops. It also has a swell pedal which is much more sensitive and gives a much greater control than that of the pipe organ.

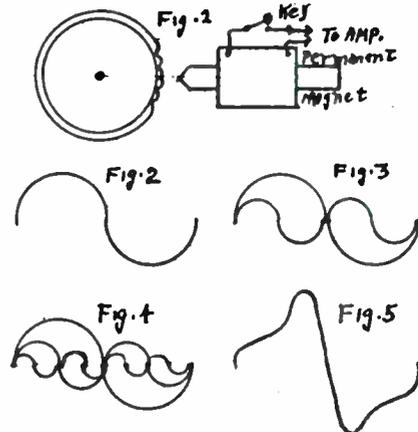
It differs from the pipe organ in that the principle of its operation permits the organist to construct his own tones, whereas those of a pipe organ are fixed at the factory by the voicer. Tones are produced in the console by a number of tiny alternators driven by a ten watt synchronous motor.

Figure 1 illustrates the method in which the tone is produced. Small toothed discs are rotated past the pole of a permanent magnet and interrupt the flux at various frequencies. The minute voltages generated in the coil surrounding this magnet are then amplified when connected by means of the keys of the manual. When a key is depressed, there is a possibility of producing nine tones simultaneously. These tones are fundamentals, and the various harmonics are introduced by the organist in his adjustment of a group of levers controlling the amplitude of the harmonics in relation to the fundamentals.

Each fundamental and harmonic is generated by an individual generator producing a true sine wave form, and are fed through a mixing transformer by means

of the harmonic controls. The frequencies generated vary from thirty-two cycles to fifteen thousand cycles. By means of the two manuals, it is possible to produce a tone for solo work on one while the other manual and base pedals may be used for the accompaniment.

An example of tone construction, disregarding phase relation, is shown in Figures 2 to 5. Figure 2 illustrates the pure sine wave fundamental; Figure 3, the introduction of the second harmonic; figure 4, that of the third; and figure 5, the resolved wave form which is similar to that produced by a violin. Various tones depend for their qualities on the

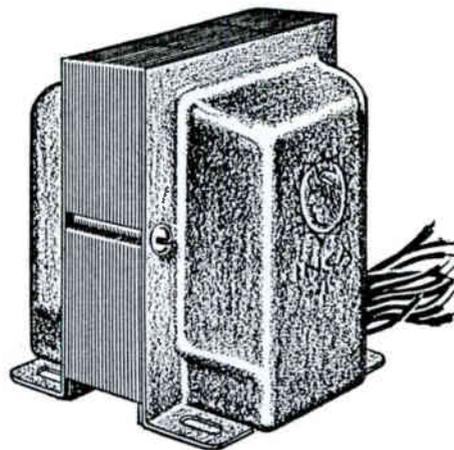


relation of the amplitudes of the harmonics to that of the fundamental as well as their phase relation. However, the control of the phase relation is not as essential as that of the amplitude.

In the Ford Bowl at the California Pacific International Exposition at San Diego

(Continued on Page 12)

# Why INCA?



The CRTA member who has used INCA products need not be told why he should continue to use these sturdy, compact, efficient, reliable components. For the few who are strangers to INCA service, let us list a few of the features of the Phelps-Dodge organization.

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## PRESENT AND FUTURE DEVELOPMENTS IN ELECTROLYTIC CAPACITORS

By PAUL MacKNIGHT DEELEY,

Chief Engineer, Electrolytic Division, Cornell-Dubilier Corporation.

For the past three years research engineers have put forth considerable effort to attain three things in the development of the electrolytic capacitor. First, a reduction in cost; second, a reduction in physical size and third, the improvement of both high voltage characteristics and power factor.

Obviously, the problem of reduction in both cost and physical size are closely co-related due to the fundamental fact that both are determined by the amount of raw materials necessary to create or produce a capacitor of given voltage and capacity rating.

The capacity of an electrolytic capacitor varies directly in proportion with the area of the anode and inversely in proportion with the voltage of the anodic film formation. It becomes quite clear that if it were possible to increase the effective surface area of an anode without increasing the actual size of the anode plate then it would be possible to get a proportional increase in capacity for any given voltage of formation. Also on the same basis a capacitor of any given capacity at any given voltage of formation could be produced in a proportionately smaller physical size, the actual reduction in physical size being in direct proportion to the increase in effective surface area of the anode.

There is nothing new or novel in this idea. In fact it has been known for a number of years that anode surface areas could be effectively increased by roughening the surface of the anodic material by such methods as sand blasting, mechanical embossing, scratch brushing and chemical etching. Some fifteen years ago patents were granted which covered chemical etching processes whereby very strong inorganic acids were used to deeply etch or pit the anode surfaces.

During the past few years a certain amount of mechanically roughened anodes have been used by a number of manufacturers but the actual gain in capacity, reduction in physical size and savings in production costs have been very slight. Within the past few months however great improvements have been made in the application of the process of chemical etching and, in the laboratory, increases in capacity of as high as twenty to one for a given size of anode at a given voltage of formation have been produced. So far however, an increase of more than

four to one in capacity has not been found to be economically feasible. This is primarily due to the fact that the cost of processing or etching the anodic material to an extent beyond the degree necessary to produce the four to one ratio in capacity gain offsets the saving in material required to produce a given type of capacitor.

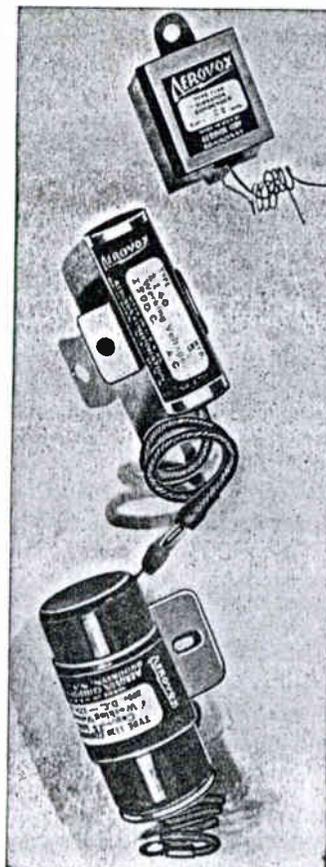
The commercial use of the etched anodic material has been delayed by the overcoming of a number of problems and not least among these has been the problem of cleaning the anodic material, after the etching operations, sufficiently free from all traces of the etching agents as to remove any possibility of their causing corrosion of the anodic in service in capacitor assemblies. For quite a while this problem presented a stumbling block of major proportions but at the present time this obstacle has been removed, at least in the cases of a few of the manufacturers of electrolytic capacitors.

Another problem which presented itself was the difficulty of obtaining a good intimate contact between all of the etched anode surface and the electrolyte. This can more easily be understood when it is realized that the average dimension of an individual indenture of the etched surface is in the order from one to two micrometers in diameter, and this is based on the referred capacity gain of only four to one. To make use of the total effective increase in anode surface area the electrolyte not only must make contact with the sides and bottom of each pit or indenture when the capacitor is first made but it must also continue to do so or capacity values will later be reduced. In other words, in active service, the electrolyte could not be allowed to dry or separate from the anode surface. This problem was effectively overcome by the use of a polyhydric bonding agent completely occluded into the structure of anode foil surfaces.

This new development in anodic material is applicable to the wet as well as the dry types of electrolytic capacitors. In the wet type of capacitor there is not a great deal to be gained as far as reduction in physical size of a completed capacitor is concerned because in order to keep the operating temperature of a

(Continued on page 21)

## Are You Getting Your Share of Auto Radio Business?



A million auto-radio sets will be installed this year. Business goes to service men who can get maximum performance out of those 1935 sets. ☉ And the million or more auto-radio sets in daily use need servicing. Business goes to the chap who knows how and has the proper replacement parts. So be prepared for—

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Sensitivity, tone, quality and volume of present auto-radio sets can be realized only if background noises are kept at minimum. That's why AEROVOX engineers have developed a complete line of interference suppressor condensers—for auto generator, ammeter, dome-light, vibrator and other functions. They do the trick!

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Regardless of make of set serviced . . . no matter what condenser needs replacement . . . Aerovox has an exact duplicate unit. Matched in size, style, mounting, but always superior in operating characteristics and longer life. That's why Aerovox replacements stay put . . . perform best . . . build good will . . . produce greater profits.

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## NEW MISSION BELL

Mission Bell Radio Mfg. Company announces that the entire new 1936 line will be engineered so that all-metal tubes can be used just as soon as reliable supplies in substantial quantities are available from the tube manufacturers. The new models include four, five, six and seven tube home receivers and five and six tube auto sets. One of the outstanding models of this new line is the Model 41, five-tube, all-wave receiver, covering the entire short wave and broadcast band from 16 meters to 550 in three bands. This advanced and improved receiver is housed in a new style, especially designed cabinet of exceptional beauty and with an airplane dial. The set uses the latest tubes and circuits, and controls on the front panel include station selector, band switch, switch and volume control and tone control. The new models are on display at the Mission Bell factory and the manufacturers invite your inspection of the entire line at your convenience. This company maintains a specialized and efficient auto radio installation department for the use of its dealers, installing Mission Bell sets at a very nominal cost. An expert upholstery man is a member of the installation crew and top antennas are installed very reasonably.

## NEW MODEL RADIOTONE

The Radiotone Recording Company, manufacturers of instantaneous sound recording equipment, have added a new model to their line of recording units. This new model is catalogued as the AA-16 Duplex recorder and allows the broadcast station or recording studio to make continuous recordings of a given radio program. The AA-16 comprises two 16-inch recording turntables, two screw feed mechanisms, two cutting heads screw fed mechanisms, two cutting heads and a switching device for feeding the amplifier output from one head to the other instantly. The drive system used is the Radiotone floor mounting type of synchronous motor.

Due to the increased demand for Radiotone equipment, this organization has taken larger quarters at 6103 Melrose Ave., Hollywood, Calif., where a modern sound recording studio has been installed to fully demonstrate the possibilities in this new instantaneous recording field. Recent installations of Radiotone recording equipment have been made in the RKO Studios in Hollywood, for use by the music department for audition recordings and Radio Station KRE in Berkeley, California.

## DESCRIPTION OF ELECTRONIC ORGAN

(Continued from Page 6)

one of these organs is in operation. But, due to the fact that it is used out-of-doors where the reverberation constant is practically zero, a few acoustical problems presented themselves which are not usually encountered with indoor installations. The massive tonal effects of the pipe organ are due to the hard reflecting walls of a cathedral, which usually has an extremely high reverberation constant. In order, then, to produce a similar effect out-of-doors, it was necessary to construct a reverberation chamber, which was so designed as to have one of its dimensions long enough to equal one-half the wave length of the lowest frequency produced by the organ. A loud speaker was then installed in this chamber, and the output of the console fed to it, which in turn was picked up by a microphone installed close by, and this signal then fed to a portion of a large bank of loud speakers installed at the rear of the orchestra shell in the music bowl.

In order to secure a suitable bass response, it was necessary to install a huge group of loud speakers which total 184 units and are divided into three banks. Two of these banks are fed directly from the organ console, while the third receives its signal input from the reverberation chamber. The total input to the amplifier bank is 17,600 watts, while the output of this unit is conservatively rated at 2500 watts of audio power.

## CLOUGH-BREngle OSCILLOSCOPE POPULAR

Electric Products Service, local distributors and factory service for Clough-Brengle equipment, advise us there has been a big demand for Clough-Brengle oscilloscopes and frequency modulated oscillators. Many users of this equipment are reporting greatly increased service business and service profits, since this equipment was installed.

Electric Products Service, authorized factory service for SUPREME, TRIPLETT and Dayrad test instruments, advise that they now have the necessary parts to change over all models of all makes of instruments to accommodate the new OCTAL tubes, and will be pleased to quote the readers of the "Technician" the cost of changing over their different makes and models of test equipment.

## BOOK REVIEWS

**160 Million Dollar Ideas For Inventors**—Inventor's Service Bureau, Division of Donley Publishing Co., 1931 University Ave., St. Paul, Minn.—50c.

This is volume one of the Library of Inventor's Manuals, containing fifty-two pages of information to inventors and prospective inventors. It contains information concerning profitable and unprofitable inventions and gives pointers for rejecting unprofitable ideas. It is a concise, well-written, easily-read, informative treatise, giving hints as to possible developments on existing inventions, how to find ideas for inventions, how to determine when an idea is worth developing and other points of pertinent interest on this subject. A new plan of refrigeration, a source of "cold light" and dozens of other ideas of inventive possibilities are discussed in these pages. The tremendous field of photo-electricity is also discussed briefly. It is a very interesting booklet for all mechanically and electrically inclined persons and particularly useful to those interested in the field of invention.

**Applied Acoustics**—Olson and Massa—P. Blakiston's Son & Co., 1012 Walnut Street, Phila., Pa.—\$4.50.

This is a 430-page text book and reference manual containing 228 illustrations. The book deals entirely with acoustical engineering principles. Every type of electro-acoustic transducer in widespread use today is fully treated, including the theory, construction, test and operation of each system. Experimental data, photographs and sketches are used profusely to augment the physical concepts. The subject of acoustical measurements is fully developed and the present day laboratory technique completely covered.

The chapter on architectural acoustics is of particular interest. Most auditoriums employ sound reproducing systems and therefore the behavior of microphones and loud speakers in studios, auditoriums and open air theatres is given full consideration. The requirements and design of sound re-enforcing systems for various applications is thoroughly discussed.

The operation of microphones in studios is treated to show the effect of the characteristics of the collecting system and surroundings. The dispersion of sound in a room is considered from the standpoint of indicating the importance of the acoustic elements of the system (characteristics of the loud speaker and the

(Continued on Page 25)



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## SERVICE KINKS AND PET EQUIPMENT

**EDITOR'S NOTE:** Through the kindness and courtesy of Mr. H. K. Bradford, President of the Capitol Radio Research Laboratories, we are able to publish the following material taken from the manual, **CASE RECORDS OF BROADCAST RECEIVER REPAIRS.**

### ALL AMERICAN MOHAWK MODELS 70, 73, 75—EXCESSIVE HUM

For this trouble simply change the position and location of the grid-leak. This unit sometimes picks up hum from the a. c. filament leads.

### ATWATER-KENT SUPERHETS INTERMEDIATE FREQUENCIES

130 Kilocycles, Models 310, 510; 264 Kilocycles, Models 165, 165Q, 185, 217, 217D, 275, 387, 425, 427, 427D, 427Q, 525, 525Q, 665, 667, 667D, 816, 926, 936; 472.5 Kilocycles, Models 708, 711, 711R, 788J or T, 788R, 808, 808A.

### ECHOPHONE, ALL MODELS INTERMITTENT RECEPTION

This is invariably caused by poor mechanical contact between the springs on the rotor shaft and the shaft of the variable condenser gang. If the point of contact is thoroughly cleaned the trouble will be eliminated.

### GENERAL ELECTRIC MODEL 40B STARTING ROAR

Very often arcing at the vibrator points will cause this trouble, and if this is the case it can be overcome by shunting the secondary of the power transformer with a 500,000 ohm resistor. Also, connect two .01 mfd. condensers across the secondary in series, grounding their midpoint. The condensers should have voltage ratings of at least 600 volts.

### GENERAL MOTORS MODEL 258 EXCESSIVE HUM

In many cases this may be traced to grounded input by-pass condenser to the power transformer. Either one or both of these condensers may be successfully replaced with .003 mfd. units although the values here are not critical.

### PHILCO MODELS 5, 6 WEAK SIGNALS

Check the 20 mfd. cathode by-pass condenser in the power tube circuit. If this unit is found to be defective, the entire power condenser block will have to be replaced due to lack of space.

### MAJESTIC MODEL 300 SERIES CRITICAL VOLUME CONTROL ACTION, WEAK

Cut both leads coming from the holes in the condenser can marked C and D and connect a good quality 0.1 mfd. condenser from the leads to ground. This will replace the other condenser inside of the can with one of the same value externally. Check each of the 1-8 watt resistors and replace all of those whose values have changed more than 25 per cent.

### RADIOLA MODELS 44, 46, 47 HOWLS AND SQUEALS

Check the contacts made by the stage shields and their supporting framework. If they are not making the proper contact with the chassis, clean them thoroughly and replace the shields.

### RCA VICTOR MODEL M34 OVERALL IMPROVEMENTS

The following changes are recommended to modernize the RCA Victor Model M34 receiver:

1. Replace the first detector 6A7 cathode resistor (270 ohms) with an 80 ohm half watt unit.
2. Replace the 400,000 ohm resistor in series with the volume control arm with a 300,00 ohm 1/2 watt unit.
3. See that the 375 mfd. fixed condenser by-passing the hot side of the heater of the first r-f type 78 tube to ground is well connected.
4. Replace the 89 type output pentode with a type 41 tube and replace its cathode bias resistor (1000 ohms) with a 500 ohm 2 watt unit.
5. Replace the first audio transformer with a unit having a higher ratio such as part No. 6732.
6. Replace the 60,000 ohm resistor shunted across the secondary of the first audio transformer with a 250,000 ohm unit.
7. Remove the trimmer adjustment plate on the bottom of the case to relieve back pressure or as an alternative drill 8 one-half inch holes in the center of the top of the case.
8. Replace the 500,000 ohm resistor in the control grid return lead of the 6B7 second detector with a 300,000 ohm one-half watt unit.

The value of these changes will not be apparent unless all of them are made. Any one or any group of these changes may be actually detrimental unless the entire job is done as described.

(Continued on Page 30)

## OLESEN ACTIVITY

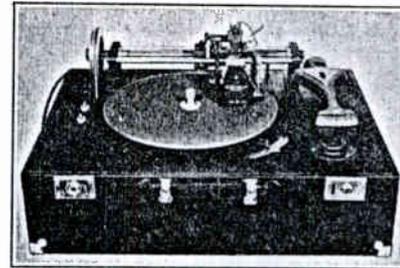
The Otto K. Olesen sound studios of Hollywood, under the direction of C. C. McDonald, have started to refinish equipment. The quarters have been largely occupied the past year by KNX but, with the removal of the station to new quarters in August, additional space has been made available to the sound work. Twenty-four individual offices, formerly used as dressing rooms by stars when Paramount Studios occupied the building, will be used for a miniature "radio city" with rentals to equipment firms, producers, writers and others connected with the industry. New developments in the Olesen studios include the "Congo Bartlett" unit which will produce 154 fifteen minute transcriptions called the "Voice of Africa," and developing a 30-pound portable recording machine for use by M-G-M and British Gaumont in tropical lands. They will be used to record native sounds which will later be dubbed on film.

## REPLACEMENT DIAPHRAGMS FOR DYNAMIC UNITS

The Electric Products Service, local distributors for Carron replacement cones, are pleased to announce that Carron is now delivering replacement aluminum diaphragms for Western Electric, Racon, Fox and Amplion dynamic units. Undoubtedly many readers of the "Technician" will be pleased to learn that Electric Products Service now have these diaphragms in local stock as heretofore there has been no available stock of replacement diaphragms for these units.

## "CLIPPER" POPULAR

Charlie Sexton reports that the recently announced RCA licensed "Clipper" four tube set with aeroplane dial and specially designed cabinet is enjoying heavy sales. These sets are on display at the Radio Products Sales Co., and Charlie invites readers of the "Technician" to drop in and look them over as well as his complete stock of replacement parts.



## UNIVERSAL PROFESSIONAL RECORDING MACHINE

Designed and built to insure Highest Class Results. Solid, heavy, dependable, precision machined throughout—16-inch distortion-proof turntable disc—Constant speed rim drive without "waver" or "wow"—110 volt A. C. 100% synchronous, reversible motor—Solid steel bar slide—Special Universal power cutter with four adjustments for damping—Engineered by Universal to provide the best in instantaneous recording equipment.

Write for detailed description.

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The Universal Microphone Co., manufacturers a French-'fone hand-set particularly for five-meter sets and transceivers. But this unit has also become adaptable for various other uses including intercommunicating work in broadcast stations, ship-to-shore work, airplane activities, police radio, amateur operation and sundry other ways.

The firm, at a slightly higher cost, will augment the regular line of sombre black instruments with a line of colored bakelite casings. Thus the microphone-receiver combination can match the furnishings of the ship's cabin, the airplane cockpit, the ham shack, radio station, auto tonneau or other places.

Colors will include salmon pink, Chinese red, jade green, sunkist orange, desert brown, Persian blue, natural walnut and several other modernistic shades and combinations. Looks as though milady's influence will yet be felt in the ranks of radio equipment.

### S-W RADIO IN STRATOSPHERE FLIGHT

Coyne Industrial Bulletin for July

Much of the future of television and short-wave radio broadcasting may rest with the results achieved by an army air corps balloon flight to be held soon. Among the scientific instruments which are to form its cargo is a small, powerful radio transmitter which will transmit short-wave radio signals from a point 200 feet below the balloon. If the balloon reaches its maximum height of fourteen miles, it is estimated the horizon will be 335 miles away. To check behavior of the short-waves the bureau of standards has designated radio stations over the country to report on the signals. From their reports and the position and height of the balloon, radio engineers will calculate whether the waves penetrate beyond the horizon, and if so, how far. These findings are expected to be of importance in the future development of radio, particularly television, which may use the short-wave band for operation.

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## EXCERPTS FROM SIGNAL GENERATOR HANDBOOK Triumph Mfg. Co.

### Measuring Oscillator Output At R. F.:

Connect a vacuum tube voltmeter across the output of the oscillator stage in the set. The oscillator output may be a cathode pickup coil, a screen pickup coil, a plate coil or it may feed to the grid of another tube. Where the oscillator feeds into the grid circuit of another tube, the vacuum tube voltmeter should connect across the oscillator tank coil. Check the characteristics of various tubes by exchanging them in the oscillator stage and comparing their R.F. output read by the V.T.V.M. It is of prime importance that the oscillator in the set shall provide a strong output over the entire tuning range, therefore, with the V.T.V.M. connected, tune across the band, looking for dead spots or unusual variations in output. The usual oscillator output is higher at the high frequency end of its range. The same test, of course, holds good for the high frequency oscillators in short wave receivers. Not more than two to one ratio in output can be tolerated. A variation greater than this tends to cause either overload or fading out of the signal.

**Double Peak Effect Correction:** In lining up the I.F. coils in superheterodyne receivers it is occasionally noted that the trimmer condenser tunes to two distinct peaks. This is commonly due to coupling being too tight between the plate and secondary windings. This condition will seldom be found in new receivers but is often met with in cases where the I.F. coil has been repaired or replaced. To correct the condition, connect the output of the generator to the control grid of the tube immediately preceding the coil, and with an output meter connected to the voice coil circuit, adjust the generator frequency to the intermediate frequency of the receiver or, if this is not definitely known, tune the generator to resonance with the set.

Reduce the output of the generator until the double peak effect is noticeable, but not too much so, when the trimmer condenser of the I.F. coil is adjusted back and forth above and below resonance. Now proceed to move the coils further apart. Do not separate the coils any more than a sixteenth of an inch at a time. With each change in spacing, make a check of the double peak by varying the trimmer condenser. If the coupling change is being properly made, it will be found that the "peaks" draw closer

together until, at a final adjustment, only one peak remains; just where the two peaks merge together to form a single resonant peak.

**Stage Gain:** (R. F. with V. T. Voltmeter): The gain of an R. F. stage is determined by dividing the R. F. voltage from grid to ground of the stage under test, into the R. F. voltage from grid to ground of the succeeding stage. A vacuum tube voltmeter may be used to check these two values when an R. F. signal, (preferably unmodulated) from the signal generator is passed through the stage under test. The same result can be had by reading the sensitivity of the set with the generator feeding to the grid circuit of the stage under test, then feeding to the grid circuit of the following stage and reading sensitivity again. Divide the second reading by the first to find stage gain.

**Overload Point Determination:** With the receiver and generator set up, increase the input to the set and make note of the input (microvolts) and the output meter readings at intervals from minimum up to the point at which increased input causes no further increase in output or causes a decrease. A curve of overload can be plotted if necessary. This will not be effective, of course, on a set using A.V.C.

**Neutralizing:** Few modern receivers require this adjustment since T.R.F. and superheterodyne circuits are by far the most numerous now in use. However, neutralizing is frequently enough among the adjustments required of a radio technician in his regular work to warrant explanation here.

In the neutrodyne receiver there is provided one or more neutralizing condensers. Connect the generator "full" output to the antenna and ground posts of the set. Tune set and generator to resonance at about 1000 K.C. Remove the first R.F. tube from its socket and insulate one filament prong so that when inserted back in the socket the filament does not light (or use adapter).

Now, adjust the first neutralizing condenser until the signal completely disappears, or is reduced to a minimum in the speaker or headphones. Remove the insulation from the first R.F. tube prong and replace it in its socket, then repeat the same adjustment on the second R.F. tube and its neutralizing condenser. If a third neutralizing stage is employed, the same procedure should be followed. Seal the neutralizing condensers after setting to complete the job.

# Two Triumph Sensations

## MODEL 500 "COMPONENT ANALYSER" THE TEST METHOD OF THE FUTURE AND MODEL 400 TUBE TESTER ANSWERING THE "ALL METAL" TUBE PROBLEM



The new Triumph Model 400 Tube Tester tests all new Octal Tubes without adapters. TRIUMPH SCOOPS THE MARKET with a Brand New Kind of Instrument—The "Model 500 Condenser—Bridge—Analyser." It tests Coils—Condensers—Resistors right in the set—Radically different in conception and purpose—So simple it will change all present test routine—Eliminates crude "cut and try" and "parts substitution" methods—Cannot be "out dated" by radio developments—analyses component parts before replacement—Checks directly on the source and cause of trouble in circuits.—Measures resistance from five ohms to two megohms—Capacity from .00005 mfd. to 20 mfd.—inductance from 50 microhenries to 20 millihenries. ALL DIRECT READING.

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# RCA RECEIVERS LISTING GENERAL ELECTRIC, WESTINGHOUSE AND GRAYBAR EQUIVALENTS

NOTE—Such a list as this was published in these pages nearly two years ago, but demands for a more complete and comprehensive compilation have been so numerous that the following is given here through courtesy and kindness of Mr. H. K. Bradford, President of the Capitol Radio Research Laboratories of Washington, D. C. It is taken from "CASE RECORDS OF BROADCAST RECEIVER REPAIRS."

RCA	G. E.	WESTINGHOUSE	GRAYBAR
SW-2	JZ-30		
R-4	J-70	WR-17	GT-7
R-5	T-12	WR-14	GB-4
R-5-DC	T-12-D		
R-5-X	T-12-E	WR-14-CR	
T-5	E-52	WR-9	
R-6	J-75		GC-13
R-7	S-22 and S-22X	WR-10	GB-8
R-7A	S-22 (2)	WR-10-A	GB-8-A
R-8	J-80	WR-18	GT-8
R-9	S-42	WR-12	
R-10	S-132	WR-15-A	GB-983
R-11	K-62	WR-15	GB-9
R-12	J-85		GC-14
Rad. 16			GB-300
RE-16	SZ-42-P	WR-13	
RE-16-A		RE-13-A	
R-17-M	BX or K-41	WR-26-M	
RE-18 and RE-18A	KZ-62-P		
R-18-W	K-40-A		
Rad. 18			GB-310
Rad. 21	B-1		
Rad. 22	B-2		
R-22-S	L-50		
R-22-W	L-61		
RO-23	JZ-835	WR-16	
R-24	JZ-822		
R-24-A	JZ-822-A	WR-24	
(47)			
R-24-A (2A5)		WR-24	
R-27	K-40	WR-26	
R-28	K-50		
R-28-P	K-50-P		
R-28-P (A to G)	K-51-P	WR-27	
M-30	A-90		
P-31	A-81		
M-32	A-60		
Rad. 33			GB-311
M-34	B-40	WR-33	
R-37	K-60		

R-37-P	K-60-P	WR-28	
R-38	K-65		
R-38-P	K-65-P		
RE-40	K-64		
RE-40-P	K-54-P	WR-29	
R-43	S-42-B		
Rad. 44			GB-500
Rad. 46			GB-550
Rad. 48	T-41	WR-4	GB-678
R-50	H-32		
Rad. 51			GB-320
R-55			GB-100
RAF-59	H-72		
Rad. 60			GB-330
Rad. 62			GB-340
Rad. 66			GB-600
R-70 and R-70-N	J-72	WR-21	
R-71	J-82	WR-19	
R-72	J-86		
R-73 (47)	J-83	WR-22	
R-73 (2A5)	J-83-A		
R-74	J-100	WR-20	
R-75 (47)	J-87		
R-75 (2A5)	J-87-A		
R-76	J-105		
R-77	J-107		
R-78	J-125		
R-78 (2)	J-125-A		
RE-80		WR-23	
Rad. 80	H-31	WR-5	GB-700
RE-80-SW		WR-25	
Rad. 82 and 82-R	H-51 and 51-R	WR-6 and 6-R	GB-770
Rad. 86 and 86-R	H-71 and 71-R	WR-7 and 7-R	GB-900
R-90	K-106		
R-90-P	K-106-P		
91-B	C-30		
100	K-43	WR-32	
101	M-41		
102	M-40		
M-105	C-41	WR-41	
M-107	C-60		
110	K-52		
111	K-53	WR-35	
112	L-52	WR-34	
114	L-53		
115	K-53-M		
M-116	B-52	WR-42	
118	M-61	WR-48	
120	K-63	WR-36	
121	K-64	WR-37	
M-123	C-61		
124	M-63		

(Continued on Page 22)

# DEVELOPMENTS IN ELECTROLYTIC CAPACITORS

(Continued from Page 8)

wet type capacitor down to safe limits there must be considered such factors as heat radiation, heat generated and volumetric electrolyte content. The use of the etched anodic material in the wet type capacitor however does produce the important result of a material reduction in equivalent series resistance or power factor with the resultant improvement in the ability of the capacitor to function as an audio and radio frequency by-pass. This improvement in power factor results mainly from the fact that in a capacitor of given voltage and capacity rating the anode is smaller and the paths from the anode through the electrolyte to the cathode or container may be made shorter.

In the dry electrolytic capacitor the etched anodic material finds its most useful and effective field of application. Capacitors can be produced that are a fraction of the size ordinarily required and at the same time the cost is materially reduced. This cost reduction, at the present time, is not however proportional to the reduction in size because the cost of etching or processing the anodic material offsets a considerable portion of the actual saving in raw material. As regards the reduction in size the following example may be cited. In an ordinary 8 mfd. 500 volt dry type electrolytic capacitor the anode required is approximately 60 square inches of surface area (figuring one side of the anode only) while in a capacitor of the same voltage and capacity but incorporating the use of the etched anodic material the area of the anode is only twenty square inches. The thickness of the anode foil is the same in both instances. As a comparison in physical size of the above units, the ordinary 8 mfd. 500 volt unit is normally housed in a container of approximately five cubic inches but the same capacitor utilizing the etched anodic material can be housed in a container of one cubic inch.

The etched anodic material also opens up a field of improvement in the alternating current type of capacitor and its application in the improvement of power factor, heat radiation and reduction in size as well as cost.

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2523 South Hill Street

PROspect 3515

## RCA EQUIVALENT MODELS

(Continued from Page 20)

RCA	G. E.	WESTINGHOUSE	GRAYBAR
126-B	C-62	.....	.....
127	K-64-D	.....	.....
128	M-61	WR-46	.....
128-B	.....	WR-50	.....
135-B	C-70	WR-47	.....
140 and 140-E	K-80	WR-30	.....
141 and 141-E	K-80-X	WR-31	.....
142-B	B-81	.....	.....
143	M-81	WR-45	.....
210	K-65	.....	.....
211	M-86	.....	.....
220	K-66	.....	.....
221	M-25	.....	.....
222	K-66-M	.....	.....
223	C-67	.....	.....
224	M-67	.....	.....
235-B	C-75	.....	.....
240	K-85	.....	.....
241-B	B-86	.....	.....
242	M-86	.....	.....
260	K-107	.....	.....
261	K-105	.....	.....
262	M-106	.....	.....
280	K-126	.....	.....
281	M-125	.....	.....
300	K-48	.....	.....
301	M-49	.....	.....
310	K-58	.....	.....
321	M-68	.....	.....
322	M-69	WR-49	.....
330	K-78	.....	.....
331	K-79	.....	.....
340	K-88	WR-38	.....
340-E	K-88-X	WR-39	.....
341	M-89	.....	.....
380	M-128	.....	.....
380 H. R.	M-128-R	.....	.....
381	M-129	.....	.....
Brand Models Without RCA Equivalents			
WR-8	Westinghouse	WR-6	Chassis with Clock in Columnaire Cabinet.
WR-8-R	Westinghouse	WR-6-R	Chassis modified for Vertical operation in Columnaire Cabinet.
K-82	G. E.	K-62	In Clock Cabinet.
J-88	G. E.	J-82	with Manual Motor Board.
H-91	G. E.	H-51	(Modified) In Clock Cabinet.
H-91-R	G. E.	H-51-R	(Modified) In Clock Cabinet.
J-109	G. E.	J-100	Chassis and Automatic Motor Board.
JZ-826	G. E.	JZ-822	In Console Cabinet.
JZ-828	G. E.	J-88	with Short-Wave Adaptor.

## DEVELOPING TELEVISION FOR THE HOME

Coyne Industrial Bulletin for July  
A program involving an initial outlay of approximately \$1,000,000 to be followed by other large expenditures is to be undertaken by one of the leaders in the broadcasting field. High definition television will now be taken from the laboratory for the first comprehensive demonstration in the field under a definitely formulated plan. Through this plan of field demonstration it will be sought to determine from practical experience the technical and program requirements of a regular television service for the home.

Great progress is already being made abroad in the field of commercial television. Recently, in Germany, there has been developed a television pick-up car. This car carries on its roof a standard motion-picture camera mounted on a cast iron roof, allowing the camera to be moved in any desired direction. The hollow pillar of the camera support is used to convey the exposed film ribbon to the dark room which is in the interior of the car. By use of special apparatus and extremely fast-working chemicals, the film is developed in one and one-half minutes. The still wet film ribbon is then sent at once through a so-called "Abtastergerat" which cuts the single film pictures in 180 lines and transforms each line into a succession of strong and weak electrical impulses. The impulses are radiated from a transmitter into the air and the radio listeners, receiving these impulses through the televisior may see the broadcast scenes.

## BAY CITIES RADIO TECHNICIAN'S ASSOCIATION

JIM HESTER, President HENRY JAMES, Vice-Pres. ROBT. L. SPEERY, Sec.-Treas.

## DICK LEITNER LECTURES

The Bay Cities Radio Technicians' Ass'n. has had the signal honor of having Richard C. Leitner, eminent consulting radio engineer, formerly with Jackson-Bell, Packard-Bell, etc., began a six months radio service course. This course is sponsored by the National Union Radio Corporation and Kierulff and Company, their local distributors.

The first lecture, held August 6, at 526 Santa Monica Blvd., Santa Monica, brought out thirty-five members and was considered by everybody worthy of its

sponsors. The topic, "The National Union All-Metal Radio Tubes" was of interest to everybody, being the first factory-sponsored explanation of their characteristics and uses.

The entertainment committee brought up the subject of a social for the servicemen and their families which was favorably received. The various standing committees gave their reports and attention was called to the fact that the association has received nation-wide publicity for the second time in three months. The next meeting is to be held two weeks from this meeting and everyone wishing to attend is cordially invited.

## PROPER BY-PASSING IN ULTRA S-W CIRCUITS

Many cases of irregular or unstable operation of short-wave receivers can be traced to improper by-passing of important plate and screen elements in the radio frequency portions of the circuits. The by-pass condensers should be placed as close as possible to the tube socket, with short, direct leads running to the screen and to the B plus end of the interstage transformer primary, and with the "grounded" sides of the condensers connected directly to the cathode rather than to the metal chassis.

For the usual amateur or experimental short-wave receiver that tunes from about 15 to 200 meters, radio-frequency by-pass condensers should have a capacitance between .005 and .1 mf., advises William Bailey, of the Cornell-Dubilier Corporation. The actual value is not critical, the .01 mf. size being the most generally used. However, it is essential that the condensers be of the non-inductive type. Mica dielectric units, hermetically sealed in molded bakelite, are especially recommended because they are not affected by moisture, which is a condenser's greatest foe. Electrolytic condensers are not satisfactory for R. F. applications.

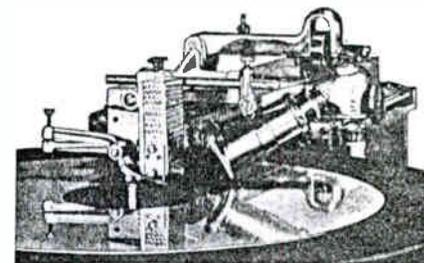
The importance of short leads in 2½- and 5-meter receivers and transmitters is especially stressed by Mr. Bailey, who says that a difference of only an inch or two in the placement of the by-passes may spell the difference between success and failure, in these ultra high frequency circuits.

## NEW WESTINGHOUSE 3-INCH METER NOW AVAILABLE

Electric Products Service, local test instrument and meter sales and service organization, now have in stock many different ranges in the new type square case Westinghouse instruments, and cordially invite readers of the "Technician" to come in and inspect this latest design in meters.

## Radiotone Recording Equipment

## Radiotone Acetate Discs



Model A-78

Write for Catalogue

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## RADIO PRODUCTS SALES CO.

A Wholesale Radio House With A Million Parts

238 West 15th Street

PRespect 0490

Los Angeles

## IMPORTANT FIVE METER ACTIVITIES

(Continued from page 10)

employed in both of these tests was the same and was approximately 45 watts.

### Plans New Links

As a result of the successful tying up of New York and Philadelphia with communication systems which, at best, may be considered temporary, the Garden City Radio Club is now more enthusiastic than ever concerning the feasibility of the five meter chain connecting Malden and Washington. The link between Malden and Hartford is now a fact. The New York to Philadelphia link is assured and Mr. Lynch says that, in spite of the failure of last year's attempt to link Hartford with New York, suitable antenna arrangements will be employed at the Club's new location, which will assure this contact. Linking Philadelphia and Washington, through Baltimore and Wilmington, will, he says, be a comparatively simple matter, and application of the experience gained as a result of the experiments conducted during the past few months should find the chain in operation within a very short time.

## NEW YAXLEY REPLACEMENT MANUAL AND SERVICE GUIDE

The Yaxley Manufacturing Division of P. R. Mallory & Co., Inc., Indianapolis, Ind., announces that the 1936 edition of its Replacement Volume Control Manual is now on the press and will soon be ready for distribution to radio service men the country over. Company executives report that twenty-four months were devoted to the preparation of this new book. That five radio service engineers, especially trained for the task, compiled, checked and re-checked the data it contains.

The first edition of the Yaxley Replacement Volume Control Manual, issued in 1934, was recognized as the most complete and comprehensive manual of its kind ever published. The new edition, we are told, is even better. It lists over 5000 set models. It provides more factual data and contains a complete catalog of Yaxley approved radio products. Any authorized radio service man can obtain a copy of this authoritative, up-to-date book by addressing the Yaxley Division of P. R. Mallory & Co., Inc., Indianapolis, Indiana.

## STERILIZED CONDENSERS

Girls dressed in immaculate white uniforms; men in those white jackets associated with the medical profession; an item of forty or fifty dollars each month for surgical rubber gloves—is this a hospital, perhaps, instead of a condenser factory?

Well, it is a condenser factory—one that has learned the importance of guarding against contamination in its production routine. In the departments of this Aerovox plant where critical condenser foil is being handled, girl operators wear gloves so as not to introduce perspiration or other impurities. Particularly in the making of electrolytic condensers, wherein the chemical aspects are of major importance, operators not only wear gloves but also freshly laundered uniforms and caps. The rooms are kept immaculately clean; the various vats and tanks are carefully guarded against dirt or impurities; the workers are constantly on guard against contaminating materials, components and assemblies.

All of which may seem little more than splitting hairs or making mountains out of molehills; but since ingredients and components are critically inspected by chemists for chemical purity, there is nothing gained if foreign matter is permitted to creep into condensers during production. In fact, the early mysteries of electrolytic condenser production, when an occasional batch might go sour for some unexplained reason, have now been solved with the sterilized technique introduced in departments handling critical departments.

## NEW FREQUENCY FOR 2GB

With the fall months and better radio reception to far distant points, American listeners who tune in for 2GB, Sydney, Australia, will hear the station on the wave length formerly held by a government-owned station, 2BL. The change will become effective Sept. 1, with the 855 kilo. band given over to 2GB, which is the most powerful privately owned, commercial station in Australia. The station will install considerable new technical equipment in August as a result of the recent visit of its President, A. E. Bennett, to this country. His son, George Bennett, is still in the United States but will return late in August. The staff of 2GB comprises 82 persons, not including musicians. Many of its programs are American-made transcriptions and its transcription library now includes some 28,000 wax discs.

## BOOK REVIEWS

(Continued from Page 13)

room). This treatment coordinates the frequency and directional characteristics of microphones and loud speakers used in public address systems with the acoustical characteristics of the auditorium or studio, and shows the importance of the various factors in designing sound reproducing equipment.

The material is presented in a manner that will serve the needs of anyone interested in the development or application of acoustic and electro-acoustic apparatus.

Handy Man's Home Manual—Modern Mechanix Publishing Co., 529 So. 7th St., Minneapolis, Minn.—50c.

This is a 146-page manual, full of useful ideas, plans, kinks, home repairing hints and other useful information. The twelve chapter heads are as follows: The Kitchen, Living Rooms, Plumbing System, Basement and Furnace, Attic and Den, Garden and Lawn, Playground and Playroom, House Exterior, Home Workshop, Garage and Auto, Furniture and Decorations, Radio and Electricity.

The entire contents are listed alphabetically and cross-listed, making it very easy to quickly refer to any bit of information contained in the manual. Many useful radio and electrical hints are contained in the last chapter, which will be of particular interest to readers of the "Technician". The book will be of value and interest to all home owners, experimenters and others who work with their hands.

## NEW TROYS

The new line of 1936 model Troys is now on display at Radio "Doc's" and Bill Sexton extends all dealers and technicians a cordial invitation to drop in and look over the many different models and styles. The new Troy line is very complete from four tube t. r. f.'s to amplifiers and all-wave consoles.

## THE YAXLEY 1936 REPLACEMENT VOLUME CONTROL MANUAL



Five radio service engineers worked on it twenty-four months. Lists more set models than any others. Complete—authoritative—up-to-date—and free! Write today! Mention jobber's name.

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## TRAVELING THE TERRITORY WITH MILTON

What ho, friends and playmates! Here it is August, 1935 and Pacific Standard Time in the bargain. So what?

After such effusive salutations we wish to remind you—all that when this edition of the "Technician" comes off the press, Yours Effervescently will be traveling hither and yon on a well-earned (?) vacation. On to the Fiesta at Santa Barbara!

And while on the subject of fiestas it comes to the ears of the doddering old Traveler that one B. C. Ford, who keeps the meter needles swinging at Electric Products Service, has gone Spanish in a great big way. When approached on the subject Friend Ford stated that he is merely preparing himself for the U. S. diplomatic service; but, somehow or other, we wonder if a certain Senorita Julia doesn't have something to do with this concentrated interest in diplomatic affairs of state. Viva el Servicio Diplomatico!

The Traveler takes this opportunity of saying hello to his old friend Ken Munro, who has just returned to the fold after spending considerable time in the citrus counties. Ken has taken charge of the radio department of the West Los Angeles Hdwe. Co., in West Los Angeles, where he will take care of the radio necessities of his many friends and customers. Good luck, Ken!

They all depend on Mr. and Mrs. Le Pla of the Radio Electric Shop on West Santa Barbara to assure the success of get-togethers and parties. When it comes to connecting microphones into home radios so as to create the impression of personal telegrams being broadcast over the air, we have to admit that Mr. and Mrs. Henry are past masters.

For using radio principles to cut mechanical production costs in factories, we take our hat off to our good little friend, R. Mestas, of Kobe, Inc., in Huntington Park. The Traveler is willing to wager that this dapper little engineer will carve a niche for himself in the wall of the Engineer's Who's Who before many moons have passed.

Glenn Goyer is having the time of his life at Lovinger's Radio Service on North La Brea. In between his moments of repairing and adjusting radios on the bench he gets a great kick out of ordering special refrigerator belts for friends who don't

know the model numbers of their refrigerators. Wotta life, Glenn; wotta life!

The Traveler just stumbled across another old timer in the radio business. Remember Hal Reynolds, formerly of Kendall Tune Radio on Glendale Blvd.? Yep, he's now handling the refrigerator orders down at Chanslor and Lyon on South Grand Ave. Attaboy, Hall!

Who said that radiomen are not musically inclined! Do you-all know that Erneste Pelaez, of Calderon's Music Store on North Main street, plays the cello every morning on the Spanish program over KTM?

And besides the Traveler himself strumming a wicked uke, have you ever listened to Phil Kudler of Radio Television play his violin, or to Pol Verbeke of House Radio Shop vibrate a harmonica, or to Russa Carruthers of Carruthers Radio Service wail a saxophone? Boy, oh boy, what a musical radio fraternity!

And keeping to the subject of music, your Traveler noticed a few more of said radio fraternity at the Hollywood Bowl the other Thursday evening.

They tell us that J. H. Spaulding of Alhambra, had his three radio-minded kittens very appropriately named in accordance with the pitch of their meows. Just step right up and meet Hi-Mu, Lo-Mu, and Dam-Mu—just three little kittens for nice boys and girls like you and me to play with.

Using radio principles for checking the intensity of color is just all in the day's work for M. W. Burton, of the Southern California Gas Co. Page Max Factor!

And so, everyone, remember to enjoy Labor Day. If you're among the lucky ones that don't have to work on that day, rejoice, my friends; but if you have to work just the same, merely keep in mind that you're celebrating Labor Day in the literal sense of the word. Isn't this world just full of justice, though?

Hasta luego, muchachos!

## SHURE EXPORT DEPT.

The organization of an export department and the appointment of Mr. John C. Hill as Export Manager, is announced by S. N. Shure, President of Shure Brothers Company, manufacturers of a complete line of crystal, condenser and carbon microphones and accessories for high-fidelity, wide-range, general purpose and special sound reproduction applications.

## NEW RECORD MATERIAL

The Allied Phonograph and Recording Co., Hollywood, late in July placed on the market its new "Velvalac" wax substance for electrical transcriptions. The new preparation is said to have minimum surface noise and is non-warping, non-breakable and of lighter weight than the usual laminated and solid transcription stock.

The Velvalac discs have been taken by the Freeman Lang Sound Studios for their usual recording service, but with option of laminated or solid stock on order. The Velvalac process has been in the Allied Research laboratory the past ten months under the direction of Archie Josephson, vice-president. The discs will come in a variety of colors including desert brown, royal blue, black, sunkist orange and emerald green.

## A GUIDE TO BETTER ALL-WAVE RECEPTION

Various methods of increasing signal strength pickup on broadcast and short-wave bands alike while at the same time reducing background noises to a minimum, are dealt with in the new 1935 catalog of Taco products just issued by Technical Appliance Corp., of Long Island City, N. Y. This literature describes the latest forms of double doublet and single doublet all-wave noiseless antenna systems, a variable impedance coupler for use between any doublet antenna and set for increased signal strength and minimized background noise, an ingenious store demonstrator antenna system and an all-wave line filter. A copy of the catalog may be had on request. (The Technician will forward your request).

## HERTZBERG JOINS ELECTRAD

Robert Hertzberg, who has been engaged in technical publicity, editorial and sales promotion work since the early days of broadcasting, has joined Electrad, Inc., of New York, in the capacity of sales engineer. He will contact the radio service and amateur fields in particular.

Electrad, Inc., manufactures a large line of radio volume controls and fixed and adjustable resistors for radio and electrical applications.

Dr. H. T. Sterna of the United States Geological Survey, by studying old beach lines, reports indications that Hawaii had "ice ages" corresponding to five known glacial periods.

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**RADIO SPECIALTIES FEATURE  
NEW RADIART ITEMS**

The Radio Specialties Company announces the development and presentation to the trade of two new units by the Radiart Corporation, manufacturers of a complete line of auto radio vibrator units. The two new items are the Radiart Filtron, a device which filters ignition noise from the antenna system of the auto radio receiver, eliminating the necessity of spark plug suppressors and Radiart "A" Line Filter for installation in conjunction with the Radiart Filtron with older model receivers and on cars with stubborn cases of interference.

It is claimed by the Radiart Corporation that auto owners will find their cars capable of greater gas mileage, increased power, easier starting and all around better performance if spark plug suppressors are discarded. The Radio Specialties Company will be glad to discuss these new items with you.

**CONDENSER KIT FOR  
THORDARSON TESTER**

To facilitate the assembly of the Thordarson combined condenser capacity and leakage tester for which the foundation unit, transformer, choke, potentiometer, knobs and other components have been available for some time past, the Aerovox Corporation of Brooklyn, N. Y., announces a special kit of condensers. This kit consists of the seven Aerovox condensers specified by the Thordarson designers, of the exact capacities and voltages called for.

**SOLAR ANNOUNCES NEW  
LINE AND CATALOGUE**

A very complete line of radio noise-eliminators known as ELIM-O-STATS has been announced by the Solar Mfg. Corp., of New York City, makers of condensers, and the trade is invited to write at once for the elaborate catalogue.

**FOR SALE**

Modern factory-built tube-tester.  
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**RADIO ART**

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**MODEL TOWN AND  
MODERNIZATION MAGIC**

The California International Exposition, San Diego, includes MODEL TOWN and MODERNIZATION MAGIC, two features of the Federal Housing Administrations exhibit.

The model city contains fifty-six houses in miniature with appropriate settings of lawn, shrubbery and trees, and has been pronounced the most beautiful exhibit of its kind ever held. In front of each house is a container with folders showing photograph, floor plan, description of the house, and detailed cost and carrying charge under F. H. A. loan for periods of ten, fifteen, twenty years. There have been over five thousand requests for these sets of pamphlets from different visitors at the Fair.

Amongst this group of homes are featured American Colonial, California Monterey, Spanish, Mediterranean, English, American farm house types, ranch houses and bungalows.

Builders and real estate men have been using Model Town for the purpose of acquainting their clients with the different styles of homes and their arrangements and a number of sales have been made as a result. It acts as a scientific laboratory for the prospective home owner where one can obtain all details regarding the home of his choice from the pamphlets available. Approximately five hundred thousand visitors, or three out of every four who have attended the Exposition, have visited Model Town.

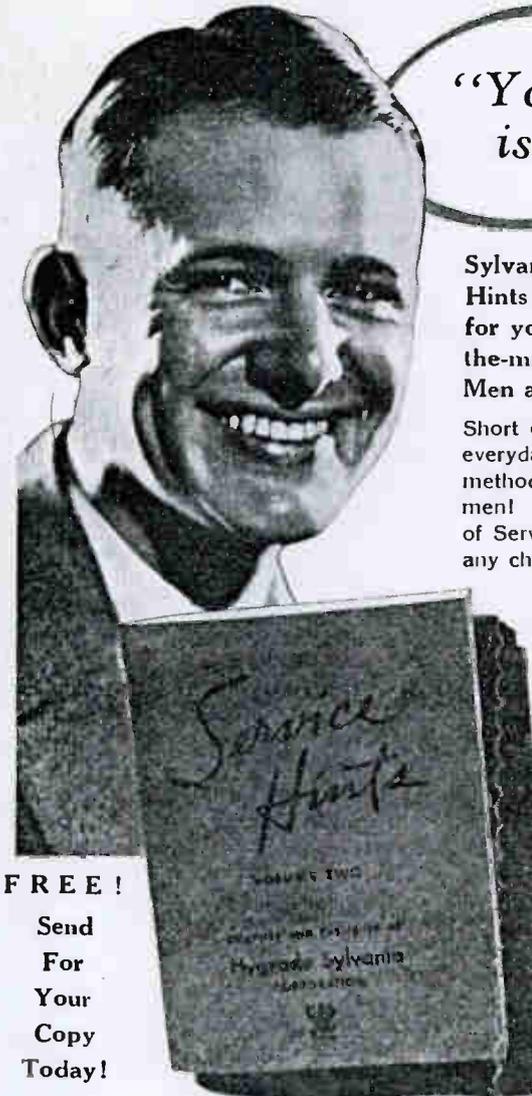
Twenty men are in attendance at all times, day and night, to give information to those interested. Daily reports are kept of all interviews, requests for mailing, and attendance. A representative of a large Chicago department store recently flew to San Diego for the purpose of visiting the Tiny City. He spent several hours there and returned to Chicago again by air.

Several sets of pamphlets describing the fifty-six homes in Model Town will soon be in the hands of all Housing Committees in California and those interested in building a new home may obtain one or more of these pamphlets at the Housing Headquarters by request.

Modernization Magic is a platform operated mechanically, which shows the effect of old buildings before and after modernization.

The exhibit at San Diego was constructed under the direction of Austin Black, Deputy Regional Director of F. H. A. Stuart Ripley is manager of the exhibit.

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## SERVICE KINKS AND PET EQUIPMENT

(Continued from Page 14)

### ZENITH MODEL 50 CHASSIS—HUM

Look for an open cathode by-pass condenser in the detector stage. When these sets are set up in your shop for testing be sure that the power and audio transformers are properly separated so as to prevent induction between the two causing hum.

### ZENITH 50 SERIES—LOUD HUM

Connect a 250,000 ohm resistor between grids of the second a-f tubes types 27. These tubes are connected in push-pull and the resistor mentioned will remedy the trouble.

### SPARTON MODEL 931—INTERMITTENT, HUM OR LOW VOLUME

The 0.6 ohm hum balancing control on the power tube filament often increases in resistance. This will cut down the filament current. The control should be replaced, although the set will operate fairly well without it in the circuit. If the hum is not too great, it may be left out permanently.

### SPARTON MODEL 18—INTERMITTENT RECEPTION

This condition has invariably been traced to poorly soldered connections or otherwise defectively connected units, mounted on the terminal strip immediately under the a-v-c tube socket. Inspect carefully the wire-wound resistors here, and look for opens as well as shorts.

### RCA MODEL R-37—WEAK RECEPTION

See that the control grid lead to the 2B7 tube is not permitted to short to the shield. Sometimes excessive temperature of this rubber covered shielded wire will melt the rubber, permitting this to happen. The use of cotton insulated replacement wire is recommended. For adjustment purposes this receiver's i-f is 175 Kc.

### RCA DUO MODEL 380-HR TESTING NEON INDICATORS

Connect lamp under test in series with 200,000 ohm resistor and an a.c. source. Shunt the line with a potentiometer and place a voltmeter at the output of the potentiometer, with the neon lamp. Not more than 64 volts should be required for lighting of the lamp and not less than 52 volts. If it lights anywhere between these figures as indicated by the potentiometer it is in good condition.

### PHILCO, ALL MODELS INTERMITTENT RECEPTION

Outside of defective tubes the most common cause for intermittent reception is to be found in by-pass condensers which intermittently become open. Generally the coupling condensers are at fault. These condensers may be checked by probing through the eyelet on the condenser case with a sharp test instrument and by gently lifting up on the wire connected to the lug. If moving this wire causes the receiver to cut out, the condenser is defective and should be replaced with a new one.

### LYRIC MODEL K69—MUFFLED AND WEAK RECEPTION

You will probably find the condenser in the detector circuit (one of the two next to the filter block) shorted. It will be best to replace both of these because the remaining one will cause trouble later. They have values of 1 mfd. each.

### BRUNSWICK MODELS 17, 24, 25 FADING OR INTERMITTENT

This can almost invariably be traced to an open 0.5 mfd. oscillator plate by-pass condenser. The open is usually due to a broken connection inside the shield housing of the condenser. The quickest and most effective method of repair is replacement. The same type of trouble may be found due to the breaking of the porcelain insulators of the "turret" condenser gang. This causes the stators to shift, in many cases allowing them to short to the rotor.

### STEWART-WARNER MODEL R116 LOW VOLUME CALIBRATION OFF

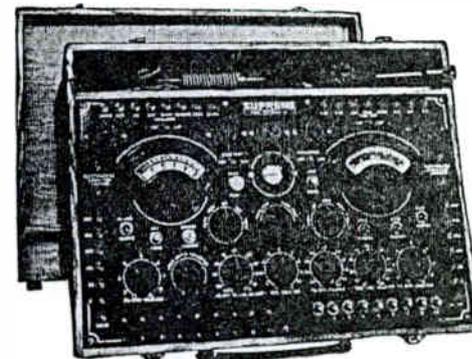
The trimmer condensers on the condenser gang are soldered in place and poor connections may develop at these contacts. Look for high resistance connections or completely opened circuits here. After resoldering the defective connections, rebalance the receiver.

### STROMBERG-CARLSON MODELS 38, 39, 40—DISTORTION

When this complaint can be cleared by placing your finger on the control grid of either the r-f or first detector tubes, the trouble is probably due to grounding of the control grid return to the chassis. The shield over the coil may bite into the lead, shorting it to ground. This will prevent the a-v-c from acting on the stage in question and will therefore reduce the swing of the visual tuning meter on resonance.

New 1936

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