

Radio
**SERVICE
DEALER**

DECEMBER, 1948



IN THIS ISSUE:

Field Findings

Checking Video & Synch Waveforms, Part I

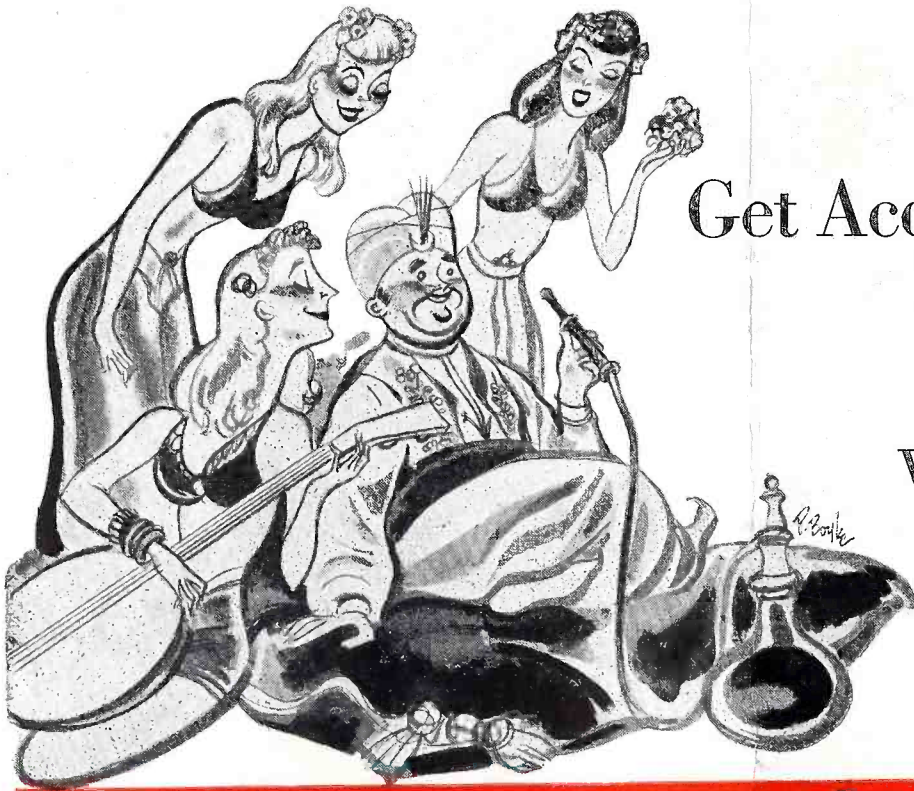
Wire Recorders

Projection TV, Part 2

Shop Notes

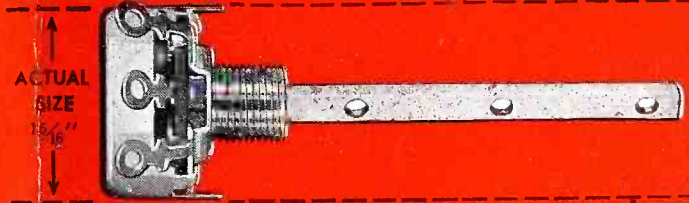
AM-FM-TV-SOUND

The Professional Electrician's Magazine



Get Acquainted with the Little Fellow with the **BIG** Advantages

The All New Mallory Midgetrol



Offers These **BIG** Advantages . . .

BIGGER MARKET

The small size of the Mallory Midgetrol lets you service portables, auto radios and small AC-DC receivers which require $1\frac{5}{16}$ " controls.

SIMPLER INSTALLATION

The unique shaft design of the Mallory Midgetrol saves installation time with *all* types of knobs.

SIMPLER STOCKING

Electrical characteristics let you use the Mallory Midgetrol to replace $1\frac{1}{8}$ " as well as $1\frac{5}{16}$ " controls. Stocks are further reduced because no special shafts are needed.

Both mechanically and electrically, the Mallory Midgetrol is amazingly quiet. Tests prove it *stays* quiet! And the Mallory Midgetrol offers nine *all new* features.

It's the NEW Standard in Carbon Controls. See your Mallory distributor.

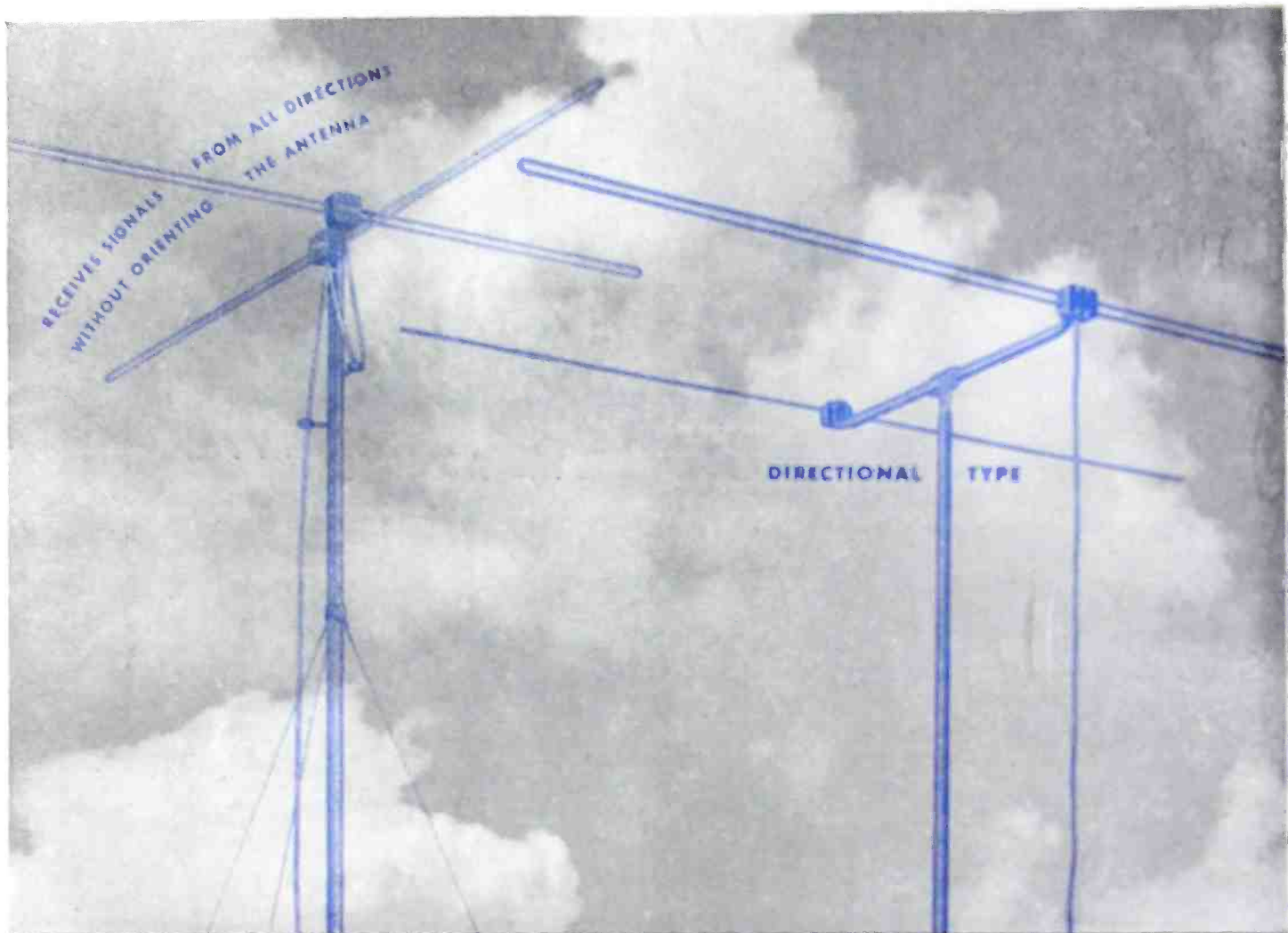
- NEW SIZE
- NEW DESIGN
- NEW SHAFT
- NEW EXTENSION
- NEW SWITCH
- NEW ELEMENT
- NEW CONTACT
- NEW TERMINAL
- NEW TWO-POINT SUSPENSION

P. R. MALLORY & CO. Inc.
MALLORY

CAPACITORS . . . CONTROLS . . . VIBRATORS . . .
SWITCHES . . . RESISTORS . . . RECTIFIERS . . .
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Insure **FM Performance**
with a GOOD FM ANTENNA



- Belden FM Antennas are engineered for finest FM reception.
- Use Belden 8322 Poly-Point Antenna to receive signals from all directions without turning!
- Use Belden 8320 Dipole Antenna for installations requiring directional characteristics.
- Sturdy aluminum construction withstands severe ice loading and high wind.
- COMMON-SENSE PRICES.



ASK your Belden Jobber

Belden
Radio **WIRE**

"KEN-RAD TUBES HAVE DONE A JOB FOR ME!"

"You can get a testimonial from me on Ken-Rad tubes any time!

"I use them. I've been using them for years. Believe me, no other tube can touch them.

"They're quality tubes. When I pass them on to a customer I know he won't come back mad.

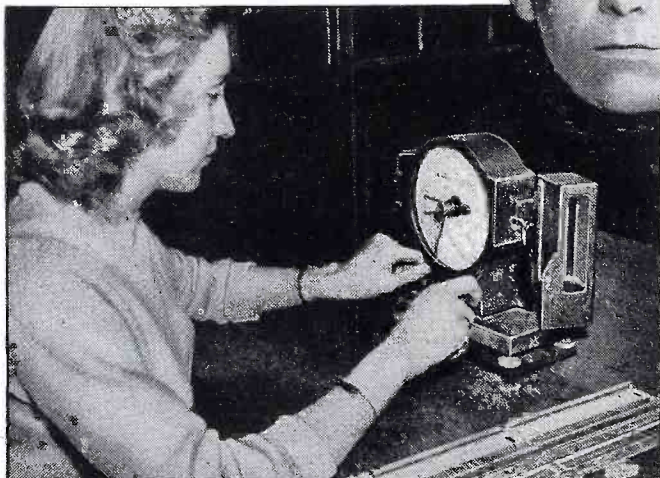
"My customers come back, all right. But satisfied. They want me to do another job for them!"



R. W. RIEDY, Modern Radio Service, 518 West Broad Street, Bethlehem, Pa. Typical of thousands of radio servicemen, coast to coast, Mr. Riedy uses Ken-Rad tubes because he knows he can depend on them to satisfy customers.



EMMETT MERCER, Foreman, is responsible for the weighing of cathode sleeves to check coating weight (shown below). Another example of the great care that is taken in making Ken-Rad tubes.



"KEN-RAD TUBES ARE MADE TO DO A JOB!"

"We make Ken-Rad tubes to perform better, last longer, satisfy customers and increase business for you.

"I've been helping to make them for years. And I can tell you we check and recheck, test and retest, over and over again, the smallest parts that go into our tubes

"We test the tubes themselves for noise, microphonics, static, life, shorts, appearance, gas, air and hum.

"You can count on them to bring customers back satisfied."

178-GA13-8880

KEN-RAD *Radio Tubes*

PRODUCT OF GENERAL ELECTRIC COMPANY

Schenectady 5, New York

The **Serviceman's Tube**



EDITORIAL

by S. R. COWAN

Associations' Activities

Our mail bag brings us an ever-increasing number of communications from Associations of radiomen throughout the country, and from non-association independents who confide they are now desirous of becoming association members.

We cannot stress too strongly our firm conviction that every man, whether an independent or employed technician, would benefit from membership in an organization of servicemen. So, for the guidance of the hundreds of men who have written us in this regard, in our next issue we will publish a complete list of Associations now functioning. It is possible that we have omitted the names of some associations, but if so, it is simply because we do not know of their existence, roster of officers, etc. Such non-listed associations should advise us of their status as soon as possible so we may include them in our listing.

The Customers Write

The many letters from our readers thanking us for the fight we waged on behalf of independent radio servicers against TV set manufacturers who have a policy of "exclusive appointees" are most gratifying. Indeed, the fight is not yet over. While RCA, an acknowledged leader in policy-forming tactics for the entire industry, has come in step with the free enterprise policies we advocated, some other dominant TV makers have not, up to this writing.

It is vitally important that this issue be settled quickly. The officers-elect who control the Democratic Party's policies have gone on record since Election Day that "wherever deemed advisable, price controls will soon be reinstated." We have no way of knowing whether the radio servicing profession is to be included in the soon-to-be price-controlled category, but if so, it will be a complex matter to thrash to a suitable conclusion of independent service organizations are to be "price-aligned" using present-day "manufacturer-established service fee" scales as a basis.

Incidentally, because of the possible return to price-fixing controls, all Service Dealers should immediately re-examine their cost-pricing-profits operations to ascertain whether or not they are conducting their businesses on a sound basis. The many thousands of Service Dealers who heard my Sept.-Oct. lectures on Book-keeping Methods and Price Determinations know exactly what we mean. As an industry, the radio servicing groups have ever been vastly underpaid for their labors. Let's not be caught with our prices down again.

Interference Eliminations

The British government recently announced that legislation will soon be introduced to protect radio owners from interference caused by electric razors, neon signs, and 67 appliances or gadgets listed as offenders. Included are autos not properly equipped with suppressors.

The publicity release states that practically every household would have to spend from 50c. to \$76 for noise suppressors. Failure to eliminate disturbances would result in fines up to \$400 and/or 3

[Continued on page 28]



Member of the
Audit Bureau of
Circulations

radio service dealer

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9
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SANFORD R. COWAN, Editor & Publisher

SAMUEL L. MARSHALL, Technical Editor

DECEMBER, 1948

Editorial	3
Trade Flashes	4
Field Findings, by S. R. Cowan Industry happenings here and there	8
Checking Video & Synch Waveforms Using a C.R.O., Part I by Samuel L. Marshall	13
The text version of Mr. Cowan's talk delivered on his recent tour	
Wire Recorders, by Arthur Silverberg	16
The first in a series of articles on the principles and practices of wire recorders	
Projection TV, Part 2, by Allan Lytell	17
Describing the Philco Projection System	
Shop Notes	24
Crystal "Ring" modulator; G. E. Model 140, loop repair; Admiral 130A1 chassis, TVI trap; Crosley Model 9-101, oscillator coil trouble; R.C.A. Q109, defective 6F6G tubes; Stromberg- Carlson 1101H Series, distortion and frying noise; Meck Radio Model 5C5, hum; High gain amplifier, cathode hum; An unusual case of wheel static; Emerson 547A, hum at high volume	
New Products	25

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TRADE FLASHES

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

RCA To Explore U-H-F TV

Plans for a new exploration of radio frequencies above 500 megacycles, as a medium for the expansion of television broadcasting, were announced as RCA applied for the necessary FCC license. To quote Dr. C. B. Jolliffe, Executive Vice President in charge of RCA Laboratories, "Results of the tests should provide further information on the problems involved in the development of television on frequencies above 500 megacycles, and if successful will be a major contribution to the expansion of this service to the public".

Hytron August Contest Winner

First prize in the August Hytron Servicemen's Contest was awarded to Douglas T. Sweeny, 310 West Union Avenue, Bound Brook, New Jersey. Mr. Sweeny is a radio serviceman of



long standing, and like many others of his profession served his country during the war. He saw considerable action during the 43 months he spent in the U. S. Navy as a Chief Aviation Radio Technician.

2,000,000 TV Sets For 1949

Predicting a television receiver industry-wide business in 1949 of \$330,000,000 at the factory and the sale of approximately 1,600,000 units, Ernest H. Vogel, manager of marketing, Electronics Department, General Electric Company, yesterday said that if picture tubes can be made available the sale of television sets may even reach 2,000,000.

RMA Silver Anniversary

A gala radio industry celebration is planned in Chicago during the week of May 15, 1949, combining the 25th RMA "Silver Anniversary" convention and the annual Radio Parts In-

dustry Trade Show. The Stevens Hotel will be largely taken over for the joint industry program marking the founding of RMA in 1924 and the annual Parts Trade Show. An elaborate "Silver Anniversary" industry banquet will climax the celebration on Thursday evening, May 19, in the Stevens Hotel Grand Ballroom.

New Rider P-A Manual

John F. Rider, Pub., announces the new "Rider Public Address Equipment Manual" Volume 1. Currently available at all Rider jobbers, the new manual contains 2024 fact-packed pages, the servicing data of 147-p-a equipment manufacturers. It embraces a ten year span—1938 to date. This volume, bound in the standard Rider looseleaf binder is compiled alphabetically. An added extra is a "How it Works" book, which describes the special circuitry found in various p-a systems. The accompanying index complete with references makes each page readily available.

Association News

ARSNY is going great guns in its TV Training Program for its members. The first meeting was sponsored by John F. Rider, Publishers; the second by the Delehanty Institute; the third by Howard W. Sams & Co., Inc. The fourth meeting, scheduled for Dec. 1, is sponsored by the Westinghouse Electric Corp., and the topic will be "Horizontal and Vertical Synch Circuits."

Philco Trains TV Servicemen

Philco Corporation and 43 of its distributors in "television cities" have provided thorough training courses in television installation, maintenance and repair to more than 5000 servicemen, it was announced by James M. Skinner, Jr., Vice President—Service and Parts Division.

Crosley Ties In With CCC

Crosley Division of AVCO Manufacturing Corporation today announced the completion of a national arrangement with Commercial Credit Company covering installment sales of its products through Crosley dealers.

Admiral Produces Millionth R.P. Unit

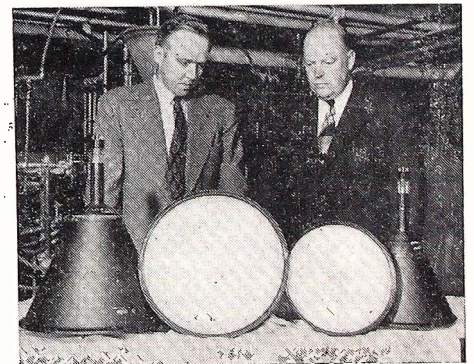
Production of their one-millionth record player unit since the end of World War II was announced today by Admiral Corporation, manufacturer of radio-phonographs with automatic record changers.

Clarostat Moves To Dover, N. H.

At the new location, reports Victor Mucher, the president, Clarostat occupies a five-story brick plant over a block long. Offices, plant and warehousing will be under one roof for maximum efficiency and economy. The plant building, is entirely modernized with up-to-date illumination, fire sprinkler system, and in part with air conditioning.

Dumont Displays Metal Tubes

The Allen B. Du Mont Laboratories, Inc., introduced their line of metal cathode ray picture tubes at a special



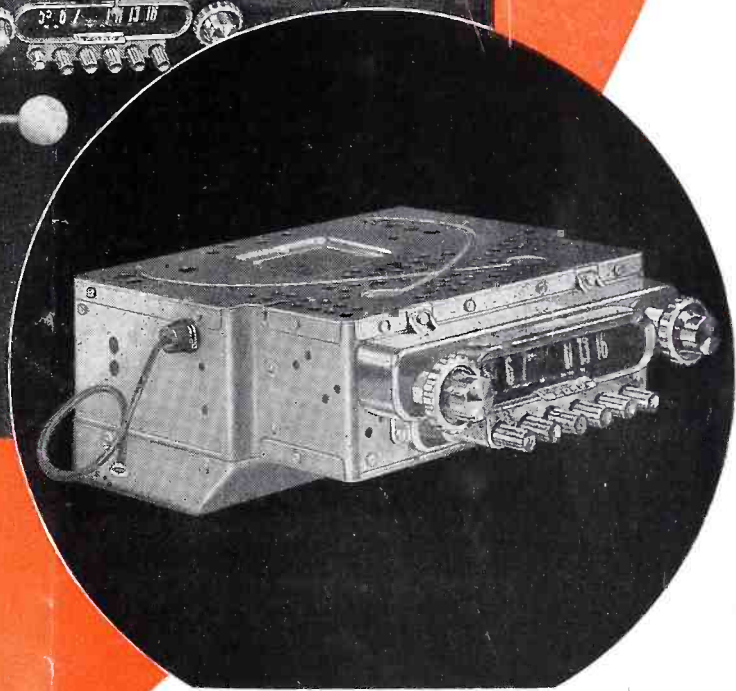
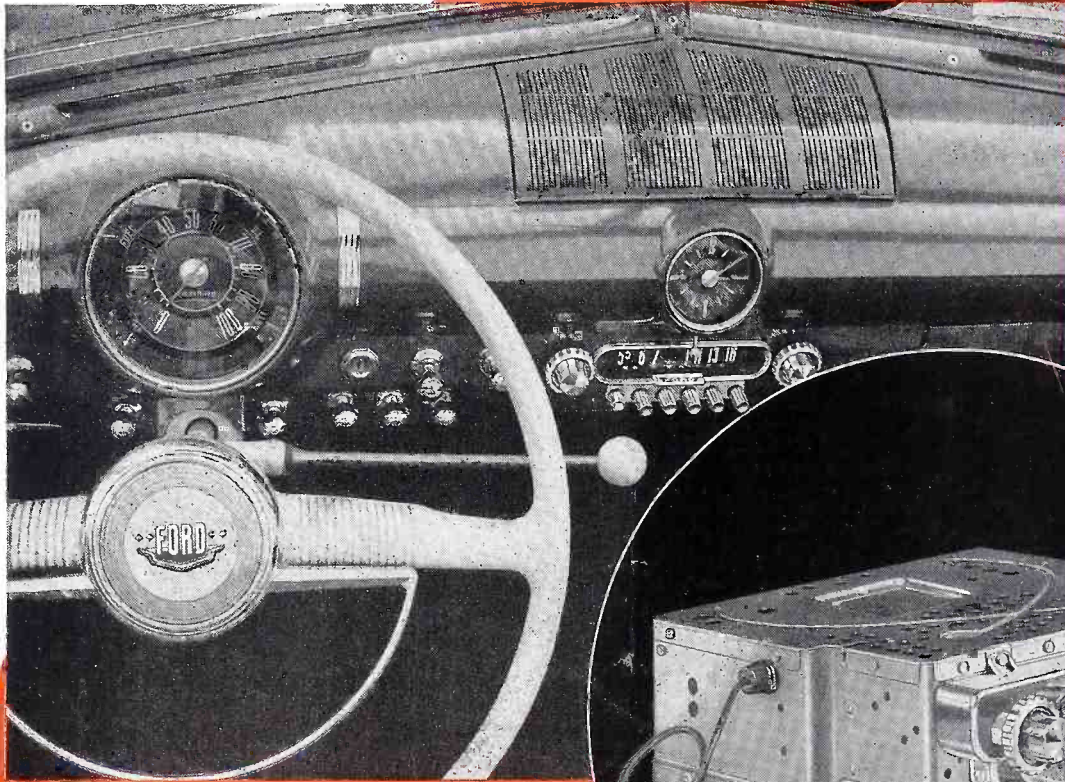
preview held at the Hotel Pierre in N. Y. C. On display at the showing, which included four new Du Mont receiver models, incorporating the new type tube, was a special table exhibit of 12" and 16" tubes.

New Miniature Tube Applications

How miniature electronic and radio equipments have been designed to provide the needs of new applications where compactness and light weight are mandatory was the subject of a paper delivered to the Rochester Fall Meeting of members of the Institute of Radio Engineers and the Radio Manufacturers Association here recently by R. K. McClintock, assistant to the chief engineer of Sylvania Electric Products Inc., Emporium, Pa.

An example of electronic miniaturization cited by him included an in-

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.

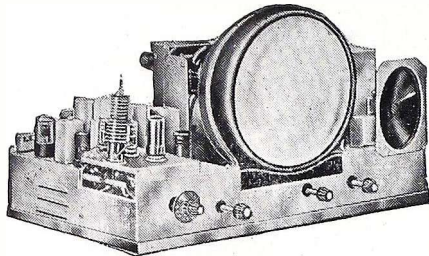
MAIN OFFICE: SALEM, MASSACHUSETTS



TRANSVISION



NEW Television Kits, and Equipment Important Advances in TV Reception and Servicing!



MODEL 10A TV KIT

NEW 10" TV KIT at amazingly LOW PRICE!

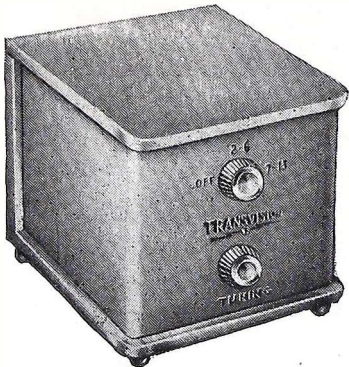
The new Transvision Model 10A electromagnetic TV Kit gives a bright, stable 52 sq. in. picture, has 10" picture tube, and **CONTINUOUS TUNING** on all 12 channels. Its high sensitivity makes for improved long-distance reception; especially good on high channels. Complete with all-channel double-folded dipole antenna and 60 ft. of lead-in wire.

MODEL 10A TV KIT, less cabinet.....Net \$199.00
MODEL 12A TV KIT, same as above,
but has a 12" picture tube.....Net \$263.00

New Streamlined Cabinets

for Transvision Model 10A or 12A TV Kit. Made of select grain walnut with beautifully rubbed finish. Fully drilled, ready for installation of assembled receiver.

Walnut Cabinet for 10A or 12A
(Specify)Net \$44.95
Mahogany and Blonde slightly higher.



ALL-CHANNEL BOOSTER

Transvision All-Channel Television Booster...

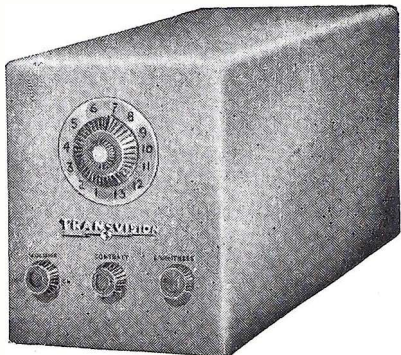
To assure television reception in weak signal areas, or areas which are out of range of certain broadcast stations, Transvision engineers have designed this new booster. It increases signal strength on all television channels. Tunes all television channels continuously. Can be used with any type of television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

Model B-1List \$44.95

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 cabinetNet \$65.00

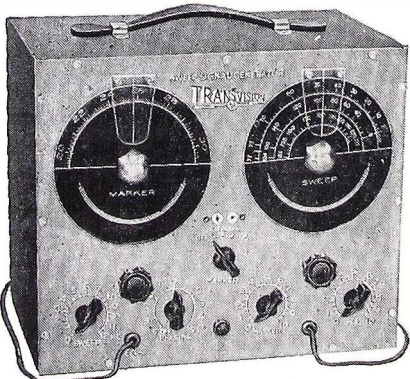


REMOTE CONTROL UNIT KIT

New... Transvision Sweep Signal Generator for Television and FM

OUTSTANDING FEATURES: (1) Frequency range from: 0-227 MC. . . . (2) Dial calibrated in frequency . . . (3) Sweep width from 0-12 MC completely variable. . . . (4) Self-contained markers readable directly on the dial to .5% or better. (No external generator required to provide the marker signals). . . . (5) Crystal controlled output makes possible any crystal controlled frequency from 5-230 MC. . . . (6) Plenty of voltage output—permits stage-by-stage alignment. . . . (7) Output impedance 5-125 ohms. . . . (8) Directly calibrated markers, 20-30 MC for trap, sound and video IF alignment. . . . (9) RF for alignment of traps for IF channels when a DC volt meter is used as the indicating medium. . . . (10) Unmodulated RF signal to provide marker pips simultaneously with the main variable oscillator. . . . (11) Markers can be controlled as to output strength in the pip oscillator. . . . (12) Power supply completely shielded and filtered to prevent leakage. . . . (13) All active tubes are the new modern miniature type. . . . (14) Phasing control incorporated in the generator.

MODEL No. SG..... Net \$99.50



SWEEP SIGNAL GENERATOR

Radiomen . . . You Can Get Into the
TELEVISION BUSINESS
In a **BIG WAY** with the
TRANSVISION DEALER PLAN
Write for Folder D-1

NEW 8-PAGE CATALOG of Transvision line available at your distributor, or write to:
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

strument probe for radio service use capable of measuring voltages up to 300 at frequencies up to 300 million cycles per second by virtue of sub-miniature tube.

Oder F. Jester Joins Ross Mfg. Co.

K. B. Ross, President of Ross Manufacturing Co., at 2241 S. Indiana Ave., Chicago, Illinois, announced



the appointment of Oden F. Jester as General Sales Manager, October 4th, 1948.

Catalogs

Lafayette-Concord Radio, 1949 catalog No. 89; 100 Sixth Ave., New York City. Allied Radio, 1949 catalog No. 117; 833 West Jackson Blvd., Chicago 7, Ill. Transvision Inc., catalog No. 8A; New Rochelle, N.Y.

New Dual-Purpose Phono Needle

The development and production of a new nylon "knee action" phonograph needle known as the "Tandem-Tip", which plays both the conventional and micro-groove records, has been announced by Webster-Chicago.

Fry Appointed Stancor Rep.

William E. Fry, Kansas City, Missouri, has been appointed distributor sales representative in Iowa, Nebraska, Kansas and Missouri, excluding St. Louis, for Standard Transformer Corporation, Chicago, according to an announcement by James M. Blackledge, vice president in charge of sales.

Radio Most Popular GI Course

Radio and other forms of communication are the most popular subjects among World War II veterans taking correspondence courses under the G.I. Bill, Veterans Administration said.

Zenith Trains TV Men

Service managers from thirty distributors located in twenty-five active
[Continued on page 28]

GI Leads Again



MODEL DM—Compact low cost 2 pole, shaded pole motor designed for portables, table models and other instruments in which space is an important factor. Simple speed change mechanism incorporates a special long-lasting molded neoprene belt.

MODEL DR—Deluxe model 4 pole, shaded pole motor for use in all high-grade instruments in which the ultimate in performance is desired. Novel speed change mechanism is both simple and positive in operation.

with **TWO** rim drive DUAL SPEED PHONOMOTORS for BOTH 33 $\frac{1}{3}$ and 78 R. P. M. Records

● The new long-playing microgroove records are here. Their enthusiastic reception proves that your 1949 customers will want, *and demand*, dual speed phonographs—operating at 33 $\frac{1}{3}$ R.P.M. for the new records, and at 78 R.P.M. for their existing record collections.

Only General Industries gives you a choice of TWO great new rim drive dual speed phonomotors to meet this profitable market. Built with the same precision that distinguishes all GI products, these dependable rim drive dual speed motors have been thoroughly tested under all operating conditions.

NOW is the time to get complete information about prices and delivery of GI phonomotors, engineered and designed expressly for this newest development in the record industry. Write *today* to:



The GENERAL INDUSTRIES Co.

DEPT. K • ELYRIA, OHIO

Field Findings

A resume of Industry happenings here, there and everywhere

Oppose New Radio Outlets

OUR friendly contemporary, "Radio & TV Weekly", in its Oct. 29th manufacturer who opines there is need for many new retail radio outlets. The "Weekly" mentions that a woman's specialty apparel store has just started to retail a receiver line and cites this as being a typical example of what is a "good, new type radio dealer". We editorial, supports a large receiver strongly take just the opposite view.

Scattered around the country are thousands of tiny merchandising outlets that carry radio sets as a side-line. For example, there are small hardware, drug, jewelry, toy and novelty stores, bicycle shops and garages, etc., all having a few extremely cheap, unknown or third-rate private brand lines of radios for sale. In the aggregate, over a period of time, such outlets sell but a small percentage of sets compared to the total annual output of well-known name brands. Most of the sets they sell are so inferior in every respect that the purchaser would have been better off with no set at all. Our own records show most of these "junk sets" were manufactured by "loft" or unlicensed manufacturers, using substandard components and tubes. They are priced so low that when they do break down no legitimate technician can get a proper fee for making necessary repairs. All in all, the set owner seldom blames himself or the dealer for having been bilked, instead, he prefers to vent his spleen on repairmen, charging them with being gyps who want to take unfair advantage of the situation. I know of technicians who have spent a week trying to obtain schematics alone for such mongrel sets, never expecting to be able to make a proper profit on the job, but just hoping to be able to oblige a friend or customer, yet inevitably winding up "holding the bag" and being tagged a gyp when he finally did get the set perking.

Price Controls

If now, to add to the confusion, it is suggested that apparel shops should sell radios along with dresses, how can one with the best interests of the

by S. R. COWAN

long-established radio retail and service outlets support such a proposal? I for one cannot!

Are established radio Retailers and Service Dealers (retailers who operate their own service departments) supposed to start selling dresses to offset the sales they ostensibly will lose to apparel shops? Of course not! Radio dealers are having troubles enough now trying to move their quota of receivers, taken on a franchise basis. Many franchises are too stringent and require a tremendous investment. Some are so bad that dealers find themselves overextended with inventory. Consequently some dealers resort to cut-prices on the Q.T. hoping to maintain the required four-times-a-year turnover necessary for proper business operation.

Time For Housecleaning

It is about time the radio set manufacturing end of the radio industry took stock of conditions in the field as a whole; not alone in regard to their own particular position in it. What about RMA? That's the body who should make the study. And from the tail-end of the industry, we might make a few observations worthy of consideration.

First, a serious attempt should be made to eliminate entirely all unlicensed and "loft" type receiver manufacturers. Second, the well-established and legitimate radio outlets (whether retailers, service dealers or pure service organizations) should be given much more direct-from-manufacturer cooperation and sales guidance.

In respect to the latter thought, a new system of franchising might be in order. For example, many radio organizations that now are forced to

[Continued on page 36]



"And this is the phonograph a-er, so that's where you do your loafing, Phenigan?"

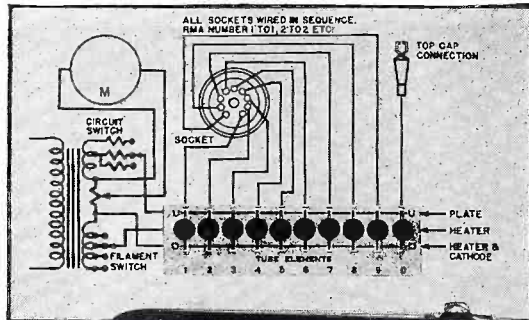
Tube Testers for Today and Tomorrow...

SPECIFY
TRIPLETT

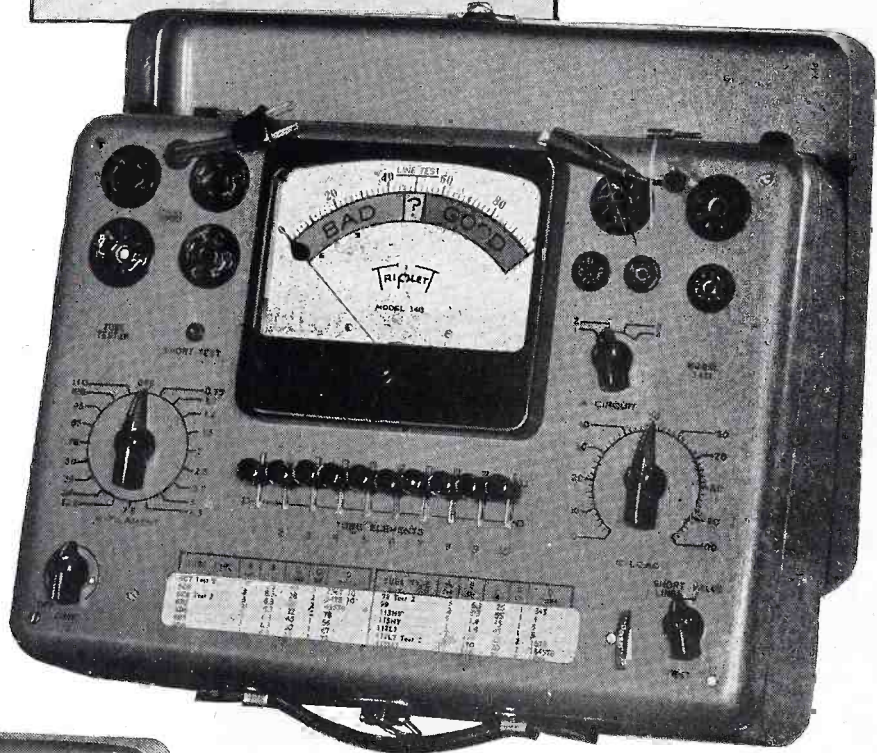
**UP
and
DOWN**

Lever Switching Connects Each Tube Pin to Proper Circuit

1. **ALL ELEMENT CHECK** — Thorough conclusive test of tube elements, shields and taps. The only commercial tester to get at each tube pin and make an open and short check.
2. **NO HUNTING FOR SOCKETS** — No plugging into wrong socket. Circuit flexibility requires only one socket for each type of tube base.
3. **CIRCUIT CLARITY** — Lever switch numbering corresponds to RMA tube pin numbers, connected to bring out each active tube element. A simple up or down motion of the lever instantly makes the connection.
4. **OPERATION SIMPLICITY** — Minimum of control settings plus straightforward arrangement of this outstanding emission circuit. Generally not more than five of the 10 lever switches need be set.
5. **"PICTURE" YOUR CIRCUIT** — Assures confidence in tests and enables special tube checks for balanced circuits, special loads, etc. "Trick" switching circuits make it more difficult for the serviceman to "picture" his test circuit.
6. **SET UP YOUR OWN TEST FOR NEW TUBES** — The "pictured" circuit and straightforward test procedures enable the user to set up data for new tubes. A feature rarely found in commercial type tube testers.
7. **INDIVIDUAL CONTROL FOR EACH TUBE ELEMENT** — Takes care of roaming elements, dual cathode structures, multi-purpose tubes, etc., in addition to standard value tests.



TUBE TESTER MODEL 3413
Triplet lever switching circuit arrangement has 7 distinct advantages contributing to maximum flexibility, simplicity of operation and anti-obsolence.
NET DEALER \$66.75 PRICE



**... Combination
Volt-Ohm-Mil-Ammeter Model 3480**

This tester combines the Tube Tester Model 3413 with complete facilities for voltage current and resistance analyses . . . a real economy for those shops requiring a combination tube tester and volt-ohm-mil-ammeter . . . Attractive two tone metal case with detachable hinged cover . . .

TECH DATA

D. C. Volts: 0-3-12-60-300-1200, at 10,000 Ohms/Volt.
A. C. Volts: 0-3-12-60-300-1200, at 2,000 Ohms/Volt.
D. C. Amps: 0-12, at 250 Millivolts.
D. C. Milliamps: 0-1.2-12-120, at 250 Millivolts.
Ohms: 0-1000-10,000 (10-100 at center scale).
Megohms: 0-1.50 (10,000-500,000 Ohms center scale).
Output: Output Jacks, Condenser in series with A. C. Volt ranges.
Scale: 5.6" long on top scale arc. 0-1000 Ohms and 0-50 Megohms on top arc. 0-12-60-300 A. C. and D. C. Volt figures are on four separate arcs. Scale markings are black on white except A. C. are red on white; 0-1K Ohms scale is green on white.



MODEL 3480 **\$98.75** . . . U.S.A. Dealer Net

SEE AT YOUR RADIO PARTS DISTRIBUTOR OR FOR MORE INFORMATION . . . WRITE

TRIPLETT ELECTRICAL INSTRUMENT COMPANY • BLUFFTON, OHIO, U.S.A.

In Canada: Triplett Instruments of Canada, Georgetown, Ontario



The "TOP" Name In Automobile
Aerials Now Brings You The
"TOPS" In
TV and FM ANTENNAS

Radiart

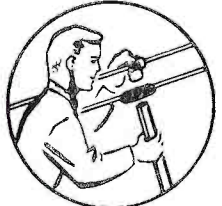


"Simpli-Flex"

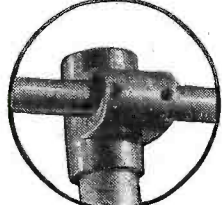
TELEVISION and FM ANTENNAS

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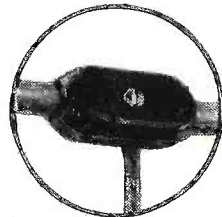
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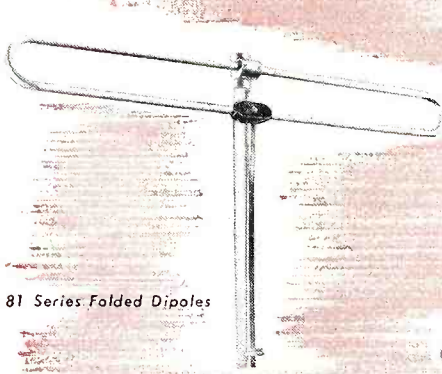
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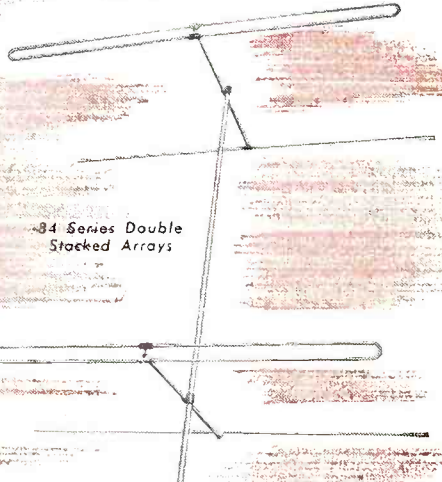
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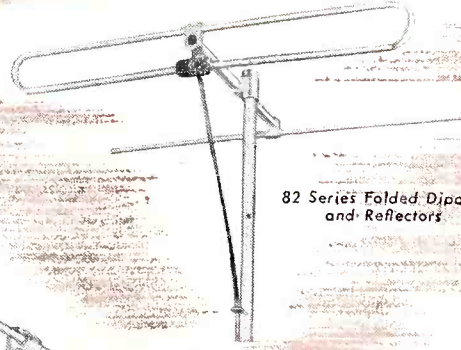
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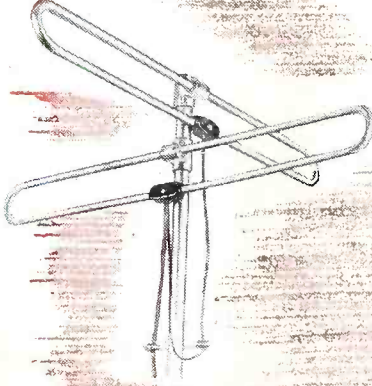
81 Series Folded Dipoles



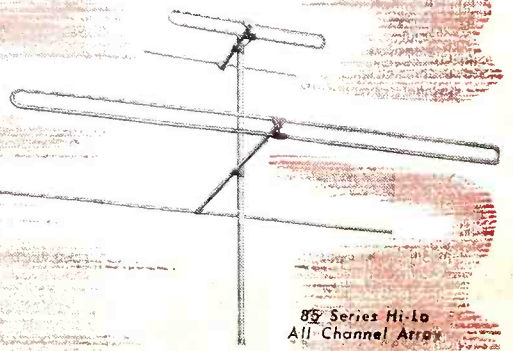
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Manufacturers of the Famous "Red Seal" Vibrators

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Checking

VIDEO & SYNCH WAVEFORMS Using a CRO

by SAMUEL MARSHALL

PART I

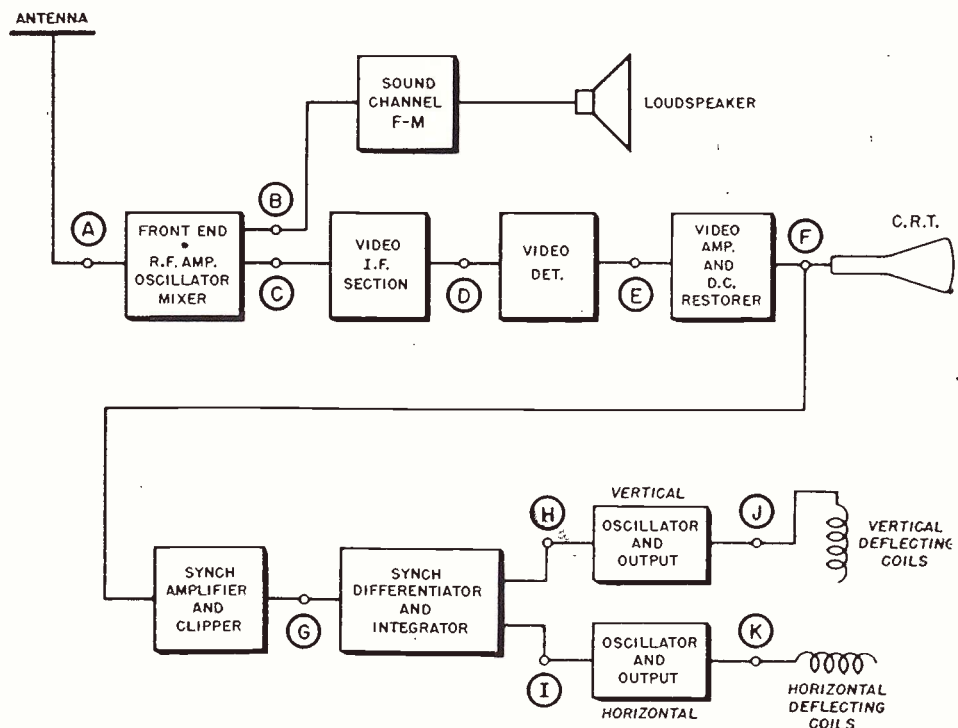
Describing a method of servicing the video and synch circuits of TV receivers using a CRO. This is the lecture that Mr. Cowan delivered recently while on tour

SPEED in servicing depends on how quickly a radioman can recognize the symptoms that appear or occur in defective receivers. These symptoms appeal to all of our five senses, namely of sight, smell, touch, taste, and hearing.

Thus, a receiver that hums affects our sense of hearing, and generally indicates to us, because of previous similar experiences, an open filter. In the same manner, a receiver that has a tarry odor affects our sense of smell and usually indicates a defective power transformer. We can go on enumerating case after case of defects occurring in receivers—each one producing its own particular symptom—and each symptom revealing to us where the trouble lies.

Now, this process is nothing more than an application of the natural laws of memory, particularly those referring to cause and effect, except that in radio repairing we first observe the effect, on the basis of which we can generally guess the cause. Naturally, the more experience we have, the easier it becomes for us to connect certain effects and their causes.

All this is particularly true in television work. Being a comparatively new development, very few men have been able to build up a stockpile of TV experiences which would enable them to tell at a moment's glance what is wrong with a particular receiver. For this reason the sincere technician, the fellow who really wants to



BASIC BLOCK DIAGRAM OF TV RECEIVER USING ELECTROMAGNETIC DEFLECTION

Fig. 1—This block diagram does not refer to "Intercarrier TV" receivers.

make a career of television, must do two things, and do them quickly. First, he must find out all there is to know about television, both theoretically and practically. Second, he must learn how to use and apply all of the different types of test instruments necessary in the testing and

adjusting of TV receivers. Naturally, as time goes on, and as he builds up his own stockpile of experiences, he will begin to depend less and less on these instruments and more and more on his experience.

Along these lines, one of the most useful pieces of equipment at the dis-

posal of the TV technician is the cathode ray oscilloscope. With this instrument he can actually observe the progress of the various components contained in the TV signal as it proceeds from stage to stage. As we shall soon see, the waveforms corresponding to these components vary considerably throughout the receiver. So, if we know beforehand, what these waveforms should look like, any variations along the line can easily be detected.

It therefore becomes a matter of learning what these waveforms look like, and how to connect up the cathode ray oscilloscope to the receiver so that the waveforms present can be observed. Once this technique is mastered the CRO will be found a very powerful tool in tracing down troubles in TV receivers.

Block Diagram Discussion

This brings us into the main theme of this article, that is, the measurement and interpretation of the video and synch waveforms appearing at various key points in a TV receiver.

For purposes of clarification let us first review the basic operating principles of a TV receiver, and follow the progress of the waveform of the incoming signal as it enters and leaves each section. In *Fig. 1* we illustrate a simple block diagram of a typical TV receiver. It consists of the following sections:

First, a *Front End* which comprises the radio frequency amplifier, the oscillator, and the mixer. The signal from the antenna enters the front end at point *A* at the frequencies contained within the channel to which it is assigned. Thus a station assigned to channel 2 contains carrier and sideband frequencies between 54 and 60 megacycles.

Fig. 2 shows a more detailed view of the front end and the waveshapes associated with it. Notice the wave-

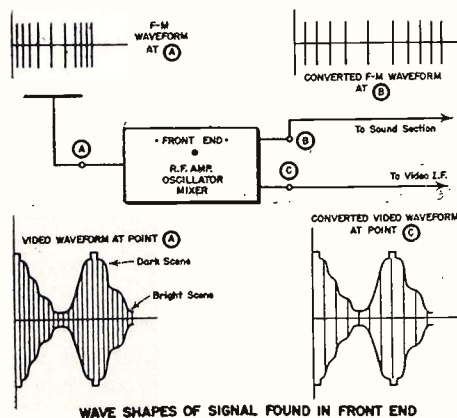


Fig. 2—AM and FM waveshapes

shapes of the incoming signal at *A* and the converted output signal waveshapes at *B* and *C*. At *A* the incoming signal contains two carriers and their sidebands, the FM and the video. Notice that the FM waveshape has a constant amplitude and a varying frequency. On the other hand the video waveshape has a varying amplitude and a constant carrier frequency.

An interesting point with respect to the video waveshape is that all synch pulses reach the same amplitude. The video portion of the signal, on the other hand, varies in amplitude according to negative transmission principles, that is, bright scenes have a low amplitude and dark scenes a high amplitude.

In the converted signal both FM and video signals have new carrier frequencies, the values of which are the i-f frequencies of the receiver. These frequencies being lower than the r-f, the wavelengths are wider as can be readily seen in the figure.

The FM section in most TV receivers is conventional and differs only

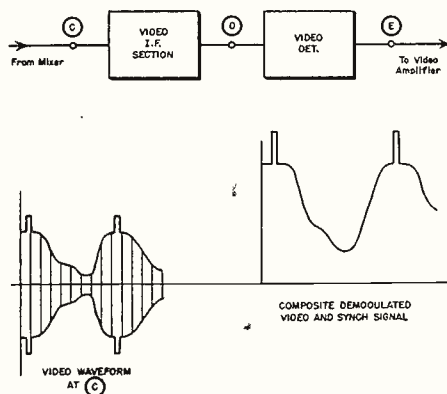


Fig. 3—Video i.f. det. waveshapes

from that in an ordinary FM receiver by the maximum deviation frequency being 25 kc instead of 75 kc which is standard for FM. We will not elaborate on the FM section of the receiver for this reason.

Returning now to *Fig. 1* we notice that the video output of the front end enters the video i-f section at *C*. This section is primarily concerned with the video picture signal and corresponds to the i-f section of a broadcast receiver. The output of this section feeds into a video detector. *Fig. 3* illustrates these sections in greater detail.

The i-f section contains the various video i-f amplifiers and sound traps. The signal entering this section is the video i-f coming out of the mixer. The signal leaving the section at point *E* is the detected video output which contains the demodulated video picture signal and synch pulses.

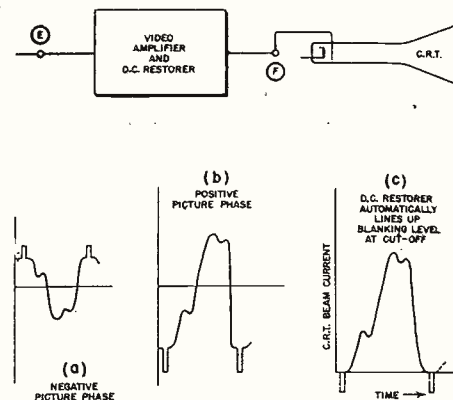


Fig. 4—Video amplifier waveshapes

Referring again to *Fig. 1* we notice that the detected video and synch signal is fed into a fourth section which contains the video amplifier stage or stages, and the d-c restorer. The output of this section at point *F* divides into two paths, the first leading into the picture tube where the video and synch signal is converted into corresponding light variations, and the second into the horizontal and vertical synch amplifier and sweep sections. These will be discussed shortly in greater detail.

Fig. 4 illustrates the input and output waveforms of the video amplifier. Notice that the input signal curve (a) is essentially alternating current and that the picture phase, in this case, is negative. A negative picture phase simply means that bright scenes drive the signal negative and dark scenes drive it positive. The output of the video amplifier, if connected directly to the grid of the cathode ray tube must have a positive picture phase, or one in which the bright scenes drive the signal positive. This is shown in curve (b). Observe that the signal is still a.c.

In curve (c) we observe that the signal is no longer a.c. but a pulsating d.c., and that the synch pulses drive the beam current in the picture tube to cut-off. This is accomplished by the d-c restorer circuit.

Synch Circuits

As mentioned previously the output of the video amplifier divides into two paths. We have just completed a discussion of the action along the first path. The second path which we will now discuss is concerned with the video and synch signal as it proceeds through a string of horizontal and vertical synch circuits.

We again refer to *Fig. 1* and observe that a portion of the video signal at *F* is fed into the synch section. Notice that the output of this section is fed

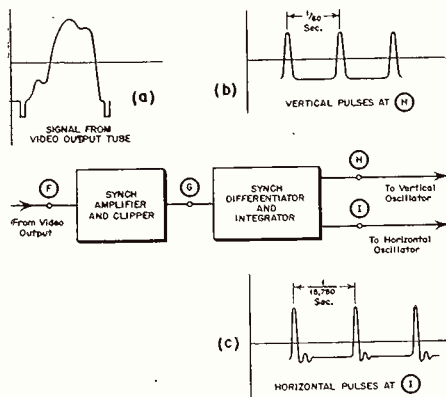


Fig. 5—Synch circuit waveforms

into separate vertical and horizontal circuits at *H* and *I*.

We now refer to *Fig. 5* for a more detailed explanation of this circuit.

Contained in this section we find a number of different types of circuits. The first is a synch amplifier. The second is a synch separator or clipper, the purpose of which is to reproduce the synch pulses in the output circuit and at the same time to attenuate all video picture components. Its effect can be compared to a peak voltage operating device.

The output of the synch separator is fed into a second amplifier which contains an integrator circuit for the passage of the vertical pulses and the attenuation of the horizontal; and a differentiator for the passage of the horizontal pulses and the attenuation of the vertical.

Now, we have assumed a certain sequence of circuits in our explanation which is not necessarily followed in all receivers. However, for purposes of explanation we have chosen this particular sequence with the understanding that of course some variations from it do exist.

Referring again to *Fig. 5* again we notice that at *F* the signal input shown in (a) contains synch pulses and video picture energy. As explained previously, the video picture component is removed by the clipper. This action combined with the action of the integrating circuit results in a pure vertical pulse appearing at *H*. Likewise, the clipper action combined with the action of the differentiating circuit results in a pure horizontal pulse appearing at *I*. These pulses are shown in waveshapes (b) and (c) respectively.

We are now ready to trigger the oscillators which are located in the next section. Referring again to *Fig. 1* it can be seen that the output of the vertical integrating circuit at *H* feeds into the vertical oscillator and output section. The output of this section, shown at *J*, in turn feeds in-

to the vertical deflecting coils of the picture tube.

We can now refer to *Fig. 6*. Here we have a more detailed view of the vertical sweep section. The action that takes place here begins with the signal pulse which triggers or discharges the vertical oscillator which operates at a frequency approximately equal to that of the incoming pulse. The latter makes this frequency exact with respect to the station being received. The output of the oscillator is fed into a suitable RC discharge circuit which develops the correct waveform required at this point. This signal is then fed into an output tube, the plate circuit of which is connected to the primary of a step-down transformer. The secondary of this transformer connects across the vertical deflecting coils of the picture tube.

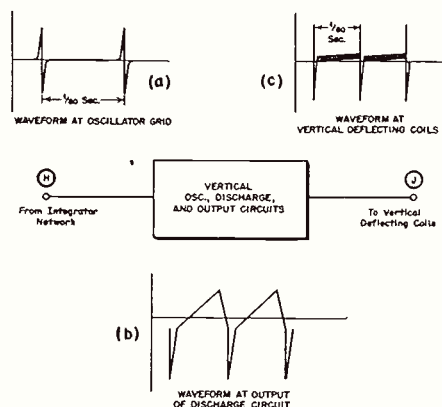


Fig. 3—Video i-f det. waveshapes

Deflecting Coil Waveform

At this point it must be remembered that in an electromagnetically deflected cathode ray tube the electron stream is deflected by the *current* in the coil. Thus, a saw-tooth *current* waveform in a deflecting coil will result in a linear sweep of the beam.

Referring again to *Fig. 6*, notice the different types of waveshapes that are developed in this section. In waveshape (b) which appears at the output of the discharge circuit we have a combination wave produced by the saw-tooth action of a condenser and the instantaneous action of a resistor. This type of wave is necessary in order to produce the voltage waveshape (c) across the vertical deflecting coils. It is in this manner that the effects of both resistance and inductance are taken into consideration in producing the required saw-tooth current wave through the coils.

We are now ready to proceed into the next section, which is the horizontal sweep unit. Again we refer to *Fig. 1* in order to identify its position in the over-all layout of the receiver.

Notice that the output of the horizontal differentiator circuit feeds into the horizontal sweep section at point *I*.

Referring now to *Fig. 7* we notice that this section contains circuits which are almost identical with those found in the vertical sweep section. The first point of similarity is the oscillator. The incoming horizontal pulses trigger this oscillator to the exact frequency of the station being received. The output of the oscillator is then fed into a horizontal discharge circuit where the proper waveshape of the signal is developed. This wave is then fed into a horizontal output tube. Connected between this tube and the horizontal deflecting coils we find, as in the vertical circuit, an impedance matching transformer which transfers the energy from the plate circuit of the horizontal output tube to the horizontal deflecting coils of the picture tube.

In this figure we discover an additional circuit which is not present in the vertical section. This circuit, called a damper, contains a rectifier tube, the purpose of which is to damp out the high-frequency, high-voltage transients that are induced in the secondary winding of the horizontal transformer during a portion of the retrace period.

Remember that the horizontal trace frequency is pretty high—15,750 cycles per second; but the retrace frequency is much higher—around 75,000 cycles per second. For this reason the order of magnitude of the voltages induced is pretty high, in the order of many thousand volts. During a portion of this retrace period the horizontal damper tube is conductive and prevents these transients from disrupting the sweep cycle. Notice the waveshapes that appear in this section. Waveshape (a) is the pulse that is injected into the horizontal oscillator. Waveshape (b) is the combination

[Continued on page 39]

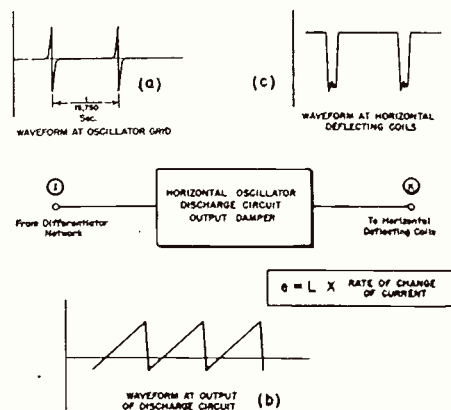


Fig. 7—Horizontal synch waveforms

MAGNETIC

MOST articles on magnetic recording start with a credit line for that man, Poulsen, who first discovered that magnetic impressions could be placed on a steel tape in a controlled sequence, corresponding to sound waves, and that these impressions could be recovered in the form of sound. Although Poulsen patented his invention back in 1898, the handicaps in his path prevented him from reaping the benefits of his remarkable discovery. It was not until the late twenties that the development of new steel alloys, and the advent of electronic means of amplification made his work of more than academic interest.

Development work continued, in foreign countries, as well as in the United States, but it took World War II to excite the public to an appreciation of the possibilities of this new-old art. Along about that time, reports circulated about a wire recorder which was used to obtain important information, or to record eye-witness accounts of vital war operations.

Probably the first wire recorder to be offered to the public, in this country, was a civilian version of the one used by the army. This early model was very disappointing to those who had been led to expect disc-recording quality from the very start.

But a start had been made, and the market was wide open. Other, better recorders appeared, and the advertising writers, as usual, were two claims ahead of the engineers. In fact, the designers of wire recording equipment were goaded on to greater efforts by advertisements describing the very products they were turning out.

Steel companies came up with better alloys, developed especially for magnetic recording. Chemists evolved new types of ferrous powders, and these latter were coated onto paper and plastic ribbons, to give us yet another version of the art: Magnetic tape recording.

At this writing, there are some fifteen magnetic recorders on the market. They range from a simple, portable unit to an elaborate, precision device, costing over \$3000.00

Radio servicemen, to whom this

Beginning a series of articles on the principles and servicing problems of magnetic recording. In this first installment the author explains the fundamental operation of this device in language understandable to all.

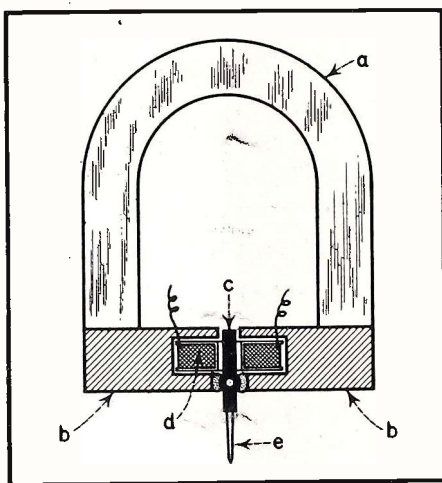


Fig. 1—Disc recording head.

article is directed, are not likely to be called upon to repair any of the super-glamour jobs, but many of the others will find their way into service shops. So, let's start from scratch and see what makes them tick.

Wire vs. Disc Recorders

First of all, we'll get a better perspective of wire recorders if we can compare them from time to time to something already well known, such as a disc recorder.

Starting from the front end, we have the microphone, the amplifier, and the recording head. Up to here the disc and the magnetic recorders are alike. As can be seen from Fig. 1, the disc-recording head is a device in which an audio signal, passing through a coil, causes a lateral motion of an armature, by magnetic attraction. This armature terminates in a recording needle, the cutting edge of which is in contact with the smooth surface of the revolving blank disc. As a thin thread is removed from the disc, a "V"-shaped groove remains. If the cutting needle has been wiggling from side to side, the resulting groove contains snake-like

undulations, corresponding to the audio signal which caused the needle to wiggle. This much we can see with the naked eye. Although we cannot sense the audible sound contained in the groove, a playback needle can do this very nicely.

Keep this picture of the disc-recording head, and its wiggly groove, in front of you while we study the recording head of a modern wire recorder. We notice, firstly, that there is no needle, nor any place to put one. Fig. 2 gives us a layout of the innards of this unit, so we won't be tempted to open the first one that comes into the shop.

We find that there are no moving parts, and we get a let-down, because the darn thing looks more like a transformer than like a recording head. There is the winding, and the laminated core, but that tapered gap doesn't look natural in a transformer. In fact, it's the gap that makes it a magnetic recorder. The gap is only a few thousandths of an inch wide, and it is plugged with mica, or copper alloy, to keep other things out.

Looking back at Fig. 1, of the disc-recording head, we find that the pole-pieces are extensions of a powerful permanent magnet. Placed in the gap

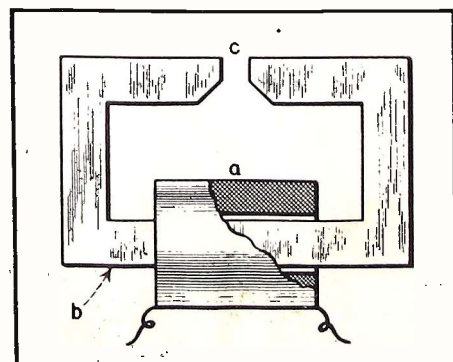


Fig. 2—Basic wire recording head showing coil and gap.

RECORDING

by ARTHUR SILVERBERG

●
PART I
●

between the poles is the soft iron armature, balanced midway in space by the equal magnetic pull of the two poles. An audio signal, passing through the voice coil, causes momentary cancellation of the magnetic attraction of alternate poles on the iron armature, allowing it to be swayed laterally from one pole-piece to the other. Since the recording needle is attached to the bottom of the armature, it goes along for the ride.

If we could see the magnetic disturbance going on in the magnetic gap, it would look like a thousand tug-of-wars, trying to pull the poor armature apart.

See anything in the wire recording head which resembles that of the disc recorder? That's right, the magnetic gap. But where is the armature? Oh yes, we said there were no moving parts. It looks as if we've been short-changed, but rest assured, everything we need is right in front of us. The wire on which we expect to record is going to become the armature in this new-fangled gadget.

Let's put a cover on it and look at it again. It resembles *Fig. 3*. We see a horizontal "V"-shaped slot across one side of the unit. Near the center of this slot are two shiny, metallic surfaces, containing vertical cracks. For the time being, let's disregard the right-hand crack. We'll come back

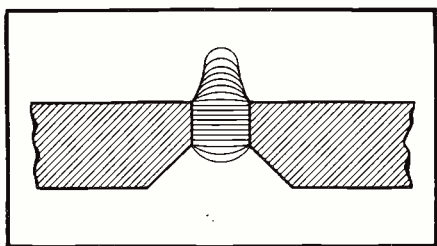


Fig. 4—Pin-point magnetic field across gap of wire recording head

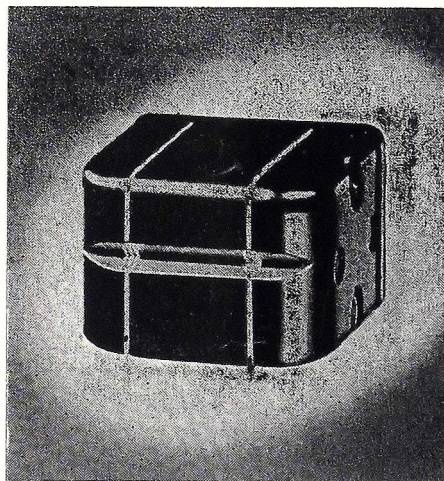


Fig. 3—Wire recording head by Shure

to it later. The remaining one is the gap we saw in *Fig. 2*.

The coil in this unit corresponds to the voice coil we discussed in the disc-recording head. Here, too, the audio currents cause magnetic lines of force to flow into the gap. But our gap is now exceedingly small, and the magnetic flux spills over beyond the pole-pieces, creating a hair-pin shaped magnetic field. See *Fig. 4*.

We draw a length of recording wire across this magnetic field and it becomes magnetized. Originally, it was uniformly devoid of magnetism, as in *Fig. 5*. Now it is uniformly full of it, as in *Fig. 6*. Suppose, now, we draw another piece of wire across the gap, but this time we introduce into the coil an audio signal, modulated with voice frequencies. This second wire is no longer uniformly magnetized. It now contains a variable magnetic pattern, as shown in *Fig. 7*, corresponding to the pattern of the voice signal in the coil. Brother, we've been wire recording!

The action going on in our magnetic recorder is very different from that happening in the disc-recorder,

yet, there is this similarity: we've converted audible sound into an inaudible pattern of magnetic disturbance. The real difference between the two methods is, that while in the disc-recorder the magnetic phenomenon was merely a means to an end, in the wire recorder, the magnetic image is the whole works.

Erasing

The above description of the principles of magnetic recording has been made purposely elementary, and is not intended as an insult to our intelligence. The rest of this will be easier to give and take, because of what has gone before.

Let's turn back to *Fig. 3*, and that right-hand fissure, which we were told to disregard. This is the gap of another magnetic assembly, similar to the recording assembly, and built into the same structure as shown in *Fig. 8*. This is called the erase section, and is used to wipe off any magnetic pattern existing in the wire before recording. All wire recorders are arranged so that the wire passes across this gap before passing across the recording gap.

Let us study this matter of erasure. What do we wish to erase? Do we want complete removal of magnetism, or just the removal of magnetic patterns? Refer to *Figs. 5* and *6*. We see two dissimilar conditions in these magnetized and non-magnetized wires, yet they present the same picture to a recording head. Neither one contains a variable pattern, so, neither one will produce an audible response on playback.

From the above, it is apparent that, whether we demagnetized the wire, or saturate it magnetically, the wire has been erased for recording purposes. It has been found, however, that saturated wire does contain a noise pattern, due, possibly, to minute irregularities in the composition of the wire. The resultant sound is in the form of a hiss, a crackle, or both.

Prior to the development of modern refinements in wire recording, it was common practice to erase with permanent magnets, or electromagnets, using direct current in the coils. Then,

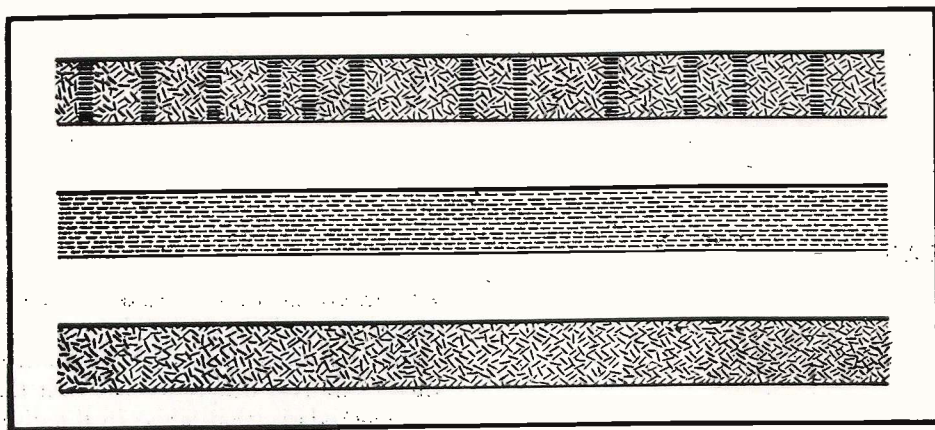


Fig. 5—Top—Molecular arrangement of unmagnetized wire.

Fig. 6—Center—Molecular arrangement of magnetized wire.

Fig. 7—Bottom—Variable magnetic pattern in wire containing audio signal.

in the early thirties, Marvin Camras, the modern Poulsen, evolved the idea of erasing with alternating current, of a frequency above the audible range. He reasoned that a powerful magnetic flux of a fixed frequency would obliterate all other magnetic impressions, and leave only the pattern of this fixed source. If this remaining pattern were above audible range, then the wire would be acoustically clean. He found his theory correct, and this system is now universally used for erasure.

In practice, the erase coil receives the output of a tube oscillator, producing a frequency in the range of 25,000 to 100,000 cycles per second, and current density of 50 to 70 milliamperes.

It is possible to prove that wire erased with high frequency current, retains an impression of the supersonic frequency. If a piece of erased wire is played back at a very slow speed, a high pitched signal is heard, the result of lowering the frequency to within the audible range. This is the phenomenon that occurs when a phonograph record is played below its correct speed.

Magnetic Biasing

Our magnetic recording head has taken on more body and stature. We find now, that it is doing two jobs, instead of only one, but we haven't heard it all. The recording head does still another job, essential to quality recording: Magnetic biasing.

Suppose you are just a little shaver, standing outside the fence while your favorite ball team is playing. Straining on your toes, you can just see the spectators in the opposite grandstand. Not much fun for you, and you are not going to be able to report much about the game. You need a boost, a lift, up the side of that fence. You spot a soap box and your troubles are

solved. That's the answer, that boost. You see the entire field from your new, higher perch.

Now, for some reason not yet fully explained, magnetic recording requires such a boost. It has been shown that, if while recording, a small amount of fixed magnetic flux is impressed on the recording material, the resulting signal is louder, covers a greater frequency range, and contains less distortion. It has been given a lift.

This job of biasing is taken care of by the same recording head that does its other chores so well. Another winding, inductively connected with the recording section, and getting a small portion of the erase voltage, but not enough to cause erasure, takes care of this "bias" on the wire. All commercial recorders use this method of biasing.

Playback

Up to now we've been talking about recording. It's time to hear the results of our work. We're ready for the playback.

Did we say that the recording head does three jobs? That's an error, it does four. Yes, this wonderful little gadget is also the playback head. Run the recorded wire through the recording slot at the same speed as when it was recorded. The tiny magnetic impressions on the wire are transferred into the pole-pieces of the gap, where

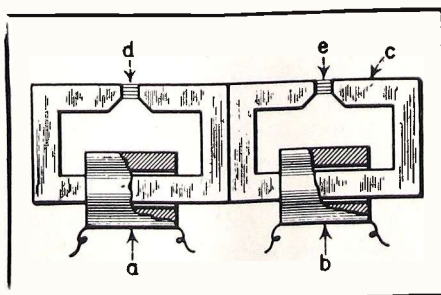


Fig. 8—Structure of wire recording head showing magnetizing and erase sections.

they induce a fluctuating voltage in the coil. This varying voltage is an exact electrical picture of the audio signals which produced the original recording. Connected as an input to the amplifier, the recording head has become a playback head for magnetic recordings.

Want that again? Let's go back to the disc recorder, Fig. 1. Consider this a disc playback head, since it is identical in makeup. Consider what goes on in this playback. Here we have an iron armature being wiggled by the needle in the groove of the disc recording. This motion of iron in the field of a coil induces a voltage in the coil. We have converted the mechanical gyrations of the record groove into magnetic gyrations in the armature and gap. These, in turn, have created the electrical picture in the coil.

We do the same thing in our wire playback head, except that all the magnetic intelligence is in the wire. As each magnetic configuration on the wire crosses the gap, a fluctuating voltage is set up in the coil.

Feed Mechanisms

By now, the magnetic recording, erasing, biasing, and playback head is the star of our show. It's a pity that it suffers just one serious shortcoming—it can't feed itself. However, it deserves a little outside help, and so, we move on to the commissary department, the wire feed mechanism.

The requirements of this mechanism are, that it feed the wire through the recording slot at the correct speed, and in a constant, continuous manner; and that it introduces no extraneous disturbances, such as rumble, wow, or hum.

The correctness of speed is easily assured by use of synchronous motors and reduction idlers. The constancy of travel, although more difficult to insure, is obtainable by careful design and close tolerance of moving parts. Freedom from noise is the important engineering problem. The slightest vibration in any portion of the drive system may be transferred to the moving wire and impress itself on the sound image. Hum, on the other hand, is due, usually, not to defects of motion, but, rather, to inductive transfer of magnetic fields from the motor, or power transformer, to the inductively sensitive record-playback head.

In the design of most commercial magnetic recording devices, the engineer has considered these pitfalls, and has taken proper steps to avoid them. It is only when some change or defect takes place, that these

[Continued on page 39]

PROJECTION

TELEVISION

by ALLAN LYTEL

PART 2

This is the second in the series of articles on Projection Television, and is based on a modification of the famous Schmidt System plus a system known as "keystoning".

PHILCO's new Projection Television Receiver, model 48-2500, is based upon a modification of the famous Schmidt System. This method of using a concave spherical mirror and a correcting lens has been in use by experimenters for several years. Several RCA models also use this method but Philco uses a special modification.

The picture screen is mounted inside of the lid of the receiver cabinet. This picture, 15 x 20 inches, is viewed in a definite area of greatest brightness by the audience seated at the normal level. To prevent operating the receiver with the screen closed, a special switch is used which allows the receiver to operate only when the lid is first raised into proper position.

In *Fig. 1* the basic system of projection is shown. A type TP-400A CRT is mounted facing a spherical mirror. The picture tube has a face curved in the same manner as the mirror it faces. Due to optical reasons, the picture tube face is mounted between the center of curvature and half the distance to the mirror from the center of curvature. In optical terms the image is placed between the focus and twice the focus. In a spherical

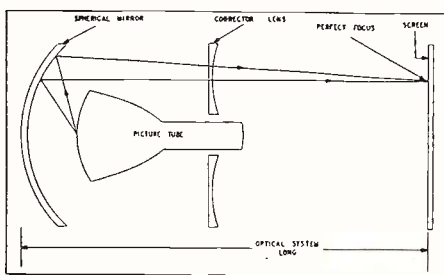


Fig. 1—Modified Schmidt optical system in Philco Projection Receiver.

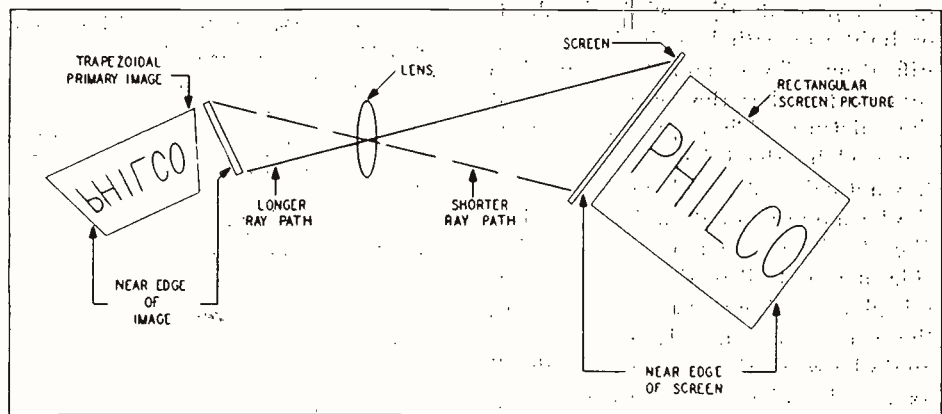


Fig. 3—Principles of keystone projection.

mirror the center of curvature is almost twice the focal length, and this mirror has a radius of 11 inches. The corrector lens is mounted at the center of curvature or 11 inches from the mirror surface.

Light from the CRT is reflected from the mirror through a correcting lens to the screen. The center portion of the mirror is blacked out to prevent the image of the tube face itself from being reflected. Only the image presented on the tube face is wanted and not the tube face. *Fig. 1* does not show the plane mirror which is a part of the actual Philco system.

Magnification of the image is caused by the mirror and not by the lens. This special lens is used only to prevent the spherical aberration, common to all spherical mirrors, from distorting the projected picture. Of passing interest is the fact that this system is used in reverse in Telescopes. Here the light enters the mirror tube and is concentrated at the focus where the bright image is magnified. The Philco lens is flat

facing the concave mirror and curved on the opposite face to produce distortion of the opposite sign from the mirror hence the two types of optical distortion cancel.

This system of *Fig. 1* is quite like the RCA system which will be discussed in a latter portion of this series.

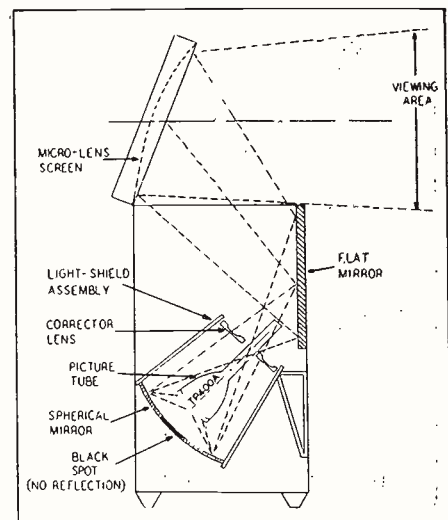


Fig. 2—Fundamentals of the Philco Projection System in Model 48-2500.

Philco folds the optical path through the use of a plane mirror as in *Fig. 2*. This flat mirror means that Philco can use a smaller cabinet than normal with the Schmidt System. If the mirror were not used there would be a longer optical path which would mean a bigger cabinet.

This modification of the Schmidt System is not without its drawbacks however. In the optical system shown in *Fig. 1* the optical paths from both the top and bottom of the CRT are the same. In *Fig. 2*, the actual Philco system, these two light ray paths are of different lengths which means an inherent optical distortion is present. To counteract this distortion, Philco has developed an ingenious system known as "keystoning." In *Fig. 3* the reason for keystoneing is evident because of the difference in optical paths.

The longer light ray path has the greater magnification while the shorter light ray path has the lesser magnification. Two magnets are used to squeeze together the lower portion of the picture. This predistortion is removed by the inherent qualities of the optical system. The position of the keystone magnets is illustrated in *Fig. 4*. They are mounted on either side of the CRT in the same horizontal plane. From the vertical view, there is approximately a 45 degree angle between the magnet and the Z axis of the tube. The effect of a magnetic field upon image formation is

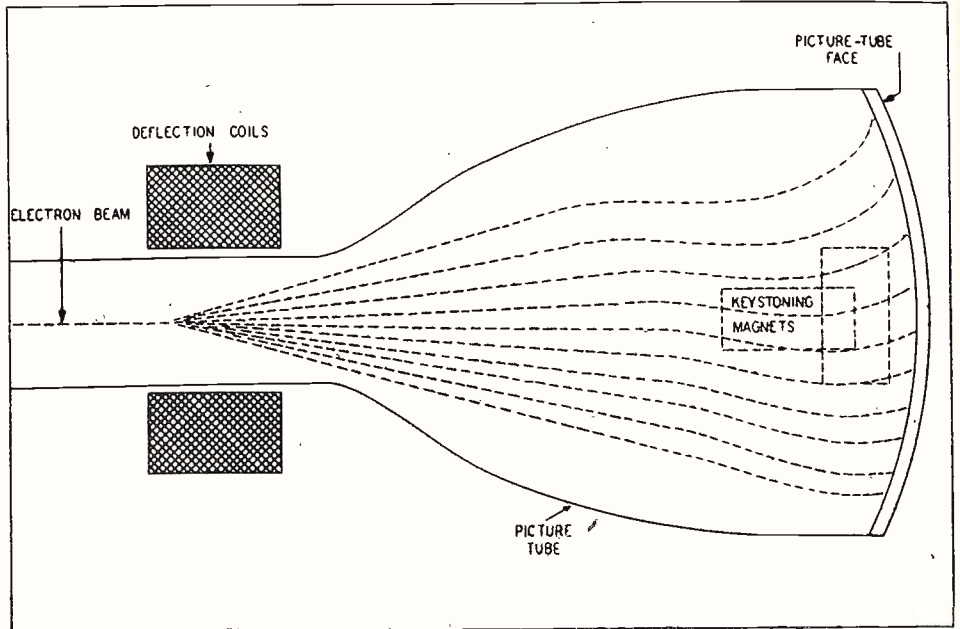


Fig. 5—Action of fixed magnetic field upon picture tube beam.

well known and permanent magnets are used rather than electro magnets to keep the picture steady. *Fig. 5* illustrates the side view of the mounting of these magnets.

Since the picture image on the tube is very small, bright adjustment of these magnets is best carried out through viewing the projected image on the screen. When unpacking a new set, the CRT, together with its mounted magnets, is placed in position in the optical housing. Care must be used when inserting the tube through the deflection coils, after which the tube is clamped in place

and the high voltage anode is connected.

The spherical mirror is placed at the large end of the optical barrel and inserted without touching the front surface of the mirror. This is of vital importance since the concave mirror is coated on the front surface. This coating may be seriously damaged by a careless fingerprint which causes corrosion of the highly polished surface. *Fig. 6a* illustrates the proper manner of inserting the mirror by touching only the outside surface. A connecting strap is used to hold the mirror in place which should be

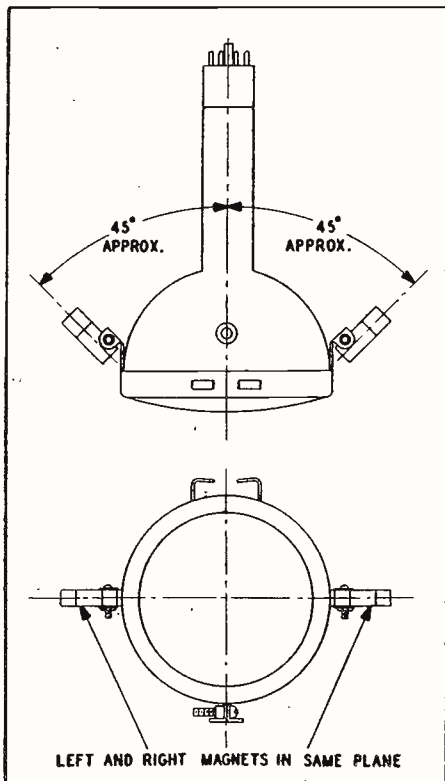
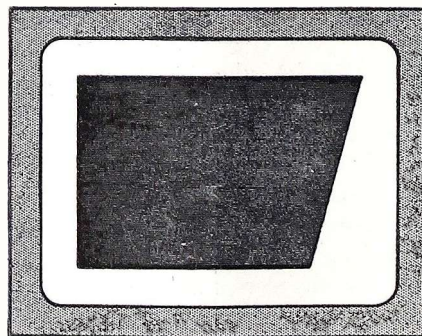
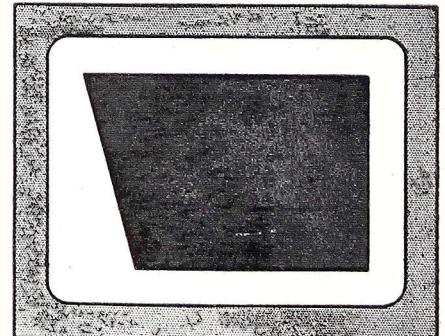


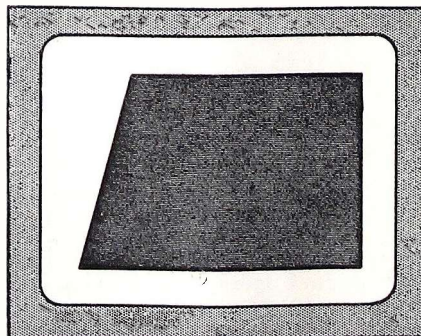
Fig. 4—Position of keystone magnets, front and top views; Note magnets.



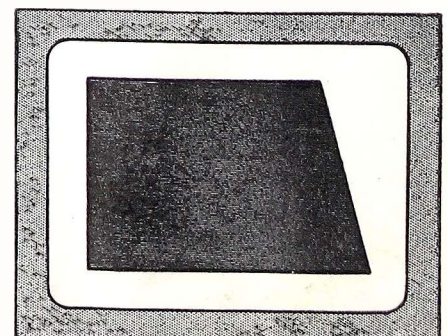
RIGHT MAGNET



LEFT MAGNET



LEFT MAGNET



RIGHT MAGNET

Fig. 7A (top)—Effect of too little keystoneing on projected picture.
Fig. 7B (bottom)—Effect of over-keystoneing on the projected picture.

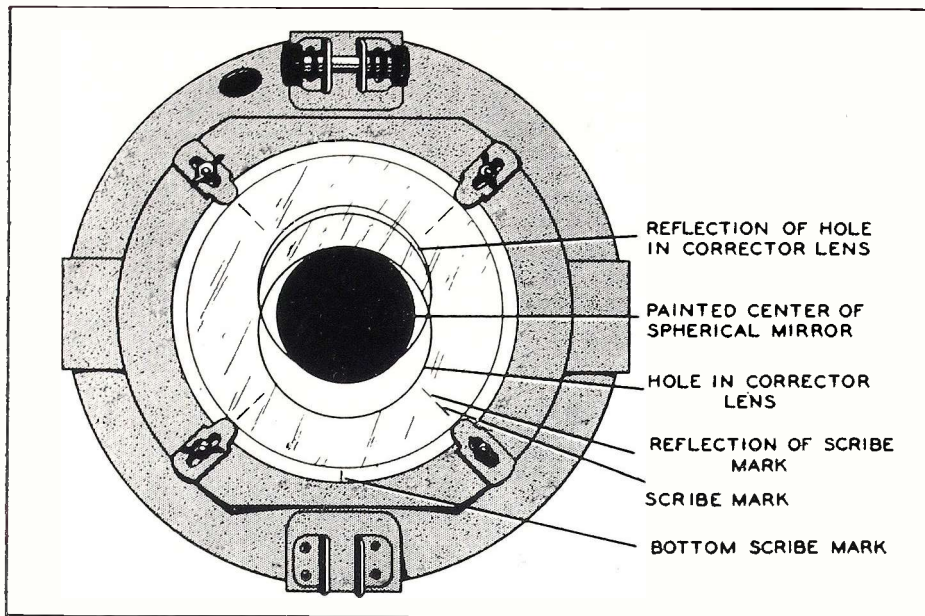


Fig. 8—Operations employed in adjustment of corrector lens.

removed with great care since it is the only support of the mirror. This strap is shown in place in Fig. 6b.

Adjustments of the optical system are best made by viewing the projected picture upon the screen. In Fig. 7 the misadjustments of the keystone magnets are illustrated. These drawings are made facing the screen and show the effects of too little keystone in A, where the bottom of the picture is smaller than the top. Fig. 7B shows the opposite effect this time of overkeystone. The proper adjustment of the magnets is obtained

when the picture is a rectangle and neither side edge appears tilted. These magnets require only very slight adjustment in any case and the proper magnets to adjust will soon show itself with practice. The magnets are adjusted by changing their angular relation to the neck of the CRT.

Should the corrector lens ever require adjustment reference should be made to Fig. 8 and the scribe marks. Since the opening in the lens is not in the exact center the scribe marks are useful in properly orienting the mirror. Place the lens so that the hole is near the bottom edge and

the outside scribe marks centered at the bottom of the housing. The lens is then moved either to the right or left until the scribe marks on the lens and their reflections from the mirror each coincide. If the lens is incorrectly adjusted there will seem to be eight scribe marks, but when the lens is properly adjusted there will be only four scribe marks. This lens need not normally be removed but if it is ever necessary to be replaced, the entire optical housing must be removed and then the wing nuts which hold the lens in place loosened.

A special screen is used with this system to present the brightest possible picture in the normal viewing range of an audience. The lid which contains this screen, called the Philco Micro-Lens Screen, must be adjusted to an angle of $67\frac{1}{2}$ degrees. If this adjustment is not obtained by normally raising the lid, the adjusting screw on the rear rail of the cabinet may be changed slightly. This screen is coated with a special plastic which may make it necessary to replace this screen when scratched or damaged. A special patented construction, as in Fig. 9 is used to make the best possible use of the image upon the screen. By use of a slightly concave shape and vertical grooves, a picture segment is presented which is approximately 20 degrees high and 60 degrees wide. By this special design, the screen also deflects all outside light providing a brilliant

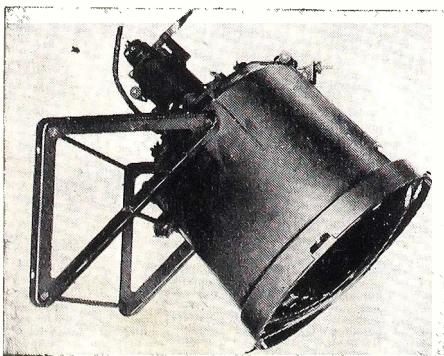
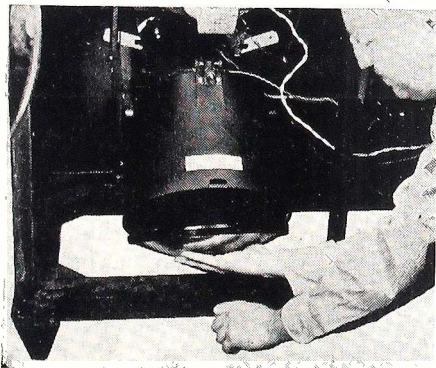


Fig. 6A (top)—Technique employed in inserting spherical mirror.
Fig. 6B (bottom)—Method employed in inserting mirror retaining strap.

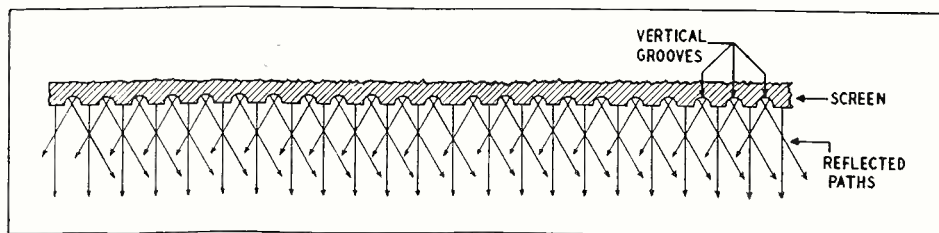
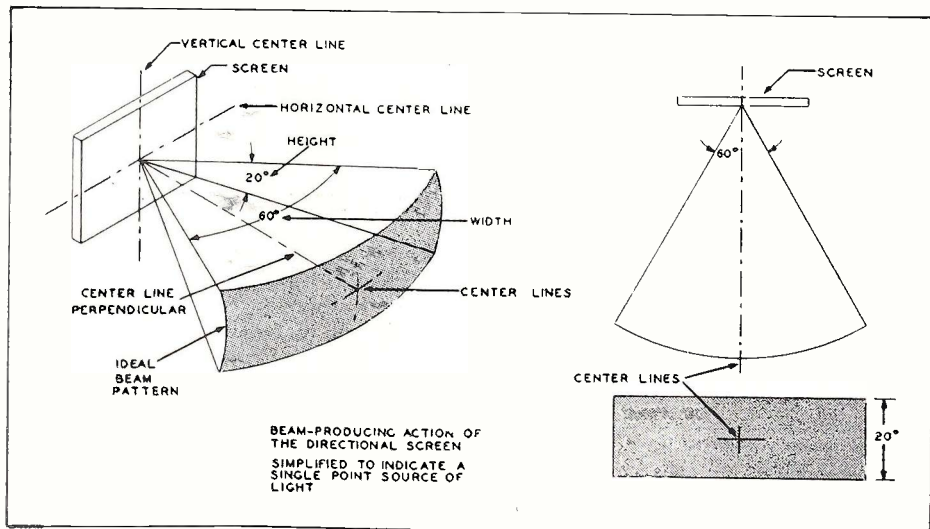


Fig. 9 (top)—Beam producing action of the Philco Microlens screen.
(Bottom)—Vertical grooving of the Philco Microlens screen.

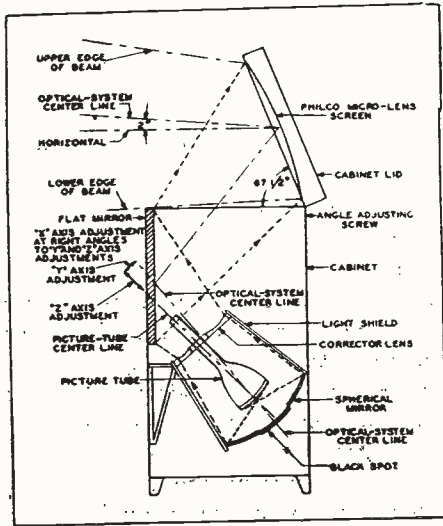


Fig. 11—Side view of Projection System showing in detail various components in position, and manner in which optical system operates.

Assuming that the receiver has been placed in operation with the correct adjustment of the keystone magnets, the following adjustments may be made with reference to Fig. 10. The deflection-yoke nuts *A* and *B* are loosened and focus lever *C* is moved backward and forward until the picture is sharp and clear at the bottom of the screen. Adjusting nuts *D* and *E* may be moved after loosening *J* and *F* to adjust the picture tube in clear picture which may be seen at a distance of between 10 and 30 feet. Experience will very soon show whether the picture is being moved in the proper direction for most clarity. *F* and *J* are adjusting nuts while *D* and *E* are locking nuts.

For side to side adjustment loosen nuts *G* and *H* and move the tube sup-

port from side to side until the picture is in focus. Note that the focus is the same on both sides. All of these above adjustments taken together mean that the tube may be adjusted in or out, Z axis, up and down, Y axis, and side to side, X axis. None of these above adjustments should ever be made until the electrical adjustments are as close as possible to being correct.

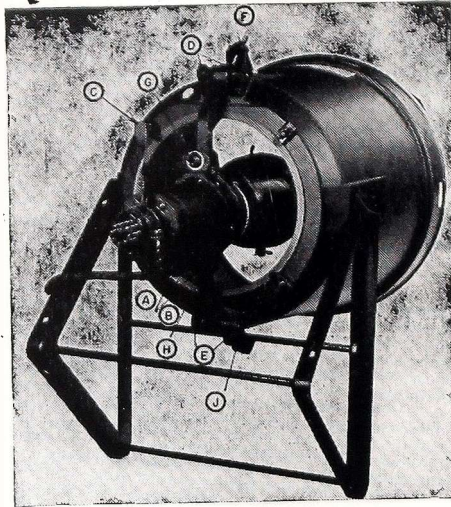


Fig. 10—Details of the Philco Projection system. *A* and *B* are deflection yoke nuts; *C* the focus lever, *D* and *E* locking nuts; *F* and *J* adjusting nuts; *G* and *H* adjustment nuts. All adjustments permit adjustment of the tube up or down (Y axis), in or out (Z axis), or from side to side (X axis), making adjustments easy.

High voltage for the CRT anode is obtained from a voltage tripler circuit using 1B3GT tubes. The horizontal sweep transformer also acts

as an autotransformer and supplies 7000 volts as a pulse to the rectifier circuit. Output of the 1B3GTs is between 18,000 and 20,000 volts with a maximum current of 100 microamperes. To obtain a filter for this voltage the capacitance of the high voltage anode coating is used which is approximately 500 uuf, together with a conventional RC filter system. Two factors supply the safe operation of this high voltage; the small current drain and the two megohm resistors as a load.

The Philco Projection System of this model 48-2500 has had wide field use since its introduction and adjustments are not difficult provided a knowledge of the effects of each adjustment are understood. Fig. 11 is an illustration of the completed Philco System. The several adjustments discussed above may be reviewed by noting sections of this figure.



Philco Model 48-2500 Projection set.

No mention was made of the plane mirror for this is one portion of the system requiring no adjustment. The Philco Service Manual of this model lists the various troubles which might be anticipated and their probable correction. This information is extremely valuable to the serviceman and is listed below in Fig. 12.

OPERATIONAL ANALYSIS OF OPTICAL SYSTEM

PICTURE NOT CLEAR

INDICATION	PROBABLE TROUBLE	REFERENCE
Picture on screen not clear, but picture on picture tube clear (resolution of at least 350 lines).	Trouble in projection system.	Refer to Projection System Optical Adjustments
Picture not clear on any part of screen, but picture on picture tube clear.	Improper adjustment of "Z" axis (mechanical-focus lever).	Refer to focus adjustment (in and out) of Projection System Optical Adjustments
Picture improperly focused at top of screen.	Improper adjustment of "Y" axis.	Refer to focus adjustment (top to bottom) of Projection System Optical Adjustments
Picture on screen not equally focused on each side.	Improper adjustment of "X" axis.	Refer to focus adjustment (side to side) of Projection System Optical Adjustments
Picture on screen not in focus from all viewing positions.	Warped flat mirror, or strain on flat mirror, preventing absolutely flat surface.	Loosen clamps slightly to make sure mirror is not in strain. In extreme cases substitution of mirror may be necessary.
Picture on screen does not always reach sharp focus when lid is raised.	Angle of lid not set properly, possibly caused by binding hinge or defective lid mechanism. Dome stop may have become damaged by rough handling.	Check lid angle for 67.5 degrees. Inspect hinge, lid mechanism, and counterbalance springs.
Picture on screen cloudy in appearance.	Excessive dust deposit on corrector lens.	Using a light brushing motion, clean lens with soft cloth (use care to make sure lens is not scratched).

Fig. 12—In this operational analysis of the Philco Model 48-2500 projection optical system various symptoms are given together with their probable causes and reference pointers. The latter refer to the methods that may be employed in rectifying the troubles that are likely to be found.

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Crystal "Ring" Modulator

VERY few inexpensive r-f test oscillators have provision for external modulation. Some fairly high-priced signal generators also have no such provision. This lack is an annoyance to the operator who must modulate his oscillator at some frequency other than the 400-cycle internal modulation without tampering with the innards of his signal generator.

Four 1N34 crystal diodes may be used in a special, simple circuit to allow an r-f oscillator to be modulated externally. The circuit is given in Fig. 1. This arrangement is the "ring modulator", more familiar to telephone engineers than to most radio men. There are several very practical crystal modulator circuits, but the one shown in Fig. 1 provides a

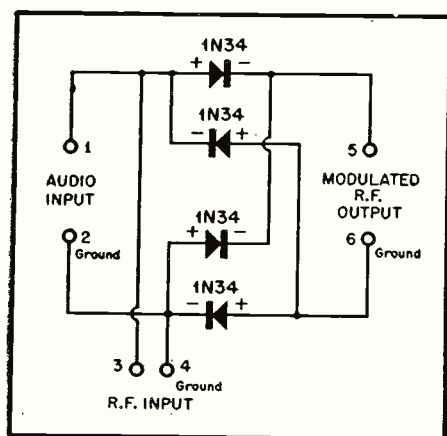


Fig. 1—Crystal device

more or less common ground terminal between the r-f and audio oscillators and the receiver under test, a distinct advantage when all three devices are a-c operated and hum is to be eliminated.

The output terminals of an unmodulated r. f. test oscillator are connected to terminals 1 and 2 of the modulator, the output terminals of the audio oscillator to terminals 3 and 4, and modulated r-f output is delivered by terminals 5 and 6. The crystal polarities shown in Fig. 1 must be observed carefully or the modulator will fail to operate. The entire device may be built into a small container no larger than a safety match box.

In operation, each half-cycle of the r-f input voltage switches the direction of the audio voltage as it passes through the circuit from terminals 1 and 2 to terminals 5 and 6. Thus, the r-f voltage is used as a high-frequency switch. Actually, the carrier is eliminated in the process, and the upper and lower sidebands are what is obtained at the output terminals of

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the modulator. However, the sidebands lie so close together at all ordinary audio frequencies that the receiver selectivity is insufficient to distinguish between them and the carrier. For example; if the ring modulator is used to modulate a 1000-kc signal at 1000 cycles, the output consists of 1001 kc plus 999 kc, the upper and lower sidebands. If the receiver has been tuned to 1000 kc, no retuning is required after modulation, since its selectivity would not be high enough to discriminate between the 2000-cycle separation of the sidebands. The receiver accordingly "sees" a modulated signal where previously there was an unmodulated one.

The serviceman and experimenter will find the simple ring modulator invaluable for the external modulation of any r. f. test oscillator not already equipped with an *external modulation* input jack. It is an inexpensive and easily-built, nevertheless highly practical device.

Submitted by Rufus P. Turner

G.E. Model 140 Loop Repair

G. E. Service Dep't. offers this excellent service note on loop repairs: A more satisfactory method for repairing broken antenna loop connecting straps has been developed and is recommended in preference to the procedure published earlier. Aside from the more simple repair over that of using the original replacement straps, the use of a specially approved flexible and insulated wire, Cat. No. REC-005, is recommended for better and longer service.

This method consists of cutting the broken straps flush with the inside edge of the notch on the loop back. The flexible wire is then used to make connections from the loop to the inside of the receiver. Consult the accompanying illustration Fig. 2 for loop connecting details and wire specifications. Carefully lift the section of loop to allow connecting the specified pieces of wire and solder wires to remainder of loop straps. Remove the fibre strap guide which originally insulated the loop straps within the cabinet. Remove original wire leads and pieces of loop strap connected inside the cabinet to the chassis terminal strip and pin 6 of the 1R5 oscillator-converter tube socket. Solder the new leads from the antenna loop directly to the terminal board and tube socket. Make certain that the inside turn of the loop is connected to pin 6 of the 1R5 tube socket.

Admiral 130A1 Chassis, TVI Trap

Admiral Service has prepared the following information for purposes of reducing FM interference on some TV channels.

Due to the broad bandwidth requirements, television receivers are inherently susceptible to image and beat frequency interference. Such interference is frequently caused by FM and other radio services using the frequencies in the 109 MC band. The trap herein described is for the purpose of eliminating such interference.

Installation—Solder two short pieces of tinned copper wire to the antenna lugs of the RF tuner unit. The trap mounting position is just above the antenna lugs and so oriented that

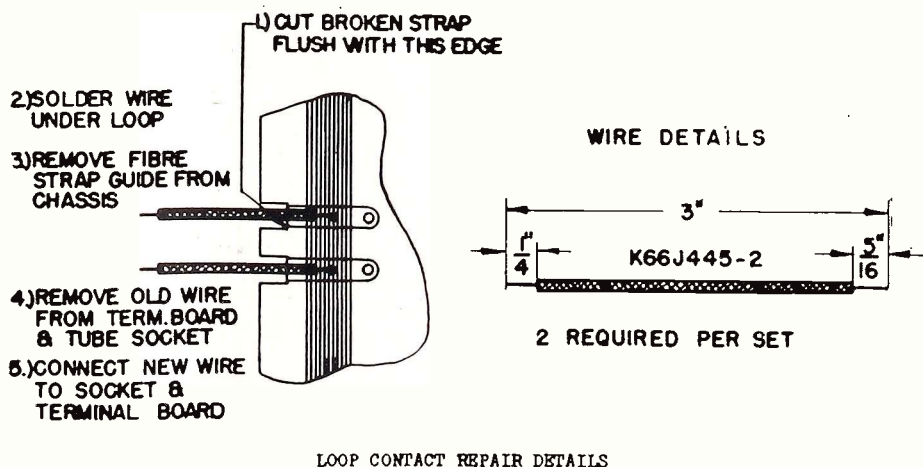


Fig. 2—G. E. loop repair details.

the 6J6 r-f tube is midway between the two coils in the trap. These traps are shown as part Nos. A37 and A38 in Figs. 3 and 4. Bolt the trap to the chassis using the rear tuner mounting bolt. Solder the front leg of the trap assembly to the chassis using a heavy soldering iron. Solder the two tinned leads, previously connected to the tuner terminal lugs, to the trap terminals.

Adjustment—If the sound or video interference is of unknown origin and frequency, the two slug adjustments on the trap must be alternately adjusted in small steps starting at the fully counter-clockwise setting of the slug adjust screws. Continue this process until the interference is completely eliminated or reduced as much as possible. If no change in the interference condition can be effected, the interference frequency must be outside of the trap tuning range. It cannot then be eliminated by the use of this trap.

The above process can be used in an attempt to eliminate audio or video interference without test equipment. The following procedure may be used when the interfering signal can be identified and its frequency determined.

1. Set a Measurements Model 80 signal generator to the frequency of the interfering signal.
2. Connect the generator to the antenna terminals using a 150 ohm series resistor in each lead.
3. Adjust the tuning of the trap so that it eliminates the interference caused by the generator signal.
4. Disconnect the signal generator from the television receiver antenna terminals.
5. Connect an antenna to the receiver.

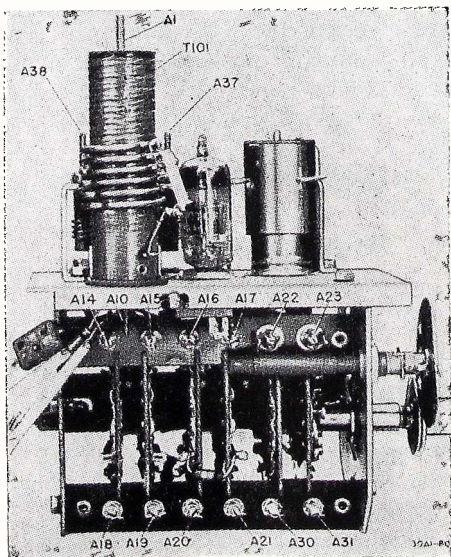


Fig. 3—Side view TVI trap

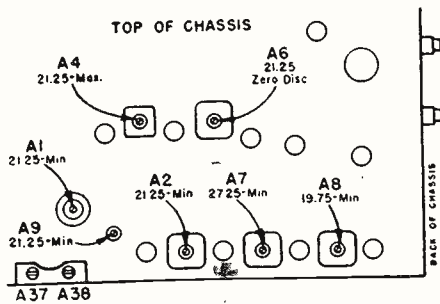


Fig. 4—Top view of trap

6. Make a fine adjustment of the trap for maximum rejection of the interference signal. Little adjustment should now be necessary since the trap has been pre-set using the signal generator signal.

The approximate range of this trap is from 94 to 113 MC.

Crosley Model 9-101 Oscillator Coil

From Crosley we obtain this information on oscillator coil trouble. Recently it was discovered that in some areas, the oscillator coil (Part No. 142975) developed trouble due to corrosive tape.

To avoid possible complaints in the field, we recommended that the coil be replaced with a new coil (Part No. 145105). This new coil will be shipped free of charge upon receipt of your order of a quantity covering all the model 9-101 radios, in your stock, which were shipped prior to September 5, 1948; those complained about in the field, and all coils in your service stock bearing part No. 142975.

R.C.A. Q 109 Defective 6F6G Tubes

It has been found that a frying or sizzling noise evident when the volume control is at minimum is often due to defective 6F6G tubes. Since such noise is often associated with defective output transformers, a hurried diagnosis may indicate that the output transformer is at fault when it is actually tube trouble.

Stromberg-Carlson 1101H Series,

Distortion; Frying Noise

Some of these sets have a one megohm resistor, shunted by a 47 μ mf ceramic capacitor connected from the 12SQ7 plate to the 35L6 plate. This is not shown in the schematic. REMOVE IT.

Frying noise, sounding like a defective r-f coil or output transformer. Before replacing any of these, disconnect the 100 μ mf mica capacitor connected between plate and cathode of the 12SQ7. This condenser frequently causes this trouble. REPLACE IT. The .002 μ f quality condenser from plate to cathode of the 35L6 is frequently missing.

Submitted by Kenneth Futrell,
Muncie, Indiana

Meck Radio, Model 5C5, Hum

Hum which occurs at all settings of the volume control but varies as the control is moved, can be traced to the grounding of one side of the line through the switch to the shell of the volume control. To remedy this tie an extra wire from switch to chassis ground.

High Gain Amplifier Cathode Hum

In a high gain motion picture sound amplifier using 6SJ7s in the pre-amp stages, I found cathode heater hum was reduced materially when all other methods failed by replacing 6SJ7s with 12SJ7s. The difference in gain was not noticeable. This remedy doubtless can be used for other types tubes by substituting 12 volt equivalents.

Submitted by Wayne E. Lemons,
Buffalo, Missouri.

An Unusual Case of Wheel Static

I do not know whether this type of interference was ever encountered by any other serviceman, but it certainly had five of the best radio technicians that I know, up in the air for two straight days, till they finally found the cause, or shall I say till the last man of the five that had been working on it, used his head and brought his knowledge of chemistry into the case. It was an R.C.A. job in a 47 Plymouth, and the complaint was severe noise in the radio. Interference was so bad that even local reception was impossible. The cause was definitely traced to wheel static, since it did not disappear when the ignition was cut while rolling along. However all known methods including static collectors, bonding graphite on the tire casings and such, failed to eliminate the noise. Finally this last serviceman discovered that the noise took place on each revolution of the wheels. Interchanging wheels with the spare found the offending wheel. Not satisfied he proceeded to find out why. Delving deep into chemistry, it was learned that part of the tire was at one time saturated with a strong solution of K₂F. This permitted the static charge built up in the car to leak to the ground, accompanied by the offending interference. I have heard it said that dog is man's best friend, but I know of four men that would tell you different.

Submitted by Albert Loisch,
Darby, Pa.

Emerson 547A, Hum at High Volume

This may be due to the 20 megohm 12AT6 grid resistance; install one of 5 megohms, dress grid lead close to chassis. A defective 12AT6 may also cause hum.

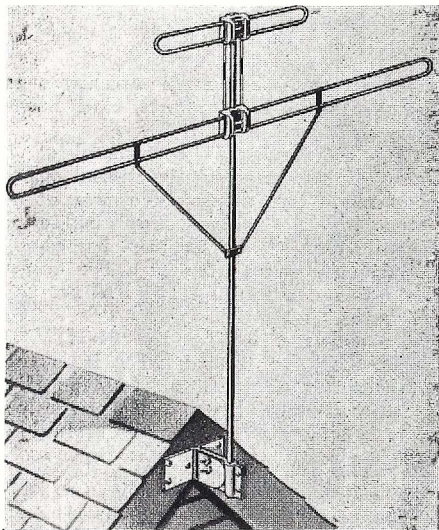
Submitted by Willard Moody,
Washington, D.C.

NEW PRODUCTS

New "Flexible" Antenna Line

L. S. Brach Mfg. Corp., Newark 4, N. J., announces a new line of FM and TV antenna kits. Salient feature of the new kits is their universal construction. Starting with base mount and mast, any additive combination of parts from the Brach Flexi-Kits may be employed.

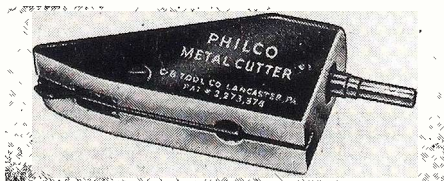
Flexi-Kits are packaged in various assortments for different installations. Among the complete individual kits is



the Hi-Lo Rotatable TV Antenna. Shown above is the FM & TV model designed for the 44-108, and the 174-216 mc bands. A complete description of the entire new Brach antenna line is available in the Brach Catalog No. 1304, available on request.

Philco Metal Cutter

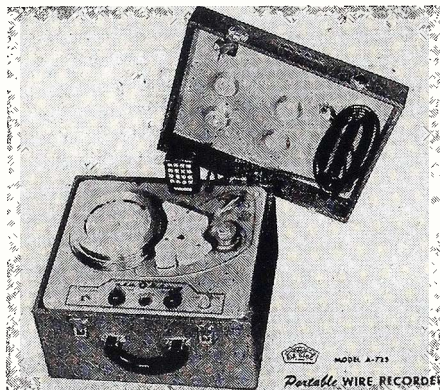
Philco announces a metal cutter to be used with any electric drill which cuts straight lines, circles, or compound



curves in steel, brass, aluminum, plastics, and other similar materials up to .040" thick. A clean edge results requiring no filing. For cuts inside edges of panel, a 1/4" pilot hole is drilled to start. Tool steel blade, tungsten carbide shear blocks.

Air King Introduces New Wire Recorder

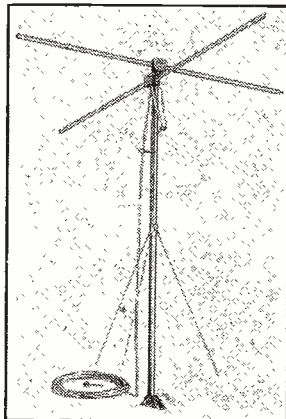
Air King Products Co., Inc., B'klyn., N.Y., has introduced its third wire recorder to its line. Among the features of this new wire recorder (known as Model A-725 is that it is a complete unit . . . includes amplifier and speaker; has immediate playback; records from microphone, radio, phonograph or telephone; automatic shut off at end of play or rewind of wire; crystal microphone for hand, table or stand with plug in mike cord; makes permanent



recordings or erases automatically when recording over used wire; has plug for cable to record from radio or phonograph; safety lock prevents accidental erasures and utilizes 4 tubes plus selenium rectifier.

Belden Poly-Point FM Antenna

Belden announces a new FM antenna, Model No. 8322, called the Poly-Point Antenna, and designed to provide an essentially circular pattern. A quarter-wave phasing stub is used for greater efficiency.



The construction is of a light aluminum alloy which will withstand severe icing and high winds. The mounting base is adjustable for flat or sloping surfaces. Also included in the package are 4 standoff insulators and 65 ft. of Belden #8225 300-ohm transmission line.

Holub Anchor Kits

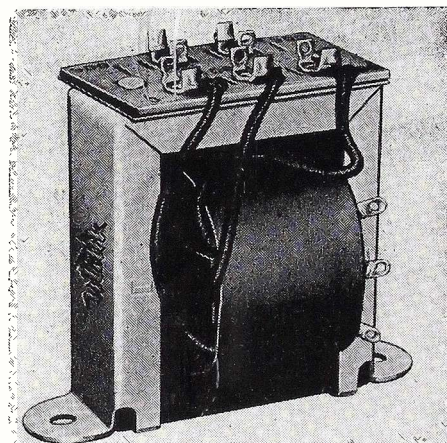
Three kits containing different quantities of popular size anchors are made



available by the Holub Industries, Inc., Sycamore, Ill. The No. 1 kit is a "Standard Utility Kit" containing 250 assorted anchors; the No. 2 kit—the large "Contractor-Industrial" kit, containing, 325 assorted anchors; and the No. 3 kit—a special anchor and drill kit containing 525 popular assorted anchors and three carbide tipped masonry drills. The latter is available for a limited time only.

Utah Replacement Transformers

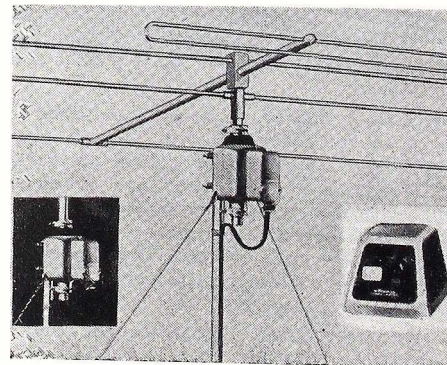
A new line of replacement transformers is now coming off the line at the Utah Radio Products plant, in Huntington Indiana. The three types that are now in production are: Universal Output, Universal Line, and Sin-



gle Output. In the impregnation of the interlayer insulation of Utah Transformers, all air and moisture is eliminated. The three new types come in eight sizes and are ready for immediate delivery.

Alliance Electric Antenna Rotator

Alliance Mfg. Co., of Alliance, Ohio, offers a new electric antenna rotator called TENNA-ROTOR, designed to "beam" an antenna in any direction. The unit, designed to resist corrosion—is enclosed in a split zinc die-cast housing,



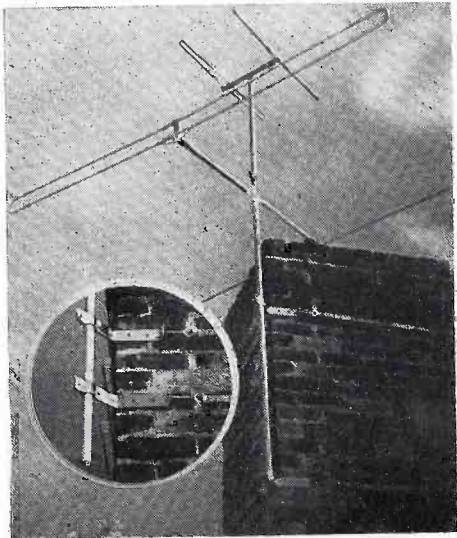
and is operated from a plastic control box which plugs into any 110 volt, 60 cycle house circuit. A three position switch rotates the antenna clockwise or counter clockwise. Four-conductor inter-connecting cable from rotor to control box is made available, depending

[Continued on page 28]

upon the length desired, at a small unit price per foot. The size of the rotor unit is 7 $\frac{3}{4}$ " x 5 $\frac{1}{4}$ " x 8".

JFD Chimney Antenna Mount

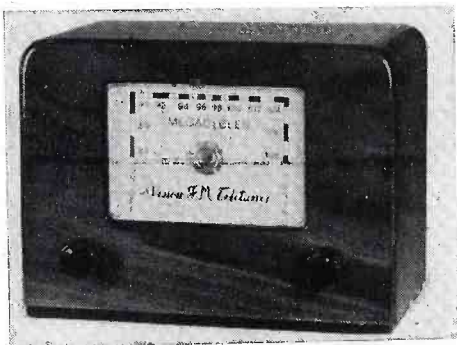
The JFD Manufacturing Co., Inc., 4120 Fort Hamilton Parkway, Brooklyn 19, N.Y., announces its new Adjustable Chimney Antenna Mount. Unit mounts on any chimney, pipe or other rectangular shaped extension and is held with two 12 foot lengths of heavy-duty



galvanized steel bands. The brackets hold any size mast from $\frac{1}{2}$ " to 1 $\frac{1}{2}$ " OD. All parts are made of galvanized steel and are completely corrosion-proof. Mount can also be screwed to any corner of a building or similarly shaped extension. Catalog Available.

Vision Introduces FM Tele Tuner

Vision Research Laboratories, of Richmond Hill, N.Y., has just announced a unit which is an FM tuner and which can be connected between the television receiver and antenna and will tune in all FM stations. Working



on either channel 2 or 3, whichever is free in a given locality, the Vision FM TeleTuner amplifies and converts FM signals so that they are received through the television sound channel. A switch-thru arrangement permits regular TV reception when the Tuner is turned off, without disturbing any connections.

Pentron Wire Recorder Combo

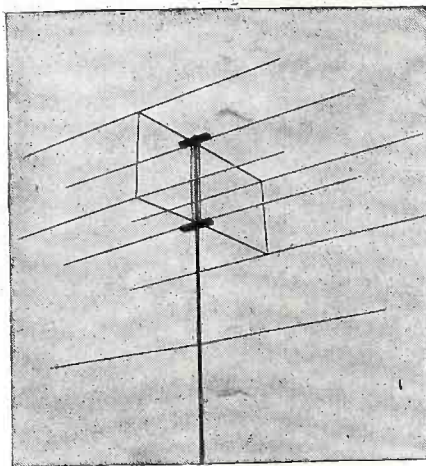
ASTRA-SONIC is a four-in-one combination which also provides a superheterodyne radio and a player equipped with tru-tracking pickup arm and Astatic L70 cartridge. The instrument also serves as a medium gain public address system. 7-tube wire recorder has recording head which guarantees one-time erasure. Records and plays



back its own radio, phonograph or microphone. The ASTRA-SONIC is fully covered by product liability insurance and is approved by Underwriters' Laboratories, Inc. Made by Pentron Corporation, 611 W. Division St., Chicago 10, Ill.

New High Gain Antenna

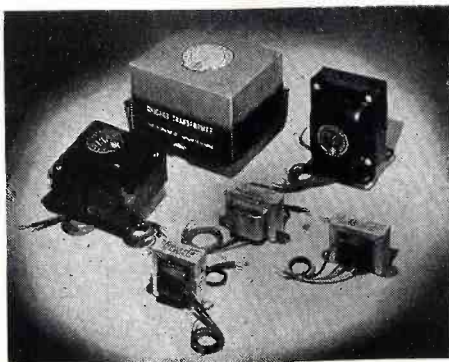
Development of a new "Double U" TV antenna that will increase the range of TV and FM sets in fringe areas by a considerable amount of mileage was announced today by the Eastern



Transformer Co., Inc., N.Y.C. The antenna contains three reflector elements, two director elements, and two collector elements. It also includes a 10 ft. galvanized steel pole.

Chi. Trans. Announces New Line

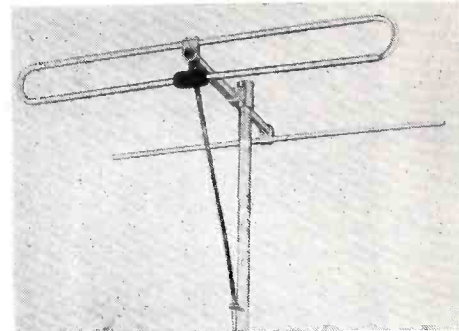
Chicago Transformer Division, Essex Wire Corporation, recently announced the addition of a replacement transformer line to the company's stock transformer business. This new replacement line fits a wide range of the ser-



viceman's most frequent power and audio requirements and fills, as well, the needs of the amateur for efficient, standard-type ratings at low cost. Included in the line are power transformers and chokes, driver, speaker matching, interstage, and output transformers in a range of practical ratings.

Radiart TV-FM Antennas

Radiart makes available their new line of "Simpli-Flex" antenna elements which may be built up from a simple dipole to a multiple stacked all-channel array by the addition of reflector kits and additional arrays in accordance with the installation requirements. The



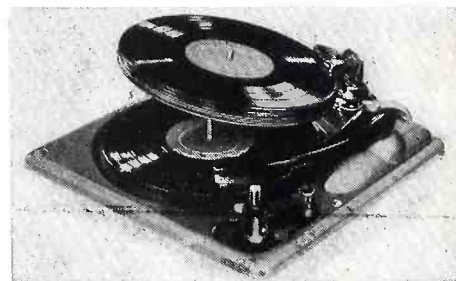
basic units contain simple all-aluminum castings, $\frac{1}{2}$ " OD elements, and heat-treated support masts.

The "81" series is comprised of 3 folded dipoles with bi-directional characteristics. The assembly comes complete with 75 ft. "twin-lead" 300 ohm lead-in T81-LTV is designed for channels 2-6 inclusive, T81-HTV for channels 7-13 inclusive, and T81-FM for the FM band, 88-108 mc.

The reflector kit for the 81-LTV is the 81-RL; for the 81-HTV it is the 81-RH. The turnstile kit for the FM antenna for non-directional conversion is the 81-TK which comes all assembled, complete with $\frac{1}{4}$ wave phasing loop.

New Dual Speed, Dual Groove RC

This is the newest dual speed, dual groove record changer produced by Webster-Chicago and being used as standard equipment on a number of leading radio-phonograph sets. The changer features two needles—one regular tip for standard discs and a



microground tip for microgroove records. Speeds are 78 or 33 $\frac{1}{3}$ R.P.M. and the changer provides for either manual or automatic play. A new feature is the Tilt-O-Matic tone arm which permits correct automatic play with absence of lateral pressure as well as minimum vertical pressure, adding to record life.

New Wire Recorder

Electronic Products, 443 Greenwich St., N. Y. 13, N. Y., announces their new "ELECTRO-WIRE" Recorder which records and erases automatically phone with desk stand and cable, record player, and two $\frac{1}{2}$ hour spools of recording wire. You can record for a full hour.

Separate, heavy duty enclosed motors for wind or rewind . . . Magnetic head which records and erases automatically . . . Immediate playback . . . Wire tra-

[Continued on page 28]



PERFORMANCE ENGINEERED!

POWER

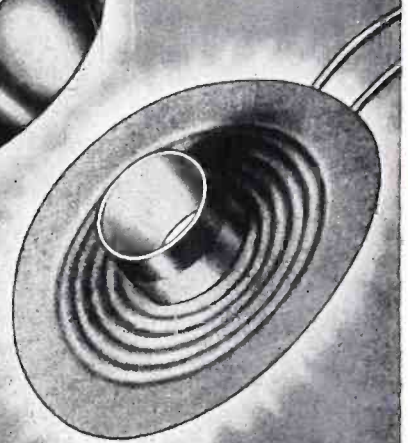
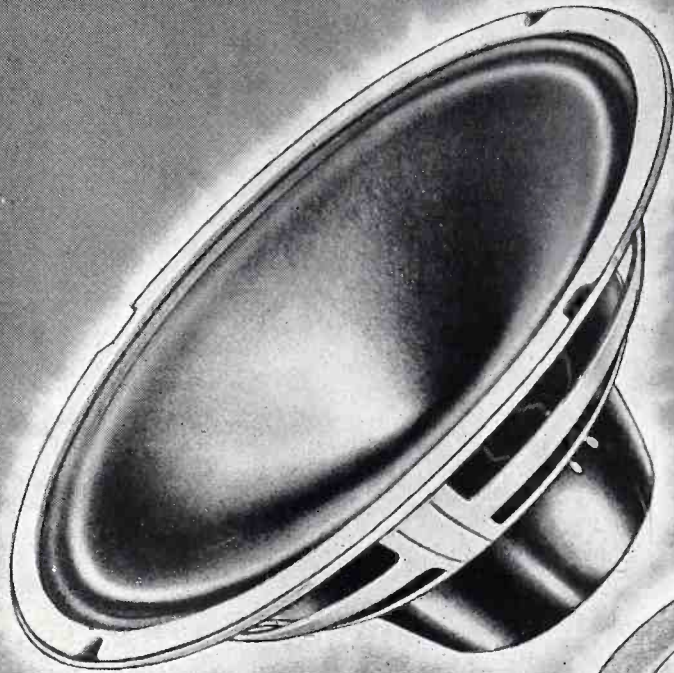
25 Watts Power Handling Capacity

SENSITIVITY

14½ ounces of ALNICO 5

FIDELITY

Broad Frequency Characteristics
50-13,000 cycles



The General Electric 1201 Speaker with the famous General Electric Aluminum Foil Base Voice Coil.

FROM THE SMALLEST TO THE LARGEST:

- Every G-E speaker is *Performance-Engineered* at Electronics Park
- Every G-E speaker is equipped with the *Aluminum Foil Base Voice Coil*
- Every G-E speaker is an *Alnico 5* speaker
- Every G-E speaker cone is designed to last
- Every G-E speaker has a *Big Market*

For complete information on General Electric Speakers write: *General Electric Company, Electronics Park, Syracuse, New York.*

Demonstration PROVED to Distributors in these and many other cities that the 1201 is OUTSTANDING IN QUALITY.

ATLANTA	LOS ANGELES
BALTIMORE	NEW YORK
BOSTON	PITTSBURGH
CHICAGO	SALT LAKE CITY
CLEVELAND	SEATTLE
DALLAS	SAN FRANCISCO
DETROIT	WASHINGTON

You can put your confidence in—

GENERAL ELECTRIC

169-G9

Stromberg-Carlson Ups Prices

The Stromberg-Carlson Company announced today price increases on its current radio and television receivers to take effect immediately. The new retail prices have been established for the east, zone one, with all prices slightly higher in the south and west.

Industry Mourns Passing of

C. Freshman

Charles Freshman, Chicago-born pioneer radio manufacturer, died October 2 at his Pasadena, Calif. home. The founder of the Charles Freshman Company in New York in the early



The late Charles Freshman

1920's, a radio manufacturing company, he introduced the Freshman Masterpiece, the first low-cost, mass-produced radio for home use.

Western Electric Opens New Plant

The Western Electric Company is holding "open house" this week for the families of employees and invited friends and neighbors at its new Allentown Plant, an industrial structure especially designed to meet the exacting demands of precision electronic manufacture.

Hams Facsimile

A home receiver of radio facsimile transmission, to sell for approximately one-half the price of receivers now on the market, has been demonstrated by Stewart-Warner Corporation.

Sylvania Appointments

Erwin A. Larson has been appointed distributor sales representative for Metropolitan New York for the renewal tube department, Radio Tube Division, Sylvania Electric Products Inc. Henry A. Bair, formerly gen-



(L to R)—Larson, Hopkins & Bair

eral foreman, has been appointed manufacturing superintendent of the Cathode Ray Department. William J. Hopkins has been appointed eastern division manager for renewal tube sales department, Radio Tube Division.

2-Way Radio Saves City

During the second week of September, Southern California suffered one of the worst forest fires in its history. Through the combined efforts of the volunteers coordinated with Motorola 2-way radio was the fire brought under control and finally fought down.

Philco TV on Airline

Passengers between Washington and Chicago aboard a non-stop DC-4 flight of Capital Airlines are now enjoying the latest in entertainment as they watch a Philco television set.

T.A.C. Manufactures Own Units

Employing highly skilled wiremen, and ultra-modern production techniques, Television Assembly Co. manufactures its own 13-tube I.F. Picture and Sound Strip (Pat. Pend.) for its full line of Direct View and Projection Television Assemblies. For its Model P-520 Projection Television

Stay on the beam

WITH **TENNA·ROTOR**

alliance
TENNA·ROTOR

GETS **STRONGER SIGNALS**

ROTATES TV AND FM ANTENNA

LIST PRICE **\$39.95**

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

Model ATR
Size of rotor unit 7 3/4" x 5 1/4" x 8"

Operates in any weather.
Fits most types of antenna.

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 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!

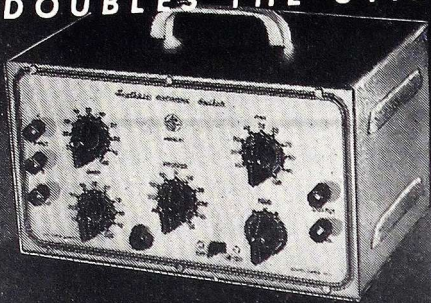
Write for catalog sheet and illustrated folder.

alliance motors

ALLIANCE MANUFACTURING COMPANY • ALLIANCE, OHIO
Export Department; 401 Broadway, New York, N. Y., U. S. A.

Build YOUR OWN TEST EQUIPMENT

Heathkit ELECTRONIC SWITCH KIT DOUBLES THE UTILITY OF ANY SCOPE



\$34.50

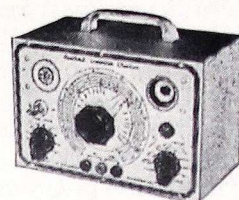
Shows two separately controllable traces on individual inputs on any scope. See both the input and output traces, locate distortion, phase shift, etc., immediately. Individual gain controls and positioning control. Coarse and fine sweeping rate controls. Complete Heathkit matches others, with 5 tubes. All metal parts are punched, formed and cadmium plated. Complete with tubes, all parts, detailed blueprints and instructions. Shipping Wt. 13 lbs.

Nothing ELSE TO BUY

HEATHKIT CONDENSER CHECKER KIT

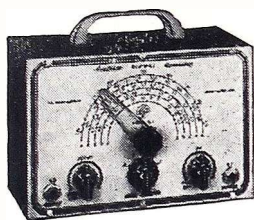
\$19.50

Nothing
ELSE TO
BUY



A condenser checker anyone can afford to own. Measures capacity and leakage from .00001 to 1000 MFD on calibrated scales with test voltage up to 500 volts. No need for tables or multipliers. Reads resistance 500 ohms to 2 megohms. 110V 60 cycle transformer operated complete with rectifier and magic eye indicator tubes. Easy quick assembly with clear detailed blueprints and instructions. Small convenient size 9" x 6" x 4 3/4". Wt. 4 lbs.

HEATHKIT SIGNAL GENERATOR KIT



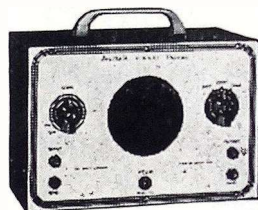
\$19.50

NOTHING ELSE
TO BUY

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". Wt. 4 1/2 lbs.

HEATHKIT SIGNAL TRACER KIT



\$19.50

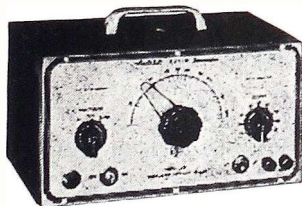
Nothing ELSE TO BUY

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". Wt. 6 pounds. Ideal for taking on service calls. Complete your service shop with this instrument.

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, 110 V 60 cycle power transformer, 5 tubes, detailed blueprints and instructions. R.C. type circuit with excellent stability. Shipping weight 15 pounds.

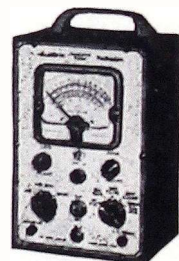


\$34.50

Nothing
ELSE TO BUY

THE NEW HEATHKIT VACUUM TUBE VOLTMETER KIT

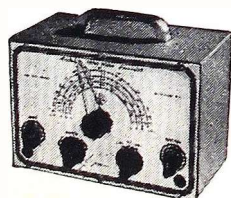
The most essential tool a radio man can have, now within the reach of his pocketbook. The Heathkit VTVM is equal in quality to instruments selling for \$75.00 or more. Features 500 microamp meter, transformer power supply, 1% glass enclosed divider resistors, ceramic selector switches, 11 megohms input resistance, linear AC and DC scale, electronic AC reading RMS. Circuit uses 6SN7 in balanced bridge circuit, a 6H6 as AC rectifier and 6 x 5 as transformer power supply rectifier. Included is means of calibrating without standards. Average assembly time less than four pleasant hours and you have the most useful test instrument you will ever own. Ranges 0-3, 30, 100, 300, 1000 volts AC and DC. Ohmmeter has ranges of scale times 1, 100, 1000, 10M and 1 megohm, giving range .1 ohm to 1000 megohms. Complete with detailed instructions. Add postage for 8 lbs.



\$24.50

Nothing
ELSE TO BUY

HEATHKIT FM AND TELEVISION SWEEP GENERATOR KIT



\$24.50

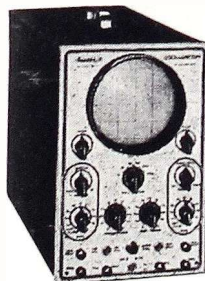
NOTHING ELSE
TO BUY

THE BASIC FM AND TELEVISION SERVICE INSTRUMENT

At the lowest cost possible, anyone can now service FM and television receivers. The Heathkit sweep generator kit operates with oscilloscope and covers all necessary frequencies. A few pleasant hours assembling this kit puts any organization in position to share the profits of the FM and TV boom.

Every part supplied — grey crackle cabinet, two color calibrated panel, all metal parts punched, formed and plated. 5 tubes, complete detailed instructions for assembly and use. Shipping weight 6 lbs.

The NEW 1948 HEATHKIT 5 INCH OSCILLOSCOPE KIT



\$39.50

NOTHING ELSE
TO BUY

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, 5B1 tube, 2 5Y3 tubes, 2 6SJ7 tubes and 884 sweep generator tube. Power transformer supplies 1000V 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.



The **HEATH COMPANY**

... BENTON HARBOR 12, MICHIGAN

Assembly, which delivers a full 520 square-inch picture, T.A.C. also manufactures its own 30 KV Tripler Fly-back Power Supply.

Reps Announce Program

The Industry Relations committee of The Representatives of Radio Parts Manufacturers, Inc. has announced its program for 1948-49 activities, following a special meeting here under the chairmanship of J. Y. Schoonmaker, Dallas, Texas.

The entire program, according to Schoonmaker, is designed to serve the dual purpose of giving service and information to the various seg-

ments of the radio parts and electronic equipment industry. It will include activities keyed directly to the interests of manufacturers, jobbers, dealers and servicemen in an attempt to harmonize all groups and benefit all members of the industry.

Automobile TV

A sealed-in device which automatically turns off an automobile's television test when the car is in motion is the answer to Safety Officials' concern over the advent of auto video, Raymond W. Durst, executive vice president of the Hallicrafters Company, Chicago television and radio

manufacturers said here this week in commenting on a press association story from Milwaukee that a video set has been installed in a private car there.

Andrew Appoints New Heads

C. Russell Cox, of Andrew Corporation, Chicago, takes over the newly created office of Director of Sales and Engineering. Walter F. Kean, assumes new duties as Andrew Sales Manager. John S. Brown moves from Assistant Chief Engineer to Chief Engineer in the other change.

New Half-Size Sound Tape Reels

Minnesota Mining and Manufacturing Co., 900 Fauquier Avenue, St. Paul 6, Minnesota announces their new half-size reels of "Scotch" sound recording tape, with either paper or plastic backings, for immediate national distribution.

I.R.E. Elects Officers

The Institute of Radio Engineers has announced the election of Stuart L. Bailey as president of the Institute for the year 1949. Arthur S. McDonald of Australia was elected Vice-President.

Thompson To Head G. E.

Replacement Tube Sales

John T. Thompson has been appointed Sales Manager, Replacement Tubes, for the General Electric Tube Divisions, it has been announced by Divisions Manager J. M. Lang. He

★ For over 35 years—the finest in electrical and electronic instruments.



HICKOK

World Famous

TUBE TESTERS

Choice of the experts!

533 DM (illustrated above)
Dynamic Mutual Conductance Tube Tester

The popular and effective selling-aid model, designed for quick customer-convincing, counter demonstration and test. Incorporates the new HICKOK test feature that foretells future tube life. Large 9" scale, reading directly in micromhos, also indicates "GOOD", "2?" and "REPLACE". 17" x 26 3/4" x 11". 110-130 VAC.

Exclusive features that have put HICKOK Tube Testers far in the lead are:

1. Tests **FUTURE** life of tubes!
2. Tests all tubes **ACCURATELY!**
3. Reads micromhos **DIRECTLY**—the only true test of a tube!
4. Tests tubes for gas content—**more important now than ever before!**

The HICKOK line of Tube Testers is COMPLETE. They are available in portable, counter and display cases. Also with self-contained, high sensitivity multimeters and with specially designed professional features.

HICKOK has long been the choice of leading technicians and electronic manufacturers the world over.

See your jobber or write for free catalog.

THE HICKOK

ELECTRICAL INSTRUMENT COMPANY

10533 DUPONT AVENUE • CLEVELAND 8, OHIO

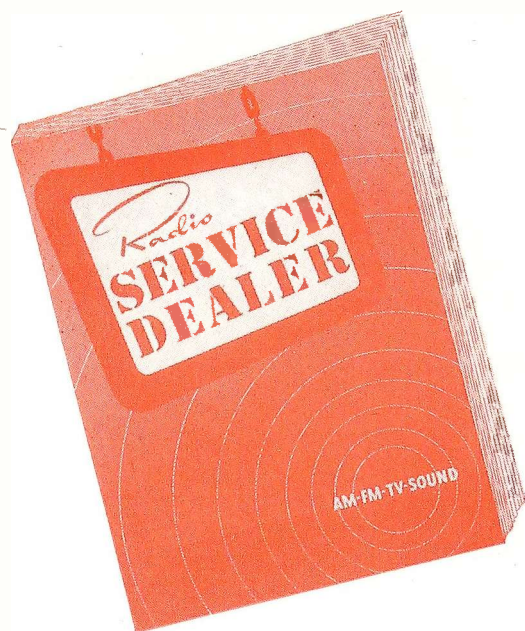


will have headquarters responsibility at Schenectady, N.Y., for the promotion and sale of G-E electronic tubes to more than 500 G-E and Ken-Rad tube distributors located throughout the country.

More RMA Town Meetings

Dates and locations for the two more in a series of meetings spearheading a program to assure proper installation

Form A Group, Servicemen— Subscribe to "RSD"— SAVE Up to 50%



★ The more in a group the bigger the savings. 6 men in a group save \$1.00 each; 4 men groups save \$.75 per man. Present "RSD" subscribers may participate in or form a group with co-workers, or even competitors. Still active subscriptions are automatically extended 1 year. Start a Group today! The timely and exclusive technical data appearing in future issues of "RSD" will make this the best investment you ever made. The special Group Rate offer may be withdrawn at any time—so hurry.

Use This Coupon For Convenience

(The coupon below can be used for from 1 to 6 subscription orders. Use it today!)



TEAR OUT — MAIL TODAY

RADIO SERVICE-DEALER MAGAZINE
342 Madison Ave., New York 17, N. Y.

Please enter 1 year subscription orders for the names given below. Our remittance is enclosed.

NOTE: If you do not wish to tear this order blank out, just print or type the information on a single sheet of paper, following the style given. Each subscriber's occupation must be clearly described.

	In U.S.A. & Canada	Foreign Rates
<input type="checkbox"/> One 1-year subscription	\$2.00	\$3.00
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<input type="checkbox"/> Three 1-year subscriptions, "	1.50	2.50
<input type="checkbox"/> Four 1-year subscriptions, "	1.25	2.25
<input type="checkbox"/> Five 1-year subscriptions, "	1.10	2.00
<input type="checkbox"/> Six 1-year subscriptions, "	1.00	1.50

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State whether a New Subscriber or Renewal Order

and maintenance of the nation's television sets were announced today.

The first of these Town Meetings of Radio Technicians is to be held in Municipal Auditorium, Atlanta, Ga., on January 31 and February 1 and 2, 1949; the second is to be held at the Roger Young Auditorium, Los Angeles, on February 28 and March 1 and 2, 1949.

New Aerovox TV Capacitors

IN keeping with television servicing needs quite as well as custom-built and experimental requirements, Aerovox Corporation of New Bedford, Mass., announces a number of new

electrolytic capacitor ratings. Several of these new values are offered in the popular twist-prong-base electrolytics, in single, dual and triple section units. Several single, dual and triple section units have been added to the midget metal-can and the cardboard-tube electrolytic types. The new ratings will be listed in the next edition of the Aerovox catalog, but are currently available through jobbers.

N.Y. State Service Ass'ns Organize

Representatives of service technicians' organizations made a significant step forward on October 31, when they met in Binghamton to form ESFHTA,

the Empire State Federation of Electronic Technicians Associations.

The following officers were elected at the Binghamton meeting: Their term of office ends April 1949.

President, T. Lawrence Raymo, Pres. RTG, Rochester; Vice-Pres., Max Leibowitz, Pres. ARSNY, New York City; Secretary, Wayne Shaw, Pres. RSA, Binghamton; Treasurer, Ben De Young, Pres. RTG, of Central New York; Sgt-at-Arms, Ewart M. Howland, Pres. Hudson Valley RSA.

TV Set Output Breaks Records

Television receiver production soared to a new monthly peak in September, the Radio Manufacturers said today, as RMA member-companies reported manufacturing 88,195 TV sets to bring their output for three quarters of 1948 to 488,133.

Following is a month-by-month table on television and radio set production for the first nine months of 1948:

	TV	FM-AM
January	30,001	136,015
February	35,889	140,629
March	52,137	161,185
April	46,339	90,635
May	50,177	76,435
June	64,353	90,414
July	56,089	74,988
August	64,953	110,879
September	88,195	171,733
TOTAL	488,133	1,052,933

	AM	All Sets
January	1,173,240	1,339,256
February	1,203,087	1,379,605
March	1,420,113	1,633,435
April	1,045,499	1,182,473
May	970,168	1,096,780
June	959,103	1,113,870
July	552,361	683,438
August	759,165	934,997
September	1,020,498	1,280,446
TOTAL	9,103,234	10,644,300

Radio Network For Farmers

Feeling that radio was not getting sufficient and specialized farm information to the farmers, that an exchange of ideas was not keeping pace with farming progress, and that city stations were not necessarily serving the farmers' exclusive interests, it was decided here recently by ten New York farm organizations that an FM radio network should be established to serve farm homes throughout New York State.

The result has been the establishment of the Rural Radio Network Inc., wholly-owned by ten farm organizations, serving 118,000 farms in New York State. It is the first all-radio network of its kind in the United States and, in its final phase, incorporates every known means of



Replacements FOR ALL SETS!

Television creates new opportunities of profit for servicemen and a new need for replacement speakers. Now Utah announces two new ovals especially designed for TV. Both are 4x6's, the SE46T6 with a 60 ohm field and the SE46T10 with 100 ohms resistance. Other ovals in the Utah line qualify for use in television sets. Many permanent magnet weights and various field coil resistances are available in 4x6's, 5x7's and 6x9's. TV is big business — see your jobber today.



UTAH RADIO PRODUCTS

HUNTINGTON, INDIANA

DIVISION OF INTERNATIONAL DETROLA CORPORATION
EXPORT DIVISION: MORHAN EXPORTING CORP. N.Y., N.Y.

UTAH FOR AM, FM, VIDEO

communication to carry on its operation.

Sun Radio Opens Sound Studio For Service Dealers

Sun Radio, in N.Y.C. has opened its sound studio containing representative lines of popular P-A equipment so that the Service Dealer who cannot afford such an extensive array may



demonstrate to his customer any combination of P-A units with the flip of a switch. The illustration shown above indicates the complete layout of this studio.

JFD Completes New Brooklyn Plant

Consummating a postwar expansion program, the JFD Mfg. Co., Inc., Brooklyn, N.Y., announces the completion of its new plant which will be devoted entirely to the manufacture of radio parts and TV-FM antenna equipment and accessories. The new factory will employ the most advanced mass production methods in turning



out more than 4,000 JFD items, which include 30 JFD Superbeam TV-FM antennas and 50 JFD TV accessories.

Under the direction of Mr. Julius Finkel, Pres., and his sons, Albert and Edward, the JFD organization is in the process of expanding its sales force, jobber outlets, and serviceman following.

Magnavox TV Service Reps.

The appointment of three district representatives to supervise the nationwide television service organization of The Magnavox Company was announced here today by Ray J. Yeranko, Magnavox service manager. In charge of the western district, west of the Rocky Mountains, is Charles K. Krolek. Central District television service manager is Russell J. Weber, who will have headquarters in

BACK NUMBERS of "RSD"

Order them now - the supply is low.

FEBRUARY 1946

Applying Neg. Feedback in Audio Amplifiers

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
Ohmmeters, Condenser Testers, Capacitance Meters, Part 1

JULY 1946

Distortion—Determining the Cause, Part 1
Ohmmeters, Cond-Testers, Cap.-Meters, 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

JANUARY 1947

Accurate Audio Amplifier Measurements
The "Guillotine" Tuning-System
Dipoles for FM-TV Home Receivers

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 Customers

Using 'Scopes For Radio Servicing

MAY 1948

FM Set Alignment Procedure
Video Detectors

How Vectors Simplify Servicing

Significance of Power Factor and ϕ

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

RADIO SERVICE DEALER MAGAZINE

342 MADISON AVE., NEW YORK 17, N. Y.

Please send me the back numbers checked here
The price is 35c. for each copy unless 10 or more are ordered. If 10 or more are ordered the price is 25c. each copy.

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NAME

ADDRESS

CITY ZONE STATE

Chicago and cover the territory between the Rocky Mountains and Ohio. Charles C. Kayhart is eastern seaboard representative with headquarters in New York City.

Radio in Convertible Chair-Bed

A radio set in arm of new convertible chair-bed was introduced recently

by Motorola. Chair converts into a comfortable 6½ foot long bed merely by pushing a button. Ottoman at foot holds bedding.

Stromberg-Carlson Sales Package

Shipments of Stromberg-Carlson's special radio sales kit for Fall merchandising of the 1948-49 line were

completed this week to the company's authorized dealers throughout the country.

Terminal Radio New Sales Policy

Terminal Radio Corp., New York distributor, has recently discontinued its home radio and appliance department to make room for the radio serviceman's increased need for television, service and sound equipment.

G.E. Announces New FM

Receiver For Buses

A new FM radio receiver, designed specifically for installation in buses, has been announced by the Specialty Division of the General Electric Company's Electronics Department at Syracuse, N.Y. The new unit will operate up to eight speakers, enabling low level operation of each one.

ANNOUNCING

**A COMPLETE LINE OF
ASTATIC
Long-Playing PICKUPS
and CARTRIDGES**

*that includes JUST WHAT
YOU'RE LOOKING FOR!*



**FLT-33 CRYSTAL
TRANSCRIPTION
PICKUP**



**FL-33 CRYSTAL
PICKUP**



**510-QT-33
CRYSTAL PICKUP**



**400-QT-33 CRYSTAL
TRANSCRIPTION
PICKUP**

WANT a two-in-one pickup that plays both LP and 78 RPM Records with the simple switching of cartridges . . . so simple that a child can make the change in a few seconds? Or, perhaps you are looking for comparable reproduction quality, with more emphasis on economy? Regardless of whether your requirements point to cartridges employing ceramic elements or magnetic-type units . . . whether you prefer permanent or replaceable needles, metal, sapphire or diamond . . . whether cost is first or secondary . . . whatever the conditions to be met—there now is a unit of Astatic precision engineering and construction, that will exactly fill the bill. Space permits mention here of only a few. Why not write for new brochure, giving complete information, illustrations, on the Astatic Long-Playing Equipment Line?

Astatic Crystal Devices
Manufactured Under Brush
Development Co. Patents

Listed in the Radio Industry Red Book



FIELD FINDINGS

[from page 8]

confine their activities solely to service work should be given the opportunity and privilege of selling certain nationally known brands of receivers, especially moderate to low priced models, without being required to take on a complete franchise for an entire line, including big consoles, etc. which they cannot afford to inventory and tie up funds in.

Instead of expanding the number of retail outlets to stores not now engaged in handling radios, set makers should strive to strengthen the position of existing radio establishments, whether or not they are now engaged in retailing radios notwithstanding. We do not imply that hardware, drug, toy or jewelry stores now selling radios in substantial quantity should be cut off by suppliers of nationally known brands with whom they deal. Instead, the toy, drug and hardware store that handle the junk lines would clean their own house, and RMA, by obliterating the "loft" type of manufacturers, would do well to force this condition upon them if they are reluctant to do it themselves.

It is human nature to want finer things. People will scrimp and save and do without certain things for a time to enable themselves to obtain what they really desire. Merchandising should be founded on that basis. Stromberg Carlson's history proves the soundness of the idea. Compare it with the old Majestic or Grigsby-Gruno philosophy. People respected S-C because they never over-produced a model, never over-extended a fran-

A Remarkable NEW LINE

High QUALITY High POWER

Custom-Built
AM-FM Chassis

Like every other model in the complete ESPEY line of replacement receivers, and FM Tuners, the Model 511 AM-FM chassis (illustrated) is the last word in modern engineering in the electronics field. Featuring 12 tubes plus Rectifier and Tuning Indicator, it is Drift Compensated, and is supplied complete with all

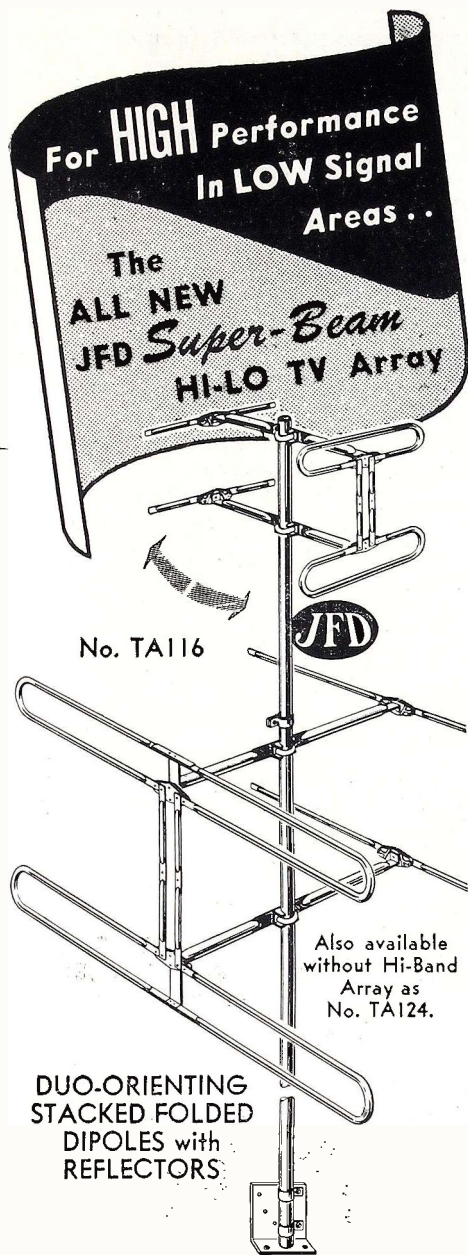
ESPEY MANUFACTURING COMPANY, INC.

528 EAST 72nd ST. NEW YORK 21, N. Y. "Established 1928"



Espey Model 511

antennas, 25 watt speaker, and all hardware. Its low price assures high profits for you in the growing replacement field. Write today to Dept. M-11 for complete details of this expanding profitable market!



LOOK AT THESE LONG-RANGE PERFORMANCE FIGURES FROM ACTUAL REPORTS!

CITIES	DISTANCE IN MILES
Albany - New York	125
Cleveland - Pittsburgh	120
New Haven - New York	110
San Diego - Los Angeles	100
South Bend - Chicago	90

OUTSTANDING FEATURES!

- ✓ Gives full 12 channel TV reception plus FM.
- ✓ Supplied complete with 10' Mast, All-Angle Mounting Bracket and Stand-Off Insulators.
- ✓ U-Bolt Clamp construction provides 1/8, 1/4 or 1/2 wavelength spacing of 2, 4, 6, or more bays on mast for tremendous stacking flexibility — also permits independent orientation of each bay.
- ✓ Lightning-fast assembly time.
- ✓ Impedance of 150-260 ohms and +8.6 DB gain.
- ✓ All-weather Roto-lock insulator made from low-loss polystyrene for perfect high frequency insulation.

Write for Literature



4113 Ft. Hamilton Pkwy., Brklyn 19, N. Y.

"Manufacturers of the World's Largest Line of TV/FM Antenna Equipment"

chised dealer to the point where he had to "dump" his stock. Majestic, in contrast, while they made good sets, continually over-produced more than the market could absorb and consequently often "dumped" entire lines causing chaos and havoc in the entire field. That Stromberg is still a big factor and Majestic is nothing more than a memory, with creditors still awaiting payment of monies due, proves this contention. On the other hand, RCA had, several years ago, a policy of merchandising their Radiola sets as a short-franchise line that did not conflict with the big RCA-Victor setup. Service Dealers and small service organizations could and did handle Radiolas successfully, and the public acceptance was unquestioned.

According to news releases, we are soon to find price controls reinstated in certain fields "where such controls are found advisable". This is pretty indefinite, but it might apply to radio, though we doubt it. Our war-time and immediate post-war contentions that the radio industry would and could render a greater public service if left uncontrolled is now proven by fact. Being a most highly competitive field, it could not be otherwise. Six months after war ended almost 500 firms claimed to be radio set manufacturers and many Johnny Come Lately opportunist set makers were marketing sets for \$50 list that obviously weren't worth half that amount. Now less than 100 set makers are in business (although two score are in very bad financial condition) and they are producing grand merchandise in the \$20 retail brackets. With the advent of TV, it is still questionable as to how many manufacturers will survive, and as to how many will be really important factors in the years ahead.

The Associations

From all parts of the country secretaries of various associations are sending us advices that their activities to re-win public acceptance and confidence are meeting with success. For example, Leon Helk, president of Lackawanna Radio Technicians Assn., submits a newspaper clipping which tells how that organization has adopted a program combating overcharges and other illegitimate practices. When newspapers carry such articles rather than the condemnatory ones we are so used to, it is evidence that great progress is being made. As for ourselves, one only has to sit in our office a few hours during which indubitably several telephone calls will come in with the phoner asking a question



Get YOUR All-Plastic Cabinet by Purchasing the Serviceman's Resistor Assortment

It's easy to find the *right* resistor... *fast*... in this handy, handsome, all-plastic OHMITE cabinet. Compact — only 9" x 5 1/4" x 4 3/4" — its 40 compartments are factory packed with a carefully selected serviceman's assortment of 125 individually marked, 1/2-watt "Little Devil" resistors in the 40 values from 10 ohms to 10 megohms most frequently used. And, you pay only the regular price of the resistors... *nothing extra for cabinet.*



See Your Distributor

BROWN DEVIL

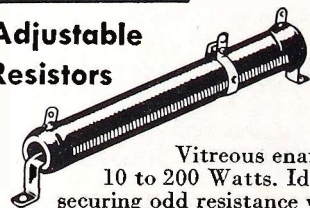
Vitreous Enamel Resistors



A favorite with servicemen. Easily mounted by its tinned wire leads. In sizes 5, 10, and 20 watts. Tol. ±10%.

DIVIDOHM

Adjustable Resistors



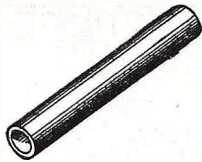
Vitreous enameled. 10 to 200 Watts. Ideal for securing odd resistance values.

OHMITE MANUFACTURING CO.
4896 Flournoy Street • Chicago 44, Ill.



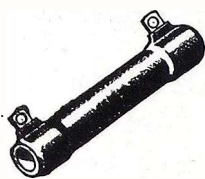
RHEOSTATS • RESISTORS • TAP SWITCHES

IRC Power Wire Wounds are better built every step of the way



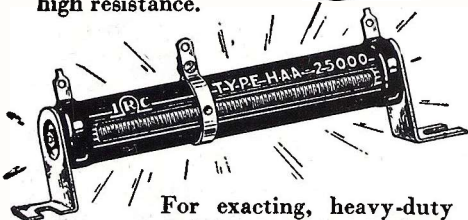
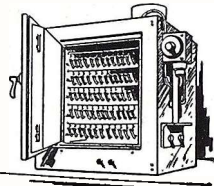
Starting right from the winding form IRC Power Wire Wounds combine the best of materials, workmanship and resistor "know-how".

Highest grade alloy wire uniformly wound on sturdy ceramic tubes. Terminals spot welded for security; heavily tin dipped for easy soldering.



Climate-proof cement coating provides dark, rough surface—best for rapid heat dissipation, moisture protection and ability to withstand reasonable overloads.

Resistors cured at LOW temperature prevents damage to resistance windings, and loss of temper in terminals. Bands for adjustable types feature stainless steel springs and silver contacts. Cannot corrode to cause high resistance.



For exacting, heavy-duty requirements you can rely on IRC Power Wire Wounds for balanced performance in every characteristic. Being full-sized, they can operate continuously at full rating. Derating in high ranges is unnecessary.

IRC Power Wire Wounds are available in a full range of ratings, sizes and terminal types. 91 new ranges have just been added. Next time you step up to your distributor's counter—stock up on IRC Power Wire Wounds.



**INTERNATIONAL
RESISTANCE CO.**

401 N. Broad Street, Phila. 8, Pa.

In Canada: International Resistance Co., Ltd.,
Toronto, Licensee



YES! We're listed in the **RED BOOK**. Looking for the correct IRC replacement controls for any receiver manufactured from 1938 to 1948? Just refer to the Radio Industry **RED BOOK!**

something like this: "I hear there is an association of honest radio servicemen here in New York and I'd like to have the name of it because I've got a set that needs repairing and I want one of that association's members to do the job." It's a pleasure to refer such calls to ARSNY which maintains a centralized distribution system allocating such calls to the member closest to the caller.

New York State now has a federation of associations. The organization, working under the title: Empire State Federation of Electronic Technicians Associations (ESFETA) is well on its way toward success, with all five of the state's existing Guilds or Associations participating. The roster of officers is listed elsewhere in this issue along with the other associations.

Random Jottings

New York's mayor wanted a TV receiver installed in his office at City Hall. According to newspaper accounts it is no-go. Expert installers and some of the best engineers have not been able to make a satisfactory installation. They've run into every possible obstacle. Does that news make the "ordinary" TV installer feel better?

A chap living in Milwaukee installed a small TV receiver in the front of his car and after making tests reported the installation quite satisfactory. However, the police department and the Safety Commission, upon hearing of the rig, had less complimentary things to say. They report it as a menace to highway safety (to which we agree) and further report that if the idea spreads municipalities will have to enact laws to eliminate the practice. Fine!

A Chicago TV installer leaned so far out of a window trying to tie down the transmission line neatly "in accord with recommended standards" that he wound up in a hospital with a sizable bump on his noggin. Lucky he was working on a second floor job. New York TV installers sometimes get height "jags" when working on installations 20 to 30 floors above street level. Some report anti-seasickness pills help while others recommend a hooker of Rye. This is one problem I won't express an opinion about, for I'm strictly a Scotch drinker and no seasickness pill ever gave me relief.

Dealers everywhere in TV areas are kicking that they are not getting enough TV sets, with orders continuing far in excess of supply. That's the kind of news we like to report, although it does give us a pang of re-

Vital Aids

IN SERVICING MINIATURE TUBE RADIOS AND EQUIPMENT



★ Star Miniature Socket Wiring Plugs for accurate alignment of miniature socket contacts during wiring. Precision cast of zinc base alloy—pins of stainless steel. #JE-9 (9 pin); #JE-10 (7 pin).

★ Star Miniature Tube Pin Straighteners (with stainless steel insert) to obtain a perfect fit when the tube is placed in the equipment. #JE-15 (9 pin); #JE-13 (7 pin).



Scientifically designed—Precision made
Immediate Delivery in Any Quantities
Visit our Display Booth I. R. E. Show,
March 7-10, 1949

★ **STAR EXPANSION PRODUCTS CO., INC.**

147 CEDAR STREET, NEW YORK 6, N. Y.



Easier Antenna Installations



STAR TAMPIN



STAR DRYVIN



STAR STAZIN



STAR SPRINGIN

Star Expansion Bolts make it easy to fasten TV equipment to brick, stone, concrete or any other type of masonry. Help you to position antenna masts, cables and lines in the best possible manner... assure greater satisfaction; reduce service calls. There's a Star fastening for every masonry job. See your jobber or write for details.

Visit Our Display Booth, I. R. E. Show March 7-10'49

★ **STAR EXPANSION BOLT CO., INC.**

147 Cedar Street, New York 6, N. Y.

FREE



SERVICE MEN REPAIRMEN!

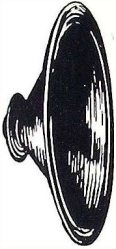
WALDOM REPLACEMENT CONE MANUAL

Just mail your name and address today for **FREE** copy of the big 20-Page **WALDOM Replacement Cone Manual**, listing replacement data for 69 different brands of speakers—from Admiral to Zenith! Manual also gives complete instructions, together with clear illustrations for installing cones properly. Invaluable reference guide for servicemen and repairmen. Get your copy **FREE!** Just send name and address.

FOR FINER TONE A WALDOM CONE

Waldom Replacement Cone Assemblies will satisfy the high standards of precision workmanship and performance set by you and by your customers because . . .

- **WALDOM CONE ASSEMBLIES** feature **HAWLEY** diaphragms with the patented thin, tapering edge that assures maximum speaker efficiency and true low frequency response.
- **WALDOM CONE ASSEMBLIES** are guaranteed unconditionally as to construction and performance. Only the very finest voice coils and spiders, precision made to exact specifications, are used.
- **WALDOM CONE ASSEMBLIES** carry full R. M. A. Warranty.



Write for Your **FREE**

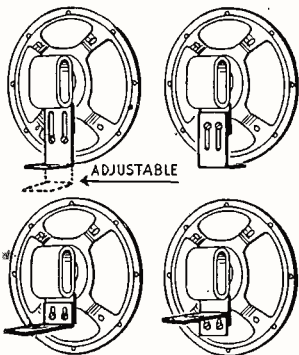
REPLACEMENT CONE MANUAL! The big 20-Page **WALDOM Manual** puts every bit of replacement cone information at your fingertips, in seconds! It will speed your speaker repair work, and help you handle those jobs more profitably. Send your name, address for **Free** copy.

WALDOM ELECTRONICS, INC., Dept. RS
911 N. LARRABEE STREET CHICAGO, ILLINOIS

Mr. Joseph B. Reynolds of the Reynolds Radio Supply at Lawton, Oklahoma says:

"Our customers tell us your adjustable mounting bracket is just what they have wanted. We have calls every day for speakers with this type of mounting."

**YOUR CUSTOMERS WILL
TELL YOU THE SAME THING.**



Write for literature

WRIGHT Inc.

2231 University Ave. St. Paul 4, Minn.

gret for those of you who are not located in areas served with TV as yet.

R. C. Cosgrove, exec.-V.P. of Avco (Crosley), opines that in five years TV will be giving employment to one million people and that by 1953 over 12,000,000 TV sets will be in use with over 50,000,000 people in the day by day audience. I agree with M. Cosgrove. Most TV stations are improving their programs, and nowadays having a TV set is a good investment. What one saves on not going to movies or sporting events more than pays for the set.

Many TV stations have failed to cooperate with radio technicians who are entrusted with the job of installing the sets that actually justify the station's existence. By that I mean, many TV stations fail to put their test pattern on the air until late afternoon. Every TV station should have their pattern on the air from 9 a.m. until the station goes into action. TV installers should not be penalized by having their patterns held off until late in the day when they want to knock off work and go home. How about it TV stations? Can't we get cooperation? Without it you set yourselves back.

MAGNETIC RECORDERS

[from page 18]

troublesome symptoms occur. The serviceman who works with magnetic recording equipment must adopt the rule that the unit on which he is working was correctly designed, and that, with few exceptions, the complaint was caused by a change or a defect in one or more components. The serviceman's job then becomes one of diagnosis, repair, or replacement. At no time is he called upon to act as a design engineer, and he should resist the temptation to become one. On reviewing this last statement, it is apparent that it applies appropriately to the servicing of other electronic equipment as well.

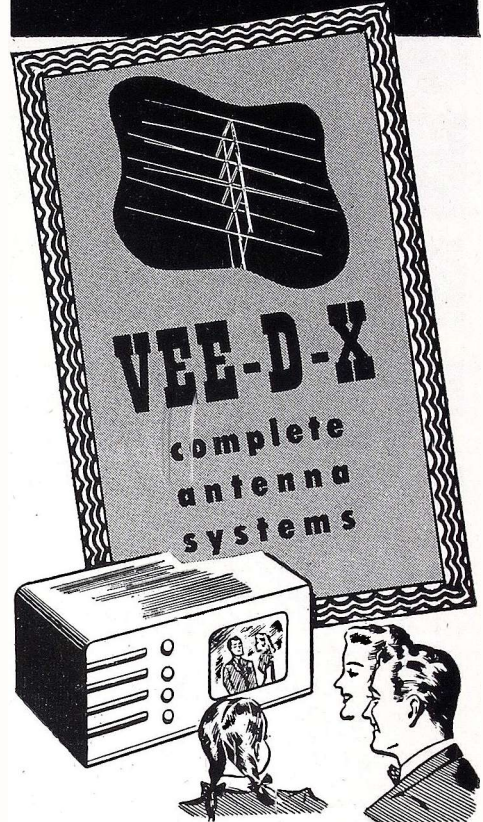
VIDEO WAVEFORMS

[from page 15]

wave produced at the output of the discharge tube. Waveshape (c) is the flattop voltage wave appearing across the horizontal deflecting coils. Remember that a flattop voltage wave produces a sawtooth current wave in a circuit which is predominantly inductive.

To those who might be a little puzzled at the reason for this statement we refer to the formula shown at the

YOUR INSURANCE FOR BETTER TV RECEPTION



INSURANCE is protection against personal loss . . . a VEE-D-X high gain, long range antenna is your protection against weak, spotty TV pictures. The VEE-D-X high gain means plenty of "power" to send signals booming into your receiver. No matter how good your pictures are now, a VEE-D-X installation makes them better. For consistent reception during the winter weak signal periods, replace ordinary antennas with a high gain VEE-D-X. In primary areas, VEE-D-X supplies the DGA-12, the SKY MONITOR. A broad band TV and FM antenna that has extremely flat response across the entire FM and TV spectrum.

See it, today, at your jobber.

VEE-D-X Supplies everything for complete TV antenna systems: • High gain antennas • primary area FM and TV antennas • two and three stage pre-selectors • mast sections • all angle mount base • chimney mount • cable clamps • cable thimbles • guy wire • rotators • guy rings • guy ring collars • transmission line • stand-offs.

LaPOINTE PLASCOMOLD CORP.
UNIONVILLE, CONN.

VEE-D-X

Adds more vision to television

**JACK-OF-ALL-TRADES
REPLACEMENT...**

AEROVOX

CLEAT-MOUNTING

ELECTROLYTICS



● An Aerovox-originated type. Replaces other electrolytics requiring mounting hole in chassis, twist-prong base, spade-lug, and/or tubular types. This Jack-of-all-trades cleat-mounting job is installed in a jiffy by center screw and metal cleat.

Available in the aluminum-can (illustrated) Type PRVC for the better trade (single, dual and triple sections). Also in the cardboard tube Type PRV for the price-conscious trade. Definitely, but really *definitely*, the jack-of-all-trades replacement.

● ● ● ● ●
● Keep a supply of these universal replacements on hand. Or depend on your Aerovox jobber to supply you in a hurry. Catalog on request.



**FOR RADIO-ELECTRONIC AND
INDUSTRIAL APPLICATIONS**

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Ad. Index

Aerovox Corporation	40
Alliance Mfg. Co.	30
Astatic Corporation, The	36
Centralab Div. of Globe-Union 10-11	
Espey Mfg. Co., Inc.	36
Federal Tel. & Radio Corp. ..Cover	3
General Elec. Co., (Speaker Div.)	27
General Elec. Co., (Ken Rad Tube Div.)	2
General Industries Co., The	7
Heath Co., The	31
Hickok Elec. Instru. Co.	32
Hytron Radio & Electronics Corp.	7
International Resistance Co.	38
J.F.D. Mfg. Co., Inc.	37
La Pointe Plascomold Corp.	39
Mallory & Co., P.R. Inc.Cover	2
Ohmite Mfg. Co.	37
Permoflux Corp.	40
Racon Electric Co., Inc.	28
R C A (Tube Div.)	Cover 4
Radiart Corp., The	12
Rider Pub., John F.	29
Star Expansion Bolt Co., Inc.	38
Star Expansion Prods. Co., Inc.	38
Telrex, Inc.	40
Transvision, Inc.	6
Triplett Elec. Instru. Co.	9
Utah Radio Products	34

right side of the illustration. This formula states that the induced voltage across an inductor is proportional to the inductance in henrys and the rate of change of current in the coil. If the voltage remains constant, and the inductance is constant, this rate of change of current also remains constant. A current in which the rate of change is constant is linear and therefore a sawtooth.

The next installment will deal with the practical methods that may be employed in order to observe the wave-forms just discussed.

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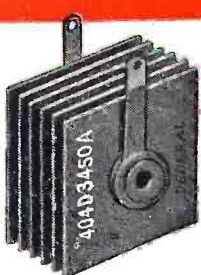


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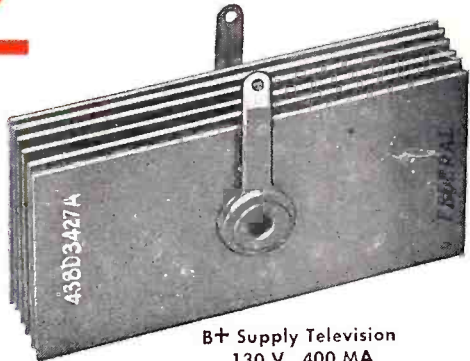
Vibrator Doubler
160 V 75 MA



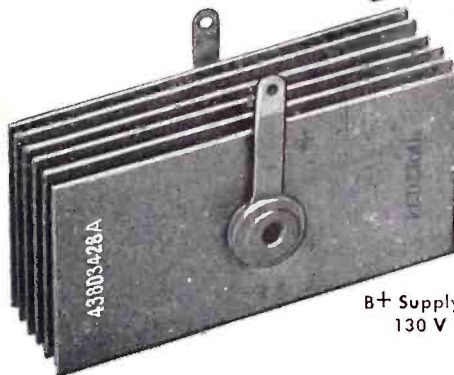
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