

NOVEMBER, 1951

# Radio-Television SERVICE DEALER

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GREEN BAY WISC  
ACME RADIO SERVICE  
191-105 85



## The Professional Radio-TVman's Magazine

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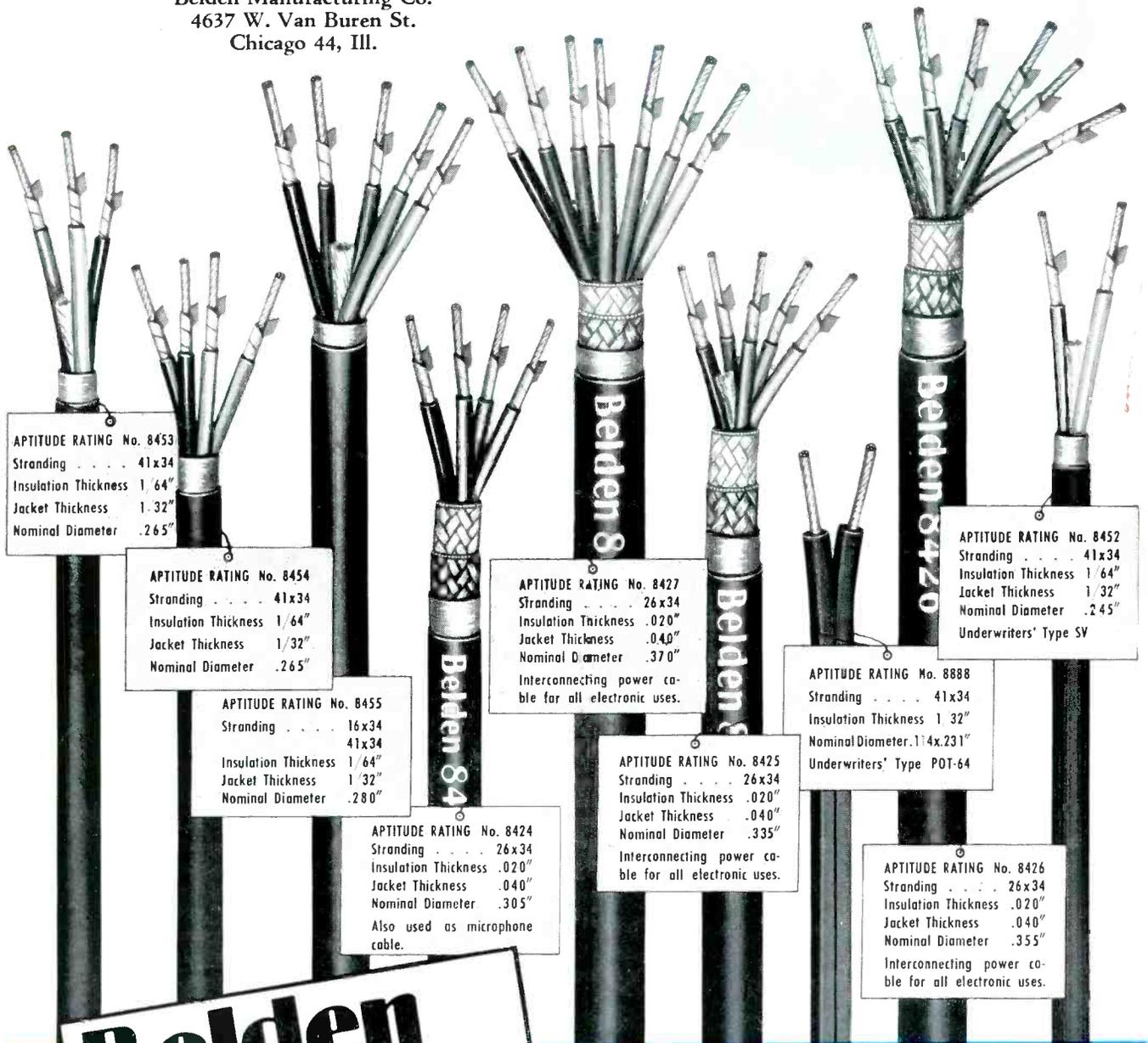
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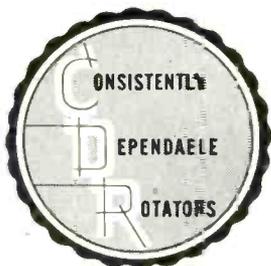
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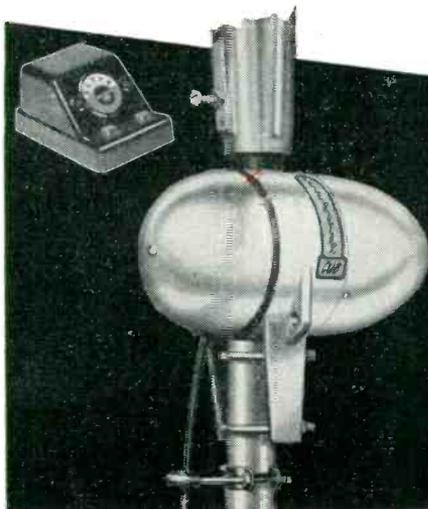
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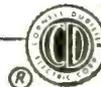
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SUPER-VEE ANTENNAS

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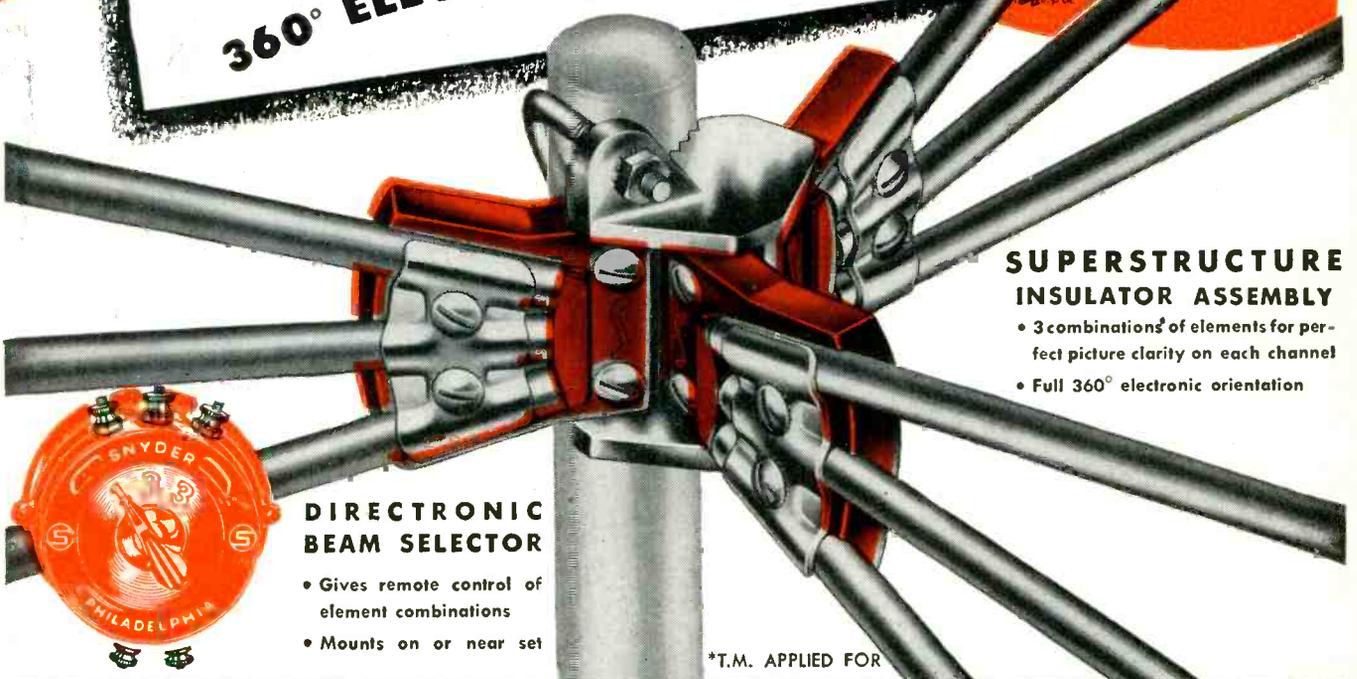
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# EDITORIAL

by S. R. COWAN

## TV Stations—Please Cooperate!

In every city from Coast-to-Coast TV servicemen are greatly handicapped by the TV transmitting stations serving their respective communities simply because the stations are not putting test patterns on the air for long enough periods or at appropriate hours, when technicians can utilize them best.

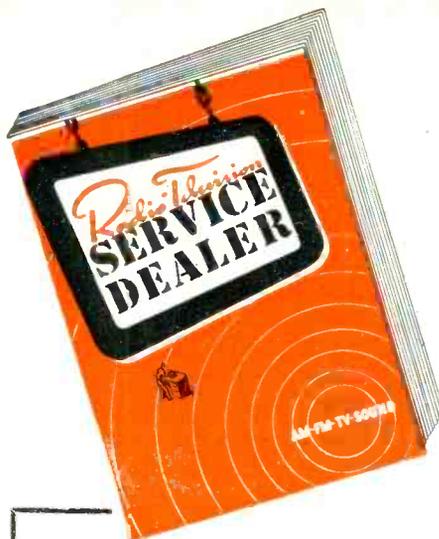
In Kansas City, for example, a few morning hours of test pattern are telecast weekly. K.C. servicemen candidly admit that they believe that 90% of the TVsets in that area have never been aligned or adjusted to a test pattern. This is unfair to K.C. TVset owners and the fault lies with the station, not with the servicing profession. But the payoff is that queried K.C. TVset owners have gotten the impression that their local technicians are lax and incompetent while the transmitting station gets no blame at all despite the fact that it has ignored requests for longer and more timely test pattern schedules to help clarify the matter.

Identically sad situations exist in many other cities, particularly those that are served by one TV transmitter. It's a problem that FCC should attend to for, unless we are off our base, TV Stations should be obliged to protect the investments of the TVset owners when such can be done simply by affording technicians with a test standard from which they can work during the hours the station isn't piling up profits on commercially sold time.

## FCC—Stop "Restricted" TV Programming

We are such simple souls that we believe that all non-military frequencies in the radio-TV spectrum are the property of all men and not a select few. TV is embryonic, but certain interests are trying to kill it while it's a-bornin'. For example, thousands of unsuspecting taxpayers purchased TVsets believing they'd be able to obtain, without extra taxation or service fees, any and all entertaining telecasts such as sporting events, et cetera, that might happen to be transmitted in their locale. But it isn't working out that way. Since certain vested interests learned that big-name fights or key football games might draw better gates or earn larger income from TV rights sold on a restricted-to-theatres basis, the misuses of the public-owned TV spectrum has become untenable.

We reiterate: all TV frequencies belong to and must remain in the public domain; and that no restricted or private enterprise has the right to withhold from public use any part of the spectrum even by handling telecasts partially over closed-wire circuits instead of conventional etherial transmission. Remember—the originating source of a live TV performance and simultaneous telecast requires the use of publicly owned TV frequencies which actuate the TV pickup camera itself.



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**Samuel L. Marshall**  
MANAGING EDITOR

**COWAN PUBLISHING CORP.**  
67 WEST 44TH ST.  
NEW YORK 18, N. Y.



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# TRADE FLASHES

A "press-time" digest of  
production, distribution,  
and merchandizing  
activities

## Reduced TV Production

Manufacturers will not be able to produce more than 1,000,000 to 1,250,000 TV sets during the fourth quarter of this year due to material shortages and Government controls, Glen McDaniel, president of the Radio-Television Manufacturers Association, said in a talk at the annual conference of the International Association of Electrical Leagues here.

With RTMA statistics indicating total industry output of about 4,000,000 television receivers during the first nine months of this year, Mr. McDaniel estimated the output of TV sets in 1951 at between 5,000,000 and 5,250,000 as compared with 7,400,000 in 1950.

"Material shortages are becoming more acute as deliveries of defense orders increase," he said. "Government allocations of several critical metals have been sharply reduced for the fourth quarter and may be cut again for the first quarter of 1952. Thus, it would appear, that radio-television manufacturers will be unable to increase their civilian production greatly during the next few months regardless of the extent of consumer demands."

## Merriam RTMA Service Manager

Glen McDaniel, president of the Radio-Television Manufacturers Association, announced the appointment of E. W. Merriam, former chairman of the RTMA Service Committee, as service manager for the Association.

Mr. Merriam, who until recently was service manager of the Allen B. DuMont Laboratories, Inc., has agreed to take the position on a temporary basis, Mr. McDaniel said, in order to implement some of the activities inaugurated by the Service Committee under his chairmanship. Upon completion of this preliminary work, Mr. Merriam plans to return to private industry.

One of Mr. Merriam's first jobs will be to promote training courses for service technicians in the nation's

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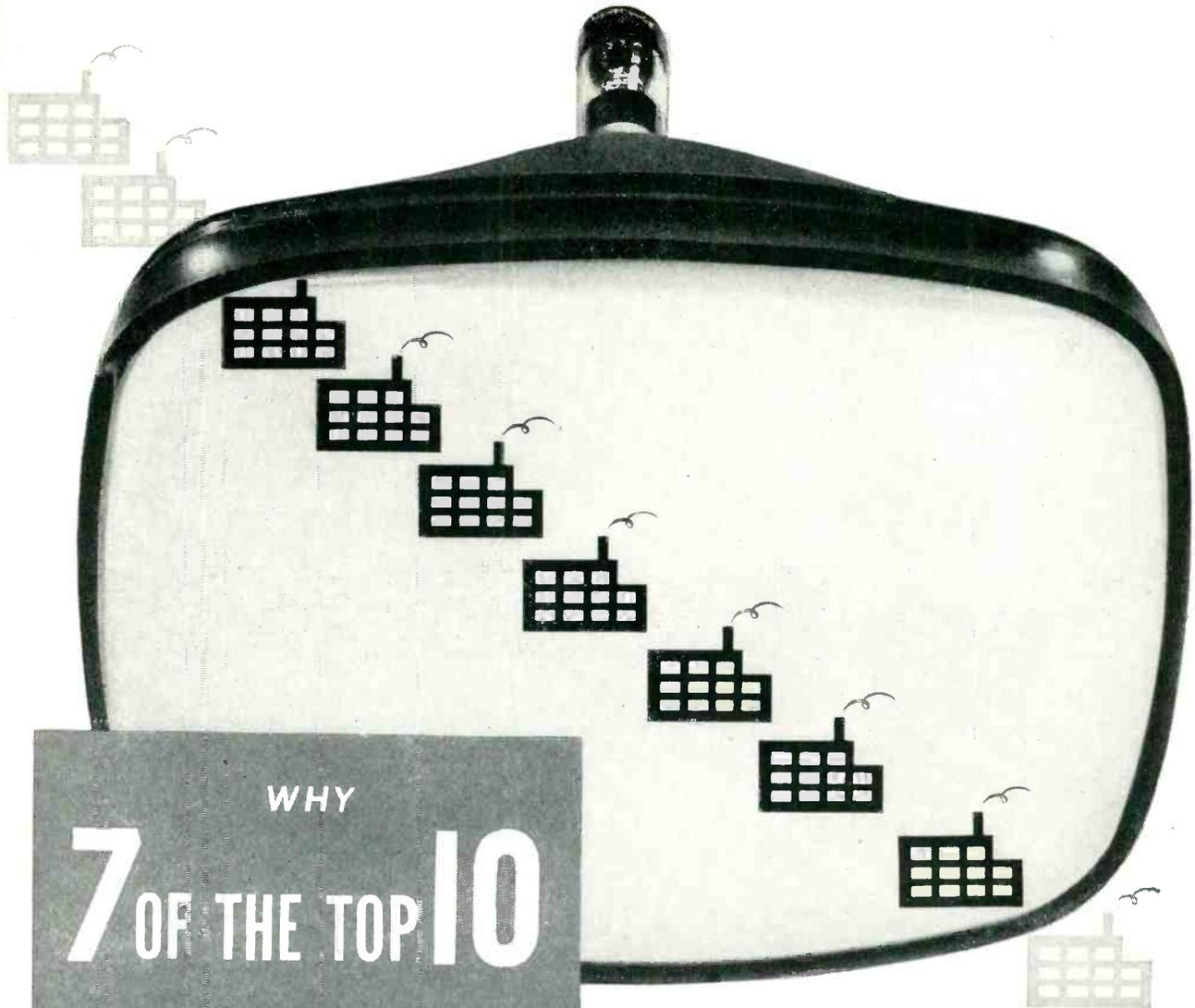
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Sylvania's picture tube experience includes leadership in 4 specialized fields . . . all basic to TV picture tube production. These are *radio, electronics, lighting, and phosphors.*

A Sylvania tube engineer, for example, invented the famous Ion Trap now generally adopted, under special Sylvania license, by other leading picture tube makers.

Sylvania's 25 years of lighting research, including advances in phosphors and filamentary wire techniques and coatings, has also contributed to the outstanding clarity and long life of Sylvania picture tubes.

**Popular TV show tells millions**

Set owners are being kept informed of Sylvania's leadership by the big, popular television show, "*Beat the Clock*," on CBS-TV. Every week this program emphasizes Sylvania's unique background and the fine quality of all Sylvania products, thus assuring you of an enthusiastic acceptance of Sylvania Tubes used as replacements in the sets you service.

To help you choose the right Sylvania Tube for each service job see your Sylvania Distributor now for your free SYLVANIA TV TUBE SELECTOR, a handy wallet folder which explains the differences between more than 100 types of picture tubes. Sylvania Electric Products Inc., Dept. R-2311, Emporium, Pa.



# SYLVANIA



RADIO TUBES; TELEVISION PICTURE TUBES; ELECTRONIC PRODUCTS; ELECTRONIC TEST EQUIPMENT; FLUORESCENT TUBES, FIXTURES, SIGN TUBING, WIRING DEVICES; LIGHT BULBS; PHOTOLAMPS; TELEVISION SETS

RADIO-TELEVISION SERVICE DEALER • NOVEMBER, 1951



## NEW PHONO PICKUP CARTRIDGES TO HELP SIMPLIFY CARTRIDGE REPLACEMENT



**WHAT IT IS:**

A high quality extended range "Vertical Drive" Cartridge complete with positive turnover mechanism. Has sapphire tipped fine-groove and osmium tipped standard-groove needle.

**WHAT IT IS:**

A low cost "Lever Type" Cartridge for 78 RPM records. Equipped with unique "slip-on" condenser-harness for dual-voltage output. 1.5 volts or 3.75 volts obtainable in one cartridge.

**WHAT IT DOES:**

Offers greatly improved performance when used as replacement for single-needle all purpose cartridge. Also recommended for replacement of other types of turnover and dual-needle cartridges. Replaces not only cartridge but turnover mechanism as well.

**WHAT IT DOES:**

Gives servicemen an ideal replacement for old style 78 RPM cartridges. A "leader" value—it modernizes the equipment at an extremely low price—only \$4.95 list. It guarantees improved reproduction. Minimizes inventory problem. One cartridge with choice of two output voltages covers bulk of requirements.

**SPECIAL FEATURES:**

1. Extended frequency response to 10,000 c. p. s.
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3. Sturdy construction guarantees long life of turnover mechanism.
4. Standard 1/2" bracket mount has elongated holes for versatility and quick easy installation.

MODEL W22AB-T—CODE: RUVUR  
LIST PRICE \$10.00

**SPECIAL FEATURES:**

1. "Lever Type" construction assures improved tracking.
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3. Equipped with pin jacks and pin terminals.
4. If used for high output, the condenser may be used separately by the serviceman for other purposes.

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### FREE! THE WONDERFUL NEW CARTRIDGE Replacement Manual No. 66



Contains over 1500 Phonographs—Radio-TV Phono Combinations equipped with or which can effectively use Shure crystal or ceramic cartridges. These sets are made by 123 manufacturers and date from 1938 to 1951.

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trade and vocational schools. A recommended agenda for a training course was prepared by a sub-committee of the Service Committee and has been distributed among trade and vocational schools. A complete course is now in preparation.

Mr. Merriam, who will occupy his new job on Monday, October 15, also will undertake to coordinate various industry activities designed to improve set servicing in the industry and eliminate abuses which have sprung up, according to Mr. McDaniel. He will work with representatives of dealer, distributor, and servicemen's organization in this activity.

The creation of the job of service manager on Mr. McDaniel's staff was authorized by the RTMA Board of Directors at its meeting on Sept. 20 in New York.

#### Sylvania Features Simplicity in Design

Modern simplicity is the keynote of Sylvania's Golden Jubilee table radio. Designed by Sundberg-Ferar, it features an interesting three-dimensional front with concave grill.



The selector dial is clear transparent plastic and the plastic case is available in five Grand Rapids Furniture Maker Guild Colors—Cardinal Red, Primrose Yellow, Hickory Brown, Chartreuse and Bottle Green—as well as in traditional mahogany, ivory and ebony.

#### Parkinson Named Chairman of RTMA Service Committee

Robert C. Sprague, chairman of the board of the Radio-Television Manufacturers Association, recently appointed W. L. Parkinson, of the General Electric Co., chairman of the RTMA Service Committee. Mr. Parkinson succeeds E. W. Merriam who resigned due to a change in his position with the Allen B. DuMont Laboratories Inc.

Mr. Parkinson served as chairman of the committee for two terms in 1946-48. He agreed to take the post for the remainder of this year because of his interest in the current educational program of the Service Com-



You wouldn't want a car that drives only in circles!

Of course not. What you want is a car that will go where you want it to go. And so it is with volume controls, too... a survey of hundreds of servicemen revealed the importance you place on adaptability to the job at hand. Naturally, you want a control that is easily tailored to *any* job.

## Make Sure! Make it Mallory!

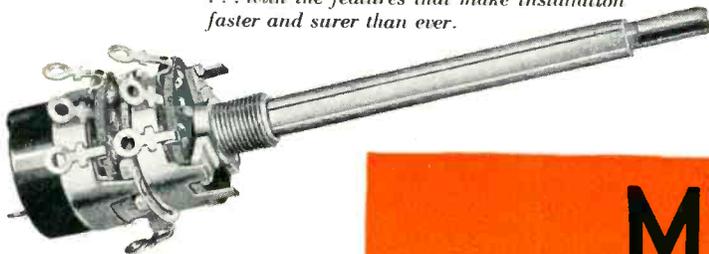
Using the Mallory Midgetrol\* helps you make sure that the installation is exactly as you want it... easier for you and insuring complete customer satisfaction.

There are three big reasons why the Midgetrol  $1\frac{5}{16}$ " control does a better job... because the *permanently fixed tubular brass shaft* can be adapted for any popular knob in a few seconds... because AC switch attachment is simple and positive... because the precision-controlled carbon element gives

smoother taper, quieter operation, more accurate resistance value and less drift in TV sets.

These same advantages are available in the Dual Concentric Midgetrol, tailor-made on the job to match each specific requirement. It is assembled in five easy steps, in less than five minutes, using complete, *factory-inspected* control sections. You can make over 10,000 different combinations from sub-assemblies available in distributor stocks.

*Make it Mallory and make sure! Ask your distributor to show you the Mallory Midgetrol... with the features that make installation faster and surer than ever.*



Complete Dual Concentric Midgetrol illustrated. Single section control available in complete line of resistance values.

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mittee which is aimed at encouraging the training of service technicians in vocational and trade schools.

**RCA To Enter Home Air-Conditioner Field**

The RCA Victor Division of Radio Corporation of America plans to enter the home air-conditioning field, it was announced by Frank M. Folsom, President of RCA.

The first room air conditioners to be sold under the RCA Victor name and trademark will be placed on the market in January, 1952.

In a letter to its distributors, RCA Victor revealed that the air conditioners will be distributed through its present nation-wide organization

of independent home instrument distributors and retail dealers.

Present plans call for the introduction of three models—a one-third, a one-half, and a three-quarter horsepower unit, the company told its distributors. New Designs and specifications for these units will be manufactured under arrangements with the Fedders-Quigan Corp. of Buffalo, N. Y. Fedders-Quigan is one of the leading air conditioner manufacturers

**DuMont Gears Production Facilities For Defense**

The world's largest television receiver manufacturing plant at East Paterson, N. J. is rapidly being converted for the production of the na-

tion's military electronic needs it was revealed at the week-end.

Dr. Allen B. Du Mont, president of Allen B. Du Mont Laboratories, Inc., disclosed several transitional changes in the huge 480,000 square foot facility, which will enable Du Mont to make a fuller use of its productive capabilities for the national defense effort. The transition, he said was made during the recent vacation period. Additional changes are being planned, he declared.

With Du Mont's anticipated TV receiver production set at 40% of last year's total because of the needs of raw materials for our country's defense effort, the executive disclosed that two of the plant's four conveyerized production lines had been allocated to government production. Additionally, areas on the remaining two lines have been reserved for conversion to military electronic components manufacture.

In a move designed to facilitate materials handling Du Mont is rearranging and re-routing more than half a mile of overhead conveyors and more than three-quarters of a mile of gravity roller conveyor systems. All told, the Du Mont East Paterson installation contains more than two miles of conveyor systems.

**G.E. Offers TV Course**

An advanced course in television service, including lessons on set conversion, is now being offered by the General Electric Company's Tube Department.

The lessons on set conversion were described as unique in the television service industry by G. A. Bradford, advertising and sales promotion manager for the Tube Department.

"As far as we know," Mr. Bradford said, "such detailed material on set conversion has never before been made available to radio and television servicemen."

Radio and TV servicemen can sign up for the course through their distributors. Each course graduate will receive a sterling silver lapel pin and a thermoplastic plaque embossed with his name.

The course emphasizes application of theoretical material presented in an earlier Tube Department course. The first two lessons of the four-lesson course provide illustrated instructions on the recognition and correction of common TV service faults. Descriptions and instructions for use of essential test equipment are also included in the first two

# 2 Great New

## Rider Manuals

### TV8 and VOLUME 22



Now available... TV8, the largest, information-packed Television Manual ever published by Rider. Contains approximately 600 models of 52 manufacturers. This manual completely covers all the vital data on production runs through September 1951. Included are chassis views, voltages, resistance readings, troubleshooting test patterns, complete alignment procedures... All this and much more... indexed and organized to make your servicing faster... easier... more profitable.

2,684 pp., 12 X 15.....\$24.00

Just published also... Rider's AM-FM Volume 22. Completely covers all production runs of 62 manufacturers from November 1950 through August 1951. Includes all available authorized service data on AM-FM, auto radios, record changers, tuners and recorders... plus an up-to-date index for Volumes 16 through 22.

1,520 pp., 9 X 11 1/2.....\$18.00

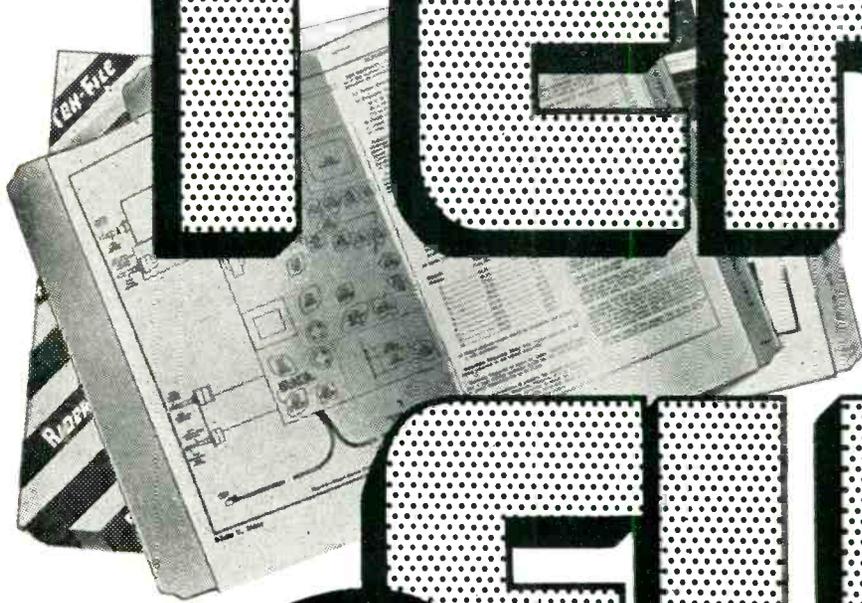
See your jobber now... for these two, new additions to the Rider line of AM-FM-TV-PA MANUALS that covers 32,855 Models - 17,038 Chassis - 53,230 Pages in 31 volumes to date.

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**IT'S COMPLETE!** Announcing a new service that only RIDER could bring you!

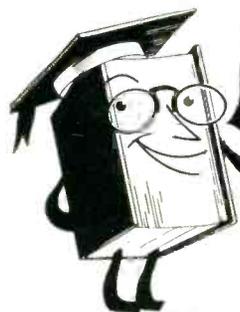
# TEK-FILE



**IT'S COMPACT!**



**IT'S FACTORY AUTHORIZED!**



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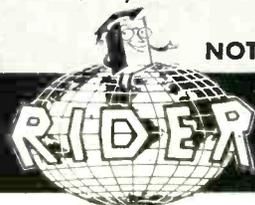
Now—the new Rider TV8 Manual available two ways. First as the standard single volume—or the sensational, new Tek-File way!

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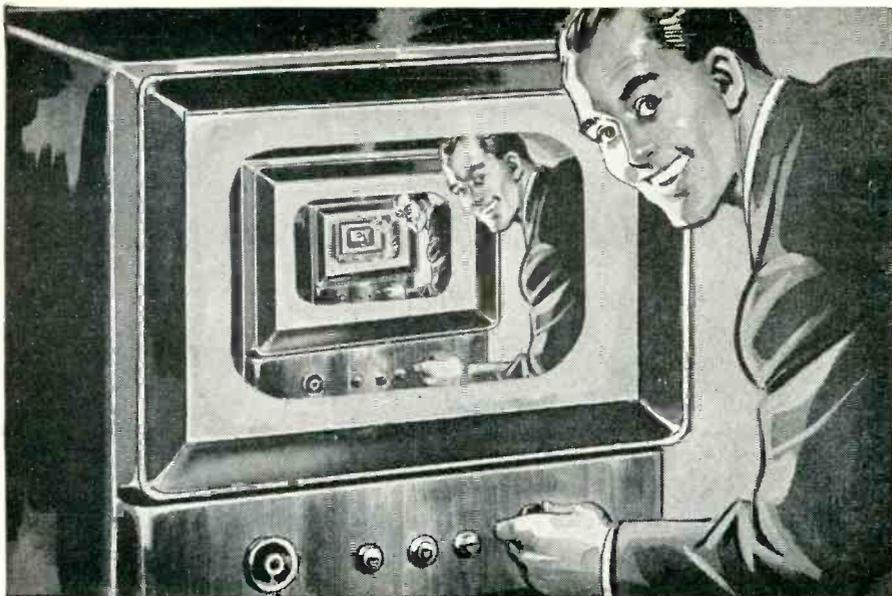
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lessons.

The final two lessons, prepared by Roland Kempton, editor of *Technitalk*, G-E publication for servicemen, cover a broad range of subjects in the set conversion field.

Subjects include methods of obtaining set conversion business, cost estimations on chassis and cabinet work, solutions of difficult chassis and cabinet problems, methods of increasing width and height of the picture, and ways to use the conversion business to step up new set sales.

Only servicemen who have taken the first course are eligible to enroll in the advanced course. However, a serviceman may enroll in both courses at the same time through his distributor.

The course is being announced to the trade through two-page advertisements in leading electronics and radio-television service publications.

### Neda Protests Licensing

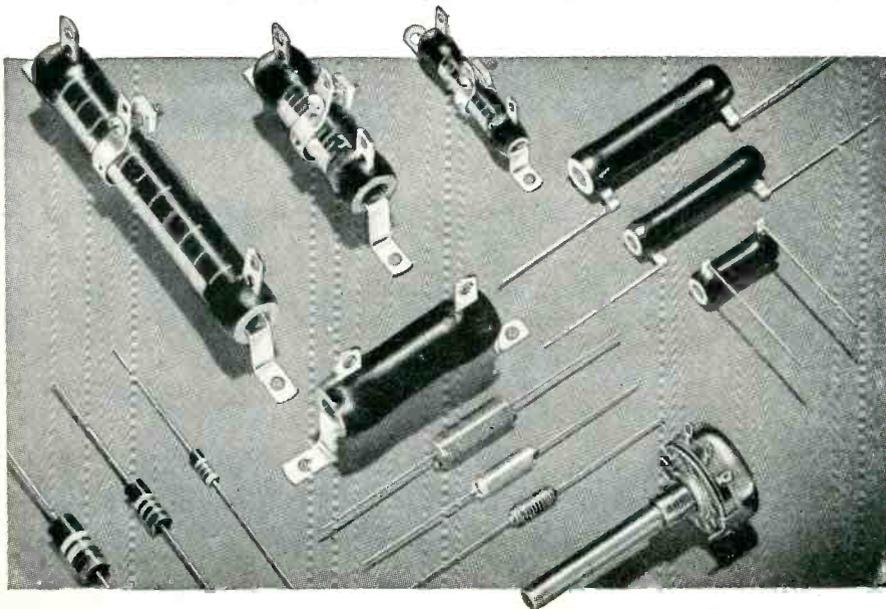
NEDA, through its executive vice president, *Louis B. Calamaras*, appeared before the licensing committee, comprised of eight aldermen of the city of Milwaukee and made a forceful protest against a proposed licensing law for radio and television service men in that city.

Appearing before the committee at the invitation of local parts distributors and service men, Calamaras pointed out that in protesting this proposed bill, he was speaking "not only in behalf of the service men, but as much in behalf of the consumer of that area and for the general welfare of TV users elsewhere."

In his arguments against the bill, Calamaras pointed out that the history of TV and all problems developing therefrom differ in no way from the pioneering stages of every other industry, profession and trade. In every such instance, he said, confusion and misunderstanding have characterized greater development and expansion. In the case of television the situation has been more drastic because unlike all other industries, TV experienced greater development and more widespread use in a shorter period of time than all other industries combined.

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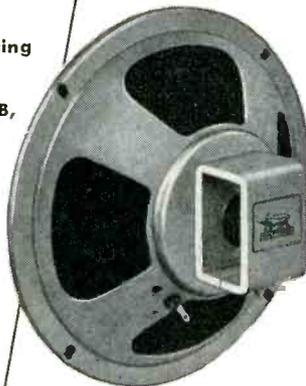


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Either one of these two models is available from your N.U. distributor on a non-profit basis at only \$8.95 each plus shipping charges from Cincinnati, Ohio.

### Walsco Introduces Chromate-Coated Magnesium Cross-Arm Antenna

The new Walsco "Model M" antenna makes its nation-wide debut this month. The Walter L. Schott Company stated that the use of chromate-coated magnesium is another important step in producing antennas that are sturdier, longer-lasting and that will provide outstanding television reception.

Model M is the first TV antenna to use a magnesium alloy which has a structural strength almost equal to steel and is one third lighter than aluminum. The added strength and decreased weight of Model M eliminates costly call-backs which steal the installer's profit.

The magnesium alloy used in Model M gives the cross-arms greater ruggedness. The elements of Walsco "Model M" antennas are made of high conductivity aluminum alloy, reinforced with Swiss "permalum".

Model M has the Walsco signal "director" which improves the gain on high band channels and eliminates "ghosts". Model M also includes the Walsco patented insulator, guaranteed unbreakable under all operating conditions.

### Exchange Of Views At RMS Forums

Heralding the reactivation of the popular RMS technical service forums for television Jobbers and their customers, Marty Bettan, Sales Manager for the well-known booster and antenna manufacturer, introduced the first in the series covering theory, design and installation of television antennas, open-line transmission wire, before Syracuse T.V. Accessory House at Elmira, N.Y.

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# UHF CONVERTERS *and* R-F AMPLIFIERS

by ALLAN LYTEL

**Modern trends in UHF converter and r-f amplifier techniques are discussed in this article which is another of a series by this author. Of particular interest is the manner in which the UHF tube elements and the surrounding structures form tuned coaxial lines and become part of the tuned circuit.**

**S**EVERAL television manufacturers have announced models of UHF television converters which have been demonstrated in actual field conditions at the UHF transmitter in Bridgeport, Conn. The most commonly used system involves a tuned input with no radio frequency amplifier tube into a crystal mixer circuit. The tube 6AF4 (a miniature version of the 6F4), is used for the local oscillator. Two stages of amplification usually follow the mixer. Signal output from the converter is fed into an unused channel position of the existing VHF tuner in the television receiver.

#### **A UHF Radio Frequency Amplifier**

At this writing, there is no adequate vacuum tube amplifier capable of operating over the entire UHF range, and at the same time, low enough in price to become part of standard commercial equipment. There are specialized tube types which could perform this function but their excessive cost, compared with the low price of the entire converter, prevents their use. Sylvania Electric Products Co. has used one of their rocket tubes to perform this function in an experimental circuit.

The Sylvania Rocket type tubes are planar-type triodes designed for continuous tuning and broadband operation up to a frequency of more than

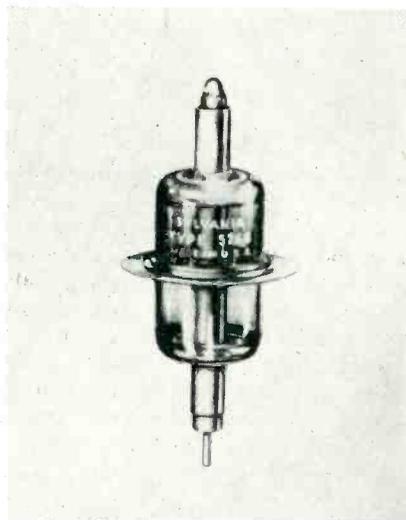


Fig. 1. Rocket type 5768 tube used in UHF applications.

3000 mc. There are several types in this general classification; the 5768 has been used in successful r-f amplifiers in the UHF TV band. Tube diameter is 0.65" and the overall length is 2.37". The design of the tube permits operation in coaxial tuned circuits which have better shielding characteristics than parallel wire lines acting as tuned circuits.

R-F amplifiers have two important contributions to make to the operation

of the UHF converter system. A tuned stage with an amplifier tube allows better selection of the desired signal from among all of the transmitted signals in the band. This is an increase in selectivity of the receiver unit and its importance depends upon the presence of other signals other than that which is desired. An increase in the noise figure is also obtained at the same time with a t-r-f stage which permits the reception of small signals. This is the first advantage of the r-f stage, the reception of weaker signals and the increase in selectivity.

The second important use of the stage is in the reduction in the radiation of the local oscillator from the antenna. As the receiver unit is tuned the oscillator frequency is changed, allowing the use of a constant frequency i.f., hence with a number of receivers operating in the same general area there will be a number of signals all in the same UHF TV band. Without a t-r-f stage to isolate the oscillator from the antenna a signal may be radiated almost as large as the transmitted signal from the station. This increases the interference problem for all converters.

As may be seen from *Fig. 1* the tube has cylindrical rods for both the plate and the cathode. These rods pass

through the glass envelope; the surface of the upper rod acts as the plate surface and the surface of the lower rod acts as the cathode. One side of the heater is tied to the cathode and the other heater lead comes through the center of the cathode rod. At the waist of the tube is the grid structure mounted as a part of the circular disk projecting out of the tube envelope. Connections to all of these elements permits short and direct connections with a minimum of lead inductance. By means of the rod-like construction, tube elements become a part of the coaxial tuned circuit.

In *Figure 2* the tube is mounted in a box-like structure with the grid being connected directly to this chassis at ground potential. Input to this grounded grid amplifier is applied to the cathode through a 100 uuf button capacitor; this same capacitor is used for plate and heater bypass. The upper

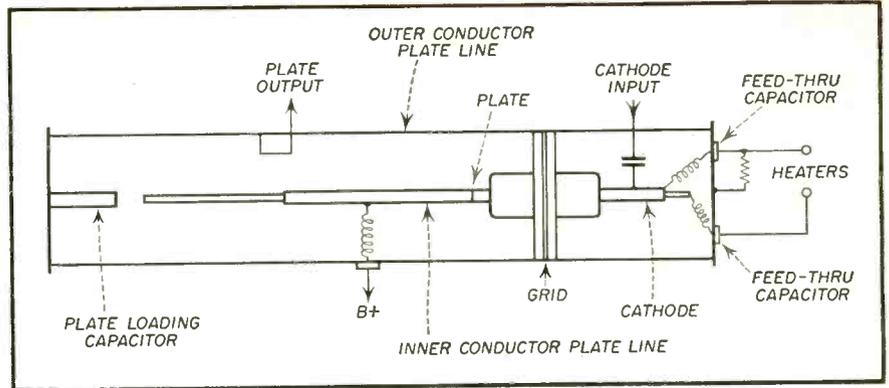


Fig. 2. Type 5768 is mounted in a box-like structure.

lowering the operating frequency. The plate is series fed through the r-f choke at the point of minimum plate r-f voltage.

*Figure 3* is a re-arrangement of the circuit as it might be using a two wire parallel line as a tank circuit; how-

voltage maximum and a current minimum at the ends. In the center the voltage will be zero or minimum and the current will be maximum. Here the plate d-c feed may be seen at the voltage minimum point, the output coupling loop is near the plate feed, and the grid circuit is at ground potential.

At the opposite end from the plate is the loading capacity which is actually in the circuit only at the lower end of the band. The half-wave length line is really less than this value because there is a part of the line inside the tube. Electrically, the entire line length is one-half wave length at resonance at any operating frequency.

*Figure 4* is a low frequency circuit showing how the components may be arranged in an equivalent circuit. Grounding the grid lowers the plate to cathode capacity to a maximum of 0.015 uufd; the grid to cathode (input) and grid to plate (output) capacities are about 1.0 uufd each. In a normal triode, unless it is neutralized, r-f amplification is impossible at high frequencies without oscillations. These oscillations occur because of feedback through the grid to plate capacity. This is reduced by the shielding action of the grounded grid. The grid is above ground by the drop across its resistor, the r-f signal input adds to or subtracts from this cathode voltage

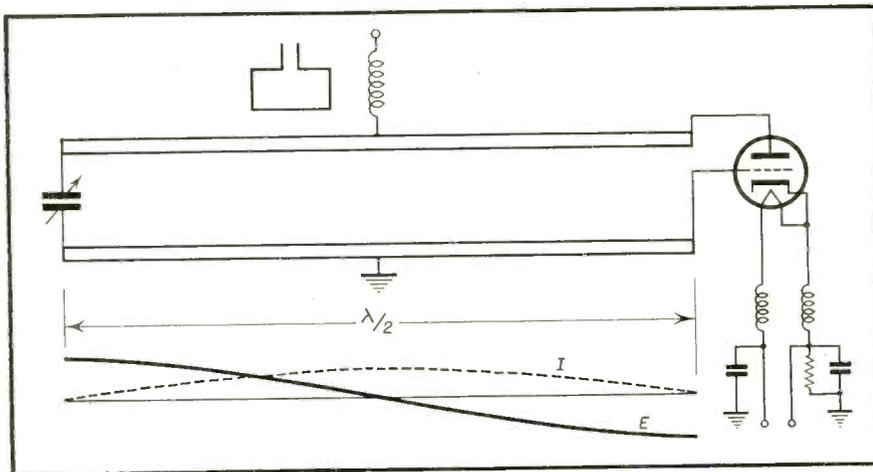


Fig. 3. Two wire parallel line tank circuit.

heater lead is common with the cathode and a 200 ohm resistor is used for cathode bias. The entire heater and cathode circuits are within the box chassis.

Acting as the outer conductor, this chassis box forms a coaxial line with the extension of the plate line. The plate rod itself acts as a part of the inner conductor, hence a part of the tuned circuit is within the tube itself allowing for the high frequencies such arrangements can reach. This coaxial tuned circuit is an electrical half wave long; tuning is accomplished by moving the telescoping section of the plate line in or out. To have the entire band from 470 mc to 890 mc covered, a capacity loading structure is needed at the low end to make the line appear to be electrically longer. As the telescoping section is withdrawn and the line made longer, the inner conductor enters the hollow tube mounted on the end of the chassis box. This action is that of a loading capacitor

ever, due to the differences in the two types of lines it is not possible to make exactly the same circuit. A half-wave open line acts, to the tube, as a high resistive impedance or as a parallel tuned circuit at resonance. Voltage and current distributions are shown on this drawing. The half-wave line, being open at either end will have a

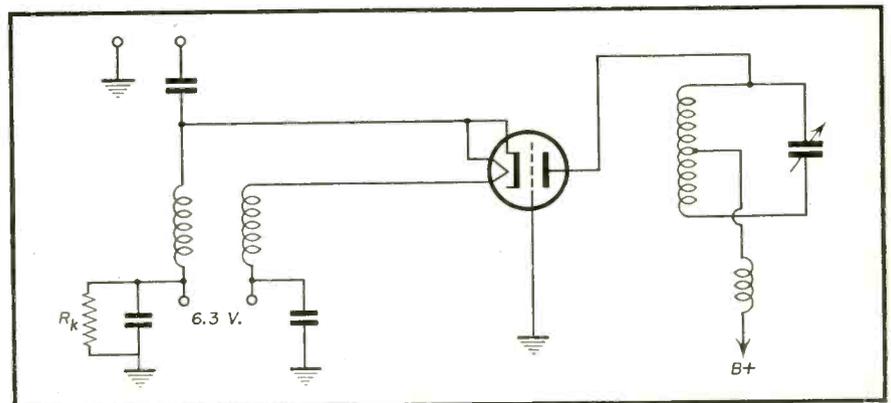


Fig. 4. Application of Type 5768 tube in l-f circuit.

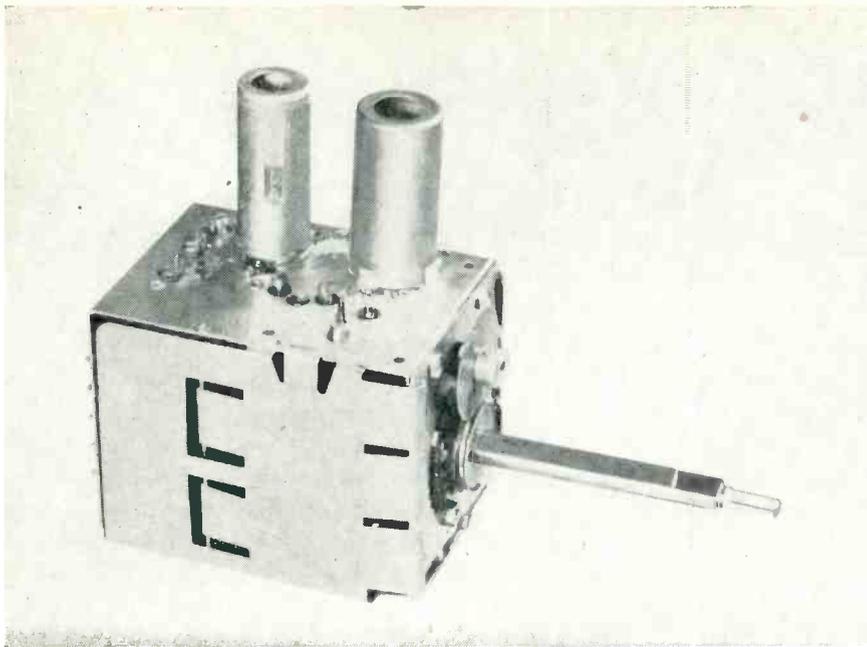


Fig. 5. Sarkes-Tarzian Model TT-16 tuner. This is a 15-position tuner which allows complete coverage of the UHF band as well as the present TV band.

and acts as the signal to be amplified.

In operation, this circuit was found to reduce the noise figure for the receiver, that is allow the amplification of smaller signals; and it reduced the oscillator radiation by a factor of 500 times. At this writing this is one of the few good r-f amplifiers that can tune over the entire band however, the cost of the amplifier tube is a drawback in commercial equipment.

#### Sarkes - Tarzian UHF Conversion

The Sarkes-Tarzian organization has several answers to UHF TV designed to allow complete coverage of the UHF band and still allow the complete operation of the TV receiver on the twelve present VHF channels,

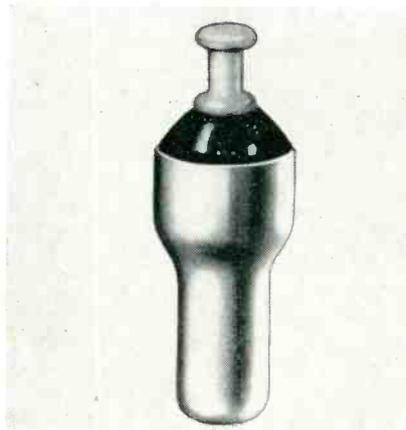


Fig. 7. Scaled ceramic capacitor designed to mount on push-pull clip.

Fig. 5 is the TT-16 which is a 15 position VHF tuner; in addition to the 12 channels there are three new positions. In between 6 and 7 there is an input for a 130 mc signal. Before Channel 2 there are two additional positions for UHF.

The UHF Translator made by this company tunes over the entire band with an output going into either Channel 2 or 3 of the VHF tuner. This is like other converters discussed in earlier sections of this chapter. A single channel device is available which will perform this function only for a single channel. This is pretuned for the one channel in areas where only a single UHF channel will be available.

Figure 6 is a single channel "match-box" type of single channel unit. This can be used with any of the three UHF positions above, on the VHF tuner. There is a local oscillator, three tuning adjustments and a Fine Tuning Control mounted on the front apron of the chassis. Operating voltages are obtained from the new model VHF tuner in some models; this unit,



Fig. 8. Thread-mounted model of same capacitor.

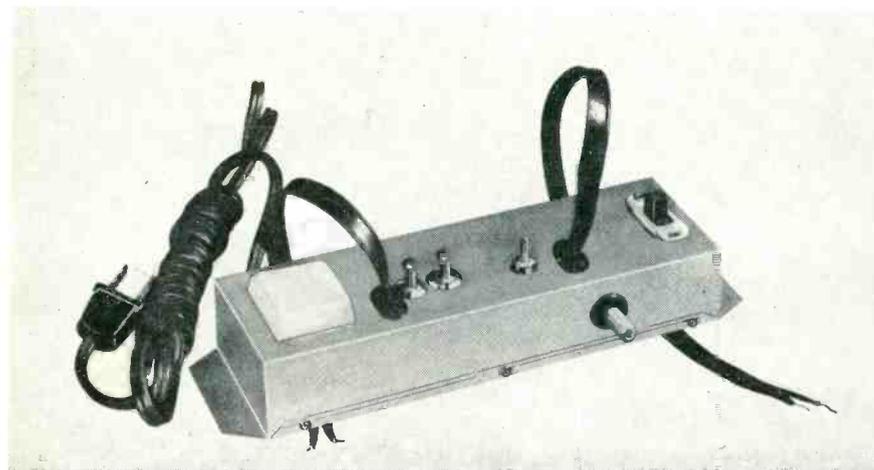


Fig. 6. Sarkes-Tarzian single channel converter with its own power supply. Designed for use with the TT-16 tuner in conjunction with the extra switch positions.

however, has a self-contained power supply.

#### UHF Capacitors

In some TV circuits the component values are variable enough so that certain deviations from the nominal value are allowed since this does not change the circuit operation. In special cases, the part values are more critical and any change will prevent normal operation. In UHF there is a new slant; not only are the values alone important, the actual specific type of resistor or capacity is needed. A case in point is the bypass capacity; the lead inductance on many types is enough to prevent their effective use.

Figure 7 is a scaled ceramic capacity designed to mount into a push-clip on the chassis. Fig. 8 is the thread mounted model. Accurate by-passing

[Continued on page 47]

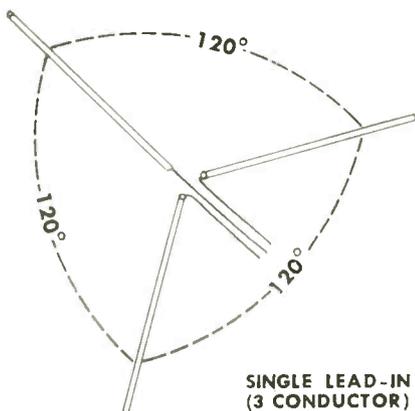
# Field Performance Of DIRECTRONIC ANTENNAS

by EDWARD M. NOLL and MATTHEW MANDL

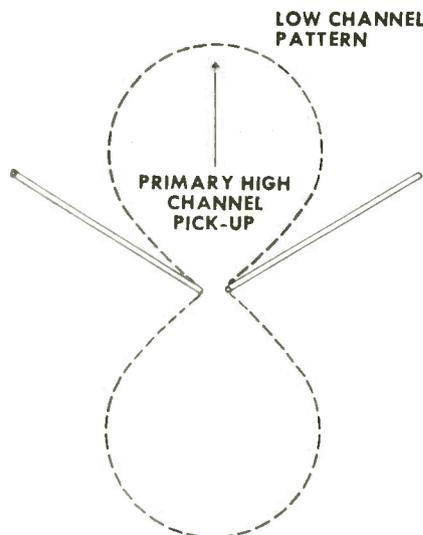
**Presenting the basic operating principles of a new type of antenna and actual field performance data taken at various reception sites; urban, suburban and fringe. This article is another in the series designed to describe product innovations of various manufacturers. More will follow.**

ONE of the most ingenious antennas recently marketed is an electronic beam selector type which gives the advantages of a rotating antenna without the use of a motor. This antenna permits selection of different positions of directivity without the necessity for turning the antenna in order to get best orientation. Inasmuch as such lobe-switching is done electronically, a single transmission line (without motor cable) plus a selector unit at the receiver are all the accessories that are required.

The operating principles of such an antenna may best be understood by referring to *Fig. 1* which shows a dipole as seen from above. The low frequency pick-up pattern for such an antenna gives a "figure eight" type of pattern as shown. By tilting the antenna elements forward, the usual "clover-leaf" type of pattern unifies



**Fig. 2.** Directronic antenna contains three elements separated from each other by 120 degrees.



**Fig. 1.** Basic directivity pattern of tilted dipole antenna.

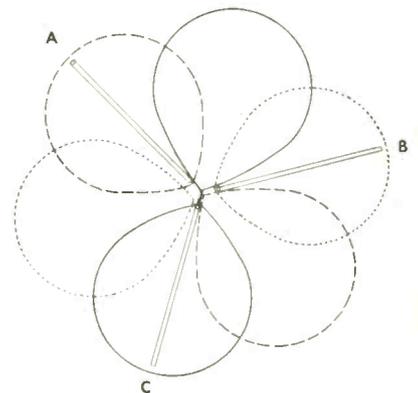
into a single forward pattern for the high channels. This forward tilt principle applies equally well to folded dipoles, biconicals, fanned antennas, and other half-wave types.

Such an antenna will pick up signals from forward and rear positions, or — with a reflector — from a substantially single direction. If, however, stations from other directions are to be received, a motor would normally have to be used, or several antennas installed each having a different orientation.

If, however, an additional element is added as shown in *Fig. 2*, so that the three elements are equally spaced 120° apart, pattern selection can be achieved by using a single three-wire lead-in connected to an appropriate

selector unit at the receiver. Thus, by connecting *any two* elements to the receiver, orientation can be changed to suit the particular television channel which is to be received.

This is more clearly illustrated in *Fig. 3*, where all the possible low frequency lobes are shown at one time. Thus, if the selector unit chooses the two wires of the three-wire line which connect to A and B, a pattern will be selected as shown by the solid line. If, however, B and C elements are selected, the pickup characteristics of the antenna change and conform to the pattern shown by the dashed lines. Finally, if antenna elements C and A are utilized, orientation as shown by the dotted lines will result. Thus, the pick-up characteristics of this antenna for the low channels can be rotated for virtually 360° without the use of a motor or other mechanical means for antenna rotation. For the higher



**Fig. 3.** Low frequency directivity patterns obtained with different pairs of elements.

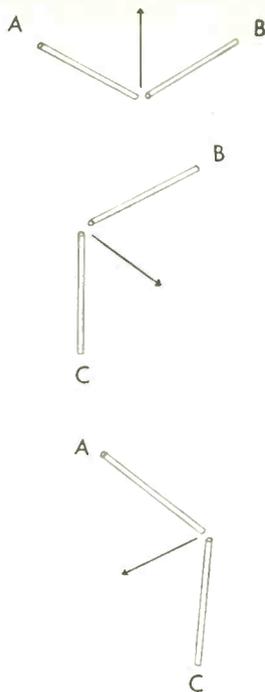


Fig. 4. High frequency orientation obtained with element pairing.

channels, a greater forward selectivity is procured due to the tilting feature of any two of the elements in use at any instant, with the result that orientation as shown in *Fig. 4* can be secured.

Physical orientation of such an antenna during installation is virtually eliminated because of the numerous directive patterns which can be chosen. For any one or two weak high frequency channels, however, slight initial orientation may be made during installation to favor these if desired. Examples shown in *Fig. 3* and *4* show use of all three selector unit positions, though in some localities only two positions will be found necessary.

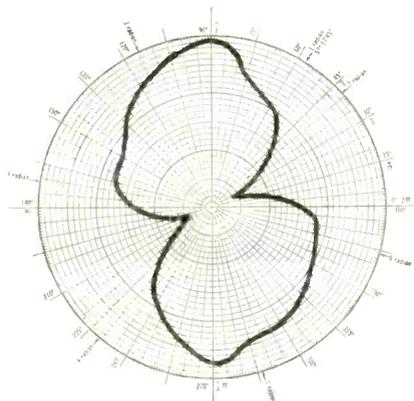


Fig. 6. Typical low band field pattern.

Such an antenna, besides permitting proper choice of correct orientation for maximum signal strength, is also an excellent antenna for strong (or weaker) signal areas because of its good noise rejection features. At most locations, signal strength will be good on two switch positions (particularly since most modern receivers have AGC systems). By correctly orientating the beam, however, noise or interference can be reduced. Thus, the selector unit will be helpful in rejecting local oscillator radiation, impulse noises, signal interference, adjacent channel spill-over, FM station interference, etc.

Such an antenna called the Directronic, can be used in its simplest form—that is, dipole elements as shown in *Fig. 2*. For better performance and broader-band characteristics, the biconical type can also be used, as well as the fanned type (biconical with three elements each side of feed

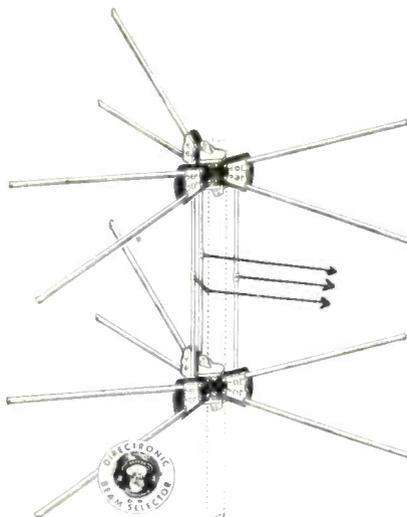


Fig. 5. The stacked Directronic. Arrows connect to downloads.

point). For increased signal pick-up, any of the above types can be stacked in similar fashion to other antenna types.

#### Urban Applications

In areas where signal levels are reasonable high, the single bay Directronic is popular because of its small size, light weight, and neat appearance. In weak signal districts or for receiving distant stations, a stacked version can be used. In urban areas, the Directronic permits of optimum signal levels and orientation from all stations.

The selector switch at the receiver (by switching wires of three-wire cable in pairs) permits a choice of elements used at antenna, (*Fig. 5*).

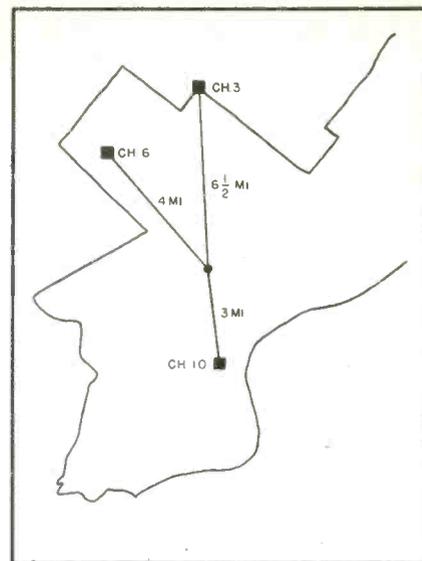


Fig. 7. Philadelphia area check site.

Inasmuch as the elements are spaced 120 degrees, there is a maximum lobe each 60 degrees, (*Fig. 6*.) With lobes spaced so near, and considering the usual width of a lobe there is only a small drop-off of the signal even at the mean angle between maximums. Although the lobes are narrower on the high band channels, the presence of the forward element tilt, additional lobes, and the widening influence of nearby objects in the majority of urban sites broadens acceptance angle.

In the vast majority of locations the antenna can be erected with absolutely no orientation. If a station is particularly weak or interference intense, some slight orientation (plus or minus about 60 degrees) on the best switch position can be helpful.

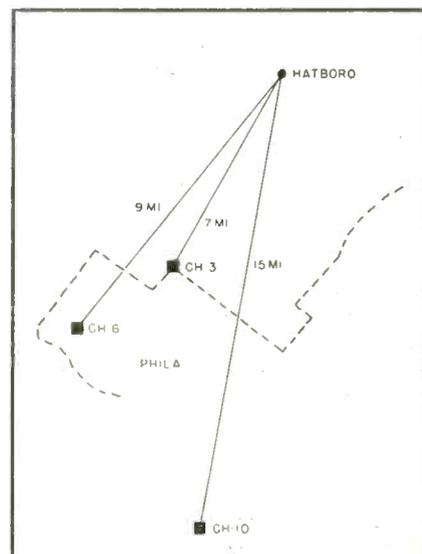


Fig. 8. Hatboro suburban site.

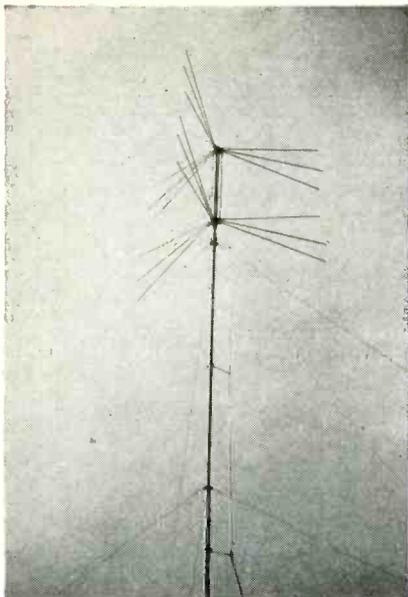


Fig. 9. Antenna installation in Atlantic City.

There are definite advantages of using Directronic in metropolitan areas troubled with impulse noises, reflections, and local oscillator interference but still with reasonably strong signals. The Directronic switch can be set for the cleanest picture under conditions of interference, which is not always the position of peak signal but rather the position of best signal-to-noise ratio. The correct switch position can vary from night to night or hour to hour in a busy industrial section, traffic center, or crowded television receiver district.

As far as reflections are concerned we might at first conclude that Directronic would be more subject to ghosts because of the absence of a reflector. This is not the case because of greater importance is the ability of this antenna to switch to another lobe. In most cases a change of directional characteristics of an antenna will eliminate reflections with only a small sacrifice in signal level.

If there is an exceptionally stubborn case of interference or noise pick up (particularly if associated with the reception of a weak signal) some slight initial orientation can be of help in minimizing noise pick up. To orient for best signal for a given interference condition, the switch is set for the best position of reception. Then the antenna is oriented slightly (plus and minus about 60 degrees) until the cleanest and most stable picture is obtained.

A typical urban application is illustrated in *Figure 7*. The antenna

site is located in West Central Philadelphia. Channels 3, 6, and 10 arrive from different directions—Channel 10 is SSE 3 miles; Channel 6, NW 4 miles; and Channel 3, N 6½ miles. Antenna orientation is a problem of move and try and then compromise. This particular site has a troublesome Channel 6. A single bay Directronic was installed. All three channels were received clean—Channel 6 picked itself out of the noise. *Antenna was not oriented.*

#### Suburban Applications

The Directronic is an excellent antenna for suburban and near-fringe areas. Its neat appearance, ease of installation, and versatility give it residential appeal. In many suburban districts there are different signal levels arriving from the various stations. Orientation of the usual type antenna is often a difficult task—it is a problem of compromise orientation for stations in differing directions, trying to favor the more distant weaker channels, and prevent interference from the strong nearby television or FM stations that may be only a very short distance away.

Orientation of the Directronic is seldom required. In suburban districts

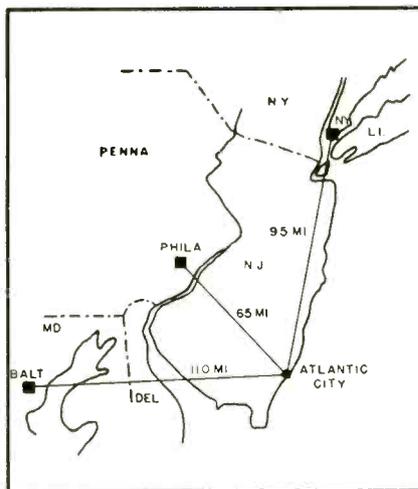
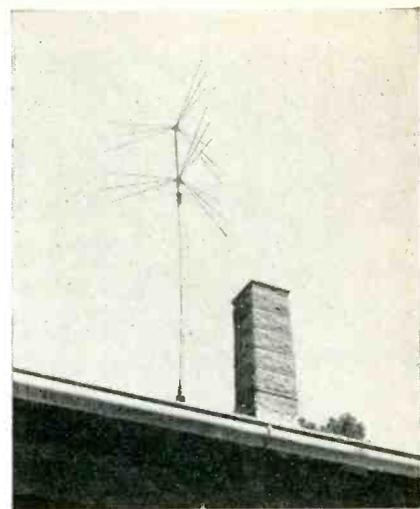


Fig. 10. Atlantic City fringe area site.

the weakest signal is most often a distant high channel station. If the station is quite weak some slight orientation with the switch on the best position can be helpful. Slight orientation can also be of help in case of strong stubborn interference on a weak station from a nearby television or FM station.

A typical suburban installation is shown in *Fig. 8*. A stacked version is used in the near-Hatboro installation. This arrangement per-



Trenton, N. J. Directronic Installation

mits optimum signal levels from the three Philadelphia channels. In addition, New York stations can generally be received.

#### Fringe Area Applications

The fringe area performance of the Directronic has been impressive. Gain of the Directronic is comparable to other types of antennas generally used in fringe area reception. In addition, the crispness and steadiness of the picture has been very apparent. This is attributed to its low noise content and low sensitivity to noise pick up.

The weight of an antenna is important. With the Directronic no heavy assembly has to be supported and the weight of the antenna is balanced and centered around the mast. Slight orientation is of substantial help in fringe areas on a particularly weak channel. Set the switch on best switch position and orient for cleanest picture. A typical fringe installation is presented in *Figs. 9 and 10*.

Atlantic City represented a far-fringe installation site. Directronic in that area receive consistent signals from the Philadelphia stations. Clarity and steady pictures were again in evidence. Ignition interference was not as damaging as to other types. With proper propagation conditions good signals are received from New York and Baltimore on other switch positions.

#### Signal-To-Noise Ratios

The signal-to-noise ratio of an antenna system has become of increasing concern. The modern television receiver has a high sensitivity which means its own noise level has been kept low. To take advantage of this

[Continued on page 44]

# Cooperation SPURS TV SALES

by HARRY J. MILLER

**B**ECAUSE of the difficulty of receiving television signals in Lansford, Pennsylvania, a coal mining community in Carbon County, video sales and service were at a low ebb and accounted for only a minor share of the business done by local servicemen.

Nestled in Panther Creek Valley, directly north of the Blue Mountains, the town was a complete blind spot, so far as reception of video signals was concerned, since the surrounding mountains deflected or blocked them out entirely.

Robert J. Tarlton, a local radio serviceman and dealer, arranged a meeting of minds between himself and the other three local dealers to attempt to solve the technical problems involved so that the community might be stirred to a keener interest in TV.

Tarlton, irked by the constant reminders of his customers that folks in Summit Hill, who live only a mile

south overlooking Lansford, had been enjoying TV for the past several years, outlined his ideas to dealer friends.

They studied the type of antenna systems installed by large apartment house owners to obviate the necessity of plural and individual aerials, and decided that a similar master antenna system could be devised that would serve the entire community. But it took many months of overcoming obstacles, ironing out dozens of legal annoyances and defeating Nature herself before TV came to the valley.

The combined corps of servicemen, after a series of tests, found that signals transmitted from Philadelphia stations 75 miles away were strong enough in the Lansford area. But a method had to be devised to intercept them as they passed overhead, and pipe them into the parlors of the town's TV-hungry residents.

Sensing the tremendous possibilities and potential business resulting from a community master antenna system, the other three dealers, Rudolph Dubosky, George Bright and William McDonald, joined forces with Tarlton to raise funds for the experiments required and a lawyer was added to the group to handle the expected legal entanglements.

A test was first made from the top of Summit Hill with many antennas, an amplifier, distribution units and hundreds of feet of cable. When this test proved conclusively that Lansford could have good TV reception, the group of progressive radio men realized that to succeed, they had to form a business organization.

Panther Valley Television Company, Inc., (PV-TV) was the name selected for the new enterprise.

Permanent installations began with the erection of an 80-foot tower in Summit Hill. Dwarfing the town's business structures, the tower supports three separate masts to intercept signals broadcast by Philadelphia stations, each mast pulling in separate channels.

An amplifier and mast control unit were mounted one third of the way

up the tower to amplify signals immediately after they are picked up. Cable was strung on poles down the hillside to another amplifier midway down the hill, there signals are given another boost.

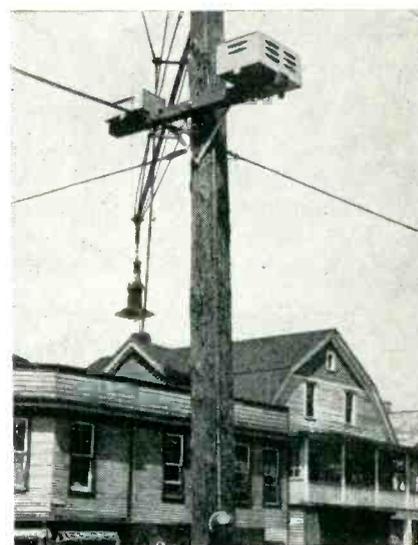
And the versatile young dealers secured permission to use the poles of the Pennsylvania Power and Light Company, the Carbon Telephone Company, and the Bell Telephone Company of Pennsylvania, for their antenna network. This undertaking proved no bed of roses, for the three companies were insistent that safety regulations and restrictions be observed to the letter for the cable-stringing job. Undaunted, the servicemen labored on, even though work was at times held up for weeks until regulations were cleared!

A third amplifying unit was mounted at the outskirts of Lansford; from this an amplifier cable was strung to specially-built distribution boxes having provisions for ten terminals. Each

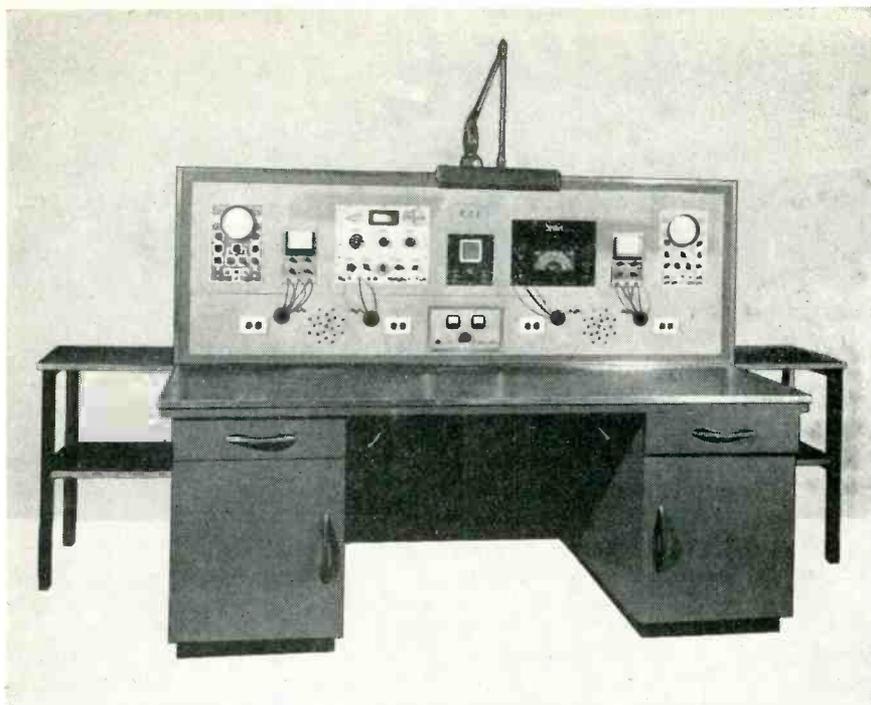
[Continued on page 38]



80 ft. tower; antennas mounted on top, and amplifier unit mounted 1/3 the way up the tower.



Typical repeater amplifier and electronic distribution-isolation installation on a company utility pole. Note the meter upon which the power company bases monthly charge.



The C.T.I. Service Bench. Notice that this bench is designed for two-man operation. Observe also, pleasing and symmetrical arrangement of instruments on front panel.

# CONSTRUCTING A SERVICE BENCH

**The bench described in this article was designed for efficient operation in the smaller radio-TV service dealer's shop.**

**T**HE Instructors Staff of Commercial Trades Institute of Chicago has designed and engineered this model television service bench especially for use in the smaller shop. It combines compactness — an important consideration where space is at a premium. Furthermore, the unit may be erected in sections outside the premises, then assembled within. Note that the bench is designed for a two-man operation. Each technician has the same basic equipment, such as the VTVM, signal generator, and scope.

Detailed blueprints, with a materials list, appear on the next page. The bench is not difficult to construct, and the effort spent on it will be well rewarded. As you study the plan, you will readily recognize that the bench

offers many advantages in addition to the above. One of the most important is that the unit is attractive, and will give the shop a business-like appearance.

The model bench in the C.T.I. shops is finished in blue and gray, with chrome trim. This color combination is recommended, but the individual may choose whatever colors he deems appropriate for his particular shop. We might also add that the design may be altered to suit individual requirements. If possible, the instructions contained herein should be followed, as they are the recommendations of our staff.

Originally, the bench was designed on the request of many C.T.I. television students and graduates. However,

the wide interest in the unit throughout the trade has persuaded us to make the plans available to all in the industry.

The following procedure is given to clarify the detail construction of the C.T.I. Service Bench. Construction of the Service Bench should begin by building the two stands upon which the entire Service Bench rests. Since both stands are identical, duplication of each part should be made.

The first part of the stand that we shall build will be the base which is of 2" x 4" lumber laid flat, and bound together with corrugated nails and 2" wood screws. A platform of 1" lumber is built next, and mounted flush with the back of the base overhanging the front and sides. The upper framework

**Do you have—**

A SHOP OR BENCH LAYOUT WHICH YOU THINK IS EXCEPTIONAL?

**If so—**

SEND IT IN TO US WITH COMPLETE PLANS AND PICTURES.

**If acceptable—**

WE WILL PUBLISH THIS MATERIAL IN RADIO-TV SERVICE DEALER.

**All published entries—**

WILL BE PAID FOR AT OUR REGULAR RATES.

of the stand is built of finished 2" x 2" lumber, whose legs are then screwed to the platform with 2" wood screws.

Considering now that both the left and right stands have been built according to dimensions given, we will now put on the side facings of 1/4" plywood with finishing nails. Drawers can be made by simply building boxes and adding faces, from 1" boards or 3/4" plywood. The storage compartment door can also be of 3/4" plywood, mounted with 3" butt hinges.

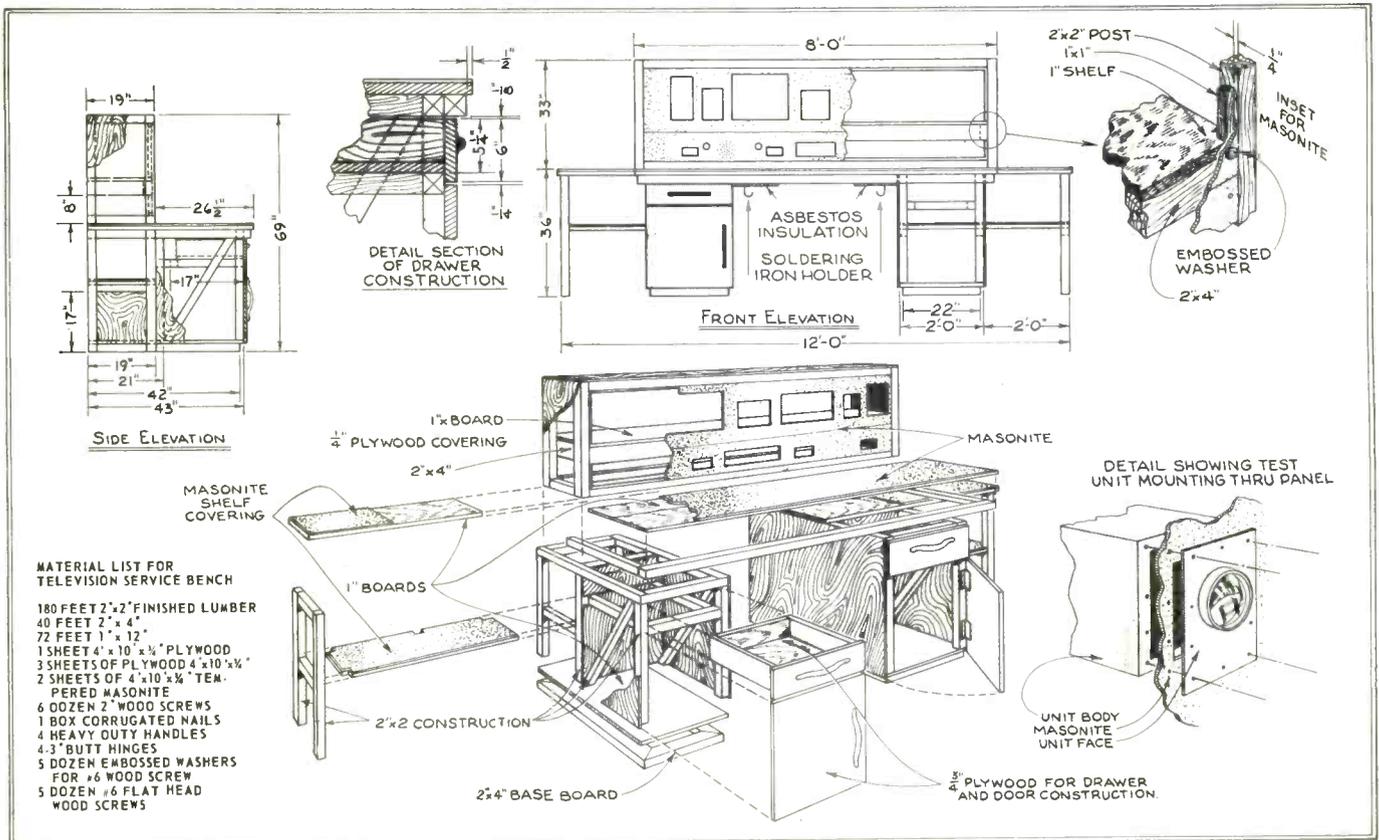
The shelf extension that protrudes from the ends of the Service Bench are to be constructed of 2" x 2" lumber, with 1" board shelves covered with tempered Masonite. These shelf extensions can now be inter-laced into the stands and secured in place with wood screws. The table top is also made of 1" boards reinforced with 2" x 2" cross-pieces. A 2" x 2" trim inset 1/2" from the edges is screwed to the left front and right sides of the table to give additional edge ridgeness. The top is now screwed to the stands with 2" wood screws and 1/4" Masonite is placed on top to give a smooth finished surface.

The instrument rack construction is last, with the frame work built of 2" x 2" lumber reinforced with 2" x 4",

which also provide the shelf rest. The top, side and back can now be covered with 1/4" plywood. The front panel can be made of 1/4" Masonite or plywood and made in two parts, top and bottom. The division of these panels should lay along the center of the 2" x 4" shelf support. The panel when finished can be mounted with wood screws backed up with embossed washers.

The instrument rack is now bolted with machine screws to the stands. Many receiver cabinets and component parts are damaged because hot irons are placed on top of the bench. This hazard is eliminated by locating the soldering iron in a harness underneath the Service Bench. The layout of the test panel will be left up to the individual since it will be entirely dependent upon the test equipment available. The cutouts in the test panel for the equipment should be made approximately 3/8" smaller on each side than the maximum widths of the Instrument front panels.

The Service Bench can finally be finished in a color scheme of blue and gray with chrome trim. This combination is highly attractive; however, you may choose colors to harmonize with your interior.



Complete plans of C.T.I. Service Bench. These include details of units, complete assembly view, and complete material list. Front and side elevation views indicate overall size of bench.

# LOOKING FOR *Trouble?*

No. 6

by **Cyrus Glickstein**

(Instructor, American Radio Institute)

**A** defective TV receiver is on the bench for repair. As usual in these quizzes, the questions follow the common servicing procedure used to locate the trouble in the set. Follow along and see if you can also find the fault. Answer each question before going on to the next, since the answer to the preceding question is usually given in the following one. Some questions may have more than one correct answer. In such cases, select all the correct answers for that question.

Answers and discussion follow the symptoms.

Type of receiver: Dumont, RA103-D. Split sound; kickback high voltage system; transformer-type a-c low voltage supply.

Fault: Sound-O.K. Pix-Good, but picture doesn't hold steady. It keeps rolling horizontally and vertically.

1. As usual, the first step is to check whether the fault is caused by misadjusted controls. The control(s) which should be checked include:

- (a) Horizontal hold control
- (b) Channel selector and fine tuning
- (c) Contrast control
- (d) Brightness control
- (e) Vertical hold control

2. All of the above controls are checked for operation. No setting of the contrast control stops the rolling. The contrast in the picture varies as the contrast control is rotated. The brightness control operates normally. Sound and pix information are normal on all channels while the hold controls can't lock the picture in on any channel. The defective section seems to be:

- (a) Front end (r-f stage, oscillator, mixer)
- (b) Video strip (video i-f

stages, video detector, video amplifiers)

- (c) Antenna
- (d) Sync section (sync take-off and clipper stages)
- (e) CRT

3. On the basis of information on the screen and from speaker together with the operation of the controls, trouble is indicated in the sync section. The next step is to find the defective stage in this section. First, all tubes in this section are changed—6AL5-V204b-Sync take-off, 6SN7-V212a-Sync Clipper, 6SJ7-V213-Sync Clipper (Fig. 1). No improvement is

noticed. Evidently, the defect is not a bad tube. The most efficient method for finding the stage where the loss of sync has taken place is:

- (a) Signal tracing with an oscilloscope
- (b) Voltage checks
- (c) Signal injection with a signal generator
- (d) Resistance checks
- (e) Visual inspection

4. A 'scope is used and checks are made at the following test points: a) grid of the CRT, b) grid of the 1st sync clipper, V212a, 6SN7, c) plate of the 1st sync clipper, d) grid of the 2nd

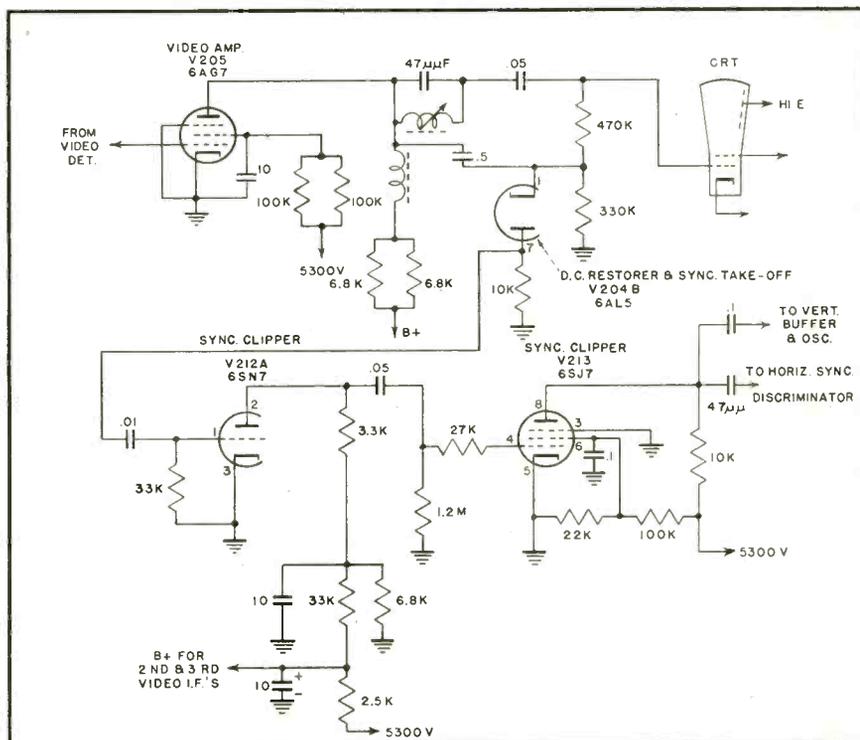


Fig. 1. Partial schematic of DuMont RA-103D sync circuit. Points marked 5300 V should read S300 V as referred to in text, and indicate B+ point coming off selector switch.

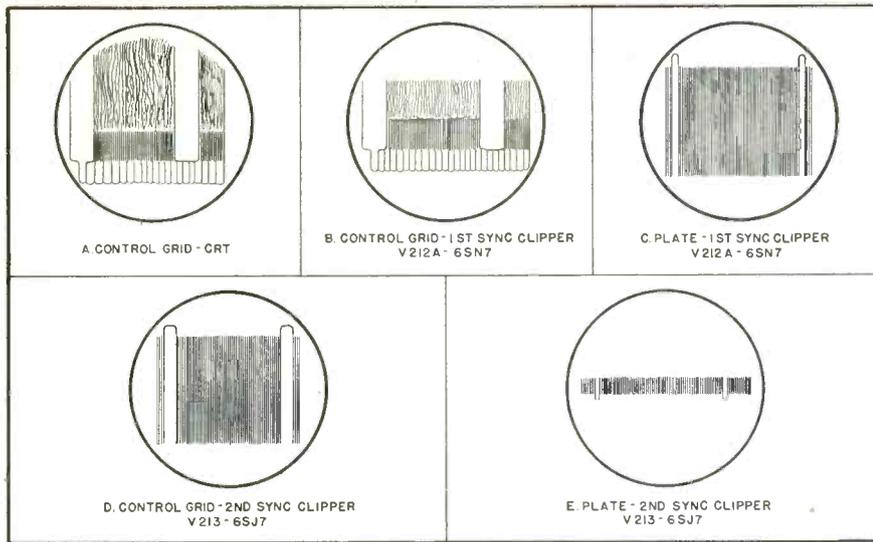


Fig. 2. Waveforms observed in oscilloscope at indicated test points.

sync clipper, V213, 6SJ7, e) plate of the 2nd sync clipper. The observed waveforms are shown in Fig. 2. On the basis of the waveform seen on the scope, the trouble is in:

- Video amplifier stage, V205, 6AG7
- Sync take-off stage, V204b, 6AL5
- 1st sync clipper stage, V212a, 6SN7
- 2nd sync clipper stage, V213, 6SJ7
- CRT

5. The signal is almost completely lost in going through the 2nd sync clipper stage, V213, 6SJ7. This, therefore, is the defective stage. To find the defective component, voltage and resistance readings are taken around this stage. Voltage readings are compared to the manufacturer's specifications:

Volt. Read. to gnd. (B+ to gnd.=300v.)	Actual Readings	Mfr's Specs.
Plate	300	250
Screen grid	42	40
Control grid	-1	-.7
Cathode	0	0
Filament	6 vac	6.3 vac

Resistance measured from each pin to ground (S300 v point to ground is normally 7 k):

Plate	7K
Screen grid	19K
Control grid	1.2M
Cathode	0
Filament (both pins)	0

On the basis of these readings, the most likely trouble is:

- Filament voltage to 6SJ7 is shorted out
- Shorted screen by-pass condenser (.1 uf-pin 6)
- Plate load resistor changed value (10K, pin 8)
- Defective tube, 6SJ7, shorted

- plate to suppressor
- Open screen dropping resistor (100K from screen, pin 6 to S300 v)

### ANSWERS AND DISCUSSION

Answer 1—a, b, c, d, e

Where pix and sound are good but picture doesn't hold in either direction, the first step usually is to adjust the horizontal and vertical hold controls. Adjusting these controls indicates whether or not the picture can be locked in. If the hold controls can't stop the picture from rolling in either direction then the other controls listed are varied to obtain additional information concerning the trouble. The contrast control is checked for proper setting. For example, if the contrast control is too low, the sync pulses on top of the video signal may be too small in amplitude to trigger the sweep oscillators properly. In such cases, the pix information will usually be weak because of the low contrast setting. On the other hand, if the contrast control is too high, the sync pulses may be levelled off, due to overdriving one or more video I.F. or video amplifier stages. Pix information in such cases is generally very strong, with overly black picture areas. In other words, a contrast control setting that is too low or too high can cause bad sync. However, in addition it affects the picture information also. The channel selector and fine tuning are tried next. This is to check whether the trouble is common to all channels or only one. It is possible the trouble may be temporary, due to a defective signal from one station. Or the trouble may be caused by a defect in the front end and occur on only one channel. The bright-

ness control is also tried to secure additional information. A CRT trouble, such as a partial short from cathode to grid, can cause defective synchronizing action. In such cases, however, the brightness control does not function properly and is usually unable to cut down brilliance, even when the control is completely counter-clockwise.

Answer 2—d

Good pix information on all channels indicates a good signal is being received at the grid of the CRT and the trouble most likely is past this point. This therefore shows that the antenna, front end, and video strip are O.K. Since the pix is rolling in both directions, and operation of all controls appears normal, the trouble most likely is in the sync section.

Answer 3—a

In sync section troubles, a great deal of time can be saved if the trouble is first localized to the defective stage. An oscilloscope is invaluable for this purpose. Waveforms provided by the manufacturer can be compared to waveforms seen on the screen to determine which stage is not operating correctly. Even where waveform information is not provided by the manufacturer, the 'scope can still be used, since waveforms in this section of the receiver are fairly uniform. A signal generator is not the most desirable instrument to use in finding trouble in the sync section since it does not provide the type of signal ordinarily found in these circuits. Voltage and resistance checks are time-consuming when the defective stage is not known. These checks are generally most useful for finding a defective component once the defective stage is found. Visual inspection is a useful supplementary method but is not a definite procedure for systematically localizing a defective stage.

Answer 4—d

Normal waveforms are seen at all points until the plate of the 2nd sync clipper, V213, 6SJ7 is reached. Here the waveform is much lower at the plate than at the grid, indicating a large loss of signal, which, in turn, indicates improper operation of this stage.

Answer 5—c

The trouble is a change of plate load resistance from 10K to several hundred ohms. Closer inspection showed a slight discoloration of the resistor's color coding, indicating overheating and a resultant change of resistance value. The low value of plate load resistance accounts for practically no voltage drop when

[Continued on page 44]

# A Simplified SIGNAL TRACER

by **ROBERT C. BROOKS**

**For the radio-TV servicing technician who likes to construct simple and convenient test equipment units we present this interesting signal tracer and probe.**

A signal tracer provides the quickest and easiest means to localize trouble in a radio receiver or audio amplifier of any kind. It does not have the adjustments necessary for a signal generator and is an ideal tool for the radio repair man. Its merit in the localization of distortion in an audio amplifier section of a radio or TV set makes it an invaluable device to have in any electronic repair shop.

The simplified signal tracer shown in the wiring diagram (Fig. 1) has been the subject of many years of improvement. It has a number of unique features and combines the ultimate in

simplicity. No parts are used in it, other than those to be found in most radio shops; in fact a few wiring changes will convert any transformer type radio receiver into this efficient yet simple tracer. The completed unit can be left on any convenient chassis or housed in the original radio case with the coaxial test lead brought out through a hole in the front.

The double pole double throw enables the user to set the instrument to amplify either 1) An audio signal (from the audio section), and 2) An r-f or i-f signal. This instrument discriminates sharply and will only am-

plify the correct signal, if present. It is sufficiently strong to locate an r-f signal on the antenna lead and to allow you to trace this signal from grid to plate all the way through the radio up to and including the voice coil. It is so versatile in its operation that it seems to point to the trouble itself. In the case of a leaky coupling capacitor, it will show a clear signal on one lead and a distorted signal on the other. It measures gain sufficiently well to identify weak tubes, is a most positive means of locating small distortion causes, poor filtering in power supplies, etc.

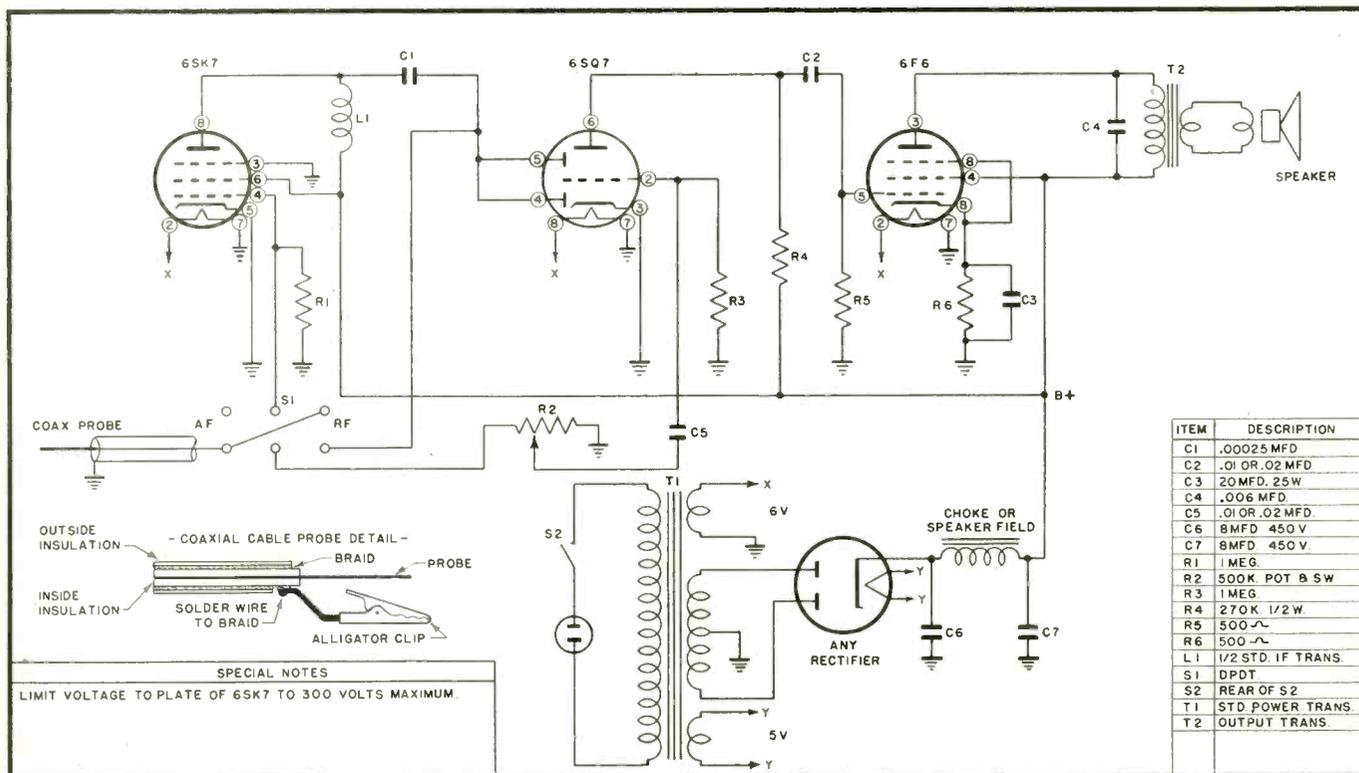


Fig. 1. Wiring diagram of signal tracer and probe details.

# MEN OF RADIO

## PART 9

by WILLIAM R. WELLMAN

**The contributions of Arthur Korn, Charles Francis Jenkins, Herbert Eugene Ives, Dr. Alexanderson, John L. Baird, and Philo T. Farnsworth are discussed in this installment. Of special interest are Farnsworth's contributions.**

A few years after the turn of the century, inventive genius began to be directed toward the sending of photographs over wire lines. Arthur Korn developed such a method in 1904 and was able to send images a distance of 600 miles over telephone lines. His system embraced a glass cylinder, over which a transparent image was placed. A spot of light coming through a small aperture traversed the picture and the highlights and shadows were converted into electrical impulses. At the receiver, these impulses were translated into light variations which affected a photographic film. It is easy to understand that the principal problem was the proper synchronization of transmitter and receiver. Despite such difficulties, Korn came into prominence in 1907 when he sent the first pictures by wire from England to the continent.

### Charles Francis Jenkins

As early as 1893, Charles Francis Jenkins invented what might be classed as the forerunner of the modern motion picture projector. His work in that field led to an interest in the electrical transmission of pictures, and by the next year he had evolved the basis of a system. Perfection of this system, however, was not reached until the period between 1923 and 1929 when mechanical scanning systems came into prominence. We now know that the television systems of that day were doomed to failure; only a weightless beam of electrons is capable of scanning an image rapidly enough to afford good definition. Mechanical scanners were limited to perhaps fifty, or at most one hundred lines. Television's first bid for popularity is interesting, even though the apparatus then used was crude; little known is the fact that even in that day, a color system was



Philo T. Farnsworth

demonstrated. To fully appreciate the developments of the period, it should be understood that methods of scanning, while they all depended upon some variation of the Nipkow disc, were divided into two general categories. First, there was the direct method, in which the transmitter scanning disc was placed between the subject to be televised and a photo cell, as shown in *Fig. 1*. As the spirally-arranged holes in the disc traversed the subject, variations in light and shadow were admitted to the photo cell, converted into electrical pulses and passed on to the amplifier and transmitter.

The indirect method, shown in *Fig. 2*, has often been called the "flyingspot" method and was incorporated in the Jenkins' system. In this case, the scanning disc is placed between the subject and the light source. As the disc revolves, a flying spot of light is caused to pass over the subject. Variations in light and shade are picked up by the photo cells located at the foci of the parabolic mirrors. This information is then conveyed through an amplifier to the transmitter. The receivers used in both systems were similar; the scan-

ning disc revolved in front of a neon lamp and changes in lamp brilliancy were reassembled into a picture by the disc.

Jenkins' system attracted considerable attention in 1923 when he sent pictures of President Harding from Washington to Philadelphia, a distance of 130 miles. The following year, he transmitted facsimiles of the signature of then Secretary of Commerce Hoover from Washington to Boston.

### Herbert Eugene Ives

While Jenkins was demonstrating his system, Herbert Eugene Ives was busy developing his method of telephone facsimile transmission. Ives, a graduate of the University of Pennsylvania, was the son of Frederic Ives, inventor of the halftone engraving process in universal use for reproducing photographs. The younger Ives worked as a physicist with the U.S. Bureau of Standards, later made a connection with the National Electric Light Association and in 1919 joined the staff of the Western Electric Company Laboratories (later the Bell Laboratories). In 1923 he invented the system of sending photographs and other facsimiles over telephone lines that was adopted by the Associated Press for general use. His work in facsimile transmission led to an interest in television and he demonstrated a fairly successful system in 1927. In 1929 he showed what was probably the first method of sending pictures in color; telephone lines were used in this test.

### Dr. Alexanderson

Dr. Alexanderson, inventor of the high-frequency alternator, developed several new types of mechanical scanners, including what he named the "multiple light-brush system" in which the projector revolved a cluster

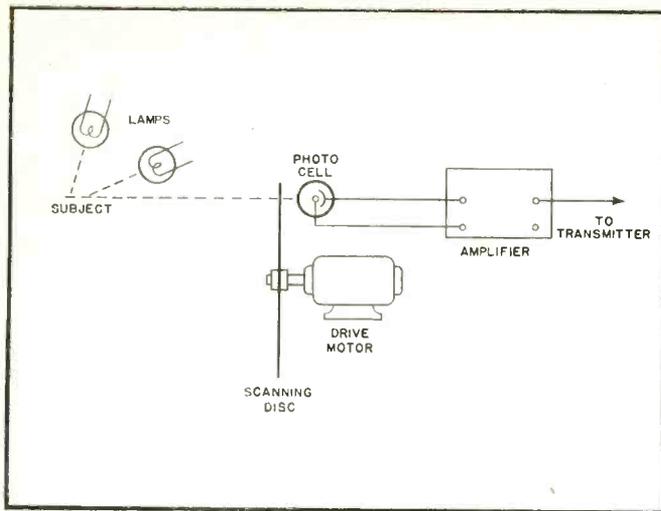


Fig. 1. Mechanical scanning. Direct pickup method.

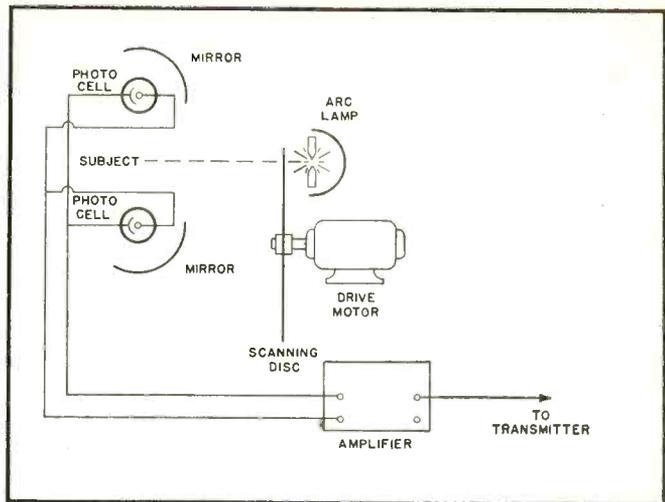


Fig. 2. Mechanical scanning. Indirect pickup method.

of lights against a screen. In 1930, Dr. Alexanderson gave a public demonstration of his system at a Schenectady theatre. The theatre orchestra was led by the image of the conductor on a seven-foot screen. The image of the conductor, as well as those of several performers, was carried by television from the laboratory, several miles away. Although the pictures obtained in that era were quite crude, they were at least recognizable and some remarkable distance records were set up. For instance, Alexanderson successfully sent a recognizable image of D.W.Griffith, famous motion picture director, from Schenectady to Los Angeles.

#### John L. Baird

Leader in research on the opposite side of the Atlantic during that period was John L. Baird. In 1926 he demonstrated his mechanical scanning system before the Royal Institution, and two years later televised a subject in his London laboratory, successfully transmitting the image across the ocean to a receiver located in Hartsdale, New York. Later in 1928 he sent an image 1000 miles from London to the S.S.Berengaria, at sea. Perhaps his most spectacular test occurred in 1932, when he televised the famous English Derby for 4000 spectators.

Despite a flurry of receiver sales during the late twenties, the awaited television boom collapsed for lack of public support, and the scanning disc joined a host of other radio antiques. Meanwhile, an all-electronic system was almost ready to make its bow.

#### Philo T. Farnsworth

Although he was probably not the first to visualize an all-electronic television system, for Cambell-Swin-

ton in England had a similar idea as early as 1907, it is certain that Philo T. Farnsworth was the first to actually construct such a system and to demonstrate its practicability. Furthermore, it is almost certain that his image dissector was the first television camera tube.

Born near Beaver, Utah in 1906, Farnsworth spent a good part of his early life on a ranch near Rigby, Idaho. He was the grandson of Mormon pioneers who settled in Utah in the eighteen forties. Even before he entered high school at Rigby he showed marked indications of mechanical and scientific ability. As a freshman at Rigby High School he attracted the attention of Justin Tolman, superintendent of the school. Tolman learned that young Farnsworth was interested in electrical phenomena and became instrumental in directing the boy's attention toward books that provided much information of great value in later years. As time passed, Tolman came to admire the keen mind and intellectual ability of Farnsworth.

Before long Farnsworth had developed an interest in the operation of photo cells and cathode ray tubes, and it is likely that even then he had begun to visualize a method of sending and receiving images by radio. With the functions of these tubes clearly established in his mind, he began to devise new applications for them, and very soon he arrived at a new and original concept of a television system, with the photo tube and the cathode ray tube operating as a team. When the idea had been refined and clarified, he proceeded to explain it to Mr. Tolman. The opportunity came one day when the school study hall was not in use. Before Tolman arrived, Farnsworth,

then about fifteen, had drawn upon the blackboard a complete sketch of his proposed system; as the superintendent entered the hall, the boy launched upon a description of the system and its operation.

The most important unit in Farnsworth's system was his proposed camera tube, which later became known as the image dissector. As mentioned earlier in this article, all television systems depend upon the principle of breaking the image to be transmitted into tiny units, each consisting of an element of light or shadow. These units were then converted into electrical impulses, fed into a transmitter through an amplifier and radiated into space. The dissector tube in Farnsworth's system was to accomplish this by first collecting the image to be transmitted upon a photo-sensitive plate within the tube. Changes in light intensity over various areas of the plate were to be registered as differences in electrical potential; the entire surface of the plate was to be scanned and information concerning light and shade conditions in each unit area was to be picked up by means of an anode finger. Deflection of the scanning beam was to be by means of magnetic deflection coils. At the receiving end of his system, Farnsworth proposed using a cathode ray tube; incoming pulses representing differences in light intensity on the image surface were to cause variations in the intensity of the electron beam which impinged upon the fluorescent screen. It should be borne in mind that at about this time leading scientists were attempting to perfect television systems based upon mechanical scanning methods. Among these research men were Jenkins, Bell

[Continued on page 44]

# SHOP NOTES

Write up any "tricks-of-the-trade" in radio servicing that you have discovered. We pay from \$1 to \$5 for such previously unpublished "SHOP NOTES" found acceptable. Send your data to "Shop Notes Editor."

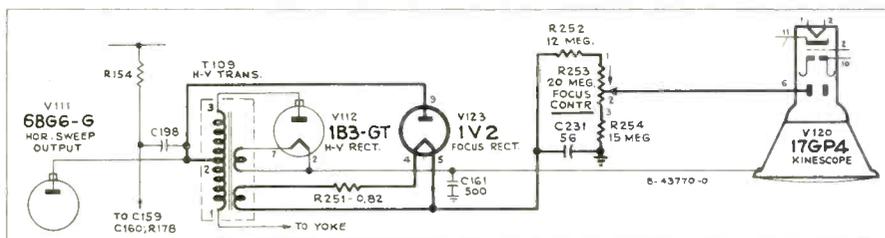


Fig. 1. Partial schematic of RCA 17" TV receivers, showing wiring changes for accommodating 17GP4 electrostatic focus kinescope.

## 17 Inch Series RCA TV Receivers—General

The RCA Tube Department announced a new 17 inch rectangular, metal cone kinescope. This kinescope features electrostatic focusing thus dispensing with the focus magnet. The electron gun employed in the tube is of an improved design to provide good uniformity of focus over the entire picture area. Furthermore, focus is maintained automatically with variation in line voltage and with adjustment of picture brightness.

Early production RCA Victor 17" television receivers employed a magnetic focus kinescope type 17CP4. Late production receivers will employ the electrostatic focus kinescope type 17GP4. To identify receivers, those employing the electrostatic focus kinescope have a letter "B" following the model number. The chassis in the "B" series of receivers is different from early production units only to the extent of the changes necessary to operate the new kinescope.

As shown in heavy lines in the partial schematic above, a new high voltage transformer is required and a 1V2 rectifier is provided to supply the focus potential to the kinescope. A focus control potentiometer is also supplied and is conveniently located on the back of the chassis.

Since the focus magnet is dispensed with on the 17GP4, a new centering magnet is provided to center the picture on the screen. This magnet assembly is in the form of two wire rings mounted on a non-magnetic form which is placed around the neck

of the kinescope, and at a distance of about three-eighths of an inch in back of the deflection yoke.

When the magnets are rotated on the tube so that the gaps in the rings are together, then maximum picture shifting effect is produced. When the rings are rotated so that their gaps are 180 degrees apart, then little or no shifting of the picture is obtained.

To shift the picture, rotate one of the magnets with respect to the other. To move the picture in a desired direction, rotate the entire centering magnet assembly around the neck of the kinescope. Repeat these two adjustments until the picture is properly centered and no corner shadows are obtained.

The ion trap magnet on the neck of the kinescope should be adjusted for

maximum brightness the same as on previous receivers. The position of the ion trap magnet also has an effect on picture centering. However, it should not be used to improve centering if such adjustment causes any reduction in picture brightness. Any adjustment of the ion trap magnet which causes a reduction in brightness, causes the electron beam to strike the edge of an aperture in the gun structure and may eventually cause damage to the kinescope.

RCA Service Company

## G.E. Phase Shift Network

Connect 60 cps audio signal from the signal generator to the HORIZONTAL AMPLIFIER terminals on the scope through a phase shift network, as shown in Fig. 2, which permits the double traces on the scope to be joined together. The alternate phase shift network may be required on scopes other than General Electric Model ST-2A.

G.E. Co. Receiver Division

## Westinghouse V-2170 Series Chassis Variations in 6CB6 Tubes Affect Gain of Video I-F Systems

The relatively slight variations that exist between tubes made by different manufacturers are important in weak signal areas where maximum gain is desirable in the video i-f stages. In some cases it is possible that the gain of the i-f system will be reduced by about two times (6db) through the use of certain 6CB6 tubes. For maximum gain when replacement tubes are required in the video i-f stages of the V-2170 series chassis, the use of 6CB6 tubes made by RCA or Raytheon is recommended. In other circuits, tubes made by other manufacturers will perform satisfactorily.

Westinghouse Elec. Corp.

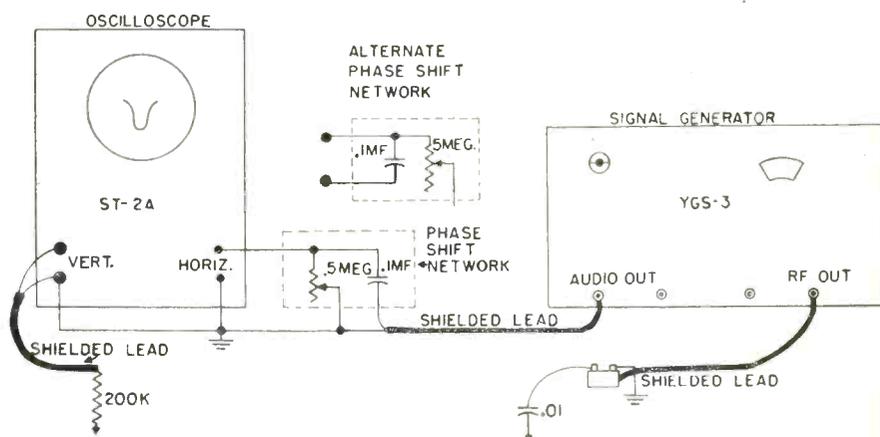


Fig. 2. Method of connecting phase shift network between signal generator and scope to remove double trace.

# ASSOCIATION NEWS

**Local, State, and National Associations are urgently requested to send in news of their activities so that we may print them in these columns.**

## **National Electronic Technicians and Service Dealers Association**

On October 7th at Toots Shor's Restaurant in New York City delegates from all Chapters met to attend the monthly meeting and hear the many reports for the servicing industry. In addition to the Chapter members, there were large delegations from Westchester, Rochester, and Buffalo, New York, also from Fall River, and Boston, Mass.

Dues were discussed and referred to finance committee headed by Mr. Vance Beachley, Treasurer.

The R.T.M.A. Service Committee's report was presented at completion of the report of the representatives present at this meeting. N.E.T.S.D.A. went on record rejecting it as inadequate and empty of any promises to meet the present day servicing problem.

A committee has been appointed to publicize and supply information to all other servicing associations and persons interested in obtaining information on the New York City and Pennsylvania licensing bills.

A nominating committee was appointed to select a list of candidates for elective offices for the coming year.

The body approved the following resolution. "N.E.T.S.D.A. representatives will not attend any future meetings called by the industry unless duly authorized representatives only of National or State groups are in attendance."

The next meeting will be held in November in Trenton, New Jersey.

## **Empire State Federation of Radio Servicemen's Association**

Their quarterly meeting was held in New York City at Toots Shor's on October 7th at 10 A.M. under the chairmanship of Wayne Shaw of Binghamton. All chapters were present. The delegates spent a great deal of time discussing educational programs, membership drives, and the R.T.M.A. report and the dues structure to be

paid N.E.T.S.D.A. The Empire State Federation will promote programs with intentions, to help the local chapters build larger memberships. The next meeting is scheduled for Sunday, January 27, in Smith Brothers Restaurant, Poughkeepsie, N. Y.

## **Federation of Radio Servicemen's Association of Penn.**

The Federation of Radio Servicemen of Pa. has completed its speaker schedule for 1951 and is now starting on the January to June schedule for 1952. Mr. A. G. Petrasek has just completed a series of lectures for RCA Tube Division throughout all chapters for the month of September. October is covered by G. E. Electronics Department which will feature Mr. F. Wendall Tietsworth who will lecture on New Trends in TV Design. He will be followed in November by Raytheon TV and Raytheon Tube Co. in a joint meeting which will feature Mr. Gill, Chief Field Service Engineer which will be followed also in November by John Rider, nationally known publisher. The Federation suggested to members that they return to sender or place in waste paper baskets all parts catalogs that are being received daily and give full patronage to local distributors.

## **Associated Radio and Television Servicemen's Association of New York**

ARTSNY has obtained a new club room consisting of three thousand square feet which in addition to being a club room will have a complete Service Clinic and offices at #5 Rutgers Street, New York City. A large group of ARTSNY members, with the Association's backing, have now a large classified ad in the telephone Red Book. The boys are still talking about the Association's fishing trip. From stories that I hear, most of the "fishermen" spent their time at the rail "chumming"—they eventually ended up at the Fulton Street Fish Market.

## **Radio Servicemen's Association of Ithaca**

Ben De Young has all the members helping him on a fund raising campaign for a cause close to his heart—The Palsy Fund. The Program Committee has developed new Educational & Business Training lectures that will be presented to its membership at its meetings.

## **Radio Servicemen's Association of Trenton, New Jersey**

At its recent election the following officers were elected: George Owens, President; Francis Wolf, Vice-President; Charles Redman, Secretary; while David Van Nest was elected delegate to the NETSDA. Trenton's delegates were requested to present application for membership to NETSDA. The Trenton association will also co-operate with other groups in New Jersey State in meeting and discussing State problems.

## **Radio and Television Servicemen's Association of Pittsburgh, Inc.**

The Radio and Television Servicemen's Association of Pittsburgh, Inc. applied for membership in the Federation of Radio Servicemen's Association of Pa. also believed to be the first association in the country to set up a Federal Credit Union. This was done to help the small shop owners and the independent servicemen to obtain additional finance for their business and the purchasing of test equipment. A great deal of time was spent at the meetings also discussing the new Penna. State Licensing Bill. The newly elected officers for the Association are: George R. Sharpe, President; Samuel Avins, Secretary and Counsel; Edward Roberts, Treasurer.

## **Allied Television Technicians Association of South Jersey**

Present officers are Rodger Haines, President; Paul Natlack, Vice-President; Bob Blazer, Secretary; and

*[Continued on page 36]*

# TRADE LITERATURE

*Robert B. Dome's Television Principles*, published by the McGraw-Hill Book Company, is designed to meet the need for an up-to-date reference book combining theory and practice. It reflects a practical, yet technical treatment that clarifies basic principles of TV transmitter and receiver design and provides information necessary to cope with new equipment designs and specifications as they develop. Mr. Dome, Electrical Consultant in the Receiver Division of the General Electric Company at Schenectady, successfully bridges the gap between general studies in radio theory and actual radio engineering practices in the specialized field of TV engineering.

*Television Principles* covers much of importance to the engineer and technician—from the origin of the picture signal at the camera to the reproduction of the picture at the receiver picture tube. Subjects that receive special emphasis in this volume are video amplifiers, cathode followers, grounded-grid amplifiers, signal-to-noise ratios in head-ends, intermediate frequency amplifiers, and detection. It also includes numerous charts, curves and tables that furnish data of universal application in the daily work of TV engineers.

In developing the final equations for particular relationships this book presents numerical examples that show exactly how the mathematical results may be applied. The author makes frequent use of certain simplifying assumptions that afford usable information for the practicing engineer. As he points out these basic reference data "enable the engineer to see the trees in spite of the forest."

*Television Principles* reflects Robert B. Dome's 25 years of practical experience with General Electric. Mr. Dome was recently awarded IRE's Morris Liebmann Memorial Prize for 1951 for his contributions to the inter-carrier sound system of TV reception, wide-band phase-shift networks, and various simplifying innovations in FM receiver circuits.

*Television Principles*, (281 pages and 81 illustrations) is priced at \$5.50. For further details, please contact McGraw-Hill's Book Information Service, 327 West 41st Street, New York 18, N. Y.

\* \* \*

*"Audio Amplifiers and Associated Equipment"*, (Volume 3) published by Howard W. Sams & Co., Inc., Indianapolis, is now available through Sams' Photofact distributors.

Presenting a detailed analysis of fifty important audio amplifiers, and full coverage of 22 FM and AH tuners, this 352-page volume brings the Sams "Audio Amplifiers" Library up to the minute, Howard W. Sams, president, said and picks up where Volume 2 left off.

Each unit is thoroughly analyzed in 4 to 10 pages with all circuit and design data based on actual original laboratory study of the equipment itself. Material contained in Volume 3 is entirely new and does not duplicate the previous two volumes, it was pointed out.

Fully illustrated, "Audio Amplifiers and Associated Equipment", Vol. 3 is available in sturdy binding, 8½ by 11 inches, and lists at \$3.95.

In a preface of the book Sams points out that interest in high-fidelity custom music systems is growing rapidly, and the Photofact Library of audio amplifiers is published to satisfy the continuing demand for authoritative data covering the increasing production of new audio equipment. Sams reported heavy demand for the volumes from public address and sound technicians, custom installers, BC engineers and students.

\* \* \*

A new second volume of *The Color Television Notebook*, containing concise technical information for TV circuit engineers, TV servicemen and TV experimenters including fundamentals of color television systems, receiver circuitry for the CBS Color Television system, details of the CBS-Columbia companion receiver and

[Continued on page 38]

## HERE'S HOW & WHY

by CHET JUR

Sales Engineer  
Merit Transformer Corp.

### Use Of Proper Width Coil

AN important problem encountered in the replacement field is the use of the proper width coil to match the horizontal output transformer. This occurs when replacing a damaged or inoperative horizontal output transformer. When this is done the normal procedure is to select one of the replacement type transformers available on the market designed for wide-spread application to many circuits. If this is done then it is quite likely the width coil will be overlooked or the service technician will assume the original one will do.

This will lead to many problems, because the original width coil will not match the new horizontal output transformer. Most initial equipment manufacturers design their horizontal output transformers with a low impedance secondary winding to match a small (low-impedance) width coil thereby reducing over-all cost.

Now the replacement type transformer, because of its universal application characteristics, is designed with several taps to match various yoke impedances. To simplify applications into many types of circuits a universal width coil is used which can be connected across any pair of these same taps. This allows a wide range of applications, but demands that the width coil have a considerable range of inductance available. By the use of a variable ferrite slug this has made the universal width coil possible. It is also apparent from the foregoing information that the ordinary width coil available in initial equipment will not meet these requirements.

If the old width coil is retained it will have a two-fold effect on the operation of the set. First—the horizontal output tube will operate so poorly that not enough power will be developed to heat up the high voltage rectifier for proper emission, causing low 2nd anode voltage. This may be so low that the cathode ray tube will

[Continued on page 42]

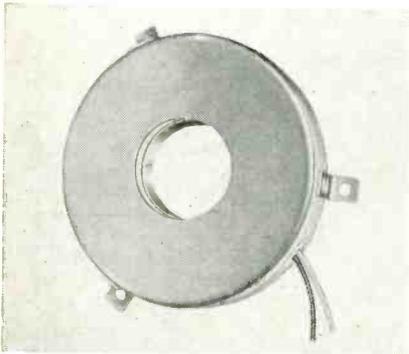
# NEW PRODUCTS

## FOCUS COIL

Standard Transformer Corporation, Chicago, announced another unit in its Stancor TV replacement components line, the FC-11 Focus Coil, for use with direct viewing kinesopes, requiring external magnetic focusing. The coil is equivalent to RCA 202D2.

The FC-11 has a DC resistance of 470 ohms; maximum Ma. 140, and diameter 4 $\frac{3}{4}$ "", with mounting centers 2-11/16" radius 120° apart.

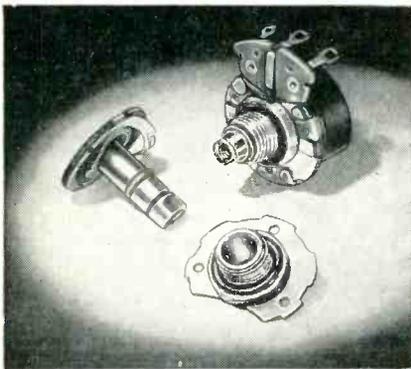
The 74 TV transformers and related components in the Stancor TV replacement line make it the most complete in the industry, Jerome J. Kahn, president said. These units



have replacement and conversion applications in over 1500 TV models and chassis. Stancor TV Transformer Catalog and Replacement Guide #338 contains a complete listing of these components and their applications.

## WATERPROOF CONTROL WITH STANDS 6-FOOT HEAD PRESSURE

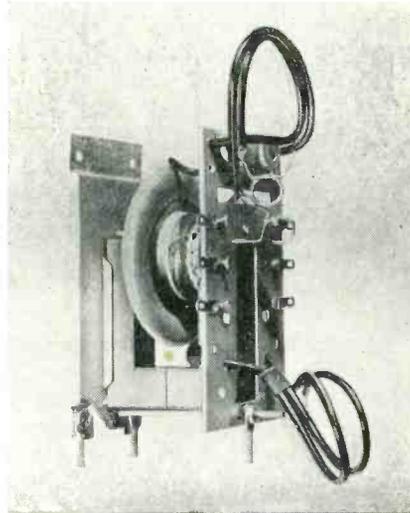
A new series of waterproof controls are announced by Clarostat Mfg., Co., Inc., Dover, New Hampshire, manufacturers of electrical resistance devices. The new controls are available in a wide range of resistances and wattages, and have been especially designed for use in military assemblies.



A rubber "O" ring is used on the shaft creating a water tight seal which will stand pressure equivalent to a six foot head of water. A similar rubber "O" ring is used on the mounting surface of the bushing performing the same function as the shaft "O" ring seal.

## FLYBACK TRANSFORMER

A flyback which can be mounted above and below the chassis horizontally or vertically or

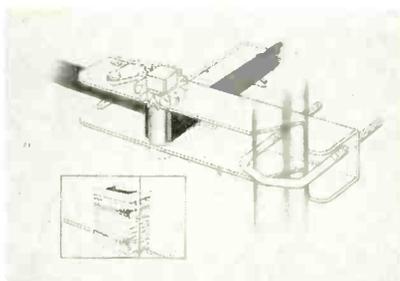


on the side wall of the hi-voltage cage within the TV set is now being made by the Merit Coil and Transformer Corporation of 4427 North Clark St., Chicago, Ill.

The new flyback is a 77J-1 type and is in all other respects electrically identical to the popular Merit HVO-6. The additional advantages of the universal mountings offer greater versatility to the Serviceman.

## CHIMNEY MOUNT

Radiart Corporation, announces the development of an entirely new idea in chimney



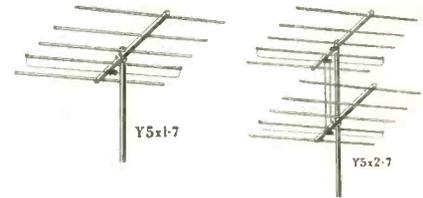
mounts for TV antennas. Known as the Speed-Dee Chimney Mount, it is swiftly installed and features the absence of the usual nuts and bolts for tightening the straps around the chimney. A slip-proof aluminum ratchet lock winds up the straps and locks them tightly in place.

This design and use of heavy-gauge, zinc-plated steel in the construction of the Speed-Dee Chimney Mount guarantees years of satisfactory performance. Use with masts up to 1 $\frac{3}{4}$ " O.D. is made possible by the large "U" bolt, and the SPEE-DEE comes complete with galvanized steel strapping.

The Radiart Corporation, Cleveland 2, Ohio, or your local Radiart distributor will be glad to furnish you with further information.

## HIGH EFFICIENCY YAGIS

A new series of "precision-built" 5 element Yagi arrays has been designed by Telrex engineers expressly to meet the need in certain areas for high back signal rejection plus high sensitivity.



These Yagis are individually cut for channels 2 through 13, with all elements operative and contributing to gain and back rejection. The high frequency Yagis are pre-assembled, ready for immediate installation. The low channel models are completely collapsible, incorporating an exclusive hinging and clamping assembly for swift assembly combined with unmatched mechanical strength.

Because of the high impedance reduction caused by the coupling of parasitic in a 5 element array, the Telrex Yagis are designed around a bi-dimensional folded dipole to achieve an impedance step up ratio of 20 : 1, which provides a terminal impedance offering an excellent match to standard 300 ohm line.

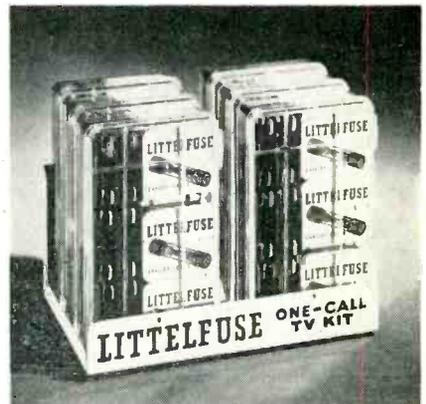
All Telrex Yagis can be stacked for increased gain by means of stacking harnesses available for each channel.

These Yagis are individually cut for each channel. This contributes to maintaining substantially flat response over the full channel, (less than db variation), and above all, eliminates the possibility of the reversal of the directivity pattern at any frequency within the channel, a common failing of many so called compromise Yagis which are tuned to the middle frequency of the channel, or, in some cases tuned to the "mean" frequency of two channels.

## TV FUSE REPLACEMENT

The 9 most needed types of TV fuses and six TV Snap On Fuse Holders for replacing pigtails are presented by Littlefuse Inc., 4757 N. Ravenswood, Chicago, Ill., in an original plastic box.

There are 45 fuses in all, packed in metal dispensers of 5 each. The metal boxes used in this kit have sliding tops which release one fuse at a time. They are vest pocket size and feature a fuse chart on the back of each box.



This assortment is known as the "One Call TV Kit" because it is designed to cover 94% of TV fuse needs according to serviceman vote. The plastic kit is 2 $\frac{1}{2}$  x 4 $\frac{1}{2}$  inches in size. It makes an ideal bench or box kit. It is

## WO-57B 3" OSCILLOSCOPE

- ✓ Sensitivity—30 millivolts rms per inch deflection.
- ✓ Response—Flat within—2 db from dc to 500 Kc.
- ✓ Tilt and Overshoot—Permits square-wave reproduction up to 100 Kc.
- ✓ Input Capacitance—Only 9.5 out with WG-216A probe.
- ✓ Trace Expansion—Two times screen diameter.
- ✓ Vertical Amplifier—Two-stage, direct-coupled, push-pull.
- ✓ Linear Sweep Range—15 to 30,000 cps.
- ✓ Preset Sweep Position—For instant synchronizing with horizontal and vertical sync pulses.
- ✓ Plus and Minus Sync—For quick lock-in on either "upright" or "inverted" pulses.
- ✓ 60-Cycle Sweep—With phasing control.



**\$145.00**  
SUGGESTED  
USER PRICE

## WO-56A 7" OSCILLOSCOPE

- ✓ Sensitivity—10.6 rms millivolts per inch deflection.
- ✓ Frequency Response—Flat within—6 db from dc to 1 Mc.
- ✓ Square-Wave Response—Negligible tilt and overshoot for square waves up to 100 Kc.
- ✓ Attenuators—Frequency-compensated, and voltage calibrated.
- ✓ Plus & Minus Sync—For easy lock-in of "upright" or "inverted" pulses.
- ✓ Preset Sweep Positions—For instant synchronizing with "H" and "V" sync pulses.
- ✓ DC Amplifiers—Identical in both vertical and horizontal sections.



**\$217.50**  
SUGGESTED  
USER PRICE

Both 'scopes come fully equipped with direct probe and cable, low-capacitance probe, ground lead, and alligator clip.

# YOUR CHOICE of these famous RCA 'scopes designed for professionals

The RCA WO-57B is a compact, lightweight oscilloscope; an excellent portable instrument for laboratory, factory or shop use. It is the first inexpensive *quality* instrument wholly equipped to handle *every* TV and radio service job.

Direct-coupled amplifiers are used to provide low-frequency response flat down to dc. Excellent low-frequency square-wave reproduction, essential for correct sweep alignment, is thus assured. Good square-wave response up to 100 Kc enables the WO-57B to reproduce blanking and sync pulses for dependable television servicing in the shop or in the field.

You will find the RCA WO-57B equipped right down to the last detail . . . including a nickel-iron-alloy shield surrounding the C-R tube to minimize hum pickup.

Ask your RCA Test Equipment Distributor for complete technical data folders, or write RCA, Commercial Engineering, Section 55KX, Harrison, New Jersey.



**RADIO CORPORATION of AMERICA**  
TEST EQUIPMENT  
HARRISON, N. J.

The RCA WO-56A has design features which make it a versatile instrument for use in servicing and development work on circuits for television, radio, audio, and industrial electronic applications.

Its two identical dc push-pull amplifiers have equal phase-shift characteristics and ample output and gain to provide three-times horizontal-trace expansion. Wide-range centering allows any portion of the expanded trace to be observed for detail.

The 'scope includes practical refinements such as a magnetic shield for the C-R tube, retractable light shield, line-frequency sweep with phasing control, voltmeter-type range switch for making peak-to-peak measurements, and dual concentric controls for coarse and fine adjustments of gain, sweep, and sync functions.

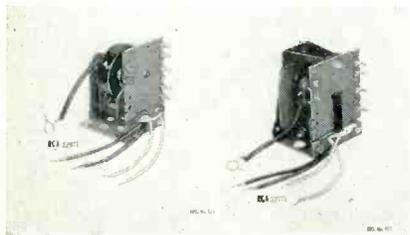
made of a clear plastic so that the serviceman doesn't need to resort to "Grab Bag" methods when he's looking for the right fuse.

A printed card on which appears a table of contents is inserted at the bottom of each kit. This refill guide can be read through the bottom of the transparent box.

The "One Call Kit" is now available at jobbers throughout the country.

### HORIZONTAL OUTPUT TRANSFORMERS

Tube Department, RCA, Harrison, N. J., announces the new RCA-227T1 and RCA-228T1 Horizontal-Deflection-Output and High-Voltage Transformers are offered for use with the electrostatic-focus picture 17GP4 and similar

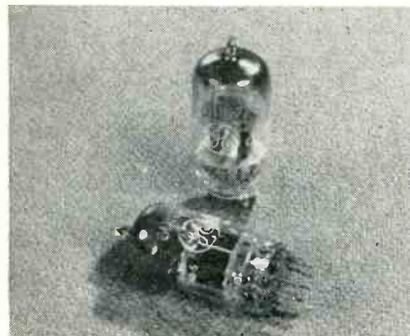


picture tubes having a horizontal-deflection angle of about 66°. Utilizing a ferrite core for high-efficiency operation, light weight, and compactness, each of these transformers is designed for use with a single, horizontal-deflection amplifier tube; a single rectifier tube such as the 1B3-GT for the high-voltage supply; a single rectifier tube such as the 1V2 for the focusing-voltage supply; and the magnetic deflecting yoke RCA-209D1 which also has a ferrite core.

The 227T1 can provide a high-voltage supply of 14 kilovolts at no load whereas the 228T1 can provide 16 kilovolts. Both will provide a focusing-voltage supply adequate for the 17GP4. For 14-kilovolt operation, ample deflection for the 17GP4 is provided by the 227T1 in a horizontal-deflection system having a single 6BQ6-GT output tube and operating with a dc power supply of only 250 volts. For 16-kilovolt operation, ample deflection for the 17GP4 is provided by the 228T1 in a horizontal-deflection system having either a single 6BQ6-GT or a single 6AU5-GT output tube. When the 6BG6-GT is used, a dc power supply of 280 volts is needed; when the 6AU5-GT is employed, a 300-volt dc supply is required.

### MINIATURE TV TUBE

The General Electric Company's Tube Department have announced development of a low-cost miniature television receiver tube designed to reduce snow in fringe area reception.



The new tube, the 6BK7, which has already gone into production at the company's receiver tube plant in Owensboro, Ky., has a noise factor of only seven decibels as a cascode amplifier at 216 megacycles.

Intended primarily for cascode service in VHP reception, the 6BK7 may also be used as a low-noise first-intermediate-frequency amplifier in UHF.

Design features of the 6BK7 include a shield between the triode sections and high transconductance to improve gain and reduce the noise level.

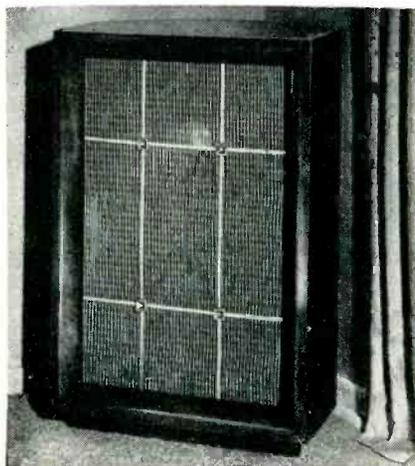
Typical operating conditions of the 6BK7 include:

Plate supply voltage, 150 v; cathode bias resistor, 56 ohms; amplification factor, 40; plate resistance, 4,700 ohms; transconductance, 8,500 micromhos; plate current, 18 ma.

Further information on the 6BK7 may be obtained by writing the General Electric company, Tube Department, Electronics Division, Schenectady 5, N. Y.

### FOLDED CORNER HORN SPEAKER ENCLOSURE

New Klipsch-licensed "ARISTOCRAT" created and produced by Electro-Voice, Inc., Buchanan, Michigan, now for the first time provides at least one full octave of added bass range at full efficiency in a small-size, low-cost folded Corner Horn Enclosure with direct front radiation for 12" full range speakers.



The E-V "ARISTOCRAT" utilizes the Klipsch principle to employ the corner of a room as an extension of the exponential-acoustic-horn air load. Efficiency is many times that obtained with the conventional bass-phase-inverted-reflex or vented type cabinets. It is designed so that it can also be used in ceiling corner position for special public address utility.

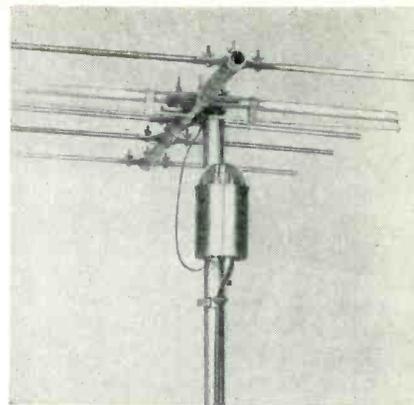
The "ARISTOCRAT" is authentically styled in the mode, and fits tastefully into the decor of any room. Proportions fully comply with all the precepts of dynamic symmetry. Exquisite mahogany veneers have lustrous hand-rubbed mirror finish on all exposed sides. Attractive polished and lacquered brass grille affords protection and provides graceful accent. Height 29½", width 19", depth 16½", overall. Weight, net 43 lbs., shipping 55 lbs. Available in mahogany finish at \$99.50 list (less speaker), or in bleached blond finish at \$106.00 list (less speaker).

For full details, write for Bulletin 180 to Electro-Voice, Inc., Buchanan, Michigan.

### SINGLE CHANNEL BOOSTER

A new mast mounted, single channel booster has been developed by VEE-D-X engineers, it was announced by The LaPointe-Plascomold Corporation.

Many outstanding features have been incorporated in this new booster which was highly praised at the recent NEDA Convention in



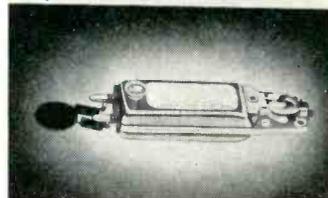
Cleveland. Scientific heat dissipation; compensating adjustments for voltage loss in transmission line regardless of line length; and amplification of signal before line noise pickup; are but a few of the special features.

Housed in a streamlined aluminum case, the VEE-D-X "Rocket" Booster is simple to install and easy to service. Power is supplied from a separate power pack on the back of the set which is automatically turned on and off by the TV receiver. Also, this new booster, Model OS, contains all of the many advantages of the VEE-D-X Model OB, including the unique RF assembly, using a 6J6 push-pull cross neutralized amplifier, and providing 18 db gain with full 5 megacycle band width. The "Rocket" will be ideal for all single channel installations, especially in fringe areas, it was reported.

### PHONO PICKUP CARTRIDGES

Shure Brothers, Inc., Chicago manufacturers of microphones and acoustic devices, announced two new phono pickup cartridges to help simplify cartridge replacement.

Model W42BH, Dual-Voltage Cartridge is described as a low cost "Lever-Type" cartridge for 78 RPM records. Equipped with unique "slip-on" condenser-harness for dual-voltage output, 1.5 volts or 3.75 volts is obtainable in one cartridge. It was pointed out that this cartridge gives servicemen an ideal replacement for old style 78 RPM cartridges. A "leader value," it modernizes the equipment at an extremely low price and guarantees improved reproduction, as well as minimizing inventory problems, since one cartridge with choice of two output voltages covers the bulk of requirements.



Special features of the Model W22AB-T "Vertical Drive" cartridge include extended frequency response to 10,000 c.p.s.; tracks at low needle point pressure—only 8 grams; sturdy construction guarantees long life of turnover mechanism, and standard ½" bracket mount has elongated holes for versatility and quick easy installation. In the Model W42BH,

Introducing...

# THE MAGIC OF MODEL M

"The Magic of Model M" . . . a new trend for TV antennas! And Walsco introduces the *first* antenna with chromate-coated Magnesium cross-arms. Structural strength is almost equal to steel, and yet is 1/3 lighter than aluminum. Once you install, *that's all!* No costly call-backs that eliminate your profit. Chromate-coating assures positive corrosion resistance. Elements are made of high-conductivity, super-strength aluminum alloy, reinforced with Swiss "Permalum." Guaranteed sturdier, more dependable under severest weather conditions. Equipped with famous Walsco "signal director" and unbreakable insulator. Same high standards of Walsco crystal-clear TV reception.

**\* NEW  
WALSCO  
TV ANTENNA Model M**

*Once you install... that's all!*

WALTER L. SCHOTT CO., 3225 Exposition Place, Los Angeles 18, Calif.

Branch: Chicago 6, Ill.

**M**  
\*  
Structural strength almost equal to steel

**M**  
One-third lighter than aluminum

**M**  
Chromate-coating for positive corrosion resistance.

AVAILABLE AT PARTS JOBBERS EVERYWHERE  
Model 4C90 M—Single Bay —List \$ 9.25  
Model 4C92 M—Dual Array —List \$19.85  
Model 4094 M—4 Bay Stack—List \$44.50  
*All prices without mast.*

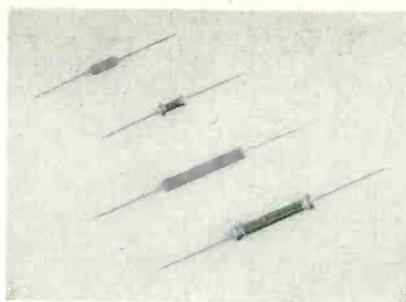
Walsco quality earned its reputation

# WALSCO

"Lever-Type" construction assures improved tracking; specially designed needle guard protects the crystal from breakage; it is equipped with pin jacks and pin terminals and if used for high output, the condenser may be used separately by servicemen for other purposes.

#### DEPOSITED CARBON RESISTOR

"A deposited carbon resistor, known as the Phaostron "Carb-ohm" is being manufactured by the Phaostron Company of South Pasadena, California. For high frequency applications, particularly where high values of resistance are essential, or power dissipations up to 2 watts are required the "Carb-ohms" are unique. They also answer the need for closely matched units for computer network and other applications, are of particular advantage for electronic equipment which is subject to extremes of temperature and can be employed as re-



placements for wire wound types in many applications.

"Carb-ohm" resistors are available hermetically sealed in glass or clad in a specially developed humidity impervious casing, which provides stability over time and freedom from variations due to climatic changes. "Carb-

ohms" are available in a variety of mountings, the axial lead, pictured above, as well as a threaded stud or a tapped hole terminal. Wattage ratings range from 1/3 to 2 watts with a resistance range of 20 ohms to 200 megohm.

The "Carb-ohm" is manufactured under license arrangements with Western Electric Company, Inc. An illustrated brochure and complete information are available upon request to the Phaostron Company, 151 Pasadena Avenue, South Pasadena, California."

#### ISOLATION BOX FOR MULTIPLE SET OPERATION

Technical Appliance Corporation, Sherburne, N. Y., manufacturers of Taco Antennas and Tacoplex Master Antenna Distribution Systems, announce a new non-powered isolation box for use with the Tacoplex Antenna Distribution System.



The new Isolation box is attractively housed in a bakelite box the size of a standard outlet box. It contains a matching network of resistors providing an isolation factor between receivers of at least 30 db, with a minimum signal drop across the outlet. There is no power required as in the case of the cathode-follower-type of isolation box. Terminals are provided for 300-ohm twin-lead to the receiver. Mounting holes allow for easy, neat baseboard, or in the wall concealed mounting.

This newest Tacoplex item adds to the versatility of the Tacoplex Antenna Distribution System through the elimination of costly, higher maintenance powered isolation boxes.

#### PIX TUBES, RINGS AND SLEEVES

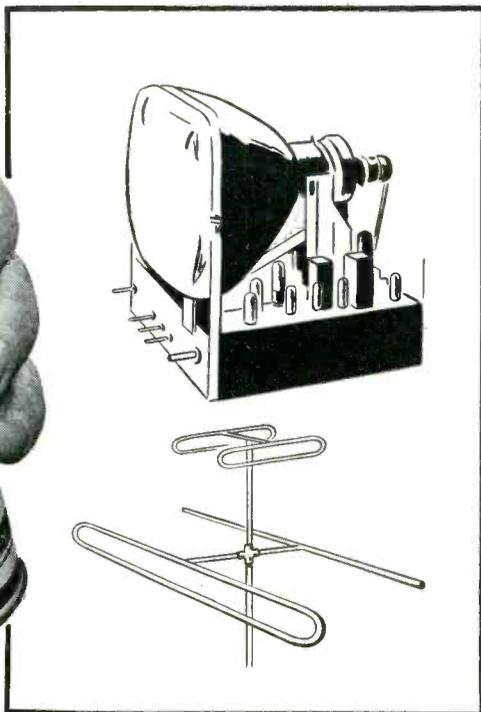
Production of a line of Rings and Sleeves for the 30" round picture tube was announced by Anchor Industrial Company, 533 Canal St., New York City.

The Ring, #30/IIIF, fits both the 30AP4 and 30BP4 tubes.

#### ASSOCIATIONS

[from page 30]

Gordon Laney, Treasurer. At the last meeting a nominating committee was appointed to select the list of candidates for election of officers for the October meeting. Membership Committee has been appointed to extend its membership drive to all of South Jersey. Paul Natlack, V-P for the



#### Spray on antenna and lead-in terminals, too; Krylon prevents corrosion and pitting

Krylon is an acrylic spray — not a vinyl plastic. Spray it, right from the 12 oz. aerosol can, on the high voltage coil and insulation...in the socket of the high voltage rectifier...on component parts of the high voltage rectifier circuit. Krylon dries in a few minutes to form a permanent protective coating of high dielectric strength.

Both inside the set and on the antenna, Krylon seals and protects...makes TV sets perform better, longer...cuts down service calls...builds customer good will. Two types — clear (list \$1.95) and nonconducting aluminum (list \$2.25). Also in gallons for application by brushing or dipping. See your jobber, or write direct.

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in high voltage circuits with



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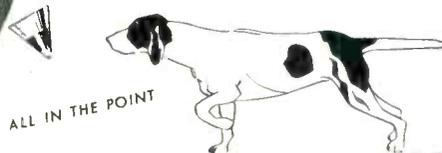
Fidelitone Conventional and Special-type Phonograph Needles; Fidelitone Recording Wire and Tape.



## PERMO-POINT

**FOR THE COIN-PHONOGRAPH TRADE**

Permo-Point Conventional and Special-type Needles, especially designed and packaged for use in coin-operated phonographs.



CHAMPION OF PERFECTION

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**PERMO**

**FOR THE COMPONENT PARTS TRADE**

Permo Conventional and Special-type Phonograph Needles; Permo Recording Wire and Tape.

## MANUFACTURERS

**FOR ORIGINAL EQUIPMENT  
MANUFACTURERS**

Conventional and Special-type phonograph needles for original installation by manufacturers of sets, record players and cartridges. First, largest, and preferred source of phonograph needles for original equipment. Permo-pivots and precision parts for instrument manufacturers.

Fidelitone, Incorporated, (a subsidiary of Permo, Inc., and the National-Standard Company) is Permo's source of supply for Fidelitone and Permo Recording Wire and Tape.

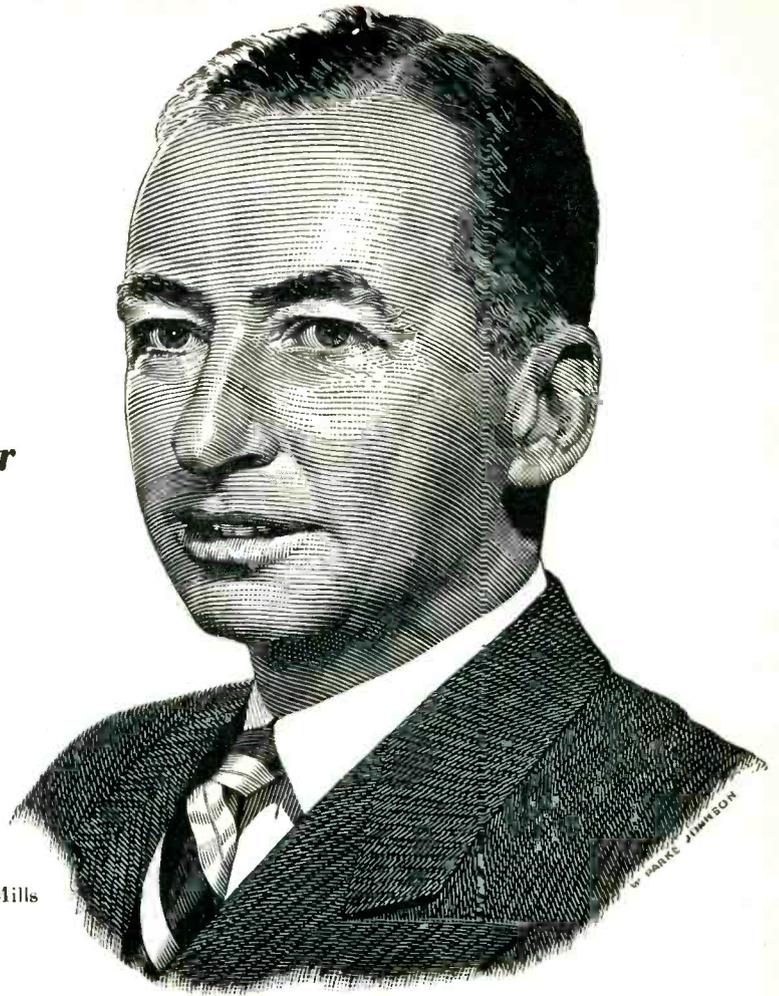


# PERMO, INC.

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MANUFACTURERS OF "FIDELITONE", "PERMO-POINT", AND "PERMO" PRODUCTS

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advantage of the  
Payroll Savings Plan...”***



**SPENCER LOVE**  
Chairman of the Board, Burlington Mills

*“The Payroll Savings Plan is one of the important personnel services offered to the employees of our company. At the present time some 15,000 employees in all branches of our organization are taking advantage of this splendid plan for systematic savings. In times of national emergency this plan assists in stabilizing the economic life of the employee, the community and the nation.”*

Last call for the 1951 Defense Bond Campaign!

While the campaign was scheduled for six weeks, beginning Labor Day, the *accounting period* will include all Payroll Savings Plan bond purchases and enrollments in September and October.

If you haven't conducted a person-to-person canvass to put a Payroll Savings Blank in the hands of every man and woman in your company there is still time to join the thousands of companies which have added nearly a million employees to the Payroll Savings Plan through person-to-person canvasses.

Phone, wire or write to Savings Bond Division, U. S. Treasury Department, Suite 700, Washington Building, Washington, D. C. Your State Director will give you all the help you need—application blanks, posters, envelope stuffers, personal assistance.

Give your employees an opportunity to save for their fu-

ture and at the same time, help to maintain America's economic security—put an application blank in their hands.

**Results of a few recent person-to-person canvasses**

Firestone Tire and Rubber Company (40,000 employees), 87% participation; Universal Atlas Cement Company, 67.8% of 4,789 employees . . . Martha Mills, 71% of 2,200 employees . . . Lit Brothers, 52% of 3,600 employees . . . Delta Air Lines, 65% of 2,100 employees; Aerojet Engineering Corporation, 78.1% of 2,000 employees . . . Brown-Lipe Chapin Division of General Motors, 87% of 1,750 employees; Fabricast Division, General Motors, 85% of 1,700 employees.

**Person-to-person canvasses now under way include:**

	Number of Employees
38 Major Railroads . . . . .	993,142
Radio Corporation of America . . . . .	40,000
Owens-Illinois Glass Company . . . . .	25,000
Cudahy Packing Company . . . . .	17,000
Pacific Gas and Electric . . . . .	17,000
Willys-Overland . . . . .	6,750
Owens-Corning Fiberglas Corp. . . . .	6,500
White Motor Company . . . . .	6,500
Frieuhaf Trailer Company . . . . .	5,700

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**Radio-Television Service Dealer**



series published.

Both full-time and part-time servicemen will find Tek-File a boon to servicing, inasmuch as they will be able to take a single folder with them to repair a receiver in the customer's home. When a job is finished, the Tek-File folder is ready for immediate alphabetical filing, without loss of time.

Each durably Tek-File is priced at \$2.00.

\* \* \*

American Phenolic Corporation, Chicago 50, Ill., makes available its new *Catalog A2* which describes its "AN" connectors for power, signal and control circuits in aircraft and electronic equipment.

This is a new—and completely revised—comprehensive catalog of Amphecol "AN" and special connectors. As in the previous catalog, the objective has been to make your job of selecting and ordering connectors as easy and fast as possible. The different types of connector shells, insert arrangements and fittings are illustrated for your convenience. Complete listings of the thousands of arrangements are given. Dimensions, weights and electrical data are shown in detail. Yet the job of selecting connectors is made even easier than before by the simplified design of this new catalog.

The method of selecting the connector you need is outlined step by step in the introductory pages of the catalog.

Insert contact arrangements are grouped by number of contacts and each one is illustrated. Each Amphecol "AN" and special connector is described fully and the data and sequence of its presentation are the results of helpful suggestions on the part of engineers and purchasing agents.

\* \* \*

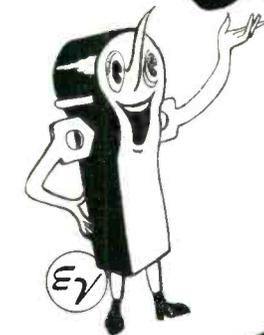
"Just dial the type!" That's the idea of the *Du Mont TV Picture Tube Replacement Selector* which, at the mere spin of the wheel, indicates the correct replacement type for that wornout picture tube. It does away with the time and trouble of thumbing through a catalog or looking up tube characteristics on a technical wall chart. Conversions are quickly and easily figured out by checking the technical data at the rear of the Selector, showing through slots for the given type. This gimmick is pocket-sized, so as to be always handy on the job, in the shop or at the jobber's counter.

The new Du Mont Selector is offered through the Teletron Distribu-

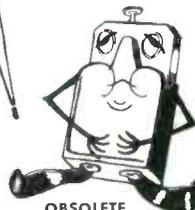
## IT'S CARTRIDGE

# Check-up TIME!

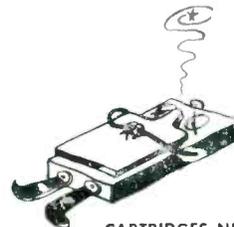
REPLACE INEFFICIENT PHONO-CARTRIDGES NOW with Modern, Lightweight, Compliant E-V CARTRIDGES



DETERIORATED



OBSOLETE

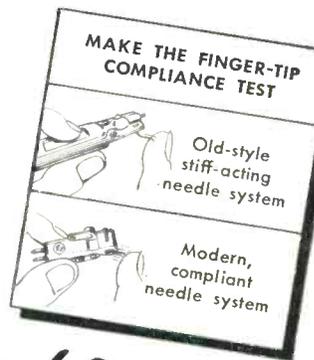


CARTRIDGES NEED NOT BE COMPLETELY DEAD TO NEED REPLACEMENT



WORN OUT

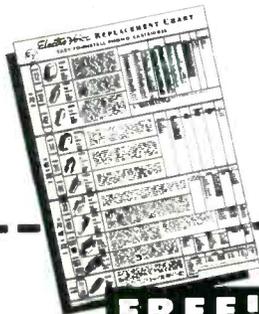
This is a good time to contact record-player owners and check the condition of their phono-cartridge. If it is not reproducing properly or is causing excess record and needle wear, chances are the cartridge has deteriorated or is obsolete—and should be replaced. You'll make new replacement sales, and open the way to other service business, too! A modern, lightweight, compliant E-V cartridge will give fullest record enjoyment and longer record life. You can demonstrate the difference. Remember, you can make most replacements with fewer E-V models!



MAKE THE FINGER-TIP COMPLIANCE TEST

Old-style stiff-acting needle system

Modern, compliant needle system



FREE!

REPLACEMENT CHART  
Large, Complete Replacement Chart. Gives handy cross-reference and valuable data. Tells when to replace a phono-cartridge. Ask your E-V Distributor or send for it now.

## Electro-Voice INC.

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TV BOOSTERS • MICROPHONES • HI-FI SPEAKERS • PHONO-PICKUPS

Electro-Voice, Inc., Dept. T11-51  
412 Carroll St., Buchanan, Michigan

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Address.....

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Seventeen years of production experience, making millions of quality capacitors, has created this complete, outstanding ILLINOIS CONDENSER line. There's a full Jobber line of capacitors for every TV and radio replacement purpose; capacitors for the entire electronics industry—capacitors that meet the highest standards of dependability.

This engineering and manufacturing experience enables ILLINOIS CONDENSER COMPANY to meet every demand for new capacitor types, whether for peace or defense applications.

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tors of the Allen B. Du Mont Laboratories, Inc., Cathode-ray Tube Division, of 750 Bloomfield Ave., Clifton, N. J.

\* \* \*

The largest *Rider Television Manual* to date, *Volume 8* is scheduled for publication in November, at which time the distributors of *John F. Rider Publisher, Inc.*, 480 Canal St., New York 13, will receive their stock of the 2,684 page (8½ x 11) pages manual.

TV 8 contains approximately 600 models, the productions of 52 manufacturers. The factory-authorized coverage is for the period June through September 1951. 12 x 15 inches in size, all pages are systematically prefiled for the user. As in preceding *Rider Television Manuals*, TV 8 also includes a single index covering the complete series.

All manufacturers' production runs and chassis modifications are presented with original and modified schematics. Also included are chassis views, voltages, resistance readings, complete alignment procedures, trouble shooting test patterns, waveforms, complete parts lists and values, boosters, tuners, and a special section devoted to manufacturers' changes on previously published data. Additional time-saving features are unpacking and installation data and circuit action descriptions. It is priced at \$24.00.

\* \* \*

Demand for the new *Shure Brothers Phonograph Pickup Replacement Manual* has been so heavy that a new supply has been made available, Jack A. Berman, vice president in charge of sales of Shure Bros., reveals.

The manual contains over 1500 phonographs and radio-TV combinations equipped with or which can effectively use Shure crystal or ceramic cartridges. The Manual, No. 66, lists sets made by 123 manufacturers dating from 1938 to 1951.

## A MUST for every radio man

CQ is a monthly publication for Radio Amateurs, Technicians, Engineers, and Communications personnel. As radio-television servicemen you will be interested in knowing that the FCC has recently initiated both Novice and Technician Class licenses for radio amateurs. Since these licenses are easily obtained, many of you will undoubtedly be interested in preparing for them. (These are discussed fully in the March issue.)

For many years CQ has served radio amateurs and communication men throughout the world. Its articles are a constant reading necessity for all men in the radio profession.

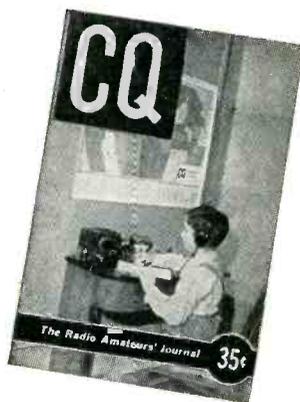
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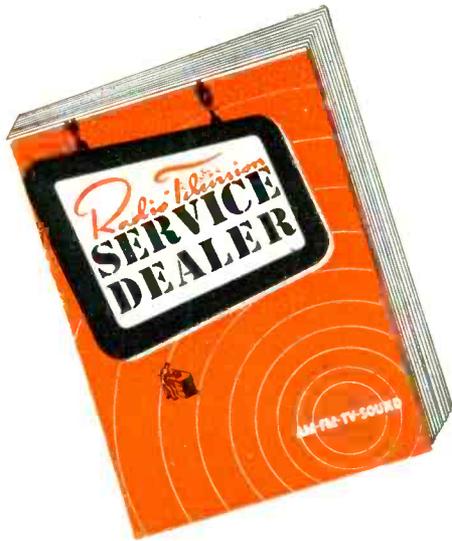
City ..... Zone ..... State .....

## HOW & WHY

[from page 31]

not light up. Second—the horizontal sweep will be so wide that no amount of adjustment will reduce it o proper size.

The first instinct is to blame the new horizontal output transformer, when in many cases it is really better than the original part. By using the



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"The Professional Radio-Television man's Magazine"—published monthly. All articles are exclusive and timely. Practically every issue is worth what an entire 1 year subscription costs.

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 "RTSD" 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 "RTSD" will make this the best investment you ever made. The special Group Rate offer may be withdrawn at any time—so hurry.

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correct type of width coil the technician has the flexibility of choice of taps and wide range of inductance values. These same characteristics, also enables him to stock this item as a replacement for many types of width and linearity coils in use today.

## TROUBLE?

[from page 25]

plate currents flows through the load resistor. Plate voltage is therefore the same as the B+ reading. Also, because of the low value of plate load resistance, the measured resistance from plate to ground is practically the same as the reading from B+ to ground. Of course, with such a low value of plate load, there not only is no amplification, but the output of the stage is reduced almost to zero.

The trouble cannot be shorting out of the filament voltage since a) 6 vac is measured at the filament, b) other stages have operating filaments (sound, pix etc are coming through). The zero resistance measurement at the hot filament pin is normal. A few turns of large wire is used for

the filament winding of the power transformer, and this is in parallel with all the filaments of the receiver. The parallel resistance reading is normally a fraction of an ohm or zero.

The screen by-pass condenser is not shorted. A shorted screen condenser would give zero volt on the screen and the resistance to ground would be zero instead of the observed readings. In this stage, screen voltage is normally low because of the voltage divider connection, 22K from screen to ground. For the same reason, the resistance of screen to ground normally measures about 19K. There are two parallel paths from screen to ground: a) 22K to ground, and b) 100K to B+ plus 7K to ground. That is, the 22K is in parallel with 107K to ground.

A shorted plate to suppressor in the tube is not possible on the basis of the given readings, for several reasons: a) the tube had already been changed and the trouble was still there, b) the voltage reading from plate to ground would be zero instead of the full B+, c) the resistance reading from plate to ground would be zero instead of 7K.

An open screen dropping resistor (100K) would not give the observed

voltage reading. With an open 100K, the screen voltage would be zero instead of the 42 v. which was measured. The resistance from screen to ground, however, would be almost the same—22K instead of 19K.

## MEN OF RADIO

[from page 28]

Telephone Laboratories' Dr. Ives, General Electric's Dr. Alexanderson, and in England John L. Baird.

A year or so after Farnsworth's disclosure to Tolman, the family moved to Provo, Utah where the young man enrolled in the local high school, later entering Brigham Young University. His father died in 1924 and shortly thereafter he gave up hope of acquiring a college education. He attempted to establish a radio repair business in Salt Lake City, but this venture was financially unsuccessful.

## DIRECTRONIC

[from page 20]

lower noise content with its resultant steady picture and motionless background, the noise level in the antenna

# THIS IS IT! THE RELAY

WITH *Interchangeable Coil*  
FOR A WIDE RANGE OF RADIO APPLICATIONS

## GUARDIAN Series 200

Interchangeable

COIL and CONTACT

Switch Assembly



Two basic parts—a coil assembly and a contact switch assembly—comprise this simple, yet versatile relay. The coil assembly consists of the coil and field piece. The contact assembly consists of switch blades, armature, return spring and mounting bracket. The new Guardian Midget Contact Assembly which is interchangeable with the Standard Series 200 coil assembly, is also available in either single pole, double throw; or double pole, double throw.

### CONTACT SWITCH ASSEMBLIES

CAT. NO.	TYPE	COMBINATION			
		Single Pole	Double Pole	Double Throw	Double Throw
200-1	Standard				
200-2	Standard				
200-3	Contact Switch Parts Kit				
200-4	Standard	Double Pole		Double Throw	
200-M1	Midget	Single Pole		Double Throw	
200-M2	Midget	Double Pole		Double Throw	
200-M3	Midget Contact Switch Parts Kit				

### 13 COIL ASSEMBLIES

A.C. COILS*		D.C. COILS	
CAT. NO.	VOLTS	CAT. NO.	VOLTS
200-6A	6 A.C.	200-6D	6 D.C.
200-12A	12 A.C.	200-12D	12 D.C.
200-24A	24 A.C.	200-24D	24 D.C.
200-115A	115 A.C.	200-32D	32 D.C.
		200-110D	110 D.C.

\*All A.C. coils available in 25 and 60 cycles

**GUARDIAN ELECTRIC**  
1606-M W. WALNUT STREET CHICAGO 12, ILLINOIS  
A COMPLETE LINE OF RELAYS SERVING RADIO AMATEURS

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<b>JULY 1949</b> Picture Tube High Voltage Systems High Quality Tuner Analysis Amateur TV Interference	<b>OCTOBER 1950</b> Know The Cathode Ray Tube, Part I Comparing AM & FM Service Problems
<b>SEPTEMBER 1949</b> Legality of TV "Policies" Clarified A Klystron TV Sweep Generator High Quality Analysis Series, Part I	Reducing Losses in Trans. Lines Band Selection Features of Tuners <b>DECEMBER 1950</b> Operation & Service of Keyed AGC Systems Sampling Techniques Applied to TV
<b>APRIL 1950</b> Servicing Sync Separators The TV Waveform & Its Components Understanding Push-Pull	<b>JANUARY 1951</b> The CBS Field Sequential Color System, Part I How De-Coupling Networks Operate Improving TV Booster Performance in Fringe Areas Radio Symbols Chart
<b>MAY 1950</b> 1-Man TV Antenna Orientation Elements of TV Signal Distribution TV Sync-Sweep Tracing	<b>FEBRUARY 1951</b> The CBS Field Sequential Color System, Part II Phase Inverters Antenna Rotators, Part I
<b>JULY 1950</b> Horizontal A-F-C Circuits, Part I Theory of Tap Recording Winch for Raising TV Towers	

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system must be kept at a minimum.

There are three general sources of noise in an antenna system, (a) noise impulses and signal interference picked up mainly from beneath the antenna system; (b) signal interference, local oscillator radiation, and reflections arriving at same vertical angles as desired signals; and (c) noise generated within antenna system.

The Directronic antenna has excellent signal-to-noise characteristics. Substantial improvement in dominance of signal over noise level result from the following:

1. Ability to obtain optimum orientation for each channel, keeping all signals well above noise. When interference is present it can be combated by choosing a switch position that permits clearest picture.

2. Noise cancellation influence of unused elements and three-wire line.

3. Simple broadside arrangement of driven elements which is effective in reducing above and beneath pick up of an antenna system.

4. Minimum number of accessories, wires, element, etc. that could add noise components to antenna system. One of the sources of noise in an antenna system is the reflection of noises from ground level into the sensitive angles of the antenna by adjacent parts.

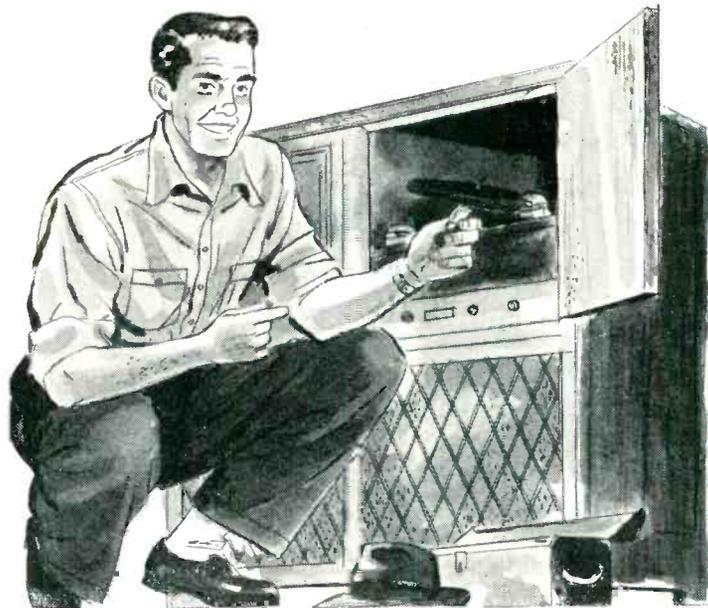
#### Gain and Patterns

Gain of the Directronic is comparable to the conventional conical-reflector combination. Gain differentials are so slight as to be unimportant on the modern, sensitive, a-g-c controlled receivers. In general the gain of a conical-reflector combination is higher at the low end of the low channels where the reflector has peak effectiveness. At the high end of the low band Directronic shows a higher gain. On the high band channels, the gain varies over and under that of a standard conical-reflector combination in almost sinusoidal fashion as measurements are made from the low to the high frequency end of the high band.

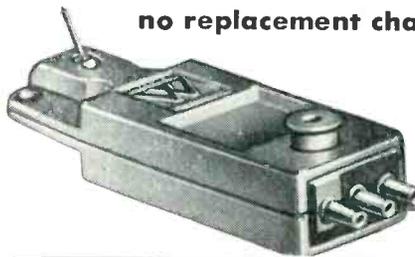
It is hoped some standard test procedures and uniform methods of handling variables will be conceived and adopted by the industry. Certainly, controlled and laboratory measurements are not sufficient. Standards must be conceived on basis of conditions prevalent at the majority of receiving antenna mounting sites. In actual field measurements it is possible to change gain relation-

# Two Cartridges...

**MEET COMPLETE SERVICING REQUIREMENTS**



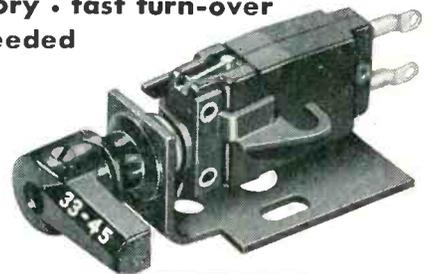
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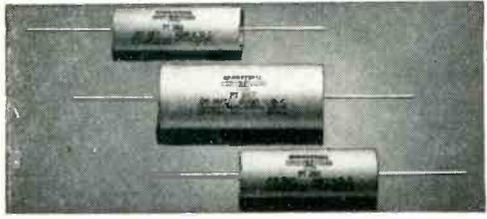
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ships between two antennas (when their performance is reasonably comparable) by changing the length of line, type of receiver input, or shifting test mount position a few feet. Of course these are the very conditions and variables under which our antenna systems and receivers function.

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The low and high band patterns of a Directronic are shown in Figs. 6 and 11. These patterns were plotted

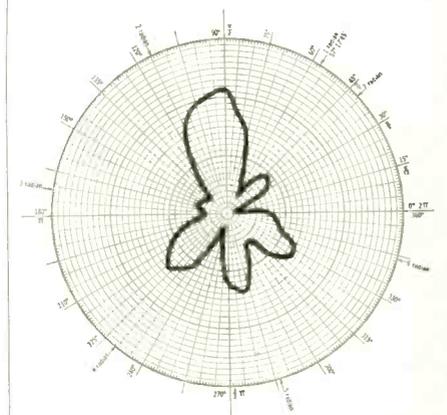


Fig. 11. High band field pattern at antenna site.

at a typical mounting site to demonstrate influence of surroundings. Patterns show the broadening influence of surroundings on the lobes (obscure theoretical minimums) and the influence of near reflections on the relative lobe maximums.

In conclusion extensive field checks have proven the utility of the Directronic types. Its advantages are—basic simplicity (value per dollar), minimum installation time, versatility, high signal to interference ratio, and good gain.

**ASSOCIATIONS**

[from page 38]

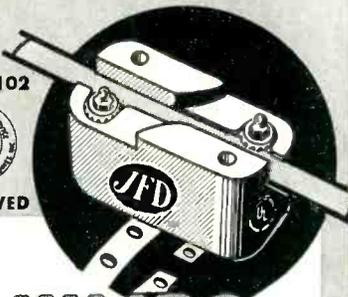
meetings with the State Federation sponsoring the RCA meeting. A committee has been appointed to publicize the new State Licensing Bill which PRSMA voted for to the public and to all Servicing Dealers and Technicians in the area. Jim Daly, President, represents PRSMA at the joint Electronic Radio Committee on Serv-

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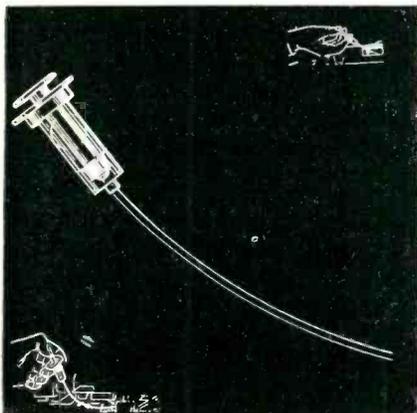
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ice. A new and active program has been set up for the Associations' magazine, the PRSMA News to enlarge it and increase its value.

### Radio Servicemen's Association of Luzerne County—Wilkes-Barre, Pa.

This organization recently played host to the many delegates of the Federation of Radio Servicemen's Association of Penna. at their annual Clam Bake at Lily Lake. In addition to the many delegates, the entire membership was present. The continuous supply of food and drink met with everyone's approval. The entire attendance participated in the Federation's meeting at which time the many revisions that were made in the State Licensing Bill by the Federation's representatives were discussed.

The Entertainment Committee is now busy making final arrangements for our annual Fall Show and for the many Technical meetings as arranged for by the Speakers and Lecture Bureau of the State Federation. The Association's making preparations for an all out program to help present to the public their opinions on the Penna. State Licensing Bill.

## U. M. F.

[from page 17]

is possible in these types since the lead length is very short going directly to the tube pin while the case is mounted on the chassis and is at ground potential. This construction allows direct grounding as a by-pass to the chassis by the shortest and most direct path. A rugged and secure connection



Fig. 9. Feed-through type of capacitor used in UHF.

is also possible due to the heavy lead; values range from 10 to 1500 uufd.

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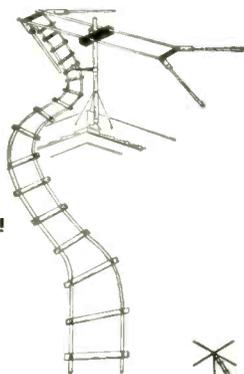
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the by-passing of a lead as it passes through a chassis or a shield as in Fig. 2 of the UHF r-f Amplifier. Here a feed-through type Fig. 9 is used; the capacity exists between the case which is grounded and the center lead. This allows the passage of direct current through the center lead which is at the same time by-passed for r-f by the lowest possible inductive path. The use of conventional capacitors in this type of circuit would involve the lead inductance and prevent effective by-passing.



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