

*Radio*  
**SERVICE  
DEALER**

JANUARY, 1949

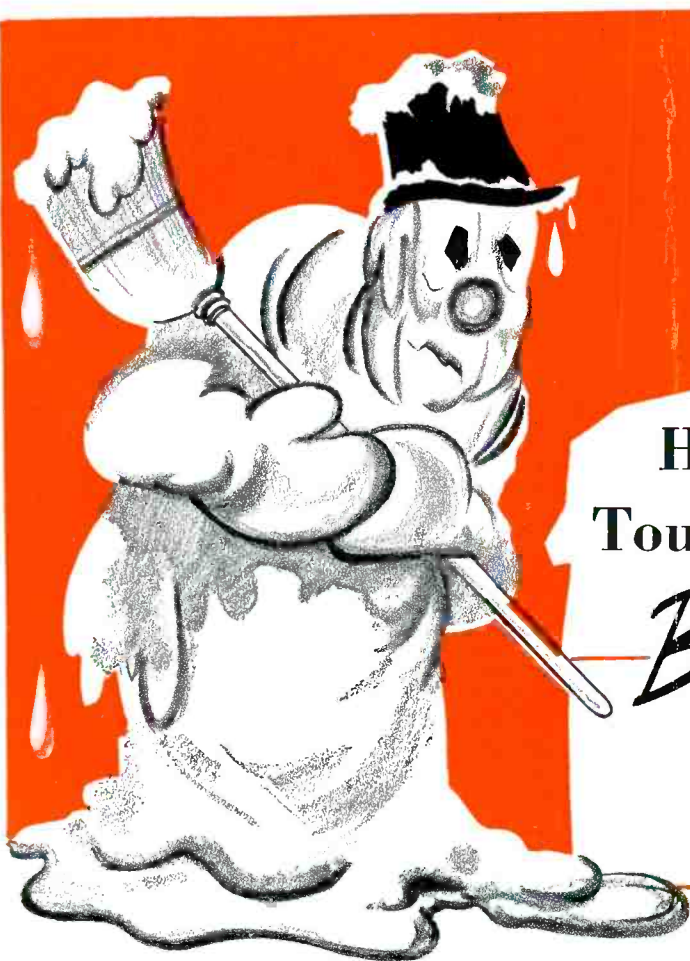


**IN THIS ISSUE:**

Field Findings  
Checking Video & Synch Waveforms  
Feedback & Phase Inversion  
Tuned Filters  
A New Phono Pickup  
Income Tax—It's Easy!

**AM-FM-TV-SOUND**

*The Professional Radioman's Magazine*



High Temperature is  
Tough on LONG LIFE...

*But*

**Mallory Capacitors  
Can Take It!**

Long life in a capacitor is one thing—long life in high temperature is quite another matter. That's why the record of Mallory Capacitors is so impressive. Tests prove that the characteristics of Mallory Capacitors are practically unchanged after 2000 hours at a temperature of 185° F.

It takes materials of the highest purity to withstand heat like that. But purity control is one of the big points in the manufacture of Mallory Capacitors. They are untouched by human hands; production workers wear rubber gloves. Specifications on the chloride content of the gauze are even more rigid than on hospital gauze. This gauze is the base on which aluminum is sprayed to create the anode plate.

That's not all! Mallory Capacitors have longer shelf life—longer life in an inactive set—lower RF impedance—ability to withstand higher ripple current.

Mallory Capacitors cost no more than ordinary capacitors—they're easy to install, and when they're installed they're *dependable* . . . and that means the kind of service that satisfies customers. Order from your Mallory distributor.

**New Improvements in  
Mallory FP Capacitors**

. . . Feature stronger anode tabs—withstand higher discharge currents—improved high surge separators—still greater heat resistance—extra heavy rubber seal—heavier cathode tab—special etched cathode.

*Buy Mallory Assured Quality At Regular Price Levels*

**P. R. MALLORY & CO. Inc.**  
**MALLORY**

CAPACITORS . . . CONTROLS . . . VIBRATORS . . .  
SWITCHES . . . RESISTORS . . . RECTIFIERS . . .  
VIBRAPACK\* POWER SUPPLIES . . . FILTERS

\*Reg. U. S. Pat. Off.

**APPROVED PRECISION PRODUCTS**

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



# SYLVANIA ADVERTISING HELPS SERVICE DEALERS INCREASE THEIR SERVICE BUSINESS!

Read what these 3 dealers say about Sylvania's Dealer Campaign for Summer and Fall

## ELECTRONICS Service Company

Public Address F. M. Radio Recording Equipment  
Phone 3-9242  
Tulsa, Oklahoma

October 23, 1948

Advertising Department  
Sylvania Electric Products Inc.  
Emporium, Pa.

Gentlemen:

We would like to express our appreciation to Sylvania for its co-ordinated advertising campaign. It has, so far, resulted in a steady increase in our service business. During September it has shown a 28 per cent increase and to date in October it has shown a 28 per cent increase. We feel that this increase is due to this campaign since we have used it exclusively during this time.

We have used the radio spot announcements over our local station and mailed the direct mail postal cards to our customers. We have also used the newspaper ad mats in our local paper upon occasion.

It is a great help to the radio service business to have this service provided so inexpensively. Thanks to you of Sylvania.

Very truly yours,

*Vernor P. Rodgers, Jr.*  
Vernor P. Rodgers, Jr.  
Manager and Prop.

VPR:ML

"September business increased 30%"

DAMON'S RADIO SERVICE  
1006 E. 14TH ST. SAN LEANDRO

## RAPID Radio Service

Dial TR 4353  
1006 East 14th Street  
SAN LEANDRO, CALIF.

R. H. DAMON

Advertising Department  
Sylvania Electric Products  
Emporium, Pa.

Gentlemen:

Enclosed is my order for the second kit in the Sylvania co-ordinated advertising program.

I took over this business on July 1 and have been using the advertising material from your first kit. I have found that it really pays to advertise. The previous business was bankrupt and had no volume of service business.

With help from Mr. H. A. Hall, the local Sylvania salesman, and the advertising material furnished by him, my business now shows great promise. Mr. Hall works for C. C. Brown Co. of San Francisco, one of your distributors. Mr. Hall filled my rush order for a Sylvania Tube Tester which has already increased my sale of tubes.

I am enclosing a few copies of my sign using Sylvania ad mats which appear in the local paper, the San Leandro News Observer and the San Leandro Shopping News. These papers have a circulation of 18,000. This type of advertising brought in over 100 radio sets for repair during the month of July. I hope business grows like this every month from now on.

Sincerely yours,

R. H. (Bob) Damon  
Damon's Radio Service  
1006 E. 14th Street  
San Leandro, Calif.

"Newspaper ads brought in over 100 radio sets for repair during July!"

216 FOURTH AVE., WEST  
PHONE 1564  
ASHLAND, WISC.

## MYERS RADIO SERVICE CO.

Advertising Department  
Sylvania Electric Products  
Emporium, Pa.

Dear Sir:

I am writing to tell you how much your co-ordinated advertising has helped my business.

I have used the postal cards, the window displays and the radio spot announcements to promote my business. The radio station. They are used seven times a week over our local taced a large range of people.

I make my living entirely through service and the sale of used records, so anything which helps to increase my business is very valuable to me. Since I have been using your campaign my business has increased from an average of \$90.00 per week to about \$135.00 per week gross. My use of the campaign has cost me about \$12.00. Before I used the campaign I was spending an average of \$7.00 per week. For the extra expense I have certainly received a fair return.

I am very much pleased with the radio spots in your booklet.

*Robert Myers*  
Myers Radio Service Co.

"Gross business increased from \$90.00 to \$135.00 per week"

## SYLVANIA'S FEBRUARY, MARCH AND APRIL CAMPAIGN IS NOW READY. Here's what it contains:

- 3 Postal Card Mailings—one for each month.
- 3 Window Displays—one for each month.
- 3 Window Streamers—one for each month.
- 6 Newspaper Ad Mats—two sizes for each month.
- Radio Spot Announcements—several for each month.

## SEND FOR FULL INFORMATION NOW!

Remember, this campaign designed for your use ties up directly with Sylvania's ad campaigns on a national scale. You pay only the postage on the government postal cards you mail. Sylvania supplies everything else free! Mail coupon today!

# SYLVANIA ELECTRIC

RADIO TUBES; CATHODE RAY TUBES; ELECTRONIC DEVICES; FLUORESCENT LAMPS, FIXTURES, WIRING DEVICES; LIGHT BULBS; PHOTOLAMPS

RADIO SERVICE DEALER • JANUARY, 1949

Sylvania Electric Products Inc.  
Advertising Department  
Room R-1801  
Emporium, Pa.

Gentlemen: Please send me full details on your February, March and April Service Dealer Campaigns.

Name \_\_\_\_\_

Company \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_ Zone \_\_\_\_\_

State \_\_\_\_\_

# EDITORIAL

## Dual Speed Player Standards

The advent of dual speed record players, combination 78-33 1/3 rpm jobs, gave the industry a big, well needed boost. The original method of launching the new player units and records left much to be desired, but with passing time has been getting straightened out.

Dual speed players afford owners with many advantages such as improved quality and economy. Likewise, the units afford Service Dealers with an opportunity to make sales and replacements, otherwise not obtainable.

However, now there's a "fly in the ointment". It seems that one or two very big manufacturers did not jump on the 33 1/3 rpm slow-speed bandwagon, preferring to establish a slightly different standard, either 45 rpm or 50 rpm for the combination with 78 rpm. If their plans to bring out dual speed players with 78-50 rpm ranges, and if their plans to bring out new phonograph records that will play only at 50 rpm are carried through to a conclusion, obviously, a great deal of confusion will result. We believe that if the record and record-player buying public gets tangled in a maze of different speed ratings, the whole business may be jeopardized. Thus, as we see it, RMA should get all the factors together immediately and establish once and finally what are to be standards for dual speed players and slow-playing records.

## Test Equipment Issue

A radical departure from our regular publishing practice takes place next month. For the first time since "RSD's" inception almost 10 years ago we will have a special issue in February. We will call it our Test Equipment Number.

Its purpose is to acquaint radio technicians, dealers and students with the fundamental characteristics, limitations and applications of the 11 basic types of test equipments required in present-day AM-FM and TV servicing. Thousands of radiomen are using obsolete test equipment and have been reluctant to make new purchases until they could learn from an authoritative source just what the score is. Our February issue will be outstanding because it will dispel all confusion in this regard.

## "LIFE" Reviews TV Progress

The December 6th issue of "LIFE" reviews the progress of radio and video quite comprehensively. One must respect some of "LIFE's" observations, to wit: it calls television, "America's newest big industry". Continuing, there were such remarks as . . . "Television no longer threatened to bring theatre

[Continued on page 48]



**Sanford R. Cowan**  
EDITOR & PUBLISHER

**Samuel L. Marshall**  
MANAGING EDITOR

**COWAN PUBLISHING Corp.**

**Vol. 10-No. 1**

**JANUARY, 1949**

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**MAKES FRIENDS...AND KEEPS THEM!**



**GENERAL  ELECTRIC**

101-MA2-0850

**FIRST AND GREATEST NAME IN ELECTRONICS**

# Field Findings

A resume of Industry happenings here, there and everywhere

## Unusual TV Installation

Harry Ward, 2916 E. Anaheim St., Long Beach, Cal., Service Dealer and active member of the Long Beach Radio Technician's Ass'n., found a unique way to make a satisfactory TV set installation in a Barber shop located across the street from his store.

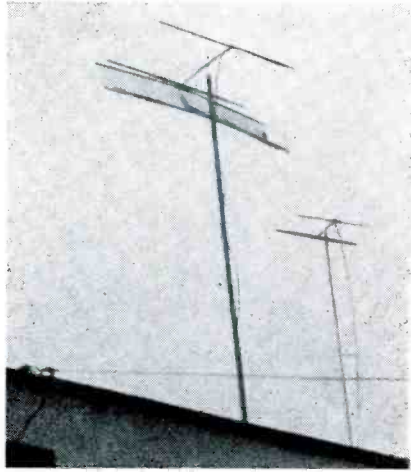
Conventional TV arrays failed to give satisfactory reception, as in every case there was excessive interference due to auto ignition. Finally, Mr. Ward rigged up a window screen, as shown in the illustration, positioning it below the dipole. This trick solved the problem—and now, throughout Long Beach, one can see many TV antennas with various types of chicken wire or screen vertical-wave-absorption devices attached.

## Another TV Antenna Ban

An Elizabeth, N.J. housing project prohibits tenants from erecting roof TV antennas. To get around this ban some tenants installed aerials on arms extending out of their windows. This infuriated the Chairman of the housing project. He not only claimed that such out-the-window installations were a violation of the local law, (which we do not believe is true), he also claimed such window installations are fire hazards, (which we are inclined to scoff at because of the ridiculousness of the claim). To top it off, The Chairman really let the cat out of the bag when he stated that if people are rich enough to own a television set they are rich enough to live in a higher rent type of building project. That is sheer nonsense, for if politicians don't realize that even poor people can afford to buy TV sets for as little as \$3.50 a week, they should learn more about the facts of life.

In a nutshell, renters hate TV unless they can use it to squeeze a few extra bucks out of the tenants. The situation is one that R.M.A. and N.A.B. should do something about . . . and they should do it now!

by S. R. COWAN



California's contribution to the problem of licking vertical pickup.

## The New Video Wire Link

Effective January 12th the new telephone company link that ties the Eastern and Midwestern video networks into an integral unit brought a acclaim and huzzahs from all branches of the video industry. In time, and that time should not be too far off, this country will have video links from Coast-to-Coast, so that live-talent shows or sporting events originating at Hollywood, Chicago or New York can be telecast in all cities having TV outlets simultaneously.

Television's biggest weakness, since its inception, has been the inferior quality of the programs. Networks are the first and most important step in eliminating that shortcoming. For example, the 1948 Baseball World Series games were split into two parts, from a video point of view, as the games played in Boston could only be seen on TV in the East, in cities on the Eastern network, and the Detroit games could only be telecast to the Midwest cities situated on the Midwestern net. Had the new telephone company link been in oper-

ation at World Series time both networks could have carried all the games.

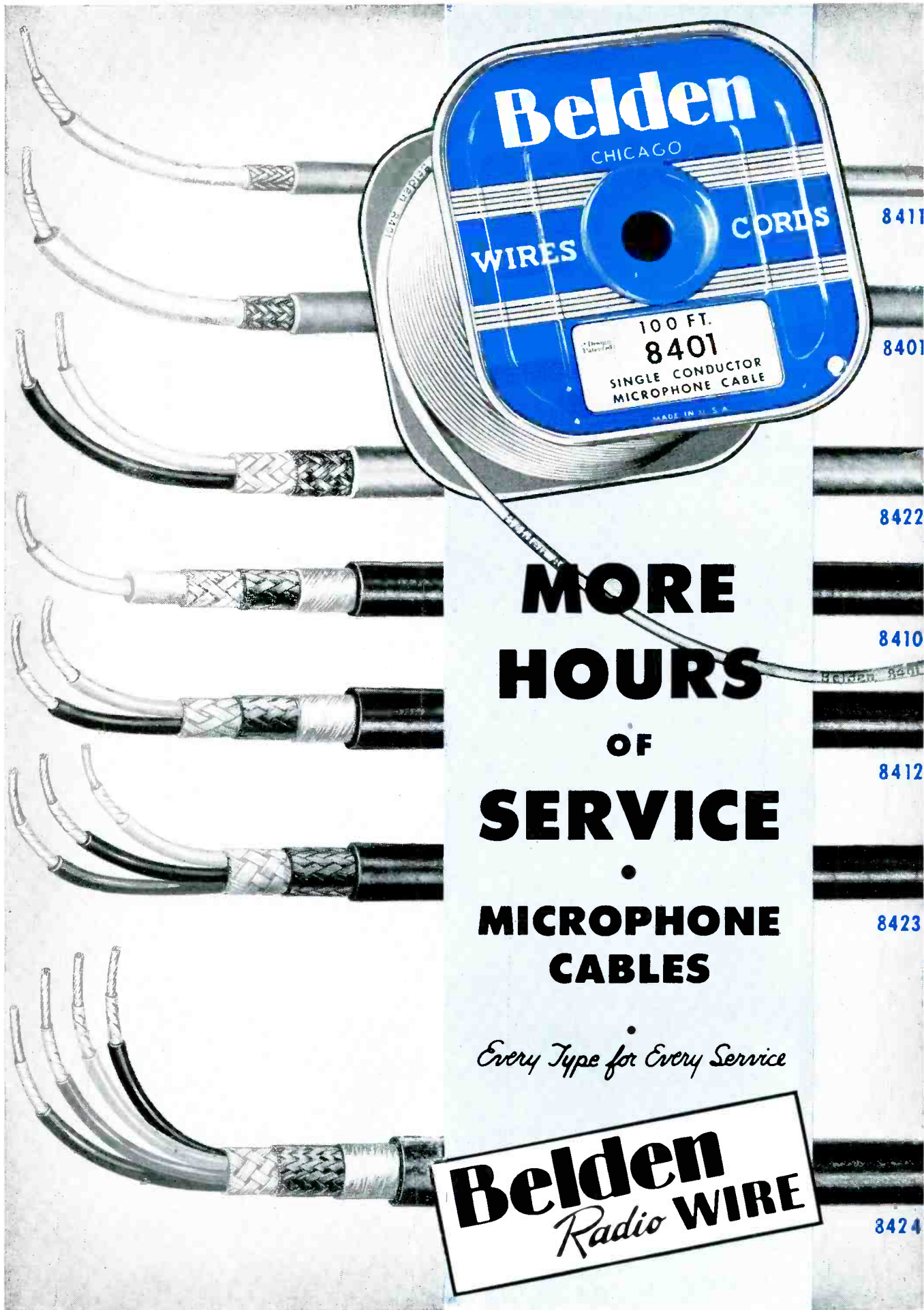
The time zone difference between East and West is going to be affected by TV and it will not be as simple a problem to lick on video as it was on conventional AM. It's much too expensive to rebroadcast a live talent video show to take advantage of the time difference, as is now done on AM programs. From where we sit, it would seem as though the West Coast is the one that is going to have to "push its viewing hours ahead". There is now a two hour time difference between Hollywood and New York. (Normally there would be a three hour difference but the West Coast is still operating on Daylight Saving Time due to the drought). Thus, if zone times were normal, a big show put on at New York at 8 p.m. New York time, were there a Coast-to-Coast link, would be on the air in California at 5 p.m., and that's a little too early. Full advantages of national commercial sponsorship would not be obtained.

Incidentally, it is time that one appreciated the new, true status of the West Coast, in-so-far as population is concerned. The next national census may show that California has a population almost as big as New York's. There has been, and there continually is an ever-increasing migration towards the West Coast. There is a greater shortage of radio technicians out West than in the East or Midwest. So, if any readers have been pondering about a trek to the West in line with Greeley's sage advice, you now have the facts. (It cannot be denied, even by a staid Connecticut Yankee like me, that the climate and hospitality of the West are factors quite definitely in its favor).

## Business Conditions

We have entered a New Year and what the future will bring only time itself can tell. My prognostications may or may not be borne out.





**Belden**  
CHICAGO  
WIRES CORDS

100 FT.  
**8401**  
SINGLE CONDUCTOR  
MICROPHONE CABLE  
MADE IN U.S.A.

**MORE  
HOURS  
OF  
SERVICE  
MICROPHONE  
CABLES**

*Every Type for Every Service*

**Belden**  
*Radio* WIRE

8411

8401

8422

8410

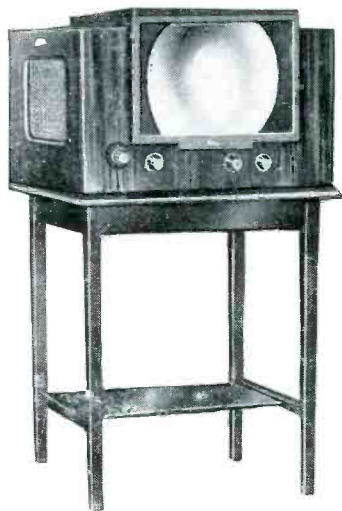
8412

8423

8424

# TRANSVISION

PRESENTS  
THE NEW



**MODEL 12CL TV KIT**  
Brings the biggest and best in television within the reach of everyone.

**GIGANTIC VALUE!**

OVER

**200**

**SQ. IN. PICTURE**  
**VISIBLE from ALL ANGLES**

(Picture much bigger than a tabloid newspaper page)

IMAGE IS EQUAL to that of a 20" tube—  
even sharper and clearer—and it is visible  
from all angles.

**\$399.00**  
NET

Includes Kit, Cabinet, Lens, Table, Antenna,  
& 60 ft. of Lead-in Wire

**EQUIVALENT OF \$1000.00 SETS!**

Price of the new 12CL electromagnetic kit  
includes these outstanding features:-  
• 12½" picture tube with special fitted All-  
Angle Lens and color kit.

- Beautiful select-grain cabinet and roto-table.
  - New all-channel continuous tuner Model CT-1.
  - New all-channel hi-gain antenna and 60 feet of lead-in wire.
- Nothing else to buy.

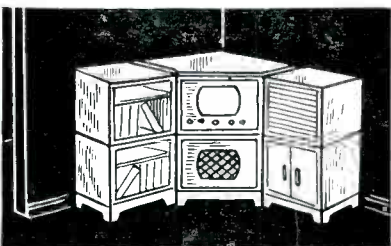
### Transvision Remote Control Unit Kit

Will operate any TV receiver from a distance. Turns set on, tunes in stations, controls contrast and brightness, turns set off. Ideal for installations where the television receiver is inaccessible. Tuner unit is a high gain, all-channel unit with about 50 micro-volt sensitivity. Easy to assemble in about an hour.

Model TRCU, with 25 feet of cable  
Net \$69.00  
Without cabinet.....Net \$65.00

### ASSEMBLE Your Own CABINETS

Transvision's "MODULAR" Cabinets come in knock-down, unpainted units, offering an unlimited range of combinations, including even a bar. Finish them off to suit your taste.



Corner piece, shown above, has room for TV, Phono, Record Storage, and open Book Case.  
**COMPLETE .....Net \$84.00**  
For other units and prices, write for "Modular" Catalog.

### MODEL 12CL TV KIT

- Features 12½" tube with fitted All-Angle Lens, giving over 200 sq. inch picture which is visible from anyplace in a room.
- Gives ideal long-range reception with **CONTINUOUS TUNING on ALL CHANNELS.**
- **COMPLETE** with Cabinet, Lens, Roto-Table, Antenna, Lead-in Wire.
- **A BIG PROFIT-MAKER** for service dealers. This kit is TOPS—ideal for homes, clubs, taverns, and other commercial installations.

**EASY TO ASSEMBLE. NO TECHNICAL KNOWLEDGE REQUIRED**  
Transvision's simple step-by-step Instruction Sheet makes assembling a TV Kit a pleasure. Each kit comes complete with all-channel double-folded dipole antenna and 60 ft. of lead-in wire. Nothing else to buy!

### TRANSVISION ALL-CHANNEL TELEVISION BOOSTER

To assure television reception in weak signal areas, or areas which are out of range of certain broadcast stations, Transvision engineers have designed this new booster. It increases signal strength on all television channels. Tunes all television channels continuously. Can be used with any type of television receiver. Unusually high gain in upper television channels.

Model B-1 .....LIST \$44.95

### TRANSVISION COMPLETE LINE OF TELEVISION COMPONENTS

Essential units for building a quality television set . . . Transvision makes available a complete line of high quality parts competitively priced. Included in this line are Filter Chokes, all types of Transformers, Focus Coils, Deflection Yokes, Coils—and of course major units such as Picture Tubes, Antennas, Lenses, etc., etc.

WRITE FOR COMPONENTS FOLDER P-1

### RADIOMEN..You Can GET INTO The TELEVISION BUSINESS

IN A BIG WAY WITH THE  
**TRANSVISION DEALER PLAN**

Write for Dealer Folder D-1

**TRANSVISION, Inc. Dept. RSD New Rochelle, N. Y.**

In Calif.: Transvision of California, 8572 Santa Monica Blvd., Hollywood 46.  
All prices 5% higher west of Mississippi: all prices fair traded. All Prices Subject to Change.

I can not see a War in the immediate offing. To begin with, Comrade Stalin has purged his top army brass again. I don't believe he would take such steps if he believed that war was imminent. It's too great a risk. So, as I do not expect any world-wide conflict, I do expect that radio amateurs will again resume great activity. They have been quite dormant for over six months. With resumed "ham" activities there must be expected a resumption of gripes in regard to TVI, (television interference). Likewise, when "hams" are active as hobbyists, they also become (too) active as part-time radio servicemen. Let's hope that "hams" will stick to the rigs and leave professional radio servicing to the men who devote their full time to this business.

Radio servicemen's organizations should contact their parts jobbers and try to work out friendly arrangements whereby the jobbers will agree to give the standard trade discounts to only recognized and deserving, legitimate radio servicemen, and not to every Tom, Dick and Harry who wants to buy some replacement radio parts at a wholesale price. Replacement radio parts, tubes, etc. have established list prices. Jobbers should charge all buyers, except professional radio servicemen and industrial manufacturers (who generally buy from jobbers) full list price. Were this one, simple-to-accomplish basic rule of good business carried out by jobbers, it would be of inestimable benefit to the radio servicing field.

Service organizations, in turn, should give jobbers a break by ordering their needed replacement parts, tubes, etc., in sensible quantities. Hand to mouth buying is not good business practice. For example, every time a service dealer makes a phone call he spends a nickel. And every call, or visit he makes to a jobber represents a waste of time. If instead of buying six items at a time the service dealer makes six phone calls, buying one item at a time, he must not overlook the fact that he has paid 30c more for these items. Such a waste of money is never justified. Buy right! Little things like this make a big difference. Keep a proper inventory. Running short of items that results in slowing down bench work represents business losses that can never be reclaimed or recovered.

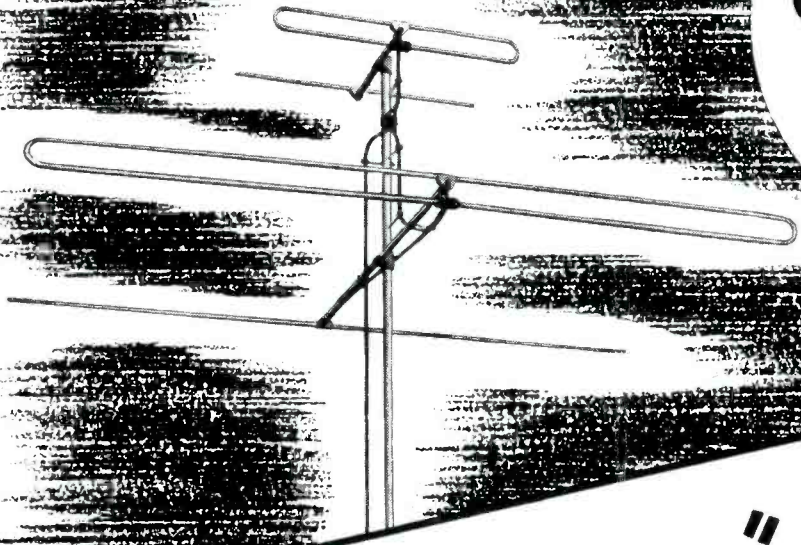
At last the servicing industry as a whole has come to recognize that the radio set owning public is willing to

[Continued on page 10]



MAKES THE BEST TELEVISION RECEPTION BETTER

THE  
*Quality*  
ANTENNA  
LINE



**"Simpli-Flex" TELEVISION and FM ANTENNAS**

SIMPLI-FLEX means just what it says! SIMple to install . . . FLEXible for any requirement! Its design allows it to be built up from the basic dipole to multiple stacked all-channel arrays by the addition of reflector kits and additional arrays as required when more stations get on the air.

● Here is the most successful . . . the best engineered antenna line in the field! The Radiart line of antennas is GUARANTEED to produce the ultimate in television and FM reception . . . covering all 12 channels! Radiart Simpli-Flex antennas get the picture — where others fail . . . so install RADIART . . . for TROUBLE FREE . . . SPEEDY . . . AND LESS COSTLY INSTALLATION!



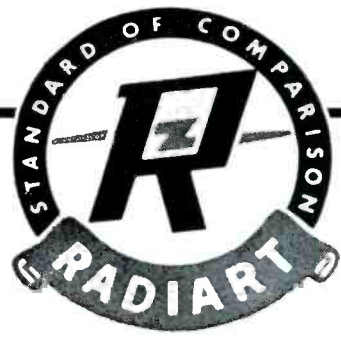
No "assembly puzzles" with Radiart's "SIMPLI-FLEX" design. No degree in engineering or truck-load of tools needed — absolutely no loose hardware. One minute assembly, one man installation!



High strength, well engineered design of more than ample safety factor, with simple, sturdy all aluminum castings, elements, and heat-treated support masts for PERMANENT installations.



"WEATHER-SHIELD" polystyrene terminal block encloses lead-in connections and protects from all weather conditions! Keeps electrical performance at maximum.



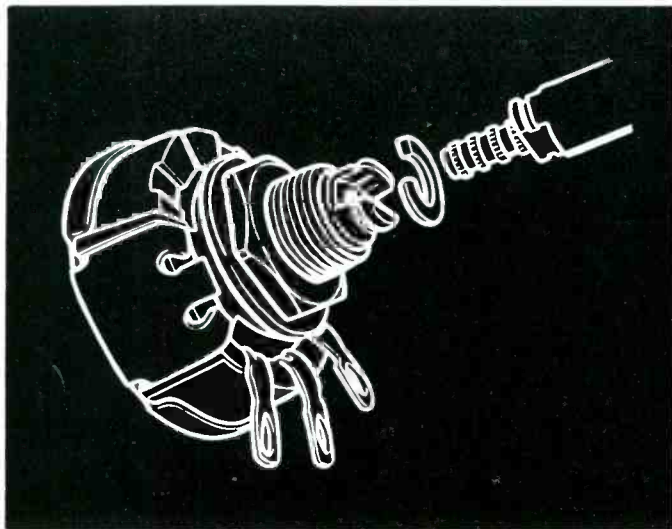
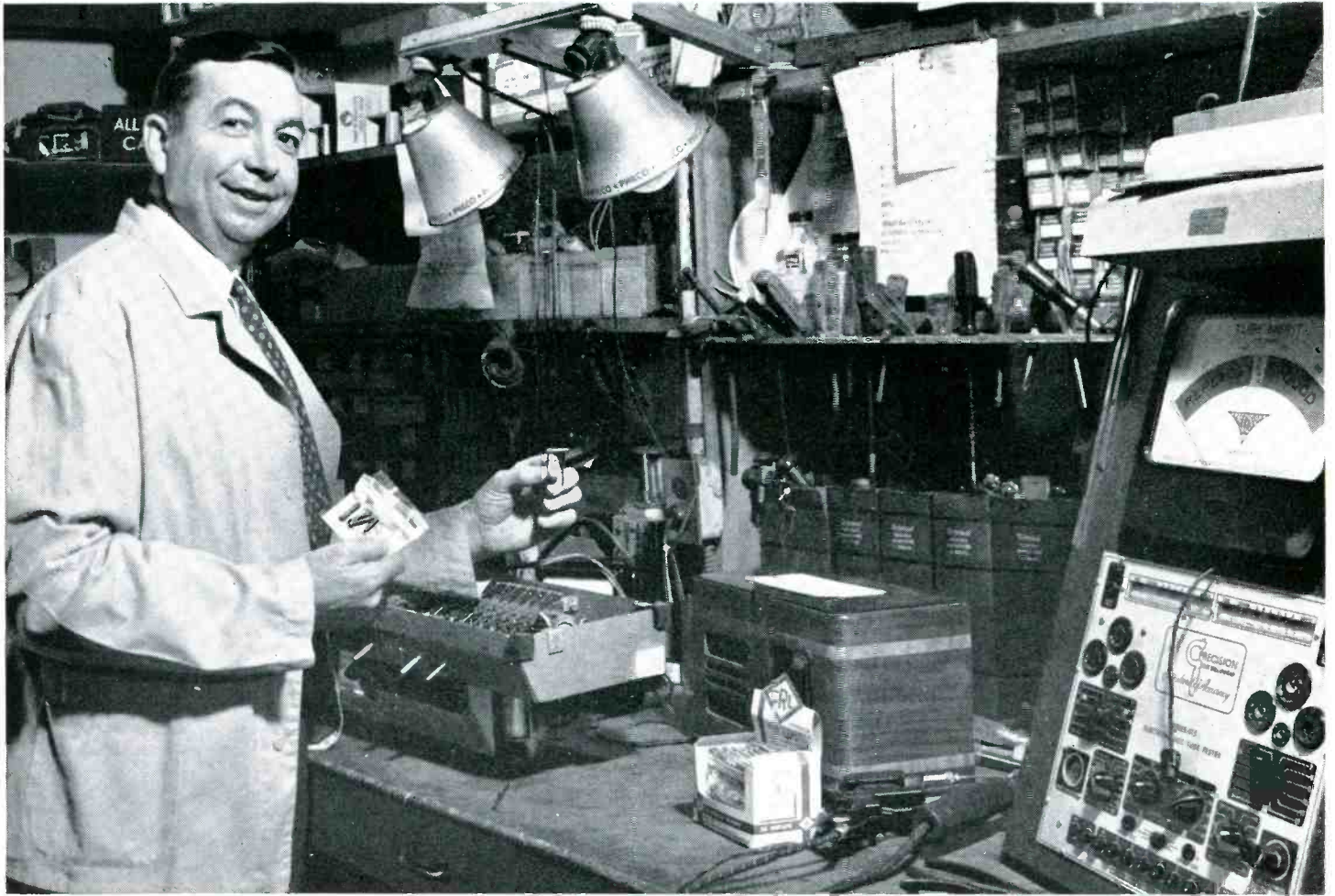
IT'S RIGHT WHEN IT'S RADIART

**THE RADIART CORPORATION**  
CLEVELAND 2, OHIO

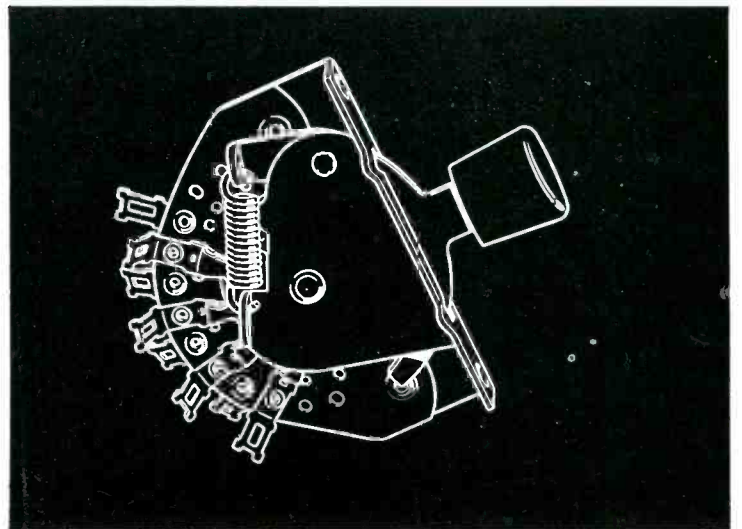
MANUFACTURERS OF THE FAMOUS RED SEAL VIBRATORS  
EXPORT . . . SCHEEL INTERNATIONAL . . . CHICAGO 18, ILLINOIS



# Build profits 3 ways



**Controls:** With CRL's improved *Adashaft* Radiolms you can carry a small stock of controls, yet be ready to handle almost any kind of control replacement problem. No wiggle, no wobble, no slip. Just insert shaft pilot in control stub shaft, and slip "C" washer into place. Available in all sizes for all model "M" volume control applications. Six types of shafts.



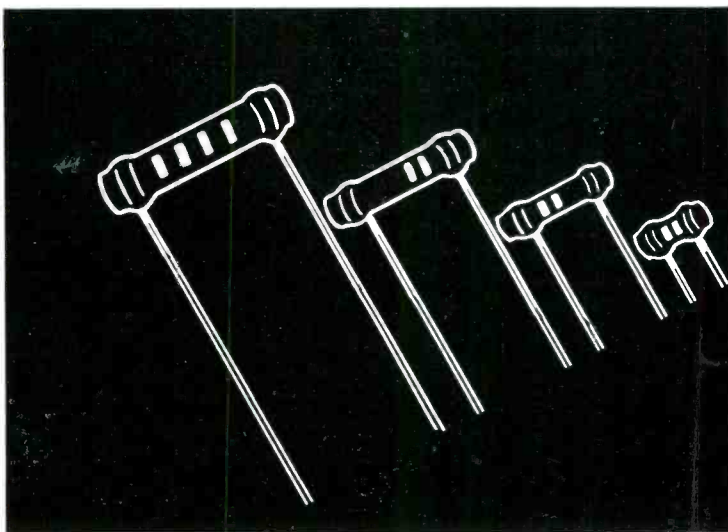
**Switches:** Centralab offers you a complete line of Tone, Rotary Selector, Lever Action and Medium Duty Power Switches, which features a wide variety in both laminated phenolic and steatite insulation. Available with shorting or non-shorting contacts. See your Centralab Distributor for further information, or write direct for new Catalog 26.



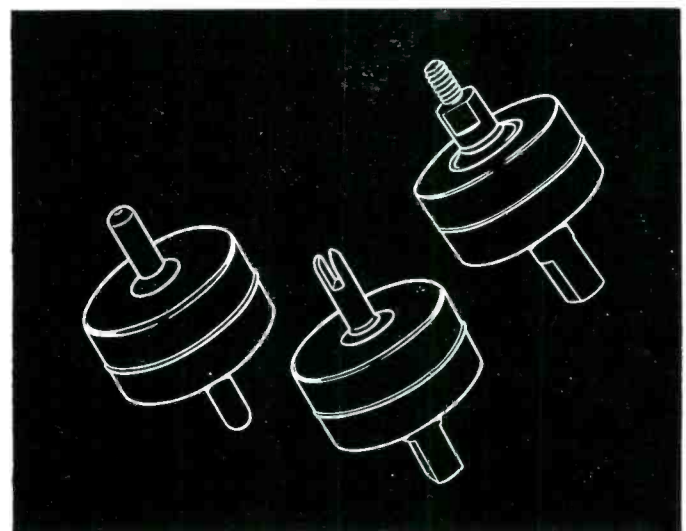
# with Centralab parts

*Three real advantages are yours when you use dependable CRL replacement parts in your shop. That's the word of successful servicemen everywhere. These men report — 1. Centralab parts are easy to stock . . . easy to identify. Many CRL components are packaged to give you more shelf space . . . neater displays. All are clearly labeled for quick identification. 2. Centralab parts are easy to use. CRL design speeds repairs by eliminating tricky bending or fitting operations. 3. Centralab parts provide performance that insures repeat orders . . . invites new customers. Yes — Centralab parts can help you build up your service business. Get the complete story from your CRL distributor.*

← — Phil A. Smith, owner of the Smith Radio & Appliance Company, Shorewood, Wisconsin, says, "I've been in the radio-servicing business 21 years — using Centralab replacement parts from the beginning. During this period I've had plenty of opportunity to prove just how dependable CRL parts are."



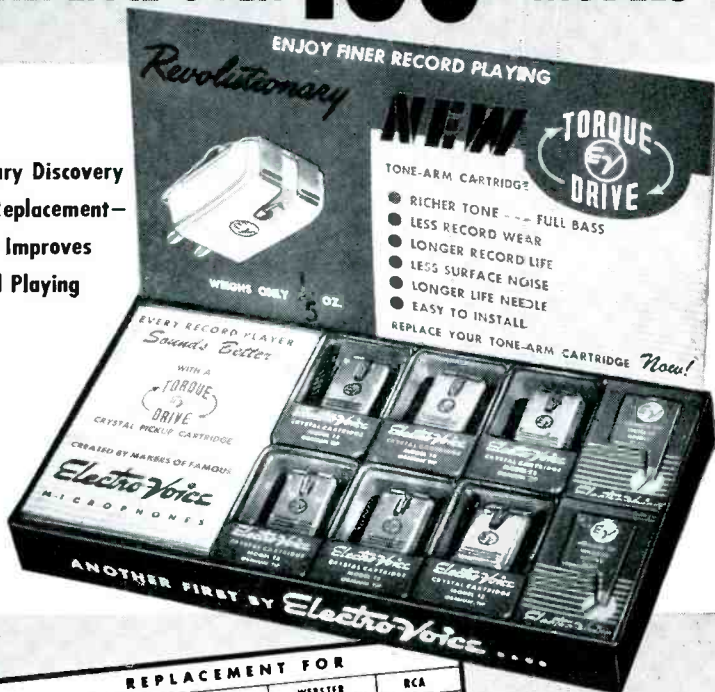
**"Hi-Kaps":** CRL line of ceramic By-pass and Coupling Capacitors gives you ceramic dependability and permanence at a new low price! Packaged in a convenient envelope of five, *Hi-Kaps* are clean, easy to stock and handle. Wide range from .000050 to .010000 mfd. Rating — 600 WVDC, 1000 VDC, flash tested. Ask your Centralab Distributor for all the facts.



**"Hi-Vo-Kaps":** Just out! Centralab's new high voltage capacitors for television and high voltage applications. Made of Ceramic-X, *Hi-Vo-Kaps* combine high voltage and small size to give you convenient, dependable performance. 10,000 WVDC, flash tested. 20,000 VDC. Capacity — 500 mmf. See your CRL Distributor, or write direct.

# 3 BASIC TYPES REPLACE OVER 150 STANDARD MODELS

**Revolutionary Discovery  
Simplifies Replacement—  
Greatly Improves  
Record Playing**



REPLACEMENT FOR							
ELECTRO-VOICE	ASTATIC	SHURE	WEBSTER	RCA			
<b>MODEL M12</b> Medium Voltage (Red)	L-22A	L-76S	P30	P93C	E4	N4	31050*
	L-25A	L-76AS	P30B	P93D	E4-1	N6	31156*
	L-26A	LT-M	P30C	P93E	E-9	N6P	32632*
	L-27A	LT-MA	P30D	P93S	F1	N6P-4	33122*
	L-32A	LT1-M	P30E	P94	F1P	N8	33217*
	L-70	LT1-MA	P30S	P94B	F2	N8P	33905*
	L-70A	LT2-M	P87	P94E	F2P	N9	34225*
	L-70A	LT2-MA	P87B	W42A	F3P	N11	34307*
	L-70S	LT3-M	P87S	W57A	F4P	N11P	34710*
	L-70AS	LT3-MA	P90B	W57AM	F5		35171*
	L-71	1-J	P90C	W58A	F5P		37158*
	L-71A	1-M	P90D	W60A	F6		39686*
	L-71S	401-A	P90S	W60B	F6P		
	L-71AS		P93	W60HS	N2		
	L-76		P93B	W61B	N3		
L-76A							
<b>MODEL M12</b> High Voltage (Blue)	L-24A	L-72S	P88	W56A	C-2†		CR1A
	L-36A	L-72AS	P88S	W59A	C-3†		CR2A
	L-46A	L-82	P89	99-180	C-6†		S2
	L-50A	L-82A	P89S	99-181	N-10		
	L-72	L-82V	W40A	W41A	N-10P		
L-72A	M-23			N-10P-1			
<b>MODEL L12</b> Low Voltage (Yellow)	L-40A	LP-6	QC	QT-3JA	C5†		71173
	L-41A	LP-21	QT-J	QT-3M	F3		70339
	L-75	LP-23	QT-M	QT-3MA	F7P		70338
	L-75A	MLP-1	QT-2J		N3		
	L-75S	MLP-1J	QT-2M		N5		
	L-75AS	MLP-2	QT-3J		N7		

Use "A" mounting plate furnished with cartridges (1/2" hole centers) for all replacements except those marked with an \* or †.  
\* Use "B" mounting plate furnished (3/8" to 13/16" hole centers).  
† Use "C" mounting plate furnished (Webster Side Flange).  
All Model 12 Cartridges equivalent to ASTATIC "A" type except Tone Arm Rest Button is not supplied.  
It is recommended that the lower voltage cartridge consistent with volume level be installed.  
NOTE: Models M12, H12 and L12 have Osmium-tip Needle. For Cartridge with Sapphire-tip Needle, specify Model M12-S, H12-S, or L12-S.

**New Torque Drive Crystal Pickup Cartridge achieves clean, clear tone definition and fidelity that are truly amazing! You can hear the difference! Gives new life to every record library.**

**AUTHORIZED DISTRIBUTORS EVERYWHERE**

**Write for Replacement Chart Bulletin No. 146**

**New Model L-14 Microgroove Crystal Cartridge, and New Model 20 Magnetic Cartridge for Regular or Microgroove records also available.**

## FIELD FINDINGS

[from page 6]

pay for all services received. For example, there is no longer any need to test tubes free of charge. The monies you receive for testing tubes during a year can be applied towards the purchase of much needed new test equipment. Test equipment wears out. When a customer asks you to test his tubes, he asks you to wear out your test equipment, and he is obligated to pay for that depreciation, not to mention your time or experience.

Which brings up the new premium deal that some Columbia (long-playing record) distributors are pulling. Full page advertisements have been run in newspapers offering the public "absolutely free a \$19.95 record player attachment with the purchase of six L-P 12" records." This sort of deal is all right for the dealers who handle Columbia records, and for the people who fall for it by buying the L-P records just to get the player attachments. But, when a record firm has to give away such premiums in order to sell its products, to our mind, it shows an inherent weakness in the product itself, meaning the L-P records. If the other claims made for L-P records are bona-fide, then Columbia need not give away \$19.95 attachments to clinch sales. Incidentally, every time one of these attachments is given away it prevents a radio dealer or serviceman from making a sale of such a unit, and, when you hit a dealer in his pocketbook you hit him where it hurts. So, as a result of Columbia's premium deal, I can visualize thousands of dealers and servicemen getting sore at Columbia. Losing the recommendation and good will factor of the Nation's Service Dealers is going to cost Columbia a lot more, over a period of time, than they'll get out of their premium deal. As stated in this issue's Editorial, we are 100% for L-P records and dual speed player attachments because they afford Service Dealers and technicians with a new, potential sales item that can represent a tremendous profit over a period of time. But no one can compete with give-aways, and we can only go on record that we are 100% against all such free offers. Let Columbia sell its line of records, and let our group of merchants be given the right to sell the attachments and the time and skill needed to install them and keep them in repair. Shame on Columbia!

**ELECTRO-VOICE, INC.  
BUCHANAN, MICH.  
Export: 13 East 40th St., New York 16,  
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Please enter 1 year subscription orders for the names given below. Our remittance is enclosed.

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# TRADE FLASHES

A "press-time" digest of production, distribution & merchandising activities

## Woods Sept. Contest Winner

First prize in the September Hytron Servicemen's Contest was won by Casimir F. Woods of 54 North 7th Street, Newark, New Jersey.

Hytron Rep. H. H. Friedman and Stanley Dudek, Radio Parts Division Manager of the Variety Electric



Company, made the prize presentation, a Jackson Model 641 Universal Signal Generator.

Mr. Woods has been associated with Colonial Radio, Buffalo. At the present, he is attending a technical school for television and plans to open his own business in the near future.

## RMA Fights Ordinances

The RMA Board of Directors appropriated funds and directed General Counsel John W. Van Allen to take whatever legal action is necessary to bring about modification or repeal of a New York City ordinance restricting the use of sound equipment and mobile radio equipment after it was explained that the municipal law is so broad that it bars the use of private auto radios, radio communication facilities for trucks or taxis, and aircraft and maritime radio facilities when operated within the confines of New York City.

Funds also were appropriated to enable Judge Van Allen to bring a test case challenging the constitutionality of a Pennsylvania state tax ruling imposing a tax on taverns equipped with television receivers. The action will be brought in Federal court and will contend that tele-

vision broadcasting is inter-state commerce and consequently not subject to taxation by a state.

A constructive RMA program to deal with the problem of television antenna installations in apartment houses, proposed by the RMA Service Committee, is under consideration, including proposed cooperation with apartment house owners, managers, and the National Real Estate Board. The RMA program is designed to meet the needs of both apartment house tenants and owner-management interests, with master antenna systems developed under RMA auspices.

Included in the RMA program is a proposal for cooperative development by the RMA legal department with the National Real Estate Board of a standard apartment house lease covering television installations.

## October Radio Tube Sales Up

October sales of radio receiving tubes by RMA member-companies totalled 19,521,368, an increase of more than one million over sales in September, the Radio Manufacturers Association reported.

A breakdown of October sales shows 14,101,695 tubes sold for new sets; 3,676,254 for replacements; 1,690,356 for export; and 53,063 sold to government agencies. Total receiving tubes sold by RMA manufacturers during the first 10 months of this year amounted to 164,331,340.

## I.R.E. 1949 Convention

The 1949 National Convention of The Institute of Radio Engineers will be held from March 7 to 10 at the Hotel Commodore and Grand Central Palace in New York City. Radio loran, radar, and television, the big new contribution to modern living, will be thoroughly covered.

## Syracuse Gets TV

Syracuse, N. Y., dealers and technicians got the low-down on television during a recent meeting at General Electric's Electronics Park. Television came to Syracuse mid-Dec. when station WHEN started program tests. G.E. supplied the transmitter and associated equipment for the station.



Typifying the wide-spread interest in practical television servicing more than 300 radio service dealers registered at the technical meeting Al Saunders conducted on behalf of Howard W. Sams & Co. in Dallas, Tex., in cooperation with jobbers.

## Mallory Gets Citation

A citation for "outstanding achievements in human relations in labor" was awarded to P. R. Mallory & Co., Inc. at the sixth annual Executive Leadership Forum, sponsored by the Indianapolis Junior Chamber of Commerce on November 16.

## Scientific TV Tube Tester

Sylvania Research recently built an automatic recording spectroradiometer for precise measurement of



television viewing tube light output. Production of the instrument, which will be used in production quality control in commercial television tube production at Emporium, Pa., was under the direction of A. E. Martin, supervisor of the photonic section.

## Battery Merchandiser

Burgess Battery Co., Freeport, Ill., announces a new counter battery merchandiser which displays 14 best-selling flashlights in 5 models. These retail from 98c to \$2.30. The merchandiser builds repeat sales and acts as its own inventory guide. For details write Burgess direct.



# Test Pointers

## ON INTERMITTENTS

One of the greatest single problems encountered by the radio technician in his daily work is the intermittent radio set.

However, when suitable instruments are used to monitor intermittent receivers, the regular shop schedule can be maintained. Other service jobs can be completed while monitor instruments stand watch for any change in the functioning of an intermittent receiver.

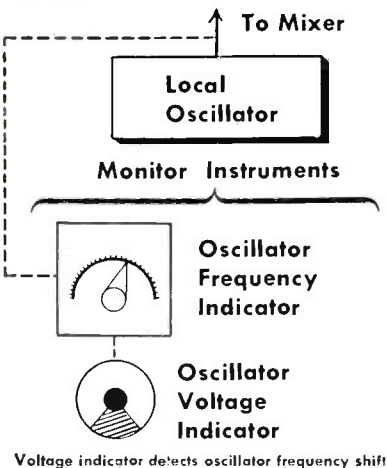
Less effective methods are also used to shoot intermittent trouble. In an attempt to save man-hours, some technicians habitually replace a majority of the capacitors in an intermittent receiver at the outset. This remedy is frequently unsuccessful because many intermittents are caused by defective resistors, coils, switches, tubes, etc. Even after all of the suspected items are replaced, an appreciable percentage of receivers remain intermittent. In such cases, man-hour costs are pyramided on top of component costs; if these costs are passed on to the customer, good will suffers.

Artificial acceleration of the intermittent cycle is helpful in some cases. High line voltage will hasten the breakdown of certain marginal components. Low line voltage frequently causes a defective oscillator to cease operation. Some intermittents can be speeded up by increasing the operating temperature of the chassis by placing it in a carton with an incandescent lamp.

Although all of these methods work at times, signal-monitoring techniques have been found to be the best answer to the intermittent problem. Occasional checks of the monitor indicators show whether gradual operating changes are taking place. After the intermittent occurs, it can be localized to a particular section of the receiver by analysis of the monitor instruments.

Monitoring instruments have the advantage of providing a *continuous* check of the oscillator frequency and voltage, of the intermediate signal frequency and amplitude, of the audio input and output, of the receiver power consumption, and of the avc supply voltage.

Oscillator frequency shift is one of the most elusive causes of intermittent operation. Other obscure intermittents are caused by defective power-supply components, which show up on the monitor chiefly as a change in power consumption.



This brief discussion illustrates the important fact that many hours of time can be saved if the receiver is divided into five main sections, or channels, which can be monitored continuously. These are the hf oscillator, the rf or af channel, the audio system, the power supply, and the avc channel. After the intermittent has been localized to one of these sections, the instrument probes can be used to "close in" on the defective component.

Continuous monitoring places intermittent trouble-shooting on a firm technical basis.



## The RCA-162-C Chanalyst Electronic Analyzer

# makes the difference between profit and loss

THE RCA-162-C Chanalyst Electronic Analyzer solves once and for all the problem of time-consuming intermittents. It works for you unattended—and spots the fault in any receiver whenever it shows—leaving you free for other work. That's why the RCA Chanalyst more than pays for itself in the time it saves.

The RCA-162-C will give you a *positive* check of any fault which takes place in the receiver under test. Its four electron-ray tubes plus an electronic voltmeter give an immediate indication of any change when it occurs. Once the trouble is localized it is a simple matter to determine the cause.

Find out today how the RCA-162-C Chanalyst Analyzer can make more

money for you. Ask your RCA Test and Measuring Equipment Distributor for the new bulletin on the 162-C, or write RCA, Commercial Engineering, Section 55AX, Harrison, New Jersey.

### SPECIFICATIONS

**RF-IF Indicator Channel:**  
Frequency Range . . . . . 96 kc. to 1700 kc.  
Frequency Calibration . . . . .  $\pm 2\%$

**Oscillator Indicator Channel:**  
Frequency Range . . . . . 600 kc. to 15,000 kc.  
Frequency Calibration . . . . .  $\pm 2\%$

**AF Indicator Channel:**  
Frequency Response 150 to 50,000 cycles

**VT Voltmeter Indicator Channel:**  
Voltage Ranges 0-5, 25, 125, 500 DC Volts  
Scale . . . zero center with positive and negative deflection

**Input Impedance . . . . . 11 Megohms**

**Wattage Indicator Channel:**  
Input Range . . . . . 30 to 250 watts

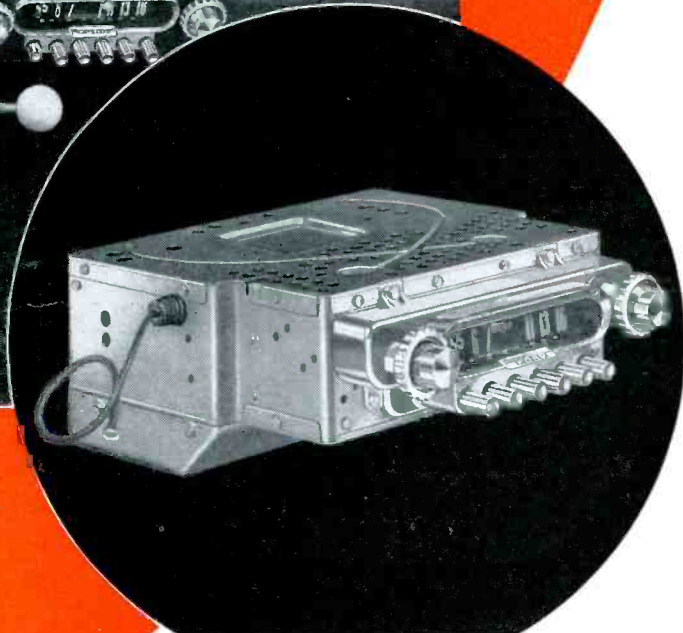
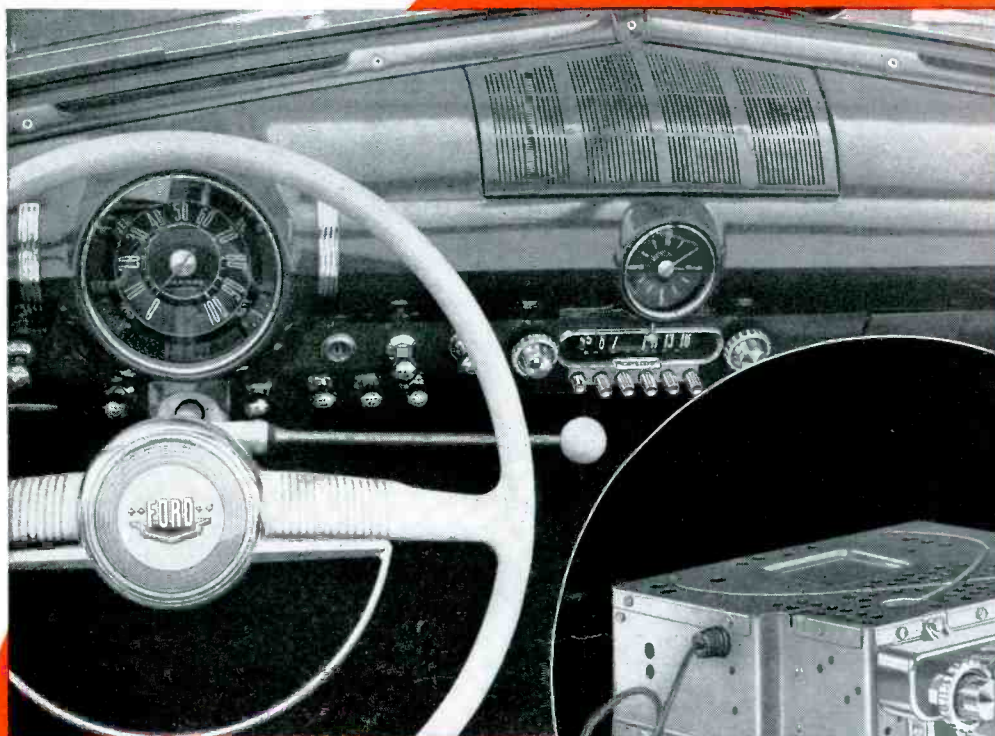
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HARRISON, N. J.

## AUTO RADIO and HYTRON go together



"A Ford in your future?" There will probably be a fine new Ford radio receiver on the dash. Chances are good this receiver will be equipped with tubes by Hytron. For Hytron is a major supplier of Ford auto radio tubes. That is only natural. Hytron *specializes* in auto radio tubes — both GT and miniature. Close engineering co-operation with leaders like Ford help make Hytron auto radio tubes leaders, too. 'Nuff said. Hytron and auto radio go together.

SPECIALISTS IN RADIO RECEIVING TUBES SINCE 1921.



# HYTRON

RADIO AND ELECTRONICS CORP.

MAIN OFFICE: SALEM, MASSACHUSETTS





# Checking

## VIDEO & SYNCH WAVEFORMS

### Using a CRO

by SAMUEL MARSHALL

#### PART 2

**Final installment of this series. Actual test set-ups are illustrated, together with the wave form shapes and amplitudes that might be expected a typical TV receiver**

**T**HE final installment in this series deals with the practical methods that may be employed in observing the various synch and signal waveforms on a cathode ray oscilloscope discussed in the first installment. *Figure 8* illustrates a typical set-up for this purpose. When making these tests it is advisable to set up the receiver so that all test points are readily accessible.

In order to become familiar with the general procedures of these tests it is best to tune in a station pattern under normal operating conditions. A pattern of this type results in a constant video signal and lends itself readily to easy interpretation.

#### Initial Test Point

The most convenient initial point of measurement is the output of the second detector. The reason for this choice is that the signal voltage at this point is 1 or 2 volts, and lends itself to good observations on an oscilloscope. Remember that we are primarily concerned with measuring and observing the video picture signal and the synch pulses, and that these are first observable in their demodulated forms at the output of the second detector.

*Figure 9* at the top right illustrates a combined video signal and vertical synch pulse obtained at the detector output. The sweep frequency of the CRO has been set at 30 cycles

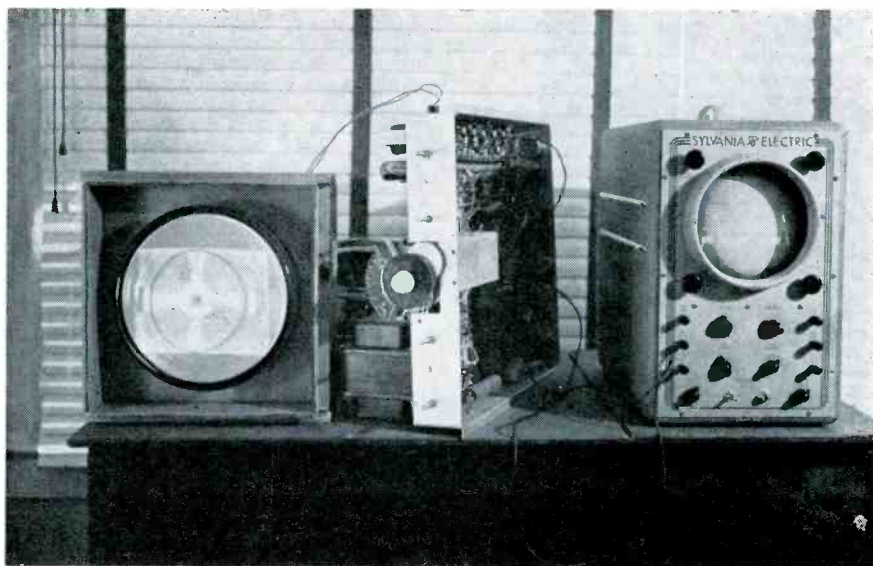


Fig. 8—Television Assembly Champion Model and Sylvania CRO used in tests.

in order to permit two of these pulses to appear on the screen. The partial circuit diagram on the left illustrates the test points for this test. This corresponds to point *E* on the block diagram section discussed during the first installment. See *Fig. 1*. The complete front view of the cathode ray oscilloscope with all its settings, and the waveform appearing on the screen is at the top right.

To make this test a connection is made between the detector output and

the vertical input connection on the CRO. Another connection is then made between the ground connections of the receiver and the oscilloscope. The detector output connection may be taken off at either side of the coupling condenser, *C*, whichever is most convenient. The receiver output is adjusted to its optimum level, thereby requiring a minimum setting of the vertical gain control on the scope. This will result in more accurate and satisfactory patterns.

Notice the amplitude *A* of the combined synch pulse and signal as compared with the signal amplitude itself shown as *B*. The middle line at *B* represents the blanking level, and the height above this level—in the slide this occurs below the blanking level because of the reversed phase of the pattern—is the region called “blacker-than-black.”

The blanking level should be 75% of the total height, *A*, according to FCC standards.

Shown in the lower right hand side of this illustration are the horizontal synch pulses and the associated picture signal. The same test point is used. However, the sweep frequency of the CRO is now adjusted to one half the incoming horizontal synch pulse frequency. This is 15,750 divided by 2, or 7,875 cycles.

Figure 10 shows the vertical and horizontal pulses at the output of the first video amplifier. Notice that the phase has been reversed 180° which is characteristic of vacuum tube action. The amplitude of the signal at this point is about 16 volts. Varying the gain of the receiver by means of the contrast control will produce corresponding variations in the height of the pattern.

As in the previous test, the sweep of the CRO is adjusted to portray two pulses. The test point may be

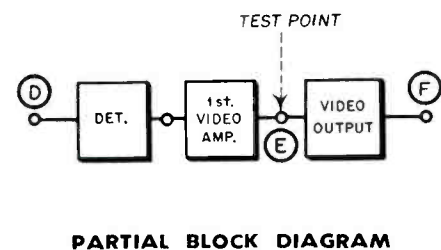
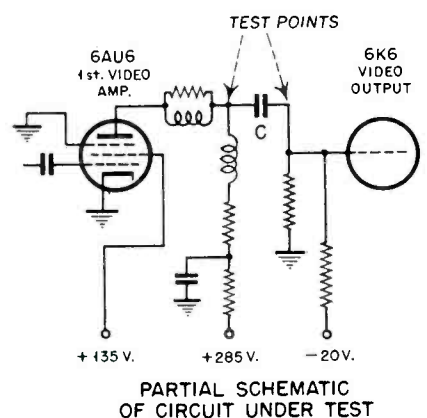


Fig. 10—Horizontal and vertical pulses obtained at 1st video amplifier.

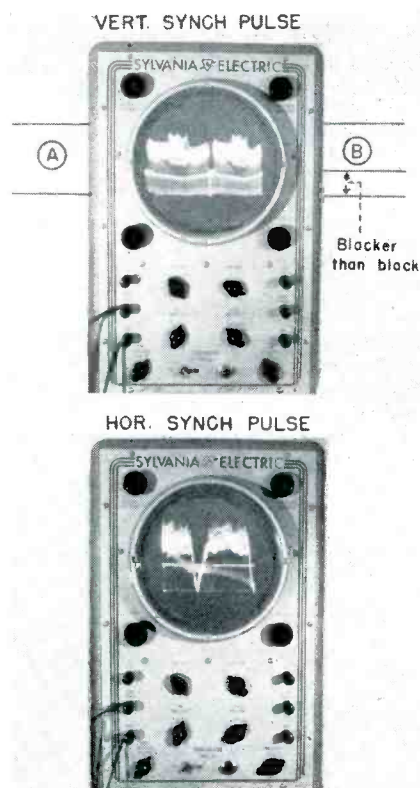
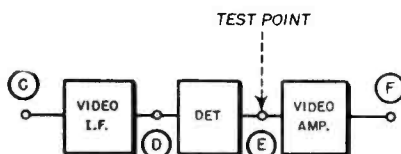
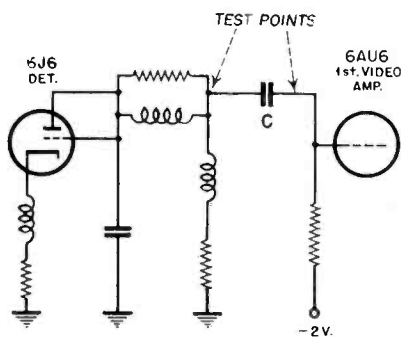


Fig. 9—Waveforms, horizontal and vertical obtained at detector output.

made on either side of the coupling condenser, *C*, shown in the partial schematic at the left of the slide. The probe connection of the scope may be brought to the plate side of the coup-

ling condenser if an isolating condenser is located in series with the vertical input terminal; and it usually is.

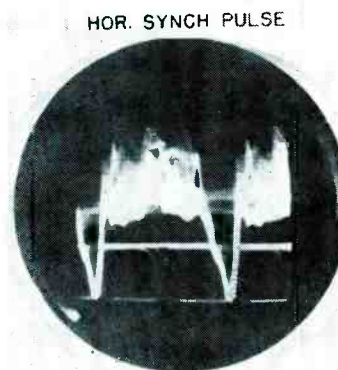
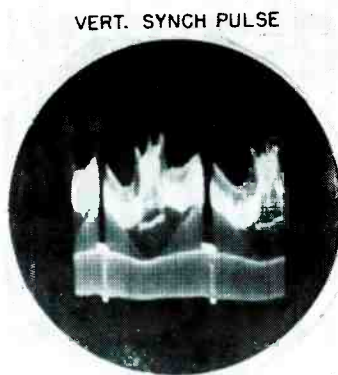
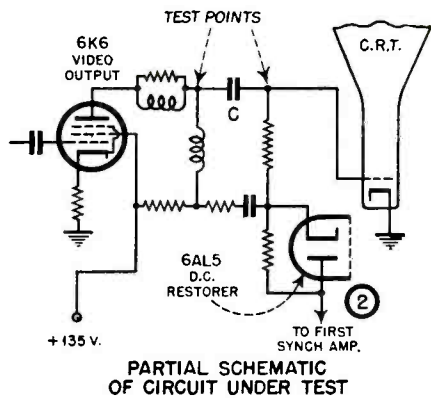
Proceeding now to the output of the final video stage, as shown in Fig. 11, we notice that the phase for both horizontal and vertical plates is again reversed, and that the amplitudes of the signal are considerably increased. In this case it is 45 volts. This output is fed directly into the grid of the CRT, and as previously pointed out, represents a positive picture phase.

#### Synch Circuit Section

A portion of the video signal is taken off the d-c restorer at the 6AL5 plate connection No. 2. The signal at this point, containing both video and synch components, with the video somewhat reduced, is fed into the first synch amplifier at a negative synch phase, or what amounts to the same thing, a positive picture phase.

This is shown in Fig. 12. The operating characteristics of this circuit result in a reduction of pulses due to noise and other interfering signals. The amplitude of the signal at the grid of the first synch amplifier is about one-fourth that of the output at the plate of the final video amplifier. This is due to the signal being taken off a point on a voltage divider connected across this circuit.





three complete 180° phase reversals, emerging from the last stage with a positive polarity.

This last synch tube, which is one half of a duo-triode, operates at low enough potentials so that an 80 volt signal applied to the grid drives the peaks of the signal. This results in an additional clipping action, thereby further reducing noise and other interfering pulses.

#### Integrating Circuit

The amplitude at the output of this tube, which is shown as point 1 in *Fig. 16* is 30 volts. The synch pulse phase is positive, and we are now in a position to inject this signal into the horizontal and vertical blocking oscillators for purposes of triggering them to the exact frequency of the incoming station pulses.

The signal at the output of the final synch amplifier contains both the horizontal and vertical pulses which we must separate from each other. This is done by the integrating and differentiating networks we mentioned in the first installment. These are shown more clearly in *Fig. 16* as combination R-C filter circuits. The integrating circuit shown at the top left consists of a number of resistors and capacitors connected in such a manner as to short out the horizontal pulses and build up the amplitude of

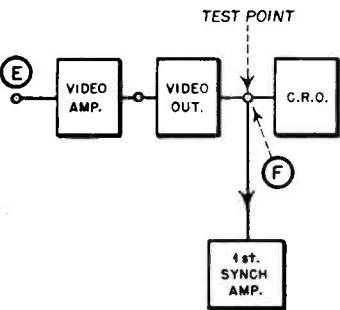


Fig. 11—Horizontal and vertical pulses obtained at video output tube.

*Figure 13* shows the horizontal and vertical pulses as they appear at the grid of the synch clipper or separator. Notice that the amplitude at this point is 60 volts, and that the signal still contains considerable picture components. Also, the synch phase is now negative.

We now shift our take-off point to the output circuit of this tube, as shown in *Fig. 14*. Observe that the picture signal has now been completely eliminated, and that only the synch pulses remain. The amplitude of these pulses at this point is 80 volts, and the synch phase is now negative.

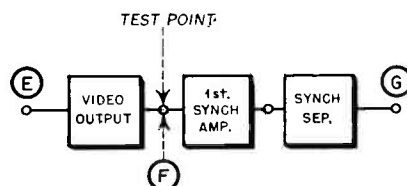
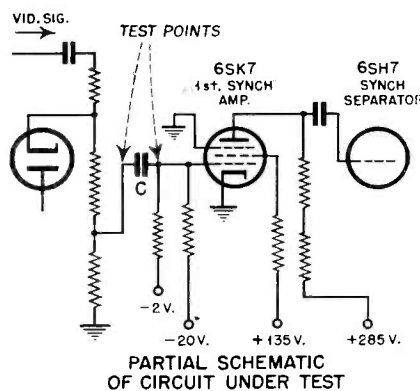
The action in this circuit that produces this clipping of the picture signal results from the following:

1. The picture signal at the grid of the tube has a negative polarity.
2. The operating voltages on the tube are such that all negative portions of the signal are cut off.

Since the polarity of the video or picture portion of the signal is negative, and since all negative portions of the signal are clipped off, only the synch pulses remain.

The next test point is the plate of the third synch amplifier. The polarity of the synch signal at the grid of this tube is now negative. At the plate it becomes positive. The complete change taking place in the synch

signal polarity in the three stages of the synch amplifiers is shown in *Fig. 15*. Here we see a negative synch pulse entering the grid of the first synch amplifier, and, after going through



PARTIAL BLOCK DIAGRAM

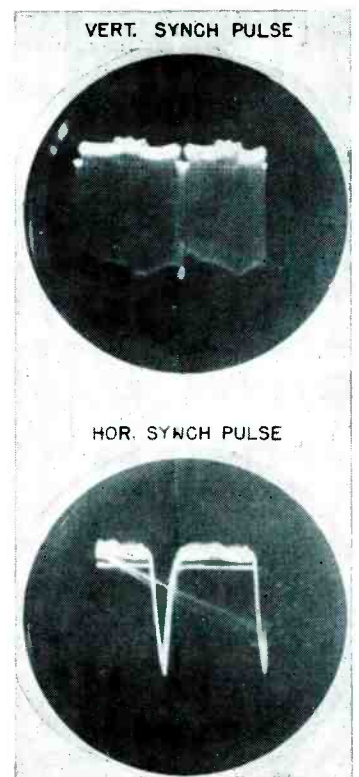


Fig. 12—Pulses obtained at 1st synch amplifier on either side of C.

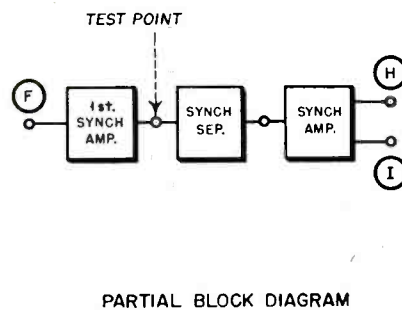
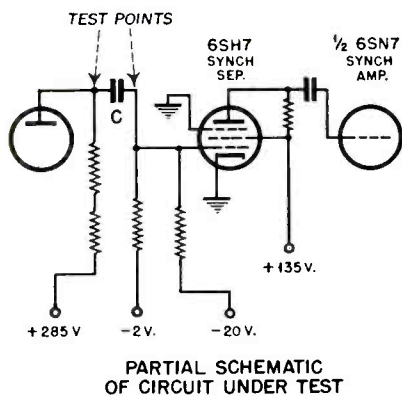


Fig. 13—Pulses obtained at input of 6SH7 synch separator. Note waveforms.

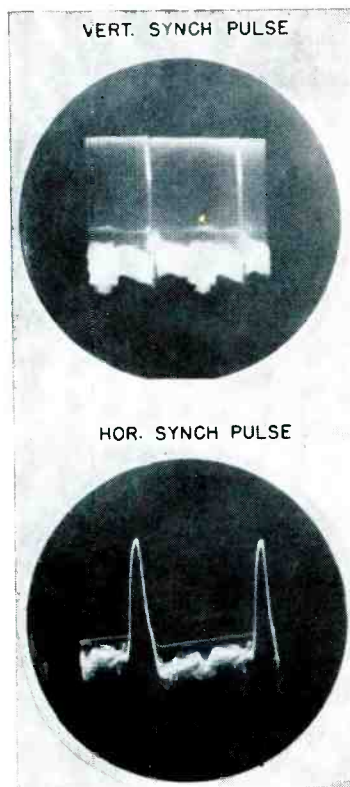
the vertical pulses. Notice the shunt capacitors,  $C_1$ ,  $C_2$ , and  $C_3$ . These condensers in addition to building up the amplitude of the vertical synch signal during successive pulses of the serrated vertical synch pulse, short out the higher frequency horizontal pulses, leaving only the vertical pulse to reach the grid of the 6J5 vertical oscillator.

Proceeding now to the differentiating circuit, the 100 mmf condenser connecting the output of the third synch amplifier to the input of the horizontal oscillator presents a high reactance to the low frequency vertical pulses as compared to high frequency horizontal pulses, so that the signal permitted to pass thru this condenser contains only the horizontal pulses.

If we apply the test probe of the CRO to point 1, both the vertical and the horizontal pulses appear. At point 2 only the vertical pulses appear, and at point 3 only the horizontal pulses appear.

We are now ready to trace the vertical pulses as they proceed from the output of the 6J5 oscillator to the input of the vertical deflecting coils. The lower left-hand portion of Fig. 17 is devoted to the block diagram of this portion of the circuit.

The upper left-hand portion of the figure is confined to a simplified partial schematic of this circuit. The



four test points shown in the block diagram are indicated in the partial schematic by identical numbers. Thus:

No. 1 is the input of the vertical oscillator.

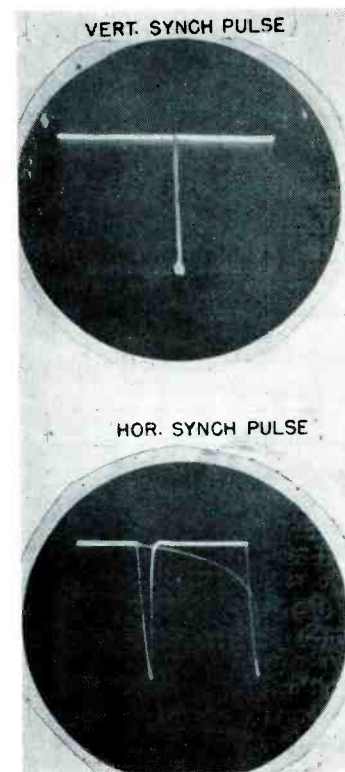
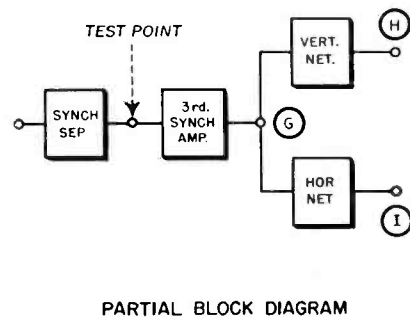
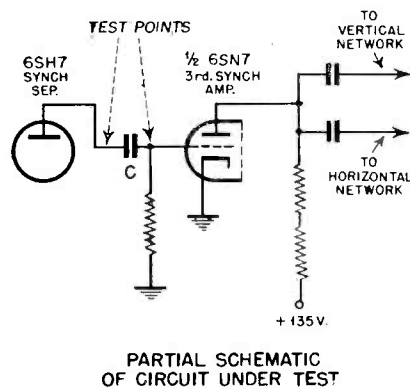


Fig. 14—Horizontal and vertical pulses obtained at 3rd synch amp. input.

No. 2 is the output of the vertical oscillator, the amplitude of which is about 120 volts. This signal is acted upon by the discharge or peaking circuit. The object of this circuit is to obtain a wave at the output of the oscillator which insures the presence of a sawtooth current wave in the vertical deflecting coils. But, more on that shortly.

No. 3 is the output of the vertical deflecting coils. The potential at this point is about 65 volts.

No. 4 is the input to the vertical output tube, which is about 450 volts.

The corresponding waveforms for test points 1, 2, 3, and 4 are shown at the right of the screen.

No. 1 proceeding from top to bottom indicates the sharp steep discharge, and slow saw-tooth charge portions of the wave which are characteristic of the blocking oscillator.

No. 2 indicates the effect of the peaking, or discharge circuit on this waveform. Variations of this waveform may be produced by varying the vertical amplitude control. This is an excellent check on the operation of this circuit.

No. 3 indicates the waveform of the pulse at the plate of the vertical output tube, or the 6K6. Notice how high the pulse voltage is for the retrace portion. This is necessary to insure a high retrace current rate on



the vertical deflecting coils during the retrace period.

**Peaking**

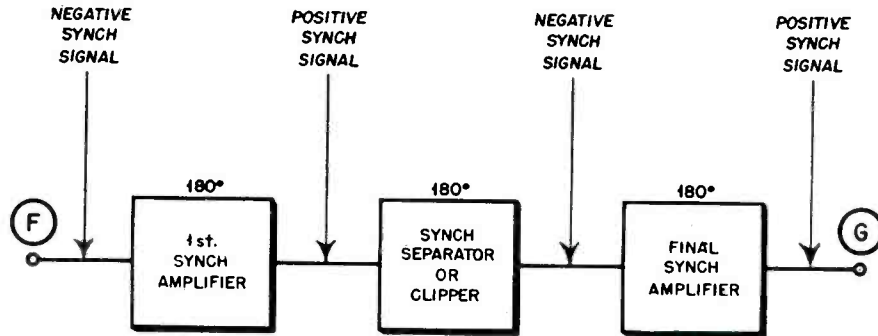
The reader will recall, the formula relating to voltage, inductance, and the rate of change of current in coil given in the first installment. This formula is repeated again in two forms:

$$e = L \times \text{Rate of change of current}$$

$$\text{Rate of change of current} = e/L$$

During the retrace period the frequency is much higher than the 60 cycle frequency of the trace period. As a result, the reactance set up by the inductance in the coil is much higher than before. This affects the current considerably. From the formula shown above, in order to get a high and fast discharge of current during the retrace period the voltage amplitude must be high and its waveform steep.

Returning again to Fig. 17, and examining waveform No. 4 once again, we notice that the trace portion of the voltage curve is somewhat of a sawtooth. This is due to the fact that during the trace period, the inductance of the vertical deflecting coil is negligible as compared to its resistance. In a resistance, if we want a saw-tooth current we must have a saw-tooth voltage. This explains why, in the composite wave, the waveform of the retrace is a sharp high ampli-



**SYNCH SIGNAL PHASE REVERSALS IN SYNCH AMPLIFIER SECTION**

Fig. 15—Signal phase is reversed 180° as it passes through each tube.

tude pulse, and the waveform of the trace is a low amplitude saw-tooth.

**Horizontal Circuit**

We can now proceed to the horizontal oscillator and the circuits devoted to the development of the horizontal sweep. Fig. 18 illustrates the partial schematic of this portion of the circuit in the upper left portion of the screen. Below it is the block diagram showing the test points numbered to correspond to the same points in the schematic above. These test points are as follows:

No. 1 is the input of the horizontal oscillator.

No. 2 is the output of the horizontal oscillator, at about 120 volts.

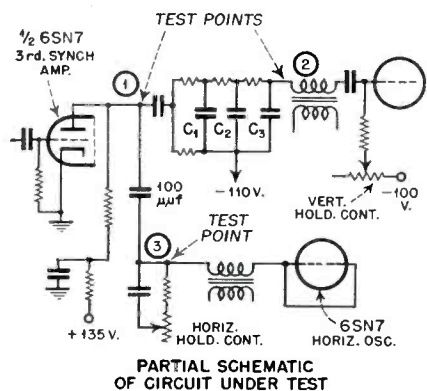
No. 3 is the output of the horizontal discharge circuit, at about 45 volts.

No. 4 is the output of the horizontal output tube, at about 4,000 volts. The utmost caution should be used when measuring high voltages of this nature.

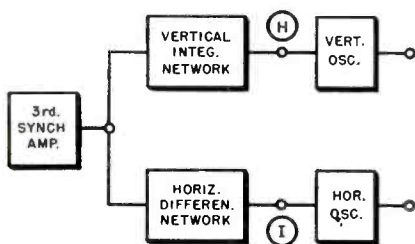
No. 5 is the output of the horizontal output transformer, which is about 800 volts, and represents the voltage waveform appearing across the horizontal deflecting coils. Notice the flattop characteristic of this waveform. It will be recalled that in order to obtain a sawtooth current wave in a circuit which is predominantly inductive, a flattop voltage wave is required. When measuring these high voltages a high voltage test probe should be used, and a capacitance voltage divider should be employed for the CRO to prevent damage to its input circuit.

Space does not permit further analysis of the many fine points each

[Continued on page 47]



PARTIAL SCHEMATIC OF CIRCUIT UNDER TEST



PARTIAL BLOCK DIAGRAM

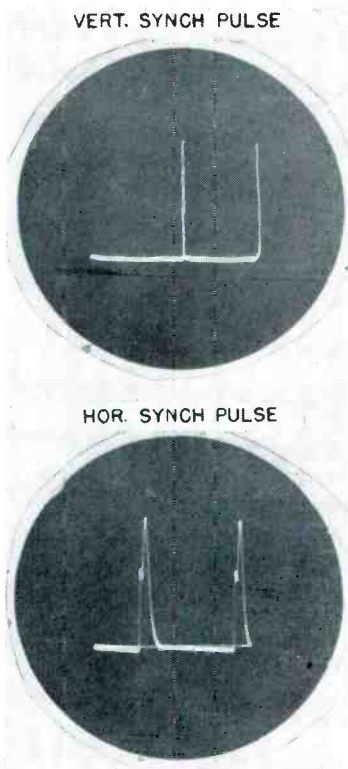


Fig. 16—Waveforms obtained at horizontal and vertical separation points.

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# Feedback & PHASE

**D**URING our chores as servicemen and dealers we necessarily deal with feedback and phase inversion within audio amplifiers to a greater extent than we realize. It is therefore fitting that we thoroughly understand these associated subjects. It is important to remember that, careless replacement of some critical capacitor, resistor or inductance by one not having the identical value intended for the original, will cause phase shift distortion. The effect becomes cumulative when several careless replacements are made with the direct result that the original signal becomes considerably distorted.

In multistage amplifiers care must be taken to prevent unwanted feedback of signal voltage in the output stage from getting back into the input circuits. Should such feedback occur, the signal fed back may be of such phase relation as to either aid or oppose the original input signal. Feedback of an aiding nature is called *positive or regenerative* while that which opposes the input signal, that which is out of phase with it, is called *negative, degenerative, or inverse* feedback. When properly controlled the *negative* type can prove most useful; in fact is used to great advantage in modern audio amplifiers. More on that later.

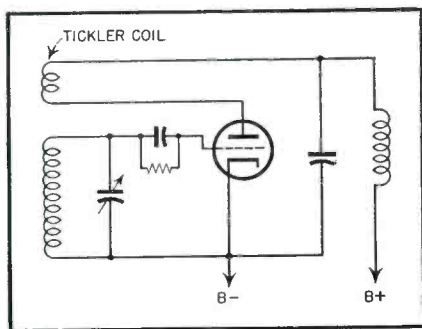


Fig. 1—Tickler feedback.

Effects of feedback, positive and negative, and principles and applications of phase inversion are discussed in two articles, the first of which is presented in this issue.

## Positive Feedback

Positive feedback has the same phase relation as the original signal; their positive half cycles are synchronized in time or *phase* relation with each other as are the negative half cycles. Such feedback was deliberately introduced in earlier regenerative sets where a tickler coil in series with the detector plate circuit was deliberately fed back to the preceding grid circuit

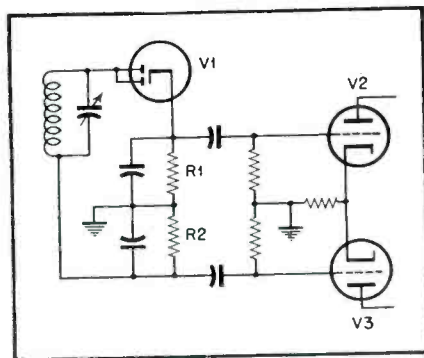


Fig. 2—Diode detector feedback.

*in phase* for an increase of signal strength. (See Fig. 1). However, because of its unstable character this regenerative type of feedback is seldom intentional in amplifiers. More often in the servicing of amplifiers it is to be eliminated or at least held to a minimum. Therefore we list the following reasons which may cause its unintentional occurrence:

1. Inductive leakage coupling; insufficient shielding between inputs and outputs; lack of decoupling; coils too close together or not at right angles to each other.

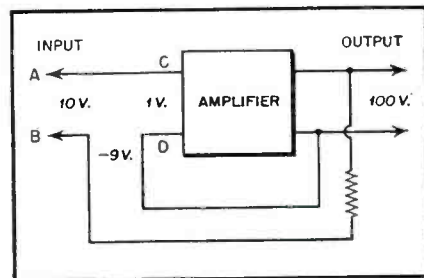


Fig. 5—Block schematic principles

2. Linkage of inputs and outputs through the use of common grounds or common power supplies. Plate and screen a-c currents must not flow through a common positive supply to all tubes. Filtering will correct this.

3. A shorted by-pass or shorted decoupling filter condenser will conduct positive feedback from output to input or supply circuits.

## Phase Inversion

Example 1—For one of the simplest examples of phase inversion, refer back to Fig. 1 to the regenerative tickler coil discussed under Positive Feedback. When the tickler's magnetic flux cuts across the preceding grid coil in such a manner as to induce voltages which are in agreement or of the same polarity as that of the incoming signal, the coupled voltages are in phase. When the leads or ends of such a tickler coil are reversed, while it remains in the same physical relation, it's phase becomes inverted. The two voltages oppose each other and the original positive feedback becomes inverted to negative feedback.



# INVERSION

by C. A. TUTHILL

●  
PART I  
●

Example 2—Many are the ingenious methods to obtain phase inversion but to better understand the simple necessity for its use, let us study another plain example of application as in *Fig. 2*. Here phase inversion is easily derived from the diode circuit of the detector tube *V-1*. It is known that the opposite ends of the diode load resistor, which amounts to *R1* and *R2* in series, will have opposite polarity at its ends since a pulsating direct current will travel through the combined resistor. Then, if the center tap between *R1* and *R2* be grounded, voltages of opposite polarity required for the push-pull stage may be fed to the grids of *V-2* and *V-3* from the opposite ends of this total resistor.

Example 3—We also find phase inversion within a push-pull stage. More often this stage is transformer fed as in *Fig. 3*. When a sine wave is introduced to the input terminals the first or positive half cycle causes

the upper half of the secondary winding of *T-1*, and hence the grid of *V-1*, to become positive. Similarly the lower half of the secondary winding and the grid of *V-2* become negative. This action is aided or bucked by the grid bias voltage applied to the mid-point of the same secondary winding mentioned above. It follows that the plate current of *V-1* increases while the plate current of *V-2* decreases. The resultant variations in plate current are therefore 180° out of phase—another case of phase inversion.

Example 4—Often an extra vacuum tube is introduced wholly to serve as a phase inverter in a resistance coupled amplifier. (See *Fig. 4*) The plate of a conventional driving tube *A* is coupled to one of the two tubes of a push-pull stage in the usual manner. A resistor tap across part of the output voltage of driving tube *A* is fed to the grid of phase inverter tube *B* which in turn feeds the grid of the second push-pull tube. Since the

alternating plate and grid voltages of tube *A* are out of phase by 180°, so then is the grid of tube *B* in relation to that of the grid of tube *A*. Thus the plates of tubes *A* and *B* are displaced the required amount to drive a push-pull stage. The only other requirement is that values of components be so adjusted that the driving voltages from tubes *A* and *B* be identical.

As will be shown later, the great advantage of inverse feedback (a phase inversion of 180°) in an amplifier, lies in the fact that the gain and frequency response of the amplifier become almost independent of changes occurring due to aging tubes, variations in supply voltages, temperature changes or mechanical vibration. The gain and frequency response of a feedback amplifier depend greatly upon the feedback circuit which employs but a few resistors and capacitors hence remains stabilized over a great period of time. Inverse feedback is therefore employed in modern a-c operated vacuum tube voltmeters, d-c amplifiers, and other equipment where a constant gain or reliable performance is mandatory.

### Negative Feedback (Voltage)

Although 180° out of phase with the input signal, and therefore opposing it, negative feedback may prove highly beneficial when properly controlled and applied to audio amplifiers. The more usual gains derived from negative or inverse feedback of the voltage type are the following:

1. It counteracts or nullifies such unintentional content of *positive* feedback as may exist and thereby stabilizes an amplifier.
2. It reduces distortion within an amplifier and betters its frequency response as we will see later.
3. It improves the dynamic characteristics of an amplifier in that it

[Continued on page 45]

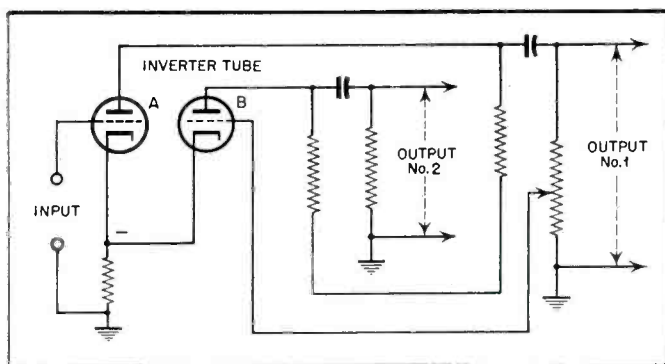


Fig. 3—Push-Pull amplification.

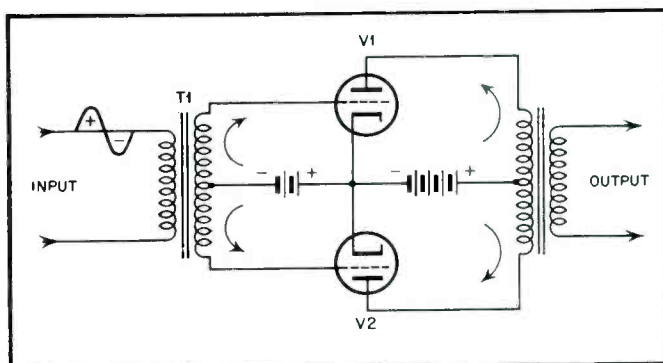


Fig. 4—Extra tube phase inverter.

# TUNED

**S**IMPLICITY and compactness very often make it advisable to use a half-wave transformerless power supply (either tube or selenium rectifier) in a small amplifier, tuner, or test instrument. The a-c hum nuisance caused by this type of power supply is well known.

A positive way to clean up the power supply hum arising from a half-wave transformerless unit is to employ a tuned filter section in conjunction with a simple conventional section. This arrangement is shown in Fig. 1. The tuned section is designed for elimination of the 60-cycle ripple, and the untuned section takes care of the hum harmonics (120 cycles and upward). The L and C values in the conventional section, shown after the tuned section in Fig. 1, are not critical and can be any choke and high-capacitance capacitor the builder happens to have on hand. The tuned section, however, requires critical circuit values for optimum performance at the fundamental hum frequency.

Including a tuned section in the power supply filter at the time of construction will require very little additional work and will pay off handsomely in subsequent hum-free operation. In order to spare the reader considerable mathematical labor, we present in this article all values which components must have in the four types of tuned filters described.

## Tuned Filter Types

The four types of tuned filters which are applied most easily to trans-

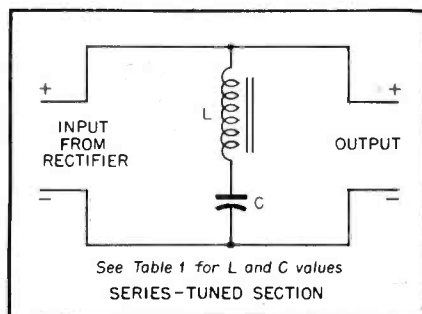


Fig. 2—Series-Tuned section.

**Tuned filters for transformerless half-wave power supplies is the subject of this article. Various types are discussed.**

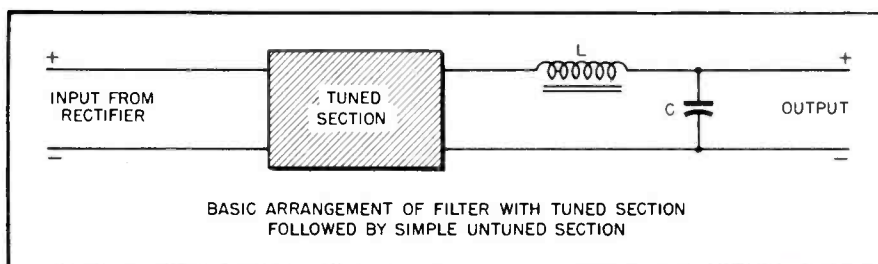


Fig. 1—Basic arrangement of filter with tuned section followed by simple untuned section.

formerless half-wave rectifiers are the *series-tuned* type (Fig. 2), *parallel-tuned* type (Fig. 3), *bridged-T* type (Fig. 4), and *parallel-T* type (Fig. 5).

These types are equally effective in hum elimination, but the special features of one type may better suit it to a particular application than another type. For example: the series-tuned type (Fig. 2) offers a very low-impedance path for the ripple current. In effect, it bypasses the ripple to ground. The parallel-tuned type (Fig. 3) offers high impedance to the ripple current and so "traps" it out of the power supply output.

In the parallel-tuned type, the total d-c current taken by the load circuit must pass through the tuned choke, L. If a sufficiently heavy choke is not available, therefore, the builder probably will prefer the series-tuned type in which the load current does not flow through the choke. The L and C values will be the same in each case. The rheostat, R, in the bridged-T section (Fig. 4) permits very close "tuning-out" of hum. But in this circuit also, the choke, L, must be rated to handle the full d-c load current of the power supply and the circuit is somewhat more complicated by its requirement of two capacitors and a variable resistor.

The parallel-T circuit (Fig. 5) is particularly useful when a second

iron-cored choke is undesirable. Here, the hum may be tuned-out very closely by adjustment of rheostat  $R_1$ .

## Series-Tuned Section

Any available choke may be used in the series-tuned section shown in Fig. 2. Table 1 lists the inductance values of chokes supplied by various manufacturers and gives the corresponding capacitance required for resonance at 60 cycles.

It will be noted that the capacitances all are fractional values. Securing these values will entail no hardship, however, since they may be obtained by connecting appropriate capacitances in parallel. Thus, the 1.6-microfarad value required to tune a 4.4-henry choke may be obtained by connecting a 1.0-, 0.5-, and 0.1-ufd. capacitor in parallel. Some deviation from the required capacitance values given in Table 1 will be caused by manufacturing variations in choke inductances. The builder should start with a capacitance somewhat lower than the value given in the table and should connect smaller capacitances progressively in parallel, while listening for satisfactory reduction of the hum level.

## Parallel-Tuned Section

The parallel-tuned section (See Fig. 3) uses the same values of capacitance for a given inductance as the series-tuned section previously de-



# FILTERS

by RUFUS P. TURNER

TABLE 2.

L (henries)	C1,C2 (microfarads)
4.4	3.160
4.5	3.085
5.0	2.780
5.5	2.522
6.5	2.140
7.0	1.985
7.5	1.850
8.0	1.735
9.0	1.542
10.0	1.390
11.0	1.263
12.0	1.158
12.5	1.110
13.0	1.070
14.0	0.991
14.5	0.957
15.0	0.926
18.0	0.772
20.0	0.694
23.0	0.604
25.0	0.555
30.0	0.463
31.0	0.448
40.0	0.347
50.0	0.278

TABLE 1.

L (henries)	C (microfarads)
4.4	1.600
4.5	1.565
5.0	1.410
5.5	1.280
6.5	1.082
7.0	1.008
7.5	0.939
8.0	0.880
9.0	0.783
10.0	0.704
11.0	0.640
12.0	0.587
12.5	0.564
13.0	0.541
14.0	0.503
14.5	0.486
15.0	0.470
18.0	0.392
20.0	0.352
23.0	0.306
25.0	0.282
30.0	0.235
31.0	0.227
40.0	0.176
50.0	0.141

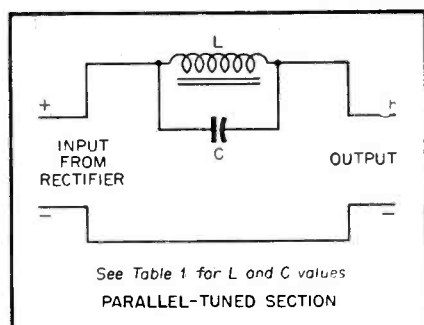


Fig. 3—Parallel-Tuned section.

scribed. Select the capacitance values from Table 1, and proceed with close adjustment of the final capacitance according to the instructions given for the series-tuned circuit. Choke  $L$  must be rated to carry the full d-c load current.

### Bridged-T Section

Two identical capacitors,  $C_1$  and  $C_2$ , are required in this type of tuned filter section, shown in Fig. 4. Their values, for a given choke inductance, are obtained from Table 2. These capacitors may be matched closely enough by means of a service-type capacitance bridge or microfarad

meter. Choke  $L$  must be rated to carry the full d-c load current. Rheostat  $R$

may be provided with a slotted shaft for screwdriver adjustment, and is "tuned" for complete hum elimination.

### Parallel-T Section

In the parallel-T R-C tuned circuit (See Fig. 5), the constants have been [Continued on page 44]

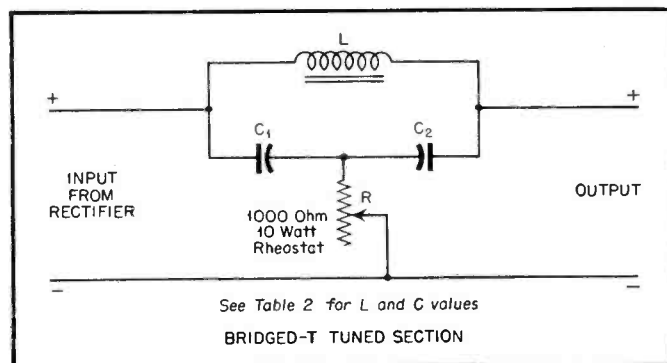


Fig. 5—Parallel-T resistance capacitance tuned section.

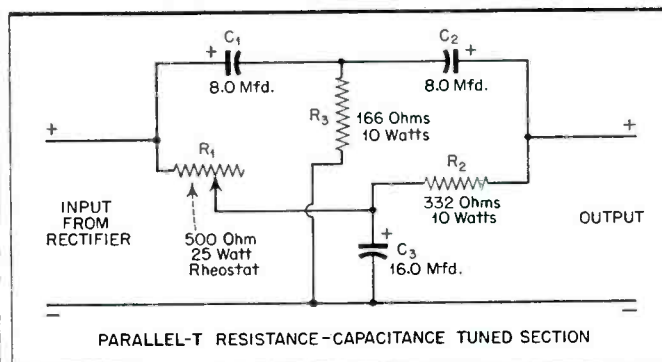


Fig. 4—Bridged-T tuned section.

# A New PHONO PICKUP

by RALPH M. BARUCH

**A** NEW discovery has been made which should have great effects upon the pickup manufacturing industry, and other allied industries such as hearing aids, loudspeakers etc. It is a new pickup cartridge containing the first man-made material acquiring the necessary piezo-electrical properties for proper sound reproduction. Piezo-electricity is the name applied to that branch of science dealing with the conversion of mechanical pressure into electrical power.

## Properties of Titanate

The material employed in the manufacture of this new pickup cartridge is a ceramic called, "titanate," which, when properly processed, acquires all the qualities necessary for good record reproduction. The first research, as pointed out by the manufacturer, in the field of ceramics in the audio field was undertaken in conjunction with a program of research for hearing aids started several years ago. At that time the discovery was made showing that this ceramic was suitable, in some cases, in uses involving piezo-electrical properties. The more the material was studied the more advantageous it was found. Research engineers followed the lead and have completed development and consumer tests of the first news in pickup design and pickup production since the development of the crystal.

Titanate in its initial state does not possess all the properties which would make it usable for pickup manufacturing. These properties are acquired by putting it through a relatively simple but precise process. The material is first mixed into a

The characteristics of a new type of phono cartridge made of titanate, a piezo-electric ceramic, are discussed here.

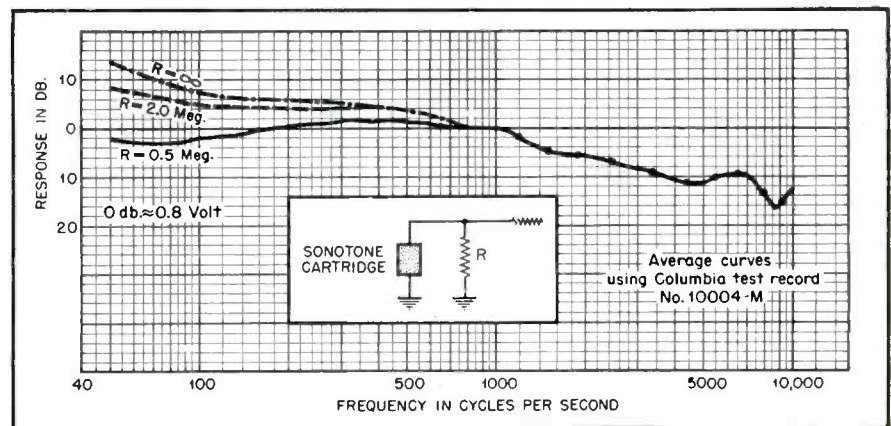


Fig. 2—Frequency response curves of Titone cartridge for various values of R.

heavy paste, spread on a moving belt, and conducted through a furnace where it is baked and thereby acquires great rigidity and hardness. The result is a long strip of material, about one hundredth of an inch thick, which is subsequently cut to

the proper size. Then each piece is silvered on both sides. Two of these small slabs are put together and a sapphire point attached through an arm at an end. The whole is encased in a metal container and equipped with screw holes for mounting. The

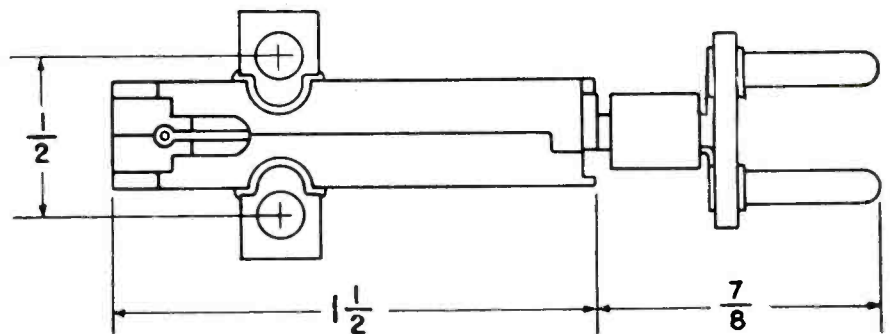


Fig. 3—Top view of cartridge and adapter.





Fig. 1—Size comparison between record and cartridge.

complete cartridge assembly is said to weigh only slightly more than two thirds of an ounce. See Fig. 1.

#### Properties of Pickup

Features of this new pickup cartridge are: Wide frequency response—high signal output—high capacitance cartridge—high needlepoint compliance—sapphire needle point—low needle point pressure—excellent temperature and humidity resistance—small size—needle guard—low distortion—compactness.

The frequency response of the "Titone" pickup is said to range from 50 cycles to at least 10,000 cycles. In the graph shown in Fig. 2 the frequency response can be seen as taken with the Columbia test record #10004-M. The solid line shows the output when loaded with 0.5 megohms; the broken line represents the output when operating into 2 megohms; the dash and dot line represents the open circuit voltage.

The latter shows excellent displacement properties over its entire frequency spectrum. It must be remembered that good pickup frequency response can only be judged with amplification systems and loudspeaker reproducing units able to reproduce the frequencies that are to be tested. You cannot get something reproduced from a record by a pickup, which cannot be handled by the amplifier or the speaker. Therefore make sure that both are up to par in frequency response with the pickup to be tested.

The generated voltage of the pickup cartridge is sufficient in amplitude to drive the average audio frequency amplifier. A value of 0.8 volt is generated at 1000 cycles per second on

the Columbia test record 10004-M. On frequencies below 1000 cycles, the open-circuit voltage generated is directly proportional to the amplitude of the recording.

The nominal capacitance is such that the new ceramic pickup can be mounted directly into apparatus constructed to handle the conventional Rochelle salt crystal thereby replacing the old type crystal. The value of this nominal capacitance is 1000 mmfd.

#### Properties of Needle

A very important factor in the development of pickups is the needle point impedance, or the sensitivity of the needle to side motions and its resistance to it. The parts in most pickups are springy and move in accordance with the sound picked up by the needle. This needle, and particularly its point, is a very small object and is thrown back and forth between five and fifteen thousand times per second according to the frequency reproduced. In the pickup discussed, the claimed lateral needle compliance is approximately  $0.5 \times 10^{-6}$  cm. per dyne, and the effective moving mass is said to be very small.

The heavier or larger the moving mass the faster the record grooves will be worn out by the back and forth movement of the needle point. A small moving mass therefore would give the advantage of low record wear. The vertical needle compliance of the arm and pickup is of the order of  $1.5 \times 10^{-6}$  centimeters per dyne. This would allow the arm to move freely up and down when records are warped and thereby eliminate any loss of fidelity sometimes caused with other pickups by this warpage. This fact would also contribute to lower record wear. Needle talk, similarly, is said to be greatly minimized in this new pickup. Records could consequently be played in open type cabinets without surface noise or needle noise, both of which are sometimes so annoying.

The needle point contained in the cartridge is a permanent sapphire point. Both the needle point radius

and the cone angle, two other factors important for low record wear, are said to be held to rigid tolerances thereby also assuring good reproduction in all frequency ranges. The cartridge was designed to operate with a needle point pressure of 22 grams.

#### Temperature Characteristics

The Titone pickup is made, in part, from a form of transducer element quite different from the piezo electrical crystals such as Rochelle salt or ammonium phosphate used in the conventional pickups. The new elements introduced are said to be able to withstand temperatures ranging from -65 degrees Fahrenheit to +200 degrees without suffering any permanent damage. This should have far reaching effects in regions of this country or abroad where extreme climatic conditions prevail. It is the damping material used in the manufacturing of the cartridge which actually limits the temperatures that can be withstood by the pickup.

In some tests made previously, the cartridge was immersed in a glass of hot water, installed in an ordinary pickup arm and reproduced many discs without any apparent damage suffered by the cartridge of the records. It should be borne in mind that this heat resistance can be an important asset when the case arises where the record player or the combination amplifiers generate a great deal of heat.

The weight of the cartridge has been reduced to 18 grams and because of its small size allows for construction of pickup arms having graceful shapes and designs. Figs. 3 and 4 illustrate top and side views of the cartridge. A novel arrangement providing a needle guard is included. In this particular cartridge a force of three ounces is enough to cause the needle guard to touch the record. The guard was installed with sufficient width to bridge the lands of successive grooves. The pickup cartridge is also provided with easy to use compact tip sockets of rugged construction eliminating the need of soldering in places sometimes hard to reach. This will facilitate faster installations and replacements of the cartridge.

#### Installation

Here are some of the installation instructions and suggestions as given by the manufacturer:

[Continued on page 42]

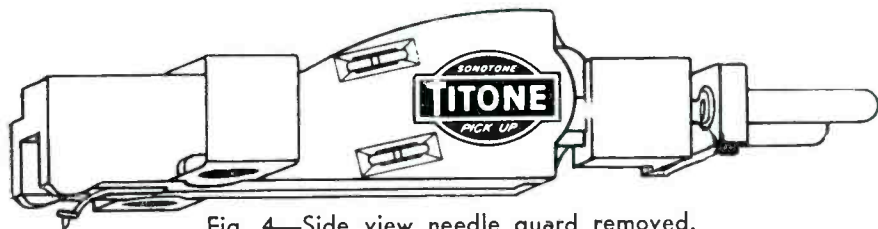


Fig. 4—Side view needle guard removed.

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# TV PICTURE TUBE CHART

Type	Dimensions (k)		Raster Size	Base	Socket Conn.	Bulb Contact	Solid Deflec. Angle	Type of Deflec.	Type of Focus	Deflection Factor		Heater (l)		Hor. Deflec. Coil Ma. (h)	Focus Coil Ma. (b)	Ion Trap	Ion Trap Ma. (e)	Grid Bias Cut-Off (d)	Grid Drive Volts	Grid No. 2 Volts	Grid No. 3 uA	Anode No. 1 Volts	Anode No. 2 Volts
	Diam. in.	Length in.								Hor.	Ver.	V	I										
3KP4	3 1/8	11 1/2	1 1/2 x 2 1/2	Magnal 11 Pin	3KP4	None		E	E	76 to 101	100 to 136	6.3	0.6					- 61		2,000		450 (r)	2,000
(a) 3NP4	2 1/2	10	1.48 x 1.8	Special 3NP4	Cup	Cup	42°	M	M			6.3	0.6		(c)	Metal. Screen		- 65		2,000			24,000
TP 400A	4	12 3/4	2 1/4 x 3	Octal	TP 400A	Cavity		M	M			6.3	0.6			Metal. Screen		- 70					20,000
5BP4	5 1/4	16 3/4	3 x 4	Magnal 11 Pin	11A	None		E	E	76	84	6.3	0.6					- 40	35			450	2,000
5TP4	5	11 3/4	3 x 4	Duo-decal	12C	Cavity Cap	50°	M	E			6.3	0.6			Metal. Screen		- 70		200 (f)	±15	1,910 (n)	27,000
7DP4	7 1/8	14 1/8	4 x 5 1/2	Duo-decal	12C	Cavity	50°	M	E			6.3	0.6	410		Mag.	70	- 45		250		1,430	6,000
7EP4	7	14 1/2	4 x 5 1/2	Magnal 11 Pin	11D	None		E	E	95	110	6.3	0.6					- 60	38			650	2,500
7CP4	7	14 1/2	4 x 5 1/2	Dihedral 12 Pin	14G	None		E	E	25 to 34	31 to 41	6.3	0.6					- 60				1,000	3,000
7HP4	7 1/8	13	4 x 5 1/2	Duo-decal	12D	Ball Cap		M	M			6.3	0.6					- 55		250			6,000
7JP4	7	14 1/2	4 x 5 1/2	Dihedral 11 Pin	14G	None		E	E	150	186	6.3	0.6					- 180	30			1,620	4,000
9AP4	9	21	5 3/8 x 7 1/4	6 Prong	9-12AP4	Metal Cap		M	E	204	216	2.5	2.1					(i)	25	250		1,460	7,000
10BP4	10 1/2	17 3/8	6 x 8	Duo-decal	12D	Cavity	50°	M	M			6.3	0.6	470	115	Mag.	109	- 45	30	250			9,000
10CP4	10 1/2	16 3/8	6 x 8	Duo-decal	12D	Small Ball Cap		M	M			6.3	0.6					- 55	38	250	50		8,000 to 10,000
10FP4	10 1/2	17 3/8	6 x 8	Duo-decal	12D	Cavity		M	M			6.3	0.6			Mag.		- 45	38	250	50		8,000
10PP4	10 1/2	17 3/8	6 x 8	Duo-decal	12D	Cavity	50°	M	M			6.3	0.6		115	Metal. Screen		- 45	38	250			9,000
10HP4	10	19 1/4	6 x 8	Dihedral 12 Pin	14G	None		E	E	80	101	6.3	0.6					- 100				961 to 1,440	4,000
12AP4	12	25	7 3/8 x 9 3/4	6 Prong	9-12AP4	Metal Cap		M	E	100	130	2.5	2.1									1,200 to 1,800	5,000
12CP4	12 1/2			Duo-decal	12D	Cavity Button	50°	M	M			6.3	0.6			Mag.	109	- 45	33	250		1,460	7,000
															115 ±15 ma.			- 45					9,000

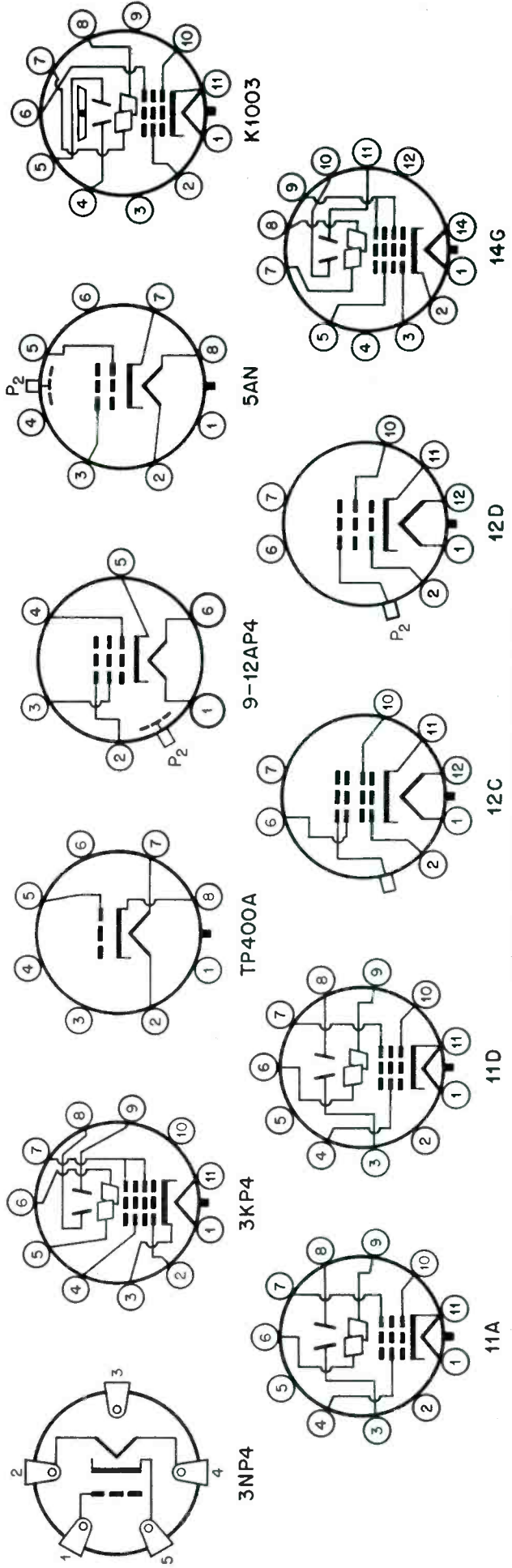


12DP4	12	20 1/2	7 3/4 x 10 1/4	Detail	5AN	Metal Cap	M	M	6.3	0.6	90 ± 20	— 45	38	250	7,000
12IP4	12	17 1/2	7 3/4 x 10 1/4	Duo-decal	12D	Cavity	M	M	6.3	0.6	146	— 45	30	250	10,000
12KP4	12 1/2	17 1/2	7 1/2 x 10	Duo-decal	12D	Cavity	M	M	6.3	0.6	135	— 45	250	250	9,000
12LP4	12 1/2	18 3/4	7 3/4 x 10 1/4	Duo-decal	12D	Cavity	M	M	6.3	0.6	110	— 45	30	250	11,000
K1003 (J)	12	23 1/2	7 3/4 x 10 1/4	12 Contact		Metal Cap	E	E	2.5	2.1	159	— 100	85	250	5,000 (n)
15A1P4	15 1/2	20 1/2	9 1/2 x 12 1/4	Duo-decal	12D	Small Ball Cap	M	M	6.3	0.6	159	— 45	38	250	12,000
15CP4	15 1/2	21 1/2	150 Sq. in. Area	Duo-decal	12D	Cavity Button	M	M	6.3	0.6	115 ± 15 ma.	— 15		250 and up	9,000 to 15,000
16AP4	15 1/2	22 1/4	10 x 13 1/4	Duo-decal	12D	Metal Cone Rim	M	M	6.3	0.6		— 60		300	12,000
20BP4	28 3/4	20	12 1/2 x 17 1/4	Duo-decal	12D	Metal Cap	M	M	6.3	0.6	135	— 45	38	250	15,000

### TV Picture Tube Manufacturers

Allen B. DuMont Labs, Passaic, N.J.  
 Radio Corporation of America,  
 Harrison, N.J.  
 General Elec. Co., Schenectady, N.Y.  
 Rauland Corp., Chicago, Ill.  
 Lectrovision, Inc., New Rochelle,  
 N.Y.  
 North American Philips Co., Inc.,  
 N.Y.C., N.Y.  
 Tel-O-Tube Corporation of America,  
 Paterson, N.J.  
 Philco Corp., Phila., Pa.  
 Zetka Lab., Inc., Clifton, N.J.

- (a) Due to the extremely high light intensity produced on the tube face, protective circuits should be incorporated in the television chassis. This should be done to prevent line burns on the phosphor screen, in the case of sweep circuit failure.
- (b) For standard focus coil JAN, or equivalent.
- (c) 290 ohm coil-120 ma; 11,000 ohm coil-20 ma.
- (d) Visual extinction of undeflected focused spot. Adjust supply to ± 40% of indicated value.
- (e) For standard ion trap coil.
- (f) Supply should be adjusted to ± 40% of indicated value.
- (g) With combined grid-No. 1-bias voltage and video-signal voltage adjusted for a highlight brightness of a 2 foot-lambert on a 1 1/2" x 2 1/2" picture area.
- (h) For standard deflection coil.
- (i) Approximately 35% of grid No. 2 voltage is required for current cutoff when, in some applications, it is necessary to use the maximum permissible grid-circuit resistance.
- (j) Designed to replace 14AP4 used in pre-war TV receivers.
- (k) Varies slightly with different manufacturers.
- (l) Plus or minus 10%.
- (m) For anode No. 2 current of 200.
- (n) Anode No. 3, 8,500 volts.



• TUBE BASE CONNECTIONS •

# CIRCUIT COURT

## Garod 11FMP

This 10 tube, a-c operated, receiver functions on both AM and FM bands. The i-f used on FM is the customary 10.7 mc. An unusual feature, however, is the use of a resistance coupled stage.

Following a 6BA6-6BE6-6C4 combination of r-f-mixer-oscillator, a conventional dual i-f stage (employing a 6BA6 tube) functions at either 455 kc or 10.7 mc. The 455 kc signal is extracted after this stage.

The 10.7 mc FM signal is further amplified in a 6AU6 tube, the first shown in the partial schematic. The plate load for this tube is a 4700 ohm resistor. A 47  $\mu$ f capacitor couples the output to the grid of the following stage. Another 6AU6 is employed to bring the signal up to sufficient level to drive a 6AU6 limiter stage. Detection takes place in a 6AL5 discriminator. Conventional dual-tuned transformer coupling is used between the last i-f stage and the limiter.

## Westinghouse H-186, H-187

A circuit which indicates unusual care with regard to elimination of sources for distortion and instability is shown. The tubes employed are high-current, low-voltage type 6Y6G. Series resistors of 100 ohms and 33 ohms are used in each grid and plate lead, respectively. These tend to prevent generation of high transient or oscillatory voltages being generated within the stage.

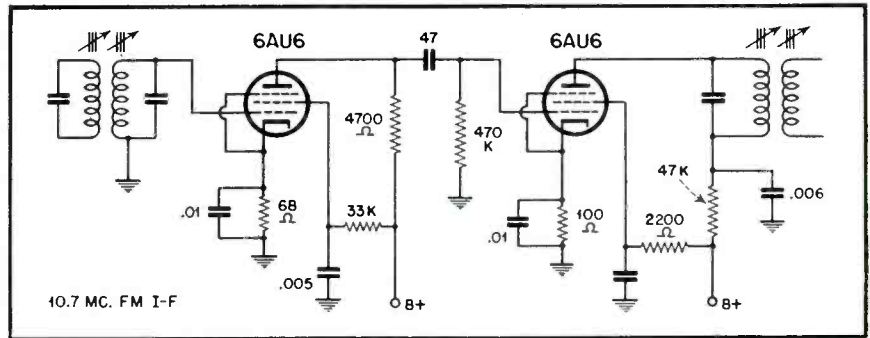
Additional stability is obtained by a well-regulated screen grid supply source. A voltage divider provides 165 volts for the screens.

Note the small value of the cathode bias resistor, correct because of the high current drain of this type of tube.

The grids are fed from a conventional first audio and phase inverter arrangement, the latter deriving its signal from the point A at the junction of the network in the grid circuit of the output tubes.

## Philco Model 49-1613

In the Philco Model 49-1613 a new tube type, 7R7, is used to perform the combined functions of i-f amplifier, a-m detector and a-v-c rectifier. A partial schematic is shown, illustrating details of the circuit.

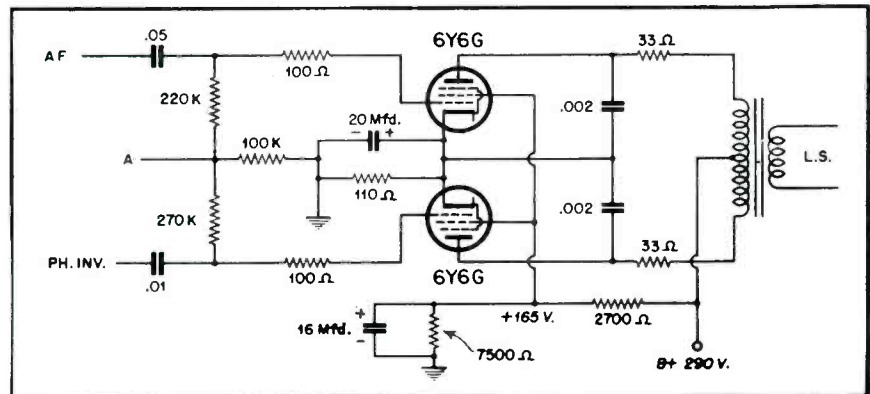


Resistance-Coupled i-f stage employed in Garod Model 11FMP receiver.

The 455 kc AM i-f signal or the 9.1 mc FM i-f signal, whichever has been perviously selected, is applied to the pentode grid via a conventional series transformer arrangement. Amplification takes place, and the voltage de-

veloped on the plate, whichever function is in use, is applied to one of the diode plates. Rectification ensues and the d.c. thus developed is applied to

the first i-f stage and mixer for a-v-c purposes. When the instrument is switched to *phono* position, a set of contacts opens the cathode lead of the 7R7, thus effectively preventing radio signals

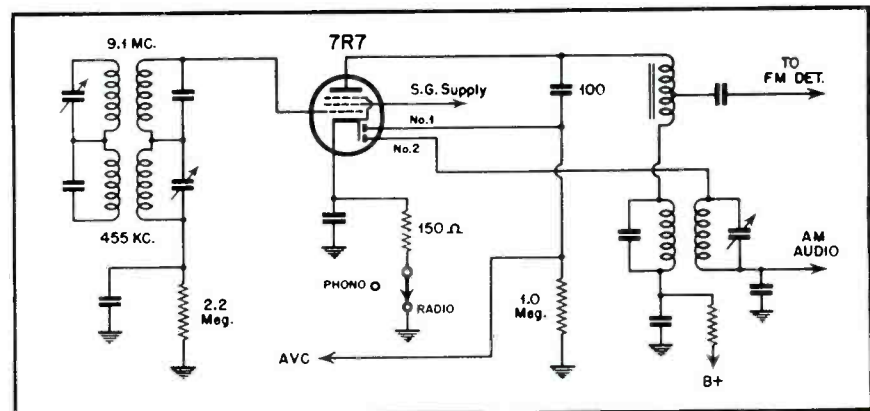


Stability and fidelity networks employed in Westinghouse H-186, H187.

veloped on the plate, whichever function is in use, is applied to one of the diode plates. Rectification ensues and the d.c. thus developed is applied to

from being developed in the audio system.

[Continued on page 34]



Use of 7R7 in Philco Model 49-1713 as combination amp., det., and rect.



# SERVICE-DEALER ASSOCIATIONS

If any Association's name does not appear here, such omission is due to the fact that we do not have any information about the association and its officers. Please supply same for subsequent listing. We also welcome Service-Dealer association proceedings and news for insertion in this column which will be a regular monthly feature of RSD.—Ed.

Phoenix Radio & Electronic Club.  
514 N. 2nd St.  
Phoenix, Ariz.  
R. C. Null, Pres.

Radio Ser. Assn. of Tucson  
2216 S. 6th Ave.,  
Tucson, Ariz.  
Howard Claiss, Pres.

Radio Servicemen's Assn. of Hot Springs Nat'l Park  
110 Market St.,  
Hot Springs Nat'l Park, Ark.  
Wilber Maisoll, Secy.

Radio Technicians Assn. of Burbank  
P.O. Box 391  
Burbank, Cal.  
Arnold J. Myer, Pres.

Long Beach Radio Technicians Assn., Inc.  
P.O. Box 4085  
Long Beach 4, Cal.  
G. L. Hollaway, Pres.

Radio & Electronic Servicemen's Assn., Inc.  
848 N. Serrano Pl.  
Los Angeles 27, Cal.  
Paul E. Heiser, Pres.

Bureau of Radio & Elec. Appliances of San Diego County  
Diego County  
Electric Building  
San Diego, Cal.  
A. K. Chamberlain, Pres.

Radio & TV Dealers Assn., Inc. of San Francisco  
6299 Mission St.  
Daly City, 25, Cal.  
T. R. Hopman, Pres.

Pueblo Radio Assn.  
54 Vanderstan Ave.,  
Pueblo, Col.

Bridgeport Radio Serv. Assn.  
Bridgeport, Conn.  
Thomas Cafora, Pres.

Ind. Radiomen's Assn. Inc.  
P.O. Box 1773  
Waterbury, Conn.  
J. Leo Phelan, Pres.

Radio Assn. of Macon County  
753 N. Water St.  
Decatur, Ill.  
P. R. Hollingsworth, Pres.

Radio Ser. Men's Assn., Inc.  
321 E. Iowa St.,  
Evansville 11, Ind.  
Victor J. Wolf, Secy.

Indiana Rad-Elec. Tech's Assn., Inc.  
443 S. Logan St.  
S. Bend, Ind.  
John E. Lackman, Pres.

Rad. & Electronic Techs. Assn. of Ind., Inc.  
528 E. Colfax Ave.  
S. Bend, Ind.  
John J. Pine, Secy.

Electronic Assn. of Des Moines  
845 42nd St.  
Des Moines, Iowa  
Howard Roberts, Pres.

Assn. of Radio Technicians  
1726 Central Ave.,

Ft. Dodge, Iowa  
Homer L. Davidson, Pres.

Radio Techs. Assn. of Ottumwa  
Cass & W. 2nd Sts.  
Ottumwa, Iowa  
Fred Swanson, Secy

Radio Ser. Assn of Balto.  
133 Hartford Ave.,  
Balto., Md.  
J. Wong, Pres.

Del Marva Radiomen's Assn.  
219 Highway Ave.,  
Salisbury, Md.  
Russell Mayer, Pres.

Radio Techs Guild of Boston  
313 Washington St.  
Newton 58, Mass.  
Albert C. Saunders, Pres.

Radio Techs Guild, Whaling City Chap.  
116 Topham St.  
New Bedford, Mass.  
Al Wohecky, Pres.

Detroit Rad. Servicemen's Assn.  
12019 Hamilton  
Detroit, Mich.  
J. Buchart, Pres.

Radio Servicemen of Amer. Minn. (1)  
1010 Second Ave. South  
Minneapolis, Minn.  
J. R. Trovall, Pres.

Assn. of Rad. & TV Service, Inc.  
1100 First Nat'l Bank Bldg.  
Minneapolis, Minn.  
Miles Chadwick, Pres.

The Elec. Assn. of Kansas City  
106 W. 14th St.  
Kansas City 6, Mo.  
R. J. Samson, Exec. Mgr.

Lincoln Electronics Ser. Assn.  
243 S. 11th St.  
Lincoln 8, Nebr.  
T. M. Duffield, Pres.

N. J. Rad.—Appliance Dealer's Assn.  
1156 Springfield Ave.,  
Irvington, N. J.  
Wm. A. Bohr, Pres.

Radio Servicemen's Assn. of Trenton  
114 Concord Ave.,  
Trenton, N. J.  
David Van Nest, Pres.  
Assoc. Rad. Servicemen of N. Y.,

Inc.  
200 W. 86th St.,  
New York, N. Y.  
Max Liebowitz, Pres.

Empire State Fed. of Elec. Techs Assns.  
T. L. Ramyo, Pres.,  
Member of Rochester RTG  
(New York State's Federation)  
T. L. Raymo, Pres.,  
Member of Rochester RTG

TV, Radio & Appl. Dealers Assn.  
925 Kings Highway,  
Brooklyn, N. Y.  
E. Y. Perlman, Pres.

Rad. & Elec. Dealers & Servms. Assn.  
1044 Rutland Rd.  
Brooklyn, N. Y.  
Irving Horowitz, Pres.

Radio Servicemen of Amer.  
25-27 Sturges St.  
Binghamton, N. Y.  
Aaron A. Baldwin, Secy.

Radio Techs Assn., Inc.  
657 Broadway  
Buffalo, N. Y.  
Theodore Telaak, Pres.

Catskill Mnt. Rad. Servicemen's Assn.  
Delhi, N. Y.  
A. Hayes, Pres.

Assn. of Rad. Serv. Engineers  
622 East 2nd St.  
Jamestown, N. Y.  
Leo Burt, Pres.

Kingston Rad. Ser. Men's Assn.  
c/o Light Radio Store  
Bayard St.  
Port Ewen, N. Y.

Hudson Valley Rad. Servms. Assn.  
c/o Hickok Music Co.  
Market St.  
Poughkeepsie, N. Y.  
E. De Cordova, Pres.

Radio Techs Guild, Rochester Chap.  
114 St. Paul St.,  
Rochester, N. Y.  
T. L. Raymo, Pres.

Rad. & Electronic Tech's Assn.  
206 Isabel St.  
Greensboro, N. Car.  
George Kiser, Pres.

Akron Rad. Tech's Assn.  
41 S. High St.  
Akron, Ohio  
George Phillips, Pres.

Assoc. Radio Service Dealers of Columbus  
2552 N. High St.  
Columbus 2, Ohio  
Leo Loudner, Pres.

Okla. City Rad. Serv. Assn.  
2529 N.W. 27th St.  
Oklahoma City, Okla.  
E. B. Cones, Pres.

Tulsa Rad. Serviceman's Assn.  
1223 N. Elwood  
Tulsa 6, Okla.  
E. J. Balcom, Pres.

Radio Research Club of Portland  
326 Northwest 6th St.  
Portland, Ore.  
M. Salines, Pres.

Lehigh Valley Rad. Servmn's Assn.  
518 W. Broad St.  
Bethlehem, Pa.  
Robert W. Riedy, Pres.

Mid-State Rad. Ser. Assn. of Pa.  
258 North Street  
Harrisburg, Pa.  
T. L. Clarkson, Pres.

Philadelphia Rad. Sermn's Assn.  
631 S. 60th St.  
Phila., Pa. 43  
Richard G. Devaney, Pres.

Federation of Rad. Servmn's Assns. of Pa.  
(Pennsylvania's State Federation)  
2109 S. 7th St.  
Phila., Pa.  
Dave Krantz, Pres.

Rad. Serv. Assn. of Pittsburgh  
910 East St.,  
Pittsburgh, Pa.  
Bert A. Bregenzler, Pres.

Reading Rad. Servmn's Assn.  
1117 N. Ninth St.  
Reading, Pa.  
LeRoy J. Link, Pres.

Lackawanna Rad. Tech's Assn.  
P.O. Box 108  
Scranton, Pa.  
Leon J. Helk, Pres.

Rad. Ser. Assn. of Luzerne County  
183 Bradford St.  
Wilkes-Barre, Pa.  
E. L. Manual, Secy.

Assoc. Rad. Servicemen of Central Pa.  
1036 W. 3rd St.  
Williamsport, Pa.  
A. R. Guild, Pres.

Rhode Island Radiomen's Bus. Assn.  
P. O. Box 800  
Providence, Rhode Is.  
G. G. Costinto, Pres.

Rad. & Elec. Tech's Assn.  
206 Isabel St.  
Greensboro, S. Car.  
C. E. Heitkamp, Pres.

Dallas Rad. Sales & Ser. Assn., Inc.  
1905 McMillan Ave.,  
Dallas 6, Texas  
T. P. Robinson, Secy.

Everett Rad. Sermn's Club  
1120 1st St.  
Snohomish, Wash.  
M. H. Nunley, Pres.

Monongahela Rad. Assn., Inc.  
Clarksburg, W. Va.  
E. W. Randolph, Pres.

Rad. Technician's Assn., Inc.  
617 Adams Ave.  
Huntington, W. Va.  
Scott Adams, Pres.

Green Bay Electronics Servmn's Assn.  
Green Bay, Wisc.

Assoc. Rad. Techs of Brit. Columbia  
918 Rogers Bldg.,  
Vancouver, B. C., Canada  
W. Munton, Pres.

Assoc. Rad. Techs of Alberta  
10125—100 A St.  
Edmonton, Alberta, Canada  
Fred. Neil, Pres.

Belleville Rad. Elec. Tech's Assn.  
32 Bridge St. East  
Belleville, Ontario, Canada  
Harry Fletcher, Pres.

Orangeville Dist. R-E Techs Assn.  
Orangeville, Ont., Canada  
James Musselman, Pres.

Guild of Radio Ser. Engineers  
37 York Road  
Edinburg 5, Scotland  
David C. Marshall, Secy.  
Holland-On-Sea

# INCOME TAX

## *It's Easy!*

by **BETTY LEE GOUGH**

**I**t's like this," said the first radio service dealer, leaning over his desk to point a pencil at his friend. "I figure that anything I do, I lose. The government is going to come back at me on taxes no matter what happens. They always question something on my income return. So I've quit worrying about it, except to curse when I work nights on filling out the returns. Every year since I've been in business they've found something wrong."

"You don't know how to do it, my friend," replied the other. "The Treasury Department has *never* come back at me over an income tax return. And I don't work nights over my returns, either. Making out your income tax form is simple enough, and it's easy to do it right the first time if you take the trouble to find out what is an allowable deduction and what is not."

"As a matter of fact," continued the second man, "I found that after I learned how to do it right, I saved money. I pay less tax now because I know just what I can claim as a business deduction."

Is income tax easy? Most radio service dealers say no. But the plain fact is that if you know the rules, you can fill out your tax return off the company's annual profit and loss statement, and do it in minutes instead of hours. And as the second radio service dealer pointed out, you save money by knowing what business expenses you may deduct as overhead from your gross profits. Every year, thousands—perhaps hundreds of thousands—of dollars are unknowingly overpaid by small business men who do not realize their legal expense items.

**A clear discussion of the knotty problems the Radio Service Dealer encounters in making out his income tax returns.**



This fellow prefers the worst fading job to filing his income tax return.

### **Short And Long Forms**

Let's look at all the things a radio service dealer must consider in filling out his income tax return. When you refer to the returns as "long form," "short form," and "capital gains form," they seem less formidable than when they carry Treasury Department code numbers. (We'll omit any discussion of the methods of filing corporation and partnership income tax returns. These are truly complicated. They require the services of a lawyer or an attorney to unravel. But it is definitely possible for the ordinary businessman to file the income returns for his individually-owned

firm—and do it without a great deal of bother.)

In the case of an individually-owned store, there are only three forms to worry about—the long form, the short form, and the capital gains form. You use only two of them at the most and, if you didn't make anything in the way of stock profits and losses or other capital gains, you have to fill out only one form.

What is the difference between using the long form and using the short form? Essentially, it is a question of whether you take your personal and family deductions one by

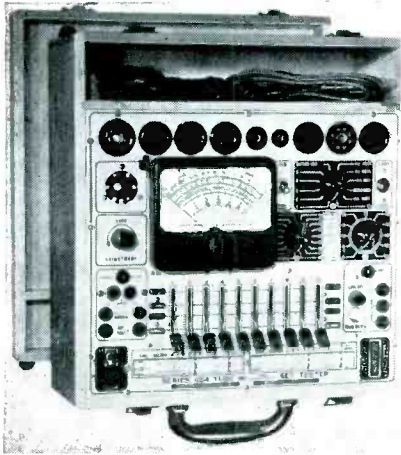
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# NEW PRODUCTS

## Precision Rounds Out "600" Line

Precision Apparatus Company, Inc., 92-47 Horace Harding Blvd., Elmhurst, L.I., N.Y., announces that their "600" line of test equipment has now been rounded out completely with the addition of their latest unit, designated as Series 654. A combination of a cathode conductance tube tester,

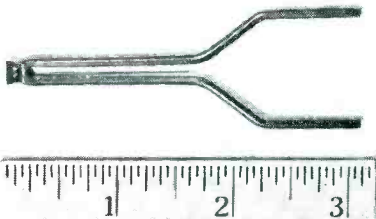


dynamic (under-load) battery tester and high sensitivity a-c/d-c circuit tester (20,000 ohms-per-volt d.c.), Series 654 is designed to meet the specific needs of the modern electronic service-maintenance technician.

This instrument handles all modern tubes with full anti-obsolescence features and circuit tests all AM and FM units as well as TV sets up to 30,000 volts with the addition of the Series TV-2 test probe. It also offers full rotary selective ranges and functions and requires use of only 2 pin jacks for all standard ranges. The instrument incorporates a wide-angle, 4- $\frac{5}{8}$ ", 50 microampere meter, also 1% wirewound and film-type resistors. All circuits are insulated from the power line for operational safety. Available in 4 models to suit individual requirements.

## New-Type Soldering Tip

A soldering tip that gives more heating area, forms easily into any shape desired and does not overload transformer - is the newest develop-



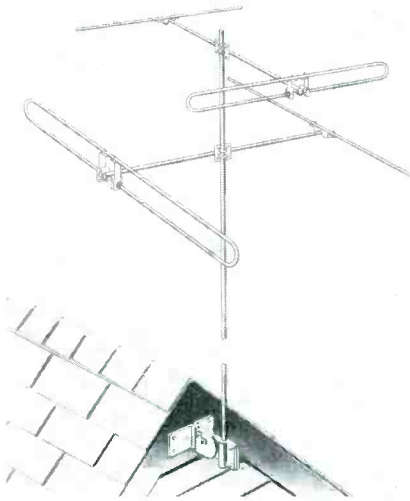
ment of Weller Manufacturing Company, Easton Pa., makers of Weller Soldering Guns. Designed especially

for use with Weller Guns, and sold under the trade-mark "duratip", this new tip already has proved in exhaustive tests and actual soldering use that tip life is increased 300 to 400 per cent. Also, because of its chisel shape, duratip offers more soldering area, thereby considerably increasing the amount of heat transferred to the work, which in turn increases the soldering efficiency.

It can be bent easily into any shape, to go around corners or into tight spaces. It draws rated current, heats in only 5 seconds, and cannot overload, damage or burn out the transformer. Also, since the working slug at tip end is an integral part of loop tip, slug cannot come loose or drop off. Available from authorized distributors in packages of 2.

## Hi-Lo Rotatable Antenna

For dealers whose volume does not warrant the variety permitted by the Brach Flexi-Kits, individual kits featuring the latest refinements are available to fill a wide variety of needs. Star among the complete individual antenna kits is the Hi-Lo Rotatable



TV Antenna, developed to provide excellent low-band reception and solve the difficulties of receiving a quality image on Channel 13 at the same time. All parts packed in the Flexi-Kits may be ordered as individual replacements, and may be used in conjunction with those of the individual kits as well. A complete description of the entire new Brach antenna line is available in the Brach Catalog No. 1304, available on request from L. S. Brach Mfg. Corp., Newark 4, N. J.

## New Microphone Desk Stand

A new Model 426 shockproof microphone desk stand is announced by Electro-Voice, Inc., Buchanan, Mich., manufacturers of microphones, phono pickups, stands as well as accessories. It combines modern streamlined "tear-

drop" design with functional utility. Provides balanced, stable microphone support.

Newly developed shock mount, with dual Lord shear-type mountings, is



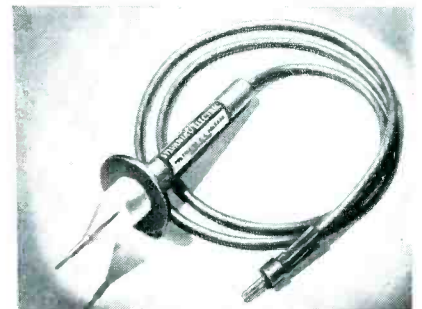
built into the base—provides double shock absorber action—prevents reproduction of external shocks and undesirable stand vibrations—reduces side-sway of microphone.

Pressure cast base rests firmly on desk or table. Finished in rich gray hammerloid. Bottom is fitted with waffle-type non-skid rubber shoe. Designed with adapter to fit all standard  $\frac{5}{8}$ "-27 thread microphones and permit easy connect or disconnect of cable. The Model 426 Desk Stand complete with shock mount is 6- $\frac{3}{4}$ " long, 4- $\frac{3}{4}$ " wide, 4- $\frac{5}{16}$ " high.

## Sylvania Multiplier For Polymer

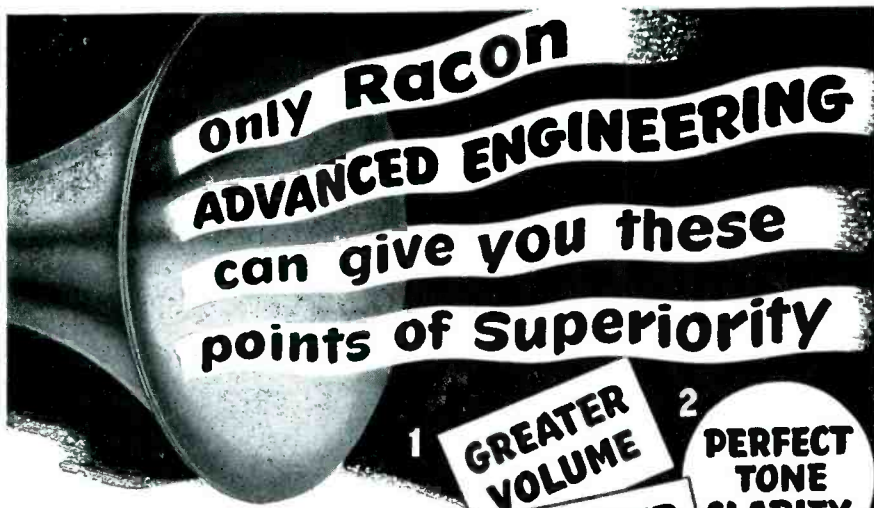
A new dc voltage multiplier for the Sylvania Polymer, which extends dc voltage measurements to 10,000 volts, has been announced by the Radio Tube Division of Sylvania Electric Products Inc., 500 Fifth Avenue, New York 18, N. Y.

The new multiplier extends the applications of the Polymer, Sylvania's multi-purpose vacuum tube voltmeter, to television high voltage supplies; transmitter plate circuits; experimental power supplies; industrial electron-



ic equipment; electronic flash tube circuits; and many other high voltage dc circuits.

The compact unit consists of a 48" plug-in flexible lead tested for 22,000 volt breakdown; nickel-plated brass contact pin mounted in tapered polystyrene rod 1 $\frac{3}{4}$ " long; a removable



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Advanced Engineering  
can give you these  
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- 2 **PERFECT TONE CLARITY**
- 3 **GREATER RANGE**
- 4 **NON-RESONANT**

**I**N every type of service Racon Speakers, Horns and Trumpets operate at higher efficiency than conventional makes through **ADVANCED ENGINEERING**. Do not be misled by similarity in outward appearance. Only Racon, embodying special features of internal construction, can give you the outstanding superior performance of a Racon unit.



**RE15** — Re-Entrant Trumpet, 18" acoustic length. List Price **\$34.00** (as illustrated).



**RASOB** — Midget Marine. List price **\$40.00** (as illustrated).



**RETOT** — Junior Giant With Alnico V Magnets. List price **\$50.00** (as illustrated).

### Racon Double Re-Entrant Trumpet

Designed to deliver highly concentrated sound over long distances with highest efficiency. Free from resonant effects. Seven models in bell diameters from 10 1/4" to 25 1/2". Also four radial models in widths from 9" to 36".

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Made from a heavy aluminum spinning with heavy aluminum casting for base. Waterproof; not affected by extreme temperature changes. Four models in bell diameters from 6 1/4" (Miniature marine) to 14" (regular marine). Designed for long range reproduction and pick-up in all types of service. Regular, Midget and Miniature Models approved by Bureau of Marine Inspection and Navigation and Dept. of Commerce, for shipboard use.

### Permanent Magnet Horn Units

These units, highly popular in all types of service, embody many improvements. Two groups, one with Alnico V Magnets and one with Alnico Blue Dot Magnets. All steel parts plated to prevent corrosion. Also fitted with corrosion proof metal or plastic diaphragms. Voice coil impedance on all units: 15 ohms. Special ohmages on request.

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52 E. 19th Street., New York 3, N. Y.



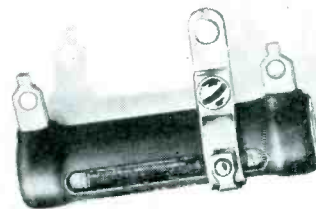
bakelite safety flange 2" in diameter; and varnished bakelite handle, 4 1/4" long, enclosing dropping resistor tested at 30,000 volts.

When used in place of the standard Polymeter low-voltage probe, it multiplies each of the present dc voltage ranges by a factor of 10.

### New IRC Resistors

To meet the increased requirements of radio service technicians, IRC has announced the addition of 91 new ranges to its current line of Power Wire Wound Resistors. This provides servicemen with a full range of ratings, sizes and terminal types.

Special "climate-proof" cement coating provides maximum heat dissipation and humidity protection. These

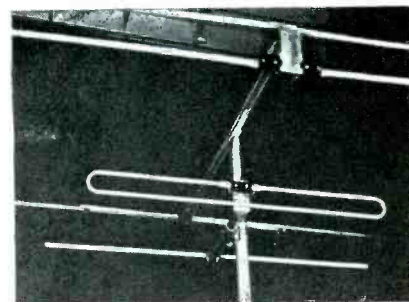


full-size heavy duty resistors will operate continuously at full rating; no derating is required in high ranges.

Supplemental catalog sheet listing all ranges in fixed and adjustable types, available terminals, tolerances and list prices may be had at no charge by writing International Resistance Co., 401 N. Broad St., Philadelphia 8, Pa.

### New G.E. TV Antenna

Two new high band adapters and a one package high-low antenna for television have been announced by the Receiver Division of General Elec-

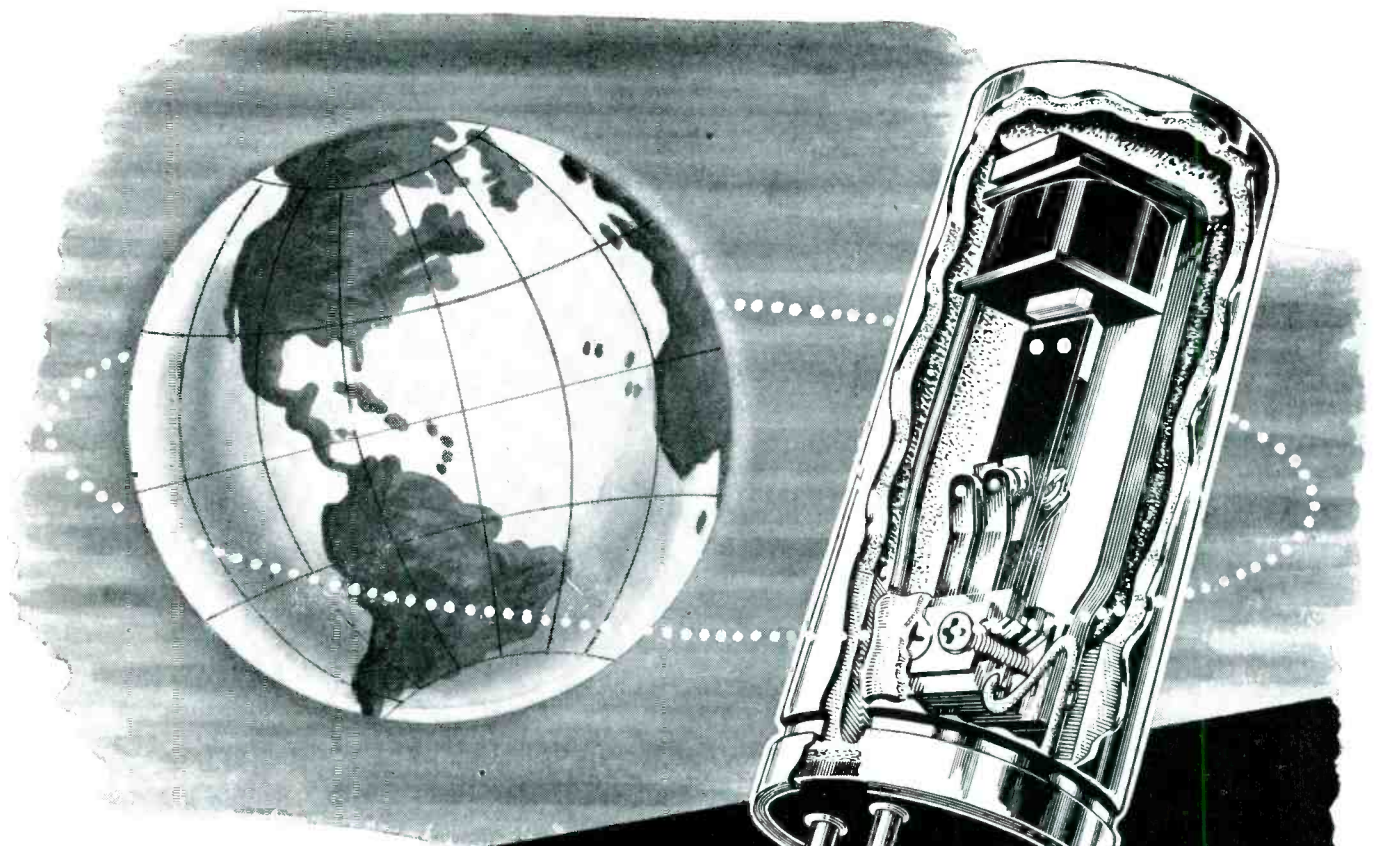


[Continued on page 34]

**\$1.00 to \$5.00 PAID  
for "SHOP NOTES"**

Write up any "kinks" or "tricks-of-the-trade" in radio servicing that you have discovered. We will pay from \$1 to \$5 for such previously unpublished "SHOP NOTES" found acceptable. Send your data to "Shop Notes Editor," RADIO SERVICE DEALER, 342 Madison Ave., New York 17, N. Y. Unused manuscripts cannot be returned unless accompanied by stamped and addressed return envelope.





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Reputation is not built overnight! Radiart's reputation has grown over the years because of its many points of superiority! Beyond the fact that the quality and design of every one of the 82 types of Radiart Vibrators . . . is beyond compare . . . the solid completeness of the line makes them the favorite wherever good vibrators are sold FOR MOST EVERY NEED TO ORIGINAL SPECIFICATIONS . . . there is a CORRECT Radiart replacement vibrator! NO OTHER VIBRATOR MANUFACTURER CAN MAKE THAT STATEMENT! Guess work is eliminated . . . all good jobbers carry most all numbers in stock . . . if your jobber does not have the number you want . . . he can get it, FAST . . . as special orders are given speedy attention . . . with immediate shipment of his order! Insist on Radiart for the EXACT REPLACEMENT Vibrator . . .

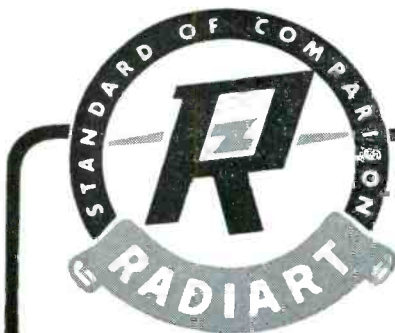
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Applying Neg. Feedback in Audio Amps.  
New Philco FM Circuit  
RMA Resist. & Conds. Chart

## FEBRUARY 1946

Applying Neg. Feedback in Audio Amps.  
Service Market in Industrial Electronics  
Ballast Tube & Plug-in Resistor Chart

## APRIL 1946

Modern Tube Testing, Part 1, Methods  
Servicing Sound Systems  
Short-cuts on Intermittants by use of  
"Substitution Block"

## JUNE 1946

Modern Tube Testing, Part 2, Instruments  
Short-cuts in Trouble-Shooting  
Ohmmet., Cond-Testers, Cap-Met., Part 2

## JULY 1946

Distortion—Determining the Cause, Part 1  
Ohmmeters, Cond-Testers, Cap.-Met. Part 2  
Multivibrators

## AUGUST 1946

How Is Your Grid Biased? Part 1  
Distortion—Determining the Cause, Part 2  
Sound Distribution Systems

## SEPTEMBER 1946

Transconductance-Reading Tube Tests  
How Is Your Grid Biased, Part 2  
Centralized Radio Servicing

## NOVEMBER 1946

The TV Opportunity—Installing & Servicing  
Don't Miss "Hidden" Profits, Part 1  
Service Market in Industrial Electronics

## DECEMBER 1946

Modernizing Sets by Using New Rectifiers  
Deflection Generators in TV  
Guide for Miniature Electron Tubes  
Answers to FM Servicing Problems

## FEBRUARY 1947

Simple Methods to Determine Impedances  
Servicing Record-Changers  
How To Block Interference

## MARCH 1947

Antenna Multicouplers  
Servicing P-A Installations  
Trade Standards for TV Installations  
Industrial Maintenance

## APRIL 1947

Using Your 'Scope in Radio Servicing  
Analysis of Coil Checkers  
"Sparx" At Work  
Trouble-Shooting in P-A Installations

## MAY 1947

Oscillator & Power Supply Troubles  
Ion-Trap in C-R Tubes  
P-A System Design & Applications, Part 1

## JUNE 1947

Simplified Set Checking  
P-A System Design & Applications, Part 2  
TV Installing Is A Specialty Business  
Servicing 3-Way Portables

## JULY 1947

Frequency Modulation, Part 1, antenna  
fundamentals & signal shifting effects  
Automatic Gain Control Circs. in TV Sets  
Using Conventional Sig. Gen. for FM Align.

## AUGUST 1947

TV R-F Circuits Described  
FM, Part 2, receiver circuit fundamentals  
TV Antenna Installation Problems

## SEPTEMBER 1947

Substitution Boxes Lick Service Problems  
TV Antennas for Multi-Unit Dwellings  
FM, Part 3, Discrim. & Deaccentuation  
Nets.

## OCTOBER 1947

Add Record-players to Modernize Old Sets  
P-A Fundamentals & Complexities  
Modern TV Kits

## NOVEMBER 1947

TV Antennas—Their Characteristics &  
Applications

## Bookkeeping Simplified

Make A Universal Test Speaker  
Eliminating Cathode Heater Hum from  
Audio Amplifiers

## DECEMBER 1947

A New TV Set Servicing Technique  
Ratio Detection & Its Applications  
External Cross Modulation—Its Cause &  
Cure

## JANUARY 1948

Master vs Indoor TV Antennas  
Audio Extractor for Signal Generators  
TV Kit Alignment Procedures  
70 Volt Speaker Distribution Line

## FEBRUARY 1948

High Speed Servicing  
Visual Alignment  
Income Tax Deductions

## MARCH 1948

Know Your Tube Tester  
TV Power Supplies  
A-C/D-C Battery Set Circuits

## APRIL 1948

Video I-F Circuits & Applications  
Computing What Price to Charge  
Using 'Scopes For Radio Servicing

## MAY 1948

FM Set Alignment Procedure  
Video Detectors  
How Vectors Simplify Servicing  
Significance of Power Factor and Q

## JUNE 1948

Amplifier Checking by Signal Injection  
Applications of Gas Type Tubes  
Modern TV Kits

## JULY 1948

Television's Service Outlook  
Video Amplifiers  
Bad Acoustics Cured Electrically

## AUGUST 1948

FM & TV Boosters  
Appliance Repair Hints for Radiomen  
Video Amplifiers D-C Component

tric's Electronics Department at Syracuse, N. Y.

The one adapter #UKT-002, designed primarily for use with the G-E folded dipole antenna with reflector, may also be used with the folded dipole without reflector. Where only high band signals are available it may be used as an antenna by itself. The other adapter #UKT-003, is designed for high gain operation in conjunction with the G-E stacked array high gain antenna. The high-low antenna consists of a folded dipole with reflector, packaged with the high band adapter, in one complete unit, including all accessories. As are all G-E TV antennas, these adapters are made of hard drawn aluminum, and terminal blocks are of Textolite plastic, formed under pressure.

Further information on the G-E line of TV antennas is available from the Parts Section, G-E Receiver Division, Electronics Park, Syracuse, N.Y.

### New Transvision TV Units

Transvision, Inc., New Rochelle, N.Y. makes available a number of new TV units to the trade. Among these is the Model No. SG sweep signal generator, shown below for TV and FM alignment.



Features of this new piece of test equipment include: frequency range from 0-227 mc. . . dial calibrated in frequency . . . sweep width from 0-12 mc completely variable . . . self-contained markers readable directly on the dial to 5% or better (no external generator required to provide the marker signals) . . . crystal controlled output makes possible any crystal controlled frequency from 5-230 mc . . . high output . . . directly calibrated markers, 20-30 mc for trap, sound, and video i-f alignment . . . unmodulated r-f signal to provide marker pips simultaneously with the main variable oscillator . . . phasing control.

### CIRCUIT COURT

[from page 28]

#### Crosley 65T series

Many schemes have been used in different a-c/d-c receivers to eliminate the power frequency hum which seems to choose such instruments for special attention. Half wave rectifiers and lack of filter chokes contribute to the problem. Large filter con-

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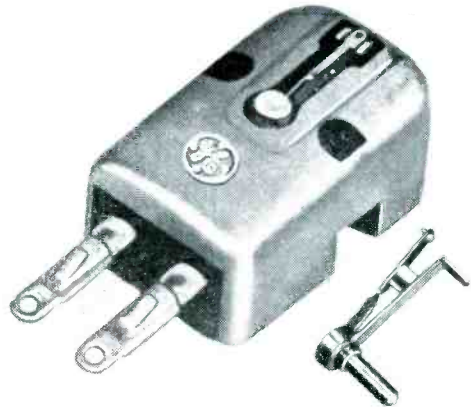
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# NEW!



## G-E VARIABLE RELUCTANCE CARTRIDGE


*with the replaceable stylus for  
Conventional and Long Playing Records*

**NOW**—in one small unit—all the sales and performance advantages of the G-E Variable Reluctance Cartridge plus this additional consumer economy feature—the Replaceable Stylus.

Negligible needle scratch and needle talk, minimum record wear, wide frequency response, freedom from resonance peaks, realistic reproduction—these are maintained at all times, simply, easily, economically with the Replaceable Stylus.

No more changing of the entire cartridge means more frequent replacement of stylus by the consumer because he can do it himself so easily.

Four simple steps—and presto! The worn stylus is replaced and maximum high quality performance is restored for the critical listener.

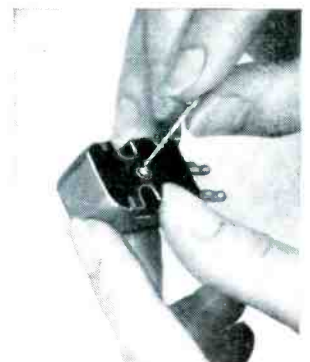
Note, too, these additional features: 

- New notched design . . . one-third smaller . . . improved shape . . . more generally adaptable to various tone arms.
- More clearance for record changers.
- Higher lateral compliance for more faithful tracking.
- More economical for the customer—more sales for the dealer.
- Cartridges available for LP records with 1 mil stylus; for conventional records with 3 mil stylus.

For complete information on the new Variable Reluctance Cartridge write: *General Electric Company, Electronics Park, Syracuse, New York.*



1 Simply remove cartridge from tone arm.



2 Use paper clip or wire to force stylus out of the cartridge.



3 Insert new stylus into cartridge with fingers.



4 Press firmly into position with thumb nail.

*You can put your confidence in—*

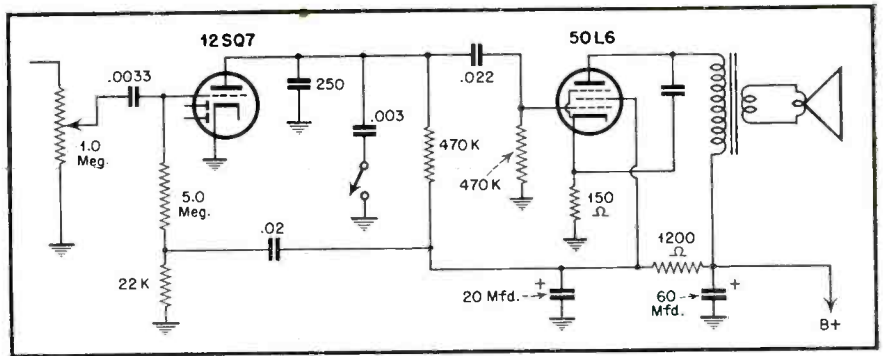
**GENERAL  ELECTRIC**

178-H1

denzers are the rule in most sets.

The Crosley 56T sets utilize an ingenious method of making the hum lift itself by its boot-straps. The circuit is a conventional 5 tube receiver covering only the AM broadcast band. A partial circuit indicates the portions of the schematic in question.

The first audio stage uses the triode portion of the 12SQ7 and the final audio tube is a 50L6. The d-c output of the 35Z5 rectifier is applied directly to the plate of the 50L6, a 60  $\mu$ f condenser acting as filter. This is followed by a 1200 ohm resistor and a 20  $\mu$ f final filter. This voltage is applied to the 50L6 screen and all



Method of bucking out hum in Crosley 56T Series receiver, through detector.

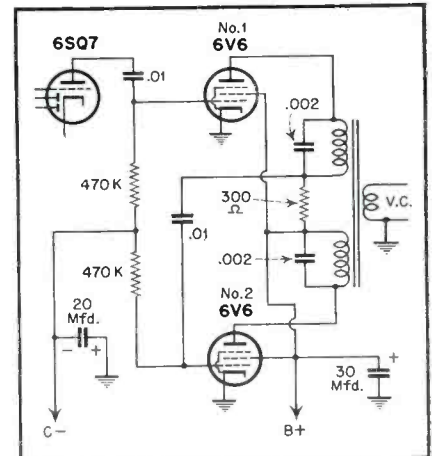
other tubes in the set.

The plate load of the 12SQ7 triode

consists of a 470K ohm unit. It is inevitable that some hum will be remaining to be applied to the plate, and be subsequently amplified by the output tube. The trick employed is to couple some of the plate circuit hum into the grid circuit of the triode. This is accomplished by tapping part way up on the grid return, in this case up 22K ohms in series with 5 meg.; the 180 degree phase change in the tube acting to buck out the hum in the plate circuit by cancellation. A .02  $\mu$ f capacitor will be seen providing the feedback voltage.

#### Motorola 107F series

This ten tube, a-c, FM and AM chassis has, among other interesting features, a novel method of obtaining out-of-phase audio to actuate the 6V6 output tubes. A variety of circuits have been developed to achieve this result and it seems that there is no end to the possible variations.



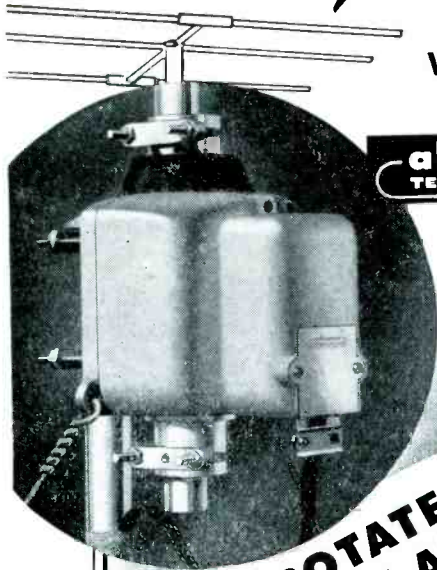
Phase inversion in Motorola 107F.

A portion of the schematic is shown, illustrating the details of the output stage. The previous tube in the circuit is a 6SQ7, whose triode section acts as the first audio stage. The output is coupled to the grid of the first 6V6 in the usual R-C manner, the grid circuit being supplied fixed bias through the 470K ohm resistor.

After amplification in the 6V6, the

## Stay on the beam

### WITH TENNA·ROTOR



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**CONTROL BOX**  
Size of box 5" x 5"  
Approx. weight 12 lbs.

Operates in any weather.  
Fits most types of antenna.

Model  
ATR  
Size of  
rotor  
unit  
7 $\frac{3}{4}$ "  
x 5 $\frac{1}{4}$ " x  
8"

Alliance Tenna-Rotor is an electric antenna rotator. It assures correct antenna "beaming"—gives positive control of antenna rotation to select the exact position for "peaked" reception! Tenna-Rotor is quick and easy to install—the electric powered rotor unit resists corrosion—is enclosed in a split zinc, die-cast housing, and is operated from a plastic control box which plugs into any 110 volt, 60-cycle house circuit. A 3-position switch rotates antenna clockwise or counter clockwise and stops it at the right point. Four-conductor inter-connecting cable from rotor to control box is made available at 5 $\frac{1}{2}$ ¢ per foot.

TV and FM service dealers, and users, will find that the Alliance Tenna-Rotor simplifies and improves new and existing installations!

Write for catalog sheet and illustrated folder.

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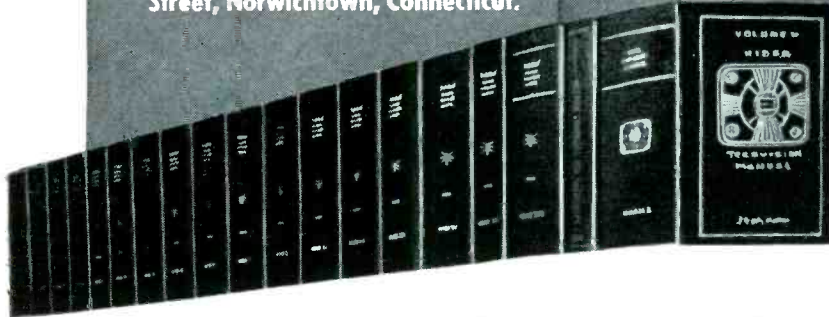


**"It's KNOW-HOW  
that counts!"**

—says Bud Ward, Owner of  
Ward's Radio Service, 24 Town  
Street, Norwichtown, Connecticut.



Bud Ward is an invalid paralyzed from the neck down. He mastered radio and repairs with his "voice" ... by directing the hands of an ex-Marine apprenticed to him under the G-I Bill. Though handicapped, Bud Ward is known as a radio wizard around Norwichtown and has built up a mighty successful servicing business. "My Rider Manuals are my bible of radio servicing," says Bud. "Having to use someone else's hands to do my work, the clear and concise service data is a 'must' with me."



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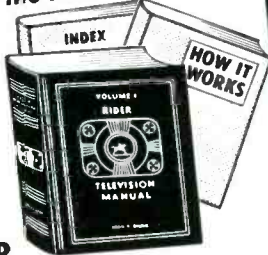
"I've got the ONE, now I'm  
waiting for the TWO"—Bud Ward

VOLUME

**2**

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WORKS" and INDEX

If you operate in a TV area, a John Rider TV Manual is as important to you as a pair of pliers. Rider Television Manuals contain the OFFICIAL, AUTHENTIC, RELIABLE DATA as supplied by the set manufacturers themselves. You don't have to guess... you know immediately what's wrong and what's to be done. Each Manual includes GIANT SIZE Schematics to guide you and your men to a quick solution of any TV servicing problem.



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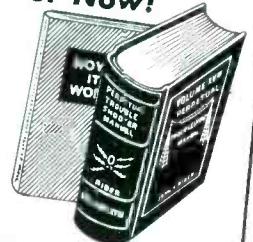
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NOTE: The Mallory Radio Service Encyclopedia, 6th edition, makes reference to only one source of radio receiver schematics—Rider Manuals.

ANOTHER NOTE: The C-D Capacitor Manual for Radio Servicing, 1948 edition No. 4, makes reference to only one source of receiver schematics—Rider Manuals.

upper one in the print, the signal appears across the upper primary coil of the output transformer. Note that the bottom of this coil does not connect directly to the B voltage source, but is isolated from it by a 300 ohm resistor. The audio drop across this resistor is fed through a .01 mfd. capacitor to the grid of the second 6V6 tube. Having been reversed 180 degrees in the first 6V6 it is now in the proper phase to excite the second tube. Bias is again via a 470K ohm resistor from the fixed source.

The only special items needed to incorporate this method of operation

are the transformer with separate primaries for the two tubes, and the 300 ohm resistor. If replacement is needed it would be necessary to observe proper polarity in the two primaries.

## INCOME TAX

[from page 30]

one or lumped together into a ready-made package. On the short form, the government allows you roughly ten percent of your "adjusted gross income" (which is your business net

profit) for personal expenses that are legal income tax deductions. On the long form, you roll your own. You list them individually. The government allows you no blanket deduction. If you think that more than ten percent of your net business income (your "adjusted gross income" on the forms) was spent for such deductible things as medical attention and state or city gasoline tax on your *personal* driving, then you'll make money by using the long form.


Many radio service dealers and other business men mistakenly believe that it is necessary to use the long form in order to take all of their business expenses as tax deductions. This is not so. You can take all of your business overhead items off a short form return as well as a long form return. The long form is used only when you wish to itemize personal and family deductions. That's why so many tax accountants and attorneys advise their clients to forget about the long form altogether.

Until the passage of the new Revenue Act that lowered income taxes slightly, there was a drawback that prohibited business men who made fairly sizeable incomes from using the convenient short form. Only those whose incomes were below \$5000.00 were permitted to take the blanket 10% deduction allowed on the short return. Now, however, the standard deduction has been extended to those making up to \$10,000. The law allows \$1000 or ten percent of the income.

### Joint Returns


However, if you plan to take advantage of the new community property provision in the Act, which extends the privilege to all taxpayers regardless of the laws of the state in which they live, watch out! In a joint return, or in the return of a single man, the \$1000 or-ten-percent is allowed, but it is different with married persons sending in separate returns. Each is allowed to take off no more than \$600 for the standard blanket deduction.

Extending the community property privilege to citizens of all states, at least as far as income tax is concerned, allows the appliance dealer whose net business profit was \$10,000 or under to use the short form. Citizens of the thirteen community property states have been able to do this all along. Thus, if you made \$9980.00, you report \$4940 as your net income, and \$4940 as your wife's net income—making you eligible for



*adapt STACKING to the conditions of the area...*

# ORIENT



**ORIENT**

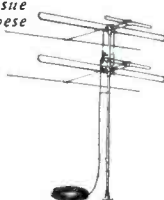
**TWO CHANNELS  
IN TWO DIRECTIONS**

The usual objective of Antenna Stacking is for the purpose of acquiring db gain—with Amphenol's 114-302 Stacked Array there is a plus value, another adaptation, one which is very important in congested TV areas. Both the upper and lower bays provide all-channel reception and each bay may be individually oriented. Overlapping signals or station interference on same channels within receiving areas may now be separated—if and when the bays are stacked for orientation. In the smaller illustration lower right, observe the same array stacked for db gain on all channels. Amphenol Antennas offer many plus values in being perfected electrically and mechanically in every detail.

*To keep posted on all that's new in TV and FM Antennas, be sure your name is on the Amphenol list to receive the monthly issue of ENGINEERING NEWS. Current issue contains timely information on these subjects—yours for the asking.*

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**AMERICAN PHENOLIC CORPORATION**  
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# Now AIR KING "Know How" makes possible this outstanding Portable WIRE RECORDER

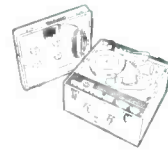
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**AMPLIFIER**

**\$99<sup>95</sup>**

Slightly higher in Zone 2



The AIR KING Wire Recorder line is complete



Model A-750-1



Model 4700

## AIR KING

Portable Wire Recorder  
Model A-725

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—and *only* AIR KING experience could build this moderately priced, matchless Wire Recorder with Amplifier. As pioneers, AIR KING has achieved and maintained the leadership in the magnetic recorder industry. Glamorous consoles... compact portables... radio-phono-wire recorder combinations: every one is AIR KING *experience-built*. It's the *know-how* that counts!

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### ✓ THESE SELLING ADVANTAGES

- ★ Complete with amplifier
- ★ Records direct from radio, phonograph or telephone
- ★ Automatic shut-off at end of play or rewind of wire
- ★ Crystal mike for hand, table or stand and plug-in mike cord
- ★ Rewind speed: 6 times forward speed
- ★ Plug for cable to record from radio or phonograph
- ★ Erases automatically when recording over used wire
- ★ Safety lock prevents accidental erasure
- ★ Covered in leatherette
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- ★ Luggage-type carrying case
- ★ 5" Alnico V P.M. Speaker
- ★ TUBES: 2 — 50L6, 1 — 1280, 1 — 6AQ6 plus selenium rectifier
- ★ WEIGHS: 21½ lbs.
- ★ MEASURES: 13¾" long by 12" wide by 9" high

# AIR KING RADIO

Division of HYTRON RADIO & ELECTRONICS CORP.

*The Royalty of Radio Since 1920*



the short form's convenience and savings and also reducing the size of the tax considerably, since both figures fall into a bracket lower than the \$10,000 figure does.

To see how much difference this makes, consider the case of a dealer whose "adjusted gross" income was exactly \$9980.00, and who split his income by reporting half of it as his own and half as his wife's. They would pay \$2640.00 without splitting. Taking it as a split income, they would each pay \$687, a total of \$1374. The saving: \$1266!

The most important thing to any business man is an exact knowledge of what he may deduct as business expense, and what he may not.

*Roughly speaking, anything you pay out in order to run your business is a business expense.*

Here is what the Treasury Department has to say about business expenses: "Business expenses may include reasonable salaries and wages paid, interest on business indebtedness, taxes on business and business property, loss arising from business operation, bad debts arising from

sales or services (provided the income portion of the amount due has previously been reported in income), depreciation, obsolescence, depletion and rents, repairs and other expenses."

The Treasury also points out that: "Other items are management expenses, commissions, labor, supplies, advertising or other selling expenses, and insurance premiums paid."

Also included are the upkeep and depreciation on cars and trucks used in the business' membership in trade associations, other clubs and Chambers of Commerce where it is sometimes good business to belong, subscriptions to publications (like this one) that you use to help you conduct your business, the cost of supplies, postage, etc., equipment that has only a short life, depreciation on equipment and fixtures that has a life longer than one year, any entertainment that actually helps the business and, finally, travel and transportation expenses.

There is one item of business expenses you'll find tricky. Many dealers have written off the cost of materials they purchased—and later found themselves coughing up back tax payments plus, on occasion, interest as well. This is because anything you have in your inventory is not a business expense. You still have it. Until it leaves your physical possession through sale, or until it is definitely written off useless, it's an asset, not an expense.

When you take a deduction for bad debts, the Treasury insists that your return show: "(a) the nature of the debt; (b) name and family relationship if any of the debtor; (c) when the debt was created; (d) when it became due; (e) what efforts have been made to collect the debt; and (f) how it was determined to be worthless."

Uncle Sam wants all of this information because of the opportunities for fraudulent deductions that dishonest taxpayers have when they claim bad debt losses. Bills rendered that have remained unpaid are not necessarily bad debts in an income tax sense. A deduction for a bad debt loss is allowed only if you have previously reported the sum due you as income. In other words, the debt must have been reported as income at some time or you can't take it off as a loss.

#### Depreciation

How do you figure depreciation? Supplies and other incidental purchases that have a short life only—

# 12 WAYS

## TO CUT CONTROL INVENTORIES

You can reduce your stock of replacement controls, and profit in time and money with these 12 IRC Tap-In Shafts. IRC engineered for easy installation and dependable performance with IRC Tap-In Shaft Controls, they cut both service time and costly stocks of exact duplicates.

Accurately tapered sockets in IRC Tap-In Shaft Controls readily receive the closely machined shaft ends. A firm hammer tap permanently "freezes" the two units. "C" washers and other cumbersome locking arrangements are entirely eliminated. IRC Tap-In Shafts are quick, easy . . . and secure!

IRC Tap-In Shafts can be conveniently cut to desired lengths before being installed. In crowded chassis, they can be installed *after* control is assembled—eliminating any necessity to remove other parts.

There's an IRC Tap-In Shaft for most radio and television requirements. Used with IRC Tap-In Shaft Controls, you are sure of smooth, quiet, trouble-free service. Ask your distributor for IRC Controls—with the *dependable* Tap-In Shaft feature. International Resistance Company, 401 N. Broad Street, Philadelphia 8, Pa. In Canada: International Resistance Co., Ltd., Toronto, Licensee.

INTERNATIONAL RESISTANCE CO.

Wherever the Circuit Says 



SHAFT A  
standard, double-flatted



SHAFT B  
slotted or tongued



SHAFT E  
universal split, knurled



SHAFT F  
3/16" dia., full round



SHAFT G  
special slotted



SHAFT H  
slotted with groove



SHAFT J  
1/16" dia., with  
.105" flat



SHAFT K  
special 1/4" round



SHAFT L  
flatted with groove and  
threaded hole



SHAFT M  
double-flatted, threaded



SHAFT N  
3/16" flatted and  
slotted



SHAFT P  
1/4" full round



Have ALL THE FUN  
SAVE 2/3 THE COST

Build  
YOUR OWN

# TEST EQUIPMENT

## 1 Heathkit VACUUM TUBE VOLTMETER KIT

Everything you want in a VTVM. Shatterproof solid plastic meter face, automatic meter protection in burn-out proof circuit, push pull electronic voltmeter circuit assuring maximum stability. Linear DC and AC scales. AC and DC full scale ranges of 3V-10V 30V-100V-300V-1000V. A total of 24 ranges. Isolated DC test prod for signal tracing and measurements of voltage while instrument is in operation. An ohmmeter section accurately measuring resistance of 1/10 ohm to one billion ohms with internal battery. Extremely high input resistance 11 megohms on all ranges DC and 6.5 megohms on AC. All these features and many more are the reasons hundreds of radio and television schools are using Heathkit VTVM's and recommending them to all students. Like all Heathkits, the VTVM kit is complete, 110V. 60 cycle power transformer, 200 microamp meter, tubes, grey crackle cabinet, panel, test leads, 1% ceramic precision divider resistors and all other parts. Complete instruction manual. Better start your laboratory now.

Shipping weight 8 lbs. **\$24.50**

## 2 Heathkit SINE AND SQUARE WAVE AUDIO GENERATOR KIT

The ideal instrument for checking audio amplifiers, television response, distortion, etc. Supplies excellent sine wave 20 cycles to 20,000 cycles and in addition supplies square wave over same range. Extremely low distortion, less than 1%, large calibrated dial, beautiful 2 color panel, 1% precision calibrating resistors, 110V. 60 cycle power transformer, 5 tubes, detailed blueprints and instructions. R.C. type circuit with excellent stability.

Shipping weight 15 lbs. **\$34.50**

## 3 Heathkit CONDENSER CHECKER KIT

Checks all types of condensers, paper mica — electrolytic — ceramic over a range of .00001 MFD. to 1000 MFD. All on readable scales that are read direct from the panel. NO CHARTS OR MULTIPLIERS NECESSARY. A condenser checker anyone can read without a college education. A leakage test and polarizing voltage of 20 to 500 volts provided. Measures power factor of electrolytics between 0% and 50%. 110V. 60 cycle transformer operated complete with rectifier and magic eye tubes, cabinet, calibrated panel, test leads and all other parts. Clear detailed instructions for assembly and use. Why guess at the quality and capacity of a condenser when you can know for less than a twenty dollar bill.

Shipping weight 7 lbs. **\$19.50**

## 4 Heathkit SIGNAL TRACER KIT

Reduces service time and greatly increases profits of any service shop. Uses crystal diode to follow signal from antenna to speaker. Locates faults immediately. Internal amplifier available for speaker testing and internal speaker available for amplifier testing. Connection for VTVM on panel allows visual tracing and gain measurements. Also tests phonograph pickups, microphones, PA systems, etc. Frequency range to 200 Mc. Complete ready to assemble. 110V. 60 cycle transformer operated. Supplied with 3 tubes, diode probe, 2 color panel, all other parts. Easy to assemble, detailed blueprints and instructions. Small portable 9" x 6" x 4 3/4".

Shipping Wt. 10 lbs. **\$19.50**

Heathkits are beautiful factory engineered test equipment kits supplied complete but unassembled with all parts — tubes, grey aluminum cabinets, punched, formed and plated chassis, calibrated panels, ready wound coils and complete detailed instruction manuals for assembly and use. With costs zooming up, Heathkits save the labor cost of assembly enabling thousands to have equipment which they otherwise could not afford.

## 5 The NEW 1949 HEATHKIT 5-INCH OSCILLOSCOPE KIT

New improved model of the famous Heathkit Oscilloscope. Building an oscilloscope is the finest training for television and newer servicing technique and you save two-thirds the cost. All the features and quality of instruments selling for \$100.00 or more. Supplied complete with cabinet, two color panel, 5BP1 tube, 2 5Y3 tubes, 2 6SJ7 tubes and 884 generator tube. Power transformer supplies 1000 volt negative and 350 volt positive. Sweep generator 15 cycles to 30 M. cycles. Has vertical and horizontal amplifiers. Oil filled filter condensers for long life. Complete blueprints and instructions included. Shipping weight 25 pounds.

Express only **\$39.50**

## 6 Heathkit FM AND TELEVISION SWEEP GENERATOR KIT

A necessity for television and FM. This Heathkit completely covers the entire FM and TV bands 2 megacycles to 230 megacycles. The unit is 110V. 60 cycle transformer operated. Uses two 6J6 tubes, two 6C4 tubes and a 6X5 rectifier. An electronic sweep circuit is incorporated allowing a range of 0 to 10 MC. A sawtooth horizontal sweeping voltage and phase control are provided for the oscilloscope.

The coils are ready assembled and precision adjusted to exact frequency. As in all Heathkits, the best of parts are supplied, Mallory filter condenser, zero coef. ceramic condensers, all punched and formed parts, grey crackle cabinet, 5 tubes, test leads, etc. Better get it built now and be ready for the FM and TV business. Shipping Wt. 6 lbs.

**\$24.50**

## 7 Heathkit SIGNAL GENERATOR KIT

Every shop needs a good signal generator. The Heathkit fulfills every servicing need, fundamentals from 150 Kc. to 30 megacycles with strong harmonics over 100 megacycles covering the new television and FM bands. 110V. 60 cycle transformer operated power supply.

400 cycle audio available for 30% modulation or audio testing. Uses 6SN7 as RF oscillator and audio amplifier. Complete kit has every part necessary and detailed blueprints and instructions enable the builder to assemble it in a few hours. Large easy to read calibration. Convenient size 9" x 6" x 4 3/4". Ship. Wt. 7 lbs.

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BENTON HARBOR 12,  
MICHIGAN



usually less than one year—can be taken off as direct expenses, but equipment, fixtures, machinery and such—things that last a long time—cannot be claimed in whole during the year they are purchased. You must depreciate them. The depreciation time should be roughly the normal life of the item.

Thus, for example, a desk that cost \$100.00 could be expected to last ten years. At the end of that time, it would have a resale value of perhaps \$10.00. So you would depreciate the desk nine dollars each year for the decade.

If you use a car for both business and pleasure, figure the part of its life that is devoted to business uses. Then take that percentage of its value. Depreciate the figure you have in the same way that the desk above was figured.

The Collector of Internal Revenue won't raise Cain about how you carry depreciation on the books, provided you use any recognized accounting method, figure on a reasonable life, and use the same depreciation procedure consistently.

#### Interest

In writing down the interest you pay on a business debt, be sure that

you do not put down interest on any *personal* loans you might have made. Your business loan is an expense you incur in making money, but your personal loan is not. You can take off personal loan interest, but only if you use the long form in filing your return. Business loan interest comes off in computing the "adjusted gross" income figure.

#### Taxes

You can take off taxes you have to pay for doing business but, again, you may not take off taxes on your home or on the cigarettes you smoke—unless you use the long form and deduct them from the "adjusted gross." Like the interest on a business loan, the taxes on your business (and only on your business) are deducted from gross income to arrive at the "adjusted gross" figure, which is no more than the net profit shown on your year-end profit and loss statement.

#### Other Expenses

Where do these various business expense items go in the conglomeration of spaces, boxes and blanks on the long or short income tax form? The easiest way to handle them is to list them just as you would in a

regular profit and loss statement, then write this remark across the various "schedules" provided on the form: "See attached schedule listing expenses and deductions."

Be sure that the special profit and loss statement is firmly attached to your tax report. Don't just clip it on. Staple or glue it to the top of the return so it can't get lost in the shuffle of thousands of forms that pour into every Collector's office during January, February and March.

What about other money you might have taken in, such as from the sale of a house, or the dividends paid on corporation stocks, or the profit on a sale of stocks you owned? These three all come under the heading of capital gains (or losses). They should be separately reported on the form that comes with each income tax return. You pay a different tax rate on capital gains.

Briefly, "capital gains" applies to any money you made from the sale, liquidation, etc. of some long-term investment. The purchase of a home is a long term investment. If, during the year, you sold your home for \$1000 more than you paid for it five years ago, you have made a capital gain of \$1000. This is *not* included in the regular listing of business profits and expenses.

In next month's issue, we'll look at the matter of deductions that govern your decision on using the long form or the short form. We'll cite examples of good income tax figuring.

### PHONO PICKUP

[from page 25]

The Titone cartridge can be used directly as replacement for a crystal cartridge. It will operate satisfactorily into a half to a ten megohm load. For average use a one megohm load is recommended. Where more bass is desired a higher resistance load is required.

To install: First remove the two screws holding the cartridge to be replaced in place. Detach the terminals from the old cartridge. If connections were soldered solder the wires to the clips of the ceramic pickup cartridge provided in the installation kit. *A word of caution:* Do not solder wires while clips are attached to the new cartridge. This is a very important point and should always be observed. Plug clips onto the terminal adapter with the ground lead on left hand pin, (looking from

# AMPERITE

## Studio Microphones at P.A. Prices

Ideal for BROADCASTING

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- PUBLIC ADDRESS

"The ultimate in microphone quality," says Evan Rushing, sound engineer of the Hotel New Yorker.

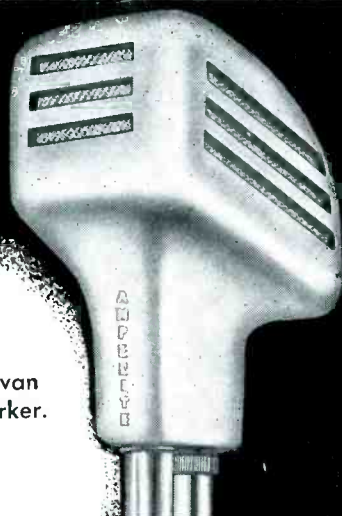
- Shout right into the new Amperite Microphone—or stand 2 feet away—reproduction is always perfect.
- The only type microphone that is not affected by any climatic conditions.
- Guaranteed to withstand more "knocking around" than any other type mike.

**Special Offer:** Write for Special Introductory Offer, and 4-page illustrated folder.

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#### Models

RBLG—200 ohms  
RBHG—Hi-imp.  
List \$42.00



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Model SKH, list \$12.00  
Model KKH, list \$18.00



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better  
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can  
sell

*Nothing Finer*

than the famous VEE-D-X  
long range antenna plus

## THE NEW VEE-D-X SECTIONAL TOWER

VEE-D-X maintains its policy of a single source for complete TV antenna installation with its new sectional tower that can be used at any height from 10' to 140'. This tower embodies every desirable feature that you and your customers could want —

- Surprisingly low in cost
- Rugged, yet light in weight
- All welded construction in 10' and 20' sections
- Comes completely assembled
- Quick, easy erection
- Diagonally reinforced for highest possible rigidity
- Has universal antenna mount
- Antenna rotated from base
- Aluminum finish — requires no painting
- Extra safe for climbing

Feature and install this VEE-D-X antenna combination and your customers will see the difference. For literature and dealer prices, write —

LAPOINTE-PLASCOMOLD CORP.  
UNIONVILLE, CONN.



**VEE-D-X**  
MEANS VIDEO DISTANCE

the front of the cartridge when it is in playing position). Another precaution: On ac-dc sets it is necessary to unground the cartridge. This can be easily accomplished by pushing back the rubber sleeve slightly, then cutting the ground strap (see Fig. 5).

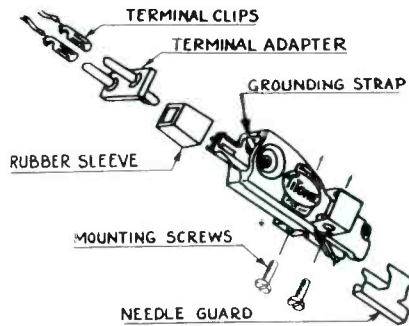


Fig. 5—Constructional details.

All free parts of metal resulting from this cutting operation should be removed from all parts of the pickup.

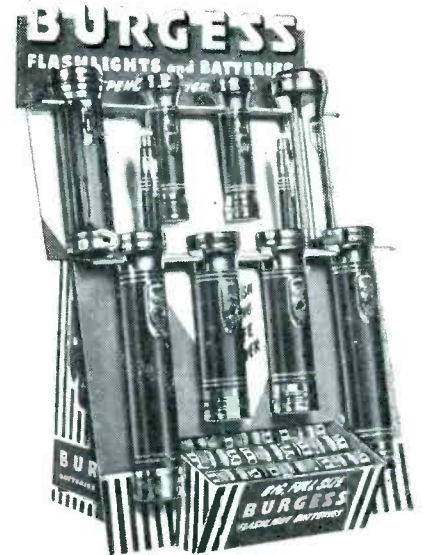
Mount the new cartridge into the arm using the size of screws matching the threads of the old mounting holes. The best use of the pickup and the least record wear is obtained with a needle force at the point of  $\frac{3}{4}$  of an ounce. This may seem minute but the pressure carried by the actual point is sometimes in excess of several tons to the square inch. If needle point force is too great, try to adjust the counterweight or the counterbalance spring at the rear of the pickup arm. Remove needle guard and pickup is ready for operation.

If upon completion of the installation the volume output is insufficient it may be due to the use of an equalizer network in the input circuit which is not necessary with this new pickup material. If that is the case, remove the equalizer network and make the connection directly.

The pickup cartridge has not had any publicity up to the present time until it was found to give satisfaction in practical field and user tests. These tests indicate excellent results on both expensive and low priced phonographs and record players. The pickups have been produced on a commercial basis since March, 1947, and several hundred thousand pickup cartridges have already been delivered to a number of phonograph manufacturers. They are now or will be shortly available to the public as replacements on pickups now being used on phonographs in literally millions of homes throughout the world. This point is of utmost importance to the serviceman.

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Gives You a  
Higher Return  
From a Square Foot  
of Your Counter



## Want Greater Turnover, Higher Returns, and More Profit?

Then here's how to use valuable counter space. Set aside one square foot for this bright, quick-sale Burgess display assortment and watch sales and profit soar.

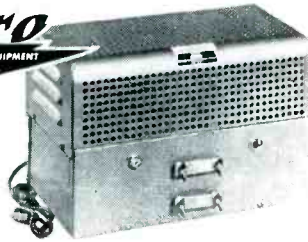
Here's a whole profit department in one compact, sturdy unit. In less than a square foot of space (actually 9" x 13") it displays and sells 48 Burgess flashlight batteries and a complete assortment of Burgess flashlights in 5 best-selling models. This new money-making display is FREE with the minimum stock of batteries and select flashlight cases.

Don't wait to step up profits. Your Burgess distributor has the No. 134 assortment in stock now. Order it by number today!

# BURGESS

BATTERY COMPANY Freeport, Illinois

**RUGGED! DURABLE!**  
**A POWER SUPPLY**  
**THAT CAN REALLY "TAKE IT"**



**MODEL "A"**

6V 15 Amp. or 12V 7½ Amp. DC filtered from 105V to 125V 60 cycle power line.

This model has proper rectifier, choke coil, condenser and transformer to provide heavy instantaneous output and still maintain rated output under unusual load and heat conditions.

Ideal long life power supply for testing auto radios with solenoid tuning and tone controls; 12 volt marine and aircraft radios; telephone circuits, laboratory apparatus, etc.

Write for complete information

**ELECTRO PRODUCTS LABORATORIES**

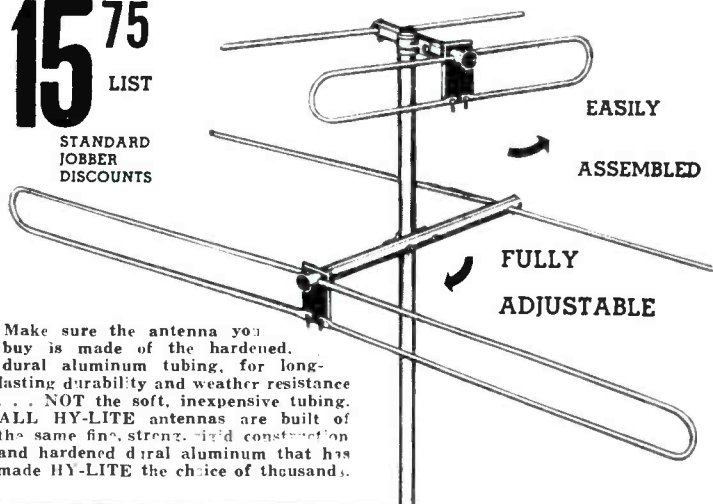
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Make sure the antenna you buy is made of the hardened, dural aluminum tubing, for long-lasting durability and weather resistance . . . NOT the soft, inexpensive tubing. ALL HY-LITE antennas are built of the same fine, strength, rigid construction and hardened dural aluminum that has made HY-LITE the choice of thousands.

**HY-LITE Antennae** INC.  
 Makers of Fine Antennas for AMATEUR - FM - TELEVISION  
 528 TIFFANY ST., BRONX 59, N.Y.

IF YOUR JOBBER CAN'T SUPPLY YOU, SEND US HIS NAME. WRITE FOR NEW FREE CATALOG  
 DI-9

In view of its evident superior characteristics, to wit: light weight and high fidelity, this pickup offers an excellent medium of introducing new sales opportunities for Radio Service Dealers. One does not have to stretch his imagination to any great extent to realize the additional income producing potentialities of an item of this nature.

A most logical procedure is to contact known owners of phono units by postcard, circular, or phone, and to acquaint them with the merits of the new pickup. It is certain that a large percentage of responses will be obtained as a result of this procedure. In fact, many of these responses will be due to unsatisfactory operation of the existing equipment due to service requirements.

It then becomes merely routine for the Service Dealer to put the equipment in first class condition first, following which the "Titone" unit is installed. No doubt, mechanical difficulties will arise—but so far none has been insurmountable. The end result will be a customer who is satisfied for two reasons: first, because of the better condition of his unit, and second, because of excellent pickup used.

**TUNED FILTERS**

[from page 23]

chosen so as to allow relatively low resistance values for  $R_1$  and  $R_2$ . This is desirable, since the total d-c load current must flow through these two resistors in series, and a high total resistance value would introduce an undesirable voltage drop. Since  $C_1$ ,  $C_2$ , and  $C_3$  are electrolytic capacitors, they must be connected in the polarity shown in Fig. 5. The capacitors and resistors must be selected as closely as possible to have the values given in Fig. 5. However, slight differences in both capacitance and resistance are compensated by adjustment of rheostat  $R_1$ . In order to obtain the resistance values given for  $R_2$  and  $R_3$ , these units may be wirewound resistors with their sliders set to the indicated values by means of an ohmmeter. Rheostat  $R_1$  may be provided with a slotted shaft for screwdriver adjustment, and may be set closely for very effective elimination of hum.

**Installation of the Tuned Section**  
 The tuned sections shown in Figs. 2 to 5 will remove the 60-cycle half-wave ripple from the power supply output voltage (or will attenuate it



to an unnoticeable level) in the most troublesome of cases. They do not affect the hum harmonics, however, and for this reason the tuned section must be followed by a simple untuned section (See Fig. 1). The untuned section may be made up with any available choke which will carry the full d-c output (load) current, and any available high-capacitance filter capacitor. A common combination, for example, is 20 henries and 10 microfarads. The values are not at all critical in the untuned section which is a brute-force circuit.

The parallel-T section (Fig. 5) is not susceptible to magnetic fields, nor does it radiate any, and so may be placed without too much concern in any convenient part of the power supply section of the chassis. When the tuned section includes a choke, such as those given in Figs. 2, 3, and 4, care must be taken to mount the tuned choke so that its core is at right angles to the choke in the untuned filter section. Care also must be taken to keep the tuned choke well away from audio transformers in the supplied circuit.

We believe that the comparative simplicity and other advantages of tuned filter sections will recommend them readily to the builders of equipment using transformerless power supplies of the half-wave type. We believe they are equally useful to the radio serviceman who should consider the installation of a tuned section to correct stubborn hum troubles.

## FEEDBACK

[from page 21]

compensates for load changes across the amplifier output. Under ordinary operating conditions, these load changes vary continuously and greatly through a wide dynamic range.

In the first case above, when the content of negative feedback exactly equals the content of positive feedback, we have an ideal condition. An original pure undistorted signal, somewhat amplified, may be taken from the amplifier. In this we have a *stabilized* condition sometimes called a balanced condition.

In the second case above, a similar distortion to that known to exist in the original, but of lesser magnitude and opposite in phase, is fed back into the input circuit with the immediate result that the original distortion is reduced through opposition. Thus, waveform or harmonic dis-

**A CHALLENGE** — Order a model 247. Disregard the unbelievably low price and compare it on the basis of appearance, quality and performance to any other Tube Tester (ANY MAKE, ANY PRICE). If you are not completely satisfied with the model 247 after a 15 day trial, return it to us for full refund—no explanation necessary. The model 247 is not surplus nor is it a hatched over pre-war model. It is newly designed and incorporates new advances in Tube Tester design. Read the description below and order one today!

### THE NEW MODEL 247



# TUBE TESTER

Checks octals, loctals, bantam jr. peanuts, television miniatures, magic eye, hearing aids, thyratrons, the new type H.F. miniatures, etc.

#### Features:

- \* A newly designed element selector switch reduces the possibility of obsolescence to an absolute minimum.
- \* When checking Diode, Triode and Pentode sections of multi-purpose tubes, sections can be tested individually. A special isolating circuit allows each section to be tested as if it were in a separate envelope.
- \* The Model 247 provides a super sensitive method of checking for shorts and leakages up to 5 Megohms between any and all of the terminals.
- \* One of the most important improvements, we believe, is the fact that the 4 position fast-action snap switches are all numbered in exact accordance with the standard R.M.A. numbering system. Thus, if the element terminating in pin No. 7 of a tube is under test, button No. 7 is used for that test.

Model 247 comes complete with new speed-read chart. Comes housed in handsome, hand-rubbed oak cabinet sloped for bench use. A slip-on portable hinged cover is included for outside use. Size: 10 3/4" x 8 3/4" x 5 3/4".

20% Deposit Required on All C.O.D. Orders

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## Announcing — “TELEVISION INTERFERENCE— Its Causes and Cures”

A new Handbook by Radio Magazines, Inc., covering in detail the important facts of TVI. The TVI Handbook is edited to fill the pressing requirements of amateurs and other technicians confronted with the problems of TV interference, or otherwise unsatisfactory television reception. Included in its thorough treatment of causes and cures are a comprehensive set of TV screen photos depicting all types of reception, many case histories, preventative design data, and other equally pertinent facts. It is a vital publication for radiomen wherever TV is on, or about to go on the air.

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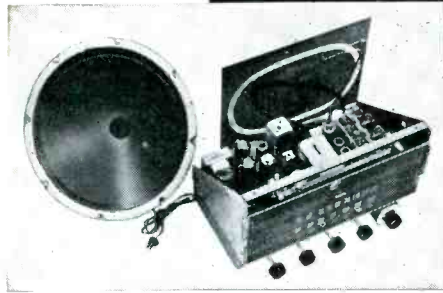
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CUSTOM BUILT  
RADIO**



This profitable chassis replacement market means increased sales to you and increased savings to over 19 million potential customers.

• Here is a fine radio, in chassis form, to please the most discriminating music lovers.

- Easy to install in any console cabinet old or new, the Espey 511 AM-FM radio chassis embodies the latest engineering refinements for lasting high quality at a price that defies competition.
- Features, 12 tubes plus rectifier and tuning indicator; drift compensated circuit for high frequency stability; tuned RF on AM and FM, high fidelity push-pull audio; 13 watts power output; wide range 12" PM speaker; smooth flywheel tuning; phono input provision; separate AM and FM antennas.

Sold through your favorite parts distributor.  
Write for catalogue D1 containing complete specifications.

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tortion, arising within an amplifier, is itself degenerated and therefore reduced. Expanded ranges of frequency spectrum can be amplified practically with equality throughout the frequency range.

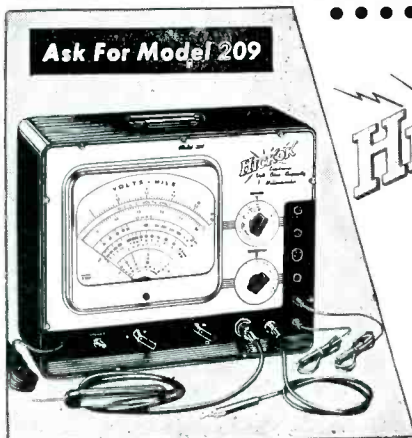
In the third case above, negative feedback stabilizes the output voltage or the dynamics of the amplifier under load and as stated these loads vary greatly and continuously. The usual tendency without feedback would be for the output voltage to drop off as the load current or drain increased. What actually happens when negative feedback is applied is the following:

An increased load of course draws a greater current in an amplifier's output circuit. This naturally decreases the output voltage. But, that action must also decrease the feedback voltage since it is derived from and paralleled across that same reduced output voltage. Thus the smaller content of feedback introduces less opposition to the original input signal. Then, when that signal has less opposition, the input is effectively larger and being again amplified results in an increased output. From this process output voltages are maintained at steadier mean values. The final product is stabilization with a minimum of distortion.

Now of course the above benefits are only gained at the expense of a loss in voltage gain since the very nature of the whole negative feedback process reduces the possible output signal from the amplifier. Yet the gains to be derived from stabilization and freedom from distortion more than offset this loss. It is merely necessary to design the amplifier for a greater amount of gain when negative feedback is employed. High mu tubes producing a greater gain per tube have aided development.

To clarify the above an example is detailed. With reference to Fig. 5, suppose an amplifier without feedback requires 1 volt input to produce an output of 100 volts. Next assume the introduction of a circuit feeding back 9 volts inversely to the input when the output is 100 volts. Ten volts will now be required at the input to maintain the original 1 volt across *CD* (10-9 negative feedback = 1 across *CD*). The original gain of the amplifier was 100/10 = 10. While the gain with feedback added has been reduced. The output over the input or 100/10 = 10. We then may say that the gain of the amplifier with feedback is, Gain = A/1-FA where A is amplification without feedback and F is the fraction of output voltage that is fed

[Continued on page 48]



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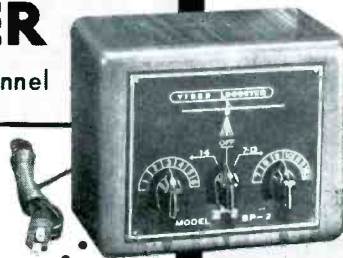
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### FEEDBACK

[from page 46]

back. In the above  $A = 100$  and  $F = -9/100 = .09$  then,  
 $Gain = 100/1 - [100 \times (-.09)]$   
 $= 100/1 + 9 = 10$

#### Sensitivity Gain

There is one more small benefit not to be ignored. An amplifier becomes more sensitive to weaker signals when negative feedback is employed. Here is what happens. The output voltage naturally falls off as an input signal becomes weaker. Since the feedback circuit is connected directly across the output circuit of an amplifier, any fall in voltage there naturally reduces the amount of feedback. Then, any lack of opposition to a weaker input signal, due to that reduced feedback, results in an effective gain in signal input.

### EDITORIAL

[from page 2]

to the home, it delivered" . . . "so many stars are taking flings at TV that on good video nights a chair at home is often better than an orchestra seat on Broadway."

Admittedly TV is still in its veriest infancy. Less than 50 stations and a million TV sets are in operation and yet it is estimated that audiences of almost 4 million are now viewing nightly programs.

Video's biggest step toward maturity occurred January 12th when the Bell System East Coast and Midwest networks were linked, joining Boston, New York, Philadelphia, Baltimore, Washington, Richmond, Pittsburgh, Cleveland, Buffalo, Toledo, Detroit, Chicago, Milwaukee and St. Louis. Having had the opinion that Eastern TV programs were so much finer and more captivating than Midwestern shows, we will now await the reaction of Midwesterners who are, for the first time, being given a break. We predict that Midwesterners, being of a naturally more conservative disposition, will immediately discern the improvement and accordingly will give TV wholehearted acceptance, which it has not had from them as yet.



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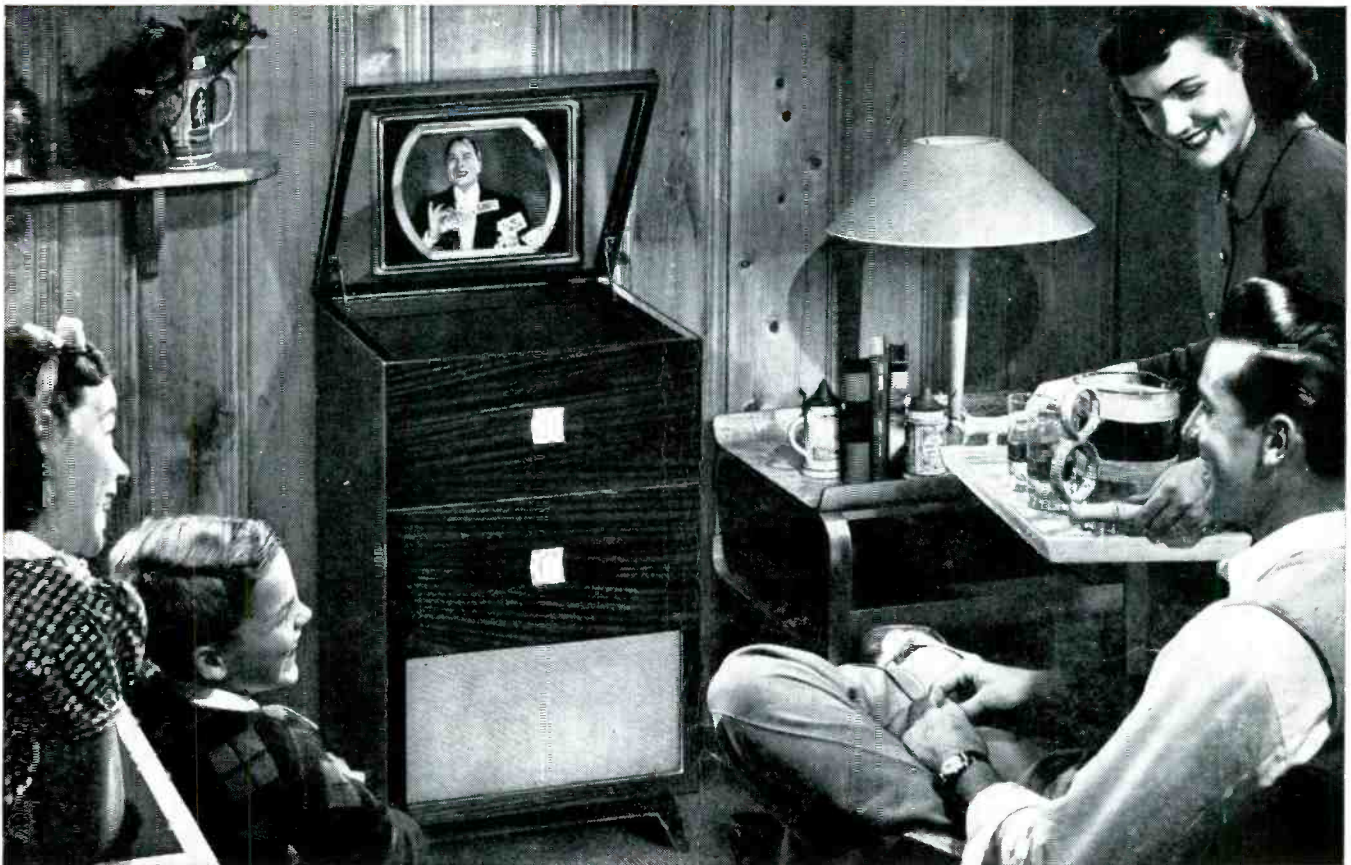
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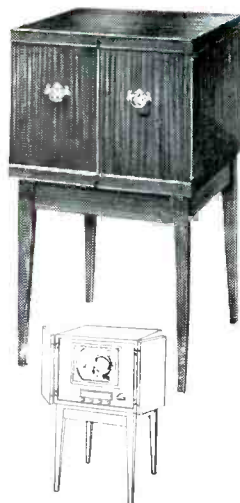
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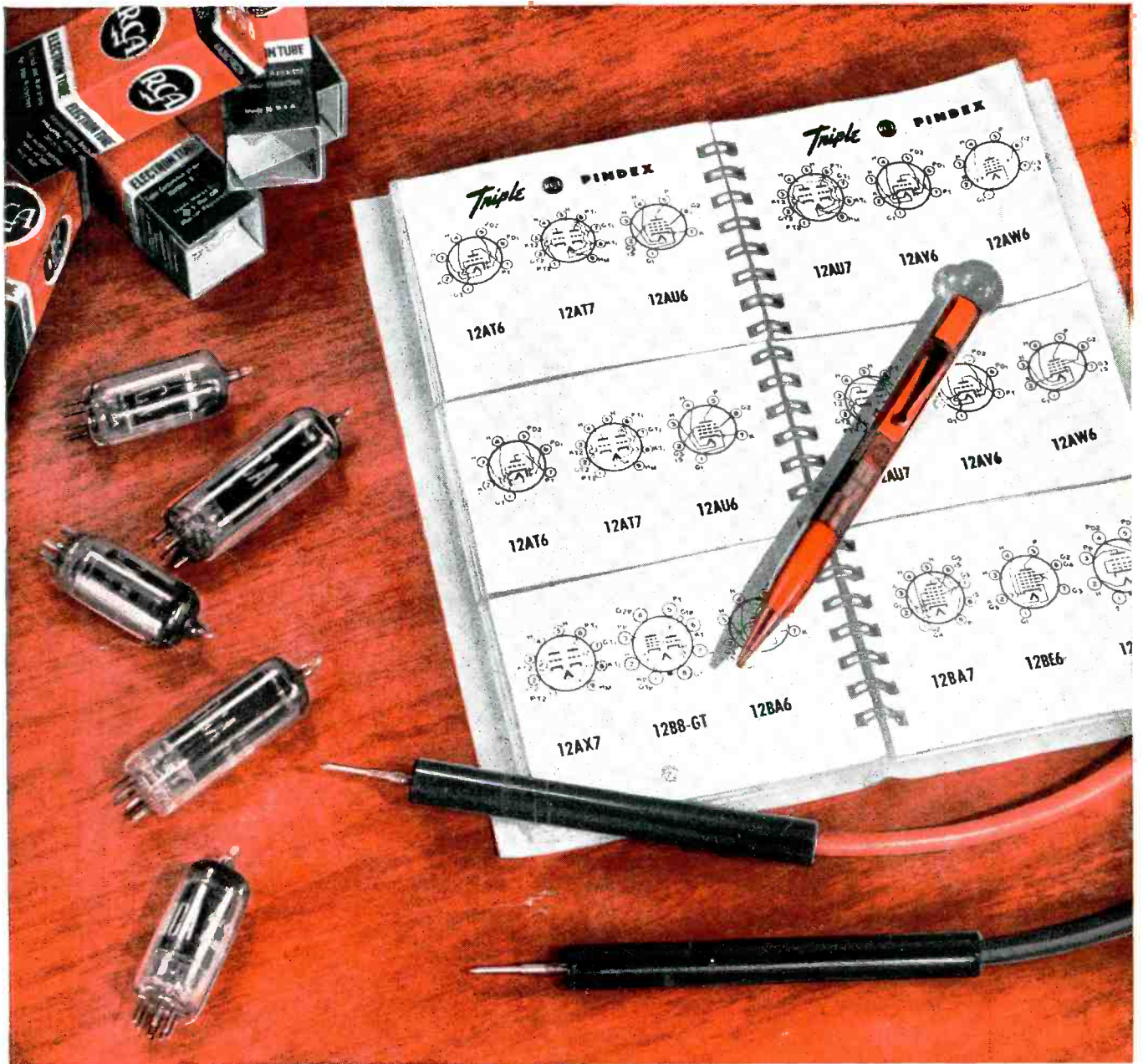
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