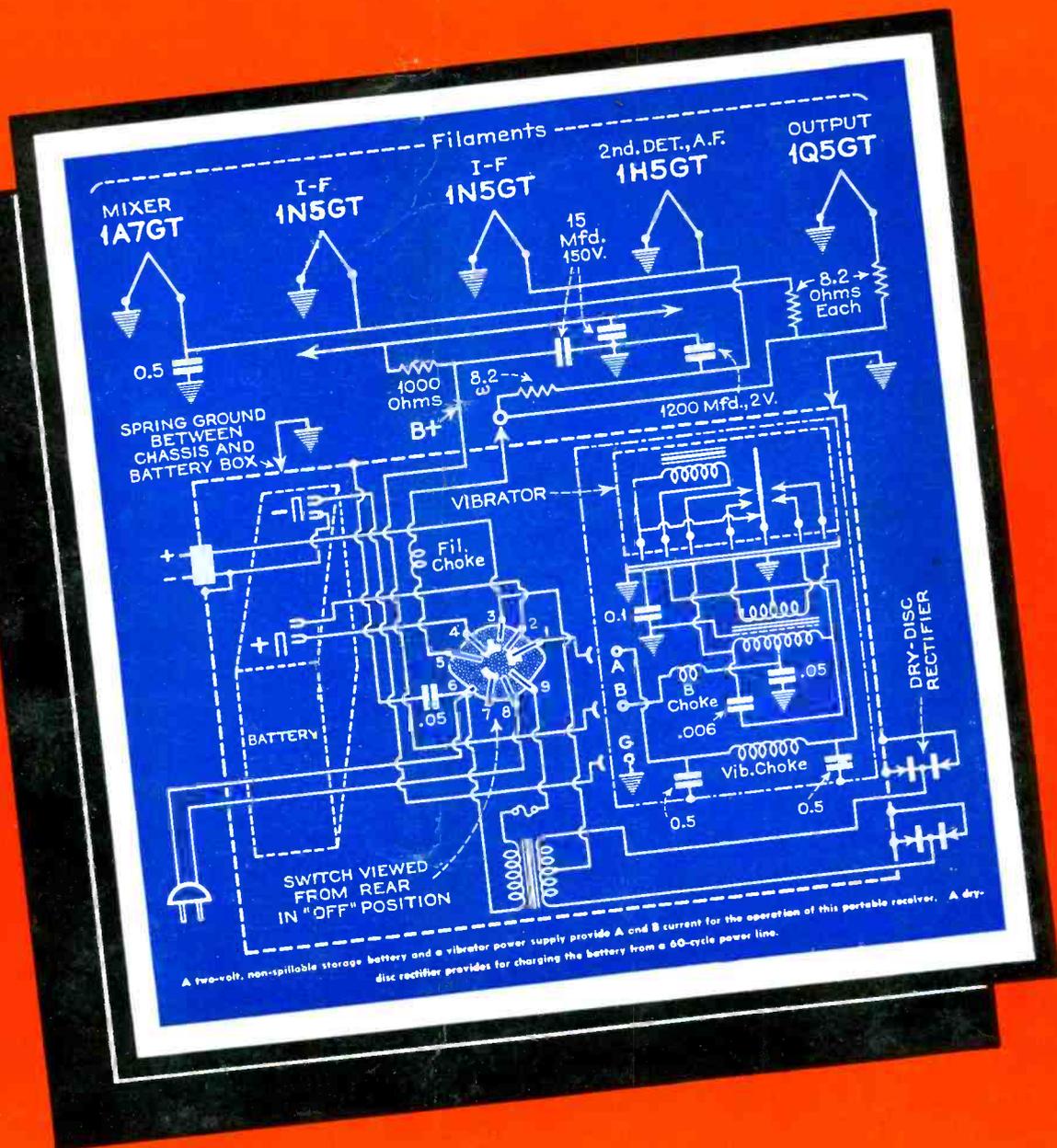


SERVICE



**JUNE
1941**



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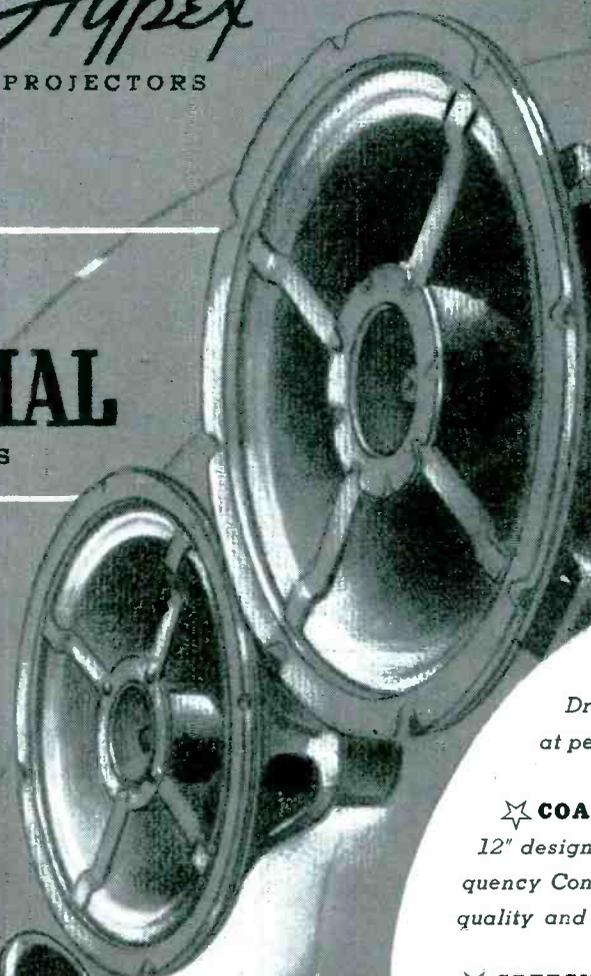
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SPEAKERS

★ *Speech
Master*
REPRODUCERS

★ *Bass Reflex*
REPRODUCERS

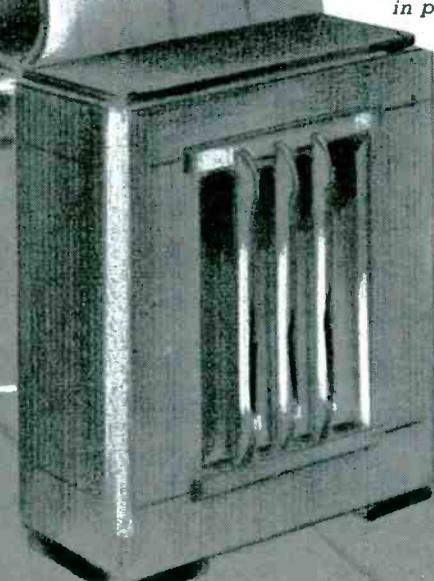


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A Monthly Digest of Radio and Allied Maintenance
Reg. U. S. Patent Office

THE other day we passed a small but elegantly appointed print shop. In the window, amid attractively engraved wedding announcements and the like, was a fairly large poster that read:

"If it's quality you're after never buy from the lowest bidder."

In the window of a luggage shop another item caught our attention a few days later, which brought up thoughts along the same lines. Displayed among highly desirable airplane luggage and overnight bags were three handsome brief cases. To our inexperienced eyes there seemed little or no difference among them. Yet the prices ranged from \$5.50 to \$9.00. A tactful, and easily believable explanation ascribed the price difference to quality and quality alone.

All this brings to mind the arguments which you conjure up every time you do a service job at *less than cost*. In each and every case the customer is anxious to get the *very best service that money can buy*. If you take the position that you'll give her just that, what argument can she in turn give you that would favor cutting your price? She certainly wouldn't want you to cut the quality of your work or the quality of the parts supplied.



THERE has been a good deal of talk circulating to the effect that radio receiver production would be curtailed. Of course, we may be wrong, but in a survey among the manufacturers in this vicinity it seems that the radio industry will rise to the task of providing suitable substitutes to keep the sets rolling from the production lines.

Substitution is no new problem to the industry. Previously, however, such changes were prompted as a measure toward price reduction. Now, with cost no object, still better products will undoubtedly result.

Much has already been accomplished along these lines, as is explained in the article, "Radio and National Defense," by Lewis Winner, on page 22 of this issue.

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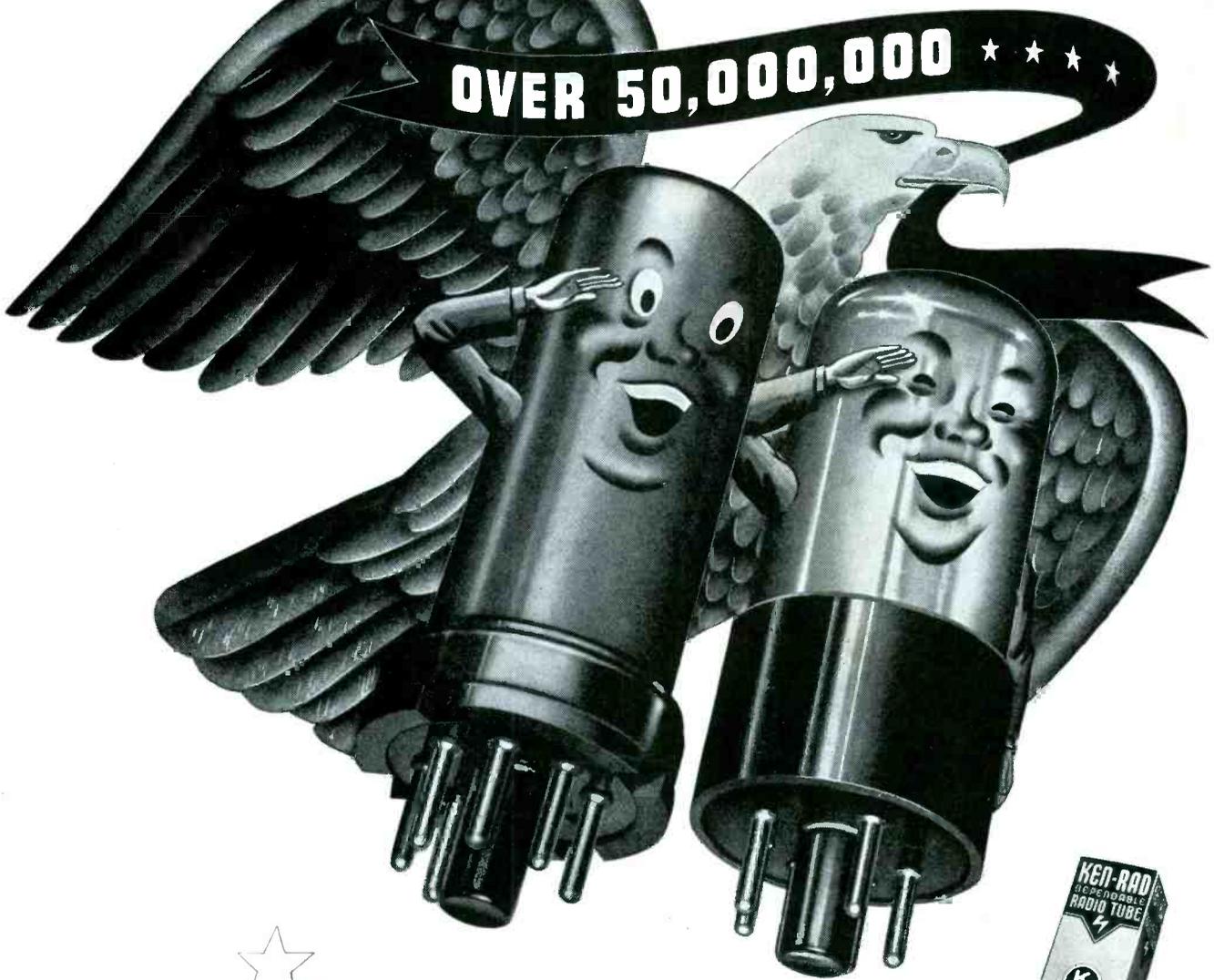
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SERVICE, JUNE, 1941 • 3

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PHONO PICKUP CONNECTION

By EDWARD M. and MARK GLASER

THE earliest phonograph pickups were of the magnetic type having the needle connected to the armature or diaphragm of an earphone. The response was limited to the middle range of frequencies and, even there, was considerably peaked, causing a tinny, squeaky reproduction. We have come a long way since then to reach our present standards and high production allowing a quite respectable phonograph adapter to be sold for the price of a single radio detector tube of less than 20 years ago.

Early Types

Only magnetic type pickups were known in the early days. They came in two types, high and low impedance, and in most cases a transformer was used to couple the pickup to the detector or first audio grid as shown in Fig. 1. The transformers had very high impedance secondaries to give a maximum possible gain (the early tubes had low amplification factors), so a lot depended upon transformer step-up. Some high-impedance pickups were connected directly in the cathode of the power detector or first audio, as in Fig. 2. Some sort of self-shorting arrangement was used to cut out the pickup in the radio position. Another method of using a high-impedance pickup directly is shown in Fig. 3 in which the pickup is connected in the grid return of the detector or first audio tube. A few low-impedance units were used as combination cutters or pickups for recording by switching them to the voice-coil winding. Magnetics are still popular for professional work, but they have been

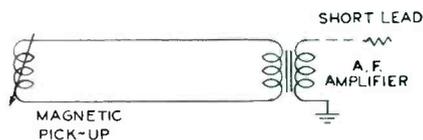


Fig. 1. Magnetic pickup with matching transformer.

largely supplanted by the less expensive crystal types for home use.

Crystal Pickups

Crystal pickups utilize the piezoelectric effect of Rochelle salt crystals to transform physical stress to electrical output. The needle, which is mechanically coupled to the crystal, follows the undulations (bumps) in the record groove transmitting these displacements to the crystal, thus producing a voltage having frequency components corresponding to those record vibrations. One principal advantage of crystal pickups is the high level output of most types. A common variety, for instance, having a fairly flat response, puts out 1/2 volt into a conventional load of 0.5

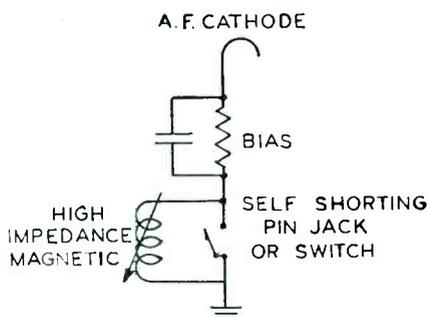


Fig. 2. High impedance magnetic in cathode circuit.

to 1 megohm. A typical circuit is shown in Fig. 5. Special high level units designed primarily for use with a single tube amplifier have outputs as high as 3 volts!

It is common practice to shield the hot lead from the pickup and to ground the other lead. A low-capacity concentric cable is ideal for connection to the receiver or amplifier. In a-c, d-c sets where the chassis is connected to the power line, a ground isolating condenser is used to prevent shock.

When switching from radio to phonograph a loud station has a tendency to

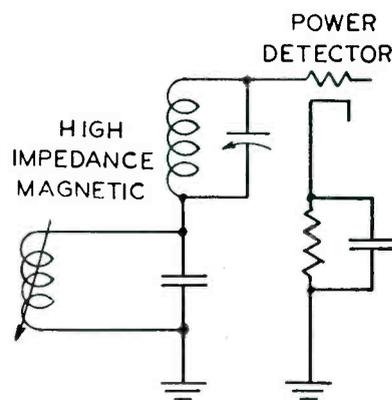


Fig. 3. Pickup in grid return of power detector.

sneak through due to capacity in the switch and associated wiring. It is now becoming a popular practice to kill the r-f or i-f part of the receiver to prevent this annoyance. This is accomplished by opening the cathode or screen-grid circuits of the converter or i-f stage, stopping the oscillator, grounding the i-f output to the detector or by opening the B circuit. The latter system permits an increased audio B voltage on phono operation, important in a-c, d-c sets. In battery sets, the filaments are opened, saving B as well as A consumption. Another method is to put a high negative potential on the avc bus, driving the associated tubes to cut-off. The potential comes from the power tube bias.

As the great majority of receivers now in use have audio volume controls at the output of the detector, the circuit shown in Fig. 5 in combination with one or more of the aforementioned means of killing the r-f signal, should give sufficient data for connecting a pickup. As a general rule regarding any set with two stages of audio amplification, couple the pickup properly to the grid of the first a-f through a volume control of about 1 megohm and open or short the r-f. Use a standard phonoradio switch readily available from job-

bers and shield the grid leads. If a record player is used which has its own volume control, this control should be

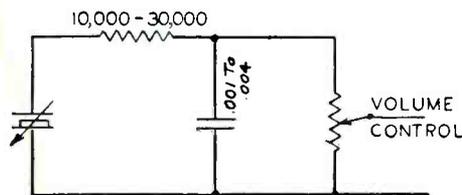


Fig. 6A. Scratch filter connected to input circuit.

left on full and the volume controlled by the receiver control.

Adaptors

With some of the phonograph adaptors now available, a complete phono installation may be made without removing the chassis. Some have adaptor plugs completely wired for certain type detector tubes in which case it is merely necessary to remove the detector, insert the adaptor, place the tube into the adaptor socket and screw on the change-over switch. In phono position, the detector output is grounded which is sufficient to stop radio signals in most cases. The record player must have its own volume control in this system; the receiver control is used for radio only.

Equalizers

The use of equalizers in connection with phonographs is widespread, and justly so, for equalizers offer a simple means for compensating some defect in pickup characteristics, cabinet resonance, acoustic feedback or amplifier deficiencies. A certain amount of voltage must be sacrificed—depending upon the amount of frequency correction desired. The application of inversed feedback flattens amplifier response and thus acts as an equalizer. It seems to us that the industry is not taking the fullest advantage of this excellent device for improving quality.

Regarding tone compensation in the pickup circuit using crystal pickups, shunt resistance kills low frequencies while shunt capacity kills high frequencies. One reason to kill highs, for instance, would be to reduce needle scratch on old or poor records. This was an absolute necessity in the old days because all records were noisy. The scratching becomes bad around 3000 cycles and reaches a peak around 3500 cycles. Hence, early scratch filters were designed to give maximum attenuation at about this frequency, thus limiting the tonal range. Modern records accentuate the highs during recording so the program noise ratio is much more favorable. Other improvements in technique have helped to make the scratch filter obsolete. Nevertheless, there are

some records which sound better with the highs attenuated and, if the amplifier has a squeaky tendency, it would be

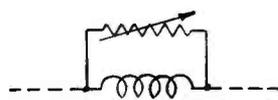


Fig. 6B. Series scratch filter circuit (above).

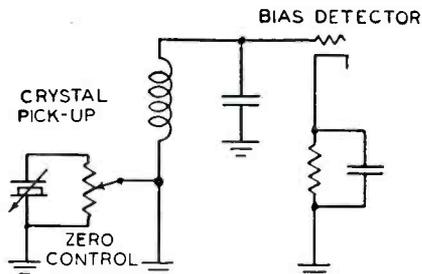


Fig. 4. Crystal pickup in grid return of power detector.

reasonable to insert an equalizer as in Fig. 6A. The series resistance cooperates with the condenser to give sharper cut-off, as in the familiar low-pass B supply filter. Radio men with experimental tendencies may make these components variable for finer variations of

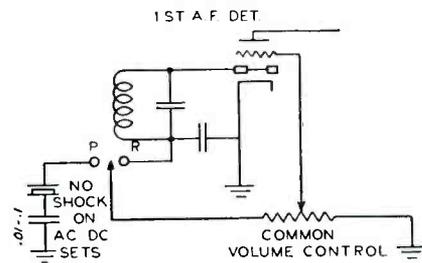


Fig. 5. Popular circuit for phono connection.

tone. Fig. 6B, containing series inductance rather than shunt capacity, was used in some scratch filters. 6A gives better control and is easier to handle, however.

Fig. 7 shows a phono input circuit used in many receivers. The series resistor cuts down the voltage output

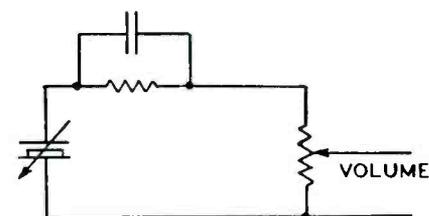


Fig. 7. Simple equalizer circuit.

while the condenser, in combination with the resistor, determines the frequency response, larger values increas-

ing highs. Where it is necessary to cut lows a shunt resistor is added across the pickup, as in Fig. 8. Similar reasoning would apply to other than crystal pickups, but the values would differ, depending upon the characteristics.

Light Weight

New pickups are provided with non-interchangeable or semi-interchangeable sapphire or steel alloy permanent points with concealed set screws. Automatic changers made this a necessity because the automatic feature would be worthless if the mechanism had to be stopped every two records to change the needle! Low needle pressure is being featured for prolonging record life and cutting surface noise. Either counterweights or very light heads are used. Housings and arms which were always of metal are now being made of bakelite, acetate or other plastics. These light-weight heads sometimes have lead weights added, for, if the pressure is too light, the needle will ride up the grooves instead of bottoming and may even jump grooves. Light-beam reproducers are being used in which the needle actuates a mirror, modulating a light beam which is delivered to a photocell, thence to a pre-amplifier which is followed by the first a-f stage in the usual manner.

Rumble

Acoustic radiation from the pickup, rumble and acoustic feedback are some of the bugs Service Men have to contend with. The latter two are reduced by floating the turntable assembly on flexible rubber mounts or other shock-proofing. The first is not so easily killed. A tight-fitting cover combined with acoustic absorbing material inside will usually be sufficient. A cleverly designed acoustic filter to minimize direct radiation was described in the November, 1940, issue of SERVICE. Equalization and degeneration may be applied to reduce rumble or, in a pinch, a low-frequency attenuator may be used which will cut all lows, including the rumble.

Wireless Players

Wireless record players are still popular. Some models come complete with an audio amplifier and speaker so

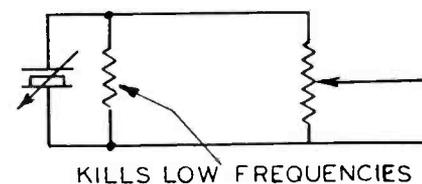


Fig. 8. Low frequency equalizer circuit.

the unit is a complete player by itself; playing through a good console receiver
(Continued on page 24)

REPLACEMENT BATTERIES FOR PORTABLES

(Continued from May)

Model	Acme	Advance	Bond	Bright Star	Burgess	Eveready	Gen-eral	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	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	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
EMERSON (Emerson Radio & Television Co.)													
EA338, 339, 340, 357,	2A	123	647	4928	361	G3	746	3H3	...	P83A	683	3H3	4919
363, FU424, FU427,	2B	830	284	6220	30-33	M30	482	W30B	B861	...	P5S30	640	6210
FU428	1A	114	247	4826	462	4F	742	4F1	A830	P94	P94A	634	4F1
CE259	2B	330	267	3017	30-03	B30	762	V30B	B860	P305	P5303	624	V30B
CE263, CE265, CX263,	1A	118	147	4829	860	8F	741	8F1	A833	...	P96A	635	8F1
CE275, CT275, CX283,	2B	330	267	3017	30-03	B30	762	V30B	B860	P305	P5303	624	V30B
CX292, CX284, CX308,	1A	123	647	4928	361	G3	746	3H3	...	P83A	683	3H3	4919
DC308, CX305	2B	330	267	3017	30-03	B30	762	V30B	B860	P305	P5303	624	V30B
DF302, DF306	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
DJ310, DJ311, DJ312	2A	123	647	4928	361	G3	746	3H3	...	P83A	683	3H3	4919
	2B	830	284	6220	30-33	M30	482	W30B	B861	...	P5S30	640	6210
DU379, DU380, FF411	2A	111	2	102	10M	2	950	D	D	D	2	1094	D
	1B	...	...	...	...	XX45	467	W45A	...	...	...	...	...
ESPEY (Espey Mfg. Co.)													
942 Series	1AB	...	...	...	...	6TA60	...	...	...	...	...	...	...
943, 958	1AB	460-15	411	...	...	5DA60	...	60A2L	...	...	AB665	...	...
040	1A	118	147	4829	860	8F	741	8F1	A833	...	P96A	635	8F1
	2B	330	267	3017	30-03	B30	762	V30B	B860	P305	P5303	624	V30B
050	1A	118S	817	4827	866	2F4	718	8F4	A834	...	P698A	638	8F4
	2B	330	267	3017	30-03	B30	762	V30B	B860	P305	P5303	624	V30B
052, 053	1A	...	...	...	...	F4P1X	...	...	...	...	...	...	...
	2B	330	267	3017	30-03	B30	762	V30B	B860	P305	P5303	624	V30B
FADA (Fada Radio & Electric Co.)													
B33, C33, M33,	3A	111	2	102	10M	2	950	D	D	D	2	1094	D
C34, S34, L34	1B	...	...	...	...	XX45	467	W45A	...	...	...	...	...
P22, PD22, PL22, P28, 1A	118S6	747	...	868	2F4L	747	...	8CF4	...	...	P698L	646	...
PD28	2B	830	284	6220	30-33	M30	482	W30B	B861	...	P5S30	640	6221
P24	1A	116	...	4824	660	6F	743	6F1	A831	P96	P96A	637	6F1
	2B	330	267	3017	30-03	B30	762	V30B	B860	P305	P5303	624	V30B
PL24	1A	118	147	4829	860	8F	741	8F	A833	...	P96A	635	8F1
	2B	830	284	6220	30-33	M30	482	W30B	B861	...	P5S30	640	6210
P40, PD40, PL40, P47,	1A	118	147	4829	860	8F	741	8F1	A833	...	P96A	635	8F1
PD47, PL58, PD49SW,	2B	330	267	3017	30-03	B30	762	V30B	B860	P305	P5303	624	V30B
P49SW	1A	123	647	4928	361	G3	746	3H3	...	P83A	683	3H3	4919
P41, PD41, PL41	2B	830	284	6220	30-33	M30	482	W30B	B861	...	P5S30	640	6210
P49, PD49, P58	1A	114	247	4826	462	4F	742	4F1	A830	P94	P94A	634	4F1
	2B	330	267	3017	30-03	B30	762	V30B	B860	P305	P5303	624	V30B
FARNSWORTH (Farnsworth Television & Radio Corp.)													
AT30 (C6-1)	1A	114	247	4826	462	4F	745	4F1	A830	P94	P94A	634	4F1
	2B	...	...	...	...	Z30	482	V30AA	...	...	P7R30	...	V30AA
AT31 (C7-1)	1A	118S	817	4827	866	2F4	718	8F4	A834	...	P698A	638	8F4
	2B	330	267	3017	30-03	B30	762	V30B	B860	P305	P5303	624	V30B
BT58, BT68 (C67, C68)	1AB	...	...	...	...	6FA60	...	60A4L	N803	P60A4L	AB84	AB667	...
CT59	2A	111	2	102	10M	2	950	D	D	D	2	1094	D
	1B	...	...	...	...	XX45	467	W45A	...	...	...	...	...
CT60	1A	118FM	547	4823	865	8FL	745	8CF1	...	...	P98L	645	8FL
	2B	430	...	...	30-55	A30	...	V30A	...	...	430P	621	V30A
FEARNOLA (See Wells Gardner)													
FIDELITONE (See Wells Gardner)													
FIRESTONE (Firestone Tire & Rubber Co.)													
500	1A	...	...	...	86	44	7111	...	...	6	6	...	6
	2B	330	267	3017	30-03	B30	762	V30B	B860	P305	P5303	624	V30B
S7397-1	5A	...	...	...	...	...	...	C	...	...	...	...	...
	1B	...	...	...	...	XX45	467	W45A	...	...	...	...	...
S7397-2, E443	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
S7426-6, S7426-7,	1AB	460-15	411	...	...	5DA60	...	60A2L	...	...	AB665	...	...
S7426-9, S7427-5	1AB	...	...	...	...	G4B60	...	60B4H	...	...	...	...	...
S7402-6	1AB	...	...	...	...	...	...	...	...	...	...	...	...

Model	Acme	Advance	Bond	Bright Star	Burgess	Eveready	Gen-eral	National Union	Philco	Rayo-vac	Usalite	Willard	Win-chester
GAMBLE (Gamble Stores, Inc.)													
4B5, 5B3	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
6B7, 6B10, 3006,	2A 123	647	4928	361	G3	746	3H3	...	...	P83A	683	3H3	4919
4002, 4946	2B 330	267	3017	30-03	B30	762	V30B	B860	P305	P5303	624	V30B	6218
1F465KC	1A 114	247	4826	462	4F	745	4F1	A830	P94	P94A	634	4F1	4816
	2B 330	267	3017	30-03	B30	762	V30B	B860	P305	P5303	624	V30B	6218
Coronado	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
590, C590	1A ...	2476	...	646	F4PI	...	4F4	...	...	P624A	639	4F4	...
	2B 430	...	...	30-55	A30	...	V30A	...	...	430P	621	V30A	...
GAROD (Garod Radio Corp.)													
BP4, BP5, BP5A,	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
BP7, BP8	...	460-15	411	...	5DA60	...	60A2L	...	...	...	AB665	...	...
BP6	...	...	...	...	...	...	...	...	...	...	...	...	...
BP9, BP10	1A ...	2476	...	646	F4PI	...	4F4	...	...	P694A	639	4F4	...
	2B ...	...	...	30-50	A30M	...	...	...	...	...	622	...	...
BP11, BP15, BP24,	2A 123	647	4928	361	G3	746	3H3	...	...	P83A	683	3H3	4919
BP25, BP307, BP308,	2B 830	284	6220	30-33	M30	482	W30B	B861	...	P5S30	640	...	6210
BP309	...	...	...	561	G5	...	5H5	...	...	P85A	687	...	...
BP12, BP12A, BP12B	1A ...	...	...	30-03	B30	762	V30B	B860	P305	P5303	624	V30B	6218
	2B 330	267	3017	...	...	...	...	...	...	...	...	...	...
BP12Q, BP36, BP36A, 2A	123	647	4928	361	G3	746	3H3	...	...	P83A	683	3H3	4919
BP37, BP38	2B ...	...	...	30-50	A30M	...	...	...	...	...	622	...	...
BP20	3A 111	2	102	10M	2	950	D	D	D	2	1094	D	...
	1B ...	...	...	...	XX45	467	W45A	...	...	...	...	...	...
BP27, BP28, BP29	1A 123	647	4928	361	G3	746	3H3	...	...	P83A	683	3H3	4919
	1A ...	...	...	...	4FL	...	F4	...	...	...	643	...	...
	2B 830	284	6220	30-33	M30	482	W30B	B861	...	P5S30	640	...	6210
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, HBX467	2B ...	...	...	...	Z30	738	V30AA	...	...	P7R30	646	V30AA	...
HB412	1A 118S6	747	4825	868	2F4L	747	8CF4	...	...	P698L	646	...	4815
	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
7B410	2A 111	2	102	10M	2	950	D	D	D	2	1094	D	...
	1B ...	...	...	...	XX45	467	W45A	...	...	...	...	...	...
JB508, JB513, JB514, 1A	118S6	747	4825	868	2F4L	747	8CF4	...	...	P698L	646	...	4815
JB523	2B 830	284	6220	30-33	M30	482	W30B	B861	...	P5S30	640	...	6210
JB630	2A 123	647	4928	361	G3	746	3H3	...	...	P83A	683	3H3	4919
	2B 830	284	6220	30-33	M30	482	W30B	B861	...	P5S30	640	...	6210
LB530	Two-volt rechargeable Willard storage cell and vibrator B supply.												
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	F4PI	...	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	6220	30-33	M30	482	W30B	B861	P5S30	640	...	...	6210
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	6220	30-33	M30	482	W30B	B861	...	P5S30	640	...	6210
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	4825	868	2F4L	747	8CF4	...	...	P698L	646	...	4815
	2B 830	284	6220	30-33	M30	482	W30B	B861	...	P5S30	640	...	6210
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

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- vacuum tube capacity meter
- signal tracing features

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DC VACUUM TUBE VOLTMETER — DIRECT READING
Sensitivity 160 megohms (high ranges), 16 megohms (low ranges).
Ranges: 0/6/30/150/600/1500/6000.
Measures all voltages without affecting circuit constants.

AC VACUUM TUBE VOLTMETER — DIRECT READING
Input capacity only .00005 mfd., input resistance 160 and 16 megohms.
Ranges: 0/6/30/150/600/1500/6000.
Measures signal and output voltages, etc.

VACUUM TUBE OHMMETER — DIRECT READING
From the lowest scale division .1 ohm to 1,000 megohms.
Ranges: 0/1000/10,000/100,000/1 meg./10 meg./100 meg./1000 meg.
No test leads to short. No resetting when changing ranges.

VACUUM TUBE CAPACITY METER — DIRECT READING
Accurate measurements from .00003 to 1000 mfd.
Ranges: 0/.001/.01/.1/1/10/100/1000.
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Complete tests on any AM, FM or television circuit, while the circuit is "hot" and without disturbing circuit constants—Clear, quick readings on 4¼" scale of 4½" D'Arsonval meter—Meter accurate to 2% full scale—Linear meter movement—Maximum protection against burnout—Matched pair multipliers accurate to 1%—Two high voltage test leads and special signal tracing probe furnished.

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88 PARK PLACE • NEW YORK CITY

Model	Acme	Advance	Bond	Bright Star	Burgess	Eveready	Gen-eral	National Union	Philco	Rayo-vac	Usalite	Wil-lard	Wia-chester	
KNIGHT (Allied Radio Corp.)														
A10700, A10701, A10725, B10540, B10545	...	...	...	...	6FA60	...	60A4L	...	P60A4L	AB84	AB667	...	...
A10730, B10505, B10506, B17131	111	2	102	10M	2 Z30	950 738	D V30AA	D	D	2 P7R30	1094	D V30AA	...	
A10748, B10521, B10522, B10523, B10524	...	...	...	...	...	...	60A4FL4	...	P60A4FL4	AB694	AB668	...	...
A10761	...	...	...	...	...	...	...	...	...	AB94	...	...	...
A10795, A10873, E10757, N2812, E10757	118S 330	817 267	4827 3017	866 30-03	2F4 B30	718 762	8F4 V30B	A834 B860	P305	P698A P5303	638 624	8F4 V30B	4817 6218	
A10826, E10715, E10716	460-15	411	...	...	5DA60	...	60A2L	...	...	...	AB665	...	...
A10848	116	...	4824	660	6F	743	6F1 A831	P96	P96A	637	6F1	4814	...	
A10855	330	267	3017	30-03	B30	762	V30B B860	P305	P5303	624	V30B	6218	...	
A10872, A10889, E10061, E10758	118 330	147 267	4829 3017	860 30-03	8F B30	741 762	8F1 V30B	A833 B860	P96 P305	P96A P5303	635 624	8F1 V30B	4819 6218	
B10562, B10563, B10564, B10565	123 830	647 284	4928 6220	361 30-33	G3 M30	746 482	3H3 W30B	B861	...	P83A P5S30	683 640	3H3	4919 6210	
B10595, B17109, B17115	118 430	147	4829	860 30-55	8F A30	741	8F1 V30A	A833	...	...	635 621	8F1 V30A	4819
B10600, B10606, B17107, B17108, B17132, B17133, B17134	111	2	102	10M	2 XX45	950 467	D W45A	D	D	2	1094	D	...	
B17111, B17112	118S6 830	747 284	4825 6220	868 30-33	2F4L M30	747 482	8CF4 W30B	B861	...	P698L P5S30	646 640	...	4815 6210	
E10755, E10756, N2870, N2871	...	...	...	...	4TA60	...	...	...	...	10793	...	...	...
E10757 early, N2812	...	...	...	...	2F4B60	...	...	...	...	10896	...	...	...
E10775, E10777	114 330	247 267	4826 3017	462 30-03	4F B30	742 762	4F1 V30B	A830 B860	P94 P305	P94A P5303	634 624	4F1 V30B	4816 6218	
LAFAYETTE (Radio Wire Television, Inc.)														
BB73	123 330	647 267	4928 3017	361 30-03	G3 B30	746 762	3H3 V30B	B860	P305	P83A P5303	683 624	3H3 V30B	4919 6218	
BP12, CC72, T56	...	...	...	561	G5	...	5H5	...	...	P85A	687	...	...
BP15, BP37, BP38, C116, C121, C125	123 830	647 284	4928 6220	361 30-03	G3 M30	746 482	3H3 W30B	B861	...	P83A P5S30	683 640	3H3	4919 6210	
BS56, BS85, E6, E72	118 330	147 267	4829 3017	860 30-03	8F B30	741 762	8F1 V30B	A33 B860	P96 P305	P96A P5303	635 624	8F1 V30B	4819 6218	
BS72, CC55, CC55A	114 330	247 267	4826 3017	462 30-03	4F B30	742 762	4F1 V30B	A830 B860	P94 P305	P94A P5303	634 624	4F1 V30B	4816 6218	
CC58, CC58A	123 530	647	4928	361	G3 Z30	746 738	3H3 V30AA	...	...	P83A P7R30	683	3H3 V30AA	4919
D93	...	2476	...	646	F4PI	...	4F4	...	...	P694A	639	4F4	...
E80, E94	118S 330	817 267	4827 3017	866 30-03	2F4 B30	718 762	8F4 V30B	A834 B860	P305	P698A P5303	638 624	8F4 V30B	4817 6218	
E92	118FM 830	547 284	4823 6220	865 30-33	8FL M30	745 482	8CF1 W30B	B861	...	P98L P5S30	645 640	...	4813 6210	
E191, S161	111	2	102	10M	2 XX45	950 467	D W45A	D	D	2	1094	D	...	
S50	116	...	4824	660 30-33	6F M30	743 482	6F1 W30B	A831 B861	P96	P96A P5S30	637 640	6F1	4814 6210	
LA FRANCE (The Fair Store) (See Wells Gardner)														
LAUREL (See Wells Gardner)														
LEARADIO (Lear Developments, Inc.)														
APRI	1A 1B	...	...	...	2F Z59	...	...	...	...	...	...	...	...
APRA, RM402A	1A 2B	...	...	561 30-55	G5 A30	738	5H5 V30A	...	...	P85A 430P	687 621	V30A	...
L'TATRO (L'Tatro Mfg. Co.)														
819	1A 2B	114 330	247 267	4826 3017	462 30-03	4F B30	742 762	4F1 V30B	A830 A860	P94 P305	P94A P5303	634 624	4F1 V30B	4816 6218
1000	1A 2B	430	30-55	A30	738	4L1 V30A	430P	621	V30A	...
S1000 (no B)	10A	111	2	102	10M	2	950	D	D	D	2	1094	D	
MACY (See Wells Gardner and Garod)														
MAGNAVOX (The Magnavox Co., Inc.)														
41, CR133, PBR378	1A 2B	114 330	247 267	4826 3017	462 30-03	4F B30	742 762	4F1 V30B	A830 B860	P94 P305	P94A P5303	634 624	4F1 V30B	4816 6218
MAJESTIC (Majestic Radio & Television Corp.)														
130	1A 1B	...	...	...	FX W40	...	...	...	...	...	...	...	...
130U	1A 2B	116 330	...	4824 3017	660 30-03	6F B30	743 762	6F1 V30B	A831 B860	P96 P305	P96A P5303	637 624	6F1 V30B	4814 6218
5BD, 5ULBD, 546BD	1A 2B	123M 530	...	...	465	4FL Z30	738	3L1 V30AA	...	...	P94L P7R30	642	3L1 V30AA
1BR50B, 1BR50BP	1A 2B	114S 830	2476 284	...	646 30-33	F4P1 M30	...	4F4 W30B	B861	...	P694A P5S30	639 640	4F4	
420P, 421, 430PL, 431	1A 2B	114 330	247 267	4826 3017	462 30-03	4F B30	742 762	4F1 V30B	A830 B860	P94 P305	P94A P5303	634 624	4F1 V30B	4816 6218
MANTOLA														
R419, R419B	1A 2B	116 330	...	4824 3017	660 30-03	6F B30	743 762	6F1 V30B	A831 B860	P96 P305	P96A P5303	637 624	6F1 V30B	4814 6218

(To be continued)

CIRCUITS

See Front Cover

By HENRY HOWARD

THE General Electric Model LB530 a-c or battery operated portable (see front cover) is a very novel set in many ways. The heart of the receiver is a 2-volt, 20-ampere-hour Willard non-spillable storage battery with self-contained charge indicator. Five standard 1.4-volt tubes are used, including two i-f amplifiers. The second i-f stage is resistance coupled to the detector. As a diode detector takes current for normal operation, a low impedance coupling circuit must be used. Hence, the plate resistor is only 27,000 ohms and the diode load resistor 47,000 ohms.

Three drop resistors of 8.2 ohms each serve to cut the battery voltage to the normal 1.4. One resistor cuts the 1Q5GT power tube while the other two resistors handle two 50-ma tubes each. The pairs of r-f tubes are individually by-passed.

The plate voltage is obtained by means of a 2-volt synchronous vibrator. There has heretofore been a general antipathy toward 2-volt vibrators because of the supposed difficulty of breaking down contact resistance for starting. It seems that about 3 volts was consid-

ered a minimum for reliable starting. However, this opinion, like so many others in radio history, has gone by the board. The receiver current consumption is 1.3 amps, which allows the set to operate about 15 hours before recharging is required. A complete copper-oxide full-wave charger with separate charging transformer is included in the receiver and is designed to give a charging rate slightly in excess of oper-

ating requirements. Hence, for a-c operation, the battery just about floats on the charger acting as a reservoir or filter. If charged, it will thus remain fully charged; if discharged, it will slowly become charged. The charger may be left on when the receiver is inoperative,

in which case the charging current is about 1.4 amps, enough to bring the battery up rapidly. Also, a charging cable is available by means of which the radio battery may be charged from an automobile battery or other 6-volt d-c source.

The charger is protected by a ¼ amp fuse in series with the primary of the transformer. A d-c ammeter with about 2-amps range is a necessary service instrument for this receiver for checking the degree of charge, three indicator balls are provided inside the battery, and act as follows: the green ball sinks when the battery is 10% discharged, the white when 50% and the red when 90% discharged. On charging, the balls rise in the reverse order. It is not advisable to let the battery remain, with the red ball down, for any length of time.

For grid bias on the power tube, a 5.0-volt bias cell assembly is used in series with a 2.2-meg grid leak. A 5-inch p-m dynamic is used.

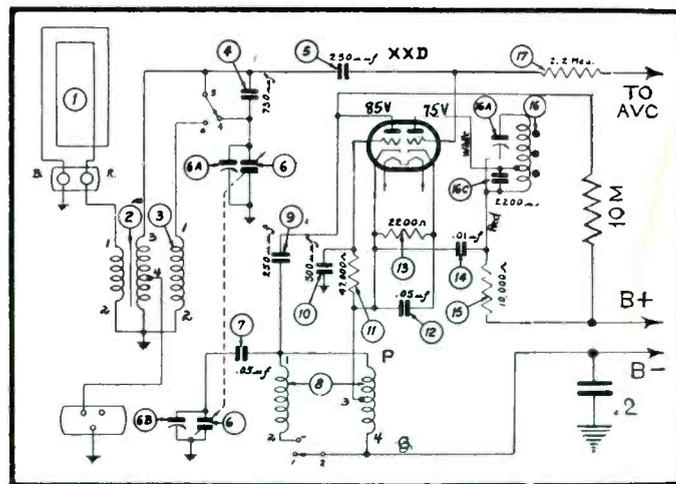


Fig. 1. Philco 41-258.

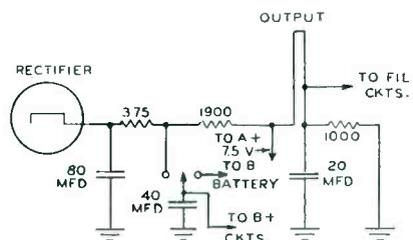
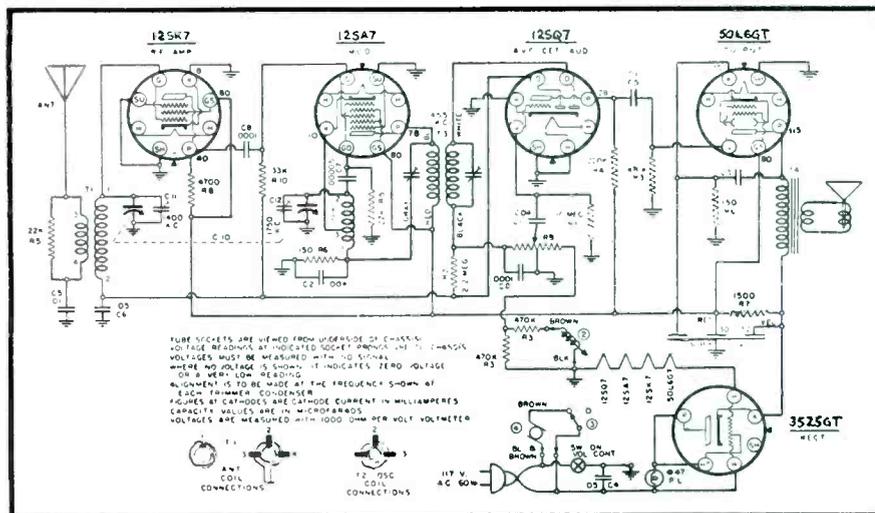


Fig. 2. Air Castle 2122 (Chassis BP12).

Fig. 3. Clarion WSI-56.



Philco 41-258

Philco Model 41-258 uses shunt inductors in the antenna and oscillator coils for the 1.6 to 3.5-mc band as shown in Fig. 1. The oscillator operates as a Hartley with grid grounded, cathode on the tap and plate at the hot end of the coil. Note also the tapped i-f transformer between the two i-f stages which permits sharper tuning.

Air Castle 2122 (Chas. BP12)

Air Castle Model 2122 (Chas. BP12) series 3-way portables operate the five tubes in series. On line operation, instead of the usual separate A and B filter from the rectifier tube, a common filter resistance is used in the first section. The filter layout consists of 80 mfd, 375 ohms and 40 mfd common to A and B. This is continued for A power

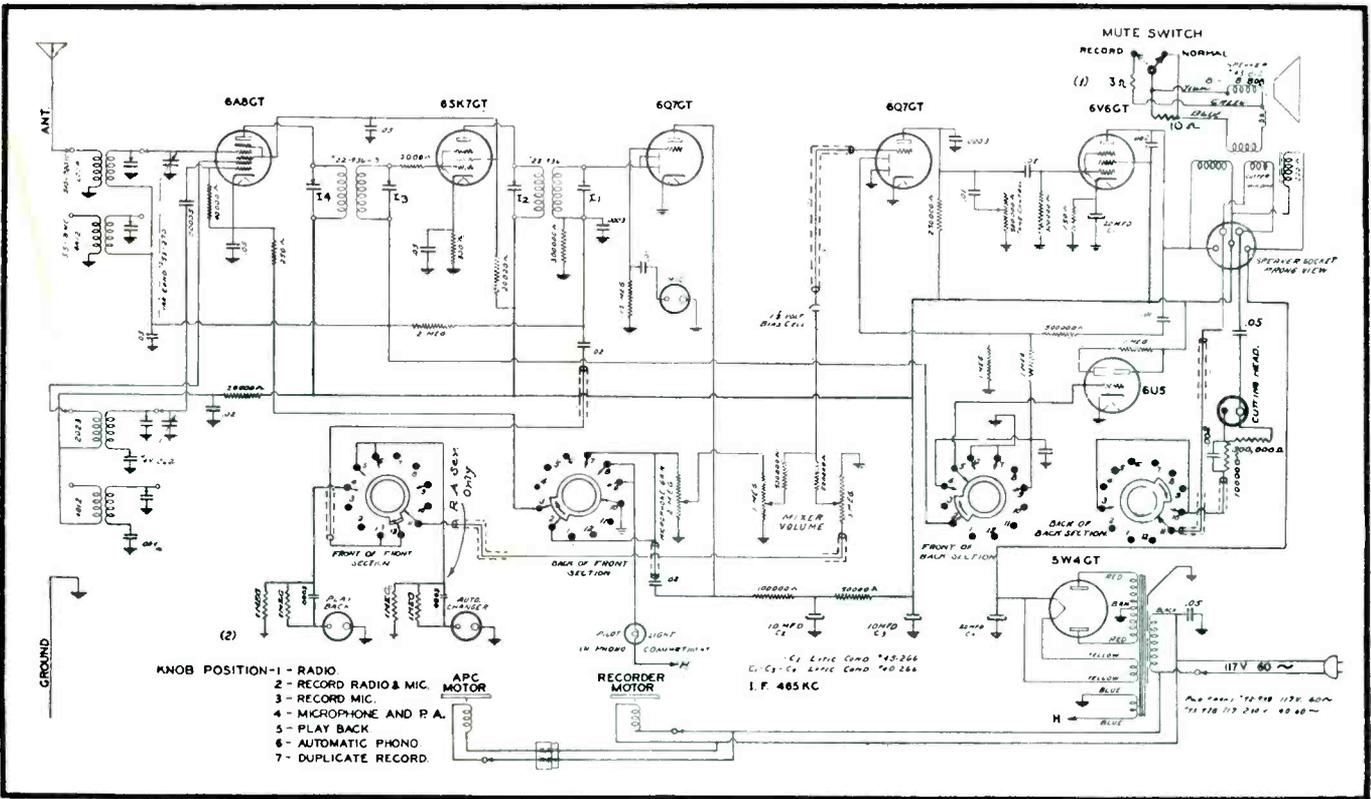


Fig. 7. Howard 302R, 302RA, 302RT.

through 1900 ohms, through the power-tube filament, and concluding with a 20-mfd condenser shunted by 1000 ohms to the chassis.

Belmont 590

Belmont's Portable Model 590 is a standard job with series filaments for both line and battery operation. A simple line to battery switch is used which connects the B circuit from the battery to the filter output. The A battery, however, is left connected in parallel with the A filter. This calls for some slight leakage in the electrolytic condensers as they shunt the battery in this mode of operation. This is also true of the B circuits. A similar arrangement is used in the Truetone Model D1182. Another simplification used in these receivers consists of a combination i-f trimmer and diode by-pass condenser of 100-mfd in the i-f can.

Silvertone 2011, 2051, 2411, 2511

Silvertone Models 2011, 2051, 2411 and 2511 battery powered farm receivers have 5 tubes; 2 i-f stages, resistance coupled; battery economizer; and 3 tuning bands. Although the input circuit to the converter is switched in the usual manner, the oscillator has only two sets of coils, the same coil being used for broadcast and police band (1.44 to 2.66 mc). This is possible because the i-f may be derived from either the sum or the difference between the

signal frequency and oscillator frequency. There is little choice of coverage of this second band for, given an i-f of 455 kc, the second band consists

therefore, some overlap in the two bands.

Clarion WSI-56

Clarion Model WSI-56 is a phono combination for a-c only having four tubes and rectifier in which a resistance coupled r-f stage is used in preference to an i-f stage. The converter output feeds directly into the diode detector through the one i-f transformer. A 2-meg volume control is tapped in the center; one-half is used as a conventional detector control, the other half on the phono pick-up input as shown in Fig. 3. Note also that the phono pick-up is loaded with two 470,000-ohm resistors

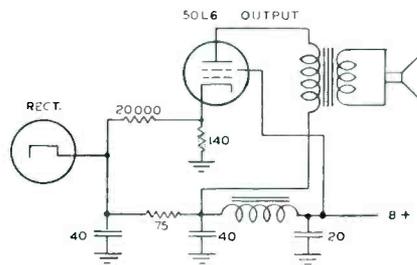
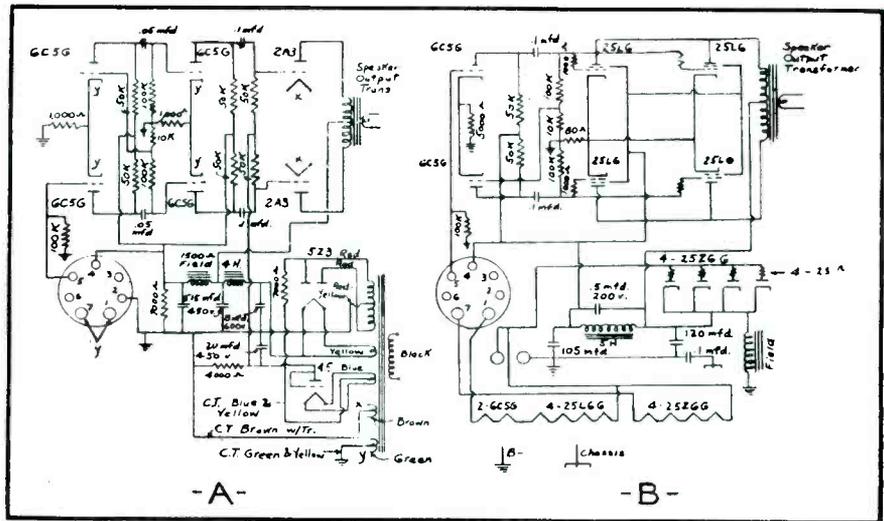


Fig. 4. Emerson EX386.

of the broadcast band plus twice the i-f, or 910 kc. It will be seen that there is,

Fig. 6A. Ansley D24A, D25A A-C, and Fig. 6B. Ansley D24A, D25A A-C/D-C.



WHEN PERFORMANCE COUNTS

New Signal Generator by



Model 1632



Geared for Today's Requirements

Provides continuous coverage of standard broadcast ranges; as well as the new high frequencies for frequency modulated and television receivers. Top-quality engineering and construction throughout makes this a sensation at the price of \$87.80, Dealer Net.

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Volt-Ohm-Ammeter...
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0-1-10 Amperes. Resistance 0-400 Ohms (shunt type circuit); 0-400,000 Ohms and 0-4 Megohms (series type circuit).
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MODEL 1213
Dynamic Tube Tester . . . Exclusive Hinged Postcard Reference Tube Chart—Filament Voltages from 1.1 to 107—RED DOT Lifetime Guaranteed Neon Shorts Test
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MODEL 1620
Counter Type, Lever Switch Operated Tube Tester. Four "quick change" non-obsolete features—Speed Roll Chart—New Socket Panel and Switching Section which can all be replaced in case of unanticipated changes . . . Dealer **\$41.64**
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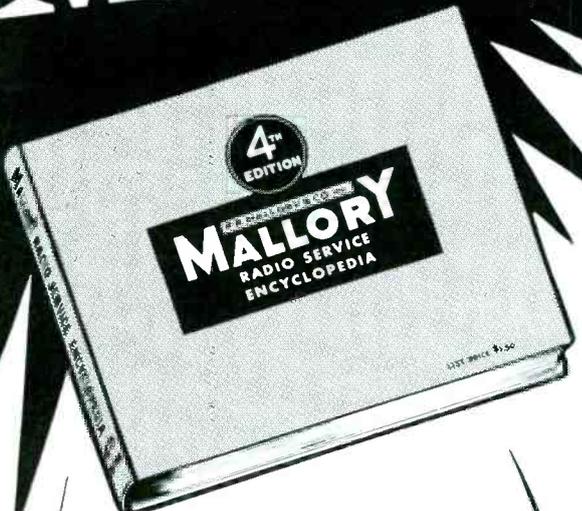
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The RSA

By Joe Marty, Jr.

Calvin Stapp (below), national secretary, resides at 512 N. Beard Street, Danville, Ill. Has been doing radio service work for ten years and is employed by Allen Electric Co. Is also secretary of Danville Chapter.



Joe Marty, Jr. (above), executive secretary of Radio Servicemen of America does all the leg work for organization. Maintains office of Association at 304 S. Dearborn St., Chicago. Played large part in organization of RSA.



George Duvall (above), national president, resides at 8005 Third Avenue, Brooklyn, N. Y. Operates his own shop and has been connected with radio since its beginning. Served two terms as chairman of New York Chapter.

Kenneth A. Vaughn, national vice-president, resides at 312 Market Street, Johnstown, Pa. Has been engaged in radio servicing for fifteen years. Owns his own shop. Served as president and secretary of Johnstown Chapter.



THE Radio Servicemen of America was incorporated in the fall of 1937, as a national organization of radio Service Men. It was organized as a result of numerous conferences between leaders of local service groups throughout the country. This formation was the action of representatives of the Institute of Radio Servicemen, the National Radio Servicemen's Association and the Radio Technician's Guild. The first governing board of the RSA was composed of members from each of these groups.

Before the formation of the RSA, there had been in existence a number of Service organizations, both local and national in character. The RSA, taking advantage of the experience of these groups, set up a new organization for Service Men.

Considering the Service Man an important cog in the radio industry, the organizers submitted their plan to the Radio Manufacturers Association, The Sales Managers Club and to the Trade Journals. Their hearty cooperation and endorsement was obtained before solicitation of membership had been made.

The plan provides complete self-government and freedom of action for local groups as well as for the individual members. The control of the policies and operation of the RSA is vested in its National Board of twenty members who are elected at regular intervals by the membership. This guar-

antees that the RSA will remain a Service Man's organization. We point with pride to the fact that every executive and officer in the organization is a radio Service Man.

Educational Programs

The education of the members of RSA has been a cardinal aim in the operation of the association. Through arrangements with manufacturers and jobbers, speakers of national prominence address our local groups. The national office supplies literature and technical notes whenever they are available. Every member of RSA has access to the Technical Service Bureau of the RSA, and, through it many are helped with difficult service problems. The technical library on file in the national office, a gift of interested manufacturers, is available to all members of the RSA upon request without charge.

Service Standards

Local chapters have set up high standards as a requirement for admission to the RSA. These standards embrace technical knowledge, general business appearance, as well as the equipment which a Service Man possesses.

An important function of an organization is the improvement it can bring in the business of its members. RSA has pioneered in the establishment of minimum price charges for each local

community. RSA has assisted members to obtain their cost of doing business and in keeping accurate books in order that fair and ethical charges may be made to customers.

By virtue of its position in the industry, and the foresightedness of its Board of Directors, RSA was able to ask for and receive the sponsorship of the National Association of Broadcasters. This single piece of promotion whereby local broadcasting stations sponsored the members of the RSA has resulted in a large increase in the business of the individual RSA members where this plan has been in operation.

RSA representation before other branches of the industry has helped to alleviate unsound business practices in the industry which had heretofore resulted in harm to Service Men.

Public Confidence

Perhaps the greatest single piece of work that the RSA has undertaken and carried to a successful completion is the creation and establishment of the RSA Guaranteed Service Plan. By means of this plan the RSA, nationally and through its local groups, guarantees the work of their individual members. This has instilled in the minds of the customers of RSA Service Men a respect and confidence not enjoyed by any other Service Man. The RSA very jealously

(Continued on page 25)

SERVICEMEN,

*by the thousands,
are Demanding*

EXACT DUPLICATE
Guaranteed
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For the **SERVICEMAN, RADIART EXACT DUPLICATE**
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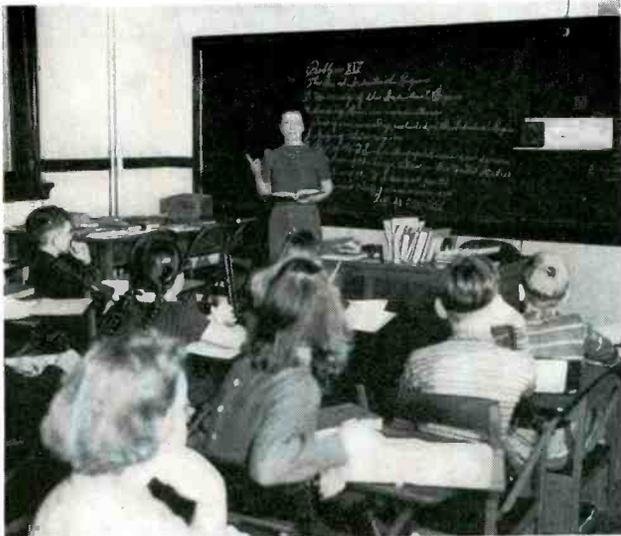
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Photos from Three Lions

Miss Lydon, a teacher in a rural school district in Iowa, is lecturing on the problem of "The Great Industrial Region" with the two-way intercommunicating hookup telling the shut-ins all about it at the same time in their own homes.

IT SEEMS that there was once a time when a poor bed-ridden soul could get out of attending school, at least. But modern science, in the form of a two-way teaching device, has changed all that. If the pupil cannot go to classes, then, like the proverbial story of Mohammed and the Mountain, the classes come home to him. Or, so the story goes in some fifteen rural districts throughout the State of Iowa.

Most states accept the responsibility for furnishing education for physically handicapped children. For those whose difficulty is chiefly in getting about bus service is provided from door to door. For others, who cannot get to class at all, the schools have visiting teachers. But, as is true in most public services, the will to economize exists, and sound equipment has shown the way.

Improves Morale

We are told that the problem of how to prevent the

Miss Mary Ellen Lydon, teacher at Monroe Junior High School, in Iowa, in her classroom with the invisible pupils represented by the standard intercommunicator on her desk.



Two-Way

TEACHING DEVICE

By **ROBERT G. HERZOG**

EDITOR

This unique application of standard intercommunicating equipment has saved the Iowa Department of Education considerable funds from their budget. With these successful installations as an example it should be comparatively easy to sell the same idea to other local school boards.

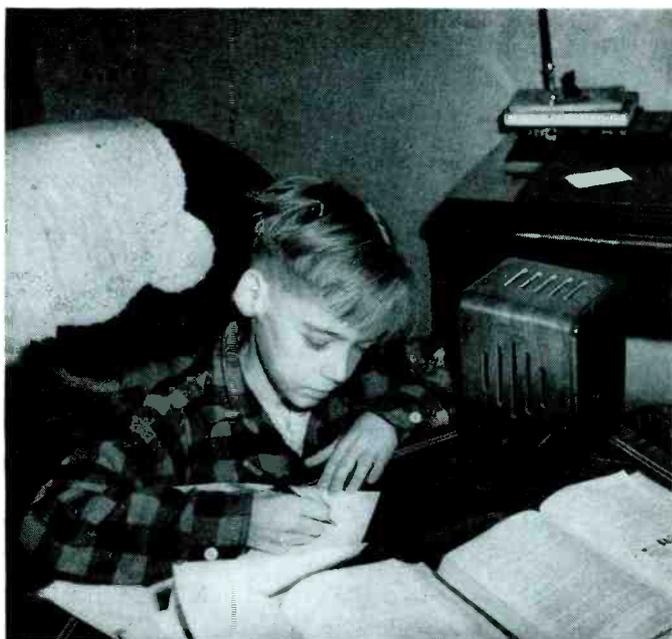
shut-in from missing out on his classes is not the only one, and perhaps not even the most important. The demoralizing effect on the youth is much more serious, especially if he is laid up for a considerable time.

In September, 1939, a high school in Newton, Iowa, was faced with the problem of supplying teaching facilities for a junior who had been confined to her bed as a result of a physical disability. It was at this time that the Department of Education decided to institute an experiment designed to adapt standard commercial intercommunication equipment to provide a solution with a minimum of expense.

The instructional value of this first set was readily apparent. The student made excellent progress academically and the benefits to her morale and physical condition were such that she was able to return to school before the end of the semester. Original estimates had figured that she would be disabled for a whole year.

Convalescent Mary Brown, of Manson City, Iowa, is reciting over the two-way hookup. Her teacher and all her fellow pupils hear her quite distinctly, yet she need not move from her chair beside the set.





At his elbow is his classroom as Howard Field buckles down to the same problems as are done at the school at the same time. As the classes move along from room to room, the Educaster is carried along and plugged in at a convenient socket.



A cheery "Good morning" from the teacher and classmates greets Robert Watson as he switches on his "concentrated classroom." From then on throughout the day's work Robert is a vital part of the classes.

Use Widespread

Spurred by the success of this experiment, a telephone operator prepared another for his fifth-grade daughter who had been suffering from a form of paralysis and could not attend school. From then on the use of this method of providing instruction spread rapidly.

Something more than a hundred sets are now in use in various Iowa school districts. In most instances the service will necessarily be continuous until graduation. Occasionally, however, recovery has permitted the release of the equipment for use in other cases.

Highly Effective

By means of the intercommunicating system victims are enabled to carry a full load of school work creditably. Three of these pupils, in three different communities using the system, are reported to be leading their respective classes in grades. In one city school one of the classes has elected the shut-in as class president!

Recommended

The method has been adopted for recommendation wherever the circumstances warrant its use. The Department, however, does not suggest use of the plan before the pupil has had sufficient classroom experience to interpret clearly the classroom instruction and discussion as it is heard over the teaching device. It would seem, too, to be necessary that the child should be sufficiently mature mentally to visualize classroom procedure.

The Equipment

The two-way teaching device consists, essentially, of a pair of standard commercially available intercommunicating units: one master and one sub-station. To these are added suitable matching transformers for satisfactory operation over a pair of telephone wire lines.

Where more than one classroom is wired the school wiring is brought to a conveniently located junction box where it is distributed and redistributed as the need arises.

It has been found best to locate the classroom unit at the center front of the classroom. Location for the home unit has been selected with an eye to convenience for the pupil.

Distance

Distance between the classroom and the home varies of course. Some homes served are in the next block to the schoolhouse grounds. The longest distance now covered is a trifle more than five miles. There is no limit to its possibilities, however.

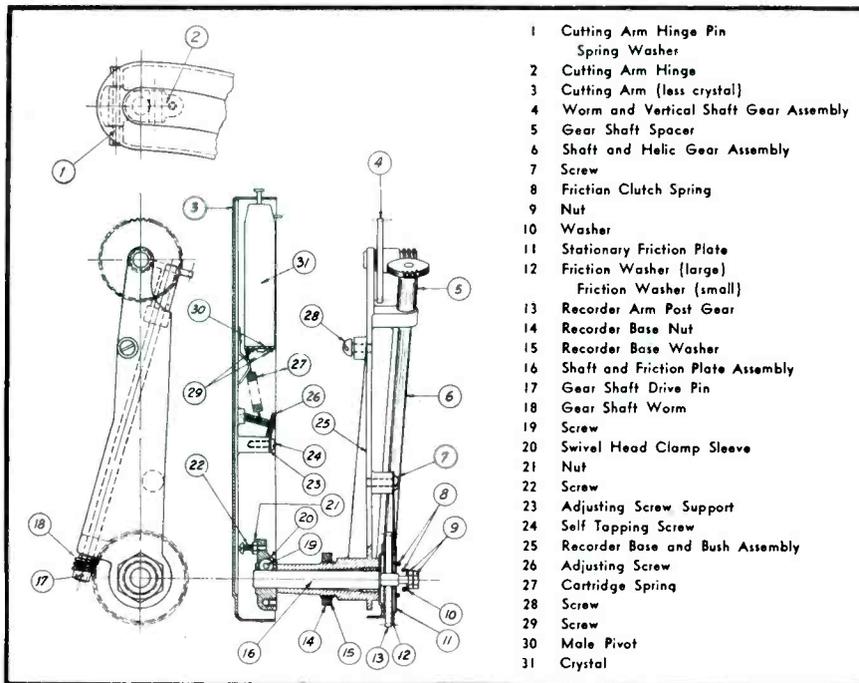
Cost

Cost of the equipment, adjustments and installation has been approximately \$40 per pupil served. As additional pupils are served by the equipment already purchased the average will decrease, however. Maintenance and operating costs are comparatively low. Leased wires between classroom and the home cost \$1.25 per month for the first quarter mile and 75c per month for each additional quarter mile.

From every angle considered the system has been highly successful. Originally started as a means for reducing the cost of furnishing education facilities to shut-ins, these flexible devices have provided superior services. Once having been sold on the idea, the educators report that they would not change even if this method had cost more than the others tried.

In conclusion, the author wishes to express his appreciation to Mr. W. A. Winterstein, Statistician of the Department of Public Instruction, Des Moines, Iowa, for his cooperation in supplying much of the material upon which this article is based.

H O M E R E C O R D I N G



WHEN making home recordings, it is essential that the speed at which the record is cut, be kept at or near 78 rpm. The load imposed on the motor when cutting a record is much greater than when playing back the recording and, when the difference in speed between recording and playing is in excess of four rpm, it becomes quite objectionable. Increased satisfaction with home recordings will result when the following conditions are observed and adjustments are made for the most suitable operation.

1. Allow the phonograph motor to become thoroughly warmed up before attempting to make a home recording. Play six records or more so that the grease in the gears becomes thoroughly loosened.

2. The fiber gear on the home recording gear train that engages the spindle should mesh loosely with the spindle gear in order to avoid binding. It may be necessary to enlarge the mounting hole in the record changer base in order to obtain this condition.

3. The cutting arm height adjusting screw should be set so that the cutting arm is just $\frac{1}{4}$ -in above the record. Put the cutting needle in the crystal and place it on the record near the spindle. Check the cutting arm height . . . $\frac{1}{4}$ -in above the record.

4. The needle pressure is very critical. A scale should be used, so that

needle pressure can be adjusted accurately to $\frac{1}{4}$ ounces with the cutting needle placed near the spindle. The needle pressure must be checked just as the needle is raised from the record.

5. The crystal low level stop should be adjusted, if necessary, to obtain $\frac{1}{2}$ -in of free movement of the crystal in the cutting arm. With the needle resting on a record, raise the cutting arm slowly. There should be from $\frac{3}{16}$ to $\frac{1}{4}$ in of motion of the cutting arm before the cutting needle lifts from the record. This will allow a free vertical movement of the crystal, compensating for any slight wobble in the turntable or record.

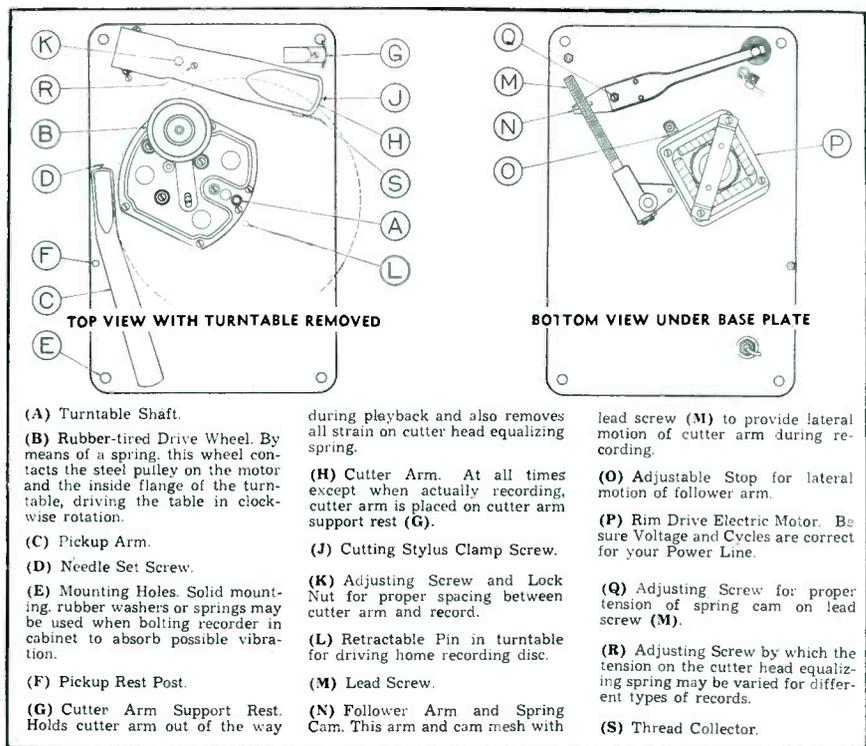
6. At the first sign of fuzzy or poor tone when making home recordings, change the cutting needle. A cutting needle should make between ten and twenty good clear recordings before it becomes necessary to replace it.

Two types of needles have been furnished in the past. The first recording needle was of the type normally known as a plow type needle. The cutting face of this needle is curved so that it actually digs into the surface of the record. This type has been replaced with a newer type which can be distinguished very readily from the plow type because the cutting face of the needle is flat and

Philco HRI home recording unit (above). Increased satisfaction with home recordings will result when adjustments are made for the most suitable operation.

The General Industries recording mechanism (below). The greater complexity of the phono-radio-recorder is not all because of its novelty but also because there are more things to go wrong.

(Continued on page 24)



Where you find
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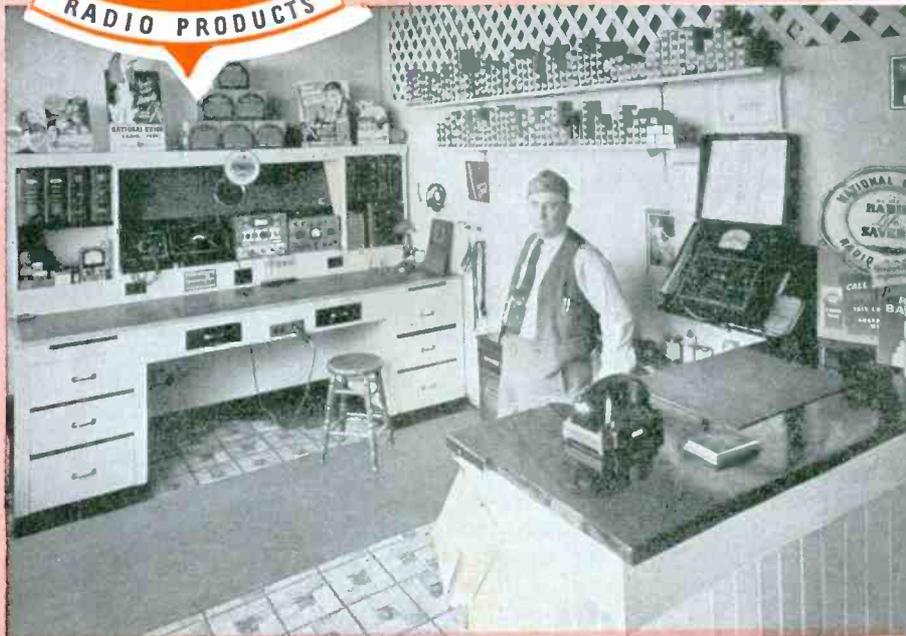


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The buying public learns faster than most dealers think. That is why National Union Dealers prosper. With better equipped shops they can give better service.

Why not get wise and equip your shop with the latest tube testers and test equipment the *EASY N. U. WAY* . . . then you too will be on the road to . . . **BETTER**

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Mr. Ben Myers and his attractive radio shop Marshfield, Oregon . . . N. U. dealer for many years.

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Radio Tubes

. . . More Radio Service Dealers use National Union than any other make . . . there must be a good reason why.



Batteries

. . . The only line of Dry Batteries sold exclusively to the Radio Trade . . . You can make more money.



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. . . Same Super Quality as found in N. U. Tubes. Just try them.



Sound Extra Tubes

. . . a line of heavy duty radio tubes for sound work . . . an exclusive N. U. development.



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. . . Performance that satisfies the critical demand of the Radio Service Dealer. Try them yourself.

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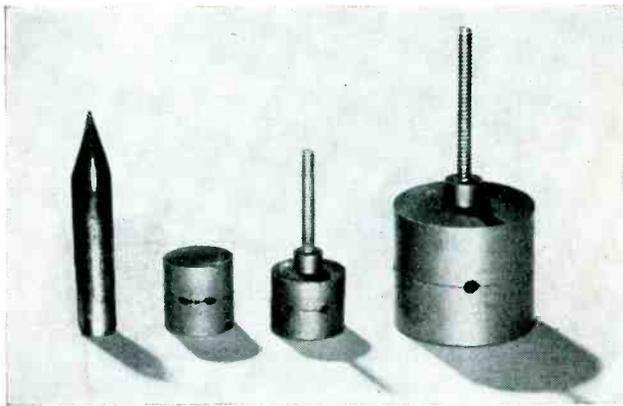


Fig. 1. Minute powdered-iron coil pots and cores, already used extensively in auto-radio and personal sets, are helping conserve aluminum.

IN VIEW of the priority regulations for defense purposes, a host of new and interesting radio parts will appear in receivers produced between now and the Fall. For instance, because of the mandatory control of aluminum, a number of substitutions will appear. These substitutions will take either of two forms; material substitutions and product substitutions. In the material substitution class will be found such things as dry electrolytic condensers with plastic tubes instead of aluminum cans. These tubes will be supplied in a variety of colors, to conform with the color code, thus simplifying identification. Although it has been the impression that substitutions will increase the price tremendously, in this instance the price increase will be comparatively small.

Plastics are also playing their major role as a substitute in many other instances. Actually, plastics are playing a return engagement, for, in the old days, laminated plastics were quite popular as subpanels. Aluminum and steel came along and sort of shelled the popular fellow. Today, however, subpanels are again being made of laminated plastics where lightweight is an essential factor. Chassis are also being made of molded plastics, with hollows in the strengthening ridges to accept the leads.

Some manufacturers are also preparing plastic containers with sprayed metallic surfaces, the metal consisting of finely pulverized scrap material. Thus, shielding surfaces will be available and yet only a minimum of metal will be used.

Another division of the industry that has taken the bull by the horns is the disc division. One manufacturer has produced glass-base recording blanks. The claims are that sound is reproduced as perfectly as modern science can achieve and perhaps better than on the standard aluminum base. The problem of transportation has also been solved

according to test and regular shipments of this material.

The mandatory control of aluminum has precipitated a major problem to solve. This order provides that all producers of aluminum, both primary and secondary, will rate a customer's requirements according to a schedule of preference ratings. This schedule contemplates that all defense requirements, either direct or indirect, shall be classified as A10, unless higher ratings are provided by the Priorities Division.

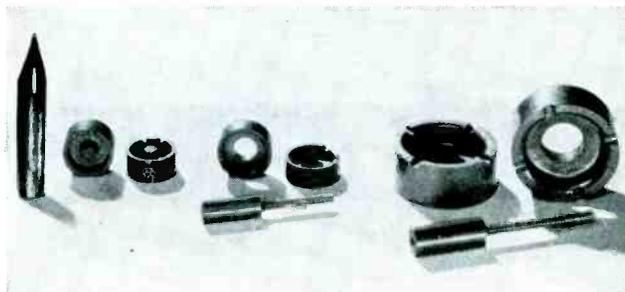


Fig. 2. The powdered-iron pot, houses the complete coil and dispenses with the usual aluminum shield or, by raising the Q , permits the use of substitute metals. Where plungers are employed, the variable trimmer is also eliminated.

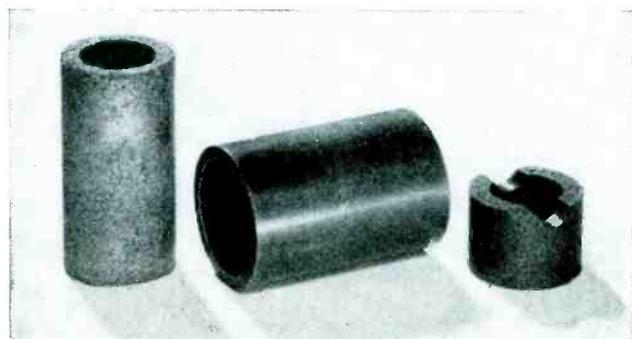
The remaining civilian requirements are given B ratings, ranging from B1 to B8. B1 rating provides that one percent of each supplier's product be set aside each month and deliveries be made out of this reserve, only in accordance with specific orders issued by the Priorities Division. In other words, there is a reserve for taking care of unforeseen demands. The remaining ratings divide civilian industries into seven categories, in accordance with their relative importance to the total defense effort. For example, B2 is for the repair or replacement of existing apparatus, while B3 is for public health

B2s, ranging down to 10% for the B8s in the case of virgin aluminum. In the case of secondary aluminum, the ratio was 100% for the B2s down to 50% for the B8s.

Variable condensers, using the preponderance of aluminum, have been jostled about by the priority regulations. And here servicemen will find a number of substitutions, both in the form of different types of condensers as well as different methods of tuning. They may find condensers made of iron, brass or steel. In some instances, instead of variable condensers as the

(Continued on page 29)

Fig. 3. Where shielding is necessary, powdered iron has again come to the rescue. These cylindrical shells, when slid over the coil, concentrate the stray field and reduce the necessity for other shielding. They have been used in the past in auto-radio sets in an effort to conserve space.



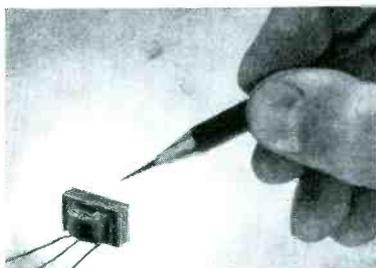


It is surprising to most people to find out that by far the bulk of U.T.C. production is on special units not normally catalogued. It is impossible to describe all these thousands of special designs as they become available. The solutions to three typical customers' problems are shown below.



FULL WAVE VARITRAN

● In one full wave rectifier application, our customer was employing a standard varitran with a step-down transformer having a center tapped secondary. The U.T.C. design division simplified this construction by developing a special varitran unit with an insulated secondary and a double contact structure, permitting a continuous variable voltage to be obtained each side of center. The step-down transformer is now entirely eliminated.



THE SMALLEST

● In one special application the requirements call for the smallest output transformer possible, size and weight being of paramount importance. The design developed by U.T.C. has dimensions only $7/16$ " square by $3/4$ " high. Almost ten thousand turns are employed in the coil of this unit. Ten of these transformers weigh only three ounces.



600 AMP. VARITRAN

● In bending some types of tubing, it is desirable to heat the tubing to a highly ductile point, thus preventing kinking. A special U.T.C. varitran was developed for this application. This unit combines a standard varitran with a step-down transformer. The output current, for any type of load normally encountered, can be varied continuously from zero to 600 Amps. with direct meter calibration.

MAY WE ASSIST YOU IN YOUR PROBLEMS?

The design ingenuity used in these applications has helped many users in other problems. The cumulative experience acquired in such development makes U.T.C. an ideal source for transformers to specifications.

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SERVICE, JUNE, 1941 • 23



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- Yes, the Aerovox Type PBS cardboard-case dry electrolytics always rate as top-notch replacements with successful servicemen when it comes to low-cost jobs. The compact dimensions; adjustable metal mounting flanges; polarity-indicating leads; generous voltage ratings; full capacity—these and other features brand them as ideal replacements when pennies count. Note wide choice of listings. . . .

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8-8-8 to 16-16-16 mfd.

- **Ask Your Jobber . . .**
He carries a full stock of these fastest-selling constantly-fresh PBS electrolytics. Be sure you have some on hand, always, for quick repairs. Ask for latest catalog—or write us direct.



PHONO PICKUP CONNECTION

(Continued from page 6)

they will usually give better performance, however. Some of the old-time receivers had a type of wireless phono-graph in which the pickup modulated an oscillator at i-f peak. With the oscillator close to the set, the signal would be picked up by the i-f amplifier directly.

Switches

Many novel switches and switching ideas have come to light recently with the growing popularity of record players. Most are based upon some simple required movement or operation, i. e., in lifting the pickup, radio is turned off; moving the arm starts the motor automatically; placing the pickup upon the rest stops the motor; as the arm is raised, a mercury switch goes to work and starts the motor. Sometimes a double pole switch is used to turn on the motor and turn off the set at the same operation. In some automatic changers, automatic muting occurs between records to cut out extraneous noises. All in all, these are simple devices; yet, they add something tangible and thereby increase the value of what might be a very simple piece of equipment.

Wows

The prevalence of wows is decreasing, but almost everybody who uses record players is sometimes annoyed by this evil. Some wows occur during recording; others are due to the playback equipment. Sometimes the hole in the center of the record is misplaced, making the grooves eccentric. The alert Service Man can at least keep the motor and mechanisms oiled and clean and keep oil from friction drive surfaces. Manufacturers complain that the average Service Man is just dumb about changers. We admit some of them are beauts to follow, but a little serious studying wouldn't be wasted. We all hope the trend is toward simplicity with a minimum of gadgets.

BUTTON-BASE TUBES

THE center hole in sockets designed for the button base, as used on miniature tubes, provides for the possibility that tube types employing the button base may be manufactured with the exhaust-tube tip at the base end. For this reason it is recommended that in equipment employing such tube types, no material be permitted to obstruct the socket hole.

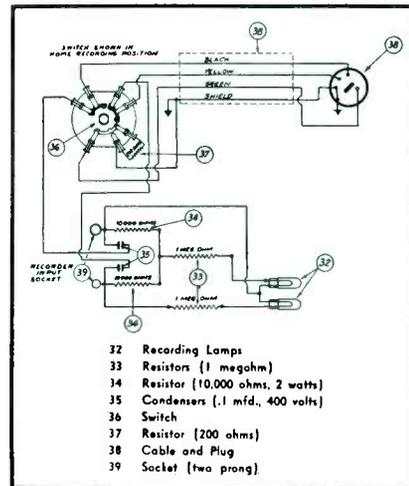
RCA Application Note No. 113

Auto radio and sound—Two phases of this business that should be especially profitable during the coming months. Are you getting your share?

HOME RECORDING

(Continued from page 20)

is parallel to the axis of the needle. The plow type needle can be used to make 6-in home recordings satisfactorily, but it should not be used to make 10-in home recordings, since it cuts too deeply into the record and will slow up the



Philco HRI pickup and cutter switching.

phono motor while cutting the outer edge of the record. The new flat face needle will be satisfactory when making the 10-in recordings.

Philco Radio Service Bulletin No. 379.

ATTENTION RADIO SERVICEMEN EXTRA PROFIT TO YOU!

RECOMMENDING NEW RADIOS TO YOUR CUSTOMERS CAN NOW BE DONE WITH REAL EXTRA PROFIT TO YOU. Give your customers Extra Value at the Right Price, and you'll be amazed at how easy it is to make MORE MONEY under our NEW EXTRA PROFIT SALES PLAN, requiring NO INVESTMENT, on your part at all. YOU DEAL DIRECTLY WITH THE MANUFACTURER. . . . No Jobbers, No Dealers—NO MIDDLEMEN. Many servicemen have doubled their income.

Write for details TODAY!

No Obligation.

SAVE ON PARTS AND TUBES

Every month, we have left over limited quantities of NATIONALLY ADVERTISED RADIO PARTS AND TUBES, from our radio production. These FIRST GRADE Nationally Advertised Parts and Tubes, made to our own rigid specification, are available to You, MUCH LESS THAN THE MARKET PRICE. Write for your copy of our Monthly Surplus Parts Sheet. THE EXPERT ADVICE OF OUR ENGINEERING DEPARTMENT IS YOURS, FREE, FOR THE ASKING.

DON'T DELAY—WRITE TODAY FOR COMPLETE INFORMATION

NORTH EASTERN RADIO CO.
80 East 11th Street
New York, N. Y.

I certainly would like to know more about North Eastern's EXTRA PROFIT PLAN.

NAME
ADDRESS
CITY, STATE

THE RSA

(Continued from page 16)

guards and will continue to administer to the best of its ability, this Plan in order that Service Men may continue to gain and hold the respect of their customers in a manner worthy of the profession of radio servicing.

The Future

Now, as never before, national solidarity is a matter of supreme importance. Concerted action along national lines, in whatever way it is deemed best for the welfare of the industry, is required. During these trying times both set and parts manufacturers are finding a tower of strength in a national service organization that is closely geared to their welfare. RSA therefore faces the future with confidence.

The next several years should be especially good ones for Service Men, and the RSA pledges itself to carry on the work which has been so auspiciously started. With this in mind RSA invites all good Service Men, who are not now members of RSA, to become affiliated in order that we may all grow together.

Boston, Mass., RSA

With the slogan that the letters R S A, in addition to standing for Radio Service Men of America, also means Reliable Service Assured; Boston Chapter has worked hard the past year and one-half and feels the benefits from the effort. By cooperation with the broadcast stations and rendering them material assistance, the stations have materially helped Boston RSA. Besides bringing added business to members, prospects have been attracted and have become members. Boston RSA is located at the cradle-side of frequency modulation and has "gone to town" with f-m in all its phases.

Raymond C. Wyman, Chairman.

Johnstown, Pa., RSA

The Johnstown Chapter is planning to send the largest number of members ever to the National Convention this year. Last year a third of the Chapter made the twelve-hundred-mile trip overland by auto; the year before we received the prize for the greatest number of members of a chapter coming the longest distance. The Chapter is paying all transportation expenses of every member who wants to make the trip to Chicago. This money does not come out of the funds of the Chapter, but is a special fund set up for this purpose. It is derived from picnics, skating parties and shows held throughout the year.

The recent push-button campaign was a success. Our local radio station cooperated by giving us plugs over the air for two weeks; the Chapter also had an advertisement in both papers listing the shops of all members.

Several members attended the last meeting of the Pittsburgh Chapter. As usual, we were treated royally and enjoyed the meeting very much and hope we can repay the courtesy soon.

Ken Vaughan, President.

HERE'S THE BIGGEST-SELLING BATTERY IN THE PORTABLE FIELD TODAY!



AND HERE'S WHY:

1. "Eveready" "Mini-Max" "B" Battery No. 482 FITS MORE THAN 90% OF THE 2,000,000 PORTABLE SETS NOW IN USE!
2. IT LASTS ALMOST TWICE AS LONG AS ANY OTHER BATTERY OF EQUAL SIZE!
3. IT COSTS NO MORE THAN ORDINARY PORTABLE RADIO BATTERIES!

GET IN ON THIS PROFIT OPPORTUNITY NOW!

**FREE PREMIUM OFFER!
ASK YOUR DISTRIBUTOR ABOUT IT!**

Here's the battery for "personal" or "camera-type" radios!



"Personal" or "camera-type" sets were designed around "Eveready" "Mini-Max" Radio "B" Battery No. 467. It packs 67½ volts in a space 3⅞" x 2⅜" x 1⅜". Folks in your neighborhood will ask you if you have it. Order now!

"EVEREADY"
"MINI-MAX"
RADIO "B" BATTERIES

NATIONAL CARBON COMPANY, INC.

Unit of Union Carbide and Carbon Corporation



The words "Eveready" and "Mini-Max" are registered trade-marks of National Carbon Company, Inc.

FREE! Replacement Guide for portable receivers! Tells the proper batteries for portable sets. Accurate! Up to the minute! Write Dept. S-1. National Carbon Company, Inc., P. O. Box 635, New York, N. Y.



MODEL J



MODEL DD

NEW! ZERO CENTER VACUUM TUBE VOLTMETER

Million does it again! Unit features a Zero Center Meter with over 30 scales. ★ Tests 1000 Megohms insulation resistance. ★ Tests oscillator grid bias while in operation at up to 3,333,333 ohms per volt. ★ Big, easy to read zero center meter. For standard and FM sets. Literature Free.

MODEL J
NET ONLY **\$34.95**

MODEL DD TUBE TESTER

New!—with wider application range. Tests emission of all tubes. Twelve sockets cover all types from "hearing aid" peanut tubes to the new Loktals and "S" series. Filament switch covers 1.4 to 110 volts with spare positions for the future. Gives instant GOOD-BAD readings on oversize D'Arsonval meter. Makes neon short or leak test with the tube hot. Tests by-pass condensers, etc.

MODEL DD
NET ONLY **\$18.95**

LITERATURE FREE

MILLION
RADIO AND TELEVISION

1617 No. Damen Chicago, Ill.

SAVE \$1.00 !!!

- The Group Subscription Plan for *Service* enables a group of service men, dealers or jobbers to subscribe at one-half the usual yearly rate.
- The regular individual rate is \$2.00 a year. In groups of 4 or more, the subscription rate is \$1.00 a year. (In foreign countries, \$2.00.)
- Each subscriber should print his name and address clearly and state his occupation—whether a dealer, jobber, independent service man, service organization, etc.

Remember this Group Plan when Your Subscription Expires

Chicago, RSA

Some 22 technical meetings were held during the past year. This feature alone has saved us many more dollars than our individual dues. During this same year the Chapter visited a half dozen radio factories to study their new lines and developments. To further supplement the technical side, we hold clinics regularly. Free service notes are often distributed to the members.

A tie-up with the local broadcast station in connection with Radio's Moving Day proved quite successful.

Our plans for the coming year are extensive and, with good prospects for a healthy growth in membership we will outdo this year's record.

Alfred A. Kilian, Secretary.

Cincinnati, Ohio, RSA

Master Radio Servicemen, Inc. is the Greater Cincinnati affiliate of Radio Servicemen of America, Inc. The chapter was formed approximately one and one-half years ago and since has enjoyed a very healthy growth.

The following officers will hold office for the year 1941: Bop Pepper, pres.; Wm. Stephenson, vice president; Ray S. Rohrer, secretary; Sid Smith, treasurer.

For the past 9 months we have had a station tie-up with radio station WCKY of Cincinnati. This tie-up has been very beneficial to both the chapter and station WCKY. A Radio Moving Day Party was held at the Hotel Gibson in Cincinnati, Ohio, the night of March 28, sponsored by MRS station WCKY and the Cincinnati Electrical Association and approximately 450 Servicemen attended.

We are looking for a strong and healthy growth in the coming years and hope to have as members all of the qualified and legitimate Service Men of Greater Cincinnati.

Ray S. Rohrer, Secretary.

Danville, Ill., RSA

After having completed their study of fundamentals with practical demonstrations and a review examination, the members of the Danville Chapter and the sea scouts continued with a new course in code with Lyle Cummings as Instructor.

The course opened with 47 enrolled for instruction. The attendance has held up except for those who were enlisted in the Army or the defense program. The course is chiefly designed to enable the fellows to get ham licenses.

Calvin Stapp.

Fremont, Ohio RSA

The Fremont, Ohio Chapter has installed their recently elected officers for 1941-42. These are: William Brown, chairman; Ralph Eversole, vice chairman; Robert Uhl, secretary and Ralph Witter, treasurer.

Frank Hawley of Toledo Radio Specialties Co., spoke on home recording at the last meeting. The discussion was timely and interesting.

D. P. Burns, Publicity

New York, RSA

Last month proved a busy one for our members. At our first meeting, usually devoted to business, we took time to show a motion picture, "The Story of Bakelite", and also had the pleasure of listening to Jack Jacobs of Sanford Samuels. Jack brought up the problem of minimum rates for specific radio repair jobs. He suggested that such a list be prepared for all types of replacements and repairs, and that

RSA as an organization sponsor such a list, and help all Service Men to live up to it. This is something that we've been waiting for for a long time!!! Sounds like a good idea.

The outstanding event of our season was the lecture and demonstration of f-m given by Earl F. Reihman of the General Electric Company at our second meeting of the month.

Our hard working Treasurer, Horace Guthman, has volunteered to handle the office of Chapter Historian in addition to his other duties. You are urged to give him your active cooperation by mailing to him at 1218 Union St., Brooklyn, all clippings and pictures of chapter activities that you find in newspapers, magazines, etc.

Pontiac, Mich., RSA

We have doubled our membership this year and certainly have a fine group of fellows in our chapter. We are getting along like one happy family. We have had fine cooperative advertising from our local newspapers and our local broadcasting station.

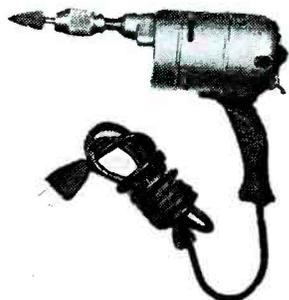
Our latest advertising, sponsors a Class B soft ball team in our local ball park. The suits have RSA insignia across front and RSA on the back in blue and gold. Our team was the winner in its first game. We also have RSA score boards made up with team photograph in center.

Parts, etc. . .

Additional information and prices of the equipment described below may be obtained, without obligation, from the respective manufacturers.

ALL-PURPOSE TOOL

Paramount Products Co., 48 W. 43th St., New York City, are featuring their new "Whiz," a "super tool of 1,000 uses."



The power driven device weighs less than 3½ lb. and drills, grinds, sharpens, sands, polishes, saws, shapes, etches, and carves, it is said.

PANEL LAMP KIT

Hygrade-Sylvania Corp., 500 Fifth Ave., New York City, are packing an assortment of 60 popular panel lamps in handy kits that the Service Man can carry with him on calls.

SMALLER ELECTROLYTICS

The perennial goal of smaller condenser sizes has been given further impetus by the government's request to reduce all non-defense uses of aluminum as much as possible. Sprague engineers have "come through" again and reduced the 8-mfd condensers, previously housed in an aluminum can 1¾ inches to a diameter of 1 inch, an aluminum saving of better than 35%. Sprague Products Co., N. Adams, Mass.

(Continued on page 32)

**ASTATIC'S
New
N-SERIES
MICROPHONES**



Made in Wide Range N-30 and Voice Range N-80 Models. List Price, each \$17.50.

Both models in the N-Series are available with convenient on-off switch as illustrated at left. Complete as shown: List Price, each \$20.00.

Because of an exceptionally smooth frequency response and other improved characteristics, Astatic's new N-Series Crystal Microphones are especially desirable for modern public address installations. Swivel joint tilting head, cushion protected internal diaphragm, concentric cable connector, low cost and grand performance, make the N-Series highly desirable from every angle.

Astatic N-Series Microphones will be displayed at the Radio Parts National Trade Show, and are included in Astatic's new 1941 Catalog, now available.



THE ASTATIC CORPORATION

In Canada:
Canadian Astatic, Ltd.
Toronto, Ont.

YOUNGSTOWN, OHIO

Crystal Products Licensed Under Brush Development Co. Patents

What Makes a Mike GOOD?

It must have equally good response for voice or music. It must be dependable under all climatic and acoustic conditions. It must have an attractive, professional appearance.

TURNER MIKES are

- Free of Distortion
- Dependable
- Attractive

If you're looking for a GOOD mike, Turn to Turner! *Turner Mikes are engineered to be FREE of amplitude, phase and harmonic distortion.* They deliver under all climatic conditions, and certainly they're tops in styling and finish.

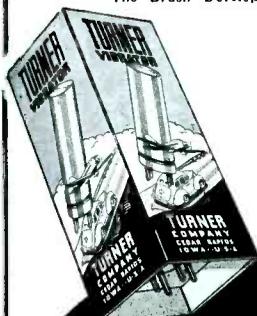
Turner Han-D Microphone



Ideal for P.A. men, recorders and amateurs. Engineered for voice AND music. Can be held, hung or mounted on desk or floor stand. Positive contact switch for off-on operation. 9D Dynamic, 60-7,000 cycles, level -50Db, with 7 ft. removable cable set. List \$25. Write for Free Turner Microphone Catalog.

THE TURNER CO.
906 17th St. N.E. - Cedar Rapids, Iowa
Crystals Licensed Under Patents of
The Brush Development Co.

**CUT
Needless
Servicing
Costs!**



**TURNER
PUSH
PULL
VIBRATORS**

With 10 Engineering advancements that free you from much costly servicing. Write NOW for Free 16-page technical manual.

THE TURNER CO.
906 17th St. N.E. - Cedar Rapids, Iowa

TIME TO TURN TO



CIRCUITS

(Continued from page 14)

genuine mixer for phono pickup and mike. The mixer serves as a phono volume control. A separate control is employed for the mike. A muting switch is provided which puts 10 ohms in series with the voice coil and 3 ohms in parallel. (See Fig. 7.)

Hallicrafters S31

Hallicrafters, known for communication sets and commercial equipment, have a new f-m, a-m tuner, Model S31, which is designed to use an external a-f system. It covers a range of 540 to 1650 kc and 40 to 51 mc, the band switch also changes the i-f from 455 to 4300 kc. On 455 a-m, a single 6SK7 stage feeds a 6R7 detector-a-f amplifier which serves as output for both a-m and f-m; also for phono. 130 milliwatts is available in output impedances of 500 and 5000 ohms which is ample power for any standard audio amplifier. A headphone jack is also provided. A 3-gang r-f and converter acts for both channels. The f-m i-f contains two stages using an 1852 and 1853 with 6SJ7 limiter and 6H6 discriminator. A carrier meter (known as an S meter on communication receivers) is provided for tuning and measurement of signal strength. Hallicrafters also have a new f-m, a-m receiver covering 37 to 105 mc that uses acorn tubes in the r-f section. It may not be long before these higher frequencies will be used for regular popular services.

Coronado C1131A

Coronado Model C1131A, 10-tube and eye, 2 band a-c job uses a different type of switching in the converter r-f transformer. The broadcast and short-wave coils are connected in series. On broadcast, the primary of the short-wave coil is shorted; on short waves, the secondary of the broadcast coil is shorted.

Philco 41-250, 41-255

Philco makes it a practice on many models to bring out the voice coil high side to the loop antenna terminal strip. This is a real aid to Service Men during alignment. On multi-band sets, the loop is tapped for short waves. Models 41-250 and 41-255 have permeability-tuned push buttons; one button labeled "television" can be adjusted for reception of television sound tuned in by special Philco television. Two fully-tuned i-f stages are used; avc is applied to the first only. This is one of several Philco's using screen grid inversion in the power stage. See Fig. 8. Note also



Old Man Centralab
reminds you to always "specify Centralab" when ordering parts.



**FIXED
RESISTORS**



**CERAMIC
CAPACITORS**



**VOLUME
CONTROLS**



**WAVE CHANGE
SWITCHES**



**TOGGLE
SWITCHES**

Centralab

DIVISION OF GLOBE UNION INC.
MILWAUKEE, WIS.

the unusual tone-control circuit where the control is split in two parts of 6 megs and 400,000 ohms.

Fada C33

With the portable season in full swing, we present some more novelties in portable design. The Fada camera Model C33 derives grid bias for the 1S4 power tube from the oscillator grid leak as shown in Fig. 9. A I-type filter consisting of two 1-meg resistors and a 0.1-mfd condenser wipes out any high-frequency coupling from the oscillator. This is a very satisfactory method of obtaining bias provided the oscillator grid current is fairly constant throughout the tuning range. Otherwise, the bias will vary in proportion to the change in grid current.

WELLS-GARDNER 7A41-3, 7A41-5, O4WG732

Production changes: Two additions have been made in the circuit for this chassis as follows: A 100,000-ohm resistor is connected between the underground side of the phono socket and the phono switch to reduce needle scratch on high impedance pickups.

No. 1 terminal of the speaker and record cutter socket is now connected to the positive B-voltage supply at the high-voltage side of filter resistor R18. This socket terminal was open on previous issues.

Joe K. Rose, Service Manager
WELLS-GARDNER & Co.

RADIO AND NATIONAL DEFENSE

(Continued from page 22)

tuning medium they will find our old friend, inductive tuning.

Inductive tuning had its inception away back in 1896, when Fleming described its virtues in his grand book. Since then, it has had many wild rides, but during the past few years, it has come into its own to become quite an important factor. Auto-radio manufacturers recognized its possibilities, in



Illustration courtesy Presto

Disc manufacturers have helped solve the aluminum shortage problem by resorting to substitutes. Several have announced discs with glass as a base. One is using paper for professional discs.

view of the high gain and small space necessary. Constant improvements have brought inductive tuning to a point where many automobile receiver makers are using them for their receivers. Several household receiver manufacturers have also adopted this method of tuning, and according to reports many more will fall in line for production of the Fall receivers.

A powdered iron core moving through the coil usually constitutes the inductive tuning methods used. This core has an extended shaft which in some instances is threaded and at other times is threaded.

A type of this powdered iron will also serve to provide a new type of shield. Under test, the use of such a powdered iron shield increased the Q of a coil (having a Q of 150 with an aluminum shield) to 165. With an iron cover, the Q was reduced to 85; with zinc the Q was 140. Receivers will also show tiny i-f transformers, using cup cores in a three piece construction.

Because of the shortage of aluminum, the popular Alnico is not available, for use in p-m speakers. Thus, the new receivers will recall the dynamic speaker to its former prestige, unless some inventive genius produces a substitute for Alnico.

Nickel, another important item in the radio industry, and now on the critical listing, will have several substitutes. Of course since nickel is used most extensively in tube construction,

SERVICING by SIGNAL SUBSTITUTION

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Question: PERFORMANCE? ... Answer: YES!
Question: COSTLY? ... Answer: NO!

Because

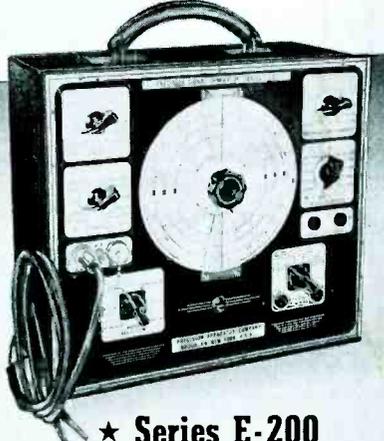
1. "S-S-S" employs ONLY BASIC TEST EQUIPMENT ... NO EXTRAS!
2. "S-S-S" is UNIVERSAL ... non-obsolescent
3. "S-S-S" requires NOTHING COMPLEX TO LEARN

Modern servicing (A.M. and F.M.) requires only 3 basic instruments: The Signal Generator (such as PRECISION Series E-200); The Dynamic Mutual Conductance Type Tube Tester and a 20,000 ohms per volt Multi-Range Set Tester (such as PRECISION combination Series 954).



★ **Series 954** Combination Dynamic Mutual Conductance Type Tube Tester and 20,000 ohms per VOLT Multi-Range AC-DC Set Tester

A complete service laboratory answering the demand for a compact unit with every facility for accurate, reliable solutions of all tube test and measurement problems (A.M., F.M. and Television). A single master rotary range selector permits simple, rapid measurements in troublesome stages, quickly localized through "Servicing by Signal Substitution."
 954 MCP—in open face portable metal case (illustrated for Series E-200). Complete with battery and extra high voltage test leads **\$61.95**
 954 P—(illustrated above) Hardwood case. Complete **\$65.95**
 954 PM—Standard panel mount. Complete **\$65.95**



★ **Series E-200** Modern Laboratory Type Multi-Band Signal Generator

Not only an unsurpassed Signal Generator for purposes of receiver alignment, but SPECIFICALLY DESIGNED as the key to "Servicing by Signal Substitution" ... Nevertheless priced within the easy reach of every progressive radio service engineer.
 E-200—(illustrated)—in heavy gauge metal cabinet, complete with tubes, coaxial output cable and FREE copy of "Servicing by Signal Substitution" **\$35.95**
 E-200PM—in standard panel mount, complete **\$39.95**

FREE A 120 page text book "Servicing by Signal Substitution" describes this simplified approach to receiver adjustment problems. Furnished FREE with every PRECISION Series E-200. Also available at leading distributors or directly from factory at 35c — Write for it today!

More than 40 models in the New PRECISION 1941 LINE ... 21 Dynamic Mutual Conductance Type Tube Tester and Set Tester models ranging in price from as low as \$29.95 ... 16 Multi-Range Tester models from as low as \$14.95 ... Signal Generators from \$35.95 ... See them at your local distributor ... Ask or write for the PRECISION TEST EQUIPMENT 1941 CATALOG.

PRECISION TEST EQUIPMENT

Standard of Accuracy SEE THEM AT YOUR JOBBER

PRECISION APPARATUS COMPANY • 647 KENT AVENUE • BROOKLYN, N. Y.
 Export Division: 458 Broadway, New York City, U. S. A. Cable Address: Morhanex

the change may not be so physically apparent. Many manufacturers are already using copper flashed steel rods for grid supports and oxidized steel for plates. Iron grid wires with nickel sleeves are also being included. It is also possible that there will be a more pronounced shift to glass envelopes instead of metal.

Because of priority regulations and general conditions, prices of parts are changing constantly. Accordingly, catalogs that will reach the Service Man and dealer will, in many instances, have

blank spaces where the prices usually occur. Price sheets with prices as of the date issued, or as close to it as possible, will be included.

Although the receivers that are to come will contain substitutes and substitutions, efficiency not only will be retained, but in many instances, will be improved upon. The wise Service Man, however, will keep constantly abreast of all changes in materials and complete design. In this way, he will more than assure himself of being able to capitalize in this rapidly changing business.

Shroud of the STUMBLEBUM

By Farley Charrell

MORE in sorrow than in anger do I paraphrase the "brown derby" and say, "Let's take a gander at the record." I mean the record of Service Man's income over the past five years or so.

It's a pretty sorry mess, and if you will please take a look at your own bank balance and your "modern" work bench, in general, you must agree with that contention. Statistics showed four or five years ago that the average servicier earned something like \$19.00 per week net. If the Government of the United States had to function on the income taxes collected from the servicing fraternity, we'd have to reduce the salaries of our Congressmen to seven bucks a week.

Let me repeat that I'm sorry about this condition—not annoyed. For many of the financial ills which have beset the serviciers during the past five or six years have been the direct fruit of the seeds of sorrow which were sown during the days of the country's normalcy. For it is a fact that the moment factories start to close down, workers thus released from steady employment begin to grasp at any straw which might provide them with the necessities of life and usually invade those lines of business which can employ their talents.

This is particularly true of the radio receiver industry. Let the production of sets drop in accordance with decreased demand, and immediately there ensues a rush to buy cheap soldering irons with which to embark on radio servicing.

Next step comes when the shade tree mechanics get out in circulation. All they want to do is get a few service jobs and the price is of little or no consequence to them. Enough for a plate of ham and eggs or a slab of stewing beef to put on the table for the wife and kids. I don't blame them too much. No more than I blame the stumblebum who hangs around fight clubs trying for a chance to get his brains beaten out for the price of one days "kip and cakes." Economic necessity knows no principles nor ethics. The "hunger of the belly kind" is just about the most impelling motive in present day price cutting.

I hope I'm never hungry—for if necessary, I'd knock out these brain throbs for the price of a cup of coffee and a pair of doughnuts. Or even one

doughnut and never mind the coffee.

Well . . . guys like that are fast getting out of the picture—the stumblebums I mean. But they have already clothed the entire servicing industry in the shroud of the stumblebum and now is the time for a change of costume.

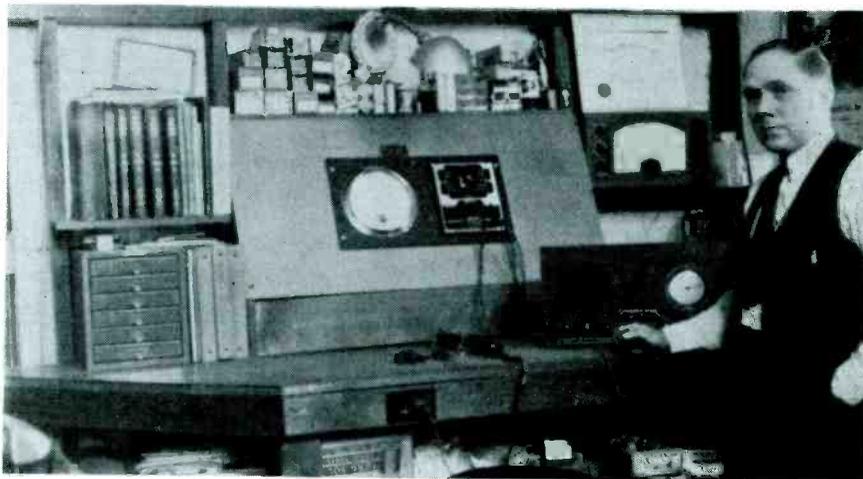
I believe that there has never been a time or circumstance when it was economically feasible for any Service Man—whether he worked from his home or not—to charge less for his time than \$2.00 per hour. But many—far too many—of our friends have been selling their birthrights for the mess of chiseling and frankly, I don't know how they could avoid it—what with the competition of the stumblebums.

But things are changing. More and more money is getting into circulation. The silk shirt for day laborers is having a renaissance. In Bridgeport and other boom towns, day laborers are buying

silk shirts, what about a man who has put in long hours studying his job, who still has to invest in advanced knowledge, who must, of necessity, have a fairly substantial investment in test equipment? No reason why he can't wear silk shirts too, if you'll just ponder it for a moment.

Service Men with whom I've spoken recently tell me that things are loosening up for them. They find that the Selective Service system and the defense industries have eliminated much of their competition. Particularly the sort of competition which only had their soldering irons and ohmmeters in the business—never their hearts. You know—the type of chappie who used the servicing business only as a stop gap until conditions got better.

And while the public in many localities has become conditioned to minuscule service charges through the



Harold Cunningham, 1322 Wilmette Avenue, Wilmette, Ill., reports that business is better now than it ever was in the ten years that he has conducted his shop. Harold is national treasurer of RSA and has held the office of vice president of the Chicago Chapter as well as chairman of the Qualifications Committee. He is also director of the eighth RSA district.

\$800 pianos—and using them for dining room tables (*Honest!*) And the time has at long last, arrived when you can begin to collect the dough to which you are rightly entitled.

After all, if a fellow who stands at a machine for eight hours a day can wear

unkind offices of these stumblebums—it is possible, according to some of my informants, to uncondition them and recondition them to the new and profitable servicing charges which must prevail under the present economic conditions.

Of course, it will be necessary for some of our serviciers to do a bit of reconditioning of their own habits. Habit is a strong factor and it may be difficult for a man who, because of circumstances beyond his control, has not been gathering the fruits of his labor and knowledge, to accustom himself to asking—and getting—an honest day's pay

(Continued on page 32)

A. C. CURRENT ANYWHERE !!
 IN CARS . . . ON FARMS . . . IN D. C. DISTRICTS



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ATR
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INVERTERS

Illustrating Types 6 and 12 Standard Radio and Industrial Inverters only.

ATR Inverters have a proven background for performance reliability and high quality. Insist upon ATR Inverters—a quality product at a low price.

Available in capacities from 15 watts to 500 watts in more than 75 different types for every possible need—Radio, Phonograph, Television, Electrical Appliances, etc.

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- Polarity Changers
- "A" Battery Eliminators
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Visit the ATR Exhibit at the Radio Parts Show, Booth 731

AMERICAN TELEVISION & RADIO CO.
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ANNOUNCING
The Most Famous Loud Speaker Line for 1941.
 The new ultra compact high efficiency Intercommunicator Booster Speaker. The new low cost medium power driver unit. The new and complete line of Super Power Bull Speakers.
 "All this is in addition to the already world famous complete general purpose line of Reflex High Efficiency—Waterproof and Weatherproof—High Power—Outdoor and Indoor loud speakers."
 University Laboratories, 195 Chrystie St., N. Y. C.

SAVE \$1.00!!!

- The Group Subscription Plan for *Service* enables a group of service men, dealers or jobbers to subscribe at one-half the usual yearly rate.
- The regular individual rate is \$2.00 a year. In groups of 4 or more, the subscription rate is \$1.00 a year. (In foreign countries, \$2.00.)
- Each subscriber should print his name and address clearly and state his occupation—whether a dealer, jobber, independent service man, service organization, etc.

Remember this Group Plan when Your Subscription Expires

MAKE THE MOST OF THIS
Unusual Opportunity



This year radio servicemen have the business—*plenty of it*—and with it the opportunity of making money—*big money*.

Your only problem today is one of production—*getting more sets serviced in less time*. You can turn out more jobs each working day by having at your finger tips complete servicing data on the flood of 1-2-3-4-5 even 10 year-old sets that are, and will continue to come, to your bench. Therefore you need *all twelve* Rider Manuals.

"Wiring diagrams" are not enough. You need the complete, authorized servicing data which can only be found "all in one place" in Rider Manuals. Here you have *cash-in-hand* information on i-f peaks, operating voltages, alignment frequencies, parts values, voltage ratings of condensers, wattage ratings of resistors, coil resistance data, dial cable adjustments, etc., etc.

Clarified Schematics

As an example of the thoroughness of the Rider Manual service look at Volume XII. This, the

latest volume, covers sets made since May 1940. In it you will find "Clarified Schematics." Bound right in the volume, this section breaks down over 200 models that had had original schematics so involved that they would heretofore have taken you hours to decipher them. From Rider's "Clarified Schematics," however, you can see at a glance which coils, condensers, resistors and switch contacts are used in the r-f, mixer and oscillator sections for each setting of the wave band switch.

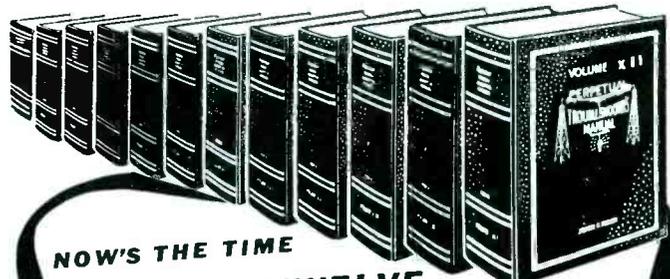
Be sure your production flows through smoothly—keep increasing your profits and lowering your operating costs. Be sure you have *complete* servicing information—Be sure you have all twelve Rider Manuals.

An Apology

The advance orders for Volume XII exhausted our first two printings. The third printing is now on press. If your jobber does not have copies available he will be able to supply you by the end of June.

JOHN F. RIDER Publisher, Inc.
 404 FOURTH AVENUE NEW YORK CITY

Export Division: Roctec-International Elec. Corp.
 100 Varick St., New York City Cable ARLAB

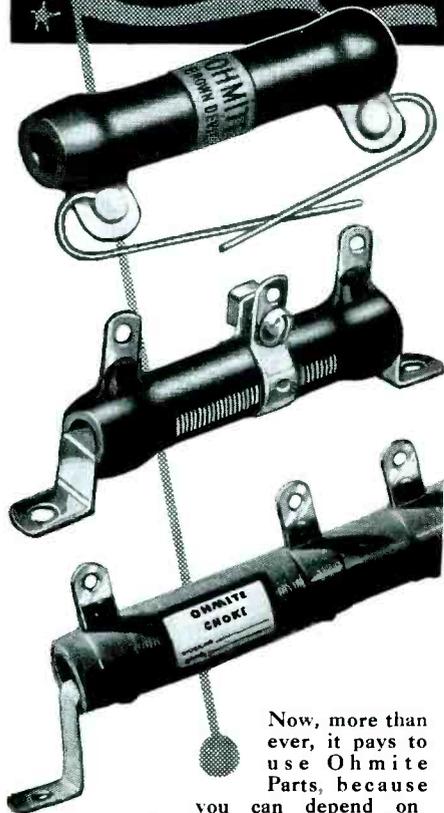


NOW'S THE TIME TO GET ALL TWELVE RIDER MANUALS!

Volumes XII to VII \$10.00 each
 Volumes VI to I \$7.50 each

Because you can do more jobs in less time, you can pay for the missing volumes you need from the increased profits they will give you. Get them now when you can afford and profit most from them.

the Dependability of
OHMITE PARTS
 counts more than
 ever now...



Now, more than ever, it pays to use Ohmite Parts, because you can depend on them to give trouble-free service and prevent costly breakdowns. Ohmite Brown Devils are available in convenient 10 and 20 watt sizes, in many stock resistance values. Ohmite Dividohm Adjustable Resistors are handier than ever for quick replacements or change of resistance values. Sizes from 10 watts to 200 watts. Ohmite Power Line Chokes prevent R.F. current from interfering with radio receivers. Get them at your jobber.

Visit us at Booth 929
 Radio Parts National Trade Show



Send Coupon and 10¢ in coin for New Ohmite Ohm's Law Calculator

OHMITE MANUFACTURING CO.
 4879 Flournoy St., Chicago, Ill.

10¢ in Coin enclosed. Send Ohm's Law Calculator.
 Name
 Address
 City State
 Occupation Service—June '41

OHMITE
 RHEOSTATS RESISTORS TAP SWITCHES

SHROUD OF THE STUMBLEBUM

(Continued from page 30)

for an honest day's labor. But he must do it. He cannot go on forever with that haphazard service bench—those outmoded, antiquated test instruments. He must have means of speeding up his work. He must invest in more and more knowledge. In order to have these things, he must have more income, too.

I suggest that, since the stigma of the stumblebum is now being removed from the service industry, the Service Man take steps to remove the shroud which might still remain.

SET PROVIDES CODE PRACTICE

COMMUNICATIONS receivers provide a simple method for keying and code-reading practice, in addition to their facilities for reception of phone and code throughout the amateur and short-wave ranges.



With a standard telegraph key connected in series with the headphone the output of the receiver to the headphones will be broken up into dots and dashes as the circuit is keyed. If the receiver is tuned to a broadcast or other steady carrier, with the beat-frequency oscillator turned on, this output will be in the form of a heterodyne whistle. When keyed the result is a perfect imitation of the sound of regular radio telegraph transmissions.

Group copying practice is possible if the headphones are placed on the table and the receiver volume turned up to make the sound audible over a reasonable range. By connecting two keys in parallel it is possible to carry on a 2-way communication with either participant breaking in at will.

When some degree of speed has been achieved in code copying then the regular code transmissions of commercial stations can be tuned in for actual on-the-air practice.

EcoPhone Radio Corp.

PLASTIC TUBE ELECTROLYTICS

A new series of dry electrolytic capacitors encased in plastic tubes has been developed by the Solar Manufacturing Corp., Bayonne, N. J., effecting a saving of metals needed in defense work.

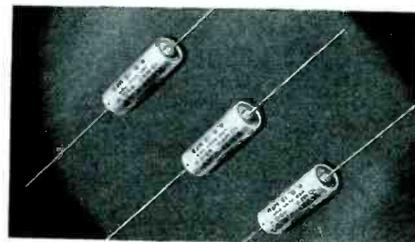
These new units, known as "Red-Caps," will be announced at the Trade Show in Chicago. They will be available in 13 single capacity values, ranging from 5 to 50 mfd, with d-c working voltages of from 50 to 600 volts. Five types of double units are also supplied, with nominal capacity ranges

CINAUDAGRAPH SPEAKERS
TOLERANCE
Takes on a New Meaning . . .
 Until the present hectic days came into being we used the word tolerance only as it applied to precision measurements. Today . . . we speak of customer tolerance . . . as we watch our frantic efforts to keep abreast of the ever-increasing demand for a product that justly deserves the recommendation . . . "IN ALL THE WORLD . . . NO FINER SPEAKER."
 Anticipate your needs . . . see your Jobber at once . . . be tolerant of his efforts to give you the fastest possible service in these trying times.
See us at the PARTS SHOW,
CHICAGO, JUNE 10-13th
BOOTHS 623-625
CINAUDAGRAPH SPEAKERS, INC.
 921 W. Van Buren St.
 Chicago, Ill.

from double-five to double-thirty mids, offering a variety of capacity arrangements. These double units have working voltages of from 25 to 525 volts. To simplify identification, the plastic tubes will be in colors to conform to the RMA code for voltage ratings.

Each of the tubes will be 23/16" in length and vary in diameter from 9/16" to 15/16". The plastic tubes are self-sealed and have a safety vent.

Because of the material used and the method of design, these electrolytics are not affected by humidity or temperature variations and can be used with complete satis-

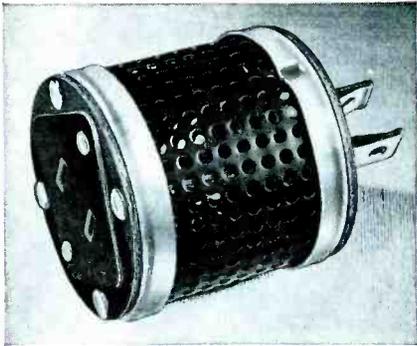


faction under a variety of conditions, it is said.

In selecting the material to mold these tubes it was necessary to choose one whose availability would not conflict with defense needs and yet would possess suitable electrical and physical properties. The material finally selected and presently used, fulfills the many requirements currently needed in the industry.

LIGHTNING PROTECTION

Clarostat Mfg. Co., Inc., 285 N. 6th St., Brooklyn, N. Y., report that their automatic line-voltage regulator serves as an additional protection against lightning surges that may find their way along the



power lines. The regulator is designed for connection between the receiver and the power lines for maintaining the voltage supplied to the set within safe limits.

1941-42 RECEIVER LINE

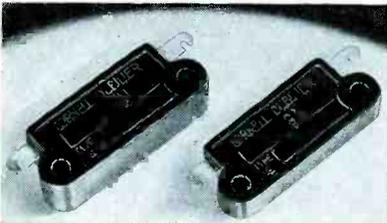
The DeWald 1941-42 receiver line includes radio sets for the home and farm, self-powered portables and radio-phonograph combinations. A popular Model, the 565, housed in a streamlined case with disappearing lid, is a 3-way portable and is available in cowhide or alligator covering. Louis Weiss, sales manager, reports that there are many select territories available for suitable parts jobbers.

DIAL LAMP KIT

National Union Radio Corp., 57 State St., Newark, N. J., have announced a handy kit of panel lamps. The kit contains a popular assortment of 60 panel lamps in an attractive green and black box. A novel pilot light extractor is being supplied free with the kit for a limited time.

MIDGET MOULDED CAPACITORS

For use in applications requiring mica capacitors of small size and rigid mounting facilities, Cornell-Dubilier announces the Type 8 unit illustrated. Molded in brown bakelite, the overall size of these capacitors



is 1 5/8" by 5/8", with thickness varying from 0.25" to 0.4", depending on the capacity. Insulated mounting holes, independent of the terminal lugs, are molded in the bakelite. Cornell-Dubilier Electric Corp., South Plainfield, N. J.

Sound News . . .

Additional information and prices of the equipment described below may be obtained, without obligation, from the respective manufacturers.

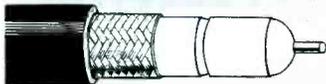
BOOSTER SPEAKER

The University Model IB8 intercommunicator booster speaker is designed for use in conjunction with medium power intercommunication systems where higher acoustic output is desired. Attached to the

Do you have a TRANSMISSION CABLE PROBLEM?



8216—Coaxial Cable



8217—Coaxial Cable with Insulating Bead



8219—100-Ohm Twisted Pair



8210—E01 Type Transmitting Line Cable



8204—72-Ohm Twisted Pair



8209—Shielded Twisted Pair



8205—Commercial Type Twisted Pair

For Antenna Wires and Kits, Hook-up Wires, Microphone Cables, and all other specialized wires for radio and sound equipment—see Catalog 841.



Here's Your Wire Insurance

Good wires make good connections. It pays to use the right lead-in for every installation.

Whether you require a noise reducing shielded cable—a twisted pair—a coaxial cable—an E01 type—or a standard rubber covered lead-in wire—you'll find the wire you want, built to do the job you want, in the Belden line.

Belden tells what you want to know about your transmission cables, too. Surge impedance, power factor, capacity, DB loss or "Q" value, puncturing voltage, maximum load capacity are given for every number.

Use Belden wire for all your installations. Ask your jobber.

Belden Manufacturing Company
4615 W. Van Buren St.
Chicago, Ill.

Belden WIRE

FOR GOOD CONNECTIONS



average intercommunicating system it will give the equivalent performance of high power factory type equipment, it is said. It is waterproof and may also be used for outdoor installation. University Laboratories, 195 Chrystie St., New York City.

CHROMIUM NEEDLE

A chromium needle which is said to be good for at least 50 playbacks has been announced by the Duotone Co., 799 Broadway, New York City. The needles are individually shadowgraphed for flaw detection.

(Continued on page 36)

Standard, nationally known parts and accessories are guaranteed for quality and performance. It pays to use them—and only them—in your work.

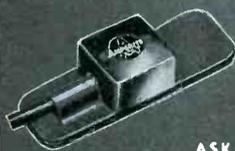
The FINEST MICROPHONES

for P. A. and RECORDING!

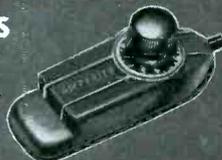
**AMPERITE
VELOCITY
MICROPHONE
WITH
PATENTED
ACOUSTIC
COMPENSATOR**



**New P. G.
DYNAMIC
WITH NEW
SUPERIOR
ELIPSOID
PICK UP
PATTERN!**



**AMPERITE KONTAK MIKES
IDEAL FOR AMPLIFYING
STRINGED INSTRUMENTS
USED WITH ANY AMPLIFIER
AND WITH RADIO SETS.**



ASK YOUR JOBBER . . . WRITE FOR FOLDER

AMPERITE

561 BROADWAY NEW YORK



WORLD'S GREATEST all around ELECTRIC TOOL

**DRILLS — GRINDS — SANDS
SAWS — POLISHES
SHARPENS — CARVES**

The new **WHIZ ELECTRIC TOOL** is the handiest power tool ever made. A rugged tool for power and precision work. Drills through 1/4 inch iron plate in 42 seconds or engraves intricate designs. Handles any material: Metals — Woods — Alloys — Plastic — Glass — Steel — etc. Saves time. Eliminates labor. Plug into any socket AC or DC, 110 volts. Chuck 1/4 inch capacity. Ball bearing thrust. Powerful, triple-gear motor. **STANDARD MODEL**, with Normal Speed (uses 200 different accessories, instantly interchangeable). **Price only \$7.95.**



**ONLY
\$7.95
POSTPAID
GUARANTEED
FOR ONE YEAR**

The only DRILL-TOOL with a full year's guarantee.

FREE Accessory outfit (Value \$2) includes set of drills, mounted 1 1/2 inch grinder, sanding discs, cutting wheels, mounted brush, polishing wheel, carving burr, etc. **FREE** with each tool ordered NOW. We pay postage.

10 Day Trial—Money Back Guarantee

PARAMOUNT PRODUCTS CO.

DEPT. 6 SER

545 FIFTH AVENUE

NEW YORK, N. Y.

34 • SERVICE, JUNE, 1941

RCP 661 ELECTRONIC MULTITESTER

The service fraternity has long recognized certain advantages offered by the vacuum-tube voltmeter but the high cost of these instruments and their relatively limited utility have prevented them from coming into common use in the service shop.

The Radio City Model 661 electronic multimeter is designed to overcome these



During the past few months the test equipment manufacturers have been giving serious thought to the problems involved with the result that prices of vtvm's have come down while at the same time the variety of measurements made possible by this newer type of equipment have increased.

difficulties. Briefly, this new instrument is a vtvm for a-c as well as d-c measurements, a vacuum-tube ohmmeter and a vacuum-tube capacity meter, all combined in one case, with readings made on a single, multiscale meter. It provides voltage ranges of 0-6/30/150/600/1500/6000; 7 resistance ranges capable of measurements from 1/10 ohm to 1,000 megohm; 7 capacity ranges for measurements of values from 0.00003 to 1000 mfd.

The instrument provides wider measurement facilities than the ordinary multimeter (except current measurements). Furthermore the instrument does its job with a minimum of circuit loading. For example, the input resistance for d-c measurements is 16 meg for the lower ranges and 160 meg for the higher. These values permit measurements of receiver operating characteristics which are impossible with conventional multimeters. In addition, careful design provides several operating advantages. Employing the ohmmeter circuits, for instance, there is no need for shorting the test leads and no readjustment of zero is necessary when shifting from one range to another. This likewise holds good for the capacity ranges.

The resistance and capacity ranges do not require high voltage, with the attendant possibility of shock; the meter cannot be damaged by checking a live resistor or by using a too low measurement range; polarity reversal is accomplished by a switch without interchanging leads.

For voltage ranges above 600 volts the circuit components carry a rating of 15,000 volts, allowing sufficient safety factor for both a-c and d-c measurements at the maximum of 6000 volts. The meter itself has an outer scale measuring 4 5/8 inches. Separate scales are provided for the different types of measurements and the several calibrations make the majority of measurements direct reading.

New Test Equipment...

Additional information and prices of the equipment described below may be obtained, without obligation, from the respective manufacturers.

VOLT-OHM-MILLIAMMETER

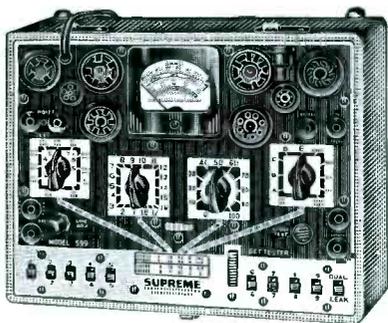
Triplet Electrical Instrument Co., Bluffton, Ohio, have introduced their Model 625T volt-ohm-milliammeter in a black molded case and panel. The instrument pro-



vides 12 a-c and d-c voltage ranges up to 5,000 volts. D-C measurements are made at 10,000-ohms-per-volt. Cartridge loading feature permits battery replacement without opening the tester.

SUPREME 1941-42 LINE

Believing that any new models could be nothing more than a relay of the panel of present instruments, Supreme will carry



the same model numbers for next year. The management says that Supreme will continue the policy of continuous improvement rather than periodically putting a new coat of paint on an old chassis.

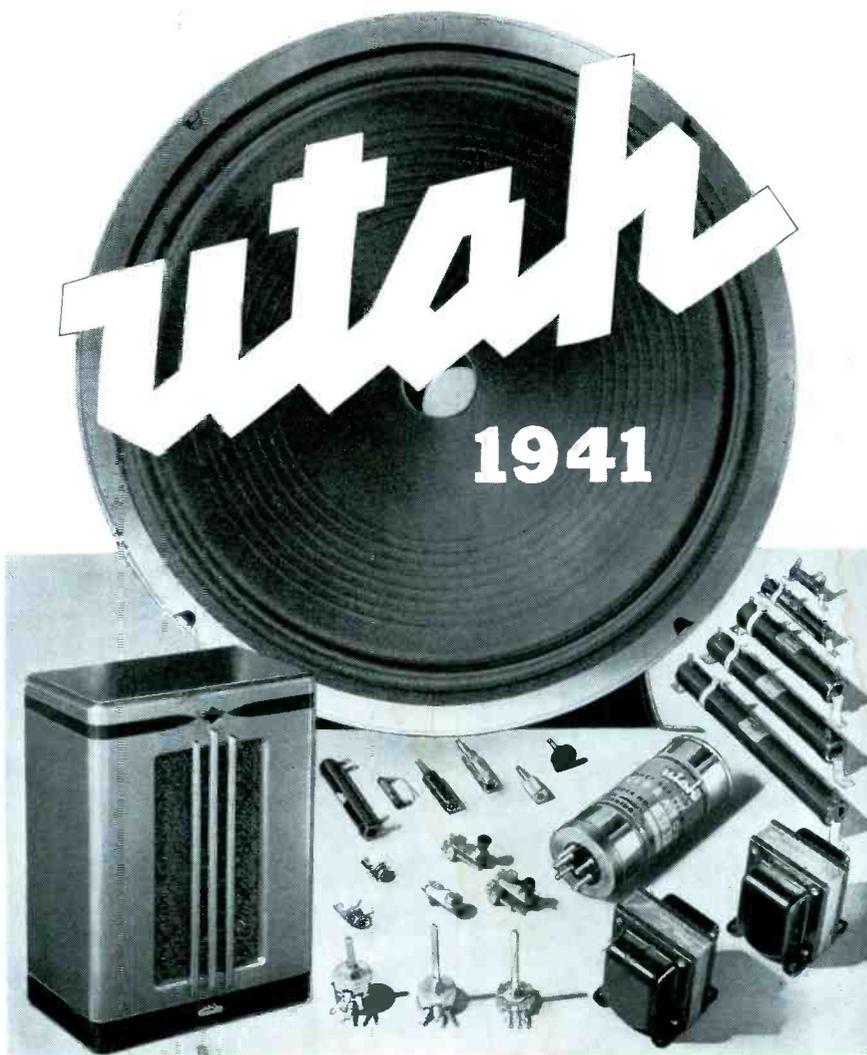
Supreme instruments will be on display at the June Radio Trade Show and several new industrial designs will also be shown. Supreme Instruments Corp., Greenwood, Miss.

G.E. TC2 TUBE TESTER

The General Electric Model TC2 tube checker includes all existing American tube sockets with some spares for new bases that may be provided at some future time. The combination seven pin socket also provides facilities for testing standard pilot lamps.

Specifications

Line Power: Standard Model for 100-130 v. 50 or 60 c. line. Line adjustment 11 steps, tapped transformer.
Tube Bases: Standard American 4, 5, 6, 7, combination, octal and loktal. Midget 6



1. See these Utah products at Nos. 1018 and 1020 in the Exhibition Hall, or Demonstration Room 505A, National Radio Parts Trade Show, Stevens Hotel, Chicago.
2. If you don't attend the show, write for the new illustrated Utah Catalog.
3. Be sure to get your copy of the new Utah Vibrator supplement.

UTAH RADIO PRODUCTS COMPANY

816 ORLEANS STREET

CHICAGO, ILLINOIS

Canadian Office: 560 King Street, West, Toronto

In Argentine: Ucoa Radio Products Co., SRL Buenos Aires. Cable Address: Utaradio, Chicago



and 7. Two spares and receptacle for dial lamps.

Filament Voltages: 23 point filament switch provides 1.5, 2.0, 2.5, 3.3, 5.0, 6.3, 7.5, 12, 14, 25, 30, 35, 45, 50, 60, 70, 85 and 117 with five spare positions.

Short Test: Standard RMA with rejection at 0.25 megohm. All elements individually tested with hot cathode.

Meter and Scale: 3-in., square case meter with 3-color scale, 1/2 ma sensitivity with bridge type shunt, giving essentially logarithmic distribution of current values on index scale.

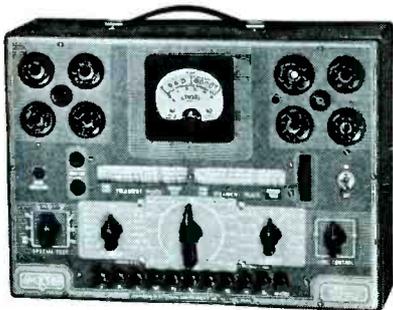
Illuminated wall meter, 9", available.

Size, Case and Panel: The over-all size with lid shut, 11 1/8 inches by 12 3/8 inches. Weight 16 lbs. The panel is beige and maroon—the case, beige crinkled with slip hinges.

JACKSON

FIRST CHOICE OF EXPERT RADIO ENGINEERS

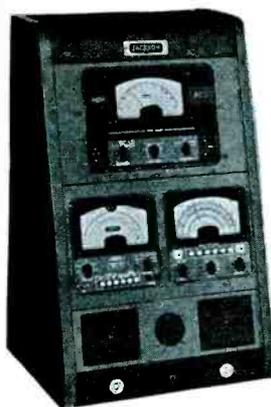
In the most exacting branches of the Radio Communication industry—where accurate testing is necessary—Jackson instruments are in daily use. Important users include U. S. Army, Navy, Commercial Aviation, Police, Broadcast Stations and Leading Service Shops everywhere. See Jackson instruments at the show.



DYNAMIC TUBE TESTERS



AUDIO OSCILLATORS



SERVICE LAB UNITS

Write for catalog



COMING SOON! New Electronic Volt-Ohmmeter

The Jackson Electrical Instrument Company, Dayton, Ohio

JACKSON



Sound News . . .

Additional information and prices of the equipment described below may be obtained, without obligation, from the respective manufacturers.

PAPER BASE DISC

Many tons of aluminum have been freed for use in the National Defense Program by the success of the RCA Research Laboratories in perfecting a 16-inch fire-resistant, paper-core recording blank for use in radio studios, airline terminals, and other locations where sound is recorded for reference purposes.

CRYSTAL MICROPHONE

The American Microphone Co., Ltd., 1915 S. Western Ave., Los Angeles, Cal., introduce their Type C7 crystal micro-



phone. The new unit is said to have a more efficient coupling system between the diaphragm and crystal element and is available in high or low impedances.

WALSCO PHONO ITEMS

A straight shank sapphire needle, a one-ounce permanent point pickup and recording blanks in all sizes are announced by Electrovox Co., 424 Madison Ave., New York City. These new Walco items will be displayed at the Chicago Trade Show.

CARDIOID MICROPHONE

The Turner Cardioid microphone consists of two elements, a ribbon and a dynamic, combined to give cardioid characteristics. Through the use of the two ele-



ments no sacrifice in frequency response need be made, it is said. Turner Co., Cedar Rapids, Iowa.

GLASS BASE DISC

Presto Recording Corp., 242 W. 55th St., New York City, will start deliveries about June 15 on a new sound recording

blank using a plate glass base. Engineers who have used the new glass disc report that its performance is even better than the aluminum base disc which were generally used in the past. The new disc is 0.104" in thickness making it as durable as the ordinary commercial phonograph record. The coating compound which serves as the recording medium adds to the durability of the disc and the breakage problem is expected to be negligible, it is said.

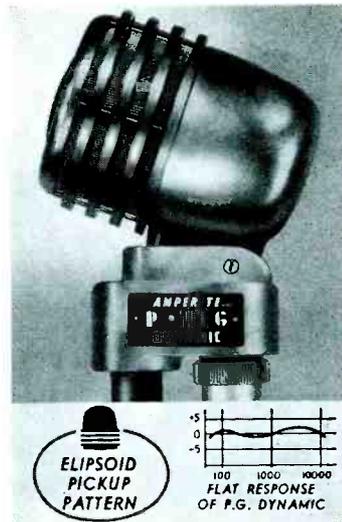
WEBSTER-RAULAND FORMED

E. N. Rauland, of Rauland Corp., announces purchase of Sound Division of Webster-Chicago Corp. The respective trade names of the two companies will form a new trade name: Webster-Rauland.

Charles Cushway, who was general sales manager of the Webster-Chicago, becomes vice president and sales manager of the new company. For the present manufacturing activities and headquarters of Webster-Rauland are concentrated at 3825 W. Armitage Ave., Chicago.

DYNAMIC MICROPHONE

Amperite Co., 561 Broadway, have announced a new Type PG dynamic with a wider range and higher output. The new instrument can be used either for close talking or distance pickup and its elip-



soidal pattern prevents pickup from the rear, it is said. Available in either high or low impedances.

GLASS BASE DISCS

Audio Devices, Inc., 1600 Broadway, New York City, announce the production of a glass-base instantaneous recording disc. Difficulties have been successfully overcome and the new disc is as good as the aluminum base type heretofore supplied, it is said.

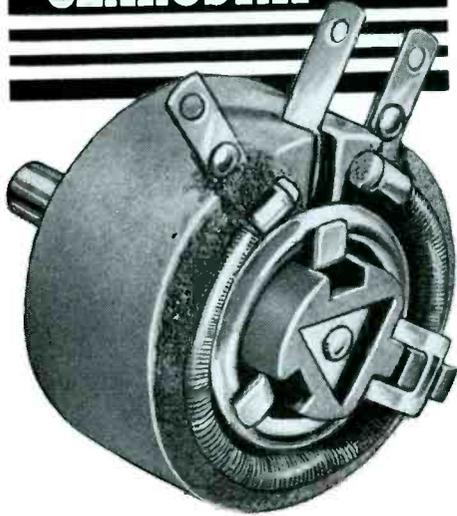
1941-42 RECEIVER LINE

Sentinel Radio Corp., Evanston, Ill., have announced their 1941-42 line of radio receivers. Some 32 models are incorporated in the line with such features as "Studio-tone" and "Sentenna-scope." An abundance of point-of-sale display material has been promised.

(Continued on page 39)

A good, well equipped service bench is vital to successful servicing. Read SERVICE each month for the latest developments.

Power Rheostat as engineered by CLAROSTAT



★ For years Clarostat engineers worked for a better power rheostat. They examined, tested, compared, all types. Hundreds of models were built. And now comes the end result—the new Clarostat Power Rheostat. Note some of its superior features . . .

Selected resistance wire on insulated metal core for uniform heat distribution and radiation. Winding set in cold-setting cement. Heat-resistant ceramic body. Unique tripod-type rotor. Graphited-copper contact shoe rides collector ring and winding. 25-watt rating even at one-third setting. A brute for punishment.



Ask for
Copy . . .

Be sure you have our latest Service Manual in your working library. Ask jobber or write direct for copy. Also data on new power rheostat.



CLAROSTAT MFG. CO., Inc.

Dept. S-6

285-7 N. 6th St.

Brooklyn, N. Y.

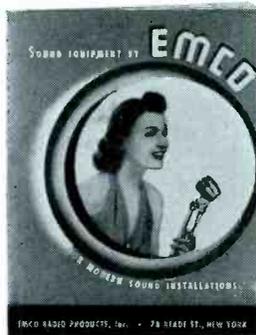


Catalogs, Bulletins, etc. . .

Copies of the catalogs and bulletins discussed below may be obtained directly from the respective manufacturers mentioned. Write for them today!

• • • • Allied Radio Corp., 833 W. Jackson Blvd., Chicago, have issued their 1941 Spring and Summer catalog. A chart contained in the catalog covers sound applications. Information is specified for computing the area to be covered in square feet, wattage required in amplifier, size, make of speakers needed and type of baffle to use.

• • • • An 8-page descriptive and illustrative catalog of p-a and record playing equipment is available from the Emco



Radio Products, Inc., 78 Reade St., New York City.

• • • • J. F. D. Manufacturing Co., 4111 Ft. Hamilton Pkway., Brooklyn, N. Y., have issued their 1941 catalog of auto-radio accessories, television and f-m antennae, etc.

• • • • A sixteen-page illustrated catalog of table and console model radio sets is offered by the North Eastern Radio Co., 80 E. 11th St., New York City.

• • • • The 1941-1942 line of test equipment offered by Radio City Products Co., 88 Park Pl., New York City, is making its bow at the Chicago Trade Show. After the show details of some fifty models which comprise this line will be presented in a new RCP catalog (No. 125), which is now in preparation.

• • • • RCA Manufacturing Co., Inc., Camden, N. J., have made the first of a scheduled series of mailings of supplementary information to owners of RCA Test Equipment. The mailing comprises five pieces: an announcement letter from W. H. Bohlke, director of test equipment merchandising; a reprinted article on the development of the Chanalyst, by John F. Rider; 8-page booklet of special application information on the RCA Rider Chanalyst; a 4-page gain data instruction bulletin for RCA Victor receivers, and a sheet describing the "Electronic Eye" indicators and associated circuits used in the RCA Rider Chanalyst.

• • • • A sixteen-page book of instructions entitled "Radio Servicing by Signal Tracing," discussing in some detail this efficient method of trouble shooting, is available from Earl Webber Co., 4358 W. Roosevelt Rd., Chicago, for 50¢.

It's Meissner again

WITH A BRAND NEW

F-M ★ A-M

3-BAND COMBINATION



TABLE MODEL RECEIVER that has everything!

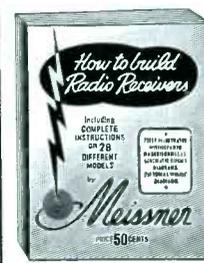
- ★ Two-tone, hand-rubbed walnut cabinet
- ★ 12¼" high — 22¾" wide — 11" deep
- ★ FM and AM in two separate channels
- ★ Covers Broadcast and Short Waves on AM
- ★ Full coverage of 42-50 mc FM band
- ★ Calibrated glass scale, edge-lighted
- ★ Tuning indicator, accurate adjustment
- ★ Includes seventeen latest type tubes
- ★ High-gain RF stage on all three bands
- ★ Wide-band I-F channel on both AM bands
- ★ 3-stage I-F channel on FM at 4.3 mc
- ★ Audio system common to both channels
- ★ Response flat from 30 to 15,000 cycles
- ★ Push-pull output, 6½ watts undistorted
- ★ Heavy-duty 8" PM Hi-Fidelity Speaker
- ★ Operates on 105-125 volts, 50-60 cycles

Complete Receiver as shown, with tubes,
Model 9-1053 List Price \$108.00

Chassis Only, with tubes
Model 9-1054 List Price \$95.00

See Your Jobber Today!

1941 INSTRUCTION MANUAL



Now Ready!

Contains complete instructions for all Meissner Kits
Circuit Diagrams
Parts Lists
Pictorial Diagrams
Charts and other useful data
ONLY 50c NET!

WRITE TODAY FOR FREE 48-PAGE
COMPLETE CATALOG

Address Dept. S-6

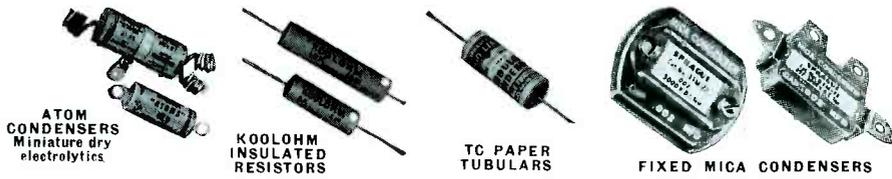


FISHING'S GOOD AT NORTH ADAMS

... but we're not doing much of it this year

Sure, we like to fish—but these are times when fishing must take a back seat. With one big Sprague plant working exclusively on national defense orders and with the other turning out more Sprague Condensers, Koolohm Resistors and Test Equipment for the radio trade than ever before, we've got a man's size job to do—and we're doing it. Meanwhile, we take this means of assuring our radio friends that, while putting national defense wholeheartedly first, we are neither forgetting nor neglecting them.

SPRAGUE
PRODUCTS COMPANY
North Adams, Mass.



Personnel...

• • • • Burton Browne, president of Burton Browne, Inc., Chicago advertising agency, has been busily engaged in passing out cigars this week in honor of Belinda Ann, weight seven pounds, who arrived May 6.

• • • • To better serve the manufacturing accounts and the jobbers in Western Missouri, Kay Sales Co., Tulsa, Oklahoma, have opened a branch office at 406 Reliance Bldg., 10 and McGee Sts., Kansas City, Mo. Mr. W. N. Lefty Wellman will be in charge.

• • • • Sam Harper, 63-12 Haring St., Rego Park, L. I., manufacturers' representative for the Metropolitan New York area for Turner Co., Kainer Co., Sterling Mfg. Co., and Speak-O-Phone, is seeking additional lines in this area.

• • • • Russell W. Metzner, sales manager of the Ken-Rad Tube & Lamp Corp., Owensboro, Ky., announces the appointment of Leslie E. Septer as assistant sales manager in charge of renewal tube sales.

• • • • Weston Electrical Instrument Corp., Newark, N. J., has announced the appointment of Cowperthwait and Brodhead, 126 Newbury St., Boston, Mass., as Weston representative to succeed the late James O. Murray. The new company will serve Weston to Massachusetts, Rhode Island, Maine, Vermont and New Hampshire.

NEW NAME

The Astatic Microphone Laboratory, Inc., of Youngstown, Ohio, will hereafter be known as The Astatic Corp. This is a change in name only and does not alter, in any way, Astatic holdings, contracts, personnel or policies.

Mr. Serviceman!

Get your RSA Membership



FREE!

Now without one cent of cost to you, you can have a membership in the RSA, the only national organization that has the sponsorship of the RMA, the NAB, the Sales Managers Clubs and the Trade Journals.

This includes the RSA Membership Certificate, the RSA Pocket Membership Card, the House Organ, access to the RSA Technical Helps Bureau, and participation in all the functions and benefits RSA offers!

It's simple! . . . easy! All you have to do is send in 5 memberships of your fellow Servicemen with a \$5.00 bill (that's \$1.00 for each) for 1941 National RSA Dues, and you get your membership *Free* of charge. Applicants in present chapter areas will be referred to the local chapter.

Act now! Take advantage of this special offer!

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"Reliable Service Assured"

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RADIO SERVICEMEN OF AMERICA, INC.
304 S. Dearborn Street, Chicago, Illinois.

- \$5.00 enclosed for 1941 National Dues for 5 memberships in RSA. Names and addresses attached herewith.
- \$1.00 enclosed for 1941 National RSA Dues for single membership.

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SERVICE JUNE '41

A "LAB" to fit your pocket

Readrite
METER WORKS

MODEL 739

\$9.90
Dealer Net Price

A.C. D.C.



VOLT-OHM-MILLIAMMETER

Pocket Volt - Ohm - Milliammeter with Selector Switch, Molded Case. Precision 3-Inch Meter with 2 Genuine Sapphire Jewel Bearings. AC and DC Volts 0-15-150-750-1500; DC MA. 0-1.15-15-150; High and Low Ohm Scales. Dealer Net Price, including all accessories, \$9.90 MODEL 739 DC Pocket Volt-Ohm-Milliammeter. Dealer Net Price \$7.50

WRITE FOR CATALOG

See the new 1941-42 line of Readrite Meters and Testers in Booth 725 - Chicago Radio Parts Show

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Big Power!
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75-100 WATT OUTPUT
complete with tubes
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Plenty of power for any job - racetracks, airports, beaches, or any other high-power installations! Read these specifications: four 6L6G's in parallel push-pull output . . . inverse feedback . . . six input channels . . . six output impedances . . . separate bass and treble equalizers . . . frequency range, 50-10,000 cycles - and lots of other Lafayette features that make Model 490-T a big money-maker at a small price.

Mail coupon TODAY for Lafayette's new P.A. Catalog.

Lafayette
SOUND SYSTEMS

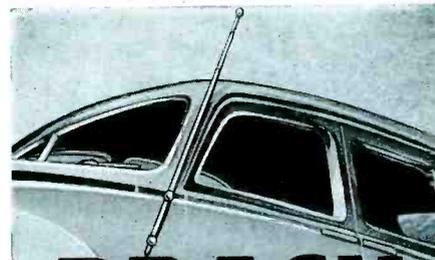
NEW YORK, N. Y. 100 Sixth Ave.
CHICAGO, ILL. 901 W. Jackson Blvd.
ATLANTA, GA. 245 Peachtree Street
BOSTON, MASS. BROADWAY
NEWARK, N. J.
JAMAICA, L. I.

Lafayette Radio Corp.
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 Rush FREE P.A. Catalog

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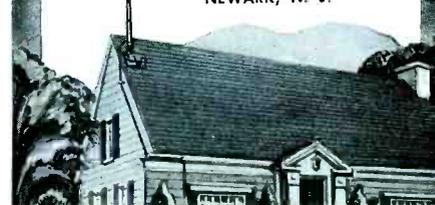
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Antennae

Automobile
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Made by World's Oldest and Largest
Manufacturers of Radio Aerial Systems

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AVIATION NEEDS
Radio and Instrument Men



Urgent need for radio service men trained for radio installation work in aircraft manufacturing. Your previous experience, plus short, special aircraft training, leads to interesting, good-pay jobs . . . which include electrical and instrument installation. Training also is foundation for lifetime career in aircraft manufacturing, in airline radio and instrument work, or in Civil Service at Army and Navy aircraft maintenance depots. All these divisions of booming aviation industry calling for many more trained men than we can supply. This oldest and largest school of its kind will send you complete information on its fine training for a MORE profitable lifetime career . . . and on your big IMMEDIATE opportunities. Send coupon NOW.

AMERICAN SCHOOL OF AIRCRAFT INSTRUMENTS

Dept. R-6, 3903 San Francisco Road, Glendale (Los Angeles), Calif.

Please send details on opportunities in Aviation for radio service men.

Name _____ Age _____
Address _____
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... If you want
Something Better,
demand

DEWALD RADIO

Proven quality since 1921. DeWALD has long been a favorite everywhere, known for quality and value. The new 1942 line features a truly outstanding group of portable, home and farm radios for every purse and purpose.



DeWALD Model 565—Versatile 3-way portable receiver. Plays on AC, DC or batteries. Brings in Police Calls as well as Standard Broadcasts. Streamlined luggage-type case with disappearing, easy-slide lid, natural cowhide or alligator covering. Five-tube advanced superhet. circuit, built-in Loop-tenna, slide rule dial, large PM dynamic speaker, 300-hour battery life, "On-Off" indicator.

WRITE FOR FREE CATALOG

See Our Display

The entire line is displayed at the Blackstone Hotel, Chicago, Ill., during the R. M. A. Convention. Come in and look it over during the R. M. A. Convention.

DeWALD Radio Mfg. Corp.
440 Lafayette St., New York, N. Y.
Chicago Offices:
6526 So. FRANCISCO, CHICAGO, ILL.

WHEN YOU CHANGE YOUR ADDRESS

Be sure to notify the Subscription Department of SERVICE at 19 E. Forty-seventh St., New York City, giving the old as well as the new address, and do this at least four weeks in advance. The Post Office Department does not forward magazines unless you pay additional postage, and we cannot duplicate copies mailed to the old address. We ask your cooperation.

Sound News . . .

Additional information on the products described below may be obtained, without obligation, directly from the respective manufacturers.

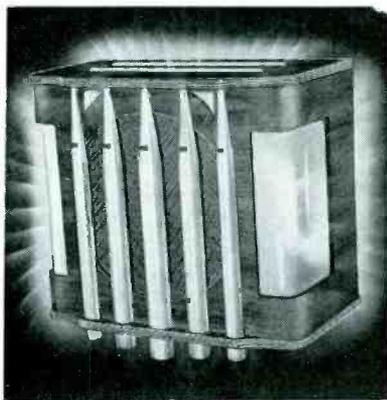
MICROPHONE CONTROL

A "pushmike" adaptor and stand has been announced by George Ewald, manager of the RCA Commercial Sound Division, Camden, N. J. The new unit is designed for uses where it is desirable to cut the microphone in and out of the amplifier circuit at will. It is finished in polished chromium and is available with or without a chromium-finished base. Without the base it may be used as a hand grip or in conjunction with a floor stand.

The switch adaptor is fitted with a heavy-duty double-pole-double-throw low-capacity leaf switch, with a push-to-talk button that can be locked in the talk position.

ILLUMINATED SPEAKER

Atlas Sound Corp., 1449 39th St., Brooklyn, N. Y., has announced an illuminated "Organette" speaker, Model OR12LT, for



night club, cafe and restaurant installations. The "Organette" is constructed of walnut veneers and colored plastic, offering illumination on the front, sides and bottom of the cabinet. The pipes are finished in gold lacquer. High fidelity 12" cone unit, 16 watts peak. 17" by 13½" by 8".

DISC PRESERVATIVE

"Slik," a scientific preparation to help preserve recording discs has been put on the market by National Recording Supply Co., Hollywood, Cal. It is said to minimize surface noise on acetate or nitrate cellulose blanks, by lessening the cutting point friction and lengthens the life of needles while also disposing of accumulated static charges. The liquid is applied with soft brush or cloth before recording.

CORRECTION

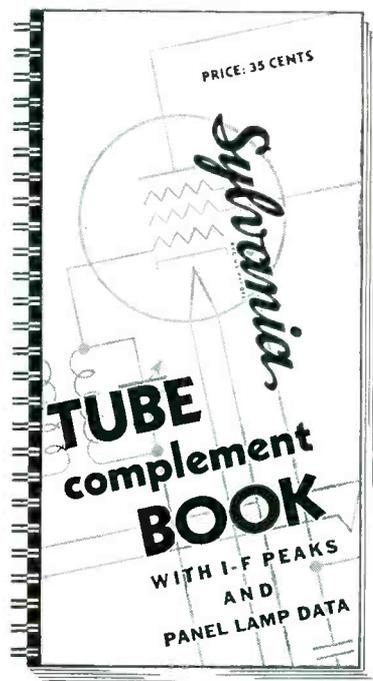
On page 22 of the May issue of SERVICE the statement is made that the equipment furnished for the Courthouse installation in Pittsburgh, Pa., is RCA throughout. However, 80 Brush Type BL1 lapel microphones were used, four for each of the 20 courtrooms.

DID YOU KNOW

. . . That there are 586 Receiver trade names?

. . . That there are 16,730 Radio Models?

. . . That there are 100,380 tubes or sockets involved?



. . . That the 1941 Edition Sylvania Tube Complement Book Contains

The First Collection of Panel Lamp Numbers Ever Attempted?

WHERE can you find all this information? In the handy, sturdy Sylvania Tube Complement book . . . the serviceman's standby.

Wir-O bound, the Sylvania Tube Complement book holds 272 pages . . . opens flat, without danger of its falling apart or any of the pages tearing out.

This compilation is the only one of its kind in the industry. It is indispensable to the man who wants to build a sound, steady business on a foundation of satisfied customers. Whether the job calls for knowledge of a 1924 antique or the latest 1941 model you're never in the dark if you have the Sylvania Tube Complement book in your kit.

Write for this book today—enclosing 35c in stamps or coins. And ask, too, for a full list of Sylvania's 125 silent salesmen. Many of these tested selling aids are free . . . others are very fairly priced. And each one of them will help you do a better job, get more trade, make more money.

Sylvania Radio Tube Division

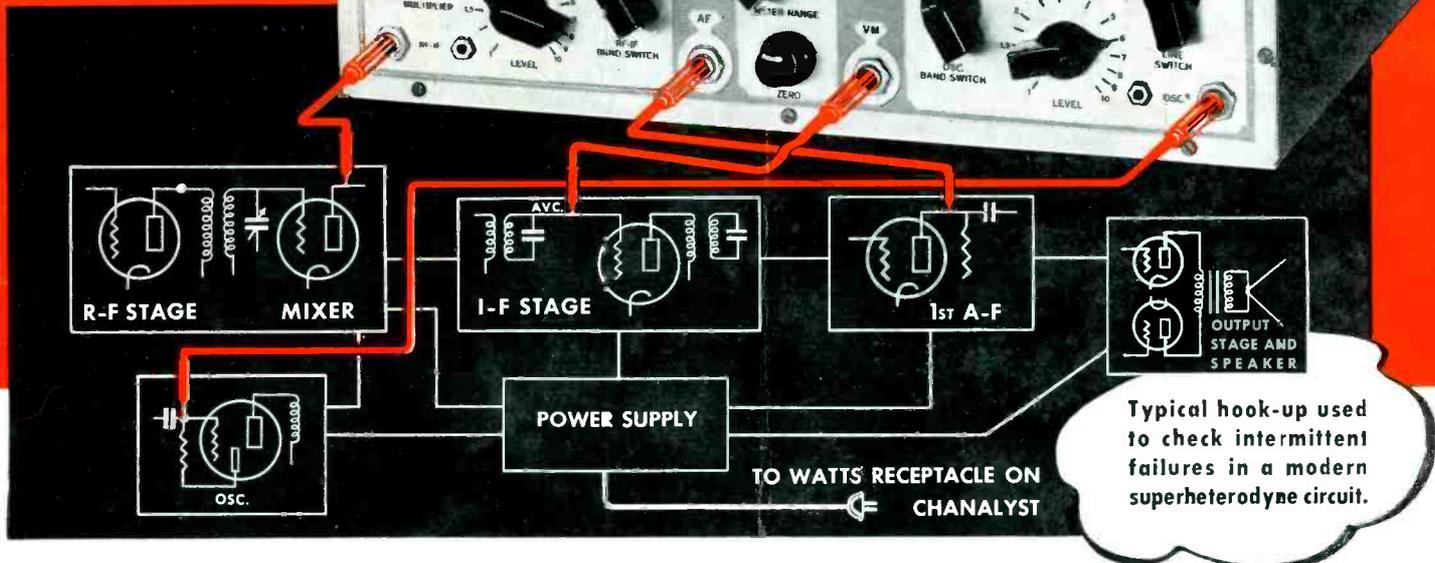
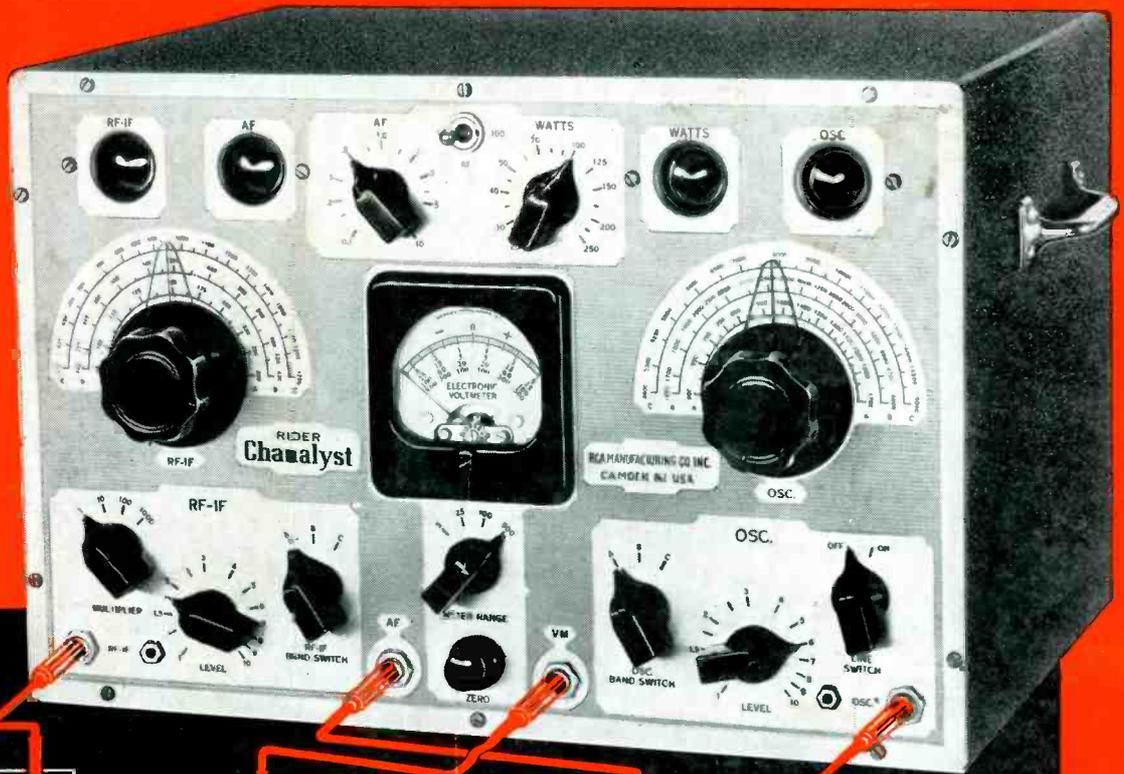
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St. Mary's, Pa., Ipswich, Mass., Towanda, Pa.
Also makers of Hygrade Lamp Bulbs, Hygrade
Fluorescent Lamps and Miralume
Fluorescent Light Fixtures

RCA Rider Chanalyst

\$107⁵⁰

**Net Price Complete
Stock No. 162**



PAYS FOR ITSELF BY TIME SAVED

Just a glance at the schematics here discloses how easy it is to use the RCA-Rider Chanalyst, and how reliably it will quickly disclose the source of the most baffling intermittent trouble. But forget technicalities for a moment and look at the RCA-Rider Chanalyst from a strictly dollars-and-cents business standpoint. Let's compare what you pay for it against what it stands to pay back to you.

At a recent meeting, a group of servicemen (who did not use the Chanalyst) admitted that they averaged somewhere between 3 and 5 "tough" repair jobs a week—sets that took them two hours or more to repair. Let's take the low figure, and do our calculating on the basis of only 3 of these "2 hour" jobs a week.

Careful tests with the Chanalyst show that an experienced operator can handle even the most difficult intermittent "short" or "open" jobs in 30 minutes. Again to be conservative, however, let's make it an hour—although,

actually, not one tough job in ten would take this long, once you had familiarized yourself with the tremendous time-saving possibilities of the Chanalyst.

Thus, a Chanalyst in your shop can mean a saving of at least a full hour on every one of those difficult "2 hour" jobs—or a total saving of 3 hours a week. That's 156 hours per year! At your normal rate for service . . . just figure how quickly the Chanalyst will pay for itself.

And remember, this only counts in the savings on difficult jobs. All that it saves you on the less complicated jobs is pure "gravity".

Small wonder, then, that more than 4,000 Chanalysts have been sold. Small wonder that it has proved the one absolutely indispensable piece of test equipment to so many leading service dealers. The Chanalyst not only helps them do better, more accurate work. It actually "puts more hours into their day"—hours for which a profitable service charge can be made!



Test Equipment



RCA MANUFACTURING CO., Inc., Camden, N. J. • A Service of the Radio Corporation of America
In Canada: RCA Victor Company, Limited, Montreal



SERVES THE SERVICES ...

Just as nerves control our bodies, communications equipment controls modern warfare. Nerves must not fail; communications must be maintained.

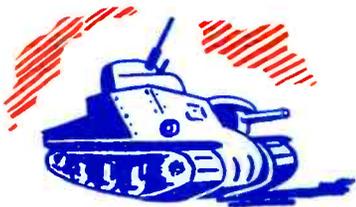
Solar is proud of...and is zealously guarding...the reliability which its Capacitors add to radio and electrical control equipment for the Armed Service Branches of our Government.



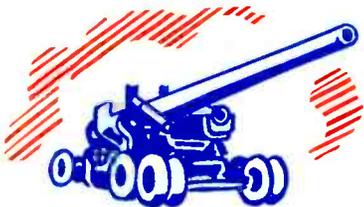
IN THE AIR special Solar capacitors function down to -40°C . or at 50,000 feet altitude, and under severe vibration.



ON THE SEA are Solar capacitors which have passed salt-water immersion tests, are corrosion-proof and stabilized.



MOBILE FORCES—Solar capacitors of compact special design can take punishment from extremes of heat and cold and have passed exacting vibration tests,



ARTILLERY — directed from aircraft — or controlled electrically from the ground — gains certainty of action from reliable electrical equipment — including Solar capacitors.

Solar reliability is built into all types of electrical condensers for industrial, radio and service applications.

SOLAR MFG. CORP.

BAYONNE, N. J.