

THE

IRC SERVICER

VOL. 1

OCTOBER, 1933

NO. IV

The International Resistance Company's Monthly Bulletin Published in Furtherance of its Program of Helping Radio Service Men Do Better Work—and Make More Money Doing it

In Radio Servicing as in all business there is always plenty of room at the top of the ladder.



"And," adds Service Sam, "most of it has been made by the leaders who have gone to sleep there and fallen off."

Let's Make it a Perpetual RADIO PROSPERITY CAMPAIGN!

A FATHER was telling his son about the turtle that was chased by an alligator.

"Yessir," said the oldster, "the turtle ran with all his might. But that still wasn't fast enough. The 'gator gained steadily. Pretty soon it was so close the turtle could feel its hot breath on his back. Then, just as the giant jaws were about to close over him, the turtle made a supreme effort. Gathering all his remaining strength, he leaped, caught the low-hanging branches of a tree and drew himself to safety."

"But dad," protested the youngster, "turtles don't climb trees."

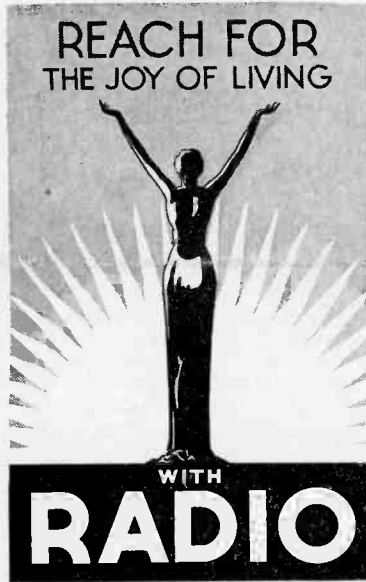
"Mebbe so," was the reply. "But this one did. By gosh he had to!"

All of which is just another way of saying "You don't know what you can do until you try!"—a statement that holds just as true of selling radio service as it does of anything else.

The Rebuild Radio Prosperity Campaign of September, for instance, showed many servicemen what a full quota of intensive, carefully directed effort will do to instil new life into a business even during a period of economic depression. Radio Progress Week is now offering additional and equally convincing proof.

These events have been periods of intense special effort—of doing things that have never been done before to make people radio conscious and to make them realize that even up-to-the-minute radios occasionally need skilled attention to keep them in good operating condition. And the plan worked out! Although figures are not available, we'll wager the finest kit of IRC Resistors against a toasted a.v.c. that, inspired by this movement, hundreds of servicemen and dealers found more ways to turn new business and new profits than they ever thought possible. Like the turtle, they have done the impossible. They have boosted business at a time when there were many who said it couldn't be done. More important, they've made countless new friends which will mean even better future business.

And now the important thing becomes that of following through—of continuing with the spirit of the campaign after it is



*It's a good slogan—a powerful one.
Let's keep it alive!*

officially over. Certainly Radio Progress Week should not be permitted to come as the grand finale to the Rebuild Radio Prosperity Campaign. To the aggressive serviceman, it will only mark the beginning—the opening wedge—to a more prosperous Fall and Winter Season than the trade has seen in several years.

The following service activities have been suggested by the Radio Manufacturers' Association. Although first mentioned in connection with the campaign, they'll prove effective at any time for those who use them conscientiously.

Plan Special Canvassing. See all your old customers personally and as many prospective new ones as possible. Also use direct mail. Feature a free tube inspection or set "tuning" service or some other unusual offer to attract attention.

If you have a store, have a special repair service window. One of the best ways of giving real "punch" to this display is to move a well-equipped service bench into the window and have a uni-

formed serviceman actually repairing sets there for a week or more. Mount samples of parts on cards, calling attention to the fact that you use the best obtainable on all jobs.

Give each serviceman a typed sheet listing the things to do in reconditioning old sets including:

a. **Test and match tubes.** Substitute new, modern tubes giving better volume of better tone, or both, for older types, and make necessary circuit changes.

b. **Renovate the existing antenna system**—solder connections, inspect insulation, check lightning arrester and move wire to another position if better results seem possible. Inspect and solder the ground. "Pretty up" the wiring inside the house. Or—install new, modern "noiseless antenna" systems.

c. Locate and eliminate sources of electrical interference in the house.

d. **Install modern accessories** such as tone-control, automatic volume control, inter-section noise suppression, etc.

e. **Clean and "balance" the receiver** so that it again performs as it did when it left the factory.

f. **Install extra speakers for remote use,** or twin-speaker tone.

g. **Refinish cabinets,** remove scratches and nicks and polish.

h. **Re-vamp receivers** so that they will receive police calls.

i. **Electrify old auto receivers** by installing modern B-eliminators.

Effective during the campaign, ideas like this will prove almost equally effective to the serviceman during the coming Fall and Holiday Radio Season—especially if he backs them with continued use of the "Reach for the Joy of Living" folder, the mats for advertising in the serviceman's newspaper and other sales helps supplied by RMA for the occasion.

So all together on the follow through! Let's continue with the job of rebuilding radio prosperity along the same aggressive, enthusiastic lines of the past month. Now, more than ever, it depends on individual energy and initiative in making the most of the opportunity the campaign has presented.

JOB'S THAT KEPT 'EM GUESSING

Three More of Those
Unusual Service Calls

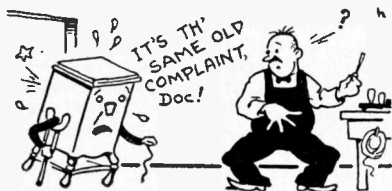
CCO

THE value of resistance measurement methods of servicing is illustrated by an experience recounted by Serviceman Jas. B. Fisher of Elizabethtown, Pa., one of this month's free IRC kit winners. It was, he states, the most baffling job encountered in his seven years of radio repairing.

The set was a Lyric 90 which had been worked on intermittently over a period of a year by several service men. After performing satisfactorily for a while, the set would develop a weak, "ragged" tone which no one seemed able to solve.

When Mr. Fisher was called on the job, a voltage analysis showed nothing wrong. However, when he moved the speaker plug the set started operating properly and he discovered upon removing this from the speaker cable that one wire was loose in the prong. It seemed like a quick, easy job and Mr. Fisher proudly turned the set over to its owner with the assurance that everything would be all right.

But it didn't prove to be as easy as that. A few days passed and back came the receiver to Serviceman Fisher with the same old complaint. Once more the usual voltage and current tests checked out. Only upon resorting to resistance measurement was the real trouble discovered. A check from ground to grid of the 45's showed normal resistance but from grid to grid there was no resistance.



Thus, with this clue to guide him, he quickly located a short between the ends of the secondary of the audio transformer—the real cause of the trouble.

"As a result of this experience," writes Mr. Fisher, "I am fully sold on the superiority of resistance measurement as a means of receiver testing."

A REAL PUZZLER

R. H. Beschorner of the Beschorner Electric Company, Washburn, Illinois, becomes the second kit winner of the month with his recounting of an Atwater Kent Model 55 experience.

When this set suddenly went dead the owner turned it off and called Mr. Beschorner to fix it. Upon his arrival, the set operated perfectly and tests failed to reveal any trouble. Consequently, Mr. Beschorner left with instructions to call him if it happened again. A day later he was called back and still again the third day, but both times the set functioned properly when he arrived and

turned it on. Finally, he took the set to the shop where it continued to operate perfectly for several days.

Soon after being returned to the customer, however, the same trouble developed. This time, Mr. Beschorner told the latter to keep the set turned on until he got there. Then, immediately upon arriving, he started to apply his analyzer but as soon as he removed one of the 45 tubes, the set started to play and continued on without interruption.

A BROKEN VOICE COIL LEAD

"Believe it or not," writes Mr. Beschorner, "I made two more calls. Then at last I found that one of the voice coil leads which are pasted to the diaphragm was broken exactly in the middle of the part that was pasted down. Only a con-



tinuity test would show it was there. Even then I had to pull the lead loose to find where it was broken. It was a soldered splice in the wire and the vibrations had loosened the joint without breaking the surface of the paste. The result was that any sudden charge or discharge of the voice coil would make the joint contact temporarily."

To which Mr. Beschorner adds: "We have never used anything in our servicing department but IRC Resistors. Our motto is: 'If a radio isn't worth the best parts you can put into it, it isn't worth fixing.'"

Well said, indeed. Chances are we couldn't have said it better ourselves if we had been advertising IRC products instead of merely writing about unusual service calls.

SHOP WORK VS. HOME WORK

And now for an unusual call from Jim Kirk of Radio Repair Service, Los Angeles:

"When called to service a Grebe Super-Synchrophase SK-4," writes Jim, "I found several things wrong besides tubes, so in accordance with my custom took the set to my shop. This saves trying to make a shop of the customer's home and also saves possible embarrassment because I can then give it a thorough test to make sure the cure will be permanent. The average customer expects the service man to be a magician and is disillusioned when he sees you painstakingly testing by a process of elimination. He expects you to wave a magic wand and immediately put your finger on the trouble.

"I always tell 'em it won't cost any more if I take the set to the shop and that I'll telephone an estimate of the cost before proceeding with the work. I likewise explain that I can do better work in the shop because I have better facilities—which, of course, is the truth.

"But to get back to the Grebe. This outfit literally bristles with resistors and I have found that the handiest thing to use on it is my ohmmeter which measures anything from .5 ohm to 10 megohms.

"I discovered that the volume control (which has the switch incorporated in it) worked backwards. Incidentally, a servicemen friend who happened to be



around at the time, helpfully (?) suggested that I merely reverse the wires at each end of the potentiometer!

"Upon further investigation, I found a grounded wire in the set. When this was taped out of the way the volume control functioned normally and I proudly delivered the set to the customer. Everything was lovely. I got my money, discussed the weather, mentioned that my work was guaranteed and then packed up and left. Then, just as I was stepping on the starter of my car, the customer stuck her head out of a window and yelled: 'It's doing it again!'

"Was my face red?"

"Sure enough the volume control was once more working in reverse. I looked at that erstwhile grounded wire. It was still bent out of harm's way but—well, you know how suspicious a customer can be. Of course, she didn't believe I had found the trouble in the first place. Also, just try and collect extra money for a thing like this. Just try!

IT'S ALL IN THE GAME

"Well, it meant another trip to the shop and some more testing. This time I found the trouble in a screen grid tube, thus accounting for the fact that it did not show up in my shop the first time or in the customer's home. The tube had to get well warmed up before it would function. I have since found there are about four things that can cause a Grebe of this model to do the same freakish trick—and it was a tough day for me when I found two of them at the same time in the same set!"

But, as we've mentioned before in these columns, it's all in the game—and it all goes to prove that you can't be too careful in continuing with complete tests even after you've found one thing wrong.

* * *

Numerous other "Unusual Call!" stories have been received. Many of them are of Kit-winning calibre and some of them are not. In any event you'll find them both interesting and helpful when they appear in subsequent issues of the "Servicer."

Keep tuned in on IRC for next month's issue!

RADIO RIDES *the* AIRWAYS

By HAROLD FRANKLIN

IT IS a perfect day over the Caribbean. The sky is an azure blue—the sea so quiet it seems almost impossible to realize the ever-present possibility of violent tropical storms with their howling winds and white-tipped waves. True, the day is warm and humid, but passengers in the giant Pan American Airways Liner high in the sky are bothered little by this. Speeding through the blue in perfect comfort at well over 100 miles an hour, they seem almost detached from the world and the cares which infest it.

Suddenly the pilot becomes tense. Looming just over the horizon is a bank of ominous clouds—blue black clouds which the skilled navigator instantly recognizes as war pennons of a rapidly advancing squall of hurricane velocity.

At once, the pilot notifies his radio operator who immediately gets in touch with Pan American stations at Kingston, Jamaica and Barranquilla, Columbia. He reports the storm or perhaps gains from them information previously learned as to its size, direction and rate of movement in miles per hour. Then, carefully plotting his course, the pilot veers around the storm area, guided safely by the triangulation system of radio direction finding. No matter how far he may be forced to fly off course and regardless of the wind drift, radio tells him at all times exactly where he is. Sooner or later, he will bring the giant plane to a happy landing at Kingston.

Although the Caribbean is one of the most difficult air routes, PAA has, at this writing, completed more than a thousand consecutive flights successfully—a splendid tribute to the fine combination of

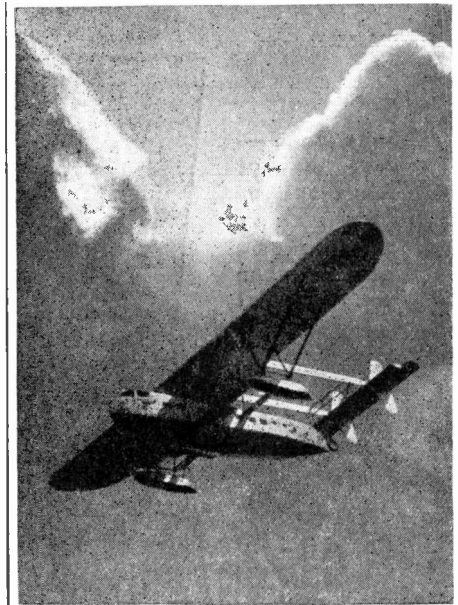
good equipment and personnel plus, of course, the all-important aid from radio.

The radio equipment of Pan American Airways, Inc., affords a particularly fine illustration of the essential part played by radio in modern air navigation. Operating over 26,662 miles of airways, the company maintains 72 ground radio stations and 108 multi-engined airliners, all of which are radio equipped. Ground equipment has a range up to 2,500 miles and the plane equipment transmits up to 600 miles.

Private weather forecasting stations are maintained at each of the ground radio stations. Operating in many countries where government weather reports are more or less incomplete for air navigation purposes and where there are no helpful Department of Commerce lights or radio beacons as there are in the United States, PAA has had to rely on its own resources to a greater extent than the average air line. This difficult job has been done in a highly commendable fashion. Planes are kept constantly informed as to weather conditions, visibility and wind direction and currents both at the surface and aloft. Thanks to radio, they are even instructed as to favorable winds at various heights which, when taken advantage of, mean a considerable saving of time and fuel.

Pilots, via their radio operators, constantly report to the ground regarding conditions through which they are flying. Thus, the company is able to construct a continuous "moving picture" of weather conditions along the entire route over which it operates.

Another important feature of airplane



Ahead of the storm—thanks to radio!

radio is in connection with instrument navigation. When rain or fogs obscure visibility or when planes are flying over open sea where no landmarks can be sighted, radio brings directional bearings to the pilot—bearings so accurate that he could practically bring his plane to its destination without looking away from his instrument board.

On PAA Mexican routes radio directional bearings are of the most vital importance. Here there are "blind" spots where pilots must rely on radio and instrument flying for periods varying all the way from five to ninety-five minutes—frequently in spots where it is necessary to rise from the sea coast and cross a dangerous mountain range where flight altitudes run as high as 16,000 feet.

At the close of 1932, the government of Mexico certified PAA operations in that country for the year as "100% efficient." This is as striking a demonstration of the accuracy of the company's system as could be imagined.

Under the PAA plan only the radio telegraphic system is employed, this being considered more reliable for the line's specific requirements. Standard plane installations must of course be as light as possible without sacrificing efficiency. Differing somewhat according to the type of plane on which it is installed, the average installation weighs approximately 60 lbs. It contains plug-in coils for wave lengths of 32, 54, 97, 600 and 900 meters. To meet international requirements, the aircraft equipment must be capable of working on 500 kc while over water and 333 kc while over land, as well as on any other frequencies selected.

It is interesting to note that radio is playing an important part in the present northern explorations by PAA in which
(Concluded on page eight)



The radio equipment of a Pan American Airways liner. Radio keeps the plane in constant contact with at least three ground stations

A COMPLETE RESISTOR STOCK— IN THE HANDIEST FORM

Save time —
save money!
Always have
the exact
resistor you
need — when
you need it!

Tools
Not Included



IRC

KIT NO. 6

NET TO SERVICEMEN

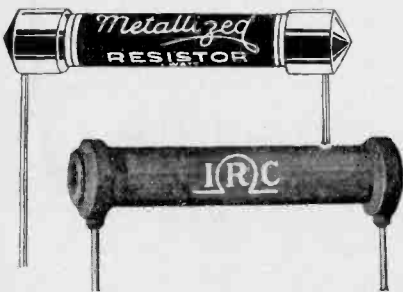
\$21.69

(List Price, \$36.15)

No more lost time in getting the right resistor—no more using two or three units when one resistor of the proper value will do the job! With IRC Kit No. 6 you have a complete resistor stock—one that will enable you to handle any service job without lost time or motion. What's more, you have it conveniently arranged in a sturdy steel box especially designed for this purpose. Kit contains 107 assorted resistors in a wide range of values required in service work. These include 83 Metallized units in 1/2-, 1- and 2-watt sizes and 24 Power Wire Wound units in 5- and 10-watt sizes. Inside of the Kit is a helpful stock card which makes it easy to keep your resistor supply complete at all times.

FREE!

Besides the handy steel kit (regular value \$2.50) each IRC Kit No. 6 purchaser receives *without any additional charge* a copy of the famous IRC Resistor Replacement Guide (value \$1) and the IRC Color Code Chart (25c). The Replacement Guide is the oldest, best known in the radio field with new, up-to-the-minute sheets being sent to owners every month. Both Guide and Color Code Chart will prove invaluable in your day to day work. Ask the thousands of servicemen who already have them!



This Fall, you'll need every one of the resistors contained in IRC No. 6 Kit—buy 'em all at once and be prepared. See this Kit at your nearest IRC jobber's.

INTERNATIONAL RESISTANCE CO.

2100 ARCH STREET

PHILADELPHIA, PA.

IRC RESISTOR PRICES REVISED

AS IRC customers are well aware, this company has always made every effort to price its products at the lowest point commensurate with parts of the highest quality and fair dealing for all concerned. Now, however, in keeping with mounting costs of labor and raw materials, it has been necessary to revise prices in accordance with the following schedule. Unlike many concerns which have been quick to grasp the slightest excuse for a sweeping advance, IRC has carefully considered each item, pricing it in direct relation to production costs. Thus, instead of a general advance, we are happy to announce that only part of the line has been increased and that there has been an actual reduction in the prices of many Precision Wire Wound Resistors due to new manufacturing developments coupled with increased demand. Also, thanks to the fact that production schedules on the IRC Volt-Ohmmeter were arranged in advance of recent raw material increases, the price of this popular service instrument remains unchanged at \$25.50 net to the trade.

METALLIZED RESISTORS

Type	List Price	Dealers' Net Cost
F 1/2—1/2 watt	\$.25 ea.	\$.15 ea.
F 1/2—1/2 watt	.25	.15
F 1—1 watt	.25	.15
F 2—2 watt	.35	.21
F 3—3 watt	.35	.21

SUPPRESSORS

All Types	.40	.24
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AUTOMOBILE CONDENSERS

0.5 mfd.	.60	.36
1.0 "	.75	.45

POWER WIRE WOUND RESISTORS

PA—3 watt	.45	.27
PB—5 watt	.45	.27
PC—10 watt	.65	.39
PD—15 watt	.85	.51

HANDY CERTIFIED KITS

No. 1—20 F-1 resistors	5.00	3.00
No. 2—20 F-2 "	7.00	4.20
No. 3—20 F-1/2 "	5.00	3.00
No. 4—12 PB "	5.40	3.24
No. 5—12 PC "	7.80	4.68
No. 6—Sp. Comb. Kit	36.15	21.69
Grid Bias Kit	3.20	1.92
M-4—4 cyl. Suppressor kit	2.00	1.20
C-4—Ditto with condensers	3.50	2.10
M-6—6 cyl. Suppressor kit	2.80	1.68
C-6—Ditto with condensers	4.30	2.58
M-8—8 cyl. Suppressor Kit	3.60	2.16
C-8—Ditto with condensers	5.10	3.06
F-8—Special Ford V-8 Suppressor Kit	3.20	1.92
FC-8—Ditto with condensers	4.70	2.82
IRC Volt-Ohmmeter	42.50	25.50

PRECISION WIRE WOUND RESISTORS

Resistance Value	List	Types WW-1 & WW-4 Dealers'		Types WW-3 & WW-4 Dealers'	
		List	Net	List	Net
0.5 to 25 ohms	\$1.25	\$0.81	*\$0.90	\$0.59	
50 "	1.25	.81	.90	.59	
100 "	1.25	.81	.90	.59	
200 "	1.25	.81	.90	.59	
250 "	1.25	.81	.90	.59	
300 "	1.25	.81	.90	.59	
500 "	1.25	.81	.90	.59	
1,000 "	1.25	.81	.90	.59	
1,500 "	1.25	.81	.90	.59	
2,000 "	1.25	.81	.90	.59	
2,500 "	1.25	.81	.90	.59	
4,500 "	1.25	.81	.90	.59	
5,000 "	1.25	.81	.90	.59	
7,500 "	1.35	.88	1.10	.72	
10,000 "	1.35	.88	1.10	.72	
12,500 "	1.35	.88	1.10	.72	
15,000 "	1.50	.98	1.25	.81	
20,000 "	1.50	.98	1.25	.81	
22,500 "	1.50	.98	1.25	.81	
25,000 "	1.50	.98	1.25	.81	
30,000 "	1.50	.98	1.25	.81	
40,000 "	1.50	.98	1.40	.91	
50,000 "	1.50	.98	1.40	.91	

PRECISION WIRE WOUND (Continued)

Resistance Value	Type WW-1 Dealers'		Types WW-3* & WW-4 Dealers'	
	List	Net	List	Net
60,000 "	1.75	1.14	1.60	1.04
75,000 "	1.75	1.14	1.60	1.04
0.1 meg	2.00	1.30	1.85	1.20
0.125 "	2.25	1.46	*2.00	1.30
0.15 "	2.25	1.46	*2.00	1.30
0.175 "	2.50	1.63	*2.25	1.46
0.2 "	2.50	1.63	*2.25	1.46
0.225 "	2.75	1.79	*2.50	1.63
0.25 "	2.75	1.79	*2.50	1.63
0.3 "	3.00	1.95	*2.75	1.79
0.4 "	3.50	2.28	*3.00	1.95
0.5 "	4.00	2.60	*3.50	2.28

Type WW-2	List	Dealers' Net
0.6 meg	4.25	2.76
0.75 "	4.50	2.93
0.9 "	4.75	3.09
1.0 "	5.00	3.25
1.5 "	7.50	4.88
2.0 "	10.00	6.50
2.5 "	12.50	8.13

*Type WW-3 is not made in these ranges; being supplied only between 75 ohms and 100,000 ohms inclusive.
For list prices of odd ranges not shown, use same price as given for next higher size.

244 Tubes versus 225-A's

Fred W. Barnes, Jr., of Independent Radio Service, Moose Jaw, Sask., Canada, reports an interesting case with a Brunswick super-het—one with the turret type gang condenser. This set gave forth a continual buzzing. Changing the first detector tube which was a 224 for a 224-A helped somewhat but the buzzing was entirely eliminated by substituting a 224-A tube for the 224 oscillator.

"The trouble," writes Mr. Barnes, "was due to the loose centers of the 224's. Similar trouble may be experienced in super-hets using autodyne oscillators although here the noise will sound more like static. A 224-A will solve the problem thanks to its filament construction.

Making a Voltmeter From a Milliammeter

QUESTION: I have an O-1 milliammeter and wish to make it into a voltmeter. How can I do this?—S. G. D.

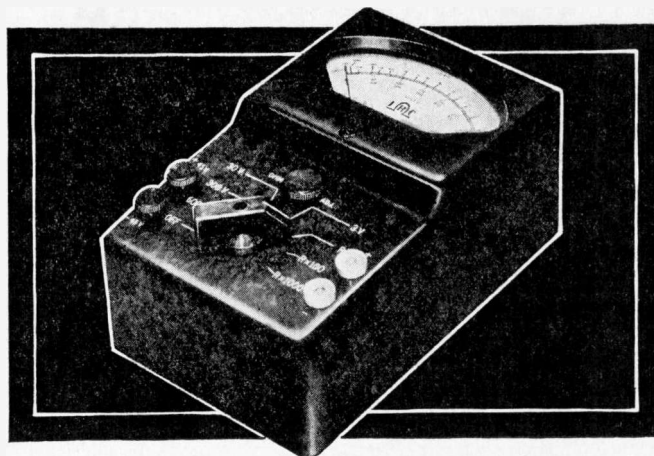
ANSWER: All that is necessary to make a voltmeter from your milliammeter is to connect resistances in series with the meter. Every 1,000 ohm precision resistor connected in this manner will permit you to measure 1 volt. Thus a 5,000 ohm precision resistor permits measurement up to 5 volts. A 25,000 ohm precision resistor permits measurements up to 25 volts and so on.

Answer to Last Month's Brain Twister

The bird in last month's brain twister will have flown exactly 60 miles by the time Car "A" overtakes Car "B." Figuring it out, we find that it will take two hours for the cars to meet. Thus, at 30 miles an hour, the bird will have traveled 60 miles regardless of the direction flown.

Due to lack of space, the Brain Twister had to be omitted from this issue. But watch out for the one we're saving for next month.

IRC VOLT-OHMMETER



Never Before So Many Features at So Low a Price

Everything found in the most expensive meters—and more—is now yours in this moderately priced Volt-Ohmmeter by the makers of the famous IRC Resistors. Note these many features: IRC exclusive Automatic Vacuum Relay which gives certain protection against overloads—no fuses to replace, no meter or circuit burn-outs possible; four voltage and three resistance ranges; easy-to-read knife edge pointer; extra large 3 in. etched scale with double strength glass cover; full Bakelite case, top and bottom; rotary switch; measures as low as .5 ohm; one set of pin jacks for all readings; self contained 4½ Volt Battery; convenient compensation for battery variations on ohmmeter; IRC 1% Precision Resistors used exclusively.

Unexcelled for point-to-point servicing or for use wherever accurate electrical measurements are made. Weighs only 2½ lbs. Never becomes obsolete. Will save you time and money, permitting quick and dependable testing with a minimum of equipment.

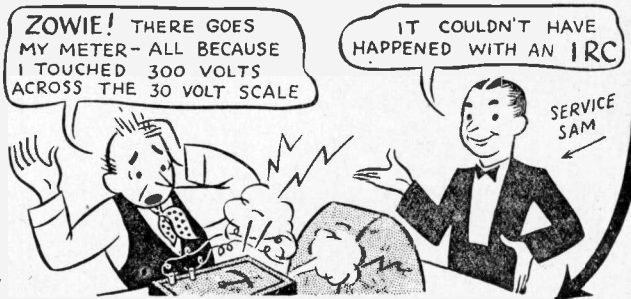
\$25.50

net to servicemen complete with test leads.

(List, \$42.50)

Voltage Ranges
3, 30, 300 and 600

Resistance Ranges
0 to 1,000 ohms—
0 to 100,000 ohms—
0 to 1 megohm



INTERNATIONAL RESISTANCE CO.

2100 Arch St.
Philadelphia, Pa.

- Enclosed find \$25.50 (check or M. O.) for a new IRC Volt-Ohmmeter. It is understood I may return it (prepaid) for full credit if, within 5 days after receipt, I am not more than pleased.
- Please send folder describing the IRC Volt-Ohmmeter and detailing its use in radio work.

NAME _____
STREET _____
CITY _____
NAME OF YOUR JOBBER _____





Making the Most of Your
RESISTANCE INDICATOR

Hints on Putting This Helpful Little Service Tool to All of its Many Uses

“WHAT on earth is that fellow doing?” asked the laboratory visitor pointing to a worker huddled over a small instrument on which he was working a slider back and forth as fast as his tired arm would permit. “Looks to me as though he’s trying to wear that instrument out.”

“Exactly,” replied the IRC engineer, “We’ve just designed a new Dual Resistance Indicator. We’re sure it’s the best thing of its kind that ever came down the pike. Now it’s his job to test it for actual durability—to make absolutely certain that it won’t wear out even after years of the hardest kind of use.”

He tapped the lab worker.

“How many times have you worked that ball bearing slider across the resistance wires, Jack?” he asked.

The worker referred to a sheet of figures before him.

“Exactly 3896 times so far,” he answered flexing his tired hand to restore circulation. “That’s more than the busiest serviceman in the world would use it in years.” Then, holding the instrument up for inspection, he added proudly: “See? Hardly a sign of wear on the wires. It will still test as good as new.”

NEW INDICATOR HAS TWO SCALES

This incident offers but a single illustration of the care that has gone into the production of the latest IRC development—the Dual Resistance Indicator which is introduced this month. From its permanent ball bearing slider contact replacing old style prods, to its two scales, heavier wire and generally improved design, it represents as much of an improvement over any previous indicator as the new Ford V-8 is over the old model T. One scale reads from 0 to 10,000 ohms and the other from 10,000 to 100,000 ohms, thus allowing accurate readings from 100 ohms to 100,000 ohms with an indefinite extension of range being possible by the addition of fixed resistors.

Of particular importance, the ball bearing slider (spring cushioned) is permanently attached to the instrument. Not only does this mean that the user’s hands are free to work elsewhere after an adjustment has been made, but also that smooth, even pressure is maintained on the resistance wires thus reducing wear

to an absolute minimum and avoiding any possibility of breaking wires. What is more, the resistance rods are enclosed.

Most servicemen are, of course, familiar with the value of an indicator in doing the job for which it is primarily designed, i.e. quickly determining the value of defective resistors or for measuring unknown resistances by the substitution method. Some, however, do not realize that a well-constructed Indicator is really a multi-purpose tool which becomes indispensable for a variety of jobs.

PLATE VOLTAGE ADJUSTMENT

Many servicemen have written to IRC telling how they have used their Indicators as calibrated rheostats or as variable resistors for adjusting voltage, limiting current, etc. Others have found them splendidly adapted for use as temporary heavy duty (30 watts) power wire wound resistors giving any value from 100 to 100,000 ohms. An Indicator also proves useful as a calibrated potentiometer or voltage divider for tapping off fixed voltages or experimentally determining voltage divider resistor values.

One short wave enthusiast had difficulty in obtaining proper adjustment of the plate voltage of the regenerative detector on a 4-tube short wave set.

“I made an experimental voltage divider with a regular IRC Resistor as one branch and my Indicator as the other,” he states. “After adjusting for best results, it was an easy matter to replace the Indicator with a fixed resistor of the proper value. Since then the set has been working perfectly, bringing in Paris, Berlin, Rome and other DX stations. Certainly your Indicator is a big help to the experimenter.”

SCREEN GRID VOLTAGE ADJUSTMENT

Another serviceman recounts using his Indicator to find the correct resistor values to furnish the screen grid voltage for the first stage of a P.A. system. His problem was solved by using the Indicator as a potentiometer, and then adjusting by ear for best volume and tonal quality from a phonograph pickup.

These are only scattered instances, but serve to show the Indicator’s usefulness in a broad range of work. Moreover, quite aside from direct radio uses, still

HOT OFF THE GRIDDLE!

Here you are—the new IRC DUAL RESISTANCE INDICATOR—one of the finest, most helpful instruments IRC has ever produced and with the widest assortment of practical service uses. From its enclosed resistance rods to its permanently attached spring cushioned ball bearing slider, heavy resistance wire and improved general design, you’ll find it far superior in every respect. And hist!—best of all, the price is only \$2.70 net to servicemen (list \$4.50).

another serviceman reported having used his Indicator for regulating the speed of an electric fan while another rigged his up as a temporary dimmer for a light.

DETERMINING RESISTOR VALUES

In determining resistor replacement values, the IRC Dual Resistance Indicator may be used alone or in conjunction with a voltmeter. Simply disconnect the old resistor and connect the red and black Indicator cords in its place. The voltmeter is then connected across the circuit.

Starting with the ball-bearing slider at the top of the 100,000 ohms scale, move it down until the voltmeter reads the correct voltage as recommended by the manufacturer. The proper resistance value will be indicated on the scale.

If the resistor value is less than 10,000 ohms, the same procedure is followed on the 10,000 ohm scale.

If no voltmeter is used, it is only necessary to tune in the set and move the slider until the best tonal quality and volume are received from several stations. Your ear will tell you—quickly and accurately.

A feature of the Indicator that conscientious workmen will be quick to appreciate is the fact that it provides a ready means for a rapid check of all resistors in a set. As every serviceman knows, the fact that a resistor is in operating condition does not necessarily imply that it is beyond the shadow of doubt. A previous serviceman may have installed a unit of the wrong value instead of more painstakingly locating and repairing the real trouble. Again, internal changes due to moisture, humidity or overload may have caused some types of resistors to vary considerably from their rated value. Such faults are not uncommon and can best be ascertained by a complete check of all units with an Indicator.

A CALIBRATED VOLTAGE DIVIDER

In using the Indicator as a calibrated voltage divider, any desired voltage may be tapped off by connecting the black and blue Indicator cords across a source of voltage. For example: If your Indicator is connected across a source of 110 volts and the test prod is placed at the 50,000 mark, a voltage of

$$\frac{50,000}{100,000} \times 110$$

or 55, of the supply voltage may then be tapped off.

Where a bridge or other resistance measuring instrument is not available, the Indicator may be used to measure resistance. The only equipment required is an 0-1 or 0-1.5 milliammeter and batteries of from approximately one to 100 volts. Ordinary “B” and “C” batteries are satisfactory and it is not necessary to know the voltage accurately.

After connecting the unknown resistor in series with the battery and milliammeter, start with a low voltage and grad-

(Continued at bottom of page seven)

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LOOK AHEAD!

THE story is told that Andrew Carnegie once held a banquet to celebrate the completion of a new steel mill.

During the dinner, the Steel King turned to Charles M. Schwab who had been in charge of the job.

"Charlie," he said, "if you had this plant to build over again, could you improve it?"

"Of course," replied Schwab. "We learned a lot during the job. There are a number of improvements that could be made."

"How much would they cost?" inquired Carnegie.

"Probably five million dollars," was the prompt reply.

"All right," said Carnegie with equal promptness. "Suppose that you start making them tomorrow."

And so the day after an outstandingly "modern" steel mill was "completed" the builder went back to work making still more modern improvements to the tune of five million dollars. When these were completed, he probably went right ahead making still more.

There is nothing unusual about this incident save perhaps the vast sums of money involved. It only serves as further proof of the old adage "Nothing is permanent but change."

Certain it is that the world moves with surprising rapidity. Whether we earn our living building steel mills or battleships (which are invariably obsolete before the final rivet is driven) or by servicing radios, it is up to us to keep abreast of things if we are to progress as we should. No one can afford to

feel that he knows it all—that he can continue working tomorrow in exactly the same manner or with exactly the same tools which serve him in good stead today.

Radio has progressed more rapidly than most industries. Change has been the order of the day. New circuits, new tubes, new wave channels have wrought improvement after improvement with lightning-like rapidity. Servicing methods have shifted accordingly with new systems and new service instruments being developed to meet the pace. All warrant careful consideration. If modernization is so important to steel mills that remodeling is begun almost before they are completed, certainly it is equally essential to the radio serviceman whose knowledge and equipment must keep step with one of the youngest, fastest-growing and swiftest-moving industries.

In servicing as in any other profession, the man whose instruments are obsolete, who cannot qualify for real service on the important jobs or who must proceed with them in a costly, round-about way will soon find himself swept aside by competitors who have made it a point to keep up with the times.

As Service Sam says: "You pay for a needed piece of equipment whether you buy it or not." And this holds true whether the item in question is the IRC Volt-Ohmmeter, the New Dual Resistance Indicator, a new tube checker or anything else which will pave the way for more efficient work.

Making the Most of Your Resistance Indicator

(Continued from page six)

usually increase it until a good deflection is obtained on the milliammeter. Next, replace the resistor under test with the Indicator. Starting with the slider at the peak of the scale work it slowly down until you get the same milliammeter reading previously obtained. The value then shown on the Indicator is the correct value of the resistor under test.

There are, of course, other uses for the new IRC Dual Resistance Indicator which the alert serviceman will be quick to discover. Throughout, it has been sturdily and painstakingly designed for long, satisfactory service as one of the handiest of modern radio instruments—a multi-purpose tool which lives fully up to IRC tradition of quality and usefulness. Make the most of yours by studying all of its many uses and their practical application to your daily work!

Service Sam's Buddy Says:



An Iowa serviceman reports a lady who wanted her set modernized because she couldn't get anything but old songs and 1910 jokes on it.

* * *

Little Girl (disturbed at her prayers by the cat scratching on the door): "Please stand by for a minute, God, while I let the cat out."

* * *

A Mid-West serviceman who lives on a farm had quite an explosion in his chicken coop lately. He fed some "Lay or Bust" to a new shipment of chickens and they turned out to be roosters.

* * *

A medical authority writes that "bathing alone will not preserve one's health." Nevertheless, we still think it's the proper thing to do.

* * *

Serviceman's Wife: "Jack gets up in time for the health exercises on the radio every morning."

Friend: "I didn't know he took them."

S. W.: "He doesn't—but the girl in the house across the way does."

* * *

Judge: "Who was doing the driving when you collided with that truck?"

Drunk (triumphantly): "None of us. We were all in the back seat."

* * *

All of which is proof of the fact that it takes more than 1500 nuts to hold a car together and only one to scatter it over the landscape.

* * *

Then there's the story of the serviceman they fished out of the lake, new truck and all. The automobile salesman had told him the truck had floating power and he decided to try it out.

* * *

Also, there's the story of still another serviceman who is notorious both as a reckless driver and a practical joker. Lately he has painted one side of his car green and the other blue. Says it's great fun to hear the witnesses contradicting each other in court.

* * *

He: "Somebody spilled mustard on this waffle, dear."

She: "Oh, Henry, how could you! That's lemon pie."

* * *

Mrs. Jones: "My husband is a specialist. He sells balloons when there is a circus parade in town."

Mrs. Smith: "That's nothin'! My husband is a real specialist. He sells smoked glasses when there is an eclipse of the sun."

* * *

"I'm cutting quite a figure," said the chorus girl as she sat on a broken bottle.

GRAHAM HUNTER '35



First Goat: "Believe it or not, Bill, I haven't been bothered with my wife's snoring since the day she ate a kit of those IRC Suppressors!"

Radio Rides the Airways

(Continued from page three)

the intrepid "Flying Colonel" and Mrs. Charles A. Lindbergh are working in an effort to determine the most satisfactory route for the Transatlantic Air Service which now seems assured.

The steamship Jelling which is participating in this survey is equipped with standard Pan American communications radio as well as a PAA direction finder. Colonel Lindbergh's plane, in which most of the air exploration has been done, has direction finding apparatus and two radio sets. One of the latter is a standard 60 lb. outfit while the other is an emergency set in a water-tight box.

"When the time comes for transport operations across the Atlantic and Pacific," states Thomas Kennedy of PAA, "radio will be an essential part of the operating equipment. All possible routes are now being investigated. When the most favorable ones are finally determined, there will naturally be installations of radio and direction finding and radio equipment at strategic points."

Pan American Airways, Inc., is, as the name implies, an international organization. Although offices are maintained in New York, its lines touch the United States only at Miami, Fla., and Brownsville, Texas.

Among leading air lines of the United States, however, radio naturally plays a prominent part in the daily operations. Here, however, the U. S. Department of Commerce facilities are of material assistance, thus making it unnecessary for individual lines to maintain the extensive systems employed by PAA on most of its routes.

It goes almost without saying that radio equipment used in air navigation must be of the very best. Here radio is infinitely more than a hobby or a medium for entertainment. It is a factor on which human life and the completion of important schedules hinges.

On it depends much of the future of commercial aviation. Thus, the best is never a luxury—it is a strict essential.

Most of the larger airways maintain laboratories for constant and exacting test of their component radio parts and other materials. New developments are carefully considered and standard merchandise fully analyzed. Nothing is purchased on the strength of "pretty" advertising claims or word-of-mouth praise by its sales representatives. The safety of air liners and their passengers is too important for that and buying by test is the order of the day. Thus, in view of these conditions, it is gratifying to note that IRC Resistors are used by Pan American Airways, Inc., as well as by United Air Lines, Transcontinental & Western Air and other leading lines.

Naturally enough, air navigation puts resistors as well as all other radio parts to what is probably the most severe and extreme conditions of actual use. Unusually sudden changes in weather conditions, high humidity or extreme dryness, moisture, vibration and constant use are only a few of the factors which must be considered. Practically all the adverse conditions met with in ordinary radio use during months and even years may be encountered aloft in the course of a few hours. For instance PAA's 26,662 miles of airways extend through 100 degrees of latitude—from the frozen wastes of the Arctic Circle in Alaska to Buenos Aires and Montevideo, the southernmost capitals of South America. Similar equipment is even now being installed in China where PAA has acquired an interest in China National Airways. A PAA plane leaving one city in zero weather may find its destination where sunshine and high temperatures are the order of the day. Another one leaving the ground in the midst of tropical heat may, within a few minutes, encounter zero temperatures at flying altitude.

Small wonder then that IRC points with pride to the continued use of its resistors under such varied and exacting conditions where chances cannot be taken and where failure, even of the smallest part, may mean disaster.

SWAP or SELL SECTION

These classified advertisements are run free of charge for servicemen. The right is reserved to edit advertisements or eliminate any that are deemed unsuitable.

WILL TRADE—One tube tester, various radio parts, slide trombone, ¼ h.p., d.c. motor. Want a National A.C. short wave set, Maytag gasolene or what have you. Write for descriptions of material and state what you have to offer. Herman L. Hepp, c/o IRC Servicer.

FOR SALE—Two Readrite Analyzers, Nos. 700 and 245. No reasonable offer refused. Harold E. Ulmer, c/o IRC Servicer.

WILL TRADE—Complete a.c. Pilot Super Wasp long and short wave receiver for anything in the public address line of the same value, such as mikes, amplifiers, etc. T. J. Tronson, c/o IRC Servicer.

FOR SALE—Weston Model 517 a.c. Ammeter, range 0-10. Cost \$5.88, will sell for \$3.75. Has been used but little. Willie H. Johnson, c/o IRC Servicer.

FOR SALE OR TRADE—Sterling No. 11R tube tester. Need a good Jewell or Weston oscillator or will sell tester for \$12 cash. Beachland Radio Service, c/o IRC Servicer.

WILL TRADE—Quartz oscillating crystals. Any frequency between 1715 to 4000 k.c. Also have good bug to swap. Need good tube tester, radio service manuals or other service equipment. Geo. Ayers, Radio Repair Shop, c/o IRC Servicer.

FOR SALE—One "Confidence" English reading tube tester. Will test all tubes including seven prong 39 tube. Cost \$65 new. Will sell for \$28.50. Complete description on request. L. H. Williams, c/o IRC Servicer.

FOR SALE—Established radio business in Southern town of 1,700 people. No competition in either sales or service. A real bargain for only \$250. Baldwin Radio Service, c/o IRC Servicer.

WANTED—Weston 562 oscillator, 563 Volt-ohmmeter; 564 capacity meter and Jewell 560 oscillator. **WILL SELL**—Weston 547 analyzer modernized for 4, 5, 6 and 7 prong tubes, \$30; Dayrad 180 oscillator, 130-1500 k.c. continuously variable in three steps a.c. or d.c., with Weston output meter, \$16.50; Tube tester, Weston meter, all tubes in general use 4, 5, 6, & 7 prongs, indicates all shorts, \$15. Dawson-Buick Co., c/o IRC Servicer.

FOR SALE—One Weston Model 301 Universal a.c.-d.c. meter, \$12.50. Slightly used. Albert Faber, c/o IRC Servicer.

PARTNER WANTED—Former RCA Victor engineer who worked on 80 watt Navy sound equipment and who is building a super sound outfit using twenty-four tubes and having 135 watts undistorted output wants partner to purchase new two ton truck and gas engine generator for its operation Alfred R. Gray, c/o IRC Servicer.

WILL TRADE—Remler Infradyne unwired; 7-tube Bosch d.c. chassis; 6-tube Crosley battery set; Goddell-Pratt lathe and numerous radio parts. Write for complete list, sending us yours. Waechter Lbr. Co., c/o IRC Servicer.

WILL TRADE—32-volt Generator, Remington typewriter and many other items. Will exchange for radio testing equipment. E. T. Richey, c/o IRC Servicer.

FOR SALE—Jannette Rotary Converter, Type C-13-F. 32 volts to 110 volts a.c.; 300 watt output. Cost \$75 new, list. Will take \$40, or make your offer. Used less than 50 hours. C. A. Watson, c/o IRC Servicer.

NOTICE!—Due to lack of space, it has been impossible to include this month many of the "Swap or Sell" ads which have been received. These will appear in the forthcoming Servicer.

WATCH FOR "SERVICE DOPE" —A FULL PAGE OF IT— IN NEXT MONTH'S ISSUE