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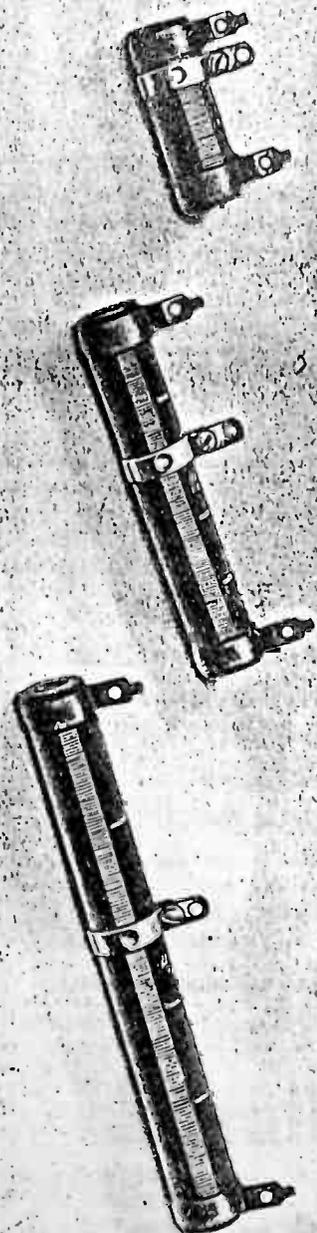
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« THE » "TECHNICIAN"

JUNE-JULY, 1935

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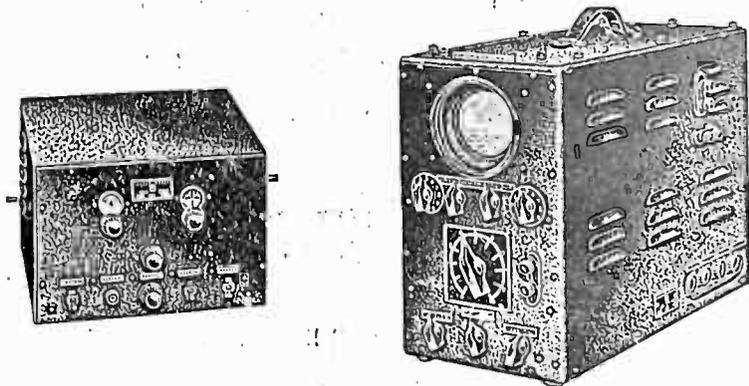
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EDITORIAL

By The Editor

Radio Servicing--A Profession

There has been much discussion both among the various members of the trade and editorially to the effect that the radio service man is a professional and deserves the prestige, consideration, dignity and position in the modern business world accorded other professionals.

Undoubtedly that is true—but what are we doing about it? The average service technician is inclined to bemoan his fate in being forced to compete with chiselers and unscrupulous screw-driver technicians and continues to overlook the fine points of customer contact.

Let us all stop for a moment and take stock of ourselves and see just how deserving we are of being placed in the professional category. Do we conduct our business in an efficient, business-like manner, or do we accept business management as a necessary evil, consisting only of having our name in the phone book, paying the rent and trying to keep

our test equipment not more than five years out of date? What is our attitude toward the customer? It is granted that there is much foundation for the service technician to have a mental picture when the word "customer" is mentioned of some grotesque monster with sharp horns and a long red tail or possibly a three-headed dragon with saw teeth along its back.

First of all, we must correct our own personal psychology and mental attitude to better fit ourselves to strip these monsters of their horns, tails and spiny backbones and cause them to appear more like well-meaning, conscientious, honest human beings.

We must all admit that there is plenty of reason for the average radio owner to be suspicious of all radio technicians as a result of having been "gypped" time and time again by free service call rack-

(Continued on page 19)

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ADJUSTING RECORDER HEADS

By JAMES L. FOUCH

Test Tech., Universal Microphone Co.

With recording making its bid for the spotlight in radio it seems a fit time to forward technical information regarding the adjustment of recording pick-ups and recording cutters. Increases in the output power of the average radio amplifier has made it possible to easily convert them into good recording outfits for the experimenter or the man looking for semi-professional results. High fidelity amplifiers have improved the quality of professional recordings not because of any extended range but for the reason that their response curve is more flat. In this article it is hoped that recording heads of interest to the two classes of recording enthusiasts above mentioned will be covered so that they will be enabled to adjust their recording cutters to their own particular requirements.

The average home recording phonograph pickup is a combination instrument being used for both recording and playback. In such an instrument the resistance must be exceptionally low and the inductance high in comparison, thus giving a greater power transfer. Some ordinary phonograph pick-ups may be adjusted for recording, with this idea in mind the radio service man may experiment and install apparatus where medeocre quality is found satisfactory.

Most magnetic pick-ups are of the same general design, having a coil, armature, and a magnet with two pole pieces. The greatest variation in the type lies in the method of damping. The pivot of the armature is clamped with rubber between two pole pieces. The rubber damping prevents lateral vibration at the bearing and reduces, but little, the rotary or pivotal function of the armature at this point. For use as a recorder the pivot should be damped still greater. This being accomplished by loosening the pole piece screws and clamping the pick-up in a vice very tightly with two .020 inch shims placed in the gaps between the poles and the tip of the armature. With the pick-up still in the vice the pole piece screws are tightened, the vice released and the shims removed. Sometimes in tightening the pivot, the rubber bearing is cut through to a pole piece on one side or the other, thus throwing the magnetic circuit out of balance. The rough casting of the armature pivot is the reason for the cutting. If the pivot is perfectly round and smooth, the liability of such an accident is much less. After the afore-mentioned procedure the

next point that needs your attention is the damping at the tip of the armature. The dampers are usually at the sides of the armature paddle and are of soft rubber, being pressed against the armature by some adjustable means or other. The damping pressure should be increased at this point if the pick-up is to be used as a recorder. It must be kept in mind that the armature should be adjusted to the center of the gap between the poles, for the best tone quality. In the event that the paddle is damped by projecting it through a slit in a rubber block, the damping may be increased by inserting a brass shim under the bridge holding the rubber block. This applies the pressure downward, limiting the movement at the pivot bearing as well as at the top of the armature.

After the foregoing, the question comes up—'Why dampen the pick-up when we want something sensitive?' It must be remembered that you are translating electrical power into mechanical power and that it must be held within a definite range of movement. Another reason for the damping is that it smooths out the frequency characteristics and gives a good quality recording on the various materials as recommended for semi-professional work. Among these are listed the Universal Processed Aluminum discs and various soft composition blank records. Many recording men have obtained very good results with combination recording heads on these materials and prove that better than average results may be obtained upon aluminum discs by a little patient experimenting.

For those who are more professionally inclined and wanting real quality recordings for transcriptions, etc., etc., an especially constructed cutting head should be purchased. These recording heads are tested and adjusted at the factory, but in the event that they become unadjusted it will be of some value to acquaint oneself with the adjustment of such apparatus. The new Universal Power Recording Head is a magnetic type, requiring no extra field supply. It is a small compact precision instrument of $\frac{3}{4}$ " x $1\frac{1}{8}$ " x $2\frac{3}{8}$ " in dimensions.

(Continued on page 24)

NOTICE!

The "Technician", its Editorial Staff or the Certified Radio Technicians Association assumes no responsibility for statements or personal opinions expressed in articles appearing under the specific authorship of any individual, nor is the authenticity thereof guaranteed.

The "Technician" is published by the CRTA for the general benefit and use of the entire radio industry of Southern California. All readers are invited to submit opinions and articles for publication, either of a controversial or any other nature. The only stipulation for publication is that articles are, in the opinion of the editorial staff, of general interest and must be accompanied by the name and address of the writer.

DR. HUND MOVES

Dr. August Hund, world-famous physicist and radio engineer, has recently moved his laboratory facilities from 134 So. Western Avenue to new and more spacious quarters at 8021 Melrose Ave.

AN EXPLANATION

It will be noted that the date lines on this issue of the "Technician" read June-July. This does not indicate the omission of an issue of the "Technician" but merely the intermediate step in advancing the date appearing on each successive issue. Due to many unavoidable causes which have been accumulating over a period of months, each successive issue was slightly later until the May issue was not issued until almost the first of June. Therefore, this issue, off the press the first week in July, is labeled the June-July issue and the next issue, off the press the first week in August, will be called the August issue. Henceforth, each successive issue will be issued in the first week of the month which name it bears.

FRED BOWEN NOW WITH LANG

Fred Bowen, formerly sound effects engineer at KHJ and with the RCA-Victor studio in Hollywood, is now with Freeman Lang's sound studios in a similar capacity.

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METHODS OF CALCULATING THE CURRENT CARRYING CAPACITY OF RESISTORS

By Eng. Dept., Aerovox Corporation.
Taken from Feb. Issue of Aerovox
Research Worker

It is often required to find the maximum safe current for a resistor of given resistance and power rating, such as a voltage divider. This problem can of course be readily solved with well known equations, yet it seems to take more time and trouble than is warranted, probably because of the extraction of a square root; particularly when fractions are involved. In this article the solution by algebraical methods will be reviewed, showing how one can avoid the fractions; a labor-saving chart is also presented, which shows the answer at a glance for practically all such questions and with an accuracy which is sufficient for all practical purposes.

Calculation of Maximum Current or Voltage

The power in a circuit is found by any one of the three well known equations:

$$P = EI \quad (1)$$

$$P = I^2 R \quad (2)$$

$$P = \frac{E^2}{R} \quad (3)$$

depending on which are the given quantities. Here, E is expressed in volts, I in amperes, R in ohms and P in watts. When the power is the required quantity, these equations are to be used, but if the power is one of the given quantities and the voltage or current is required, the equations have to be transposed so as to bring either E or I alone to the left of the equation. This gives:

$$I = \sqrt{\frac{P}{R}} \quad \text{amperes (4)}$$

or,

$$I = \sqrt{P \times \frac{1,000,000}{R}} \quad \text{milliamperes (4a)}$$

$$E = \sqrt{PR} \quad \text{volts (5)}$$

Before going over to the examples, it is necessary to discuss the voltage divider briefly. Such a divider might for instance be rated at 50 watts, allowing a certain maximum current. Now the resistor is divided into sections carrying different amounts of current and consequently dividing the power unequally over the resistor. It should not be thought that since one section is carrying less than its share, that other sections can handle more so as to bring the total up to 50 watts again. That cannot be done; the maximum current is to determine by

supposing that the entire 50 watts is to be divided uniformly and the current found in this way should not be exceeded in any section.

Similarly, the maximum voltage across the resistor may be found by equation (5) again assuming that no current is to be drawn from any tap. If any part of the resistor is to carry less than the allowable maximum current, the maximum allowable voltage is more than the value found by equation (5).

Mathematical Methods of Calculation

Example 1: What is the maximum allowable current for a resistor of 15000 ohms and 25 watts? Using equation (4a) and substituting values:

$$P = \sqrt{\frac{25 \times 1,000,000}{15,000}} = \sqrt{\frac{5000}{3}} =$$

$$\sqrt{1667} = 40.8 \text{ ma.}$$

Example 2: What is the maximum allowable voltage across a 75000 ohm resistor with a power rating of 10 watts? Use equation (5); substituting values:

$$E = \sqrt{10 \times 75000} =$$

$$\sqrt{750,000} = 100 \sqrt{75} = 868 \text{ volts.}$$

Example 3: A speaker field has a resistance of 1000 ohms and is rated at 6 watts. What is the current required? Use again equation (4a)

$$I = \sqrt{\frac{6 \times 1,000,000}{1000}} =$$

$$\sqrt{6000} = 77.5 \text{ ma.}$$

Example 4: A resistor of 10,000 ohms is to carry a current of 25 ma., what is the dissipated power? Use equation (2) remembering that I is in amperes:

$$P = .025^2 \times 10,000 = .000625 \times 10,000 = 6.25 \text{ watts}$$

If the squaring of a fraction is inconvenient, the equation can be written:

$$P = \frac{I^2 R}{1,000,000} \quad \text{Watts (2a)}$$

where I is in milliamperes. Using the same example:

$$P = \frac{25^2 \times 10,000}{1,000,000} = \frac{625 \times 10,000}{1,000,000}$$

$$= 6.25 \text{ watts}$$

The table in this article has been prepared for users of standard size resistors. It shows the maximum allowable current for the most common resistors of this

(Continued on page 18)



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CATHODE RAY TUBES AND OSCILLOGRAPHS NOTES ON THEIR DESIGN, CONSTRUCTION AND OPERATION

By J. L. MAHON, E. E.

With the recent advent of Cathode ray tubes to the service field many technicians are becoming interested in the acquisition of an oscillograph either by purchase or construction. One of the chief concerns is the life of the tube as early tubes had a short life due to gas ions destroying the cathode surface. Tubes developed and marketed during the last few years are of the high vacuum type and their life is comparable to the life of well-built receiving tubes. Contrary to common belief, the failure of the tubes is due to the loss of filament emission and not to screen fatigue; operation at the proper heater voltage will therefore insure a long life for the tube. The oscillograph besides being a very useful service instrument is also justified from an educational viewpoint as it allows the observer to visualize conditions of voltage, phase, etc., in circuits which at best were a strain on the imagination.

There are several good oscillographs on the market at a reasonable price, of which the Dumont type 145 is a good example. For the men who wish to build their own instruments either to save money or for the experience or both, the following general notes have been prepared. The electrical circuits of the oscillographs can be divided in two sections, first, the power supply and controls for focusing the beam and secondly, the power supply and circuits of the sweep oscillators for moving the spot horizontally while observing a signal. In this issue we will deal only with the power supply and controls for focusing, taking up sweep circuits, etc., in the next issue along with actual circuits and construction details.

Since the beam of electrons and the spot is deflected by either magnetic or electrostatic fields, the cathode tube should be well shielded to prevent "worms"; this is a form of distortion produced by stray fields and appears as small ripples etc. in the pattern. Trouble of this nature is usually harder to eliminate in the compact portable instruments because of the proximity of the power transformer. For laboratory installations it is recommended that the power supplies and sweep oscillators be placed at least three feet from the tube and voltages supplied through a well shielded cable. The anode and deflecting plates are 1000 volts positive in respect to the heater cathode and intensity grid; signals being applied between the anode

and plates make it necessary to ground the anode. This places the heater cathode and grid 1000 volts negative with respect to ground and requires good insulation on that part of the circuit.

The DC voltage supply to the tube may be any well filtered 1000 volt set-up. The voltage is not critical and may be actually anywhere between 900 and 1100. Improper filtration will show up in the form of intensity modulation, the same appearing to break the horizontal line up in to dashes when the sweep is set at a frequency at or below that of the ripple: with the sweep faster than the ripple it appears as dark waves moving across the pattern, very annoying. A by pass of $\frac{1}{2}$ mfd. across the intensity potentiometer is helpful in reducing this effect. High resistance leakage between the grid, cathode, heater winding or focusing grid and any part carrying AC will cause this trouble in a similar fashion to ripple in the power supply. The heater winding for the cathode tube should be electrostatically shielded from all other windings and well insulated to prevent leakage.

(To be continued)

BAY CITIES RADIO TECHNICIANS ASS'N.

At the recent meetings of the Bay Cities Radio Technicians Association we have had such speakers as Charlie Nichols, formerly an engineer with Jackson-Bell, Mission Bell and now with Packard-Bell; Joseph Tami, Jr., instructor at the Frank Wiggins Trade School, who gave us a very instructive talk on systematic service methods; Joe Reiside, technical and service sales representative for the General Electric Co., who gave us some interesting side lights on a trip through the Southwest, during which he visited many radio men and groups of radio men.

We plan to have regular classes in radio servicing in the very near future and also further information to be brought out in discussions. We hope to have an attendance of approximately fifty within two months.

THE FIGHT IS ON

United States Senator Arthur Capper (Kansas), in a recent speech said, "The independent business men whose numbers have been reduced from 1,600,000 to something over a million in the last decade, is not getting a square deal under present conditions. He is being destroyed by the unfair business methods of the huge Chain Store combinations through their predatory business methods."

We know that this statement is one of fact. The Chains are getting stronger and the Independent has only the prospect of bankruptcy facing him in the not too far distant future. This is not a pleasant prospect and the law of self-preservation demands that we fight back with all the skill and resource at our command. To effectually wage a winning fight the CRTA has joined together with other trade associations and formed the Independent Retailers Tax Protective League, on whose Board of Directors, together with representatives of these other associations sits Norman B. Neely. The main purpose of the I.R.T.P. League is Tax Equalization and the Board of Directors control its policy and approve all its expenditures.

We have found in the past that we cannot rely on the promises of vacillating legis labors, so we are going directly to the people of California. An initiative petition embodying a real chain store tax law with teeth in it, is being circulated, and will be put on the ballot for a vote of all the people at the next general election. No amendments of the Legislature in the Senate, not a veto of the

Governor can effect its purpose. It becomes a law, if passed, that cannot be tampered with.

You will be asked in the near future to help in this work. It is of vital importance that we all work together; the combined efforts of all trade associations and their members, coordinated under the banner of I. R. T. P. League cannot but bring success. We suggest and recommend that you support this movement with your money, time and effort. Subscribe to the "Pacific Argus," the I.R. T. P. League official weekly organ; become an associative member and if possible donate to the best of your ability, and get your friends to do likewise.

Soon representatives will call on you. Give them your courteous cooperation and with combined and coordinated effort we will sweep on to Victory and reclaim for the independent the right to live decently, without fear of the morrow—An American creed dearly cherished by all of us. Call your officers or I. R. T. P. League headquarters, MUtual 2479, for any further information.

TROY ALL WAVE POPULAR

The new Troy Model 84U high fidelity radio receiver is proving quite popular with Southern California listeners. It is housed in a burl walnut inlaid cabinet and uses an airplane, double ratio vernier dial. It covers a band wave of 15-550, employing an eight-tube super-heterodyne circuit and a wide range audio system.

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RADIO TECHNICIANS OF SAN DIEGO EXPOSITION NUMBER

By DUANE W. SEIBERT

Whistles blew, bells rang, horns tooted, cannons roared and merry-makers joined in fun and forgot their daily routine when President Roosevelt, over direct telephone from his White House study, gave the opening address and delegated two orphans to throw the switch to officially open the California Pacific International Exposition at eight o'clock p. m., May 29th, illuminating the beautiful Exposition grounds at San Diego with volleys of lighting effects of all colors and descriptions.

The Midway with its leather-throated barkers offering their wares, "Life", "Crime", Ripley Believe It or Not", "Miss America", "Boulder Dam" and countless others. Rides, thrills, spills, exhibits extraordinary throughout the 12 miles of Exposition grounds.

Not only does the Exposition offer such glamorous exhibits and fun making, but many points of interest to the Radio Technician. May we comment on a few: Something a little different from the ordinary work of the average technician is shown in Hollywood Recordograph Studio managed by Morris C. Selvage and Frank D. Vincent. Their technician and sound man is a capable young fellow, Joe R. Craco, formerly of Craco Sound Systems. This little place on the Midway is unique in that it offers a six-inch record of your voice for the price of two bits. They use a Photo-Phone Style of cutting head which cuts 93 grooves per inch, using a turntable speed of either 33 $\frac{1}{3}$ or 78 revolutions per minute. The Amplifier System is Class "A" and a pair of 2B6's is used in the final. The output is 15 watts and crystal, Condenser and Velocity mikes are used, depending on the quality of voice. They have a very neat set-up for their concession and it will be well worth your while to look it over and try it out.

No doubt you have read of or maybe heard over the radio at some time or other, of Alpha, the scientific wonder in robots. Take twenty minutes of your time to witness this shining metal man that took 14 years to make at an expense of \$180,000.00. Professor H. May, the

English inventor, demonstrates this "man-made man" and explains his workings. Alpha will stand up, sit down, talk and answer questions, tell time, shoot a gun and what not, merely by a command to do so, all operated of course by the frequencies of the voice, using non-directional carbon mikes placed at various places in the room. Alpha has an anatomy of 1040 specially wound relays to trip at 6 mils. His nervous system is separated by Class "A" amplifiers throughout using Exide batteries and has a 20 watt output using about 2 watts undistorted on demonstrations. Induction motors are used throughout to eliminate sparking. His voice is operated by improved magnetic speaker. One ton is represented in Alpha's weight and he is 8 feet tall.

The music loving technicians, if we have such a thing, will be interested in the Hammond Console organ, just recently put on the market and made by the skilled workmanship of the Hammond Watch Co. I hope in the near future this magazine will be able to publish full description and diagrams of this wonderful full-toned and full-range instrument. (Editor's note: Such an article by R. B. Dogherly will appear next month) The organ in home use will need but a small amplifying system, but as it is used at the Ford Bowl, in order to get proper volume and acoustics, 92 units of amplification are needed. Each unit consists of one 5Z3, four 2A3's and two 56's. There are two Model A-12 Jensen speakers to each unit of amplification and each unit good for about 20 watts output. This console is operated by a series of revolving discs driven by a 10 watt synchronous motor, each disc of which is cut to a particular note by means of small teeth revolving past the poles of permanent magnets which interrupt the flux at various frequencies. The total input to the amplifiers is 17,000 watts and the output is in the neighborhood of 2500 watts of audio power. Much credit must be given to Edward Nelson and Walter Martin, sound technicians at the Ford

(Continued on Page 25)

HOW TO SOLDER

By FRANK CHAPMAN
President of the M. W. Dunton Co.
Manufacturers of Nokorode Products

Being asked by your editor to write an article on this subject I am doing so out of my own experiences of the 32 years in which I have been making Nokorode Soldering Fluxes, and I hope that the little effort may help someone as I have been helped by others many times in my career.

It is not difficult to do a good job of soldering, if one remembers the essentials. There are but four (4) essentials which must be followed to achieve success—these are as follows:

- (1) The soldering iron must be kept free from pit holes, clean and well tinned.
- (2) A good soldering flux must be used.
- (3) The metals to be soldered must be comparatively clean.
- (4) The joint must be heated above the melting point of the solder.

Most people fall down on number 4.

Number 1—There are two processes of extracting copper, one is by the electrolytic process, which by passing a current of electricity through the ore carries copper and other metals which are in the ore and deposits all the minerals on the plate. This makes a soft porous copper, filled with particles of iron, silver, or such other metals as may be with the copper ore. This kind of copper is very poor for soldering purposes, but is commonly used, because it is cheaper.

The other process is to melt the ore into a liquid mass and draw from this molten mass, all impurities, together with any other metal but copper. This process makes the best copper for soldering purposes, as it is hard, free from pit holes and other substances, a 99 per cent pure copper. If you can get this kind of copper you will have little trouble with your irons, unless you permit them to be continually overheated, or use Sal Ammoniac.

A soldering copper that is overheated continually, will "pit", also any one who uses Sal Ammoniac, either in brick form or as a dip, will have coppers that give much trouble by "pitting". Be sure your iron is well tinned, to do this, just heat the copper to a cherry red and while hot file smooth (copper which is filed while cold will not be as smooth as one filed while hot). If the copper has cooled off while being filed, heat it again to about the temperature one would use in

(Continued on page 21)



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One Year against drying out**

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945 North Louise Street
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Makers of Nokorode Soldering
Paste for over 30 years.**



RADIO TECHNICIANS OF SAN DIEGO EXPOSITION NUMBER

By DUANE W. SEIBERT

Whistles blew, bells rang, horns tooted, cannons roared and merry-makers joined in fun and forgot their daily routine when President Roosevelt, over direct telephone from his White House study, gave the opening address and delegated two orphans to throw the switch to officially open the California Pacific International Exposition at eight o'clock p. m., May 29th, illuminating the beautiful Exposition grounds at San Diego with volleys of lighting effects of all colors and descriptions.

The Midway with its leather-throated barkers offering their wares, "Life", "Crime", Ripley Believe It or Not", "Miss America", "Boulder Dam" and countless others. Rides, thrills, spills, exhibits extraordinary throughout the 12 miles of Exposition grounds.

Not only does the Exposition offer such glamorous exhibits and fun making, but many points of interest to the Radio Technician. May we comment on a few: Something a little different from the ordinary work of the average technician is shown in Hollywood Recordograph Studio managed by Morris C. Selvage and Frank D. Vincent. Their technician and sound man is a capable young fellow, Joe R. Craco, formerly of Craco Sound Systems. This little place on the Midway is unique in that it offers a six-inch record of your voice for the price of two bits. They use a Photo-Phone Style of cutting head which cuts 93 grooves per inch, using a turntable speed of either 33 1/3 or 78 revolutions per minute. The Amplifier System is Class "A" and a pair of 2B6's is used in the final. The output is 15 watts and crystal, Condenser and Velocity mikes are used, depending on the quality of voice. They have a very neat set-up for their concession and it will be well worth your while to look it over and try it out.

No doubt you have read of or maybe heard over the radio at some time or other, of Alpha, the scientific wonder in robots. Take twenty minutes of your time to witness this shining metal man that took 14 years to make at an expense of \$180,000.00. Professor H. May, the

English inventor, demonstrates this "man-made man" and explains his workings. Alpha will stand up, sit down, talk and answer questions, tell time, shoot a gun and what not, merely by a command to do so, all operated of course by the frequencies of the voice, using non-directional carbon mikes placed at various places in the room. Alpha has an anatomy of 1040 specially wound relays to trip at 6 miles. His nervous system is separated by Class "A" amplifiers throughout using Exide batteries and has a 20 watt output using about 2 watts undistorted on demonstrations. Induction motors are used throughout to eliminate sparking. His voice is operated by improved magnetic speaker. One ton is represented in Alpha's weight and he is 8 feet tall.

The music loving technicians, if we have such a thing, will be interested in the Hammond Console organ, just recently put on the market and made by the skilled workmanship of the Hammond Watch Co. I hope in the near future this magazine will be able to publish full description and diagrams of this wonderful full-toned and full-range instrument. (Editor's note: Such an article by R. B. Dogherly will appear next month) The organ in home use will need but a small amplifying system, but as it is used at the Ford Bowl, in order to get proper volume and acoustics, 92 units of amplification are needed. Each unit consists of one 5Z3, four 2A3's and two 56's. There are two Model A-12 Jensen speakers to each unit of amplification and each unit good for about 20 watts output. This console is operated by a series of revolving discs driven by a 10 watt synchronous motor, each disc of which is cut to a particular note by means of small teeth revolving past the poles of permanent magnets which interrupt the flux at various frequencies. The total input to the amplifiers is 17,000 watts and the output is in the neighborhood of 2500 watts of audio power. Much credit must be given to Edward Nelson and Walter Martin, sound technicians at the Ford

(Continued on Page 25)

HOW TO SOLDER

By FRANK CHAPMAN
President of the M. W. Dunton Co.
Manufacturers of Nokorode Products

Being asked by your editor to write an article on this subject I am doing so out of my own experiences of the 32 years in which I have been making Nokorode Soldering Fluxes, and I hope that the little effort may help someone as I have been helped by others many times in my career.

It is not difficult to do a good job of soldering, if one remembers the essentials. There are but four (4) essentials which must be followed to achieve success—these are as follows:

- (1) The soldering iron must be kept free from pit holes, clean and well tinned.
- (2) A good soldering flux must be used.
- (3) The metals to be soldered must be comparatively clean.
- (4) The joint must be heated above the melting point of the solder.

Most people fall down on number 4.

Number 1—There are two processes of extracting copper, one is by the electrolytic process, which by passing a current of electricity through the ore carries copper and other metals which are in the ore and deposits all the minerals on the plate. This makes a soft porous copper, filled with particles of iron, silver, or such other metals as may be with the copper ore. This kind of copper is very poor for soldering purposes, but is commonly used, because it is cheaper.

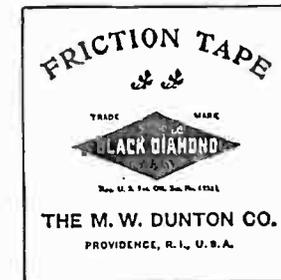
The other process is to melt the ore into a liquid mass and draw from this molten mass, all impurities, together with any other metal but copper. This process makes the best copper for soldering purposes, as it is hard, free from pit holes and other substances, a 99 per cent pure copper. If you can get this kind of copper you will have little trouble with your irons, unless you permit them to be continually overheated, or use Sal Ammoniac.

A soldering copper that is overheated continually, will "pit", also any one who uses Sal Ammoniac, either in brick form or as a dip, will have coppers that give much trouble by "pitting". Be sure your iron is well tinned, to do this, just heat the copper to a cherry red and while hot file smooth (copper which is filed while cold will not be as smooth as one filed while hot). If the copper has cooled off while being filed, heat it again to about the temperature one would use in

(Continued on page 21)



**SOLDERS THAT
ARE RIGHT
AT PRICES THAT
ARE RIGHT**



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COURT DECISION

A court decision of far-reaching importance has just been handed down by Justice Eder of the 9th District Court of New York, in the matter of patents covering aluminum blanks used for recordings. The Universal Microphone Company of Inglewood, California, has long held a license for marketing and using aluminum discs and has pioneered units for use in aluminum recording. The new professional recording machine was perfected in May. Two years ago patent owners brought suit involving the process of recording on metal and the use of basic patents and improvements whereby aluminum discs were used to record voice, conversation, music, radio broadcasts, etc. The New York decision will be followed by other suits to protect the original rights, particularly in New York, California and Illinois, according to a representative of the patent owners, who claim coverage of all angles in the various patents.

SOME CONDENSER

An order for the largest mica dielectric fixed capacitors ever made has been successfully filled by the Cornell-Dubilier Corporation. Standing three feet high and twenty inches in diameter in their oil-filled aluminum cases and weighing 300 pounds each, these units are capable of carrying 150 Amperes of radio frequency current, at continuous operating voltages up to 15,000 volts, according to their designer, William Dubilier, vice-president of the company.

This unusual power-handling capacity is made possible by a unique wheel-like construction. The capacitors consist of four rings of condenser units, each ring having six stacks of specially tested and impregnated condensers arranged radially around a central suspension shaft like the spokes of a wheel. The spokes are staggered to allow free circulation of the cooling oil. The actual capacitance is .02 mfd., and the power factor only .008 percent.

ALL WAVE MULTIPLE ANTENNA

For the past two years an attempt has been made to provide a suitable antenna system for use in radio stores, in small apartment houses or in other locations where more than one radio receiver is operated. Multiple antenna systems have for some time been more or less common but are unsuitable for use with all wave equipment. Arthur H. Lynch, Inc., has spent considerable time, effort and expense in developing a suitable all way antenna system which will allow simultaneous operation of several receivers. A very severe and rigid test of the accuracy of this system proved its worth in a radio company in New York City whose various stores are located in sections of the city where subway, elevated, street car and automobile traffic is quite heavy. Here, these new aeriels are rendering suitable demonstration service every day. A very important feature of this system is the fact that regardless of the number of receivers employed, it is necessary to use only one antenna transformer and one receiver transformer.

Ordinary alum, melted in a crucible or other container makes an excellent cement for joining glass, metal, china, etc. It makes a very strong joint and is impervious to water.



FREE "Successful Servicing," our 8-page monthly house organ, with valuable data pertaining to RIDER'S Service Manuals, should be reaching you regularly. Be sure you are on our list, if you are interested in successful radio servicing.

Rider's Auto Radio Manuals

Every Service Man Should Have
The CATHODE RAY TUBE AT WORK
By JOHN F. RIDER

The cathode ray tube explained in theory, with practical applications, showing how to recondition sets with minimum wasted effort. The graphic findings set forth here were determined in our own Successful Servicing Laboratory. If you want to be conversant with the cathode ray tube and its associated circuits . . . get this valuable book.

320 Pages, 6x9 inches
\$2.50 Postpaid

You would not try to change tires with your table utensils . . . you'd employ the best equipment for the job. It's the same with servicing Auto Radios . . . you need the very best equipment, RIDER'S Auto Radio Manuals, especially 416-page, Vol. II, now ready. No duplication between this and the great Vol. I. Auto Radio servicing brought right up to the last minute . . . a wonderful time-and-money-saver for the busy service man. Can you afford to be without RIDER'S?

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RIDER'S MANUALS are the absolute standard in their field. Each volume contains more facts, more manufacturers, more illustrations, schematics, I-F peaks, voltage data. We maintain an elaborate Laboratory for the purpose of improving the contents of our treatises. RIDER is as thorough as he is illuminating on every point discussed. It is folly to use any other manuals as your daily reference works. Stick to Rider and make more money!

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168 pages of pure factual experience, boiled down to indispensable reference data for the serviceman on his daily rounds.

COMBINATION—Contains Vols. I, II and III, with Carrying Handles, \$25.00 2870 pages with cumulative index. Steel-backed stiff cover binder with patented Herculox mechanism. Also available without carrying handles for \$21.50.

John F. Rider, Publisher

1440 BROADWAY, NEW YORK, N. Y.

YAXLEY MALLORY

MALLORY and Yaxley Radio Parts are produced with the dominant idea of promoting the Service Man's interests. With the manufacture of these parts, it is our ambition to retain permanently our reputation for leadership in furnishing constructive, helpful information and assistance.

INDIANAPOLIS.....INDIANA

What is the exact inductance of that coil?
 What is the exact resistance of that resistor?
 What is the exact capacity of that condenser?
 How is the power factor of that condenser?
 How bad is the leakage in that condenser?

卐 卐 卐

Is this condenser or that resistor or coil causing the trouble in a given stage or circuit?

卐 卐 卐

Can you answer all these questions easily, quickly, accurately, definitely and without substituting any parts? You can with Triumph's newest instrument!

卐 卐 卐

The new Triumph Model 500 Component Analyzer is truly the answer to a service technician's prayers—a dream come true!

卐 卐 卐

A real professional laboratory instrument, housed in a beautiful walnut finished instrument case with hinged cover—it is an instrument you will be proud to own—it is rugged, accurate and you will appreciate its convenience.

卐 卐 卐

Open and shorted parts show up instantly but in addition the Model 500 will show you actual values.

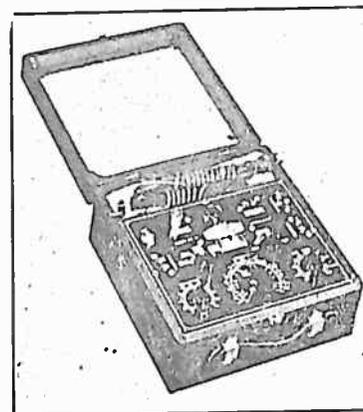
卐 卐 卐

Resistance from five ohms to two megohms—capacity from .00005 mfd. to 20 mfd.—inductance from 50 microhenries to 20 millihenries. ALL DIRECT READING.

卐 卐 卐

Binding posts are provided for external standards thus making easy the extension of the instrument's ranges.

Power factor can be shown as "GOOD" or "POOR" and leakage as "NORMAL" or "EXCESSIVE". Circuit continuity as high as four megohms may be checked. The instrument measures wet or dry electrolytic and paper condensers.



The Triumph Model 500 Condenser—Bridge—Analyzer measures 10" by 9¾" by 5¼". Weight packed for shipment is 10 pounds. Operates on from 100 to 130 volts, 50 or 60 cycle power supply. A compartment is provided in the case for carrying test leads, phones and accessories.

Let your jobber show you how the Triumph Model 500 will pay for itself on a few "tough jobs" by time, labor and expense saved and customer good will increased.

Never before has the service technician been given real laboratory facilities at a price compatible with service profits.

\$20⁹⁵

On The
West Coast

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KEEPING A PROMISE

Triumph stated that the Model 400 Tube Tester would not be obsoleted by ordinary changes in tubes. Triumph keeps this promise with the first "ORDINARY CHANGE" involving the introduction of ten new eight-prong all-metal tubes, to be announced to the trade July 1. Several weeks in advance of the availability of these tubes, Triumph is providing all owners of a Model 400 Tube Tester with test chart information and an eight-prong adapter ENTIRELY FREE OF CHARGE! It will only be necessary for owners to write to the factory giving the serial number of their instrument and information as to from whom it was purchased. The only expense will be postage charges.

卐 卐 卐

TRIUMPH MFG. CO., 4017 W. Lake Street, Chicago

See These Distributors for Demonstration

RADIO SPECIALTIES COMPANY **PACIFIC RADIO EXCHANGE**
M. D. EALY **J. L. MAHON** **DISTRIBUTORS, INC.**
ELECTRIC PRODUCTS SERVICE
ZACK RADIO SUPPLY CO.

WESTERN RADIO & ELECTRIC CO., San Diego
COAST ELECTRIC CO., San Diego

California Representative:

NORMAN B. NEELY, 1656 North Serrano Street, Los Angeles

CALCULATING CARRYING CAPACITY OF RESISTORS

(Continued from Page 8)

kind; the current is given in milliamperes unless otherwise stated.

It is of course impossible to give the figure for all possible cases in a table. The nearest approach one can make to such an ideal is to provide a chart and even then it is difficult enough to cover the complete range and to obtain sufficient accuracy to be of any use.

Maximum Current Ratings of Standard Resistors

Resist.	10	25	50	75
Resist.	10	25	50	75
Ohms	Watt	Watt	Watt	Watt
Ohms	Watt	Watt	Watt	Watt
1	3.16 amp.			
2	2.24 amp.			
2.5	2.00 amp.			
3	1.83 amp.			
5	1.41 amp.			
10	1.00 amp.			
15	817			
20	707			
25	634			
30	578			
50	448			
100	316	500	707	877
200	224	354	500	613
300	183	292	408	500
400	158	250	354	432
500	141	224	316	388
750	115	183	258	316
800	112	177	250	306
850	108	172	242	297
1,000	100	158	224	274
1,500	82	129	183	224
2,000	70.7	112	158	193
2,500	63.4	100	141	172
3,000	57.8	91.2	129	158
4,000	50.0	79.2	112	137
5,000	44.8	70.7	100	122
6,000	40.8	64.5	91.2	112
7,000	37.8	59.8	84.6	104
7,500	36.6	58.8	81.7	100
8,000	35.4	56.0	79.2	97.0
10,000	31.6	50.0	70.7	87.7
12,000		45.7	62.0	79.2
15,000		40.8	57.8	70.7
20,000		35.4	50.0	61.3
25,000		31.6	44.8	54.8
30,000			40.8	50.0
40,000			35.4	43.4
50,000			31.6	38.8
60,000				35.4
75,000				31.6

Current ratings given above are all in milliamperes except those designated in amperes (amp.). These currents should not be exceeded in any portion of a voltage divider.

NEW SUPREME INSTRUMENTS

Electric Products Service, local factory service and distributors for Supreme instruments, announce they have received the new 1936 models of Supreme instruments. The new line consists of the following types in brief: the 89 Standard tube tester handling all the latest all-metal type tubes without adapters. The model 89 DeLuxe tube tester has available voltage ranges of 0-1250 volts, ohm ranges from 0-200,000 ohms and meg-ohm-meter with ranges from 0-20 Megs. The 339 Standard Analyzer is a free reference point-to-point analyzer with voltage ranges both AC and DC of 0-1250 and 0-125 M.A. DC, and 0-200,000 ohms. The 339 DeLuxe Analyzer has DC Milliampere ranges of 0-1250 M.A. AC and DC volts, 0-1250 volts, capacity ranges 0-12.5 mfd resistance ranges of 0-200,000 ohms and 0-20 Megs. The 391 P. A. Analyzer is a new item in analyzers and is brought out especially for motion picture and sound equipment service. Combined with all the desirable features of a good radio analyzer, it has in addition microampere ranges for photo cell testing, ampere ranges for exciting lamp testing, capacity ranges of 50 mfd, six resistance ranges to 50 meg with self-contained power supply. Also two db ranges from minus 10 to plus 20 and plus 5 to plus 35. The 385 Automatic model is a new combination unit having all the features of the 339 DeLuxe analyzer and the 89 DeLuxe tube tester with the addition of an extremely low ohm range of 0-200 ohms and the reading of electrolytic condensers directly on the meter scale in GOOD and BAD. The 189 Signal Generator, a new item in the line, uses an electron-coupled circuit with ranges from 90 kilocycles to 30 megacycles, individually calibrated on a four-inch airplane dial, equipped with a 10 to one ratio and ladder attenuator calibrated in approximate microvolts. The instrument operates directly off the AC line employing three tubes. Electric Products Service have all these new instruments in stock and will be pleased to demonstrate them to the readers of the "Technician."

Radio Servicing—A Profession

(Continued from page 5)

ets, cut rate tube sales propaganda and unqualified service "experts".

It is granted that any man to successfully service radio equipment must have considerable technical education and practical experience. He must be equipped with testing instruments, a certain amount of laboratory equipment and other accessories. Every word that has ever been said urging service men to increase their education and improve their equipment, is undoubtedly true and there is room for much more propaganda of this type. However, this discussion and advice as shown by the state of the men in the field is undoubtedly overbalanced on the side of the technicalities at the expense of a consideration of proper business methods.

By proper business methods, we do not mean that a man must be a graduate of a business college, having specialized in business administration, office efficiency, and advertising methods, but he should have some understanding of that peculiar knowledge long described as "knowing how to meet the public".

During these days of keen competition, it is folly to expect that radio owners will continue to patronize establishments who are not willing to give prompt, courteous, efficient service and be pleasant and non-antagonistic. It is very easy for a radio technician who has been struggling for hours over a "fader" to go to the front of the store when the bell rings announcing the entrance of a customer, with a frown. However, if he is to remain in the radio business, he must train himself to leave his service problems in their respective locations and quickly and easily don a cloak and mask of pleasant courtesy whenever a customer enters his store or when he enters the customer's home, as the case may be.

It is well to have enough individuality to converse intelligently with a customer rather than be a "yes" man, but after all, we must admit the wisdom of the age-old slogan, "the customer is always right". What matter if a customer has a political, religious or other viewpoint which differs radically from our own? Agree with him. Discover the eccentricities of his nature if possible. Use this knowledge as a weapon in gaining his good will. If he leaves your store pleased, no matter what the reason, you will have gained a means of free advertising than which there is no better. Your views as an individual have absolutely no place in your conversation or contact with the

customer. Even in the settlement of complaints, you will find that the final outcome will be much easier—much more satisfactory if you are not too hesitant to admit you are wrong even if you are correct. As soon as you admit your error your customer has no "wind in his sails". He has no point for which to argue, he has won the argument and consequently he feels just a bit elated, although that may not be readily apparent.

In summary, then, let us say that in order to truly make a profession of the radio servicing business, a technician must, in addition to his technical education, experience and up-to-date equipment, possess the ability and intelligence to quickly and accurately analyze his customer and engage him in conversation of the type and to the extent which will please him. Above all, never neglect a customer when he walks into your store, even if instant attention means dropping a half-wound coil or any other bit of work. Always give your customer the impression that you have absolutely nothing on your mind or nothing to do but await his pleasure. He is your entire consideration for the moment. If you will only take the pains to make him feel this without being too obvious, you will find that he will be pleased to return to your store and send his friends there. Humanity is vain by nature. We all like to feel that we are the center of attention regardless of how inconsequent the occasion may be, or regardless of whether or not we have the right to expect to be the center of attention. Of course, the customer has a perfect right to expect this attitude on your part.

(Continued on page 30)

NEW TRIUMPH GENERATOR

The Triumph Mfg. Company of Chicago announces the Model 150 Signal Generator essentially identical in characteristics and specifications to the Model 110. However, it is for battery operation rather than a.c. It is priced the same as the Model 110 including long-life heavy-duty batteries and tubes.

NEW — 1935 ALL-WAVE SETS



"Western made for Western Reception"

TRAVELING THE TERRITORY WITH MILTON

Yeah, man, another month and here we are again. By this time you boys all must know that the three most unpleasant things in this world are death, taxes, and that column known as "Traveling the Territory. Oh, well.

We just ran across Harry Hoyt down at the Radio Maintenance Co., where he is doing his share toward keeping the customers satisfied. Harry has just returned from a vacation in Mexico, where the steady rays of Old Sol helped to turn his complexion as brown as the proverbial berry. As the story goes, it's better to be sunburned on one's vacation than tanned on one's week-end.

And speaking of Mexico we remember with a chuckle an incident in Juarez which caused considerable commotion for the moment. Just imagine an individual who, not getting enough excitement out of an ordinary bullfight, throws fire-crackers in the arena to stimulate the situation a bit. For full particulars on the subject just call, write or phone to one Bob Brown on West 54th street.

"Watch the pretty needle swing!" So says our good friend B. C. Ford (no relation to Henry) of the Electric Products Service when showing his customer that the meter under observation has been repaired 100 per cent O. K. Meters to the right of us, meters to the left of us—Holy Moses! More movements than Ziegfeld's chorus!

By the time this edition will have gone to press a certain Phil Kudler, who keeps the dealers in good humor at Radio Television Supply, will be enjoying a blissful honeymoon in Catalina. Lucky fellow! And he deserves it, too.

The earthquakes are coming, yo ho, yo ho! Yeah man; when Bill Hilchey at the Wilshire Radio Service on South Western Avenue, starts making those 40 watt amplifiers, the walls of the building sure begin to feel it. The last time the 40 watt was operated at full volume, the side walls of the two buildings vibrated to such an extent that the occupants commenced to evacuate said buildings with haste and dispatch. Was your seismograph working, Charlie?

We take this opportunity of greeting an old friend, Al Ferris, who now observes and is observed at Pacific Radio Exchange. Good luck, Al.

Did you ever think a whole lot of a man without even having met him? Such is one E. B. Harrison, of Wilson Mfg.

Co. in West Los Angeles, to whom we are indebted for the consoling thought that no matter how tough the steak may be, you can always stick your fork in the gravy.

Over the blue ocean waves from Catalina word comes to us that Oscar Wick is now the sole owner and proprietor of that trim little radio store known as Arcade Radio Shop. Congratulations, Oscar!

Many do not know it, but Ross Welch out at the Electronic Labs on Melrose Ave., was at one time a professional photographer. To Ross credit is given for the statement that "many a negative young lady has been developed in the dark."

And now we learn that Melvin Wagy, late of Sacramento, Santa Paula and Santa Barbara, has just joined the radio fraternity in Los Angeles. We'll be seeing you, Mell!

And those of you who have been wondering what has happened to "Dee" Elder can find him plodding away with Norb Spero at Zack's Radio Supply on South Broadway. Attaboy, Dee!

INDUSTRIAL CONDENSER REPLACEMENT GUIDE

Service men seeking replacements for electrolytic or oil condensers used in electric refrigerators, oil burners and other condenser-start motor devices, will find their task greatly simplified by referring to the Aerovox Industrial Condenser Replacement Guide. Just issued, this bulletin lists replacement units according to the equipment manufacturer's own part number followed by the Aerovox part number, capacity, dimensions and list price. Also illustrations of units. A copy of the guide may be had by writing the Aerovox Corporation.

KIERULFF EXPANDS

Chas. Kierulff of Kierulff and Co., announces expansion of his business activities to include a full line of high-grade condensers. After extensive investigation both locally and during a trip through the middle West, Mr. Kierulff selected a brand of high-grade condensers offering a complete line to service technicians. By-pass, paper electrolytic replacements and other replacement condenser items are now carried in regular stock.

HOW TO SOLDER

(Continued from page 13)

soldering, and while hot, dip it into a solution of Nokorode Salts dissolved in water from the faucet, using about a tablespoon of the Nokorode Salts to a tumbler full of faucet water. This prepares the soldering copper to take the solder, called "tinning". Now apply solder to the prepared tip, rubbing it all over the four sides of the tip.

If you use Sal Ammoniac, you will have to re-tin your soldering copper many times during the day, if however, you have done as instructed above, you will probably not have to re-tin it all day. This will save much labor, make a better job of the soldering and give great satisfaction. Occasionally you will want to "wash the face of your copper" by just dipping it into the solution, to get rid of the dross formed by the solder and the metals on which you are working.

Number 2—A good soldering flux must be used. This applies also to the solder you use, if you use plain solder, without any flux core, you may use Nokorode in paste form, or in solution made from Nokorode Salts, this time diluted about 1 to 3 parts Nokorode Salts in 8 to 12 parts water, according to the kind and condition of the metals to be soldered.

Some prefer Resin for a flux and some use acid, again according to the work to be done, or their own preference. Good work may be done with any of the fluxes mentioned, but personally I prefer Nokorode, not alone because I make it, but because I know it can, when properly used, do far better work than any other flux with which I am acquainted.

If you prefer a core solder for reasons of convenience in application, be sure your solder is PURE, a Virgin solder will melt quicker, give a stronger joint and cause less trouble, what one saves in cost price by buying cheap solders is lost many times over in time and final results.

I believe that you will find Nokorode Core Solder is the quickest flowing of any, makes the strongest joint and is free from corrosion. To prove this for yourself flow some on any of the common metals, except aluminum, see how it acts, then try Resin Core solder and see how much longer it takes to flow the same amount of solder, how far it flows and how bunched the joint it compared with the Nokorode solder. Try this also, with Acid core solder and make comparisons with them all. Then when Nokorode

core solder has cooled, touch the joint with the tongue and you will find no taste, a good proof it contains no acid. First, test all solders, then choose the one you like best and stick to that.

To harden the Nokorode Paste used in the core solder, a special hardener is used, this is also a very good electrical insulator, it may be wiped off while hot, but if allowed to cool, it makes a dark, hard waxy deposit about the joint, much the same as resin. It will surprise you, if you try to break this down with an electric current, as the resistance is very high. Try this on any measuring instrument on which you would test resin and make comparisons.

Nokorode Core solder flows so very quickly that it does not require heat which would burn or anneal the fine wires, as is the case with resin solders. Many radios and delicate instruments cause much trouble because their makers have not used enough heat to properly burn out the resin between the joints, thus making what is commonly known as "a resin joint" (an open circuit, insulated with a layer of resin) instead of a complete metal to metal union.

Many persons prefer to use Resin Core solder, especially on radio work. Do so if you prefer, but be very careful that you use enough heat upon the joints to cook the resin out between the solder and the metal, or you will have trouble. As we make all kinds of flux core solders it makes no difference to us which solder you may select, because the price is alike on all. I merely recommend Nokorode Core solder, as said before, because I personally think is the best solder ever produced.

DAYRAD Radio Service Equipment

Represented by
FRANK A. EMMETT CO.
1341 South Hope St.
Los Angeles, Calif.
Richmond 6301

TRAVELING THE TERRITORY WITH MILTON

Yeah, man, another month and here we are again. By this time you boys all must know that the three most unpleasant things in this world are death, taxes, and that column known as "Traveling the Territory." Oh, well.

We just ran across Harry Hoyt down at the Radio Maintenance Co., where he is doing his share toward keeping the customers satisfied. Harry has just returned from a vacation in Mexico, where the steady rays of Old Sol helped to turn his complexion as brown as the proverbial berry. As the story goes, it's better to be sunburned on one's vacation than tanned on one's week-end.

And speaking of Mexico we remember with a chuckle an incident in Juarez which caused considerable commotion for the moment. Just imagine an individual who, not getting enough excitement out of an ordinary bullfight, throws fire-crackers in the arena to stimulate the situation a bit. For full particulars on the subject just call, write or phone to one Bob Brown on West 54th street.

"Watch the pretty needle swing!" So says our good friend B. C. Ford (no relation to Henry) of the Electric Products Service when showing his customer that the meter under observation has been repaired 100 per cent O. K. Meters to the right of us, meters to the left of us—Holy Moseal! More movements than Ziegfeld's chorus!

By the time this edition will have gone to press a certain Phil Kudler, who keeps the dealers in good humor at Radio Television Supply, will be enjoying a blissful honeymoon in Catalina. Lucky fellow! And he deserves it, too.

The earthquakes are coming, yo ho, yo ho! Yeah man; when Bill Hilchey at the Wilshire Radio Service on South Western Avenue, starts making those 40 watt amplifiers, the walls of the building sure begin to feel it. The last time the 40 watt was operated at full volume, the side walls of the two buildings vibrated to such an extent that the occupants commenced to evacuate said buildings with haste and dispatch. Was your seismograph working, Charlie?

We take this opportunity of greeting an old friend, Al Ferris, who now observes and is observed at Pacific Radio Exchange. Good luck, Al.

Did you ever think a whole lot of a man without even having met him? Such is one E. B. Harrison, of Wilson Mfg.

Co. in West Los Angeles, to whom we are indebted for the consoling thought that no matter how tough the steak may be, you can always stick your fork in the gravy.

Over the blue ocean waves from Catalina word comes to us that Oscar Wick is now the sole owner and proprietor of that trim little radio store known as Arcade Radio Shop. Congratulations, Oscar!

Many do not know it, but Ross Welch out at the Electronic Labs on Melrose Ave., was at one time a professional photographer. To Ross credit is given for the statement that "many a negative young lady has been developed in the dark."

And now we learn that Melvin Wagye, late of Sacramento, Santa Paula and Santa Barbara, has just joined the radio fraternity in Los Angeles. We'll be seeing you, Mell!

And those of you who have been wondering what has happened to "Dee" Elder can find him plodding away with Norb Spero at Zack's Radio Supply on South Broadway. Attaboy, Dee!

INDUSTRIAL CONDENSER REPLACEMENT GUIDE

Service men seeking replacements for electrolytic or oil condensers used in electric refrigerators, oil burners and other condenser-start motor devices, will find their task greatly simplified by referring to the Aerovox Industrial Condenser Replacement Guide. Just issued, this bulletin lists replacement units according to the equipment manufacturer's own part number followed by the Aerovox part number, capacity, dimensions and list price. Also illustrations of units. A copy of the guide may be had by writing the Aerovox Corporation.

KIERULFF EXPANDS

Chas. Kierulff of Kierulff and Co., announces expansion of his business activities to include a full line of high-grade condensers. After extensive investigation both locally and during a trip through the middle West, Mr. Kierulff selected a brand of high-grade condensers offering a complete line to service technicians. By-pass, paper electrolytic replacements and other replacement condenser items are now carried in regular stock.

HOW TO SOLDER

(Continued from page 13)

soldering, and while hot, dip it into a solution of Nokorode Salts dissolved in water from the faucet, using about a tablespoon of the Nokorode Salts to a tumbler full of faucet water. This prepares the soldering copper to take the solder, called "tinning". Now apply solder to the prepared tip, rubbing it all over the four sides of the tip.

If you use Sal Ammoniac, you will have to re-tin your soldering copper many times during the day, if however, you have done as instructed above, you will probably not have to re-tin it all day. This will save much labor, make a better job of the soldering and give great satisfaction. Occasionally you will want to "wash the face of your copper" by just dipping it into the solution, to get rid of the dross formed by the solder and the metals on which you are working.

Number 2—A good soldering flux must be used. This applies also to the solder you use, if you use plain solder, without any flux core, you may use Nokorode in paste form, or in solution made from Nokorode Salts, this time diluted about 1 to 3 parts Nokorode Salts in 8 to 12 parts water, according to the kind and condition of the metals to be soldered.

Some prefer Resin for a flux and some use acid, again according to the work to be done, or their own preference. Good work may be done with any of the fluxes mentioned, but personally I prefer Nokorode, not alone because I make it, but because I know it can, when properly used, do far better work than any other flux with which I am acquainted.

If you prefer a core solder for reasons of convenience in application, be sure your solder is PURE, a Virgin solder will melt quicker, give a stronger joint and cause less trouble, what one saves in cost price by buying cheap solders is lost many times over in time and final results.

I believe that you will find Nokorode Core Solder is the quickest flowing of any, makes the strongest joint and is free from corrosion. To prove this for yourself flow some on any of the common metals, except aluminum, see how it acts, then try Resin Core solder and see how much longer it takes to flow the same amount of solder, how far it flows and how bunched the joint it compared with the Nokorode solder. Try this also, with Acid core solder and make comparisons with them all. Then when Nokorode

core solder has cooled, touch the joint with the tongue and you will find no taste, a good proof it contains no acid. First, test all solders, then choose the one you like best and stick to that.

To harden the Nokorode Paste used in the core solder, a special hardener is used, this is also a very good electrical insulator, it may be wiped off while hot, but if allowed to cool, it makes a dark, hard waxy deposit about the joint, much the same as resin. It will surprise you, if you try to break this down with an electric current, as the resistance is very high. Try this on any measuring instrument on which you would test resin and make comparisons.

Nokorode Core solder flows so very quickly that it does not require heat which would burn or anneal the fine wires, as is the case with resin solders. Many radios and delicate instruments cause much trouble because their makers have not used enough heat to properly burn out the resin between the joints, thus making what is commonly known as "a resin joint" (an open circuit, insulated with a layer of resin) instead of a complete metal to metal union.

Many persons prefer to use Resin Core solder, especially on radio work. Do so if you prefer, but be very careful that you use enough heat upon the joints to cook the resin out between the solder and the metal, or you will have trouble. As we make all kinds of flux core solders it makes no difference to us which solder you may select, because the price is alike on all. I merely recommend Nokorode Core solder, as said before, because I personally think is the best solder ever produced.

DAYRAD Radio Service Equipment

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ARCTURUS DEVELOPS NEW TUBE LINE

The Arcturus Radio Tube Company, Newark, N.J., has developed and marketed a new line of tubes, designated as the "G" series, which is identical in electrical characteristics and pin connections to the all-metal tubes. It is stated that several of the larger set manufacturers and many smaller ones have already developed circuits employing these new "G" tubes. Early announcement of some of these radio receivers is expected.

Carrying the same type numbers as do the all-metal tubes, the letter "G" is suffixed to denote the glass envelope type. The "G" line follows conventional tube manufacturing processes which have been perfected and overcomes the difficulties invariably associated with not only new designs, but also with a totally new development. The "G" line is as perfect as radio tubes can be made today and enable set manufacturers to design immediately an all-metal tube set without further waiting upon the limited production of all-metal tubes.

As announced to date, the Arcturus "G" line comprises the following types:

- 6A8G Pentagrid Converter.
- 6C5G Detector-Amplifier Triode.
- 6D5G Power Output Triode.
- 6F5G High-Mu Triode.
- 6F6G Power Output Pentode.
- 6H6G Double Diode.
- 6J7G Detector-Amplifier Triple Grid.
- 6K7G Super Control-Amplifier Triple Grid.
- 6L7G Pentagrid-Mixer-Amplifier.
- 5Y3 Full Wave Rectifier (Interchangeable with 5Z4).

These tubes are directly interchangeable with corresponding numbers of all-metal tubes.

CATHODE RAY TUBE DISTRIBUTOR APPOINTED

J. L. MAHON, local Sylvania tube distributor, of 1358 S. Grand Avenue, announces his appointment as distributor for the Allen B. DuMont laboratories, pioneer manufacturer of cathode ray tubes and oscillographs. The DuMont line is one of the most complete on the market including special purpose tubes as well as those adapted to television. The DuMont tubes all have high intensity short persistence screens and a very high voltage sensitivity. The DuMont oscillograph is designed to accommodate either a 3-inch or a 5-inch tube interchangeably. Mr. Mahon will be glad to discuss these products with readers of the "Technician" and offers his assistance on your oscillograph problems.

UNIVERSAL BOOKLET

E. E. Griffin, chief engineer of the Universal Microphone Co., has just written a 16-page booklet, "Advanced Disc Recording," as the successor of "Simplified Disc Recording" which was published a year ago. It discusses the various types of discs, needles, lead screws, advantages of pregrooved and ungrooved discs, playback procedure, recording heads, turntable speeds, hum level, amplification, stroboscope and other topics. A small charge of a dime has been placed on "Advanced Disc Recording" to partially cover the cost of compilation and mailing.

While primarily of interest to transcription, station and agency people, the booklet will also be of interest to amateurs who do professional or home recording.

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EARNSHAW TO MOVE

Hollywood, long a center for sound activities of films and transcriptions, is also becoming a headquarters for program-builders.

On June 1 Harry A. Earnshaw moved his radio interests to the Warner Bros. Hollywood Theatre Building, after centering his activities in the Petroleum Securities Bldg., Los Angeles, for nearly eight years. The firms include the Earnshaw Radio Productions and Earnshaw-Young, Inc.

The move was made because of the proximity in Hollywood to technical recording laboratories and the source of talent.

Chandu, Black and Blue, Count of Monte Cristo and scores of other notable transcription successes have come from the pen of Mr. Earnshaw in recent years.

Fifty years ago, in 1885, the linotype type-setting machine was invented by Mergenthal.

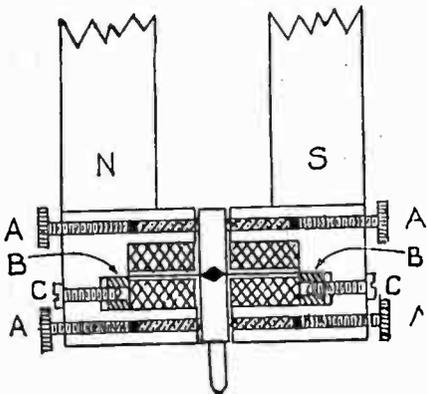
NEW MIKE STAND

Stock model microphone stands from the Universal Microphone Co., Inglewood, Cal., will hereafter come equipped with a detachable lightweight copy holder for attaching announcers' notes, music and lecture memos. There will be no increase in net prices. The frame, fashioned of frosted cadmium, is curved at the bottom to securely hold letterhead or smaller size sheets with sufficient room for pencils. It operates on a flexible arm and is easily and quickly adjusted or removed. It has been designed as the result of a survey among broadcasters to determine what improvement, if any, could be made on floor model stands. More than 60% of the station announcers interviewed voiced the expression that such a gadget would fill a long felt need among those who appear frequently before the microphone.

After washing hands in gasoline the unpleasant odor may be removed by rubbing them with moistened salt.

ADJUSTING RECORDER HEADS

(Continued from page 6)



In the sketch may be seen the four damping adjustment screws (A) for the initial adjustment, (sealed at factory) the blocks (B) are tightened and so aligned that the gap between the poles and armature is equalized. The especially constructed alloy metal strip, between the blocks and upon which the armature is mounted, is drawn to the right tension to tune out any resonance therein by the screws (C). The armature spacing obtained, the dampers are brought into play. As stated before, the dampers accomplish many things—restricting the movement of the stylus, preventing the armature from striking the poles, and damping the movement in such a way that the recorder may be tuned to the desired frequency response upon the material to be recorded upon.

Now, how will you know when the proper tuning is obtained? Of course, the final test is upon the record of material expected to be used, but other methods of testing are much quicker. The recording head should be fitted with an ordinary steel phonograph needle tightly secured in the armature. The recorder may be held in one hand and adjusted with the other, after pushing the steel needle into the edge of a thin partition such as that from a cigar box. An audio signal applied to the head should produce a loud speaker effect. Sound boards of these dimensions are rather high in pitch, that is to say, they don't reproduce the lows because of the small baffle. This is entirely satisfactory since the recording man is interested in the resonant peaks in the higher frequencies and not in the lower range which is free of such annoyances. In the event that the tone quality is dis-

torted, the dampers should be adjusted in opposite pairs, first, the top and then the bottom. When the damping is balanced on either side of the armature, the distortion clears away and clear, brilliant tone is the characteristic.

Each type of recording material has its own particular requirements as regards damping of the recorder head. In all cases the damping should be balanced so that the upper half of the armature is damped to the same degree as the lower half. Thus it is seen that when recording upon Universal Aluminum discs, the lower dampers may be loosened slightly to take care of the damping action in grooving the metal. This gives a greater power transfer, requiring less power to give the same results. Softer materials should be recorded upon with heads having the armature more equally balanced, since these materials offer but little resistance to the movement of the stylus. Greater overall damping provides more stability of operation in handling a large amount of power.

Use of the Universal Power Recording Head on the new Silveroid discs has proved in many instances far superior to pressings from wax due to the low groove noise, no processing required for playback, and the wide frequency range of the instrument and Silveroid material. Transcription men with amplifiers of good frequency response will find that they can not expect the same results from their transcriptions when a good cutting head is not placed at the output of their amplifiers. Quality must be carried through from the microphone to record material, just as in high fidelity radio reception—one condenser or one tube will upset the range and the goal is lost. A real good recording head should be the transcription man's first step in the direction of quality recordings for his clients.

RADIO FELLOWSHIP ACTIVE

The Radio Fellowship, a chapter of the DXer's Alliance, is quite active and is attracting substantial membership from prominent citizens and outstanding figures of the radio industry in Southern California. Their regular meetings once a month are supplemented by listening activities of those members who enjoy getting together for this sort of recreation. It publishes a bulletin "The Listening Post" edited by M. H. Ryder, President of the organization. Mr. Frank Andrews, well-known in all wave radio circles, is Secretary of the organization, and Howard C. Cote is Vice-President.

RADIO TECHNICIANS OF SAN DIEGO

(Continued from Page 12)

Bowl, for their ability to keep all the equipment in perfect operation.

The Palace of Electricity offers two outstanding features. Television, of course, as we now understand it and a super demonstration by two capable boys, Allan Scoville and F. C. Leach, from the General Electric Laboratories. They produce a demonstration that keeps their audience in "High Fidelity" interest for 40 minutes. Their demonstration is primarily of a high frequency high voltage machine, sodium light, photo electric cell and oscillograph experiments. Wm. J. Greene is the technician for the Robophone Electric Kitchen and has his troubles in keeping the proper lights and machines running in time with a phonograph record. Mr. Smallman of New York is the manager of this Exhibit. Be sure to visit the General Electric demonstration when you make that trip to San Diego to visit the Exposition, and may I say "Don't expect to see the whole Fair in one day. While down be sure to drop in and see the boys at W6USA in the Park.

The San Diego Technicians are holding their election of officers at the next meeting and it is hoped that the new officers can serve as efficiently and unselfishly as the present ones. Mr. Howard, of Inca Transformer, spoke at the last meeting on the "Iron Tube and Construction of Inca Transformers." Door prize consisting of long-nose pliers, snippers and a small crescent wrench were won by President Art Hunt.

RADIO SERVICEMEN—
\$400 IN PRIZES!

A "Radio Sweepstakes" is what we might term the "Ideal Radio Service Shop" contest now being conducted by RADIO-CRAFT magazine. Two points of interest are that: (1) It doesn't cost a penny for anyone to enter the race; and, (2) the chances of getting a valuable prize are far greater than they are in the more familiar horse-race and other lotteries that appear to be in vogue.

Awards include: 1st prize, Portable Cathode-Ray Oscilloscope; 2nd prize, Volt-Ohmmeter and carrying case; 3rd prize, All-Wave Service Oscillator; 4th prize, Portable Analyzer or, optionally, Tube-Checker; 5th prize, Portable Vacuum-Tube Voltmeter. Special prize, 6 volumes of the Gernsback Consolidated Official Radio Service Manuals (value, \$17.50 each).

(The rules of the contest appear in the July and August issues of RADIO-CRAFT. The contest closes August 15).

MAGAZINE CONSOLIDATION

According to latest reports, the amateur magazines "R/9", "Radio" and "Calls Heard" are consolidating, the composite magazine to be known as "Radio" and published in Los Angeles. Publication under the new arrangement is scheduled to start in July. The consolidation of three such excellent amateur publications should undoubtedly result in a "ham" magazine par excellence. Congratulations and best wishes!

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ORME ADVANCES

Mr. John A. Orme, Vice-President of the CRTA, has disposed of his holdings in the Technical Service Laboratories and has accepted the position of Chief Engineer of the Electronic Research Laboratory. Mr. Orme was chosen by this firm because of his extensive experience in research development and construction of vacuum tubes and acoustical devices. We wish him much success in his new venture.

RADIO SPECIALTIES ENLARGES

The Radio Specialties Company, well-known radio parts jobbers has recently purchased the entire stock and accounts of the Electro-Distributing Company, formerly operated by Mr. Michalson. This ever-expanding firm which has added several new members to its staff in the past few months is further extending its facilities to properly care for the customers of the concern which it has absorbed.

SERVICING SUPERHETS

The revised edition of John F. Rider's "Servicing Superheterodynes" should undoubtedly be a part of every service technician's equipment. Although we reviewed this excellent publication in a previous issue of the "Technician" we feel impelled to again remark upon the most competent and enlightening manner in which this 278-page book handles the entire subject of superheterodyne circuits and the problems involved in servicing them. It is beyond a doubt one of the greatest dollar's worth which any serviceman can secure. A point of interest which will undoubtedly strike a responsive cord in the minds of many radio men's wives is the dedication of this work. It reads as follows: "Dedicated to Janet (two years old) who so kindly kept her mother busy while her father stayed away nights playing with superheterodynes".

Silver is the best conductor of electricity although copper is more extensively used commercially because of its comparatively low cost.

NEW CLOUGH-BREngle SIGNAL GENERATOR

Electric Products Service, local distributors and factory service for Clough-Brengle equipment, announce that they have just received the new Model "OM" Signal Generator, which is essentially similar to the Model "OC" with the addition of a beat-note frequency modulation circuit necessary for reproducing selectivity-sensitivity curves on a Cathode-Ray oscilloscope.

The inherent shortcomings of frequency modulation systems, where a motor-driven condenser is connected directly across the oscillator tuning condenser; i. e., destruction of calibration by the added capacity of the leads and motor-driven condenser, and the fact that a selectivity curve width cannot be secured at all test frequencies, are eliminated by this newly developed circuit.

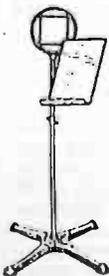
A separate beat-note oscillator circuit, whose frequency swings plus and minus 15 kc. of a fixed value at a rate of approximately 50 cycles per second, provides uniform, accurately calibrated frequency modulation at all frequencies of the main calibrated oscillator output. Irrespective of the testing frequency (oscillator output) the band width of the sweep is 15 kc. below resonance to 15 kc. above resonance. This is made possible by generating a separate frequency of 760 kc. for the motor-driven sweep. After frequency modulation heterodyning this frequency with the output of the tunable oscillator to secure the desired test frequency this uniformity of sweep makes possible accurate calibration of the receiver's selectivity showing the r. f. response curves as well as shapes directly on the cathode-ray oscilloscope.

The calibration of the signal generator

is made in terms of the resultant frequency of the two oscillators within the two units so that there is no addition or subtraction of frequencies in order to find the true output frequency of the instrument as calibrated frequency denotes the exact center resonant point between the 15 kc. minus and 15 kc. plus sweep or in other words the definite direct beat resonant frequencies.

The manufacturers claim that this new signal generator is the only commercial type of this description obtainable with the advantages of being able positively to show directly on the screen of the oscilloscope varying selectivity curve width and sensitivity of a receiver at different portions of the frequency band which is covered.

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SYLVANIA RADIO TUBES

TRIUMPH TEST EQUIPMENT

WIDE RANGE PICK UP

The Universal Microphone Co., Inglewood, Calif., has started to produce a new item in its Universal full frequency pickup. Previously its catalog item along these lines was a combination pickup and recorder. The new instrument is for playback only of all types of instantaneous records, especially those of aluminum, Silveroid and other semi-plastic substances. The pickup is designed for the widest possible frequency reproduction with maximum volume of output. The adjustable arm can be extended to sixteen inches and allows a proper playback position for any size of record disc. The device is ball bearing mounted and eliminates side wear of the grooves. A thumb screw makes it possible to quickly and easily adjust pressure to a feather-weight on the needle.

Adding a pinch of salt to the water in which cut flowers are placed will make them last longer.

The world's loudest noise, the volcanic explosion of Krakatoa in 1883, was heard by human ears as far away as Bangkok, a distance of over 1400 miles.

NOKORODE POPULAR

Mr. Frank Chapman, President of the M. W. Dunton Company, manufacturers of Nokorode products, who is spending several months in Southern California, reports increasing popularity of Nokorode products in this territory. This company, manufacturers of Nokorode soldering paste for many, many years, has developed an outstanding line of acid-core, resin-core and Nokorode-core solder. These solders being all virgin metal and having a lower melting temperature enable all technicians to perform better soldering jobs with less time, effort and expense. Nokorode Salts, another product of this company is most excellent for keeping iron tips in order easily without constant filing and without danger of pitting the copper.

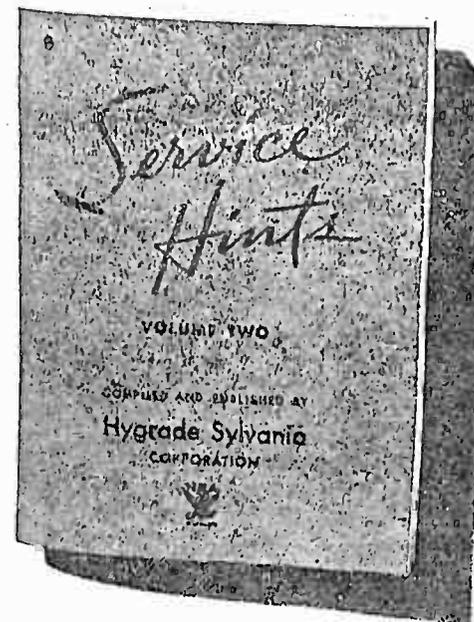
After seven years of study and research by Dr. E. E. Ecker and his assistant, Loyal Weeds, of Western Reserve University, they were rewarded by the development of an antiseptic 1200 times as powerful as carbolic acid which is non-corrosive to surgical instruments and non-poisonous.

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HOW TO SOLDER

(Continued from page 21)

Number 3—It is desirable that the metals to be soldered be clean, the cleaner they are the quicker the joint can be made. If they be dirty, it requires much more heat to "cook" the flux in, and some fluxes will not cause the solder to flow properly. In such cases, don't try to see how much flux you can get on, but clean the joint and see how much quicker the solder will flow. Some fluxes like resin, require the joint to be very clean, or the solder will not stick, acid core solder cleans its own joint, but causes corrosion after the joint is made. No-korode cleans and fluxes its own joint without causing after effects, but it will of course, not clean a very dirty joint.

Number 4—This, I think is the reason so many people fall down on their soldering. They do not transmit enough heat to the joint to be soldered. A well heated joint causes the solder to flow smooth and even and uses very little solder to do a good job, as well as a smaller amount of flux.

Look at the soldering jobs that come your way. Try the suggestions given herein and see how much better soldering you can do. Attention to details will let you do soldering which will surprise you, and it is SO VERY EASY to do a good job if reasonable care and precautions are taken.

If you use an electric soldering iron, see to it that the point does not get so hot it keeps the tinning burned off. If using a common soldering copper, such as the plumber or sheet metal man, DON'T heat the point and burn off the tinning, but fix your stove so that the "butt" of the copper gets the heat, that is why the butts are made heavier, you can heat it very nicely by sticking the point down through the hole in a gas stove and letting the flame come up around the butt, unless it gets too hot it will not burn off the tinning. Above all, never use Sal Ammoniac in any form if you want real good work.

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LINE NOISES

With the coming of warm weather, the increased use of electric fans and refrigerators will bring with it new problems in the way of radio interference. Although the radio and electrical industries are making a concerted drive against interference-creating devices and many municipalities have passed anti-noise ordinances, there are still countless numbers of sparking motors to contend with.

The most effective attack on the noise problem is to isolate the offending machine and to equip it with a simple filter consisting merely of two fixed condensers in series, with the outer connections across the motor brushes and the center connection grounded to the motor frame. However, in the majority of cases encountered by radio set owners and service men, the source of the interference cannot be readily located.

The only possible cure in cases of this kind is the use of an interference filter consisting of both by-pass condensers and radio-frequency chokes, according to William Bailey, of the Cornell-Dubilier Corporation, who has had considerable experience with the noise problem. This filter is connected to the line cord of the receiver, and in most cases it is quite effective because it prevents the noise from entering the receiver through the power line, which is its usual carrier.

Of course, no line filter will eliminate or even reduce noise that is picked up by the aerial or its lead-in.

A line filter is the easiest thing to try first, as it can be plugged into service in a few seconds. If the noise continues, it

is not reaching the set through the electric wires, and the erection of an antenna of the noise-reducing type should be considered. Radio dealers sell line filters on a trial basis, as they know conditions vary a great deal. A filter may be 100 per cent effective in one house and not effective at all in another.

NEW 4-TUBE

Charlie Sexton gives advance notice of a new four-tube Superheterodyne with air-plane dial and all the latest improvements. It will be housed in a beautiful cabinet and as a leader will carry a list price slightly under twenty dollars, and will carry a long discount. Charlie invites inspection.

SOUND-ON-FILM RADIO

The first public demonstration of sound-on-film for radio stations was given in Colorado Springs July 6 to 10 by Freeman Lang, transcription producer. The National Association of Broadcasters was meeting in the Colorado city at that time.

Though sound-on-film would be in direct competition with the regular wax recordings, Mr. Lang believes the experiments will ultimately show a use for both methods in broadcast usage.

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