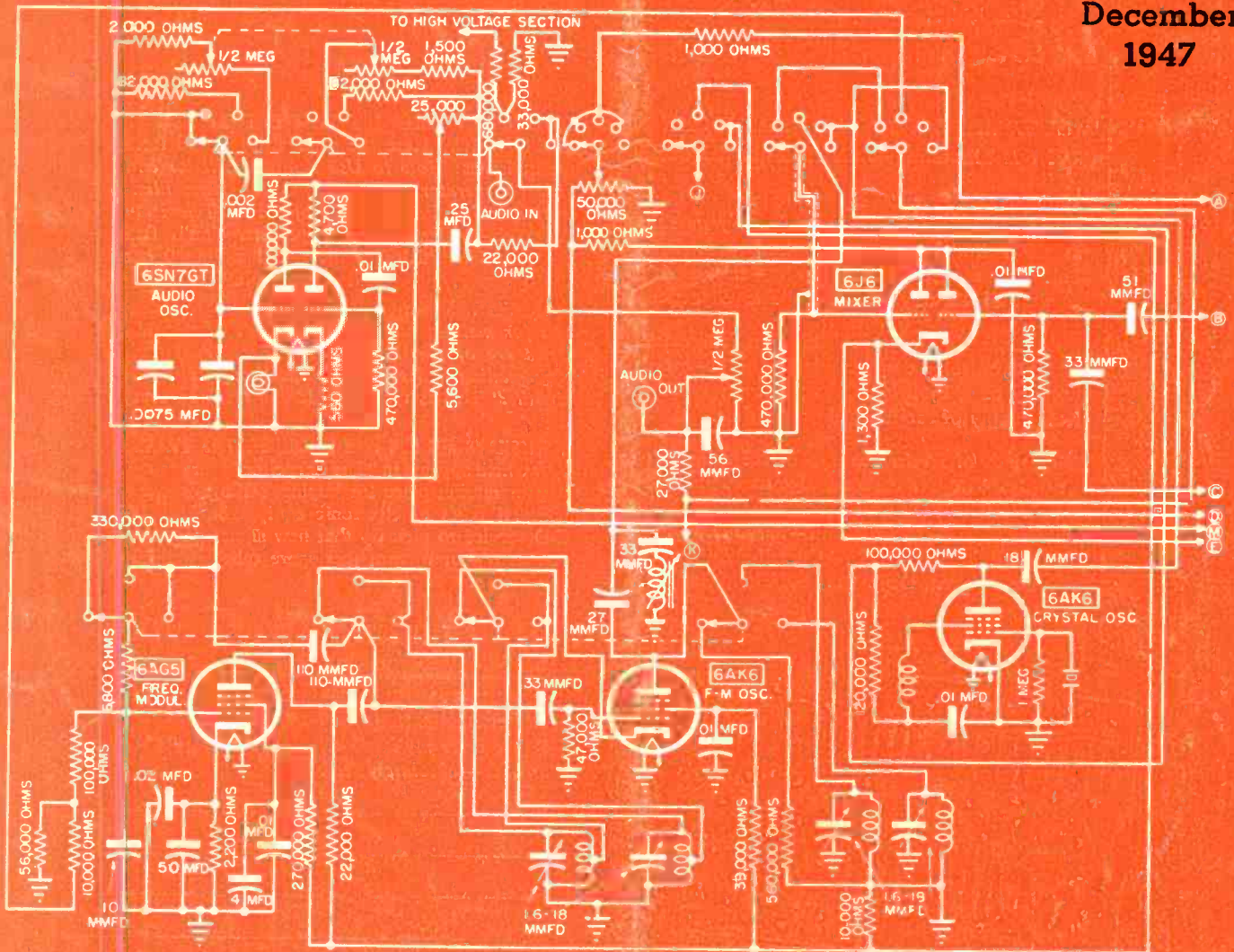


SERVICE

December
1947

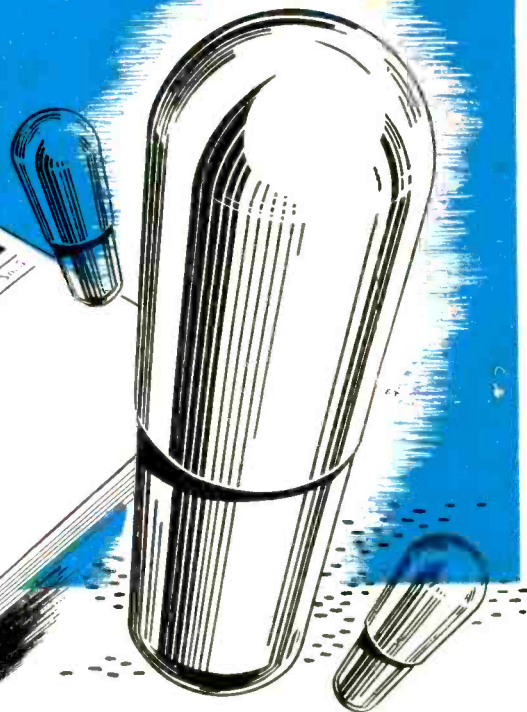


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[See page 2]

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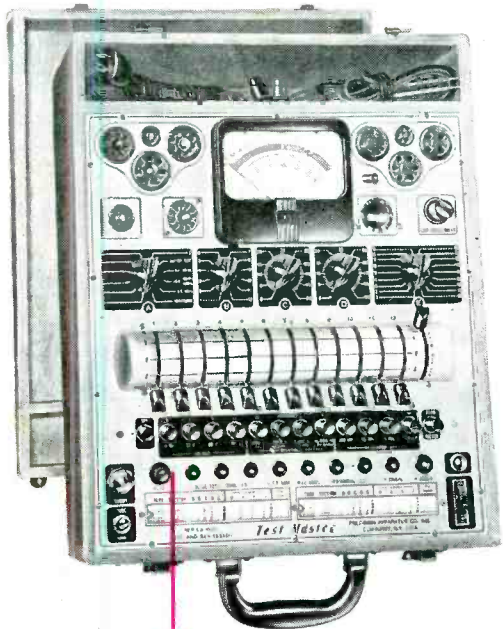
*An amplifying tube tested for just one selected characteristic does not necessarily reveal its overall performance capabilities. Electronic tube circuits look for more than just Mutual Conductance or other single factor. In the Precision MASTER Electronamic Tube Test Circuit, the tube under test is subjected to appropriately phased individual element potentials and is electro-dynamically swept over a complete Path of Operation, on a sinusoidal time base, encompassing a wide range of plate family characteristic curves. This complete Path of Operation is automatically integrated by the indicating meter in the direct and non-confusing terms of Replace-Weak-Good.

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SERVICE, DECEMBER, 1947 • 1

EDITORIAL

Highlights of '47

SIGNIFICANT STRIDES, technical and economic, were recorded in Servicing during '47.

It was the year in which . . . Associations regained their prewar popularity and effectiveness.

Codes of ethics became charters of good servicing throughout the country.

Servicing won its professional spurs and became a vital factor in industry.

Nation-wide clinics were instituted by manufacturers to familiarize Service Men with the new techniques of i-m, tv, sound and other new improvements.

New fields for Servicing were found . . . taxi, bus, aviation, marine, police, coin-operated receivers, motion-picture sound units.

Custom-building interest was regained and installation of chassis, speakers and remote controls became a successful activity of many Service Men.

F-M and tv developed new channels of servicing and installation . . . antennas, special tv amplifier boosters, screen enlargers, etc.

Kits became popular again and Service Men found quite a market for their talents, which involved construction of the kit or aiding in its building, alignment, as well as installation of the complete equipment.

Tv receiving problems accentuated the need for specialization in single and master antenna installations. Service Men found their knowledge of solutions to the problems quite profitable. Many Service Men set up installation-servicing facilities for dealers and manufacturers.

F-M emphasized the importance of fidelity and multiple speaker installations appeared on the work calendar of many Service Men.

Wire and tape recorders spiraled to popularity and Service Men were called in for installation and servicing. Use of special recorders with receiver amplifiers became a hobby of many, too.

P-A activity zoomed. Service Men became alerted to the mounting possibilities in the field and began studying the fine points of p-a selling, installation and servicing.

Improvements in component design and manufacture were a boon to every Service Man, facilitating repairs and minimizing callbacks.

Tool improvements were numerous.

Standardization of circuit diagrams, components, exploded views of circuits, point-to-point test values . . . all aided the Service Man in doing a better job and earning more money.

Service Men found '47 a year of progress, and '48, with the many technical developments now on the bench, looms as an even better year for every Service Man!

RADIO · TELEVISION · ELECTRONIC SERVICE

Vol. 16, No. 12

December, 1947

LEWIS WINNER
Editorial Director

ALFRED A. GHIRARDI
Advisory Editor

F. WALEN
Managing Editor

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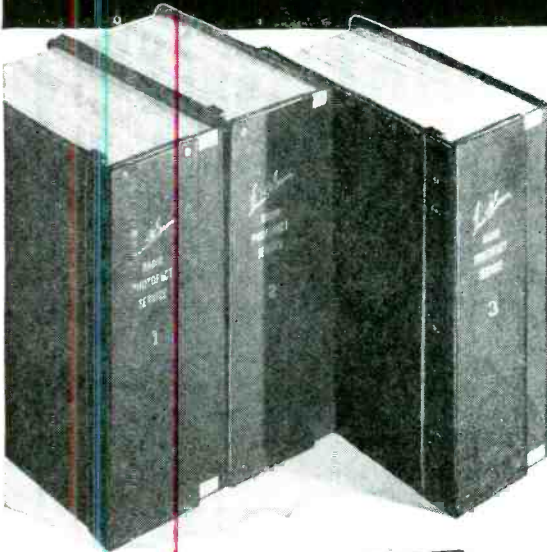
Brand & Brand, 315 Montgomery Street, San Francisco 4, Calif.; Telephone Douglas 4475

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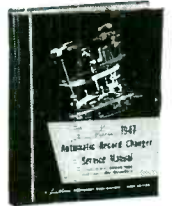
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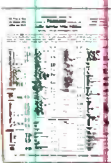
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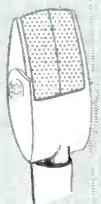


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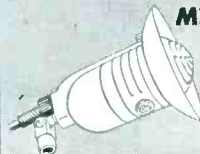
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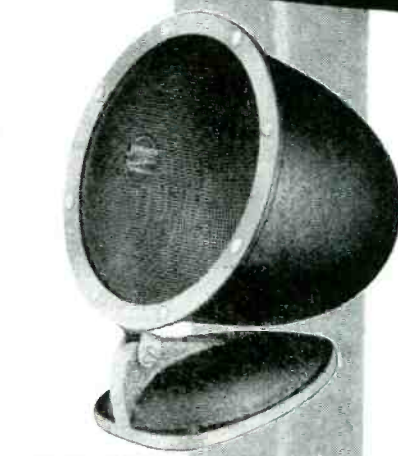
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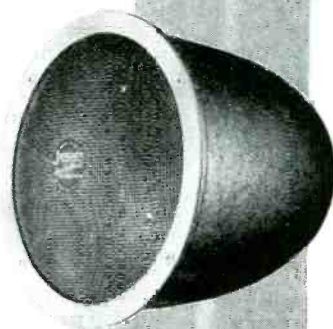
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MODEL AP-10 SPEECH MASTER
(Desk Type)

ALNICO 5 PM design. Complete with swivel base and tilt adjustment. Double dustproofed, fully enclosed and protected. Internal mounting bracket for 1/2 x 1/2" transformer. Power rating 5 watts. Height 6 3/4", depth 5 1/8", diameter 5". Attractive hammered gray finish with satin chrome trim. 36" RC cord. Shipping weight 5 1/4 lbs.

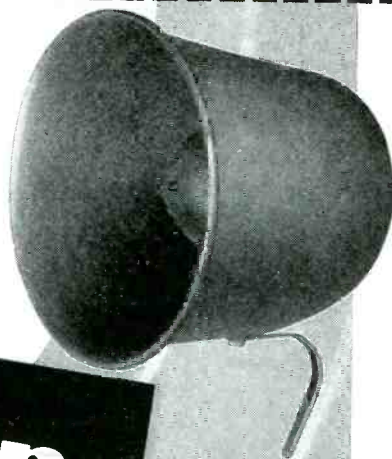
	List Price
AP-10 (ST-590) with 3-4 ohm voice coil	\$13.90
AP-10 (ST-591) with 45-50 ohm voice coil	14.50



MODEL AP-11 SPEECH MASTER
(Panel Type)

Similar to AP-10 but without swivel base. Clearance eyelets for mounting screws. Mounts in 4-27/64" cutout. Depth from front panel 4 1/2". Power rating 5 watts. Screws and drilling template furnished. Shipping weight 3 1/4 lbs.

	List Price
AP-11 (ST-592) with 3-4 ohm voice coil	\$11.30
AP-11 (ST-593) with 45-50 ohm voice coil	11.90



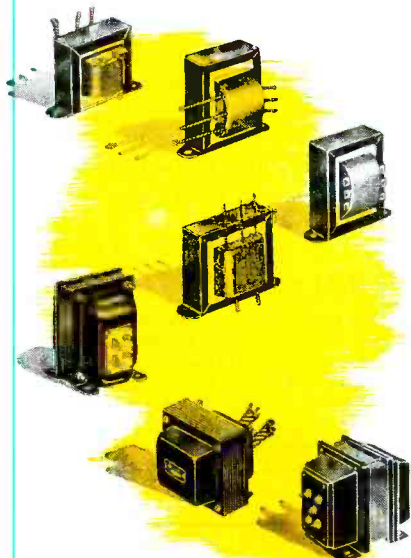
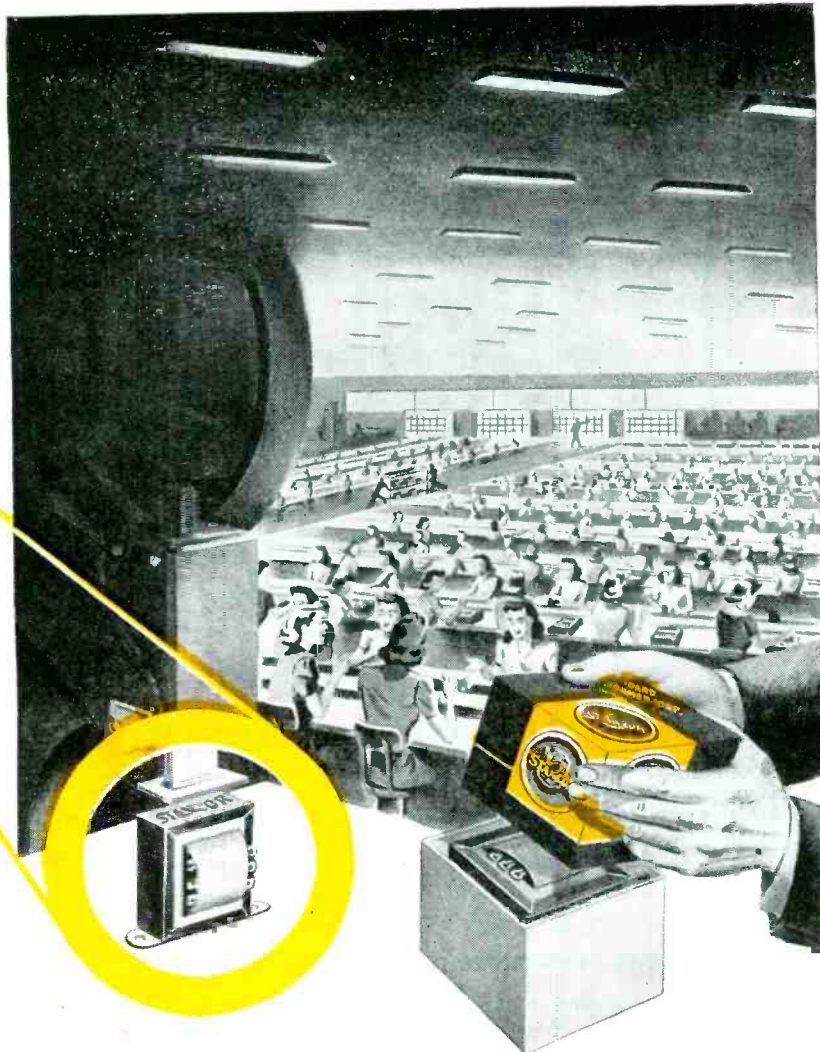
MODEL AR-10 REFLEX SPEECH MASTER REPRODUCER

Specially designed reflex horn increases efficiency in mid-range, giving added effectiveness and punch to speech quality when used for paging, intercom and call systems operated at moderate levels. Reflex construction prevents direct access of snow or rain to speaker diaphragm. Power rating 6 watts. Space within case provided for mounting 1/2 x 1/2" transformer. Over-all diameter 10", depth 8". Complete with bracket for wall or post mounting.

	List Price
AR-10 (ST-643) with 3-4 ohm voice coil	\$20.00
AR-10 (ST-644) with 45-50 ohm voice coil	20.75

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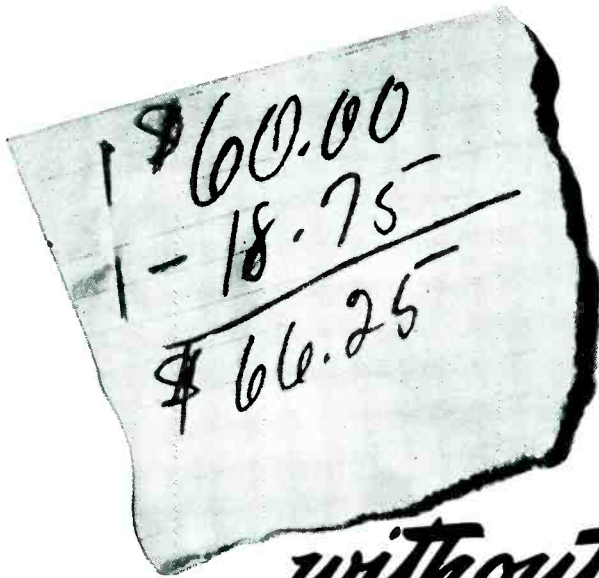
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PART 2 OPERATING THE MASTER CONTROL

Chapter 6. Where Split Seconds Count.

PART 3 OPERATING OUTSIDE THE STUDIO

Chapter 7. Remote Control Problems, 8. Remote Versus Studio Pickups, 9. Remote Musical Pickups, 10. Eye-Witness Pickups and Mobile Transmitters, 11. The Live Symphony Pickup.

PART 4 OPERATING THE TRANSMITTER

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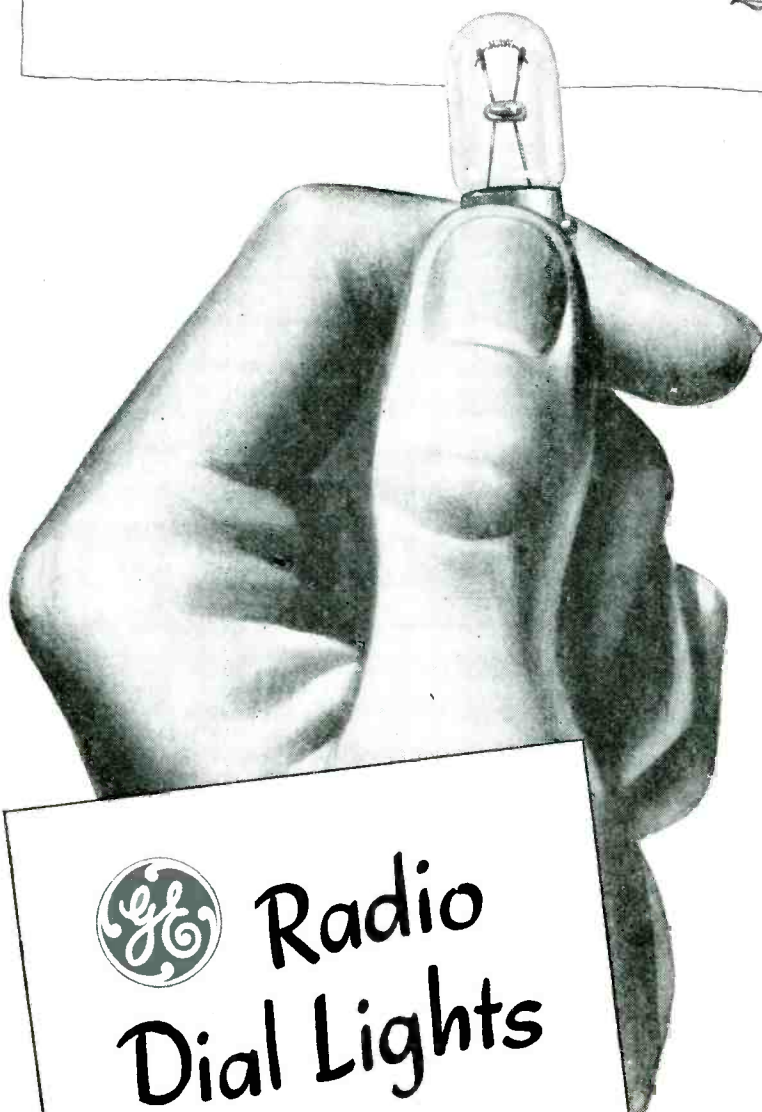
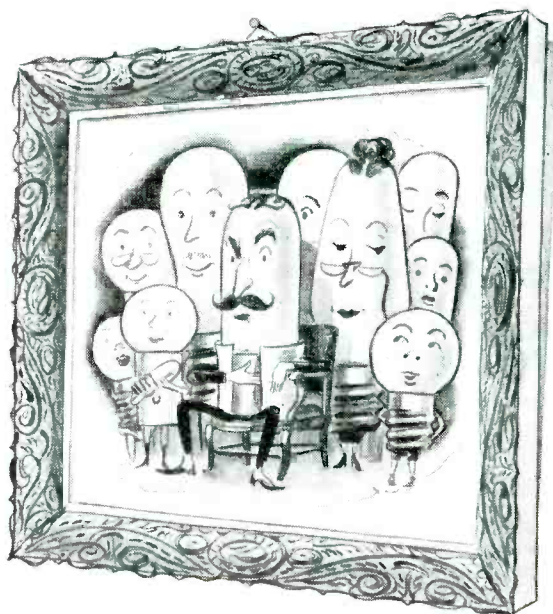
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G-E LAMPS
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A-M/F-M Signal Generator

[See Front Cover]

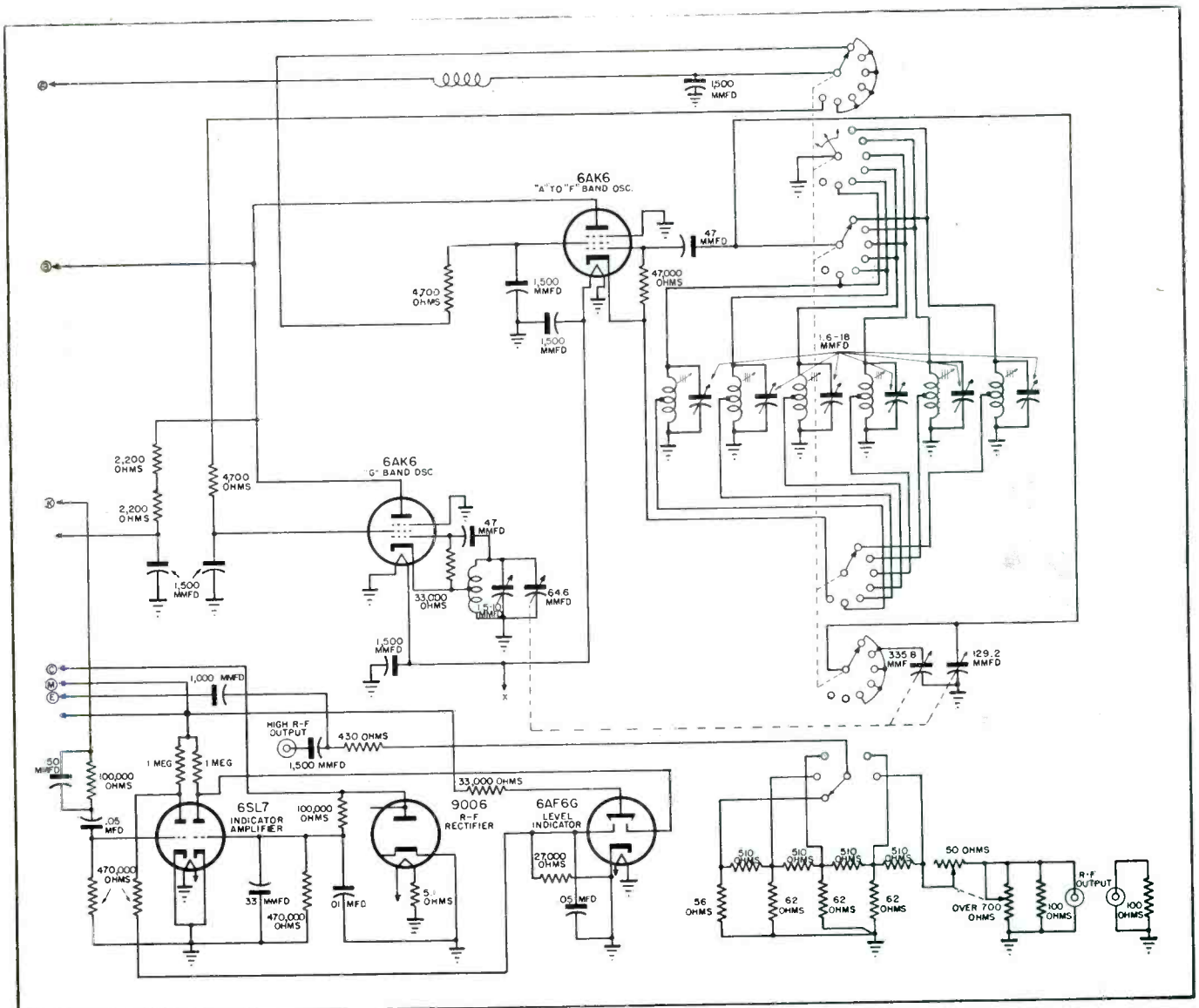
A SIGNAL GENERATOR (G. E. YGS-3) for f-m and a-m servicing, providing eight types of outputs, appears on the cover and Fig. 1 this month; unmodulated r-f, r-f plus crystal, fixed audio, variable audio, modulated r-f, modu-

lated crystal, f-m (100 kc to 200 mc) and unmodulated crystal.

The circuit employs eleven tubes: four 6AK6 r-f oscillators, one 6AG5 reactance modulator, one 6AF6 electron-ray tube, one 6SL7 electron-ray

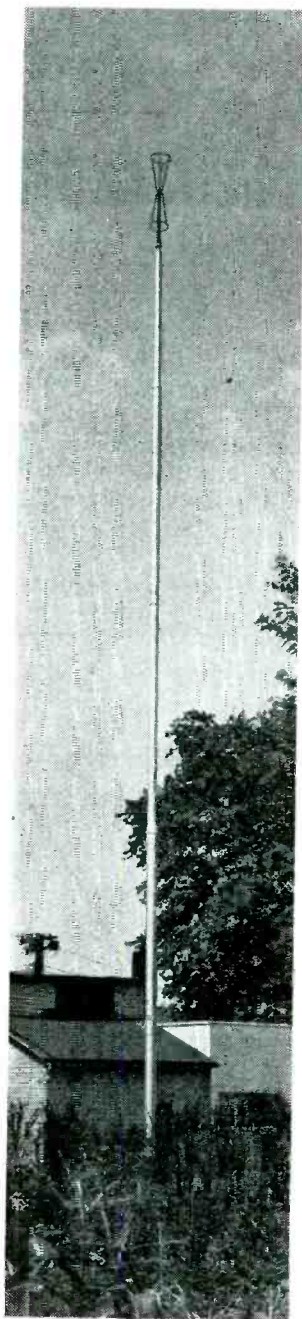
tube amplifier, one 6SN7 audio oscillator, 6J6 mixer, and a 9006 r-f rectifier and 5Y3 power rectifier. In the generator are means for simultaneously supplying modulated voltage for the
(Continued on page 35)

Fig. 1. The oscillator, level indicator, indicator amplifier and r-f rectifier circuit of the signal generator. The 64.6, 129.2 and 335.8 mmfd values represent the capacities of the rear section, mid-section and front section of the variable tuning unit in the generator.



Servicing Two-Way Cab

Painesville, Ohio, Service Man, Who Set Up an Installation and Servicing Program For Local Taxi Company Operating Seven Cabs, Describes the Many Opportunities Which Exist In Taxicab Servicing Today. Equipment and Test Techniques Analyzed.



THE GROWING POPULARITY OF v-h-f m 2-way mobile equipment, particularly taxicab radio, has opened a bright new market for the Service Man, providing profitable long-term contract business. It has been possible to arrange for both the installation and servicing of the fixed and mobile equipment. In my case, a tiein with the local cab company with seven cabs, has been effected.

Background

Upon my return from the Navy, I felt that I'd like to capitalize on my wartime and ham v-h-f training, applying it to some phase of servicing in which I had been active before the war. Taxi work seemed to fit the bill and a talk with Jack Mahoney, owner of the local Lake Cab Company, proved I was on the right track. He

had decided to put radio in his cabs as soon as possible.

Planning

As was the case in many instances, he had to wait a number of months before actually getting delivery on his gear. In the meantime we had a good chance to plan together as to how we would work out the installation and maintenance problems when the equipment did arrive. Our first problem, of course, was the selection of the best type of equipment.¹

Fee Arrangement

Next, we agreed on a fee arrangement which provided for planning the system, as well as the installation and maintenance. This is a particularly important move.

(Top, left)

The 90' antenna mast at the Lake Cab Company's central station. Antenna is a biconical type.¹



¹Bendix 110-A.

The v-h-f cab radio in use.

Antennas

In analyzing the fixed station problems, a high, well-situated site was selected for the antenna. Installation procedure called for a mast and coaxial cable which would provide maximum strength in case of high winds, with

¹Bendix used in this installation.

Radio

by T. M. ALANEN

the coax leadin, either inside the metal pipe or secured in a permanent position to afford stable signal strength.

Equipment Required

The most used items of test equipment for v-h-f taxicab servicing include a r-f signal generator, variable audio oscillator, set of absorption-type wave meters, sensitive volt-ohm-milliammeters, secondary frequency standard, tube tester, preferably of the dynamic mutual conductance type, and a crystal frequency indicator, a must item to check frequencies, since FCC insists on *on-the-beam* accuracy. Also required are test harnesses designed to incorporate a voltmeter and a milliammeter to give continuous indications of input voltages and current while servicing the equipment in the shop.

Transmitting License

Another prime requirement is a second-class radiotelephone license, without which it would not be possible to test the transmitter portion of the systems.

Trouble Sources

From my own observations, I have concluded that inoperative taxi radio sets found in some cabs and dispatching offices are due to installation faults; the result of poor or inefficient planning of the installations and the systems function. Also, for a large majority of taxi communication systems, when inoperative or intermittent, one can probably blame routine tube failures. Such mechanical devices as the magnetic squelch are apt to give trouble.

Training

Radio dispatching of taxicabs is very new to most cab dispatchers and driv-



Checking frequency of cab equipment.

ers. Therefore, it comes well in the scope of the local Service Man to undertake instruction of all personnel who will use the equipment, not only from the standpoint of better utilization of the system for the cab company, but also recalls for minor items, which are time-consuming and not profitable.

Usefulness of Service

From the operational point of view, which is naturally not within my province, it might be well to mention that both the cab users of Painsville and the owner of the Lake Cab Company are well pleased with the new communications facility. Fares can hardly believe that cabs can be dispatched to their own address in such short order. Early expectations are

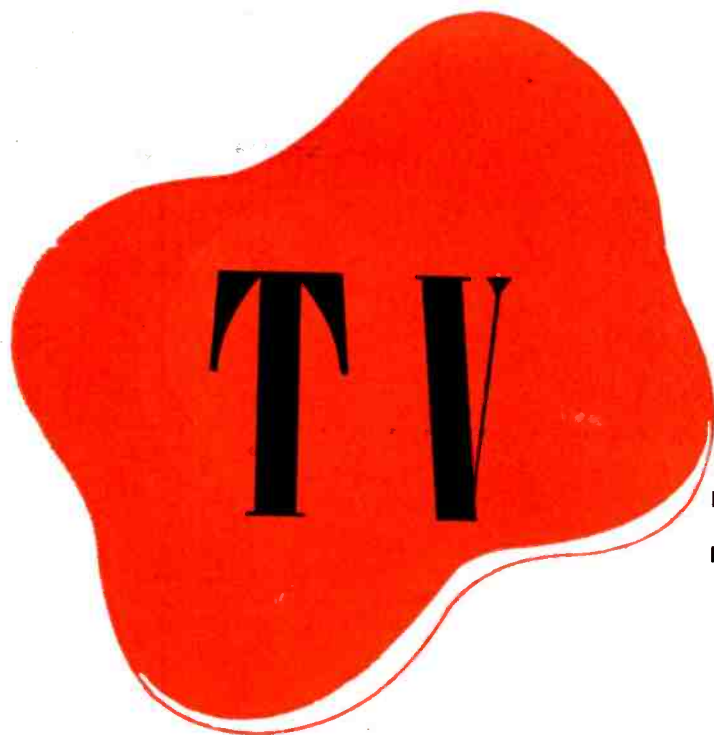
that between 10% and 15% less gas and oil will be required with radio cabs, due to a minimum of dead-mileage travel.

Servicing Opportunities

It would seem that the operator in the small town, both the taxi owner and the Service Man, are missing a bet if they do not get together to their mutual profit. In some localities, such as Painsville, located on Lake Erie, the v-h-f radio technician can also undertake aircraft and marine radio installation and maintenance, as well as the taxi projects. This type of business coupled with the old standby of home Service leads to an expanding business and a greater margin of profit.

Alanen in his Service Shop.





Servicing Equipment

by J. H. RUITER, Jr.,

Manager, Technical Publications
Allen B. Du Mont Laboratories

THE POTENTIALITIES of the field of television Servicing present a very attractive picture to the Service Man. Particularly important in the activity are the servicing instruments. Unlike standard broadcast receiver servicing, tv work requires quite an assortment of apparatus. To guide the Service Man on what types of equipment are basic musts and what other types should be available, if economically possible, the table below and at right have been prepared. Data are based on practical experience.

FURTHER DESIRABLE EQUIPMENT

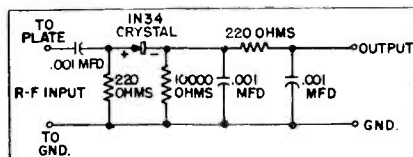
Equipment	Approx. Price	Pertinent Specifications	Remarks
1 Portable Television Receiver	\$300	For making pre-installation surveys. It has been found economical to make such surveys for each installation in large cities and for each area in suburban districts.	Useful for analyzing such problems as weak signals, ghosts, best antenna locations, and the position of the receiver prior to installation.
2 Kit of Various Antenna Arrays	\$40	Kit includes: single dipoles, double dipoles, Cosgrove antenna and suitable reflectors.	Also used in the pre-installation survey.
3 Cathode-ray 'scope	\$250 to \$600	Vertical amplifier having frequency response flat to 2.5 mc.	Used in troubleshooting and in careful analysis of sweep-circuit wave forms. The wide frequency response is necessary to give true reproductions of sweep wave forms.

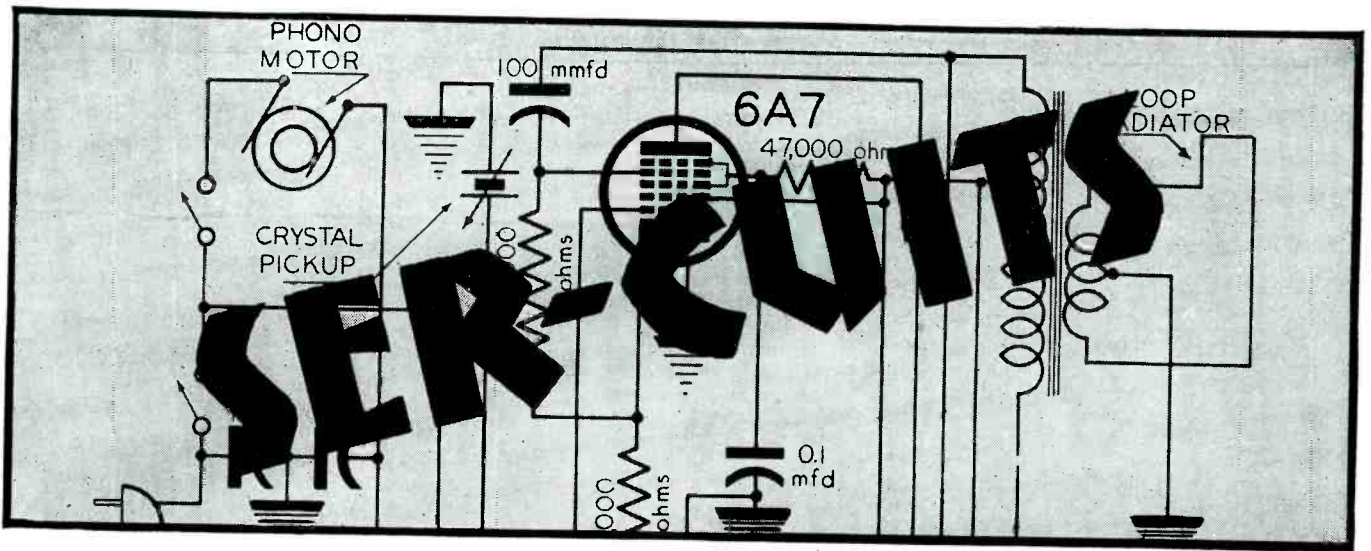
OPTIONAL EQUIPMENT

1 Video Sweep-frequency Generator	Sweeps through the frequency range of video amplifiers; 0-5 mc.	Used in quick check of video amplifiers.
2 Square-wave Generator	Generates a square wave from 10 cycles to 50 kc.	Used for square-wave testing of video and audio amplifiers.
3 Voltage Calibrator	\$35	Measures peak-to-peak voltages directly on the screen of the scope.	Useful in servicing sweep circuits.

ESSENTIAL EQUIPMENT

Equipment	Approximate Price	Pertinent Specifications	Remarks
1 Voltohmmeter	\$30 to \$75	A High sensitivity (preferably 20,000 ohms per volt). B Measure d-c and a-c voltages. C Approximate ranges: 0-1/10/100/500/1000 volts. D Ohmmeter with approximate ranges of: 0-1000 and 0-100,000 ohms, and 0-10 megohms.	C External shunts can be used to measure higher voltages. Direct measurements of very high voltages are usually avoided.
2 Tube Tester	\$45 to \$140	A Mutual conductance type. Capable of testing the newer-type tubes employed in tv receivers: 1B3GT 6AT6 6K6GT 6V6GT 5U4G 6AQ7GT 6SA7 7B4 5V4G 6AU6 6SG7 7B5 5Y3GT 6B6 6SH7 7B6 6AC7 6BA6 6SJ7 7C5 6AG5 6BG6G 6SL7GT 7F8 6AG7 6H6 6SN7GT 7W7 6AK5 6J5 6SK7 8O7 6AL5 6J6 6SV7 8O16 6AS7G B The cathode-ray tubes in common use are: 7EP4, 7GP4, 10BP4, 12JP4, 15AP4, and 20 BP4.	B The c-r tubes employed in tv receivers cannot be tested by the ordinary commercial tube-tester. Usually, they must be returned to the manufacturer for proper testing. However, it is possible to check them by substituting them in a receiver which is known to be operating properly.
3 Cathode-ray 'scope	\$300	A1 5" diameter cathode-ray tube. A2 Both horizontal and vertical amplifiers should provide distortionless deflection of twice full scale. A3 Vertical amplifier frequency response flat from 2 to 100,000 cps. A4 Vertical amplifier must have high sensitivity deflection factor: 0.01 rms volt/in. or better.	A1 To obtain as large a pattern as possible for alignment response curves. A2 To expand the normal response curves to take full advantage of the 5" tube. A3 To give accurate response curves of which the ideal is equivalent to a 30-cycle square wave. A4 To provide a stage-by-stage alignment of the sound and video i-f stages.
	\$100 to \$150	Nearly any general-purpose 'scope will serve to do average work.	This class of instrument is highly satisfactory for a-m servicing but it is not sufficient in sensitivity, linear expansion of sweeps, and l-f response for high-quality tv servicing.
4 Signal Generator (Variable)	\$400	A Frequency variable from 0 to 4 mc. with output voltage constant.	A For servicing audio and video amplifiers, and checking frequency response of video amplifier.
	\$50 to \$200	B Frequency not completely variable throughout the above range, but sufficient distribution for good spot checks of both audio and video amplifier response.	B The signal generator used for a-m servicing will probably suffice.
5 Sweep-Frequency Generator (Wobulated R-F Signal Generator)	\$450 to \$1200	Center frequency variable from 20 to 30 mc. (minimum). Sweep frequency which varies the center-frequency from ± 200 kc to ± 5 mc. Output voltage: 0.1 volt minimum, with an attenuator to control the output according to the needs.	Used for alignment of video and audio i-f stages and the discriminator. If the center frequency is sufficiently high, it can also be used to align the r-f stages of the receiver. Harmonics of lower frequencies can often be used for this purpose.
6 R-F Signal Generator	\$500	Frequency variable from 20 to 70 mc. Accuracy: Within ± 10 kc. Calibrated output attenuator.	Used to supply a marker signal for alignment of video and audio i-f stages and the discriminator. Also used in the alignment of the r-f section and the setting and attenuation of sound traps.
7 Crystal Detector Probe	\$5	The circuit shown below can be built into a probe and connected to the 'scope by a suitable length of coaxial cable.	Used in the stage-by-stage alignment of video and audio i-f stages.





F-M Circuit Developments: The FreModyne... A-C/D-C F-M... Commercial Type F-M Receivers With Cascade Limiters, Adjustable Squelch, etc.

THE PAST FEW WEEKS have seen the development and production of many unusual and extremely effective f-m circuits.

In the Hazeltine FreModyne circuit, Fig. 1, for instance, we have a super-

het-superregen arrangement with one dual triode. One triode of this tube serves as the local oscillator required for superhet frequency conversion. The other triode (the superregener-

ator) performs four functions: superhet converter to an i-f of about 22 mc, superregen i-f amplifier of high gain, converter from f-m to a-m, and detector delivering a-f. The f-m signal is converted to a-m by side tuning the receiver.

Fig. 1. How the 12AT7 dual triode is used in the FreModyne superhet-superregen f-m/a-m system.

Radiation Control

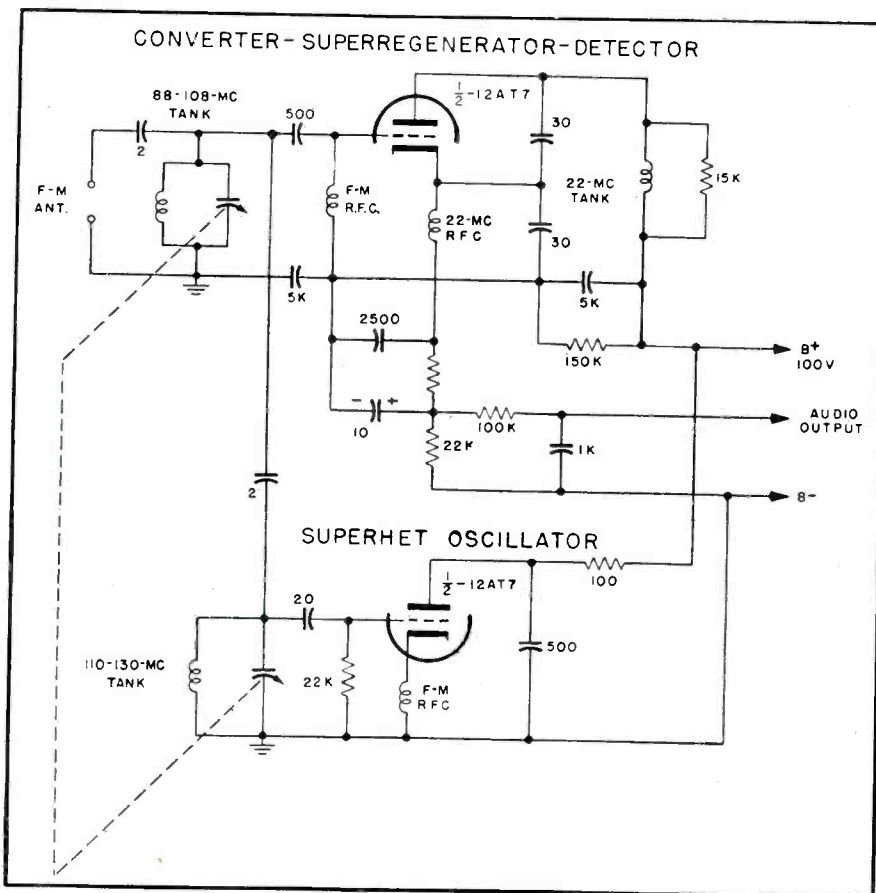
The use of the superhet principle greatly reduces signal frequency radiation, in comparison to a conventional superregenerator, providing approximately a 30- to 40-db reduction. This circuit also includes an automatic stabilizing arrangement, which does away with the normal superregen regeneration control.

The detector characteristic of the triode in this system is logarithmic so that large amplitude noise pulses, that are not ignored, are compressed.

Operation of Circuit

In operation an f-m signal is applied through a signal frequency tuned circuit to the grid of the superregenerator. Here it is mixed with a local oscillator signal produced by a conventional Colpitts oscillator circuit. The resulting 22-mc signal is amplified by a Colpitts-oscillator type of superregen detector and the audio is recovered across a 22,000-ohm resistor in

(Continued on page 34)



A 500 Speaker-2500 Earphone Sound System

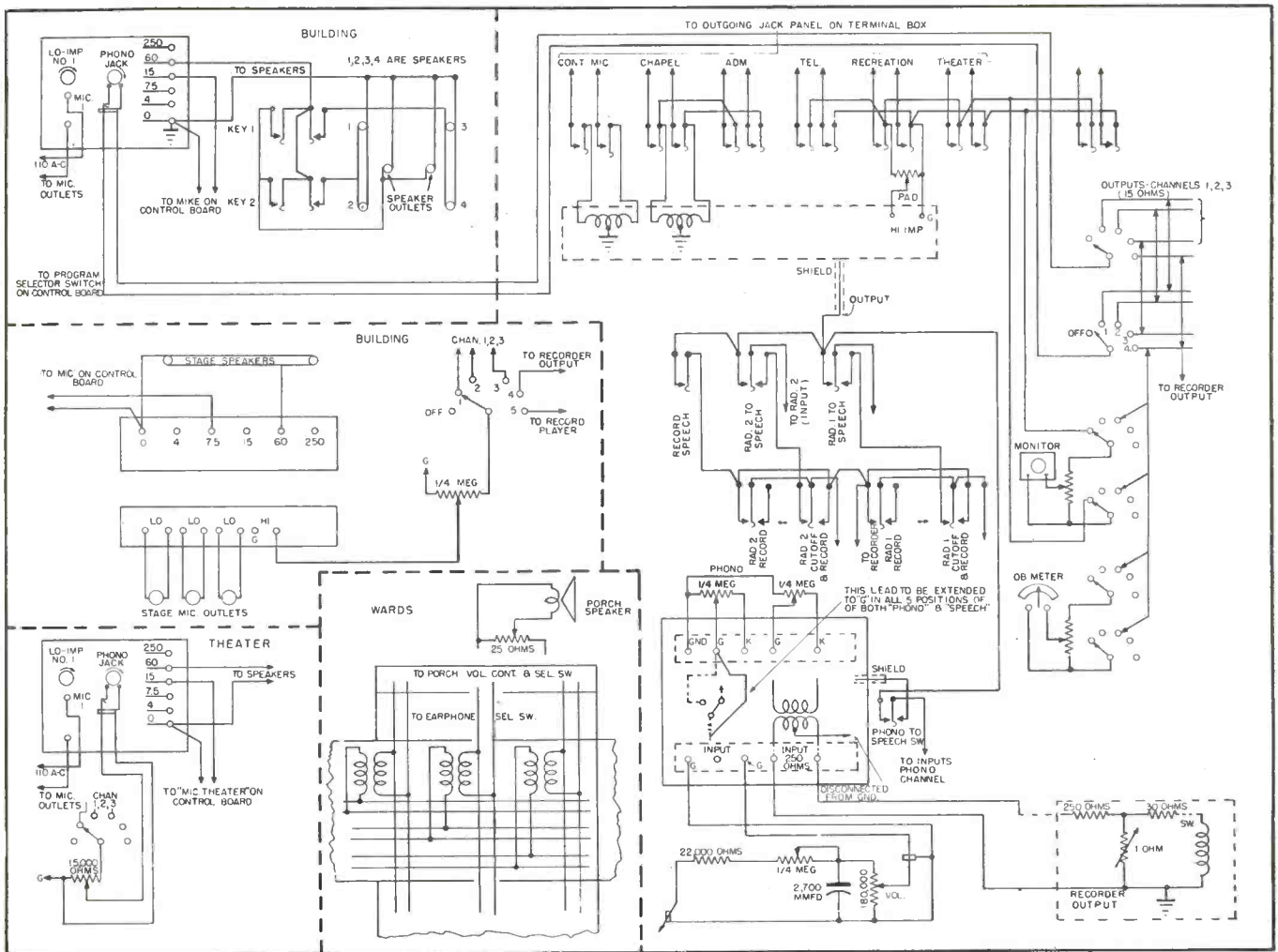
Flexible Sound Setup At Crile Veterans Administration Hospital In Cleveland, Ohio, Over Which Recordings, Interviews and On-The-Air Programs Are Fed In a 15½-Hour Daily Schedule. Microphone Outlets In Recreation Hall, Theatre, Gym, Chapel and Wards. Volume Control and Selector Boxes At Each Listening Post.

THE DESIGN AND INSTALLATION of multiple-feed systems routing on-the-air, phono and live programs through-out plants, hotels, clubs, apartments and hospitals, has become a specialty of many. The setups have varied from simple few-room single-floor arrangements to elaborate networks for hundreds of rooms on many floors such as the three-channel 500 speaker-2,500 headset link¹ recently installed in the

(Continued on page 38)

¹Designed by Don Criss of the Cleveland Radioelectric Corp.

Wiring system for the console, remote pickup and general outlets.

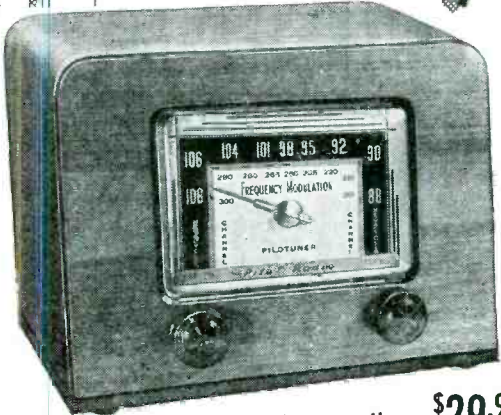
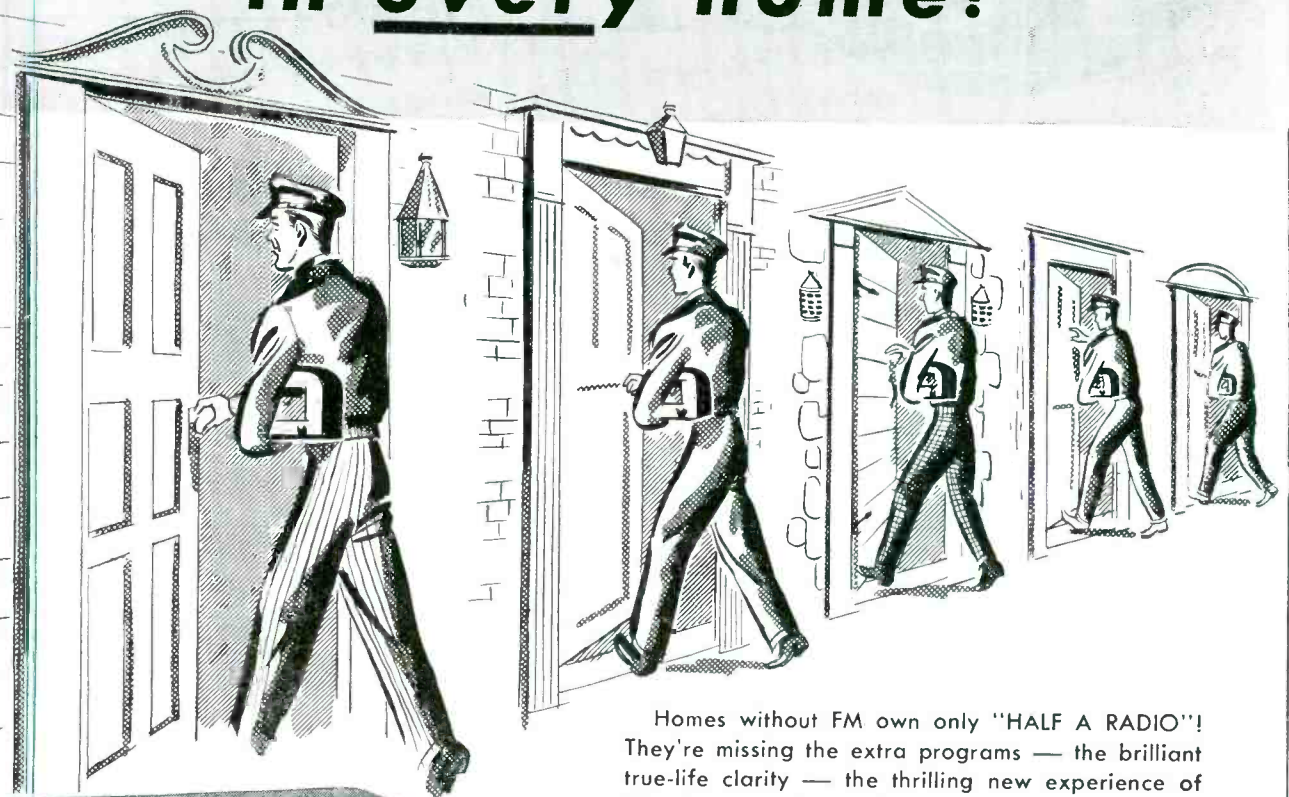


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TUBE News

Frequency-Drift Compensation . . . Microphonics Caused By Heater-Cathode Capacitance Variations . . . Circuits for 6BA6, 6BE6 and 12BA6, 12BE6 Tubes

IN F-M AND TV RECEIVERS the problem of frequency drift, during warm up, occurs often. It has been found, in many instances, that the trouble is caused by tubes and their sockets, where a short-time frequency drift

lowers the oscillator frequency during tube warmup.

When the receiver has miniatures, the drift condition can be minimized. It appears as if heat is conducted directly from the tube elements through the base pins to the tube socket contacts. Because the socket dielectric material is a poor heat conductor, little heat is lost to the chassis. Consequently, the changes in temperature at the socket terminals are closely related both in time and in relative value to the temperature changes of the tube elements to which the terminals are connected.

mmfd/°C provided most effective results. The capacitor was connected across the terminals of a mica-filled socket as shown in Fig. 2, between pins 3 and 6. This is equivalent electrically to connecting the capacitor

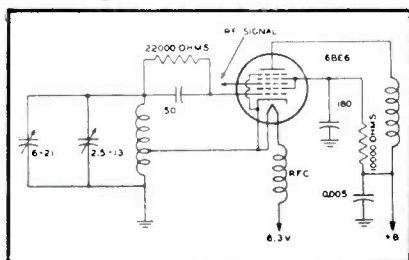
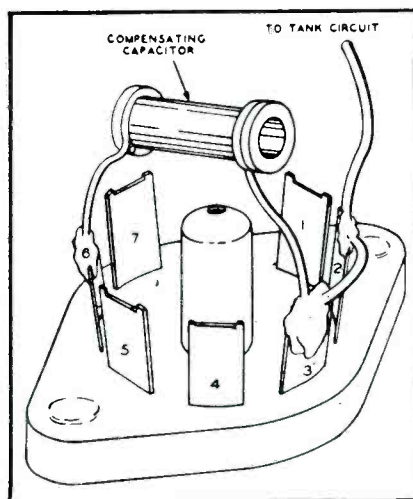


Fig. 1. Schematic of oscillator circuit used to study frequency drift compensation.

Fig. 2. Location of compensating capacitor across miniature socket terminals.



In studying the problem, two tests were conducted with a receiver using a 6BE6 as a local oscillator in a conventional cathode feedback circuit; Fig. 1. First a receiver was tested without any form of frequency compensation. The chassis was taken out of the cabinet and the oscillator was operated with a fundamental frequency above the signal, 110.7 mc. It was found that the warmup drift was about 200 kc. When a cold 6BE6 was substituted for a hot tube in the set after it was thoroughly warmed up the measured drift was about 140 kc. A mica-filled rubber socket was substituted for the phenolic wafers used in the set and the drift was again measured with a cold 6BE6 inserted in the hot chassis. This time the drift was reduced to about 100 kc. It was found that a capacitor with a negative temperature coefficient could minimize the drift. A 8.2 mmfd capacitor with a negative temperature coefficient of .00075 mmfd/

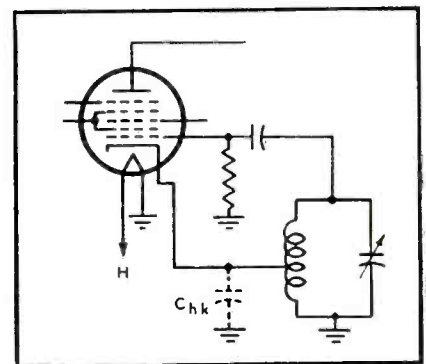
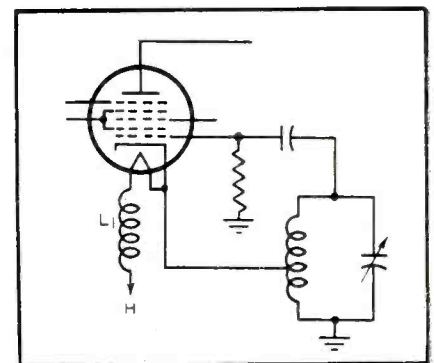


Fig. 3. Typical 100-mc converter circuit with a Hartley-type oscillator used to study receiver microphonics. (See page 37 for discussion of microphonics.)

Fig. 4. Use of r-f choke in the second heater lead which prevents heater from loading the oscillator and minimizes microphonics.



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90 SUGGESTIONS For Better Service Business

by **R. S. FENTON**

Sales Manager, Universal Parts
General Electric



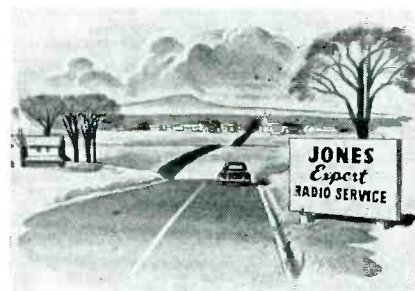
In Your Store

- 1 Be courteous to customers.
- 2 Be sure your store is neat and clean.
- 3 Have tubes, parts and other stock carefully arranged on shelves.
- 4 Make use of sales aids, counter displays and streamers.
- 5 Display merchandise for sale prominently.
- 6 If you have a display window, change it frequently to attract attention.
- 7 Make use of newspaper, magazine pictures or articles. Paste them on your window or door.
- 8 If you have space in the window, do some of your work there. People like to watch a technician.
- 9 If customers like to watch while you work, explain some of the things you do in simple language. They will acquire respect for your profession and your ability.

- 10 Read your technical magazine carefully. Each issue has a wealth of ideas to draw from.

In the Home

- 11 When you are called to do repairs in the home, be systematic.
- 12 Place the set on a clean piece of material, and spread your tools out on it, too. Don't place tools or equipment on furniture or rugs.
- 13 If children are about and interfere, don't be annoyed—explain to the mother that they will be safer away from harmful voltages.
- 14 Find out if there are other sets in the home that need repairing. Often you can make another sale.
- 15 If you repair appliances, call that fact to the housewife's attention. Profitable work may be found in every home. People often put off repairs until it is called to their attention.
- 16 Leave a card with your address and telephone number.
- 17 Put a sticker on the set with your address and telephone number.
- 18 Ask the housewife to refer her friends to you.
- 19 Demonstrate the perfect working condition of the set before you leave.
- 20 While demonstrating, wipe off the set, touch up any scratches, wipe glass over the dial. These little extras register in a big way.

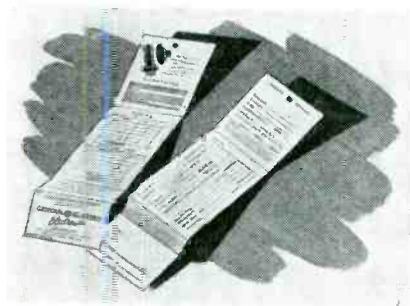


Advertise

- 21 Use your local papers—if only to reproduce your business card.
- 22 Make good use of one-cent postal cards carrying your own message.
- 23 Keep your mailing lists up to date.
- 24 Send out envelope stuffers with every bill—calling attention to your merchandise and services.
- 25 Use blotters, book matches and other media which are serviceable items, in calling attention to your business.
- 26 Signs at good locations are helpful.
- 27 Your display window is your best advertising medium. A 'scope in operation will attract attention.
- 28 If local ordinances permit, a speaker carrying broadcasts always gets an audience.
- 29 If you have a speaker, place a sign in your window everytime a special program is to be broadcast. Side-walk audiences may have many potential customers.
- 30 Your delivery car or truck can do a real advertising job for you. Put it to work.

Keep Your Customers Happy

- 31 Don't quote prices before you make a thorough analysis of the job.
- 32 Explain before you start work on a job what must be done if the customer has indicated what he thinks he should pay.
- 33 Keep a careful record of time spent and materials used on a set.
- 34 If you make replacements, keep the old parts to show to the customer. Seeing the evidence is often convincing.
- 35 Don't give any hurry-up delivery dates if you can't be sure. A delay will often cause more trouble than to add a day or two at the beginning.
- 36 Call up before you return a set to make sure that someone is home to receive it. This saves time and saves the customer disappointment.
- 37 Make this a rule: Never make promises on prices or delivery unless you are sure you can keep them.
- 38 When you return a set, place it in the proper location in the home and then test it before leaving.
- 39 In sending a bill, list labor, materials, and parts. If the labor seems great, a little explanatory note at the bottom of the bill will go far towards keeping the customer happy.
- 40 Always keep your customers happy even if they are unreasonable. A difficult customer can become your best booster.



Make Your Business More Efficient

- 41 Use modern business practices. They can save you money.
- 42 Use job tickets to keep track of your work.
- 43 Use modern equipment to speed repairs.
- 44 Keep your bench orderly. Don't waste time hunting for tools or parts.
- 45 Keep close check on costs. You can avoid serious losses.
- 46 Keep month by month records as future guides.

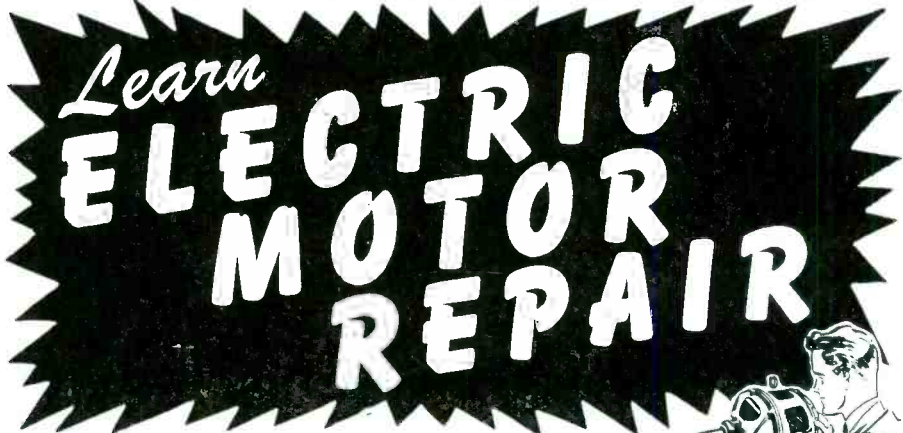
(Continued on page 28)

THE LOGICAL MOVE

for any serviceman who wants to

EXPAND HIS BUSINESS

... into an uncrowded field!!!



This Big Book Teaches You Every Step of the Work . . . for only \$5 complete

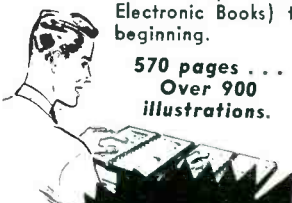
Look ahead to where the BIG profits might be when today's radio repairing rush dies down!

There's good pay in electric motor repair work. Every home, every business house and industrial plant is a prospect. It's an easy and logical addition to any radio service business. Best of all, the field is uncrowded—because, up to now, there hasn't been any easy way to learn the work in spare time. Be the man in your community who cashes in on this glowing opportunity!

Based on What Can Be Learned from This Big Book Alone, You Can **PREPARE FOR PROFITABLE SERVICE ON PRACTICALLY ANY MOTOR!**

ELECTRIC MOTOR REPAIR, the unique new bench book with Duo-Spiral Binding (by publishers of famous Ghirardi Radio-Electronic Books) teaches you this profitable work from the very beginning.

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Over 900 illustrations.



Explains every detail of motor trouble diagnosing and repair—from simple cleaning and adjustments TO COMPLETE REWINDING. Covers AC and DC motors, synchronous motors and generators and BOTH mechanical and electrical control systems. Quick reference guides for use right at the bench show exactly how to handle specific jobs. When a certain type of motor comes in for repairs, just look it up! The book shows you what to do and how to do it!

"BORROW" IT AT OUR RISK!

ELECTRIC MOTOR REPAIR is ideal for beginners and equally valuable for daily use in busy motor shops. Unique Duo-Spiral Binding divides book into 2 sections, permitting both text and related diagrams to be seen at the same time. Over 900 specially prepared diagrams and illustrations make your training easier—AND TWICE AS FAST. Send coupon now! Practice from ELECTRIC MOTOR REPAIR for 5 full days. If you're not more than satisfied, return it to us and we'll cheerfully refund EVERY CENT OF YOUR MONEY.



PRACTICE FROM IT for 5 full days!

5-DAY MONEY-BACK GUARANTEE

Dept. S-127, Murray Hill Books, Inc.
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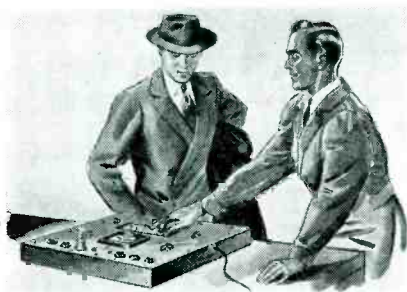
Enclosed find \$5 (\$5.50 foreign) for a copy of ELECTRIC MOTOR REPAIR; or send C.O.D. for this amount plus cost of postage (no foreign C.O.D.'s). In either case, if not satisfactory, it is understood I can return book for complete refund of my money.

Name.....
Address.....
City & Zone..... State.....

- 47 Make every square foot of your shelf pay its own way.
- 48 Check your stock of parts. Don't run low on any item.
- 49 Don't let work accumulate. A lot of unrealized profit accumulates too.
- 50 Don't sweep out odd nuts, bolts, screws, washers that have dropped on the floor. Salvage them for future use.

Make an Extra Sale To Every Customer

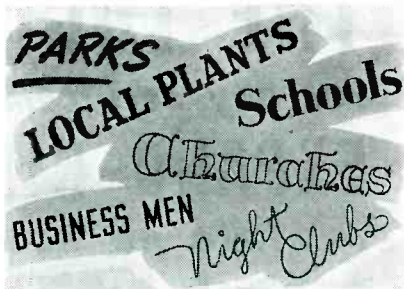
- 51 If the set requires minor repairs show the customer how much better it can sound with a new speaker.
- 52 Suggest new parts to improve performance.
- 53 Let the customer see how you test tubes on your tube checker.



- 54 When a combination comes in, suggest a modernization job—new pickup, tonearm, preamplifier, speaker. The job will bring you a nice profit and be a real service to the customer.
- 55 Find out if the customer owns a car. A new auto antenna will step up car radio reception.
- 56 If the customer operates a plant or is engaged in industry, let him know of the additional services and accessories you have to offer.
- 57 Suggest a check on his car radio.

Look Around for Other Business

- 58 Study up on ham receivers and go after this servicing business.
- 59 Get a second-class radiotelephone license so you can service police, taxi, truck, aircraft, marine and bus equipment.
- 60 Your transmitting ticket will also come in quite handy in servicing ham rigs.
- 61 Sound systems in local auditoriums, parks, schools and night clubs can be serviced under contract. A nice backlog to take care of your overhead.
- 62 Portable sound systems can be rented for many occasions.



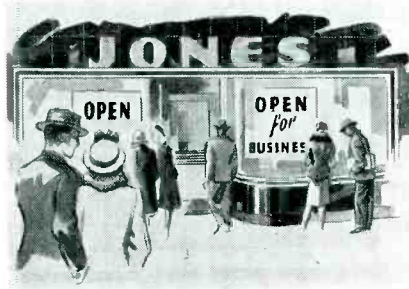
- 63 Study up on therapeutic machines. Physicians may need your help. Here's where a transmitting license will be of help, too.
- 64 Form a youngsters radio club. Give them one evening a week. It will pay off.
- 65 Join your local civic organizations and fellow Service Men's organizations.
- 66 Don't hesitate to give talks before groups. Show them some of the things the modern, professional Service Man is doing.

Keep Up-To-Date

- 67 Study up on l-m and tv.
- 68 Build up a good library.
- 69 Attend meetings when you have a chance.
- 70 Start a scrapbook of interesting items on radio subjects.
- 71 Arrange catalogs for convenient reference.

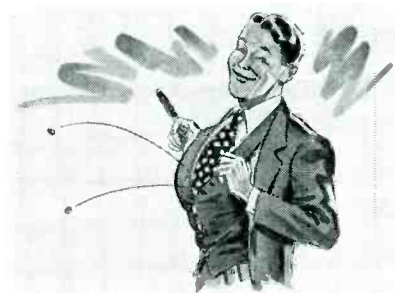


- 72 Read ads. You can learn a lot and use some of the ideas yourself.
- 73 Try your hand at writing articles. You'll get to be known.



Keep Growing

- 74 You are in a rapidly growing and expanding business. Grow with it.
- 75 Your local bank wants to see you grow. Don't hesitate to consult with its personnel.
- 76 Your community wants to see you successful. Be a part of it.
- 77 Your local chamber of commerce wants to see you grow. They can help you.
- 78 The salesmen who call on you want to see you grow. They can give you plenty of tips.
- 79 Your fellow business men want to see you grow. Get to know them. They can often send business your way.



- 80 Your friends want you to grow, and will help you with their business.
- 81 You, yourself, want to grow. A successful and expanding business enterprise is a matter of pride and increasing profit.

Plan Ahead

- 82 Plan ahead on location. Expansion may require a new site.
- 83 Plan ahead on your work to accomplish jobs more efficiently.
- 84 Plan ahead on the lines you will want to carry as you grow.
- 85 Plan ahead on ideas for building your business.
- 86 Plan ahead as new developments in the industry offer new opportunities.
- 87 Plan ahead by studying your business and how it might be improved.
- 88 Plan ahead by watching the successful businesses near you and applying their principles in your own operation.
- 89 Plan ahead by studying general business conditions.
- 90 Plan ahead by making this your objective: "I am going to be the biggest and best Service business in this community."



**LOWELL, MASS., SERVICE MANAGER
WINS FIRST PRIZE IN RIDER
MANUAL CONTEST**

Albert Giddis, 362 Adams Street, Lowell, Mass., in the servicing business since 1925, won first prize of \$500 in the recent hundred-word contest conducted by John F. Rider, Publisher, Inc., 404 Fourth Ave., N. Y. 16, N. Y.

Mr. Giddis is service manager for Gaumont Bros., 338 Merrimac St., Lowell, Mass.

The A. W. Mayer Co., 895 Boylston St., Boston, Rider distributors, received \$100 first prize, awarded to the distributor listed by the prize winner as being the parts jobber supplying the Gaumont firm.

Other cash awards went to: George F. Escher, 1205 Chestnut St., Alameda, Calif.; Newell Terry, 350 S. Central Ave., Eartow, Fla.; F. Dale McGinnis, Aurora, W. Va.; William L. Vincent, 160 Fair St., New Bedford, Mass.; C. A. Watson 551 State St., Meadville, Pa.; Charles S. Savin, 224 E. Main St., Aho-skie, N. C.; R. F. Olson, 3556 Lime Ave., Long Beach, Calif.; O. B. Miller, 416 Hudson Ave., Albuquerque, N. M.; and Tom Prickett, Mexia, Texas.

Other Rider distributors who won cash awards were: Wave Miller & Co., 188 Twelfth St., Oakland, Calif.; Radio Accessories Co., 1054 S. Florida Ave., Lakeland, Fla.; Trenton Radio Co., Clarksburg, W. Va.; C. E. Beckman Co., New Bedford, Mass.; Warren Radio, Erie, Pa.; Radio Supply Co., 711 Granby St., Norfolk, Va.; J. Miller Parts Co., 111 W. Lead Ave., Albuquerque, N. M.; and Wilkinson Bros., Dallas, Texas.



Top winners in the recent Rider manual contest: Albert N. Giddis (left) and Henri Jappe, partner of A. W. Mayer Co. (right). John F. Rider who presented the awards is in the center.

* * *

**R. E. CASSATT NOW G. E. RECEIVER DIV.
ASST. ADVTG. & S. P. MGR.**

Robert E. Cassatt, for the last two years advertising and sales promotion manager of the G. E. specialty division, has been appointed assistant advertising and sales promotion manager of the receiver division.

In his new position, as assistant to Fred A. Parnell, he will be primarily responsible for exploitation of component

(Continued on page 30)

**mcmurdo
SILVER LCETI** **MAKE
FM and TV
SERVICING
Easy!**

MCMURDO SILVER Laboratory Caliber Electronic Test Instruments are designed to make FM and Television servicing easy. Each is accompanied by comprehensive instructions . . . the added "know-how" to transform your shop into a modern service laboratory. The new instruments used in laboratories and factories building the radios you must service, they are proven in use by tens of thousands of smart service technicians. Despite unequalled quality, accuracy and completeness, prices are the lowest.

906 FM/AM SIGNAL GENERATOR

Vital to AM, FM and Television service. 90 kc. thru 210 mc. in 8 ranges directly calibrated $\pm 1\%$ accurate. Variable 0-100%, 400 cycle AM and 0-500 kc. electronic FM sweep, output less than 1 microvolt to over 1 volt spells low strays which put it in the \$500 class. Yet only \$99.50 net.



900 "VOMAX"



Superior quality, range and accuracy make this universal VTVM predominant choice of research and service users. 51 ranges; d.c., a.c., a.f., i.f., r.f. volts; current; db. and resistance. New flexible pencil-thin r.f. probe reaches tightest spots for meter signal tracing thru 500 mc. The outstanding meter, yet only \$59.85 net.

905 "SPARX"

Thousands in daily use prove it the big-money earner. Visual and audible AM, FM and TV signal tracing 20 cycles thru 200 mc. Locates trouble in 30 seconds per tube/stage! Is your shop test speaker; tests phono pickups, microphones, speakers, PA amplifiers, too. Only \$39.90 net.



904 CONDENSER-RESISTANCE TESTER



Laboratory accuracy of $\pm 3\%$. Range $\frac{1}{4}$ mfd. thru 1000 mfd., $\frac{1}{4} \Omega$ thru 1000 meg. Ω . Measures all condensers with internal 0-500 v. rated d.c. applied. Utterly unmatched at only \$49.90 net.

SILVER FM-TV "SCOOP"

MODEL 909 FM AND TELEVISION SWEEP SIGNAL GENERATOR

1 thru 228 mc., true electronic FM & TV sweep variable 0 thru 9 mc. Size and appearance like MODEL 906. Equips you to earn big FM—and TV—service profits, yet only \$48.50 net.

WRITE FOR NEW LCETI AND AMATEUR CATALOG.

OVER 36 YEARS OF RADIO ENGINEERING ACHIEVEMENT

McMurdo Silver Co., Inc.

EXECUTIVE OFFICES: 1240 MAIN ST., HARTFORD 3, CONN.
FACTORY OFFICE: 1249 MAIN ST., HARTFORD 3, CONN.

**For the Finest
Phonograph Performance Ever Achieved . . .**

Newcomb
**ANNOUNCES 2 GREAT NEW
PHONOGRAPH AMPLIFIERS**

with the MAGIC RED KNOB

LOGICAL culmination of years of electronic research and engineering development continuously carried on in Newcomb laboratories, these new phonograph amplifiers, used in conjunction with suitable accessories, will produce unbelievable realism from recorded music or from AM-FM radio tuners connected to them. Their improved response at low volume, their beautifully clear, undistorted treble tones and the exclusive new "Magic Red Knob" control, which virtually eliminates surface noise and distortion from records in any condition, make these two amplifiers the best possible choice for those custom phonograph installations.

MODEL KXLP-30: Its ample power permits use of the famous Newcomb KX-Series dual tone control circuit, which provides tonal range and balance unattainable in less costly circuits. This circuit allows controlled emphasis of the desirable but power-consuming fundamental bass tones, avoiding emphasis of harmonic bass, so unacceptable to discriminating listeners.



MODEL HLP-14: Brings to music lovers an entirely new listening pleasure in a somewhat less expensive unit than the superb KXLP-30. Exceptional tonal balance at whisper volumes is a feature of the HLP-14. Its adaptability to use with the new AM-FM tuners, wide range loudspeakers and new phonograph pickups make it an ideal starting point for those increasingly popular custom installations.



Send for Specifications

AUDIO PRODUCTS CO.

Dept. E, 6824 Lexington Avenue • Hollywood 38, California

News

(Continued from page 29)

and universal parts and, at the same time, will continue to direct the advertising and sales promotion activities of the specialty division.

SOLAR CATALOG

A catalog, SC-2, showing popular types of capacitors and receiver noise filters has been published by Solar Capacitor Sales Corp., 1445 Hudson Blvd., North Bergen, N. J.

Among the items described in the catalog are Superex paper capacitors, midjet hearing-aid capacitors, molded paper ca-

pacitors, speedflash capacitors, plastic-protected dry electrolytics, and twist-prong electrolytics.

NEW WESTON ENGINEERING AND ADMINISTRATION BUILDING

The Weston Electrical Instrument Corporation is now occupying a new engineering and administration building on the plant grounds at Newark, N. J.

With the new structure, the Weston plant consists of 380,000 square feet of floor area in 19 buildings.

ROGAN KNOB CATALOG

A catalog listing stock molded plastic knobs, control handles, instrument knobs,

etc., has been published by Rogan Brothers, 2500 W. Irving Park Blvd., Chicago 18, Ill.



SUPREME DIAGRAM MANUAL

A 192-page manual, *Most-Often-Needed 1948 Radio Diagrams*, has been published by Supreme Publications, 9 South Kedzie Ave., Chicago 12, Ill.

Circuits of receivers, amplifiers and accessories of about 60 manufacturers appear in the manual.

COYNE INSTRUMENT AND TEST METHOD BOOK

A 343-page book entitled "Modern Radio Instruments and Testing Methods" has been prepared by the technical staff of the Coyne Electrical and Radio School, Chicago 12, Ill.

The book covers such subjects as indicating meters; operating and care of meters; measurements with d-c; h-f measurements; measurements with bridges; analyzers and multi-meters; electronic voltmeters; signal tracing; signal generators and test oscillators, and tube testing.

WESTINGHOUSE INTERNATIONAL TO HANDLE PREMIER CRYSTALS

Westinghouse Electric International Co., 40 Wall St., New York 5, N. Y., has been appointed exclusive export representative for Premier Crystal Laboratories, 53-63 Park Row, New York 7, N. Y.

BODEM JOINS N. U.

George A. Bodem has joined National Union Radio Corporation, Newark, N. J., as vice president, in charge of sales.

Mr. Bodem was formerly with International Detrola Corporation as vice president and general manager of the radio division. He also was with Tung-Sol as general sales manager.



PARTS SHOW BOOTH DRAWING

A drawing for booths at the forthcoming National Radio and Electronics Parts Show, which will be held in the Stevens Hotel in Chicago, was conducted at the Hotel New Yorker in N. Y. City recently. Over 130 names were drawn and booths assigned by exhibitors preference as the names were drawn.

Charlie Golenpaul, sales manager of the jobber division of Aerovox and president of the parts show, presided. Other parts show executives attending the booth draw-

(Continued on page 40)

Servicing Helps

Cures For Modulation Hum Distortion In Phase Inverters . . . Magnetic Tape Recorders . . . Auto Radio Servicing Notes

Modulation Hum

A COMMON TROUBLE, particularly in a-c/d-c receivers, is modulation hum; a strong hum which is only present when a station is tuned in, and disappears between stations. Sometimes the hum is only present on one or two stations.

The cure can usually be effected by shunting the a-c input, inside the receiver with a .1-mfd capacitor. Other values of capacitance can also be tried, since, in some cases, lower values of capacitance have been found to be more effective, particularly for high-frequency stations.

Another possible cause may be cathode to filament shorts in the r-f tubes, particularly the converter tube. This short may not show up on a tube checker, and individual replacement of each tube is often necessary to locate the offender. The tube condition may be caused by an excessive filament voltage drop. Checking with an a-c voltmeter often shows that one tube is drawing more than its share of filament voltage.

Incidentally, audio distortion may be traced to a similar situation which exists in output tubes, such as the 50L6 and 43.

Distortion in Phase Inverters

MANY RECEIVERS EMPLOY PHASE INVERTERS for feeding push-pull output stages. Two common troubles in such receivers are extreme distortion and hum. These conditions can be traced directly to an unbalance in the phase inverter circuit caused by unequal amplification in either the phase-inverter stage or the push-pull audio stage.

When replacing tubes in the push-pull stage, both tubes should be exchanged. The phase inverter tube

must be carefully selected to insure both triode sections being identical in amplification ability.

Magnetic Tape Recorders

SUBSTANTIAL PROGRESS has been made in the magnetic-tape recording field. It has been possible to achieve very wide range reproduction; 30 to 10,000 cps, Fig. 1. It will be noted that speed plays quite an important role in achieving the wide ranges. The plot, based on a white-paper type of tape,¹ illustrates the frequency response at various speed runs. With proper compensation, it has been possible to secure comparatively flat responses from 100 to 7,500 cycles, even at a slow speed of 8" per second. This is the customary speed at which home and

semi-professional tape recording machines are run. It is expected, however, that the speed will be increased to provide wider range reproduction.

The paper tape is about .0005" thick and is usually wound on 7" diameter reels, similar to the 8-mm movie film reel.

Auto Radio Service Notes²

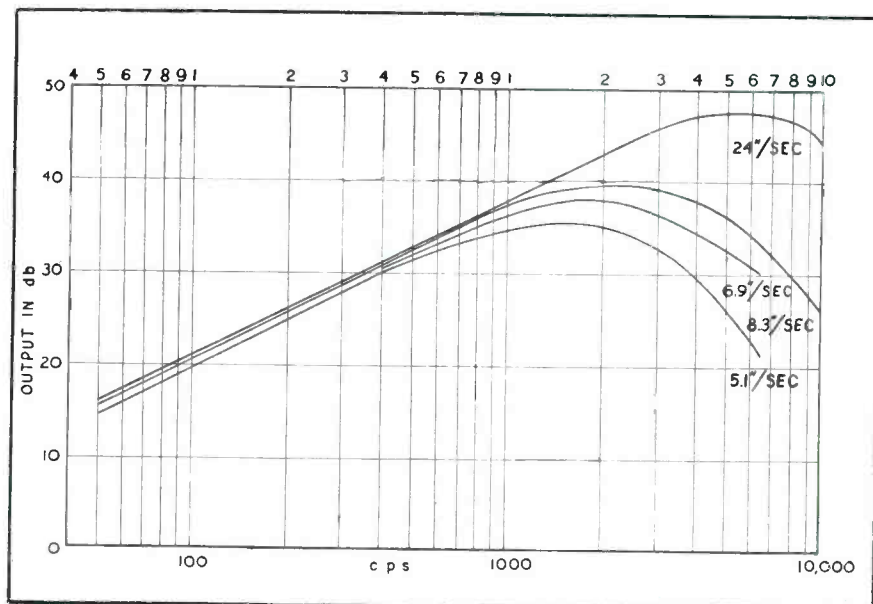
Arvin Auto Radio, Model 18: Severe ignition interference at the lower end of the band has been a frequent complaint. Tests showed the noise was not entering through the A lead nor

(Continued on page 42)

¹Minnesota Mining and Mfg. Co. Scotch Sound Recording Tape.

²Prepared by John W. Findarle.

Uncompensated frequency response of Scotch sound-recording tape at various speeds.



ASSOCIATIONS



Radio Technicians Guild, Rochester, N.Y.

THE ROCHESTER CHAPTER of the Radio Technicians Guild held an unusually interesting two-day technical-business session at the Seneca Hotel in November. Plans were made to form ten State Guilds which would become members of a Radio Technicians Guild of New York State. Bertram L. Lewis of the service department of the Rochester Gas and Electric Co., and past president of the RTG, was named chairman of a ten-man Guild committee. William Brewerton was named to assist Mr. Lewis.

Discussing the State Guild, David Boyce, president of RTG, said that the federation will help exchange information on trade techniques, provide for standardization of servicing procedures and establish codes which will promote good will and better business. It is expected that the Guild may go into operation in June. Incidentally, the federation will be incorporated, but it



Ye editor and A. C. Saunders of the Saunders Radio-Electronics School of Boston at the recent Rochester Fall Meeting of the Institute of Radio Engineers, where Mr. Saunders presented a paper on receiver design and layout and the Service Man. Saunders also spoke before the RTG covering servicing techniques in f-m and television receivers today.

is not expected that there will be paid officers.

Among those who attended the RTG meeting were Ben DeYoung, president

of the Ithaca chapter, Technicians Guild; E. M. Howland, representing the Hudson Valley Radio Servicemen's Association; Leo N. Burt of the Jamestown Radio Men's Association and Ted Telaak, president of the Buffalo Servicemen's Association. Dave Krantz of PRSMA also attended and spoke briefly on the activities of the Philadelphia Radio Servicemen's Association, describing how they formed their group and how the Federation of Radio Servicemen's Association of Pennsylvania is operating at the present time. Dave Krantz is chairman of this federation and A. R. Guild is secretary.

Boyce reported that there are 94 members in the RTG, where the annual membership fee is \$10.

Among others who spoke at the two-day session were A. C. W. Saunders of the Saunders Radio-Electronics School in Boston and B. V. French of Sam's Photo Facts.

A very impressive 12-page program, issued for the meeting, contained messages from local jobbers and broadcasting stations. In a program statement, Gordon P. Brown, president of WSAY in Rochester, said "Having formerly been an independent Service Man myself, operating my service business under the name Brown Radio Service & Laboratory, I am fully in sympathy with your problems, and the aims of the Guild. It is my sincere hope that many advantages will accrue to the members through the organization of the State Federation."

The program also contained an unusually timely message entitled *The Creed of the Radio Serviceman*, which said, in part: "To be allowed to make a decent living at my chosen profession . . . educate my children and put a few dollars away for a rainy day. . . . To build up the standards of the profession to the high place where it rightfully belongs. . . . To make a charge for my services that will enable me to produce the best work possible and build up customers' confidence. . . . To maintain a laboratory that is befitting a professional man. . . . To be neat in appearance when visiting a customer's home. . . . To attend servicing meetings at least once a month to discuss my problems with my fellow technicians realizing his problems are the same as mine and deciding the best solution to remedy the ills in our profession so that we might progress and prosper."

R. T. G., New Bedford, Mass.

THE WHALING CITY CHAPTER of R. T. G. has been reorganized and Al

TEN YEARS AGO

From the Association News page of *SERVICE*, December, 1937

ANNOUNCEMENT OF THE first joint meeting of the RSA was made. Local chapters of the IRSM, the national group of NRSA and RTG of New England agreed to cooperate with the national group. . . . At the first board meeting of the RSA, T. P. Robinson of Dallas, Texas, was named president; A. C. W. Saunders, Boston, vice president; Ingvar Paulsen, Boston, Mass., secretary; and Lee Taylor, Chicago, treasurer. . . . At their November meeting the Detroit chapter of the IRSM cast a unanimous vote to affiliate with the RSA. A two-meeting-a-month schedule was set up for the section with technical and business management information scheduled to receive major attention at the meetings. R. H. Hendricks was secretary of the Detroit chapter. . . . Norman B. Anderson was named president of the Radio Service Society, Inc., of Seattle. Clyde

W. Ellis was elected secretary. The RSS adopted a code which said in part: "To build up prestige of service work . . . improve relationship between all engaged in the business." . . . A. Schreiber and J. E. Stoffel were nominated for presidency of the Buffalo Radio Servicemen's group. Ted Telaak and Leon Roberts had been proposed for presidency but both declined. P. Bennett and J. Klemens were nominated for vice presidency. . . . The Cleveland Chapter of the IRSM had changed its banner to Cleveland Chapter of RSA. . . . Fred Ray of the G. E. sales division and Johnny Wallfield, G. E. engineer, explained the operation of the 1938 receivers to the boys. It was rumored that Neal Bear would be the new Cleveland Chapter chairman and Al Theriault would be reelected as trustee and delegate-at-large.

Wobecky has been elected president. John Santos, Harry Wood and Albert Gagnon were appointed as a committee to study the revision of the bylaws, with Santos acting as chairman of the group.

Frederick S. Baker, electrical instructor at Vocational High School, discussed tuned circuits at the meeting which was held in Carpenter's Hall.

A. R. T., British Columbia

THE 1947 CONVENTION of the Associated Radio Technicians of British Columbia was held in Stanley Park Pavilion.

Speakers included Jack Davies of the Canadian General Electric Co., who discussed the variable reluctance pickup. Other talkers covered television, f-m, noise problems and the future of the industry.

A. R. T., Vancouver

THE VANCOUVER CHAPTER of the Associated Radio Technicians meeting in the Canadian Forestry Association Hall, featured a discussion on minimum wage rates. J. Baird and W. Munton, reporting on their attendance at the Board of Industrial Relations, stated that a minimum wage rate for a journeyman class technician was being considered. A minimum rate of \$1.25 per hour was recommended.

Federation of R. S. A., Pennsylvania

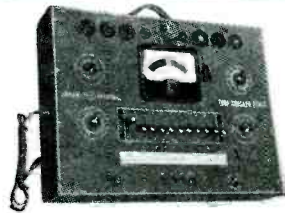
THE FIRST ANNUAL CONVENTION of the Federation of the Radio Servicemen's Association of Pennsylvania will be held in Philadelphia on January 11, 12 and 13 at the Bellevue-Stratford Hotel, simultaneously with the Town Meeting of Radio Technicians. PRSMA will act as convention host.

Registration for the convention will begin at 1 P.M. on Sunday, January 11th. There will be no charges for



Quality

SERVICE TEST EQUIPMENT FOR FAST, EFFICIENT, ECONOMICAL SERVICING



Tube Checker—type YTW-1.
Quick, accurate results.

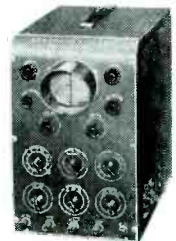


Sine Square Wave Generator—type YGA-2. Sine or square wave at the flick of a switch.



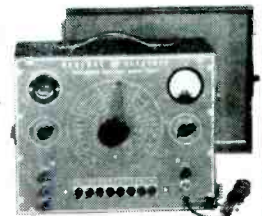
Signal Generator—type YGS-3.
For FM and AM Servicing.

Oscilloscope—type CRO-3A.
Extra Sensitivity in this unit.



Unimeter—type YMW-1A.
A versatile, easy-to-operate instrument.

Capacitance Resistance Bridge—type YCW-1.
Wein Bridge principle—assures accuracy.



For additional information write: General Electric Company, Electronics Park, Syracuse, New York.

GENERAL ELECTRIC

164-F8

either registration or attendance, although credentials or identification will be necessary since neither the convention nor the Town Meeting will be opened to the public.

Those desiring hotel reservations should write to Dave Krantz, 2109 South 7th Street, Philadelphia 48, Pa.

The Town Meeting of Radio Technicians will be actually a clinic during which the technical and business phases of Servicing will be completely discussed by industry authorities. This

meeting will serve as a basis for other clinics which are scheduled to be held throughout the country next year.

The Town Meeting was announced by the Radio Parts Industry Coordinating Committee as a joint undertaking of the R. M. A., the Sales Managers Club, N. E. D. A., E. P. E. M. and the Mid-Atlantic Chapter of The Representatives, with the assistance and cooperation of the Federation of Radio Service Men's Association of Pennsylvania and PRSMA.

Ser-Cuits

(Continued from page 17)

the lead from cathode to B-. After filtering out quench and applying de-emphasis, the audio signal is delivered and then fed to a conventional audio amplifier. A 1,500-ohm resistor and 2,500-mmfd capacitor decontrols the wave shape of the quench.

Tuning

Since the FreModyne system employs side tuning, there are two responses for each station, both of which represent correct tuning. This compares with three responses in a conventional f-m set, only one of which represents correct tuning. The two responses on the FreModyne receiver are quite close together on the dial.

Use in 4-Tube Model

It is possible to use the circuit with a conventional a-m 4-tube plus rectifier receiver to achieve an a-m/f-m setup.

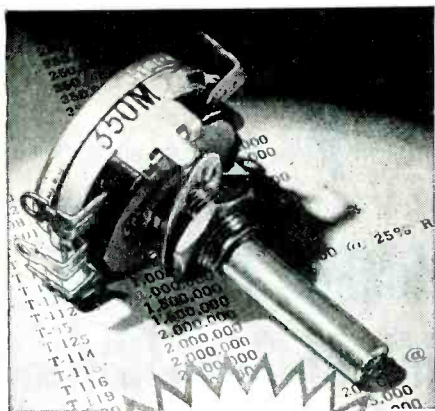
In Fig. 4 appears block diagram of a typical setup using a 12BE6, 12BA6, 12AT6, 12AT7, 35B5 and 35W4.

Airadio F-M Combinette

In Fig. 2 appears another interesting example of f-m receiver design, an 8-tube a-c/d-c f-m receiver/tuner. Tubes used include 12BA6 r-f amplifier, 12BE6 oscillator converter, 6BJ6s as first and second i-f, 12BA6 third i-f, 12AL5 ratio detector, 6AQ6 first audio/avc and 50B5 power output amplifier. A selenium dry disc amplifier is used in the power supply.

Delayed AVC

Features of the receiver include an avc delayed bias system to increase audio output from the ratio detector. By operating the detector with a high initial bias and by allowing operation of the r-f and i-f tubes at full gain until the input signal reaches a speci-



GEARED
to Service
Needs

★ Composition or wire wound—required tap or taper—with or without switch—correct shaft: that's what we mean when we say that Clarostat controls are **GEARED** to service needs.

Latest Clarostat catalog lists an outstanding selection of controls, resistors and resistance devices for your replacement requirements. Be sure to take advantage of that real "know-how." Also remember, when you install Clarostat controls and resistors, you can forget about them. They won't let you down.



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Controls and Resistors

CLAROSTAT MFG. CO., Inc. · 285-7 N. 6th St., Brooklyn, N. Y.

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Every Radioman Needs—

"RANGE MASTER" MODEL 10

The 8-in-1 Service Instrument

A precision instrument for RADIO TESTING, Appliance Repairing, Service Calls, Amateur and Experimental Work.



"RANGE-MASTER" covers these

25 ranges.

- (1) CAPACITY .001-.1, .01-1, .1-10 Mfd.
- (2) A.C. CURRENT 0-.150, 0-1.5, 0-15 amps.
- (3) A.C. VOLTAGE 1 10 100 500 1000 volts.
- (4) D.C. VOLTAGE 10 100 500 1000 volts.
- (5) D.C. CURRENT 1 10 100 1000 milliamps.
- (6) RESISTANCE 0 to 10,000 100,000 1 megohm.
- (7) Special High range ohmmeter to 2 megs and 20 megs.
- (8) Sensitive A.C. microammeter to 900 microamps.

TELEVISION SERVICEMEN

why guess, measure! This is the only instrument in its class that can be used as an **OSCILLOSCOPE CALIBRATOR**. A standard bleeder will deliver 1-10-100 accurate RMS volts from A.C. line.

Available in KIT form, or assembled
Complete KIT and Instruction...\$17.95 net
Bench Model (assembled)...23.50 net
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Test leads... .85

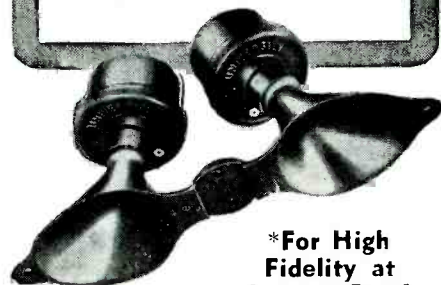
Ask your local distributor, or write to Dept. S.
BRADSHAW INSTRUMENTS CO.

942 Kings Highway, Brooklyn 23, N. Y.

Stop, Look and Listen*

to the new

**UNIVERSITY
TWEETER**



*For High Fidelity at Lowest Cost!

You'll be amazed at the difference this tweeter can make in the tone quality of any good radio or phono. And it's quick and easy to install. Just attach two wires to the voice coil terminals of your present speaker and you have full range speaker response right up to 15,000 cycles. There are three models to choose from—a handsome walnut cabinet, and single or dual unmounted units. Prices from \$20.00. For details write to UNIVERSITY LOUDSPEAKERS, INC., 80 South Kensico Avenue, White Plains, N. Y.

University Loudspeakers

Ser-Cuits

(Continued from page 34)

fied level, higher audio output is obtained.

External Audio

Provision is made for the use of external audio systems via a *remote* switch. In operation, a plug is inserted into the remote jack and contact is then made to the phono jack of the a-m receiver.

Over-all sensitivity of the receiver is in the range of 30 microvolts.

General Electric SC-4

A communications type of i-m receiver, G. E. SC-4, appears in Fig. 3. This model for the 30 to 40 or 34 to 44-mc bands is a 12-tube affair using two cascade limiters¹ and a double conversion superheterodyne circuit.

Tubes in Receiver

Tubes used include a 7T7 r-f amplifier, 7T7 first converter, 7C7 h-f i-f amplifier, 7T7 second converter, 7C7s as oscillator, 1-f, i-f, and first and second limiters, 7K7 discriminator and noise amplifier, 7A6 squelch voltage doubler, 7F7 first audio and squelch amplifiers and 7C5 power output. Incidentally, the 7T7 and 7AG7s are interchangeable.

Adjustable Squelch

An adjustable squelch is featured in this receiver. With no carrier on the receiver will remain muted on all random noise. The squelch circuit automatically opens the receiver on a signal input as low as .1 microvolt. Receiver selectivity is 30 kc at 6 db down and 120 kc at 60 db down.

¹See discussion on cascade limiters in November, 1947, SERVICE.

Fig. 4. Block diagram setup of the FreModyne system in a typical a-m/f-m receiver.

AMPHENOL

ROTARY BEAM

SIGNAL SQUIRTER

moves the world
into your back yard



Deluxe Rotator



Direction Indicator

The Signal Squirrel gives your rig the power to punch through to the four corners of the globe. Offering full performance on ten and twenty meters, for transmission and reception, it is comprised of two three-element arrays each coupled to the line with a separate inductive coupling. Match between antenna and line is simplified. Assembly and installation are easily accomplished. No tedious adjustments are required.

Ready-to-assemble kit includes: Rotator with mounted Inductostub assembly, direction indicator, center section, elements and insulators with all hardware ready for installation.

See your jobber, or write direct for complete data.

Manufactured under Mims patent 2,292,791.

You Get These Advantages with Signal Squirrel:

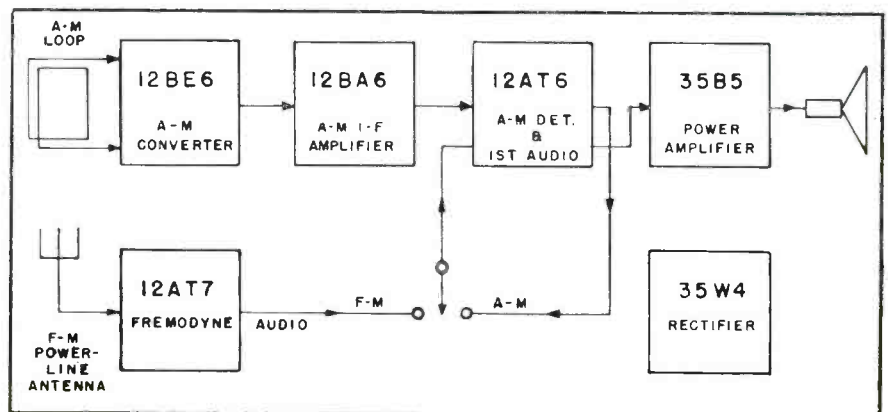
- Unlimited rotation either direction
- Inductostub matched coupling
- Two band operation
- Deluxe rotator
- Positive position lock
- High front-to-back ratio
- Rigid low-loss elements
- Easily tuned
- Durable and efficient
- Non-resonant transmission line
- High forward directivity



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TRANSVISION

7" TELEVISION KIT with COMPLETE FM RADIO



**COVERS
ENTIRE
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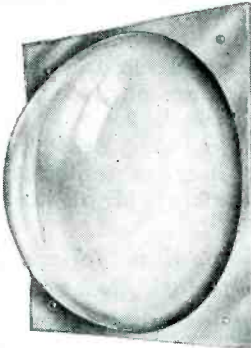
(87.5 TO
108.5 MC)

TRANSVISION 7" De Luxe Television Kit with FM Radio Receiver. Easy to assemble; no technical knowledge required. 18 tubes and picture tube. Folded Dipole Antenna and 60 ft. low-loss lead in cable. List \$199.00
7" Standard Television Kit. List \$169.00
Table Model Cabinets for above. List \$ 32.50
10" CONVERSION KIT with 10" Electrostatic Tube and Directions. Converts any 7" Television Kit to 10" size. List \$ 69.00
Also 10" STANDARD TELEVISION KIT List \$239.00
Table model cabinet. List \$ 35.00

Transvision Picture Blow-Up Lens

Brilliantly enlarges any 7" television picture to equivalent picture of 10" television set.

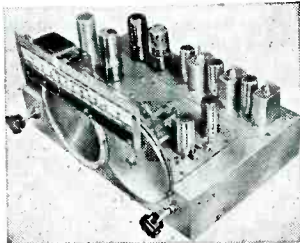
Has adapter arrangement for Transvision Panels and cabinets. Optically ground and polished to high accuracy. Plastic, gives 50% greater light transmission than equivalent glass lens.



. List \$19.95

Transvision 8-Tube FM Radio Receiver

Covers entire FM Band (87.5 to 108.5 mc).



No technical knowledge required for assembly. Makes an FM Radio Receiver worth 2 to 3 times cost of kit. Model FM-1 8-tube FM Radio Receiver Kit with 10" Speaker and Tubes. List \$64.95
FM CONVERSION KIT enables you to incorporate a complete FM Radio into your present television receiver. List \$29.95

HIGH-FIDELITY FM TUNERS

Model FMF-2 2-tube Tuner Front End (less tubes) List \$21.65
Model FMF-3 3-tube Tuner Front End (less tubes) List \$30.75
Model FM-107R 3-tube IF Amplifier Kit (less tubes) List \$21.65
Model FM-107 6-tube IF Amplifier Kit (less tubes) List \$41.20

All prices fair traded. All prices 5% higher west of the Mississippi River.

See your local distributor, or for further information write to:

TRANSVISION, INC. DEPT. S.
385 North Ave. New Rochelle, N. Y.

A-M/F-M Signal Generator

(Continued from page 11)

f-m oscillator and horizontal amplifier voltage for an external 'scope when aligning discriminators and i-f channels. Audio output and audio frequency controls are directly calibrated in db and kc.

Oscillator Ranges

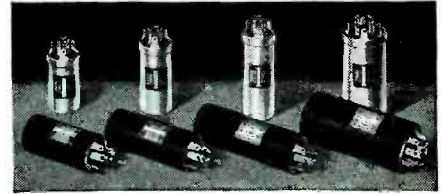
Fundamental continuously-variable range of the r-f oscillator is 100 kc to 150 mc, in seven bands. The f-m oscillator range has center frequencies of 1, 20 and 50 mc with frequency deviations of ± 20 , ± 300 and ± 750 kc respectively. Crystal calibrator frequency is 1 mc, fundamental, with harmonics available to 150 mc.

A-F Oscillator

The audio oscillator range of 100 to 12,000 cps is continuously variable in one band. Has a fixed power-line frequency of 400 cps. A wein bridge, resistance tuned, is used in this oscillator, which has an output voltage of 4.5 in a 20,000-ohm load with a ± 2 db variation throughout the frequency range. Attenuator in this system is calibrated from zero to -60 db. An attenuator, also included in the r-f system, is of the 5-step resistor network type, with a continuously variable 50-ohm L pad as a vernier.

The output level indicator is a dual electron-ray tube. At r-f, shadow angle of 0° is at 25,000 microvolts on low output jack. At a-f, shadow angle

ILLINOIS CONDENSER CO. NOW HAS UMP!



TYPE UMP

A popular replacement twist prong line of COMPACT, HERMETICALLY SEALED, efficient, dry electrolytic condenser, is now a member of the ILLINI line of highest quality capacitors.

The "Illini" UMP capacitors are now available at your local jobber. Our latest catalog, listing complete Illinois line, will be mailed to you upon request.

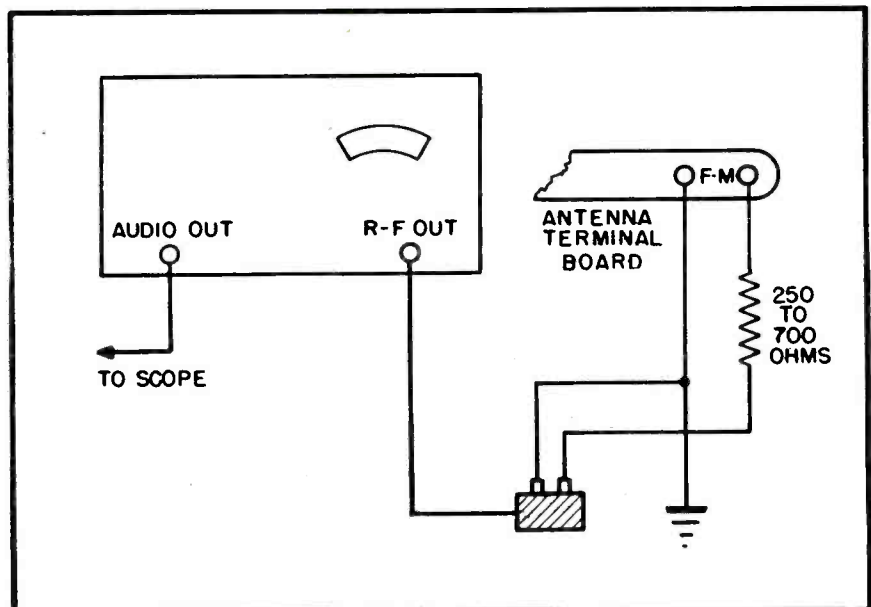


ILLINOIS CONDENSER CO.
1616 NORTH THROOP STREET • CHICAGO 22, ILL.

0° is at 30% amplitude modulation or at indicated f-m deviation.

Modulation for the r-f and f-m oscillator is continuously variable from 0% to 100%, calibrated at 30%, frequencies available being 100 to 12,000 cps, and 400 cps (power line).

Fig. 2. How the signal generator is connected to an f-m receiver and scope.



Tube News

(Continued from page 21)


tor is not completely cooled by insertion of the cold tube into the hot socket.

MICROPHONICS IN CONVENTIONAL SUPERHET RECEIVERS are often caused by small variations in the heater-cathode capacitance of the oscillator tube. These variations are caused by vibration and occur at an audio frequency. In f-m receivers, microphonics can be readily detected as frequency modulation of the oscillator. In an a-m system, microphonics are evident when the receiver is a slightly off tune. Under this condition the center frequency is located on the side of the i-f response curve and frequency variations cause changes in amplitude. In the standard broadcast band, microphonics caused by the capacitance variations are negligible. In f-m and tv, however, the problem is acute and design and construction precautions¹ must be taken to minimize microphonics.

The heater-cathode capacitance for the 6SB7-Y and 6BE6 is approximately 3 mmfd. If the oscillator of an f-m receiver operating at 100 mc has a total tank capacitance of 25 mmfd, a change as small as .00375 mmfd will cause a frequency deviation of 7,500 cycles. If this deviation is recurring, we have a 5% modulation of a 150,000 cycle f-m bandwidth. If the deviation takes place at an a-f rate, this capacitance change, although small, is large enough to cause a microphonic howl in an h-f receiver.

To analyze, let us study a typical 100-mc converter circuit employing a Hartley type oscillator, Fig. 3. In a pentagrid converter, such as the 6SB7-Y or 6BE6, grid No. 2 (screen) functions as the oscillator anode and is at r-f ground. The cathode is connected to a tap on the tank coil and the heater-cathode capacitance is, therefore, across part of the tank coil. If there is movement of the heater in a cathode sleeve at an audio frequency due to vibration, the heater-cathode capacitance will vary at an audio frequency and will in turn modulate the frequency of the oscillator. To minimize microphonics in this type of a circuit, it is necessary to limit the effect of heater-cathode capacitance variations on the oscillator. This result can be achieved

¹These precautions have been adopted by some manufacturers. Where it is necessary to add the suggested circuit changes in complete receivers, the changes must be made carefully since tracking difficulties or loss of sensitivity may result.



Wishing you a
Merry Christmas
and a
Prosperous New Year

**MEISSNER
RADIART
THORDARSON**

MAGUIRE INDUSTRIES, INCORPORATED

almost entirely by tying one heater lead to the cathode. The only other circuit change required is the insertion of an r-f choke in the second heater lead to prevent the heater from loading the oscillator, Fig. 4. A ground return for the heater is provided through a cathode tap on the oscillator. The choke L_1 and the high-frequency oscillator coil must contain wire heavy enough to carry heater current.

[The foregoing application note data are based on copyrighted material supplied by RCA.]

The 6BE6 and 6BA6 Tubes

In the October *Tube News* discussion appeared an analysis of the 6BA6 and 6BE6 miniatures; high-frequency pentode and converter, respectively. Circuits of typical receivers using these tubes have been requested by many and accordingly such circuits have been obtained and appear in Figs. 5 and 6. The circuit in Fig. 5 represents an auto model, while the circuit in Fig. 6 is an a-c/d-c superhet using a 12-volt version of the 6BE6 and 6BA6 miniatures.

Now! HEAR FM FROM ALL DIRECTIONS

Ward Products scores again with a new high-gain non-directional FM dipole, the Model FMT-61.

This new "turnstile" dipole picks up FM signals efficiently from ALL directions, does not require orienting!

Engineered for quick assembly and easy mounting, it comes complete for only \$13.50 list.

See your Ward dealer or jobber, or write us direct.



LIST PRICE
\$13.50

NEW WARD NON-DIRECTIONAL TURNSTILE FM DIPOLE

THE WARD PRODUCTS CORP., Division of the Gabriel Company
1523 E. 45th St., Cleveland 3
EXPORT DEPT.: C. W. Brandes, Mgr., 4900 Euclid Ave., Cleveland 3
IN CANADA: Atlas Radio Corp., 560 King St., W., Toronto, Ontario

Sound System

(Continued from page 18)

Crile Veteran Administrations hospital in Cleveland, Ohio, where veteran-patients are provided with a 15¼-hour-a-day program.

The Crile System

With the aid of two twelve-tube receivers² and three 50-watt booster amplifiers, connected in a two-channel system, veteran-patients are able to listen in to a variety of on-the-air programs. The amplifiers are connected in parallel so that if one breaks down, the other two can carry the load; or, if two stop working, the third can carry the load until repairs are made. A single roof antenna with double lead-in serves both receivers.

The receivers have motor controlled push buttons so that, when station changes are necessary, the operator need merely press a push button after station identification, for a quiet station change.

Channel II of this hookup, used for local program broadcasts, consists of a dual recorder³ and playback and two automatic changers.⁴ A third channel also has three 50-watt booster amplifiers connected in parallel with the output of all the playback units.

All connecting leads, for output and input, are under the floor, and run through a conduit. Leads from output of all functions are well shielded and grounded. The leads, from the control panel, are fed to a jack outlet box, which contains a terminal block and then from the terminal block to isolation jacks.

Various areas of the hospital are equipped with separate feed lines. The administration building and offices have one feed line while most of the wards have separate lines.

If switches or lines from any one of these sections short out, it is possible to isolate the trouble to particular areas by using wooden plugs in the output jacks.

This system prevents the entire radio system from being affected in the case of trouble in any one part. After the trouble has been located and repaired, the jacks are removed and normal reception resumed.

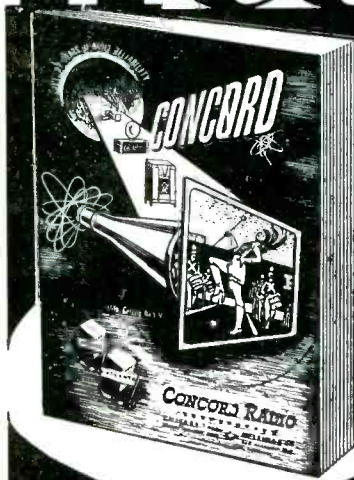
Each bedside is equipped with ear-phones and a selector box, and each ward has step-down isolation transformers. If one particular ward is shorted out, other wards are not affected. Every sun porch and each room in the quarters is equipped with

²RCA.

³Presto model F.

⁴Webster.

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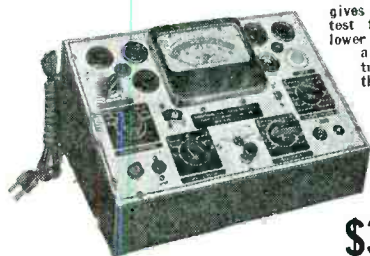
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901 W. Jackson Blvd. 265 Peachtree St.
Downtown Chicago Branch—229 West Madison St.
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CONCORD RADIO CORPORATION, Dept. S-127
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gives you more test features, at lower cost, than any other tube tester on the market.

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- Accurate tests due to famous Dynoptimum circuit.
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- Operating instructions and tube chart gives approximately 800 tube testings.

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Sterling METERS

Greatly valued by service men for over 40 years.

Pocket Type D.C.	Panel Type A.C. or D.C.
AMMETERS	AMMETERS
VOLTMETERS	VOLTMETERS
VOLTAMMETERS	MILLIAMMETERS

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write for circulars.

The STERLING Mfg. Co.
9205 Detroit Ave., Cleveland 2, O.

AMAZING DEVELOPMENT TRANSFORMS ANY RADIO-PHONOGRAPH INTO A FINER MUSICAL INSTRUMENT

The Tausher Sound System has been called "one of the most important advances in musical reproduction since the invention of the loudspeaker!" Formerly available only on costly custom radio-phonographs, but through special arrangement with inventor, a limited number may now be sold through high grade independent dealers. Quickly, easily installed. Sure-fire direct mail promotion makes selling practically automatic. Get all the facts about this fast-selling **BIG MONEY MAKER, TODAY.** Write E. J. Halter & Associates, Dept. B, 707 North Clark St., Chicago 26.

a loudspeaker, volume control and selector box.

Console Control Panel

The control panel of the console⁵ has 12 toggle switches, controlling the administration building, chapel, telephone lines, recreation hall, theatre and gymnasium. To operate it is only necessary to throw a toggle switch in receiving position (or on position), and use corresponding volume control for the area from which the program is being received.

Toggle switches also can cut off channels I and II to speech. In this way, either one, two or all three channels can be used for speech.

Two d-p-d-t switches have been installed to record on-the-air programs. Programs can be recorded and sent over the hospital channel at once, or they can be cut off and recorded. For example, during the World Series, games were broadcast over channel I and, at the same time, recorded on blank discs for use later in the day at another VA hospital.

Programs emanating from the radio control room can be recorded at the same time they are being broadcast, or they can be recorded while records are played over channel III.

The recorder, by means of these switches, also is used as a monitor in preparing programs. When the boys in the studio are ready to go on the air, a single toggle is thrown transferring the program for monitor to channel, so that patients can listen.

The console also contains volume controls for the preamplifiers and the automatic record changers (one for the 16" tables and a master control for both playback machines and record changers) on the control board.

Console also has controls for a microphone in the operating room, and the administration building and chapel building which are connected in parallel. There are also mike controls for the recreation hall, theatre, telephone lines and gymnasium. There is also a master speech control, and a compander for all.

All the controls can be reached from a sitting position at the center of the console. The automatic changers face the control panel and can be reached also from a sitting position. The 16" tables are but two steps from the center of the console.

Three db meters are located directly in the center of the console, to indicate the output level of all three channels.

⁵RCA.

BUILT FOR SERVICE



Now—the new "RC-15" Receiving Tube Manual

- The new RC-15 Receiving Tube Manual is unquestionably the most authoritative reference guide to receiving-type tubes ever published . . . and it costs only 35 cents!



Successor to the famous "RC-14," it has been extensively revised and expanded. Features RCA's complete receiving line including miniatures and kinescopes. The popular introductory section on tube and circuit theory has been increased to 55 pages. The widely used Resistance-Coupled Amplifier Charts are in improved new form. The completely revamped circuit section gives diagrams and parts values for up-to-date receiver and amplifier designs. GET YOUR COPY TODAY FROM YOUR CUNNINGHAM DISTRIBUTOR.

For more service—TURN THE PAGE →

Cunningham Electron Tubes

A product of
RADIO CORPORATION OF AMERICA
Harrison, N. J.

Chicago

INSTRUMENTS

Quality at Low Cost!



For years, Chicago Instruments have given radio men accurate, dependable service. And because of simplicity of design and freedom from "gadgets" we have been able to hold down prices to a fraction of what you would normally pay for instruments of similar quality.

Chicago Instruments are available in a variety of ranges and sensitivities. You may see them at your Suppliers or get the complete details by writing for Bulletin No. 10.



POCKET VOLT-OHM-MILLIAMMETERS for ONLY \$5.25

Anyone can now own a good volt-ohm-milliammeter. There is a Chicago V.O.M.A. priced at only \$5.25. Chicago "Featherweights" that slip easily into the pocket are the original miniature radio test instruments. They are popular throughout the world.

CHICAGO INDUSTRIAL INSTRUMENT CO., 536 W. ELM ST. CHICAGO 10, ILL.

News

(Continued from page 30)

ing were Ken Prince, general manager of the show; Paul Duryea, president, Eastern Sales Managers group; J. L. Robinson, president, Western Sales Managers group; Bill Schoning of NEDA, Jerome Kahn (Stancor) and Walter Jablon (Hammarlund) of the show committee.

* * *

J. K. WEST NAMED RCA V-P IN CHARGE OF PUBLIC RELATIONS

John K. West has been elected vice president in charge of public relations for the RCA Victor division.

* * *

HUGO SUNDBERG BECOMES UTAH S-M

Hugo Sundberg has been appointed sales manager of the jobber and industrial divisions of Utah Radio Products, division of International Detrola Corporation, 1123 East Franklin St., Huntington, Ind.



* * *

W. K. BURLINGAME JOINS TELICOR AND INTRA-VIDEO

W. K. Burlingame has been appointed field operations manager of Telicor Corporation, manufacturers of large screen television receivers, and Intra-Video Corporation of America, manufacturers and distributors of the Intra-Video master antenna system.

Mr. Burlingame was formerly national service manager of the Allen B. DuMont Laboratories.

* * *

ATR DISPLAY CARDS

Display cards for battery eliminators, inverters and vibrators, have been announced by American Television & Radio Co., 300 East Fourth St., St. Paul, Minn.

AT RECENT ESPEY DEMONSTRATION



Harold Becker, sales manager of the distributor division of Espy Mfg. Co., discussing the features of their recently announced television kit with Paul Weil of SERVICE and Samuel Kavesh of the Fischer Distributing Co.

TWO GREAT MONEY-SAVERS

OHM CHEST

with 100 Insulated Resistors

This handsome Chest has 20 compartments, 10 in the base and 10 in a removable tray. Walnut finish; brass hinges and fastener. Contains 100 resistors stamped with resistance values, 5 ohms to 20 megohms, 1/2 watt to 2 watts, color coded. Every size is popular!

\$4.95

COMPLETE

CAP CHEST

with 27 "Akrad" Condensers

A terrific buy! We want you to try the amazing new Olson "Akrad" Condensers, so we pack 27 "Akrads" (a \$31.45 List Value) in a beautiful walnut-finish wood chest with hinged lid and 6 compartments—and send you the whole works for only \$9.95. Wow! Order now!

QUAN.	CAP.	VOLTAGE	LIST	TOTAL
2	10	25	\$0.75	\$1.50
2	25	25	.85	1.70
5	20	150	.95	4.75
5	40	150	1.10	5.50
4	70-70	150	1.30	5.20
5	8	450	.95	4.75
4	16	450	1.35	5.40
Walnut Finished Chest			2.65	2.65
			TOTAL	\$31.45

\$9.95

COMPLETE

GUARANTEE

Use 5 Olson "Akrads." If for any reason you are not satisfied, you can return the rest with Cap Chest and get back the \$9.95 and postage.

Send for our FREE MONTHLY BARGAIN BULLETIN

Free with each Ohm Chest ordered, you get our "Resist-O-Guide" free. Revolving wheels in color show all resistance values.

Send me _____ Ohm Chests with 100 Insulated Resistors in each, at \$4.95.

Send me _____ Cap Chests with 27 "Akrad" Condensers in each at \$9.95.

I enclose \$_____ Send my order C.O.D.

Olson pays the postage. I will pay the postage.

OLSON

RADIO WAREHOUSE inc.

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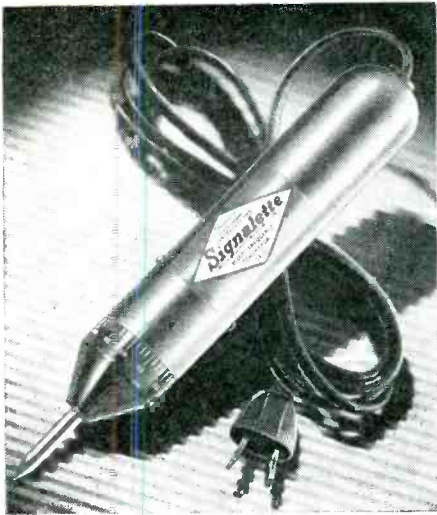
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Faster Signal Tracing *Signalette*

MULTI-FREQUENCY GENERATOR

Generates R.F., I.F. and AUDIO Frequencies, 2500 cycles to over 20 megacycles, using new electronic multivibrator radar principle. Completely self-contained—fits coat pocket or tool chest. Just plug into A.C. or D.C. LINE AND CHECK RECEIVER SENSITIVITY, AUDIO GAIN, R.F. and I.F. alignment, auto radio aerial peaking or shielding, breaks in wires, stage by stage signal tracing, tube testing by direct comparison, etc., etc. Sturdy construction, handsome appearance! See at your dealers or write for details:

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Recognized Jobbers — wire,
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ATTENTION TELEVISION SERVICEMEN AND DEALERS

Make television measurement of high voltage easy and safe. Use the **HiVolter**. Converts most low range vacuum tube voltmeters, such as RCA Voltomyst, into high voltage testers. Read 10 kilovolts full scale. Indispensable for radiomen who service television receivers. Keeps your hands away from high potentials and yet is easy to handle. Simple to connect. Just plug the probe of the V.T.V.M. into the **HiVolter**. Only 10½ inches long. Use it like you would use any probe. Cost, \$3.25. Send \$1 deposit with order, balance C. O. D.

DISTRIBUTORS: Write for quantity discounts.

MILLER ELECTRONIC DEVELOPMENT LABS.

94 Holland Avenue, Elmont, New York

RCA TV SERVICE RENEWAL TERMS

RCA Victor has announced provisions for renewal of its Television Owner's Policy to provide service, maintenance, and parts replacement coverage for their television sets beyond the first year of set ownership.

Renewal fee for the 621TS will be \$30, compared to \$45 for the first year. The policy for 630TS will be renewed for \$36, as against the \$55 first-year fee.

MUELLER ELECTRIC DISPLAY BOARDS

Display boards which may be mounted on a wall or placed on a counter, have been announced by Mueller Electric Co., 1583 East 31st St., Cleveland, Ohio. Clips are detachable from metal pegs on which they are secured.

ALLIED RADIO CATALOG SUPPLEMENT

A 48-page supplement, No. 114, to the 164-page master catalog has been prepared by the Allied Radio Corp., 833 West Jackson Blvd., Chicago 7, Ill.

Supplement features wire and disc recorders, test instruments, a television kit, etc.

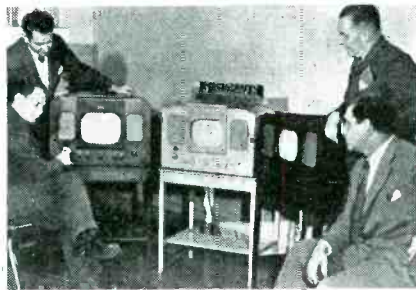


* * *

SUESHOLTZ HEADS SIGHTMASTER

Herbert Suesholtz has become president of the Sightmaster Corp., 220 Fifth Ave., N. Y. 1, N. Y.; Michael Kaplan is treasurer; Bernard Kaplan, vice president; and F. Wakefield Minor, sales manager.

The line of Sightmaster television receivers includes 10", 12", and larger table models, consoles, combinations, and club models for commercial installations.



Left to right: Herbert Suesholtz, Michael Kaplan, F. Wakefield Minor and Bernard Kaplan.

* * *

MALLORY SERVICE MAN BUSINESS- PROMOTION PROGRAM

A "Good Service for Good Business Plan," to assist Service Men in developing their business, has been announced by the wholesale division of P. R. Mallory & Co., Inc., Indianapolis, Ind. The plan makes available to Service Men a complete kit of material for improved shop identification, customer follow-up activity and simplified service records.

Mallory distributors will sponsor service meetings and offer a sound film covering all details of the plan, together with information on recent Mallory developments.

* * *

ATLAS SOUND BULLETINS

Bulletins describing microphone support stands and studio accessories have been released by the Atlas Sound Corp., 1443 39th St., Brooklyn 18, N. Y.

Offered are data on collapsible and boom stands, flexible gooseneck attachments, banquet and desk stands, etc.

BUILT FOR SERVICE



Mural Displays Sell Service

These outstanding new Mural displays are scientifically designed to create a modern, selling atmosphere in your store. They will give your store more sell per square foot. Each is silk-screened in rich oil colors on heavy, washable stock. They are fadeproof and are easily applied to walls, windows and panels with cellulose tape.

Available in either vertical or horizontal form, these exciting displays will brighten up your place of business, emphasize your services, and identify you with the famous Cunningham brand. Get some from your Cunningham Distributor today.



For expert guidance—TURN THE PAGE →

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AM-FM-AF SIGNAL GENERATOR

For All Receiver Servicing



MODEL 641—SIGNAL GENERATOR

- **AM**—100 KC to 120 MC. All fundamental. Metered output 0-100,000 microvolts. Modulation variable 0-80%. Modulation Frequency variable 100 to 10,000 cycles.
- **FM**—100 KC to 160 MC. Variable frequency deviation 0-400 KC (800 KC total sweep) at variable audio rate.
- **A.F. OSCILLATOR**—100 to 10,000 cps (R-C Circuit). Available for direct connection to Audio Circuits.
- **MODEL 645 VTVM**—Complete electronic AC-DC Volts Ohms ranges. Has MA ranges and with RF probe measures up to 200 MC RF volts.

See Your Jobber or Write for Catalog

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EVERYTHING!

- **ULTRA MODERN**
- **COMPLETE**



MODEL 645 VTVM

JACKSON

Radio Testing Equipment

THE JACKSON ELECTRICAL INSTRUMENT CO., DAYTON, OHIO

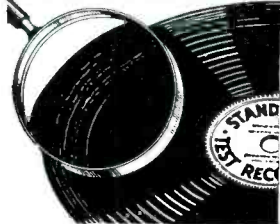
NUMBERS 4 and 5 OF THE WALSCO Hit Parade

THE SENSATIONAL, NEW, SCIENTIFIC

WALSCO STANDARD TEST RECORD

FOR IMMEDIATE . . . ACCURATE . . . AUDIBLE ADJUSTMENT OF RECORD CHANGERS AND COIN OPERATED PHONOGRAPHS . . . SOLVES THE PROBLEM OF ADJUSTING PICKUP AND TRIPPING MECHANISM THROUGH

SOUND!



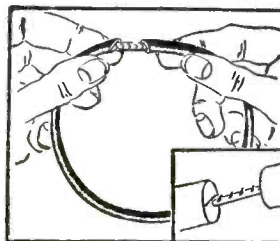
- Three Tone lead-in grooves permits immediate adjustment to proper set down position of the pick-up through audible means.
- Made to RMA and NAB standards.
- Record plays in less than 40 seconds.
- Audio tone at end of record indicates proper adjustment of tripping action.

The WALSCO Standard Test Record saves time and increases efficiency in the adjustment of record changers and coin operated phonographs. Write for full information.

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Help The Radio Man

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WALSCO UNIBELT THE UNIVERSAL DIAL DRIVE BELT CAN BE CUT TO FIT ANY DIAL DRIVE Will not Slip or Stretch



"UNIBELT" comes in 5-foot length spools and can be installed without taking dial mechanism apart. A real time and money saver. Eliminates the need for stocking numerous sizes of belts.

Free sample and literature. Write to Dept. 12C.

Servicing Helps

(Continued from page 31)

through the receiver's mount. The usual noise-elimination procedure did little if any good.

Removal of the leadin and the coupling transformer, which couples the antenna to the receiver input, and unsoldering leadin from the short lead protruding from the transformer case revealed the trouble. The soldered joint of the shielding at the transformer case had been poorly soldered resulting in a cold-soldered joint, and the leadin and the wire from the transformer had merely been twisted together without being soldered. To further improve operation, the suppressors, which had been on since the time of installation, were replaced.

Antenna Installations: New installations using coax leadins often introduce a splicing problem. To make an effective splice, the old leadin should be unsoldered, and the old leadin saved. Then the new leadin should be cut to the required length, or if the latter is correct the plug on the receiver side of the cable should be removed, since it is not used. The outer rubber jacket of the coax should be stripped back about 2½", the shield about 2", and the insulation about ½". A 3" to 3½" piece of loom should then be cut from the old leadin and slit for about one-half of its length. It is then slipped over the stripped end of the coax leadin, slit end first. The slit permits the loom to be slipped farther down the cable to permit splicing. However, before actually splicing, a piece of shielding, about 4" long, should be cut from the old leadin and slipped over the coax. The next step is to splice the wire ends from the leadin and the transformer, by joining them securely and then soldering, after which the loom can be slipped down over the splice. Besides acting as an insulator the loom also keeps the splice rigid and helps prevent a break from the vibration encountered while in use. The shield which has been slipped over the cable is then pulled down and soldered securely at the case of the transformer and then to the shield of the coax. A very hot iron should be used when soldering the latter joint, the operation being done quickly, since the plastic insulation used in the coax leadin melts easily.

SERVICE IN '48—

- HEAVIER PAPER STOCK
- STREAMLINED TEXT
- COLOR ON TEXT PAGES
- SUBSTANTIALLY INCREASED CIRCULATION

NEW PRODUCTS

MEISSNER A-M AND A-M/F-M TUNERS

Tuners for a-m and a-m/f-m have been announced by Meissner.

Frequency response of tuners is said to be flat within ± 2 db from 30 to 15,000 cycles. Tone control provides a 10-db boost at 40 cycles and response variation from +12 db to -14 db at 10,000 cycles. Volume control is provided with an automatic bass-compensation circuit. Has a 6U5/6G5 tube as a tuning indicator.

Output is 8 volts at high-impedance terminals and .75 volt at 500-ohm terminals, with a hum level 60 db below output level. Both units are provided with phono input terminals.



* * *

UNIVERSAL RECORDING FREQUENCY RECORDS

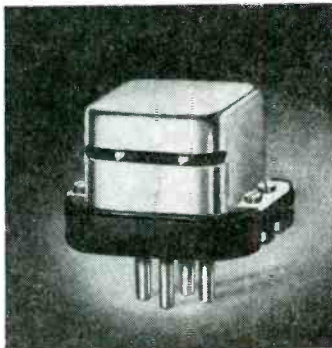
Lateral frequency standard records, recorded at 78 and 33 $\frac{1}{3}$ rpm on opposite sides, or vinylite, have been produced by Universal Recording Corporation, 20 North Wacker Drive, Chicago 6, Illinois.

Voice announcements identify each of the frequencies, which include 1,000 cycles reference, 10, 9, 8, 7, 6, 5, 4, 3, 2 kc and 1500, 1,000, 700, 500, 300, 200, 100, 70 and 50 cycles, with an additional 10 kc band at the innermost useful groove diameter for checking reproducer tracking loss. Also has 30 seconds of blank grooves with a specified rumble content for testing playback equipment.

SHURE WIRE RECORDING HEADS

Three types of wire recording heads, WR 16, WR 14, and WR 12, have been announced by Shure Brothers, Chicago.

Features include variety of impedances for individual needs, closely controlled air-gaps, and controlled groove contour.



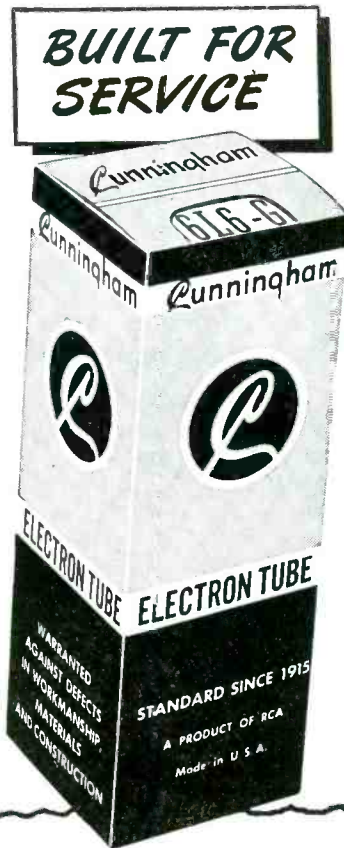
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KNIGHT 20-WATT AMPLIFIER

A 20-watt phono amplifier which is said to have a frequency response of ± 1 db from 20 to 20,000 cps, has been announced by Allied Radio Corporation, 833 W. Jackson Boulevard, Chicago 7, Illinois.

Said to have less than 2% harmonic and less than 8% inter-modulation distortion at 20 watts. Individual bass and treble tone controls. Hum is said to be better than -75 db from rated output. Gain is 78 lb. Has adjustable automatic

(Continued on page 44)



Technical Tips Spotting Weak Discriminator Tubes

- Under normal operating conditions, the discriminator tube in an FM receiver cancels out amplitude noise by producing equal but opposite voltages across the output load. If one discriminator diode has low emission, the output voltages are no longer equal and voltage cancellation is therefore incomplete. This condition is characterized primarily by impaired noise rejection at low signal inputs.

If both discriminator diodes have low emission, noise rejection may be adequate, but the sensitivity of the receiver is impaired. This condition may also cause distortion.

In either case, a quick check can be made by replacing the discriminator tube with one known to be good. As you know, you can always have complete confidence in a Cunningham tube.

For more service—TURN THE PAGE →

Cunningham

Electron Tubes

A product of
RADIO CORPORATION OF AMERICA
Harrison, N. J.

Permoflux SPEAKERS

YOUR JOBBER CAN SUPPLY YOU!

Permoflux quality and dependability—the same as supplied to the major set manufacturers—is your assurance of complete customer satisfaction. You'll find Permoflux Speakers easy to install and readily available in both PM and Electro-dynamic types. You'll find too, that it pays to give your customers "tops in tone" with a Permoflux Replacement Speaker.

TWO COMPLETE
FACTORIES TO SERVE YOU

PERMOFLUX

WRITE FOR
FREE BULLETIN

PIONEER MANUFACTURERS OF PERMANENT MAGNET DYNAMIC TRANSDUCERS

PERMOFLUX CORPORATION

4900 WEST GRAND AVE., CHICAGO 39, ILLINOIS
236 SOUTH VERDUGO ROAD, GLENDALE 5, CALIFORNIA

Here's how
University
can help you plan

QUICKER... AT LOWER COST!
The logical approach to any sound system planning problem is to first select the speaker or speakers capable of proper coverage and quality of reproduction. Once the speakers have been decided upon, the selection of the correct size amplifier becomes a routine matter of totalling the powers required for the individual speakers. The many UNIVERSITY speakers now available readily solve this problem. Included are speakers for every class of service—low power, super power, directional, radial, explosion-proof, submergence-proof, high fidelity, paging talk-back and others.

BETTER SOUND SYSTEMS

.. WITH LESS POWER!
University speakers require minimum amplifier power. Having a higher conversion efficiency, they deliver more acoustic output per watt input, than any other speaker of comparable size and weight.

WRITE TODAY FOR THIS HANDY SPEAKER SELECTION CHART — NO OBLIGATION!

APPLICATION	SPEAKER MODEL	FUNCTION	POWER (APPROX)	MIN NO. SPEAKERS
OFFICES STORIS STORAGE STOCK ROOMS	MIL OR 1BB 1BB RBPB WITH STANDARD B SPEAKER	Paging and announcing. Substitute for low efficiency speakers in intercom systems. Same as above, but distribution 360°. Voice and music. Distribution 360°.	1.3 watts per 1000 sq ft.	1
FACTORIES (light assembly) SHIPPING— RECEIVING	CR 1BB OR 3WH WITH 2M4 RCR PM OR 1K WITH 3WH RPM WITH 3WH OR RPB 12	Paging and announcing. Same as above, but distribution 360°. Voice and music. Same as above, but distribution 360°.	1.3 watts per 1000 sq ft.	1.2

UNIVERSITY LOUDSPEAKERS, INC.
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MODEL 3AH
PRICE \$37.00

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1R5, 1S5, 1T4, 3S4, 3Q4, 6AK5, 6AC5, 6AC7, 6AQ5, 6BE6, 6BA6, 6AU6, 6BJ6, 6X4..... each 49¢
32L7, 70L7, 117L7..... each 59¢
All Tubes Carry RMA 90-Day Guarantee

PM SPEAKERS

4" Alnico No. 5..... each \$1.19
5" Alnico No. 5..... each 1.29

TERMS: Net C.O.D. No order accepted for less than \$5.00.
WRITE FOR BARGAIN CATALOG S-12
Greylock Electronic Supply Co.
30 Church Street New York 7, N. Y.

New Products

(Continued from page 43)

volume expansion. Output impedances of 4, 6, 8 and 500 ohms.

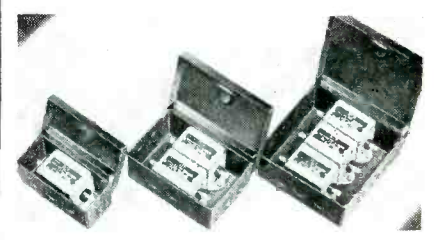
* * *

SOLAR HEAVY-DUTY INTERFERENCE FILTERS

A series of heavy-duty interference filters, type EB, has been announced by Solar Manufacturing Corporation, 1445 Hudson Blvd., North Bergen, N. J.

Filters are furnished in standard Underwriters' approved heavy cadmium-plated steel surface cabinets.

Have a noise elimination range of from 150 kc to 250 mc. Intended for continuous-duty service in 1, 2 and 3-phase circuits and equipment drawing from 5 to 200 amperes, 250 v a-c/600 v d-c.



* * *

KING POWER DRILL

A midget power drill, with pistol grip, polished aluminum body and geared-head motor has been announced by the Wolfson & Fairclough Mfg. Co., Buffalo, N. Y. Operates at approximately 600 rpm and takes bit up to 1/4".



* * *

DUMONT CAPACITORS

High Q capacitors, which are said to have a leakage resistance of better than 1/2 million megohms and a power factor of .01%, have been announced by Dumont Electric Corp., 34 Hubert Street, New York.

Available in capacity ranges from 5 to 100,000 mmfd, in voltages 500 to 10,000.

* * *

NEWCOMB AUDIO 10-WATT AMPLIFIER

A 10-watt amplifier, model E-10, has been announced by Newcomb Audio Products Co., 6824 Lexington Ave., Hollywood 38, Calif. Uses push-pull 6V6s in a multi-stage inverse feedback circuit. Has



Model 730

Range: AC-DC 1v to 3000v (7 bands.)
Zero center scale for F.M. alignment.
Ohm Scale: 10 Ohms to 10 Megohms.
Frequency Range: Audio to 110 MC.
Input: 100 Megohms AC or DC.
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2-A4522.

High gain Signal Tracer with enclosed speaker. No amplifications needed in receiver—no hum.
8" illuminated dial.

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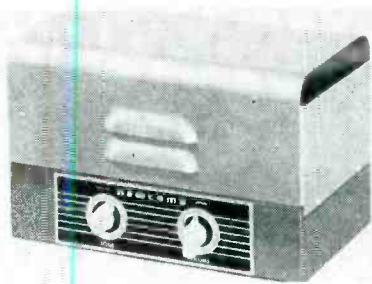


Write for catalog sheet
Dept. 12C

Coastwise Electronics Co., Inc.

130 North Beaudry Ave., Los Angeles 12, Calif.
New York Office & Warehouse
258 Broadway, New York 7, N. Y.

inputs for microphone and phonograph and a full range tone control.



* * *

DECIMETER SOLDERING FLUX

A liquid soldering flux, *Silver-O*, which is said to be non-corrosive, has been announced by the chemical division of Decimeter, Inc., 742 W. Colfax Ave., Denver, Colo.

Flux is used with coreless solder.

* * *

ELECTRO-VOICE CRYSTAL, DYNAMIC AND CARBON MICROPHONES

A multi-purpose *Century* series of microphones available in a choice of three generating elements, crystal, dynamic or carbon, has been developed by Electro-Voice, Inc., Buchanan, Mich.

Microphones can be used in any position: on a table or desk by itself, can be mounted in the E-V model 415 reclining desk stand for aiming at sound source, or

hand-held. It also mounts on a floor stand or conventional desk stand, or can be used for overhead suspension.

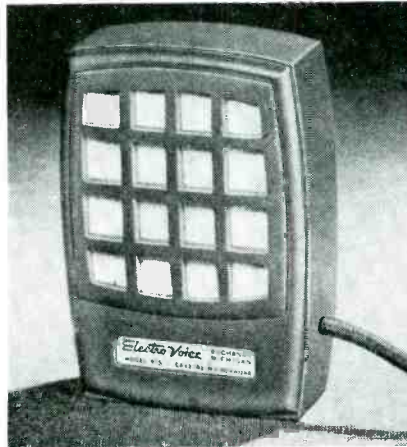
Size is 3" x 2 1/8" x 1".

Model 915, crystal type, has an output of -50 db and a frequency response of 60-7,500 cps.

High-impedance dynamic type has -57 db output and frequency response 55-7,500 cps.

Single-button carbon microphone has a speech response of 200-4,000 cps with 48" cable. Output level is 22 db below 6 milliwatts for dynes/cm².

For further complete information write for bulletin No. 137.



* * *

AEROVOX HIGH-VOLTAGE PAPER TUBULARS

High-voltage oil-impregnated wax-filled paper tubulars, series 84, now being made by Aerovox Corporation, New Bedford, Mass.

Available in 2,500, 3,500, 5,000, 7,500 and 10,000 v d-c-w, and in capacitances from .001 to .05 mfd. The smallest unit is .001 mfd 2,500 v, measuring 3/8" dia. x 1 1/2" long, while the largest is a .003 mfd. 10,000 v, measuring 1 3/8" dia. x 3" long.



* * *

GENERAL CEMENT CARBON CONTROL CLEANER AND CONTACT SILVER PLATE COMPOUND

A carbon-control cleaner which cleans carbon controls has been announced by General Cement Manufacturing Company, 919 Taylor Avenue, Rockford, Illinois.

Chemical both removes oxidation and coats contacts. Applicator is supplied with each bottle.

Another new G-C item is a silver plate compound which can be used for plating worn contacts, newly made contacts and

(Continued on page 46)

JOHN RIDER SAYS...

Repair your Public Standing

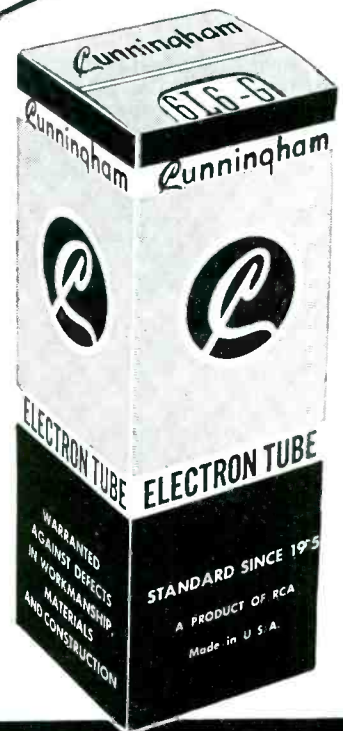


● It is not inconceivable that the popularity of record changers will tend to improve the relationship between the general public and the radio serviceman.

As a mechanical device, its workings are not mysterious; when it refuses to change records, rotate the turntable, or otherwise perform as it should, the presence of a defect is clearly evident. We doubt seriously if the public's view of such a repair will be surrounded with the uncertainty which prevails in connection with the repair of radio receivers.

Prompt and efficient correction of defects in record changers is an opportunity to win the public respect and confidence which servicemen rightfully deserve. A perfect repair will help achieve this goal.

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RADIO CORPORATION OF AMERICA
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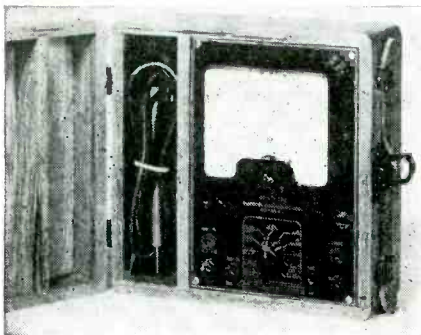
replacing worn silver plating.. Compound silverplates all different types of metals.

* * *

**ELECTRONIC MEASUREMENTS CORP.
VOLOMETER**

A *volometer*, type 120, has been announced by the Electronic Measurements Corp., 423 Broome St., New York City.

Features include an a-c voltage frequency range of 30 cycles to 1 mc; d-c volts at 20,000 ohms per volt . . . 0-3, 0-15, 0-60, 0-300, 0-1,500, 0-6,000; a-c volts at 10,000 ohms per volt . . . 0-6, 0-30, 0-120, 0-600, 0-3,000, 0-6,000; d-c current at 0-60 microamps, 0-60 ma, 0-600 ma, 0-6 amps; resistance . . . 0-3,000, 0-300,000, 0-3 meg, 0-300 meg; db . . . -4 to +11, +10 to +25, +22 to +37, +36 to +51, +50 to +65, +62 to +77.



* * *

GENERAL INDUSTRIES WIRE-TAPE MOTOR

A new model motor, RM-4, for wire and tape recording units, has been announced by The General Industries Company, Elyria, Ohio.

Features of the model, a four-pole shaded-pole induction type, include the addition of a bottom motor cover, and locating and locking means for both top and bottom covers to facilitate alignment of rotor within the stator bore. Has a totally-enclosed magnetic circuit which is said to insure low stray fields.

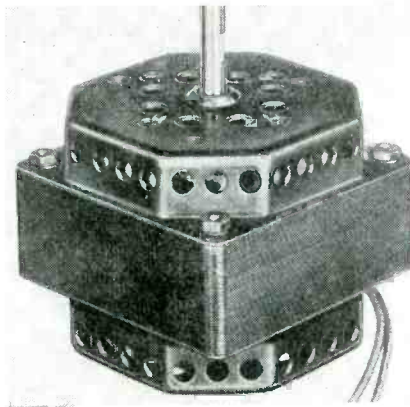
Also has dual aluminum fans for controlled forced-air circulation. Self-aligning, oil-impregnated end thrust and sleeve bearings.

Size is 3 3/8" square x 2 7/8" high, over the main body of the motor. Over-all

New Products

(Continued from page 45)

height, including bearing housings, is 3 3/8". Motor shaft is standard 1/8" in diameter. Weighs 4 1/2 pounds.



* * *

HEINTZ AND KAUFMAN DIPOLE

A folded dipole for receiving or transmitting in the 85- to 150-mc range has been introduced by the communications equipment division of Heintz and Kaufman, Ltd., 50 Drumm St., San Francisco, Calif.

Dipole can be tuned to any frequency within range.

For 85-mc operation the dipole is extended to 65"; at 148 mc, its overall length is reduced to 37".



* * *

RCA P-M SPEAKERS

A line of p-m speakers for general replacement and sound-systems work has

been announced by the renewal sales section of the RCA tube department.

Line includes a *controlled-resonance* 12" speaker, a 4" and a 5" speaker, a 4" by 6" elliptical speaker, and a 2" by 3" elliptical speaker. The 12" speaker (rated at 12 watts) has a one-piece stamped steel frame for rattle-free operation, and a filter which is said to automatically filter needle scratch and other objectionable high-frequency noises. An adjustable voice-coil mounting permits accurate alignment of the cone.



* * *

SILVER F-M/TV SIGNAL GENERATOR

An f-m/tv sweep generator, model 909, for visual alignment of f-m and tv, r-f, i-f and video amplifiers, has been announced by McMurdo Silver Co., Inc., 1240 Main St., Hartford, Conn.

Generator covers a center-frequency range of 2 to 226 mc, in three bands, without band-switching. Frequency modulation (sweep) is adjustable from 40 kc to over 9 mc by a panel control, while output is adjustable by a second knob from 0 to 1/2 volt, maximum. Synchronization of the 'scope used to visually trace alignment pictures is at power line frequency (or selected multiple or sub-multiple thereof), or by sawtooth synchronizing voltage provided by the generator at twice power frequency.

* * *

BRADSHAW PORTABLE ANALYSER

A test instrument, Rangemaster model 10, with three direct-reading capacity

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Universal/general corp.

365 Canal St., Dept. K, N. Y. 13 WALKER 5-9642

ranges, providing measurements up to 10 mfd, has been announced by Bradshaw Instruments Co., 942 Kings Highway, Brooklyr 23, N. Y.

Additional features include a-c current ranges of 0-15, 0-1.5 and 0-15 amperes; a-c voltage ranges of 1, 10, 100, 500 and 1000; d-c voltage ranges of 10, 100, 500 and 1000; d-c current ranges of 1, 10, 100 and 1000 ma; resistance ranges of 0-10,000 and 100,000 ohms and 1, 2 and 20 megohms; and a-c microamp range to 900 μ a. Instrument can also be as a scope calibrator.

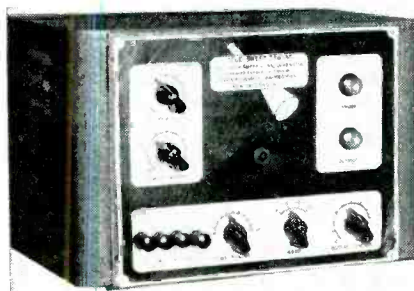
Instrument is also available in kit form.



VISION RESEARCH SWEEP GENERATOR

A sweep signal generator for the visual alignment of f-m and tv sets has been announced by Vision Research Laboratories, Kew Gardens, N. Y.

Unit has a sweep width of 500 kc to 10 mc. Output one volt maximum. Frequency coverage in four bands, 5 to 100 mc, 170 to 216 mc.

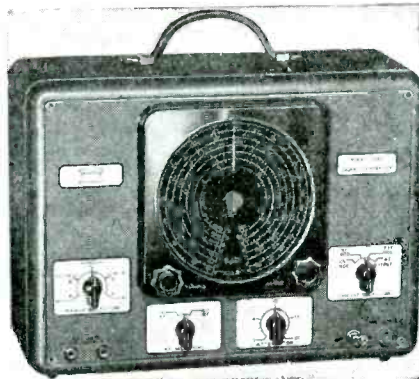


TRIPLETT ILLUMINATED-DIAL SIGNAL GENERATOR

A wide-range signal generator, model 3432, with five fundamental ranges, 165 kc to 40 mc and two harmonic ranges directly calibrated 36 mc to 120 mc, has been announced by the Triplett Electrical

Instrument Co., Bluffton, Ohio. Has an r-f selector which provides high and low r-f output. Output attenuator controls r-f output to coaxial output cable connector.

Circuit selector provides for internally modulated signal (variable 0 to 100% at 400 cycles). Variable amplitude of external modulation 40 to 15,000 cycles; unmodulated signal or variable audio 0-10 volts at 400 cycles.



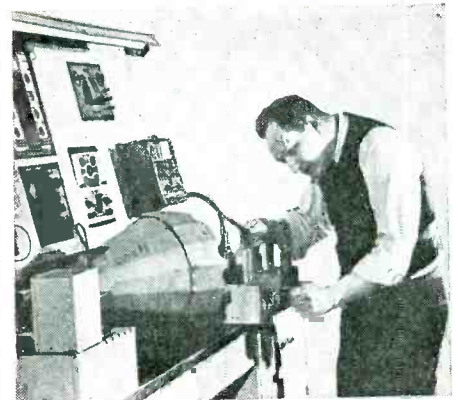
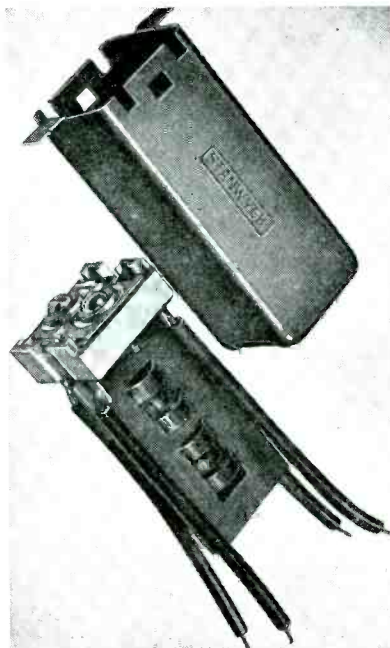
OLSON CAP CHEST

A combination kit of Akrad electrolytics known as the *Cap Chest* has been announced by Olson Radio Warehouse, Inc., 73 E. Mill St., Akron 8, Ohio. Chest contains a selected assortment of 27 of the most popular 25 v, 150 v and 450 v capacitors. Packed in a hinged-lid walnut finished wood chest with six adjustable compartments.

STANWYCK MINIATURE I-F TRANSFORMER

A line of molded powdered iron core midget i-f transformers has been announced by The Stanwyck Winding Company, 102 South Landers Street, Newburgh, New York.

Uses mica compression trimmers. Primaries, specially adapted to match the impedance of pentodes, are available. Pre-aligned to 455 kc. Mounted in a $\frac{3}{4}$ " square can x $1\frac{1}{8}$ ".



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RADIO-ELECTRONICS SERVICING
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Little competition is to be expected from the pre-war serviceman who has not modernized his knowledge through training. The industry is more of a specialized science than ever before! The average "screw-driver" serviceman is on his way out, and the trained electronics service engineer is on his way in. Honestly ask yourself if you are equipped to qualify for maintenance and service work in this new, broadened service field. If not, you are limiting your own opportunities in a field that drastically needs trained men.

Join the many servicemen who are now studying CREI courses in spare time . . . protecting their future jobs, their businesses, by acquiring new "know-how" now. CREI's reputation for home study training has been proved over 20 years. Important new electronics developments are covered in the CREI courses. Trained instructors give you personalized attention and step-by-step guidance all the way. No matter how little or great your practical experience there's a CREI course suited for your personal needs. The FREE booklet will tell you the whole story. Write for your copy today! Don't pass up this opportunity, or you'll regret it in years to come.

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The smooth, plastic handle remains cool to the touch. The heat is in the working tip where it belongs.

For complete information write:
 General Electric Company, Electronics Department, Syracuse 1, N. Y.

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GENERAL ELECTRIC

JOTS AND FLASHES

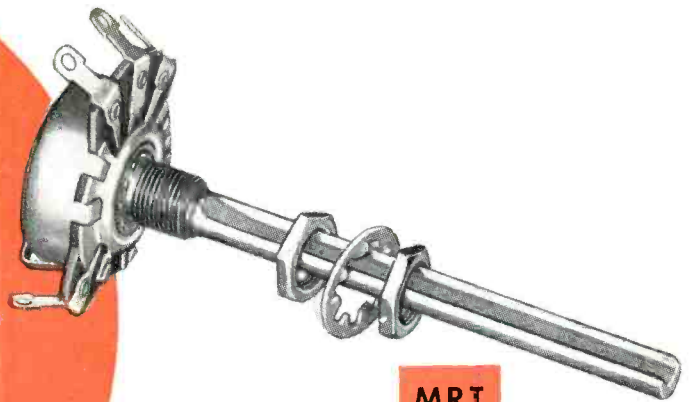
THE TV PARADE OF PROGRESS continues to become more and more impressive and indicative of the growing opportunities in tv Servicing. With some two million sets expected to be in operation by 1949, tv will be a must factor for practically every Service Man. At a recent meeting in Syracuse, J. B. Poppele, vice president in charge of engineering for WOR, said that more than three-quarters of a billion dollars will be spent by the public for tv receivers within the next two years. Quite a bit of that money will be for installation and servicing. . . . Hotels are taking to tv now. The Hotel Roosevelt in New York recently equipped 40 of its rooms with a tv system developed by Hotelvision, Inc., a subsidiary of Olympic Radio. . . . Industrial Television, Inc., of Nutley, N. J., has also developed a hotel tv system known as *guest television*. . . . Additional manufacturers who plan to have tv sets available for the Christmas holidays include Garod with a 12" model and Cleervue Television Corp., with direct view 10" and 12" models. Irving Kane is president of this new television corporation, which is located at 81 Wiloughby Street, Brooklyn. Mr. Kane was formerly president of Viewtone. . . . Stromberg-Carlson has also announced that they will produce tv sets beginning in January. . . . Max Rappaport is now on the sales staff of National Electronic Manufacturing Corp., 27-28 Steinway Street, Long Island City 5, N. Y. . . . James M. Blackledge, vice president and sales manager of the Standard Transformer Corp., visited Los Angeles recently. . . . The Kay Electric Co. have moved to a new plant at Maple Avenue, Pine Brook, New Jersey; telephone CALdwell 6-3710. E. L. Beaudry, Jr., is president. . . . J. Arden Still has been named manager of the southwestern division, distributor tube sales, Sylvania Electric. . . . Jay Sullivan has been named president and treasurer of Airadio, Inc., Stamford, Conn. . . . A 25-year celebration was recently held at the General Industries plant in Elyria, Ohio. . . . John L. Utz has been appointed sales manager of the Atlantic division of Philco. . . . J. H. Kelly, formerly southeastern district manager for Farnsworth Television & Radio Corporation, has become manager of the Farnsworth Sales Division. . . . The Burlington Instrument Company, Burlington, Iowa, have developed a safety cord swivel which is said to prevent twisting, curling and knots in electrical appliance and hand-tool cords. . . . The Canadian Marconi Co., Ltd., have been appointed Canadian Dominion distributors for Clarostat. . . . The Variety Electric Co., Inc., 601 Broad St., Newark, N. J., have purchased the complete stock of the radio parts department of the Bowers Battery and Spark Plug Co., the acquired department being placed under the direction of Stanley Dudek. H. Schlafer is president of Variety Electric. . . . Photostats of new schematics are now available from John F. Rider, Publisher, Inc., 404 4th Ave., N. Y. 16, at ten cents for two pages (five cents per extra page up to seven pages, and three cents for additional pages above seven), which will include the schematic, alignment and voltage data and parts lists, if available. Service Men desiring this service are asked to send in twenty cents with each order either in stamps, coins or postal note. Any differences in cost will be returned with the photostats; increased cost data will be supplied, too.

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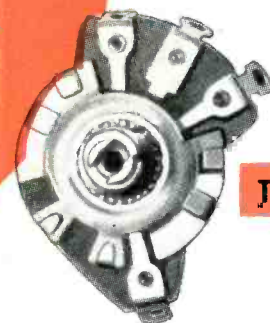
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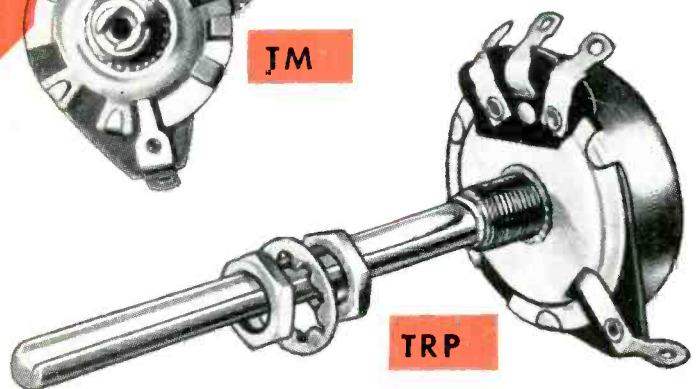
More Tapped Control Values For Your "Every Need"



MRT



TM



TRP

MALLORY provides every needed resistance value in its single tapped replacement controls—31 combinations of overall and tap resistances in all.

Mallory MRT Controls are available in most of the popular values, and feature an easy-to-cut channel shaft that fits all types of knobs. Mallory TMs are made in an even wider range of resistance values than the MRTs, and are used in conjunction with 30 non-wobbling, non-loosening Plug-In Shafts. They have practically universal application because they provide "special" shafts of nearly every required type.

Where shaft lengths of 3 inches or less are required, Mallory TRPs (fixed shafts)

replace large originals using set screw or spring type knobs. See your Mallory distributor.

Insist on MALLORY—the Complete Control Line

Mallory offers 33 Tapered Wire-Wound Controls . . . 31 Values in Single Tapped Controls . . . 10 Values in Double Tapped Controls . . . 12 Clutch Type Controls . . . 10 Universal Dual Controls . . . and 92 Popular Special Controls.

The MALLORY "Good Service for Good Business" Plan includes ideas that will help your business grow. Ask Your Distributor about it.

P. R. MALLORY & CO. Inc.
MALLORY

VIBRATORS . . . VIBRAPACKS* . . . CAPACITORS . . . VOLUME CONTROLS . . . SWITCHES . . . RESISTORS . . . FILTERS . . . RECTIFIERS . . . POWER SUPPLIES.

*Reg. U. S. Pat. Off.

APPROVED PRECISION PRODUCTS

P. R. MALLORY & CO., Inc., INDIANAPOLIS 6, INDIANA

OVERWHELMING ACCEPTANCE!



- Month after month, RCA Batteries continue to smash all previous sales records.

The reasons for this unprecedented acceptance are conclusive—

RCA Batteries are designed for *radiomen* . . . to sell through *radio* outlets. And they're backed by the greatest name in radio—RCA.

RCA Batteries are your assurance of immediate customer acceptance and greater profits.

RCA BATTERIES—THE COMPLETE LINE FOR THE ELECTRONIC DISTRIBUTOR



Flashlight

Portable A's

Portable B's

Portable AB's

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