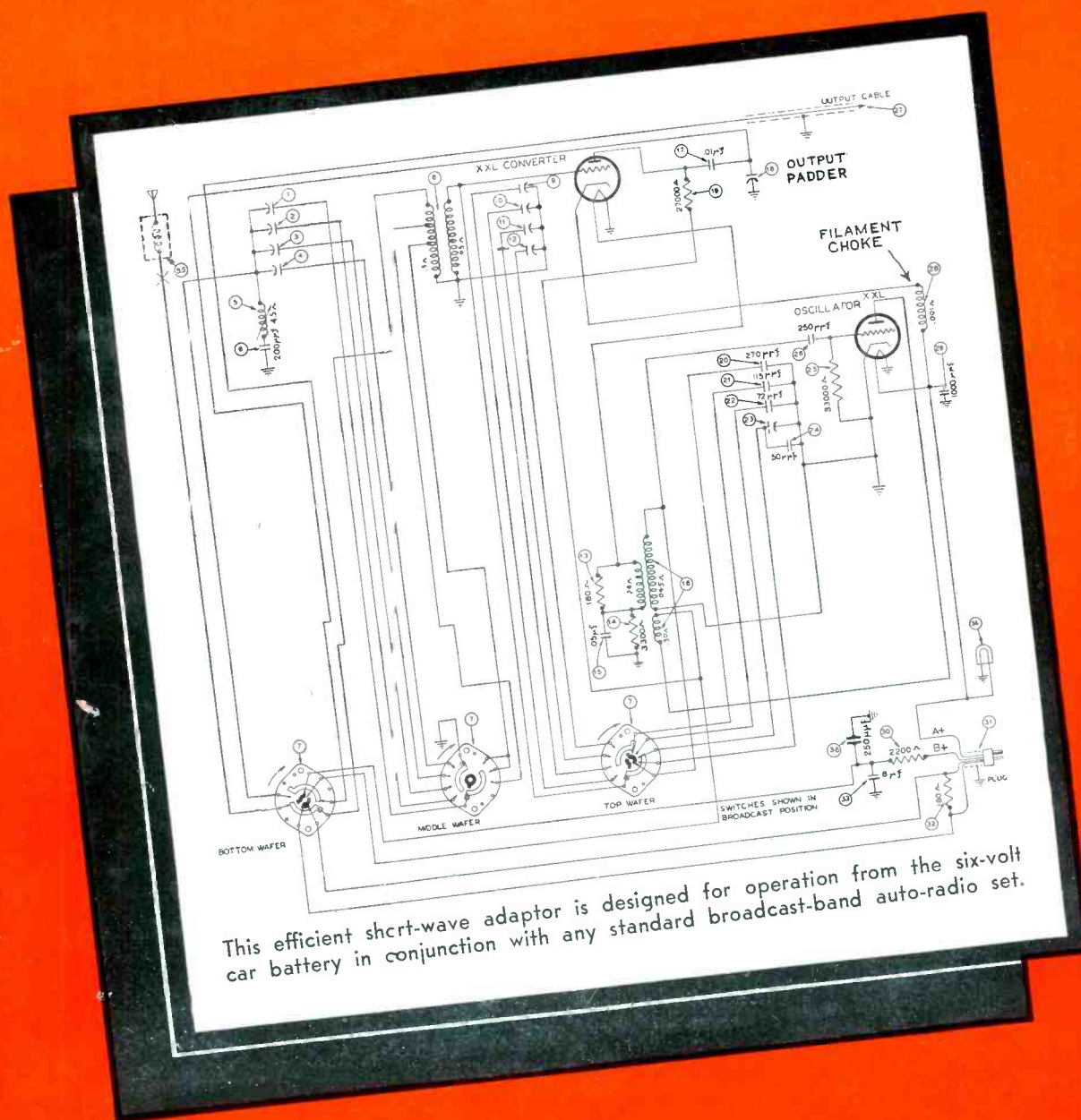
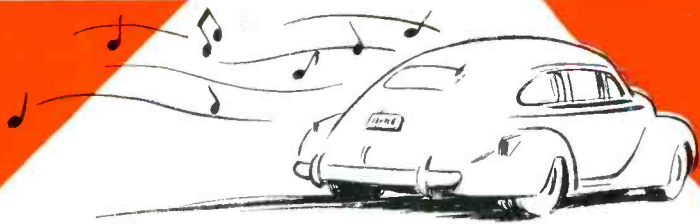


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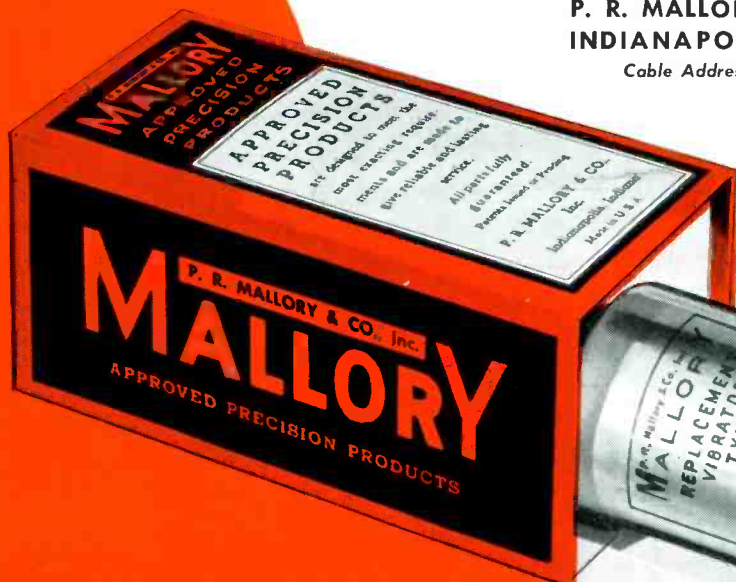
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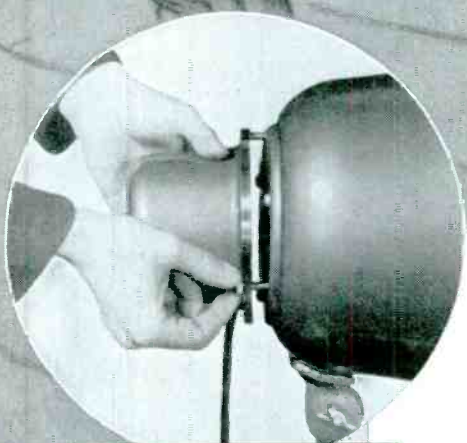
Jensen

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The New **HIGHER EFFICIENCY PROJECTORS**..

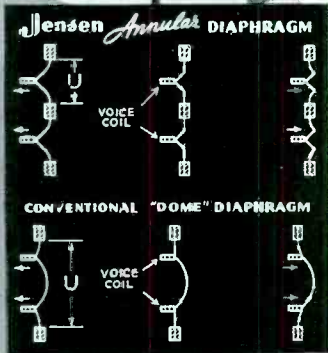
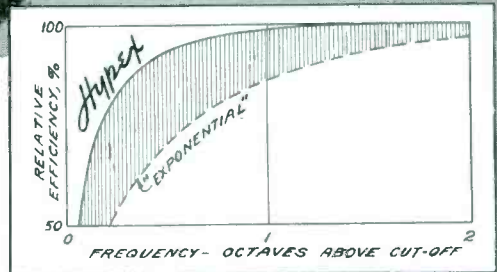


Jensen HYPEX (patents pending) brings you markedly higher efficiency because horn impedance acoustically matches driver better than older "exponential" formula.



No awkward twisting to install U 20 Driver Unit! Slips easily into place rigidly held to bulkhead with three nuts

JENSEN LEADS AGAIN WITH 2 GREAT SOUND CONTRIBUTIONS



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Discarding 22-year-old "exponential" horn theory, Jensen Research discovered a new, better HYPEX¹ horn formula which gives improved projector performance. Then a new general-purpose ANNULAR² Driver Unit was designed with the exclusive annular principle long used by Jensen in the highest quality reproducing systems. Extra design features were incorporated for enhanced utility and dependability.

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Write for Data Sheet 123—it gives complete details.



Weatherproof ANNULAR Driver Unit enclosed in sturdy 1/4" steel case... husky out-of-the-weather screw terminals... screen-protected, dustproof sound chamber—to mention only a few of the designed-in improvements for more dependable service.

1. Patents Pending.

2. U.S. Pat. 1,845,768. Others Pend.

Jensen

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

REPORTS from receiver manufacturers seem to indicate that sales of home recording outfits are not going so well. . . . It occurred to us that some of this may be charged to the sale of inferior discs, cutting and playback needles. A survey which we conducted recently shows that there is plenty of such inferior stuff being pushed by dealers and Service Men; in many cases inadvertently. How many of you really know that the recording materials which you recommend and sell will enable the enthusiast to make a record which he can at least listen to on playback, much less one that can be considered good?

Home recording has often been likened to photography, in that the fan will try again and again and spend many dollars before he will be able to obtain usable results. Remember, however, that there are several processes involved in the making of a photograph. Any deficiencies that might occur in the taking of the shot can be compensated in developing or printing. This is not the case in home recording. The finished record is made in a single operation. All the deficiencies will show up in the playback.

EACH year the industry tries to outdo itself in making the Radio Parts National Trade Show a huge success. This year's show is to be again held at the Stevens Hotel, June 10, 11, 12 and 13. The entire radio parts industry will be on hand to bid you welcome. The time and expense which you might undertake in order to attend will prove well spent.

THERE has been some engineering advance in the design of auto-radio sets with short-wave bands. The use of band-spread for easy tuning, and improved limiter circuits for reducing ignition interference, have made these receivers quite satisfactory.

Aside from the possibility of receiving "Europe Direct" in these perilous times, there is the additional feature that storm static may be eliminated by listening to the favorite network's short-wave outlet (if available) and for reception in locations which represent dead spots for the lower frequencies; while up in the mountains, for instance.

JUST before we go to press the FCC has given the long awaited "green light" to commercial television. Sponsored programs can now go on the air on July 1.

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FOR THE BROADCAST STATION

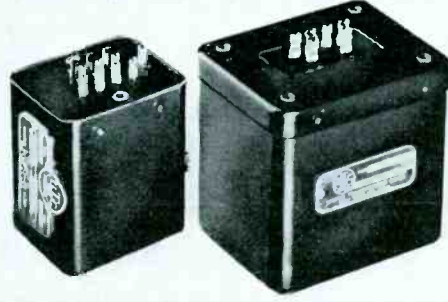
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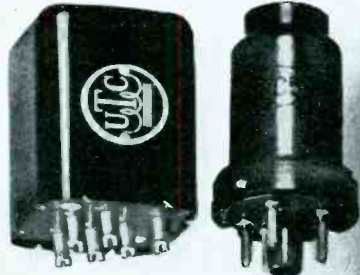


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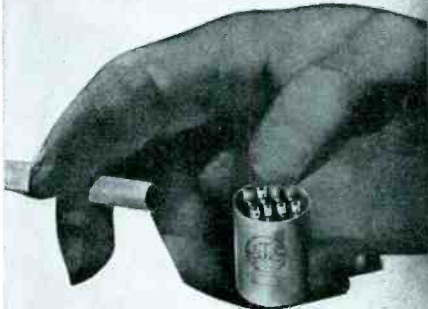
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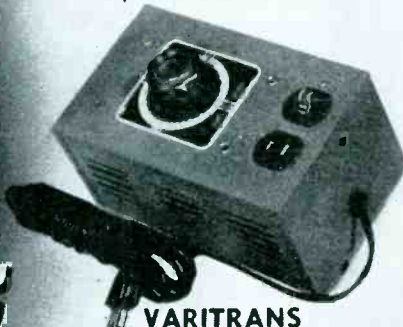


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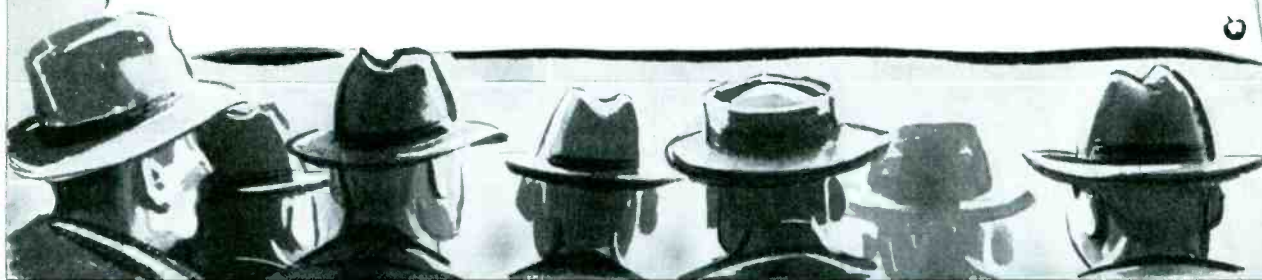
start at 2:00 p. m. Tuesday, June 10 and run to 6:00 p. m.
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RSA SPECIAL PERIOD

Thursday, June 12, 6:00 p. m. to 10:00 p. m.

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Friday, June 13, 11:00 a. m. to 8:00 p. m.



Radio Parts National Trade Show

Sponsored by Radio Manufacturers Association and Sales Managers Club
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PERSONAL PORTABLES

By HENRY HOWARD

A SERIES of personal miniature receivers, thought to be the last word in neat design, were recently brought out by the industry. But, almost as soon as they hit the store windows, the public was asking for a-c/d-c line operation, having been educated along this line through the experience of the previous few years when the popular type of standard large portables went through the same procedure. Now we hear that honest-to-goodness pocket sets will be coming along soon which

Farnsworth CT59.

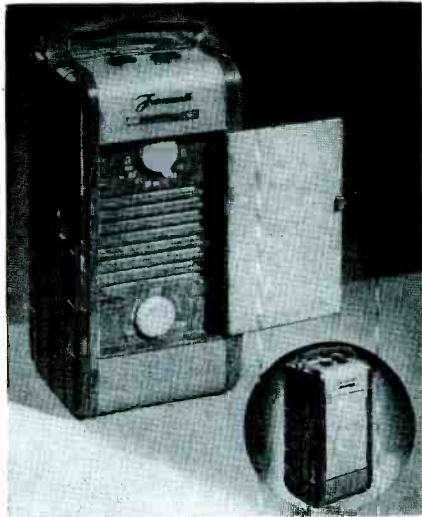


Photo courtesy Eastman Kodak G-M pocket portable

won't require a policeman's overcoat pocket!

Portable sets have always had unique appeal—probably because of complete isolation from home surroundings, antennae and power lines. Even in the comparatively early days of radio, cigar box receivers were continually appearing in amateur and experimenters' magazines. They were not commercial designs, however, being the product of hobbyists.

Just as the low drain series of 1.4-volt tubes made the standard portable loop receivers possible a few years ago, the new series of miniature tubes and

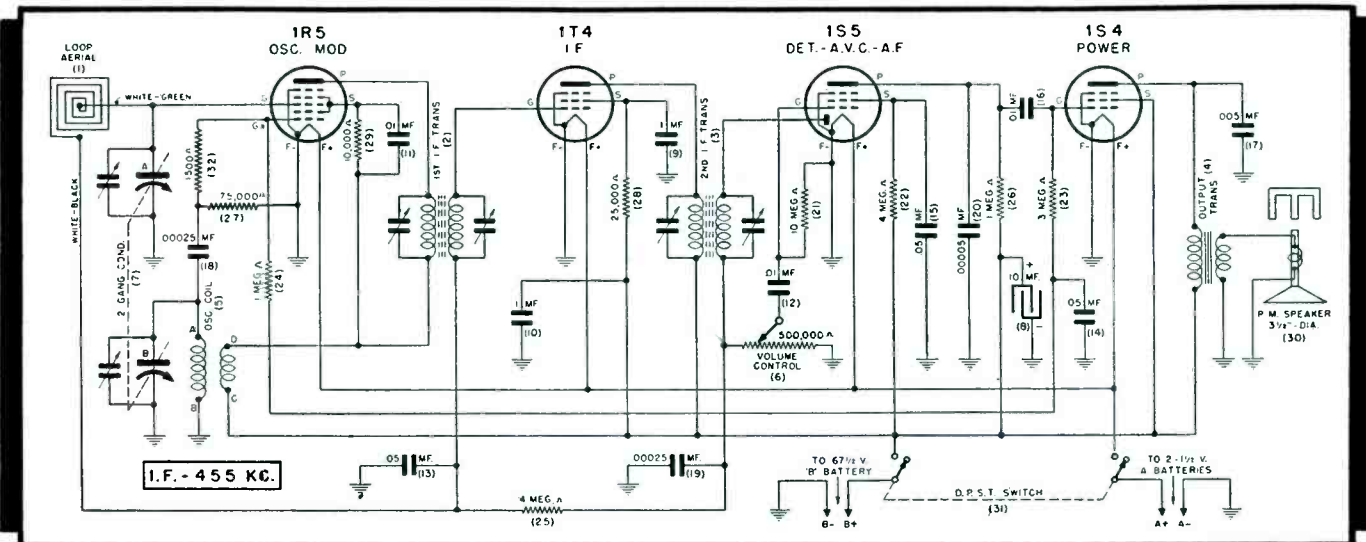
small i-f transformers made the present personal models feasible. The power requirements haven't changed, but the new tubes are very much smaller. They are more fragile, too, having no bases. The prongs are supported by the glass itself which can cause cracked envelopes. Socket manufacturers have to design the small sockets for these miniature tubes since misfits cause strains.

The tube types are as follows: 1T4 r-f and i-f, 1R5 oscillator-converter,

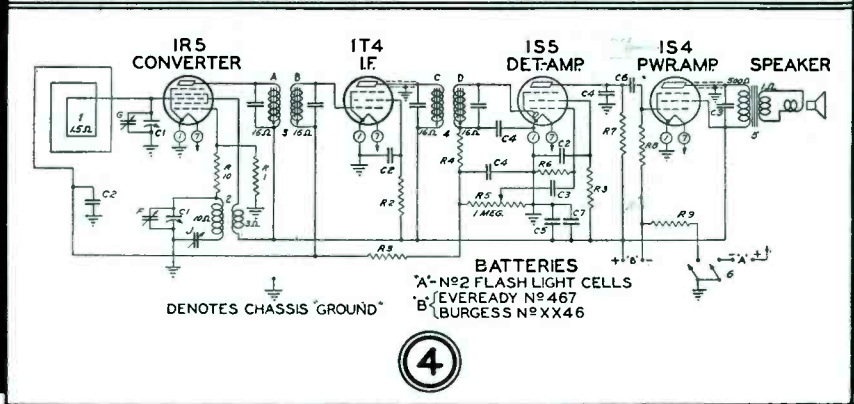
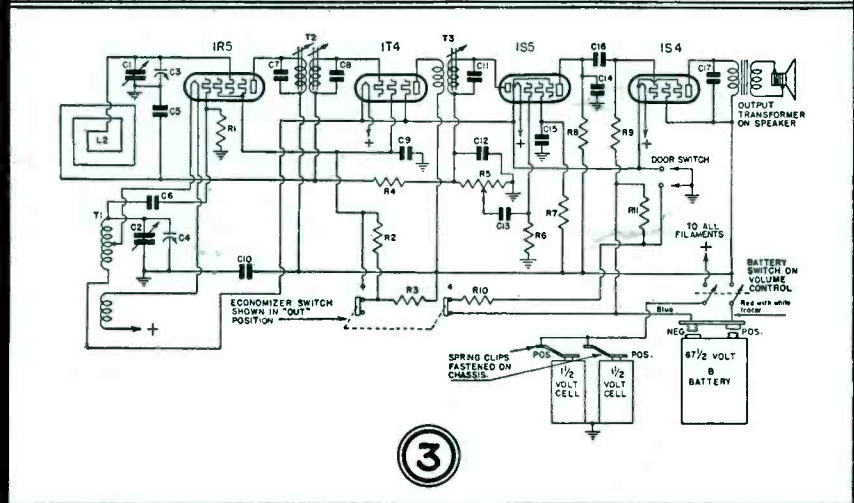
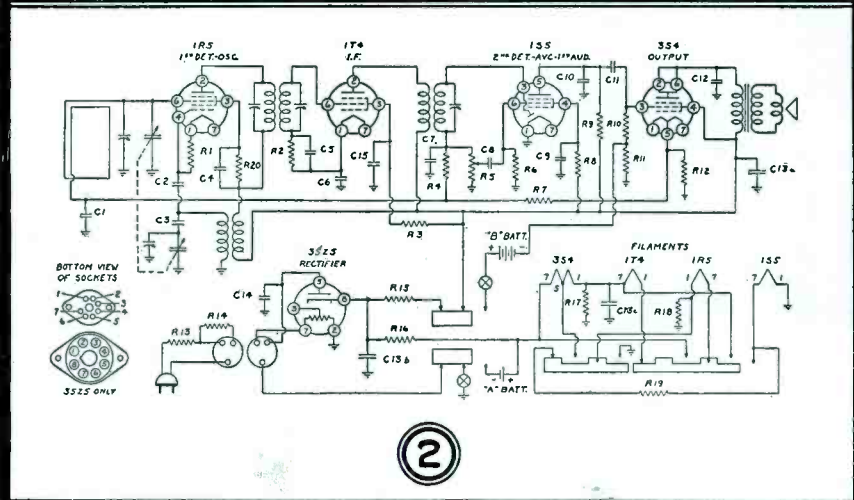
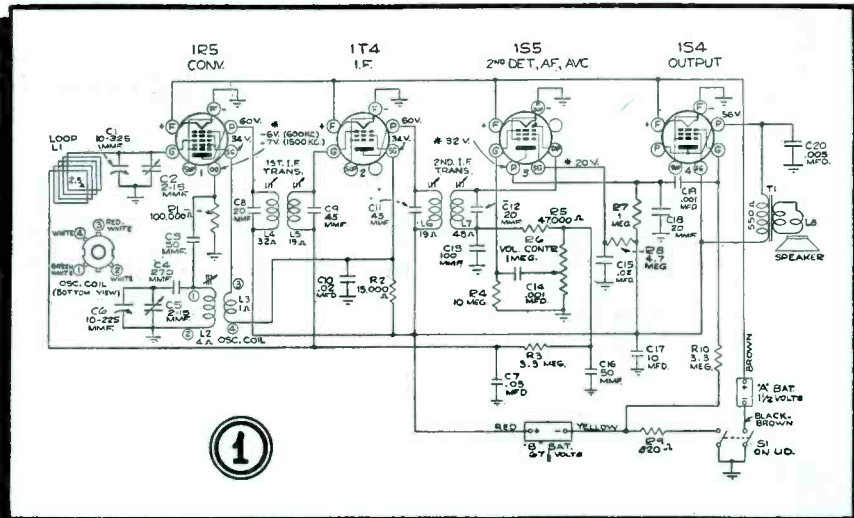
DeWald 564.



General Electric LB412 (below).



Circuits to left: (1) RCA BP10; (2) Admiral 29G5; (3) Emerson FF411, and (4) Zenith 4K600. Others on pages 8 and 9.



1S5 diode pentode for detector and first audio, and 1S4 power output. The filament of the last tube draws 100 ma, the others 50 ma. The type 3S4 is sometimes used in place of the 1S4, the only difference being that the filament is tapped for either parallel or series operation, making it convenient for line operation with the filaments in series. The converter and i-f tubes have a tendency to be microphonic, so shock-proof sockets must be used.

A-c/d-c operation creates a serious ventilation problem in personal sets, there being so little chance for heat dissipation. Screen bezels are generously used, the back of the cabinet is sometimes left open by means of a leather tab with two snaps, resistance line cords are still employed and special efficient rectifier tubes are being developed—all for the sake of line operation. One type of gas rectifier takes no cathode power during operation, thus eliminating most of the heating. Due to the low voltage, a filament is needed to start rectifying action, but this is connected only momentarily. A new tube, the 45Z3, is just being announced. Rated at 75 ma with 60 ma d-c output, this miniature size rectifier will have UL approval when used with a 5-watt, 1000-ohm internal resistor.

Cases

Whereas all the large battery portables had wooden cases with simulated leather or airplane luggage covering, there is considerable variety in the personal receiver cases. While DeWald, Fada, Garod and Silvertone are among those using covered wood cases, Crosley is using aluminum, RCA and Motorola are using metal, and Sentinel, Admiral, General Electric and Detrola and Farnsworth have tenite or acetate cases partially covered with cloth giving a neat two-tone effect. These plastic cases come in a variety of colors and are very attractive. In most personal sets the loop antenna is contained within the door so all doors are of insulating material including bakelite and several plastics. Motorola uses a maroon polystyrene cover. As some of these plastics will cold flow at rather low temperatures (140 degrees), the cases should not be subjected to excessive heat. Zenith has a camera model which really looks like a camera.

One of the most appreciated features of all portables is the instantaneous operation obtained, there being no appreciable thermal lag in the filaments. The personal designs accent this feature by

providing automatic on-off switching as the door is opened or closed. A few models use the converse system of having the on-off switch open the door automatically through the use of spring hinges. On non-metallic cases, the hinges also act as loop connectors. Metal case sets must have insulated strip connectors—note those on Crosley's photo.

Loops

Due to the location of loops in the doors of pocket sets, higher Qs can be realized than in the larger portables. While the larger sets have Q values of 200 at the low-frequency end to 125 at the high-frequency end when in open air, these values drop to 80-100 at l-f to about 60 at h-f when the loops are in position close to the chassis. In the personal sets representative Q values with door open are 140 at l-f to 80 at h-f. It is advisable to use Litz wire in the small loops because the advantages are realized, whereas, in the large loops, chassis absorption largely cancels the effect of Litz.

I-F Transformers

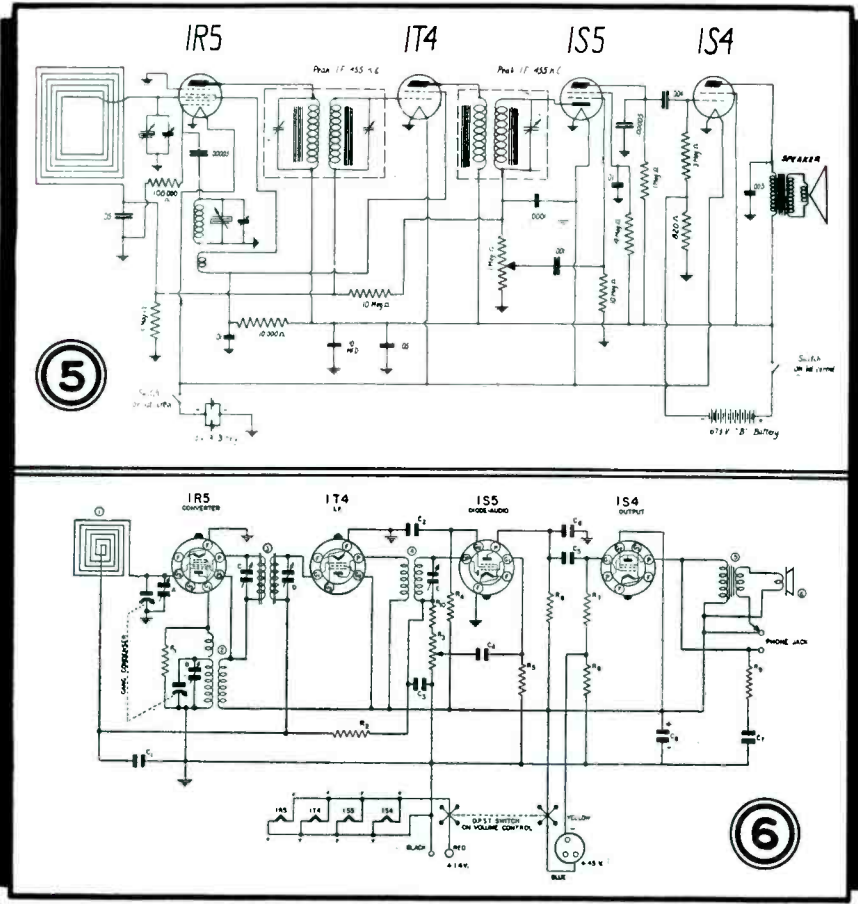
The successful performance of pocket sets, particularly with respect to sensitivity and selectivity, is largely due to the development of tiny i-f transformers, some as small as $\frac{3}{8}$ -inch in diameter. The coils are potted—entirely surrounded with iron—eliminating any external field and preventing any can absorption. The Q varies from 80 to 100 and the gain is equal to that of standard large i-f transformers. Designed to conserve space, the transformers fit right on top of the miniature sockets or between two sockets, while the trimmers are separately located at some point convenient for adjusting. Some transformers use permeability tuning which requires a small fixed condenser, eliminating the need for trimmers. R-f coils are of similar size and performance.

Condensers

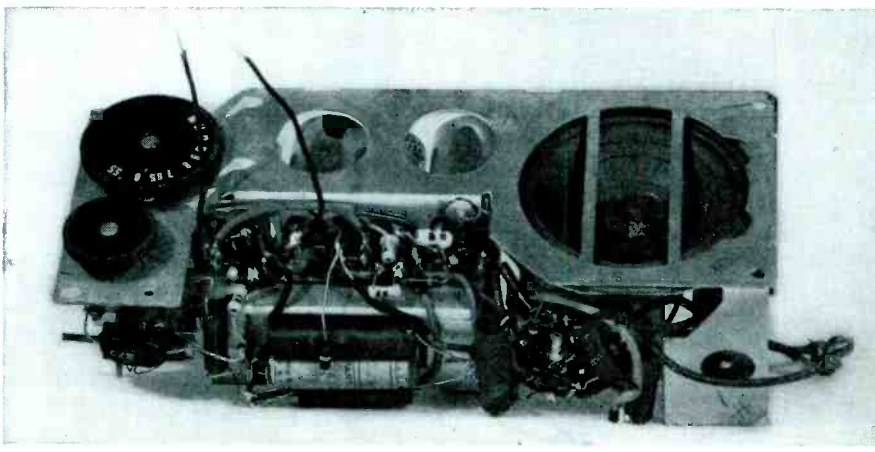
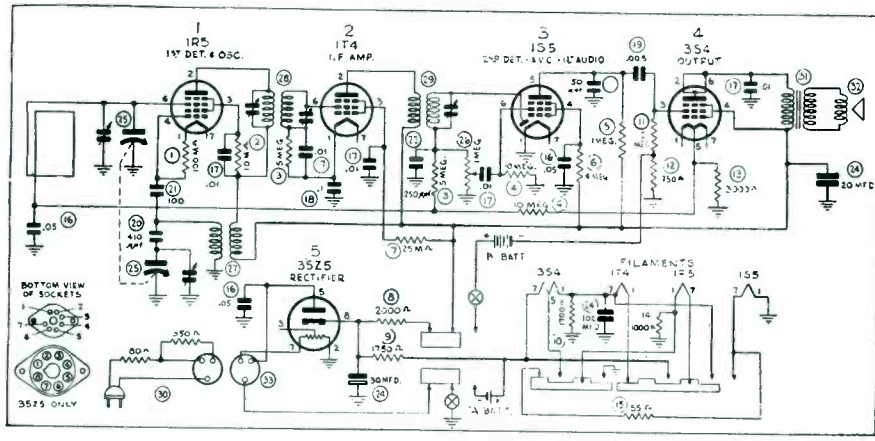
The new two-gang variable condensers are about the same size as a single section of condenser two years ago. Aluminum plates are used (if they can still get it) and very accurate flat stock—it has to be for the spacing is only .008 inch, which is mighty close for a tuning condenser. Both direct drive and an 8:1 reduction drive are used, the reduction being a planetary arrangement of a shaft within a shaft, the balls of the bearing doing the friction driving. This is probably the most



Sets at right: (A) General Electric; (B) RCA; (C) Zenith; (D) Admiral; (E) Philco; (F) Garod; (G) Crosley; and (H) General Electric.



Circuits above: (5) DeWald 410 and (6) Air Castle 5122. Below: Farnsworth CT59 and RCA BP10 with cover removed.



difficult commercial condenser ever put out in quantity production.

A brand new line of midget tubular paper condensers was developed expressly for the pocket receivers. These condensers are rated at 120 volts and are smaller in both length and diameter than standard tubulars. Built with two sheets of .0003 paper and foil proportionally thin, a very high grade of workmanship is required for soldering the foil and for other assembly operations.

Electrolytics, too, have been shrunk commensurately with other components. A 3-section filter is used in all a-c/d-c battery models consisting of two high-voltage sections of 20-60 mfd, and a low-voltage section of 100-200 mfd for filament bypassing. Etched or fabricated plate types are used having physical dimensions for 3 sections approximating the size of the old type 8-mfd. 450-volt tubular dry electrolytics.

Batteries

The development of the Eveready type 467 "B" battery, a midget 67½ volt long life unit, and its equivalent, has been a boon to the industry. The few models not using this battery make use of a standard midget 45-volt battery produced by many manufacturers. The Mini-Max was specifically developed for the 8 to 11 milliampere load and will give from 40 to 60 hours of service under average conditions. From 1 to 5 standard flashlight cells serve as A batteries. The lightest sets, weighing 3¾ to 4 lbs., use only a single cell which will last from 3 to 5 hours, depending upon the period of operation and recuperation. Most of the plastic models use two "A" cells providing 10 to 15 hours of operation; a few including Fada, are using three cells, allowing 22 to 30 hours, and Motorola's three-power model 3A5 uses 5 cells with a corresponding increase in life. This model uses series filaments on both line and battery operation. The flashlight cells, while seemingly adequate for the job, are not used under optimum conditions in most cases, so new "A" cells are being designed specifically for a 125-ma load, figuring on two cells in parallel for the standard 250-ma filament drain.

Emerson obtains a greater B battery life at some sacrifice in performance by including an "economizer" in model FF-411. The economizer increases the bias on the 1S4 power tube and also lowers the screen grid potential on the converter 1R5 and the 1T4 i-f stages dropping the B current from 7.5 to 5.5 ma.

Dry batteries sometimes swell considerably when used up, so sufficient tolerance must be allowed for the easy removal of forgotten cells. While but-

ton contact slips are used on the B batteries, the "A" cells depend on springs for contact. The current being comparatively high, a sliding action must take place in order to insure low contact resistance.

Most companies are working on new volume controls, the present controls being several years old and obviously too large! In all sets, the volume control serves also as the diode load resistor. Fixed resistors are all insulated and of very small dimensions suitable for mounting on the sockets. Grid leak bias is used on the 1S5 first audio pentode, the value being 10 to 15 megohms. The use of a-v-c is advantageous in minimizing the directional effect of the loop antenna, which would otherwise be objectionable. No pilot lights are seen in this series of pocket sets; for one reason, the sets are so compact there just isn't any room!

Speakers

3 to 4-inch p-m speakers having 1½ to 4 oz magnets are used. The quality is surprising when the amplifier is not overloaded. Because of confined space, which doesn't allow much back pressure, the resonant point is set high. This doesn't admit much bass, but it prevents muffling. The majority of output transformers are mounted on the chassis, the designs not permitting room on the speaker. Because of very limited power output (0.04 to 0.1 watt) the transformer must be efficient, so they appear to be of reasonable size in spite of confined space. For real tiny pocket sets, 2 inch and oval 2 x 3 inch speakers are being developed with up to 4 oz. alnico magnets.

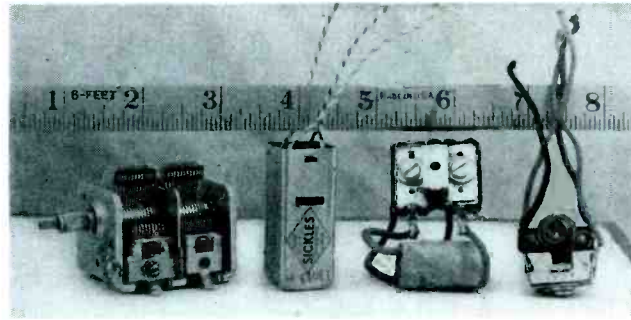
All 3-way sets run the filaments in series on line operation and all except Motorola run them in parallel on batteries. This leads to a complicated switching problem. Admiral pioneered a well-designed switch using a single wafer. Instead of a knob, the switch uses a lever with an insulated knurled fibre piece for shock protection. Line cords are usually rolled up in rear of case. In other cases, the cords plug into an outlet, being completely removable. The photo of Farnsworth's model CT-59 shows the lever type switch. Garrod's model BP-20 shows the switching diagram. This model has a floating chassis being isolated from the negative bus by a 0.1-mfd condenser.

Farnsworth model KD-57 shows a tapped line cord with plug-in feature. The tap allows for a 80-ohm series resistance which acts as a buffer or surge preventer, protecting the rectifier cathode and the first filter condenser. This model also uses a type of regeneration by running the low side of the first i-f

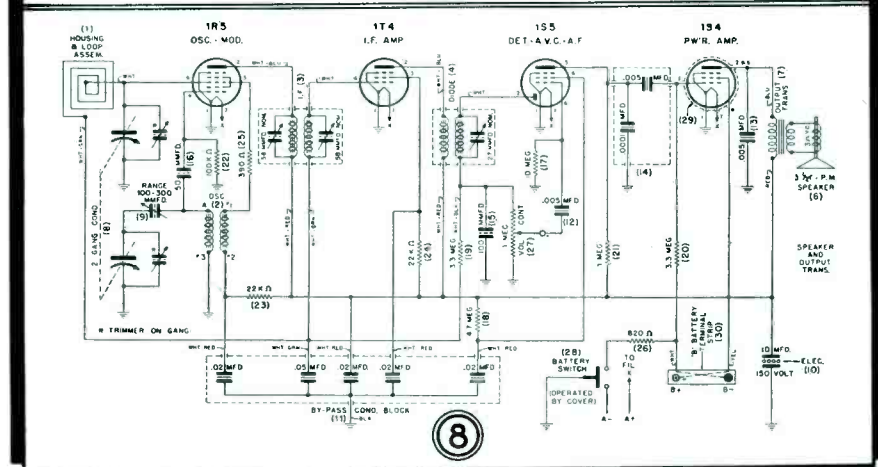
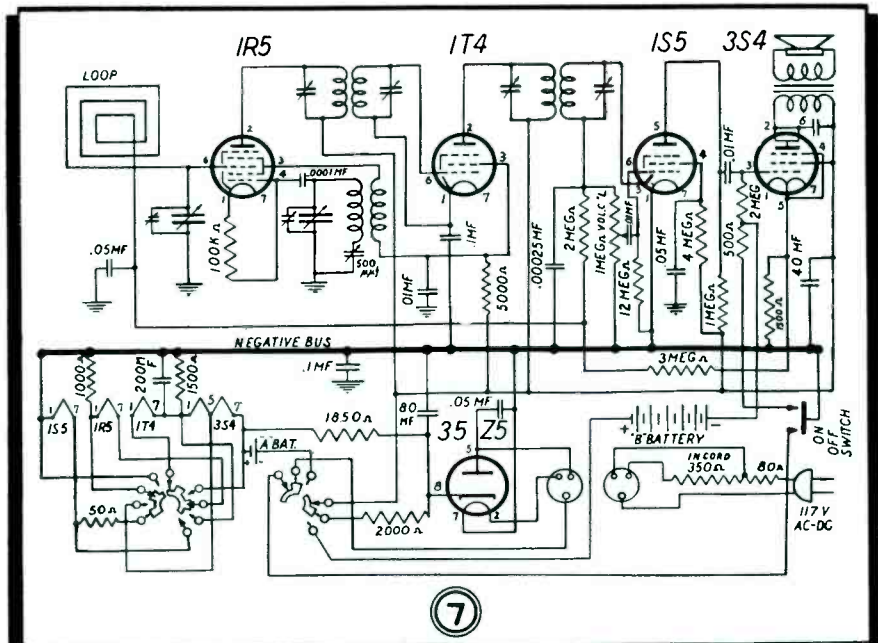
(Continued on page 23)



Photo from Three Lions



Above: The British version of the personal set uses an earphone. Left: Special parts are used in the personal sets. Below: (7) Garod BP20 and (8) Motorola A1.



REPLACEMENT BATTERIES FOR PORTABLES

Model	Acme	Advance	Bond	Bright Star	Burgess	Eveready	Gen-eral	National Union	Philco	Rayo-vac	Usalite	Wil-lard	Win-chester
ADMIRAL (Continental Radio & Television Corp.)													
27G4, 29G5.....2A	111	2	102	10M		950	D	D	D	2	1094	D	...
1B	...	...	...	...	XX45	467	W45A	...	...	...	...	...	...
33F5, 34F5, 35G6	...	...	...	...	...	...	...	...	...	...	...	...	...
37G6, B34G6, 36H5...1AB	...	...	...	...	6FA60	...	60A4L	N803	P60A4L	AB84	AB667	...	...
51D4 .....1AB	...	...	...	...	6TA60	...	...	...	...	...	...	...	...
76P5, 77P5, 1A	123M	...	...	465	4FL	...	...	...	...	P94L	642	...	...
L76P5 .....2B	430	...	...	30-55	A30	...	V30A	...	...	430P	621	V30A	...
78P6, 79P6, 164-4D, 1A	116	...	4824	660	6F	743	6F1	A831	P96	P96A	637	6F1	4814
311-4D, PH, 335-4Z	...	...	...	...	...	...	...	...	...	...	...	...	...
635-4Z, 1035-4Z.....2B	330	267	3017	30-03	B30	762	V30B	B860	P305	P5303	624	V30B	6218
231-4F, 231-4Z, 1A	114	247	4826	462	4F	742	4F1	A830	P94	P94A	634	4F1	4816
331-4F .....2B	430	...	...	30-55	A30	738	V30A	...	...	430P	621	V30A	...
236-5N, 336-5N, 1A	...	...	...	561	G5	...	5H5	...	...	P85A	687	...	...
636-5N, 1036-5N.....2B	330	267	3017	30-03	B30	762	V30B	B860	P305	P5303	624	V30B	6218
319-4Z .....1A	123M	...	...	465	4FL	...	3L1	...	...	P94L	642	...	...
2B	430	...	...	30-55	A30	738	V30A	...	...	430P	621	V30A	...
AEOLIAN (Aeolian Manufacturing Co.)													
BP4, BP5, BP8 .....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
BP6, BP10 .....1A	...	...	...	...	F4PLX	...	...	...	...	...	636	...	...
2B	330	267	3017	30-03	B30	762	V30B	B860	P305	P5303	624	V30B	6218
BP36 .....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
AIR CASTLE (Speigel, Inc.)													
560-1, 561-1, 561-1M...1A	118	147	4829	860	8F	741	8F1	A833	P96	P96A	635	8F1	4819
611-1 .....2B	330	267	3017	30-03	B30	762	V30B	B860	P305	P5303	624	V30B	6218
591-1 .....1A	...	2476	...	646	F4PI	...	4F4	...	...	P694A	639	4F4	...
2B	330	267	3017	30-03	B30	762	V30B	B860	P305	P5303	624	V30B	6218
1555, 6622.....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
2122, BP12.....1A	115S	...	...	561	G5	...	5H5	...	...	P85A	687	...	...
2B	330	267	3017	30-03	B30	762	V30B	B860	P305	P5303	624	V30B	6218
2132, F5, XF5.....1AB	...	...	...	...	6FA60	...	60A4L	N803	P60A4L	AB84	AB667	...	...
2134, 2148, O-557, 1A	118S	817	4827	866	2F4	718	8F4	A834	...	P698A	638	8F4	4817
BP11S .....2B	330	267	3017	30-03	B30	762	V30B	B860	P305	P5303	624	V30B	6218
5122, T40.....4A	111	2	102	10M	2	950	D	D	D	2	1094	D	...
1B	...	...	...	...	...	...	41AAA	...	...	...	...	...	...
CP5120, CP5121.....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
AIR CHIEF (See Firestone Tire & Rubber Co.)							AIRLINE (See Montgomery Ward)						
AIR KING (Air King Products Co.)													
444 .....2A	111	2	102	10M	2	950	D	D	D	2	1094	D	...
1B	...	...	...	...	XX45	467	W45A	...	...	...	...	...	...
3905, 3912 .....AB	460-15	411	...	...	5DA60	...	60A2L	...	...	...	AB665	...	...
3906, 3910 .....1A	118	147	4829	860	8F	741	8F1	A833	A96	P96A	635	8F1	4819
2B	330	267	3017	30-03	B30	762	V30B	B860	P305	P5303	624	V30B	6218
3916 .....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
3950, 4112 .....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
4012 .....AB	460-14S	659	...	...	D4A60	...	...	...	...	...	AB664	...	...
4016 .....1A	118S6	747	4825	868	2F4L	747	8CF4	...	...	P698L	646	...	4815
2B	830	284	6220	30-33	M30	482	W30B	B861	...	P5S30	640	...	6210
ANDREA (Andrea Radio Corp.)													
6G61, 6G61A, (G61), 2A	123	647	4928	361	G3	746	3H3	...	...	P83A	683	3H3	4919
6G63, 6G63A, G63.....2B	330	267	3017	30-03	B30	762	V30B	B860	P305	P5303	624	V30B	6218
21AF5, 21F5, (UF51)...A	118	147	4829	860	8F	741	8F1	A833	...	P96A	635	8F1	4819
B	330	267	3017	30-03	B30	762	V30B	B860	P305	P5303	624	V30B	6218
ANSLEY (See Port-O-Radio)							ARCADIA (See Wells Gardner)						
ARIA (See Wells Gardner)							ARLINGTON (See Wells Gardner)						
ARVIN (Noblitt Sparks Industries)													
802, 803, 822.....1A	118FM	547	4823	865	8FL	745	8CF1	...	...	P98L	645	...	4813
2B	830	284	6220	30-33	M30	482	W30B	B861	...	P5S30	640	V30A	6210
AUTOCRAT (Autocrat Radio Co.)													
90, 98 .....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
120 .....A	118S	817	4827	866	2F4	718	8F4	A834	...	P698A	638	8F4	4817
B	330	267	3017	30-03	B30	762	V30B	B860	P305	P5303	624	V30B	6218
131, 132 .....A	...	2476	...	646	F4PI	...	4F4	...	...	P694A	639	4F4	...
B	330	267	3017	30-03	B30	762	V30B	B860	P305	P5303	624	V30B	6218
161 .....AB	...	...	...	...	...	...	...	...	...	AB94	...	...	...
531, 533.....1AB	...	...	...	...	...	...	60A4FLA	...	P60A4FLA	AB694	AB674	...	...
AUTOMATIC (Automatic Radio Mfg. Co. Inc.)													
P30, P33.....2A	111	2	102	10M	2	950	D	D	D	2	1094	D	...
1B	830	284	6220	30-33	M30	482	W30B	B861	...	P5S30	640	...	6210
P40, P41, P50, P51 ....1A	...	...	...	...	4FL	...	F4	...	...	...	643	...	...
2B	830	284	6220	30-33	M30	482	W30B	B861	...	P5S30	640	...	6210
P43, P45 .....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
P57, P58, P61, P72 ....1A	...	...	...	...	F4PIX	...	...	...	...	...	636	...	...
2B	330	267	3017	30-03	B30	762	V30B	B860	P305	P5303	624	V30B	6218
P80, P81 .....1A	118-S6	747	...	868	2F4L	747	...	...	...	P698L	646	...	...
2B	830	284	6220	30-33	M30	482	W30B	B861	...	P5S30	640	...	6210
Thom Thumb, Tom 1A	111	2	102	10M	2	950	D	D	D	2	1094	D	...
Thumb Deluxe.....1B	830	284	6220	30-33	M30	482	W30B	B861	...	P5S30	640	...	6210

Model	Acme	Advance	Bond	Bright Star	Burgess	Eveready	Gen-eral	National Union	Philco	Rayo-vac	Usalite	Wil-lard	Win-chester	
BELMONT (Belmont Radio Co.)														
403, 460	1A	118	147	4829	860	8F	741	8F1	A833	P96	P96A	635	8F1	4819
	2B	330	267	3017	30-03	B30	762	V30B	B860	P305	P5303	624	V30B	6218
407	1A	123M	...	...	465	4FL	...	3L1	...	...	P94L	642	3L1	...
	2B	430	...	...	30-55	A30	...	V30A	...	...	430P	621	V30A	...
507, 513, 590	1A	...	2476	...	646	F4P1	...	4F4	...	...	P694A	639	4F4	...
	2B	430	...	...	30-55	A30	...	V30A	...	...	430P	621	V30A	...
BLACK HAWK (See Wells Gardner)							CARRYETTE (See Westinghouse)							
CARRYOLA (See Garod)														
CHEVROLET (Chevrolet Division, General Motors Corp.)														
985514	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
985775	1A	111	2	102	10M	2	950	D	D	D	2	1904	D	...
	1B	...	...	...	...	XX45	467	W45A	...	...	...	...	...	...
CLARION (Clarion Radio Co.)														
0-464	1A	118FM	547	4823	865	8FL	745	8CF1	...	...	P98L	645	...	4813
	2B	830	284	6220	30-33	M30	482	W30B	B861	...	P5S30	640	...	6210
0-534, 535, 539	1A	...	2476	...	646	F4P1	...	4F4	...	...	P694A	639	4F4	...
	2B	330	267	3017	30-03	B30	762	V30B	B860	P305	P5303	624	V30B	6218
532, 536	1AB	...	...	...	...	...	...	60A4FL4	...	P60A4FL4	AB694	AB668	...	...
CLARK (See Warwick)							CLIMAX (See General)							
COLONIAL (Colonial Radio Corp.)														
575	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
G.M., 985775	1A	111	2	102	10M	2	950	D	D	D	2	1904	D	...
	1B	...	...	...	...	XX45	467	W45A	...	...	...	...	...	...
CORONADO (See Gamble Stores, Inc.)														
CROSLEY (Crosley Radio Corp.)														
27, 27BD, 27BE	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
45BD, Commuter	1A	111	2	102	10M	2	950	D	D	D	2	1904	D	...
	1B	...	...	...	...	XX45	467	W45A	...	...	...	...	...	...
52PA, 67	1AB	...	...	...	...	G4B50	...	Z50B4H4	...	...	...	AB670	...	...
62PA, 62PB, 68	1AB	...	...	...	...	...	...	Z50B5H5	...	...	...	...	...	...
429, 429A, B429A	1A	118	147	4829	860	8F	741	8F1	A833	...	P96A	637	8F1	4819
	2B	330	267	3017	30-03	B30	762	V30B	B860	P305	P5303	624	V30B	6218
439, 439A	1AB	442-4	41AD7	...	...	4GA42	...	41A4FL	...	P41A4FL	...	AB669	...	...
549, 549A	1AB	...	...	...	...	F4A41	...	...	...	...	...	...	...	...
5549, 5549A	1A	118S	817	4827	866	2F4	718	8F4	A834	...	P698A	638	8F4	4817
	2B	830	284	6220	30-33	M30	482	W30B	B861	...	P5S30	640	...	6210
DELCO (Delco Radio Division, General Motors Corp.)														
R1400	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
R1401, R1402	1A	123M	...	...	465	4FL	...	...	...	...	P94L	642	...	...
	2B	430	...	...	30-55	A30	738	V30A	...	...	430P	621	V30A	...
R1406, RC527E	1A	116	...	4824	660	6F	743	6F1	A831	P96	P96A	637	6F1	4814
	2B	830	284	6220	30-33	M30	482	W30B	B861	...	P5S30	640	...	6210
R1407, RC562	2A	173	647	4928	361	G3	746	3H3	...	...	P83A	683	3H3	4919
	2B	830	284	6220	30-33	M30	482	W30B	B861	...	P5S30	640	...	6210
DETROLA (Detrola Radio Corp.)														
282 (Pee-Wee)	1A	114	247	4826	462	4F	742	4F1	A830	P94	P94A	634	4F1	4816
	1B	...	...	...	...	A60	...	...	...	...	BB60P	...	...	...
286, 288	1A	118	147	4829	860	8F	741	8F1	A833	P96	P96A	635	8F1	4819
	2B	330	267	3017	30-03	B30	762	V30B	B860	P305	P5303	624	V30B	6218
295	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
299, 289	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
303, 303A, Treasure Chest	1AB	442-4	41AD7	...	...	4GA42	...	41A4FL	...	P41A4FL	...	AB669	...	...
339, 339-1, 340-1, 341-1	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
341-2, 360-1	2A	111	2	102	10M	2	950	D	D	D	2	1094	D	...
	1B	...	...	...	...	XX45	467	W45A	...	...	...	...	...	...
DEWALD (DeWald Radio Mfg. Co.)														
408	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
408R, 409	1A	118	147	4829	860	8F	741	8F1	A833	P96	P96A	635	8F1	4819
	2B	330	267	3017	30-03	B30	762	V30B	B860	P305	P5303	624	V30B	6218
410, 564	2A	111	2	102	10M	2	950	D	D	D	2	1094	D	...
	1B	...	...	...	...	XX45	467	W45A	...	...	...	...	...	...
415	1AB	460-15	411	...	...	5DA60	...	60A2L	...	...	...	AB665	...	...
415R	1A	116	...	4824	660	6F	743	6F1	A831	P96	P96A	637	6F1	4814
	2B	830	284	6220	30-33	M30	482	W30B	B861	...	P5S30	640	...	6210
544, 544L	1A	118S	817	4827	866	2F4	718	8F4	A834	...	P698A	638	8F4	4817
	2B	330	267	3017	30-03	B30	762	W30B	B860	P305	P5303	624	V30B	6218
545, 545LW, 545SW	1A	118S6	747	4825	868	2F4L	747	8CF4	...	...	P698L	646	...	4815
	2B	830	284	6220	30-33	M30	482	W30B	B861	...	P5S30	640	...	6210
ENDURANCE (Western Tire & Auto Stores, Inc.) (See Detrola)														

(To be continued)

CIRCUITS

See Front Cover

By HENRY HOWARD

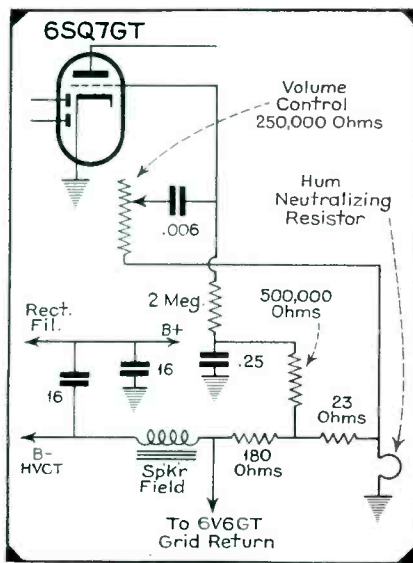


Fig. 4. The Emerson Models ES374 and ES397 utilize a novel method of introducing out-of-phase hum voltages to neutralize residual hum in the receiver circuits.

of the antenna transformer which is tapped for optimum impedance matching. A similar set of secondary padders is also used, for 6, 9, 11 and 15 mc. A low-impedance resistance-coupling system is used in the converter output to even the sensitivity curve, preventing peaks, and an output padder is provided to tune the broadcast receiver input for maximum gain.

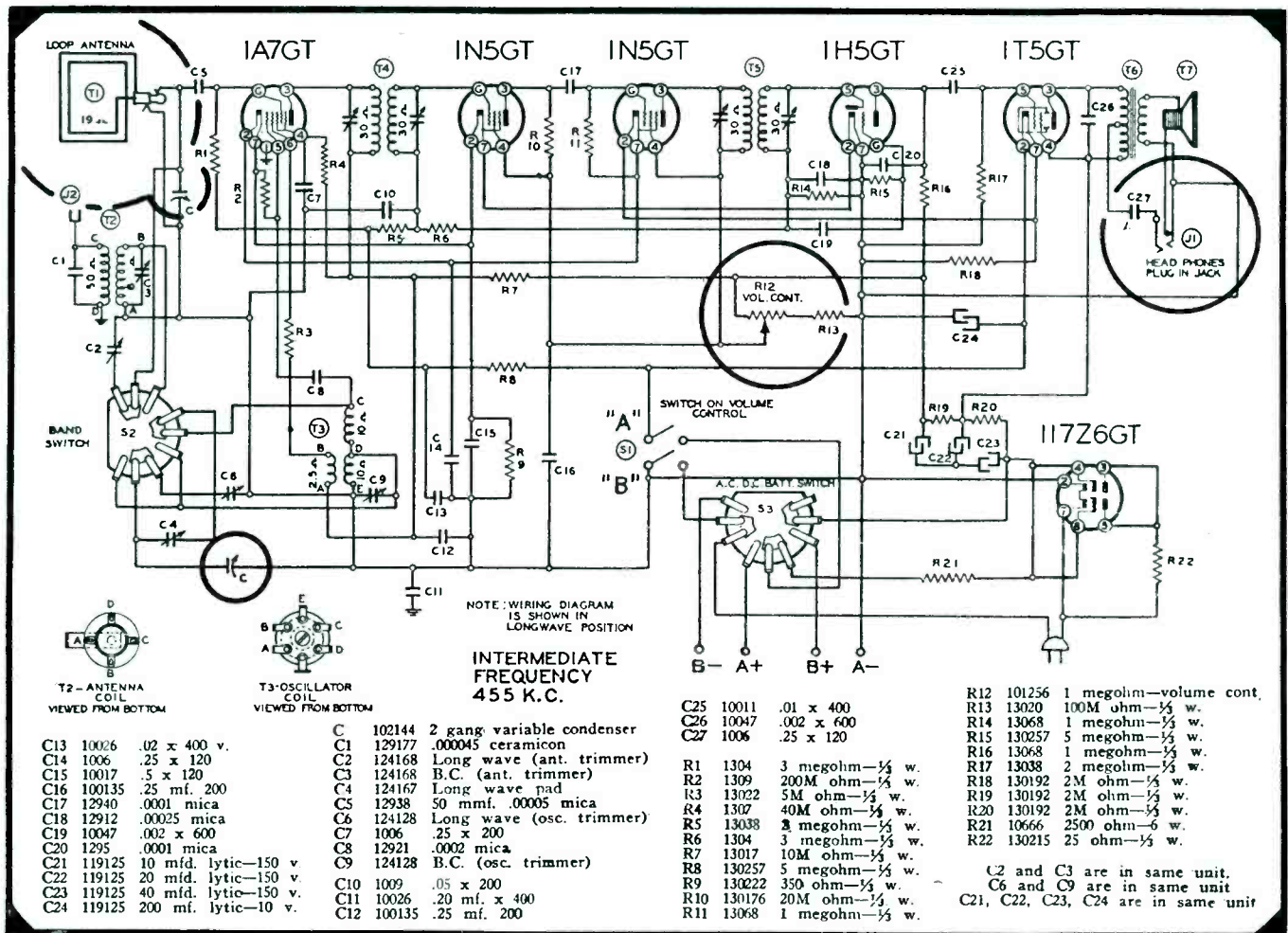
PHILCO has an efficient short-wave adaptor for auto sets, in their Model SW1, four-band tuner. Used in conjunction with a standard broadcast-band auto-radio receiver, the composite circuit becomes a double superheterodyne. Two type XXL triodes are used in the adaptor, one as oscillator and the other as converter. The i-f output is fed through a shielded cable to the main receiver. The recommended i-f peak is 1,400 kc (the frequency to

which the broadcast set should be tuned) which is high enough to prevent bothersome image interference. (See front cover.)

An antenna choke is used as in many standard auto sets. Following the circuit through the wave-band switch, we note the i-f wave trap, four antenna primary padders for the four channels, through another switch to the primary

The oscillator is a plate-tickler circuit, silvered-mica condensers being paralleled in the tuned-grid circuit for the different bands. Oscillator voltage is delivered to the cathodes of the converter by means of an inductively-coupled load circuit. Note the 180-ohm

Fig. 2. Sea Pal 6P21 portable radio and direction finder.



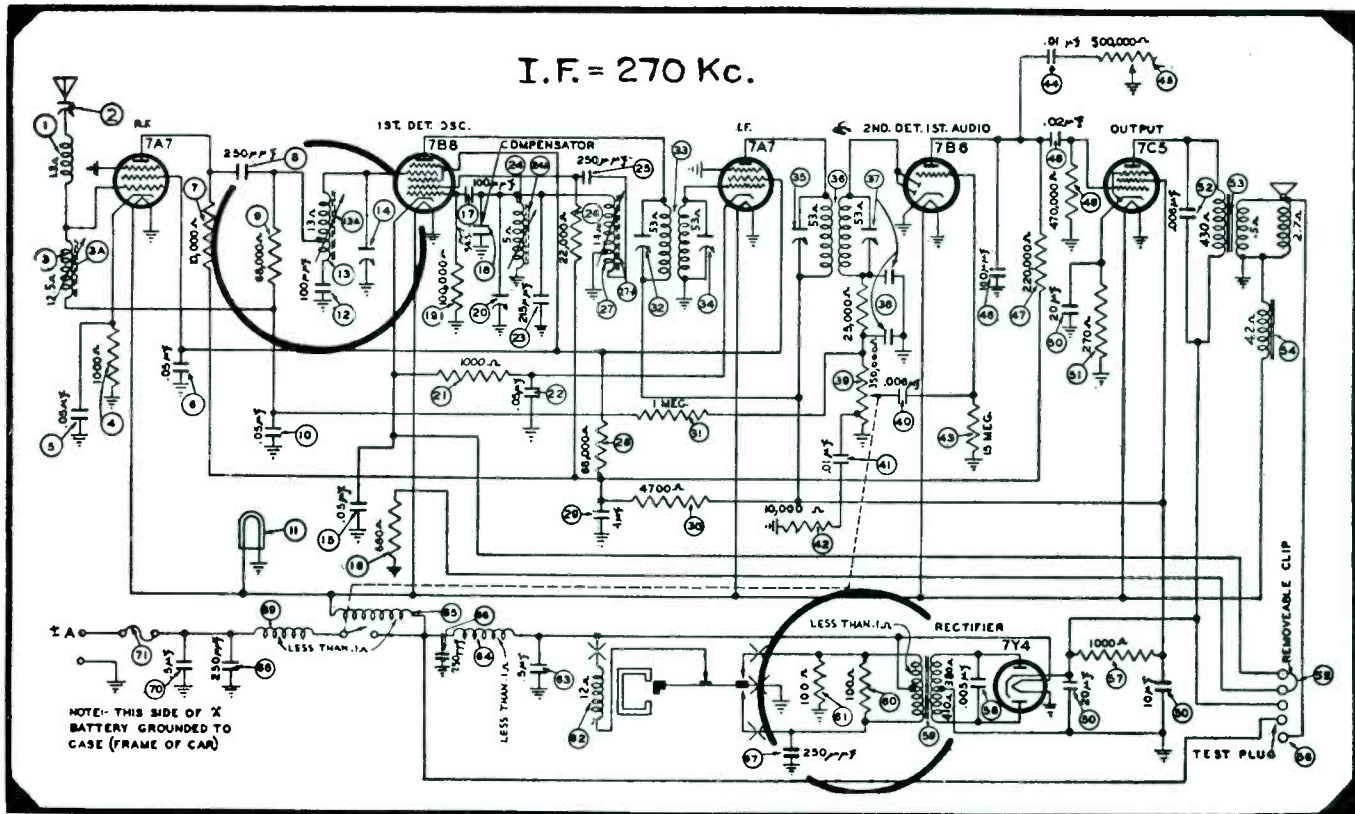


Fig. 1. Packard Philco Model P1830 auto radio receiver.

resistor shunting the load coil which tends to keep the oscillator output voltage constant over its entire frequency range. Note also the r-f choke isolating the tube heaters. A and B power is derived from the main receiver through a power cable and plug.

Packard-Philco P1830

Philco's Packard Model P1830 custom auto-radio receiver has an i-f peak of 270 kc—a little unusual in these days of 455 kc. Features include permeability tuning with a tuned r-f stage,

former) and vibrator anti-noise resistors which take the place of the usual by-pass condensers in cutting vibrator hash. The 6-volt transformer primary is, of course, a low impedance circuit. The effectiveness of by-pass condensers increases with the impedance of the circuit, so they are not particularly efficient in this location. The resistors, which may vary between 50 and 200 ohms, are definitely more effective. See Fig. 1. Service Men should make a note of this application. It ought to come in handy in some cases of exces-

second i-f transformer. The audio end of the receiver consists of a 6SQ7, a 6J5GT driver and a 6N7 Class B output. Degeneration is provided between driver output and first audio output by connecting the two plates with a 1/2-megohm resistor. This resistor also serves as the first a-f plate load. A 100-ohm resistor is shunted across the solenoid, used for automatic tuning, to kill the inductive kick.

Sea Pal 6P21

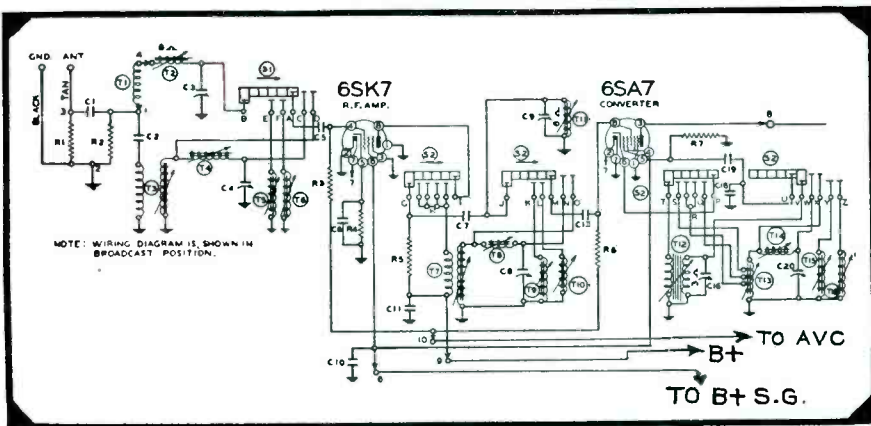


Fig. 3. Belmont Model 11AE2.

sive hash interference. It is certainly simple to try.

Airline 14BR682A

temperature compensated oscillator for minimizing drift, low-impedance resistance coupled isolation circuit between r-f tube output and first-detector input (resembling a step-up auto-trans-

Montgomery Ward's Airline Model 14BR682A is a 6-tube auto radio set with automatic tuning featuring permeability tuning and a triple-tuned flat-top

Fig. 2 shows the circuit of a very interesting receiver, the Sea Pal, Model 6P21, a simple combination radio direction finder and portable receiver. In addition to the broadcast band, the marine and aviation beacon band of 190 to 410 kc is covered (and an interesting feature is that the i-f peak is 455 kc—between the two tuning ranges). A plug-in loop is provided with a compass scale to read compass bearings. Fair accuracy can be obtained, even though the loop is not balanced to ground. The low side of the loop is connected to A—which is connected to the chassis through a 0.2-mfd condenser.

One tuned i-f stage and a tuned second-detector stage is used with resistance coupling between them. An unusual method of controlling the volume is employed. The plate and screen voltages of both i-fs are varied by means of a 1-meg control (in series with a

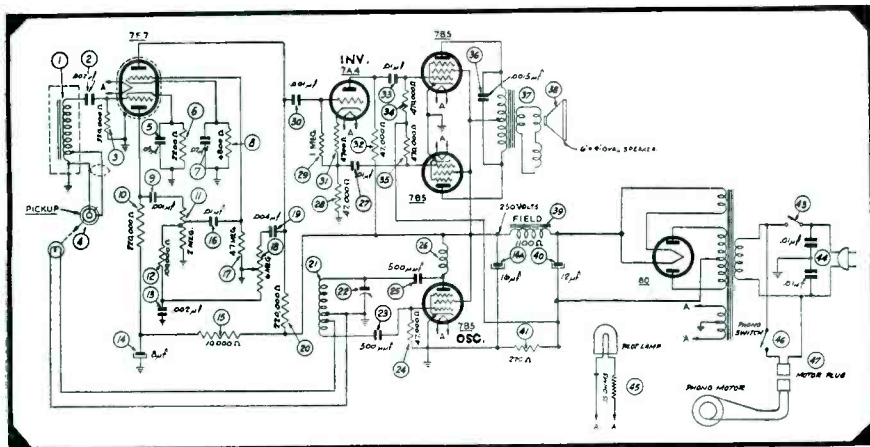


Fig. 5. Philco 41-620 phonograph amplifier.

0.1-meg resistor which provides a minimum voltage). Almost looks like the old days when screen-grid control was common. A phone jack is provided to enable the operator to get more accurate bearings. 500-ohm phones are recommended; the primary of the output transformer is tapped as a step-down auto transformer. No d-c flows through the phones because of the 0.25-mfd. isolating condenser, leaving the phones at A—potential. This is important to prevent any possibility of shock as moist conditions on shipboard cause all sorts of grounds.

Belmont 11AE2

Belmont has an 11-tube, high-fidelity, a-c job, Model 11AE2, with four spread short-wave bands. The tube lineup includes an r-f stage, two i-f stages, all tuned, including a triple-tuned inter-stage i-f transformer, two audio stages, inverter and push-pull 6V6GT output. Although permeability tuning is featured, a loop is used in the unusual arrangement shown in Fig. 3. Note also the resistance-capacity high-pass input filter from the antenna. A good power supply filter is also included, consisting of the speaker field flanked by 30 mfd and followed by two resistance-capacity sections. A-f degeneration feeds back from the secondary of the output transformer to the second audio cathode. A Seeburg record changer is included and is available in 25-, 50- and 60-cycle designs.

Emerson ES374, ES397

Automatic record changer Models ES374 and ES397 of Emerson have a novel rumble filter which looks like an inversed feedback arrangement running from the high side of the voice coil through 2 megs to the high side of the crystal pickup. The 6SA7GT converter cathodes are opened in phono position. An interesting method of hum-bucking or neutralizing is used as follows: the speaker field in combination with three small resistors serves as the series power-supply filter element in the nega-

tive high-voltage leg. The grid leak of the 6V6GT power tube is picked off at the low end of the field. This provides the proper value of d-c grid bias, but also sends some a-c ripple into the power tube; there is no filter or by-pass condenser at this point. At the next resistor, continuing with the filter, the first audio tube gets its bias, but this tap is filtered. The low side of the volume control is run to the next resistor instead of to ground, *delivering some out of phase hum voltage* (that appearing across final resistor) to first a-f grid. Sounds complicated, but the device is really simple—after it has been worked out, and does neutralize hum.

Philco 41-620

Philco has a new phonograph (only) Model 41-620 featuring a light-beam reproducer unit which is complete within itself. A table model manually operated, its features a new oval type dust-proof speaker having high efficiency. A 7B5 power oscillator delivers power to light the reproducer lamp. The photo-cell output is stepped up in an autotransformer in the grid of the 7F7 preamplifier. The 7F7 contains two separate triodes that are used as two separate audio stages. The volume control is in the input to the second stage. A continuously variable tone control is connected in the plate circuit of the second stage. Next comes a type 7A4 triode connected as a hot cathode inverter and then the final 7B5 push-pull output.

Note the power-supply filter in Fig. 5. The speaker field is in the positive leg. A 220-ohm bias resistor is in the negative leg. This resistor contributes to the filtering while supplying C bias to the push-pull stage. The bias being derived from the filter input, any hum voltage that is present at this point is cancelled by the push-pull action. An r-f line filter performs a two-directional function in, first, in preventing, line transients from getting into the high gain preamplifier and, second, killing any r-f escaping from the power oscillator, preventing it from getting into neighboring radio receivers via the power line.

WELLS GARDNER 2D2-7C

Rectifier tube: In the A and B issues of the Series 5D2 radio either a 35Z4GT or a 35Z5GT rectifier tube may be used. Both of these tube numbers are shown in the instruction manual and on the tube layout label.

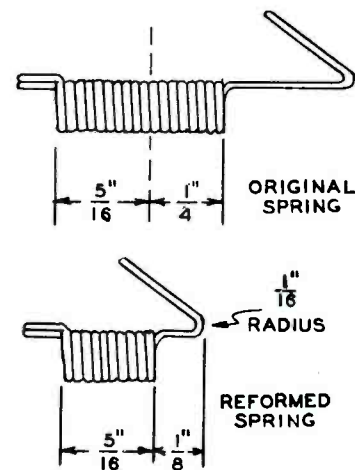
In the C issue chassis which uses a dial lamp and is identified by the number 5D2-7C on the chassis label, only the type 35Z5GT rectifier tube can be used. The chassis base for this issue is incorrectly stamped 35Z4GT. The tube layout illustration printed on the cabinet back and in the instruction manual has both the incorrect and correct number shown. Be sure to use only the correct tube, the 35Z5GT.

J. K. Rose, Service Manager
WELLS GARDNER & Co.

WILCOX GAY A93, A94

Wow: If recorded wow is encountered in dual-speed recorder units of the automatic record changer type used in equipment bearing serial numbers prior to 624010, a correction may usually be effected by increasing the tension of the intermediate drive wheel spring. To accomplish this, proceed as follows:

- 1) Remove turntable and intermediate drive wheel assembly.
- 2) Remove recorder-changer unit by removing the four mounting screws, and disconnecting cables with plugs, from Recordio chassis.
- 3) Place recorder-changer unit on the work bench, tilted to a position that provides easy access to the under side of the unit. Do not place unit in an upside-down position, as the record spindle may be sprung or bent.
- 4) Remove the intermediate drive wheel spring, and make alternations to the spring



in accord with the specifications given below.

- 5) Remove twelve turns at the hook end of the spring. Straighten out three turns of the coiled spring, and—
- 6) form a new hook so that the bend in the hook is only $\frac{1}{8}$ " from the coiled spring. Do not make a sharp bend in forming the hook. Instead, form a $\frac{1}{16}$ " radius as shown in the drawing.
- 7) Before replacing the spring in the unit, remove the burred or ragged edge of the hole in the base plate, through which the pin protrudes for attachment of the loop end of the spring.
- 8) After the spring has been installed, and the unit restored to the cabinet, the intermediate drive wheel assembly and turntable should be replaced.

COMMUNICATIONS RECEIVER

(RCA AR77)

THE RCA Model AR77 receiver is intended especially for short-wave communications service, both amateur and commercial. Among the features of this receiver are: electrical band spread, calibrated directly in frequency; crystal filter, for ultra-sharp selectivity where required; noise limiter and automatic volume control circuits; S meter for indicating relative strengths of incoming signals. The standard broadcast band is included in the overall tuning range—540 to 31,000 kc. Fidelity is improved through the use of compensated negative feedback in the audio amplifier. A comparatively low value of maximum undistorted power output—approximately 3 watts—is employed to minimize chassis heating and thereby improve stability. All insulating materials are treated to withstand tropical service.

The receiver is designed for use with a permanent-magnet dynamic type speaker, having a voice-coil impedance of from 2 to 3 ohms. A jack is provided on the right-hand side of the cabinet, near the front, for plugging in a pair of 600-ohm headphones. The speaker is automatically disconnected when the phones are plugged in.

Circuit

The antenna coupling system is designed to provide optimum coupling from transmission lines of 50 to 500 ohms, or from conventional antenna and ground systems. The coupling coils are balanced to ground and may be connected directly to a balanced transmission line. An antenna trimmer capacitor adjustment is provided on the

front panel to insure input circuit resonance with any antenna system.

The r-f amplifier is designed to provide as much selectivity as possible ahead of the first detector. On the two highest frequency ranges the oscillator frequency is placed below the signal frequency.

Band spreading is accomplished by means of a capacitor gang having sections suitable for each amateur band. The sections are connected by the band switch.

The r-f oscillator circuit is of the tuned-grid type with plate circuit feedback. A voltage regulator is used to stabilize the plate voltage. Temperature changes are compensated for by a special capacitor.

Two stages of i-f amplification are used. A crystal filter is placed between the first detector and the first intermediate amplifier. This filter is adjustable by means of a control on the front panel and provides five positions of selectivity. A crystal phasing control of the usual type is also provided on the front panel. The inter-

mediate frequency is 455 kc.

The bfo second heterodyne oscillator used for c-w reception is a separate pentode. The coupling to the second detector is just sufficient to provide suitable heterodyne action. A panel control is provided for changing the frequency a small amount so that the desired audio beat-frequency may be obtained.

The avc circuit is a simple diode rectifier. The received signal carrier produces a voltage across R38 which is filtered by R36 and C72 and applied to the control grids of the r-f and i-f amplifiers. The S meter is connected in the cathode circuit of the first i-f tube and thus records changes in plate current caused by changes of avc voltage applied to the grid. This type of S meter circuit is approximately linear with respect to db input.

The avc is in operation on both the nfd and avc positions of the Avc-Nfb-Bfo switch. The avc is off when the switch is in the bfo position.

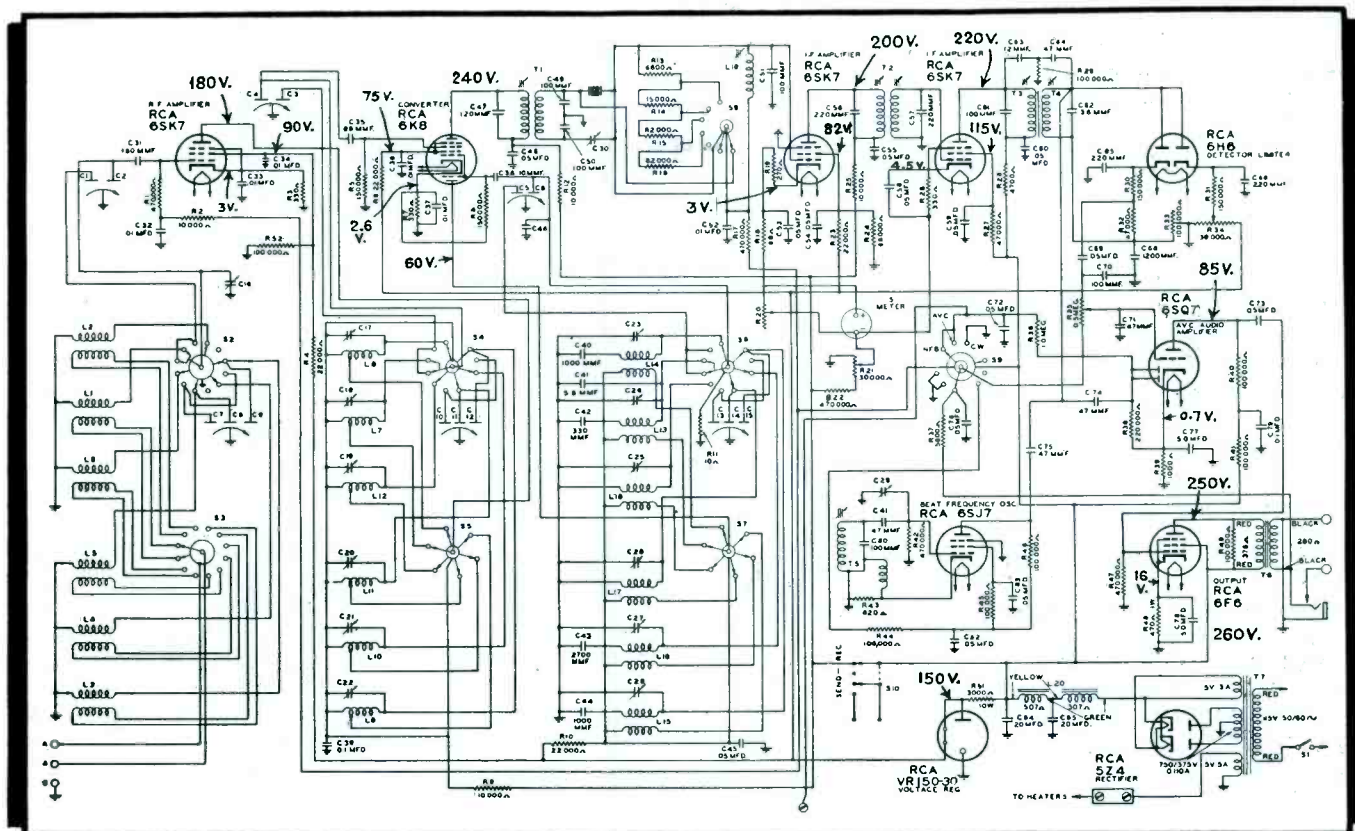
A noise limiter is provided in the second detector circuit. The limiter is manually adjusted. This provides best limiter action since noise voltages cannot increase the limiter bias.

It has been found that noise such as that produced by the ignition system of automobiles may have an effective value in excess of that of a weak signal. This is practically true on the 10-meter band. In order to be effective, the limiter must have a bias or gate opening of not more than twice the signal. If this gate opening bias is provided by the signal, the noise voltage,

(Continued on page 24)



RCA AR77 communications receiver.



CUT price, substandard parts will never displace quality parts in the service industry, for, by and large, the average Service Man is not a shoddy individual. He, collectively, takes more pride in his work—in the perfection of every job—than any group of artisans in the world. He realizes that junk parts are the most expensive in the end. And the fact that those producers of junk parts have never been able to get more than a precarious toe-hold on the replacement market, is, in a way, a tribute to the savvy of that much maligned individual, the American Service Man.

Despite this optimistic premise, there

were not advertised) and thus divert into their own cash registers the monies which might otherwise go to printers, publishers and so forth.

The speaker represented a manufacturer of cheap condensers, and was obviously attempting to explain the difference in the prices which parts jobbers asked for his product and the prices which they got for quality, advertised, condensers. But, somehow, he didn't get his axe ground that day, for regardless of what one might say about Service Men, they know a junk condenser when they see one, just as I know a bad egg when I smell one.

It might be well, therefore, to con-

No, my good servicer friends, advertising does not increase costs. By increasing demand and therefore production, advertising has actually *reduced* costs to the point where products which were only within reach of a Croesus a few short years ago, are now available for the masses of the people. Look at radio sets and tubes.

Many of you will recall the lush days in the radio business when every set was a custom-built job; when every set was his own manufacturer. In those days a pretty fair condenser could be had for about \$3.00. And a radio tube would set the buyer back a paltry \$3.50 to \$7.00 or more!

Is the 59c condenser of today less dependable than the \$3.00 condenser of 1921? *Not on your tintype!* It is *more* dependable. It has more engineering, more quality, more performance built into it. And the same holds true of the tubes which today list at 70 or 80 cents.

The reason for finer, more dependable component parts at prices which a few years ago were unheard of is *mass production*. *Mass production created by advertising!*

Cheaper Parts—Lower Quality

It may safely be stated that as a general rule unadvertised products are not produced on a mass production basis because the unadvertised product does not enjoy a demand which would justify mass production. It follows, therefore, that the cost of production in the case of unadvertised products is greater than the cost of producing in mass volume. This holds true, however, only in those cases where the quality of both products is comparable. *Where there is a difference in selling price, we may be assured that the lowered price of the unadvertised article is made possible only by drastically lowered quality.*

As between the two, I will pick the product which has enough good points to brag about *in print*.

Junk Not Patriotic

One of the things I don't like to do is wave the flag. I'm no George M. Cohan. I am not chauvinistic even on July Fourth at 7:35 A. M. But I do distinguish between extreme chauvinism and just downright love of the country which has given me opportunity, liberty, and happiness. And I feel very strongly about such things as the conservation of raw materials in times like the present, when the difference between enjoying liberty or submitting to slavery might be contained in the wilful and wanton waste of materials which are essential to the defense of this democracy.

I make no bones about it—I state flatly that junk ain't patriotic. Whether

(Continued on page 25)

JUNK AIN'T PATRIOTIC

By FARLEY CHARREL

can be no doubt, however, that the use of junk parts by some of our misguided servicers, with the consequent customer dissatisfaction which is the inevitable result, has, to some extent, undermined the confidence of the American Public in the servicing fraternity as a group. The old adage about the one rotten apple might be applied to this business. For it is true that one gyp job will create a dozen suspicious set owners. One chiseling servicer, using undependable replacement parts, will blacken the eye of an entire group of servicers.

The logical preventive of such a state of affairs is a rigid adherence to those quality lines which are advertised—which not only proclaim their virtues in print, but which prove them in action. And I want to add the thought that it is also helpful to the entire industry if Service Men give their business to those parts distributors who rally around the flag of quality and handle those lines which will uphold and enhance the reputations of their Service Men customers.

Advertising Reduces Cost

A speaker recently told a group of Service Men that they were suckers of the first water when they bought replacement tubes, parts and test equipment which were advertised nationally. Advertising was a waste of money, he intimated, which ultimately came out of the pocket of the servicer. The point he tried to get across was that Service Men should buy cheaper parts (which

consider just what role advertising does play in modern merchandising. For nothing could be further from the truth than the statement that advertising increases the cost of any of the things which Service Men purchase. *The stark truth is, that advertising decreases the cost of those products.* Permit me to illustrate:

Advertising Creates Demand

I still recall the first automobile which my family owned. It was a Ford. A bright red affair, with a high tonneau—circa 1910. It cost \$1,500. Some car! It had a "one man top" which took the combined efforts of three kids and two grownups to get into place. My Dad wise-cracked that it would not be necessary for us to attend Billy Sunday's meetings. (Billy was the Aimee Semple McPherson of his day.) For, opined the Pater, the family could get more of the devil shaken out of it during a ride in the Ford than by attending a revival meeting. Contrast the cumbersome blimp of 1910 at \$1,500, with the sleek, streamlined Ford of 1941 which may be purchased for less than \$750. Need I tell you the reason why you can get ten times the car for the money today? You and I know that this modern miracle was caused by *mass production*.

And what made mass production possible? *Demand!*

And what created demand? *Advertising!*



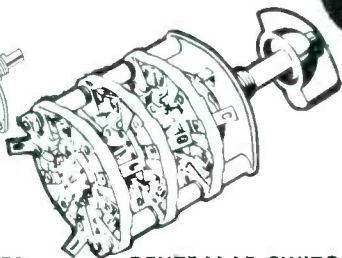
There's a **BIG** *Swing* **to**
Centralab
SWITCHES



**CENTRALAB SWITCHES
 WITH BAKELITE
 INSULATION**

Centralab Selector and Tone Switches in single or multi-section types with Bakelite insulation available for numerous electronic applications. The double bite control has a resistance of less than .002 ohm and is completely self-cleaning Positive index, with each rotating position 30° apart. Adjustable stop on each switch permits selecting any number of positions from 2 to 11.

Send for catalog giving detailed description.



**CENTRALAB SWITCHES
 WITH ISOLANTITE
 INSULATION**

Similar to the popular Bakelite selector switches, Isolantite is preferred in high frequency circuits because it has lower losses and less moisture absorption. Isolantite transmitter switches for Amateurs will operate in transmitters rated up to 100 watts and at potentials up to 1000 volts D.C. Contacts spaced 90° apart, adjustable stop to limit rotation to 2 to 3 positions if required.

Send for catalog giving detailed description.

More and more radio receivers and electronic devices call for complicated switch assemblies . . . and more and more set builders . . . experimenters, amateurs and servicemen swing to CENTRALAB Bakelite and Isolantite Switches.

These switches singly and in gangs have an almost infinite variety of adaptations. Whatever your SWITCH need may be . . . for original use or replacement . . . be sure to ALWAYS SPECIFY CENTRALAB.

CENTRALAB — Division of Globe Union Inc., Milwaukee, Wis.



SOUND IDEAS

Fig. 4. The diverse facilities of this New York City Airlines Terminal include a Western Electric sound system.

Industrial System

By HARRY PARO

THE INDUSTRIAL speed-up involved in the present defense program has brought a situation which makes this one of the liveliest, if not *the* liveliest, of all present markets for sound installations, particularly call systems. The reason for this does not require a Sherlock Holmes to unravel. Working under pressure and oftentimes under conditions which call for entirely new production programs, the closest kind of cooperation among executives, department heads and other key men becomes absolutely essential. Inability to locate one of these key men quickly may have serious consequences, yet the need for close personal supervision of production operations and a million other things are constantly coming up to keep many of these men away from their desks and therefore out of reach so far as their telephone extensions are concerned.

Call systems involving gongs or horns have been in extensive use for years, but the limitations of such systems are showing up seriously under pressure of increased activities and increased personnel. The signal codes employed are becoming highly complicated for one thing. Every time a call is sounded all those who are subject to call over the system must listen to determine whether or not the series of long and short signals is his particular code combination. There may be fifty key men on call over such a system and in that case the attention of fifty men is likely distracted every time a call is sounded.

But perhaps even worse than this is the fact that the constant clanging of gongs or blasting of horns is something less than soothing to the already strained nerves of hard-pressed workers.

Modern amplified sound systems employed for paging purposes, on the other hand, depend for their effectiveness on man's normal reaction to hearing his name called. Ninety-nine calls may come over such a system without a given indi-

vidual even being aware of it, except in a subconscious way. But let his name be called and a man's response is immediate and automatic. Workers, too, are likely to be completely unconscious of the operation of such a system once they become accustomed to it.

Another point in favor of the modern sound system is that no matter how many new key men may be employed during the expanded production program, they can be reached by the call system without the complications of assigning them code numbers. This adds tremendously to the effectiveness of such a system and permits its utility to be extended downward to the sub-key men or to any worker in the plant if desired.

One important point in all this, is that some of this advantage can be offset if the sound system is a poor one, is improperly adjusted, or the output of the various loudspeakers is disproportionately high in level. In noisy operating departments, loudspeaker output at high level may be required to overcome

existing noise but its volume output should be just enough to accomplish its purpose. In large departments the purpose can best be served through the use of several speakers distributed around the department, each operating at a relatively low level, rather than by one or two large ones being forced to blast their way over the entire department. Speakers in offices and quieter departments will, of course, be operated at lower levels. Here again the use of several speakers operating at extremely low level is preferable to a single speaker operating at higher level in order to provide the same coverage.

Illustrating these principles is an installation of Lafayette equipment recently completed in an industrial plant in the east. This property consists of a plant proper of moderately large size and a 3-story office building. It was the desire in installing the new system to provide complete coverage in every nook and corner of both the plant and offices. This included production floors, general offices, private offices, shipping and receiving departments, etc.

Following the principle of low-intensity, wide-area coverage, this installation utilizes a total of 78 loudspeakers distributed throughout the premises. Fifty-two of these speakers are located in the general and private offices. These are the 6-in. p-m type and are mounted in

Fig. 5. Battery of high-power amplifiers develop electrical speech energy to direct the flow of traffic through the airlines terminal.



Fig. 6. Bart Heaney, dispatcher, makes a remote emergency announcement at one of the twenty-two microphone stations in the terminal.



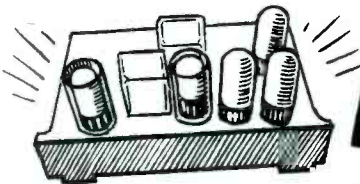
The 6 MOST INTELLIGENT QUESTIONS A RADIO SERVICE DEALER can ask

1 Is the Quality Outstanding



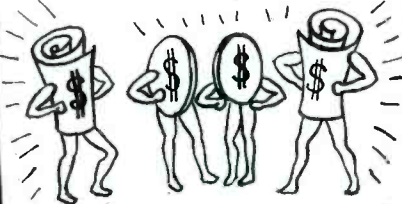
Radio Service Dealers cannot afford expensive call-backs. Tubes and repair parts must be right. National Union quality is recognized everywhere as tops.

2 Does the Merchandise Carry a Worthwhile Guarantee



It is recognized that there will always be a percentage of defects due to human frailties. When this occurs does the manufacturer make good easily and quickly? Just try N.U.

3 Is the Manufacturer stable financially

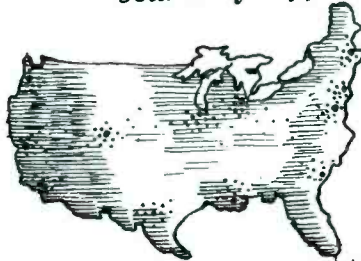


No dealer likes to be caught with merchandise orphans. In dealing with N.U. you are assured of unquestioned financial stability.



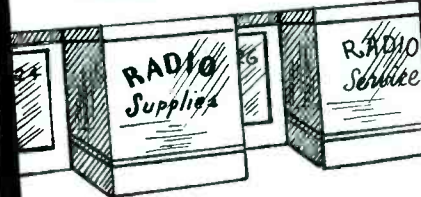
© 1941 N.U.R.CORP.

4 Is the dealer sure of a convenient continuous source of supply



N.U. Distributors carry complete stocks at convenient locations all over the U. S. No hunting or waiting for odd types when you deal with your N.U. Distributor.

5 Are prices and selling conditions competitive



N.U. specializes in selling the Radio Service Dealer. You can be sure your prices and selling conditions are as good or better than can be found elsewhere.

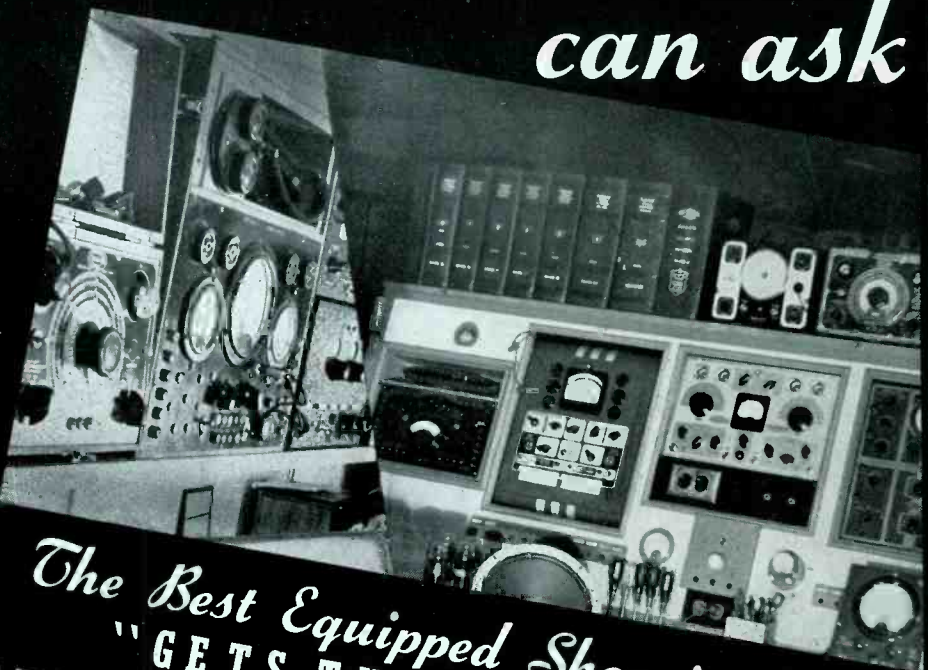
6 Will the Manufacturers selling plans make money for you



N.U. gives you a program tailor-made for your needs.

1. Exclusive . . . test equipment the N.U. way.
2. Exclusive sales to radio dealers . . . no cut price business solicited.
3. Exclusive advertising helps that get business for service dealers.
4. Exclusive stock and inventory control plans.

Ask your N.U. Distributor or write



The Best Equipped Shop in Town
"GETS THE BUSINESS"

NATIONAL UNION RADIO Corp.
57 STATE STREET, NEWARK, N. J.

fabrikoid wall baffles as shown in Fig. 2. Each of the private offices has its individual speaker while in each of the larger general office areas several of these are employed.

The speakers in the plant are 8 and 12-in. p-ms. Those in the departments where the noise level is high are the 12-in. type mounted in parabolic baffles.

two groups, making six of these groups in all, each with its own group matching transformer. Not only is the load of each group suitably matched into the main line in this way, but the different groups can be operated at different volume levels as required by their individual applications. All speakers are connected at all times with the exception

Employing an output stage consisting of 4 6L6s in a special push-pull parallel circuit, operating Class AB1, this amplifier provides a normal undistorted output of 50 watts with up to 75 watts on instantaneous peaks.

Another feature supplied in this amplifier is a built-in relay which in its normal position holds open the high-voltage supply circuit but leaves the filaments in operation. No sound can come from the speakers until the push-switch which controls this relay is pressed.

The crystal telephone is mounted at the 2-position telephone switchboard directly between the two operators where it is within easy reach of both. The mounting takes the form of the collapsible gate-type bracket often used for telephones. When one of the operators desires to page an individual she pulls the microphone over to her by means of a handle on which the relay control switch is mounted. Pressing this control she speaks the name of the individual into the microphone. An idea of this arrangement is gained from Fig. 1 which shows one of the operators in the act of calling. The shelf-mounted amplifier is seen at the extreme left in this view.

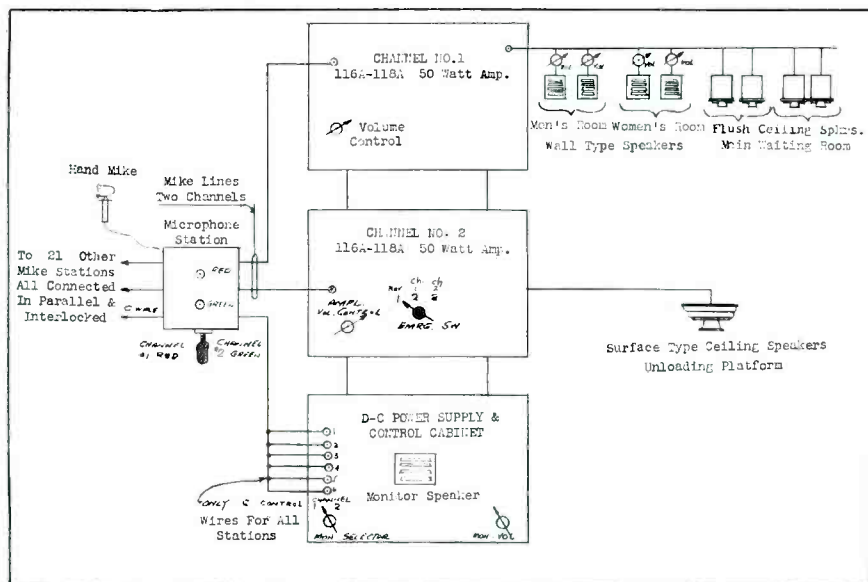


Fig. 7. The sound system installed in the \$5,000,000 Airlines Terminal in New York City employs two channels with 22 microphones and seven loudspeakers.

The one shown in Fig. 3 is typical and is one of several distributed around one of the larger mechanical departments. The 8-in. type are employed in the less noisy areas and are housed on wall baffles similar to those in the offices.

Speakers are wired in groups, each group with its own distribution transformer. Thus the speakers on each floor of the office building are divided into

Fig. 2. Fifty-two small speakers similar to the one shown are operated in the offices at very low intensity to be heard distinctly but unobtrusively.

that in each private office is a toggle switch, right beside the door, to enable the occupant to turn his speaker off while he is alone in his office and is therefore directly accessible by phone.

The amplifier is a Lafayette Model 485T Booster. Normally this model is intended for operation out of a preamplifier and does not have sufficient gain for use directly from a microphone. It can, however, as in this case, be supplied on special order with a 6J7 preamplifier stage built in, thus providing ample gain for use with a standard microphone.

Fig. 1. In this modern plant any executive can be reached via the call system's seventy-eight speakers distributed throughout the plant and offices.

The wiring for the entire system is concealed. In the private offices advantage is taken of wire-ways provided in the steel partitions. This makes speaker installation both neat and convenient as evidenced by the illustration of Fig. 2. In other office areas metal moulding is employed and in the plant standard rigid conduit or bx is the rule.

This illustration demonstrates beyond a doubt that the disturbing, raucous tones of call systems are entirely unnecessary.

Low-intensity sound distribution such

Fig. 3. Power is conserved and uniformity of coverage assured by spacing speakers at intervals and utilizing the directional characteristics of parabolic baffles.

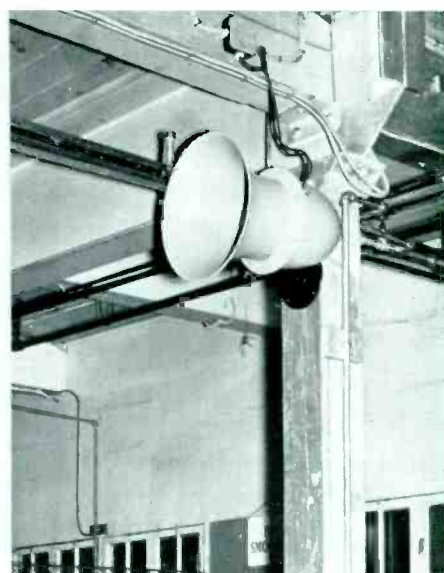
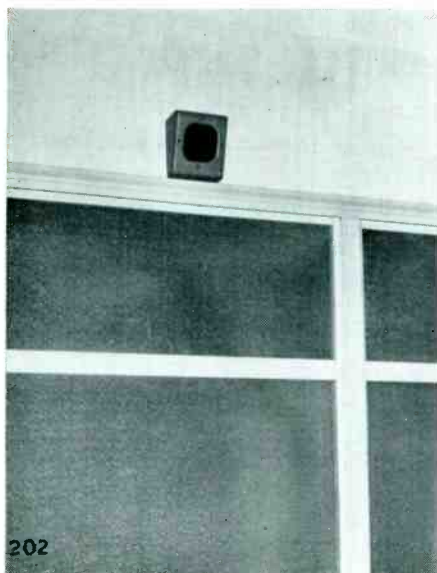




Fig. 8. One of the twelve loudspeakers in the terminal system is located along the walk from the loading platform 5.



Fig. 9. Dispatchers dictate movement of traffic via loudspeakers and electrical remote control.

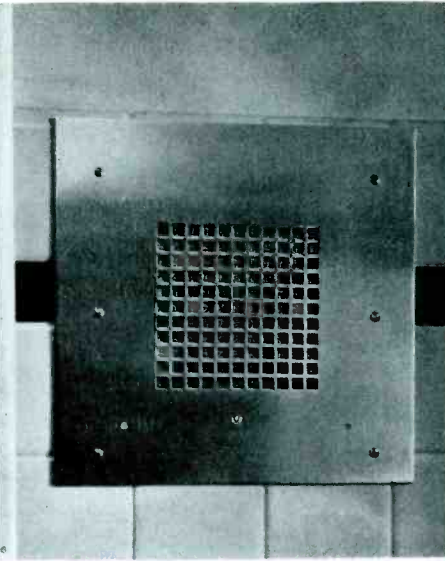


Fig. 10. Another of the twelve loudspeakers is located in one of the rest rooms of the terminal building.

as this involves more speakers but these can be smaller with the result that their cost is little more than that of the fewer larger speakers that would be required to provide the same area of coverage. The primary difference in cost lies in the more extensive wiring required where speakers are more numerous. Fortunately the industrial picture has changed with the upswing of activity. Today considerations of practical utility are likely to receive at least an even break. Not only are industrial prospects for sound equipment more numerous but they are more receptive to suggestions which have practical merit. This idea of low-intensity coverage certainly falls in this latter class.

Airlines Terminal

By C. L. STONG

TIME: 1920. Place: A typical railway terminal replete with grimy benches, public drinking cups, huge brass cuspidors. On the benches, beside stacks of aged luggage, huddle several timid families. Here and there over-alled men chew on the ends of straws; fiddle with big gold watches. Occasionally an anxious mother rushes in pursuit of a squealing five-year-old.

A stringy man appears in rumpled uniform. Edging through the town's loafers, he lifts a hollow cone to his mouth and shatters the station's calm: "O-o-o-n-trackshifsee-e-e-en. Inecomvill, Treesa-a-ken, Arman-s-verg, Ubblawn, Balsip, Per-c-h-oon, Boomsick, a-a-n Wiss-sig . . . ull-l-l-l BOARD!"

This double-talk, translated by puzzled travellers, meant approximately—"get set, here comes something." All would face the stringy man. Then some would peer at a huge blackboard, others would shout information to uneasy neighbors, and all minds would ask the compound

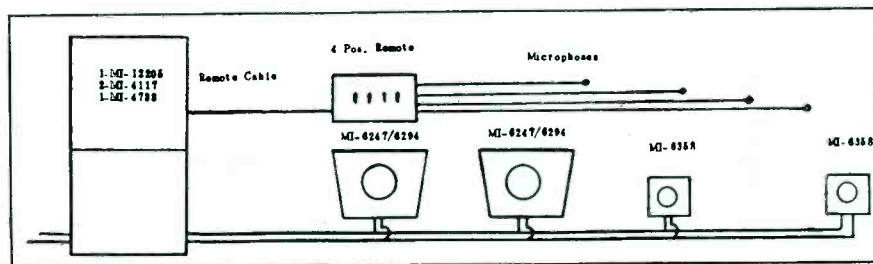
question—what train approaches and whither is it bound? So functioned the public-address system of transport terminals twenty years ago!

Shift now to 1941 and the world's first skyway terminal—a \$5,000,000.00 union station of the air in New York City. Step through its great arched doorway and onto the streamlined escalator which lifts you from noisy Forty-Second Street into the quiet splendor of the terminal's oval rotunda. Here you find intense activity. Every day in the week hundreds complete the routine business of transferring from earth travel to air travel. From the long domed ceiling, which curves many feet above your head, a hidden voice speaks from time to time. In tones that are distinct, well modulated, and crystal clear, this voice conducts you through the routine of ticket buying, weighing in, and boarding the luxurious limou-

and the remainder in back of the ticket sellers' counters associated with the six airlines using the terminal. Four loudspeakers are installed in the ceiling of the waiting room; one in each rest room; and the seventh in Basement A, the unloading platform for passengers arriving from the airport.

Even to the non-technical minded visitor operating procedures seem unusually easy to understand and equally as easy to set in motion. Announcements of bus departures take precedent over all other calls. Five minutes before each streamlined limousine rolls smoothly through the gates the dispatcher announces the time and connecting plane destination to those in rotunda and rest rooms. Hidden away in his snug booth above the loading platform he controls the system—a lord of all he does not survey.

With a schedule of 226 flights a day



sines that whisk you away to La Guardia airport. It is the public-address system of modern air transportation.

Behind the unseen voice is a Western Electric sound system engineered and installed by the C. C. Langevin Company. Employing two channels, the equipment consists of 22 microphone stations, seven loudspeakers, two 50-watt amplifiers. Two microphones are located on the information desk in the main waiting room; one in the dispatcher's booth,

Fig. 11. Twenty separate sound systems have been installed in the Allegheny County Courthouse in Pittsburgh, Pa.

(weather permitting) his is a busy job. Quietly, but clearly, he will tell you that the coach for Albuquerque, Lisbon, Chicago or Memphis leaves in five minutes from platform A, B, C or D, as the case may be. He may follow up this information with the disturbing news that Mr. Jones has not boarded his bus. If Mr. Jones does not put in a prompt

*Big enough
to last...*



Dry section in aluminum can. Inverted screw mounting. Two color-coded leads for each section. Slightly over actual size, 450 v. 4 mfd.

- Of course those midget metal-can electrolytics are O.K. So are cardboard-case electrolytics. But honestly, if you want an electrolytic that will last a mighty long, long time, by all means spend a bit more and use an AEROVOX GL. It's big enough to last and last and last.

AEROVOX TYPE GL ELECTROLYTICS	
Single Section:	
800 v. Surge Pk.—600 v. D.C.W.	
4 and 8 mfd. \$1.11 and \$1.56 your net.	
600 v. Surge Pk.—475 v. D.C.W.	
4, 8, 12 and 16 mfd. \$0.75 to \$1.38, your net.	
525 v. Surge Pk.—450 v. D.C.W.	
4 to 80 mfd. \$0.51 to \$2.55, your net.	
Double Section:	
600 v. Surge Pk.—475 v. D.C.W.	
8-8 mfd. \$1.41, your net.	
525 v. Surge Pk.—450 v. D.C.W.	
4-4 to 20-20 mfd. \$0.78 to \$1.65, your net.	
Triple Section:	
325 v. Surge Pk.—450 v. D.C.W.	
4-4-4 to 10-10-10 mfd. \$1.14 to \$1.59, your net.	
300 v. Surge Pk.—250 v. D.C.W.	
8-8-8 to 8-16-16 mfd. \$1.26 to \$1.56, your net.	
Type GL 45025:	
10-10 x 450	
—20 x 25 \$1.59, your net.	

Ask Your Jobber . . .

- Ask to see these popular GL electrolytics. Be sure to use them in building or servicing assemblies that must stand up under hard and steady going. Ask for catalog—or write direct.



SOUND IDEAS

(Continued from page 21)

appearance, he will learn to his regret that plane buses like tides wait for no man. The dispatcher receives word of the missing passenger from the agent loading the bus. It is this same master voice which gives the "go ahead" signal to bus drivers.

When a ticket agent, stationed at an airline counter, or a clerk at the center information booth, wishes to use the equipment he may select either of two channels. Channel A carries his voice to the speakers in the waiting room; channel B to the unloading platform speaker. This latter connection enables the clerk to page a passenger who is just arriving from the airport without the call being heard in the waiting room. These are brief announcements, such as, "Mr. Brown has not called for his ticket," "Mrs. Smith has not weighed-in," "Will Mr. Green, arriving on American Airlines bus, report at information desk." Trained in the art of air travel these men know their sky maps from pole to pole.

The microphone positions employ signal lights—a red light indicating that the system in the waiting room is in operation; a green that the unloading platform speaker is in use. As a double precaution, all microphone stations are interlocked so that one announcer cannot interrupt another until the first has completed his call.

If anything could entice air-shy travelers to venture forth in the sky, it is a visit to this terminal. Soft organ music intermittingly drifting through the rotunda—harmonious decorations—the quiet efficiency with which all business is conducted creates an atmosphere of assurance and tranquility. It is all so nonchalant, so matter of fact, that one might think mankind had been flying the airways for centuries past.

On entering the building one gets the impression of space, sky and wings. The ceiling, a grey-blue elongated dome, is insulated against sound reverberations. This, together with the quality of loud-speaker reproduction, gives a soft clarity to the announcer's voice. Black and silver trimmed ticket booths make a startling contrast to the circular gold stainless steel walls. Raised figures of symbolic man and an eagle in flight against a swirl of terra cotta are prominently displayed on the upper wall ends. On the information booth, located in the center of the rotunda, a four-faced clock is mounted at the intersection of right-angled wings composed of light-transmitting plastic, 11 feet high. These are

said to be the largest sheets of this magic material ever produced.

Courthouse Systems

By R. McELQUAINE

THE PROCEEDINGS in the numerous courtrooms of the Allegheny County Courthouse, Pittsburgh, Pa., are clearly audible these days since the installation of individual sound systems in each of the courtrooms.

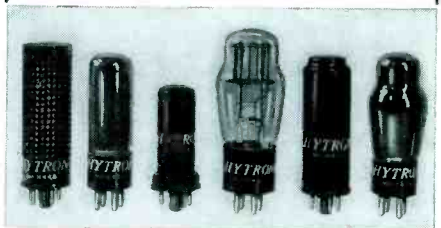
The installation covers twenty separate courtrooms and each system is independent of the others. An RCA Model 12205 twenty-five watt amplifier with a four-position mixer is used to feed two speakers in the courtroom. Four lapel type microphones are used, one for each attorney, one for the judge and the fourth for the witness box.

An intercommunicating system is also included on the judge's bench in each of the twenty units, so that the jurist may communicate with the court stenographers, with his chambers, or with adjoining officers, without leaving the bench. Desk type speakers are used for this purpose. Frequent causes for delays are thus avoided.

The equipment is RCA throughout and was installed by Hamburg Brothers, 305 Penn Avenue, Pittsburgh, Pa.

**FOR THOSE WHO
WANT THE BEST**

*You take
no chances*



With Hytron EXACT-DUPLICATE ballast tubes (plug-in resistors).

There's no danger of burning out tubes or otherwise damaging or impairing the performance of the set for Hytron ballasts are designed for the particular circuit. And you can't make the error of cutting the wrong pins or taps since each Hytron ballast is an EXACT-DUPLICATE. Furthermore, you actually PAY LESS for them.

Then, too, Hytron, as a manufacturer of radio tubes fully understands the correlation between the ballasts and the radio tubes used in the set. Don't forget Hytron is the only manufacturer of radio tubes also making a complete line of ballasts.

Get your complete list of Hytron ballasts from your jobber or write direct.

Since 1921

HYTRON CORP. SALEM, MASS.

PERSONAL PORTABLES

(Continued from page 9)

primary to the hot side of the tickler coil instead of to the positive B bus.

Zenith's model 4K600 uses a real pi section filter to isolate the r-f and a-f output of the detector. All the other sets use a single by-pass condenser only. The oscillator circuit is also unusual, the padding condenser also serving as a grid condenser. A 680-ohm resistor is used in series with the grid to cut down the oscillator voltage at the high-frequency end, thereby preventing a decrease in sensitivity. G. E.'s model LB-412 uses a 1500-ohm resistor similarly.

Emerson's FF models have the 1R5 filament "hot," being tapped above ground on the oscillator coil. The other side of the filament must be run through an r-f choke. Air Castle uses only a 45-volt "B" battery; also provides a phone jack for headphones. Motorola's model A-1 has five by-pass condensers combined in a condenser block.

Expansion . . .

• • • • L. T. Holland, owner of the Houston Radio Supply, Inc., Houston, Texas, is opening a branch to be known as 'Ole Miss Supply at 448 N. 17th St., Baton Rouge, La. The branch will be under the supervision of Leonard C. Phillips. The territory to be covered will range from the Texas-Louisiana border East to Gulf Port, Miss., and North to Natchez, Miss. and Alexander, La.

'Ole Miss Supply will handle National Union radio products, Halldorsen, Jensen, Clarostat, Solar, Meissner, Jackson, Eveready and Triplett.

• • • • Hygrade Sylvania Corp., Salem, Mass., manufacturers of fluorescent lighting units, announce the purchase of a fluorescent power plant at Towanda, Pa.

• • • • Adjoining their quarters in Bayonne, N. J., Solar Manufacturing Corp. have erected a warehouse for raw materials, thus releasing substantial additional factory space which will be devoted to greatly increased production of oil condensers. The largest backlog of orders in Solar's history has also made it necessary for the corporation to lease additional factory quarters in nearby Jersey City. This new plant will produce mica transmitting condensers exclusively.

• • • • Two new departments have been created by the Turner Co., Cedar Rapids, Iowa. W. D. Lyon becomes head of Turner's advertising department, and Miss Garnet L. Ramsey is named as manager of the vibrator export department. Mr. Lyon will have charge of the advertising of both Turner microphones and vibrators, while Miss Ramsey takes charge of exporting vibrators only. The exporting of Turner microphones remains under the direction of Ad Auriema, New York.



Astatic Low Pressure CRYSTAL PICKUPS Offer Outstanding Advantages

FIRST—These Pickups are made with permanent, built-in, Sapphire points, doing away with the buying and changing of needles.

SECOND—Stylus pressure of only one ounce on the record, scarcely more than one-third that of conventional pickups, reduces wear to the extent that records remain like new for years.

THIRD—The highly polished, precisely contoured Sapphire stylus, under feather weight pressure, rides record grooves with such precision as to give every tone new beauty and fidelity of reproduction.

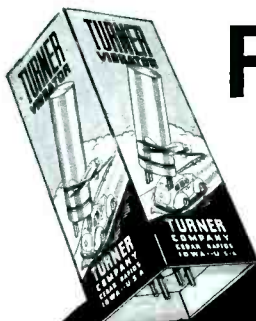
PHONOGRAPH OWNERS are therefore interested in replacing conventional playing arms with Low Pressure Pickups. Simple to install. Nothing to get out of order. List Price \$16.50.

SPECIAL LITERATURE IS AVAILABLE

ASTATIC

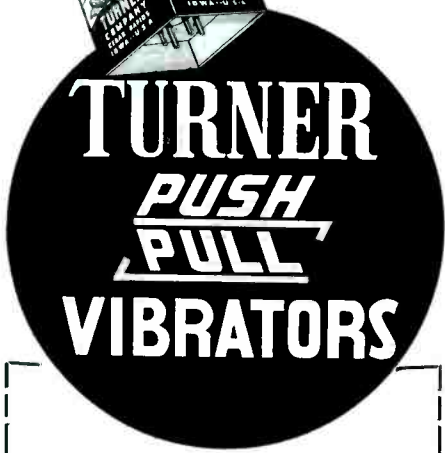
THE ASTATIC CORPORATION YOUNGSTOWN, OHIO

Licensed Under Brush Development Co. Patents



FREE!

16-page Manual of Turner Push-Pull and Standard Vibrators. Contains a Wealth of Technical Information, and complete explanation of "Push-Pull." Use the coupon!



THE TURNER CO.,
906 17th St. NE., Cedar Rapids, Iowa.

Please send me FREE Vibrator Manual for Radio Service Engineers, telling how to cut service costs.

Name

Address

City..... State.....

My Jobber Is.....

**Cut Your Servicing Costs—
Give Your Customers the
best—with TURNER Vibrators**

• 10 engineering advancements in the Turner Push-Pull Vibrators free you from customers' complaints. Stack type assembly is eliminated; contact points are micro adjusted at the factory. Everyone is praising them. FIND OUT TODAY! MAIL THE COUPON NOW!

**NO TONE DISTORTION WITH
TURNER Microphones**

Here's the TURNER 99—a mike that carries the mail! Once it's off your shelf it's got a home for good! Veterans demand it. Internationally famous manufacturers specify 99 for their finest equipment. Level —52DB. Range 40-9,000 cycles. In 200 ohm, 500 ohm or high impedance, with 25-ft. removable cable set, gunmetal finish. List \$29.50.



Write for Free Turner
Microphone Catalog

TIME TO TURN TO



TURNER

COMMUNICATIONS RECEIVER

(Continued from page 15)

if it has a higher effective value than the signal, will open the gate to such a high value that the limiter circuit is ineffective. The action of the noise circuit in the AR77 is such as to make signals readable which are below the effective noise voltage.

The signal and noise voltages appear across R32 and the noise peaks alone appear across R33, since the bias applied to R31 by the potentiometer R34 prevents this diode from operating with the signal voltage. The sum of these voltages (across R32 and R33) are applied to the audio amplifier. The noise peak voltage across R32 is out of phase or opposed to that across R33. The balance of this circuit is adjusted by potentiometer R33. The potentiometer R34 is the front panel bias control.

Noise Adjustment

This adjustment is the potentiometer mounted on the right flange of the chassis (R33). It may be reset as follows: First tune in a strong modulated signal such as a broadcast station. Next turn the noise control, on the front panel, all the way clockwise. Now adjust the potentiometer (R33) for a minimum signal output. This point will be found to be very sharp. When properly adjusted, the signal output will be quite low until the noise control on the front panel is turned back counterclockwise.

Dial Shutter

If the dial shutters do not line up with the dial calibration, they may be adjusted by means of an idler pulley bracket which adjusts the tension of the cord. By loosening the two screws which clamp the idler pulley bracket to the chassis the bracket may be shifted until the shutter opening lines up with the dial scale.

Another adjustment may be made by loosening the two nuts on adjusting screw fastened to back of shutter. To raise or lower the shutter, adjust the nut accordingly.

Tuning

In tuning this receiver, the various controls should be approximately set for the class of signal it is desired to receive. Select the frequency band desired by rotating control knob R until the proper scale appears in the slot at the upper left of the panel. Before proceeding, adjust the antenna trimmer to maximum for this band. The frequency calibration on the main dial scales are correct for tuning, when the band-spread dial is turned to its maximum frequency position only.

The band-spread dial is calibrated for the amateur bands of 10, 20, 40 and 80 meters only. To use the band-spread on these bands, set the main tuning dial at the highest frequency on that band, then tune with the band-spread dial. On the 160-meter band, the calibrations on the main dial are spread sufficiently so that it is not necessary to use the band-spread tuning. For an extremely accurate calibration, set the band-spread dial for a signal of known frequency, and then adjust the main dial until the station is tuned in. When this position has been obtained, note the setting of the arbitrary scale with its vernier index.

The Transmit-Receive switch opens the plate circuits of the receiver on the transmit position and shorts the two terminals at the right rear of the chassis, which may

be connected to a relay for operation of the transmitter.

The tuning or S meter should normally give a low-scale reading when no signal is being received. To adjust this meter, tune the receiver to a point free of signals, turn the sensitivity control to maximum, switch in avc, switch crystal out, have antenna trimmer turned off resonance, and then adjust the potentiometer at the back of the receiver until the meter pointer just coincides with the mark at the low end of the scale. The meter will usually rise slightly when the antenna trimmer is tuned to resonance.

SPECIFICATIONS

- Cabinet: Metal; grey crinkle lacquer finish, oven baked.
- Frequency range: 540 kc to 31 mc.
- Number of bands: 6.
- Range of each band: 540 to 1,340 kc, 1,340 to 3,300 kc, 3,300 to 5,800 kc, 5.8 to 10.2 mc, 10.2 to 18 mc and 18 to 31 mc.
- Frequency stability: Warm-up shift, 1 minute to 1 hour, 68° F ambient; less than 3.5 kc. Shift with line voltage variation, 105 to 125 volts: less than 1.3 kc at 29 kc. Shift is proportionally less at lower frequencies.
- I-f peak: 455 kc.
- Sensitivity: 2 microvolts required (30% modulation) for 0.05 watt output.
- Power supply: 105 to 125 volts, 50 to 60 cycles.
- Power consumption: 70 watts.
- Audio output: 3 watts, undistorted.
- Speaker: P-m dynamic, 2 to 3 ohm voice coil.
- Dimensions: 20½ in W by 10½ in H by 11½ in D.
- Weight: 48½ pounds net.



The Outstanding Tube Tester Value . . .
Checks all type tubes including Loctals, Bantam Jr., 1.4 volt Miniatures, Gaseous Rectifier, Ballast, High Voltage Series, etc. Filament Voltages from 1.1 to 110 volts. Direct Reading GOOD-BAD Meter Scale. Professional-appearing case with accessory compartment large enough for carrying Model 739 AC-DC Pocket Volt-Ohm-Milliammeter, thereby giving the serviceman complete testing facilities for calls in the field. . . . Model 432-A with compartment, Dealer Net Price . . . \$18.85. Model 432-A in case less compartment. . . \$17.85. Model 739, Dealer Net Price. . . \$10.90.

WRITE FOR CATALOG—Section 517 College Avenue
READRITE METER WORKS, Bluffton, Ohio

JUNK AIN'T PATRIOTIC

(Continued from page 16)

the person at fault is a manufacturer who will waste raw materials in the manufacture of inferior products, the parts distributor who aids and abets so unpatriotic a manufacturer or the Service Man who comforts the enemies of his country by participating in so vicious a circle of sabotage—he is tarred with the brush of subversive elements.

I'm not much worried about you Service Men. I know you too well—that is, the majority of you. With your cooperation in the use of quality replacements, we'll eliminate waste motion and the waste of required raw materials. Any American Serviceman will agree that junk ain't patriotic.

Displays . . .

• • • • A spring and summer display with the theme "Spend Your Leisure Listening" has been released by the Sylvania Radio Tube Division of Hygrade Sylvania Corp.,



Emporium, Pa. The display is lithographed in 8 colors with red, blue and green predominating. It is 21 in. wide and stands 43 in. high.

Catalogs, Bulletins, etc. . .

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

• • • • The 1941 Atlas Sound catalog F41 describes 100 types of p-a speakers, microphone stands, connectors, and accessories. Atlas Sound Corp., 1443 Thirty-ninth St., Brooklyn, N. Y.

• • • • The Crowe Name Plate & Mfg. Co., 3701 Ravenswood Ave., Chicago, have issued a Bulletin No. 242 covering radio components, including precision tuning devices, plates of all sorts for transmitters, radio receivers, phonographs, etc., in different metals

All-Wave antenna Systems

Terminals

Extension Cord

Replacement Cords

Indoor Aerial Wire

Ground Clamps

Lightning Arresters

Power Line Filters

Hook-Up Wire

Things to Take Along to Make a Good Connection

Good radio service usually requires more than tube replacement, which any clerk might handle. As a professional serviceman—you can easily find the other troubles that interfere with good reception. A new antenna, a power line filter, hook-up wire, or one of the many other radio wire accessories may restore that "brand new" set condition. Take them along—give satisfaction to your customer—get the real profits your knowledge of this business deserves.

You'll find these fast selling items and many more in the Belden radio wiring line. Make a good connection—buy Belden from your jobber.

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

Belden Wire

FOR GOOD CONNECTIONS

and finishes; knobs in bakelite and tenite for instruments, transmitter panels and other special uses, in various styles and colors; and other specialties.

• • • • Crowe Name Plate and Manufacturing Co., 3701 Ravenswood Avenue, Chicago, have issued their bulletin No. 237, which covers remote controls and kits for auto radio set controls.

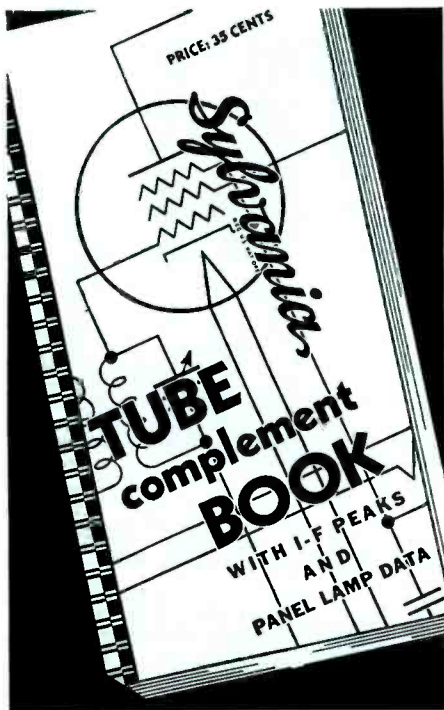
• • • • Howard Radio Co., 1735 Belmont Ave., Chicago, announces two new folders: No. 105 listing a line of replacement chassis, including frequency modulation and home recorders; No. 106 listing metal and paper-base recording discs and needles. Available to readers of SERVICE without charge. Folder 104, listing a complete line of communication receivers is also available.

• • • • Hytron Corp., 76 Lafayette St., Salem, Mass., have issued a new price list for their receiving tubes and plug-in type resistors. Over 500 different "exact duplicate" plug-in resistors are listed.

• • • • A 16-page brochure from Lafayette Radio, 100 Sixth Avenue, New York City, lists summer specials in sets, replacement parts and tools for the Service Man.

• • • • A 48-page catalog devoted to sound equipment and including the 1941-42 Lafayette line has been issued by Lafayette Radio Corp., 100 Sixth Ave., New York City.

• • • • A 20-page catalog illustrating and describing Stancor transformers, chokes and packs is available from Standard Transformer Corp., 1500 N. Halsted St., Chicago.



**SERVICEMAN'S
STANDBY
1941 EDITION...
NEW, IMPROVED
ONLY BOOK OF ITS KIND**

272 Pages—16,730 Radio Models shown—including data on '41 receivers. Tube replacement information for 100,380 Tubes or Sockets. 586 Trade Names of receivers. Names and Business Addresses of 190 Receiver Manufacturers. Patented, Hold-Tite, Wire-O Binding.

*The First and Only Compilation
of Panel Lamp Numbers.*

Every Radio Serviceman should own one of these Sylvania Tube Complement Books. All the information you'll need—from the oldest set up to and including the latest '41 models — is packed into those 272 pages. And the book is bound by the WIRE-O process. It opens flat and there's no danger of it falling apart or of the pages pulling out.

This valuable compilation, the only book of its kind in the field, is one of the 125 silent salesmen Sylvania has created to help you build a sounder, more profitable business. Write today for Sylvania's Tube Complement Book, enclosing 35c in stamps or coins, and for a full list of the surefire, tested, dealer aids. Some are free and some are available at a very nominal cost—all of them are designed to help you sell more, and *make more!*

Radio Tube Division
HYGRADE SYLVANIA CORPORATION
Emporium, Penna.

SYLVANIA
Set-Tested Radio Tubes

*Also makers of Hygrade Lamp Bulbs, Hygrade
Fluorescent Lamps and Mirlume Fluorescent
Light Fixtures*

Sound News...

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

REFLEX PROJECTOR

Atlas Intermediate 4½-ft. Morning Glory reflexed projector, Model DR54, has a bell opening of 25 in; effective air column



of 54 in and dynamic reflex design which reduces the overall length of the double re-entrant trumpet to 23½ in. Finish is a battleship grey oven-baked crackle lacquer. Atlas Sound Corp., 1449-39 St., Brooklyn, N. Y.

RECORDER-AUTOMATIC CHANGER

One of the latest products of Allied Radio Corp., 833 W. Jackson Blvd., Chicago, is this combination recorder-playback system with record changer and portable p-a system, housed in a single airplane-type luggage case. Plays manually,



at 78 rpm, all acetate home recordings or commercial records up to 12-in. diameter. Automatically plays without interruption twelve 10- or ten 12-inch records. Will record at 78 rpm on composition and acetate blanks up to 10-in. diameter. Built-in amplifier delivers 3-watts output.

SOUND BUSINESS INCREASES

Sales of RCA sound amplification and reinforcing equipment and related units showed an increase approaching 50 per cent in the first quarter of 1941 as compared with the same three-month period of 1940, according to George R. Ewald, RCA Commercial Sound Division Manager. The increase brings sound equipment sales volume for the first quarter to the highest point in RCA history.

PORTABLE AMPLIFIER

The 1941 Audiograph 25-watt amplifier has been announced by John Meck Indus-



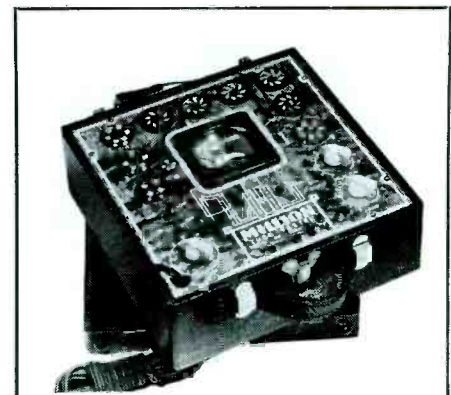
tries, 1313 W. Randolph St., Chicago. Three input channels are available with individual volume control. Construction of this unit makes it suitable for 24-hour service in paging systems and other severe applications, it is said. It is available separately with two speakers in a rawhide-finished carrying case for use as a dual speaker portable system. Both plug-in sockets and terminal board speaker connections are provided, with choice of output impedance. Record player built into top shield is optional.

INDUSTRIAL PAGING SYSTEM

Allied Radio Corp., 833 W. Jackson Blvd., Chicago, have introduced a 30-watt industrial paging system for use with four p-m speakers in a wide variety of applications. Controls are provided for regulation of output power and tone to meet requirements.

RECORDING DISC

Howard Radio Co., 1735 Belmont Ave., Chicago, announce a 6½-in. economy re-



**• MILLION •
NEW DF TUBE CHECKER
FOR ALL NEW TUBES**

New, with wider application range. Tests emission of all tubes. Ten 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 tube hot. Tests by-pass condensers, etc. Literature on request.

**MODERN
ACCURATE
DEPENDABLE
ECONOMICAL** **\$16.95 NET**

If your Jobber cannot supply you,
write us direct.

MILLION RADIO AND TELEVISION
1617 No. Damen St. - - - Chicago, Illinois

cording disc with the same Type C black coating used on their metal-base discs. An 11 by 1 3/4-in. cream color card with glossy



maroon color printing and sample disc attached is available to help push the sale of the discs.

Be sure to drop in at the SERVICE booth in the Registration Lobby of the Stevens Hotel while you are attending the Trade Show in Chicago, June 10 to 13 inclusive.

Personnel...

• • • • The Audio Development Co., Minneapolis, Minn., have appointed Norman B. Neely Enterprises, 420 Market St., San Francisco, Cal., as exclusive agents for their audio transformers and allied items, for several Western States.

• • • • The appointment of William J. Halligan, president of The Hallicrafters Co., to the Chicago Commission on National Defense has been announced recently by Chicago's Mayor, Edward J. Kelly.

• • • • Joseph M. Muniz, general sales manager of the Howard Radio Co., Chicago, announces that Howard C. Briggs, one of the firm's vice-presidents, will take over the sale of communication receivers, replacement chassis, household receivers and recording discs in Illinois, Indiana, Kentucky, Michigan, Ohio, Wisconsin and St. Louis, Mo. Mr. Briggs will be assisted by Russ Diethert in the sale of recording discs and replacement chassis.

• • • • A general wage increase of approximately 7 1/2%, applying to all hourly workers and effective as of April 21, was announced by the Hygrade Sylvania Corp., Salem, Mass. About 4,000 employees in the company's six Massachusetts and Pennsylvania plants will be affected by the increase.

• • • • Frank B. Koessler has been added to the staff of the Norman B. Neely Enterprises, manufacturers representatives, San Francisco, Cal.

• • • • John Meck Industries, Chicago, have announced the appointment of William W. Montgomery as sales manager of the Audiograph sound systems division.

• • • • Roy S. Laird has been appointed sales manager for the Ohmite Manufacturing Co., Chicago.

• • • • The Solar Manufacturing Corp., Bayonne, N. J., announce the return of Sylvan A. Wolin to their organization as sales promotion manager.

• • • • James R. Donahue, has been promoted to sales manager of Standard Arc-turus Corp., receiving tube manufacturers in Newark, N. J.



Utah Keeps "The Tropics" in a Refrigerator

Steaming, dripping heat that duplicates the tropics is created in the Utah laboratory. Into this sweat box go Utah Transformers to prove their ability to withstand the severest moisture conditions.

Because moisture resistance is provided by vacuum-pressure, complete impregnation, Utah Transformers are assured of adequate protection against moisture. The causes of failure so frequently experienced where ordinary transformers are used are avoided.

In the impregnation of the interlayer insulation of Utah Transformers, all air and moisture are eliminated. Then molten wax is

forced into the minute cells of the paper under pressure. The result is complete, thorough insulation, not just surface coverage.

Inadequate insulation in transformers frequently causes breakdowns with consequent costly loss of time and money. Protect your best interests by insisting on UTAH. Write for all the facts about the complete Utah Transformer line. 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.



*500 x enlargement of cross section of interlayer insulating paper showing advantages of (A) Utah's vacuum-pressure, complete impregnation over (B) ordinary hot-dip, surface coverage method, in which air and moisture remain in the cells.



TRANSFORMERS

VIBRATORS • SPEAKERS • UTAH-CARTER PARTS

• • • • The Turner Co., Cedar Rapids, Iowa, announce the appointment of two new representatives to handle push-pull vibrator sales: Verner O. Jensen, The General Sales Co., 2607 Second Ave., Seattle, Wash., will serve the northwest. His territory will include Idaho, Montana, Oregon, Washington, Alaska, Alberta, Canada, and Vancouver, B. C. Herb Erickson, Herb Erickson Co., 14 Biltmore Ave., Asheville, N. C., is the new representative in the southeast. His territory includes Alabama, Florida, Georgia, North Carolina, South Carolina and Tennessee.



When you are at the Trade Show in Chicago, June 10 to 13 inclusive, be sure to visit the SERVICE booth in the registration lobby. We'll be pleased to see you.

Fifty of Chicago's radio notables turned out to wish Sam Poncher, Newark Electric Co., good luck following the announcement of his marriage. Sam was presented a completely outfitted portable bar. Left to right: W. S. Hartford, Thordarson; Sam Poncher; W. J. Halligan, Hallicrafters; Arthur Schmitt, Amphenol; and Sid Shure, Shure Brothers.

Ready Now THE only
INSTRUMENT OF ITS KIND

NEW RCP
ELECTRONIC MULTITESTER

MODEL
661



4 COMPLETE INSTRUMENTS
-26 RANGES - IN 1

Vacuum Tube DC Voltmeter
Vacuum Tube AC Voltmeter
Vacuum Tube Ohmmeter
Vacuum Tube Capacitometer

Here, in one electronic instrument, are more features than have ever been available in any vacuum tube volt-ohmmeter!

\$33.50

Make complete checking tests on AM, FM and Television receivers under actual operating conditions without disturbing the circuit constants! RCP Model 661 has all the newest needed ranges, including capacity measurements from .00003 mfd. to 1000 mfd. DC voltmeter impedance 160 megohms on high ranges, 16 megohms on low ranges. AC voltmeter input capacity is only .0005 mfd. Look at the extra ranges of this great new RCP achievement!

DC VOLTS—0-6/30/150/500 at sensitivity of 16,000,000 ohms input impedance.
DC VOLTS—0-1500/6000 at 160,000,000 ohms input impedance.
AC VOLTS—0-6/30/150/500/1500/6000 at .0005 mfd. input capacity.
OHMS—0-1000/10,000/100,000/1 meg/10 meg/100 meg/1000 meg.
CAPACITY—0-.001/.01/.1/1/10/100/1000.

IMPORTANT!
Meter completely protected from burn-out through wrong connection or overload.

RCP
dependable
41 47
instruments

RADIO CITY

PRODUCTS COMPANY, INC.

88 PARK PLACE • NEW YORK, N. Y.

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.

Associations . . .

Fort Wayne, Ind.

Working toward a closer tie-up with radio Service Men for mutual benefit, J. B. Conley, general manager of WOWO-WGL, Fort Wayne, Ind., has made the studios available to a local Service Men's group for its monthly meeting. An entire year's program of meetings is being worked out, featuring movies, lectures, and discussions. The group held its first meeting April 25, with about 140 in attendance. The tie-up can be attributed directly to the cooperation between Service Men and WOWO-WGL during the Radio's Movin' Day promotion.

Arthur Stringer, NAB.

Industries Special Train

The 1941 Radio Industries Special Train, sponsored by the Representatives, will leave Grand Central Station in New York at 4:20 P. M., Sunday, June 8, according to Perry Saftler, in charge of arrangements. It will arrive in Chicago on Monday, June 9, the day before the show opens.

Picking up a car from Boston, carrying more show-bound travellers, at Albany, the Special will stop at Schenectady, Utica, Syracuse, Rochester and Buffalo. Passengers will detrain at Engelwood and proceed to the Stevens by taxi.

"If anyone is interested in joining us," says Perry Saftler, "and will contact me, I will give them all the necessary information. They can call me by telephone at Rector 2-5334, or reach me by mail at 53 Park Pl., New York City."

Louisville, Ky.

C. R. Wexler, of the Ken-Rad Tube & Lamp Corp. engineering laboratories, addressed a dinner of the Amateur Radio Transmitting Society, Louisville, Ky., April 12. Mr. Wexler's subject was "Radio Aids to Aviation." The address and following discussion, originally scheduled for 45 minutes, extended over three hours, because of the great interest displayed in this timely subject.

New Bedford, Mass., RTG

The regular meeting of the Radio Technicians Guild, Whaling City Chapter, New Bedford, Mass., was held Wednesday, April 16. The subject for the evening, "Distortion in Audio Amplifiers," furnished an interesting discussion. Material for the demonstration was furnished by several of the members and the lecture conducted by J. L. Shepley.

Using an Atwater Kent receiver, we discontinued the bias resistor of the output tube and various amounts of bias were applied to the tube. A milliammeter inserted in the plate circuit enabled a check to be kept on the plate current while feeding different values of sine-wave voltages to the input of the tube, at the same time an oscillograph connected across the output showed the tie-in between wrong bias and the distortion. A record player connected to the input allowed the boys to hear the distortion while watching the plate current swing. Further check was made by listening to signal in a monitor

speaker. The effect of extreme variations in plate voltage was also shown.

Thanks to R. Lorenzen, whose article in a back issue of SERVICE started the thought which made the discussion possible.

James L. Shepley, Secretary.

Radio's Old Timers

Radio's Old Timers, otherwise known as ROT, with headquarters at 53 W. Jackson Blvd., Chicago, is now accepting applications for memberships and planning its activities at the Trade Show at the Stevens Hotel in Chicago, June 10-13.

The first five hundred applicants will receive a "Charter Member" celluloid badge to be worn at industry functions, such as the National Trade Show, and will also receive a sterling silver "ROT" pin of the screw-lapel type. All applicants after 500 will be "Members."

John Olsen, when asked to amplify on ROT and to state its purposes, said: "The purpose of ROT is to foster good fellowship among the pioneers of the radio industry. Anyone who has been connected with radio for fifteen years or more is eligible to join us. We have no axes to grind—ROT is in every way a social organization."

Sylvania Service Schools

The pleasant jingle of coins in the jeans and the rustle of paper money was sum-

(Continued on page 33)



All the same . . .
whether 2 or 12 inch

The answer is ALWAYS the same . . . it's better to replace a bad-acting speaker with a new OXFORD than to play around with the old one.

We go all the way from a 2 inch to a 12 inch speaker in making that claim . . . and because OXFORD Speakers are built from stem to stern right here in our Chicago factory . . . we just know they are good . . . and you can bank on it.

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New Test Equipment...

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

SIGNAL GENERATOR

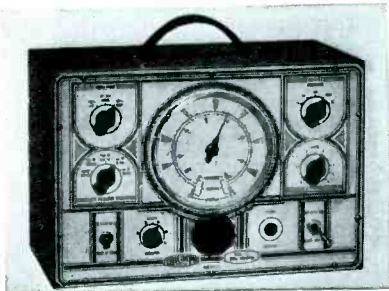
Triplett Electrical Instrument Co., Bluffton, Ohio, have announced two direct-reading signal generators for the Service Man. Model 1232A is for operation from 110-volt, 60-cycle and the Model 1231A



operates from self-contained dry batteries. Six bands cover a range from 115 kc to 30.5 mc in fundamental frequencies. A dial scale with a total length of 50 inches is employed. The 400-cycle audio note can be obtained from panel jacks.

SIGNAL GENERATOR

Triumph Manufacturing Co., 4019 W. Lake St., Chicago, have introduced their Model 131 signal generator with an output



range from 100 kc to 96 mc. Variable percentage modulation is provided and 2½ volts of 400-cycle audio signal is also available at the output cable.

Parts, etc...

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

B BATTERY

A new 45-volt B battery (Type P7830) for portable radios has just been introduced

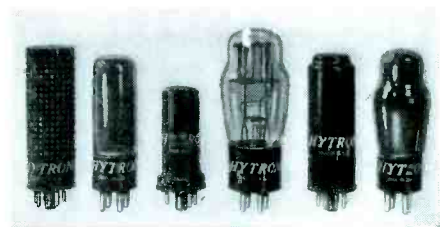


by the Ray-O-Vac Co., Madison, Wisc. Although the new battery is said to deliver the long life of the standard size portable battery, it is only about one-half the size of the latter.

PLUG-IN RESISTORS

Hytron Corp., 76 Lafayette St., Salem, Mass., have expanded their line of exact


duplicate plug-in type resistors. Both the new and the older items in the line are




available with or without ballast action and include items in glass and in metal envelopes.

(Continued on page 33)

New!




EASY-TO-INSTALL DOUBLE-FLATTED Type A SHAFTS




IRC never rests on the oars no matter how far out in front it may be. That's why IRC engineers have been working to make "the easiest shafts to install" even easier to use on an even wider variety of installations.


Eliminate Inserts and Filing!




Shaft position in knob requiring ½" flat.



Shaft position in knob requiring ½" flat.

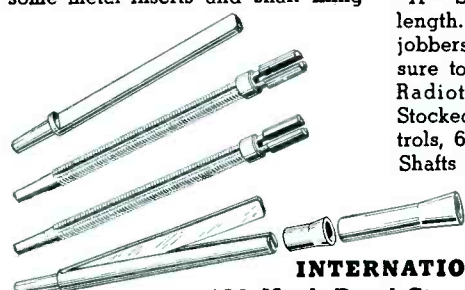


Shaft positioned for set-screw knob.



Only edges of shaft filed for odd types.

Now—in the new double-flatted Type "A" Tap-in Shaft for Type D Universal Controls—you have IRC's answer to simplified fitting for *all* knobs. Here's the end to bothersome metal inserts and shaft filing



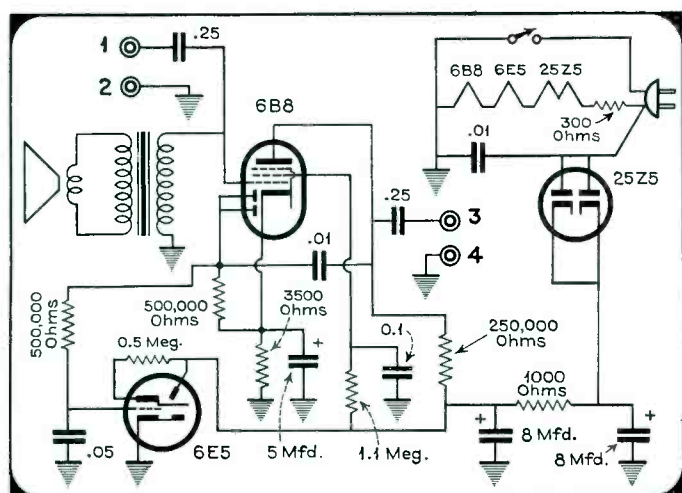
for all ½" and ¾" standard flats. Even the occasional odd type knob requires little more than a brush of your file on the edges of the shaft to make it fit. Moreover, Type "A" Shafts are easier to cut to length. See them today at your jobbers... and, at the same time, be sure to ask about the IRC Master Radiotrician's Control Cabinet. Stocked with only 18 Type D Controls, 6 switches and 5 extra Tap-in Shafts of special design, it covers 60% to 75% of all control replacement needs.

INTERNATIONAL RESISTANCE CO.
401 North Broad St. Philadelphia, Pa.

Wireless OUTPUT INDICATOR

By H. J. McCREARY

MILLION RADIO & TELEVISION



IN ALL steps of radio receiver alignment, a good output indicator is essential so that the i-f, r-f, and oscillator circuits can be peaked for optimum performance. The point of resonance in these circuits can best be observed visually, because the eye responds much more accurately to small changes in sound level, when observed on an output indicating device, than the ear, when listening for the resonant point as indicated by the point of maximum sound level in a loudspeaker.

An inherent disadvantage in all output indicators heretofore available is that electrical connection to the receiver circuits must be made. It is not always convenient to do this, and in the case of receivers having loop antennas, it is not always advisable. To make connection to the output circuits in these sets, means that the relation of the loop and its leads to the chassis must be disturbed, in many cases. When the output indicator leads are disconnected and the loop is placed in position again, the chances are that the alignment of the loop circuit will be imperfect. The wireless output indicating instrument discussed in this article eliminates these difficulties and speeds up receiver alignment.

Circuit

Fig. 1 is the schematic diagram of the unit. Essentially, it consists of a small permanent-magnet dynamic speaker used as a microphone to pick up the audio tone from the receiver's loudspeaker, and a visual indicator tube to indicate the point of maximum volume. The voltage picked up by the substitute microphone is amplified and rectified in a duo-diode pentode amplifier tube. The rectified voltage is proportional to the level of the audio tone picked up, and is used to vary the shadow width of a visual indicator tube. The narrowest shadow width in the indicator tube represents the point of maximum sound level.

Operation

In use the wireless instrument is placed near the speaker of the receiver being aligned. All steps of the alignment are completed, using the usual modulated signal, while the resonant point at each step is observed in the indicator tube. If the receiver is designed to operate from a regular antenna, all steps of the alignment follow standard practice. In the case of receivers using loop antennas, the procedure is slightly different.

In loop type receivers the i-f transformers and oscillator circuit are peaked in the usual manner, direct connection being made from the signal generator to the receiver chassis. Special precautions must be taken in aligning the loop circuit, however, to insure perfect tracking. The modulated r-f signal is fed to some form of radiating loop placed parallel with the receiver loop and a foot or two from it. The center of the radiating loop should be on a line with the center of the receiver loop, as indicated in Fig. 2. The receiver loop picks up the modulated signal and the loop trimmer can then be adjusted for resonance at the high frequency end of the receiver dial scale, observing the resonant point in the wireless output indicator tube. Under these conditions, alignment of the

receiver loop is accomplished without electrical connections to either the input or output receiver circuits.

When batteries are replaced in portable receivers, the position of the loop leads in relation to the chassis is usually changed enough to affect the tracking of the loop circuit. For this reason it is good practice to align the loop circuit every time batteries are replaced. The wireless output indicator used with a radiating loop makes this adjustment possible in a very short time.

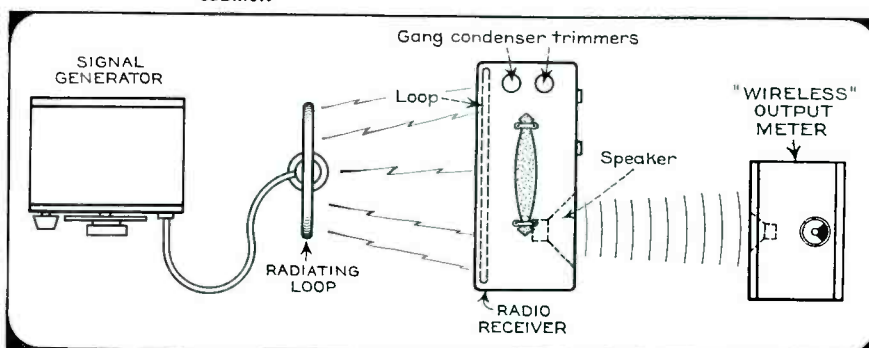
Advantages

Aside from its convenience, the wireless device possesses other features that make it a useful piece of service equipment to own. The device is not susceptible to overloads. In the event a sound of high intensity is picked up the shadow in the indicator tube merely disappears—no damage is done to the device. It has a high order of sensitivity, which is important in receiver alignment. An output level of ten milliwatts is sufficient to close the shadow in the indicator tube when the unit is placed two feet from the receiver loudspeaker. The sensitivity can be controlled by the simple expedient of changing the distance from the receiver loudspeaker, by rotating the output meter cabinet, or by reducing the input to the receiver on the signal generator attenuator.

No impedance matching problems are presented in the use of the wireless output meter.

(Continued on page 35)

The wireless output indicator is decidedly convenient in loop operated receivers where alignment must be made in the cabinet.



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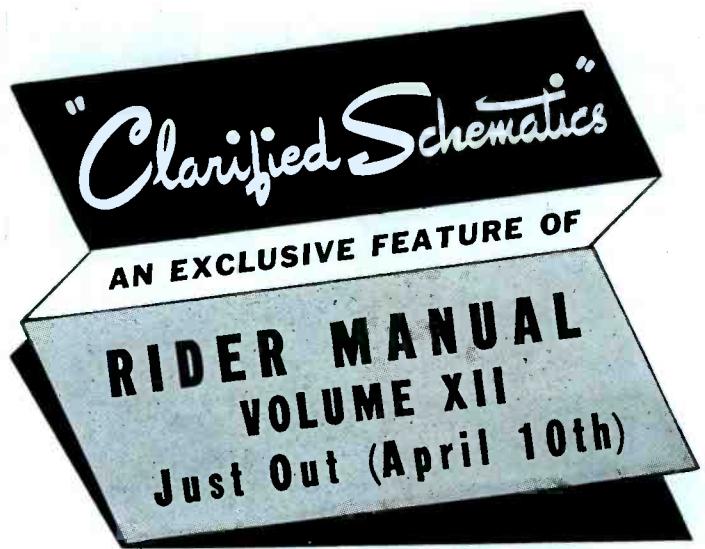
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Because of the increasing complexity of radio receiver design, Rider Manuals have presented all available information on involved circuits and innovations. However, these circuits have in many cases become so complicated that the serviceman can only at great expense of time follow the schematics. As a result, a new service has been created and bound right in Volume XII. "Clarified Schematics" break down over 200 models whose original schematics were so involved that they each required hours of study to decipher. These new, special drawings, produced by our engineers and technicians, show you—at a glance—the circuit conditions for the different wave bands. See that your production flows through smoothly—keep your profits up and your operating costs down. Be sure you have complete servicing information—be sure you have all twelve Rider Manuals.



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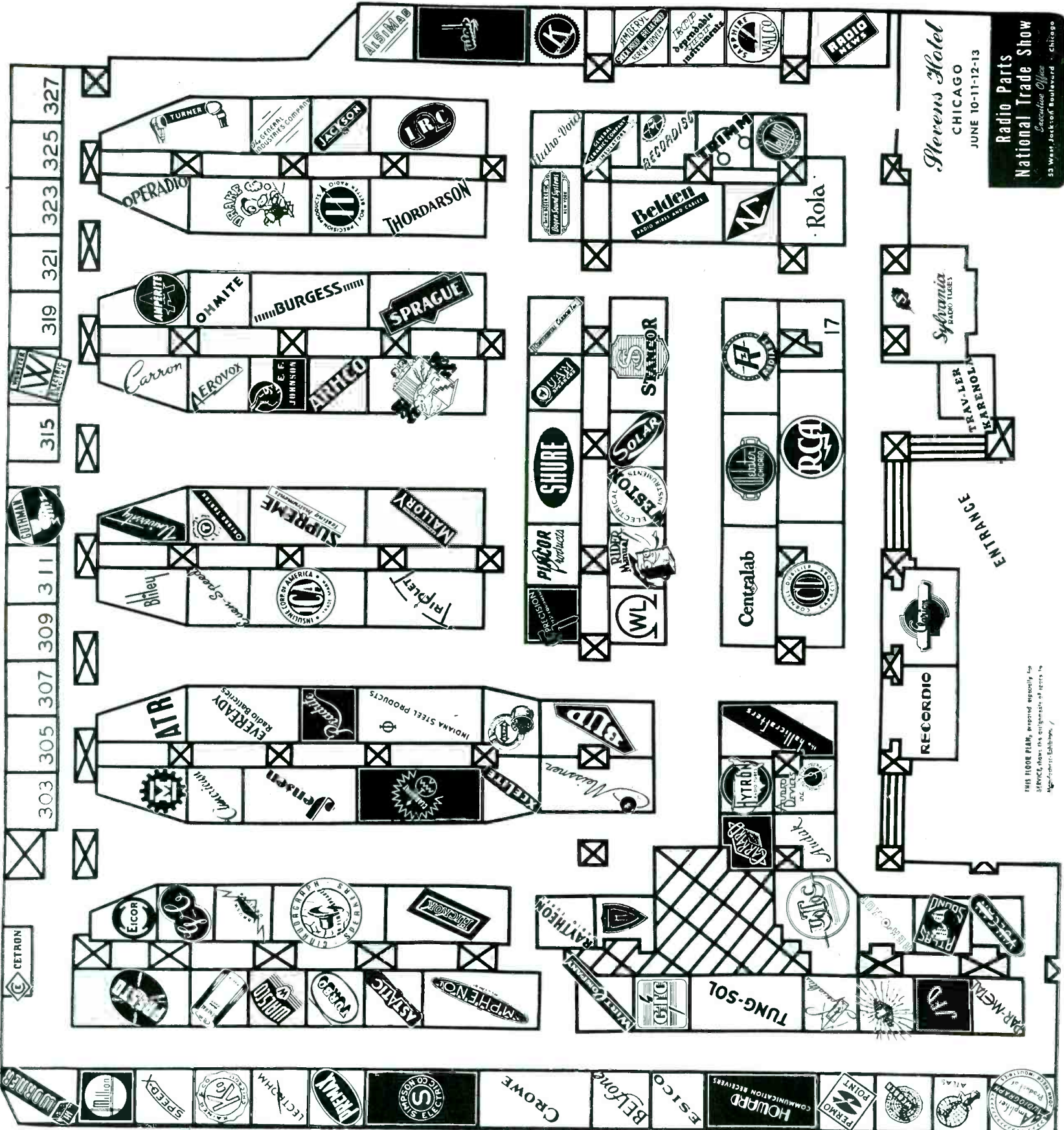
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Rider Manual owners receive "Successful Servicing" magazine. It keeps servicemen up-to-date on developments in the field and carries news from the "Successful Servicing" Laboratory. If you do not receive it write us and you will be placed on the list to receive it regularly in the future.

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SCHEDULE OF SALES MEETINGS June Trade Show

Aerovox	Mon. June 9,	7:00 P.M. to 12:00 Mid.
Alpha	Tues. June 10,	9:00 A.M. to 11:00 A.M.
American Radio Hardware	Mon. June 9,	9:30 A.M. to 11:30 A.M.
Amphenol	Sun. June 8,	10:00 A.M. to 12:00 Mid.
Amperite	Sun. June 8,	12:00 Noon to 3:00 P.M.
Audio Devices	Mon. June 9,	8:00 P.M. to 10:00 P.M.
Bogen	Mon. June 9,	9:30 A.M. to 12:30 P.M.
Cinaudagraph	Mon. June 9,	3:30 P.M. to 4:30 P.M.
Cornell Dubilier	Mon. June 9,	7:00 P.M. to 10:00 P.M.
Crowe	Mon. June 9,	3:00 P.M. to 6:00 P.M.

DeJur	Mon. June 9,	12:00 Noon to 3:00 P.M.
Electrovox	Mon. June 9,	3:00 P.M. to 6:00 P.M.
Hallerifters	Mon. June 9,	3:30 P.M. to 6:00 P.M.
Hickok	Mon. June 9,	9:30 A.M. to 12:30 P.M.
Hytron	Wed. June 11,	7:00 P.M. to 10:00 P.M.
Insuline Corp.	Sun. June 8,	12:00 Noon to 3:00 P.M.
Inter'l. Resistance.	Mon. June 9,	8:00 A.M. to 1:00 P.M.
Meissner	Mon. June 9,	9:00 A.M. to 2:00 P.M.
Millen	Mon. June 9,	9:30 A.M. to 11:30 A.M.
Million	Mon. June 9,	7:00 P.M. to 9:00 P.M.
Operadio	Mon. June 9,	9:30 P.M. to 6:00 P.M.
Park Metalware	Sun. June 8,	9:00 A.M. to 12:00 Noon
Permo	Tues. June 10,	10:30 A.M. to 2:00 P.M.
Presto	Tues. June 10,	10:00 A.M. to 12:00 Noon

Quam	Mon. June 9,	1:00 P.M. to 3:00 P.M.
Radiart	Sun. June 8,	1:00 P.M. to 3:00 P.M.
Radio City Prod.	Wed. June 11,	6:30 P.M. to 11:00 P.M.
Raytheon	Mon. June 9,	10:00 A.M. to 2:00 P.M.
Recordisc	Sun. June 8,	12:30 P.M. to 3:00 P.M.
Schott	Mon. June 9,	6:30 A.M. to 9:30 A.M.
Shure	Sat. June 7,	9:00 A.M. to 1:00 P.M.
Sprague	Sun. June 8,	3:00 P.M. to 6:00 P.M.
Stancor	Sun. June 8,	3:00 P.M. to 9:00 P.M.
Vaco	Tues. June 10,	9:00 A.M. to 12:00 Noon
Ward	Mon. June 9,	6:30 P.M. to 10:00 P.M.
Webster-Chicago	Mon. June 9,	5:00 P.M. to 10:00 P.M.
Wirt	Mon. June 9,	2:00 P.M. to 3:30 P.M.
Worner	Mon. June 9,	9:30 A.M. to 11:30 A.M.

Associations . . .

(Continued from page 28)

moned to the minds of southeastern radio Service Men who attended the recent Sylvania Service School sessions in that area as the rewards for enterprise in handling servicing problems with customers. The meetings were conducted jointly by Sylvania commercial engineers George C. Connor of New York and Frank D. Langstroth of Emporium.

Three topics of interest to Service Men with an eye on the future were explored. They were: 1) deriving profits from service problems; 2) The construction of the loktal tube, and 3) fluorescent lighting. At meetings in Florida, John Carter and Angus MacDonald, Hygrade Sylvania fluorescent representatives, spoke briefly on the future of fluorescent lighting. Blackboard diagrams drawn with fluorescent chalk were illuminated by ultra-violet or black light.

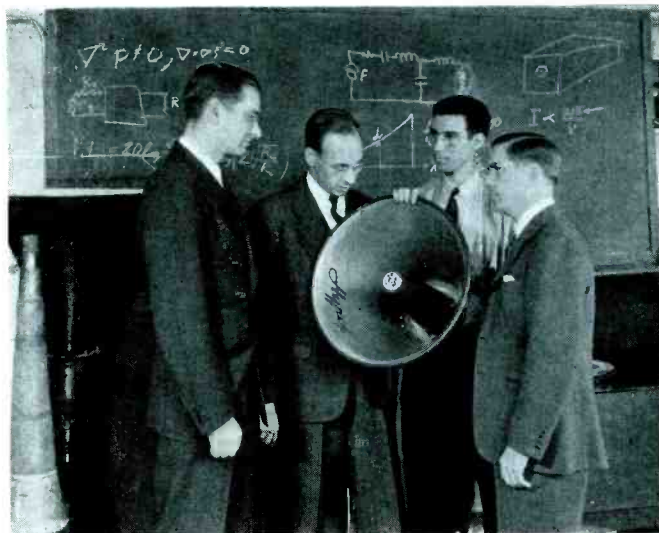
Sponsoring Sylvania jobbers were respectively: Radio Parts Co., Radio Supply & Equipment Co., Radio Accessories Co., Thurow Radio, Teague Hardware Co., Gulf Electric Supply Co., Inter-State Electric Co., Shuler Supply Co., and Nelson Radio and Supply Co.

Henry C. L. Johnson

A.I.E.E. Convention

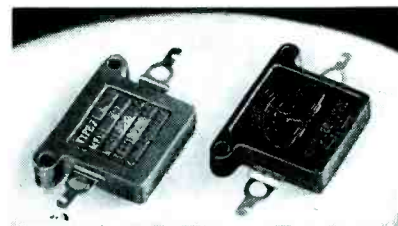
Canadian electrical engineers are to be hosts this year to members of the profession from the United States when the American Institute of Electrical Engineers holds its summer convention in Toronto, Canada, on June 16-20. Plans are now practically completed for the five-day gathering, to consist of technical sessions, inspection trips, entertainment and sports activities. A number of advance registrations have already been received by the Royal York Hotel, the Toronto Convention Headquarters, and this fact is taken as an indication that a record attendance may be expected.

The technical papers to be presented will cover every major branch of electrical engineering. Starting with a session on communications, there will be papers and meetings covering: instruments and measurements; basic sciences and electronics; land transportation; switching equipment; electrical machinery; relays, lighting and insulation; industrial power applications; power transmission, domestic and commercial applications; and power applications.



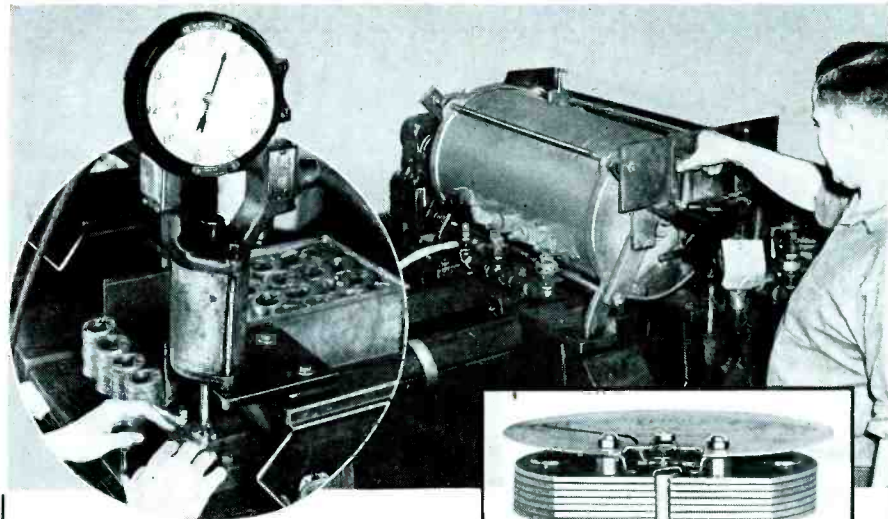
Climaxing a long development program which started with a new mathematical concept in loud speaker horn theory originated by Dr. Vincent Salmon, Jensen engineers examine the first production sample of Jensen's UH-20 Hypex Projector. The Hypex horn has increased efficiency, it is said. Left to right: H. E. Allen and Karl Kramer, project engineers; Dr. Vincent Salmon, mathematical physicist; Hugh S. Knowles, vice-president and chief engineer.

bakelite capacitor, similar to the existing Type 4, but with wider spacing between the insulated mounting holes to meet the 1½-in standard called for in a number of applications. Standard units are moulded in brown bakelite and are available in



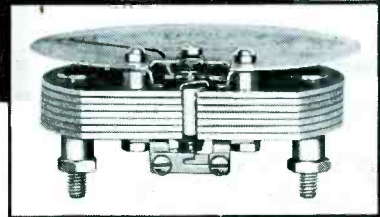
capacities from 0.00005 mfd to 0.03 at 600 volts, 0.01 for 1200-volt, and 0.003 for 2500-volt rating. Insulation resistance is 20,000 megohms. Cornell-Dubilier Electric Co., S. Plainfield, N. J.

When you are at the Trade Show in Chicago, June 10 to 13 inclusive, be sure to visit the SERVICE booth in the registration lobby. We'll be pleased to see you.



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Interior View of D.C. Movement . . . Double truss bridge protects against any vibration—insures permanent perfect alignment of bearing supports, and provides correct scale readings.

In every phase of manufacture, Triplet exercises rigid control over the quality of every part. In instrument manufacture, for example, heat-treating magnets the Triplet way, plus careful ageing, insures permanency. Following heat-treating, processing by special electric hammers insures initial uniformity and freedom against change. Triplet instruments have perfect alignment magnetically and mechanically, with the result that scale readings are linear and free from "curve error." That is why Triplet instruments have been recognized internationally for their precision, long life, and reasonable prices. That is why more and more people are standardizing on Triplet instruments, because they know—"It's got to be RIGHT to be Triplet."

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Parts, etc. . . .

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

(Continued from page 29)

MOULDED MICA CAPACITORS

A new addition to the Cornell-Dubilier line of mica dielectric capacitors is the Type 7 illustrated. This is a moulded

GENERAL ELECTRIC TC2 TUBE TESTER

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

A new type of selector switch pro-

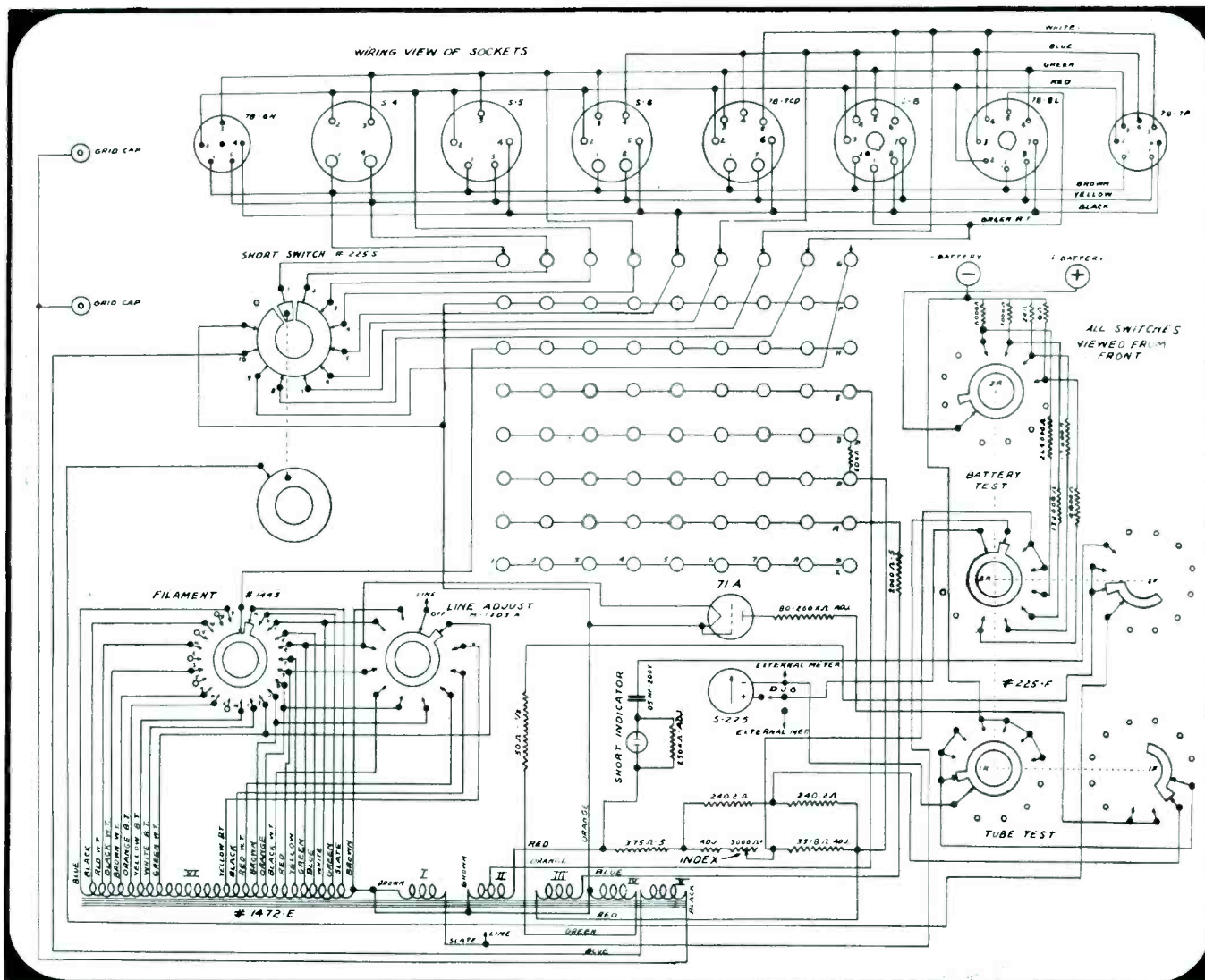
vides some 20,000 possibilities of basing an 8-tube lead on an 8-pin base. This development makes it possible to connect any pin or combination of pins to any voltage or test impedance of the checker. As a further safeguard, a spare contactor has been included in the switch in the event that a 9-pin base

should make an appearance.

A "Recard" data system is keyed to the controls through panel design. New data can be added without taking the instrument apart.

Battery test under load conditions are made possible with the same instrument.

Provision is made for the addition of a large illuminated meter for wall mounting store use.





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MANUFACTURERS reserve your advertising space NOW for the important June Convention Issue of **SERVICE**

PREFERRED POSITIONS ARE GOING FAST.

WIRELESS OUTPUT INDICATOR

(Continued from page 30)

put indicator. Voice-coil or plate-load impedances in the receiver being aligned will affect the sensitivity of other output meters which require electrical connection to the output transformer. The former can be used equally well with any type loudspeaker.

Standard, readily available receiving type tubes are used in the unit, so that replacements may be easily obtained. The device operates from 110 volts, either a-c or d-c.

Two sets of pin jacks (illustrated at 1, 2, 3 and 4 in Fig. 1) are provided. Jacks 1 and 2 are provided for two reasons. The unit can be used as a null indicator in bridge circuits or as a direct connected (condenser isolated) output meter when these jacks are connected to the audio frequency source. Since the only connection to pin 1, other than the input transformer, is to grid one of the multiple purpose tube, the wireless output meter can be used as a substitute speaker, in testing radio receivers and amplifiers. In this application, jack No. 1 is connected to the out-

put tube plate in the receiver and jack No. 2 is connected to the chassis (through suitable isolating condensers).

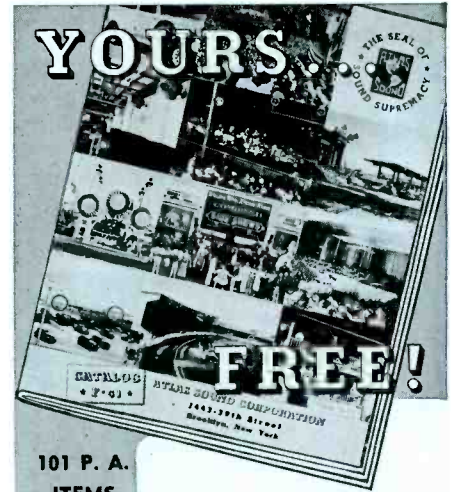
Jacks 3 and 4 are provided so that a sensitive a-c meter or an oscilloscope can be connected to them. The a-c meter can be used when a definite reference voltage is required and when an oscilloscope is connected to these jacks, two or more loudspeakers operating from the same amplifier can be phased.

The wireless output indicator can also find numerous uses as a sound level indicator or as a noise level meter. Here again an oscilloscope or sensitive a-c meter may be employed where a definite reference voltage is required.

The wide variety of uses for the wireless output indicator makes it a rather desirable service instrument. The saving of time during receiver alignment alone makes it well worth while.

Be sure to drop in at the SERVICE booth in the Registration Lobby of the Stevens Hotel while you are attending the Trade Show in Chicago, June 10 to 13 inclusive.

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304 S. Dearborn Street, Chicago, Illinois.

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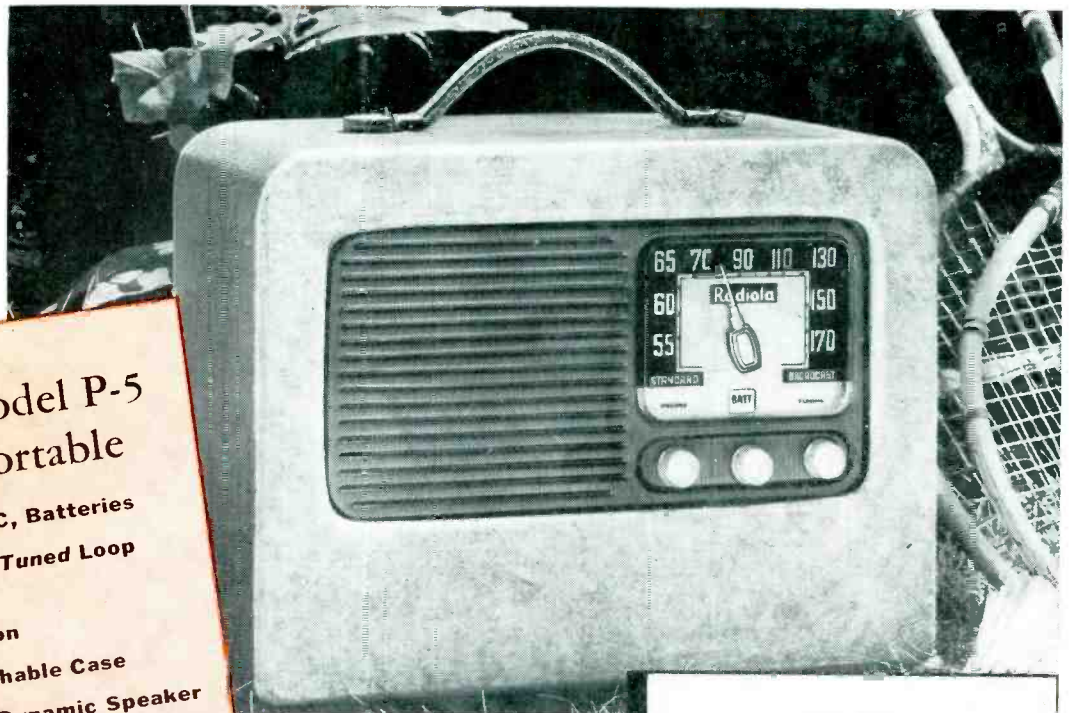
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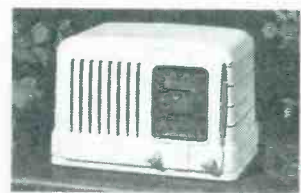
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