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And LAST, - - why don't you order your copy now??

Above answers all contained in HB-2 "MRL #2 Long Distance Crystal set." at 27¢ postpaid, or 25¢ with order. Besides writing all details on our #2 set, we tried to include answers to questions fellows asked us in the last 22 years. It seems there are certain questions that predominate and most of them are in this 24 page booklet. Printed, copyrighted, etc. Many good comments have been received from Old Timers.

M R L RADIO BUILDER No. 25

FOR RADIO EXPERIMENTERS.

Per Copy: 20¢

6 Issues for $1.00

Issued 4 to 6 Times per Year

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San Carlos, Calif., U.S.A..

Contents

Subscribe Now

Notices of new merchandise, out of stock items, price revisions, and special items. Refer to MRL 1946-47 Catalog. On each new run we make, we delete items no longer in stock. This column shows all changes from last Fall - so when ordering, be sure to check this page. CAT. page #'s.

p.2. CAT.1-1. #10 Enamel. OUT

CAT.1-12. Leadin Window Strips. Fahns. clips both ends. Brand new. 4 oz. .10

CAT.3-10. Batt. Jars. OUT

CAT.4-26. Black Bak. Binding post heads. 8-32. .06

CAT.4-27. Same, red-- .06

CAT.4-23. 6-32 x ¼ Head top screws for BP. Has slot in top. Dozen---------- .08

CAT.4-25. 2-Screw Terminal strips. Marked 'A' 'G' .15

p.3. HB-25. "18 Xtal Set Cir." will be ready soon. Mostly made up now, ready to be photographed. After RB-25 is mailed we will start to mail HB-25.

HB-1. "Earphones--" partly made up now. After HB-25 will go right out. Got FB data from Eastern factories. Looks OK to us.

DX Almanac. OUT. Good while it lasted.

p.4. DP-63. "2-tube DC 2-v. set" All made over. Looks swell now. Revised 11-1-46. Reg. DP price. Include one on your next order.

"Radio Amateur Call Book" We have just been appointed agents for it. Price is $1.50 FOB Chicago. When U order, figure 2 lbs. postage from Chicago to U. You always get latest issue in this way.

p.5. CAT.7-51. 12½/1000" Celluloid sheets for plug-in SW coils. Per sq. inch .01

CAT.7-52. 15/1000", same as 2XM coil forms. Sq. in .02

p.5. CAT.7/69. 50/1000" (1/16"). OK for lots of uses. Sq. .03

No special coils made to order 'til further notice if U want 'Radio Builder.'

P.6. Magnet Wire. Will substitute nearest size when necessary. Almost impossible to set. Only M/O house selling it in 100 ft lengths. (Also hookup solder, spaghetti, etc. by the foot).

Midget Var. Cond. Mfrs. up prices on us.

CAT.8-1.	15 mmfd.	4 pl.	.90
CAT.8-2.	50 "	11	1.00
CAT.8-3.	100 "	14	1.10
CAT.8-4.	149 "	19	1.25

Used Variable Condensers. We have some various old types, .00025 to .0005 and .001 you may have for 50¢ each. Postage 1 to 2 lbs. Just a few on hand. Worl OK. Fair condition.

CAT.8-17 .00005 Micas now in stock. Each------ .15

CAT.8-67. 4 mfd. x 450 v. dry condenser. OUT

CAT.8-81. 8x8 Can Electro. OUT. Sub 8 mfd (8-80) or 8x8 dry (8-72). Mount under chassis. New

CAT.8-98. .05 x 600 v. Mica pigtail cond. Brand new. A special buy. Each .25

CAT.8-99. Insulated Extenders to run insul shaft to panel. As Ant. Cond. for 1-Tube kit. 1/4 shaft .15

CAT.9-2. Doesn't mean a fixed crystal. We slipped. We meant 'OK to be used in a Fixed Crystal.' Fixed Pyrites are CAT.9-5 at 50¢ & are Honeys. We don't make them. Our Fixed Carborundums work swell with a 3 v. battery in series.

CAT.9-20. New style Switch levers. Knob ½" long. If

Continued on page 23----------

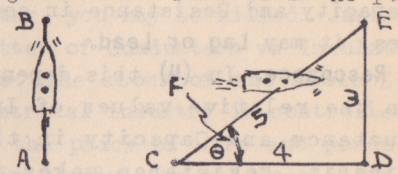
While we intend keeping away from Radio Engineering as much as possible, the technicalities involved should be grasped readily by anyone in Radio 5 years or longer. If you have any suggestions as to subjects being discussed, please feel free to write us. Thanks -- MRL

VECTORS.

About 500 B.C. the likes of the modern Radio man might have been a professional "Rope Fastener." Pythagoras, the Greek Philosopher of those times, discovered that 3 plus 4 equals 5. Three men held 3 ropes, 3-4-5 ft. long, and joined at corners to make a right angle triangle. This formed the first Vector. This was used as a try-square when they made buildings, parks, etc. Carpenters, surveyors, and others still use the same principle after some 2000 years.

Vector analysis is an easy method of solving complex problems by Radio, Electrical, Chemical, Mechanical Engineers and others. All kinds of problems in FM, Television, AC circuits, Impedance and similar ones may be solved in this manner. The two complex quantities we are now interested in are Scalar and Vector quantities.

When you have Magnitude, or distance only, as numbers, temperature, etc. you represent them as straight lines on a map. A boat goes 4 mls. per hour over calm water with no wind, you are using Scalar quantity, AB. But-, you add a current or wind of 3 miles DE to pull it sidewise, and you have a Vector quantity, which must be represented by Magnitudeand Direction. As per



diagram, DC represents the direction of 4 mls. per hr. DE represents the magnitude, or value of current. CE, or 5 m.p.h. represents the speed the boat must make to cover the distance. We may use the following formula:

$$CE = \sqrt{CD^2 + DE^2}$$

$$\text{(or)} \quad CE = \sqrt{16 + 9} = 5$$

Vectors may also be drawn to a scale and measured.

The movement of the boat may be said to **Lag** behind the power applied to the boat to reach its destination. You can see the smaller the angle at F is, the less the **Lag**. Therefore, this is called the **Angle of Lag, Phase Angle**, or **Angle of Drift**. That is, the Hypotenuse, CE, side is **Out of Phase** with the CD, the direction, or velocity side.

Phase relationships come under the following:

(1) A circuit containing Resistance Only (Scalar) is in Phase. That is, the current and voltage rise and fall at the same time.

(2) A circuit having Resistance and Capacity in series, where

the Current **Leads** the Voltage. **(3)** A circuit having Inductance and Resistance, where the Current **Lags** behind the voltage. **(4)** A circuit having Inductance, Capacity and Resistance in series, it may **Lag or Lead.**

Resonance. In **(4)** this depends on the relative values of Inductance and Capacity in the circuit. Resistance makes no difference. As follows:

(a) If the **Inductive Reactance** is greater than the **Capacitative Reactance,** the total net reactance is positive and the current **Lags.**

(b) If the **Capacitative Reactance** is greater than the **Inductive Reactance,** then the circuit is negative and the current will **Lead.**

(c) When the two reactances balance each other, the circuit is **in Phase** and **in Resonance.** That is, it has no **Angle of Lag or Lead.** In other words, it is the equivalent of a D.C. circuit.

You can see now that 1 unit of Inductive Reactance less 1 unit of Capacitative Reactance equals zero. Likewise, this cuts the Phase Angle to zero.

Suppose we now substitute 4 ohms resistance for CD; 3 ohms **net** Reactance for DE; and 5 ohms Impedance for CE. We now have the characteristic Electrical Vector. Breaking it down further - Reactance is composed of Inductive Reactance and Capacitative Reactance. Inductive Reactance is the resistance to A.C. caused by self-induced voltage in a coil. Capacitative Reactance is the resistance to AC of the condenser effect of capacity between turns of the coil. **Net Reactance** is the Inductive less the Capacitative Reactance, as follows: $X = X_L - X_C$

To get the Inductive Reactance we use the following formula:

$$X_L = 2\pi fL$$

where $\pi = 3.1416$

f = freq. in c.p.s.

L = Ind. in Henries

For quick reference, because Reactance, Inductance and Frequency are proportional you may figure any Inductive Reactance:

1 Henry at 1000 cps at 6280 ohms Reactance. For instance, 10 Henries is 62,800 ohms Ind. React at 1000 cps; 6,280 at 100 cps.

To get Capacitative Reactance, we use the following formula:

$$X = \frac{1}{2\pi fC}$$

Reactance of a condenser is inversely proportional to the Frequency and Capacity. Doubling the Capacity gives one/half the Reactance, as more current flows across a larger condenser. Also the higher the frequency, the less the Reactance. Therefore, the Capacitative Reactance acts oppositely to the Inductive Reactance in this respect.

Continued next issue....

Most beginner's courses are too long; too much involved for these fast times. The writers go from one reference source to another - finally ending up with scads of stuff that fills a big book, but doesn't leave much impression on the reader's mind. We will attempt to give you examples, principles, etc. that apply to one starting to tinker with Radio. For more details, there are always Radio texts, etc. in your local library.

PRINCIPLES OF ELECTRICITY.

Potential-Volts-Amps. Nobody knows what electricity is, - but you know there's some form of energy there when you tangle up with a 110 volt line. **Potential** is the force that drives anything from one point to another, as water falling over a dam. Or lightning striking from a cloud to ground. **Volts** is the electromotive force, or pressure, in the energy. **Amperes** is the current, or body, that is being pushed from one pole to the other. **Watts** are Volts multiplied by Amps. This energy is helped or retarded by Conductors and Insulators.

Conductors. We also know that electricity travels thru our body, metal objects, impure water, air, etc. which are called Conductors of electricity.

Insulators. When you touch 110 volts and stand on a dry board you receive no shock. The board insulates your body from ground, or the other side of the circuit. When you touch the same circuit, standing in a bathtub of water, you may be killed. Just a matter of Conductors vs Insulators. The stock of the whole Electrical industry is controlled by the price of wire and porcelain; Conductors and Insulators.

So, we see, the aim in life of an electrical current of one pole is to get over to the other pole to complete the circuit. But, there are special "work-makers" it has to contend with, as Resistance, Capacity and Magnetism, or a combination of all in varying proportions. These work-makers prevent the circuit from being completely shorted out, technically, Man comes along and winds large coils, constructs resistors, and puts all kinds of gadgets in its path, thereby getting all he can for his money. (Just like a man?)

Resistance is found in any circuit - no matter how good the conductors may be. As low-frequency currents travel all thru the wire, hi-frequency ones go only on the surface. However, a circuit always has resistance. Stretch out 100 ft. of #32 Enameled wire and test with an Ohmmeter for resistance. Then, try 100 ft. of #14 Aerial wire and see the difference in resist-

ance. To lower (or cut down) the voltage of a circuit, we use resistors (or concentrated resistance), usually carbon type in a Radio. They have no other purpose in a circuit.

Capacity. A condenser stores or condenses. Two plates, oppositely charged, form a condenser. Winding several turns of wire of a magnet alongside each other - gives capacity between each turn (distributed capacity). It can store an electrical charge -however large - between one conductor and the other. If the Insulator (dielectric) breaks down, - it will jump across, or discharge, as a lightning discharge for example. Turning more plates into a variable condenser will add capacity. Also, the winding of more layers of paper and tinfoil in a filter or bypass condenser. Any circuit will have some capacity.

Magnetism. Magnets may be permanent as horse-shoe, PM speakers, etc. Or they may be electro-magnets as Induction coils, Dynamic speakers, etc. which must have electricity applied to make them work. All Magnets have a core, whether iron or air, and all have lines of force. Place a knife-blade inside a tuning coil while listening to a station and you will see the effect of lines of force, different cores, etc.

Inductance. Most writers give Inductance as one of the major requirements of an Electrical circuit. While so, it should be classified under Magnetism. Inductance is the property which an electrical circuit has of producing induction (or magnetism) within itself by cutting lines of force. A single wire has induction, or magnetic lines of force around it. If placed close to another wire, it will cut the magnetic field of the other wire. Any coil, electro-magnet, choke, field, tuner, etc. all have Inductance, or Magnetism. A tickler coil induces part of its current back into the secondary to increase volume of signals when the two coil fields are bounced against each other. Inductance causes current (Amps) to lag behind Volts (force).

Above you have Conductors, Insulators, Resistance, Magnetism, and Inductance - all of which serve to 'annoy' the electrical circuit. You may have combinations as **Reactance** which is a resistance having self-induction (or magnetism) and capacity. **Impedance** which is the total opposition to an Alternating (AC) current due to Ohmic resistance and apparent resistance due to self-induction and capacity.

NOTE: If **Old Timers** are like me, they enjoy reading elementary articles. I never fail to get some point of good out of them.

Using dual-purpose tubes in many experimental circuits may bring a lot of grief to the average Radio Builder. We see very little information on this subject in Radio texts and magazines. A few of the following ideas may be of help to MRL Radio Builder readers.

The source of most troubles is the attempt to use a tube with a common Cathode connection for each section, when using the tube as a Detector and Amplifier combined. A detector normally requires no Cathode voltage, and is usually hooked direct, or nearly direct, to ground or the chassis. An Amplifier, whether it is Radio frequency or Audio frequency, requires a Cathode, or C-bias. This voltage is usually built up by a resistor and condenser combination. However, you may use one side of a dual-purpose tube's common Cathode for an RF Amplifier and the other for an Audio Amplifier without getting into trouble. We know that many combinations have been made up in the magazines, but they aren't worth their efforts to build them. The resulting signals may be of good volume in some cases, but the quality and control are both poor. Control is very poor if a regenerative detector is used. We know of many hours we have put in trying to get some Editor's "dream" working OK. Radio is complicated enough without adding difficulties which can easily be avoided.

On the other hand, if you refer to the Tube Manual and find a tube with separate Cathode connections in a dual-purpose tube, you will save yourself a lot of trouble. You may then use one side as any form of detector and the other half as an Audio or RF amplifier. If you intend using one side of tube as an RF amplifier, we would advise using a dual tube with a Hi-mu section for the RF side. This will also give good cut-off in signals as well. A good example of this is the 12B8, which has a suppressor grid hooked to the Cathode. Then, use the other section for the detector, which Cathode may be grounded if the circuit calls for this.

It is interesting looking thru the Tube Manual for tubes with separate Cathode connections. You will find some dual-purpose tubes as the 12A7, etc. using one side as a power-supply/rectifier with the remaining section as an Audio amplifier. This is very practicable as both tubes are working at audio, or low, frequencies. However, be sure to get it hooked to the correct side. Most all tube manuals now give under-view of sockets for the correct connections.

It is not a good idea to couple up D.C. tubes, as the filament is the common Cathode. Many have built the #19 tube set as Detector and Audio frequency,but it usually runs into a lot of grief.

When using a regenerative detector, it is best after all, to use a separate tube to prevent interstage capacity-coupling, etc. Then couple on with a dual-purpose tube as two stages of AF amplification.

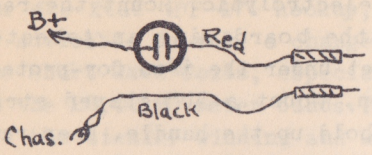
Most tubes with common Cathodes are designed only as push-pull (B) or class A amplifiers, working in tandem. As the Cathodes are usually connected together, the tube companies have connected them together inside the tube at the factories.Therefore, the #19 works better this way than in cascade operation as detector and audio. A common Cathode dual-purpose tube may be used in RF, or IF stages as well as audio to save space and some cost in the price of a tube.

Altho we have skipped some of the good tubes, that have separate Cathodes in dual-operation, the following numbers will give you a good start. Refer to Tube Manuals for their characteristics, connections, etc.:
2C21(1642); 6AF7; 6AH7; 6C8; 6F8 6H6; 6SL7; 6SN7; 7A6; 6F7; 7F8; 7K7; 7N7; 12A7(rect); 12AH7; 12B8(rf); 12H6; 12SL7; 12SN7; 12SX7; 14AF7; 14F7; 14N7; 25A7 (rect); 70A7(rect); 79L7(rect); 117N7(rect); 117F7(rect); 1638 and many others.

As G or GT tubes may be used in place of the above, we did not specify. As tubes are still scarce, one must use what they can get. "rf" means one/half is used as Radio frequency amplifier. "rect" means one/half is used as a rectifier for power supply.

We would appreciate any comments,or results of experiments, you have had with dual-purpose tubes.

NEON DRY CONDENSER TESTER.



PARTS LIST

1 Wall Socket for lamp.
1 2 watt Neon Test Lamp.
5 Red Test Prod wire.
5 Black ditto
1 Red Insulated Alligator clip.
1 Black ditto
1 Red Insulated Tip Jack.
1 Black ditto
1 Red Insul. Solderless Ph. Tip
1 Black ditto

This will show up a leaky by-pass Condenser in "nothing flat" at little expense. No need to build a special Power-supply, just hook to your present Broadcast Radio. Set the two Insulated Tip Jacks in the rear of the chassis. Hook the black one to the chassis or B- and the red to any Bplus point, as field,screen grid, etc. when you are ready to test, just plug in. Put the Neon lamp in the positive (red) side, then you won't blow out fuses.Hi

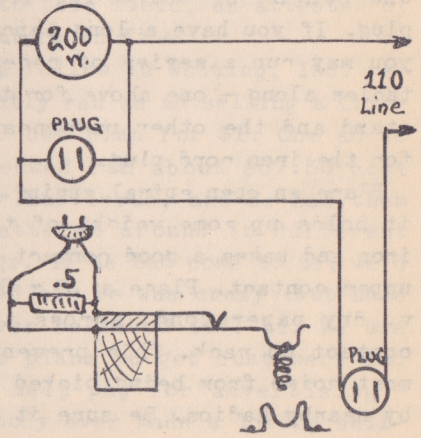
Neon takes about 100 to 200 v. DC to operate it. You may use up to 250 v. OK. (1) A continuous glow shows a short, or nearly one. (2) A "flick" will be noticed when you first make contact when the Condenser charges up, but this doesn't mean a thing in our tests. (3) A slow pulse, about 1 per second shows a slow leak; not enough to discard condenser. (4) If it fluctuates 2 or more times per sec. then it leaks, and needs replacing. Do not use on Electrolytics as it will show a direct short. Test them with a 1000 ohms-per-volt voltmeter on a DC source.

When testing, always be sure one side is open and isn't connected across a resistor as Neon will show 100,000 ohms on 250 v. source. We have found a little pulse when the test leads were brought close together. A pencil mark will cause a glow.

If you desire to test with handles, be sure they are Bakelite as stuff is "hot." Always be sure condenser is shorted after texting, as they hold their charges.

We suggest mounting the wall socket over the bench permanently at eye-level. A magnifying glass may be placed in front of it to "mystify" customers. Hi.

AUTOMATIC SOLDERING IRON STAND



PARTS LIST

1 Wall Socket for lamp.
1 200 watt lamp. (not MRL)
1 Open type spring. (not MRL)
1 .5 x 600 v. Bypass Condenser
2 110 v. Receptacles and plates.
1 Attachment plug for stand.
1 85 or 100 watt Soldering Iron.

This may be old to some of you but we have added some improvements. This stand allows full voltage to go thru your iron when in use; but when you place it back on the rack, it automatically cuts in the 200 watt lamp, thereby cutting down the voltage on the iron to save it. We have used this in our Los Angeles' shop and found it to work out fine.

It is built in two units; one for the wall and the other for the rack on bench, as per drawing. For the wall, use a wall socket for the 200 w. lamp. Use a receptacle to hook onto the attachment plug from stand. Run another receptacle underneath the bench for soldering iron plug. If you have a long bench, you may run a series of receptacles along - one above for the stand and the other underneath for the iron cord plug.

Place an open spiral spring so it holds up some weight of the iron and makes a good contact on upper contact. Place a .5 x 600 v. dry paper Cond. across the contact on rack. This prevents most noise from being picked up by nearby Radios. Be sure it is a dry bypass Condenser and not an electrolytic. Mount the rack on the board with an Asbesto sheet under the iron for protection. Mount a "U" shaped strap to hold up the handle. Keep rack away from Radio chassis, ground, etc. - by covering up exposed parts as much as possible. Pull the iron cord plug out when not in use.

Next #26 "Radio Builder" will have a good article on "Good Soldering Kinks."

DO NOT send in old parts or tubes. We can't use them. Only things bought now are 4 prong UX tube bases 1-3/8" in dia. We pay 2¢ each plus postage. Parts sent in without our consent will be returned - collect.

AIR MAIL now 5¢ per oz. Faster.

SEND Money-order, Postal note or Cashier's check to us instead of cash when you can - Safer.

NEED 1946-7 Catalog for URself or friend? Send Postal if U do.

SHORT WAVE COILS. When using our #28 Xtal (DP-47) hookup, it is advisable to make a change in the Short Wave Coils, especially on the 20,40,80 meter bands. Take off the tickler winding and wind it over the secondary. You may space-wind the tickler over the secondary if you wish. Using the same number of turns is alright. This gives closer coupling to the secondary, with a greater transference of energy with an increase in volume of signals.

ARMY-NAVY FIXED CRYSTALS. They work OK. We have made a test of them and find the rectification as high as 6100 ohms to 100 ohms or 61:1 ratio. Rectification is complete as far as it goes, However, there is a certain limit where the rectification may improve without improving loudness of signals. We have compared these with a good Steel Galena and find no difference in volume. A Fixed Carborundum with 3 v. battery in series gives about twice the volume. While a Steel Galena is 25¢ - one of the Radar xtals run 69¢ to 1.25 each

FM ON XTALS. If anyone has any results of experiments receiving Frequency Modulated stations on a Crystal detector, please let us know. We have lots of inquiries here. It doesn't seem to me it would be much different than receiving Amplitude Modulated signals as the pulsation is received and not pure D.C. It is first necessary to tune down to the hi-frequency used, around 40 to 50 megacycles (below one meter). This would probably be the main stumbling block. The crystal could not be connected around the coil and condenser as in regular Xtal circuits as too much energy would leak off thru the crystal. We refer to principle used in #8 Xtal (DP-23). Let us hear from you on this.

CRYSTAL SET ADS. Ever notice any fairly large town how the dime stores stick close together? They found it pays. They don't fight each other - they work together. People live compactly in cities in order to obtain certain advantages. The Xtal field is a small one. The more Fans any of us can get into it - the more it helps the others, and inversely. We are always willing to give advice to anyone going into this field, as attested by letters on file.

A fellow in Whiting, Ind. recently ran an ad selling a Crystal set plan for $1. One ad we checked ran about $67.50 cost for one issue, and he had them scattered around in different mags. If he had come to us, we'd told him he was crazy (but he'd never believed it). hi. We use 25¢ plans to get customers and to help pay for advertising - nobody ever made a living sell-

ing 10¢ or 25¢ plans. You can't sell a $1 plan unless you can give several pages of description. We send them our catalog and that picks out the buyers. His Xtal set "didn't use old-fashioned aerials" but a loop instead, 6½ ft. square. (I remember loops since 1920). Advertised as a "sensation of the Atomic Age," etc. How a magazine takes such advertising is beyond me. We claim to know most of the Xtal circuits, and am sure he has nothing extraordinary. From reading his ad it looks like he has 2 strikes on Edison! Needless to say, the ad never appeared again. Anyone can rig up a large loop and connect a variable condenser across it. Connect to a crystal and phones - and you got it - $1.00.

FURTHER XTAL INFORMATION. See page 24 (rear cover) for questions on HB-2. Also, we have some copies left of "Crystal Detectors" Handbook at 12¢ - for operating characteristics, etc. of many kinds of minerals. 20 pages in all. Data you won't find elsewhere.

CRYSTAL ORES. Like variations in animal and plant life, there is a dissimilarity in ores. Different localities have various mixtures of other metals to make the ore look and act differently. Several examples may prove interesting to Crystal Set Fans.

From our experience, the best Steel Galena and Iron pyrites come from Colorado. There may be other good localities, but as a whole we have found this state to be best in sensitivity of ore received. Look out, however, it has some very poor grades, too.

Variations in Steel galena aren't as common as differences in Iron pyrites. From Georgia we have gotten a smooth type of Pyrites, rather dull on the surface. In test, it is spotty- not sensitive all over. However, the spots are very sensitive when U find them. In Colo. we have a mineral that looks similarly but is very poor in sensitivity. A similar one exists in the hills of Oakland, Calif. In Penn. we find a Pyrites of similar character. However, it also has one of the striated (layered), shiny type which is very sensitive. The best Pyrites we get from Colo. is shiny, striated and very sensitive. The best catwhisker for Iron pyrites is a fairly heavy brass one having a fairly strong pressure applied.

Steel galena is called this because it looks like a piece of broken steel rod. The bright, shiny type is more sensitive. Some say it has some Silver, but metallurgists say it is just a matter of formation of crystals. Plain Galena is more sensitive if you can get near the edge.

Can a dry Electrolytic condenser be substituted for a wet can type? Ans.: Yes, they are both Electrolytic condensers. The dry electrolytic is made of an Aluminum oxide sheet as positive (anode) and plain Aluminum sheet as negative (cathode). Between each is placed a gauze saturated with an electrolyte of following proportions: 1000 gm. Glycerine; 620 gm. Boric acid; 50 cc 26% Ammonia water. The can type uses a formed positive grid for center of Aluminum and a Copper can, with the electrolyte between. The principle is the same. Dry paper, air or mica condensers must be used for RF circuits, - never electrolytics, the latter being used only for filtering hum. Electrolytics are self-healing; not so with dry paper condensers. Paper condensers occupy about 5 times the space of electrolytics of same capacity. Electrolytics must always be connected negative to negative (usually ground) while it makes practically no difference with paper, mica or air condensers.

Could a 25 mmfd. variable condenser be substituted for a 25 mmfd. trimmer as Antenna cond.? Ans.: Yes, when coupled to a detector stage, the variable is much preferred as it may be controlled from front of panel. Most kit mfrs. (to make more money) use a trimmer, or compression-type condenser, connected to the rear near Aerial. It is so critical you can't get within a mile of it. Use a 2 or 3 plate midget variable controlled from front metal panel with an insulated shaft extension and you have something. (BP-2). You may also use it as a Vernier adjustment when tuning 10-20 meter stations. Be sure the cond. is insulated from the panel or chassis or it will short out set.

I have a metal roof, would it be good as receiving Antenna? Ans.: Yes, if metal roof is atop a wooden building it is OK. Be sure no grounded metal pipes run up thru it. Also be sure connection to roof is clean. If joints of roof are loose - nail them together. Of course, if roof is rusty, don't use it as reception will be noisy. Naturally a high Aerial will always work better.

Is a Telephone wire about 200' long OK for an Aerial? Ans.: It may be used in a pinch. However, most telephone wire is too small for most pickup, as RF currents run on the surface. If you can hook the 3 conductors together it will help some. It is much better to use the 7/22 stranded or heavy solid enameled wire made for the purpose. It is also possible one wire may be grounded in the circuit. This may be determined with an Ohmmeter. Or try one wire at a time as an An-

tenna on your set. You will soon find a grounded one.

Does a Set use more electricity when the volume is turned - on full? Ans.: There may be some difference due to more power being consumed by the power amplifier tube, but not enough to be noticed on your light bill. The following formula will show how to figure cost of your Radio for a month:

$$\frac{\text{watts x days.mo. x ¢kw x hr.day.}}{\text{kilowatts (1000 w.)}}$$

or ordinarily:

$$\frac{\text{75 w. x 30 da. x .05 kw x 4 hrs.}}{\text{1000 watts (kw)}}$$

equals .45 per mo. to run Radio. Considering we have no tax on Radios, this is a very low price for entertainment at 4 hrs. per day. Most theatres out here tax us 75 to 85¢ for one admission.

Does an extra Magnetic speaker or phones use more electricity? Ans.: Apparently not. However, the more units you hook up, the weaker each individual speaker or phone will be. The current will be divided between them according to their impedances.

Does 32 v. DC make a good B-supply? Ans.: We presume you mean 32 v. of Storage Batteries. At one time this wasn't enough, as 45-180 v. of B-supply was required. With the Hi-gain tubes now used, it is possible to get enough volume on this voltage. In case you are getting 32 v. DC from a generator, it must be smoothed out with a 20x20-150 v. filter condenser with a choke in between in one leg of line. If not, it may be noisy or mixed with hum.

May fine wire be used for connecting an extra Magnetic speaker? Ans.: It may be used OK, but larger is better. You may not notice any difference in volume without some form of output meter at the speaker terminals. As connections to a magnetic speaker are usually "hot" it is advisable to use some form of insulated, or leadin wire, to carry the current. In case a Dynamic or PM speaker is to be used at a distance, it will be more noticeable due to low resistance of voice coil. Additional resistance of small wire may throw the "impedance match" off.

What is the difference between an Audio and Output Transformer? Ans.: They are built the same, except different windings. A 3-1 Audio may have 4000 Ts of about #40 Enam. wire on primary and about 12,000 on secondary, - total about a mile. If secondary is tapped, it may be used for an input transformer to Push-pull amplifier. If the primary is tapped it is an Output transfr. from a P-P amplifier to a speaker or phones. Most Output trans. have a low-impedance secondary to match the voice coil of spkr.

BROKEN METER GLASSES. It may be easy to cut circles in glass, but I'll get out of it if I can. We prefer to cut them from heavy celluloid about 1/16" thick. It may be cemented in with heavy Coil cement. They look as well as glass and never have to be replaced unless you run a soldering iron thru them. (P.S RB).

REMOVING ADHESIVE TAPE. It's generally a nuisance to get off your fingers, etc. Rub a little MRL Cement and Lacquer thinner over it - and presto! It's gone.

SCRATCH REMOVER. The new MRL Scratch Remover at 15¢ per oz. bottle really does its stuff. If you have scratches on furniture, Radios, etc. just rub it on and wipe off. Scratch is gone. It seems to fill edges of cut some way, and unless you get real close, it can't be noticed. Wish we had it when we used to sell sets in stores - when they came all scratched up - and the women used reading glasses to look for scratches when buying the set.

POWDER PUFFS. One guy uses the powder puffs he steals from his sister to make buffing wheels. Not a bad idea, and they last.

FIRE PROTECTION. Be sure to hook all machines, soldering irons, etc. to a common switch in the shop. Preferably a DPDT knife switch. A neon lamp may be connected across the side not in use to show when everything in shop is off. Neon will cost but a few cents a month and it's always better than a fire, no matter what insurance you may have.

REMOVING ENAMEL ON MAGNET WIRE Use plain Alcohol 1 part; Benzol 1 part; Ammonium hydroxide 1 part. Paint it on and wipe off.

BENDING COPPER TUBING. Ever try to bend copper tubing and all those kinks you got? Fill the tubing with sand and bend it all you want without kinks.

RUSTING OF TOOLS. Place a little Camphor in tool box to prevent rusting of your tools.

LONG-HANDLED PLIERS. Take an Alligator clip and solder two long pieces of #10 busbar on the ends - and you have a set of "very" long-nosed pliers for getting into tight places.

REMOVING TIGHT TUBES. Wrap a loop of Friction tape around the base of tube and pull out. Rotate the tube as you pull out.

REMOVING GLASS STOPPERS. They usually break if forced. Drop a little Glycerine and water on the cork edge and let remain a few minutes. Wipe bottle off afterwards or cork won't stay in.

PLIERS ALWAYS OPEN. Push a pc. of rubber tubing over the handles - it will keep pliers always open when not squeezed.

PHILLIP'S SCREWDRIVER. Just grind tips off a regular screwdriver point at 45 degrees and U have it.

Note: Initials of writer given only, unlesshe gives permission as he may be too busy to write. See Correspondence Club p. 17.

1-TUBE D.C. REPORTS. (BP-2).

Oreg.,Newport, E.L.W.:"1-tuber brings in Australia, Japan, Ecuador, Mexico, Canada, beacons, stations coast to coast." Mr.E. L.W. is located on Oregon coast, away from BC stations with good "damp" weather. He gets Australia time and again.

Ill.,Newcomb, Major R.W.M.:"I added a 1S4 power tube and 1T4 RF stage to 1-tuber. Now I get London, Berlin and others with good volume. It drives a 5" PM speaker. For total tubes I use 45 v. to 67½ v. B-batt. Use 75' Ant. 20' high. I added a vernier dial to help regeneration control. Improves it very much."

Minn.,Delevan, B.W.:"I heard 2 stations in Spain, 3 from Belgian Congo, London, across the US, etc. Use Ant. 50' high x 50' long. I like the HF-BC Band coil as it gets lots of low-powered BC stations. Using same batts."

Cal.,San Diego, R.C.:"Built 1-tuber about a year ago and am well pleased. When in service on East coast I picked up all large European stations."

S.W.Pacific, Pfc J.L.J.:"Out here I played Tokio, Australia, S.F. and others. Set is fine."

Cal.,Alameda, B.W.W.:"I play Boston on 1-tuber with little distortion."

NO.2 XTAL. (DP-22,22-A,HB-2).

N.J.,Bound Brook, J.C.:"Played London on #2 on about 40 meters."

Hawaii,Kauai, S.Y.A.:"Midnight on Mar.31,1942 I got KFBK, Sacramento, Calif. on your #2 set. I used an 800 foot Aerial."

Italy,?,(APO) A.M.:"Pick up 7 stations: 1 British and others German and French."

Order that Display ad **N O W** ----

Ill.,Deer Creek, P.R.:"Richmond, Va.(675 mls); Pittsburgh (500); Cleveland(425); Nashville (350); andmany others. My Antenna is 20' long and 25' high with no ground. I reversed wires to Xtal Det. Can hear local with one side of phone disconnected."

2-TUBE RECEIVER. (DP-31,63).

Cal.,Alameda, B.W.W.:"Built up 63 set and get Yokohama, Japan, Costa Rica, Borneo, Philippines, Alaska and many others. Also on DP-31 - 2-tube AC we get London, Australia, Hams all over the US, and Pacific." Note (DP-63 has just been revised, same price.

1-TUBE D.C, SET (DP-29)

Cal.,Hollywood, M.K.:"Get Australia on it with good volume."

Nebr.,Beatrice, R.D.:"Obtain excellent results. Stations fm Cuba, Mexico, Canada and every state in the Union."

50-in-1 ANTENNA TUNER. (DP-61).

Cal.,Montebello, K.E.C.:"With this tuner I cut out 10,000 watter 4 mls. away. Sure does its stuff. On #2 Xtal I get S.F. on Short Wave band at 5 p.m."

CRYSTAL SETS #4 - 7 - 10.

Ariz.,Phoenix, B.C.:"With 4-7-10 I get KWID short wave in S.F. (700 miles). It operates speaker at times. Have had good results with all your sets."

#28 PLUG-IN COIL XTAL. (DP-47).

Penn.,East Pittsburgh, H.P.: "I have received England and Italy without an Aerial. Hi. When I receive these stations I can take the Ant. off and get a fair signal. Other days I can't get a whisper. Germany and a Spanish-speaking country come in at the same time. Occasionally I receive W1XAL with fair signal. I also get WCZE-KDKA-WJAS-WLW-WRVA WBZ-KQV-WWSW-WABC-WTIC-WOR-WHAS-WJZ-WHJB and others that are weaker. I also get 75 and 160 m. Amateurs and Airways. Detector is Iron pyrites 10 yr. old. I get auto ignition on 20 m. coil.

WHAT WE PUT UP WITH. Here is a sample of a letter received.Figure it out for yourself:

"Before sending any money to you, I want to ask a few questions. Send Ans. free of charge. I am interested in Crystal sets..can you get England, Germany, etc. from Chicago direct just by the turning of a selector switch..do you test all parts for long distance in your Lab..can they be used without Aerial or ground.. no catwhisker to adjust..no two stations on 1 setting?..I want pictures so I can see it myself in front of me..no plans or diagrams..I don't want any soldering to do..just an eyelet on the wires..I also want a volume control to make it louder or sweeter..and be able to turn speaker on or off..to use several sets of earphones at once. Send distance map, pictures, and parts list so I can see what I'm getting for my money."

(Ed.:"People in Hades want ice water, too.")

COST TO DO BUSINESS. Wholesaler's approx. cost is 5% of sales - Dealer's 15-20% of sales made.

DON'T COMPARE our Catalog with others unless you first find out if they have articles in stock. Most prices have advanced in the other catalogs but listed at old prices. Most our parts in stock.

METAL SHORTAGES will continue. Copper until Mar.,1948; Tin until 1949; Lead 1951 or later.according to estimates received.

RADIO INDUSTRY is 600 times larger than before the War. 1947 promises to be largest ever.Over 1½ million sets per mo. now being built. Many mfrs. of off-brands have quit manufacturing.

RADAR RADIOS. In Jacksonville, Fla. Mr. Crews reports a "Radar Xtal Radio" on the market for $8 - uses Xtal diode. Compare it with our 2-A kit at $3.50. Albeit it hasn't the selectivity of our #2. Don't let a plastic cabinet fool you.

INSIDE LOOKING OUT. A customer of Salt Lake pen wrote us he ordered some Aerial wire. Warden wouldn't let him have it, said he could 'go over the wall' with it. Hi. Warden claimed it was clothesline. (7/22 Antenna). #2 set worked swell even with all steel bars and walls, he said.

MRL CORRESPONDENCE CLUB. Many like to correspond. We like to keep up the interest of experimenters but space costs money. Starting next issue you may list your name and interests at 15¢ per issue or 2 issues for 25¢. Closing date about Feb. 15th as near as we can predict. Send it in now. Fellows used to get a bang out of this and many good friendships resulted. You will find lots of fellows interested in your identical experiments, & much good will come from it.

SURPLUS GOODS

If this article had been out sooner, it could have saved hundreds of you fellows a headache. Sorry for our delay.

Be very careful in buying used Army and Navy surplus Radio equipment. There are many items that are OK - but be careful of built-up units, special parts, etc. which cannot be used by the civilian trade. They are built for Government frequencies, use etc. I worked at the Naval base as Radio Mechanic during 2 years of the War and know of what I speak.

They use special sockets, volume controls, condensers, tubes, coils, chokes, transformers, etc. - almost everything is made to government specifications. Only thing we could find that was about standard was wire, hardware, raw materials, etc.

Aircraft receivers are now selling for $12.95 - which use 24 v. generator supply. To convert it over would cost more than buying a new standard set on the market - and the latter occupies much smaller space, and looks and works better. Phones are made to match low-impedance circuits - having a resistance of 60 ohms. Not good for Crystal sets.

Then we find 150 watt transmitters which cost the government (you and me) $700 - selling only for $67.50. Gads, what a buy! Got a truck to put it in? OK, go ahead and buy it then. They tell you to make it over - only slight modifications about $50 or so. Aircraft equipment uses a 12-24 v. Dynamotor to operate most equipment. Got one laying around in the attic?

You can bet a Bobby-soxer's bandana that the big shots got there first and made off with all the good tubes and parts. If the government has anything good - they'll keep it. I have seen and worked with some of the best equipment at the Naval shops money can buy. I doubt if they are parting with any of this at 1/10th of its cost. A person may think they are shrewd, but the other party is usually shrewd, also. He knows the value of an item fairly well, too.

It is a shame so many Veterans gobbled up a lot of this stuff - figuring on making a clean-up. There is as much difference in appearance and operation of a standard government piece of apparatus and civilian as day and night. As for buying for resale, anyone can buy it. What is the advantage, then, if you can't protect your selling price? This equipment can be used by Amateurs as communication equipment, but they buy it direct - they R shrewd, too!

Go to your Radio dealer - or to us if you like. We will sell you proven merchandise. It is cheaper to buy thru someone who knows than buying a truckload of stuff you can't use. I have an Amateur friend who bought hundreds of tubes - many kinds. Naturally, the scarce numbers were limited to 1 or 2 of each. All he had left was a house full of Museum items.

Another fellow, after filling out 8 copies for Radio tubes got Radar parts. Another surprised victim got WAC brassieres - ain't we got fun?

We just got a listing from WAA on RU-19 Aeroplane receivers at $34.58, including Dynamotor, receiver, 9 coils, meter, etc. It takes 28 v. DC, or 5 storage batteries at $8 each. A power pack may be substituted for Dynamotor.

ASSORTMENTS.

We know of several concerns selling assortments. Even the large mail-order houses are getting their share of the nickels. Did you ever buy one? Oh, yeah? Junk, all kinds of odd parts, odd shafts, sizes, dreams, etc. Did they ever fit anything?

We bought several (we are also suckers) and didn't even get our money's worth. It usually hits the beginner who wants to put in an assortment for stock. Yep, he really gets one!

They contact factories, etc. which change models now and then with special parts made to order - that won't fit anything else. Standard stuff is picked out and sold to mfrs. or thru regular channels. These "assortments" R then dumped at 98¢ up to anyone who will buy them. It is cheaper to buy one part you can use than 10 for the same price that you can't use. Think it over.

There are assortments of mica and var. condensers, resistors, volume controls, chassis, sockets, hardware, knobs, chokes, dials, - in fact the ingenuity of some of these concerns is limitless. Order what you need, and see that you get what you order.

Mail-order has been hurt immeasurably by concerns with a peculiar quirk in their mind - that to sell anything thru the mail you have to sting someone. There is no limit to the amount of good merchandise - nor the demand for it. There is no reason to gyp anyone.

We get this every day in our mail - "I know I will lose my quarter - but I'm going to try once more." You can't blame the customer from past experiences. It is sure tough trying to convince them that they have come to a place that won't gyp them!

Just like Real Estate or anything else, if it's cheap, there must be a reason behind it. If assortments are cheap - why?

"THEM RADIO CROOKS"

An Audio transformer is wound with miles of fine wire, usually smaller than #40 Enameled. If there is a flaw in the wire, it may corrode and come apart during operation. However, it may also arc across this break and continue in operation a short time. In order to test an Audio for this condition, one usually hooks a 45 v. B-battery in series with a voltmeter across the suspected transformer winding. The meter hand may waver, or it may drop - showing the winding has come apart permanently,which is good! A poor transformer like this will cause signals to come in and out at intervals.

When I had a store in Los Angeles I was called over one night to look at one of these fluctuating transformers. I made the above test and out it went! The customer came over and snapped the switch on again, but naturally, no music. He grabbed me by the back of the neck and led me to the door, saying "at least it would work some before you came in, - now the d--m thing doesn't play at all. You won't get any more of my business."

There I was, out on the porch, on another Wild Goose chase!

WHAT! NO BUTTER?

Most land stations are located in the most outlandish places then, to get away from interference, static, etc. After an Op spends several years at sea, he gets sick of the monotony of se life and looks for a land station job. Such was the plight of an Op who landed at RCA station, KPH at Marshalls, Calif. Right on the side hill, with cows pasturing all around. (I was there myself, but got kicked out!)

This Op would walk the floor day after day, saying "if I stay here much longer, I'll go nuts." However, it was passed off by the other Ops as he kept staying on. One hot day they were operating with all the windows open. Suddenly, - he felt something warm on the back of his neck. H looked around into the face of a cow. "That did it!" he yelled, and off he went with his hat in his hand.

UND COMES THE GRAY HAIRS.

A customer came into our store in Los Angeles one time and asked for a "piece of War and a Reacher." We finally sold him a piece of hookup wire and switch lever.

Another unsuspecting customer was sold 2 Aerial strain insulators when he asked for a "couple of breakers." (I suppose he was referring to circuit breakers - and right he was).

A lady was sold an Atwater Kent - who was sure she wanted a "Kent Water."

Si:"My Radio ain't got Beevolts"

Atomic power is here to stay; are we?

-...-

Reporter: "Have you seen a lie-detector in action?"
Prof. Snoop-snop: "Seen one? I married one!"

-...-

Cat to an Elephant:"You may have the ivory, but I got what it takes to make violin strings."

-...-

Ad: "For sale: 2 rabbits and 1 adding machine."

-...-

During the war one bright squirt of WPB suggested removing horse-shoes at night to save steel.

-...-

Little girl in nursery: "Are you old enough to have a baby?"
Other girl: "Heck no,- I can't even tell time yet."

-...-

"Mamma, mamma, I just learned to write."
"Johnny, what does it say?"
"I don't know, mamma, I haven't learned how to read yet."

-...-

Customer: "So you're a salesman, are you? What do you sell?"
Salesman: "I'm a salt seller."
Customer: "Shake."

-...-

Instructor: "What is one/half of one/tenth?"
Student: "I don't know exactly, but it can't be very much."

-...-

Office boy: "Please, may I have the afternoon off?"
Boss: "Suppose it's your Grandmother again?"
Office boy: "Yes, she's making her first Radio set today."

-...-

One fellow wanted Dried Batteries and Locked washers.

Jake, one of our customers,got a new house so small he had to remove the matches from his pockets and turn the gum around in his mouth before going in.

Another Experimenter just invented "Super-thyroid Talkies" Must be Super-man type!

-...-

Why does a Mother-in-law resemble a Radio?
ANS. She turns herself on;Broadcasts nothing but speech; Runs on hot air; Never runs down.

-...-

Judge: "What is that man charged with?"
Clerk. "Bigamy; he has 3 wives."
Judge: "That's not bigamy; it's Trigonometry."

-...-

The Amoeba is quite a Mathematician;he multiplies by dividing. (No Abacus, either)

-...-

Mom: "John, I thought I heard a mouse squeak."
Pop: "Well, what do you want me to do - get up and oil it?"

-...-

Hairdressers give Headsets! No?

Hello, Radio Fans and Fannies:

It's quite a job, but maybe we can work out a system and have the sheet out regularly. Our aim is to have our closing date for next issue on February 15th, so we can mail copies in March. We are starting at 4 issues per year, but will increase this as soon as we get into stride. As RB is sold at 6 issues for $1.00 - schedule isn't too important. However, it is to our advantage, too, to issue as many per year as possible.

What we need now is subscriptions and lots of them. Then we can put our hearts (and money) into the project and get it out on schedule. We have lots of subscriptions already, but not enough. One publisher, we know, runs a "deficit fund" but this isn't a very good way to do business. You deserve something for your money. If you don't want 6 issues for $1 - send 50¢ for 3. It all helps.

Over the past 15 years MRL has had a nice family of Radio enthusiasts. A fine bunch of fellows and many of the Fair sex. We want to bring items of interest to you. Our large reference library, Radio "morgue" of clippings, and URs truly's experience back to 1915 may help. By RB we have attempted to bring U a smattering of Radio - once over lightly! MRL would appreciate your telling us what you'd like to see in RB; you're paying for it. Once we had a number of beginner's Radio magazines, but ones nowadays have become too technical for the beginner. If we can help fill the gap - our mission is accomplished.

Here are a few suggestions for future issues, if you like them; Radio servicing; What's in the Magazines? Theory; Amateur work; Technical articles; Crystal set data; Operating commercially, Experiments; Store work; Radio business; Manufacturing; Selling Radios; Chatter about Networks; Reports from others; Shop work; Scientific articles along nearby lines, etc. We have fair experience in most of these lines - maybe a little here and there. Hi

Ones supposed to know, say 1947 will be the biggest Radio year yet. If labor and industry doesn't get together soon - it won't be big for any of us!

The policy of RB is honesty in business and government; non-racial; non-sectarian; non-political. When one expresses an opinion; someone disagrees. If your opinion is different, write in and give us H—l. We won't get mad, just so you don't hit us with your flippers. Opinions make magazines grow big. If you like the present set-up, say so.

Until #26 RB,- Happy New Year,
-Elmer G. Osterhoudt and staff.

PAGE 6. Cont. from p.2

you want a short 1/4" one for Midget sets - same price. Sw levers not obtainable anywhere in US but here. Either style, each .15. Dozen 1.50

3/16" sq. Brass Rod. Brass went up. CAT. 9-26. Per inch, cut .01½

PAGE 7

Nichrome Elements and Wire. OUT of stock. CAT. 11-51.

866-JR Xmting Tubes. OUT Stock.

PAGE 8

SPDT Knife Switches. In Stock. CAT. 12-13. New price----- .30

Alarm Clocks. CAT. 12-33. OUT

"Devel- & Ptg." CAT. 12-40. OUT

R.H. Machine Screws. #8 x ½" n.p. CAT. 13-25. In stock. Doz. .10

Binding Head Machine Screws. n.p. #6 x 1/4". CAT. 13-48. Doz. .08

al Head Machine Screws. n.p. #6 x 1/4". CAT. 13-55. Doz. .05

Fibre Shoulder Washers. 1/4" x 5/16". Fit Midget cond. bushing. CAT. 13-114. Dozen--- .10

#2 Teeth Lockwashers. #2 hole. CAT. 13-127. 20 wash. for- .05

PAGE 9

1-Tube DC Kit. CAT. 14-3. Kit is now #4.95 due to increases to us by mfrs. We absorbed several increases, but we can t stand the gaff. Also, we now use Alum. panels, better cond. assemblies, cell. BC coil and other improvements. Send $1 as deposit on COD orders. Get ur 1C5GT, 1Q5GT or 3Q5GT tubes B 4 ordering kit, none available here. All 4-prong coils in stock at present. $4.95 ne

Aluminum Panels. No more cut as it gums our saw. We don t have shears. Sorry.

Trimm 24,000 Ohms. Imp. Phones... Same as CAT. 17-1 except metal headband. CAT. 17-2. Postpd 6.00

Army Phones. 200 ohms DC. OK for Xtal sets. New. Complete. CAT. 17-48. Postpaid to you--- 2.00

Ear Cushions. CAT. 17-12. Plenty

Red Midget Phone Plugs. Plastic, small. CAT. 17-14. 2 oz. .35

Metal Midget Phone Plugs. New.. CAT. 17-47. 3 oz.--------- .40

Multi-phone Connectors. CAT. 17-42. Not obtainable now.

PAGE 10

Used Vol. Controls sizes 50M & 2 meg. & switch. CAT. 19-21. OUT.

Sterling Polarity Meter. CAT. 20-6-K. OUT of stock.

Alligator clips. Now in stock. Same moola. CAT. 20-10. .06

Spade lugs. Go under screws, BP, etc. Solder onto test leads. CAT. 20-20. Each lug------ .05

4" PM Speaker. No trans. 1 left. CAT. 21-12. 2 lbs. wt.. 1.75

Best grade Stamp Hinges. Error in printing. CAT. 22-2. 1000 for. 15

Approvals. Are you interested in them? If so, write us. We can get a lot together if enough R interested. Good copies & price

PAGE 11

Bell Transformer. CAT. 24-1. OUT

New Cartridge Grid Clips. OK for fuse clips, etc. Nickeled. We don t make the 1¢ ones anymore CAT. 25-34. Each clip----- .02

New 4-prong Base Sockets. In boxes. Base mtg. CAT. 25-43. .27

Same, exc. 5-prong. CAT. 25-44. .30

Spaghetti. CAT. 26-21 & 22. #14 & #18 Spaghetti OUT. Substitute #14 Sleeving. CAT. 26-23.

PAGE 12

"Radio Builder" new cost. Now 6 issues for $1-- as we are making it better than intended. More work and stuff like that there

1947-48 CATALOG

It will be our policy to issue a new Catalog every Fall, instead of sending duplications during the year. It will be sent to buyers and subscribers on our list at that time