

NATIONAL RADIO NEWS

FEBRUARY-MARCH 1933



Franklin Delano Roosevelt

*President-Elect
of the United States*



from the

PRESIDENT'S PEN

by J. E. SMITH, President, National Radio Institute

GOVERNMENT RADIO REPORTS ENCOURAGING

When the Radio division of the United States Department of Commerce made public its annual report, it stressed several items which are of particular interest to those concerned with the development of Radio and its future.

This report stated that Radio aids to air and ocean navigation are being improved and much more widely used. Radio has become an absolute necessity in aviation.

It is becoming increasingly important as an aid to law enforcement. Just about a year ago, there were fifty-three stations licensed in the United States for police Radio operation, and at the time this is written, there are seventy-nine such stations in operation and ten more for which construction permits have been issued—an increase of approximately 50% in that one year.

It is particularly interesting to note that in the same Government report to which we refer recommendations were made which would amend the present marine Radio laws to include other types of vessels than those required by law at present to maintain Radio communication. Safety of ocean navigation seems to demand this change.

As we go to press with this issue, we hear of orders being placed with one company for approximately \$150,000 worth of transmitting equipment to be used for improvements to existing aviation Radio equipment.

500 TO 1 FOR YOU --- OR AGAINST YOU ?

A noted teacher was talking to a large group of men. He asked, "If you were broke, how many of you would be willing to shovel some coal into my basement for \$1?" **500 hands shot into the air.**

"But," explained the teacher, "I have only one load of coal, so you have only one chance in 500 of getting the job—the odds are 500 to 1 against you."

"How many of you can paint my house, mix your own paint, and do a first-class job?" **50 hands were raised.**

"Having only one house, the odds are 50 to 1 against you," answered the teacher.

"I have a Radio receiver in my home—want it thoroughly overhauled and brought up-to-date. How many of you could do this job?" **Only one hand was raised.**

"Now," said the teacher, "when you hunt common labor, like shoveling coal, the chances are 500 to 1 against you. The country is full of men who will do work of that type for a very little pay. If you are able to do work that requires more skill, such as painting a house—you have one chance in 50 to get the job. But—if you have specialized training—like the one man who just raised his hand—the odds are 500 to 1 that you will land a job."

That story wallops you right between the eyes—shows more clearly than ever the greater opportunities trained men have to get and hold good jobs. People will tell you—"Men in every line of business are out of work—even trained Radio men." Of course they are—it is due to business conditions. Right now we are not only talking about trained Radio men—we're talking about "trained men" in every field. Regardless of what business conditions are—regardless of how many men are out of work—your job chances are just about 500 to 1 if you are trained and the same odds are against you if you have not the benefit of specialized training.

The Chief Talks

Automobile Radio Again

Chief Instructor Dowie, off on his pet subject, discusses "WHY YOUR STORAGE BATTERY RUNS DOWN."

Complete satisfaction from auto radio or automobile can be obtained only by using the proper necessary equipment.

The storage battery of a car although originally furnished to take care of only the needs of the electrical system of the automobile has stood up well in cars equipped with a radio set obtaining some of its power from the storage battery, using "B" batteries to supply the necessary high voltage for the receiver.

But now many auto radio owners instead of replacing the run-down "B" batteries, which last only a few months (the length of time depending on how many hours the radio set is in use every day) are replacing them with "B" eliminators. These "B" eliminators obtaining their input power from the storage battery naturally add an additional load on the storage battery, in other words, instead of drawing from the storage battery a mere three or four amperes the elimination of B batteries places an additional load of two to three amperes on the same auto storage battery. If the car is driven but little at night this extra load is easily taken care of by the car's generator, but when the combination of night driving with head lights on and the automatic starter used often, especially in rainy and cold weather, and the radio operating for a long time this will tax the capacity of the car's generator and battery even if the charging rate of the generator is advanced.

Fortunately there is a device on the market which does satisfactorily overcome this problem in a very simple way and very inexpensively. This device is called a battery

booster. A typical installation is shown in Fig. 1. This battery booster is very simple to operate as it takes care of the extra drain on the storage battery by restoring the battery to full efficiency in the garage without removing battery from the car or even lifting the floor boards to get at the battery. There is no danger of overcharging the battery if left on for a considerable time as the charge automatically tapers when the battery is fully charged.

Although it is advisable to occasionally (every two weeks or so) inspect the battery to see if the electrolyte in the battery is at the proper level, and that the battery is clean and dry and it is fastened properly in its rack.

The battery booster besides taking care of the extra load on the battery assures easy starting in the coldest weather, because no matter what other winter precautions are made a fully charged battery is essential to give a hot spark and a quick turn over of the engine.

From Fig. 1 it can be clearly seen that only a few simple connections are necessary so this device can be quickly installed in any garage furnished with alternating current 110 volts 50-60 cycles. One connection being made to one side of the ammeter stud A back of the dash and another connection B is made by clamping a socket on the metal dash of the car.

The socket B and connection A remains permanently on the car. The booster hangs on the wall of the garage and connected to a convenient lamp socket C. When the car is in the garage just plug in dash socket B and the lamp socket C.

This device does naturally save time waiting for battery service as well as expense of battery, rental.

The socket B on the dash which is permanent may also be used as an outlet for a trouble light extension cord if necessary.

Other advantages of this booster are, that it can be used as a separate charger for individual radio storage "A" batteries, noiseless, does not use any tubes or liquids so there is nothing to get out of order, with proper care.

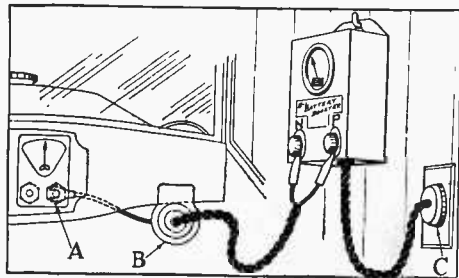


Fig. 1. Typical Installation of Battery Booster
(Courtesy of B-L Electric Mfg. Co.,
St. Louis, Mo.)

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A FEW WORDS WITH THE N.R.I. DIRECTOR

E. R. HAAS, Vice President and Director, National Radio Institute



DIPLOMACY

DIPLOMACY has been defined as the art of saying "yes" and conveying the meaning "no." Diplomacy is so ancient and honorable a profession that it must be an important one. It is.

Why do nations—why do clever men—use diplomacy? The answer is so that they may get by skillful maneuvering what would be obtainable otherwise only by force. Diplomacy is the clever way to get what you want. It is also the easy way.

Where can you see diplomacy in practice to study it? Ministers and doctors are usually good diplomats. Successful business men are almost always diplomats. Watch them handling men—watch the way they get you to do what they want. Four times out of five you will see something diplomatic done, hear something diplomatic said—which gets results easily.

Diplomacy is the easy way of getting hard things done. A well-banked turn in the road is a good example of diplomacy. It helps you to get around corners without slowing down. Diplomacy would save a lot of unnecessary wrecks if people would learn how to use it.

Getting along with people and still getting what you want—that is diplomacy. It is a fundamental rule of all great successes. Show me a truly successful man—and I'll show you a diplomat.

Try getting what you want the easiest way—the friendly, frank, open way. Work for the consent or cooperation of others in little things so that when you need them in important things you will know how to get them.

KEEPING A CALENDAR OF RADIO EVENTS

THE WISE Radio-Trician who is conducting a spare-time or full-time Radio Service, Radio Sales, or Public Address System business will do well to keep a calendar of Radio events.

This calendar is merely a day by day record of important future Radio Broadcasts. Information for such a record may be obtained in various ways. The more alert, active and ingenious the man—the larger his calendar.

He can contact the various broadcast stations periodically and get some good information. The Radio Editor of the newspaper can usually supply date of interesting and important Radio events. Then by careful study of political, sporting, and other activities a worthwhile calendar can be compiled.

The information can then be passed on to customers and prospective customers in various manners; the chief idea behind the plan being to create a desire for a Radio—in good operating condition for that and other broadcasts.

One Radio-Trician I know who lives in a rural community makes a practice of addressing post cards to Radio owners about a week before a big event suggesting they let him call and check tubes and batteries so the set will be in top-notch condition. As a result he has sold a lot of tubes and batteries—does all the A battery charging and gets the other service work as well.

Another man gets out a free blotter once a month on which is printed all the Radio Events information he can obtain. He calls it "The Radio Calendar." It carries his name, address and phone number. He does general Radio Service and specializes in noise reducing aerials. His business is growing.

The Radio man of today soon develops into a business man. He thinks Radio and business methods at the same time. He profits by the opportunity to give free rein to his ideas and imagination.

RADIO-TRICIAN SERVICE SHEET

REG. U.S. PAT. OFF.

COMPILED SOLELY FOR STUDENTS & GRADUATES

ATWATER KENT 91, 91B, 91C, 188, 188F, 260, 260F, 469, 469F

TUBE	CIRCUIT	91 91-B 91-C	188 188-F	260 260-F 1ST TYPE	260 260-F 2ND TYPE	469 469-F
R. F. TUBE	FILAMENT PLATE	6	2.4	2.4	2.4	2.4
	SCREEN	130	130	200	250	125
	GRID	80	75	90	70	110
1ST-DFT. TUBE	FILAMENT	6	2.4	2.4	2.4	2.4
	PLATE	125	130	200	250	100
	SCREEN GRID	75	75	200	60	100
I. F. TUBE	FILAMENT	6	2.4	2.4	2.4	2.4
	PLATE	130	130	200	250	125
	SCREEN GRID	85	75	90	70	110
2ND-DFT. TUBE	FILAMENT	6	2.4	2.4	2.4	2.4
	PLATE	60	95	**	**	170
	SCREEN GRID	9	55	**	**	15
1ST-A. F. TUBE	FILAMENT	6	2.4	2.4	2.4	2.4
	PLATE	130	205	115	110	230
	SCREEN GRID	3	215	2	1	235
2ND-A. F. TUBE	FILAMENT	6	2.4	2.4	2.4	2.4
	PLATE	127	—	230	225	—
	SCREEN GRID	12	—	235	230	—
Osc TUBE	FILAMENT	6	2.4	2.4	2.4	2.4
	PLATE	100	85	35	40	75
	SCREEN GRID	*	*	*	*	*
CONTROL TUBE	FILAMENT	6	2.4	2.4	2.4	2.4
	PLATE	40	40	**	**	14
	SCREEN GRID	10	10	**	**	10

* The measured oscillator grid voltage will vary dependent on several factors. In some cases, no reading will be secured for grid bias. In other cases, the reading will be only slight, or it may be as high as 10 volts.

** In Model 260 and 260-F, the 2nd-detector also functions as automatic-volume-control tube. The voltages that can be read at this socket are as follows: 1st type, cathode to ground 20 volts, grid to ground 7 volts, 2nd type, cathode to ground 15 volts, grid to ground 5 volts.

VOLTAGE TABLE

91, 91-B, 91-C, 188, 188-F, 260, 260-F, 469, 469-F
The voltages listed in this table are only approximate and are measured values, not actual operating values.

Use 250-volt scale of a 1000-ohm-per-volt voltmeter.

TONEBEAM ADJUSTMENT FULL COUNTER CLOCKWISE;
RANGE SWITCH AT LOCAL.

All plates, screen and grid measurements are made from cathode in heater-type tubes, and from -F in plain-filament-type tubes.

LINE VOLTAGE = 110 VOLTS

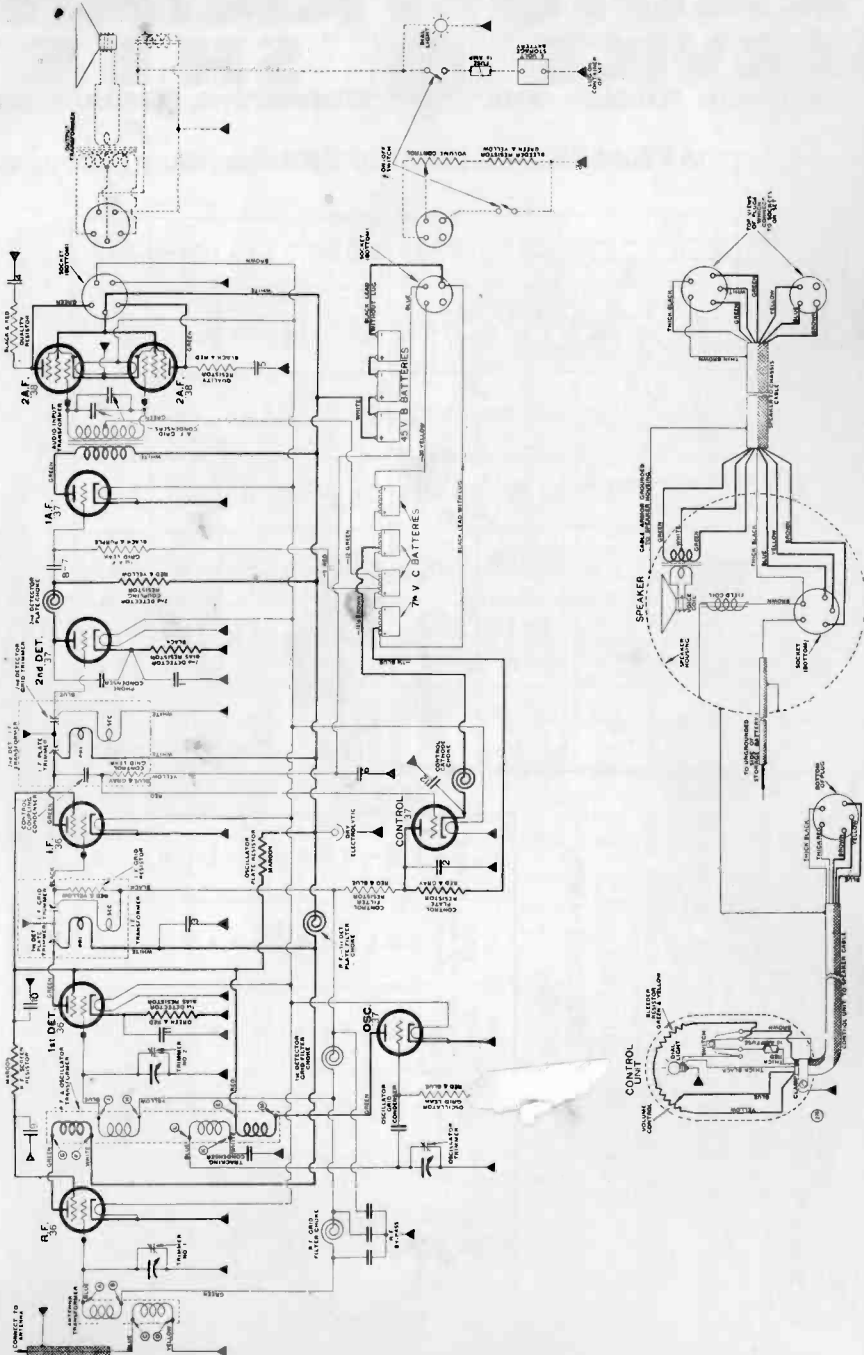
VOLTAGES ACROSS BLEEDER AND BIAS RESISTORS

RESISTOR	188 188-F	260 260-F 1st type	260 260-F 2nd type	469 469-F
Bleeder No. 1	50	92	90	50
Bleeder No. 2	85	108	75	110
Bleeder No. 3	70	73	55	8
Bleeder No. 4	11	20	15	12
Bleeder No. 5	—	88	30	Slight
Bleeder No. 6	—	50	85	35
Bleeder No. 7	—	—	—	55
1st-detector bias	5	2	1	3
R. F. A. F. bias No. 1	Slight	4	6	1
R. F. A. F. bias No. 2	7	2	2	—
2nd-1, F. bias	—	Slight	Slight	—
2nd-detector bias	5	—	—	15
1st-A. F. bias	—	5	5	—
A. F. bias	12	15	15	15
Tonebeam adjustment	—	95	120	65

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ATWATER KENT MODEL 91, 91B AND 91C MOTOR CAR RADIO

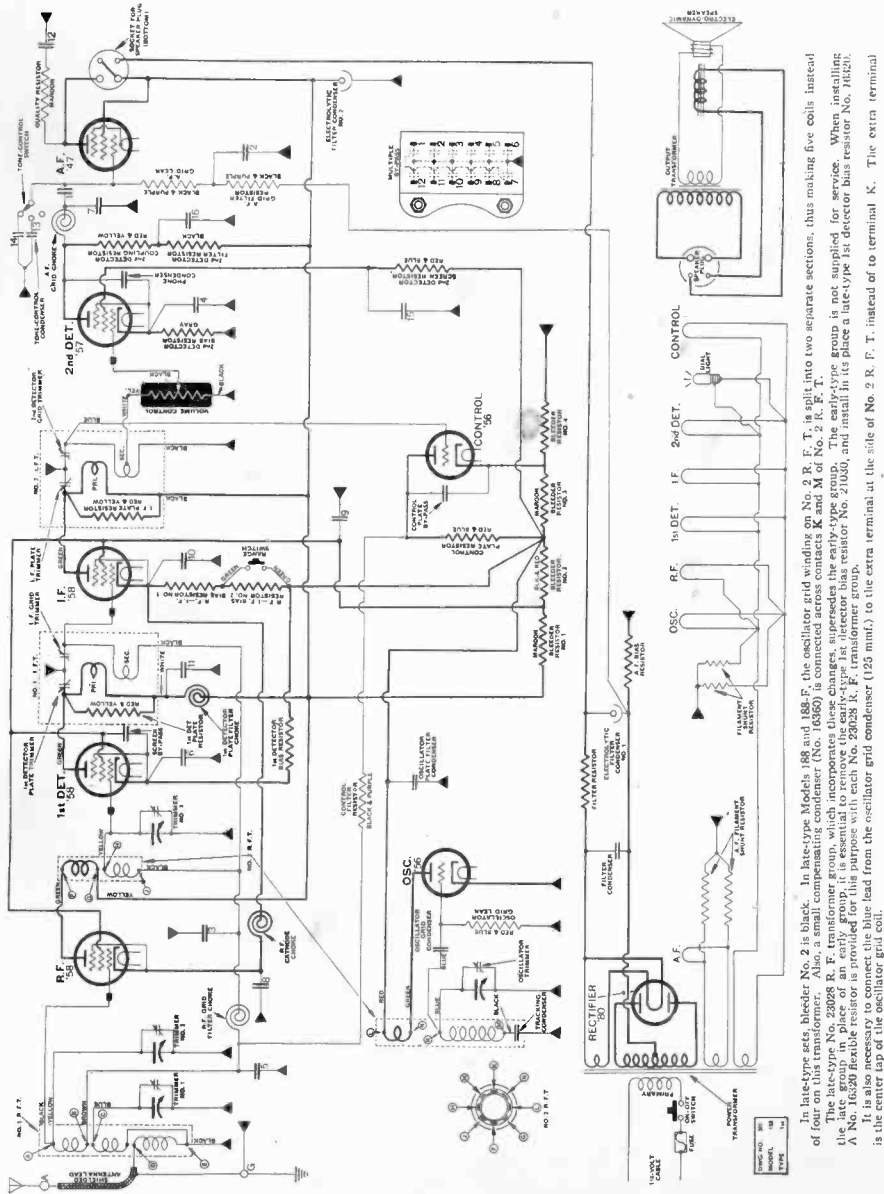
(Intermediate Frequency, 260 Kilocycles)



RADIO-TRICIAN SERVICE SHEET

REG. U. S. PAT. OFF. COMPILED SOLELY FOR STUDENTS & GRADUATES

ATWATER KENT RADIO MODEL 188



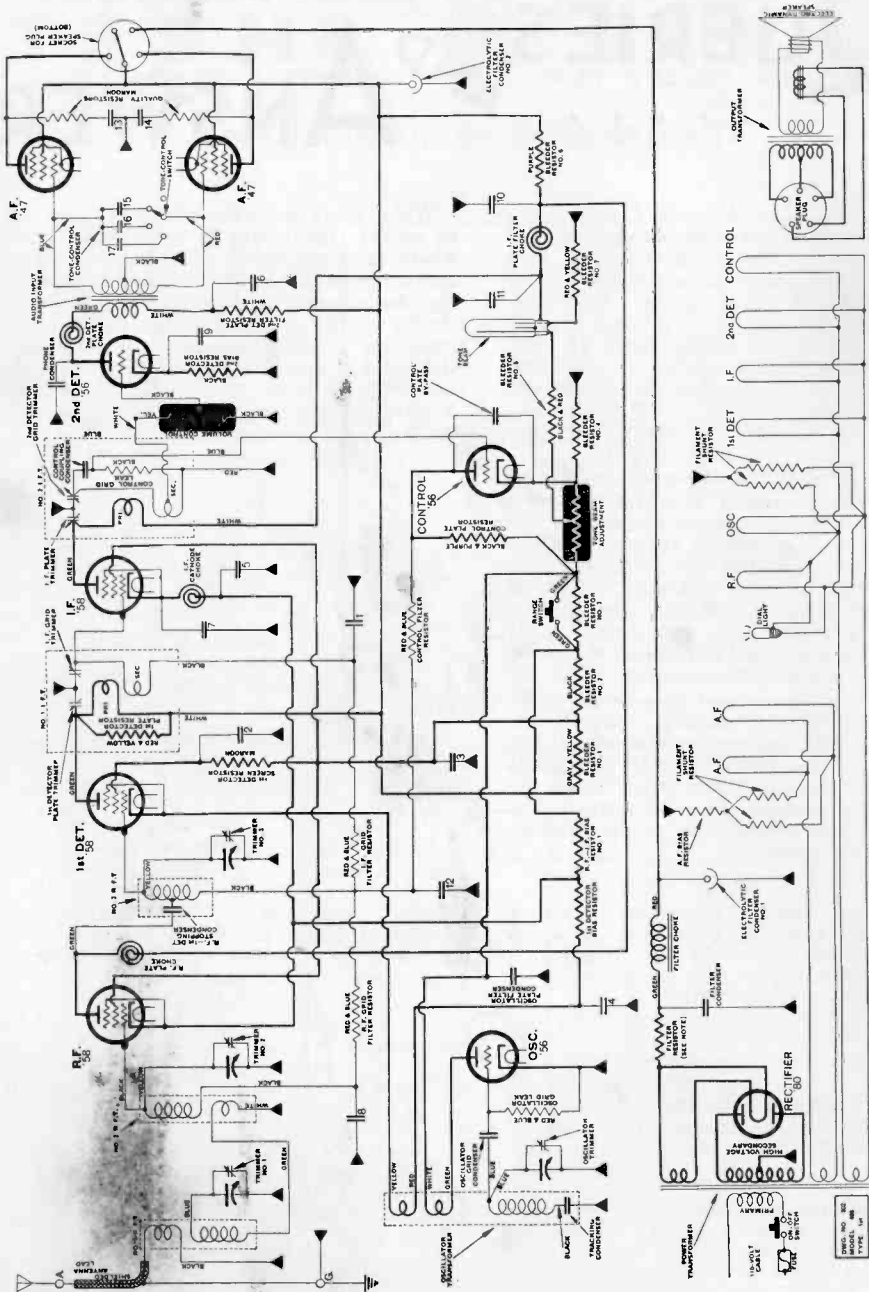
In late-type sets, bleeder No. 2 is black. In late-type Models 188 and 188-F, the oscillator grid winding on No. 9 R. F. T. is split into two separate sections, thus making five coils instead of four on this transformer. Also, a small compensating condenser (No. 16360) is connected across contacts K and M of No. 2 R. F. T.

The late-type No. 23028 R. F. transformer group, which incorporates these changes, supersedes the early-type group. The early-type group is not supplied for service. When installing the place of an early group, it is essential to remove the early-type 1st detector bias resistor No. 21030, and install in its place a late-type 1st detector bias resistor No. 16321.

A No. 16330 filament resistor is essential to remove the filament lead from the oscillator grid condenser (123 mmk) to the extra terminal at the side of No. 9 R. F. T. instead of to terminal K. The extra terminal is the center tap of the oscillator grid coil.

Readers who file Service Data in separate binders remove page carefully; trim on dotted line for same size as Data published heretofore.

ATWATER KENT MODEL 469, 469F



Early-type Model 469 receivers employed a T-12-A power transformer which necessitated the use of a filter resistor (No. 10, 80, X) as shown above. Later types of this model use a T-23 power transformer which does not require the use of a filter resistor. The T-23 power transformer is not suited for service, being superseded by the T-23. When installing T-23 in place of a defective T-12-A, it is necessary to remove or short circuit the filter-resistor.

In late-type 469, the 2nd detector filter resistor is sealed inside the audio input transformer, which has six leads. The white lead is for connection to condenser 6, and a yellow lead is for connection to plus B. When replacing an early-type audio input transformer, with the late-type, it is necessary to remove the External zinc-detector filter resistor.

QUERIES AND ANSWERS

???



Question: Recently I purchased a voltmeter and it doesn't seem to work right. I have an old B battery which I removed from our Radio set and when I tested it the new meter showed 20 volts. I have another voltmeter and with it the battery tested 17 volts. When I tested a new 45 volt battery the new meter showed 50 volts and the old meter showed 48 volts. Are the volts defective?

Answer: One of the most important things to remember in connection with voltmeters is that, when a voltmeter is connected across two terminals, the voltage across them is not the same as it was before the voltmeter was connected. Voltmeters have different values of resistance and require different amounts of current to give a full scale deflection. These conditions alone will cause different voltages to be registered when measurements are attempted with one meter used at a time. Comparisons of voltmeters should only be attempted with both meters connected at the same time. Usually, this will result in slightly different values being shown from those obtained when the meters are used alone but it will allow a direct comparison to be obtained between the two meters.

A new 45-volt battery often tests between 48 and 50 volts, and this voltage drops gradually after the battery is in use. Therefore, the meter is not necessarily defective if it indicates a higher voltage.

On the other hand, the manufacturers of meters cannot make a meter which is accurate over the entire scale, unless the meter is calibrated by hand, which is done only in special instances for high-grade work.

The manufacturer usually specifies the tolerance as plus or minus a given percentage. The higher grade meters usually have a tolerance of plus or minus 2%, while the cheaper grade meters, and other Radio devices, have a tolerance of plus or minus 10%.

When more accurate readings than 2% are necessary, the meter is sent to a laboratory where accurate values of voltage are available and a correction chart or curve is made, showing the amount of deviation at each scale division on the original meter. The correction chart does not guarantee absolute accuracy either as the accuracy is seldom greater than one-half or one per cent with such calibrations. A physical measurement is always an approximation.



Question: In a Lyric Model S-63 I have a defect which I have been unable to eliminate. The plate voltage on the detector is low while the pentode 47 tube shows no grid voltage and high plate current. All by-pass condensers and resistors seem to be in good condition. What is the trouble?

Answer: A common trouble encountered by the Service Man is the shorting of coupling condensers in resistance coupled stages.

In the modern receiver where no first audio tube is used this coupling condenser usually couples the output of the detector to the input of the power tube or tubes. If this coupling condenser leaks or shorts, current from the plate of the detector tube leaks through the condenser into the power tube grid leak creating a drop in it which will buck the negative grid voltage of the tube, causing sometimes a net positive voltage on the grid of the power tube. This in turn causes the plate current of the tube to be very high with consequent low plate voltage.

When testing through the receiver for defects it will be found that all resistances and by-pass condensers associated with these two circuits are in good condition and, of course, when a test is made on the coupling condenser the defect is readily apparent.

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QUERIES and ANSWERS

(Continued from page 9)

Another trouble associated with this stage is that the grid leak for the power tube sometimes becomes open. In this case no grid voltage is applied to the tube and plate current will be abnormally high. Inasmuch as the tester does not, as a rule, give an accurate indication of grid voltage in this stage due to the high resistance in the grid circuit, we may think that there is some other defect causing this trouble. In many cases the value of the grid leak cannot be accurately tested by means of meters and in such cases it is recommended that a new resistor be tried in place of the original one.



Question: How may a power amplifier stage of a transmitter be neutralized?

Answer: The plate supply connection is removed and the transmitter is set into operation. To the tank circuit of the tube being neutralized is coupled some type of absorption indicator which will show the presence of any tank current. This device may be an absorption wavemeter with a neon lamp, meter or series filament type lamp, or a galvanometer fitted with a rectifier.

The neutralizing condenser is then adjusted for minimum tank current and coupling of the indicator is increased. Adjustment of the neutralizing condenser is continued until no tank current flows. The capacity value of the neutralizing condenser is further increased or decreased until tank current again flows and a central position between equal values of indicated tank current where no tank current flows is the correct setting.

If the neutralizing condenser cannot attain this adjustment at minimum setting, move the coil clip a few turns away from the ground or voltage node position so as to include more turns in the neutralizing circuit, and if this adjustment cannot be attained at maximum value of the neutralizing capacity, move the clip nearer to the node position, thus reducing the turns in the neutralizing system.

If the clips on the coil are moved, it will probably be necessary to retune the stage and then reneutralize it as mentioned.

DO YOU KNOW

that

... automobile manufacturers in increasing numbers are designing their pleasure cars for Radio installation?

... Ford, Plymouth, and Chevrolet automobiles are among the cars being extensively used as Radio equipped patrol machines for Police use?

... there are 25,000,000 passenger cars in service in the United States of America and only 600,000 of these are equipped with Radio receiving sets?

... there are now in the field 16 manufacturers making "B" battery mechanical substitutes?

... in 1931 there were only 100,000 Radio Receivers sold for automobile use—while in the first half of 1932 alone, the sales amounted to 72,000 receivers for the same purpose, which would indicate that 1932, though a bad business year, will show approximately a 50% increase in the sale of this product?

... many of the manufacturers of better grade automobiles are creating and maintaining their own Radio engineering departments to cope with the many problems which arise in connection with automobile Radio installations?

Ambition is the motive power in man's make-up.

Ambition is like electricity, useful when properly controlled, dangerous when uncontrolled.

Genius and ambition laugh at precedent. We can't all be top-notchers, but we can all climb a little higher than we are and thus relieve the congestion at the foot of the ladder.

Doing well is all right, but when a man reaches the point when he doesn't want to do better, he is done for. He who does not soar high will suffer less by a fall. The height of the pinnacle is determined by the base.

MEN AND MONKEYS

by Mark Keys

Out at the Zoo throngs of people crowd around the monkey cages to watch the antics of those little fellows whose existence seems only justified by their ability to entertain people with their capers.

And as entertainers they do their job well. They are active—they are easily trained—they can imitate just about anything they happen to see.

We are told that many years back the monkeys had a pretty hard time of it. They were prey for larger animals—but they developed their agility—their ability to climb and jump to such a degree that they could successfully compete with the more formidable denizens of the jungle in the struggle for existence.

The chief difference between a man and a monkey lies in the brain. While a monkey can imitate he cannot reason. The power of reason is the facility which raises man above the rest of the animal kingdom.

But all men don't use this reasoning power which is the human birthright. Some do—but

very few use it to the fullest extent of its possibility.

For instance, we see plenty of men, who, with opportunity on every side to develop themselves—to get out of the rut—to protect themselves and their families from the evils of poverty—insecure employment—no proper assurance of a livelihood in their old age—will pass up the opportunity—who will not develop themselves to where they can cope with these, the most dreaded enemies of the human race.

In all fairness to both men and monkeys—doesn't it appear that some of the men we know—the men in the class we just discussed—do not use the wonderful reasoning power which nature has given to mankind to lift themselves to a plane of protection as even the monkeys have done.

One may go so far as to say that while it is impossible to make a man out of a monkey—it is not at all unusual to find a man who has made a monkey out of himself.

Making Thorough Inspection a Habit

By J. F. Himes, Alumni Association Member, Atlanta, Ga.

AFTER reading many articles on shop or bench service methods—I have come to the conclusion that the Radio repairman should develop a habit for certain procedure in handling all repair jobs.

Habits may be created easily and once formed are hard to break. If you create this habit of procedure which I shall outline it will eventually mean money in your pocket.

If you have a Radio on your work bench, take all the tubes out and test them. Next, invariably run a continuity test, then examine and test all the resistors as these can cause plenty of trouble.

Make it a part of your habit that under no circumstances will you jump at conclusions. Plenty of grief results from taking things for granted. Just because you listened to a Radio and found that a certain noise or rattle was speaker trouble—is no reason for you to believe that the same trouble exists the next time you hear a similar noise.

If you will get yourself into the habit of giving each Radio a thorough examination you will profit in the long run. Anything that is worth doing is worth doing right and if the job you have on hand can be rated as a Radio job—then it certainly deserves a complete examination. Get the habit.

FISHING INDUSTRY ADOPTS MARINE TELEPHONY

By F. B. WOODWORTH

EIGHT bells had just struck the end of the morning watch on the trawler "Flow," which was steaming over the Georges Bank some 200 miles east by south from Boston. The wheelman glanced at the compass, gave the wheel a couple of spokes to correct his course, and as he lifted his eyes to the vessel's bow, a shrill thousand-cycle tone came from a loudspeaker mounted above his head in the front of the pilot house. Immediately after a voice came from the loudspeaker saying, "Marine Service, Boston calling the 'Flow'."

Captain Ness stepped into his cabin, and removed a handset from a hook projecting from a small metal box fastened to the bulkhead just inside the door. In a moment a red light showed that his transmitter was ready for use. He pressed a switch in the handle of the handset and replied,

"This is Flow answering."

"Just a moment, please," came the voice—now from the handset receiver—"Mr. Malcolm

of the Bay State Fishing Company is calling you."

A moment's pause and a new voice from the receiver—"Good morning, Captain Ness, how much fish have you?"

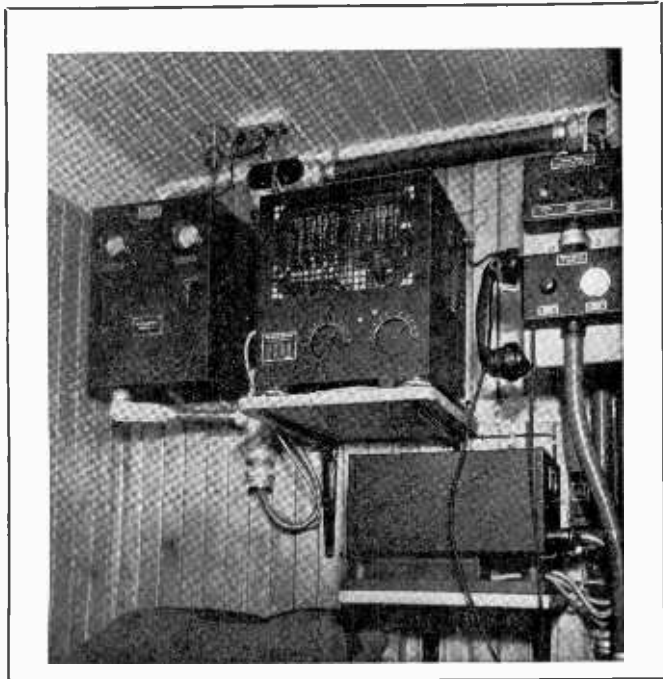
"Good morning, Mr. Malcolm. The fish are running fine. We took in 75,000 lbs. of haddock last night."

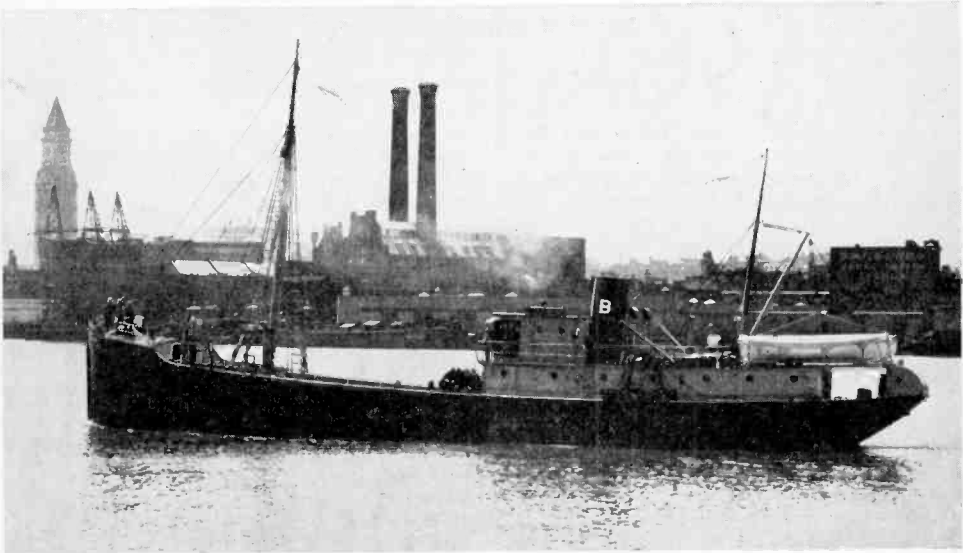
"That's fine," replies Mr. Malcolm, "We expect the price for haddock to be very good tomorrow. You had better come in."

"All right," replies the Captain, "We will head for Boston in a couple of hours. Good-bye."

This is a typical application of one of the latest services of the Bell System. Radio telephone equipment similar to that designed by the Laboratories for aviation has been employed in this new field. The equipment now available is suitable for tugs in the harbors or pleasure yachts not more than a few hundred miles from shore. At Boston, trial installations have demonstrated that fishing boats over 200 miles at sea may have very satisfactory communication with their home office or with any Bell System telephone. Such communication can be given through shore stations located at important harbors on both coasts.

The equipment for the boats has been made as reliable and as simple to operate as possible. The necessary control units, which include a telephone handset, will, in general, be located in the pilot house or captain's cabin. The installation on the "Flow" is shown in Figure 1. A loudspeaker, placed where it may always be heard, receives all incoming calls. A single master control switch in the upper section of the control unit starts or stops the operation of the entire system. With the master switch in the "ON" position, the radio receiver runs continuously and any call for the boat is heard from the loudspeaker. A volume control for the incoming speech and a small meter to indi-





cate when the transmitter is working are also included in the control unit.

Removing the handset from the hook at the side of the control unit automatically starts the radio transmitter. This handset is similar to the standard type with the exception of a finger plate switch located in the handle, which is pressed while talking and released while listening.

The remaining radio and power apparatus, shown in the picture on page 12, may be installed in any convenient place elsewhere in the boat, and requires little space. The radio transmitter is the standard Western Electric 50 watt aviation unit. It is very small and light in weight, and provides crystal control of the carrier frequency and high-percentage modulation. The radio receiver is a compact superhetrodyne with automatic gain control. The tuning is adjusted to the particular shore station frequency and locked.

An antenna tuning unit, flexible enough to adjust the radio transmitter to antennas which can be constructed on a small boat, is shown

at the left of the picture on page 12. In it is a relay which switches the antenna from the receiver to the transmitter when the finger plate switch on the handset is pressed. A relay set is also provided so that the radio equipment may be located a considerable distance from the control apparatus without incurring loss of power due to long supply wires.

The power equipment may be any one of four types depending upon the kind of boat on which this radio apparatus is to be used. On a steamboat, for example, it is convenient to use a small steam turbine generator. This machine will run continuously so that power is always available for the radio equipment. The B supply for the radio receiver is obtained from a small dynamotor which is run from this turbine generator set. On a boat with a large capacity electrical supply, motor generators may be used for both transmitter and receiver power. For use on Diesel or gasoline engined boats there has been developed a small automatic gasoline engine generator set, which starts automatically when the handset is re-

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THE SERVICE FORUM

The Service Forum will be devoted to discussions of everyday service problems. It will not deal with the "unusual" cases, but with the things which happen frequently in servicing and which are therefore of most value to the Service Man.

You are invited to contribute to this page. The editor reserves the right to select articles for their reader-interest. No manuscripts will be returned. Communications must be addressed to "The Service Forum," National Radio News, 1536 You Street, Washington, D. C. Sent in with letters or other communications they will not be considered.

Low Plate Voltage Majestic Models 70 and 90

MAJESTIC 70 and 90 series may give considerable trouble due to low or no plate voltage. The condenser blocks of these receivers often produce short circuits internally and it is quite difficult to remove the condensers from the container. For that reason, most service men use a new condenser block entirely, when this trouble develops.

This trouble makes itself evident in that there will be low or no plate voltage on the R. F., detector, and first audio tubes.

In some of the models, external condensers can be connected in place of the defective ones in the power pack. All that it is necessary to do is to remove the connection from the defective condenser terminal and reconnect it to one terminal of the 2 mfd. condenser rated at 600 volts D. C. The other side of this condenser is connected to ground. In the Model 90 series, if the condenser connected across the detector B+ circuit shorts, then it will be necessary to obtain a new block for you cannot eliminate the condenser from the circuit without going into the condenser container and this is not advisable.

F. L. SPRAYBERRY,
N. R. I. Consultant.

Fading Accompanied by Pronounced Hum Bremer-Tully S81

CONSIDERABLE trouble was recently encountered with fading and loud hum in a Bremer-Tully S81 set. A voltage analysis showed all voltages normal. Connecting a meter to any part of the set, or in fact, attempting to make any kind of an adjustment or test caused the signals to instantly return with full volume. The set would then operate satisfactorily for several hours only to fade again when it was thought the trouble had been overcome.

The trouble was finally located in the lead to the cap of the first screen grid tube. A new lead stopped the trouble—until the set was returned to the owner, when it faded and hummed as bad as ever! A low-reading ohmmeter soon showed that the lead to the cap of tube was making intermittent connection. The same test showed that the lead to the third screen grid tube was also defective, while the lead to the second tube was still good. These leads were a fine wire mesh cable covered with cloth insulation. For some unknown reason the three cables became defective, finally completely opening the circuit. Replacing the leads with good flexible wire, with rubber insulation, cured the trouble.

D. B. LOONEY,
N. R. I. Consultant.

Replacing Resistors General Motors Receiver

IN a General Motors receiver when you replace one of the vitreous enameled resistors by connecting a good resistor across the burned out section be sure to destroy the defective parts as they have a way of suddenly becoming continuous at times and causing howls. A file will enable you to destroy the defective part for good.

J. B. STRAUGHN, N. R. I. Consultant

When Fuses Blow Out On Crosley Receivers

CROSLY receivers sometime burn out fuses quite often. Therefore, if you are called upon to service a Crosley model and the tubes do not light, then examine the fuse in the primary circuit of the power transformer. Almost invariably this fuse has burned out, preventing an application of voltage to the primary of the power transformer.

(Page 16, please)



(Continued from page 13)

moved from the hook in the pilot house. The fourth arrangement provides for the use of storage batteries and dynamotors for both transmitter and receiver power. The main advantages of this latter system are the compactness of the power machinery and ability to operate in emergency without any other source of power than the storage battery.

In view of the compactness of the equipment and of its adaptability to different types of power supply, it is expected to find application on a wide variety of craft operating in coastal waters, and a widespread use of the new system is anticipated as its many advantages become fully appreciated.

Above is a picture of Captain Ness at the radio telephone equipment of the Trawler "Flow."

This article is a reprint through the courtesy of the Bell Laboratories Record, with which the author, F. W. Woodworth, is associated. Cuts are supplied courtesy of Bell Laboratories Record.

HERE'S ONE FOR THE BAG OF TRICKS

LITTLE Lake Merritt is one of the most beautiful spots in northern California. It is about one-half mile in diameter and nestles right down in the very midst of Oakland's finest residential district.

Imagine a giant Oregon fir tree, sixty feet high, beautifully lighted, standing in the very middle of this little lake. Now, add to this the singing of carols and the playing of chimes with a volume that covers the entire section with Christmas music and you'll have some idea of the effect.

This mammoth Christmas tree was installed on a large float and around its base were arranged four airport horns operated with model No. 207 Wright-DeCoster units. Cables which carried the current for lighting the tree and for operating the speakers ran from a boat house on shore along the bottom of the lake to the float. A good sound installation playing carols and chimes can do more to permeate real Christmas spirit at less cost than any type of decoration. City officials and shop owners cannot help but see the truth of this statement if it is properly explained.

Maybe your town doesn't have a beautiful lake—but we know from experience that community trees in parks, squares and even in the center of business communities are becoming more and more popular. Whenever such a tree is to be established—music will make the plan much more worthwhile.

Some wide-awake Radio-Trician is going to remember that idea for next Christmas. It's an idea to keep in the little bag of tricks. It can help you make some money. Think it over for next Christmas.

NEW CATALOG ITEMS IN THIS ISSUE

The Calcaterra Catalog Service lists a number of new items not featured in previous issues. It will pay you to read this feature regularly and send in requests for the items in which you are interested.

ON THE 17th DAY OF MARCH

ON THE 17th day of March the Irish of the world will celebrate what is believed to be the fifteen hundred thirty-sixth anniversary of the birth of Saint Patrick, the patron saint of Ireland.

Little is known about this man. His name is Latin, signifying patrician. He is supposed to have lived about 396 to 469 A. D. and was the first Christian missionary to the Emerald Isle.

Tradition has it that he was of Roman ancestry, born in Dumbarton, Scotland, where his father was connected with the Roman garrison. The only two writings attributed to him which remain, one called "Confessions," the other a brief biographical sketch, give slight information of his life.

However, we are told that he was captured early in life by a marauding expedition of Irish Picts and sold into slavery in Ireland. He lived a hard life but succeeded in escaping. He then fitted himself for the priesthood and obtained permission to return to Ireland as a missionary.

A legend has built up around the name of Saint Patrick which gives him credit for driving the snakes out of Ireland. This seems to be a fallacy as snakes have never been plentiful in that beautiful land. But snakes or no snakes, the Irish will continue to celebrate the 17th of March.

THE CHIEF TALKS AUTO-RADIO

(Continued from page 3)

No radio interference with your home radio when in operation as some of the older battery chargers do.

The socket ^B is not required on a model A Ford. Plug into regular Ford dash light socket. To do this turn on the light, pull off metal hood and remove lamp bulb without turning off switch and plug in booster cord base.

This convenient battery can be obtained from any reliable wholesale radio supply house.

WE WANT TO GIVE YOU PROMPT CONSULTATION SERVICE

THE N. R. I. Consultation Department realizes the need for speed in its service to students and graduates. Every consultation letter must be promptly handled and returned—that's an IRON CLAD RULE.

But this peak of efficient service can only be maintained with one hundred percent student and graduate cooperation. Before mailing in your consultation letter—be sure you have given your name, address and student number. Failure along these lines causes delay.

And in writing about a receiver be sure to FIRST, give the name of the set; SECOND, give its model number; THIRD, whenever possible give the serial number.

Some of these points seem like minor details—but our information is necessarily so catalogued and so filed as to make the information of great importance to prompt, efficient consultation service.

Help us give you Good Service.

THE SERVICE FORUM

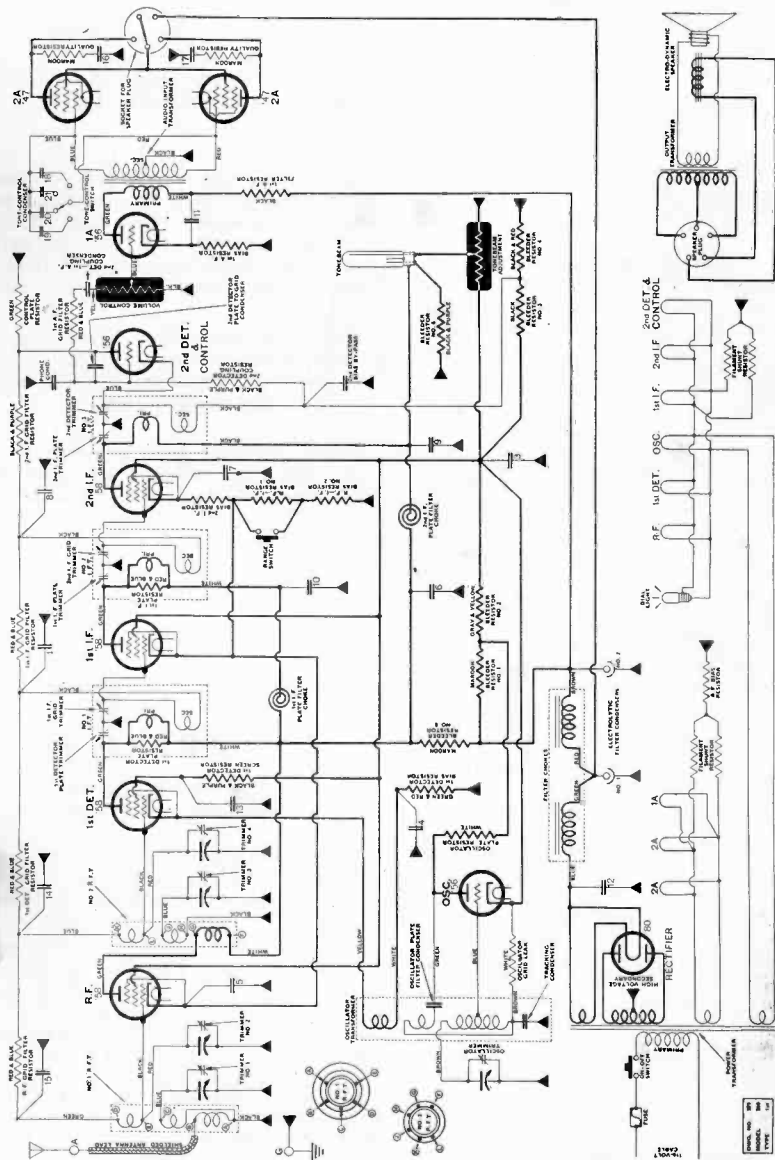
(Continued from page 14)

This is often caused by an overload and as a rule, this overload in Crosley receivers is due to an electrolytic condenser having excessive leakage. In some models, corrosion forms between terminals on the Mershon condensers and this causes excessive leakage. This may be corrected by taking a stiff wire brush and cleaning all accumulation of dirt and other foreign material between terminals. In other cases, there is a steady, excessive, current leakage through the condenser and where this condition is encountered, it is advisable to use a new electrolytic condenser entirely. However, the older electrolytic condensers should be tested to see if the condenser is really at fault.

F. L. SPRAYBERRY,
N. R. I. Consultant.

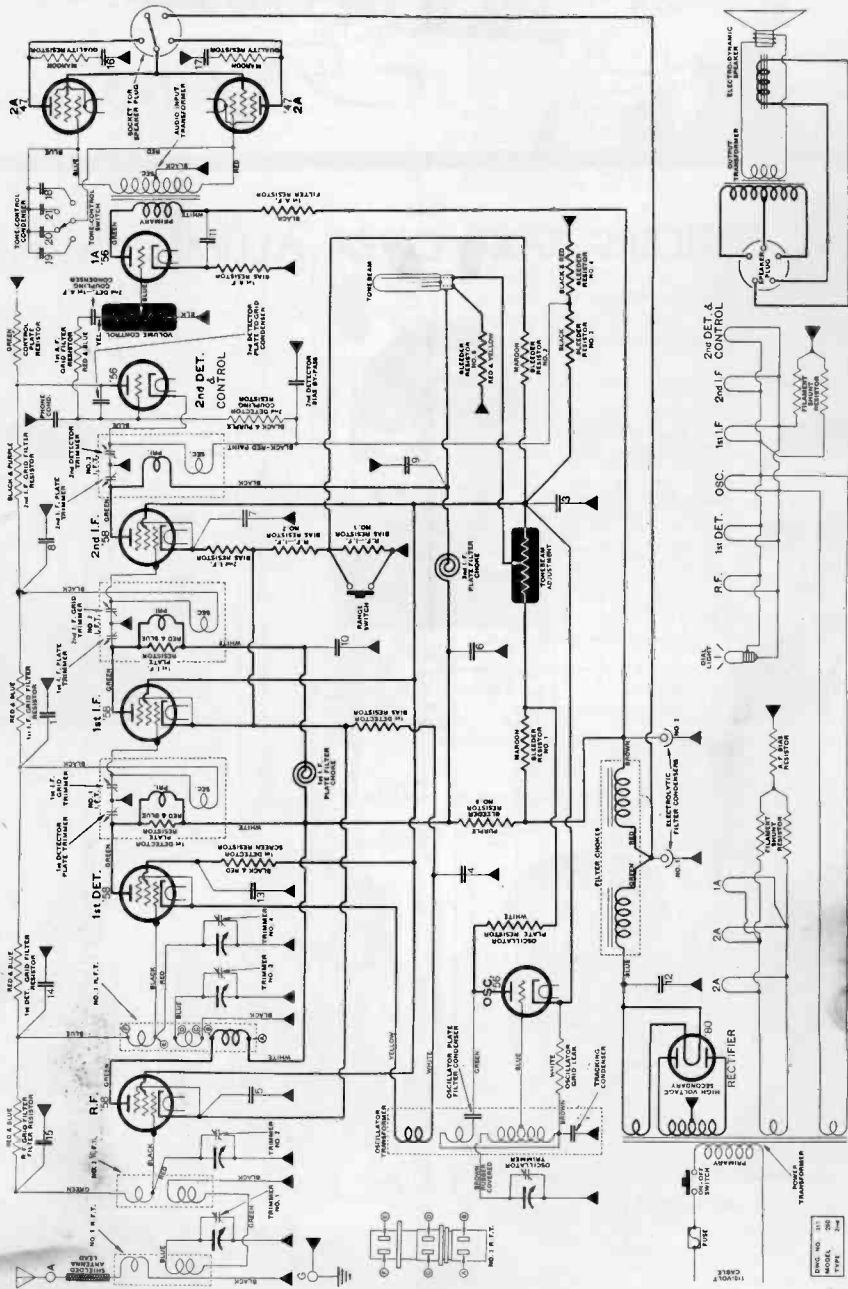
ATWATER KENT MODEL 260, 260F (First Type)

Below Serial No. 8422101



ATWATER KENT MODEL 260, 260F (Second Type)

Above Serial No. 8422101





N.E.I. ALUMNI

News

NEW OFFICERS TAKE OVER ALUMNI DUTIES



Frank A. Parkins, Oglethorpe, Ga., elected Vice-President to succeed Donnell O'Connor.



K. W. Griffith, President of Little Rock, Arkansas—a real N. E. I. old timer, who succeeds John E. Fetzer, the retiring President.

P. J. Murray, Executive Secretary, formerly Corresponding Secretary, located at Alumni Association National headquarters in Washington.



Harry Barschdorf, Vice-President, of Adams, Massachusetts, re-elected to serve for another year.



Fred Nichols, Vice-President, of Greeley, Colorado, elected to succeed Alphy Blais of Canada, retiring Vice-President.



Hoyt Moore, Vice-President, of Indianapolis, Indiana, re-elected to serve for another year.



Earl Merryman, Secretary, re-elected for another year. Located in Washington, D. C.

PUBLICATION PRAISES N. R. I. ALUMNI ASSOCIATION

FROM the October, 1932 issue of the "National Home Study Council Bulletin" the following item was clipped:

"Three years ago the National Radio Institute brought to Washington seventy-five of its outstanding alumni. These men came from every point of the compass, from Maine, California, Florida, the State of Washington, Newfoundland, from thirty-four states of the union and four provinces of Canada. The occasion of their meeting was the fifteenth anniversary of the founding of the National Radio Institute. During the convention, this group organized the National Radio Institute's Alumni Association, which is probably the first alumni association of home study graduates ever organized.

"This alumni association has a constitution, a full corps of officers and is supported by dues contributed by its members the same as the alumni associations of resident colleges and universities. The purpose according to its constitution is 'to cultivate fraternal relations among the alumni of the National Radio Institute, to foster the spirit of loyalty to the Alma Mater, to encourage the Institute, in its dissemination of Radio knowledge and to promote the welfare of its membership by interchanging of helpful information.' The association has recently published its 1932 Year Book which contains a wealth of material regarding conditions in the Radio field and also indicated that the number of members in good standing in this unique alumni association is now in excess of three thousand."

The fact that our Alumni Association has come to the attention of the Education field which was given in this good publicity in the National Home Study Council Bulletin, it is of particular interest to all boosters of the Alumni Association.

"A. M. Flechtheim & Co., Inc., 136 Liberty St., N. Y. C., manufacturers of fixed condensers, announce the addition of a complete line of dry electrolytic condensers rated at 500 volts d. c. peak in the inverted, upright and cardboard containers. Their new electrolytic catalogue No. 25A listing a wide range of capacities will be sent to anyone requesting same."

It is with great sorrow that we learn of the death of Alumni Association Member Walter C. Anderson of Chester, Connecticut. A good Radioman has passed on.

CANADIAN LICENSE RULING

ALUMNI Headquarters desires to call attention of our Canadian students and graduates to the following paragraphs from the revised Radiotelegraph acts of the Dominion of Canada, now in effect.

"No person shall sell any radio receiving set to any person for installation or operation until the purchaser has produced for inspection of the vendor his Private Radio Receiving License."

Furthermore:

"No person shall service a Radio Receiving set until the owner thereof produces to such person his license to operate such a set."

It is suggested that these regulations be strictly adhered to as the act provides a penalty of up to \$50 and costs or three months imprisonment for violations.

Mr. Kendall Clough and Mr. Ralph Porenge formerly of Silver-Marshall, Inc., have gone into business as Clough-Bringle Co., 1134 W. Austin Ave., Chicago, Ill. They will manufacture laboratory and production test equipment, amplifiers, etc.

The Amperite Corporation, 561 Broadway, New York, manufacturers of a popular line, voltage regulator, now supply it with a standard screw base.

An ant was gazing longingly at the carcass of a dead horse when a rum runner's car passed. A case of liquor bounced off the car and the bottles broke. The ant immediately proceeded to quench his thirst. Then grabbing the dead horse by the tail, he shouted lustily: "Come on, big boy, we're going home."

WHERE TO TAKE LICENSE EXAMINATIONS

THERE are now twenty offices in the United States where examinations can be taken for Radio operator's licenses.

As all of these offices do not hold examinations on the same day of the week it is suggested that in every case where a Radio-Trician desires to take one of the examinations he communicate with the office which has control of his locality and ascertain just when the examination will be available.

The addresses of the various offices together with the district number and the territory covered by the offices follows:

Radio District No. 1: Headquarters, Boston, Mass.

Territory:

Maine, New Hampshire, Vermont, Massachusetts, Connecticut and Rhode Island.

Radio District No. 2: Headquarters, New York City.

Territory:

The City of Greater New York and the Counties of Suffolk, Nassau, Westchester, Rockland, Putnam, Orange, Dutchess, Ulster, Sullivan, Delaware, Greene, Columbia, Albany and Rensselaer of the State of New York, and the Counties of Bergen, Hudson, Passaic, Sussex, Warren, Morris, Essex, Union, Somerset, Middlesex, Monmouth, Mercer, Hunterdon of the State of New Jersey.

Radio District No. 3: Headquarters, Philadelphia, Pa.

Territory:

The City of Philadelphia and the Counties of Bucks, Montgomery, Philadelphia, Delaware, Chester, Lancaster, York, Adams, Cumberland, Perry, Dauphin, Lebanon, Berks, Schuylkill, Lehigh, Northampton, Carbon and Monroe of the State of Pennsylvania, and the Counties of Ocean, Burlington, Atlantic, Cape May, Cumberland, Salem, Gloucester and Camden of the state of New Jersey.

Radio District No. 4: Headquarters, Baltimore, Md.

Territory:

The State of Maryland, the District of Columbia, and the Counties of Arlington, Loudoun, Fairfax, Prince William, Fauquier, Rappahannock, Page, Warren, Shenandoah, Frederick and Clarke, of the State of Virginia.

Radio District No. 5: Headquarters, Norfolk, Va.

Territory:

The State of Virginia, except the Counties of Arlington, Loudoun, Fairfax, Prince William, Fauquier, Rappahannock, Page, Warren, Shenandoah, Frederick and Clarke, and the State of North Carolina, except the Counties of Ashe, Watauga, Caldwell, Avery, Burke, McDowell, Yancey, Mitchell, Madison, Buncombe, Haywood, Swain, Graham, Cherokee, Clay, Macon, Jackson, Transylvania, Henderson, Pope, Rutherford and Cleveland.

Radio District No. 6: Headquarters, Atlanta, Ga.

Territory:

The States of Alabama, Georgia, South Carolina, Tennessee, and the Counties of Ashe, Watauga, Caldwell, Avery, Burke, McDowell, Yancey, Mitchell, Madison, Buncombe, Haywood, Swain, Graham, Cherokee, Clay, Macon, Jackson, Transylvania, Henderson, Pope, Rutherford, and Cleveland of the State of North Carolina.

Radio District No. 7: Headquarters, Miami, Fla.

Territory:

The State of Florida.

Radio District No. 8: Headquarters, New Orleans, La.

Territory:

The States of Louisiana, Mississippi and Arkansas

Radio District No. 9: Headquarters, Galveston, Texas.

Territory:

The Counties of Jefferson, Chambers, Harris, Galveston, Fort Bend, Brazoria, Wharton, Matagorda, Jackson, Victoria, Calhoun, Goliad, Refugio, Aransas, San Patricio, Nueces, Jim Wells, Kleberg, Brooks, Kenedy, Willacy, Hidalgo and Cameron of the State of Texas.

Radio District No. 10: Headquarters, Dallas, Texas.

Territory:

The State of Texas, except the Counties of Jefferson, Chambers, Harris, Galveston, Fort Bend, Brazoria, Wharton, Matagorda, Jackson, Victoria, Calhoun, Goliad, Refugio, Aransas, San Patricio, Nueces, Jim Wells, Kleberg, Brooks, Kenedy, Willacy, Hidalgo and Cameron, and the States of Oklahoma and New Mexico.

Radio District No. 11: Headquarters, Los Angeles, Cal.

Territory:

The Counties of Monterey, Kings, Tulare, San Luis Obispo, Kern, Santa Barbara, Ventura, Los Angeles, Orange, San Diego, Imperial, Riverside, and San Bernardino of the State of California; the County of Clark of the State of Nevada, and the State of Arizona.

Radio District No. 12: Headquarters, San Francisco, Cal.

Territory:

The State of California, except the Counties of Monterey, Kings, Tulare, San Luis Obispo, Kern, Santa Barbara, Ventura, Los Angeles, Orange, San Diego, Imperial, Riverside and San Bernardino, and the State of Nevada, except the County of Clark.

Radio District No. 13: Headquarters, Portland, Ore.

Territory:

The State of Oregon and the State of Idaho, except the Counties of Boundary, Bonner, Kootenai, Shoshona, Benawah, Letah, Clearwater, Nez Perce, Lewis and Idaho.

Radio District No. 14: Headquarters, Seattle, Wash.

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WHERE TO TAKE LICENSE EXAMINATIONS

(Continued from page 21)

Territory:

The State of Washington, and Counties of Boundary, Bonner, Kootenai, Shoshona, Benewah, Letah, Clearwater, Nez Perce, Lewis and Idaho of the State of Idaho, and the Counties of Lincoln, Flathead, Glacier, Toole, Pondera, Teton, Lake, Sanders, Mineral, Missoula, Powell, Lewis and Clarke, Cascade, Meagher, Broadwater, Jefferson, Granite, Ravalli, Deerlodge, Silver Bow, Beaverhead, Madison, Gallatin of the State of Montana.

Radio District No. 15: Headquarters, Denver, Colo.

Territory:

The States of Colorado, Utah, Wyoming, and Montana except the Counties of Lincoln, Flathead, Glacier, Toole, Pondera, Teton, Lake, Sanders, Mineral, Missoula, Powell, Lewis and Clarke, Cascade, Meagher, Broadwater, Jefferson, Granite, Ravalli, Deerlodge, Silver Bow, Beaverhead, Madison and Gallatin.

Radio District No. 16: Headquarters, St. Paul, Minn.

Territory:

The States of South Dakota, North Dakota, Minnesota, the northern peninsular of Michigan, and the State of Wisconsin, except the Counties of Crawford, Richland, Sauk, Columbia, Dodge, Washington, Ozaukee, Milwaukee, Waukesha, Jefferson, Dane, Iowa, Grant, Lafayette, Green, Rock, Walworth, Racine and Winona.

Radio District No. 17: Headquarters, Kansas City, Mo.

Territory:

The States of Nebraska, Kansas, Missouri and Iowa, except the Counties of Winneshick, Allamakee, Fayette, Clayton, Buchanan, Delaware, Dubuque, Linn, Jones, Jackson, Clinton, Cedar, Johnson, Washington, Muscatine, Scott, Louisa, Des Moines, Henry and Lee.

Radio District No. 18: Headquarters, Chicago, Ill.

Territory:

The States of Indiana, Illinois, and the Counties of Winneshick, Allamakee, Fayette, Clayton, Buchanan, Delaware, Dubuque, Linn, Jones, Jackson, Clinton, Cedar, Johnson, Washington, Muscatine, Scott, Louisa, Des Moines, Henry and Lee of the State of Iowa; and the Counties of Crawford, Richland, Sauk, Columbia, Dodge, Washington, Ozaukee, Milwaukee, Waukesha, Jefferson, Dane, Iowa, Grant, Lafayette, Green, Rock, Walworth, Racine and Kenosha of the State of Wisconsin.

Radio District No. 19: Headquarters, Detroit, Mich.

Territory:

The State of Michigan, except the northern peninsular and the States of Ohio, Kentucky and West Virginia.

Radio District No. 20: Headquarters, Buffalo, N. Y.

Territory:

The State of New York, except the City of Greater New York and the Counties of Suffolk, Nassau, Westchester, Rockland, Putnam, Orange, Dutchess, Ulster, Sullivan, Delaware, Greene, Columbia, Albany and Rensselaer; the State of Pennsylvania, except the City of Philadelphia, and the Counties of Bucks, Montgomery, Philadelphia, Chester, Delaware, Lancaster, York, Adams, Cumberland, Perry, Dauphin, Lebanon, Berks, Schuylkill, Lehigh, Northampton, Carbon and Monroe.

The title of the official in charge of the different headquarters is as follows: "Acting Inspector in Charge, Radio District No. etc., etc."

NATIONAL RADIO NEWS



Vol. 5—No. 6

Feb.-Mar., 1933

Published bi-monthly in the interest of the students and Alumni Association of the

NATIONAL RADIO INSTITUTE
Washington, D. C.

The Official Organ of the N. R. I. Alumni Association

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ALLEN L. R. WALTZ, Poncono Lake, Pa.

Cleaning variable condensers is a subject about which very little is ever said, but is essential to good receiver performance. I always make it a point to clean them even if they look fairly clear, in fact I clean the whole chassis before working on any set. I use a one-inch paint brush for the chassis and regular condenser cleaner or pipe cleaners for the variable condensers.

A Westinghouse WR 4 which I serviced played fine until volume was increased to a certain point, then it would cut out as though the switch was suddenly turned off. A slight movement of the dial and it would be O. K. for a few seconds, then the same thing would happen. A hard thump on the chassis would sometimes cut it in or out. All voltages, tubes and connections were O. K. Cleaning the variable 4-gang condenser assembly remedied the trouble.

B. C. FORD, Los Angeles, Calif.

At times lately it has been rather difficult to devote the time I would like to with the lessons, as it seems that over night when the fact became known that I was studying Radio, I received more service calls than I can handle in my spare time. At this writing I have here on my bench three broadcast receivers for service, and may I state that they were received through word of mouth advertising by pleased patrons.

ALFRED ORCHARD, Toronto, Ont., Can.

Had several Sonora Radios, model D50, which had bad cases of distortion and rasping sound. The tubes checked O. K., but upon checking bias resistor for the 217 pentode it was found to be open. When replaced by a higher value the sets worked like a charm.

EMPLOYED IN RADIO SHOP

Frank Jonitz, Saginaw, Michigan, is doing Radio work for The George Electric Shop, Saginaw, Michigan. He reports that he is kept busy repairing Radios.

There are many roads to success, but the man who gave up the search because he once turned into a blind alley, is not likely to find them.

W. IRVING LOTTIER, Baltimore, Md.

If a Sparton Junior receiver Model 410 oscillates badly on out-of-town stations, look for a shorted or open bypass condenser in the R. F. amplifier. These condensers are located just below the tube sockets. There are four .25 mfd. condensers in one can. The highest voltage across any of these condensers is 200 volts.

ARTHUR R. OWEN, Williamsport, Pa.

Maybe you will be interested in knowing that I have my own business established and it is quite a good sideline. I have equity of about \$1,000, all in shop, equipment and supplies, all paid for, and as yet have not spent anything for advertising. I have been called to look at sets other men in the city have fixed. I think the only thing they fixed was the customer.

EDWARD SHEPARD, Saxonville, Mass.

I have had several cases of intermittent operation of Atwater Kent Model No. 86 superhets. These sets would play all right for a while, then suddenly they would stop short and you could hear a rushing noise; then, turning the volume control up, reception would come back with a snap. It acted like a defective volume control. But the trouble was found to be in the second detector 224A tube although this tube tested perfect and was not shorted in any way. Replacement of this tube cleared up the difficulty. By the way, this job had several service experts in Boston "stuck."

J. B. MONTERO, Delagua, Colo.

The volume control on a Brunswick would only work when the arm of the potentiometer was set at either end of the volume control. On one end reception was low, at the other end was too loud. When the arm was brought about the center no reception could be obtained in fact nothing but howls and noise. I thought sure the trouble would be in the potentiometer arm not making good contact about the center, but upon inspection I found an open 1 mfd. condenser connected from screen terminal of second R. F. socket to ground. Since the potentiometer increases and decreases the screen voltage of the R. F. tubes and detector, it effected the potentiometer in that manner.

On a Bosch 48 I found defective volume control, weak tubes, and condensers out of synchronism. Before I could adjust them to synchronism I had to remove what is called a soft tube which was causing all kinds of howls and oscillations on the high frequency.

Nothing is so high as the high cost of loafing.

Build Yourself a Valuable Radio Library with these Helpful FREE MANUFACTURERS' BOOKLETS AND CATALOGS

A FREE SERVICE DESIGNED TO SAVE YOU TIME AND MONEY

The cooperation of the manufacturers whose catalogs, literature and booklets are listed on this page, and the courtesy of the Calcaterra Catalog Service has made it possible for the N. E. I. Alumni Association to offer to readers of National Radio News a unique and money-saving service in obtaining Radio manufacturers' literature.

All that is necessary for you to obtain the catalogs or other literature listed on this page is to write the numbers of the items in which you are interested on the coupon, fill in the information

asked for and MAIL IT TO THE CALCATERRA CATALOG SERVICE. DO NOT MAIL COUPONS TO THE NATIONAL RADIO INSTITUTE, AS THAT WILL DELAY THE FILLING OF YOUR ORDER.

Stocks of the publications listed are kept on hand and they will be sent to you promptly, as long as the supply lasts.

To avoid waste and needless postage expense, PLEASE DO NOT SEND FOR ANY MATERIAL IN WHICH YOU ARE NOT ACTUALLY INTERESTED or of which you already have a copy.

1. WHOLESALE RADIO SERVICE CO. 1933 CATALOG. 130 pages of illustrations, descriptions and specifications with list and net prices of radio parts, replacement items, receivers and radio and electrical supplies carried by this old, reliable mail order house. —

2. HAMMARLUND 1933 PARTS CATALOG. 8 pages. Variable and adjustable condensers, sockets, coils, intermediate frequency transformers, chokes, etc., for broadcast and short wave work.

3. HAMMARLUND-ROBERTS 15 TO 200 METER MET "PRO" SUPERHETRODYNE. Details of a receiver designed especially for laboratory, newspaper, office, airport and steamship use.

4. ELECTRAD 1933 CATALOG. 14 pages. Standard replacement volume controls, Truvolt adjustable resistors, vitreous enamel fixed resistors, voltage dividers, etc address systems, etc.

6. AMPERITE REAL LINE VOLTAGE CONTROL. Characteristics, uses and chart showing correct Amperite recommended by set manufacturers for their sets. Tells how to improve customers' sets and make a profit besides.

9. INTERNATIONAL RESISTOR CATALOG. 16 pages. Specifications and prices on International Metallized Precision wire wound and enameled wire wound resistors, motor radio noise suppressors and resistor kits.

10. INFORMATION ON THE SUPPRESSION OF MOTOR RADIO NOISES. Circuits and data published by International Resistance Co. on how to overcome troublesome motor radio noises in automobile installations.

16. LYNCH RMA STANDARD RESISTOR COLOR CODE CHART. Handy reference for identifying resistance values and colors. Gives a list of most commonly used values and colors.

22. OHMITE RESISTOR STOCK LIST NO. 8. Complete details of Ohmite line of fixed and semi-variable resistors of the vitreous enameled type and list of values.

23. OHMITE REPLACEMENT RESISTOR BULLETIN NO. 10. Technical details, specifications, stock values and prices of the Ohmite "Red Devil" replacement resistors designed to withstand excessive heat.

25. LYNCH TRANSPPOSITION TYPE NOISE-REDUCING ANTENNA SYSTEM. Technical details of an antenna system which effectively eliminates the majority of electrical noise interference in broadcast and short wave reception.

30. LYNCH SHIELDED TYPE NOISE-REDUCING ANTENNA SYSTEM. Details on a new, low-cost, impedance-matching system which now makes possible the use of a shielded transmission line of any length without loss of signal strength, for the elimination of electrical noise interference and makes possible the use of several receivers on one antenna.

31. SAMSON PAM-O-GRAPH RECORDING PHONOGRAPH. Details of a combination recording and reproducing phonograph which makes possible the recording and reproduction, with aluminum records, of lectures, dictation and musical programs.

32. SAMSON MICROPHONES AND ACCESSORIES. Specifications of a wide variety of high quality and low priced hand, desk and suspension microphones of the condenser, carbon and dynamic types, microphone stands and cables.

34. ELECTRAD SERVICEMAN'S REPLACEMENT VOLUME CONTROL CHART. A revised complete list, in alphabetical order of over 2,000 different receiver models with the proper type of Electrad control to use for replacements.

37. SUPREME SERVICEMAN'S AND DEALER'S 1933 TESTING AND TROUBLESHOOTING INSTRUMENTS. 16 pages. Descriptions, specifications and illustrations of Supreme diagnetometers, tube testers, set analyzers, ohmmeters, etc., and blue-prints for building such instruments.

(Please Use Pencil and Print in Filling in Coupon)
CALCATERRA CATALOG SERVICE NRN-233
Pleasantville, N. Y.

Please send me, without charge or obligation, the catalogs, booklets, etc., whose numbers I have filled in below.

Booklet Numbers: _____

My connection in radio is checked off below.

- Serviceman operating own business
 Serviceman employed by:
 Manufacturer
 Jobber
 Dealer
 Servicing Organization
 Dealer
 Jobber
 Radio Engineer
 Experimenter
 Laboratory Technician
 Professional or Amateur Set Builder
 Licensed Amateur
 Station Operator
 Manufacturer's Executive
 Student

I buy approximately \$ _____ .00 of radio material a month.

(Please answer above without exaggeration or not at all.)

Name _____

Address _____

City _____ State _____

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