

January, 1932

RADIO-CRAFT

RADIO RECEPTION

ON HORSE BACK

Radios in U.S.



By LOUIS MARTIN

THE crime wave that has swept the country during the past few years has been instrumental in causing Federal, State, City and County officials to equip all departments engaged in crime-detection work with radio transmitting and receiving apparatus. This type of apparatus has been installed in both permanent and portable locations, and has well justified its use. Officials, however, may well borrow a tip from the ever-alert Signal Corps of the U. S. Army, which has equipped Southwestern cavalry units, stationed at Fort Sam Houston, Texas, with radio so as to enable direct communication between cavalymen and field commander.

The Receiver

The receiver, shown in Fig. A, which is inverted (as can be seen by referring to Fig. B) to provide ease of tuning and short battery-connections, is mounted on a piece of sponge rubber. This in turn is securely fastened to the receiver mounting strip of stiff leather and the whole riveted on one side of the saddle pocket. A canvas belt is used to prevent the leather strip, on which the receiver is mounted, and the remaining saddle pocket, which contains the batteries, from bouncing against the horse.

When in operation, no direct ground is used, as it has been found that the capacity existing between the metal case of the receiver and the side of the horse is sufficient to give satisfactory pick-up.

The receiver itself consists of one tuned and one untuned stage of R.F., a regenerative detector, and two stages of A.F. amplification; special non-microphonic tubes are used. It has a frequency range of 400 kc. to 850 kc., (350-750 meters) being designed to receive signals from Signal Corps SCR-127 and SCR-130 transmitters. All connections, including those to the batteries,

Fig. A (above)

Above is a close-up view of the "radio saddle pack," otherwise known as the SCR-152 Radio Receiver. Its range is 400 to 850 kc. (350 to 750 meters). This illustration of the pack shows the tuner in an inverted position, since in use it mounts most conveniently on the left flank of the horse, as shown in the center panel. The only ground effect is that which results from capacity coupling. Perhaps cavalry maneuvers in the future will be executed without a visible commander.

Fig. B (below)



are well soldered to prevent interrupted reception due to faulty connections which may result from the extreme vibration that the unit receives while the horse is in motion. The transmitters are designed for radio communication between mounted organizations and are of the master-oscillator, power-amplifier type. They use one 5-watt VT2 tube as an oscillator and three such tubes as power amplifiers and have a positive day range of 60 miles.

Transmitter Power Supply

As for power supply, these transmitters use either a dynamotor which supplies 250 milliamperes at 350 volts when used by organizations equipped with motor transportation facilities or a hand generator of like output, if required by mounted organizations acting alone.

As a receiving antenna for the "saddlebag" receiver, a steel casting-rod, or a pike, wound spirally with insulated wire and mounted in one of the stirrups as shown in Fig. B, is used.

Government Activities

Radio equipment of almost every description has been, and is being, designed by the U. S. Army. The novel receiving station described above is only one of the many interesting devices that are being used to increase the efficiency of the army. In the December issue of RADIO-CRAFT, there was published a description of a one-pound transmitter that is used by the army for meteorological observations.

As additional material concerning Signal Corps radio apparatus is secured, it will be published.

State	Radio Sets	Listeners (Estimated)
Alabama	56,101	251,216
Arizona	19,295	79,310
Arkansas	40,218	169,042
California	239,816	2,939,461
Colorado	101,376	495,366
Connecticut	243,821	879,666
Delaware	27,183	108,732
Dist. of Columbia	67,800	264,732
Florida	58,146	227,939
Georgia	64,908	292,086
Idaho	42,869	134,736
Illinois	1,144,397	4,578,388
Indiana	351,510	1,333,852
Iowa	309,247	906,024
Kansas	189,527	739,156
Kentucky	111,452	480,241
Louisiana	54,064	233,765
Maine	77,803	311,212
Maryland	156,165	657,153
Massachusetts	290,183	2,478,411
Michigan	298,196	2,456,794
Minnesota	287,800	1,208,096
Mississippi	25,475	109,543
Missouri	352,252	1,373,783
Montana	43,809	170,849
Nebraska	164,324	637,296
Nevada	7,369	27,452
New Hampshire	54,111	207,133
New Jersey	625,639	2,565,159
New Mexico	11,401	49,037
New York	1,890,208	7,544,832
North Carolina	72,329	354,412
North Dakota	59,252	278,951
Ohio	810,767	3,161,991
Oklahoma	121,973	512,287
Oregon	116,299	418,676
Pennsylvania	1,144,704	5,778,816
Rhode Island	91,594	367,285
South Carolina	28,097	134,433
South Dakota	71,301	306,952
Tennessee	86,239	374,997
Texas	257,086	1,082,281
Utah	47,739	210,098
Vermont	39,913	150,652
Virginia	96,569	444,217
Washington	180,259	686,847
West Virginia	87,169	402,357
Wisconsin	361,425	1,491,143
Wyoming	19,482	75,980
United States	12,563,737	50,186,494

Radio Sets in U. S. A. April 1, 1930

It should be noted that the figure of 12,563,737 sets is given as of April 1, 1930. It is fair to assume that, between that date and January 1, 1932, the number will have increased to 14,000,000 sets in actual use at this latter date. This is a very conservative estimate, due consideration having been given the recent depression; if anything, the figure of 14,000,000 is too low, and a subsequent census will probably place the figure somewhat higher.

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- "A" SUPPLY**----- Adjustable output, .3 to 7.0 volts, voltage regulated, 2.25 amps maximum, automatic current limiting. Regulation: 1.5% maximum change, no load to full load. Ripple: Less than 15 mv p-p at full load.
- "B" SUPPLY**----- Output: 22.5, 45, 67.5, 90; 135-140 VDC, 5% tolerance, voltage regulated up to .04 amps maximum load all taps combined. Regulation: 5% maximum change, no load to full load. Ripple: Less than 15 mv at full load.
- "C" SUPPLY**----- Output: 3, 4.5, 9, 16.5, 22.5 VDC, 3% tolerance, voltage regulated, .015 amps maximum. Regulation: 4% maximum change, no load to full load. Ripple: Less than 7 mv.
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POSTAL IDENTIFICATION STATEMENT
The Horn Speaker (USPS 956120) is published monthly, except July and August by Jim Cranshaw, 9820 Silver Meadow Dr., Dallas, Texas 75217. Subscription rates are \$8.50 per

year, \$15.00 two years. Second-class postage paid at Dallas, Texas. POSTMASTER: Send address changes to The Horn Speaker, P.O. Box 53012, Dallas TX 75253. Subscribers, advertisers, photo-

graphers and writers, please use the following address;
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The Serviceman

Testing Condensers

EDITOR, SERVICEMAN:

In previous correspondence with your office, I mentioned a method of measuring resistance with a voltmeter of known resistance. Although I learned that method

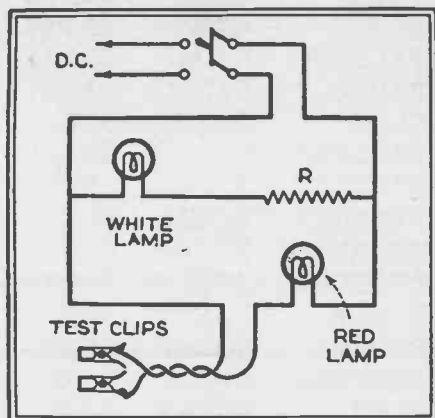


Fig. 1

as much as 15 years ago, it had not appeared in any radio publication to my knowledge. However, very shortly after sending the item to you, it appeared in a current issue of a manufacturer's booklet. Merely a coincidence, I assure you. With the above off my chest, may I offer the following circuit for testing short condensers.

This idea has not appeared in print, to the best of my knowledge. I have used it to test telephone condensers as long ago as 17 years. The resistance R, Fig. 1, is just high enough so that the white lamp does not light when the red lamp does. The d.c. can be taken from the "B" circuit taps. The test clips are snapped on the condensers to be tested and the switch closed. If the red lamp lights, the condenser is shorted. If the white lamp lights, the condenser is not shorted (this does not mean, however, the condenser is O. K., it could be open). Of course, all set connections must be off the condenser when under test. A red lamp could be placed between the common connection on the filter block and "B" minus, to light in case of a short in any of the condensers forming the block.

Hoping the above may be of some help to other servicemen, I am

Yours very truly,
L. S. Dow.

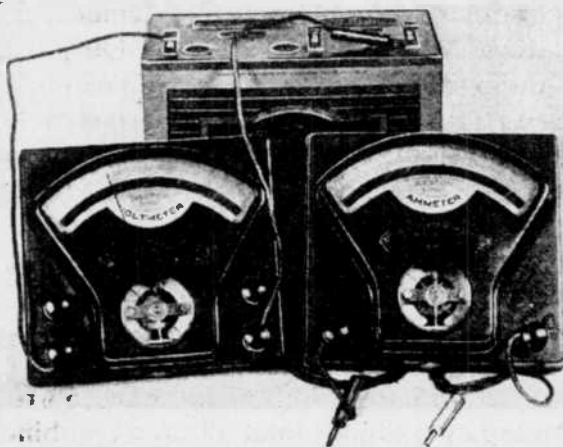
A Practical Coil Winder

Many servicemen have often gone to the trouble of rewinding defective coils by hand and have as often wished they had some sort of a coil winder. Mr. Herminio L. Alvarez, of Manila, P. I., had the same wish, but has gone a step farther in that he has designed and built a coil winder, of which constructional details follow.

The most expensive unit of the winder

is the tool grinder, but as the majority of servicemen have such a grinder in their shop, this expense is eliminated. Let us continue.

First, obtain a brass rod, 12½ inches by ½ by ½ inch. Then at one end divide it into two equal portions, two inches long, Fig. 2. Make the cut with a hacksaw and bend the two halves at right angles to the rod, drilling two ¼-inch holes 1½ inches from the center of the square rod, as shown. Then, from the grinder remove the front plate holder, drilling two ¼-inch holes through the face plate 1½ inches out from the center of the driving shaft of the grinder and 180 degrees apart. The two cones were obtained from a carpenter shop (with the holes already drilled) for 10 cents each. The fixed or headcone is then bolted together with the brass shaft to the face plate of the grinder by means of carriage bolts. The movable or adjustable cone has a square hole which fits snugly on the brass rod, and the wooden disc has a key-way through which a wedge is tapped, in order to keep it from drawing back in use. Fig. 2 shows the completed winding with the



The preparing of the

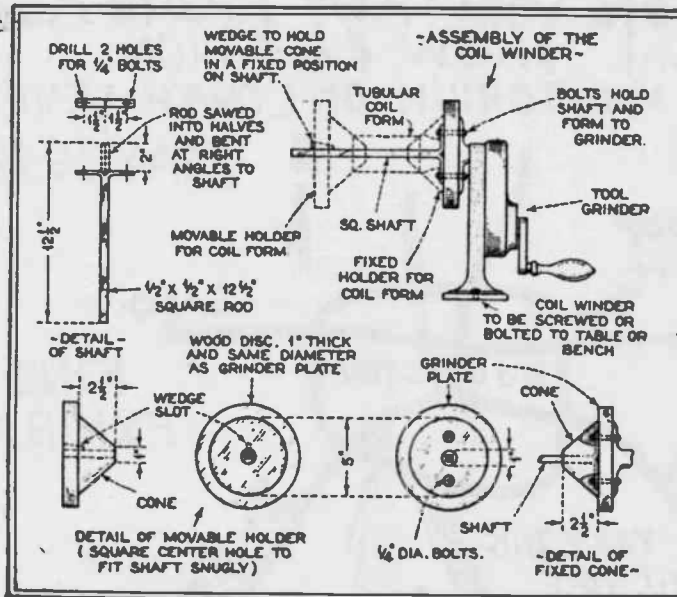


Fig. 2

"B" Condenser Replacements

Of particular interest to servicemen is the announcement of the Dubilier Condenser Corp. of New York of replacement units for the Majestic B, Super B and Master B eliminators. These replacement blocks incorporate the usual Dubilier features, namely, increased paper insulation, extra large safety factor and exceptionally long life. The blocks come ready for installation, being equipped with soldering lug connections.

Test for Continuity

Sometimes the serviceman has a very high resistance to test for continuity, writes Mr. Harold C. Dow of Hartford, Conn., but has no testing battery of sufficiently high voltage to register on a meter. In such cases, the following stunt will do the trick. This, of course, will not be new to the old-time telephone and telegraph man, but may be of help to some radio repair man.

A dry or flashlight cell can be used, connecting a wire from the battery to one side of the resistance to be tested, the lead from the other side of the battery and the lead from the opposite end of the resistance are touched to the tongue, separated by about ¼ of an inch. A salty taste indicates continuity; the absence of this saltiness of course shows an open circuit. If one has alternating or pulsating current available the two wires may be held on a moistened thumb, the wires, of course, in this case being separated too. Some persons who are especially sensitive to electric shock will feel a tingling sensation with direct current as well as alternating current in the second method of testing for continuity.

To determine the value of a "B" battery a voltmeter is required, not an ammeter. The latter may be used to test dry "A" batteries

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Radio

THE UNDERSTANDING AND ALIGNMENT OF NEUTRALIZED AMPLIFIERS

By John Alford

Before the pentode there was the tetrode. Before that there was trouble.....at least for the radio engineer of the 1920's who was attempting to develop effective radio-frequency amplifier circuits using the available triode tubes of that time. The problem, of course, was the grid-to-plate capacitance which was 8 picofarads for a typical triode like the Type 01-A. While this amount of capacitance was negligible at audio frequencies, it created a real problem in designing stable r-f amplifiers for the 200 to 600 meter wavelengths.

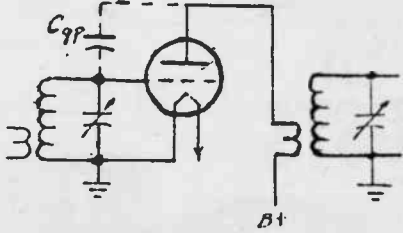


Figure 1
TRIODE R-F STAGE

Figure 1 shows a typical triode r-f stage with the grid-to-plate capacitance, C_{gp} , emphasized externally with dotted lines. Because both the grid and plate circuits are tuned or else coupled to tuned circuits, the circuit contains the necessary elements for oscillation with C_{gp} providing the feedback path from grid to plate. This circuit will always oscillate if enough energy can be fed back from the plate to the grid in the correct phase to overcome circuit losses. Unfortunately, the conditions for best gain and selectivity are also those which promote oscillation. In order to prevent oscillation in r-f amplifiers it was necessary to reduce the stage gain to a level that insured circuit stability. This could be accomplished in several ways such as lowering the Q of tuned circuits; stagger tuning, reducing filament voltage on the amplifier tube, loose coupling between stages or inserting a "losser" element into the circuit. While all of these methods reduced gain, detuning and Q reduction had detrimental effects on selectivity. Variation of filament voltage was, of course, a universally used method for gain control in the battery sets of the 1920's.

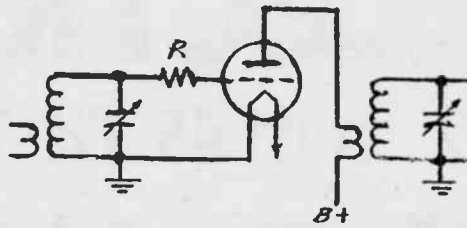
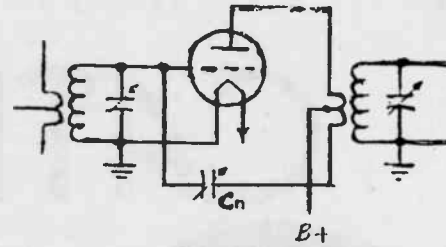


Figure 2
R-F STAGE WITH
LOSSER RESISTOR

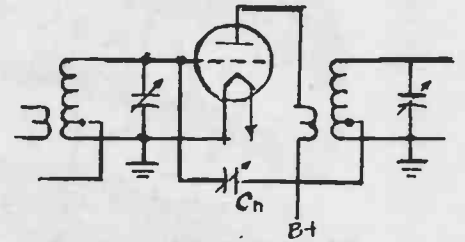
Probably the most common technique used to inhibit feedback was the "losser" resistance, R, shown in Figure 2. This circuit was widely used and is typified in the Atwater Kent receivers of the 1920's. Since R appears in series with the grid-to-plate capacitance of the tube, it interrupts the feedback path. If made sufficiently large, R will prevent oscillation. Typical values of R ranged from 50 to several hundred ohms or more depending on the other circuit parameters. With good design, a stage gain of 5 could be obtained on the 200 to 600 meter broadcast wave-lengths using the gain limiting techniques. Useful amplification at short wavelengths (below 200 meters) was considered impractical or impossible by most radio engineers at that time. Thus was the state of the art until Prof. L.A. Hazeltine introduced the famed Neutrodyne circuit in which the troublesome effect of the grid-to-plate capacitance of the tube was "neutralized" by introducing into the grid circuit a signal which cancelled the signal coupled through the grid-to-plate capacitance..... Figure 3a shows one variation of the Hazeltine circuit. In this circuit the primary winding of the r-f transformer is tapped. With this arrangement, the primary coil end opposite the plate has a voltage out of phase with the r-f voltage at the plate. The neutralizing capacitor, C_n , is adjusted to couple the proper amount of "out-of-phase" voltage into the grid to nullify the signal fed through the grid-to-plate capacitance. By neutralizing the effect of grid-to-plate capacitance, higher stage gains without oscillation were possible. Because of difficulties in maintaining neutralization over a wide tuning range, stage gains were limited to not more than 10 with good stability. Doubling the stage gain did mean that a three-stage amplifier could achieve a stable gain of as much as 1000 compared to 125 for a similar amplifier without neutralization. A significant improvement indeed!

The typical Neutrodyne circuit is shown in Figure 3b. The neutralizing capacitor is connected to a tap

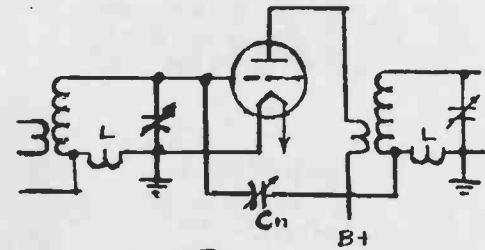
near the ground end of the next stage grid coil. In principle, the circuit functions in the same man-



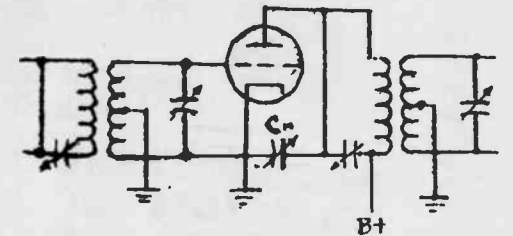
a. HAZELTINE



b. NEUTRODYNE



c. RFL



d. RICE

Figure 3
NEUTRALIZING CIRCUITS

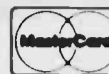
ner as the circuit of Figure 3a with the advantage that the neutralizing capacitor does not have the B voltage across it. The primary and secondary windings of the r-f transformer must be properly polarized to allow neutralization to take place. Additionally, the primary was frequently interwound with the ground-end portion of the secondary coil to obtain tight coupling.

Figures 3c and 3d show two other neutralizing circuits employed in receivers of the 1920's. Figure 3c is the RFL (Radio Frequency Laboratory) circuit used, for example, in the Majestic Model 70 chassis.

(Continued on page 8)

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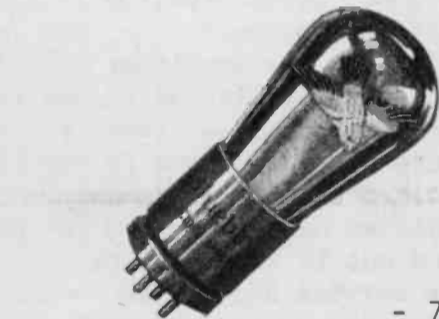
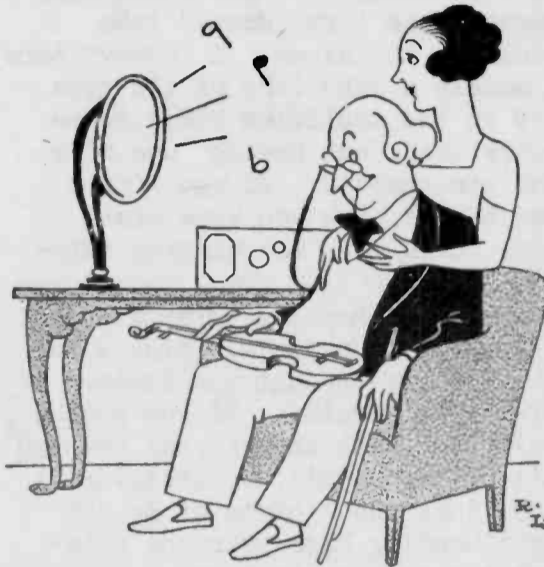
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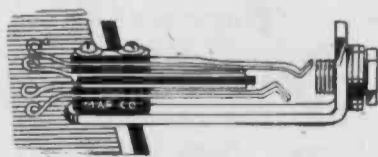
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 - 26. 16 x 16 uf at 150V \$1.25 each or 2 for \$2.00 --
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 - 28. SCREW BASE CAPS.. TAKE THE HUM OUT OF ANYTHING. 40 uf/ 40 uf at 450V \$3.00 each or 2 for \$5.00. Fits 7/8" hole.
 - 29. RESISTOR LINE CORD REPLACEMENT KIT. - 5 TUBE SET TYPE RLC-2 \$4.50 - 4 TUBE SET TYPE RLC-1 \$3.50 --
 - 30. Padder capacitors for BC superhets \$1.00 each --
 - 31. Olde tyme spaghetti ass'd lengths and colors large package \$3.00 regular package \$1.75 --
 - 32. Tie down terminals 3 part 13 cents each OR 10/ \$1.00 --
 - 33. Dial cord - medium nylon 10 cents/ft. --
 - 34. OLDE TYME AC PLUGS.. \$1.10 EACH OR 3/\$2.95 --
 - 35. Olde tyme toggle switch with short bat with ball \$1.85 each. Good for AK-37, etc. Radiola 17, 18, etc. --
 - 36. Electrolytic capacitor FP type cardboard insulation tubes. state size required. 25 cents each 5/\$1.00 --
 - 37. SPEAKER GRILL CLOTH, 2 PATTERNS.. \$3.25 SQUARE FOOT. SEND FOR SAMPLE.
- OUR SHIPPING POLICY -----
 We ask that you send sufficient funds to cover shipping and handling costs. Overages if under \$1.00 will be credited to future orders or refunded if requested. Overages over \$1.00 will be returned with your order when it is shipped. Unless specified otherwise, orders weighing 8 ozs. and under will be mailed by first or third class mail. Order over 8 ounces will be shipped by U. P. S. When making an inquiry, please send S.A.S.E. PHONE AFTER 7:P.M. E.S.T. (301) 585-8776.

In Figure 3c, L is part of the tuned circuit at the next stage grid but is oriented for minimum coupling to the other windings. J is wound on a separate form and is mounted at right angles to the coupled windings. If the windings are properly polarized, the voltage across L due to the circulating current in the grid circuit will have the proper phase to cancel the signal coupled through the grid-to-plate capacitance. Again, balance is achieved by adjustment of C_n . The Rice circuit of Figure 3d uses a center-tapped coil in the grid circuit. With this arrangement the signal voltages at the ends of the tuned grid coil are equal and out of phase. C_n is then adjusted to equal the grid-to-plate capacitance of the tube to effect complete neutralization. Figure 3d is the type of circuit used in the Radiola 60 and 62 i-f stages. The principal disadvantage of the circuit is that the tuning capacitor is not grounded and makes the circuit difficult to employ in gang-tuned r-f stages.

The circuits shown in Figure 3 all fall into a general class of neutralizing circuits known as "bridge" circuits. That is, the circuit is electrically equivalent to a balanced electrical bridge network where C_n is adjusted to achieve a balance. When C_n is properly adjusted, circuit gain is due to the amplifying properties of the tube alone as the feedback path through the grid-to-plate capacitance is balanced out so to speak. Many variations of bridge neutralizing circuits exist and still find application today, especially in r-f power amplifiers for transmitting equipment.

Up to now, neutralization has been discussed for what it is and does. Of equal importance to the collector is "how to do it" when aligning the old neutralized triode TRF or superhetrodyne receivers. As a licensed radio amateur for many years, the author has read much on neutralization as applied to transmitting circuits but has seen almost nothing that related to the alignment of the early BC sets. My first experience at neutralizing the BC set was as a teen-age radio nut in 1947. I had a part time job in a radio shop which was rather handy as I was an avid builder and experimenter and my boss gave me lots of junk to work with. One day one of the "old" AC TRF sets came in--about a 1928 set, I think. The owner claimed that it was the first time in twenty years that the set had quit. The main problem was a bum filter capacitor which was promptly replaced. After that, I attempted alignment but the set broke into oscillation when the tim-

mers were peaked. I asked the boss about it and received my first lesson on neutralizing BC sets using a "dummy" tube.

The Neutralizing procedure which follows uses the "dummy" tube technique and should provide generally acceptable results on most if not all of the neutralized triode r-f and i-f stages. Before continuing however, the term "dummy" tube should be explained. A "dummy" tube is merely a good tube of the type used in the amplifier stage to be neutralized, but having one filament pin removed. If you didn't know before, now you know what those tubes with the missing filament pin were used for. Do not use a tube with shorts or open filament as a cheap substitute. Also a bad tube may have enough gas content to affect the results. If you simply can't part with one of your beloved 26's, 27's, 01-A's, or whatever is used, just put a piece of Scotch Magic Mending Tape over one filament pin and use that for a dummy tube. Another method is to put a paper shim in the tube socket so that one of the filament pins doesn't contact the socket.

Alignment consists of peaking the trimmer capacitors of the stage to be aligned using a signal generator or broadcast station as a signal generator or broadcast station as a signal source. The signal generator is preferred since both frequency and strength of the alignment signal are adjustable. Alignment should always be done with all shields and covers in place. The r-f trimmers are usually peaked somewhere between about 1000 KHz to 1400 KHz--wherever gives the best tracking and gain compromise. If the capacitor has slotted end plates, these can be adjusted starting from the high end and working down to obtain nearly perfect tracking. This can turn into a lot of work and generally isn't necessary unless the tuning capacitor was damaged. The i-f stage should, of course, be adjusted to the recommended i-f frequency which, if not known, can usually be quickly located with the signal generator. If during alignment the amplifier breaks into oscillation, the alignment must be stopped and neutralization attempted. Note that the amplifiers must be checked at maximum gain for oscillation. AC sets using 26's ran at maximum gain since the gain control was in the antenna. Most battery sets used filament control so the r-f gain must be advanced to maximum. Likewise, the cathode gain control used with 27's must be advanced. Back off the trimmer adjustment that caused the oscillation until oscil-

lation ceases or else reduce gain until oscillation stops. Tune to a strong station (or set generator) around 1000 to 1200 KHz and then plug the dummy tube into the neutralized stage nearest the detector. Not all sets neutralized all stages. Be sure any shields and covers are replaced before proceeding. Using a non-metallic adjusting tool, adjust C_n for minimum signal output from the stage. Usually this point is very well defined. What has been done is to cancel out the signal coupled through the grid-to-plate capacitance of the tube.

Plug a "live" tube back into the stage just neutralized and plug the "dummy" tube into the next neutralized stage back. Again be sure all shields are in place and repeat the neutralizing procedure. Repeat for other stages until all have been adjusted. At this time repeat the r-f trimmer adjustment. It may be necessary to repeat the neutralization and r-f trimmer adjustment two or more times as the adjustments interact. Also, neutralization in these circuits is not perfect at all frequencies and the amplifier should be checked for oscillation across the entire tuning range. Tuner r-f amplifiers are more prone to oscillation toward the high frequency end of the band so neutralization is usually carried out in this region.

The service literature, when available, should be followed. Sometimes the adjustment procedure will be somewhat different than the procedure described, although end results will be the same. Some RCA sets for example, employ one neutralized stage which is simply adjusted until the set doesn't break into oscillation anywhere in the tuning range.

If trouble is encountered with r-f or i-f alignment and neutralization, check to see that all bypass capacitors are in good condition and all grounds are solidly connected. All tube, coil, and capacitor shields must also be in place. If these conditions don't exist, efforts to adjust the circuit may well be wasted.

For those readers who have access of QST magazine, the article "R. F. Amplification--A Re-Hash" by Lyford in the November 1926 issue makes interesting reading. This article is addressed strictly to the problems of r-f amplifier stability in receivers.

John Alford, W5TXL, is an electronic engineer who is an avid radio collector with a strong interest in "cathedral" shaped radios.

club news

HOUSTON VINTAGE RADIO ASSOCIATION

Show Announced

Unless something comes up, the 1982 HVRA Annual Show and Auction will take place at Gulfgate Mall in Houston on Saturday, May 29. Finalization of the date and time will be established at the March meeting. At the February meeting, contest chairmen and assistants were determined. Contest Chairman is Frank Cooper, Show Chairman is Wendell Wyborny, Publicity Chairmen are Duie Roth and Maury Zivitz, Security Chairman is John Mohundro, and Auction Chairman is Gary Coplin.



THE
ANTIQUERADIO CLUB OF ILLINOIS
AN AFFILIATE OF
THE ANTIQUERADIO CLUB OF AMERICA
IN CO-OPERATION WITH
THE INDIANA HISTORICAL RADIO SOCIETY
AND
THE MID-AMERICA ANTIQUERADIO CLUB
PRESENTS

RADIOFEST '82
AUGUST 7, 1982 at the HOLIDAY INN, 345 RIVER BLUFF RD.,
ELGIN, ILL. (Route 31 South exit from the I-90
Northwest Tollway)

THE PROGRAM

- I. ALL DAY SWAP-SELL SESSION
- II. SEVERAL TECH SESSIONS INCLUDING: RESTORING RADIO CABINETS
- III. RADIO CONTEST--CATAGORIES:
CLASS I--A.C. RECEIVERS
CLASSII--BATTERY RECEIVERS
CLASSIII--CRYSTAL SETS
CLASS IV--HORN SPEAKERS
CLASS V--HOMEBREW RECEIVERS
CLASS VI--TUBES
CLASS VII--ADVERTISING
FIRST, SECOND, AND THIRD TO BE AWARDED IN EACH CLASS PLUS BEST OF SHOW. CONTEST ENTRIES MUST BE IN CONTEST ROOM BY 11:00 A.M.
- IV. SATURDAY AFTERNOON: TOUR RALPH MUCHOW'S FANTASTIC MUSEUM
- V. SATURDAY NIGHT: BANQUET AND AWARDS PRESENTATION PLUS AN INTERESTING PROGRAM.

REGISTRATION: PRE-REGISTRATION \$2.00--REGISTRATION ON THE DAY OF MEET \$3.00
BANQUET TICKETS: \$ 9.75
MOTEL ROOMS: WE HAVE GUARANTEED 20 ROOMS WITH A 10% DISCOUNT--CONTACT THE HOLIDAY INN AT THE ABOVE ADDRESS OR CALL 312-695-5000 and request reservations for: THE ANTIQUERADIO CLUB OF ILLINOIS MEET IN AUGUST

STAY OVER SUNDAY AND ATTEND THE SANTA FE HAMFEST (ONE OF THE LARGEST IN THE COUNTRY) DIRECTIONS AT THE MEET

YES, I PLAN TO ATTEND THE MEET
YES**NO** I PLAN TO ATTEND THE BANQUET
MAKE BANQUET AND PRE-REGISTRATION CHECKS TO: ARCI AND SEND TO: JOE WILLIS--525 OAKDALE #524--CHICAGO, ILL. 60657
IF POSSIBLE, PLEASE REPLY BY APRIL 30th.

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EARLY ZENITH AC CONSOLE. Model 39-A, dated April 20, 1926, beautiful all wood cabinet with lift up lid, recessed speaker grill/ tuner/ antenna control, built in rotatable loop antenna, ornate and in working condition, very heavy, 43" h x 37" l x 21" d, accepting offers, Ken Sleger, 2424 Taylor Avenue, Alexandria, VA 22302 (703) 836-7242.

 TUSKA 1925 SUPERDYNE. Works fine. Excellent condition and cabinet \$375; Magnavox R3 horn, good \$65; Edison Standard Graphophone, beautifully restored, with twelve cylinders and large horn. \$495. Horn too large for U.P.S. All plus U.P.S. paul C. Crum, 6272 N. Cicero Avenue, Chicago, Illinois 60646 (312) 282-3033.

 FOR SALE: CATHEDRAL, BATTERY and AC RADIOS from 1920's and 1930's. Please send self addressed stamped envelope. J. Albert Warren, Box 279, Church St., Waverly, PA 18471.

WILLARD RADIO BATTERIES, 24 tube cells; new old stock \$40.00 each. FEDERAL 417, NO CABINET, 15" X 17" \$150.00. EDISON AUTOMATIC REPRODUCER, EXCELLENT REPRO WEIGHT \$75.00. W.E. THEATER PROJECTOR FROM PARAMOUNT STUDIOS, CIRCA 1932 \$750.00. 1930'S RECORDING LATHE \$75.00. RARE CYLINDER AND DISC RECORD AUCTION LISTS. WALLY WOOD, BOX 8153, LA CRESCENTA, CA 91214. (213) 246-1225.

 TUBES, NEW AND USED, FOR EARLY ELECTRIC RADIOS. SASE FOR FREE PRICE LIST. SAM FAUST, CHANGE-WATER, NJ 07831.

 700 - 7 and 9 PIN MINATURE TUBE, new in original boxes, 20 cents each if you take all plus U.P.S. shipping. James Fred, Cutler, IN 46920.

 SALE. INTERSTAGE TRANSFORMERS by Stancor, A-53C. New stock in cartons. Nearly universal 1:3 ratio. Price \$14.00, plus postage. Two units for \$26.00. Maury Zivitz, 11503 Atwell Dr., Houston, TX 77035

 FOR SALE: WESTINGHOUSE RA-DA, Radiola III, Radiola IIIa, Freshman Masterpiece, and other radios and speakers. Daniel Ullmer, 1662 Carole Lane, Green Bay, WI 54303 (414) 494-6750.

 FOR SALE OR TRADE: UNUSUAL A.K. SET MODEL 509 TUNE-O-MATIC. THIS SET FEATURES A CLOCK SET IN THE FRONT WITH AN ARRANGEMENT OF PLUG IN WIRES SO THE SET COULD TUNE ITSELF, IT HAD A MOTORIZED TUNER TO DO THIS. ROUGH SHAPE BUT IS RESTORABLE. WOULD PREFER NOT TO SHIP. - :: AEROLA SENIOR WITH DUD WD-11, VERY NICE WORKS, INSERT IS HIGH QUALITY REPRO. \$125.00. :: RADIOLA SUPER VIII CONSOLE ROUGH SHAPE BUT ALL PARTS ARE THERE \$65.00. 4 VT-1 S NEW IN BOXES VERY NICE, GOLD TIPPED \$20.00 EACH OR WILL TRADE FOR EQUAL VALUE WD-11S OR 99S. 4 DEFOREST TUBES NEW IN BOX WITH SMALL BOOKLET ABOUT USES FOR EACH TUBE. 1#10, 2#81'S 1#50, \$15.00 EACH OR SME TRADE AS ABOVE. NICE DISPLAY ITEM. WANT EARLY R.C.A. SETS. JAMES P. MCKINNON, 605 NORTH BRIDGE STREET, BRIDGEWATER, NJ 08807 (201) 526-8421.

 FOR SALE. PILOT 3" TV, OLD BATTERY SETS, SPEAKERS, HEAD- PHONES, OLD RADIO BOOKS AND MAGAZINES, CRYSTAL SETS, RADIO PARTS AND SEVERAL THOUSAND RADIO TUBES. BILL LAVERTY, 1012 W. GENEVA STREET, EGG HARBOR, NJ 08215.

FOR SALE: 100 RADIO TUBES, NEW .. \$150.00, VT-67 TYPE -30 - INCLUDE POSTAGE AND INSURANCE. THANK YOU. E. REMSKI, 920 WAL- NUT AVENUE, BOHEMIA, NY 11716

 FOR SALE - RIDER MANUALS, RADIO AND TV. RADIOS- BATTERY AND AC CATHEDRALS. SEND S.A.S.E., CLARENCE STEVAHN, P. O. BOX 576, WISHEK, ND 58495 (701) 452-2790.

 I HAVE A FEW RARE TUBES TO SALE PLUS A FEW OLD RADIOS. SEND L.S.A.S.E. FOR LIST. THANK YOU. RAY GARNER, ROUTE 1, BOX 320, BIG SANDY, TN 38221.

 RADIOLA 33 (V.G.) \$45. AK-35 (BOTH AUDIOS -OK -V.G.) \$35. AK 85 CHASSIS (VERY CLEAN) \$20. PHILCO 84B MINT EXCEPT FOR 1" X 2" AREA ON TOP - WORKING \$85. PHILCO 38 (V.G. - 1" TEAR IN CLOTH) \$60. SIMON 221 V.O.M. (EXC.- WORKING) \$25. SEND SEV- ERAL S.A.S.E.'S FOR COMPLETE MONTHLY LISTINGS OF RADIOS, BOOK, COMMON AND COLLECTABLE TUBES. RON BOUCHER, 376 CILLEY ROAD, MANCHESTER, NH 03103 (603) 669-1698.

 1. CHROME SCOTT ALLWAVE 15 IN EXCELLENT CONDITION, PURCHASED FROM ORIGINAL OWNER WITH ORIG- INAL SHIPPING CARTON, RECEIVER- CHASSIS, PWR. AMP. CHASSIS AND SPEAKER. ALL ESCUTCHEONS AND WOOD FRONT. \$400.00 .. 2. STEINITE LABS EARLY ELECTRIC, HAS METER AND FANCY BRASS ES- CUTCHEONS. WORKING. INTERESTING SET. \$200.00 .. 3. AERIOLA JR. CRYSTAL SET. GOOD CONDITION, WORKS .. \$175.00 .. 4. PHILCO 51, CLOCK RADIO, BEAUTIFUL PI- ANO FINSH, CABINET IN FANCY MANTEL CLOCK STYLE, WORKS. \$275.00 .. 5. AK 225 TOMBSTONE - FANCY CABINET- ROUND DIAL, WORKS WELL \$165.00 .. 6. MU- SETTE TOMBSTONE RARE- ART DECO STYLE CABINET, KNOBS ON SIDE. EXCELLENT WORKING CONDITION. \$225.00 .. 7. SILVERTONE 115 CATHEDRAL, VERY FANCY CABINET. IN EXCELLENT OVERALL CONDITION- NOT WORKING. \$95.00 .. 8. CROSLY 5M3, TOMBSTONE FLAT TOP- VERY SMALL CUTE SET. WORKING. \$65.00 .. 9. AERODYNE SPECIAL 5 TUBE BATTERY SET- VERY SMALL SLANT FRONT UNUSUAL DESIGN- WITH 5 01-A TUBES. EXC. COND. NICE LOG CHART INSIDE. \$65.00 .. 10. ZENITH 712 FANCY TOMBSTONE STYLE BURL WALNUT CABINET- WORKING- NICE STYLE SET. \$75.00 .. 11. PHILCO TOMBSTONE ROUND DIAL GOOD COND. WORKS. \$50.00 .. 12. RCA PUSH- BUTTON FANCY ODD CABINET STYLE- WORKS \$50.00 13. PHILCO TOMB- STONE ROUND TOP- LARGE FANCY CABINET, ROUND DIAL. BEAUTIFUL,

WORKS. \$65.00 .. 14. MAGNAVOX R3 HORN SPKR. EXC. COND. WORKS. \$90.00 .. 15. AK-L HORN SPKR. EXC. COND. - WORKS. \$75.00 .. 16. PEERLESS LARGE GOTHIC FANCY CABINET- VERY HEAVY WITH BUILT IN POWER SUPPLY- BEAUTIFUL- WORKS. \$100.00 .. 17. WESTINGHOUSE TYPE FL DRIVER ATTACHED TO BLACK METAL MORNING GLORY HORN- EDISON? PROBABLY USED IN RADIO STATION. HAS HORN NO. 5. PAINTED ON HORN. WORKS. EXC. COND. \$60.00 .. 18. DICTOGRAPH RADIO- PHONO DRIVER UNIT -LIKE NEW. WORKS. \$20.00 .. 19. WESTERN ELECTRIC 522 CW DRIVER UNIT WITH BASE PAT. JULY 23, 1918. ADD A SMALL HORN AND WILL MAKE A MINIATURE SPKR. EXC. COND. WORKS. \$30.00 .. 20. TOWER MEISTERSINGER HORN SPKR. DRIVER UNIT. WORKS \$10.00 .. 21. EARLY SPRING MICROPHONE BY AMERICAN MIC. CO. LA, CALIF. NO RING BUT MIC. IN EXC. SHAPE. \$30.00. 22. VERY EARLY JAR BATTERY IN EXC. COND. WITH BOOK, 1905- MODERN PRIMARY BATTERIES- BEST BOOK ON USE AND CONSTRUCTION OF EARLY CHEMICAL BATTERIES. \$80.00. .. 23. EARLY WHIMHURST STATIC GENERATOR MACHINE BY CENTRAL SCIENTIFIC CO. CHICAGO- 1923. LARGE 14" AND 12" GLASS DISC'S AND LEYDEN JARS. BEAUTIFUL DISPLAY ITEM. \$395.00. .. 24. ADMIRAL MOD. 1911 S" TV NEAR MINT- WORKS. \$85.00. .. 25. LARGE EARLY KNIFE SWITCH BY FNB COPPER CO. TAUNTON, MASS. 100 AMP.- 600V ON SLATE BASE, 15" LONG. \$20.00. .. 26. EARLY MOTOR ON MAHOGANY BASE BY C.M. SORENSEN CO. N.Y. NICKEL MOTOR AC-DC. \$12.00. .. 27. STANDARD CELL-CHEMICAL TYPE ENCLOSED IN SMALL WOOD BOX. BY LEEDS AND NORTHRUP CO. PHIL. PA. EARLY ONE BUT STILL WORKS GREAT. EXC. CALIBRATION ITEM AND DISPLAY. LIKE NEW. \$95.00. .. 28. RADIOACTIVE SOURCES ALPHA AND BETA INSIDE GLASS TUBE. CHECK YOUR GEIGER COUNTER. \$5.00 .. 29. LARGE 211 TUBES WITH SOCKETS, HAVE 3. \$8.00 EACH .. 30. BLONDER TONGUE EARLY UHF CONVERTER- WOULD GO NICE WITH THE ADMIRAL TV. \$12.00 .. 31. EARLY SPIDER WEB ANMD SLIDER COIL LOOSE COUPLER, TYPE. MISSING CRYSTAL AND HOLDER. JUST HOOK UP AND WILL MAKE A REAL NICE EARLY XTAL. SET. \$15.00 .. NOTE.. ALL ITEMS SHIPPED U.P.S. ADD SUFFICIENT AMOUNT FOR SHIPPING AND INSURANCE. ANY EXCESS WILL BE REFUNDED. ALL SETS WITH TUBES. FOR MORE INFORMATION ON ANY ITEM CALL OR WRITE (305) 741-6838 BETWEEN 7 P.M. AND 10 P.M. RICHARD CANE, 8391 N.W. 21 ST. ST., SUNRISE, FL 33322

FRESHMAN MASTERPIECE BRN. PANEL, DIAL WINDOWS WITH ENCLOSED SPEAKER, RESTORED, EXCELLENT \$85.00 .. RADIOLA III RESTORED, VERY GOOD \$60.00 .. PHILCO 38-35 TOMSTONE RESTORED V. GOOD \$35.00 .. CROSLEY 52 RESTORED, VERY GOOD \$70.00 .. MAJESTIC B ELIMINATOR W/TUBE, UNTESTED \$15.00 .. RIDER'S VOLUME I-V ABRIDGED W/ INDEX \$30.00 .. RIDERS VOLUME PUBLIC ADDRESS I \$9.00 .. RIDERS VOLUMES VI AND XIII \$5.00 EACH .. PEERLESS CATHEDRAL SPEAKER EARLY MODEL EXC. \$25.00 .. BOB HUSTED, 280 E. BOCA RATON RD., BOCA RATON, FL 33432. PHONE (305) 368-8358. ***** CRYSTAL RADIOS, perfect condition: Shamrock Radiophone \$200, Ivalek with original packing \$65... Maris, Mantle baseball radio \$145. Please add \$5.00 handling per order. S. Leonard, Box 127, Albertson, L.I. N.Y. 11507. (516) 742-0979. *****

WANTED

CASH FOR DECEMBER 1915 TO DECEMBER 1921 QST'S FOR PERSONAL COLLECTION. KEN MILLER, K6IR; 16904 GEORGE WASHINGTON; ROCKVILLE, MARYLAND 20853. (301) 774-7709.

WANTED: SCOTT PHILHARMONC. Prefer Napier console. Dick Howe, 9318 Wickford, Houston, TX 77024 or call (713) 680-9945 collect.

WANTED: T.V. GUIDES. ESPECIALLY PRE-1970. ALSO WANT ALL TYPES OF OCEAN LINER MEMORABILIA. DESCRIBE AND PRICE. RICHARD HEBERT, BOX 603 AUBURN, NY 13021.

WANTED: 1923 OR EARLIER RADIO NEWS, Science and Invention, Modern Electrics, Any pre 23 mags or catalogs. Also any Grebe receivers or amps. Also need HZ. Ray Garner, Rt. 1, Box 320, Big Sandy, TN 38221.

WANTED- ADAPTER # 615 OR OTHER adapters for Eico tube tester model # 666 & 667. Also latest tube chart. Frank Hoffert, 19605 Chardon Road, Cleveland, OH 44117.

"WANTED ATWATER KENT GRAND-FATHER CLOCK; ALSO A.K. CONSOLES OF THE "LATER" ('34 THROUGH '36) YEARS. ALL A.K. TABLE SETS OF THE '30'S. ALL A.K. ADVERTISING. WRITE ARTHUR AXLEMAN, 19652 WEEBURN LANE, TARZANA, CA 91356."

WANTED: AK 35 grid leak and 2nd AF transformer. Radiola 17 power supply, Radiola UZ-type and Music Master horn speakers, good originals; Jim Conaway, 709 Halstead Rd., Wilmington, DE 19803.

WANTED: 1, CRYSTAL DETECTOR FOR AMRAD 3366 WILL PURCHASE JUNKER IF AVAILABLE OR CAN SOMEONE FURNISH ME WITH A GOOD PHOTO AND A FEW MEASUREMENTS. 2, ALSO NEED A TUBE COVER FOR THE SAME SET. 3, NEED A SMALL COIL COVER FOR A MAGNAVOX R3 TYPE D HORN. 4, ALSO NEED JUNKER CABINET FOR A.K. 84 BROKEN GRILL OK, NEED TRIM PIECES. JAMES P. MCKINNON, 605 NORTH BRIDGE STREET, BRIDGEWATER, NJ 08807. (201) 526-8421.

WANTED: ZENITH TABLE MODEL 6 VOLT farm radio used with a 6 Volt windcharger or 6 Volt car battery (only) the year around 1937-38. This radio has split second tuning dial with green tuning eye. Will settle for Zenith and other radio brands with or without the tuning eye. Sketch size, knobs and feature, how many tubes, etc. Let's hear from you. Also, can I buy a new windcharger blade 6 feet long? Philip O'Donnell, P.O. Box 944, Alleghany, CA 95910.

CROSLEY BINDING POST THUMB SCREWS. 2 metal covers for Radiola V. Nameplate or junker BC 312. Moon radios or literature. Wireless Specialty sets or parts. A.K. BB parts. Thank you. Ray Garner, Rt. 1 Box 320, Big Sandy, TN 38221.

WANTED: PLUG IN COILS, audio transformer and rheostat for Grebe CR-18 Special. Bob lane, 2301 Independence Avenue, Kansas City, MO 64124
P. S. Error in article on tube dates -- 71A, 27, 26 tubes made in 1927 not 1924.

WANTED 3 MAGNAFORMER IF TRANSFORMERS RF61, 2 FERRANTI AUDIO TRANSFORMERS AF4, 3 AMPERITE SELF ADJUSTING RHEOSTATS NO. 1A FOR 01A TUBE AND/OR JUNKER MAGNAFORMER BATTERY OPERATED SUPERHET, J. A. RAWLINS, 1920 STEPHENSON DRIVE, MESQUITE, TX 75149.

WANT VICTOREEN CHOKES AND TRANSFORMERS. IF YOU HAVE THE LOOT, I HAVE THE CASH. FEEL FREE TO CALL ME COLLECT ANY TIME AFTER 6:00 P.M. PST AT (415) UK:6-1885. DAN O MEARA, G.P.O. BOX 521, PALO ALTO, CA 94302.

