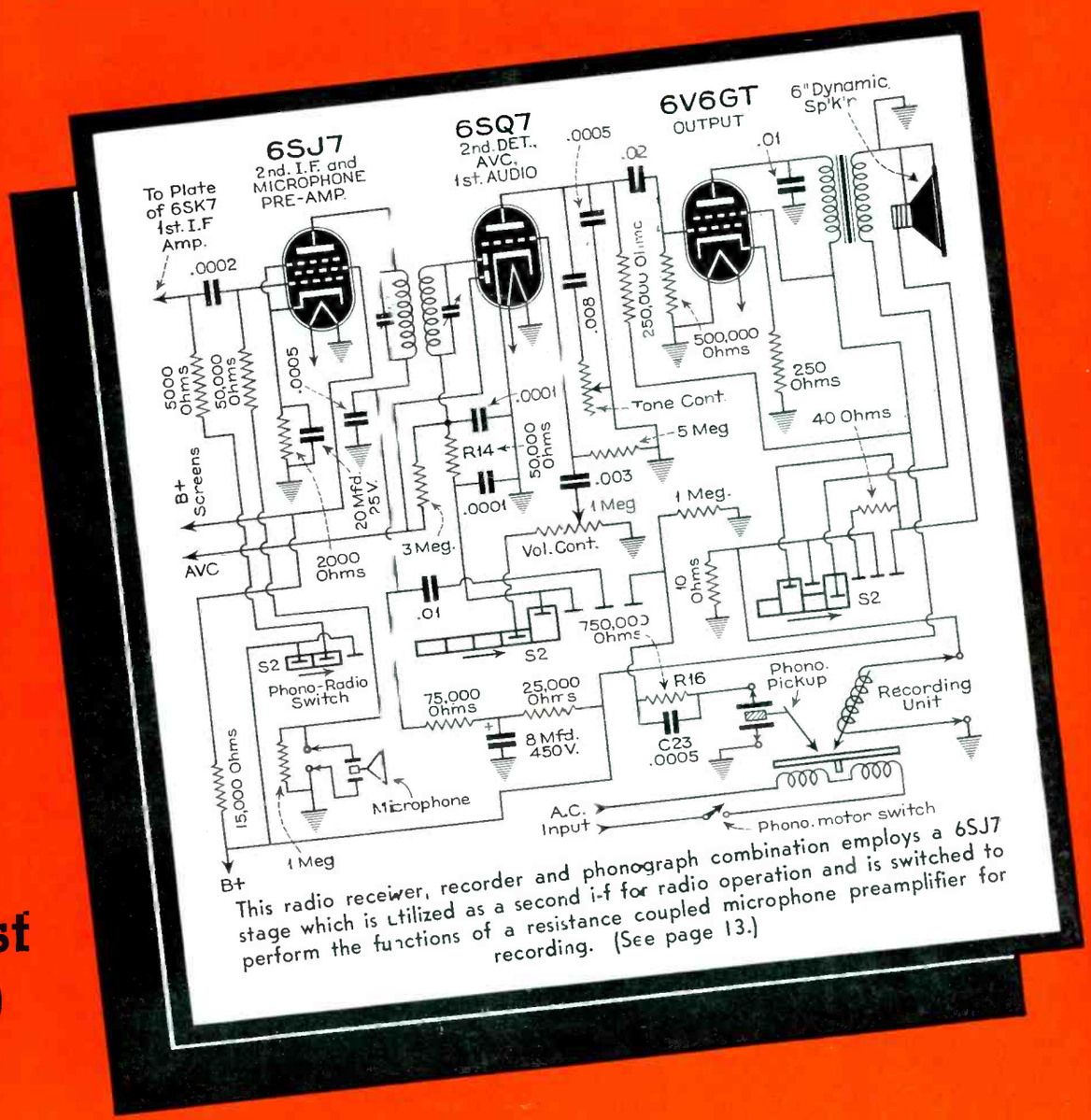
A MONTHLY DIGEST OF RADIO AND ALLIED MAINTENANCE

SERVICE



This radio receiver, recorder and phonograph combination employs a 6SJ7 stage which is utilized as a second i-f for radio operation and is switched to perform the functions of a resistance coupled microphone preamplifier for recording. (See page 13.)

August 1940

RADIO — TELEVISION

COMPLETE COVERAGE For Your Condenser Requirements

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MALLORY

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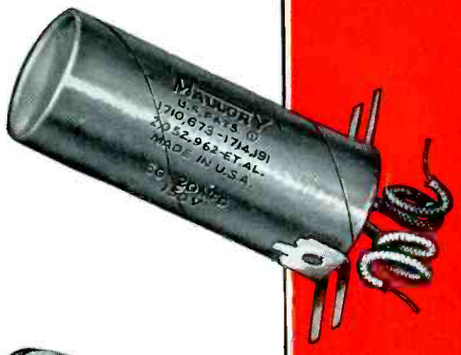

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TRADE MARK REG. U. S. PAT. OFF.

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Every advantage of FP construction is afforded in these small, metal encased tubulars. Made with one piece drawn aluminum can and insulated with an attractive cardboard cover clearly marked for rating identification. Strong internal construction eliminates troublesome open circuits.

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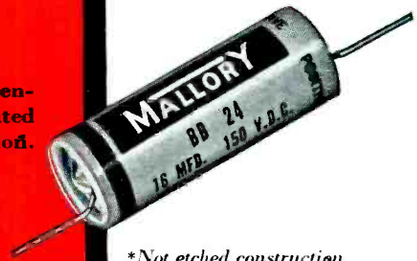
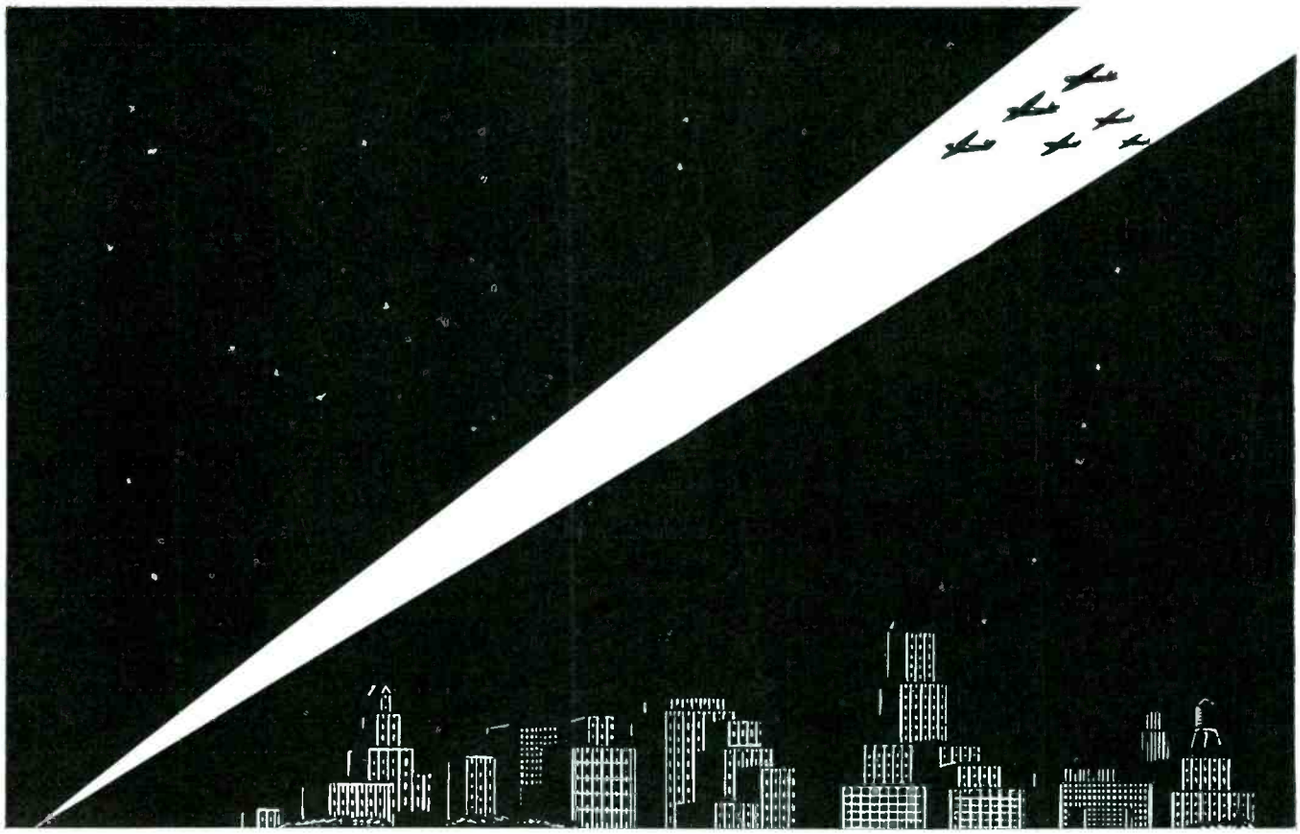


*Not etched construction

Use MALLORY APPROVED PRECISION PRODUCTS

Include VIBRATORS • VIBRAPACKS • CONDENSERS • VOLUME CONTROLS • ROTARY SWITCHES • SINGLE AND MULTIPLE PUSH BUTTON SWITCHES • RESISTORS RADIO HARDWARE



LIGHT

WHERE IT'S NEEDED
WHEN IT'S NEEDED

A modern anti-aircraft battery is useless until enemy planes are picked out of the black by the powerful beams of the searchlights. Without *light* . . . where it's needed, when it's needed . . . the accuracy of the guns and the skill of the gunners would be entirely wasted.

In radio servicing, even the most skillful trouble-shooter must have a thorough knowledge of every detail of construction and wiring of the particular set on which he is working in order to do his job quickly and efficiently. That is why the most successful servicemen never depend on guesswork or memory . . . they turn to their RIDER MANUALS for complete and accurate data on every set, instantly!

RIDER MANUALS provide, in the most convenient form, everything a serviceman needs to know about any make or model of radio receiver. They contain authoritative data on alignment, I-F peaks, operating voltages, parts lists and values, voltage ratings of condensers, wattage ratings of resistors, coil resistance data, gain data, etc.

No serviceman can afford to be without this essential data any more than the anti-aircraft gunner can do without searchlights. Like the searchlights, RIDER MANUALS provide *light* for the trouble-shooter . . . *where* it's needed, *when* it's needed . . . at a cost of only 3¢ a day! Fill in any missing volumes of RIDER MANUALS at your jobber's. Do it today!

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You NEED RIDER MANUALS

VOL. 9, NO. 8 - AUGUST, 1940

SERVICE

A Monthly Digest of Radio and Allied Maintenance

ROBERT G. HERZOG, Editor

MEMBER AUDIT BUREAU OF CIRCULATIONS

Reg. U. S. Patent Office

VACATIONS will be over soon and people will be returning to the cities. Children will be starting back to school shortly. Fall and winter key programs will be back on the air. A presidential campaign of vital interest will bring speakers to the microphones, who can and will speak with unusual authority.

How about starting out right after Labor Day on a conscientious house-to-house bell pushing program. There should be plenty of service work for you. Tubes will need replacing; receivers will require adjustment. Outdoor antennae are also a good bet for a door-to-door sales effort. For reception, they are still the best bet by far.

The coming months should be profitable for good Service Men. . . . Just as profitable as you want them to be. It all depends upon the work and energy that you are willing to expend.

■◆■

THE August issue of the PRSMA (Philadelphia Radio Service Men's Association) News gives the results of a recent survey conducted among the membership. One question asked, "What trade papers do you read *regularly?*" (Italics ours). It is especially gratifying to note that SERVICE far outranked all other radio trade publications.

■◆■

WE NOTE with interest that the Federal Communications Commission in cooperation with the Radio Manufacturer's Association have organized the National Television Systems Committee to investigate and formulate television standards for the entire industry.

Details of organization and future procedure were arranged at a New York meeting. Many companies will be represented by research and technical experts who will serve on various panels of the committee. Chairman W. R. G. Baker, Director of the Engineering Department of the Radio Manufacturers Association, has announced the organization of these panels and subcommittees.

It would seem this is the first long step toward the long awaited adoption of television standards. We are pleased to see that the industry is taking this opportunity to reconcile their differences at the conference table.

CONTENTS

BRYAN S. DAVIS, *President*

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Now! YOU CAN MEET MANUFACTURER'S SPECIFICATIONS FOR F. M. and TELEVISION SERVICING with this . . . . . .

MODEL 188X

NEW HICKOK WIDE BAND SIGNAL GENERATOR

AMPLITUDE MODULATION • FREQUENCY MODULATION • CRYSTAL CONTROLLED

Yes, Manufacturer's servicing instructions specify the use of a wide band Signal Generator for alignments of F.M. and Television Receivers. As usual, HICKOK is prompt to offer new, efficient equipment to meet this need with this Electronic Wide Band Signal Generator with Crystal Control for servicing all F.M. and A.M. receivers including especially these latest 1941 models.

Among the 12 output selections (all fundamental frequencies) of this outstanding instrument are the following: •Wide band frequency modulated R.F. output, (750 KC sweep—60 cycle) 100 KC to 133 megacycles. •Frequency modulated R.F. output (150 KC sweep—400 cycle) 1000 KC to 133 megacycles. •Frequency modulated R.F. output (30 KC sweep) 100 KC to 110 megacycles. •Unmodulated R.F. output 100 KC to 110 megacycles. •Amplitude modulated R.F. output (400 cycles) 100 KC to 110 megacycles. •Audio frequency outputs of 400 cycles fixed and 50 to 10,000 variable. •Crystal controlled outputs, modulated or unmodulated, with accuracy better than .01% to 10 megacycles in 100 KC steps and to 150 megacycles in 1 megacycle steps. •Synchronized sweep voltage for oscillograph use.

OTHER NEW HICKOK INSTRUMENTS ALSO FOR FREQUENCY MODULATION AND TELEVISION TESTING ARE: OSCILLOGRAPH, *equipped with wide band modulation.* TRACEOMETER, *unequalled for signal tracing in F.M. and A.M. Receivers—Has built-in speaker.* SET TESTER NO. 133, *New precision built, laboratory quality instrument, very sensitive, tests dry batteries.* Vacuum Tube Voltmeters, Tube and Set Testers, Crystal Controlled Micro Volt Signal Generators, Zero Current Set Testers, Vibrator and Substitute Speakers, Testers, Volt-Ampere-Wattmeter, Appliance Testers, Volt-Ohm-Milliammeter, Tube Testers, Electronic Bridge.

Complete Information in New Catalog No. 120.

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NEW RADIO TUBE AND SET TESTER NO. 510X

An outstanding instrument that tests all tubes by measuring Dynamic Mutual Conductance in Micromhos (Patented Hickok Circuit) and tests sets thru the measurement of Volts, Ohms, Milliamperes, Capacity, Inductance, Leakage and Decibels.

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Think of the convenience, the saving in both time and money of this method! With IRC Type D universal-size Controls, you're sure the shaft is right—and you're sure the quality of the control is the highest money can buy!

Used Anywhere to Replace Larger Old-Style Controls

Don't confuse IRC Type D Controls with ordinary midgets! . . . . . .

For IRC's are *more* than midgets. They are *exact* reproductions of the larger IRC Type C Controls, with exactly the same features, exactly the same design in smaller size and with the added convenience of tap-in shafts. They are large enough to be fully dependable; small enough to fit in any set; sturdy enough to stand up under the vibration encountered in auto radio use. You can use them anywhere, regardless of the size of the control being replaced. A small stock of IRC Type D (universal-size controls) plus a supply of the Tap-in Shafts will enable you to make quick, dependable replacements on almost any job.

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The recent adoption of a new, improved switch for "D" controls necessitated a change in the drive arm in the control. This means that the new switches can be used only with the new controls, and the older style switch can be used only with the older controls. The new control has the rotational stop pin in the base instead of in the cover. Our distributors have identified their *older* style switches and "D" controls with a star on the boxes. The new style is not marked. In attaching switches to "D" controls, be sure to know whether the control requires a new or older style switch. The proper combination whether old or new will be perfectly good and dependable. Your jobber can supply either combination and will be glad to properly balance your stock.

The Only Small Controls with These Exclusive Features

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RADIO

SERVICE
A Monthly Digest of Radio and Allied Maintenance

TELEVISION

BATTERIES FOR PORTABLES

By ROBERT G. HERZOG
EDITOR

So-called dry battery cells, used in radio A and B batteries are generally of the sal ammoniac type with a manganese dioxide depolarizer. The electrolyte is in the form of a paste and the cell so constructed and sealed that it is nonspillable. The zinc can is the negative electrode as well as the container for the cell. As a battery becomes discharged the can is actually consumed. All other things being equal, the greater the zinc area exposed to the chemical action in a dry battery the greater its capacity and performance.

Just as in storage batteries, the negative zinc element of the dry cell must be insulated from the positive carbon and mix. In the past various types of paste, or muslin and paste combinations, were employed for this purpose. Most modern batteries employ some form of patented paper thin separator which makes room for more active material in a cell of given dimensions.

To prevent the electrolyte from drying out, all cells must be hermetically sealed. To guard this seal against cracking, a metal top, insulated from one or both electrodes, is often employed Between the seal and the electrolyte a small air space is provided to permit expansion of the gases produced during the use of the cell.

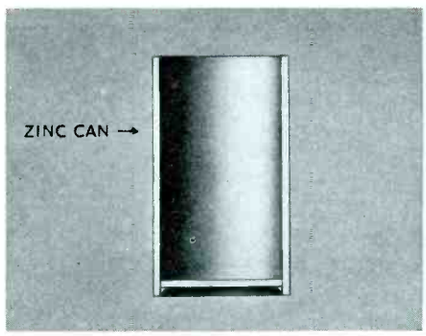


Fig. 1. (Above.) The container for a dry cell is a cylinder of zinc, which in addition to holding the ingredients of the cell, is itself a vital element in the making of the electricity.

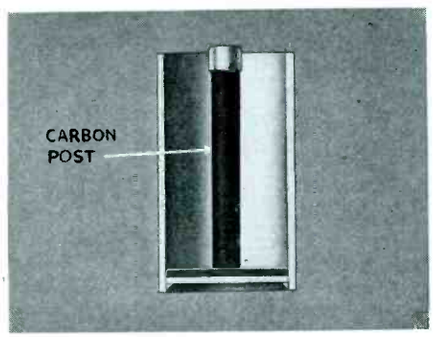
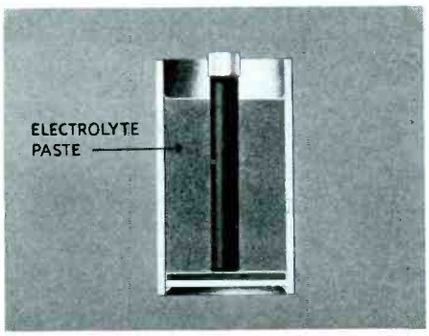


Fig. 2. (Above.) A carbon post with a brass cap is in the center of the cell and is the positive electrode. The current is created by dissolving the zinc with an electrolyte paste which is placed in the cell next to the zinc (Fig. 3, below).

Illustrations courtesy National Carbon Co.



Cell sizes

Since 1912, efforts have been made to standardize the general shape and size of dry battery cells and groups of these cells. As a result of these efforts, the dimensions shown in Tables I and II have been promulgated. As far as cell dimensions are concerned, the battery manufacturers have more or less remained within the tolerances permitted by these standards. Additional complications arise, however, with batteries composed of groups of these cells. This is especially so for batteries employed in portables.

In grouping cells of small dimensions, horizontally or vertically, where they are to be connected in series, insulating boards must be used between the cells to prevent them from shorting each other. Various manufacturers use different types and thickness of insulation causing the assembled betteries to have different dimensions. Differences in

TABLE I

Cell designation*	Diameter	Height over can	Metric dimensions
	Inches	Inches	mm
AAA	½	1	13 by 25
AA	½	1⅞	13 by 48
A	⅝	1⅞	16 by 48
B	¾	2⅛	19 by 54
C	15/16	1 13/16	24 by 46
CD	1	3⅜	25 by 86
D	1¼	2¼	32 by 57
E	1¼	2⅞	32 by 73
F	1¼	3 3/16	32 by 87
G	1¼	4	32 by 102

* Includes cells of other than cylindrical form and of equivalent rated capacity.

Cell sizes have been standardized around a number of definite sizes. These standards have been adopted, in general, by the battery manufacturers.

TABLE II

Nominal battery voltage	Maximum dimensions		
	Length	Width	Over-all height
Volts	Inches	Inches	Inches
1½	2⅝	2⅝	5
3	4	2¾	6
4½	4	4	6

Battery designation	Maximum dimensions			
	Length	Width	Body Height	Over-all height
	Inches	Inches	Inches	Inches
F30AAA	3⅛	1⅝	3⅛	4½
F30AA	3⅛	2⅜	3⅛	4½
H15A	3½	2 3/16	2 13/16	3 3/16
H15B	4¼	2⅝	3	3½
F30B	4⅜	2 13/16	6	6⅝
F30D	8¼	3 5/16	7⅜	7 15/16
F30F	8¼	4½	7⅜	7 15/16
F30G	8¼	4½	7⅜	7 15/16

Standards exist for batteries made up of groups of cells as well as for the cells themselves (see Table I). Difficulties arise, however, in applying the former standards.

REPLACEMENT BATTERIES FOR PORTABLES

(Continued from July)

Model		Acme	Advance	Bond	Bright Star	Burgess	Eveready	General	National Union	Philco	Rayo-Vac	Usalite	Willard	Winchester
AIR CASTLE (Speigel, Inc.)														
1B350, 591	1A	...	2476	...	646	F4P1	...	4F4	...	...	P694A	639	4F4	...
	2B	330	267	3017	30—03	B30	762	V30B	B860	P305	P5303	624	V30B	6218
4D, 18, 553, 554, 2861.	1A	...	...	...	...	...	...	4H1	...	...	...	...	4H1	...
2952, TF	2B	330	267	3017	30—03	B30	762	V30B	B860	P305	P5303	624	V30B	6218
5N	1A	...	...	...	561	5G	...	5H5	...	...	P85A	687	...	...
	2B	330	267	3017	30—03	B30	762	V30B	B860	P305	P5303	624	V30B	6218
130	1A	116	...	4824	660	6F	743	6F1	A831	P96	P96A	637	6F1	4814
	2B	330	267	3017	30—03	B30	762	V30B	B860	P305	P5303	624	V30B	6218
200	1A	...	...	...	...	...	...	4L1	...	...	...	...	4L1	...
	2B	330	267	3017	30—03	B30	762	V30B	B860	P305	P5303	624	V30B	6218
KD, KD73	1A	118S	817	4827	866	24F	718	8F4	A834	...	P698A	638	84F	4817
	2B	330	267	3017	30—03	B30	762	V30B	B860	P305	P5303	624	V30B	6218
ANDREA (Andrea Radio Co.)														
6G63, 6G63A	2A	123	647	4928	361	G3	746	3H3	...	...	P83A	683	3H3	4919
	2B	330	267	3017	30—03	B30	762	V30B	B860	P305	P5303	624	V30B	6218
EMERSON (Emerson Radio & Television Co.)														
DU379, DU380	2A	111	2	102	10M	D	950	D	D	D	2	1094	D	...
	2B	...	...	...	...	...	467	...	...	...	...	...	...	...
FIRESTONE (Firestone Tire & Rubber Co.)														
500	1A	...	...	...	86	44	7111	...	...	6	6	...	6	...
	2P	330	267	3017	30—03	B30	762	V30B	B860	P305	P5303	624	V30B	6218
GAROD (Garod Radio Corp.)														
BP4, BP5, BP5A,	1A	114	247	4826	462	4F	742	4F1	A830	P94	P94A	634	4F1	4816
BP7, BP8	2B	330	267	3017	30—03	B30	762	V30B	B860	P305	P5303	624	V30B	6218
BP6	1AB	460-15	411	...	...	5DA60	...	60A2L	...	...	...	AB665	...	...
BP9, BP10	1A	...	2476	...	646	F4P1	...	4F4	...	...	P694A	639	4F4	...
	2B	...	...	...	30—50	A30M	...	...	...	...	...	622	...	...
BP11	2A	123	647	4928	361	G3	746	3H3	...	...	P83A	683	3H3	4919
	2B	830	284	...	30—33	M30	482	...	B861	...	P5S30	640	...	...
BP12, BP12A, BP12B	1A	...	...	...	561	G5	...	5H5	...	...	P85A	687	...	...
	2B	330	267	3017	30—03	B30	762	V30B	B860	P305	P5303	624	V30B	6218
BP12Q, BP36, BP36A	2A	123	647	4928	361	G3	746	3H3	...	...	P83A	683	3H3	4919
	2B	...	...	...	30—50	A30M	...	...	...	...	...	622	...	...
BP118	1A	118S	817	4827	866	2F4	718	8F4	A834	...	P698A	638	8F4	4817
	2B	330	267	3017	30—03	B30	762	V30B	B860	P305	P5303	624	V30B	6218
GENERAL ELECTRIC (General Electric Co.)														
GB400, HB408	1A	118	147	4829	860	8F	741	8F1	A833	...	P96A	635	8F1	4819
	2B	330	267	3017	30—03	B30	762	V30B	B860	P305	P5303	624	V30B	6218
GB440	1A	116	...	4824	660	6F	743	6F1	A831	P96	P96A	637	6F1	4814
	2B	330	267	3017	30—03	B30	762	V30B	B860	P305	P5303	624	V30B	6218
HB402, HB403, HB410,	1A	114	247	4826	462	4F	742	4F1	A830	P94	P94A	634	4F1	4816
HB411, HBN467	2B	...	...	...	...	Z30	738	V30AA	...	...	P7R30	...	V30AA	...
HB412	1A	118S6	747	...	868	2F4L	747	8CF4	...	...	P698L	646	...	...
	2B	330	267	3017	30—03	B30	762	V30B	B860	P305	P5303	624	V30B	6218
HB504, HB505	1A	118S	817	4827	866	2F4	718	8F4	A834	...	P698A	638	8F4	4817
	2B	330	267	3017	30—03	B30	762	V30B	B860	P305	P5303	624	V30B	6218
JB508, JB513, JB514	1A	118S6	747	...	868	2F4L	747	8CF4	...	...	P698L	646	...	...
	2B	830	284	...	30—33	M30	482	...	B861	...	P5S30	640	...	...
GENERAL (General Radio & Television Corp.)														
73	1A	114	247	4826	462	4F	742	4F1	A830	P94	P94A	634	4F1	4816
	1B	...	...	...	...	A60	...	...	...	...	BB60P	...	...	...
507, 507L, 509, 512,	1A	...	2476	...	646	F4P1	...	4F4	...	...	P694A	639	4F4	...
578, 592	2B	330	267	3017	30—03	B30	762	V30B	B860	P305	P5303	624	V30B	6218
568, 575	1A	116	...	4824	660	6F	743	6F1	A831	P96	P96A	637	6F1	4814
	2B	330	267	3017	30—03	B30	762	V30B	B860	P305	P5303	624	V30B	6218
611	2A	123	647	4928	361	G3	746	3H3	...	...	P83A	683	3H3	4919
	2B	330	267	3017	30—03	B30	762	V30B	B860	P305	P5303	624	V30B	6218
GILFILLAN (Gilfillan Bros., Inc.)														
4B, 5B	1A	116	...	4824	660	6F	743	6F1	A831	P96	P96A	637	6F1	4814
	2B	330	267	3017	30—03	B30	762	V30B	B860	P305	P5303	624	V30B	6218
4C	1A	114	247	4826	462	4F	742	4F1	A830	P94	P94A	634	4F1	4816
	2B	830	284	...	30—33	M30	482	...	B861	...	P5S30	640	...	...
6B	2A	123	647	4928	361	G3	746	3H3	...	...	P83A	683	3H3	4919
	2B	330	267	3017	30—03	B30	762	V30B	B860	P305	P5303	624	V30B	6218
GREBE (Grebe Mfg. Co., Inc.) (See Garod)								**GRIFFITH** (See Wells Gardner)						
HOWARD (Howard Radio Co.)														
10B	1A	118	147	4829	860	8F	741	8F1	A833	...	P96A	635	8F1	4819
	2B	330	267	3017	30—03	B30	762	V30B	B860	P305	P5303	624	V30B	6218
14ACB	2A	123	647	4928	361	G3	746	3H3	...	...	P83A	683	3H3	4919
	2B	830	284	...	30—33	M30	482	...	B861	...	P5S30	640	...	...
HUDSON (See Wells Gardner)														
IMPERIAL	1A	114	247	4826	462	4F	742	4F1	A830	P94	P94A	634	4F1	4816
	2B	330	267	3017	30—03	B30	762	V30B	B860	P305	P5303	624	V30B	6218
KADETTE (International Radio Industries)														
L34	1A	118S6	747	...	868	2F4L	747	8CF4	...	...	P698L	646	...	...
	2B	830	284	...	30—33	M30	482	...	B861	...	P5S30	640	...	...
KARADIO (Karadio Corp.)														
905	4A	111	2	102	10M	D	950	D	D	D	2	1094	D	...
	2B	330	267	3017	30—03	B30	762	V30B	B860	P305	P5303	624	V30B	6218
KENNEDY (Goldblatt Bros.)														
	1A	116	...	4824	660	6F	743	6F1	A831	P96	P96A	637	6F1	4814
	2B	330	267	3017	30—03	B30	762	V30B	B860	P305	P5303	624	V30B	6218

Model	Acme	Advance	Bond	Bright Star	Burgess	Eveready	General	National Union	Philco	Rayovac	Usalite	Willard	Winchester
KNIGHT (Allied Radio Corp.)													
A10700, A10701, A10725 ..... 1AB	...	...	...	...	6FA60	...	60A4L	...	P60A4L	AB84	AB667	...	...
A10730 ..... 3A	111	2	102	10M	D	950	D	D	D	2	1094	D	...
1B	...	...	...	...	Z30	738	V30AA	...	...	P7R30	...	V30AA	...
A10748 ..... 1AB	...	...	...	...	...	...	...	...	...	AB694	AB668	...	...
A10761 ..... 1AB	...	...	...	...	...	...	...	...	...	AB94	...	...	...
A10795, A10873, E10757, 1A	118S	817	4827	866	2F4	718	8F4	A834	...	P698A	638	8F4	4817
N2812 ..... 2B	330	267	3017	30—03	B30	762	V30B	B860	P305	P5303	624	V30B	6218
A10826, E10715, E10716 ..... 1AB	460-15	411	...	...	5DA60	...	60A2L	...	...	...	AB665	...	...
A10848 ..... 1A	116	...	4824	660	6F	743	6F1	A831	P96	P96A	637	6F1	4814
2B	330	267	3017	30—03	B30	762	V30B	B860	P305	P5303	624	V30B	6218
A10855 ..... 1A	...	...	...	561	G5	...	5H5	...	...	P85A	687	...	...
2B	330	267	3017	30—03	B30	762	V30B	B860	P305	P5303	624	V30B	6218
A10872, A10889, E10061, 1A	118	147	4829	860	8F	741	8F1	A833	P96	P96A	635	8F1	4819
E10758 ..... 2B	330	267	3017	30—03	B30	762	V30B	B860	P305	P5303	624	V30B	6218
E10755, E10756, N2870, N2871 ..... 1AB	...	...	...	...	4TA60	...	...	...	...	10793	...	...	...
E10757 early, N2812 early 1AB	...	...	...	...	2F4B60	...	...	...	...	10896	...	...	...
E10775, E10777 ..... 1A	114	247	4826	462	4F	742	4F1	A830	P94	P94A	634	4F1	4816
2B	330	267	3017	30—03	B30	762	V30B	B860	P305	P5303	624	V30B	6218
LAFAYETTE (Radio Wire Television, Inc.)													
BS56, BS85, E6, 1A	118	147	4829	860	8F	741	8F1	A33	P96	P96A	635	8F1	4819
E72 ..... 2B	330	267	3017	30—03	B30	762	V30B	B860	P305	P5303	624	V30B	6218
BS72, CC55, CC55A 1A	114	247	4826	462	4F	742	4F1	A830	P94	P94A	634	4F1	4816
2B	330	267	3017	30—03	B30	762	V30B	B860	P305	P5303	624	V30B	6218
CC58, CC58A 2A	123	647	4928	361	G3	746	3H3	...	...	P83A	683	3H3	4919
2B	530	...	...	...	Z30	738	V30AA	...	...	P7R30	...	V30AA	...
E80, E94 ..... 1A	118S	817	4827	866	2F4	718	8F4	A834	...	P698A	638	8F4	4817
2B	330	267	3017	30—03	B30	762	V30B	B860	P305	P5303	624	V30B	6218
E92 ..... 1A	118FM	547	...	865	8FL	745	8CF1	...	...	P98L	645	...	...
2B	830	284	...	30—33	M30	482	...	B861	...	P5S30	640	...	...
S50 ..... 1A	116	...	4824	660	6F	743	6F1	A831	P96	P96A	637	6F1	4814
2B	830	284	...	30—33	M30	482	...	B861	...	P5S30	640	...	...
T56 ..... 1A	...	...	...	561	G5	...	5H5	...	...	P85A	687	...	...
2B	330	267	3017	30—03	B30	762	V30B	B860	P305	P5303	624	V30B	6218
LA FRANCE (The Fair Store) (See Wells Gardner)							**LAUREL** (See Wells Gardner)						
LEARADIO (Lear Developments, Inc.)													
APRI 1A	...	...	...	...	2F	...	...	...	...	...	...	...	...
1B	...	...	...	...	Z59	...	...	...	...	...	...	...	...
APRA 1A	...	...	...	561	G5	...	5H5	...	...	P85A	687	...	...
2B	430	...	...	30—55	A30	738	V30A	...	...	430P	621	V30A	...
L'TATRO (L'Tatro Mfg. Co.)													
819 ..... 1A	114	247	4826	462	4F	742	4F1	A830	P94	P94A	634	4F1	4816
2B	330	267	3017	30—03	B30	762	V30B	A860	P305	P5303	624	V30B	6218
1000 ..... 1A	...	...	...	...	...	...	4L1	...	...	...	...	4L1	...
2B	430	...	...	30—55	A30	738	V30A	...	...	430P	621	V30A	...
S1000 (no B)..... 10A	111	2	102	10M	D	950	D	D	D	2	1094	D	...
MACY (See Wells Gardner and Garod)													
MAGNAVOX (The Magnavox Co., Inc.)													
41 ..... 1A	114	247	4826	462	4F	742	4F1	A830	P94	P94A	634	4F1	4816
2B	330	267	3017	30—03	B30	762	V30B	B860	P305	P5303	624	V30B	6218
MAJESTIC (Majestic Radio & Television Corp.)													
130 ..... 1A	...	...	...	...	FX	...	...	...	...	...	...	...	...
1B	...	...	...	...	W40	...	...	...	...	...	...	...	...
130U 1A	116	...	4824	660	6F	743	6F1	A831	P96	P96A	637	6F1	4814
2B	330	267	3017	30—03	B30	762	V30B	B860	P305	P5303	624	V30B	6218
5BD, 5ULBD, 546BD..1A	123M	...	...	465	4FL	...	3L1	...	...	P94L	642	3L1	...
2B	530	...	...	...	Z30	738	V30AA	...	...	P7R30	...	V30AA	...
1BR50B, 1BR50BP ...1A	114S	2476	...	646	F4P1	...	4F4	...	...	P694A	639	4F4	...
2B	830	284	...	30—33	M30	482	...	B861	...	P5S30	640	...	...
420P, 421, 430PL, 1A	114	247	4826	462	4F	742	4F1	A830	P94	P94A	634	4F1	4816
431 ..... 2B	330	267	3017	30—03	B30	762	V30B	B860	P305	P5303	624	V30B	6218
MANTOLA													
R419, R419B..... 1A	116	...	4824	660	6F	743	6F1	A831	P96	P96A	637	6F1	4814
2B	330	267	3017	30—03	B30	762	V30B	B860	P305	P5303	624	V30B	6218
MEISSNER KIT (Meissner Mfg. Co., Inc.)													
10-1187 ..... 1A	114	247	4826	462	4F	742	4F1	A830	P94	P94A	634	4F1	4816
2B	330	267	3017	30—03	B30	762	V30B	B860	P305	P5303	624	V30B	6218
MIDWEST (Mid-West Radio Corp.)													
P5 ..... 1A	114S	2476	...	646	F4P1	...	4F4	...	...	P694A	639	4F4	...
2B	330	267	3017	30—03	B30	762	V30B	B860	P305	P5303	624	V30B	6218
MISSION BELL (Mission Bell Radio Mfg. Co.)													
400, 503 ..... 1A	114	247	4826	462	4F	742	4F1	A830	P94	P94A	634	4F1	4816
2B	330	267	3017	30—03	B30	762	V30B	B860	P305	P5303	624	V30B	6218
500, 501 ..... 1A	...	...	...	86	44	7111	...	...	6	6	...	6	...
2B	330	267	3017	30—03	B30	762	V30B	B860	P305	P5303	624	V30B	6218
502 ..... 1A	118FM	547	...	865	8FL	745	8CF1	...	...	P98L	645	...	...
2B	830	284	...	30—33	M30	482	...	B861	...	P5S30	640	...	...
504 ..... 1A	114S	2476	...	646	F4P1	...	4F4	...	...	P694A	639	4F4	...
2B	330	267	3017	30—03	B30	762	V30B	B860	P305	P5303	624	V30B	6218
MONROE (See Wells Gardner)													

(*Continued on page* 10)

seating of the battery group can also account for slight differences in dimensions, as can the positioning of the plug-in socket. Although some attempt has been made to standardize the sizes of the various groups (see Table II), batteries manufactured for portables have grown faster than the standardization. This makes it somewhat difficult for the individual manufacturers to adopt standardization once their production has been set to specific measurements.

Plug Connections

Under the title "Battery Connection Sockets," the Committee on Component Parts of the RMA has approved for standardization action the proposed standards shown in Figs, 5 and 6, on sockets for dry batteries for radio service. In accordance with established procedure this proposal has been submitted to the RMA membership for comment. Adoption should follow shortly, since practically everyone that had a real interest in the matter was represented on the committee which drew up the standards.

These standards have already been adopted, by and large, for A batteries and for A and B battery packs. As for B batteries, however, some set manufacturers persist in using a smaller three prong plug (see Fig. 7) than that specified in the RMA standards. To accommodate this latter plug, battery manufacturers are forced to provide their 45-volt B batteries with a universal socket which will take both the RMA and the small plug.

There are several battery portables on the market, and in use, which employ battery packs with special sockets. By the use of the adapter shown in Fig.

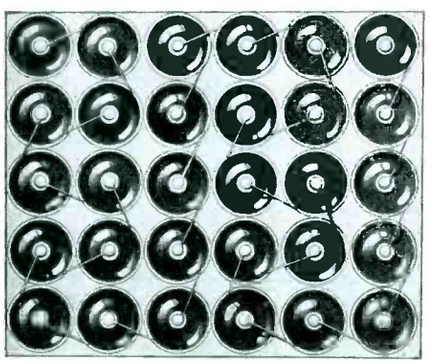


Illustration courtesy National Carbon Company

Fig. 4. Group cell assemblies made by different manufacturers differ slightly in some of their dimensions.

8 these sets can be made to accommodate standard packs. Similarly, sets which use special packs or even standard packs, can be made to accommodate standard A and B batteries through

Quite a number of people are hesitant to permit the Service Man to make permanent changes in the plugs or cable connections of their portable receivers. They are especially hesitant to pay for such changes, and the small profit on the sale of a single set of standard batteries does not justify doing the work for nothing. In most cases, however, a small charge for an adaptor, which will accomplish the same purpose, will raise no objections. This is especially true if the great convenience, which such a gadget will afford, in obtaining future replacements is stressed.

the use of the adapter cable shown in Fig. 9.

In the absence of ready made adaptors they can easily be made on the service bench with the socket from the old battery and standard battery plugs or cable. The low cost of the completed unit, however, renders such a makeshift unnecessary except in an emergency requirement.

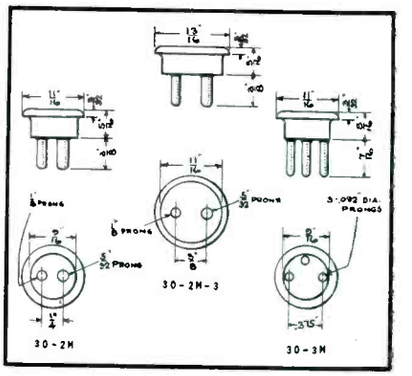


Illustration courtesy Eby

Fig. 7. Portable battery plug connections have been standardized by the RMA. These standards have generally been adopted for A batteries, but several manufacturers use the non-standard small, three-prong plug shown on the right of the above illustration.

Battery Cables

The colors used for the various leads of the A and B battery cable have also been standardized by RMA, since April 1939. The colors to be used are specified as follows: A plus, red; A minus, black; B plus, blue; B minus, yellow; B intermediate, white; C plus, brown; C intermediate, orange; and C minus, green.

It would seem, however, that in spite of the standardization on battery cable colors, receiver manufacturers use whatever color they choose. In examining three portables of different manufacture, we found three different sets of colors. In fact, two different models of one particular manufacturer did not agree in cable coloring.

Battery Packs

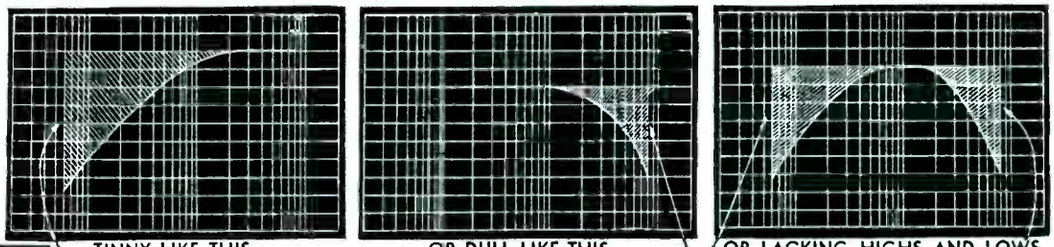
In an attempt to corner the battery replacement business or possibly to squeeze an extra inch off the size of the portable, some set manufacturers have equipped their portables with special batteries much to the inconvenience of their customers and to the Service Man. In some cases batteries are designed for a single model . . . that is to say no other battery can be used with the receiver nor can the particular unit be used economically with any other set.

This short sighted policy is bound to

"A Real Money Maker"

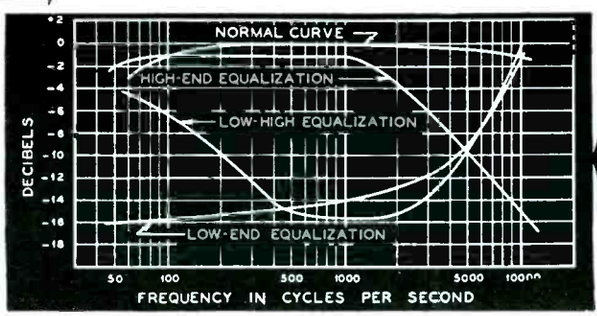
Convert Sets and Amplifiers to High Fidelity with the

UTC VARITONE

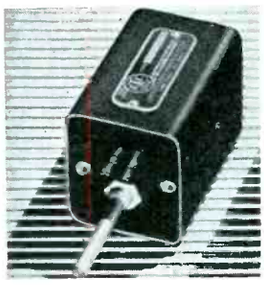


TINNY LIKE THIS — OR DULL LIKE THIS — OR LACKING HIGHS AND LOWS LIKE THIS

WHETHER YOUR AMPLIFIER OR SET SOUNDS



UTC VARITONE CAN BRING BACK THESE LOST NOTES LIKE THIS . . .



The Varitone Audio Unit Is the Only Transformer of Its Kind Giving Continuously Variable Low End, High End, or Low and High End Equalization.

The UTC Varitone is a revolutionary audio device which permits full control of the frequency response of any audio amplifier or receiver. Using this device, tone correction can be affected for defects in acoustic conditions or overall audio response. It is also possible to produce new tonal effects from phonograph recordings or radio reception and to bring back notes which would otherwise be lost completely.

VT-1—This Varitone is incorporated with a universal audio transformer. Two primaries are provided. One is suitable for working from a single or double button microphone, a low impedance pickup, or a line; the other primary is designed to work out of the plate of a tube or from a high impedance pickup. The secondary winding is centertapped and is equally suitable for working into one or two grids. Net price..... **$5.10**

VT-2—The VT-2 is a Varitone control unit, incorporated with an impedance matching device so that it can be connected directly across a 200 or 500 ohm line, or low impedance pickup or mike, or in shunt with the plate circuit of any triode or a high impedance pickup. The circuit is not changed in any other way. The VT-2 is solely an addition for tone correction. The original audio circuits are not disturbed. Net price..... **$3.60**

VT-4—The VT-4 is a complete self contained wired unit including a variable control so arranged that with the control at one end high fidelity performance is effected by the increase of low and high frequencies, and with the control at the other end the high response is reduced to diminish static, line noises, and heterodyne whistles. The unit is connected directly from plate to B plus of first audio triode. This unit is designed to work in the plate circuit of low impedance tubes such as 01A, 12A, 30, 31, 26, 27, 37, 55, 56, 85, 262A, 864, 57 triode, 6C6 triode, 77 triode, etc. Net Price **$3.60**

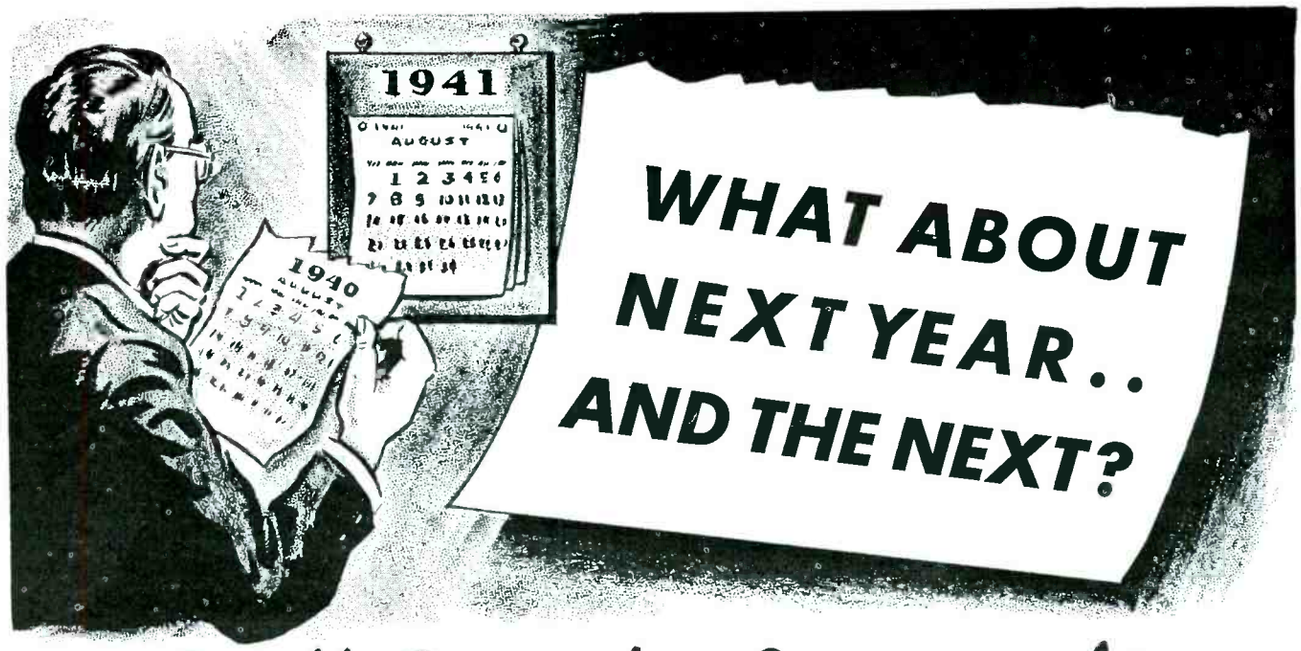
VT-10—Band pass filter for amateur service removes unnecessary low and how frequencies, reducing QRM, increasing efficiency and intelligibility. Connects in plate circuit of triode. Net Price..... **$6.00**

UNITED TRANSFORMER CORP.

150 VARICK STREET ★ NEW YORK, N. Y.

EXPORT DIVISION: 100 VARICK STREET NEW YORK, N. Y. CABLES: "ARLAB"

Model		Acme	Advance	Bond	Bright Star	Burgess	Eveready	General	National Union	Philco	Rayo-Vac	Usalite	Willard	Winchester
MONTGOMERY WARD (Montgomery Ward)														
403, 454, 1455, 555,	1A	...	...	...	...	...	...	4L1	...	...	...	...	4L1	...
2555, (15B3)	2B	330	267	3017	30—03	B30	762	V30B	B860	P305	P5303	624	V30B	6218
407, 461, 1461, 464,	1A	123M	447	...	465	4FL	...	3L1	...	...	P94L	642	3L1	...
1464, (14B11)	2B	430	...	...	30—55	A30	738	V30A	...	...	430P	621	V30A	...
565, 1565, 2565, (15B8)	1A	118	147	4829	860	8F	741	8F1	A833	P96	P96A	635	8F1	4819
	2B	330	267	3017	30—03	B30	762	V30B	B860	P305	P5303	624	V30B	6218
566, 2566, 569, 2569,	1A	...	2476	...	646	F4P1	...	4F4	...	...	P694A	639	4F4	...
(15B12)	2B	430	...	...	30—55	A30	738	V30A	...	...	430P	621	V30A	...
663, 668, 2663, 2668,														
(16B7), 672, 2672,	2A	123	647	4928	361	G3	746	3H3	...	...	P83A	683	3H3	4919
(16B10)	2B	330	267	3017	30—03	B30	762	V30B	B860	P305	P5303	624	V30B	6218
MOTOROLA (Galvin Manufacturing Corp.)														
41D, 41D1, 41D2, 51D,	1A	116	...	4824	660	6F	743	6F1	A831	P96	P96A	637	6F1	4814
51D1, 51D2, 52D, 52D1	2B	330	267	3017	30—03	B30	762	V30B	B860	P305	P5303	624	V30B	6218
41H	1A	114	247	4826	462	4F	742	4F1	A830	P94	P94A	634	4F1	4816
	2B	830	284	...	30—33	M30	482	...	B861	...	P5S30	640	...	...
41S (Sporter)	1A	...	...	...	....	2F	...	2F1	...	...	...	...	2F1	...
	1B	...	...	...	...	W2OP1	...	V20AAAG	...	...	...	...	...	...
	1B	...	...	...	...	W34	...	V34AAAG	...	...	...	...	...	...
57BP, 57BP1, —BP2,														
—BP4, 65BP, 65BP1,	2A	123	647	4928	361	G3	746	3H3	...	...	P83A	683	3H3	4919
—BP2, —BP3, —BP4	2B	830	284	...	30—33	M30	482	...	B861	...	P5S30	640	...	...
MUSIC-AIRE														
590-1A	1A	118S	817	4827	866	2F4	718	8F4	A834	...	P698A	638	8F4	4817
	2B	330	267	3017	30—03	B30	762	V30B	B860	P305	P5303	624	V30B	6218
NAMCO (Namco Manufacturing Co.)														
D110, D111, D112	1A	118S6	747	...	868	2F4L	747	8CF4	...	...	P698L	646	...	...
	2B	830	284	...	30—33	M30	482	...	B861	...	P5S30	640	...	...
PACKARD BELL (Packard Bell Co.)														
40	1A	114	247	4826	462	4F	742	4F1	A830	P94	P94A	634	4F1	4816
	2B	330	267	3017	30—03	B30	762	V30B	B860	P305	P5303	624	V30B	6218
40A, 40B	1A	...	2476	...	646	F4P1	...	4F4	...	...	P694A	639	4F4	...
	2B	330	267	3017	30—03	B30	762	V30B	B860	P305	P5303	624	V30B	6218
41	1AB	...	...	...	...	6TA60	...	...	...	...	...	...	...	...
54, 56A, 57A	1AB	460-15MS	...	...	...	2GA60	...	...	...	...	...	...	...	...
56, 57	1A	118FM	547	...	865	8FL	745	8CF1	...	...	P98L	645	...	...
	2B	830	284	...	30—33	M30	482	...	B861	...	P5S30	640	...	...
PHILCO (Philco Radio & Television Corp.)														
39-71T, 39-72T, 39-73T,														
39-74T, 39-504T	1A	114	247	4826	462	4F	742	4F1	A830	P94	P94A	634	4F1	4816
40-74T, 40-504T	2B	330	267	3017	30—03	B30	762	V30B	B860	P305	P5303	624	V30B	6218
40-81T, 40-82T,														
40-83T, PT63	1AB	442-4	41AD7	...	...	4GA42	...	41A4FL	...	P41A4FL	AB419	AB669	...	...
40-84T	1AB	...	...	...	...	...	...	...	...	P60A110	...	...	...	...
40-88T	1AB	...	...	...	...	6FA60	...	60A4L	...	P60A4L	AB84	AB667	...	...
41-81T, 41-83T	1AB	...	...	...	...	...	...	...	...	P41A4G	...	AB672	...	...
41-84T, 41-85T	1AB	...	...	...	...	...	...	...	...	P60A8F4	AB673	...	...	...
PT87, PT89	1AB	...	...	...	...	...	...	...	...	P89	...	...	...	...
PIERCE-AIRO (See De Wald)														
PILOT (Pilot Radio Corp.)														
TH11, TH12	1A	118	147	4829	860	8F	741	8F1	A833	P96	P96A	635	8F1	4819
	2B	330	267	3017	30—03	B30	762	V30B	B860	P305	P5303	624	V30B	6218
T71	1A	118S6	747	...	868	2F4L	747	8CF4	...	...	P698L	646	...	...
	2B	830	284	...	30—33	M30	482	...	B861	...	P5S30	640	...	...
T186, T187	2A	123	647	4928	361	G3	746	3H3	...	...	P83A	683	3H3	4919
	2B	830	284	...	30—33	M30	482	...	B861	...	P5S30	640	...	...
T1021	1A	...	...	...	461	...	...	...	...	...	...	...	...	...
	2B	...	...	...	30—50	Z30	738	V30AA	...	...	P7R30	...	V30AA	...
T1351	1A	...	...	...	661	...	...	...	...	...	...	...	...	...
	2B	...	...	...	30—50	A30M	...	...	...	...	...	...	...	...
T1451, T1452	1A	118	147	4829	860	8F	741	8F1	A833	P96	P96A	635	8F1	4819
	2B	330	267	3017	30—03	B30	762	V30B	B860	P305	P5303	624	V30B	6218
X1451, X1452, X1453	1A	118S	817	4827	866	2F4	718	8F4	A834	...	P698A	638	8F4	4817
	2B	330	267	3017	30—03	B30	762	V30B	B860	P305	P5303	624	V30B	6218
PLYMOUTH (See Wells-Gardner)														
PORT-O-MATIC (Port-O-Matic Corp.)														
BE27 Series	1A	118	147	4829	860	8F	741	8F1	A833	P96	P96A	635	8F1	4819
	2B	330	267	3017	30—03	B30	762	V30B	B860	P305	P5303	624	V30B	6218
U17A, U17C, USW17,	1A	114	247	4826	462	4F	742	4F1	A830	P94	P94A	634	4F1	4816
USW17A, USW17C	2B	330	267	3017	30—03	B30	762	V30B	B860	P305	P5303	624	V30B	6218
	1C	...	...	...	...	5540	773	...	...	P5B	...	...	...	...
PORT-O-RADIO (Ansley Radio Laboratories)														
M1	1AB	...	...	...	...	6TA60	...	...	...	...	...	...	...	...
RADIETTE (See Wells-Gardner)														
RCA VICTOR (RCA Manufacturing Co., Inc.)														
15BP Series,	1A	116	...	4824	660	6F	743	6F1	A831	P96	P96A	637	6F1	4814
RC527, RC527A	2B	830	284	...	30—33	M30	482	...	B861	...	P5S30	640	...	...
94PB Series, RC407,	1A	114	247	4826	462	4F	742	4F1	A830	P94	P94A	634	4F1	4816
RC410	2B	330	267	3017	30—03	B30	762	V30B	B860	P305	P5303	624	V30B	6218
BP10	1A	111	2	102	10M	D	950	D	D	D	2	1094	D	...
	1B	...	...	...	...	...	467	...	...	...	...	...	...	...
BP55, BP56,	1A	118S6	747	...	868	2F4L	747	8CF4	...	...	P698L	646	...	...
BP85, RC455	2B	830	284	...	30—33	M30	482	...	B861	...	P5S30	640	...	...



Will You be Prepared?

The new developments in radio are going to change the servicing business greatly . . . and quickly! Servicemen who are "on their toes" *this* year, in keeping up with these developments, will find increasing opportunities for profit *next* year and the *next* . . . while those who "put off" the necessary reading and study will be wondering why their business is slipping away from them. *Now* is the time to begin *your* study of these important subjects. A few minutes a day with these fascinating, authoritative, easy-to-understand books by John Rider will prepare *you* for the new opportunities already opening up. Read over the brief descriptions below and select the one that interests you most . . . then order it from your jobber *today!*

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4D	1A	118	147	4829	860	8F	741	8F1	A833	P96	P96A	635	8F1	4819
	2B	330	267	3017	30—03	B30	762	V30B	B860	P305	P5303	624	V30B	6218
RADOLEK (The Radolek Co.)														
17679, 17680	1A	114	247	4826	462	4F	742	4F1	A830	P94	P94A	634	4F1	4816
	2B	330	267	3017	30—03	B30	762	V30B	B860	P305	P5303	624	V30B	6218
17681	4A	111	2	102	10M	D	950	D	D	D	2	1094	D	...
	2B	330	267	3017	30—03	B30	762	V30B	B860	P305	P5303	624	V30B	6218
REMLER (Remler Co., Ltd.)														
92	1A	114	247	4826	462	4F	742	4F1	A830	P94	P94A	634	4F1	4816
	2B	330	267	3017	30—03	B30	762	V30B	B860	P305	P5303	624	V30B	6218
93	1AB	460-15MS	411	...	...	6TA60	...	60A2L	...	P41A4FL	...	AB665	...	...
94	1AB	460-15	411	...	...	5DA60	...	60A2L	...	...	...	AB665	...	...
95	1AB	860-41	411	...	...	5DA60	...	60A2L	...	...	...	AB665	...	...
RME (Radio Manufacturing Engineers, Inc.)														
ME14	1A	...	...	...	...	2FBP	...	...	...	...	...	...	...	...
	2B	...	...	...	...	Z30N	...	...	...	...	...	...	...	...
ST. REGIS														
263	1A	118	147	4829	860	8F	741	8F1	A833	96A	P96A	635	8F1	4819
	2B	830	284	...	30—33	M30	482	...	B861	...	P5S30	640	...	...
403	2A	123	647	4928	361	G3	746	3H3	...	...	P83A	683	3H3	4919
	2B	830	284	...	30—33	M30	482	...	B861	...	P5S30	640	...	...
SEARS ROEBUCK (See Silvertone)														
SENTINEL (Sentinel Radio Corp.)														
127BL, 151BL	1A	114	247	4826	462	4F	742	4F1	A830	P94	P94A	634	4F1	4816
	2B	330	267	3017	30—03	B30	762	V30B	B860	P305	P5303	624	V30B	6218
160BL, 170BL	1AB	...	...	...	...	4TA60	...	...	...	...	...	...	...	...
172BL, 202BL, 205BL	1A	118FM	547	...	865	8FL	745	8CF1	...	...	P98L	645	...	...
	2B	830	284	...	30—33	M30	482	...	B861	...	P5S30	640	...	...
178BL, RC181BL	1A	116	...	4824	660	6F	743	6F1	A831	P96	P96A	637	6F1	4814
	2B	330	267	3017	30—03	B30	762	V30B	B860	P305	P5303	624	V30B	6218
180XL (Early)	1A	...	2476	...	646	F4P1	...	4F4	...	...	P694A	639	4F4	...
	2B	330	267	3017	30—03	B30	762	V30B	B860	P305	P5303	624	V30B	6218
180XL (Late), 201XL	1A	118S	817	4827	866	2F4	718	8F4	A834	...	P698A	638	8F4	4817
	2B	330	267	3017	30—03	B30	762	V30B	B860	P305	P5303	624	V30B	6218
192XL, 213P	1A	118S6	747	...	868	2F4L	747	8CF4	...	...	P698L	646	...	...
	2B	830	284	...	30—33	M30	482	...	B861	...	P5S30	640	...	...
217P, 219P	2A	123	647	4928	361	G3	746	3H3	...	...	P83A	683	3H3	4919
	2B	830	284	...	30—33	M30	482	...	B861	...	P5S30	640	...	...

(*Continued on page* 34)

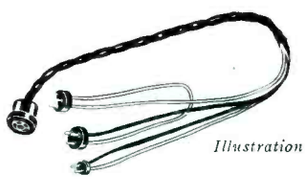
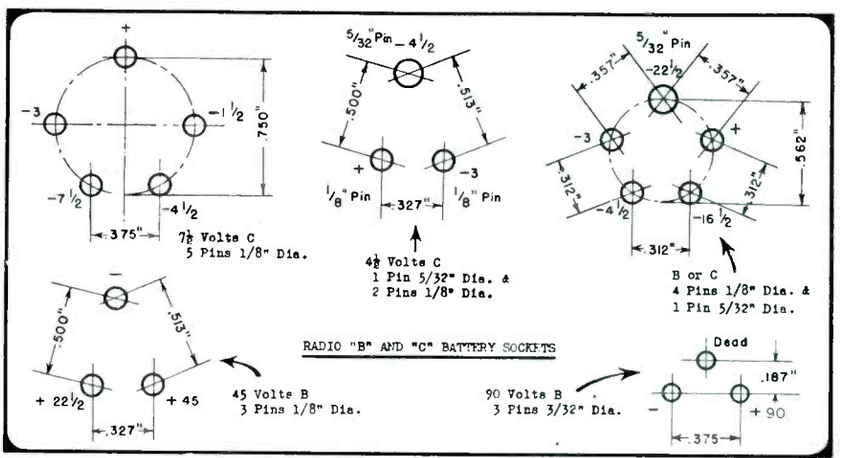


Fig. 9

Illustration courtesy Eby

A cable adaptor permits the substitution of individual A and B batteries in the place of a pack in many portables.

reap a toll of dissatisfied users and will undoubtedly boomerang back to the manufacturer. No customer enjoys going from store to store to obtain replacements nor is he particularly pleased to wait till they are shipped from the factory. Any dealer who stocks batteries with such a limited demand cannot help to pay a heavy loss due to depreciation and shelf life. . . . If he sells the stale batteries to his customers, as is often the case, the manufacturers will get the blame for poor design in the first place.



Figs. 5 (above) and 6 (below). RMA has proposed standards for battery plugs and sockets for portable receivers.

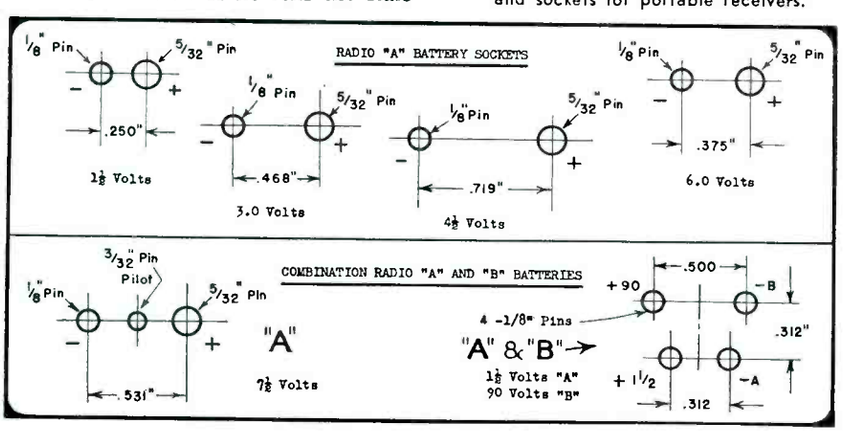
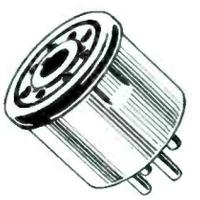


Fig. 8

Several manufacturers use special plugs for their battery cables. Standard packs can be substituted through the use of inexpensive adaptors.



Service Men are urged to recommend the purchase of portables which use standard batteries and to replace, wherever possible, packs and special batteries with standard units.

(*Charts continued on page* 34)

CIRCUITS

See Front Cover

By HENRY HOWARD

With the exception of frequency modulation, there hasn't been anything startling in the way of new circuits in the past year or so. In spite of this, however, there are many novel twists and kinks that improve the operation of the receiver, simplify its manufacture or give it greater freedom from trouble. Notwithstanding this supposed simplification and freedom from trouble, these unique features can prove the bane of a good Service Man's existence unless he familiarize himself with them sufficiently.

Airline O4BR615A

Ward's Airline Model O4BR615A is a 6-tube, a-c set with 2 bands. A 6SJ7 second i-f stage is added to the usual lineup: 6SA7, converter; 6SK7, first i-f; 6SQ7, second detector-first a-f, and 6V6GT, output. Besides serving as a second i-f stage this 6SJ7 is also used as a microphone preamplifier when recording from the mike. (See front cover.) Most manufacturers have been using a separate tube for this function. A crystal mike, loaded with a 1-meg resistor is continually in the grid circuit of the 6SJ7. Resistance coupling is used between the i-f stages to permit this arrangement. No sound from the mike can get through to the audio amplifier in radio position because the i-f transformer between the second i-f and detector won't pass audio frequencies. To permit audio to get through in the recorder position, a 0.01-mfd audio-coupling condenser is switched from the 6SJ7 plate to the hot side of the volume control. Radio signals are prevented from getting through in this position by opening the plate circuit of the first i-f tube. This also removes the plate load of this tube from the mike circuit during recording.

Note that the 0.0005-mfd, r-f by-pass condenser for the primary of the second i-f transformer has a value which is not ordinarily sufficient for an i-f by-pass condenser. A higher value in this position, however, would by-pass too much a-f when the stage is used as an audio amplifier. Sufficient isolation is rendered from the power supply by the 75,000-ohm audio plate resistor. In other words,

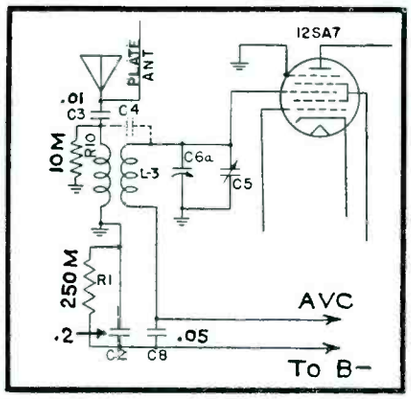
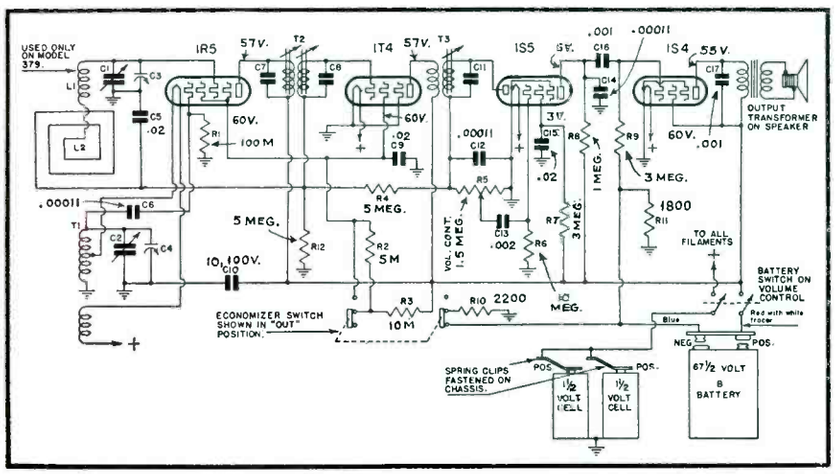


Fig. 2. (Above.) A metal plate, in place of the conventional cardboard back, picks up the antenna signal for the G.E. Models J501 and J502.

Fig. 4A. (Below.) With the models DU379 and DU380, Emerson has introduced their camera type portables. Miniature seven-pin base tubes are used.



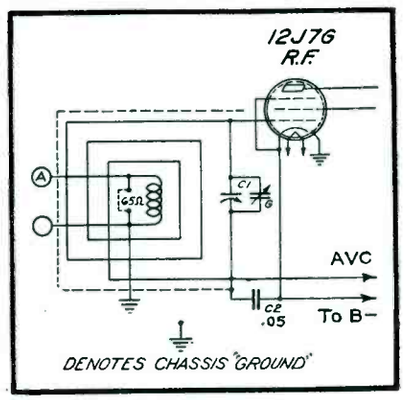


Fig. 3. Many manufacturers, of late, have used resistance coupling between the r-f and converter stages. Zenith, in the Models 6D510, 6D525, 6D526, uses an i-f trap between these stages. A novel antenna coupling circuit (shown above) is also used.

the resistor-condenser combination acts as an R-C filter, during radio operation, which is quite sufficient, whereas the condenser alone would not be.

For playback, the hot side of the volume control is switched to a crystal pick-up. An equalizer circuit (R_{16} and C_{23}) is used in series with the pick-up and a 1 meg load resistor is shunted across the volume control. As a change from most new recorders, a magnetic cutter is used. This permits feeding the cutter directly from the secondary of the output transformer. When crystal cutters are used, either a separate transformer or a third winding on the speaker output transformer is used in order to obtain a proper match.

The power consumption of the radio chassis is 70 watts while the motor draws 40 watts. We are glad to see the power rating of recorder motors on the increase. It is a healthy sign toward obtaining better quality records which are free from wows. Also, there is less difference in recording and playback speed (rpm) when a husky motor is used. This is very important when the amateur musician wants to accompany the record on an instrument which is not readily tuned. No recorder indicator is provided. However, the operator, after making a few trial tests and carefully following instructions, should be able to judge the correct amount of volume to be used.

G. E. J501, J501W, J502, J502W

General Electric Models J-501 and J-502, which are five-tube a-c, d-c superhet compacts, have an unusual antenna arrangement. In place of the conventional cardboard back there is a metal plate which serves as the antenna. Thus, no loop is used. In practically all cities where the local stations have a high level, there is sufficient pickup with this antenna. Where the sensitivity is inadequate, a Fahnstock clip is provid-

ed for an antenna bank. (See Fig. 2.)

Zenith 6D510, 6D525, 6D526 (Chas. 6A01, 6A10)

In certain areas of the country where local commercial stations transmit at or near the intermediate frequency (now, usually 455 kc) an objectionable amount of interference has been encountered. This is especially true for compacts and inadequately shielded sets. Loop sets are less subject to this type of interference; yet, such interference does exist. The ordinary antenna sets have long employed i-f wavetraps in the input circuit to minimize this annoyance but this has not been possible with sets using loops. Zenith has a solution for this in their a-c, d-c Models 6D510, 6D525, 6D526 (Chas. 6A01, 6A10) which are loop receivers equipped with an r-f stage. An i-f trap is here used between the r-f and converter stage where many manufacturers have used straight resistance coupling of late. (See Fig. 3.)

Emerson DU379, DU380 (Chas. DU)

The new Emerson camera models DU379 and DU380 have several interesting features (see Fig. 4.) On the converter stage, cathode feed back is used. This puts the filament at a high r-f potential. One side of the filament is fed through the oscillator coil; the other side must be fed through an r-f choke to maintain the high potential (to prevent the r-f from being grounded). Model 379 utilizes the shoulder strap as a loop antenna. If not worn around the shoulder, it is important that the strap be stretched into a loop of about the same width as the cabinet to provide sufficient pick-up and to maintain resonance or ganging. These sets have permeability tuned i-f stages. A battery economizer is provided which increases the bias on the power tube and also decreases the voltage on the i-f and converter screen grids. With normal operation, the set draws 7½ ma; with the economizer in operation, 5½ ma. Two 1½-volt flashlight cells are used in parallel for A supply. This is a good investment as it gives about 14-hours service compared to only about 5-hours service from a single cell. The 67½-volt B battery gives nominally 50 to 100 hours service, depending on the economizer switch position.

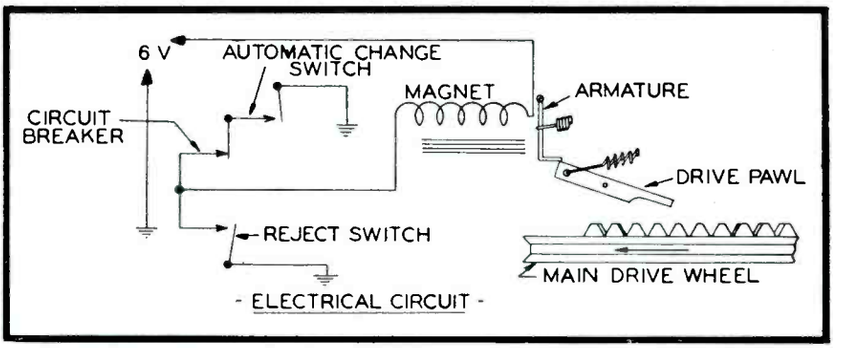


Fig. 7. (Above.) Motorola B2RC, B3RC and B4RC automatic record changers employ a solenoid operated mechanism to start the record changing cycle. Most other changers are entirely mechanical.

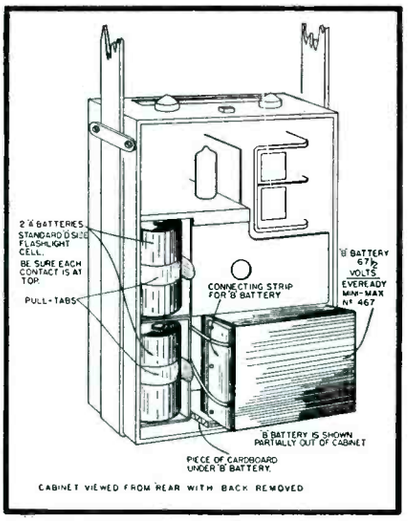
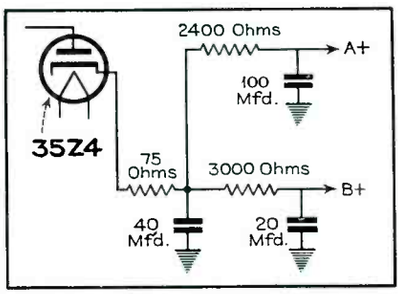


Fig. 4B. The Emerson Camera type portables employ two standard D size flashlight cells for filament (A) power. A Minimax 67½-volt B supplies plate power.

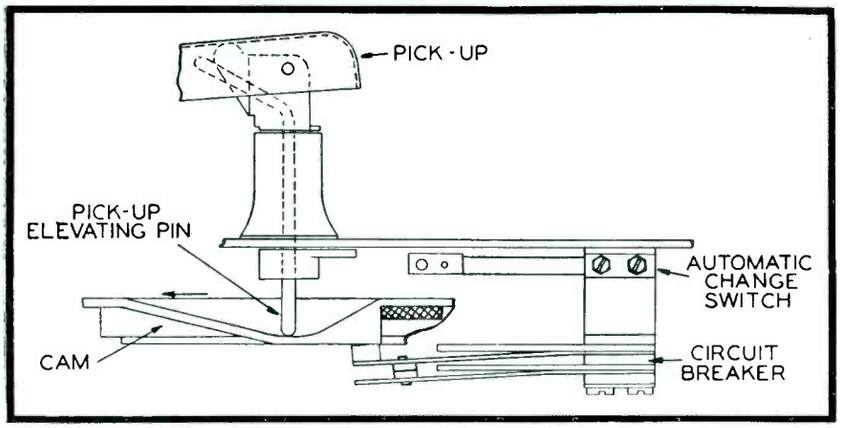
Fig. 5. (Below.) DeWald employs a 75-ohm resistor in series with the rectifier cathode to assure uniform filament voltage regardless of the type of power line on which the set is operated.



DeWald 545R

While on the subject of portables, DeWald has a simple, but very effective stunt for providing correct filament voltage in either a-c or d-c operation. Formerly, about 135 volts, d-c appeared across the first filter condenser when operated from a-c and about 115 volts when operated from d-c. If the manufacturer sets the voltage at 1.35 for a-c operation, only 1.15 volts were obtained on d-c operation, which is not enough for proper performance. On the other hand, when set at 1.35 volts for d-c, 1.6 volts were obtained on a-c, which is excessive. The solution was to maintain an equal voltage across the first filter section for both a-c and d-c operation. A proper value resistor in series with the rectifier is all that was needed (combined with the proper value of the first filter section). See Fig. 5, showing the values used in the DeWald Model 545R. On d-c, the 75-ohm resistor acts simply as an anti-surge series resistor, dropping the voltage a few volts. On a-c, the 40-mfd filter condenser draws sufficient a-c component that the voltage is dropped (through the 75 ohms) to the same value as on d-c.

Fig. 8. An elevating pin rides up an inclination and raises the pickup, lifting the needle from the record.



G. E. JM23 Wireless Record Player

General Electric has a new wireless record player, Model JM23, which features an entirely self-contained radiating capacity antenna which is non-directional. This eliminates the necessity of changing the position of the player to

(*Continued on page 27*)

BOOK REVIEWS

PERPETUAL TROUBLE SHOOTER'S MANUAL, Volume XI, by John F. Rider, published by John F. Rider, publisher, 404 Fourth Ave., New York City, 1940, 1652 *pages,* 8½ *x* 11, $10.00.

Following the editorial policy of Volume X, the 1652 pages of Volume XI include schematics, chassis layouts, wiring diagrams, complete alignment and voltage data, sensitivity and gain measurements and parts lists . . . in fact, everything that will assist the Service Man.

Once again, this year, saving in space has been effected in many instances by lettering in voltage values on the schematics and alignment frequencies on the chassis layouts that show the locations of the trimmers. As a result of this, Volume XI contains considerably more data for its number of pages than earlier volumes.

Contrary to previous practice, however, the index which accompanies each manual lists only that data which is found in Volume XI, except where additional material is included in this manual for models already listed in previous volumes. In these latter cases, reference is also made to the earlier listings. All chassis numbers are cross-referenced to the model numbers and if more than one model number is used with a chassis, these are listed numerically and referred to the lowest number in the group.

Bound with the index is a new "How It Works" section. This section contains explanation of the more important circuit refinements that are to be found in the 1940 receivers and will help to clarify service problems which these refinements will present.

With every copy of Rider's Volume XI is supplied a Service Man's Vest-Pocket Manual, which contains the frequency ranges covered by the push-buttons of all receivers in which electrical automatic tuning is incorporated; a complete set of diagrams of tube socket connections with index and list of interchangeable tube types; color codings of condensers, resistors, transformers, field and output circuits; a table for the computation of mark-up; a decibel conversion chart and other data which a Service Man will find invaluable both in the field and in his shop.

It is this reviewer's opinion that Rider's Manuals are as essential as the Service Man's soldering iron or voltmeter.

L. M.

RECEIVING TUBE CHARACTERISTICS CHART AND SOCKET CONNECTIONS 1275B, prepared by the Commercial Engineering Section, RCA Manufacturing Co., Inc., Harrison, N. J., 1940, 12 *pages,* 8½ *by* 11, *self covers, free to readers of* SERVICE.

This new chart retains the convenient booklet form of the preceding edition, but has been made larger to facilitate filing. It gives characteristics data on all RCA glass, glass-octal, octalox, and metal types in numerical-alphabetical order. The first two pages show a classification of the types according to their cathode voltages and their functions. This classification will assist the tube user in identifying type numbers and in choosing a tube type for an application. The last two pages show socket connections with RMA designations (4AD, 4B, 4C, etc.).

The Receiving Tube Characteristics Chart is highly recommended. R. H.

SERVICE At Your Door

By CHARLES HURT

Fig. 1. (Left) The Trailer Radio Shop, Elkhart, Ind., serves as a shop for Charles Hurt and features "Service at Your Door."

AFTER having been in business for a number of years without really making a living, I finally began to ask myself why. What could I do to establish more efficient operation? This was definitely not an easy problem since my financial resources were limited.

As a first step I established a system of bookkeeping capable of showing the relationship of sales to cost. I had already learned that I would have to make a profit on every transaction in order to stay in business; my books were to help me set prices that would insure profit.

A survey of business possibilities and competition in this community showed, that while the former were distinctly limited to the area which I could profitably service, the latter seemed to be practically limitless. To add to this one sided picture (against me), one shop enjoyed the advantage of having a number of men working under one overhead and several others were willing to subsidize service work for the merchandising possibilities. I could well see that any one of these organizations, if they cared to press their advantage, could easily force me out of the picture, with my one man organization and limited resources.

I could have no confidence in the future, if my business was to be at the mercy of such forces which seemed beyond my control. My problem was to increase my efficiency so that I might compete in price and at the same time to increase my service area so that I would not be entirely dependent on those areas which might be thrown open to disastrous competition. It was at this point that I conceived of the idea of a trailer radio shop with "Service at Your Door," as a slogan.

A simple check convinced me that the maintenance costs for a trailer are cheaper than those for a shop and the saving in time and expense due to the elimination of pickup and delivery would increase my efficiency tremendously. There would also be an advantage in that I could shift my service area whenever necessary. No further convincing was necessary. I obtained the trailer (shown in Fig. 1) and got to work in earnest.

Having established what I considered the ideal one man shop, I was confronted with the necessity of establishing an advertising and sales policy. A large part of my previous trade had been walk-in customers and I realized that unless I took preventative measures, I would lose this business. I decided that mailing cards offering free tube testing in the home and stressing "Service at Your Door" would probably intercept a good deal of this trade. I also employ house to house canvassing, but I must confess that I have never found an easy way to canvass. Although the customer is curious she is also suspicious. You must work smooth and fast.

The method I use to canvass, which has enjoyed limited success, is as follows: After a short introduction, I hold the attention of the person who answers the door by presenting her with an item of some small value, such as a calendar or a log book. I inquire if she has heard of the Trailer Radio Shop and go on to explain how, instead of her taking her radio to the shop, we bring the shop to her radio. During this conversation I make sure to explain that this saves her time and money while it still insures A1 service.

At first thought this type of canvassing seemed to be extremely extravagant with my time, until I realized that my time was really a liability unless I could sell it profitably. Of course, if I ever get so busy that I can no longer pursue this policy of canvassing then I might advertise in newspapers and telephone directories. But then, if I am that busy, advertising would probably be unnecessary.

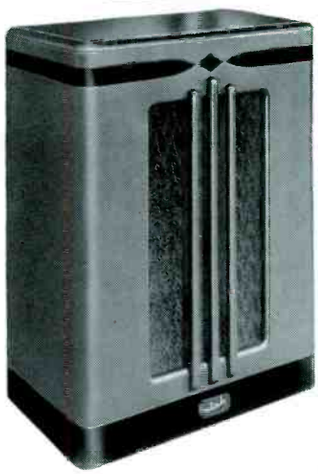
Although I have not as yet reached this stage, I have enough trade to make time saving important on every job. In this connection I have found that argument was a non-productive time consuming element. I have decided to do my best to eliminate all cause for argument. To stop the chiseler who only wants an estimate as a basis for argument, I charge a small fee for inspection and estimate. The inspection fee is very small and the customer who is really anxious to have his set fixed generally does not object to it. It often helps clinch the job, since the customer would have to pay this part anyhow whether he decided to go through with the repair, or not.

I have found that presentation of the estimate is also very important. There are two reasons why a customer may reject your estimate. He may have no confidence in your ability to do the job, or he may feel that your price is too high. Your problem is to present your estimate in such a manner as to leave no doubt that you know what you are talking about. You must also prepare your customer for the size, or that is to say, the amount, of your estimate. In spite of your customer's complete confusion at technical terms, you should cloak your explanation with enough of such terms as to convince her that at least **you** know something about the maze of intricate circuits that comprise her radio set. Show her the little screws on top of the tuning condensers and inside the i-f cans. Impress her with the delicate nature of the adjustments . . . which only an expert with your years of experience can adjust properly. Before you can finish you will be asked, "How much?" If you have given her the proper spiel you should hear a sigh of relief when you tell her how *little*.

In extending credit, I have found that there are two types of credit risks: Those to whom credit is a convenience, and those to whom it is a necessity. The first group has caused me little or no trouble. I have never extended credit to the second group unless they can make a substantial down payment and a promise of further payment on a definite date. I make it very clear that I will call to collect on that date. Even with these precautions I still have an occasional credit loss.

With every phase of my business fitted to a definite policy it is a simple matter to keep things moving at top efficiency in a well oiled routine. Any interruption of that routine can immediately be noticed and corrective measures applied. I am now in a position to make a profit or to know the reason why.

PUBLIC ADDRESS REPRODUCERS
GET THE VOTE!



● You, too, will give the new Utah Public Address Reproducers your vote when you see and hear them. They have won the immediate acceptance and approval of the industry.

Through these new reproducers, Utah engineering and precision manufacturing have again scored an outstanding triumph. They include the latest and most worthwhile refinements in sound equipment construction. They provide an easy means of profitably meeting the most exacting requirements.

Utah's NEW BAFLEX REPRODUCER

In the new Utah Baflex Reproducer, Utah engineering has incorporated all the latest developments and improvements of reproducers for public address systems, schools, colleges, taverns, dance halls, auditoriums, clubs, etc. They are available in four models.

These new Utah Public Address Reproducers are marked by a total absence of "back radiation." There is no distortion in the greatly improved bass response. *Two models are especially designed for television and Frequency Modulation receivers* which require a wide audio frequency range. The frequency response has a range up to approx. 9500 cycles per second.

The cabinets are of sturdy, extra-heavy construction, scientifically designed to eliminate cabinet vibration and resonance. The cabinet design is strikingly modern, with an attractive, durable satin bronze finish.

THE NEW *Utah* BI-DIRECTIONAL SPEAKERS

The Utah Bi-Directional Speaker embodying the latest speaker design and construction features, has been especially developed and engineered for factory call and paging systems.

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Utah's NEW WALL REPRODUCER

The new Utah Wall Reproducer is the effective solution for sound systems that require a reproducer for music as well as voice. Its low price makes it an economical one as well. The finish blends with any decorative scheme.

The tone quality has been immeasurably improved by the molded, non-metallic housing. Ideal coverage of a given area is assured because of the scientifically engineered angle of this new Utah Wall Reproducer.

AND 107 OTHER UTAH SPEAKERS

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SPEAKERS

VIBRATORS • TRANSFORMERS • UTAH-CARTER PARTS

SOUND IDEAS

By JAY ALLEN

Fig. 3. A control tower operator at LaGuardia Field, New York City, announces the impending arrival of a skyliner over the sound system at the airport. The dispatcher (seated) has been in constant communication with the incoming plane and thus is able to pass on information as to its probable time of arrival to friends waiting to greet the plane's passengers.

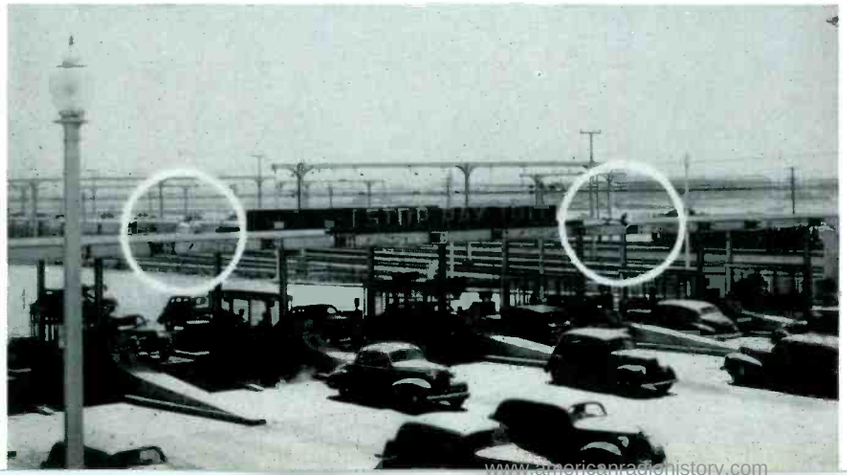
Photo courtesy Western Electric

Fig. 2. (Above) The world's largest bridge uses five sound systems to guide traffic along the proper ramps. Trucks are separated from passenger cars along the bridge just ahead of the toll booths shown below.

Photo courtesy Atlas Sound

Fig. 1. (Below) Speakers are mounted directly above the toll booths and are operated from a system which is controlled by a police sergeant at a master traffic control station.

Photo courtesy Atlas Sound



FIVE sound systems have been installed on the San Francisco-Oakland Bay Bridge. Fig. 1 shows the Toll Plaza on the Oakland side of the bridge. After passing through the toll gates, the traffic can travel on either the upper or lower decks of the bridge. The lower deck is reserved exclusively for trucks and commercial vehicles and the upper deck for passenger cars. The amplifier system is used to warn cars off the lower deck entrance if, by mistake, they should attempt to take this lane.

Atlas Sound exponential projectors with permanent-magnet compression units are mounted directly above the toll gates and are directed towards entrances to the different traffic lanes. The speakers are of the 6-foot trumpet type, each with a capacity of 25 watts and are driven by a 50-watt Remler amplifier. A dynamic microphone is used. The microphone and operating controls are located in the main toll office where an observer directs the traffic.

Further along the bridge (Fig. 2) a series of speakers are mounted (such as the one shown on the light tower in the illustration) to further separate the cars and trucks.

At the San Francisco bridge entrances, two similar amplifiers are used together with dynamic microphones. These operate into special marine type folded horn speakers.

Two additional amplifier systems, with dynamic microphones and folded horn speakers, are employed at the vehicle roads leading off the bridge to the Golden Gate International Exposition at Treasure Island. These roads are approximately in the middle of the bridge.

A novel use for these systems is proposed for the Christmas Holidays when it is planned to play Christmas Carols by means of commercial recordings.

The entire system was installed by the Remler Company, Ltd., San Francisco, Calif., in cooperation with San Francisco-Oakland Bridge Engineers.

New York's municipal airport, LaGuardia Field, has been equipped with

an announcing system to bring information as to the arrival and departure of skyliners to every portion of the field where passengers or their waiting friends may gather. Eighty-five speakers in the Administration Building and on the loading platform broadcast announcements which originate at microphones located at 15 different information centers. The field engineering as well as the installation of the entire system was done by the Langevin Company.

From the control tower (Fig. 3), which is in constant communication with planes headed for the field, comes information as to the time of arrival of each flight. Five microphones located at the ticket counters of the four airlines and at the information desk in the rotunda of the Administration Building are used to announce the time and place of impending departures and to page passengers. (See Fig. 4.) In offices at nine of the 14 gates of the loading platform are similar microphones used for the same purpose and to call taxis and porters. (See Fig. 5.)

Each microphone is equipped with a "press-to-talk" switch which makes the whole system available to but one microphone at a time and eliminates interruptions.

The specially designed speakers on the loading platform have a 360-degree area of coverage and are so arranged that the output of any one blends naturally with the others and does not compete for the listener's ears. The rotunda of the Administration Building (Fig. 4) is covered by three Western Electric Cobra horns mounted in the dome, while all the other public rooms in the building are reached by wall speakers mounted behind ornamental grilles.

The system employs Western Electric amplifiers of three different types. One 119A and two 116A's serve the entire installation, while four 118A power amplifiers, one for the three Cobra horns, one for the 52 speakers in the Administration Building and two for the loading platform speakers complete the system.

The rush installation requirements of a typical rental job were met in the manner shown in Fig. 6. Cinaudagraph infinite baffle speakers mounted on telescoping floor stands were simply placed in one carner of the hall and faced away from the microphones. An electronic piano, used during the evening, was also placed in this corner. Political rallies should provide ample opportunity for similar installations in the fall.

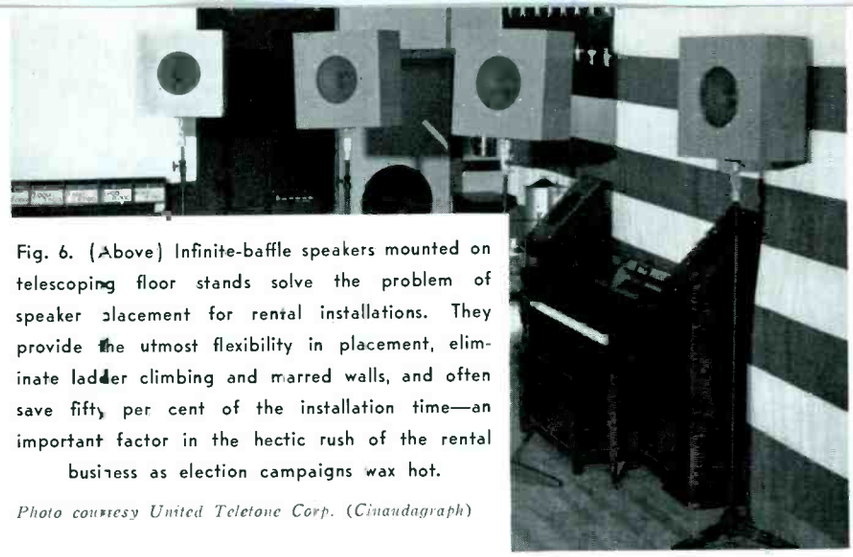


Fig. 6. (Above) Infinite-baffle speakers mounted on telescoping floor stands solve the problem of speaker placement for rental installations. They provide the utmost flexibility in placement, eliminate ladder climbing and marred walls, and often save fifty per cent of the installation time—an important factor in the hectic rush of the rental business as election campaigns wax hot.

Photo courtesy United Teletone Corp. (Cinaudagraph)

Fig. 5. (Above) An airline employee at one of the gates on the loading ramp at LaGuardia airport announces the impending departure of a plane. Over the same announcing system he may page late passengers and his voice will be heard in every part of the field where passengers may gather.

Photographs from Western Electric Co.

Fig. 4. (Right) Passengers in the rotunda of the Administration Building at LaGuardia Field are kept informed as to impending arrival and departure of planes by means of three loudspeakers which may be seen mounted in the dome. These speakers, known as Cobra horns, have a very wide area of coverage.

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NOISELESS ANTENNAE

Noiseless antennae of every type have been available for the crowded cities, as well as for rural and suburban installations, for many years. With the recent tendency toward loops, however, these have been more or less relegated to the background. Perhaps it is for this reason that several interesting facts concerning antennae have not been brought to the attention of the Service Man.

Noiseless antennae have been perfected to such an extent that the more recent crop present an overall net gain in signal strength, in addition to their noise reducing qualities, when compared with a similar standard antenna devoid of these features. (See Fig. 1.)

The large majority of noiseless antenna systems are so adapted that by the use of extra set couplers additional receivers can be connected and operated from the same aerial simultaneously.

The number of listeners with more than one receiver is growing daily. Thus, with more than a single set to operate from it, the antenna installation should be that much easier to sell. Modern electrically operated households present a man-made radio interference problem wherever the high-lines ride. A good noise-reducing antenna, properly installed will easily overcome the greater percentage of this noise. A simple demonstration will convince even the most hardened cynic.

Taco 476, 215FM, 225FM

The collector for an antenna designed to cover the f-m, standard broadcast and short-wave bands, may be of different design and Taco has available either of the following: a dipole, each leg approximately ¼-wave length (62-in) of the middle of the 42-50-mc band; a doublet with 30-ft on each side of the transformer; or an L-type antenna 50-ft long. (See accompanying illustrations.)

In either case the transformer system used at the antenna and at the set end of the transmission line will be similar in operation, although slightly different in design. As a typical construction in the 62-in dipole collector, and the transformers used with it, the antenna transformer is connected in the transmission line 6-ft down from the collector rods. The reason is to obtain additional aerial pickup for the standard broadcast and short-wave bands.

The system operates as follows: For the f-m band, the 62-in doublet operates as a dipole and a circulating current is set up through transformer A, which transformer transfers the energy to its secondary. This secondary current passes through condensers C1 and C2,

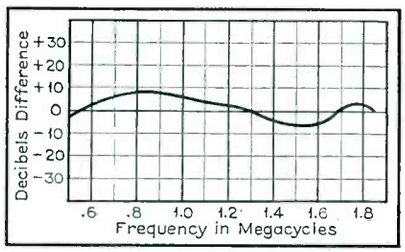


Fig. 1. A properly installed antenna of the noise reducing type will deliver an average net gain in input signal level over an antenna of the same dimensions without noise reducing transformers.

through the transmission line, through the primary of transformer D of the set transformer, through condensers C4 and C5 and back to the antenna transformer through the second conductor in the transmission line, completing the circuit. In the set transformer the energy transferred from the primary to the secondary in transformer D will supply the emf for the f-m band in the receiver. Two short leads are available for connection to the receiver.

For the short-wave bands from 3 to 25 mc the energy collected in the 62-in dipole and the 6-ft transmission line, which in this case acts as part of the aerial, passes through the primary of transformer B through condenser C3 to ground. The transfer of the energy in transformer B will set up a circulating current in its secondary which will pass through condenser C2, through the transmission line, through the few turns of transformer D, through transformer E and condenser C5, back through the second conductor of the transmission line to the antenna transformer, completing the circuit through transformer A. A voltage is generated in the secondary of the transformer D which forms the emf for the short-wave bands in the receiver connected to the A-G terminals.

The standard broadcast-band signals are transferred through the transformers C and F, same as described above. A slight energy tranfer of the broadcast signals will take place in transformers B and E and precaution is taken in the designing of the transformers so that these voltages are adding rather than bucking the main voltages generated by transformers C and F in the broadcast band. As noticed, the set transformer is designed with separate terminals for the f-m and a-m bands which design will take care of most set inputs available on the market today.

The 30-ft—30-ft doublet type antenna such as used in the 215FM antenna system uses a modification of the above mentioned transformer system. In the antenna coupler, the transformer A covers both the f-m and short-wave bands through a special design of the transformer. Therefore, both the f-m and S-W bands pass through the same transformer, through condenser C1 and down through the transmission line to the set transformer as described before. The same type of set transformer is used in all three systems. The broadcast energy transferred in transformer B is picked up by the 30-ft—30-ft collector and brought down through the primary of transformer B, to ground. The secondary cirulating current set up in transformer B is transferred to the set transformer through the transmission line, same as described before.

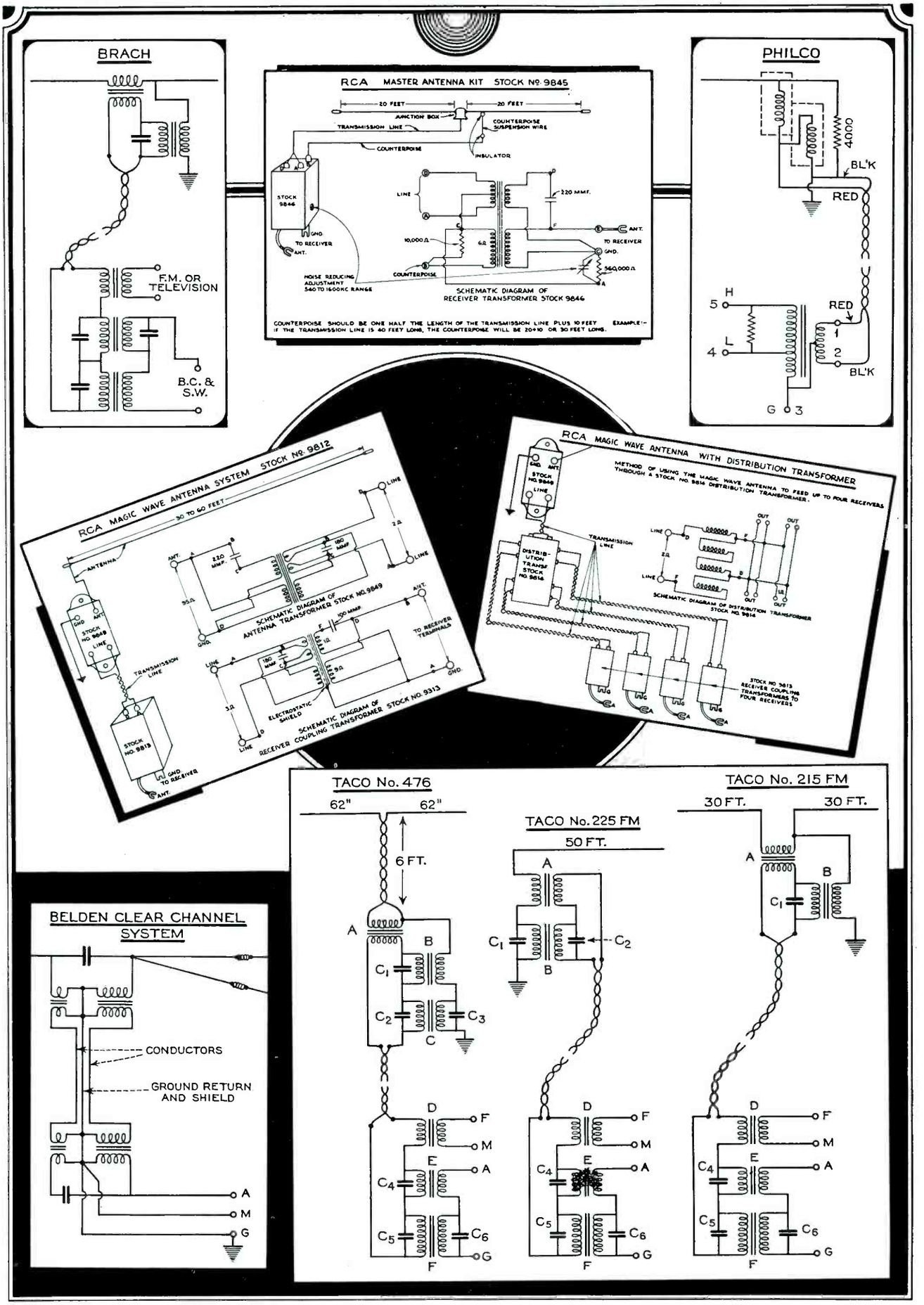
A slightly different construction is used in the 225-FM type antenna where the f-m and the short-wave signals are passing from the L-type collector through transformer A, through condenser C1, to ground. The secondary currents are transferred to the radio set the same as described before.

The advantage of a long antenna as used by 215FM or 225FM kits, is that the longer collector picks up a stronger signal in the standard broadcast and the short-wave bands. This type of antenna is for use where emphasis is placed on the standard broadcast and short-wave reception and where a strong f-m signal is available.

The disadvantage of this type of antennae, however, for f-m reception is the difficulty in elevating the antenna high enough above the ground and the inability to readily turn it in the proper direction towards the transmitting station for maximum pickup.

Brach Combination Antennae

Brach has introduced several antennae, the more recent types of which can be used for the reception of both f-m and a-m signals. (See accompanying illustrations.) These types consist of a quarter-wave dipole, connected to the primary of an antenna coupler. One side of the dipole is connected to a special winding on the aerial transformer; the other end of this winding is



grounded. This winding is coupled to a secondary which is connected across a condenser that is in series with the uhf secondary and the transmission line. On uhf the impedance of the special winding is high and little signal is by-passed through it. The impedance of the condenser across the secondary winding, however, is negligible and it effectively shorts the latter. For uhf, therefore, the system acts as a simple quarter-wave dipole.

For the broadcast and short-wave bands the special winding by-passes some signal and aids somewhat in giving the effect of additional length to the flat top.

The set coupler is designed with suitable windings, and four terminals in accordance with the practice followed on the combination f-m and a-m receivers which have separate posts for f-m and a-m antennae.

Belden 8300 Clear Channel System

The Belden 8300 Clear Channel antenna system consists of four parts: The antenna; antenna coupler; transmission line and the receiver coupler.

The antenna has two parts. First, a flat top or L-type section 60-feet long and, second, an additional half doublet (which responds most efficiently to the 31 meter band).

The transmission line is a 2-channel type comprising two conductors and a shield. The shield is common to both channels and also encloses the two rubber covered wires. This shield or third conductor is also the common ground wire of the antenna circuit.

The coupling system is shown in the schematic on the accompanying chart. Connections are made from the junction point of the two antennae legs to the condenser and long-wave primary winding. The opposite side of the condenser connects to the short-wave primary. The other ends of both short- and long-wave primaries are connected to the shield of the transmission line, making it the common conductor for the ground of the antenna circuit. One end of each short- and long-wave secondary of the coupler is connected to the shield of the transmission line, with the other ends connected to the twisted pair. This method of circuit coupling makes the surge impedance between the individual conductors and the shield more important than the impedance between the conductors. In the 8300 couplers the surge impedance between the conductors and the shield is approximately 37 ohms or about half the impedance between the conductors.

It will be noticed that separate lines are used to bring the short- and long-

(*Continued on page 25*)

P-M SPEAKERS

By M. HELLER

In many cases where an enterprising Service Man is called upon to administer to an ailing receiver, he will give his customer just a little extra. This additional service, not only brings more profits immediately, but, causing a marked improvement in performance, will increase his prestige with his customer

THE advantages of p-m speakers for universal replacement in compacts are not generally realized. It seems to us, the customer benefits as much as the Service Man when p-ms are substituted for electro-dynamics. See if you don't think so after our analysis.

(1) With alnico and similar alloy magnets, more field energy (higher flux density in the voice-coil air gap) is provided than is ordinarily available in the average size electro-dynamic speaker. This will permit greater power output from the set as well as improving the sensitivity and low-frequency response of the speaker. In replacing magnetic speakers now being used in some cheap midgets, the improvement in sensitivity, quality, and power output will be very marked. In most cases, a p-m speaker will do a better job than the electro that it replaces.

(2) An obvious advantage is the elimination of open field problems especially in high-resistance speakers wound with very small wire. Sets used near the water, or in any damp climate are particularly prone to this trouble. Then there is no need for a hum-bucking, or neutralizing coil. Where a shunt field had been used, eliminating the field load lessens the current drain on the rectifier tube and also, in time, saves the customer something on the power bill. Eliminating the field load also raises the B voltages, allowing greater sensitivity and increased power output.

(3) A small stock will suffice for universal replacement purposes since there is no need of a variety of field resistances. P-ms require less space than electros, too. Hence, problems of installation in close spots should be minimized. Having no field coils, there is no heat developed—an important factor in midget receivers. P-ms are fully dust-proof, eliminating the possibility of rattles due to dust particles. Also, a p-m equipped

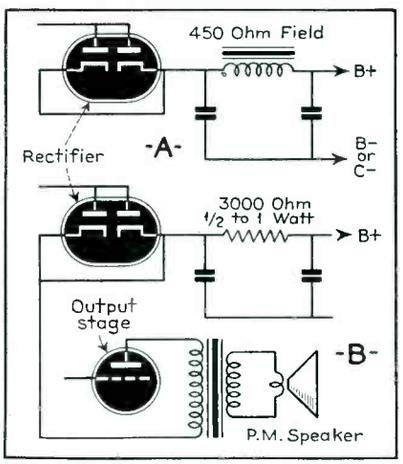


Fig. 1. A-c, d-c receivers that employ a 450-ohm, or similar, electro-dynamic speakers require the addition of an r-c filter when a p-m is used as a substitute. It may also be necessary to increase the capactiy of the filter condensers.

set is mode modern—according to present trends.

There are a few cases where exact duplicate speakers must be used. With a little thought, however, and minor changes in design, all types of electromagnetic speakers can be replaced with p-ms. They may be fitted to most auto sets, saving from 1 to 1½ amps battery drain when replacing an electro-dynamic.

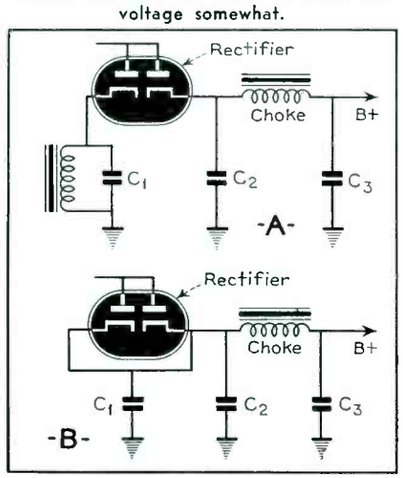
P-ms also make handy microphones suitable for limited p-a work, radio nurse or interoffice communication systems, etc. The smaller diameter speakers are preferable, giving good quality at a high output level.

Fig. 1 shows the changes necessary in replacing a series-field speaker with a p-m. A choke could be substituted for the field coil, no other changes being necessary. However, the arrangement shown at B will usually prove entirely satisfactory and is a lot more economical. A resistor of the order of 3,000 ohms is substituted for the field and the power tube plate voltage is now derived directly from the filter input. If the current through the filter resistor is 10 ma or less ($I^2R = 0.3$ watt) a ½-watt resistor is adequate. If greater than 10 ma, a 1 watt should be used.

Fig. 2 shows the changes required in replacing a shunt field speaker. At A, the field had its own separate B supply which is usually the case. The two rectifier cathodes are tied together thereby dividing the load and halving the internal resistance. The tube life will be increased after substitution and the B voltage raised a little. The shunt field filter condenser C_1 should be used to help along the B filter. If a choke had been used, it may as well be let alone, the power tube deriving voltage from the filter output. However, it may be permissible to substitute a resistor, as in Fig. 1, switching the power tube to the filter input.

A p-m speaker may be substituted directly for a magnetic, no changes being necessary.

Fig. 2. In a-c, d-c sets which employ a speaker field which is connected to one of the diodes of the rectifier with a separate filter condenser, no additional parts are required. The cathode formerly connected to the field, together with its condenser, can be tied to the plate supply circuits where it will serve to boost the voltage somewhat.



NOISELESS ANTENNAE

(*Continued from page 23*)

wave signals to the receiver coupler.

As many as four receiver couplers can be used with one Clear Channel antenna.

RCA Magic-Wave System

The RCA Magic-Wave antenna system is a noise-reducing system that can be applied to any installation where noise pickup on the down lead is a serious problem. The couplers are so designed that they can be connected to an existing flat top from 30 to 60 ft in length or to a vertical antenna, such as a rod or pipe, over 30-ft long. Any number up to 16 outlets can be used with a single antenna without too great attenuation.

Magnetite-core couplers are used with a simple dual primary and triple secondary designed to cover the bands from 530 kc to 23 mc. A lightning arrestor is built into the antenna coupler.

RCA Master Kit

In locations where practically every possible spot for antenna installation is a source for noise interference as well as signal, this antenna system would seem to be quite the thing. A simple doublet antenna with 20-ft arms is employed. This doublet is connected directly to a twisted pair transmission line. The later terminates in a special receiver coupling transformer. In addition to these usual components the system utilizes a counterpoise which is so located that it purposely picks up a good noise component with very little signal. This counterpoise has a length that is ten feet more than half the transmission line. It feeds noise voltage into the receiver coupler.

An adjustment is provided, on the set coupler, which permits balancing the phase of this noise voltage so that it will cancel that picked up by the antenna proper. The antenna is, therefore, not dependent upon its location for its noise reducing properties. This system is recommended, by RCA, for use where extreme local noise cannot be overcome by the usual type of noise reducing system.

In addition to the types described RCA has several others chiefly designed for multiple and apartment house installation.

Philco Tuned Lead-In

The Philco tuned lead-in system is designed for use with all types of aerials, including the standard L or flat top and the Philco Safety Aerial. The system is also recommended for multiple set operation from a single aerial. It is only necessary to connect additional set couplers to the transmission line to accommodate up to four additional receivers from one aerial.

The system includes the two couplers, one for the aerial and one for the set, and a twisted pair transmission lead. In extremely noisy locations an additional ground lead may be connected to the aerial coupler at the roof. A short bare lead is provided for this purpose at the bottom of the aerial coupler. The connections are shown in the accompanying illustration.

When it is desired to operate more than one receiver from the antenna, the additional set couplers are connected in parallel across the transmission line.

JACKSON TUBE TESTER

Jackson Electrical Instrument Co., 122 Wayne Ave., Dayton, Ohio, have introduced their Model 636 Dynamic tube tester. Full range filament selection, with voltages marked on the front panel, is provided. Roll-chart index is also on the front panel. Additional information and prices may be obtained directly from Jackson.

MICROPHONE SWITCH

The new Atlas Sound "Break-In" switch offers on-off or press-to-talk operation. Button is pressed for press-to-talk operation, and turned for on-off switching. For all microphones or circuits having single conductor shielded cable connections. Completely wired and can be instantly attached to microphone; chassis connector; or anywhere in the microphone cable line by using a male and female connector. Atlas Sound Corp., 1449 39 St., Brooklyn, N. Y.

NEW TUBES CK505, CK505X

THE CK505 and CK505X are miniature pentode type amplifier tubes designed for use as voltage amplifiers in applications where extremely small size and low battery drain

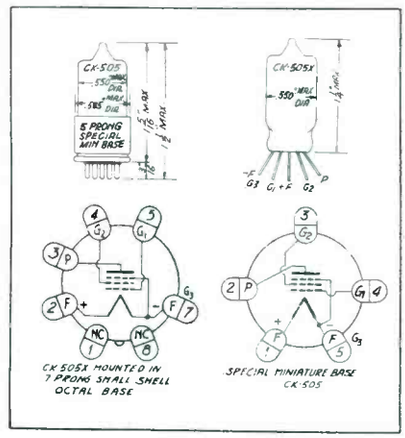
are the primary tube requirements. The CK505 is equipped with a special miniature base. The CK505X has tinned copper leads for direct soldering and is supplied with a removable standard octal base to facilitate retesting.

Interelectrode Capacitances (Approx.)

Grid to plate	0.25 mmfd
Input	2.5 mmfd
Output	3.5 mmfd

Ratings

Maximum filament voltage supply must not exceed	0.78 v
Mean filament voltage	0.625 v
Maximum plate voltage	45 v
Maximum screen voltage	45 v



Typical Operation (Class A)

	Impedance Coupled	Resistance Coupled		
Filament voltage*	0.625 d-c	0.625 d-c	0.625 d-c	v
Filament current	0.030	0.030	0.030	amp
Plate voltage	30	45	30‡	v
Screen voltage	30	45	30‡	v
Grid Bias†	0	—1.25	0	v
Plate resist. (approx.)	1.1	2.0	—	meg
Transconductance	140	150	—	mmhos
Plate current	0.17	0.2	.020	ma
Screen current	0.07	0.08	.007	ma
Voltage amplification	—	—	15	—

* The filaments of two tubes may be operated in series directly from a single small flashlight cell. If larger cells are used or if other factors cause the mean battery voltage to exceed 1.25 volts computed over the normal battery life, a series filament resistor should be used to reduce the mean filament voltage to 1.25 volts for the two tubes in series.

† Grid circuit returned to negative filament. The d.c. resistance in the grid circuit should not be less than 5 megohms.

‡ Supply voltage. Plate resistor: 1 megohm. Screen resistor: 2 megohms by-passed with 0.01 mfd. Coupling condenser: 0.01 mfd.

(*Continued from page* 14)

get maximum transmission to the receiver. (See Fig. 6.)

Frequency Modulation

Following the FCC frequency assignment for frequency modulation, Stewart-Warner announces a new series of

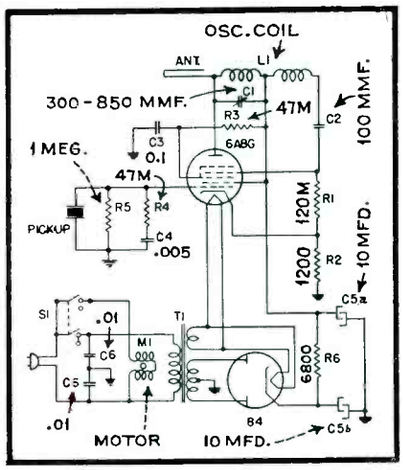


Fig. 6. G. E. has introduced a new wireless record player, the Model JM23, which employs a non-directional antenna radiator.

receivers to cover the entire f-m band. Some f-m receivers already sold cover only a small portion of the new 42-50-mc band.

While on the subject of f-m, in order to demonstrate the freedom from noise interference provided by an f-m receiver at any time and anywhere, General Electric has put out a dealer demonstrator outfit. It consists of a standard G. E. f-m, a-m receiver, two wireless record players and an electric-razor-

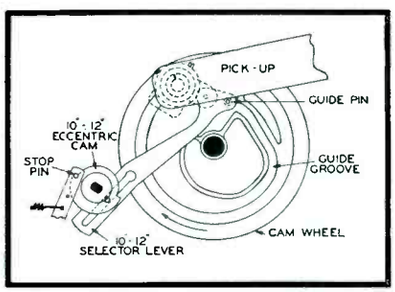


Fig. 9. At the end of the record the pickup guide pin rides in a groove that causes the pickup to swing out beyond the edge of the record.

noise-factory. A new f-m wireless record player, Model JM31, was developed for this demonstration unit. Both players are equipped with the same record. With the receiver volume adjusted to the same level on each band, the interference device is allowed to operate continuously, causing local interference which overcomes the signal from the conventional record player but does not affect the f-m signal.

Motorola B2RC, B3RC B4RC Automatic Record Changers

As phonographs and the record business are leaping ahead, so are recorders and automatic record changers following suit. Thus, it behooves the Service Man to dig into the innards of these items and know what makes them tick. As production increases and prices come down within the reach of the average consumer, automatic record changers will be the rule rather than the exception. The alert Service Man will have to brush up on his mechanics for these changers are mechanical marvels, having few, if any, electrical parts. The new Motorola changers are novel in that a solenoid operated mechanism starts the changing cycle. We can't very well cover the entire action here but a few points may be of interest.

When the needle enters the eccentric groove at the end of a record, the pickup oscillates slightly, which in turn causes the automatic change switch to make contact. The first momentary contact is all that is necessary to start the changing cycle as this contact ener-

gizes a small electro magnet. The magnet pulls an armature back out of the way, permitting a drive pawl which is mounted on the cam wheel to fall down and engage in one of the notches which are provided on the upper surface of the main drive wheel. (See Fig 7.) Since the main drive wheel is already revolving, the engagement of the pawl now causes the cam wheel to revolve with it. When the cam wheel starts to revolve, it causes several things to happen. In the first few degrees of revolution, it opens a circuit breaker switch (see Figs. 7 and 8) which de-energizes the magnet to prevent chattering. The next few degrees of rotation causes the pickup elevating pin to ride up an inclined section of the cam, thereby elevating the pickup and lifting the needle from the record. (See Fig. 8). Next, the pickup guide pin rides in the guide groove on top of the cam wheel, causing the pickup to swing out beyond the edge of the record so that it will be out of the way when the next record falls upon the turntable. (See Fig. 9).

The cam wheel continues to revolve, and at another point on its circumference a roller on the end of the trip lever rides up an inclined section of the cam. The other end of the trip lever bears against the push rod which operates the record release, located near the top of the spindle, causing it to push the next record off its support. The groove in the top of the cam now brings the pickup back over the edge of the record and the elevating pin rides down another incline, permitting the needle to settle gently in the first groove of the record. The cam has completed one full revolution. When the needle touches the record, the drive pawl hits the magnet armature, disengaging it from the notch in the drive wheel, stopping the cam. The turntable continues to revolve and play the record. A simple, clever job; yet, one which may easily be put on the bum by a tinkerer.

HARPER ADVISES B OF E

The Board of Education of the City of New York announce the appointment of Sam Harper, 63-12 Haring Street, Rego Park, L. I., New York, as special personnel advisor to represent the radio industry on the Emergency Defense Training Service Program. Mr. Harper is manufacturer's representative in the metropolitan area for Turner Co., Kainer Co., Sterling Manufacturing Co., and Pauley-James Co.

CLARION SOUND SYSTEM

The Clarion Model CS45 31-watt sound system incorporates four inputs, built-in phono mechanism, master gain control, bass and treble equalizers, VI meter (or optional monitor speaker) dual speaker outlets, 12-in p-m speakers and remote control. Eight tubes are used in all. Microphone gain is said to be 118 db; overall response, 40 to 12,000 cycles. Additional details and prices may be obtained from Transformer Corp. of America, 69 Wooster St., New York City.

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JEFFERSON CATALOG

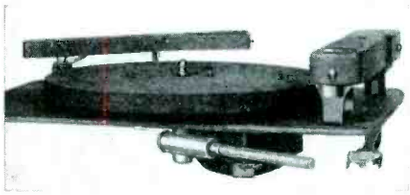
Jefferson Electric Co., Bellwood, Ill., have recently published a 16-page catalog illustrating and describing their line of transformers, chokes and speaker field supplies. Copies may be obtained directly from Jefferson.

WILCOX-GAY DISTRIBUTORS

Wilcox-Gay Corp., Charlotte, Mich., announce that hereafter Recordio disc distributor contracts will not be confined to Wilcox-Gay Recordia distributors, but will be extended to other wholesalers.

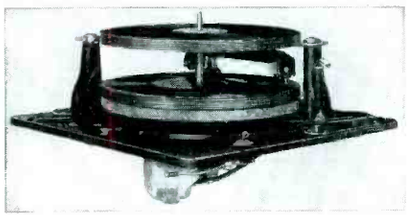
GENERAL INDUSTRIES EQUIPMENT

Requests for descriptive literature on General Industries Model GIC120 drop type record changer unit and the Model GIR70 home recording assembly are in-



vited by the General Industries Co., Elyria, Ohio.

The GIC120 and the GIR70 are supplied ready to install, mounted on a suitable base plate. The record changer assembly includes direct-drive motor, with turntable, cycling switch and tangent tracking crystal pickup with a balance arm. It has a ca-



pacity of ten 12-in. records or twelve 10-in. records. The recorder consists of cutter and cutter feed mechanism, pickup, rim-drive motor and 10-in. weighted turntable with retractable record driving pin.

READRITE BIGBOY MULTIMETER

Readrite Big-Boy Model 860 volt-ohm-milliammeter provides a 6-in. scale for 14 ranges in d-c volts, at 1,000-ohms-per volt;

in a-c volts, at 400-ohms-per-volt; in d-c milliamperes and in ohms. Additional information may be obtained directly from Readrite Meter Works, Bluffton, Ohio.

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TRIPLETT TUBE TESTER

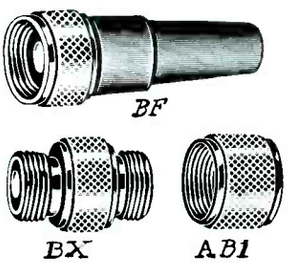
A lever type switch, in the Triplett Model 1620 tube tester, gives individual control for each tube prong and takes care of roaming elements, dual-cathode structures, multi-purpose types, etc. The panel is divided into four separate sections which may be individually replaced in the advent

of radically new changes in tube design. The four sections are: sockets; meter; roll chart, and switching and power supply.

Additional information and prices may be obtained directly from Triplett Electrical Instrument Co., Bluffton, Ohio.

BRUNO CONNECTORS

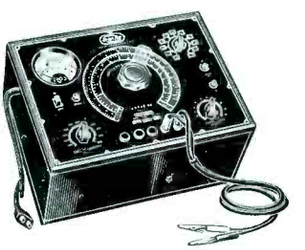
Bruno Baby connectors are of the locking type and are designed for output or speaker connections. They are equipped with ½ in. 27 thread to prevent inadvertent mixing



with the input cables. Complete literature on these and other Bruno products by writing to Selectar Mfg. Corp., 30 West 15th St., New York City.

SOLAR EXAM-ETER

The new Model CE Solar capacitor Exam-eter measures condensers both in and out of the circuit, tests for shorts, opens, high r-f impedance, and inter-



mittents, it is said. A capacity and resistance bridge, megohmeter and milliammeter are also provided. Additional information and prices may be obtained directly from Solar Mfg. Corp., Bayonne, N. J.

ERWOOD AMPLIFIERS

Erwood Sound Equipment Co., 224 W. Huron St., Chicago, have announced two 6-volt 110-volt amplifiers. The Model 1414, 14-watt unit and the Model 2428, 28-watt unit.

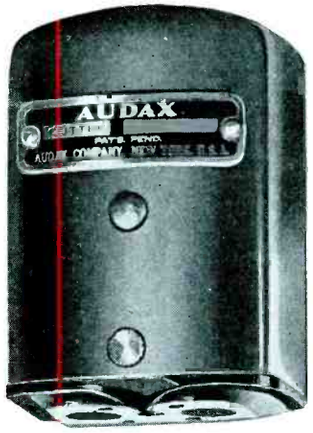
The Model 1414 is available in two forms, either with built-in turntable, or the amplifier chassis only. It has provision for use of one microphone and one pickup, and in addition has a tone control to equalize response characteristics.

The Model 2428 has facilities for the use of two microphones as well as a built-in record playing mechanism. Provision is made for continuously varying either high- or low-frequency response.

Output impedance for both models is variable to accommodate a variety of speaker installations. To change from a-c operation to 6-volt operation, all that is required is to change power cables.

AUDAK CUTTER

The Audak Co., 500 Fifth Ave., New York City, announce a High Fidelity cutter which, it is said, overcomes distortion



and has a flat response to over 9,000 cycles. The new cutter is available in three models: H2, H3, and H4, in various price ranges. A descriptive bulletin may be obtained directly from Audak.

HICKOK SIGNAL GENERATOR

The Hickok Model 188X universal crystal-controlled signal generator covers a range from 100 kc to 133 mc on fundamentals with 12 output selections. These include: Electronic controlled wide-band frequency modulated output with 750-kc sweep for alignment of frequency modulation and television receivers; frequency modulated output, internally modulated, at 400 cycles with FCC standard frequency modulation sweep (150-kc for servicing and checking f-m receivers; amplitude modulated output as well as narrow-band frequency modulation (30-kc sweep) for servicing amplitude modulation receivers; audio-frequency outputs of 400 cycle fixed and 50 to 10,000 cycle variable; crystal-controlled outputs, modulated or unmodulated with frequency coverage from 100 kc

to 10 mc in 100-kc steps and from 1000 kc to 150 mc in 1-mc steps plus synchronized sweep voltage for oscillograph use.

The oscillator includes a built-in power supply consisting of a transformer, rectifier and filter for 110-volt, a-c line, 40 to 65 cycles.

For further details write The Hickok Electrical Instrument Co., 10514 Dupont Ave., Cleveland, Ohio.

WEBSTER-CHICAGO MICROPHONE

Webster Company, 5622 Blomingdale Ave., Chicago, have enlarged their Microphone line. Among the recent additions, the Uni-Vel microphone, features cardioid directional characteristics which permit favorable pickup under reverberatory conditions without background noise or feedback, it is said. The microphone is housed

in a streamline black and chrome case.

Write for catalog 140, which illustrates and describes this and other new Webster-Chicago microphones.

MEISSNER F-M RECEIVERS

Meissner Manufacturing Co., Mt. Carmel, Ill., have announced two f-m receivers, a console model 9-1037, and a table model 9-1023. Both models employ 12-tube chassis and have a range from 42 to 50 mc. Power output is 6-watts, approx., undistorted, the selectivity is rated at 170 kc broad at twice the signal, and the sensitivity 10 microvolts average.

IRC NONINDUCTIVE RESISTORS

A line of commercially noninductive power wire wound resistors, from 10 to 200 wats, and with any type of mounting, has been announced by the International

Resistance Co., 401 N. Broad St., Philadelphia, Pa.

These units utilize the Ayrton-Perry type of winding which eliminates large differences in potential as well as high capacitances which may exist between adjacent turns on windings of other types, it is said.

All features of standard IRC power wire wound resistors including the climate-proof IRC coatings are included in the new noninductive units. IRC resistance data bulletins IV and IVA are available upon request.

UTAH BAFLEX SPEAKERS

The Utah Baflex reproducer is available in four models, two of which are designed to have a frequency response up to 9,500 cycles for f-m and television sound. These reproducers are marked by a total absence of back radiation, it is said, and the cabinets are of extra-heavy construction, scientifically designed to eliminate cabinet vibration and resonance. The cabinet design is modern with a durable satin-bronze finish.

Additional information on this and other Utah products may be obtained directly from Utah.

TELEVISO BULLETIN

Televiso Products, Inc., have issued a bulletin entitled "Instruments for Measurement of Electronic Devices." It discusses a vacuum-tube voltmeter, microvolter, beat-frequency oscillator, signal generator, decibelometer and an audio spectrum divider. Copies of the bulletin are available from the above organization. Write to them at 1135 N. Cicero Ave., Chicago.

MALLORY NOISE FILTERS

P. R. Mallory & Co., Inc., Indianapolis, Ind., have introduced a line of noise filters of various types. Heavy duty filters in standard cut-out boxes, for use with equipment permanently connected to the power line or which draws a minimum of 10 amperes or more, are included. Type ZA1, for example, is a capacity and inductance combination using house wiring as an antenna. Field-tested recommendations in

technical data folder NF100 tell the correct type and size of Mallory filter to install in order to overcome a given character and intensity of interference, it is said. Write for it today.

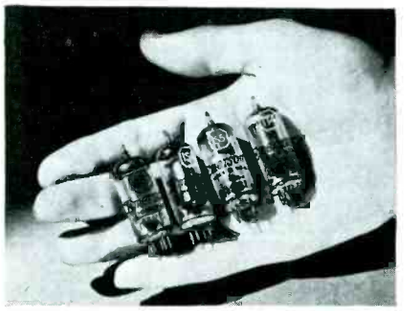
MONTGOMERY WARD PREAMPLIFIER

The Montgomery Ward Professional Airline preamplifier provides six input channels which permit the use of four microphones at one time and either one of two pickups. The unit can be operated up to a mile from the main amplifier, it is said. Two tone booster controls allow emphasis of either the low bass or the high treble, or both. Four microphone input controls regulate input level. A master phono control and an overall gain control are also provided.

Additional information can be found in Montgomery Ward's catalog "Simplified Sound Systems," available upon request from Montgomery Ward & Co., Dept. S39, Chicago.

EMERSON MINIATURE TUBES

Emerson Radio & Phonograph Corp., 111 Eighth Ave., New York City, have announced 4 miniature tubes for battery op-



eration. These types are the 1R5, pentagrid converter; 1S4, power amplifier pentode; 1S5, diode pentode; and the 1T4, super-control r-f amplifier pentode. This complement is used in the new Emerson "Camera" type portables, Models DU379 and DU380.

MULDOWNY REELECTED PRESIDENT OF NU

Reelection of S. W. Muldowny as president of National Union Radio Corp. was announced recently, after the organization meeting of the Board of Directors. At the same time W. R. Wilson was named treasurer, and E. O. Sandstrom, formerly acting secretary, was elected secretary and assistant treasurer.

UTC CATALOG

Bulletin PS404 incorporates a complete listing of the 1940-1941 United Transformer Corp. line including equalizers and filters. Ouncer series, plug-in high-fidelity audio units, UTC microphone cable transformers, automatic voltage regulators, Varitran controls, amplifier circuits and kits. Also grid-cathode modulation components and kits. UTC transformers are available for broadcast, aircraft, industrial, amateur and replacement service. Catalogs are available on request directly from United Transformer Corp., 150 Varick St., New York City.

F-M LITERATURE

Meissner Manufacturing Co., Mt. Carmel, Ill., are issuing a complete series of bulletins which illustrate and describe their various f-m kits and parts. Circuit and construction details are given together with design notes and theoretical considerations.

Copies of these bulletins are available without charge to readers of SERVICE, directly from Meissner.

PRESTO MERCHANDISING AIDS

Presto Recording Corp., 242 W. 55th St., New York City, have developed a set of merchandising aids to help their dealers and Service Men sell recording discs and needles. These sales aids include a metal container display cabinet, window display posters, disc order cards and mats for local newspaper advertising. Additional information may be obtained directly from Presto.

TALKAPHONE MOVES

Talk-A-Phone Mfg. Co., manufacturers of intercommunication systems and amplifiers, have moved to 1219 W. Van Buren St., Chicago.

LAFAYETTE CATALOG

Lafayette Radio Corp. (formerly Wholesale Radio Service Co., Inc.), 100 Sixth Ave., New York City, have their 196 page, 1941 master catalog (No. 82) ready for distribution. The pages are devoted to radio equipment, parts, sets and tools for the Service Man, amateur and experimenter. Copies may be obtained directly from Lafayette.

SYLVANIA WINDOW STREAMER

A three color political window streamer to help Sylvania Service Men promote the sale of Sylvania tubes during the present presidential campaign is announced by Hygrade Sylvania Corp. Caricatures of the Republican Elephant and the Democratic Donkey add a lively touch to the copy. The American color scheme, red, white and blue, gives the Sylvania window poster a patriotic, cheerful spirit. It measures 36 inches by 12 inches.

RISSI BROS. MOVES

With the opening of new quarters at 1112 W. Warren Ave., Detroit, Mich., Rissi Bros., Inc., announce a new 200-page net-price catalog. Service Men can now obtain quicker service at both the main store in Detroit as well as at the branch in Grand Rapids, it is said.

SUN RADIO CATALOG

Sun Radio Co., 212 Fulton St., New York City, has just released a 24-page public-address catalog. Among the equipment described and illustrated are amplifiers and sound systems of nearly every type and classification, including portable systems, mobile systems and complete indoor and outdoor installations suitable for the small auditorium or the large arena or stadium.

Meissner general sales meeting at Mt. Carmel, Ill., held just before the recent trade show. A number of the latest Meissner products were discussed at this meeting.

REPLACEMENT BATTERIES FOR PORTABLES

(*Continued from page 12*)

Model		Acme	Advance	Bond	Bright Star	Burgess		Eveready	Gen-eral	National Union	Philco	Rayo-Vac	Usalite		Wil-lard	Win-chester
SETCHELL-CARLSON (Setchell-Carlson, Inc.)																
55	4A	111	2	102	10M	D	950	D	D	D	D	2	1094		D	...
	2B	330	267	3017	30—03	B30	762	V30B	B860	P305	P5303		624		V30B	6218
66 (no B Bat.)	5A	111	2	102	10M	D	950	D	D	D	2		1094		D	...
SKY CHEF (Sky Chief Radio Corp.)																
A212, A213, 216	1A	114	247	4826	462	4F	742	4F1	A830	P94	P94A		634		4F1	4816
	2B	330	267	3017	30—03	B30	762	V30B	B860	P305	P5303		624		V30B	6218
215, 218	1A	118	147	4829	860	8F	741	8F1	A833	...	...		635		8F1	4819
	2B	330	267	3017	30—03	B30	762	V30B	B860	P305	P5303		624		V30B	6218
217, 221	1A	115S	...	...	...	...	...	...	...	...	...		633		...	...
	2B	330	267	3017	30—03	B30	762	V30B	B860	P305	P5303		624		V30B	6218
219	1A	114S3	...	...	...	...	...	...	...	...	...		...		...	...
	2B	330	267	3017	30—03	B30	762	V30B	B860	P305	P5303		624		V30B	6218
222	1A	123M	...	...	465	4FL	...	...	...	...	...	P94L	642		...	...
	2B	330	267	3017	30—03	B30	762	V30B	B860	P305	P5303		624		V30B	6218
225	1AB	460-15S	...	...	...	...	...	60A5D5	...	...	...		...		...	...
226	1A	115S	...	...	...	...	...	...	...	...	...		633		...	...
	2B	830	284	...	30—33	M30	482	...	B861	...	P5S30		640		...	...
SILVERTONE (Sears, Roebuck & Co.)																
6256, 6266, 6273, 6274	1A	114	247	4826	462	4F	742	4F1	A830	P94	P94A		634		4F1	4816
6372, 6541	2B	330	267	3017	30—03	B30	762	V30B	B860	P305	P5303		624		V30B	6218
6551, 6751	1A	...	...	...	...	...	...	...	...	...	...		643		...	...
	2B	830	284	...	30—33	M30	482	...	B861	...	P5S30		640		...	...
6561, 6661, 6721, 6761	2A	123	647	4928	361	G3	746	3H3	...	...	P83A		683		3H3	4919
	2B	330	267	3017	30—03	B30	762	V30B	B860	P305	P5303		624		V30B	6218
6651	1A	116	...	4824	660	6F	743	6F1	A831	P96	P96A		637		6F1	4814
	2B	330	267	3017	30—03	B30	762	V30B	B860	P305	P5303		624		V30B	6218
7814	1A	...	2476	...	646	F4PI	...	4F4	...	...	P694A		639		4F4	...
	2B	330	267	3017	30—03	B30	762	V30B	B860	P305	P5303		624		V30B	6218
SKY HAWK																
3910	1A	116	...	4824	660	6F	743	6F1	A831	P96	P96A		637		6F1	4814
	2B	330	267	3017	30—03	B30	762	V30B	B860	P305	P5303		624		V30B	6218
SOLTER																
	1A	114	247	4826	462	4F	742	4F1	A830	P94	P94A		634		4F1	4816
	2B	330	267	3017	30—03	B30	762	V30B	B860	P305	P5303		624		V30B	6218
SONORA (Sonora Radio & Television Corp.)																
400, 805	6A	111	2	102	10M	D	950	D	D	D	2		1094		D	...
	2B	330	267	3017	30—03	B30	762	V30B	B860	P305	P5303		624		V30B	6218
KB73, KD75	1A	118S6	747	...	868	2F4L	747	8CF4	...	...	P6986		646		...	...
	2B	830	284	...	30—33	M30	482	...	B861	...	P5S30		640		...	...
KG80 (Candid)	3A	111	2	102	10M	D	950	D	D	D	2		1094		D	...
	1B	...	...	...	...	Z30	738	V30AA	...	...	P7R30		...		V30AA	...
PL29, PL37	1A	114	247	4826	462	4F	742	4F1	A830	P94	P94A		634		4F1	4816
	2B	330	267	3017	30—03	B30	762	V30B	B860	P305	P5303		624		V30B	6218
XL28, XL29	1AB	460-15	411	...	....	5DA60	...	60A2L	...	...	..		AB665		...	...
SOUNDVIEW MARINE (Karns-White Corp.)																
400, 510, 805	6A	111	2	102	10M	D	950	D	D	D	2		1094		D	...
	2B	330	267	3017	30—03	B30	762	V30B	B860	P305	P5303		624		V30B	6218
SPARTON (Sparks-Withington Co.)																
410-1	1A	118	147	4829	860	8F	741	8F1	A833	P96	P96A		635		8F1	4819
	2B	330	267	3017	30—03	B30	762	V30B	B860	P305	P5303		624		V30B	6218
549-1	1A	114	247	4826	462	4F	742	4F1	A830	P94	P94A		634		4F1	4816
	2B	330	267	3017	30—03	B30	762	V30B	B860	P305	P5303		624		V30B	6218
590-1, 590-1C	1A	118S	817	4827	866	2F4	718	8F4	A834	...	P698A		638		8F4	4817
	2B	330	267	3017	30—03	B30	762	V30B	B860	P305	P5303		624		V30B	6218
591-1	1A	...	2476	...	646	F4P1	...	4F4	...	...	P694A		639		4F4	...
	2B	330	267	3017	30—03	B30	762	V30B	B860	P305	P5303		624		V30B	6218
STEWART WARNER (Stewart-Warner Corp.)																
02-4A* Series. 05-5X,	1A	116	...	4824	660	6F	743	6F1	A831	P96	P96A		637		6F1	4814
(02-4A1 to 02-4A9)	2B	...	...	...	...	...	727	F30A	...	...	BB30P		...		...	...
02-41 Series,	1A	114	247	4826	462	4F	742	4F1	A830	P94	P94A		634		4F1	4816
(02-411 to 02-419)	2B	330	267	3017	30—03	B30	762	V30B	A860	P305	P5303		624		V30B	6218
05-5L Series,	1A	118FM	547	...	865	8FL	745	8CF1	...	...	P98L		645		...	...
(05-5L1 to 05-5L9)	2B	830	284	...	30—33	M30	482	...	B861	...	P5S30		640		...	...
15-5X1	1A	118S6	747	...	868	2F4L	747	8CF4	...	...	P698L		646		...	...
	2B	830	284	...	30—33	M30	482	...	B861	...	P5S30		640		...	...
STROMBERG-CARLSON (Stromberg-Carlson Telephone Manufacturing Co.)																
402H, P30990	1A	118	147	4829	860	8F	741	8F1	A833	P96	P96A		635		8F1	4819
	2B	830	284	...	30—33	M30	482	...	B861	...	P5S30		640		...	...
SUPERMACY R. H. Macy & Co. (See Wells-Gardner & Garod)										**SYMPHONY** (See Wells-Gardner)						
TELEX (Telex Radio & Television Co.)																
P5	1A	118S6	747	...	868	2F4L	747	8CF4	...	...	P698L		646		...	...
	2B	830	287	...	30—33	M30	482	...	B861	...	P5S30		640		...	...
TEMPOTONE (Barker Bros.)																
93	1AB	460-15	411	...	...	5DA60	...	60A2L	...	...	...		AB665		...	...
TRANSITONE (See Philco)										**TRAVEL MATE** (See Packard Bell)						

Model		Acme	Advance	Bond	Bright Star	Burgess	Eveready	General	National Union	Philco	Rayovac	Usalite	Willard	Winchester
TRAV-LER (Trav-ler Radio & Television Co.)														
553, 554, 1555, (Also B and BT Nos.)	1A	114	247	4826	462	4F	742	4F1	A830	P94	P94A	634	4F1	4816
	2B	330	267	3017	30—03	B30	762	V30B	B860	P305	P5303	624	V30B	6218
556, 1556, B71, B80, B81, B82, FB73... (Also B and BT Nos.)	1A	118S	817	4827	866	2F4	718	8F4	A834	...	P698A	638	8F4	4817
	2B	330	267	3017	30—03	B30	762	V30B	B860	P305	P5303	624	V30B	6218
B70	1A	...	2476	...	646	F4P1	...	4F4	...	...	P694A	639	4F4	...
	2B	430	...	...	30—55	A30	738	V30A	...	...	430P	621	V30A	...
WELLS-GARDNER (Wells-Gardner & Co.) (All numbers cover entire series)														
4B5, 5B3, 5B8, 5B9...	1A	118	147	4829	860	8F	741	8F1	A833	P96	P96A	635	8F1	4819
	2B	330	267	3017	30—03	B30	762	V30B	B860	P305	P5303	624	V30B	6218
4B11	1A	123M	447	...	465	4FL	...	3L1	...	...	P94L	642	...	...
	2B	430	...	...	30—55	A30	738	V30A	...	...	430P	621	V30A	..
5B12	1A	...	2476	...	646	F4P1	...	4F4	...	...	P694A	639	4F4	...
	2B	430	...	...	30—55	A30	738	V30A	...	...	430P	621	V30A	...
6B7, 6B10	2A	123	647	4928	361	G3	746	3H3	...	...	P83A	683	3H3	4919
	2B	330	267	3017	30—03	B30	762	V30B	B860	P305	P5303	624	430B	6218
WESTINGHOUSE (Westinghouse Electric Supply Co.)														
WR166, WR674, RC410A	1A	114	247	4826	462	4F	742	4F1	A830	P94	P94A	634	4F1	4816
	2B	330	267	3017	30—03	B30	762	V30B	B860	P305	P5303	624	V30B	6218
WR675, WR675A, RC433	1A	118	147	4829	860	8F	741	8F1	A833	P96	P96A	635	8F1	4819
	2B	330	267	3017	30—03	B30	762	V30B	B860	P305	P5303	624	V30B	6218
WR676, WR678, WR679, RC455A	1A	118S6	747	...	868	2F4L	747	8CF4	...	...	P698L	646	...	...
	2B	830	284	...	30—33	M30	482	...	B861	...	P5S30	640	...	...
WR680	2A	123	647	4928	361	G3	746	3H3	...	...	P83A	683	3H3	4919
	2B	830	284	...	30—33	M30	482	...	B861	...	P5S30	640	...	...
WILCOX-GAY (Wilcox-Gay Corp.)														
A73	1A	...	2476	...	646	F4P1	747	4F4	...	...	P694A	639	4F4	...
	2B	330	267	3017	30—03	B30	482	V30B	B860	P305	P5303	624	V30B	6218
ZENITH (Zenith Radio Corp.) (All model numbers include entire series)														
4K400, 5416	1A	114	247	4826	462	4F	742	4F1	A830	P94	P94A	634	4F1	4816
	2B	330	267	3017	30—03	B30	762	V30B	B860	P305	P5303	624	V30B	6218
4K402	1AB	860-41	...	...	...	4FA60	...	...	...	...	...	...	...	...
5G401, 5G403, 5G405	1AB	...	...	...	...	F4B60	...	...	...	...	...	...	...	...
5G500, 5G501	1AB	...	...	...	...	GB4B50	...	...	...	...	...	AB670	...	...
ZEPHYR (Zephyr Radio Co.)														
578, 583, 585, 592	1A	...	2476	...	646	F4P1	...	4F4	...	...	P694A	639	4F4	...
	2B	330	267	3017	30—03	B30	762	V30B	B860	P305	P5303	624	V30B	6218

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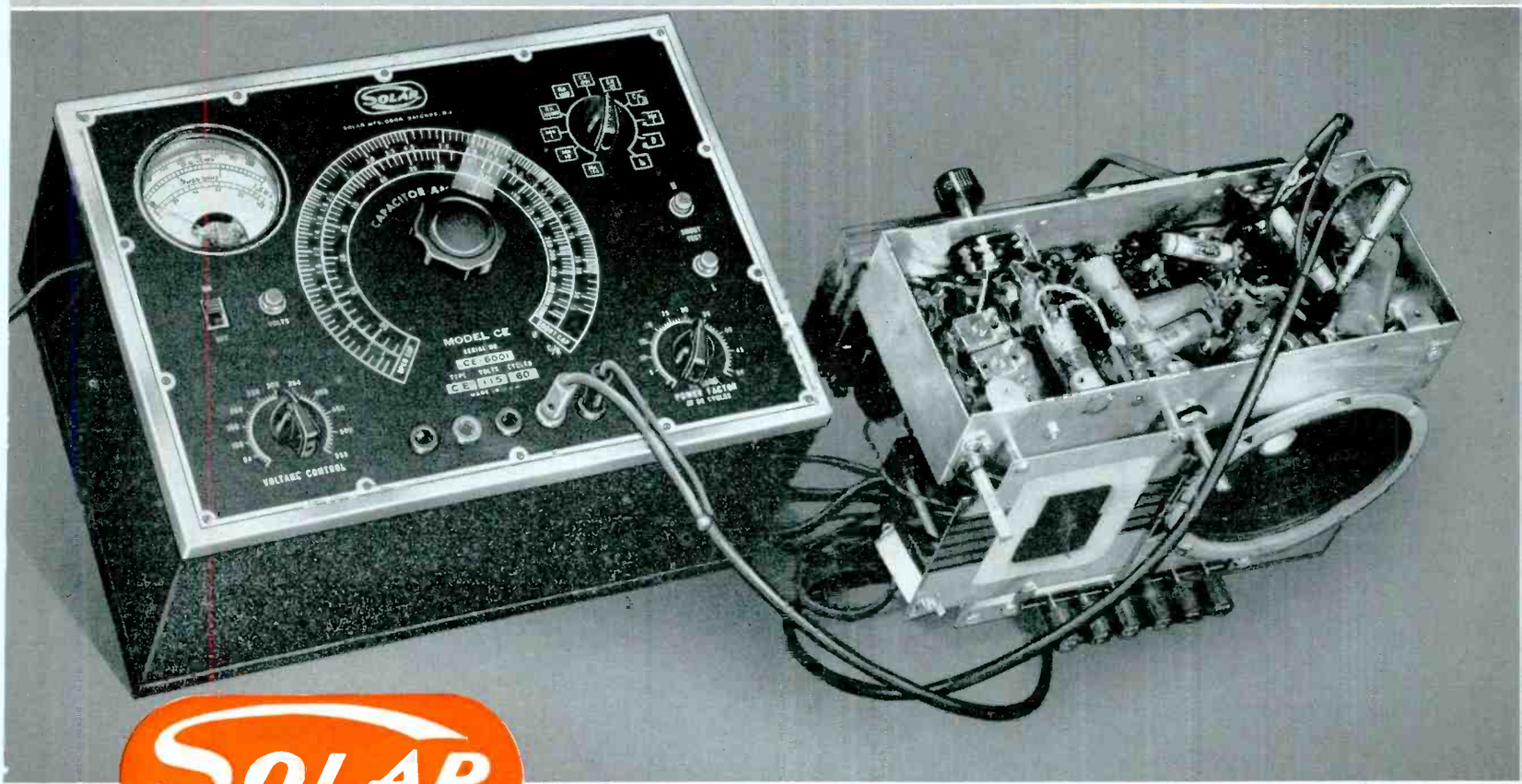

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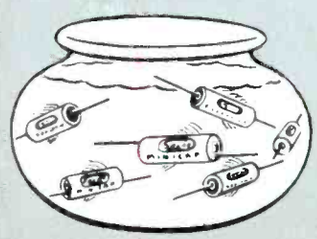

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