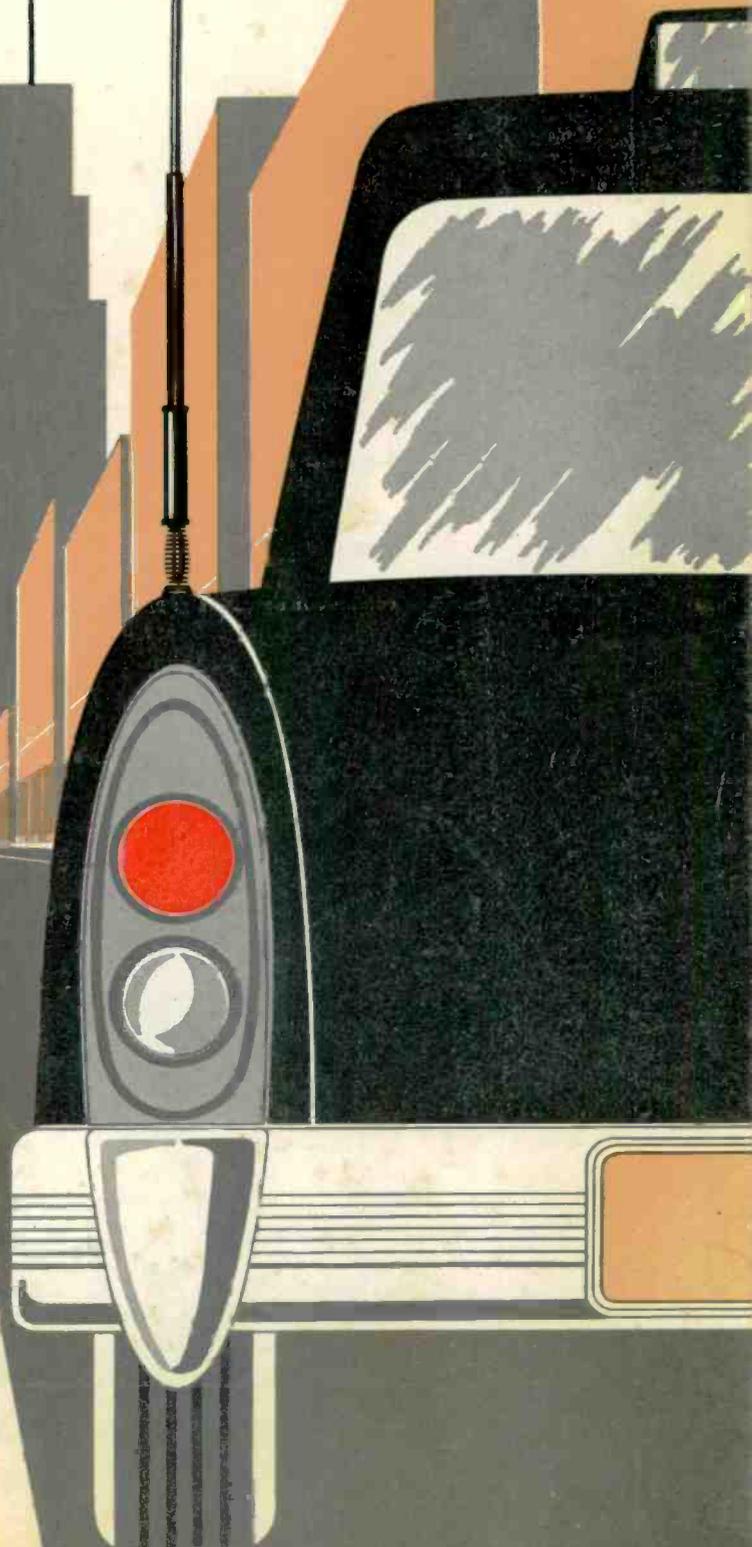


TECHNICIAN

& Circuit Digests



**SERVICING
2-WAY RADIO**

December • 1955

Caldwell-Clemerts, Inc.

20 7 WATT RESISTORS

SELECTED POPULAR VALUES



RESIST-O-CARD

\$6.60
NET

NEW TYPE PW-7 WIRE WOUND POWER RESISTORS • FULL 7 WATT RATING



TRY

these modern power resistors

Servicemen everywhere are finding IRC's unique approach to wire wound power resistors is ideal for today's service requirements. Try them yourself, and benefit by these exclusive IRC features:

- **COMPACT, RECTANGULAR DESIGN** for easier assembly in tight circuits
- **AXIAL LEADS** for easier, faster soldering
- **CLEAR, PERMANENT MARKINGS** for full identification
- **CONSERVATIVE RATINGS** permit continuous operation at full power
- **FAMOUS IRC ELEMENT** sealed in ceramic case for complete insulation and protection
- **2 SIZES** —PW-7, full seven watts and PW-10, full 10 watts
- **FULL COVERAGE OF RESISTANCE VALUES** for today's service needs

BUY

handy Resist-O-Card assortments

Your IRC Distributor has these new power resistors in 2 convenient assortments of popular values. The values are printed on each card . . . you always know what you have, and you always have what you need.

RESIST-O-CARD #19-A. 7 Watt assortment of 20 popular values — \$6.60 net

RESIST-O-CARD #20-A. 10 Watt assortment of 20 popular values — \$7.20 net



INTERNATIONAL RESISTANCE CO.

Philadelphia, Penna.

FOR 10 WATT POWER RESISTOR REQUIREMENTS SPECIFY IRC ASSORTMENT #20-A. ASSORTMENT #20-A INCLUDES 20 PW-10 RESISTORS IN SELECTED VALUES—\$7.20 NET.

TECHNICIAN & Circuit Digests

TELEVISION • ELECTRONIC • RADIO • AUDIO • SERVICE

DECEMBER, 1955

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FRONT COVER

The impressive growth of two-way mobile radio in police, fire, taxi and industrial services has expanded the horizon of opportunities for qualified TV-electronic service technicians. There are many rewards, financial and otherwise, in such commercial work. What do you need to get started? What can you expect? See article starting on page 16.

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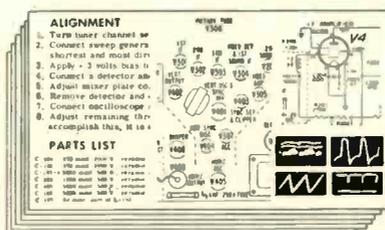
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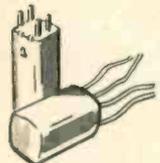
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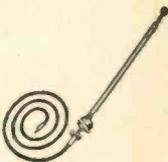
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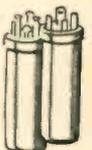
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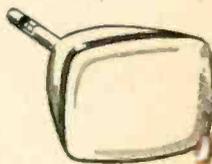
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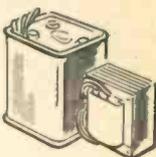
CONTROLS



CAPACITORS



PICTURE TUBES



TRANSFORMERS

*Here's a man who can put
New Life
in your electronics business*

He's your Delco Electronic Parts Distributor. It's fair to ask, "What's he got that others haven't?"—or, "What makes Delco so outstanding?"

First, he's got two of the finest names in any business behind him—Delco and General Motors. They're both names that are respected for quality products, dependable service, and business integrity. When you handle his line of parts, you automatically add the prestige of these names to your business.

Second, Delco is outstanding in the electronic parts business because it is the sole

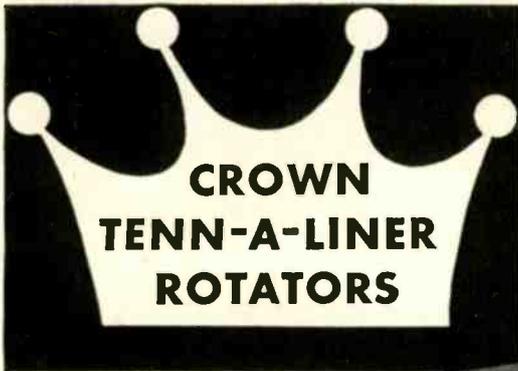
source for special application parts used for original equipment replacement on Delco auto radios. This is a readymade market of well over 13 million sets! Delco is also an important source of the most used universal replacement parts. So you can see how important the Delco line is to your business.

If you spend a few minutes with your Delco Electronic Parts Distributor, he'll explain how Delco's current bulletins and field schools also help to put new life in your electronics business. See him soon—you'll be glad you did.



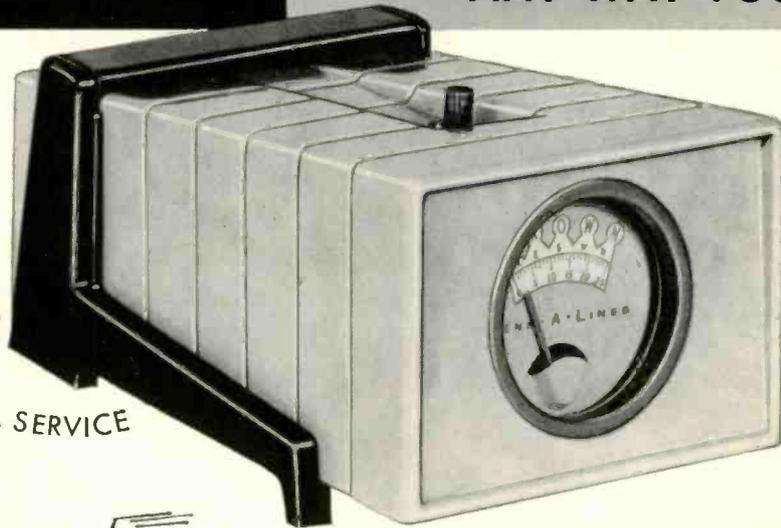
A GENERAL MOTORS PRODUCT • A UNITED MOTORS LINE





BEST

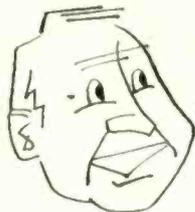
IN ANTENNA ROTATION
ANY WAY YOU LOOK AT IT!



... SERVICE

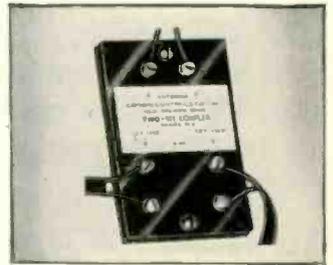
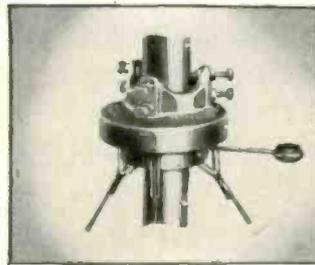
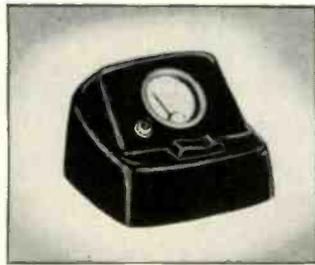
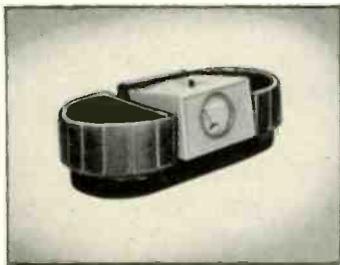


PROFIT



... CUSTOMER SATISFACTION

PERFORMANCE ...



Right now is the time to get ready to cash in during the peak selling season ahead . . . get the complete story on the bigger profits possible with Crown Tenn-A-Liner Rotators. Available in two decorator-styled models, Crown Tenn-A-Liners give you the highest profits in the TV antenna rotator field. Crown's ruggedness and dependability increase customer satisfaction and reduce profit-consuming call backs . . . in fact,

only 1.06% of all Crown units sold require service. A guaranteed product, Crown's exclusive replacement policy keeps customers happy.

Crown also provides a complete line of TV accessories — the Crown TV Planter for use with the CAR6B Tenn-A-Liner, the Roller Bearing Guy Ring, and the Two Set Coupler — sure ways to make those extra sales that come from impulse buying.

For bigger profits this year . . . **SELL WITH CONFIDENCE, SELL CROWN!**

CROWN CONTROLS Co., Inc. NEW BREMEN, OHIO

Canadian Subsidiary Crown Controls Mfg. Ltd. Export Division, 15 Moore St., New York, N. Y., Cable—"Minthorne"

For ALUMINIZED TUBE PERFORMANCE, *plus* EXCELLENT TUBE LIFE . . . Replace with



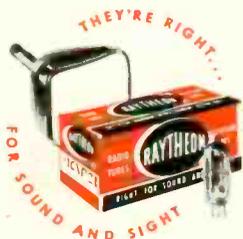
Thanks to LUMILAC, Raytheon Aluminized Picture Tubes provide sharper pictures, high light output and superior contrast — *plus excellent tube life*. LUMILAC, — a lacquer especially blended and used exclusively by Raytheon — is the secret of superiority. This amazing lacquer produces an extra smooth, unbroken surface for the pure aluminum coating, yet leaves no gas-producing residues which could impair cathode emission and shorten tube life.

What's more, the quality of Raytheon Aluminized Picture Tubes is safeguarded by Raytheon's great ultra-modern Cathode Ray Tube Plant in Quincy, Mass. — a plant designed and built solely for the manufacture of first quality picture tubes.

Replace with Raytheon Aluminized Picture Tubes — they are best for you and your customers, too.

RAYTHEON "Lumilac" ALUMINIZED PICTURE TUBE REPLACEMENT GUIDE

RAYTHEON "Lumilac" ALUMINIZED PICTURE TUBE	REPLACES STANDARD TYPE	NECESSARY ADJUSTMENTS OR CHANGES	RAYTHEON "Lumilac" ALUMINIZED PICTURE TUBE	REPLACES STANDARD TYPE	NECESSARY ADJUSTMENTS OR CHANGES	
12KP4A	12KP4	None.	21AUP4A	21AUP4	None.	
	12QP4	Ground conductive coating. Remove ion trap.		21AUP4B	None.	
	12QP4A	Ground conductive coating. Remove ion trap.		21AVP4A	21AVP4	None.
	12RP4	Ground conductive coating. Remove ion trap.			21AVP4B	None.
16KP4A	16KP4	None.	21EP4B	21EP4	Ground conductive coating.	
	16QP4	Ground conductive coating. Change ion trap.		21EP4A	None.	
	16RP4	Check conductive coating contact.	21FP4C	21FP4	Ground conductive coating.	
	16TP4	Space may not be sufficient in some cases.		21FP4A	None.	
	16XP4	Ground conductive coating. Change ion trap.		21YP4A	21AFP4	Ground conductive coating.
17BP4B	17BP4	Ground conductive coating.	21YP4		None.	
	17BP4A	None.	21ZP4B	21ZP4	Ground conductive coating.	
	17BP4C	None.		21ZP4A	None.	
	17JP4	Do not exceed voltage rating.	24CP4A	24CP4	None.	
17HP4B	17HP4	None.		24QP4	None.	
	17HP4A	None.		24TP4	None.	
	17RP4	None.		24XP4	Ground conductive coating.	
17LP4A	17LP4	None.	24DP4A	24DP4	None.	
	17VP4	None.		27EP4	27GP4	None.
20DP4C	20DP4A	None.	27NP4		Add filter condenser.	
	21ALP4A	21ALP4	None.	27RP4	27GP4	Ground conductive coating.
21ALP4B		None.	27NP4		None.	
21ANP4		Ground conductive coating.				
21ANP4A		Ground conductive coating.				



RAYTHEON MANUFACTURING COMPANY

Receiving and Cathode Ray Tube Operations

Newton, Mass. • Chicago • Atlanta, Ga. • Los Angeles, Calif.

Raytheon makes all these } Reliable Subminiature and Miniature Tubes, Semiconductor Diodes, Power Rectifiers and Transistors, Nucleonic Tubes, Microwave Tubes, Receiving and Picture Tubes



Excellence in Electronics

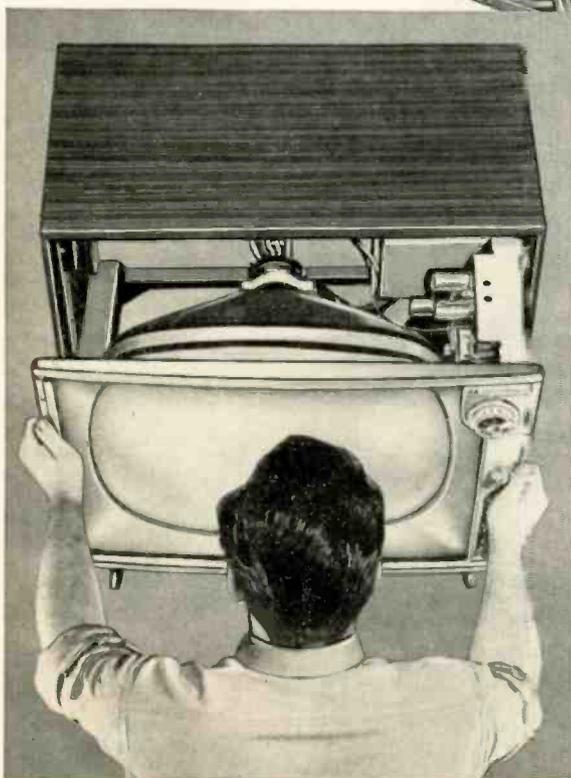
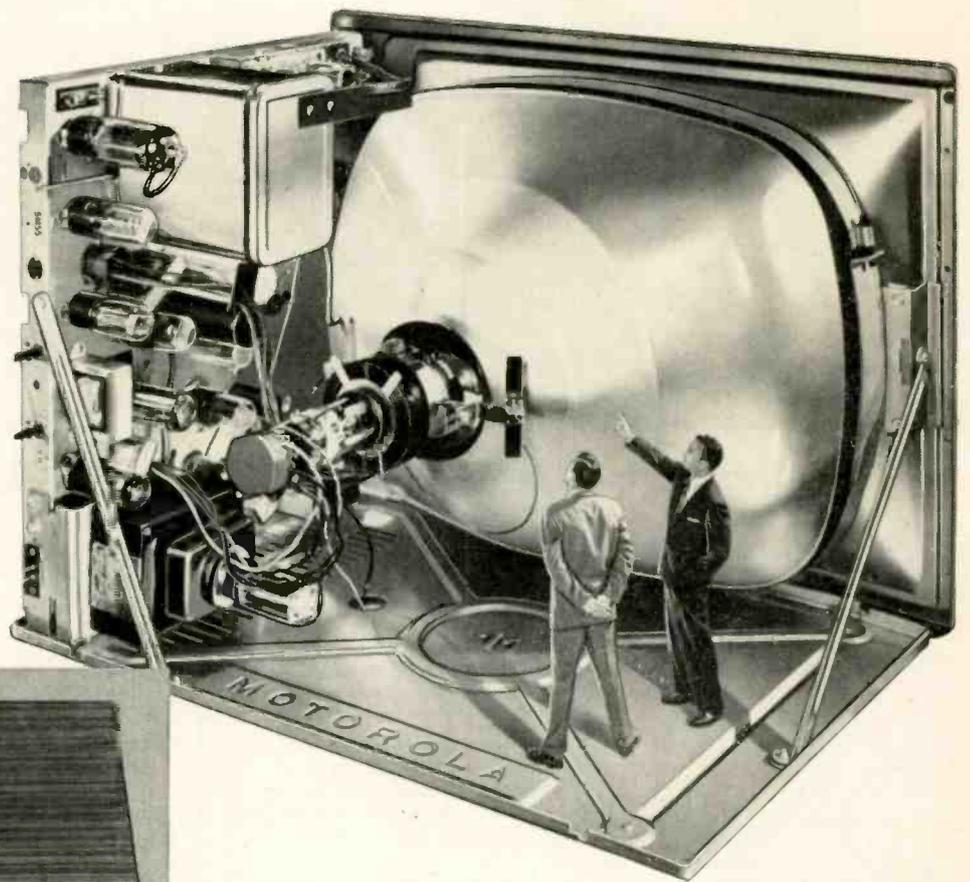
Motorola Power Panel makes your work easier

Here's how this new upright design does it—

1 Sturdy tri-wall construction incorporates picture tube in easy-to-handle one-piece chassis.

2 Short-shaft, in-line controls lead directly to the electronic components they control.

3 Clutter-free design eliminates hidden assemblies and wiring patterns.



Easiest servicing in the industry

A lot has been said (some of it unprintable!) about many of the vertical chassis on the market today. Complicated control shafts, impossible wiring patterns, inaccessible assemblies have been nightmares to every technician.

But, unlike others, Motorola did not just take its horizontal chassis, rotate it and stand it on end. The all-new Motorola Power Panel was developed specifically for an upright design. It took years of experimentation to come up with this entirely new—and entirely workable design.

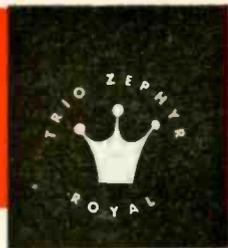
Once you work with it you'll know why we're proud of it—why it makes your work easier for you, why it cuts service hours to service minutes.



MOTOROLA

World's Largest Exclusive Electronics Manufacturer

TECHNICIAN • December, 1955



ANNOUNCING THE

Trio Zephyr Royal

THE FIRST STAGGER-TUNED TELEVISION ANTENNA

Patent No. 2,703,840

*What Hi-Fi brings to Audio
Stagger-tuning
brings to TV Antennas!*



Pre-Assembled—Uses TRIO's famous Insta-Lok Clamps. Sturdy—Rugged—Compact and it's patented too!



MODEL ZR-1

The ZEPHYR ROYAL employs three "wing" dipoles, stagger-tuned, to provide even higher and more uniform gain, absolute flat response on all channels 2-13—a necessity for color TV. It is tuned on six predetermined frequencies in the same way that stagger-tuned circuits are used in I.F. stages in TV receivers.

The ZEPHYR ROYAL is not just an addition to the famous TRIO ZEPHYR, but is a completely new electrical design. Parasitic elements are used ONLY where they contribute to the efficiency of the antenna's electrical design—not just for promotional purposes.

A new phasing method provides increased directivity—and functions equally well on the highs as well as the lows.

The elimination of minor lobes, to an extent never before realized in an all-channel antenna, finally banishes all co-channel interference. All of the gain is packed into one efficient forward lobe.

Try a new TRIO ZEPHYR ROYAL. You'll find that in gain and directivity it's the best all-channel TV antenna ever produced for color or black and white.

America's New Favorite

the Trio Zephyr

The antenna everyone's talking about! The ZEPHYR is a high performance, single lobe antenna, employing two revolutionary "wing" dipoles. Three half waves in phase, combined with an integrated director makes each dipole a uni-directional antenna on the high channels.

The ZEPHYR uses two "wing" dipoles, one resonated on the low ends of channels 2-6, and 7-13, the other on the high end of these channels. These composite dipoles, both driven, together with fully functional parasitic elements, produce the high performance to size ratio never before achieved in antenna design.

There's sharp directivity too, on all channels—comparable to a yagi.

TRIO believes that with the introduction of the ZEPHYR and the ZEPHYR ROYAL, the need for stacked arrays is eliminated.



TRIO Manufacturing Company
GRIGGSVILLE, ILLINOIS

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Patent No. 2,703,840

Use TRIO'S famous Insta-Lok Clamp.



It's Efficient!



It's Compact!



It's Patented, too!

MODEL Z-1

EXPORT SALES DIV., SCHEEL INTERNATIONAL INC., 4237 N. Lincoln Ave., Chicago, U.S.A. Cable Address: HARSHEEL

P. R. MALLORY & CO. INC.
MALLORY
APPROVED PRECISION PRODUCTS

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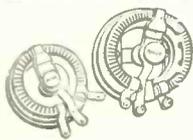
Your customers will like Mallory Midgetrols® —and so will you

NO FUSS—Midgetrols cut replacement time to minutes. The round, tubular shaft is simple to cut to exactly the length you need . . . and it's easily adapted to split-knurl, flatted or set screw type knobs. Attaching an AC switch is a cinch, without taking the control apart.

NO KICK-BACKS—Midgetrols give your customers the long, trouble-free service that makes lasting friends. You can count on them for performance that equals or exceeds that of original equipment, because they're engineered to provide accurate resistance, superior stability, in any radio or TV set . . . in any climate.

NO DOUBT ABOUT IT—Midgetrols save you time and money. Your local Mallory distributor is ready to supply a special Mallory Control Kit that will set you up to service more than 50 models of radio and TV sets. You'll get a stock selected on the basis of set popularity in your own area . . . plus a free metal storage cabinet. Call your Mallory distributor today, or write to P.O. Box 1558, Indianapolis, Indiana.

BE SURE TO USE . . .



MALLORY POWER RHEO-STATS . . . vitreous enamelled, in ratings from 25 to 500 watts, with exclusive hinged contact arm for positive contact.



MALLORY DEPOSITED CARBON RESISTORS . . . high stability resistors with tolerances of 1% or 10% . . . at lower cost than wire-wounds.

P. R. MALLORY & CO. INC.
MALLORY

CAPACITORS • CONTROLS • VIBRATORS • SWITCHES • RESISTORS
RECTIFIERS • POWER SUPPLIES • FILTERS • MERCURY BATTERIES
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APPROVED PRECISION PRODUCTS

Superior's New Model TV-12

TRANS-CONDUCTANCE TUBE TESTER

ALSO TESTS TRANSISTORS!

SPECIFICATIONS

TESTING TUBES

• TESTS ALL TUBES including 4, 5, 6, 7, Octal, Lock-In, Hearing-Aid, Thyratrons, Miniatures, Sub-Miniatures, Noval, Sub-Minar and Proximity Fuse types.

• Employs improved TRANS-CONDUCTANCE circuit. An in-phase signal is impressed on the input section of a tube and the resultant plate current change is measured. This provides the most suitable method of simulating the manner in which tubes actually operate in Radio & TV receivers, amplifiers and other circuits. Amplification factor, plate resistance and cathode emission are all correlated in one meter reading. Although the Model TV-12 is not calibrated to provide mutual-conductance reading (MHO'S), the Engineer or Technician who needs that information may easily compute it with calibrations we supply.

• NEW IMPROVED ROLL CHART MECHANISM uses a combination of fibre and brass gears to eliminate back-lash and slippage.

• NEW LINE VOLTAGE ADJUSTING SYSTEM. A tapped transformer makes it possible to compensate for line voltage variations to a tolerance of better than 2%.

• SAFETY BUTTON — protects both the tube under test and the instrument meter against damage due to overload or other form of improper switching.

• This model retains the INDIVIDUAL ELEMENT IDENTIFYING SYSTEM developed by Superior in 1945. All elemental switches are numbered according to RMA pin number designations. This procedure enables the operator to instantly identify the particular element being tested.

• NEWLY DESIGNED FIVE POSITION LEVER SWITCH ASSEMBLY. Previously because of switch limitations, the same voltage was applied to the plate and grid. Extra position and unique design of new switch permits application of separate voltages as required for both plate and grid of tube under test, resulting in improved Trans-Conductance circuit.

TESTING TRANSISTORS

Although Transistors may be tested for forward and inverse action with an Ohmmeter, such procedure will not identify an inefficient transistor. Also, if the ohmmeter uses a high-internal battery voltage, the transistor will likely be damaged. A transistor can be safely and adequately tested only under dynamic conditions. The Model TV-12 will test all transistors in that approved manner, and quality is read directly on a special "transistor only" meter scale.

The Model TV-12 will accommodate all transistors including NPN's, PNP's, Photo and Tetrodes, whether made of Germanium or Silicon, either point contact or junction contact types.

Model TV-12 housed in handsome rugged portable cabinet sells for only **\$7250**



A RADICAL CHANGE IN DESIGN PROCEDURE. Customarily, a new model Tube Tester means a revised model. For usually when a manufacturer designs a "new" model, he actually re-designs the last model made, including new improvements to meet changing requirements, and circuit improvements resulting from experience in producing the last model made. That is the usual practice, but doesn't apply to the new Model TV-12.

Superior Instruments Co. has been designing and producing Tube Testers since 1935. About two years ago, they asked their engineers to select a circuit which would meet the requirements of those technicians who want a top quality Tube Tester. The engineers selected the basic TRANS-CONDUCTANCE circuit employed in the Model TV-12. And then, thanks to the cooperation of a leading switch manufacturer, who designed a special five position lever switch, they were able to improve that basic circuit.

The Model TV-12, therefore, is not a "rehashed" model — it is not a tester which simply tests good tubes "good" and bad tubes "bad." This radically new tester will check tubes under dynamic conditions very closely simulating the manner in which they would function in a receiver or amplifier. It is a tube tester we are proud of. It is a tube tester which we claim will compare favorably with laboratory instruments selling for double the price.

And about Transistors. We doubt that the Transistor will ever wholly replace the Vacuum tube. Unquestionably, however, the present already substantial rate of production and use of Transistors will be very greatly increased in the near future.

The Model TV-12 will test all Transistors produced to date and provision has been made for testing the new Transistor types known to be designed but not yet in production.

SHIPPED ON APPROVAL NO MONEY WITH ORDER — NO C. O. D.

Try it for 10 days before you buy. If completely satisfied then send \$22.50 and pay balance at rate of \$10 per month for 5 months. **No Interest or Finance Charges Added!** If not completely satisfied return unit to us, no explanation necessary.

MOSS ELECTRONIC DISTRIBUTING CO., INC.
Dept. D-191, 3849 Tenth Ave., New York 34, N.Y.
Please rush one Model TV-12. I agree to pay \$22.50 within 10 days and to pay \$10 per month for 5 months. It is understood there will be no finance, interest or any other charges, provided I send my monthly payments when due. It is further understood that should I fail to make payment when due, the full unpaid balance shall become immediately due and payable.

Name _____

Address _____

City _____ Zone _____ State _____

new!

Simpson 7" COLORSCOPE



MODEL 458

\$229⁹⁵ complete with shielded input cable and manual.

100% response at 3.58 mc colorburst!

DUAL BANDWIDTH—NARROW OR WIDE

Compare the new Simpson Colorscope Model 458 with any oscilloscope on the market. It is an advanced, seven-inch, high-gain, wide-band scope especially designed for color-TV service. (Ideal for black and white, too.) A big feature of the Model 458 is its *flat* frequency response—within 1 db to 4.5 mc! With its accessory probes, Model 458 can do more color-TV testing jobs than any scope in its price range.

ADDITIONAL FEATURES

- Dual bandwidth provides extra testing versatility.
- Properly compensated wide band vertical amplifier stages.
- High sensitivity and very good transient response.
- Compensated step attenuator.
- Vernier vertical attenuator for *continuous control* of the signal voltage.
- CRT balanced deflection.
- Excellent square wave response.
- Very small loading of circuit being checked.
- "Tilt" and "Overshoot" carefully checked and minimized.
- Very stable sweep and synchronizing circuits.

ACCESSORY PROBES

- Voltage Doubler, No. 740. . \$10.95
- Low Capacitance (input impedance of 10 megohms shunted by only 14 mmf), No. 741. . \$9.95
- 100:1 Voltage Divider, No. 742 \$9.95
- Direct-Resistive Dual Purpose, No. 743 \$9.95

See Your Electronics Parts Distributor, or write

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WORLD'S LARGEST MANUFACTURER OF ELECTRONIC TEST EQUIPMENT

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Phone: ESTebrook 9-1121

In Canada: Bach-Simpson Ltd., London, Ontario

SPECIFICATIONS

VERTICAL AMPLIFIER FREQUENCY RESPONSE—Wide band position: Flat within ± 1 db from 20 c/sec to 4.5 mc/sec; flat within ± 2 db from 10 c/sec to 5.0 mc/sec.

Narrow band position: Flat within ± 1 db from 20 c/sec to 200 kc/sec; flat within ± 2 db from 10 c/sec to 300 kc/sec.

RISE TIME—Less than 0.05 microsecond (wide band position).

VERTICAL DEFLECTION SENSITIVITY—Wide band: 40 mv R.M.S./inch minimum. Narrow band: 15 mv R.M.S./inch minimum.

HORIZONTAL AMPLIFIER FREQUENCY RESPONSE—Flat within ± 1 db from 20 cycles/sec to 200 kc/sec.

HORIZONTAL DEFLECTION SENSITIVITY—Horizontal input "Hi", 115 millivolts R.M.S./inch minimum. Horizontal input "Low", 1.4 volts R.M.S./inch minimum.

VERTICAL INPUT IMPEDANCE—3.3 Megohms shunted by 20 mmf.

HORIZONTAL INPUT IMPEDANCE 1.1 Meg.

LINEAR SWEEP OSCILLATOR—Saw tooth wave from 14 cycles/sec to 250 kc/sec. Sixty-cycle sine wave also provided.

INPUT CALIBRATION—18 Volt P-P test voltage available on panel.

INTENSITY MODULATION—Provision for internal, external and 60 cycles.



SYLVANIA SILVER SCREEN 85

No. 1 in independent survey among servicemen



"Fewer returns" votes for "Silver Screen 85" were more than twice that of No. 2 and No. 3 brands combined

Best quality and consumer demand important reasons why servicemen make "Silver Screen 85" their No. 1 choice.

Servicemen gave "Silver Screen 85" the highest vote of confidence paid any picture tube in a national survey recently conducted by an independent research corporation. "Silver Screen 85" took top honors in answer to the key question, "what picture tube do you consider *best regardless of price?*"

FEWER RETURNS

"Fewer returns" were experienced with "Silver Screen 85" than with the No. 2 and No. 3 brands combined. "Best quality" and "better picture" were highest among reasons servicemen gave for voting "Silver Screen 85" No. 1.

PUBLIC DEMAND

Consumer demand was one of the factors of importance servicemen credited to "Silver Screen 85" according to the survey. When asked why they specified brand to their distributors, more servicemen named public demand as their reason for "Silver Screen 85" preference.

In fact, among the top four reasons why servicemen specified brand, "Silver Screen 85" again took 1st place.

You, like the servicemen who offer its high praise, can profit from "Silver Screen 85's" success story. Make "Silver Screen 85" your good-will leader. Feature it; promote it; you'll develop strong customer relations and high word-of-mouth recommendations. Your business will flourish and so will profits.



SYLVANIA®

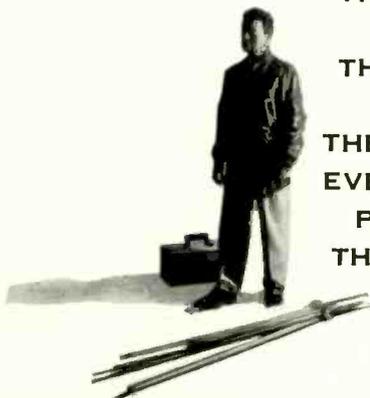
SYLVANIA ELECTRIC PRODUCTS INC.
1740 Broadway, New York 19, N. Y.
In Canada: Sylvania Electric (Canada) Ltd.,
University Tower Bldg., Montreal

LIGHTING • RADIO • ELECTRONICS • TELEVISION • ATOMIC ENERGY

FIELD REPORT NO. 8

The voice of the serviceman is the voice of Experience . . .

... AND THESE DEALERS ARE SPEAKING FROM PERSONAL EXPERIENCE. THEY REPRESENT THOUSANDS OF ENTHUSIASTIC SERVICEMEN THROUGHOUT THE COUNTRY. THESE MEN MUST PROVIDE THEIR CUSTOMERS WITH STEADY, SHARP RECEPTION ON EVERY CHANNEL RECEIVED IN THEIR AREA. THEIR REPUTATIONS DEPEND ON THE QUALITY OF THEIR ANTENNA INSTALLATIONS. SO THEY RUN THEIR OWN FIELD TESTS. AND THEY'RE MORE THAN SATISFIED. THEY KNOW THAT THERE'S A JFD ANTENNA FOR EVERY PROBLEM, FOR EVERY PURSE. THEY'VE SEEN FOR THEMSELVES. YOU CAN, TOO.



CARL KOWA
KOWA ELECTRIC
OLNEY, ILLINOIS

WE HAVE USED JFD ANTENNAS FOR SEVERAL YEARS AND HAVE FOUND THEM SUPERIOR TO ALL OTHERS THAT WE HAVE TESTED. WE WERE THE FIRST TO USE JET213 AND WHEN SX711 WAS RELEASED WE STARTED USING IT. TO DATE WE HAVEN'T HAD A SINGLE COMPLAINT AND HAVE INSTALLED APPROXIMATELY TWO OR THREE HUNDRED.



FRANK A. MARZANO
MARS APPLIANCE CO.
HARTFORD, CONNECTICUT

I AM CONVINCED THAT THE STAR-HELIX ANTENNA IS THE HIGHEST GAIN ANTENNA ON THE V. H. F. CHANNELS I HAVE EVER USED IN ALL MY EIGHT YEARS IN THE BUSINESS. CUSTOMERS ARE ENTHUSED ABOUT RECEPTION FROM NEW YORK, OVER ONE HUNDRED MILES AWAY.



FRED LOREMAN
LOREMAN SERVICE
BARSTOW, CALIFORNIA

WE ARE IN AN EXTREME FRINGE AREA. WE HAVE RECENTLY PURCHASED YOUR NEW STAR-HELIX ANTENNA FROM ELECTRONIC SUPPLY CORP., RIVERSIDE, CALIF. WE ARE QUITE HAPPY WITH THEIR PERFORMANCE AND ALSO THEIR CONSTRUCTION.



AL ADAMS
HOLMES REFR. ELECT. SERVICE
MYRTLE BEACH, SOUTH CAROLINA

WE USE AND RECOMMEND THE JFD STAR-HELIX ANTENNA IN THIS AREA AS IT NOT ONLY GIVES THE BEST PERFORMANCE POSSIBLE FROM OUR DISTANT STATIONS BUT WILL WITHSTAND EXTREME WEATHER CONDITIONS AND EFFECTS OF SALT SPRAY.



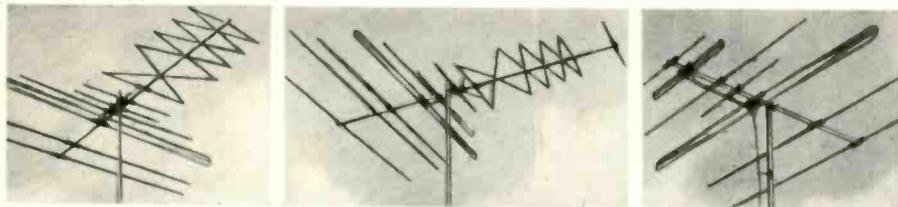
WILLIAM F. PETERSON
WANK'S FURN. & APPLIANCE MART
SOUTH HAVEN, MICHIGAN

WE LIKE THE JFD STAR-HELIX ANTENNA BECAUSE OF ITS EXCELLENT FRONT-TO-BACK RATIO. CO-CHANNEL INTERFERENCE IS LESS THAN WITH ANY OTHER ANTENNA WE HAVE TRIED. WE RECEIVE STATIONS FROM FOUR DIRECTIONS AND WE CONSISTENTLY BRING IN THE FIVE (5) CHICAGO STATIONS WHICH ARE OVER 75 AIR-MILES DISTANT. WE ALSO USE THIS ANTENNA WITH OUR COLOR RECEIVER FOR DEMONSTRATION.



H. H. PIGFORD
BURGAW RADIO & T.V. SERVICE
BURGAW, NORTH CAROLINA

I HAVE TRIED MANY DIFFERENT ANTENNAS BUT I FIND THAT THE JFD STAR-HELIX GIVES BEST PERFORMANCE IN A FRINGE AREA OVER ALL THE REST OF THE ANTENNAS I HAVE TRIED.



STAR-HELIX		SUPER-STAR HELIX		FIREBALL	
SX711	single	\$25.50	SX13	single	\$35.00
SX711S	stacked	\$52.50	SX13S	stacked	\$72.50
SX711S-96*	96" stacked	\$55.00			
				FB500	single
				FB500S	stacked
				FB500S-68†	68" wide stacked
				FB500S-96*	96" wide stacked

*for added ch. 2-6 gain

†for areas with co-channel and cross-channel interference

*YOUR REPUTATION GOES UP
WITH A JFD ANTENNA!*



MANUFACTURING CO. INC.
BROOKLYN 4, N. Y.

INTERNATIONAL DIVISION, 15 MOORE ST., N. Y., U. S. A.

GO FORWARD WITH JFD ENGINEERING!

TECHNICIAN

& Circuit Digests

CALDWELL-CLEMENTS, INC., 480 LEXINGTON AVENUE, NEW YORK 17, N. Y.

Six Ways to Increase Your Income

Too few technicians realize that the knowledge and skill they exercise every day to repair TV, radio and audio equipment in the home can be successfully applied to related fields. Not only would such extension of your services mean greater income, but such diversification would also help you maintain servicing activity on a more even keel, filling in seasonal slack periods.

Here are six excellent profit-making fields which can supplement your regular TV-radio income:

1. **TWO-WAY MOBILE RADIO:** With over 350,000 mobile and base stations operating in the U.S., many top-flight opportunities are available to qualified technicians. See article "Service Opportunities in Two-Way Mobile Radio" in this issue for full details. For business leads, contact communications manufacturers, and local taxi, police, fire and similar mobile radio users.

2. **INDUSTRIAL ELECTRONICS:** There are over 275,000 manufacturing establishments operating in the U.S. A significant number utilize such electronic devices as photoelectric controls, timers, temperature controls and paging systems. Many of them would be glad to know that a local electronic technician can be right there if trouble occurs. Contact manufacturing plants in your area.

3. **APPLIANCES:** Almost every home has one or more appliances such as irons, electric heaters, toasters, fans, mixers, rotisseries, etc. With a little study and experience, you can become quite adept at fixing them. In the summer, air conditioner installation and repair can be a profitable sideline. Contact any of the 77,000 appliance dealers and let your TV-radio customers know you also repair appliances.

4. **COMMERCIAL MUSIC:** In many thousands of restaurants and other mercantile establishments, background music systems are in regular use. Equipment is usually maintained by the installing company, which can be contacted by obtaining the name and address from the restaurant owner.

5. **PUBLIC ADDRESS RENTAL:** For a reasonably small investment in a public address system capable of being mounted on a car or set up in a meeting hall, very good rental fees can be realized. Top prospects are churches and clubs.

6. **HOBBIES:** Numerous toys and hobby devices such as model railroads employ electrical and electronic parts. Contact local hobby and toy stores.

Select the extra-profit sidelines which interest you most. Diversify now . . . and increase your income!

Repercussions—Phase Two

In July of this year we exposed the receiving tube reprocessing racket. In August we reported Repercussions—Phase One, the hornet's nest of consternation and avid interest in our findings throughout the electronic industry. At that time we stated that the Phase Two Repercussion—direct action against offenders—would not be long in coming.

Phase Two is here.

Recently, **TECHNICIAN** editors have had long consultations with investigators of the Federal Trade Commission, who are now delving into the misleading promotion of tube sales.

Most heartening are two reports directly from men who have been operating in the tube field. One man, who used to sell these bargain tubes, states

that his company (which was shopped by **TECHNICIAN** editors) no longer carries on these activities because they are not profitable any more. Evidently, service technicians are wise to the game.

The second gentleman was reported to us by alert readers. He used to pass out business cards reading: "Reject TV & Radio Tubes, No Picture Tubes, One Cent Each." At the height of his one man activities he used to buy 12,000 tubes per month from techs, and sell them to reprocessors for 3¢ each. He claims he is no longer in business because technicians refuse to sell him the tubes.

We're proud of the way you and your fellow techs are helping to curb the tube rackets. Keep up the good work.

Tuning In the

CRYSTAL BALL STUFF: At a recent IRE meeting held in Washington, scores of electronic miracles either already here or very much on their way were described, including: microwave tubes so powerful and versatile that a single one can amplify a thousand or more 'phone conversations and several TV programs simultaneously without mixing them—transistors made of materials (like silicon) that are much more plentiful and cheaper than the rare germanium—developments pointing to cheaper and better color TV tubes and sets—and high-speed tubes that will permit observation of electrical phenomena taking place in billionths of a second.

ATOMIC ELECTRICITY. The nation's first two atomic submarine propulsion plants, in use by the Atomic Energy Commission and the Navy for more than 2 years, have already put out more than 5 million kilowatt hours of electricity. This amount of power could supply all the electrical needs of Manhattan Island for 10 hours. Both plants were built by Westinghouse.

HI-FI NOTES: Good music is good for the grocery business, reports a supermarket operator (Nasser's) in Mesa, Arizona. A 50 percent increase in business has been attributed to the installation of a store-wide high fidelity music system. Increase in sales, Nasser tells GE, manufacturers of the equipment used, result from two factors: more people are attracted into the store by the system, and they stay longer (buying more) once they have entered. The point could be raised that any background music system would accomplish the same results. However, the jump in sales occurred after a non-Hi-Fi set-up already in existence was replaced with the system of superior quality . . . **TEEN-AGERS**, not super long-hairs in the high-income brackets, are becoming the backbone of the Hi-Fi industry according to a survey conducted by the Trav-Ler Radio Corp. For every Hi-Fi set it sells to the "arty" enthusiast, this company claims to sell 10 to teen-agers. The latter group form the country's leading record buyers, and thus represent the biggest potential market.

NICKEL SHORTAGE is putting a squeeze on the manufacture of electron tubes. Substantial quantities of high grade nickel are used in making receiving tubes, but a short supply and government defense priorities are reducing the amount left over for tube manufacturers.

ILLEGAL TV RERADIATORS in the Northwest U.S. have been operating despite FCC orders to shut down. These low-power stations pick up a channel, amplify the signal and retransmit it on the same frequency. In a letter to the FCC, Milton J. Shapp, president of Jerrold Electronics, urged that immediate action be taken since these reradiators are delaying the spread of fringe TV by legal means.



"I wish they'd let us color code resistors instead of marking them all red."

AN "ELECTRONIC FLAG" for small boats keeps them out of danger of being rammed by larger vessels in thick fog or darkness. The "flag," a simple, folding octahedral made of sheet aluminum, is being marketed by Raytheon. This radar reflector may be mounted on a mast or held aloft on an oar. Larger, radar-equipped vessels are much more likely to pick up a "pip" (return signal) on their screens from a small craft so equipped than would ordinarily be possible from bobbing, low-lying small boats in the water.

INDUSTRY GROWTH. The electrical manufacturing industry should double in the next 8½ years, opines GE president Ralph J. Cordiner, while the electronics industry, moving at an even more rapid pace, may well double in the next 4 or 5 years. His company alone, he says, employs over 70,000 people to work on products today that did not even exist in 1939.

DECEMBER 1955 NETWORK COLOR TV SCHEDULE

WEEKDAYS, December 1-2, 5-9, 12-16, 19, 22-23, 26-30			
3:00—4:00 PM (EST)	NBC	"Matinee Theatre"	(Live)
MONDAYS through FRIDAYS, December 1-2, 5-9, 12-16, 19-23, 26-30			
5:30—6:00 PM (EST)	NBC	"Howdy Doody"	(Live)
SUNDAY, December 4			
7:30—9:00 PM (EST)	NBC	"Color Spread"	(Live)
MONDAY, December 12			
8:00—9:30 PM (EST)	NBC	"Sleeping Beauty Ballet" (Producers' Showcase)	(Live)
TUESDAY, December 20			
8:00—9:00 PM (EST)	NBC	"Milton Berle"	(Live)
SATURDAY, December 24			
9:00—10:30 PM (EST)	NBC	"Babes In Toyland" (Max Liebman Presents)	(Live)

The CBS December color schedule is not available at press time.

Picture



TV MEMORY MIRROR: Remember when newspaper ads used to push "larger" sets featuring "giant, life-size 12-in. pictures?" . . . And how about those 7-in. receivers with the picture tube stuck in one corner of a large cabinet, the rest of the front being given over to control knobs, speaker opening and decorative trim? . . . Set owners had to diddle with as many as 8 different front-panel controls to get good viewing every time they switched channels . . . Seen any very old tuners lately that still have a setting for Channel 1?

TV HORIZONS: We all recognize the development of TV as an entertainment medium, but what about other applications? Today, "the greatest advances in TV are being made in its application to industrial and educational problems; closed-circuit television is unquestionably emerging as an electronic giant." The quote is by J. L. Lahey, GM of Dage TV Div., Thompson Products. He believes that closed-circuit TV is now entering a boom period, that equipment demand and sales during 1956 will surpass the \$4 million worth sold during the last decade.

TV NOT "WASHED OUT:" When Mr. and Mrs. William Houston lost their summer cottage in Pleasant Valley, N. Y., to this summer's disastrous floods in the east, they thought that everything went with it. The house was swept from its foundation and completely demolished, with its contents. Two days later their Sylvania TV set, bought in 1951, was found buried in mud and debris a mile from the site of the cottage, after being submerged in 15 ft. of water. They cleaned out the mud, let the set dry, then plugged it in. It worked!

CALENDAR OF COMING EVENTS

- Jan. 9-20: Furniture Mart, Chicago, Ill.
- Jan. 15-17: National Appliance Radio & TV Dealers Assoc., 1956 Convention, Conrad Hilton Hotel, Chicago, Ill.
- Jan. 24-28: 1956 Southwestern Jobber-Rep-Mfrs. Electronic Conference, Galvez Hotel, Galveston, Texas.
- Jan. 25-26: Third Annual Industrial & Amateur Show, sponsored by Almo Radio, Penn Sherwood Hotel, Phila., Penna.
- Feb. 8-11: 1956 Los Angeles High Fidelity Music Show, Hotel Alexandria, Los Angeles, Calif.
- Mar. 12-16: National Electrical Manufacturers Assoc., Edgewater Beach Hotel, Chicago, Ill.
- Mar. 19-22: 1956 IRE National Convention and Radio Engineering Show, Waldorf-Astoria and Kingsbridge Armory, New York, N. Y.
- Apr. 15-19: The 34th annual convention of the National Association of Radio & Television Broadcasters, Conrad Hilton Hotel, Chicago, Ill.

MOBILE RADIO ARTICLES. The cream of the crop are being selected by Motorola Communications & Electronics in an extensive editorial contest conducted by that company among its hundreds of factory authorized service stations. Top prize winning articles, plus others written by Motorola engineers, will be published exclusively in **TECHNICIAN's** expanded series on communications servicing. Two-way radio is an attractive and growing field. Watch for more business and technical articles explaining just what you need to know to service two-way radio equipment used by police, fire, taxi and industrial services. (See article starting on next page.)



Service Opportunities

Facts and Figures on Required Investment and Equipment,

MACK WALKER,
REGIONAL SERVICE MGR.,
MOTOROLA, INC.

• That two-way radio is not known as well as more-talked-about products is easily understandable. Until the end of World War II, it was practically non-existent. The Federal Communications Commission licensed a total of only 63,000 transmitters in the Public Safety, Industrial and Land Transportation Services in 1948. But war-born advances created an awareness in the public mind of a new and important time and labor saving device; mobile radio, defined as two-way communication between vehicles. The FCC report of January, 1954 shows these services were authorized for operation of approximately 433,000 transmitters, and it is estimated that more than a quarter of a million units are actually in operation. Here then, is a large market for radio servicing, and it is growing each year at a substantial rate.

Some two-way radio users are

well-known. The taxicab industry, for example, is celebrating its tenth anniversary with two-way radio. Taxi users are licensed to operate more than 100,000 transmitters—more than any other group with the exception of police agencies.

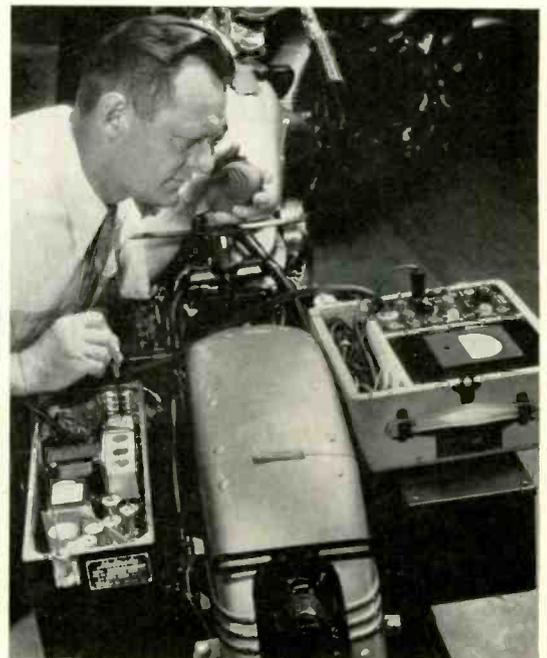
Manufacturers and users of two-way radio soon found that its usefulness depended on the availability of maintenance. At first, there were three courses a user could take to keep his system in operation: 1. Hire a qualified, licensed technician, buy equipment and parts, and set up a company-owned shop. 2. Utilize the local radio repair shop. 3. Arrange with a broadcast station engineer or other licensed technician to maintain the system in his spare time. For various reasons, none of these solutions was entirely satisfactory. Out of this picture one fact became clear. There was a definite requirement for a professional type organization staffed with well-trained, licensed technicians, prepared to install and maintain commercial FM communications equipment.

Larger equipment manufacturers began developing service organizations from independent operators, many of whom were radio-TV shops which had started two-way servicing as part-time work. While the service station may be in combination with a consumer radio-TV business, the two fields are growing farther apart. Where both types of work are carried on by the same organization, it is generally advisable to separate the two functions as much as possible.

Two-way radio is a necessity to its users. Its reliability and continuity of operation must be maintained at the highest levels. Consequently, there is the need for a type of maintenance seldom considered when you speak of TV and home radios—preventive maintenance. Maintenance on a regular basis provides the serviceman with an opportunity to exercise highest skills, and simultaneously assures him of a future income. The importance of two-way radio is such that in many fields, 24-hour service is required, particularly where the Public Safety Serv-

Figure at left shows basic equipment in one service shop. Top row, l. to r.: VTVM, 2 power-and-test panels, deviation meter, field strength meter, and calibrated sig. generator. Bottom row: Lab.

freq. meter, thru-line wattmeter, chassis being worked on, and test meter (with dummy load on top). Figure on right shows operator checking two-way mobile radio on motorcycle with standard test set.



in Mobile 2-Way Radio

Income and Potential in a Fast-Growing Service Field

ices (fire, police) are involved.

Communication service companies require somewhat different operating personalities since they deal with industrial and specialized users rather than the general public. Even the technical work pattern differs; the two-way technician has a more specialized approach and must hold an FCC radio license. His test equipment is special and often unsuited for use on home radios and television sets.

Since many equipment manufacturers offer a prospective customer a complete "package"—system, installation, and maintenance on a continuous basis—it is to their advantage to closely coordinate and support the service stations, which will receive the installation and maintenance subcontracts.

Complete technical information, such as instruction manuals, parts price books, work report forms, business calling cards and many other aids are supplied to the stations at no charge. A sign is furnished to identify the station as a member of the National Service Organization. One-day service clinics are held throughout the country, conducted by factory personnel. The Regional Service Manager and Field Service Engineers are available to assist in both technical and administrative matters.

Replacement parts and supplies are stocked by manufacturers' parts depots in various sections of the country, and are available to the service stations at substantial discounts, permitting resale to the user on a competitive basis. Experience indicates the necessity of maintaining a stock of maintenance supplies equal to approximately 50% of the monthly gross billing. Thus a station grossing \$1,000.00/month should have \$500.00 invested (at cost) in inventory. This represents a 60-day turnover. This factor would necessarily vary with location and availability of parts.

The manufacturer assists the service station in procuring test equipment, recruiting additional personnel and provides free factory schooling for new station employees.

A volume of maintenance contracts assures the service station of a known income, permitting budgeting of expenses and careful planning for expansion. The service station is relieved of collection problems and protected against bad debt losses. Simplification of accounting procedures is also possible, in that the manufacturer is billed for several contracts, rather than individual billing to the customers. A manufacturer often arranges for a maintenance contract on a large system extending over several states by using the services of several service stations, whereas the individual operator would not be in a position to undertake this project.

Income and Expenses

A practical rule of thumb to use in predicting gross business is: Each licensed technician, devoting full time to two-way work, should gross \$800.00 to \$1,000.00 monthly. This represents approximately 125 radio units to be serviced. Thus, a two-man organization should gross \$1,600.00 to \$2,000.00; a four-man station, approximately \$3,200.00 to \$4,000.00, etc. The gross per person will begin to drop in the larger organizations because of "non-productive" employees, such as secretary, accountant, etc.

Today, service companies specializing in two-way radio fall into two general groups: Group A consists of the completely equipped and staffed commercial organization. Group B includes the small one-man type operation with modest or minimum facilities.

A typical full-time Group B operator may have accumulated specialized test gear worth \$500.00 to \$1500.00, and may have one part-time helper under a working arrangement. (See Table I). He usually maintains 75 to 150 mobile units and 15 to 20 base stations, many of them under contract. He probably has one vehicle for use in his service work to furnish transportation for himself and his equipment to the job site. The commercial grade station wagon such as the Ford "Ranch Wagon,"



Station wagon holds drive-to serv. equipment

Plymouth "Suburban," etc., is preferred, since this vehicle usually serves a dual purpose of both commercial and personal use. The station wagon has the advantages of providing speed and comfort with space for test equipment and parts usually needed. A van or truck has the advantage of greater storage space, but is less comfortable and is not as fast. The shop location may be a simple drive-in garage on the edge of town, even a residential garage. Generally, the area of operation would be a radius of about 60 miles from the base. A gross business of \$1,000.00 to \$1,500.00 a month is usually realized, sufficient to yield acceptable earnings.

Some communities or areas have as yet insufficient two-way radio equipment to support a full-time service operation, so that many part-time operators are necessary. With the growth of two-way radio in their communities, many of these individuals reach the point of transition to a full-time business operation.

Many Group A service companies include metropolitan area operations. Capital investments may run into several thousands. (See Table II). Many of these companies are graduates from Group B who have grown up with the two-way industry.

A Group A station may include an owner-operator and 3 to 5 full-time employees, most or all of whom are FCC licensed. The shop is more centrally located, and usually is a drive-in garage type structure. Operational area may encompass a 100

or 150 mile radius for "drive-to-it" business, and may include part-time satellite operations to cover service at distant points. Shop facilities, however, may be geared largely towards "drive-in" speedy repairs in volume with duplicate test positions, spare unit chassis of various types and a large stock of supplies. Waiting room and reception facilities may be provided. Personnel complement may include one non-technician, perhaps a combination bookkeeper, receptionist, and coordinator. This type of organization soon develops a lower unit rate and greater volume to remain competitive and continue to grow with increasing service demands. Obviously, considerable business and administrative ability is required for success in this operation.

Today, the typical two-way service company is a responsible business providing a complete service function. The two-way specialist has

acquired a well-earned professional status, particularly since the introduction of selective calling, split-channel equipment and numerous other improvements. What is the profit picture? The return on dollar investment is much higher than the average in small business. The successful service company often realizes 10% to 25% return, compared to the usual 6% to 8%.

Present trends point to an increasing volume of contracted preventive maintenance. Contracts between equipment supplier and user originating at the time of sale are becoming the rule, and the resulting subcontracts, held by the supplier and authorized service company, increasingly call for all-inclusive service on flat rate, with provisions for periodic preventative inspection of all units. A pattern of regular system inspections is emerging. Preventative checks are scheduled by

the service station to minimize in-service failures. Improved techniques are holding emergency calls to a minimum, bringing greater customer satisfaction, and leading to more new users than ever before.

Improved liaison between customers, service stations and supplier, stepped-up distribution of information, as well as better coordination of system installation details are already in evidence. In the short term future, further improvement along with the growing volume of contract maintenance will bring a better profit ratio to the service station, stimulating rapid growth of many part-time operators into full-time professional organizations capable of providing service on a round-the-clock schedule. All types of operations will be enabled to make substantial progress. The growing market is both a challenge and an opportunity. •

TABLE I

Typical One-Man Organization

Investment:

Test Equipment

Test Set	
In-line wattmeter	
Frequency and modulation meters	
Calibrated signal generator	
Tools, etc.	\$ 1,500.00
Inventory (parts and supplies)	500.00
Service Vehicle	2,000.00
Accounts Receivable	1,000.00
	<hr/>
	\$ 5,000.00

Expenses—Monthly:

Test equipment depreciation	\$ 30.00
Vehicle depreciation	45.00
Vehicle operation expense	60.00
Telephone	25.00
Rent (pro rata of residence)	20.00
Utilities (pro rata)	20.00
Parts cost (for maint. contracts)	125.00
Postage, office supplies	10.00
Insurance	20.00
Expenses away from home	35.00
Reserve for taxes, etc.	30.00
	<hr/>
	\$ 420.00

\$1000.00 gross less \$420.00 expenses yields gross profit of \$580.00. Assuming owner salary of \$500.00, return on investment of \$5,000.00 is \$80/mo or \$960.00 yearly, or approximately 20%.

TABLE II

Typical Class A Service Station (4 Men)

Investment:

Two (2) Calibrated Signal Generators @ \$600.00	\$ 1,200.00
Three (3) Test Sets @ \$100.00	300.00
Three (3) Sets of Freq. and Modulation Meters @ \$460.00/Set	1,380.00
Three (3) In-Line Wattmeters @ \$200.00	600.00
Three (3) Volt-Ohm-Milliammeters @ \$50.00	150.00

Two (2) VTVM's @ \$80.00	160.00
Three (3) Dummy Loads @ \$25.00	75.00
Four (4) Sets of Tools @ \$125.00	500.00
Shop Equipment — battery, charger, benches, grinder, drill, air compressor, desk, typewriter, etc.	1,500.00

Total Test and Shop Equipment \$ 5,865.00

Operating Capital	\$ 2,500.00
Two (2) Vehicles @ \$2,000.00	4,000.00
Accounts Receivable	3,500.00
Inventory	1,750.00

Total \$18,615.00

Gross volume per month, \$3,500.00 for owner-operator plus three men.

Yearly Gross Business \$42,000.00

Operating Expenses; Yearly:

Rent	\$ 1,800.00
Utilities	1,650.00
Salaries:	
Owner	\$ 8,500.00
Technician	5,200.00
Technician	5,200.00
Helper	4,200.00
	<hr/>
	\$23,100.00

Depreciation	\$ 2,000.00
Vehicles operating cost	1,600.00
Travel Expense	750.00
Insurance	600.00
Advert. and Entertainment	300.00
Reserve for Taxes	2,000.00
Postage, office supplies	600.00
Accounting and Legal	1,200.00
Parts Cost (Maint. Contracts)	4,600.00

Total \$37,050.00

\$42,000.00 Gross less \$37,050.00 expenses yields \$4,950.00 net profit on investment of \$18,615.00 or a return of approximately 26%.

Silicon Power Rectifiers

They are small, and offer improved characteristics

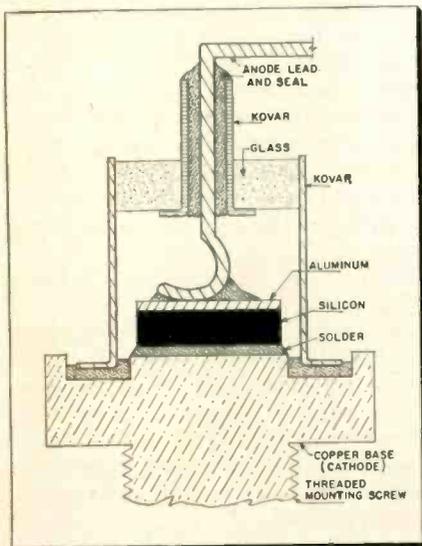
JAY ROBIN GNESSIN

• A step in the miniaturization of power supplies has been accomplished with the development of the silicon power rectifier. This tiny giant gives up to 98 percent efficiency at peak inverse voltages up to 400 volts. It can operate directly from the 115-volt ac line, to be used with any type of radio or tv home receivers. No special precaution other than a surge-limiting resistor of about 10 ohms is necessary. This resistor is placed in series with the power source to reduce capacitor surge currents to safe values when the rectifier is switched on. The rectifier works equally well with inductive-input or capacitive-input filters.

The design is shown in Fig. 1. Note that, unlike familiar selenium disc-stacks, this new rectifier handles line voltage with a single element. In larger models the rectifier can supply currents of hundreds of amperes at several thousand volts.

Consider the home-receiver model depicted. The small slice of single-crystal silicon is less than $\frac{1}{8}$ -in. square, with the anode lead attached to the aluminum faceplate fused to the top surface of the crystal. The other face is bathed in a solder pool, attaching it to the heavy copper

Fig. 1—Construction of a silicon rectifier.



base. The base serves as heat radiator and cathode. The fusing action of attaching the aluminum plate creates the semiconduction barrier which permits rectifier action.

The crystal, after careful washing and drying, is placed in an airtight container with a glass cover. Hermetic sealing is provided by the Kovar-to-glass seal. Since Kovar and glass have the same temperature coefficient of expansion, the seal keeps out contamination in the air which might cause leakage, possibly ruining the crystal.

In Fig. 2 the silicon power recti-

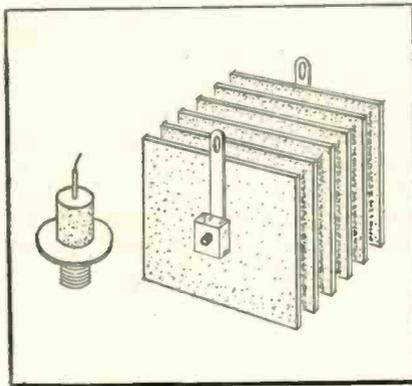


Fig. 2—Silicon and selenium rectifier size.

fier is compared to the standard dry-disc stack in size. Beyond the size reduction and increase in efficiency, the bugaboo of heat damage is conquered by having the cathode threaded on a large surface to permit heat dissipation into a metal chassis. Unfortunately, the cathode is the wrong end to have at chassis potential, since the rectifier cathode is generally B-plus in conventional circuits, while the chassis is usually B-minus.

In the special case where the chassis is at B-plus potential, simply attach the rectifier to the chassis, omitting the spacer and mica washer, as shown at the left in Fig. 3. In the usual case where polarity does not permit the rectifier cathode to be at chassis potential, thin large-area mica insulators and spacers are inserted between the rectifier and the chassis, insulating the two from each other. The mica offers a low resistance to the flow of heat, yet is an

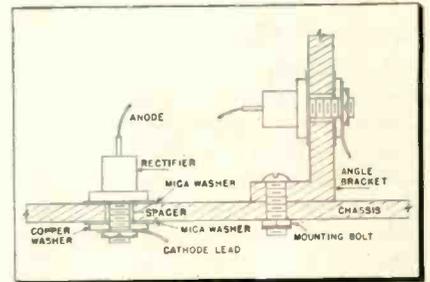


Fig. 3—Rectifier mountings with B-plus to chassis (left), B-minus to chassis (right).

excellent electrical insulator. The heavy copper washer on the bottom helps transfer the heat through the mica to the chassis. If necessary, an extra cooling fin may be mounted on the copper stud to provide additional convection cooling. The right side of Fig. 3 shows the mounting on a stand-off angle-bracket, if desired.

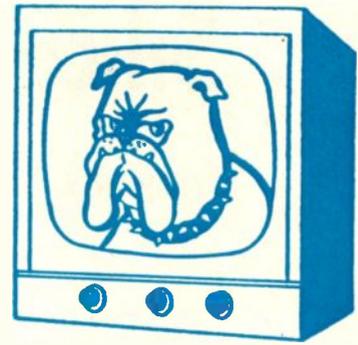
Other Advantages

Among the additional improvements provided by the new hermetically-sealed rectifier is the absence of an increase in voltage drop, common with aging of dry-disc units. Raised temperature does not cause voltage troubles in the silicon units, since the breakdown voltage actually *increases* with temperature. Thus, if the rectifier works satisfactorily at room temperature in the open air, it may be assumed it will resist voltage breakdown when hidden in the cabinet. Unfortunately, however, inverse currents *increase* with temperature, so cooling is still desirable. This is satisfactorily achieved with the threaded cathode mounting on the chassis.

(Expanding use of transistor circuits may have some effect in promoting use of the new semiconductors. Conventional grounded-emitter transistorized circuits generally work from power supplies in which B-plus is grounded. Such supplies are easily obtained, as pointed out, by threading silicon rectifiers directly into the chassis. The small size of the units also falls into line with the trend toward miniaturization that is associated with transistorization.—Ed.) •

"Tough Dog" Corner

Difficult Service Jobs Described by Readers



Vert. Fault Darkens Pix

The picture and raster were very dark on this GE 16C110. The picture-tube and high-voltage circuits were checked, with everything found to be within tolerance. To help matters, the picture suddenly became normally bright again while we were looking at it. The set had to cook for 3 days before the picture darkened again and troubleshooting could be resumed. All checks were then repeated, to no avail, and a substitute picture tube was also tried with no improvement.

In handling the set, it was noticed that the vertical hold was also touchy. Since this was something that had to be fixed too, we followed the path of least resistance and tore into the vertical section first. It was soon discovered that the 0.01-mfd condenser between one grid of the vertical oscillator (pin 1) and the plates (pins 1 and 6) of the vertical output stage had broken down considerably (see figure). An ohmmeter showed a resistance reading of only 1.5k. After this condenser was replaced, the set was turned on for a check. In addition to improved vertical hold action, normal brightness was also evident, and it stayed that way.

Tracing the schematic showed why brightness had been restored. The 0.01-mfd condenser was in series with a 39k resistor, which then leads to the primary of the vertical output transformer. Through the primary, the connection continues to another resistor and finally arrives at a point on the horizontal-output transformer. This is the supply point from

the boosted B-plus, coming from the damper and linearity coil. The leaking condenser had caused excessive drain on the boosted B-plus supply, thus reducing efficiency of the high-voltage circuit.—William H. Ward, White Hall, Illinois.

Double Trouble

On a complaint of no vertical deflection, I took the chassis back to the shop after substituting the vertical oscillator and output tubes, and making all appropriate adjustments, failed to restore operation.

All voltages were close to normal in the vertical circuit. A scope at the grid of the output tube showed a sawtooth wave of reasonable amplitude and form. At the plate, however, nothing appeared unless scope gain were turned all the way up. After all parts checked on the button in a resistance check, I made a temporary connection of a new vertical output transformer, which produced a full raster when the set was turned on. I was just about to pat myself on the back when the raster collapsed.

Grabbing the scope and vtvm, I went through the circuit starting from the sync take-off point clear to the yoke. At the grid of the vertical blocking oscillator, the waveform would disappear, the negative voltage signifying oscillation would then be missing, and oscillator plate voltage would rise from 165 to 400 volts. After all components were checked carefully, it was decided to try another oscillator tube again, a 6SN7. This restored the circuit to normal operation once more.

The old transformer was then put back into the set. Performance was good for a couple of hours—then the raster collapsed again. Once more the sawtooth waveform was missing at the output tube plate. Apparently this dog was the result of two separate but simultaneous intermittent troubles! Permanently replacing the tube and the transformer cured the trouble once and for all.—Peter J. Caras, Hammond, Indiana.

Connection Out of Control

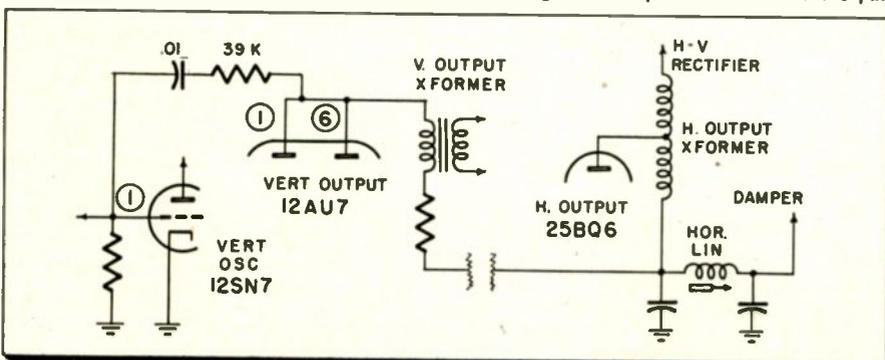
An RCA recently came into our shop that had us going around in circles for a few days. The complaint was intermittent vertical rolling on all channels.

Needless to say, the set worked fine in the shop. No amount of jarring, shaking or application of heat would cause the condition to become evident. Furthermore, all components tested okay. The set was returned to the customer with new vertical oscillator and output tubes. Two days later it came back.

We replaced every resistor and condenser in the vertical circuits and played the set for eight hours, after which the trouble appeared. Output and blocking transformers were replaced, but the trouble again appeared after a few more hours. What could be the cause? Everything had been replaced, including r-f and i-f tubes. Everything? Well, not the vertical hold control. It was functioning in a perfectly normal way, but we replaced it anyhow. What else could we do? The set played fine for two days here in the shop. It has been playing perfectly since it was returned to the customer three months ago.

The explanation? Disassembly of the control revealed that one of the rivets connecting the resistive element with a terminal was loose, thereby varying the resistance in the circuit and changing the frequency of the vertical oscillator intermittently.—George J. Rupp, Baltimore, Maryland.

A leaky condenser in this vertical oscillator cut down brightness output and darkened the pix.



Adding Retrace Blanking

Simple "Extra" Pays Off in Profits and Customer Good Will

M. G. GOLDBERG

• Every TV service shop can up its income on many repair jobs already on the bench by installing retrace line blanking circuits. The sets involved, of course, are older models that do not already contain such circuits. Most of these require very little labor and only two or three small components, with the total cost usually coming to 60 cents or less. The author has not yet had a customer complain over the rela-

tively small extra charge because of the advantages thus obtained.

On an old picture tube, retrace lines will show up more prominently because the brightness has to be turned up higher than when the tube was new. This lowering of the bias moves the operating point of the grid further from cutoff, encouraging the possibility of having retrace lines activate the beam. As sets age, their owners often buy new ones to dispose of this and other disadvantages. However, many older sets, especially consoles, represent

considerable investments and may be part of the home furnishing scheme. These are particularly good candidates for blanking-network installations.

The specific circuits discussed here involve many popular chassis and models. Instructions should be followed exactly as these circuits, worked out on actual receivers, were designed to eliminate any chance of interaction between circuits that would show up as smear, excessive shading at the top of the picture due

(Continued on page 41)

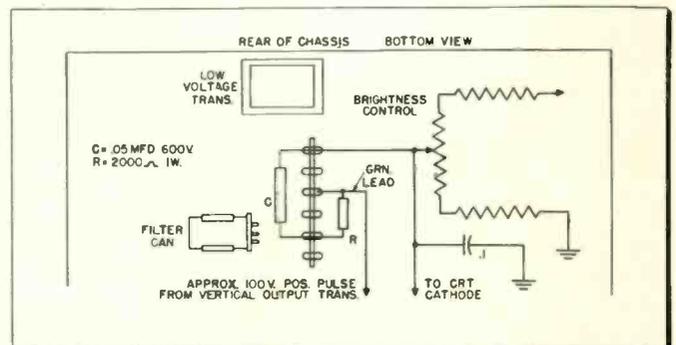
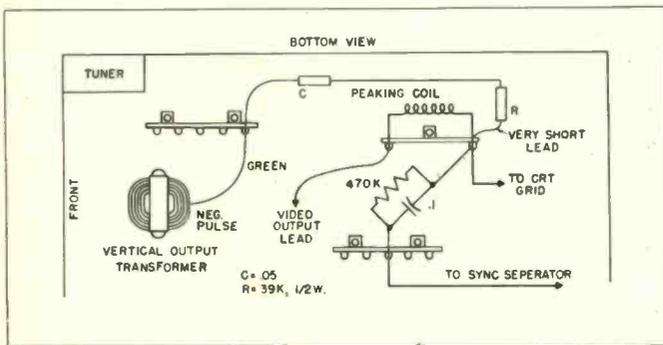


Fig. 3—Simple network provides blanking in Westinghouse 2150, 2151.

Fig. 4—Three components fill the bill in Westinghouse V-2150-136.

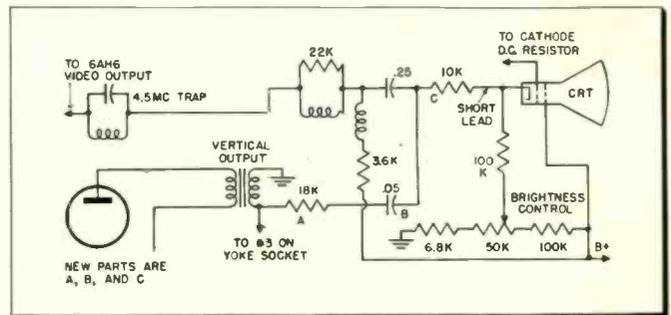
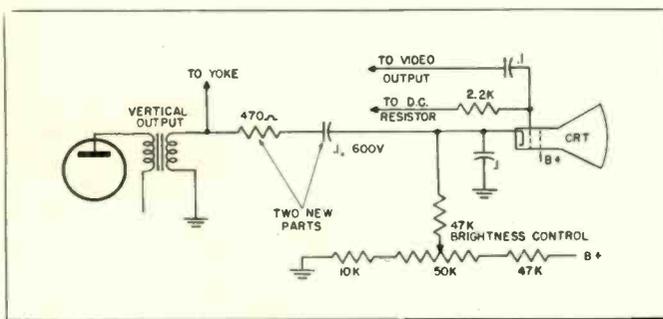
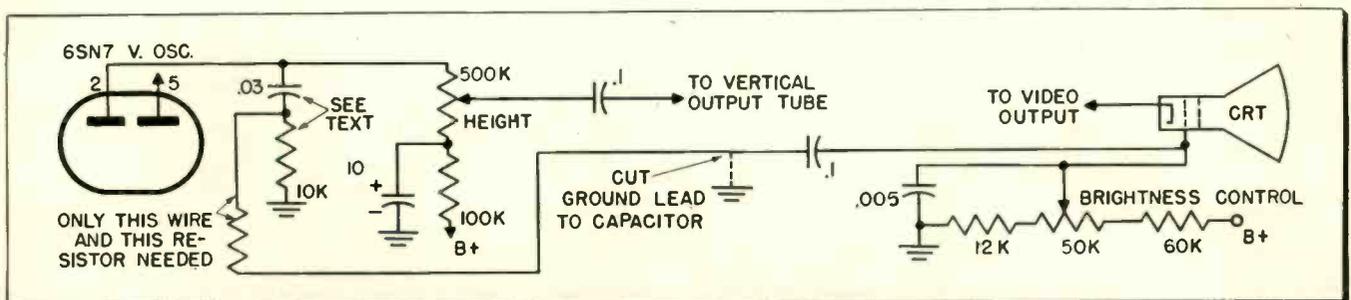


Fig. 5—A single resistor, a length of lead, and two simple wiring changes complete the circuit for the Westinghouse V-2192 series.



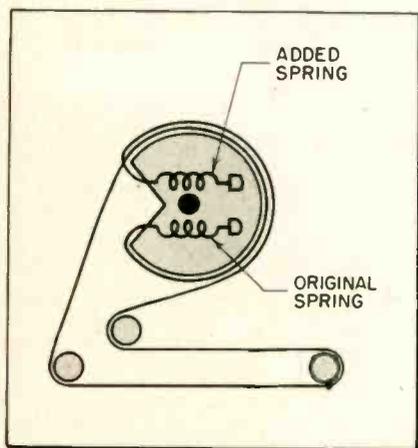
Shop Hints to Speed Servicing

Tips for Home and Bench Service Contributed by Readers

Dial Cord Slippage

Repairing dial cable mechanisms on small radios is a frequent task. Often, because the sets are inexpensively made, annoying comebacks result as the repairs may not last too long.

In these receivers, the dial cable usually has only one spring at one of its ends. It is a simple matter to add another. Two springs will pull the cord much tighter, eliminating



Extra dial-cord spring improves radio tuning.

"sloppy" tuning and annoying backlash. Since they take up a greater amount of slack than one spring will, tuning action will remain "tight" for much longer. The very sharp tuning thus permitted is especially valuable if the set happens to have a short-wave band. In the long run, making the addition of the extra spring a standard practice results in a longer-lasting, customer-satisfying repair.—Joseph Amorose, Richmond, Virginia.

Simple Xformer Repair

This is a suggestion for a quick, inexpensive repair on older receivers similar to the Du Mont RA-103. The same circuit was used in many receivers made by Crosley and other manufacturers. When these sets lose vertical sync, the cause is often an open winding (primary) in the vertical blocking oscillator transformer. As shown, this circuit uses three instead of two windings on the transformer, with transformer coupling of the sync pulse from the vertical in-

tegrating network to the grid of the oscillator, instead of direct coupling. When this occurs, the fault can be corrected without the necessity of transformer replacement, simply by converting the circuit to use the conventional direct coupling from integrator to oscillator grid found in most b-o circuits. Only two additional parts are needed: a 0.01-mfd condenser at 600 volts and a 100k (1-watt) resistor. They are inserted where shown in the illustration.—Donald F. Marcy, Seaside Heights, New Jersey.

Auxiliary H-V Supply

If you ever come across an old TV receiver with an r-f high-voltage power supply, taken in trade or procured any other way, don't scrap it altogether. I salvaged such an r-f supply from an old Du Mont taken in trade. It's worth its weight in gold for localizing high-voltage and horizontal-deflection troubles. When horizontal troubles occur, you generally lose the high voltage too. Consequently, you lose the service of the quickest indicator you have, the picture tube itself. Substituting the 10-kv r-f supply for the one in the receiver puts the tube back in business, and gives clues as to where the trouble may lie. With the picture far off sync, for example, horizontal oscillator or afc faults are indicated; inadequate width points to the output or flyback portions; a trapezoidal raster throws suspicion on the yoke; and a vertical-line raster directs attention to the flyback transformer or yoke.—Arthur Anderson, Fords, New Jersey.

Loose Flyback Ground

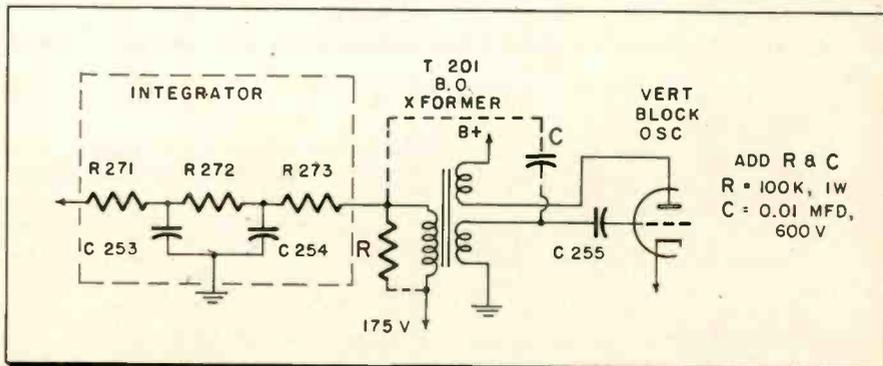
We encountered a severe frying and popping noise in a Muntz TV receiver. The symptom was traced definitely to the flyback transformer. At first, it was thought that the cause might be one or more defective condensers, resistors, or corrosion in the windings. Close observation of the picture showed no picture pulling, distortion or other adverse effects. Behavior was similar to that when a severe corona discharge is present. The trouble was finally traced to the fact that the iron core of the flyback transformer was not solidly grounded to the chassis, with arcing as the result. Simply tightening the two bolts that fasten the transformer to the chassis corrected the trouble at once.—Edwin W. Holscher, Spencer, Iowa.

Frayed Wire Insulation

Where insulation has deteriorated for some distance along a length of wire whose removal and replacement would take considerable time, a simple repair can be made if the wire itself is in good condition. The repair is made with rubber or other insulating tape, but it need not be made in the usual time-consuming way of winding tape around exposed wire.

Cut a strip of tape slightly longer than the length of wire that is to be re-insulated. Lay the tape lengthwise along the wire, overlapping the remaining good insulation at each end. Then wrap the tape around the wire along its length, and seal it by squeezing the open edges together with a pair of pliers.—Henry Josephs, Gardenville, Penna.

If defective, the primary of this blocking-oscillator transformer need not be replaced.



Technician's Color Quiz

Know the Score on TV Hue? Check Yourself on "I" and "Q"

Special Feature

• A great deal of information on color TV reception and receiver circuits has become available since **TECHNICIAN** took the lead, two years ago, in presenting such data to the service profession. As we get closer to the practical aspects, this material increases in value. Furthermore, changes that have been taking place in receiver design have done nothing to make such information obsolete; the basic understanding of signal and set remains unaltered.

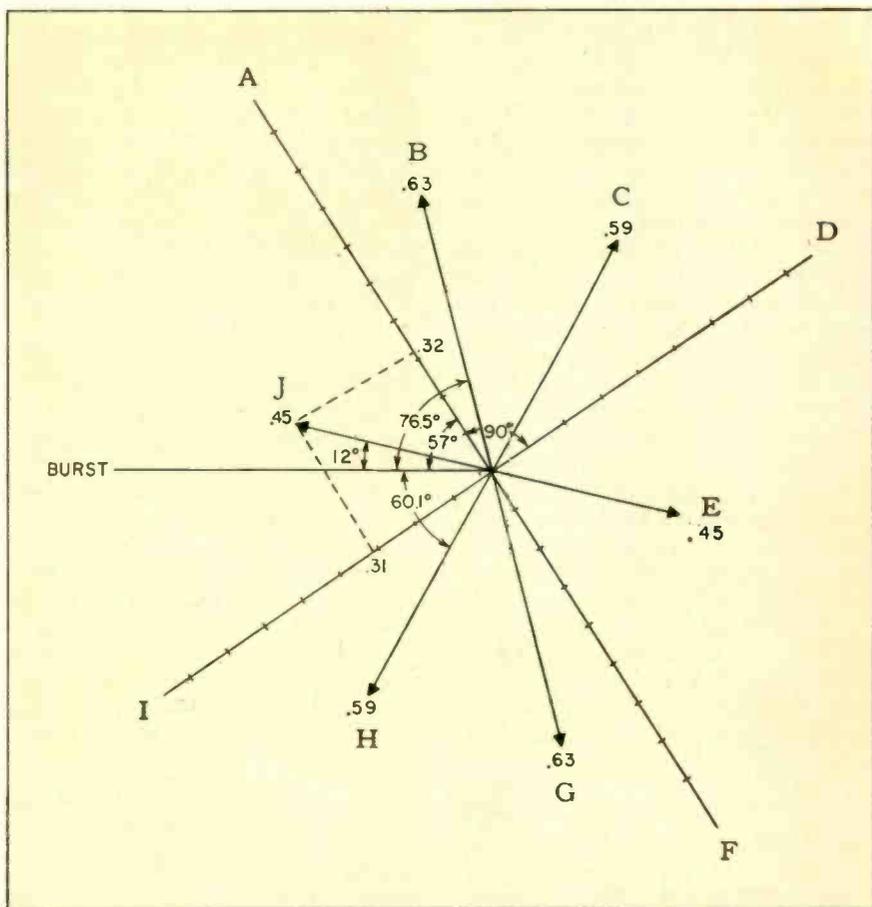
However, with little chance to *apply* what you've learned in this time, there is the danger that knowledge begins to slip away. Are you getting stale? Here's a chance to find out how much you've retained and where you may need some review.

Emphasis in this group of 10 test questions is on important characteristics of color and of the color signals. An arbitrary value of 10 points is assigned to each question. Distribute the 10 points evenly for parts of multiple questions. Remember, you got the answers in **TECHNICIAN** articles.

To keep the temptation to peek out of the way, we suggest you cover the answers at the start and uncover them successively as you go through each one. Ready? Here goes!

Questions

1. By what three characteristics may any color be described and defined?
2. Define, or illustrate by example, the three characteristics given in the answer to Ques. 1.
3. Concerning the three characteristics involved in the preceding questions, how may they be recognized in the color signal?
4. To send out a signal that can be converted by the receiver into a useful color picture under the NTSC system, what three basic components must there be in the video information?
5. Describe briefly how each of the three video-signal components does its part in contributing to the



Vectors show phase and amplitude of important color signals. How many can you identify?

reproduced picture.

6. What is the "burst"? Why is it important?

7. True or False: A color subcarrier at about 3.58 mc is modulated with color information and sent out along with monochrome information.

8. The accompanying vector diagram shows the amplitude and phase of some important color signals and other reference points. With the phase of the burst already identified to orient you, can you identify five of the points lettered A to J?

9. The single color subcarrier must be modulated independently by two signals that are needed to decipher color information in the receiver. How is this done so that each signal can be picked off separately in the receiver circuit?

10. Two transmitted color signals

were discussed in the answers to Ques. 4-9. True or False: A receiver cannot reproduce a color picture until it has demodulated each of these specific signals.

Answers

1. Hue, saturation, and brightness.

2. Hue is color in the general sense—that quality whereby we distinguish one color from another, such as blue from red. It may be any one of three so-called primary colors or hues, or their various mixtures. Saturation refers to the intensity of a hue to the degree that it is diluted with white light. Artists refer to this quality as tint. For example, pink is a low-saturation tint (containing much white) of a fully saturated, vivid red (with no white

light). *Brightness* is that characteristic of a color by which we can locate it on an imaginary white-to-grey-to-black scale. To distinguish brightness from saturation, imagine that a color, after hue and saturation have been determined, is reduced to a shade of black, grey or white as is done in black-and-white photography or monochrome television. Its brightness would now be reduced to the same term as we understand it in b-&-w TV; that is, a shade of black, grey or white. As another example, consider the pink (red of low saturation, but considerable brightness) discussed earlier. If we tone its brightness down somewhat closer to black, we get a dusty rose or charcoal pink.

3. The *phase* of a color signal (that is, the angle it makes with some reference point, such as the burst, on the accompanying vector diagram) determines its hue. Amplitude of the signal (length of the vector in the diagram) corresponds to saturation. Brightness is sent out as black-and-white (luminance) information. It is the amplitude variation of the standard black-and-white video signal as it exists in both color and monochrome transmissions.

4. I, Q, and Y components.

5. The I signal and its negative aspect ($-I$) or complement represent an orange-red hue and a green-blue hue. The Q signal occurs at a 90-degree phase angle with respect

to the I signal. Q is a purplish hue; $-Q$ is yellow-green. As can be seen in the diagram, the vectors of these two, at right angles to each other, form the skeleton of a graph on which the point representing any color may be located. The Y signal is simply the brightness or black-and-white information.

6. The burst is a short period of 3.58-mc oscillation normally consisting of eight cycles. It is sent out immediately following the horizontal pulse (occurring on the trailing portion of the horizontal blanking pulse). This burst is used to synchronize the local 3.58-mc oscillator in the receiver circuit so that it is locked to the same phase and frequency as its counterpart in the transmitter. The burst may also be used to operate the receiver's color killer. When the color killer receives burst input, the killer is cut off, permitting normal processing of color information. With no burst input (as when a monochrome picture is being received), the killer operates to cut off circuits that process color information, so that only a black-and-white pix appears.

7. False. One detail destroys the truthfulness of this statement: After the 3.58-mc subcarrier has been modulated, its modulation *sidebands* are sent out, but the subcarrier itself is suppressed at the source. As a result, color demodulator stages differ in design from ordinary video

detectors. Suppression is used to reduce the occurrence of 3.58-mc "grain" interference in the reproduced picture. (Were you "trapped" by this one? Read more carefully!)

8. A is $+I$ signal, B is red, C is magenta, D is $+Q$, E is blue, F is $-I$, G is cyan (blue-green), H is green, I is $-Q$, and J is yellow.

9. The two modulating signals (I information and Q information) are applied to different *phases* of the 3.58-mc subcarrier. The Q signal is modulated directly onto the subcarrier. The subcarrier is shifted 90 degrees to provide a separate carrier on which I signal is imposed. This is like using two separate carriers operating at the same frequency, although out of phase with each other. If the two demodulators in the receiver are adjusted to their proper respective phases, each will respond only to its own intended signal.

10. False. Once the full chrominance information is sent out, the receiver may use any two vectors that are convenient as reference lines for locating transmitted colors. It is common to find a receiver using an R-Y (Red minus Y) demodulator in conjunction with a B-Y demodulator, for example. The latter arrangement simplifies certain mixing problems in the receiver.

(If you reached or passed 70 percent in this quiz, you're in pretty good shape!) •

The Flying Technician

About two years ago Whitey Brayer, TV technician of Phoenix, Arizona, started out with a Piper plane and a hunch about outlying towns that couldn't support repairmen of their own. He now schedules regular flights to Ajo, Bisbee, Douglas, Williams, and other far-flung

smaller communities that would otherwise be without service and often, for that matter, without TV. He advertises locally in these places.

Two technicians accompany him on flights, along with equipment including a TV receiver and a field-strength meter. With these, he has

been able to find new areas where reception of Phoenix stations is possible, then scout terrain for high spots where antennas could be installed. He has thus been able to develop and maintain community antenna systems, and map routes by which he could get his service trucks into these areas. His efforts made it possible for citizens of Williams to see their first World Series this year.

With two-way radio, Brayer keeps in touch with his office in Phoenix and his trucks on the road. Out-of-town customers bring their sets to specified points where he makes his stops. He will leave Phoenix on a flight at 8 a.m., make as many as 18 service calls, and be back by normal quitting time. Outlying customers pay the same service rates that he charges in Phoenix. He is kept so busy that he was unable to go on a trip to Europe he had won in a prize in a dealer's selling contest. He plans on adding another plane next year. —Prepared from information supplied by D. S. Halacy, Jr.

Flying tech Whitey Brayer, transferring equipment from his service "ambulance" to his plane.



Garry Moore

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MAKER AND MODEL	LIST PRICE	POWER OUTPUT (WATTS)	FREQUENCY RESPONSE (CPS ± DB & WATTS)	HARMONIC DISTORTION (% ± DB & WATTS) < LESS THAN > GREATER THAN	INTERMODULATION DISTORTION (% CPS OR WATTS) < LESS THAN > GREATER THAN	HUM (DB BELOW WATTS)	DAMPING FACTOR
ALTEC LANSING CORP., 9356 Santa Monica Blvd., Beverly Hills, Calif.							
A-340A	\$159.00	35	5-100,000 ± 1	<1/2° 35		95 ± 35	Variable
AMPLIFIER CORP. of AMERICA, 398 Broadway, New York 13, N. Y.							
FA-10	280.00	10	15-65,000 ± 5 ± 10	0.5 ± 10	0.2 ± 10W	90 ± Max	15
BEAM INSTRUMENTS CORP., 350 5th Ave., New York 1, N. Y.							
Quasi II	130.00	15	20-20,000 ± 0.2	0.1 ± 12	0.4° ± 15W	80 ± 15	12
BOGEN CO., DAVID., 29 9th Ave., New York 14, N. Y.							
D0110	44.35	12	8-60,000 ± 0.5 ± 12	0.15 ± 12	<2° ± 12W*	75 ± 12	Infinity
D030A	99.00	30	10-25,000 ± 0.2	0.7 ± 30	<2° ± 30W*	85 ± 30	+2 to -1
* 60 & 7000 CPS 4:1 Ratio							
BRITISH RADIO ELECTRONICS LTD., 1833 Jefferson Pl., N.W., Washington 6, D. C.							
HF25	139.50	25	20-50,000 ± 3	0.1 ± 25	1.60-1000cps	90 ± 25	35 to Infinity
BROCINER ELECTRONICS CORP., 344 E. 32nd St., New York 16, N. Y.							
Mark 30A	98.25	30	15-100,000 ± 0.5 ± 20		1 ± 30W	90 ± 30	5
CAPEHART-FARNSWORTH CO., 3700 Pontiac, Ft. Wayne 5, Ind.							
CA-156	49.50	12	20-20,000	<1 ± 10		70 Max	
DUOTONE CO., Locust St., Keppert, N. J.							
EL6400	275.00	20	30-19,000	2 ± 20		50 ± 20	2.7
EL6411	361.75	40	30-19,000	2 ± 40		53 ± 40	2.2
EL6420	550.00	70	22-1/2-20,000	2 ± 70		56 ± 70	3.5
ELECTRO VOICE INC., Buchanan, Mich.							
A15	69.50	15	20-50,000 ± 1/2	0.15 ± 15W	0.35 ± 15W	85 ± 15	0.1 to 15
A20	85.00	20	20-60,000 ± 1/2	1/2 ± 20W	1 ± 20W	85 ± 20	0.1 to 15
A30	108.00	30	20-75,000 ± 1/2	0.3 ± 30W	1/2 ± 30W	85 ± 30	0.1 to 15
*A30	145.00	30	20-50,000 ± 1/2	1/2 ± 30W	1/2 ± 30W	90 ± 30	0.1 to 15
A50	168.00	50	20-75,000 ± 1/2	1/2 ± 50W	1 ± 50W	85 ± 50	0.1 to 10
A100	261.00	100	20-50,000 ± 1/2	1/2 ± 100W	1.2 ± 100W	85 ± 100	0.1 to 10
* Has built-in power supply for PRC1, PRC2							
ESPEY MFG. CO., Congress & Ballston Sts., Saratoga, N. Y.							
Anadote	49.50	5	40-15,000	2 ± 4		60	
100G*	69.95	8	40-15,000	1/2 ± 5		60	
501G*	79.95	24	20-20,000	1/4 ± 24		80	
700G*	119.50	(Tunes)	20-20,000	0.1 ± 1		80	
710G*	149.50	12	20-20,000	1/4 ± 12		80	
FAIRCHILD RECORDING EQUIPMENT CO., Whiteston 57, N. Y.							
255	99.50	25	20-20,000 ± 0.5 ± 25	<1 ± 25	<2 ± 25W*	80 ± 25	12
260	149.50	50	20-20,000 ± 0.5 ± 10	<1 ± 50	<2 ± 50W*	85 ± 50	9
* 60 & 7000 CPS 4:1 Ratio							
FISHER RADIO CORP., 21-21 44th Dr., Long Island City 1, N. Y.							
70-AZ*	99.50	25-50 Peak	15-35,000 ± 1 ± 25	<0.5 ± 25	<0.5 ± 20W	>95 ± Max	Vary
50-AZ*	159.50	50-100 Peak	15-60,000 ± 1 ± 40	<1 ± 50	<2 ± 45W	>92 ± Max	Vary
* Also available: 50F H-Low Filter, 50W Mixer Fader.							
GENERAL ELECTRIC CO., Electronics Park, Syracuse, N. Y.							
A1-300	47.75	10	30-15,000 ± 1	<1 ± 10	<3 ± 10W, 60 & 7000 cps	70 ± 10	4
GROMMETS DIV. of PRECISION ELECTRONICS INC., 9101 King St., Franklin Park, Ill.							
220BA	59.50	20	10-50,000 ± 0.5 ± 1	0.5 ± 20	1 ± 20W*	90 ± 20	+2 to Infinity
230BA	175.00	60	10-50,000 ± 0.5 ± 1	0.75 ± 60	0.5 ± 60W*	95 ± 60	+3 to Infinity
* Tests made with 60 & 3000 CPS 4:1 ratio.							

MAKER AND MODEL	LIST PRICE	POWER OUTPUT (WATTS)	FREQUENCY RESPONSE (CPS ± DB & WATTS)	HARMONIC DISTORTION (% ± WATTS) < LESS THAN > GREATER THAN	INTERMODULATION DISTORTION (% CPS OR WATTS) < LESS THAN > GREATER THAN	HUM (DB BELOW WATTS)	DAMPING FACTOR
HEATH COMPANY, 305 Territorial Rd., Benton Harbor, Mich.							
W-4AM**	39.75	20	10-100,000 ± 1 ± 1	1.5 ± 20	2.7 ± 20W*	95 ± 20	28.5
W-3**	49.75	20	6-150,000 ± 1 ± 1	1 ± 21	1.3 ± 20W*	88 ± 20	20
W-5**	59.75	25	5-160,000 ± 1 ± 1	1 ± 25	1 ± 20W*	99 ± 25	40
* 60 & 3000, 4:1 ** KR							
INTERELECTRONICS CORP., 2432 Grand Concourse, New York 58, N. Y.							
400	99.50	40	18-35,000 ± 1 ± 40	0.05 ± 30	0.25 ± 30W	96 ± 40	+5 to -3
MARTIN & CO., H. S., 1916 Greenleaf St., Evanston, Ill.							
352A	194.50	25	10-100,000 ± 0.5 ± 20	<0.5 ± 25	<0.5 ± 22W	90 ± 25	15
MC INTOSH LAB. INC., 320 Water St., Binghamton, N. Y.							
MC-30	143.50	30	20-20,000 ± 0.1 ± 30	0.3 ± 30	0.25 ± 60W, 60 & 7000 cps	90 ± 30	12
MC-60	198.50	60	20-20,000 ± 0.1 ± 60	0.3 ± 60	0.25 ± 140 cps	90 ± 60	12
NATIONAL COMPANY, 61 Sherman St., Malden 48, Mass.							
Horizon 20	84.95	20	20-20,000 ± 0.1 ± 10	0.1 ± 20	± 20W	80 ± 20	0
PEDERSEN ELECTRONICS, 3667A Mt. Diablo Blvd., Lafayette, Calif.							
W-20	62.50	20	15-30,000 ± 1 ± 10	1 ± 20	1 ± 15W	90 ± 20	12
W-30	108.00	30	15-40,000 ± 1 ± 10	0.2 ± 30	0.5 ± 30W	90 ± 30	27
PILOT RADIO CORP., 37-06 36th St., Long Island City 1, N. Y.							
AA-410	49.50	15	15-20,000 ± 0.1 ± 15	0.1 ± 5	2 ± 15W	90 ± 15	
AA-90*	99.50	20	15-50,000 ± 1 ± 15	0.1 ± 15	0.5 ± 10W	90 ± 10	
RADIO CORP. of AMERICA, Front & Cooper Sts., Camden, N. J.							
SP10	99.50	10	20-20,000	0.5 ± 10W	<1.2 ± 60 cps	39 ± .01	
SP20	134.50	20	20-20,000	0.5 ± 20W	<1.2 ± 60 cps	39 ± .01	
RADIO CRAFTSMEN, INC., 4401 N. Ravenswood Ave., Chicago 40, Ill.							
C450	19.50	5	20-20,000 ± 1 ± 5	1 ± 5.5	<5 ± 5.5W*	70 ± 6	2
C400	29.50	10	15-20,000 ± 1 ± 10	1 ± 10	2.5 ± 10W	70 ± 10	4
C550	89.50	30	10-50,000 ± 1 ± 30	1 ± 30	5 ± 30W	90 ± 30	30
* 60 & 7,000 CPS 4:1 Ratio							
REGENCY DIV. I. O. E. A. INC., 7900 Pendleton Pike, Indianapolis 26, Ind.							
HF-200	99.50	20	20-30,000 ± 1 ± 10		2 ± 20W*	80 ± 20	6
HF-350A	134.50	30	20-40,000 ± 1 ± 30		2 ± 30W*	85 ± 20	6
* 40 & 7,000 CPS 4:1							
SARGENT-RAYMENT CO., 1401 Middle Harbor Rd., Oakland 20, Calif.							
SR-14B	59.50	14	15-60,000	0.2 ± 10	0.8 ± 10W	80 ± 14	20
SR-98B	91.50	25	10-75,000	0.1 ± 18	0.75 ± 18W	87 ± 18	20
SCOTT INC., HERMAN HOSMER, 385 Putnam Ave., Cambridge 39, Mass.							
223	74.95	20	20-70,000				
232-B	99.95	32	12-60,000 ± 1/2 ± 32	1/2 ± 32	0.1	85 ± 32	
265-A	199.95	70	12-80,000 ± 1/2 ± 65	1/2 ± 65	0.1	90 ± 65	30:1 to 1/2:1
SIMPSON MFG CO., MARK, 32-28 49th St., Long Island City 1, N. Y.							
CM-8	59.75	8	20-20,000 ± 1	<1 ± 7		60 ± 8	
CM-10	106.25	10	20-20,000 ± 0.5	<1 ± 10		80 ± 10	
SONEX, INC., 245 Sanson St., Upper Darby, Pa.							
U-L251	124.75	25	10-100,000 ± 0.5 ± 5	<0.5 ± 25	<1 ± 20W	85 ± 25	16
U-L601	169.50	60	10-100,000 ± 1 ± 60	<0.5 ± 60	<1 ± 60W	90 ± 60	16
STEPHENS MFG. CORP., 8538 Warner Dr., Culver City, Calif.							
Chitade	138.00	20	20-70,000 ± 1/4	0.5 ± 20		90 ± 20	100 ± 1000 cps
TECH-MASTER CORP., 75 Front St., Brooklyn 1, N. Y.							
TWISA Kit	49.95	20	12-50,000 ± 1 ± 20		0.25 ± 10W	70 ± 20	25
UNITED TRANSFORMER CO., 150 Varick St., New York 13, N. Y.							
MLF	108.00	20	20-30,000		1 ± 20W 40 & 7000 cps	80 ± Max	37

Hi-Fi Glossary — Audio Distortion

DISTORTION—Any deviation, during reproduction, from the original or "live" form of a sound. The commonest forms of distortion involve the addition of sounds that were not in the original, or the elimination of sounds that were originally present.

HARMONIC DISTORTION — A form of distortion in which spurious sounds are generated that are harmonically related to the original

sound. Thus, if a 1,000-cps pure sine-wave tone is fed to the input of an inferior amplifier, the output might contain, in addition to the original sound, a 2,000-cps tone (2nd harmonic) and a 3,000-cps tone (3rd harmonic).

INTERMODULATION DISTORTION—A form of distortion in which spurious sounds are generated in reproducing equipment when sounds of more than one frequency

are fed into that equipment, and in which the frequencies of the added sounds are the sum or the difference of the applied tones. For example, if tones of 100 and 500-cps are simultaneously applied to a poorly designed amplifier or speaker, the output might contain, in addition to those two tones, 400-cps and/or 600-cps notes. Transducers (speakers, playback pickups) are generally greater offenders in this respect than amplifiers.

FIRST TO BREAK THE TV RECEPTION BARRIER...

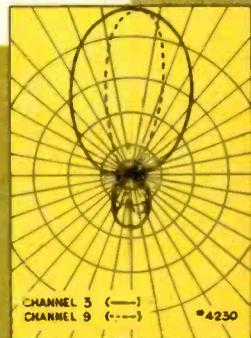
**MOST POWERFUL SUPER FRINGE
ANTENNA IN THE WORLD**

NEW WALSCO WIZARD

with exclusive **PHASE REVERSER**

Distance is no barrier to the amazing new WALSCO WIZARD. Exclusive "Phase Reverser" delivers the sharpest, crystal-clear picture ever seen in the most difficult reception areas. No other antenna like it!

New WIZARD offers highest gain and sharpest directivity possible on all VHF channels. Installation in a jiffy... without complicated harnesses, phasing stubs, or extra dipoles. Guaranteed for 3 years!



WALSCO WIZARD Imperial equals reception of 10 element yagis on low channels, and equals a three stack 10 element (30 elements) yagi on channels 7 to 13.

Actual comparison of fringe antenna performance

Channels	Gain (db) Single Bay						
	2	4	6	7	9	11	13
WalSCO Wizard Imperial	6.1	6.9	8.2	11.9	11.6	10.8	12.6
Antenna "A" With 3 Phase Reversing Dipoles	6.3	6.6	8.1	10.5	10.2	10.6	12.4
Antenna "B" - Yagi Type with Phasing Loops	5.1	5.5	5.8	7.5	9.6	8.8	11.2
Antenna "C" - Yagi Type with Loading Coils	5.9	6.9	8.6	9.1	8.6	9.6	7.8



ELECTRONICS CORPORATION

A SUBSIDIARY OF *Teltron* CORPORATION

3602 Crenshaw Blvd.,
Los Angeles 16, California

Model

Wizardette #4210
Wizard #4220
Wizard Imperial #4230

Price

\$14.90 list
19.50 list
34.90 list



POWERAY

fringe area antenna

REVOLUTIONARY Sleeve Dipole Principle...

POWERAY is an outstanding new antenna design for fringe and deep-fringe areas. Based on a unique variation of the sleeve dipole principle, **POWERAY** provides better TV pictures miles away from the station. The sleeve dipole principle is based on resonance of the overall length at a low frequency and resonance of a 3-wire transmission line section at a high frequency. Only this new design properly balances *high gain, directivity and exact impedance match* for better fringe area reception.

PREASSEMBLED

POWERAY is preassembled for less installer-time on the job. Easily and quickly put up, **POWERAY** provides superior performance for years.

*For complete customer satisfaction and full profit margins—it's **POWERAY**, AMPHENOL's exceptional fringe area antenna*

AMERICAN PHENOLIC CORPORATION
chicago 50, illinois
AMPHENOL CANADA LIMITED
toronto 9, ontario



LETTERS

To the Editors

Color TV

EDITOR, TECHNICIAN:

Enjoy your magazine as a whole, but I'm getting fed up with the space devoted to color TV. I haven't met a technician yet who made a buck on color.

B. DAIEN

Suffern, N.Y.

• *Only a minor portion of our editorial space is devoted to color, but no tech should ignore it. Color TV is complex, and knowledge should be acquired gradually. When color does arrive in force, the tech who's prepared will cash in.—Ed.*

Rx for Hi-Fi Rx

EDITOR, TECHNICIAN:

Referring to "Rx for Ailing Hi-Fi Gear" (Oct. issue), under "Tracking," I'm amazed that you didn't mention the real culprit in 9 out of 10 cases; namely a worn needle. We've heard of too many cases where servicemen with little hi-fi experience literally took a changer part, when all they had to do was examine the worn needle under a microscope. In most cases of groove skipping, a new needle (not the all-purpose 0.002 in. tip) of the correct size will correct the trouble.

LEON FERGUSON

FERGUSON'S RECORD SHOP

Memphis, Tennessee

Tube Experience

EDITORS, TECHNICIAN:

Two or three years ago we had considerable trouble with supposedly new tubes purchased around New York from distributors thought to be reliable. Some lots ran as high as 10% shorts and 15% low emission. As a deterrent to the racketeers, it has been suggested that all discarded tubes be mutilated by cutting off one or more pins, or in the case of metal tubes a brief application of a heavy hammer before consigning them to the ash can.

FRED W. MARTIN

Richmond, Va.

• *Several readers have made this suggestion. It looks like an excellent idea.—Ed.*

Wishful Thinking

EDITOR, TECHNICIAN:

I fixed the set six months ago
And yet they phone, "You were just here;

The sound has been bad since you left,
The picture has been but a smear."
And though complaints act on my nerves,

"A bad picture tube," I hope to hear.

R. M. THORSON

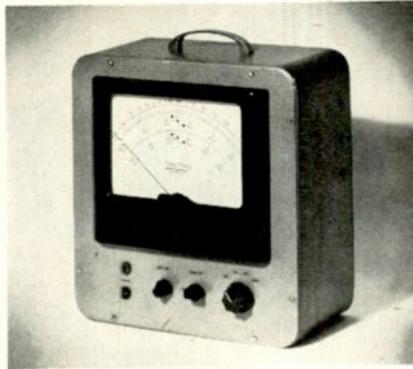
Palo Alto, Calif.

(Continued on page 31)

Progress in New Products

Leitch AUTOMATIC VTVM

In the Meter-Matic, range switching is automatic. Application of probes to points under test gives reading on 8½-in. meter. Scale to read is indicated by a red light. Measurement on ac and dc from .1 to 1500 v. Automatic resistance reading from 0.5 to one billion ohms in 6 ranges; center-scale value of proper range lights up. Protected from "burn-out" or damage up to 2000 v. Uses single set of probes. Price, \$149.50. Leitch Engineering Corp., Manchester, N.H.—TECHNICIAN (Ask for No. 12-12)



Hexacon LIGHT SOLDER GUN

A new instant solder gun with ⅛-in. tip for fine soldering is soldering-hot in a few seconds, without the use of heavy transformer or thermostats. It weighs but 8 oz. Special alloy lifetime tip cannot wear, corrode or bend, thus eliminating tip maintenance. Trigger control gives any degree of heat required without danger of overheating. Has long, thin reach for getting in tight places and an effective spotlight. Recommended for printed circuits, subminiature assemblies, TV. 150-w, ac or dc. Cat. No. G148; \$7.95. Hexacon Electric Co., 180 W. Clay Ave., Roselle Park, N.J.—TECHNICIAN (Ask for No. 12-19)

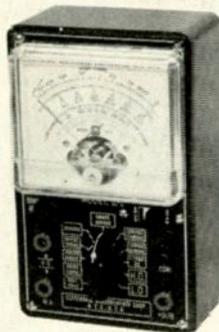
GC GUN & CLEANER

The aluminum Trol-Gun loads like a pen, fits over control shaft, where operation of the tool's piston forces cleaner-solvent around shaft. The company recommends Trol-Kleener, formulated for this purpose. These products can be used on push buttons, switch contacts and tuners; will not harm wood, acetate, or metal. Trol-Gun (Cat. No. 9280) sells for (dealer net) \$3.75. Trol-Kleener (Cat. No. 65-16), a 16-oz. bottle, \$1.95. Gen. Cement Mfg. Co., 400 South Wyman St., Rockford, Ill.—TECHNICIAN (Ask for No. 12-13)



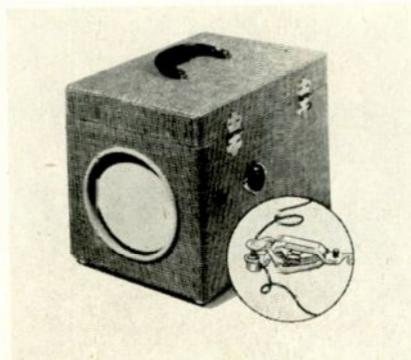
EMC V-O-M

Model 102 Volometer has a 3½-in. 800 microamp. D'Arsonval-type meter accurate to within 2% and a plastic face for easier reading, is made of high-impact bakelite. The pocket-size 102 combines 5 ac ranges: 0 to 3000 volts; 5 dc ranges: 0 to 3000 volts; 3 ac current ranges: 0 to 600 ma; 4 dc current ranges: 0 to 130 max, 0 to 1.2 amps.; and 2 resistance ranges: 0 to 1000 ohms, 0 to 1 meg. \$14.90, complete. Electronic Measurements Corp., 280 Lafayette St., New York 12, N.Y.—TECHNICIAN (Ask for No. 12-14)



Sel-Son CRT TESTER

A simplified tester for pix tubes, the CRT Substituter, avoids removing tube, yoke, focus arrangement or ion trap from the set. Unit includes h-v extensions, tube socket, and yoke supply. The h-v lead and tube socket are hooked up as usual. The yoke supply extension leads have insulation-piercing clips. Gives a direct view at all times, simplifying work. The unit is offered ready-to-use and also in kit form, less the tube. Sel-Son Electronic Tube Corp., Darby, Pa.—TECHNICIAN (Ask for No. 12-15)



T-M ANTI-STATIC AGENT

An anti-static spray to ensure cleaner, clearer TV pictures, No-Fog, can be applied in less than 2 minutes to neutralize electrostatic charge. It is a colorless, odorless liquid which, when sprayed on the pix tube or mask and wiped with a clean dry cloth, leaves an invisible film. It is also good for cleaning phonograph records and plastic products. Available in quick-spray, translucent bottles. TeleMatic Industries, Inc., 16 Howard Ave., Brooklyn 21, N.Y.—TECHNICIAN (Ask for No. 12-18)

C-D VIBRATOR CONVERTERS

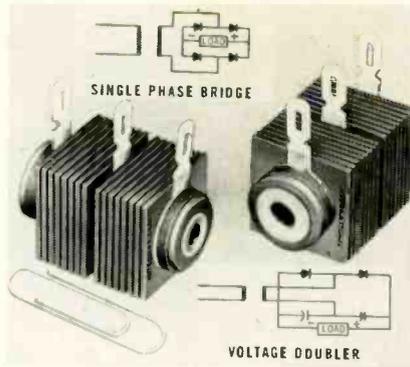
The expanded line covers dc-to-ac power outputs from the 2-watt to a 350-watt model. Four of the units (Moblipaks) are for ham, aircraft and general mobile use, including 2 dual-purpose models to operate from a 6 or 12 volt battery source. Six models provide sine-wave regulated power for tape recorders, broadcast and Hi-Fi amplifiers and similar equipment requiring pure ac. Two "A" battery eliminating units are suited for auto radio servicing. Cornell-Dubilier Electric Corp., South Plainfield, N.J.—TECHNICIAN (Ask for No. 12-16)

For more technical information on new products, use inquiry coupon on page 34

New Tubes & Components

Int'l SELENIUM STACK

Compact type 60-9150 is a voltage-doubler stack. One unit can be used as a doubler, and 2 as a single-phase full-wave bridge. Two in a bridge will deliver approx. 180 v dc at 0.10 amp for an rms input of 230 v. As a doubler, one delivers 50 ma with ac input of 175 v rms. Output to 350 v dc. Applications include solenoids, counters, relays, variable speed controls and field supplies for small dc motors. International Rectifier Corp., 1521 E. Grand Ave., El Segundo, Calif.—TECHNICIAN (Ask for No. 12-31)



RCA VACUUM TUBES

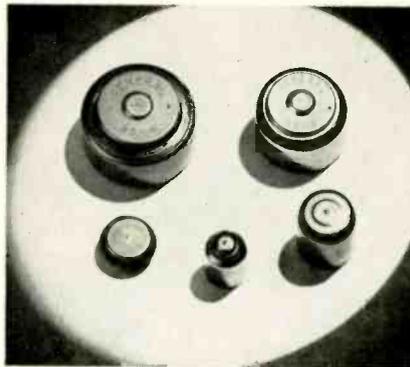
The 3BZ6 is a semiremote-cutoff pentode (7-pin miniature) for TV receivers with series heater strings. The 6AU4-GTA is a half-wave rectifier (glass-octal) for damper service in TV. The 12AB5 is a beam power tube (9-pin miniature) for auto receivers operating from 12-v batteries. These types are conventional in appearance. Tube Div., Radio Corp. of America, Harrison, N.J.—TECHNICIAN (Ask for No. 12-35)

Raytheon 6AF4A

The 6AF4A is a heater-cathode miniature UHF triode for use as a local oscillator in UHF receivers (470 to 890 mc). The 6AF4A is electrically identical to the 6AF4 and differs only in physical characteristics by employing a miniature bulb 1 3/4-in. in length. Basing Information: pin 1—plate; pin 2—grid; pin 3—heater; pin 4—heater; pin 5—cathode; pin 6—grid; and pin 7—plate. Raytheon Mfg. Co., 55 Chapel St., Newton 58, Mass.—TECHNICIAN (Ask for No. 12-33)

General MERC. BATTERIES

Range is from a cell weighing 4.5 grams to a battery weighing 25 lbs. Basic cells include G-625 (400 ma hrs.), G-450 (350 ma hrs.), RG-1 (1200 ma hrs.), RG-3 (2200 ma hrs.), and RG-4 (3500 ma hrs.). Cells may be combined in battery packs. New uses in transistorized and semi-transistorized equipment include radios, wrist watches, guided missiles, geiger counters, computers and hearing aids. General Dry Batteries, Inc., 13000 Athens Ave., Cleveland 7, Ohio—TECHNICIAN (Ask for No. 12-32)

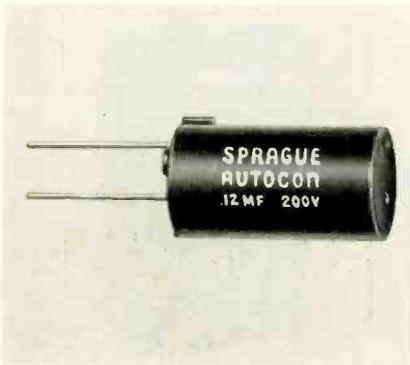


CBS TV TUBES

The 3CE5 and 6CE5 are high-transconductance, sharp-cutoff pentodes for vhf r-f and i-f amplifiers, made to narrow limits for grid voltage at plate current cutoff, permitting closer tolerances in the receiver. Electrically and mechanically the tubes resemble the 3CB6 and 6CB6. The 6792, a multipurpose beam tetrode for voltage stabilization service from 3000 to 25,000 v. may also be triode-connected in different ways for a choice of characteristics. Useful as a regulator, gating tube, variable resistor, or amplifier. Its plate is connected to a top cap. CBS-Hytron, Danvers, Mass.—TECHNICIAN (Ask for No. 12-34)

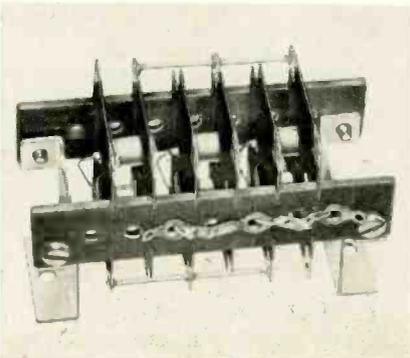
Sprague CAPACITORS

Type SE Autocon molded paper tubular capacitors have tiny "standoff" feet, which eliminate dust and moisture traps and prevent printed chassis wiring shorts. Generous leads permit use in all single-ended replacements. Autocons have high insulation resistance, low power factor, and flat temperature-capacitance curve. Available in 47 types, rated at 200, 400, and 600 volts, from .001 mfd to .47 mfd. Bulletin M-716. Sprague Products Co., 65 Marshall St., North Adams, Mass.—TECHNICIAN (Ask for No. 12-29)



Federal POWER RECTIFIERS

Germanium power rectifier stacks combine better heat dissipation with light weight, rigidity, and small size. The stacks are interchangeable with present types. External connections may be soldered directly to the plate, eliminating terminal lugs. Ratings from 15 v and 0.35 amp, to 888 v. and 2 amps in over 100 combinations. Elements are Federal 1N91, 1N92 and 1N93 germanium rectifiers. Components Div., Federal Telephone & Radio Co., 100 Kingsland Rd., Clifton, N.J.—TECHNICIAN (Ask for No. 12-30)



La Salle TEST PIX TUBE

The Pic-Testube comes in a handy carrying case for use in the home and in the shop. It gives consumers a visual test of how set will work with a new tube, without removing old tube from set; uses 5AHP4 universal miniature-picture tube, aluminized; has automatic focus; eliminates ion trap and focus coil. Complete cost to serviceman, including the case, \$21.95. Literature available. La Salle Tube Mfg. Co., Inc., 155 East Grand Ave., Chicago, Ill.—TECHNICIAN (Ask for No. 12-36)

For more technical information on new products, use inquiry coupon on page 34

(Continued from page 28)

No Time to Read

EDITOR, TECHNICIAN:

I can recognize the two types of mechanics mentioned in your "Editor's Memo" (Oct. issue). Recently, a set using phase detector AFC horizontal circuitry was in for servicing, with the usual complaint, "Won't stay in sync." After scope checking revealed a lack of sampling pulse at the horizontal output, further examination showed a new horizontal transformer had been put in, but it didn't have the tap to develop the pulse. By changing the width coil to one with a step winding, the pulse was provided.

Some time later, encountering the serviceman who had made the transformer change, I said nothing about the job. Instead, I praised a book on AFC. He just gave me a blank look and said: "I ain't got the time to read that stuff."

AL KINCKINER

Philadelphia, Penna.

Contest Results

EDITOR, TECHNICIAN:

New test equipment opportunities are our lifeblood. The best thing that could come out of the Technician Test Equipment Contest would be to uncover new needs that are unsuspected now, merely because we can't see the forest for the trees. We need the technician to hand us a periscope so that we can see over the top. He is up on the firing line where the view is unobstructed. Sometimes the technician is reticent in telling us what he sees, so he should be encouraged to speak his piece. I feel that your contest is a step in the right direction.

ROBERT G. MIDDLETON
SIMPSON ELECTRIC CO.

Chicago, Ill.

• Many good ideas were submitted in the contest which closed on Nov. 30. Each entry is being carefully evaluated, and winners will be announced soon.—Ed.

Tube Tricks

EDITORS, TECHNICIAN:

As I read your "Tricks With Tubes—Lesson Two" (Oct. editorial), it occurred to me that the original manufacturer's multi-colored and sealed carton is not going to deter some of the more unscrupulous tube reproducers. The mess the tube manufacturers find themselves in is entirely of their own choosing. It is long overdue that tube producers should deeply indent GT/G and similar bases with their trade mark, type and date code, using the entire tube circumference. Any grinding could then be easily observed by the measurably smaller diameter. Metal shell tubes should be indented and glass types etched. Let's go tube manufacturers . . . don't fret over a few pennies added production cost!

FRED R. SONNENBERG
SONORET TELE-RADIO CO.
Wilkes-Barre, Penna.

NOW! TEST TUBES IN SECONDS! MAKE NEW PROFITS *in MINUTES!*



on every
service call



NEW PORTABLE

DYNA-QUIK

MODEL
500

DYNAMIC MUTUAL CONDUCTANCE TUBE TESTER

ONLY
\$109⁹⁵
NET

Now you can easily cut servicing time—make more on-the-spot tube sales—prevent costly call-backs—and give a better service guarantee! DYNA-QUIK—the new top quality, low cost, portable tester quickly locates all weak and in-operative tubes—and easily does the complete job with laboratory accuracy right in the home! You create greater customer confidence because your customer sees for himself the true tube condition. Easy to operate—in just a few minutes you can quickly check all the tubes in a TV set. You can depend upon DYNA-QUIK because it tests under the dynamic heavily loaded conditions that are the actual operating conditions of the set. At such low cost DYNA-QUIK quickly pays for itself—and continues to make money for you every day!

DYNA-QUIK DOES IT FASTER, EASIER, MORE ACCURATELY

- Makes complete tube test in as little as 12 seconds per tube—faster than any other tester!
- One switch tests everything! No multiple switching—no roll chart.
- Laboratory accuracy right in the home! Large 4½" plastic meter has two scales calibrated 0-6,000 and 0-18,000 micromhos.
- Shows customer true tube condition and life expectancy on "Good-Bad" scale!
- Automatic line compensation! Special bridge continuously monitors line voltage.
- 7-pln and 9-pln straighteners mounted on panel!
- Always Up To Date! Test procedure instructions for new tubes supplied by factory at regular intervals.

TESTS OVER 90%

OF ALL TUBES*
in use today for:

- DYNAMIC MUTUAL CONDUCTANCE SHORTS
- GRID EMISSION
- GAS CONTENT
- LEAKAGE
- LIFE EXPECTANCY

*Including new 600 mill series tubes.

PORTABLE—CAN BE USED ANYWHERE

Handsome, rugged, luggage style carrying case, covered in durable, black leatherette. Removable slip-hinged cover. Size: 15½ x 14½ x 5¾ in. For 105-125 volts, 60 cycle, A.C. Net wt. 12 lbs.

SEND FOR BULLETIN 500T

Made by the makers of
the famous CRT 350

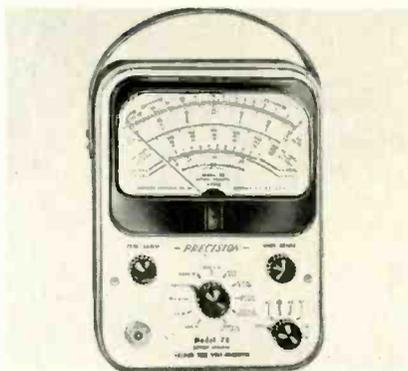


B & K MANUFACTURING CO.
3726 N. SOUTHPORT, CHICAGO 13

Latest Test Instruments

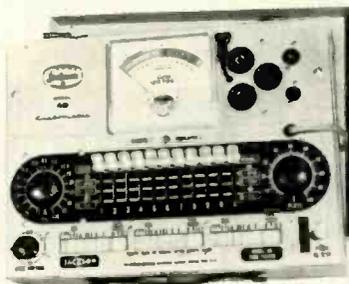
Precision BATTERY VTVM →

Model 78 is a battery-operated vtvm with $\pm 2\%$ accuracy. Features include 6 zero-center dc voltage ranges at 13-1/3 meg input resistance to ± 1500 volts; 5 ohms ranges to 1000 meg; 5 rms ac voltage ranges at 8 meg input resistance and 67-mmfd input capacitance, to 1200 volts. Accessories include RF-12 hi-freq probe (range to 250 mc) and TV-4 H-V Probe to 60 kv. Model 78 with tubes, batteries, and manual, is \$57.50 net. Precision Apparatus Co., Inc., 70-31 84th St., Glendale 27, N.Y.—TECHNICIAN (Ask for No. 12-22)



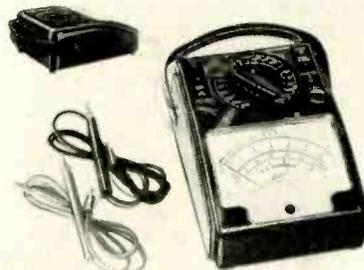
Jackson COMBO TESTER →

Designed to have its meter and power supply used for other purposes, tube checker model 49, features plug-in accessories for additional tests. Accessories include high-resistance short tester, heater current tester, and selenium rectifier checker. Soon available are a signal tracer, r-f oscillator, and condenser tester. The basic tester sells for \$49.95. Meter provides scales for accessories. A tube roll chart is included. Jackson Electrical Instrument Co., Dayton, Ohio.—TECHNICIAN (Ask for No. 12-20)



Hickok NO-BURNOUT VOM →

This portable multimeter protects meter and internal circuit against burnouts. When overloaded, the instrument disconnects itself and raises a re-set button on the case. Available in 2 models: industrial model 455: 20,000 ohms/volt, ac or dc; audio model 456: 20,000 ohms/volt dc and 1,000 ohms/volt ac, includes db ranges and provisions for output measurements. Uses single range function selector switch. Hickok Electrical Instr. Co., 10523 Dupont Ave., Cleveland 8, Ohio.—TECHNICIAN (Ask for No. 12-21)



B&K CRT REJUV.-TESTERS →

Portable CRT Model 400 has 4 1/2-in. meter; replaces B&K CRT 350 at same user's net price, \$54.95; checks and corrects pix tube troubles without removing tube from set. It finds and repairs inter-element shorts and opens circuits, stops leakage, reactivates cathode, and restores emission, checks gas content and predicts life expectancy. Model 200 performs many functions of the former CRT 350; user's net for this model is \$39.95. B&K Mfg. Co., 3726 N. Southport Ave., Chicago 13, Ill.—TECHNICIAN (Ask for No. 12-23)



Talley GENERATOR-PROBE

The Genaprobe is a compact a-f generator within a test probe. It obtains operating potential from equipment under test or separate source (90 to 600 vdc) and approx. range is 40-1200 cps. A viewing window in the side of the instrument facilitates indication of voltage and generator operation. Provides a-f signal of good wave-form. Can be used as a variable frequency generator by application of a known voltage. A voltage vs. frequency graph is supplied; also operating instructions and 90-day warranty. Talley Electronic Dev. Co., 800 Schmidt Bldg., Cincinnati 2, Ohio.—TECHNICIAN (Ask for No. 12-28)

Volt-Ohmic AUTOMATIC VTVM

This instrument eliminates the need for manually selecting voltage or resistance range. The user touches probe tip to unknown voltage or resistance while depressing "Automatic" button, allows Range Selector switch to automatically rotate and stop at appropriate range, while instrument is protected from damage. One probe is used for all functions. Ranges may be changed manually, if desired. Price \$99.50. Bergen Labs., 11 Godwin Ave., Fair Lawn, N.J.—TECHNICIAN (Ask for No. 12-24)

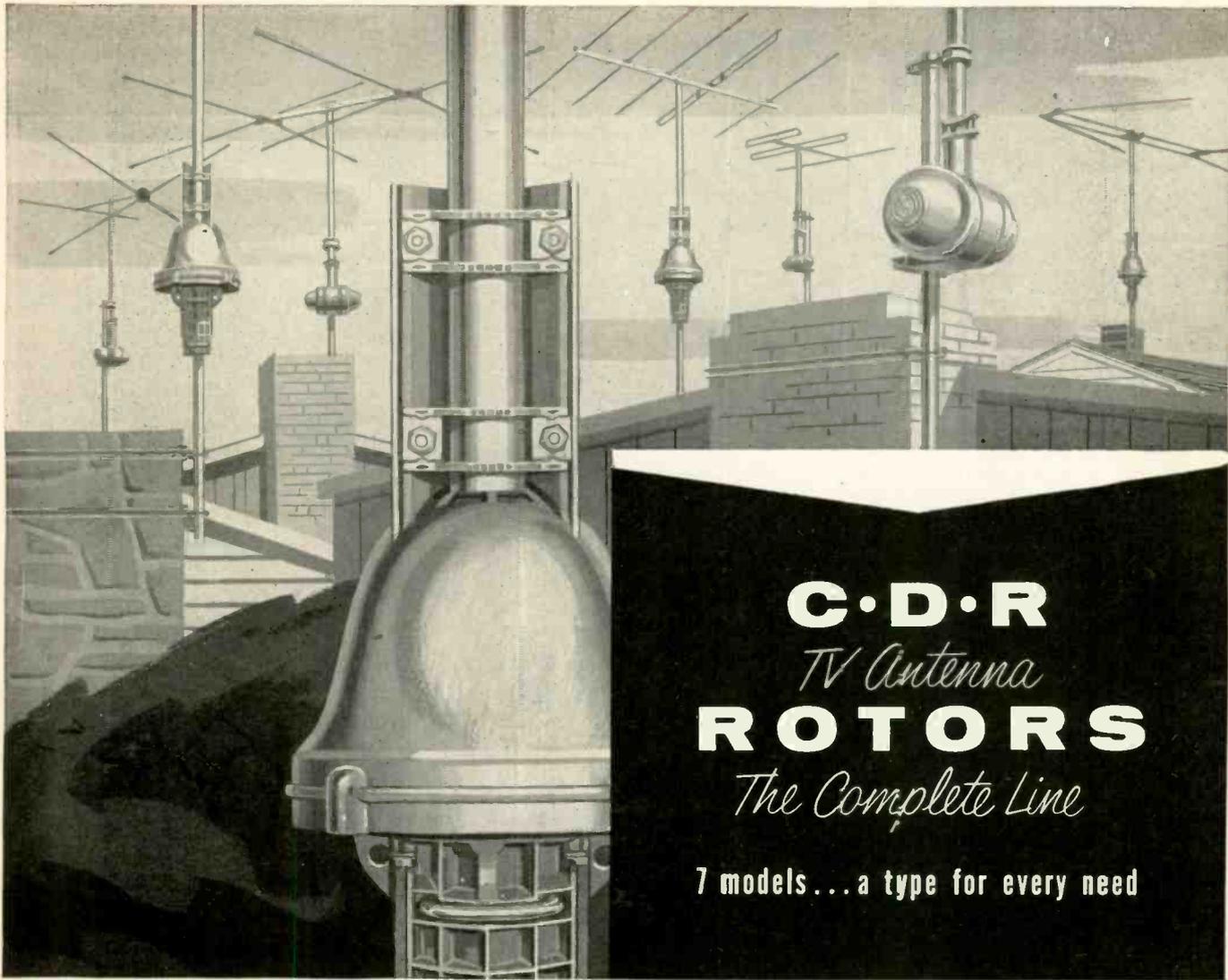
Telectro FS METER

Model 728 radio field-strength set operates in the range of 19 to 125 mc and will measure intensities ranging from 2 to 2.5 million microvolts per meter. Readings in db above 1 microvolt per meter are made by addition of three values. Measurement of noise intensities can be made with accessory probes. Operates from wet or dry cells. A self-contained charger is provided. Telectro Industries Corp., 35-16 37th St., Long Island City 1, N.Y.—TECHNICIAN (Ask for No. 12-26)

Du Mont WIDE-RANGE OSC.

Lab-type oscillator offers extended range, small weight and size, and high output. Type 347 covers 18 cycles to 1.1 mc; costs \$150. Output is 10 v open circuit; distortion is less than 2/10% over most of range. Useful for testing sound and Hi-Fi systems, ultrasonics. Operates on power supplies of 50-400 cycles. For balanced output, matching transformer 2624 is available. Technical Products Div., Allen B. Du Mont Labs., Inc., 760 Bloomfield Ave., Clifton, N.J.—TECHNICIAN (Ask for No. 12-27)

For more technical information on new products, use inquiry coupon on page 34



C·D·R
TV Antenna
ROTORS
The Complete Line

7 models... a type for every need

featuring **C·D·R automatic ROTORS**

Here they are . . . the fastest selling line of rotors . . . complete in every detail . . . including three models in completely AUTOMATIC rotors! The AR-1 and AR-2 and the AR-22 which is the automatic version of the famous TR-2. ALL FIELD TESTED AND PROVEN BY THOUSANDS OF SATISFIED USERS!

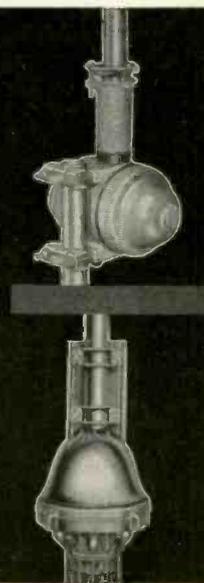
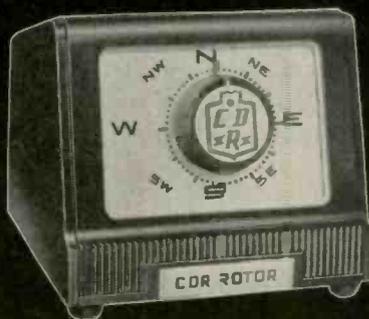
TR-2 The heavy duty rotor with plastic cabinet featuring "compass control" illuminated perfect pattern dial . . . uses 8 wire cable.

TR-12 Complete rotor INCLUDING thrust bearing. Handsome modern cabinet with meter control dial, uses 4 wire cable.

TR-4 The heavy duty rotor complete with handsome new, modern cabinet with METER control dial, uses 4 wire cable.

TR-11 Same as model TR-12 without thrust bearing.

40% sharper tuning
 than any other
 automatic rotor



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PRE-SOLD to millions with
 the greatest concentration
 of TV Spots in our history.



CORNELL-DUBILIER
 SOUTH PLAINFIELD, N. J.

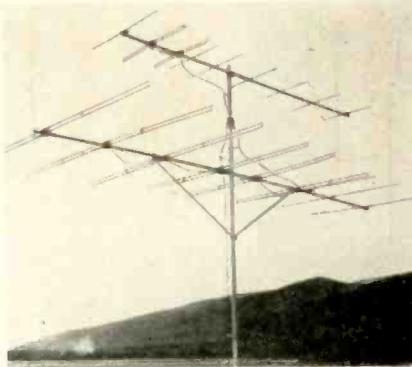


THE RADIART CORP.
 CLEVELAND 13, OHIO

New Antennas & Aids

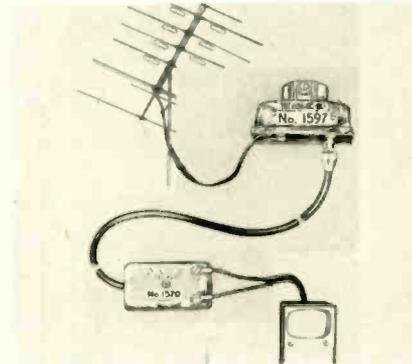
Channel Master ANTENNA →

The K.O. antenna, a driven end-fire array, has exceptionally high front-to-back ratios for eliminating co-channel interference and "venetian blinds." Ratios range from 13:1 to 50:1 (relative voltage). In addition, gain characteristics are high. The K.O. is preassembled, features Snap-Lock action. Model 1026 (channels 2-6), list price of \$40.97. Model 1073 (Channels 7-13), list price of \$16.67. Model 1023 (entire VHF band), lists for \$56.64. Channel Master Corp., Ellenville, N.Y.—TECHNICIAN (Ask for No. 12-1)



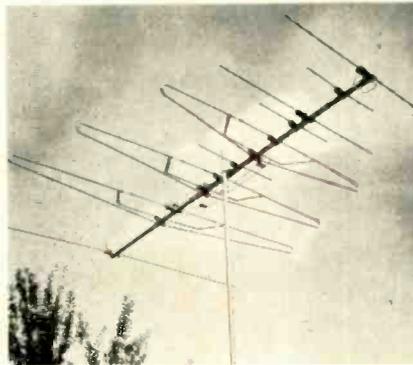
Taco COAX TV COUPLER →

A solderless coaxial coupler eliminates noise pick-up in the lead-in. Designed to improve pictures affected by man-made static (traffic, elevators), 2 couplers are available. A No. 1597 coupler mounted at the antenna transforms signal to 72 ohms. At the receiver, the reverse procedure is followed in a No. 1570 unit, having screw terminals for the flat type line. By shielding the down-lead, pick-up in the cable is eliminated. Bulletin 1402. Technical Appliance Corp., Sherburne, N.Y.—TECHNICIAN (Ask for No. 12-3)



Trio FRINGE ANTENNA →

The Zephyr Royal incorporates stagger-tuning, with the antenna tuned to 6 pre-determined frequencies, gives flat response throughout the VHF band. On the low band, the Zephyr Royal has 3 driven elements stagger-tuned to Channels 2, 4, and 6. Optimum phasing is provided for maximum forward gain. The 2 "wing" dipoles add a total of 9 driven elements pre-tuned to Channels 7, 10, 13, in phase. Recommended for color reception; lists at \$34.95. Trio Mfg. Co., Griggsville, Ill.—TECHNICIAN (Ask for No. 12-2)



Snyder AUTO ANTENNAS

New fiberglass colored auto antenna line permits matching to color schemes of modern autos. Available in 3 colors: sea green (model F8-G) oriental red (F8-R) and Caribbean blue (F8-B). The antennas can be installed on top cowl on the front of the car, or on the rear deck (with an extension cable.) They are also break-proof, corrosion-proof and fade-proof. The single mast stands 36-in. high. They list for \$5.45 with 48-in. cable. Snyder Mfg. Co., 2218 W. Ontario St., Philadelphia 2, Pa.—TECHNICIAN (Ask for No. 12-7)

B-T ANTENNA-MOUNT BOOSTER

A broadband VHF amplifier with low-noise circuit, power supply and weatherproof housing, model AB, provides more than 25 db gain on all VHF channels and operates automatically through its power unit near the TV set. Gain overcomes line loss of 2200 ft. on low band and 1400 ft. on high band. Power unit supplies 24 or 117 v to amplifier. Special taps compensate for voltage drop in long lines. List Price, \$95.00. Blonder-Tongue Labs., Inc., 526-536 North Ave., Westfield, N.J.—TECHNICIAN (Ask for No. 12-8)

Kenco PARAPET MOUNT

Model No. 106 takes antenna masts up to 1½-in. diameter and can be used on walls up to 13½-in. thick. It employs a sturdy frame and 4 clawlike members. At the end of each claw a hardened set screw assures positive anchorage. At each side of the frame, an adjustable cam gives vertical support on tile or stone copings regardless of contour. The mount is assembled and can be set up quickly for a trouble-free installation. Kenwood Engineering Co., Inc., Kenilworth, N.J.—TECHNICIAN (Ask for No. 12-6)

Mosley MULTI-SET COUPLERS

Two and 4 set couplers for operating multiple TV and/or FM receivers from single antenna are of the resistive-pad type. Though introducing some loss, they provide effective isolation. They include: type 902 (\$3.95 list) a solderless type for 2-set use; Tiny Mite type 912 for up to 5 sets when used in multiple (\$1.75 list); type 904 solderless 4-set coupler (\$6.25 list). All units available in brown or ivory. Mosley Electronics, Inc., 8622 St. Charles Rock Rd., St. Louis 14, Mo.—TECHNICIAN (Ask for No. 12-4)

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use this convenient coupon. Enter below the reference numbers for all items desired.

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Editor's Memo

A short while ago I was chatting with a few editors of other electronic publications. One of them mentioned how much troublesome work it was answering all the letters sent in by readers.

Well, I don't have to go looking for work—there's plenty to do searching out and refining the cream-of-the-crop information for insertion in the magazine—but there are few things in publishing that are more important or pleasurable to me than receiving letters from readers: What's on your mind? And how can we serve you better? That's the important thing, for our philosophy is that a **TECHNICIAN** subscriber should have the benefit of all our technical and business facilities, as well as receive the magazine.

That's why I gladly answer every personal letter as promptly as possible. With mass contest or survey correspondence it is, of course, impractical to answer every entry personally, but each one receives individual attention.

Replying to inquiries has its lighter side. We used to receive mail from a fellow who was spending a long stretch in a Louisiana jail. How he came to contact us I never was able to find out. His main problem was that the iron bars caused poor radio reception... "like a man breathing through a blanket" he described it.

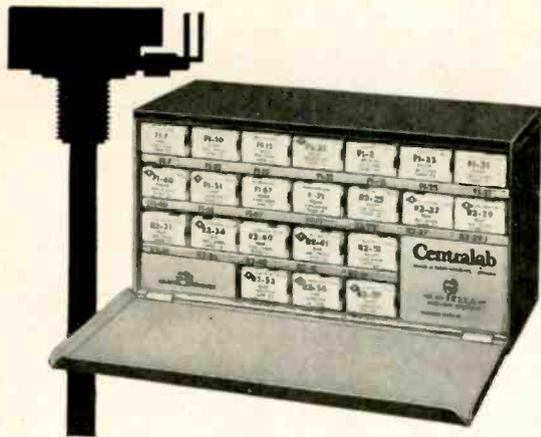
Then there are the letters written in foreign languages. We manage to decipher them after a struggle, particularly if they're in French, Spanish or German. But if we ever receive one in Greek or Japanese, we'll really have a problem. Fortunately, the United Nations is located only a few blocks away.

Of course, these are the exceptions. Most of the letters are straightforward, covering practical problems and reasonable attitudes. It's a sign of a vigorous industry when people will take the trouble to say what's on their minds.

By the way, I'm very gratified by the many hundreds of entries to the Technician Test Equipment Contest, which closed on November 30. The instrument manufacturers should benefit from the many excellent ideas submitted, and so will you by having available the equipment you want to improve servicing. It will take several weeks to study all the entries, and to award the \$2400 worth of prizes to the winners.

I'm sorry that there isn't enough time before Christmas to announce the winners... Some of those expensive scopes and meters would be well timed with the holiday gift spirit. However, on behalf of the entire **TECHNICIAN** staff, I want to extend our best wishes to each and every reader for an enjoyable holiday season and the blessings of good health, inner satisfaction and prosperity for the New Year.

Al Forman



\$23.50
including sturdy
metal cabinet
Suggested net price

You be the judge! Which saves you more time?

1. Having the dual-control replacements you need — right at your fingertips — in Centralab's handy **Fastatch® FR-22A Kit?**

... or —

2. Chasing all over town to find an exact replacement?

Think of all the popular TV, radio, and auto sets you know about. Think of all the different controls they use — all the different combinations of resistance values, tapers, taps, switches, and shaft lengths (actually over 600).

Could you find enough shelf-space in *your* shop to carry exact replacements of more than 600 original-equipment controls? Could you afford to tie up the money necessary to buy more than 600 controls?

The average distributor can't, we know. And that's why he's so frequently "out of" the exact replacement you're looking for. That's why you either have to go from distributor to distributor until you do find one that has the control in stock — or have to wait until the distributor gets delivery on a special order. Meanwhile, your customer gets mad, because you have to delay fixing his set.

Doesn't this make more sense?

For less than \$25, a Fastatch FR-22A Kit gives you a practical, working stock of replacements for over 80% of the carbon dual-concentric controls you run up against (even more, now that the *new* Centralab wirewounds are available). You can match 121 different combinations of resistance and taper, to duplicate exact electrical characteristics.

You get 11 Fastatch front units, 11 Fastatch rear units, 4 Fastatch switches, and 2 auto-type adapter bushings — all 100% factory assembled, tested, and guaranteed.

See your Centralab distributor

See the FR-22A at your Centralab distributor. Or, write for bulletin 42-223.

Front and rear units snap together easily.

A 5-year-old has done it — in just seconds!

SNAP FRONT UNIT . . .
(with outer shaft
cut to length)



TO REAR UNIT . . .
(with blue shaft
cut to length)



SNAP ON SWITCH . . .
(from Fastatch
KB series)



ADD THE KNOBS
— and there's your
custom dual



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B-2R55

FIRST and FOREMOST!

The ORIGINAL and UNMATCHED

CapaciTester

The pioneer instrument for checking coupling condenser leakage in the circuit!

TeleTest anticipated your demand for a unit that would check leaky coupling condensers, under load, without removal from the circuit. With the remarkable and unparalleled CapaciTester, you not only can check any coupling condenser without clipping or unsoldering leads, but you can test for leakage between any points where it may occur! AND, with the added Wien bridge, you can measure capacities from 10 mmf. to 50 mfd.



Model CT-355

1-YEAR FACTORY SERVICE GUARANTEE

Slightly higher West of the Rockies

only \$44⁹⁵

- Tests all coupling condensers for leakage, regardless of type or capacity.... IN THE CIRCUIT
- Will not damage condensers
- No calibration adjustments required
- Positive indication of relative leakage amount present

TELETEST

See your local jobber, or write TODAY:
TELETEST INSTRUMENT CORP.

31-01 Linden Place, Dept. T-12 Flushing 54, N. Y.

News of the Industry

SNYDER MFG. CO., Phila., is planning a year-long celebration marking the silver anniversary of the founding of the company in 1931.

LES. A. THAYER, sales mgr., marked his twenty-fifth anniversary with **BELDEN MFG. CO.**, Chicago on November 12th.

JOSEPH SOLARI has been appointed general sales mgr. of the components div. of **FEDERAL TELEPHONE & RADIO CO.** . . . **J. E. VAN WAGENEN** has been named selenium product mgr. of **FEDERAL TELEPHONE & RADIO CO.**



Joseph Solari

Sam Schlusel

SAM SCHLUSSEL has been named to the newly created post of sales mgr., antennas and accessories for **CHANNEL MASTER CORP.**, Ellenville, N. Y.

ALLEN B. DU MONT LABS. announces an expansion of national service facilities to handle the increased number of DU MONT instruments in the field. In this connection, **F. WM. SCHARPWINKEL** has been appointed mgr. of service for Technical Sales Dept. and **RUDOLPH A. ARO** has been named mgr. of parts sales.

RAYTHEON MFG. CO. announces a price reduction on the CK722 transistor to 99 cents.

GARRY MOORE is CBS's newest tube salesman. He will be sponsored on alternate Fridays from 10:30 to 10:45 AM by the tube mfg. div. of CBS.

M. D. ERCOLINO, pres., **TELREX, INC.**, Asbury Park, N. J., announces the signing of three more patent license agreements. They are between his firm and **WALSCO ELECTRONICS CORP.**, Los Angeles, **LINDSAY ANTENNA PRODS., LTD.**, Ontario and **ASHMAN ELECTRONICS, LTD.**, Ontario.

INSULINE CORP. OF AMERICA, Manchester, N. H., recently honored two of its executives—**EDWARD MUCHEWICZ** for entering the quarter century club of **INSULINE** employees and **ALFRED CHAMBERS** who is leaving to open a printing service business.

KESTER



EASIER TO USE



Absolutely non-corrosive and non-conductive, **KESTER "RESIN-FIVE" CORE SOLDER** contains an activated type of resin that gives you that fast, positive action on all your jobs . . . including the most difficult.



LONGER LASTING

KESTER SOLDER COMPANY
4264 Wrightwood Avenue • Chicago 39, Illinois
Newark 5, New Jersey • Brantford, Canada

SOLDER

EDWARD C. TUDOR, pres. of I.D.E.A., INC., announced the acquisition of **RADIO APPARATUS CORP.**, Indianapolis, Ind. effective August 31, 1955.

NORMAN C. OWEN has been appointed vice pres. in charge of sales for **CBS-COLUMBIA**. . . **WM. J. BAKROW** has been appointed public relations mgr. of **CBS-HYTRON**.

ALLEN S. JOHNSON, Chicago, has joined the electronics div. of **THOMPSON PRODS., INC.**, Cleveland.

FREDERICK D. OGILBY has been appointed vice pres.-marketing of **PHILCO CORP.**

ROBERT B. SAMPSON has been named mgr., market research, for **RCA Tube Div.** in **Harrison, N. J.**

ARTHUR B. SHESSER has been appointed director of sales for **HAYDU BROTHERS**, Plainfield, N. J., and **FRANK G. FERDINAND** has been named sales mgr. of the cathode ray tube div.

JACK WHITESIDE, gen. mgr. of **SIMPSON ELECTRIC CO.**, Chicago, has been promoted to vice pres. of the parent company—**AMERICAN GAGE & MACHINE CO.** in charge of the **SIMPSON ELECTRIC DIV.**

JFD MFG. CO.'s founder and pres., **JULIUS FINKEL**, was feted at a surprise celebration, marking his sixty-ninth birthday.

CHARLES B. GRAHAM has been appointed mgr. of distribution and promotion for the High Fidelity Div. of **FAIRCHILD RECORDING EQUIPMENT CO.**, Whitestone, N. Y.

ASTRON CORP. announces the death of its founder and pres. **OTTO PASCHKES**, a pioneer mfr. in the radio and TV field.

ELECTRO-VOICE, INC., Buchanan, Mich., appoints four to new sales positions. **HOWARD T. SOUTHER** is marketing director, **WEBSTER F. SOULES**, administrative assistant, **GEORGE R. RILEY**, mgr. of distributor sales div. and **CULLEN H. MacPHERSON**, mgr. of high-fidelity products.

RAYMOND E. CARLSON, vice pres. in charge of sales and a director of **TUNG-SOL ELECTRIC INC.** relinquished his sales responsibilities on Nov. 30th and **GEORGE W. KEOWN**, who has been elected a vice-pres., will assume the sales responsibilities. Mr. Carlson will remain active with the company as a vice pres. and member of the board.

SEYMOUR D. GURAIN has been appointed sales mgr. of the eng. prods. div. of **RADIO RECEPTOR CO., INC.**, Bklyn, N. Y.

Reps and Distributors

"THE REPRESENTATIVES" announces that total membership of electronic products mfrs. now stands at 490 seniors, 203 associates and one honorary . . . national headquarters of "The Reps" at 600 S. Michigan Ave., Chicago, has been moved from room 1425 to 1219 in the same bldg.

BAUME ELECTRONIC SALES CO., Bethpage, N. Y. has been appointed sales rep for **PANASONIC HI FI SPEAKERS**.

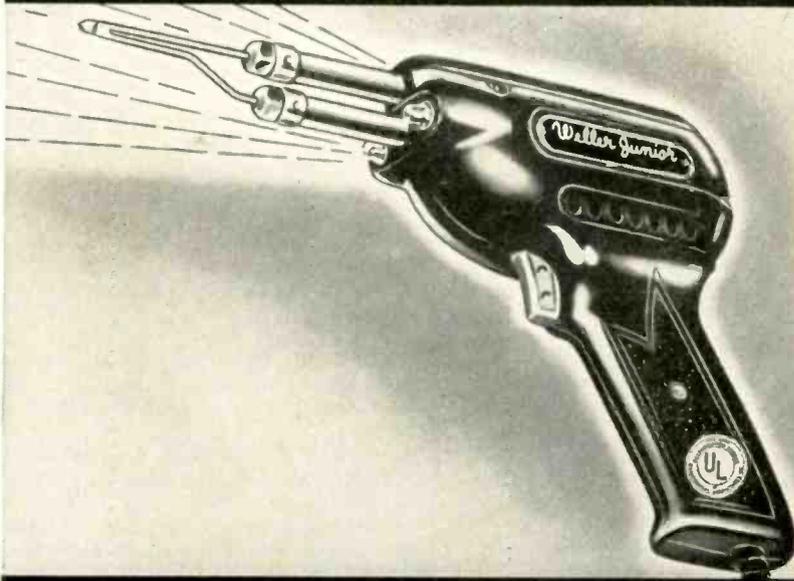
ERIE RESISTOR CORP., Erie, Penna., announces the appointment of **LEWIS** and **TRIMBLE** to represent them in Wisc., and Ill.

JAMES J. FAHY has joined the **MORRIS F. TAYLOR CO.**, mfrs' reps of Silver Spring, Md., as district mgr. to cover the middle section of Penna.

WAYCO INC., Waynesboro, Tenn., announces the appointment of four new reps. **PEYSER & CO.** will handle the Rocky Mountain territory, **DAYTON L. WARNER CO.** to cover Wis. and Ill., **HARRISON J. BLIND** will handle Ind. and Ky. and **ROD BUTCHART** will cover Mich. and Toledo trade area.

(Continued on page 38)

**OVER 1/2 MILLION
WELLER SOLDERING GUNS**
*have been bought by
radio and TV servicemen*



Weller... first to design and patent a soldering gun

Weller... first in performance and features

Weller... first in value — models as low as \$7.95

Weller

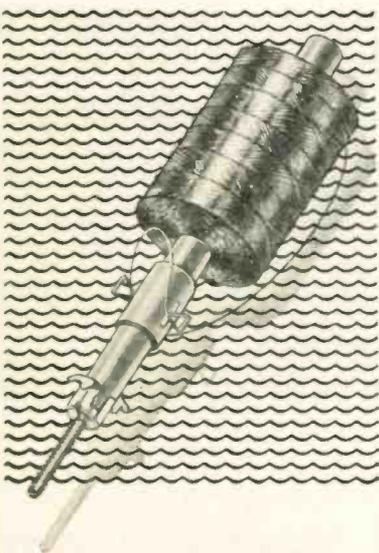
ask your distributor for a demonstration

ELECTRIC CORP.

805 Packer Street
Easton, Pa.

RCA SERVICE PARTS • FACTORY-TAILORED TO SAVE YOU TIME AND MONEY

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Coils
for
example



RCA Coils for RCA Victor television receivers are specifically designed to save you time and money by fitting right, installing fast. RCA replacement coils are duplicates of the originals used in every RCA Victor TV receiver. It is this faithfulness to original design that assists you in restoring the stability, sensitivity, and superior performance of RCA Victor TV receivers.

Coils are just one example of how every RCA Service Part is factory-tailored to keep your servicing "on-the-go" profitably. Remember: RCA Service Parts are the only genuine replacement parts for RCA Victor TV receivers, radios and phonographs.



**RADIO CORPORATION
of AMERICA**

SERVICE PARTS HARRISON, N. J.

(Continued from page 37)

W. BURT KNIGHT CO., Los Angeles, has been appointed **SARKES TARTZIAN** rectifier div. reps for southern Calif. and Ariz.

AMERICAN PHENOLIC CORP., Chicago, appointed **GEORGE ELLIS** to represent them in the San Francisco area.

METROPOLITAN NEW YORK PARTS JOBBERS AND REPS staged a joint conference and jamboree at the Concord Hotel, Kiamesha Lake, N. Y. on Oct. 7th-9th.

TODD-TRAN, Mt. Vernon, N. Y., has appointed **JACK R. ALSHULER** to represent them in Ill and the **FRED W. FALCK CO.** to represent them in southern Calif.

COOPER-DIBLASI announces the removal of their offices and showrooms to 90 Main St., Port Washington, L. I., N. Y.

FRANK EDWARDS CO., San Francisco, has been franchised to distribute CBS television and radio receivers in northern Calif.

NATIONAL ELECTRONIC DISTRIBUTORS ASSOC. held its annual meeting in Columbus, Ohio and elected **JOSEPH A. DeMAMBRO** as pres. and **AARON LIPPMAN** was reelected chairman of the board.

RADIO PARTS CO., INC. has been appointed exclusive distributors for **HAYDU TV** picture tubes in Penna., Ohio and W. Va.

AIR PRODUCTS, INC. has been named distributor of **SYLVANIA** television, radios and high fidelity phonographs in Okla.

GREGNALL CO., San Francisco, has been appointed full line distributor for **CAPEHART-FARNSWORTH CO.**

BENDIX TV NAMES 4 DISTRIBUTORS: **MCGOWIN-LYONS HARDWARE & SUPPLY CO.** has been named distributor for 17 Alabama counties, 10 Fla. counties and 9 in Miss.; **PAIGE E. MULHOLLAN CO.** will serve 33 counties in Okla. and 19 in Ark.; **SILKWORTH DISTRIBUTING CO.** will cover 23 counties in north-eastern Mich. and **HAYES & HOPSON** will cover 18 counties in N. C.

FINNEY CO., Cleveland, announces the following new distributors: **SOUTHERN MINN. SUPPLY CO.**, Mankato and Rochester, Minn.; **S. M. SUPPLY CO.**, La Crosse and Eau Clair Wisc.; **RADIO ELECTRIC SUPPLY CO.**, Minneapolis, Austin and Worthington, Minn.; **GERNER SUPPLY CO.**, St. Paul, Minn.; **HALL ELECTRIC CO.**, St. Paul, Minn.; **BUSHLAND RADIO SPECIALTIES**, Chippewa Falls and Eau Claire, Wisc. and **FALLS ELECTRONIC SUPPLY CO.**, Eau Claire, Wisc.

Snyder
PHILADELPHIA

**Auto
Antennas**

**WORLD'S
MOST
COMPLETE
LINE**

40 MODELS+

"Perpetual" Solar Radio

Using 7 solar cells, Admiral engineers have worked out a transistor radio that can operate indefinitely on solar energy without the need for external recharging. The cells, made by National Fabricated Products and National Semiconductor Products, are sealed, p-n junction silicon units, connected in series. Said to last indefinitely, these units can develop voltage in the order of 1.5 v at 50 ma when activated by sunlight. This voltage is used to charge a nickel-cadmium battery whose life expectancy is 30 years. The battery, in turn, powers a transistor radio of average performance. Admiral is not presently putting the radio into commercial production.

Annual Industrial Show

Almo Radio Co. of Philadelphia, Penna., wholesale distributors of TV, radio, electronics, amateur and sound equipment, is sponsoring its 3rd Annual Industrial Show on Wednesday and Thursday, January 25 and 26. The show, in which 90 industry exhibitors will participate, will be held at the Penn Sherwood Hotel in Philadelphia. Almo Radio is located at 412-16 N. 6th St., Philadelphia 23, Penna.

Sylvania Christmas Club

Want to give the girl of your dreams a mink collar this Christmas without digging into the cash reserve? Sylvania's Christmas Stocking Club, in effect now and continuing until December 31, can help you. The mink collar is one of nearly 200 premiums, including cameras, toys, wrist watches, sports goods, housewares and outdoor gadgets, available in exchange for Sylvania tube "scrip." The script is issued in the form of 50-, 100- and 300-tube denominations, depending on quantities of tubes purchased. Premiums range from a pen, available for 100 tubes purchased, to a 35mm camera with f/3.5 lens, range of shutter speeds and flashgun, available for 3850 points of scrip.

Selenium Shortage Worse

The U. S. Department of Commerce has issued a renewed appeal urging TV-radio technicians to salvage as many discarded selenium rectifiers as possible. Selenium supplies, inadequate for years, have been set back further this past summer by work stoppages in the copper industry. Copper refineries are the main source of selenium, a by-

product of the refinement process.

A diligent salvage program would assure continued availability of selenium for rectifier use. The element is also used in the production of stainless steel, glass, paint, rubber, and in photographic and pharmaceutical applications.

Science Talent Hunt

Do you have any bright, science-minded high-school seniors in the family? They are invited to enter the 15th annual Science Talent Search. Winners will share \$11,000 in Westinghouse Science Scholar-

ships, to be awarded next spring at a 5-day Science Talent Institute, which will see an elimination among 40 finalists in the competition. The boy or girl who comes out on top will receive a \$2,800 Grand Science Scholarship, with lesser cash awards going to the other finalists. Others who show promise will receive citations.

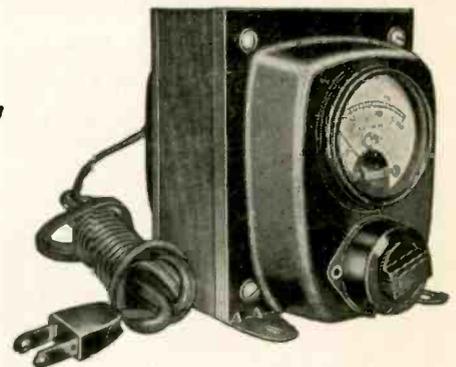
Entrants must report on an original science project and take a stiff aptitude exam. Entries must be received by the Talent Search in Washington no later than Dec. 27. Past projects include a small radar set and an electronic brain.

2 PROFITABLE TOOLS FOR EVERY SERVICEMAN

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MANUAL VOLTAGE ADJUSTOR

...EASY TO SELL

to control voltage for top TV reception

Here are two instruments that every serviceman should have to detect and correct the effects of low voltage on television receivers. They are easy to use — just plug them into any convenient outlet. They are easy to sell for extra profit — a simple demonstration on a service call easily convinces the set owner that proper voltage is essential to good TV reception.

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ing the tap switch over the low voltage range, reception difficulties can be reproduced. The simple demonstration of this fact convinces the set owner that voltage control is necessary. An easy sale is made for the T-8394M Manual Voltage Adjustor to correct the fluctuating voltage conditions. This low cost, quality instrument adjusts voltage over a range from 95 to 125 volts and can be set at the exact voltage for top TV reception. Write for Acme Electric Bulletin VVA-190.

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Association News

National Unity

At the recent Indianapolis meeting of the Electronic Service Council, 72 delegates representing 37 associations voted to urge all locals to affiliate with NATESA. Present were delegates from TEA-Texas, FRSA, NETSDA, NARDA, NATESA and many unattached locals.

As a result, NATESA is preparing copies of its constitution and other information for distribution to all interested, unaffiliated groups. NATESA urges all such groups who have questions about the nature of NATESA to address queries to the office of Frank J. Moch, Pres., NATESA, 5908 South Troy St., Chicago 29, Ill.



Chief officers of leading national and state associations appear jovial at the national unity meeting in Indianapolis: l. to r.: Max Liebowitz (NETSDA), Frank Moch (NATESA), Al Bernsohn (NARDA), and Bert Bregenzer (FRSAP).

RTGLI Doings

The Radio Television Guild of Long Island, Box 87, Bethpage, N. Y., is offering a special business course to members in recognition of the fact that people in the service industry "have been constantly criticized for being technicians first and businessmen second." The 10-session course will include lectures on business location, display layouts, advertising, customer relations, inventory control, taxes, insurance, business law, credit, record-keeping and pricing service for profit.

Oklahoma Unit

The Television Service Association of Oklahoma (TSA), 4477 N. Cooper St., Oklahoma City 18, Oklahoma, is incorporated under the state laws of Oklahoma to combat such problems as unethical practices, unqualified technicians, and ignorance on the part of the public. To qualify for membership, applicants must pass a written examination and be approved by a screening committee. All members cooperatively concentrate their purchasing through a single distributor.

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Retrace Blanking

(Continued from page 21)

to excessive blanking pulse width, or other undesirable effects.

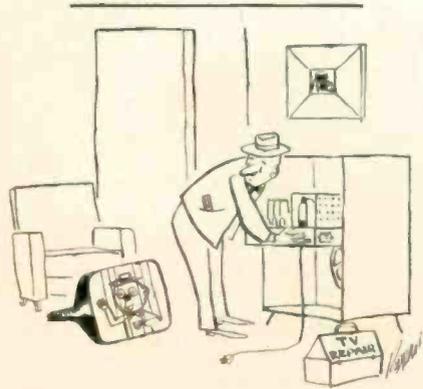
For a detailed discussion of the principles involved and a number of other practical blanking circuits, see the author's *Eliminating Vertical Retrace Lines*, **TECHNICIAN**, September 1953. For the most part, the circuits shown in the illustrations are self-explanatory. However, mention should be made of some points:

Admiral Chassis 20Z1, Fig. 1: The only parts needed for the many models that use this chassis are a 0.05-mfd capacitor (600 v) and a 39k (½ watt) resistor. Because the blanking pulse is being applied to the crt grid, which is also the video signal input point, stray capacity must be kept to a minimum. Thus the resistor is placed right at the terminal lug with a very short lead. Do not interchange the positions of the resistor and capacitor. No additional wiring is required as all connections are conveniently available at the designated tie points.

Crosley Chassis 320 & 331, Fig. 2: At least 11 models in the 11-400 series are involved. The two new parts are added as shown with no additional wiring being necessary. Use existing tie points. Since connection is to the crt cathode, pulse polarity is positive.

Westinghouse Chassis 2150 & 2151, Fig. 3: In addition to resistor and condenser, a 1-ft. length of insulated lead is needed to wire these components between the crt cathode and the green lead of the vertical output transformer. Pulse is positive. Models using these chassis include the H-231.

Westinghouse Chassis V-2150-136, Fig. 4: Models include H-610T12 and H-614T12. Positive pulse is applied



to the cathode but, since video signal is also applied here, isolate wiring capacity with the additional resistor (part C; 10k, ½ w) at the point shown. A number of tie points are available to choose from for fastening new components. Additional note on these chassis: high-frequency video detail may be improved by shunting a 0.0005-mfd capacitor across the contrast control.

Westinghouse Chassis V-2192-1, -2, & -2, Fig. 5: Models include H-640T17, H641K17 and others. Points to be connected are just be-

hind the vertical hold control at the rear of the chassis. Only one part (the 1k, 1 w resistor) is needed. Sever the ground connection to the 0.1-mfd capacitor, as shown. Use short length of wire to connect added resistor to the junction of the 0.03-mfd capacitor and the 10k resistor. Special note: In the original circuit wiring, the 10k resistor is connected to the plate of the vertical oscillator and the 0.03-mfd capacitor goes to ground. These parts must be reversed to the positions shown when the blanking circuit is installed. •

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All Units Are TV Receivers Unless Otherwise Noted

ADMIRAL Circuit Digest No.
 Chassis 2242: Models 520M15, 520M16, 520M17.
 Chassis 22A2A: Models 520M11, 520M12, Chassis 22M1: Models 121M10, 121M11A, 121M12A, 121M11, 121M12, 121K15A, 121K16A, 121K17A, 121K15, 121K16, 121K17, 221K46A, 221K47A, 221K47A, 221K45, 221K46, 221K47. Chassis 22Y1: Models 321M25A, 321M26A, 321M27A, 321M25, 321M26, 321M27, 421M15A, 421M16A, 421M15, 421M16, 421M35, 421M36, 421M37, 521M15A, 521M16A, 521M17A, 521M15, 521M16, 521M17 1
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Note: Months prior to September, 1953, refer to issues of Television Retailing (predecessor of TECHNICIAN)

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Catalogs & Bulletins

SEMICONDUCTORS: Bulletins describing Texas Instruments' semiconductor products. Complete data on the behavior of transistor and diodes, parameters with current, voltage, and temperature. Price schedule included. Texas Instruments Inc., 6000 Lemmon Ave., Dallas 9, Texas. (Ask for B12-14)

TRANSFORMERS: TV transformer replacement guide, listing replacements for over 7000 models and chassis for 116 television manufacturers. Available free from Stancor Distributors. Chicago Standard Transformer Corp., Addison & Elston, Chicago 18, Ill. (Ask for B12-15)

TEST EQUIPMENT: Complete performance specs of line of VOM's, VTVM's, tube testers, generators and other instruments is contained in 16-page Catalog No. 120. Triplett Electrical Instrument Co., Bluffton, Ohio. (Ask for B12-16)

DISPLAYS: Displays available to jobbers handling Oxford replacement speakers. One is a window streamer. The other is printed so that it can be hung and read from either side. Oxford Electric Corp., 3911 South Michigan Ave., Chicago 15, Ill. (Ask for B12-1)

POWER RECTIFIER: Bulletin GPR-1 describes two styles of International Germanium Power Rectifier: Style C, natural convection cooled and Style F, fan cooled. International Rectifier Corp., 1521 E. Grand Ave., El Segundo, Calif. (Ask for B12-2)

PHONOGRAPH NEEDLES: New phonograph needle replacement chart (Form #555) listing models and prices. Offered without charge. Recoton Corp., 52-35 Barnett Ave., Long Island City 4, N.Y. (Ask for B12-3)

CARTOON BOOK: 16-page color cartoon book for customer-prospect distribution explains the importance of the TV service technician, his skill, his training and his reliability. Free copies available from Tung-Sol supplier or from Sales Promotion Dept., Tung-Sol Electric Inc., Newark 4, N.J. (Ask for B12-12)

ANTENNAS & ROTATORS: Booklet with specifications on Trio's line of TV antennas and rotators, including price sheet. Trio Mfg. Co., Griggsville, Ill. (Ask for B12-13)

SOLDER: Data sheet describes solder available in all combinations of tin and lead on 1-lb. to 20-lb. spools or in small package to go in a kit. Kester Solder Co., 4201 Wrightwood Ave., Chicago 39, Ill. (Ask for B12-10)

OBTAIN THE BULLETINS

described here by writing on company letterhead to Bulletins Editor, **TECHNICIAN**, 480 Lexington Ave., New York 17, N. Y., listing numbers given at end of each item of interest. Please mention title of position held. Use coupon on page 34.

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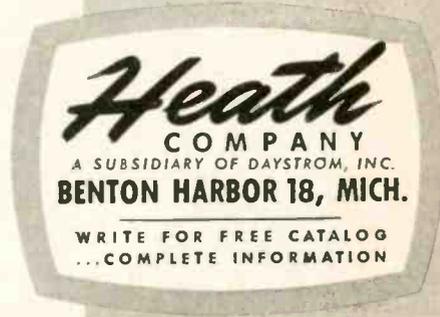
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Circuit Digest No.

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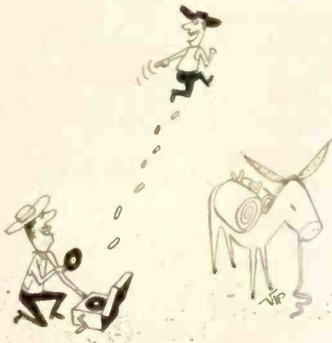
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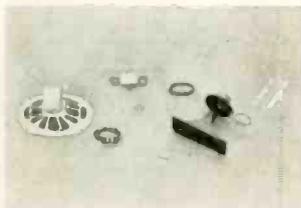
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C169	5@350/75@150	159901-1	R-2164
C173	200@200	158557-1	R-1646
C174	140@350	159902-1	R-2165

HOFFMAN CHASSIS 316, 318, 319

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C103	5@25	4233A	TVA-1203
C109	5@25	4233A	TVA-1203
C609 } C710 } C801 } C802 } C803 } C804 }	100+20@350/50@50	4239	R-2168
	100@350/40@300/40@250	4235A	R-2169

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C78	20@450	25E86	TVA-1709
C79	200+5@150	25E85	R-1645
C80	140+10@300/200+30@150	25E87	R-2131
C81	150@150	25E84	TVA-1422

PACKARD-BELL CHASSIS 8851

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C2	5@50	24038	TVA-1303
C8	10@475/100@350/25@25	24093	R-2161
C20	25@25	24006A	TVA-1205
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C402	125+20@300/100@50	45X419	R-2142
C403	125+60@300/40@50	45X420	R-2143
C305 } C308 }	Integrator Plate	76X7	V-1

CBS CHASSIS 1610, 1611

Symbol No.	Rating μF @WVDC	CBS Part No.	Sprague Replacement
C1-5 } C4-5 } C12-11 } C16-5 } C6-3 } C6-4 } C11-3 } C16-6 } C16-4 }	140+10@300/10@150/100@25	21001131	R-2166
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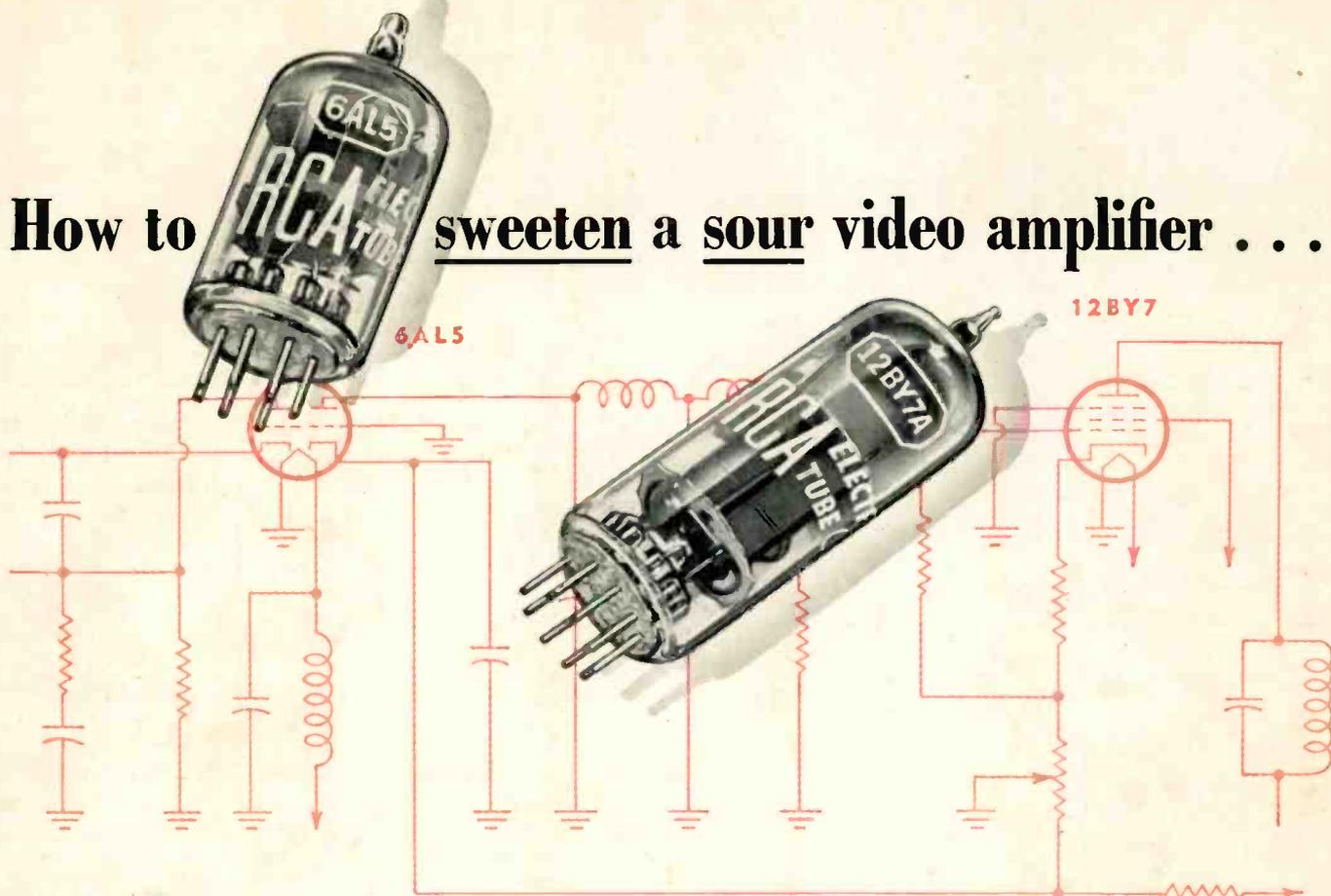
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