ELECTRONIC TECHNICIAN

Including SERVICE Magazine

60¢

May • 1961

NEW—AND MOST VERSATILE

TRIPLETT

MODEL 850 ELECTRONIC VOLT-OHMMETER IS BEST FOR YOU

MODEL 850 $79.50

FEATURES:

1 Now you can test low voltage applications. .5 VOLT full scale range on D.C. Extremely useful in low voltage transistor circuits.

2 BETTER STABILITY through improved current design.

3 LONG FULL VIEW SCALES. Scales 7" long at top arc for easy reading.

High Input Impedance (11 MEGOHMS) and wide Frequency Ranges give this extremely versatile Electronic Volt-Ohmmeter considerable advantage in the measurement of DC voltages, AC RMS and Peak-to-Peak voltages. It measures directly the Peak-to Peak values of high-frequency complex wave forms and RMS values of sine waves on separate scales.

ADDED PROTECTION. Meter is shorted out in OFF position for greater damping, meter safety during transit, electrically protected against accidental overload. ZERO CENTER mark for FM discriminator alignment, plus other galvanometer measurements.

New pencil thin test probe used for all functions: DC, AC, and ohms. No need to change cables. Beautifully styled case for professional appearance and functional utility, 7⅞" x 6⅞16" x 3¾".

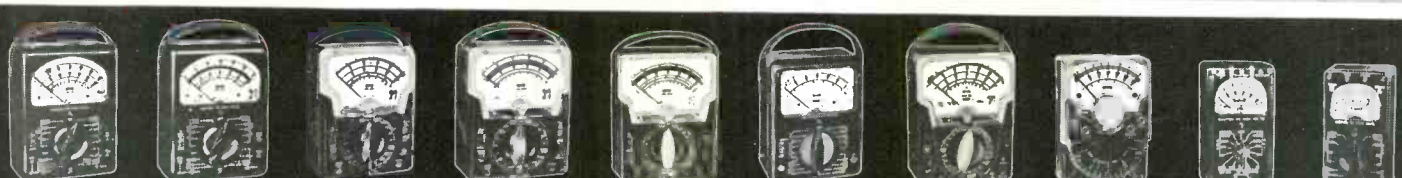
Carrying handle can be used as a tester stand to place the tester at 25° angle for ease in reading.

Frequencies to 250 MC may be measured with auxiliary Diode Probe, $7.50 extra. DC voltages to 50 KV may be measured with auxiliary High Voltage Probe. $20.50 extra.

CARRYING CASE
Case 859—OP—Black leather
Padded Carrying Case. $19.50 Net

RANGES	
8 DC VOLTS RANGES	0-.5-1.5-5-15-50-150-500-1500
7 AC RMS VOLTS RANGES	0-1.5-5-15-50-150-500-1500
7 PEAK-TO-PEAK VOLTS RANGES	0-4-14-40-140-400-1400-4000
7 RESISTANCE RANGES	0-1000-10,000-100,000 OHMS; 1-10-100-1000 MEGOHMS.
FREQUENCY RANGE 15 CPS to 3MC; (Up to 250 MC with accessory diode probe available extra.)	
INPUT IMPEDANCE DC Volts 11 Megohms; AC Volts minimum of .83 Megohms.	

TRIPLETT ELECTRICAL INSTRUMENT COMPANY, BLUFFTON, OHIO



630 630-A 630-PL 630-APL 630-NA 630-T 631 310 666-HH 666-R

THE WORLD'S MOST COMPLETE LINE OF V-O-Ms. AVAILABLE FROM YOUR TRIPLETT DISTRIBUTOR'S STOCK

ELECTRONIC TECHNICIAN

Including SERVICE Magazine

World's Largest Electronic Trade Circulation

ELECTIONIC TECHNICIAN & Circuit Digests, including Service, May 1961. Vol. 73, No. 5. $.60 a copy. Published monthly by Electronic Technician, Inc. Publication Office, Concord, N. H. Editorial, advertising and executive offices, 480 Lexington Avenue, New York 17. Telephone YUkon 6-4242.

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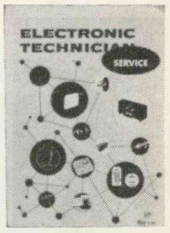
For more data, circle 5-C2-1 on coupon, p. 57

May, 1961

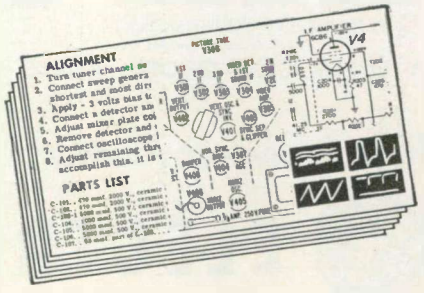
FRONT COVER Manufacturers will show their latest electronic parts and equipment at the annual Electronic Parts Distributors Show this month (see p. 55). Also, ET's annual directory lists names and addresses of manufacturers, schools, service associations, and technical societies in the electronic industry (see p. 43).



FEATURES and ARTICLES

DEPARTMENTS

CIRCUIT DIGESTS ..... Preceding Back Cover



IN THIS ISSUE

(16 pp. latest schematics & data)

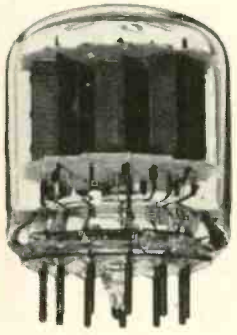
CUMULATIVE INDEX of all schematics published to date

PHILCO: TV Chassis 11N56

WESTINGHOUSE: TV Chassis V-2411-1, V-2411-3

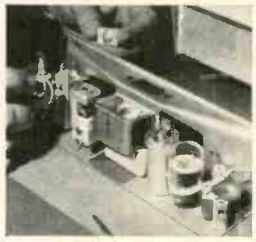
ZENITH: Transistor Portable Radio Model Royal 150 Chassis 6GT42Z2

Up goes the showroom curtain on in the most advanced



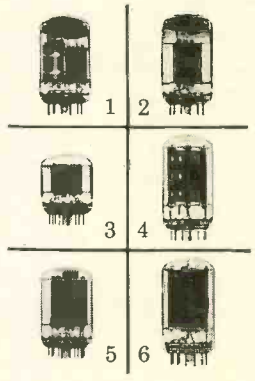
COMPACTRON.* General Electric's revolutionary new multi-function vacuum device. It's here today—now—designed into some of the newest 1961 television sets. COMPACTRON. You'll be seeing more—in entertainment equipment, industrial control, instrumentation, communications. COMPACTRON. Here's what it means to you in . . .

CIRCUITRY. COMPACTRON devices package a combination of functions into a single miniature envelope. The result: fewer components, less space per function, more compact circuitry than is possible with miniature tubes—and higher power output, greater sensitivity than transistors. Circuits with COMPACTRONS require fewer sockets and clips. Twelve stem leads serve as rigid mounting pins which can be inserted directly into clips on simplified circuit boards. Large ¾-inch diameter pin circle reduces clustering of associated components.



SERVICE. As more and more equipment with COMPACTRON devices comes on the market, you're the man who will need the answers to your customers' service and replacement needs. Equipment with COMPACTRONS offers the appeal of miniaturization plus the advantages of vacuum device reliability. Compatible functions in one envelope mean fewer components and plug-in replacement with no time-consuming hand selection of replacements.

SALES. You have a stake in COMPACTRON devices because your future replacement sales will include these revolutionary new multi-function devices. Six COMPACTRON types are now in production: *For table radios*—(1) Combined oscillator, converter and intermediate frequency amplifier; (2) Combined second detector, audio amplifier, audio output amplifier and rectifier. *For television*—(3) Horizontal oscillator and automatic frequency control; (4) Horizontal damping diode (single diode); (5) Vertical deflection amplifier and oscillator; (6) Horizontal deflection amplifier. Nine other types are committed to production and approximately 40 more are being developed now.



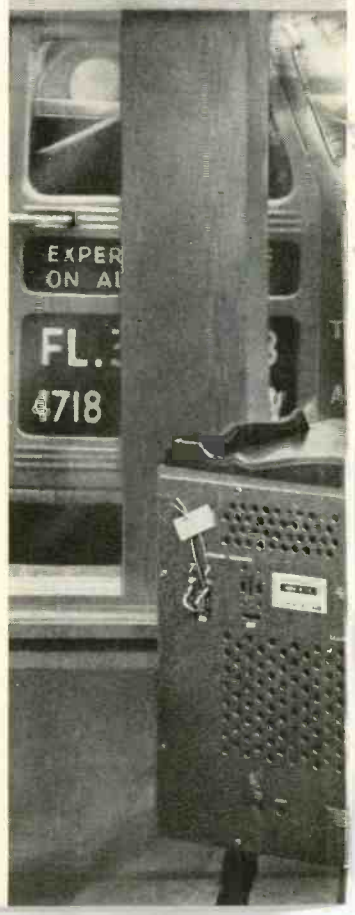
For more information about America's newest electronic marvel, contact your G-E tube distributor. Distributor Sales, Electronic Components Division, General Electric Company, Owensboro, Ky.

*T. M. General Electric Co.

RECEIVING TUBES, CATHODE RAY TUBES, CAPACITORS, AUDIO PRODUCTS

Progress Is Our Most Important Product

GENERAL ELECTRIC



For more data, circle 5-2-1 on coupon, p. 57

new COMPACTRON devices

TV sets ever

Editor's Memo

Editors are essentially brainpickers, drawing information from readers, authors and others they contact. The end result of all this cerebral suction are the editorial items which relay the information to all readers.

I recently ran across a suggestion which was made to one service dealer. The fellow adopted the idea, and has reaped the reward of favorable daily publicity and much increased business. It's not a new idea by any means, but too few technicians ever consider using it.

Everyone has some of the sidewalk superintendent in him. Watch the crowds that gather to gawk at construction sites, store fronts displaying men making pizza pies, repairing clocks and similar work.

To the casual passerby, peering into such a store window satisfies his curiosity. And if the work is well done, it fosters admiration.

So here's a solid idea put forth by an old time radio technician, Sol Weingast, now president of Pacotronics. If you are located in an area where there is street traffic, move your shop out from that back room. Place the work bench smack in front of the street window. Line up that impressive array of test gear. Put on a neat smock or work jacket and start troubleshooting.

Then watch the curious eyes gather round. Let the set owners see that there are no mysterious goings on. You're a skilled professional using costly equipment to repair their sets efficiently. If that doesn't build confidence, attract more customers, and reduce arguments about repair bills, I don't know what will.

A technician's main asset, the most important "product" he sells, is his service know-how. So it stands to reason that showing himself at work will be an effective display of his wares.

Impressing customers is not a bad idea. Now and again I think back to a cartoon we once published. It showed a dealer passing a TV set through an opening in a wall made up to look like a giant computer front. Behind the wall a technician, unseen by the customer, was picking up the set. The dealer was telling the customer: "From here our electronic brain takes over."

Al Forman

For more data, circle 5-4-1 on coupon, p. 57

For more data, circle 5-5-1 on coupon, p. 57

"When it's Mallory...I know it's reliable"

Don Domers (center), shown here with servicemen Everett Hammond and Jess Cody, has built a growing business on a reputation for quality servicing of radio, TV, auto radio, hi fi and stereo sets, and antennae installation. Don has had his own shop for 29 of his 34 years in radio servicing, now has 7 employees. He's also an authorized Philco, Motorola and Sylvania dealer, having carried the first two lines for 20 years.

Your Mallory distributor stocks these quality components

TC TUBULAR ELECTROLYTICS

Economical filter capacitors. Hermetically sealed. Also special TCX type for —55° C. Twin-pack keeps leads free from kinks.

FP ELECTROLYTICS

Original 85° C capacitor, now better than ever. Etched cathode gives hum-free performance. Chassis or printed circuit mounting.

STA-LOC® CONTROLS*

Your distributor can custom build in just 30 seconds, any of over 38,000 single or dual controls.

*U. S. Patent 2,958,838.

GOLD LABEL® VIBRATORS

Quietest ever made . . . for the best in auto radio servicing. Buttonless contact design gives longest trouble-free service, sure starts.

says Don Domers, Terre Haute service dealer

"Wherever possible, I always use Mallory parts . . . and I've never had a call-back caused by one. When they're labeled 'Mallory', I know they're dependable. I first tried new PVC capacitors for that very reason—then I found a lot more reasons for liking them. For instance, the handy zip-lip plastic pack keeps stock visible and easy to count, can be hung on my rack for fast use; and PVC's flexible plastic jacket never cracks when we bend or solder the leads."

You'll find this kind of money-saving, customer-pleasing reliability in all Mallory replacement parts. It's the industry's broadest line . . . all top quality . . . all sensibly priced. See your Mallory distributor soon.

Don Domers buys all his parts from Mallory distributor C. T. Evinger Co., Terre Haute, a quality distributor who handles quality parts. He's shown here with Charlie Evinger and salesman Max Springer.

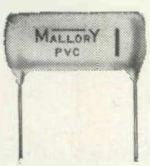
Put an end to call-backs . . . buy your parts from Mallory authorized distributors.

Distributor Division, Indianapolis 6, Indiana

P. R. MALLORY & CO. Inc.

MALLORY

In Canada: A. C. Simmonds & Sons, Ltd., Toronto



MALLORY PVC CAPACITORS

New, blue Mylar** capacitors. Withstand moisture, heat, bending of leads and overloads.

**Reg. T. M., E. I. du Pont de Nemours & Co., Inc.

MALLORY MERCURY BATTERIES

Tops for transistor radios. Up to 7 times more *sound power*† . . . guaranteed against leakage . . . stay "live" for years when idle . . . won't fade. †T.M.

GEMS

Rugged, moisture-proof tubular capacitors, great for filter, buffer, by-pass and coupling service. Handy five-pack keeps stock clean, leads kink-free.

RMC DISCAPS®

Quality standard for original equipment. In handy 3" x 5" file card package.

®Trademark Radio Materials Company, a Mallory division.

For more data, circle 5-7-1 on coupon, p. 57

LETTERS
To the Editor

On Part Timers

Editor, ELECTRONIC TECHNICIAN:

Your current editorial campaign deploring "wholesale houses" selling direct to "part-timers" and hobbyists has some glaring faults. Many established service shops had their roots in "after-work" basement shops from which the owner was able in time to finance a full-time business. By compelling wholesalers to deal favorably in price with registered shops, and except all others, many "part-timers" would have to abandon plans to enter future full-time business. In short, this stand of yours appears to be an attempt to protect shops whose price policies have probably influenced radio-TV owners to shop around.

J. F. CULLEN

San Francisco, Calif.

• *The Letters to the Editor column does not reflect our own position. As we have stated on numerous occasions, a part-timer who runs a legitimate business has as much right to do such work as a full-timer. What we object to are wholesalers by-passing their own dealer customers to go directly to consumers.*

Intercom Shop Hint

Editor, ELECTRONIC TECHNICIAN:

I read with interest the suggestion of Jack Darr of Mena, Arkansas. I use my wrist watch to check out speakers and microphones on intercom and PA systems. By taping the wrist watch to the microphone or speaker as the case may be, complete systems can be checked out quickly. It is well to demagnetize watch after the check with the AC field of a solder gun, by bringing it close to the field and slowly moving it away.

LANDO K. MOYER

Bedminster, Pa.

Fire Department Alarm System

Editor, ELECTRONIC TECHNICIAN:

The local volunteer fire department is interested in an alarm system which would alert all firemen in their homes in the event of a fire. We understand there is equipment on the market for this application, both wired and radio types. In the case of the radio type units, they would probably need two or three two-way units and the balance could be receivers only. If you have any information on this type of equipment, manufacturers, sources of supply, etc., we would appreciate receiving same. Thanks.

ROBERT C. MARSHALL

Television Equipment Co.
West Salem, Ill.

• *The "Electralert" radio facilities designed for alerting firemen by receivers placed in the home has been announced by Nuclear Electronics, 2925 No. Broad Street, Philadelphia 32, Pa. Also various Citizens Band and tone controlled signal systems are available.—Ed.*

TV Apprentices

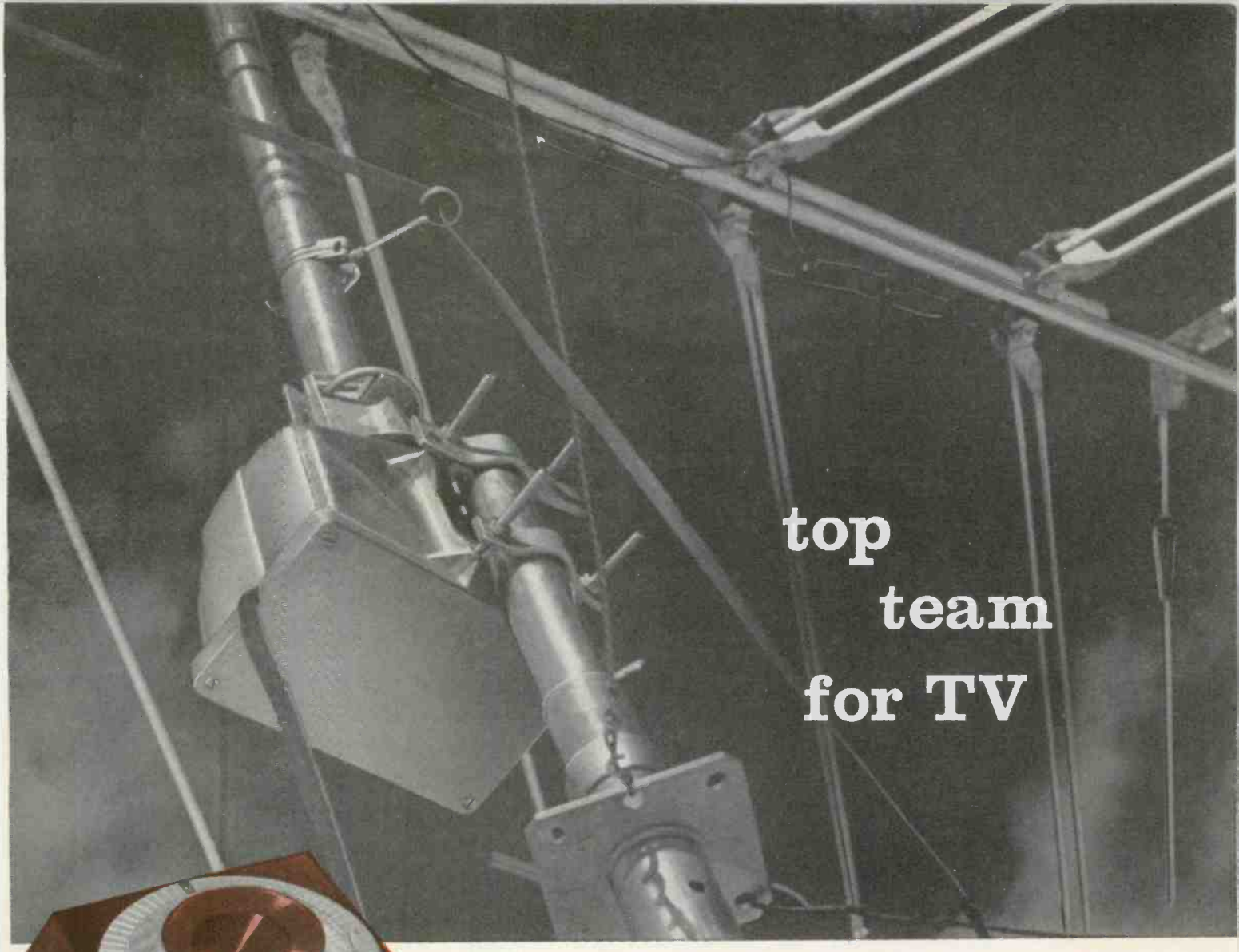
Editor, ELECTRONIC TECHNICIAN:

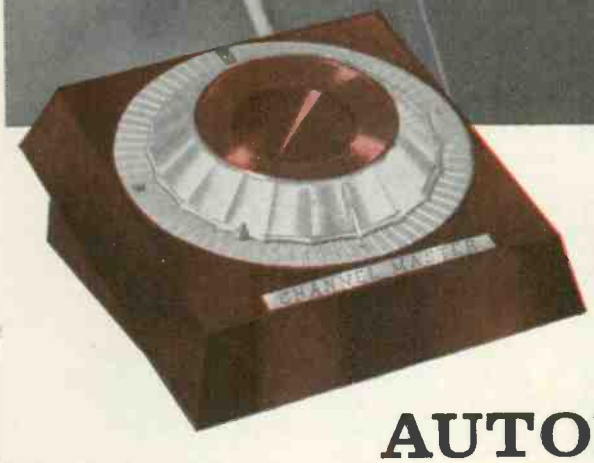
If we get TV licensing without an apprentice program, where will the trained technician come from? Before I started repairing sets part-time, I had two and one-half years of studying theory, in night school. I asked two shops to let me work two or three days a week for free until I could apply my knowledge on a paying basis. No soap. You know the next move.

GUS BATTALIO

Clinton, Wisc.

(Continued on page 10)





CHANNEL MASTER®

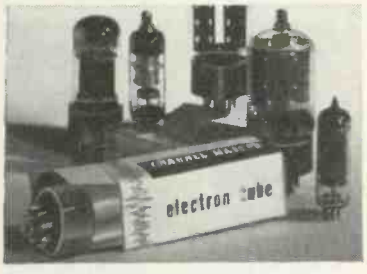
T-W ANTENNA and AUTOMATIC TENN-A-LINER

You're looking at the most potent combination ever developed for getting crisp, clear TV reception in far-off fringe areas!

The Channel Master T-W is the most powerful broad-band antenna yet devised. It owes its superiority to a new and different approach in antenna technology . . . Channel Master's patented Traveling Wave principle.

And where a rotator is required, team the T-W with a Channel Master Automatic Tenn-A-Liner . . . the only rotator that aims the antenna within one degree of precise transmitter location. The ruggedness and dependability of the Automatic Tenn-A-Liner have been proved by hundreds of thousands of trouble-free installations.

Limited time offer! Check your Channel Master distributor about the lowest prices in rotator history.



More Channel Master profit makers! *America's fastest-growing tube line! Longer lasting, uniformly dependable, with minimum call-backs. No other tubes offer greater opportunity for profits than these fully proved performers.*

CHANNEL MASTER *works wonders in sight and sound*

ELLENVILLE, N. Y.

For more data, circle 5-9-1 on coupon, p. 57

(Continued from page 8)

Louisiana License

Editor, ELECTRONIC TECHNICIAN:

I am writing you in reference to the quote in your article in the January issue about Louisiana technician's license and remarks about trying to get oil field workers out of radio and TV servicing. Personally, I think it is a very poor attitude for anyone to have, since I happen to be one of the many oil field workers the article referred to. I sincerely believe that any licensed person has the right to try to better himself. I have completed three and a half years course and have a graduate's certificate from N.R.I. I have also applied for and received my Louisiana license and would like to know why we should be squeezed out.

About the Louisiana license, well I think it's for the birds! I asked a wholesale dealer as to the sale of parts to those unlicensed persons. His reply was that if they had a sales tax number, he and the other dealers would sell them anything they wanted.

JOE'S RADIO & TV SERVICE
Lafayette, La.

Tape Strobe Source

Editor, ELECTRONIC TECHNICIAN:

I have written to the Techni-Parts address which I received from you and have had no reply. I am interested in the tape recorder "tape type strobe" which you pictured in one of your issues. Let me know if you know of a source. Thank you for your assistance.

LEONARD BLECHMAN
Coatesville, Pa.

• *Mail for Techni-Parts Co. should now be addressed to Sono-Vision Co., 156 Hempstead Turnpike, Hempstead, N.Y.*

Bats In Belfry

Editor, ELECTRONIC TECHNICIAN:

I have been a subscriber of your magazine for the past 10 years and have always enjoyed it very much. At the present time I find myself in need of help. A customer recently purchased a large hangar-type warehouse and has a problem of birds and bats roosting in it. Do you know of any electronic device (high frequency oscillator?) which will drive them out? It seems I have read of such, but sure cannot find any trace of it now, nor do my distributors know about any such thing.

H. E. BRAUER
Radart
Pueblo, Colo.

• *Certain noises will frighten these tenacious birds and bats, but probably not drive them out. Playing recordings of distress calls may affect certain species. The most effective methods are probably non-electronic, namely "Roost-No-More" chemicals on landing places or fumigation.—Ed.*

"Unavailable Parts" Reprint

Editor, ELECTRONIC TECHNICIAN:

Wonderful article, "How to Substitute 'Unavailable' TV Parts" in your March issue. I would like to make a general mailing to our service dealers (approximately 500).

H. E. MCELHENNEY
Hemcor Radio Supply
Spartanburg, S.C.

Safety Reminder

Editor, ELECTRONIC TECHNICIAN:

A lot of us are getting careless again in our safety precautions toward picture tube implosions. Many are no longer bothering with even a set of goggles. Perhaps you could run a short article with a few pictures showing what damage an implosion can do.

C. R. WEBB
Sugar Land, Tex.

(Continued on page 12)

IT'S NEW FROM CLAROSTAT

Right now—at your Clarostat distributor—just what you ordered! A brand-new concept in replacement components that is designed to make your job easier, more profitable, and more satisfying. See your Clarostat distributor today!

YOUR CLAROSTAT DISTRIBUTOR FILLS YOUR NEEDS BEST! FOR ALL YOUR REPLACEMENT PARTS —ASK HIM FIRST!

CLAROSTAT

CLAROSTAT MFG., CO.

DOVER, NEW HAMPSHIRE.

For more data, circle 5-11-1 on coupon, p. 57

(Continued from page 10)

Indiana Licensing Trend

Editor, ELECTRONIC TECHNICIAN:

. . . In the January issue of ELECTRONIC TECHNICIAN an article titled "Service Industry Votes on TV Licensing" appeared. Would you please answer these questions for me:

1. How many votes came in from Indiana? From what areas? Did Indiana follow the national trends as listed?

2. Who was the reply from that was printed on page 33, stating that Indiana once had licensing in an area? What area did he refer to?

FRANK J. TESKEY,
Editor
The Hoosier Test Probe
Indianapolis, Ind.

• *The individual who wrote that Indiana once had licensing in his area lives in Huntington. Also, 2.7% of all votes came from Indiana. This compares with about 2.6% of the population which is in Indiana. About 58% from Indiana voted against licensing, compared to 47% against it nationally.—Ed.*

Solution to Auto Radio Noise

Editor, ELECTRONIC TECHNICIAN:

Concerning Mr. Bentley's letter in your October issue on ways to eliminate radio noise, I use three Hypass 0.1 μf capacitors. One is used for the generator, another for the distributor, secured with a metal bracket cut as short as possible to ground. Also I use a suppressor in the distributor cap to the coil and a ground strap from the motor to the ground. Also, since the hood is on hinges, I ground that as well as the rear of the tailpipe. As a last resort, antistatic powder in the tires may be used. Of course, coax is a must. One other point—get all those loose nuts and bolts tightened.

JOSEPH J. DUERLOO
Oakland, Calif.

"Your Picture Tube's Gone . . ."

For more data, circle 5-12-1 on coupon, p. 57

CBS 6SN7GTB FREE!
with New CBS "Preferred Line" Profit Pack

Introductory "P-L" tube offer gives you these 15 fast-sellers: 5–5U4GB, 4–6CB6A, 3–6SN7GTB, 2–6BQ7A, 1–12AU7A

What a deal! You get a selection of the hottest tube types on the market – 15 tubes in the five types that account for 20% of your business. Best of all you pay for only 14. CBS gives you a 6SN7GTB *free!*

"Preferred Line"–the Dealer Line

CBS Electronics' new "Preferred Line" consists of the types *you* sell the most. And each and every CBS "P-L" type is quality-controlled for Total Reliability. This is your assurance of the best quality in the industry. To prove it to yourself try the free 6SN7GTB that comes with this offer.

See your distributor today. Get your free 6SN7GTB with your purchase of this "P-L" Profit Pack. Act now, offer is good for a limited time only.

CBS ELECTRONICS
Danvers, Massachusetts
A Division of Columbia Broadcasting System, Inc.

Receiving, industrial and picture tubes • transistors and diodes • audio components • and phonographs

CBS "Preferred Line" tubes have TOTAL RELIABILITY to cut callbacks

All CBS "P-L" tubes are specifically engineered for utmost dependability. Total Reliability features include non-emissive plates (5U4GB), anti-gas bulb coating and anti-sag molybdenum screen grid (6CB6A), low-microphonic mount (6SN7GTB), long-life coil heaters (6BQ7A and 12AU7A).

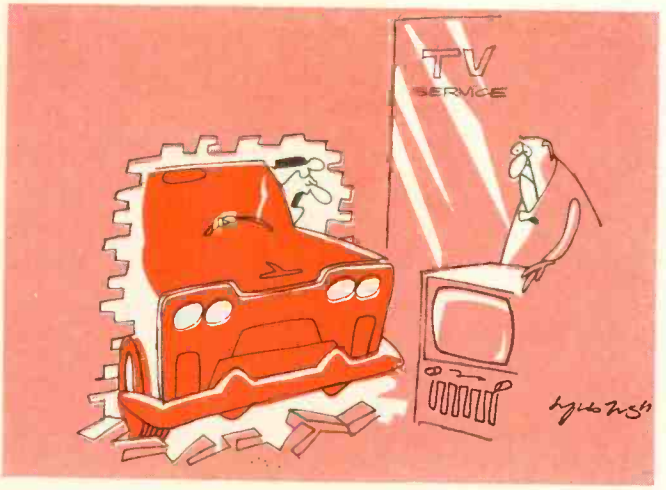
And all CBS receiving tubes have earned the Good Housekeeping Guaranty Seal. The lady of the house will recognize it immediately as a seal of confidence in you and the CBS tubes you sell.

Guaranteed by Good Housekeeping

For more data, circle 5-13-1 on coupon, p. 57

Tuning In the

TRAVEL AIDS FOR THE BLIND were reported by Biophysical Electronics, Inc., at the IRE Show. An obstacle detector uses a special infrared lamp to send out invisible pulses of radiation which are reflected back to the instrument by obstacles, causing a stimulator in the handle of the device to vibrate. A model has been field tested from two to eight feet. Still in the experimental stage, a curb detector provides a steady source of infrared light not affected by walking motion. The light is focused on the sidewalk about five feet ahead of the user. As a curb, hole or step is approached, the beam "jumps," and the momentary disappearance of the light from its spot on the sidewalk is transferred by a photosensitive device to a small loudspeaker which emits an audible tone. The ultimate aim is incorporation of both detectors into a single unit.



"I was coming in to complain about that outrageous bill,... Shall we call it square?"

CHECKOUT OF COLOR TV PICTURE TUBE

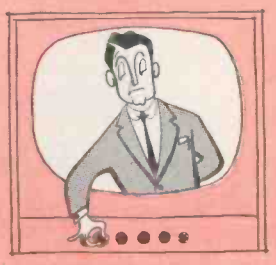
A rainbow of color is produced on RCA's new 21-inch color tube during one of many tests at the company's Lancaster, Pa. plant. Providing up to 50% brighter pictures with greater sharpness and contrast, the tube also enhances black and white images. Improved phosphors are largely responsible for advantages of the new tube.

ULTRASONIC SOUND WAVES focus and change slides by wireless remote control in the new Bell & Howell slide projector. The Tele-Sonic has neither wires nor batteries and frees the operator to project from any point in the room or to move about. It may be carried in a pocket, and can operate from a distance of more than 40 feet.

RETIRING FROM TV AND STEREO field, Hoffman Electronics Corp. is expanding its operations in the military, semiconductor and industrial products fields and will increase its overall employment by approximately 10% in the near future. However, the company will maintain service and stock parts for the owners of their TV and stereo sets.

JAPANESE EXPORTS of electronic products to the U.S. during 1960 totaled $94.0 million, a 24% increase over the $75.6 million total of 1959, reports the Electronic Div., Business & Defense Services Admn., U.S. Depart. of Commerce. The value of exports of radio receivers in 1960, which accounted for 74% of the total shipments, registered a gain of 11% over 1959. Exports of radios with three or more transistors last year increased by 4% in quantity, but declined by 4% in value from the preceding year; exports of other radios increased appreciably. Other products, showing substantial gains, were sound recorders and reproducers, radio-phonos, speakers, receiving tubes, and other electronic components. The 1960 exports of TV receivers to the U.S. totaled 10,000 valued at $507 thousand. Exports to the U.S. were equivalent to 48% of total Japanese exports of electronic products to the world in 1960 compared with 56% in 1959.

Picture.....



HARNESS RACING Automatic Starting Control System has been designed and developed by Schaevitz Engineering. Starting and acceleration of the automobile are completely out of the starter's hands, thus eliminating the possibility of human error. The control functions are fed into a portable recorder so that the track officials can have a record of the events if needed, and the starting speeds and acceleration can be programmed to any rate, depending on the quality of the field of horses involved in a given race.

MICROWAVE POWER TRANSMISSION, permitting huge amounts of power to be sent from a point on the ground to a point high in the atmosphere or even beyond the atmosphere where wires cannot be run, is on the threshold of its development, according to W. C. Brown, Assoc. Dir. of Engineering, Microwave and Power Tube Div. of Raytheon. Interest in this possibility has been generated in the past two years with development of high power tubes such as the amplitron. These tubes are highly efficient, small sized, and convert large amounts of DC energy to microwave energy.

NEW LAMINATED TV PICTURE TUBE which retards face plate reflections without loss of picture clarity has been developed and is being produced by Corning Glass Works. A new technique for treating the surface of the tube cap allows an 88% improvement in the picture contrast over earlier methods for reducing reflections. According to the manufacturer, there is a 44% improvement in transmitted picture resolution. The newly-developed cap is called the Velvetone Panel.

DYNAMIC EQUALIZER has been designed to improve the fidelity of AM radio broadcasts as heard on standard home radio receivers. It provides equalization at both the low and high frequency ends of the transmitted audio spectrum by sampling program material, determining the frequency content, and applying correction accordingly. Developed by ABC Engineers, the new device will be put into operation by WABC Radio, New York City.

SECOND INDUSTRIAL REVOLUTION is now materializing with practical application of developments in the fields of analytical technology, electronics, and above all, the electronic computer, according to Dr. Herbert W. Robinson, Pres. of C-E-I-R. Dr. Robinson projects that within a decade the electronic computer and the electronic control manufacturer will be supplying one-fifth of the value of all producers' durable goods installed in the U.S. The producers' durables market today amounts to some $30 billion a year.

CALENDAR OF COMING EVENTS

May 22-24: 1961 Electronic Parts Distributors Show, Conrad Hilton Hotel, Chicago, Ill.

May 22-24: 5th Global Communications Symposium (GLOBECOM V), Sponsored by PGCS and AIEE, IRE, Sherman Hotel, Chicago, Ill.

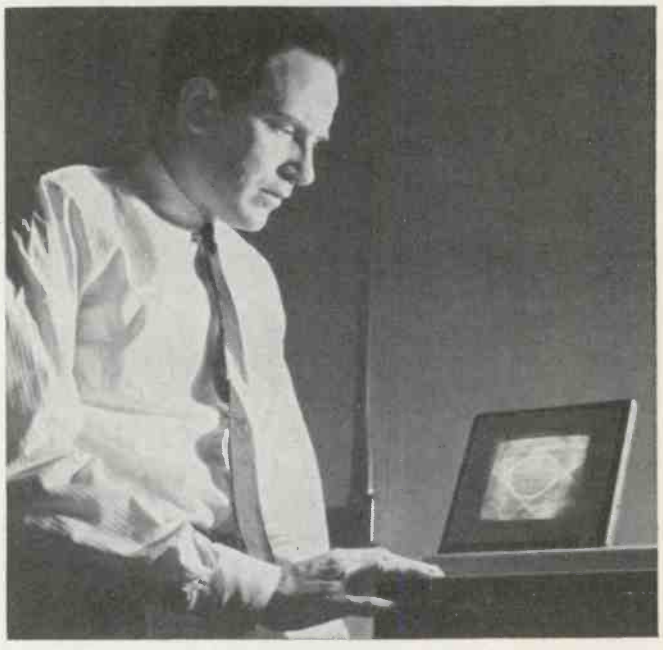
June 19,-20: Second National Conference on Broadcast Television Receivers (IRE & PGBTR), O'Hare's Inn, Des Plaines, Iowa.

Aug. 22-25: Western Electronics Show & Conference (WESCON), Cow Palace, San Francisco, Calif.

Oct. 2-4: IRE Canadian Electronics Conference, Automotive Bldg., Exhibition Park, Toronto, Canada

MARINE ELECTRONIC EQUIPMENT field is foreseen to have a record year with sales topping $15-million, according to APELCO Sales Mgr., B. H. Ballard, Jr. Total industry sales in 1960 were over $11-million for pleasure boat electronic equipment, with another $3.5-million for electronic equipment for commercial fishermen.

NEW PRINCIPLE PRODUCES IMAGE



Electronic Panel less than one-half inch thick, invented by Stephen Yando of GT&E Labs., utilizes a new principle to produce a moving, lighted image. In the device shown above, composed of a piezo-electric" ceramic material, a coating of electroluminescent material is actuated by a moving electric charge to produce a luminous display.

New Type
BUSS FUSE SERVICE-STAND ASSORTMENTS

Supplies fuse needs and saves service time

Most Practical Stand Yet Devised

Made of metal, the stand is sturdy and unbreakable, not like a fragile, plastic stand.

Keeps the fuses needed by the serviceman at his fingertips. Prevents scattering of fuses.

Can be hung on the wall or placed on the counter where the stand's wide base prevents accidental tipping.

Each 5-in box is neatly held on its own shelf—easy to slide out without disturbing other boxes.

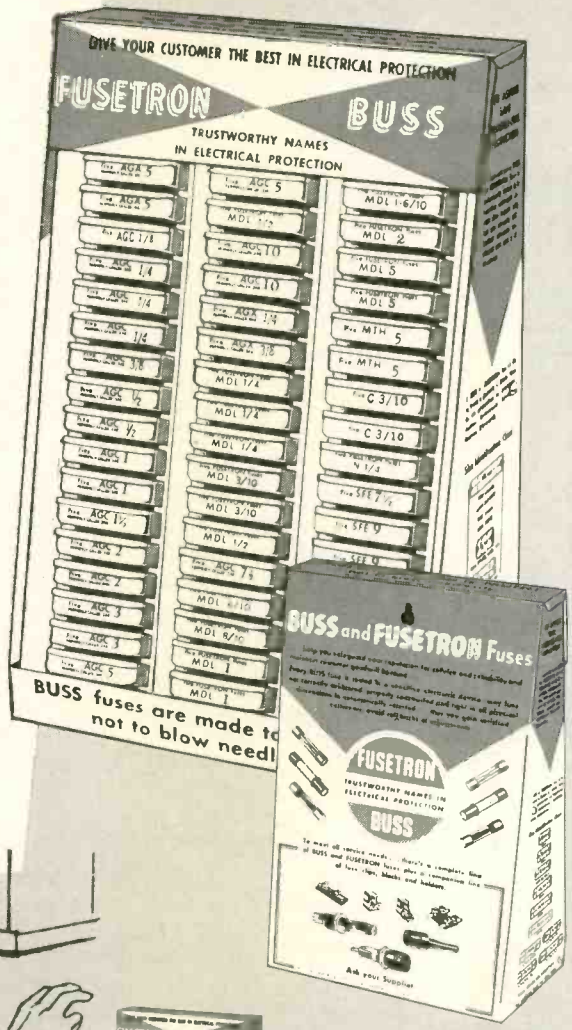
Two Quick-Service Assortments with Stand

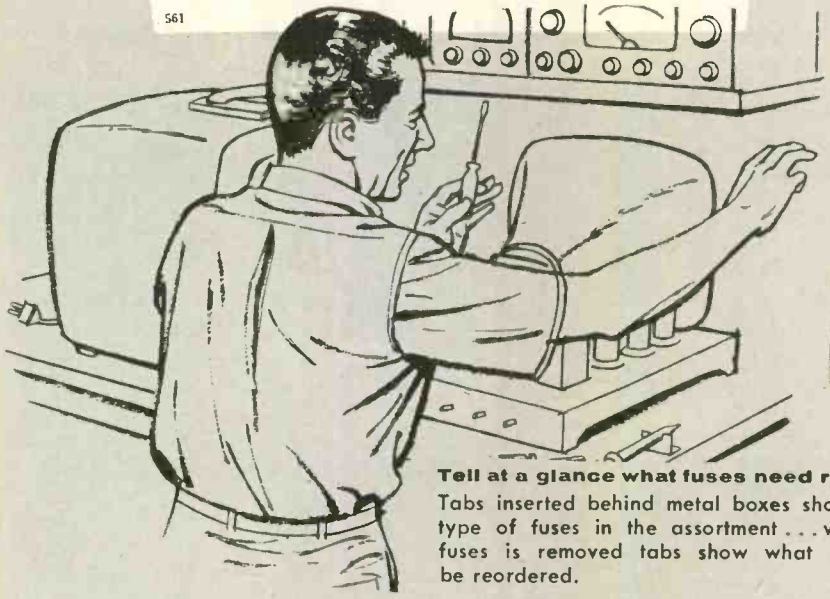
No. 255 Full-Service electronic fuse assortment contains 255 fuses—practically all the fuses you might need for TV and other electronic devices.

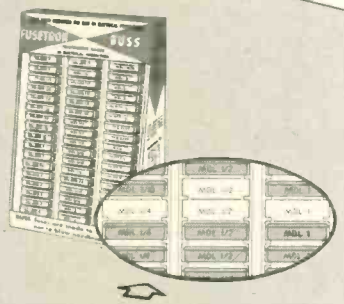
No. 130 Special electronic fuse assortment contains 130 fuses. It gives you one box of each size and type of all the popular fuses at a minimum investment.

Make your service work easier and more profitable by ordering the BUSS Electronic Fuse Service Stand Assortment best suited to your needs. Your Jobber has it or will get it for you.

561







Tell at a glance what fuses need re-ordering
Tabs inserted behind metal boxes shows size and type of fuses in the assortment . . . when box of fuses is removed tabs show what items should be reordered.

BUSS makes a complete line of fuses of unquestioned high quality for electronic, commercial, industrial automotive, farm and home use.

FUSETRON TRUSTWORTHY NAMES IN ELECTRICAL PROTECTION BUSS McGRAW EDISON

BUSSMANN MFG. DIVISION, McGRAW-EDISON CO. • UNIVERSITY AT JEFFERSON • ST. LOUIS 7, MO.

RAYTHEON UNILINE

FIRST IN QUALITY

THE "FIRST IN QUALITY" CLEARLY PRINTED ON ALL RAYTHEON UNILINE TUBES GUARDS AGAINST CALL-BACK LOSS...ASSURES ALL YOUR CUSTOMERS OF HIGHEST QUALITY SERVICE

RAYTHEON

RAYTHEON COMPANY

DISTRIBUTOR PRODUCTS DIVISION

411 Providence Turnpike • Westwood, Mass.

For more data, circle 5-17-1 on coupon, p. 57

News of the Industry

AEROVOX resumes publication of the "Research Worker."

BELDEN MFG. has named WARREN STUART as Sales Mgr.

JERROLD appoints ROBERT H. BEISSWENGER as Gen. Sales Mgr.

SOUTH RIVER METAL purchases the APEX HARDWARE MFG. CO. of Paterson, N.J.

SWITCHCRAFT celebrated its 15th Anniversary on March 6th during company ceremonies.

SPRAGUE PRODUCTS has been joined by MARCEL G. DEMERS who will serve on the field sales promotion staff.

SENCORE announces an official name change from Service Instruments Corp. to SENCORE, INC. at the company's annual sales meeting.

WESTINGHOUSE mails the "Model-To-Parts Guide" to their TV and radio distributors across the nation. The manual is composed of four sections: TV, hi-fi, radio and portable phonos, listing more than 58,500 parts.

CBS ELECTRONICS announces the following two appointments: JOSEPH L. YOUNGER, Mgr., Dealer Product Sales, St. Louis District; and ROBERT C. BURNHAM, Receiving Tube & Audio Component Quality Control Mgr.

GENERAL INSTRUMENT announces plans to acquire, through a statutory merger, PYRAMID ELECTRIC CO., and combine its engineering, production and marketing facilities with those of the Micamold Div. Agreement is subject to approval of stockholders of both companies.

SECO ELECTRONICS has been purchased by DI-ACRO CORP. of Lake City, Minn., to operate as a wholly-owned subsidiary with present management under its own name.

SYLVANIA reports the following appointments: SAMUEL A. SADER, Mgr. of the New York branch; JAMES M. HUDSON, District Sales Mgr., Miami; ROLAND H. MARTIN, District Sales Mgr., San Francisco, the Northwest and Honolulu; and HARRY H. MARCO, Mgr. of San Francisco branch.

Reps & Distributors

NEDA New York Chapter voted THE IRV BROWN CO., INC., Brooklyn, as Rep of the Year, for the second consecutive time.

SONAR RADIO CORP. announces the appointment of WESTERN ELECTRONIC SALES CO. as rep for the territory of northern Calif., northern Nev. and Utah.

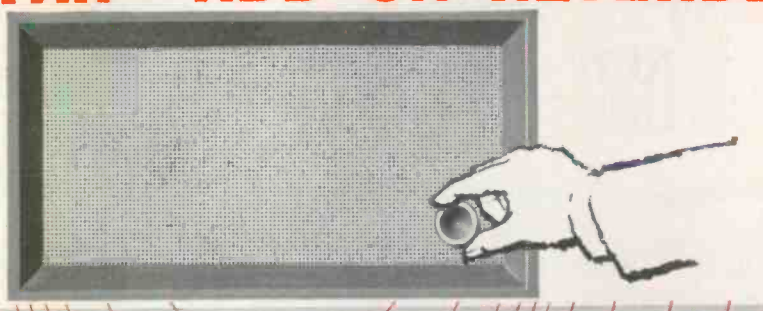
SOUTH RIVER METAL appoints THE EBERLE-SCHAAR CO. as sales rep for Dela., Md., Va., District of Columbia, eastern Pa., and portions of N.J.

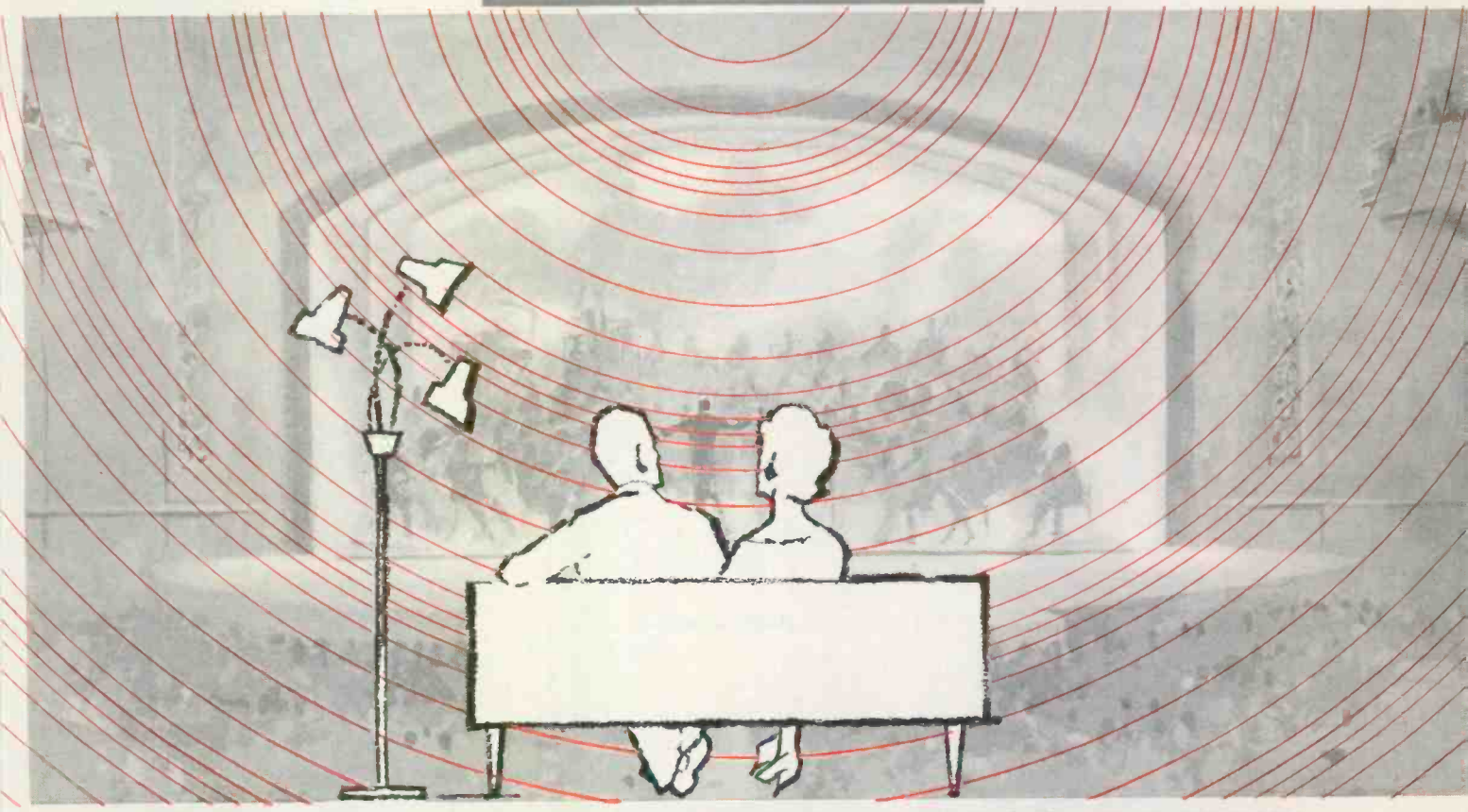
TRU-OHM PRODUCTS appoints four new manufacturers reps: PEYSER & CO., Colo.; ROBERT C. FOSTER, upper N.Y.; SCOTT TECHNICAL SALES, Tex.; and E. A. DICKINSON & ASSOC., Wisc.

LOWELL MFG. has purchased THE VAN SICKLE RADIO CO., St. Louis, Mo., to operate as a wholly-owned subsidiary under the name of VAN SICKLE RADIO-ELECTRONICS, INC. No change in personnel or location is contemplated.

(Continued on page 20)

NEW FROM UTAH—ADD-ON REVERBERATION





MAKES YOUR LIVING ROOM SOUND AS LARGE AS A CONCERT HALL!

Change acoustic dimensions of a room to fit the music . . . switch from club lounge intimacy to concert hall grandeur at the touch of a dial. Controlled reverberation is the secret! Some of this year's consoles feature "built-in" reverberation. But Utah alone offers "Acousti-Control"—a self-contained reverberation speaker-and-amplifier that hooks into any radio, phonograph (mono or stereo), or component sound system.

Here's how it works: *Hook Utah's "Acousti-Control" unit into any speaker system. Part of the original signal feeds through a carefully tuned device which delays the sound for 1/30th of a second. This delayed sound blends with the original sound to add acoustic dimension to the room. (The further you turn the knob, the larger the room sounds.) Makes monaural FM sound like stereo—adds startling dimension to stereo itself. Ask for a demonstration at your dealer's—or write for free literature and prices.*

utah

UTAH RADIO & ELECTRONIC CORP.
Huntington, Indiana

For more data, circle 5-19-1 on coupon, p. 57

(Continued from page 18)

ERA Manufacturer-Representative Council met at the IRE Show, N.Y.C. to review Council progress and discuss such topics as a Unit Territory Plan, Manufacturer-Rep Contracts, improvement of the development and transmission of marketing data, tasks which manufacturers want reps to accomplish, improvement of sales training reps and the further improvement of manufacturer-rep communications.

ELECTRONIC PUBLISHING issues new catalogs: DALTON-HEGE, INC., 108 page "Guide for 1961" listing components of 61 manufacturers and equipment for stereo, hi-fi, audio, and amateur radio applications; and WEDEMEYER ELECTRONIC SUPPLY CO. catalog, listing products of over 115 manufacturers of electronic equipment and components and radio-TV supplies.

Catalogs & Bulletins

ANTENNA EQUIPMENT: Catalog #19 contains a complete line and description of standoffs, mounts, antennas, antenna kits, guy wire, ground wire, masting, test leads and other technician, dealer and industrial items. Fully illustrated. iE Mfg., 3039 W. Carroll Ave., Chicago 12, Ill.

For more data, circle 5-20-2 on coupon, p. 57

RADIO DISPLAY UNITS: Literature covers a play-it-yourself display for transistor radios. Can be used as a counter unit. Optional stand converts it to a floor model. Its use permits open display of radios for customers to play, compare, and even lift up. Built-in electrical alarm mechanism protects against pilfering. Channel Master Corp., Ellenville, N. Y.

For more data, circle 5-20-3 on coupon, p. 57

TUBE SOCKET PRESERVERS: Specification sheet describes "Thinline" tube socket preservers, designed to prevent permanently wired sockets on electron tube testers from wearing out under constant use. Illustrations of the 7 and 9 pin sockets and the octal socket included with drawings and physical specifications. Forway Industries, Inc., 122 Green Ave., Woodbury, N. J.

For more data, circle 5-20-4 on coupon, p. 57

TUBE GUIDE: A new, 24-page, foreign tube interchangeability guide lists 1150 different tube types. For rapid cross-reference, the tube numbers are arranged under three headings: European; European/American; and American. Price, 25¢. Send your order with payment direct to United Catalog Publishers, Inc., 60 Madison Ave., Hempstead, N. Y.

(Continued on page 22)

Two outstanding products by the HIDDEN 500* who plan for your future:

DIFILM® BLACK BEAUTY® molded tubular CAPACITORS

DIFILM® ORANGE DROP® dipped tubular CAPACITORS

TWO GREAT TUBULARS . . . TAKE YOUR CHOICE!

(± 10% Capacitance Tolerance is standard at no extra cost)

Sprague Difilm Capacitors can't be beat! Dual-dielectric construction combines the best features of both Mylar® polyester film and special capacitor tissue. And for additional reliability, Difilm capacitors are impregnated with Sprague's HCX®, a solid impregnant which produces a rock-hard capacitor section—there's no wax to drip, no oil to leak!

BLACK BEAUTY Molded Tubulars are actually low-cost versions of the famous Sprague high-reliability capacitors used in modern military missiles. They're engineered to withstand 105°C (221°F) temperatures . . . even in the most humid climates! And their tough, molded phenolic cases can't be damaged in handling or soldering.

ORANGE DROP Dipped Tubulars are the perfect replacement for radial-lead capacitors now used by leading manufacturers of TV sets. Leads are crimped for neat mounting on printed wiring boards. Extremely small in size, they'll fit anywhere, work anywhere. And they're double-dipped in epoxy resin for extra protection against moisture.

* **The "Hidden 500"** are Sprague's 500 experienced researchers who staff the **largest research organization in the electronic component industry** and who back up the efforts of some 7,000 Sprague employees working in 14 manufacturing operations—four at North Adams, Mass.; Bennington and Barre, Vt.; Concord and Nashua, N. H.; Lansing, N. C.; Grafton, Wis.; Visalia, Calif.; two at Ponce, Puerto Rico; and Milan, Italy.

Get your copy of Catalog C-614 from any Sprague distributor, or write Sprague Products Co., 65 Marshall St., North Adams, Massachusetts.

SPRAGUE®
THE MARK OF RELIABILITY

WORLD'S LARGEST CAPACITOR MANUFACTURER

For more data, circle 5-21-1 on coupon, p. 57

For more data, circle 5-22-1 on coupon, p. 57

(Continued from page 20)

TEST ACCESSORIES: General Catalog 6-61 covers the PECO line of patch cords, cable assemblies, circuit panels, test socket adapters, and other related accessories. Includes specifications and prices. Pomona Electronics Co., Pomona, Calif.

For more data, circle 5-22-2 on coupon, p. 57

VTVM-VOM COMBINATIONS: Literature covers model SM112 "Service Master" vacuum tube voltmeter which becomes a portable volt ohmmeter with a flick of the function switch. Designed for use with or without 115v a-c. Features include automatic scale indication. Sencore, Addison, Ill.

For more data, circle 5-22-3 on coupon, p. 57

SOLDERING IRONS: "Magnastat" controlled temperature soldering irons, covered in catalog sheet, features a sensing device in the tip to automatically maintain the correct soldering temperature. Descriptions, with prices, are given for three models in the line. Weller Electric Corp., 601 Stone's Crossing Rd., Easton, Pa.

For more data, circle 5-22-4 on coupon, p. 57

SOLDERING TIPS: A new catalog, #603, shows "Hexclad" and "Xtradur" lines of long life iron coated soldering tips. The new line of "Durotherm" Non-sticking iron coated tips is also shown. Specifications, sketches of point shapes, style of point, etc. included. Hexacon Electric Co., 180 W. Clay Ave., Roselle Park, N. J.

For more data, circle 5-22-5 on coupon, p. 57

TUBE TESTER REFERENCE MANUAL: A new edition of the GC Vis-U-All tube tester reference manual covers the latest tube types and gives the settings for over 1,000 tubes on all the Vis-U-All tube checkers. Price, $1.00. Send your order with payment direct to G-C Electronics Co., 400 S. Wyman St., Rockford, Ill.

CAPACITORS: Catalog C-614, 44 pages, contains more than 4000 items, including over 1300 new listings of the firm's line of capacitors, resistors, printed circuits, filters and capacitor test equipment. Price. 10¢. Send order and payment direct to Sprague Products Co., North Adams, Mass.

"I think we lost a set on the last curve."

TEST EQUIPMENT by SPRAGUE® WORLD'S LARGEST CAPACITOR MANUFACTURER

The Sprague TCA-1 is specifically designed to safely test capacitors such as tantalum capacitors, low-leakage aluminum electrolytic miniatures, low voltage ceramics and low voltage paper and film capacitors used in transistor and other low voltage circuits. No industrial laboratory or modern electronic service shop can afford to be without one!

MODEL TCA-1 TRANSFARAD 115 VAC/60 cy $197.50 net

MODEL TCA-1RM FOR RACK MOUNTING

Electrically identical with the standard instrument Model TCA-1RM has a standard 19" w. x 10½" h. panel sa that it can be maunted in the canventianal relay rack.

MODEL TCA-1RM ..... $207.50 net

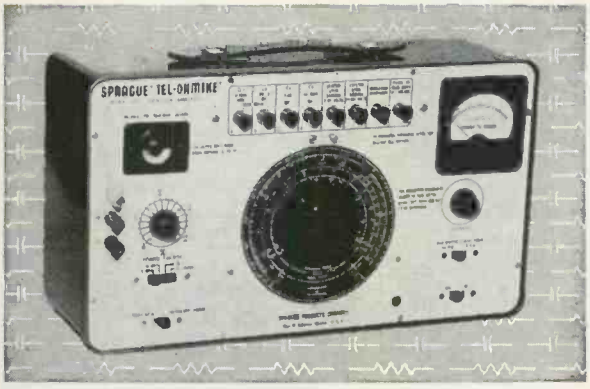
*Trademark

TCA-1 TRANSFARAD*

THE FIRST ANALYZER SPECIFICALLY DESIGNED TO SAFELY TEST TRANSISTOR CIRCUIT CAPACITORS

- **CAPACITANCE BRIDGE** measures 1μμF to 2000μF in five overlapping ranges. Only 0.5 volt is applied to the bridge from a continuously adjustable power supply. The voltage ocross the capacitar is less than this applied voltage, the amplitude depending on the capacitance being measured. No possibility of overheating or deforming any low voltage capacitor during measurements.
- **INSULATION RESISTANCE** directly read from 50 megohms to 20,000 megohms. Only 25v d-c is applied, permitting measurements on low voltage ceramic, mica, and film capacitors. IR of ceramics rated below 25v may be calculated from leakage current measurements at exact rated voltage.
- **LEAKAGE CURRENT** measured directly on meter at exact rated d-c voltage of capacitor. Sensitive circuit makes full scale measurements from 0.6 μa to 600μa in seven ranges.
- **POWER FACTOR** measured by Wien bridge from 0 to 50 per cent.
- **MAGIC EYE** null detectar in high-gain amplifier has sensitivity control permitting accurate measurement of small capacitors.
- **SHORT-TIME STABILITY** is assured by dual regulation of the power supply. Specially processed etched circuits and complete encapsulation of the critical bridge-null amplifier insure long-time stability.
- **BINDING POSTS** are shielded against strays, assuring greater accuracy during low capacitance measurements.
- **FOR SAFETY** the capacitor under test is automatically discharged after testing. Three wire line cord grounds instrument case.
- **OPERATING PROCEDURES** are clearly shown on convenient pull-out slide.

TO-5 TEL-OHMIKE® CAPACITOR ANALYZER

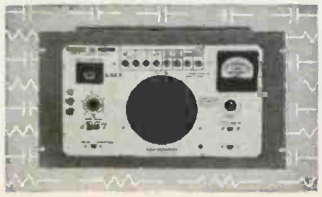


The TO-5 TEL-OHMIKE capacitor analyzer is a must for checking all capacitors except special low voltage transistor types. The TO-5 is a moderately priced instrument with laboratory quality and accuracy—the highest accuracy of any instrument of its type available to the service trade!

MODEL TO-5RM FOR RACK MOUNTING

Electrically identical with the standard instrument, Madel TO-5RM has a standard 19" wide x 10½" high panel sa that it can be mounted in standard relay racks.

Model TO-5RM.....$102.50



- **CAPACITANCE BRIDGE** measures up to 2000 mf in five overlapping ranges. The special 1 mmf to 100 mmf range is exclusive with the Tel-Ohmike.
- **INSULATION RESISTANCE** directly read on large meter up to 20,000 megohms for papers, ceramics, and micas. No guessing with neon lamps.
- **LEAKAGE CURRENT** of electrolytics measured directly on meter, with exact rated voltage up to 600v. applied from continuously adjustable power supply. Two ranges: 0-6-60 ma. No guessing on eye-width or counting lamp blinks!
- **POWER FACTOR** of electrolytics measured by Wien Bridge up to 55% in three ranges.
- **TURNS RATIO SCALE** to measure turns ratio of power and audio transformers.
- **MAGIC-EYE TUBE** simplifies bridge balancing for capacitance and power factor measurements.
- **PUSH-BUTTONS** for instant range selection, also discharge capacitors for safety upon release.
- **MODERN CASE** finished in two-tone gray; measures 8⅞" high, 14⅝" wide, 6⅛" deep. Weight only 12½ pounds.

MODEL TO-5.....115 VAC/50-60 cy.....$92.50 net

Madel TO-5X.....115-230 V/25-60 cy..... 98.75 net

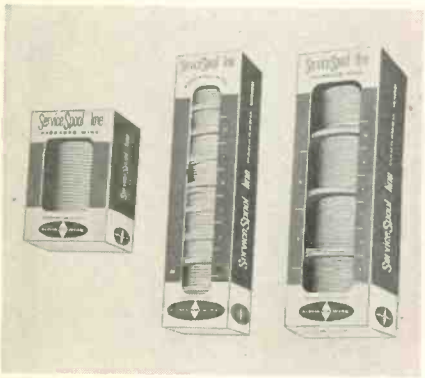
SEE THEM AT YOUR SPRAGUE DISTRIBUTOR

For more data, circle 5-23-1 on coupon, p. 57

New Products

Alpha WIRE

A new method of packaging ServiceSpools for self-display and self-dispensing is announced. ServiceSpool wire items are now packaged in three types of boxes, known as Protected-

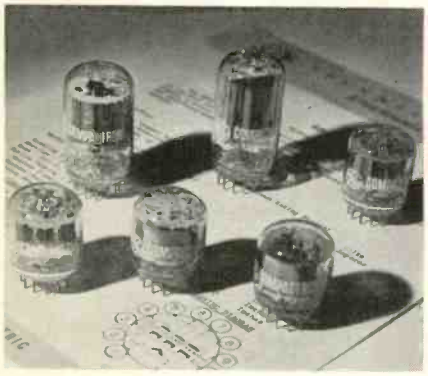


Packs, to eliminate dirt and dust problems. The new boxes have a plastic window, an inventory indicator, and are designed to load into present floor or counter racks. Alpha Wire Co., 200 Varick St., New York, N. Y.

For more data, circle 5-24-2 on coupon, p. 57

G-E "COMPACTRONS"

Four new "Compactron" multifunction devices for radio and TV receivers are: type 6FJ7 dissimilar double triode, for use as a combined vertical-deflection oscillator and amplifier; 6B10 duplex-diode twin triode, functions similarly to 6CG7 conven-



tional receiving tube plus two selenium diodes; 6K11 3-section triode, performs functions similar to those of the 12AU7 and 12AX7 conventional receiving tubes; and 6AX3 damper diode, operates similarly to the 6AX-4GTB conventional receiving tube. General Electric Co., Receiving Tube Dept., Owensboro, Ky.

For more data, circle 5-24-3 on coupon, p. 57

For more data, circle 5-24-1 on coupon, p. 57

Never before so much performance, versatility and styling in a speaker as small in size as it is in price!

NEW ELECTRO-VOICE PA 15

Model PA15 (8-ohms) $30.00 List
Model PA15-45 (45-ohms) $31.25 List
Model PA15T (70.7-volt transformer) $36.00 List

Small enough to be hidden . . . with a voice that can't be missed!

Now, from Electro-Voice—home of major PA speaker improvements since World War II — comes the most effective solution to many sound problems. It's the exciting new PA15! Features a driver located right up front—in the horn mouth itself—to eliminate one of the "bends" of ordinary reentrant horns . . . and to insure wider range and smoother high frequency response!

And the PA15 is uniquely easy to install and service. Special swivel mount permits installation anywhere . . . while the driver's front location makes field replacement unusually quick and simple. Installations are neater, too, when you use the PA15T with its optional 70.7-volt transformer built right in!

Better check these other PA15 features:

- Modest size (6" x 9" x 9½") to fit anywhere.
- Highest power-handling capacity in its class.
- Smoothly rising response for better penetration, less feedback.
- Rectangular shape for best dispersion, minimum wasted power.
- 8-ohm or 45-ohm impedances available.

ELECTRO-VOICE, INC.
Commercial Products Division, Dept. 516T
Buchanan, Michigan

FURTHER PROOF THE SMART MOVE IS TO ELECTRO-VOICE!

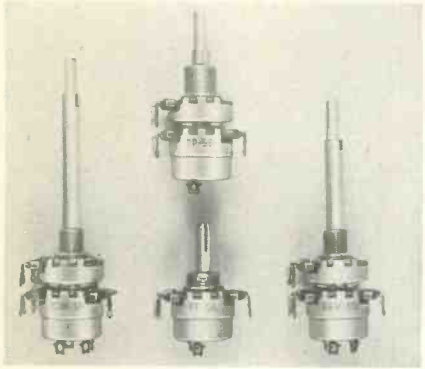
Write for full specs on the PA15 today!

Electro-Voice®

For more data, circle 5-25-1 on coupon, p. 57

Centralab CONTROLS

Five new exact replacement auto radio controls are: part No. PP-58 and PP-59, for Philco original part No. 33-5580-21 and 33-5580-27 used in 1958 Plymouths and 1959 Plymouths; part No. DEM-59, DOM-58 and DOM-



59, for Motorola original part No. 18K561733, 18K560417 and 18B561732 used in 1959 DeSotos, 1958 Dodges and 1959 Dodges. Centralab, 900 E. Keefe Ave., Milwaukee, Wis.

For more data, circle 5-26-2 on coupon, p. 57

G-T VTVM

A VTVM kit, model VTV45, is available in wired or kit form. The instrument is said to be accurate and sensitive. It features a unique process

of prefabricating kit components. Production cost savings are passed on to the consumer. Model VTV45 kit, $29.95. Model VTV45W, wired, $54.95. General Techniques, Inc., 1270 Broadway, New York 1, N. Y.

For more data, circle 5-26-3 on coupon, p. 57

Sarkes Tarzian REGULATORS

A newly-developed, low-cost line of silicon voltage regulators is announced. The one-watt, epoxy-enclosed units range from 6 to 105v in 20% increments, have a basic tolerance of 20%, with 10% and 5% tolerances available on request. Unit prices are in the one dollar range for production quantities; are under two dollars for sample quantities. Sarkes Tarzian, Inc., Semiconductor Div., 415 North College, Bloomington, Ind.

For more data, circle 5-26-4 on coupon, p. 57

For more data, circle 5-26-1 on coupon, p. 57

PROFITS GOING UP IN "SMOKE" OVER TUNER TUBE "BURNOUTS"?

Sylvania 6BZ7 and 6BQ7A "douse" the major cause of tuner tube failures.

There's nothing that takes a bigger chunk out of your hard-earned servicing dollars than unnecessary callbacks. And here's how Sylvania has improved the 6BZ7 and 6BQ7A to give you the kind of dependability profits are made from.

- Gold-plated grid wire and an oxygenated heater wire reduce runaway and burnouts.
- The famous Sylvania Sarong cathode eliminates hot spots, assures uniform temperature and emission over the entire cathode surface.
- Unique getter support – a Sylvania exclusive – extends from top to bottom micas, provides rigid support to eliminate noise of getter vibration.

More, too—every tube is tested for continuity, filament current, gas, plate current, plate current cutoff, mutual transconductance and heater-cathode leakage. That's why the Sylvania 6BZ7 and 6BQ7A are your best replacement buys. Over ten years of Sylvania production (more than 3 million produced with the Sarong cathode) gives you extra profit assurance.

So, if you want to stop "burning" profits, make sure you specify Sylvania next time you're out of 6BZ7's and 6BQ7A's. The tubes with the built-in profit protection.

Electronic Tubes Division, Sylvania Electric Products Inc., Dept. 216, 1740 Broadway, New York 19, New York.

SYLVANIA

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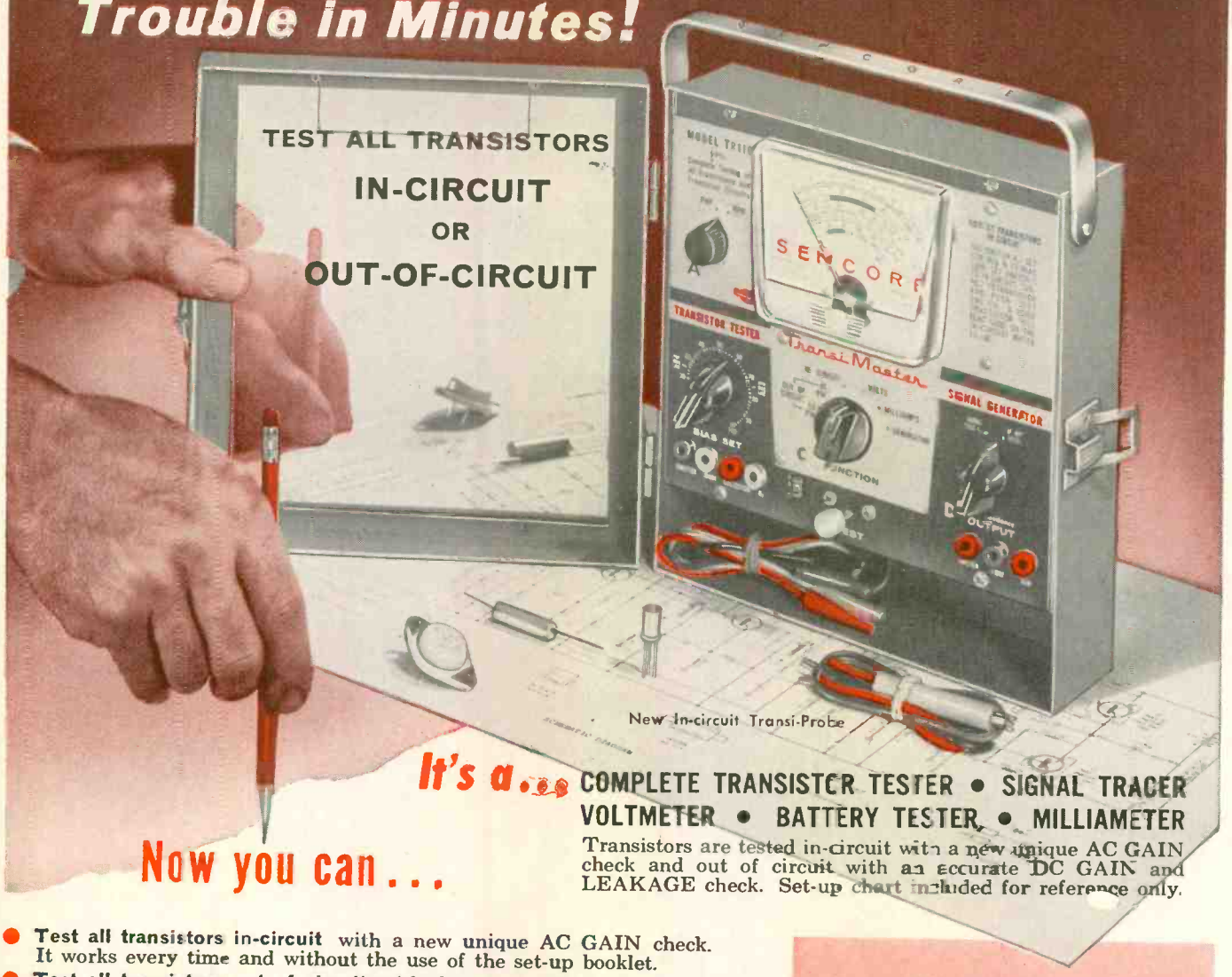

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For more data, circle 5-28-1 on coupon, p. 57

ELECTRONIC TECHNICIAN
Including SERVICE Magazine

The Price of Mandatory UHF

The Federal Communications Commission is urging Congress to pass a law which would force manufacturers to produce all-channel VHF-UHF TV receivers.

Considering the fact that an all-channel set costs about $25 to $30 more than VHF-only, and many viewers have no need to receive channels 14 to 83, the public will have to pay a pretty penny for an unnecessary circuit capability. During a typical 6,000,000 set sales year, allowing about 6% for existing UHF production, consumers would be forced to spend around $155,000,000 extra on its TV set purchases because of the UHF feature.

That's a pretty penny!

Since TV competes with other entertainment media, a price rise cannot help but affect retail sales adversely. And one can foresee some market stagnation resulting from a wait-and-see attitude when the public learns that something supposedly new is coming out. The pity is that the "something new" will be an extra cost feature which most people will not be able to use.

FCC has justifiably exercised its influence in laying down the law on manufacturing transmitting equipment. After all, public safety is at stake when radiated signals interfere with vital communications. But there is no such justification for telling producers which frequencies receivers should be capable of receiving.

Lest we forget, when FCC set up its TV allocation program, intermixing VHF and UHF stations in the same area, knowledgeable industry observers said it wouldn't work. The sad results have underscored this monumental FCC error. UHF stations in UHF-only areas fared well; in intermixed UHF-VHF areas one UHF station after another has folded, unable to compete with VHF.

Now FCC finds too many UHF channels are inadequately used—and they wonder why. One would think that FCC would ask the Government to shoulder some of the responsibility for the unhappy state of affairs. This could be done by supporting the proposal of one FCC commissioner who has advocated the lifting of the excise tax on all-channel sets.

There is talk—just talk so far—about moving all TV into UHF, allowing a five year obsolescence period for existing VHF sets. Overall allocation needs across the entire radio spectrum may make this necessary. We reserve judgement until all the pro and con arguments have been mustered. Until a shift to UHF becomes national policy, we oppose the mandatory UHF requirement. We certainly oppose it without a compensating excise tax reduction.

If you want to make your voice known on this subject, write to Senator Warren Magnuson and Representative Morgan Moulder in Washington, D.C. Let them know that both the public and the TV industry stand to lose a great deal if Congress legislates UHF into all TV sets, regardless of whether it is needed or not.

TV MANUFACTURERS

DELCO

Wonder Bar Radios—Battery Eliminator Testing

A portion of the band may be missed when a 1960 or 1961 "Wonder Bar" radio is powered by a battery eliminator due to the sudden drop in voltage when the solenoid engages. In fact, the tuner may stick at the high end of the band and never move.

Therefore, it is important to use a heavy-duty power supply capable of 20 amperes intermittent current on the 12 volt range and to set the eliminator at 16 volts. A car battery supply's 12 volts is constant and, consequently, doesn't vary when the tuner solenoid energizes.

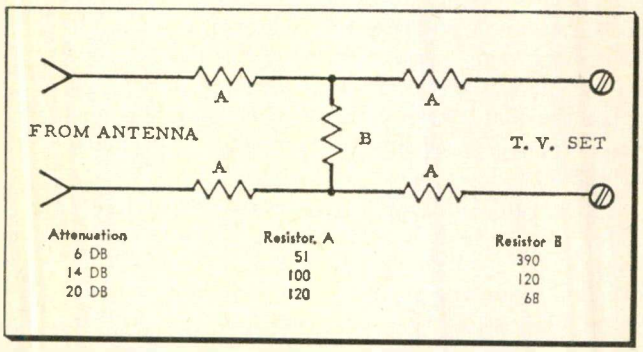
FLEETWOOD

Chassis 1000 & 1010—Secondary Controls

(See ET Circuit Digest #632, 4/61)

Two secondary controls, "Definition" and "Area," both located under a trap door below the CRT, should not require adjustment under normal conditions. However, should it become necessary to adjust either one, proceed as follows:

Definition Control—After the TV set has been adjusted to give a satisfactory picture with the control set in its normal position (center), this control may be adjusted to create a soft or sharper picture, whichever is more pleasing. Turning the control counterclockwise will cause the CRT to exhibit a softer picture and advancing this control clockwise creates a sharper picture. Note that this control has no effect unless the fine tuning control has been properly adjusted.



Attenuation	Resistor A	Resistor B
6 DB	51	390
14 DB	100	120
20 DB	120	68

Installing a signal attenuator network in Fleetwood TV sets corrects an extreme overload condition.

Area Control—This control adjusts the sensitivity of the receiver. It should be adjusted so that the weakest station will have a minimum of snow and the strongest station will not overload the CRT causing hum or buzz. In cases of extreme overload it may be necessary to add an attenuation network of ½ watt resistors between the antenna lead and the receiver's antenna terminals (see illustration).

GENERAL ELECTRIC

Chassis M6—Overloaded Contrast Control

Under certain conditions the contrast control employed in this and other chassis may burn-up as a result of a failure in another section of the TV receiver. For example, if the B+ 135v line should become shorted to ground, the contrast control would have 140 volts appearing across it. To avoid setting up secondary component failures such as this, the receiver should be turned off before changing tubes; particularly the 6CX8 video amp and 6CU5 audio output tubes.

MAGNAVOX

Radio-Phonograph—Static Voltage Discharge

Sometimes a Magnavox phonograph or radio-phonograph may be encountered that has a popping noise as the muting switch on the recorder changer is activated at the start of the reject cycle.

This static voltage discharge condition can be eliminated by adding a 10 ohm (¼ watt) resistor from the high side of the phonograph stereo pickup circuit to ground. Mount this component across the muting switch. Only one resistor is required and it may be connected to either channel 1 or 2 with equally good results.

MOTOROLA

Chassis TS-432—Production Changes

(See ET Circuit Digest #558, 9/60)

. . . code C-02 and above, resistor R317 (22 ohms 10%, ½ watt) has been added between the base of transistor TR-11 (audio i-f) and lug 4 of terminal board 301 in place of the jumper lead. C-302 (.01 μf) ground lead has been relocated and tied to the emitter

TECHNICAL DIGEST

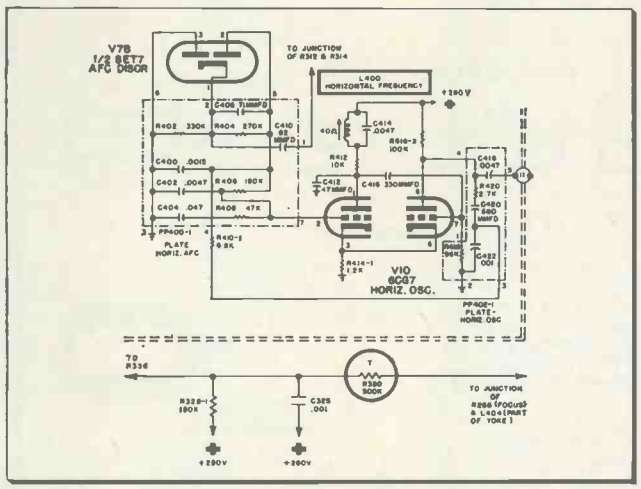
of TR-11. TR-11 has been coded with a red dot on its top to indicate the higher gain type. The TR-11 part number remains the same. On chassis stamped prior to C-02 do not use the higher gain part unless the production change has been included in the set. Using it without the production change may cause 4.5 Mc oscillation in the audio i-f stage.

. . . code C-04 and above have their focus improved by the following circuit modification: The potential for the grid (pin 4 of the CRT) is varied by using one of three terminal posts and securing the CRT's blue lead to the post giving best overall focus. To permit the use of a wider range of regulator transistors R808 (39 ohms) has been added between the collectors of TR-24 and 25. The yellow jumper originally found there has been removed.

SYLVANIA

Chassis 548-1, -2 Code 04—Latest Circuit Revisions

Early chassis should have the following revisions made: (1) PP400 (the plate-horizontal afc) has been



In Sylvania TV chassis 548-1, -2 code 04, the plate-horizontal afc and oscillator printed networks have been changed.

changed to PP400-1. The new part number is 190-0062. (2) PP402 (printed circuit in the plate-horizontal oscillator circuit) has been changed to PP402-1. This new part is labeled #190-0061. (3) Resistor R410 (from connection 4 of one printed circuit to 3 of the other) has been changed from 8.2K to 6.8K ohms. (4) The cathode resistor (R414) in the horizontal oscillator has been changed from 1K to 1.2K ohms. (5) R416 (located in the plate circuit of the oscillator is changed from 68K to 100K ohms. (6) Remove R417 located in the horizontal oscillator circuit connected between pin 1 and 2 of PP402. (7) Change the value of R328 from 680K to 180K ohms and mount it between B+ and the hot side of the height control. Resistor R329, located between this arm and ground, is removed. Add a capacitor from this arm of the height control to ground (C325).

Later chassis already incorporate these circuit changes.

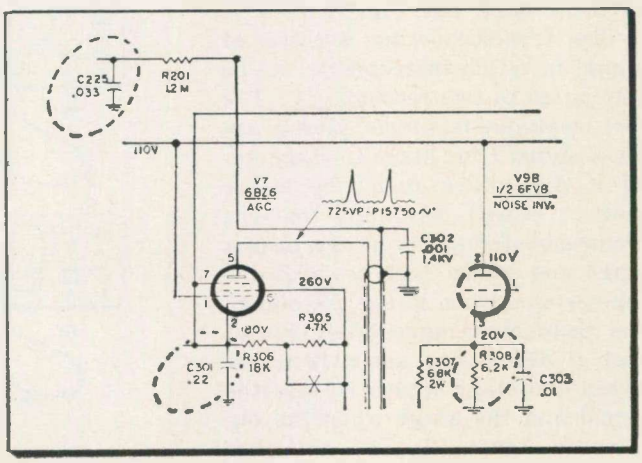
WESTINGHOUSE

V-2378-1, 2, 3 & 4—Improved Sync & AGC

(See ET Circuit Digest #576 7/60)

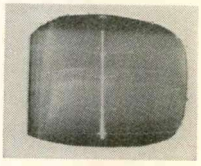
The values of capacitors C225 and C301, and resistor R308 have been changed to eliminate sync lock-out and agc floating when switching relatively strong signal channels. The manufacturer recommends that this change be made on early production sets. The value of the three parts forms a matched network and if one part is changed all three should be changed to these values: C225—.033μf, C301—.22μf, R308—6.2K ohms. Later production sets include these circuit changes.

Westinghouse V-2378-1, 2, 3, & 4 TV receivers have modified sync and agc circuitry to eliminate lock-out and improve stability.



TV Sweep Circuit Analyzers

How To Use Signal-Injection Instruments To Repair Defects Like



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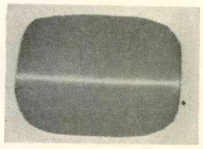


ELECTRONIC TECHNICIAN
Editorial Staff

• Continuing last month's study of TV sweep analyzers, three of the seven test instruments examined by ET's Editorial Staff have signal injection provisions: B&K's model 1070 (and model 1076), Sencore's model SS105, and Winston's model 820.

What Is Signal Injection?

Signal injection, sometimes called signal substitution, is a familiar troubleshooting technique to radio-TV technicians. For example, the old-timer's method of wetting a finger and placing it on a "hot" lug of a radio's volume control, listening for a loud buzz in the speaker, was a form of signal injection (applying a plugged-in solder tool is a safer check method). Similarly, signal injection is commonly employed by injecting an r-f generator's audio modulated signal into the grid or plate of various TV i-f stages, observing the CRT for appearance of black bars. See Fig. 1.

The troubleshooting success of signal injection instruments can be attributed to two reasons: (1) *The test technique is simple.* Merely apply a signal from stage-to-stage until it disappears (can't be either seen or heard), assuming that the troubleshooter starts at the output stage and works back towards the input stage. Upon losing the signal, the technician immediately knows that a defect lies somewhere between the stage where he lost the signal and the stage where he obtained a signal. (2) *The method is accurate.* The set is examined under dynamic conditions which ferrets out components that don't break down except under load.

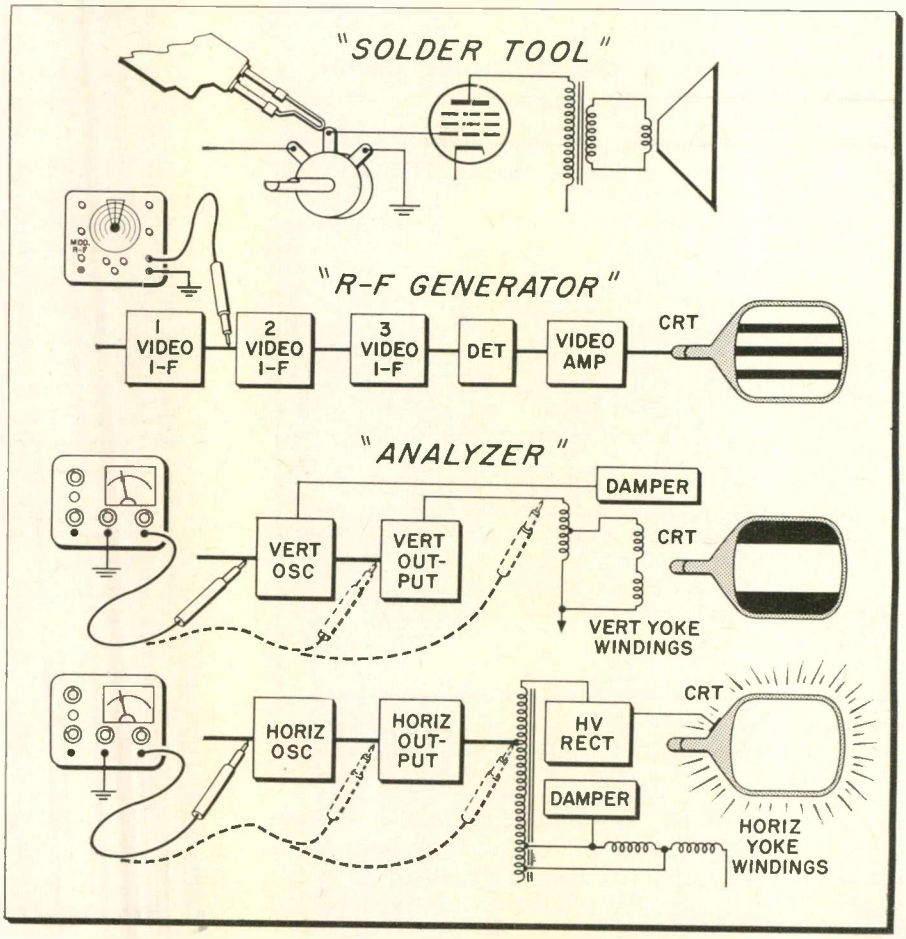
In view of these attributes, it's not surprising that signal injection instruments have been developed to aid technicians in servicing troublesome TV sweep circuits.

All three signal injection instruments were utilized by ET's Editors to troubleshoot two television receivers, a 16" Garod and a 21" Admiral. Their signal injection facilities are illustrated in an accompanying chart.

"Horizontal" Troubleshooting

♦ Referring to the schematic of Fig. 2, the Garod's horizontal out-

Fig. 1—Three "signal-injection" test methods are shown, as follows: 60 cycle hum for radio's audio section, modulated r-f for TV r-f, i-f sections, and sweep pulses for vertical and horizontal sweep sections of a television receiver.



put tube's coupling capacitor was substituted with an open capacitor (the other Editors did not witness the "bugging"). Turning the set on, we naturally had no raster. Each instrument restored the raster when a horizontal signal was applied to the grid of the set's 6BG6 output tube.

Moving a signal injection lead to the 6SN7 oscillator tube's plate, the raster did not appear. Obviously, the defect was between the 6SN7's plate circuit and the 6BG6's grid circuit. The coupling capacitor was a natural suspect and easily detected as the defective component by jumping it with a known-to-be-good capacitor. (A VTVM grid check would have indicated a defect, also.) The restored raster may be seen in Fig. 3.

♦ Another "bug" put into the Garod 16" TV was substituting a ½ meg resistor for the 8.2K screen resistor of the 6BG6 tube. This simulated a likely output circuit problem: Increased screen resistor value. We lost our raster, of course.

One Editor employed a screwdriver to draw a spark from the 1B3 high voltage rectifier's cap. The arc was unusually small. Practically no spark was obtained at the 6BG6's cap; it was more like a magnetic pull. Insufficient high voltage was obviously the problem here.

Using the B&K tester, a horizontal pulse was injected into the 6BG6's grid; the raster was not restored. (Some techs prefer to start tests at the horizontal oscillator's grid. Our Editors seem to prefer some natural center check point, such as a TV output tube's grid, or a volume control if checking a radio.) Since the raster didn't appear, it indicated a defect somewhere between the 6BG6's grid and the CRT second anode. (Unless the grid coupling capacitor was leaking badly and loading the instrument. However, we decided to continue checks in the output section rather than unsolder the capacitor.)

After de-energizing the set, the output tube's plate cap lead and voltage rectifier's plate cap lead were removed. B&K's high voltage neon indicator was clipped to the rectifier lead. Using the instrument's Plate Drive jack, the test lead was clipped to the flyback's output plate lead and the set was turned on. The clipped-on high voltage indicator glowed, indicating r-f pulses in the lead and the instrument's B+ boost indicator came on, indicating the presence of boost voltage. This exonerated the flyback; the defect must be either in the high voltage rectifier circuit or the output tube circuit (screen resistor, screen bypass capacitor, or cathode resistor or capacitor).

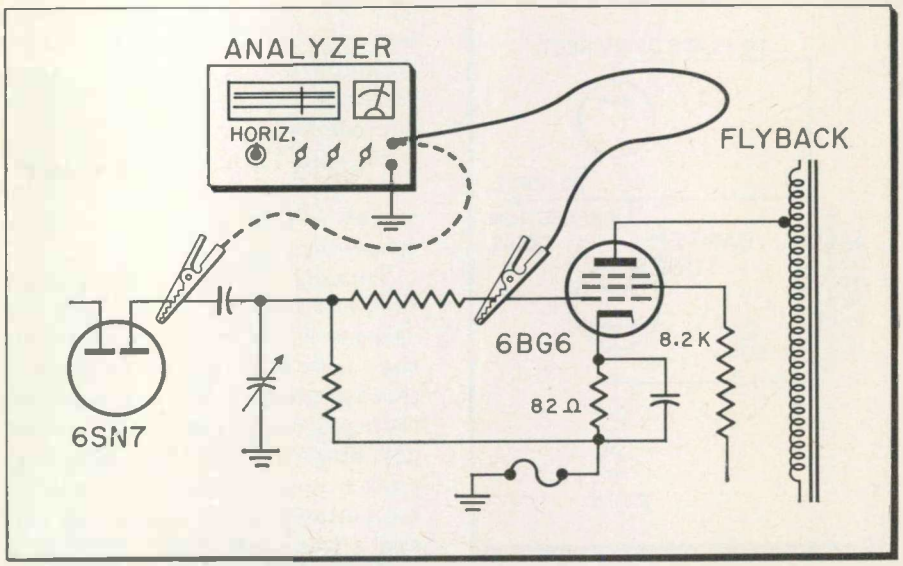


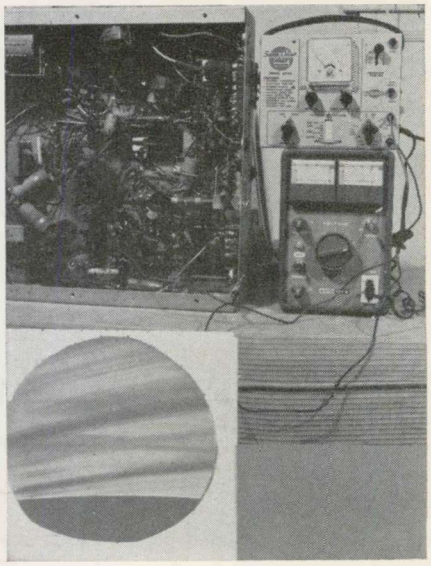
Fig. 2—Substituting an open coupling capacitor in the horizontal oscillator plate-to-output tube grid effected an open signal path, as shown. Using an analyzer instrument, a raster appeared when a pulse was applied at the 6BG6's grid, but didn't appear when applied at the 6SN7's plate. This isolated the defect between grid and plate.

The high voltage rectifier was eliminated as a suspect by clipping the plate lead back on the rectifier plate (first turning the set off, of course) and noting if the raster appeared and the HV indicator glowed. It did. A fast VTVM check in the output tube circuit pointed to a defective resistor (if this occurs, a little insurance against a future breakdown can be had by replacing the screen bypass, also).

Winston's tester led us to the same conclusion. B+ Boost, however, had to be measured separately with a VTVM. Also, no provisions for checking r-f is provided though the manufacturer suggests drawing an arc from the rectifier's plate to indicate the horizontal output circuit is operating. However, an r-f neon indicator purchased separately, should accomplish this test in the same manner as B&K's test since Winston also employs a high horizontal pulse derived from a 6BQ6. (B&K's unit has a clip to hold the r-f indicator when not in use.)

Driving the flyback from Winston's "xfmr drive" restored raster, which indicated the horizontal circuit was operating from the flyback onward. Though not offering a B+ boost and r-f indicator, the unit does have another type indicator: an overload pilot in the unit's 6BQ6 cathode circuit. If it becomes abnormally bright it indicates a shorted component in the horizontal output circuit. Components not absolutely necessary for generation of deflection and high voltage can be disconnected one at

Fig. 3—Injecting Sencore's horizontal pulse into the output tube's grid resulted in the raster shown in the inset picture. The restored raster would normally fill the entire screen; however, the Garod TV's separate CRT didn't lend itself to accurate yoke adjustment.



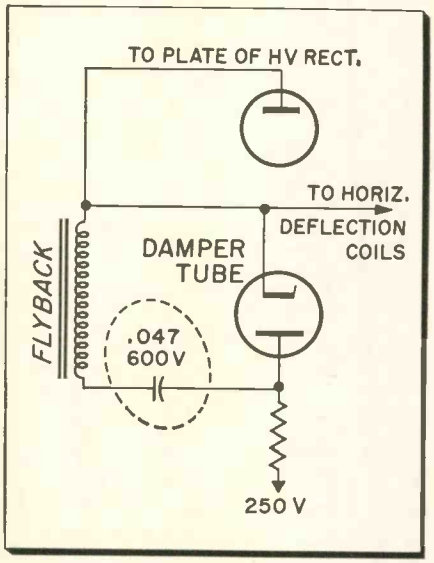


Fig. 4—A shorted .047 μf capacitor was installed between plate and cathode of a damper tube, killing B + boost.

a time (for example, flyback agc connections) and the overload light can be observed to see if the short was removed.

The **Sencore** model SS105 does not incorporate a direct plate-drive circuit. Consequently, we could not drive the output circuit from the 6BG6 plate lead. However, the tester can check the output tube's plate or screen circuit by another means: using the tester's milliammeter to monitor cathode current.

Removing the horizontal output tube, it was inserted into Sencore's male socket adapter, which automatically breaks the cathode circuit for milliamp measurement. The adapter with inserted tube was reinserted into the chassis socket. We switched the meter selector to cathode current and the cathode selector to pin 3 (unit has a roll-chart which identifies various output tube cathode current, screen voltage, grid drive and corresponding pin numbers).

Turning the set on, we observed that the cathode current was low (normal is about 100 ma). Since all the tube's current must pass through the cathode, a low reading indicated trouble in the tube's output stage, either the screen or plate circuit. Employing the unit's d-c voltmeter, the low screen voltage was quickly discovered, pointing to a defective screen resistor. The unit's d-c voltmeter can also be employed to meter measure booststrap (B+ boost) voltage.

♦ Using the Garod TV again, the high voltage rectifier's limiting resistor was replaced with an open component. Connecting the **B&K** unit to the disconnected horizontal output plate lead, as before, the B+ boost and separate high voltage indicator both glowed. However, we still didn't have a raster when the rectifier's lead was attached, which pointed to a defect in the rectifier's output circuit. Using an ohmmeter in this section, the open limiting resistor was discovered.

The **Winston** unit, which also has a plate drive jack, also indicated a defect in the flyback to second anode circuit, but aside from a rectifier arc test, didn't isolate the defect further. The arc test, however, is fairly reliable in this instance. **Sencore's** unit also indicated a defect in the flyback to second anode circuit. An arc test here isolated the defect further.

♦ TV boost problems, that is, insufficient or loss of high d-c voltage generated by the damper tube, is a frequent defect encountered by TV technicians. In view of this, ET's Editorial Staff put a boost defect into an Admiral 21A3Z 21" TV set. A shorted .047 μf capacitor was substituted, as shown in Fig. 4. The raster was lost.

Starting our chassis with Sencore's SS105 instrument, this time, a horizontal pulse was injected into the TV's output tube grid, using the unit's octal socket adapter. Nothing happened. Switching the instrument to measure cathode current, as shown in Fig. 5, the reading was "low." This indicated a defect in the output circuit. (A high reading would have indicated

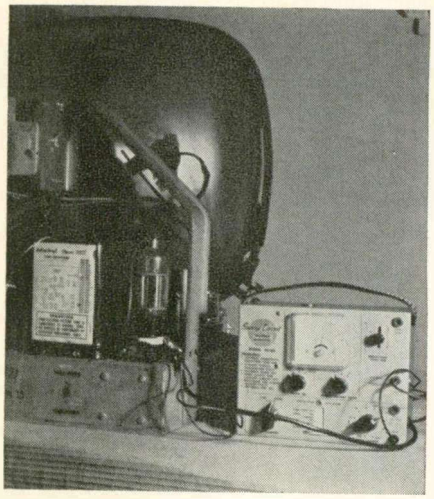


Fig. 5—Horizontal output cathode current is measured by employing Sencore's adapter socket which switches a milliammeter in series with the cathode.

Fig. 7—ET Editors employ a B&K model 1076 TV Analyst to troubleshoot a vertical defect in an Admiral TV set. A circuit defect is indicated by raster not opening.

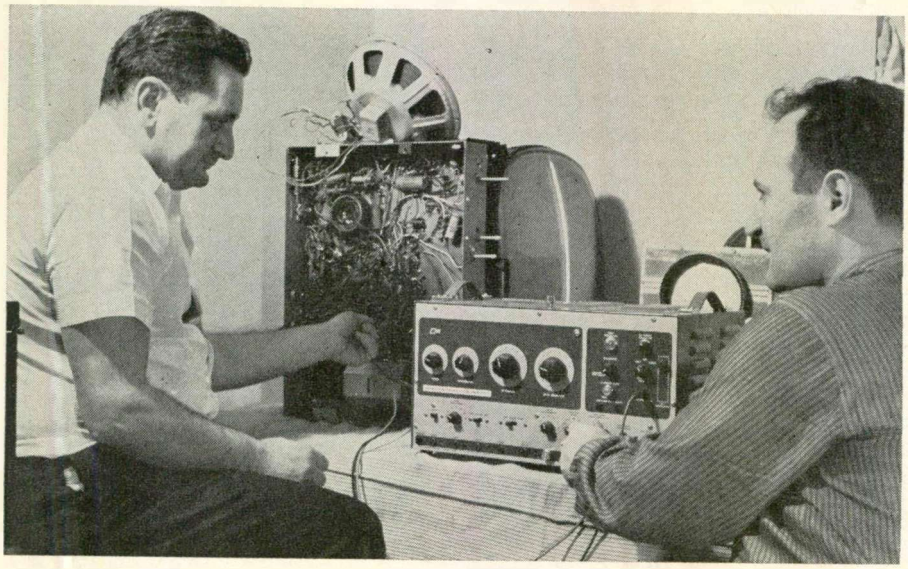
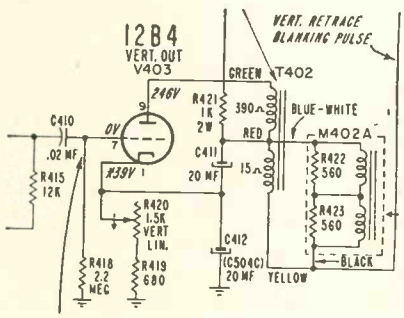


Fig. 6—A shorted grid coupling capacitor was inserted in the vertical output circuit to check vertical problems with each TV sweep circuit instrument.



Sweep Signal-Injection Facilities

Models & Prices	Horizontal		Vertical		Sync	Level Controls	Output Drives	Indicators (other than TV's CRT)
	Grid	Plate	Grid-Plate	Yoke				
B&K Model 1070* $74.95	✓	✓	✓	✓ Full Defl.	Comp + or — Blank Bars	Sync	V & H Grid V-H Plate Vert Yoke Comp Sync Blank Bars	B+ Boost neon R-f HV neon
Sencore Model SS-105 $42.95	✓		✓	✓ Max. ½" Defl.	Horiz	Osc	V-H Osc Horiz Sync	D-c volt, Milliometer to monitor cothode
Winston Model 820 $69.95	✓	✓	✓		Comp, horiz, Vert + or —		V Osc H Osc Horiz Plate V & H Sync	Overload pilot

* B&K's model 1076 @ $299.95 has same features plus many additional circuit test facilities.

the oscillator circuit wasn't operating which could be caused by a defect in the output grid circuit or oscillator circuit. Also, a short in the output circuit could result in abnormally high cathode current.)

A screw-driver arc test at the cap of the 1B3 rectifier didn't pull a spark. This isolated the defect to a circuit area between the output tube's plate and the 1B3's plate circuit. Consequently, the defect must lie in the flyback, yoke, or damper circuit. Our next step was measuring B+ boost with Sencore's d-c voltmeter. The unit's adapter socket was employed in the damper socket so that we didn't have to go under the chassis.

B+ boost measured about 260 volts; the schematic (ET Circuit Digest #142) called for 500 volts. Obviously, we were not obtaining any boost voltage, only the power supply's normal B+ voltage. A voltage check on the damper plate side of the capacitor read 260 volts, too. Turning the set off, a separate VTVM's ohmmeter confirmed our defect: a shorted capacitor between the damper plate and flyback-damper cathode circuit.

Injecting a horizontal drive at the output tube's grid with a B&K analyzer didn't restore raster, as was anticipated. Disconnecting the output tube's plate lead, a signal was injected here. Neither r-f indicator nor the boost indicator glowed. This immediately directed our attention to the horizontal output circuit. B+ boost was immediately measured with a VTVM and the defective capacitor was quickly located.

Winston's instrument led us to the same conclusion. Though no boost indicator is provided, the "overload" indicator became brighter which pointed to a shorted component in the output stage. A VTVM

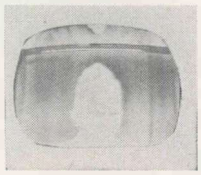
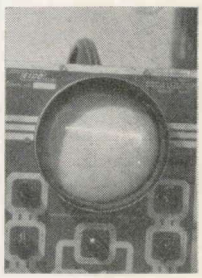


Fig. 10—B&K's 1076 opens raster fully.



B&K's monitored verticol pulse as seen on Eico scope.

Model 1076 also transmits video test pattern.

once again localized our defect to the damper plate-to-cathode capacitor.

Vertical Troubles

Each test instrument has provisions for investigating the vertical

(Continued on page 84)

Fig. 8—A vertical output transformer is driven directly by a Sencore unit. About two inches deflection is obtained (right).

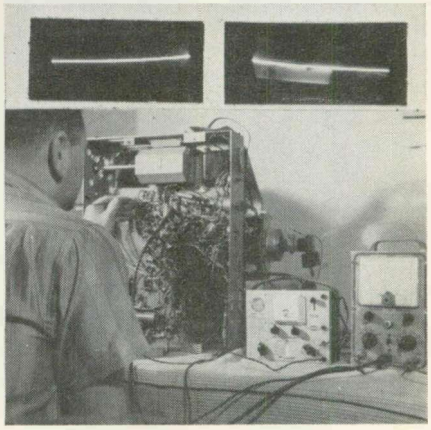
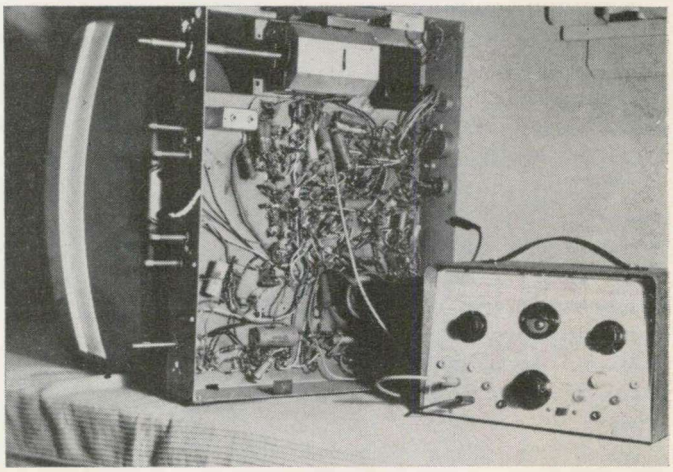
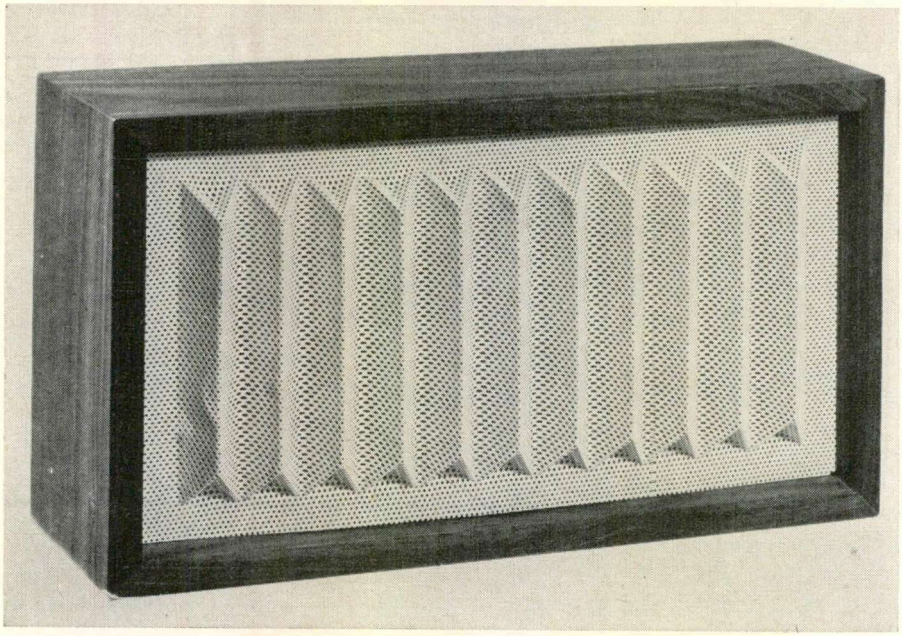


Fig. 9—Injecting Winston's vertical pulse into a TV set's vertical output transformer opens the raster a few inches.





Center Speaker For Stereo

Small Mid-to-High Range Speaker Fills "Hole" Of Two Channel Stereo

L. M. DEZETTEL
Allied Radio Corp.

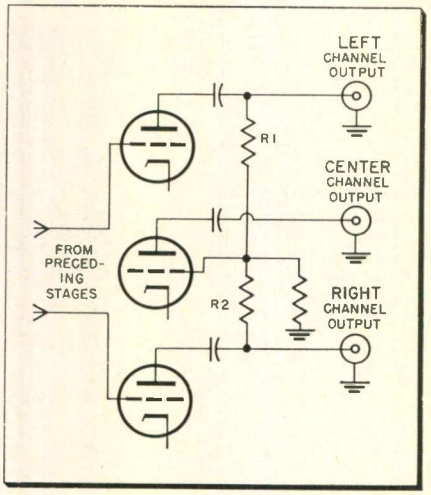
• One of the early reasons for installing a center speaker, sometimes called a third channel, in home stereo systems was to overcome the so-called "hole in the middle." Particularly in some of the first stereo discs, sound separation was exaggerated for spectacular effects.

After living with this kind of unnaturalness for a while, the listener usually became annoyed with an illusion of two separate performances; one in the left and one is the right speaker.

This recording technique is disappearing—but new justification for the center channel is beginning to emerge. The technician is apt to encounter several methods used by manufacturers to provide a third channel; now appearing on most "second generation" stereo systems.

Aside from filling the hole in the middle, an important reason for a third speaker is to widen the listening area. The listener is no longer restricted to a precise point in the room to hear the full stereo effect. Group listening is more comfortable, too.

Fig. 1—Method of obtaining an *additive* combination of right and left stereo channels from pre-amplifier stage to operate a third amplifier for center speaker.



Flexibility in speaker placement is another benefit; the center speaker covers the gap where speakers are sharply angled outward (in small rooms) or widely spaced (for large areas). A less apparent result is that a third channel, in effect, recreates the original center sound.

The first approach to the problem of providing a center channel output was to tap it from the stereo pre-amplifier. This is shown in Fig. 1; two resistors (R-1 and R-2) bridge left and right channel voltages before they are fed to the power amplifiers. The output is a mixture—an additive combination of the two channels.

To complete the link, a power amplifier is jacked into this output and the signal is boosted to a level sufficient to drive a center speaker. Several stereo adapters, used in converting monophonic systems to stereo, also feature the "bridge"

output for operating a center amplifier.

In an effort to eliminate the need for a third amplifier, systems have been devised to combine left and right channels directly at the speaker outputs. Here, the center speaker is driven by power tapped off the audio output transformers of both left and right channels. The block diagram in Fig. 2 represents two possible arrangements: (1) the center speaker driven by a *sum* signal or (2) operated by a *difference* signal (power from one amplifier subtracts from the other).

Objectionable Characteristics

The earlier circuit is illustrated in Fig. 3; where the center speaker is operated by the difference signal. Connections are essentially simple parallel hookups. At any given instant the transformer taps will have the relative polarities shown. If these voltages are combined, the signal to the third speaker will always be the net difference between audio in the left and right channels. But the performance of this circuit, although satisfactory in some cases, is subject to certain faults.

Assume that *equal* amounts of left and right signal appear at the stereo amplifier's two outputs. Since the center speaker responds to difference signals only, its sound output will drop to zero. This characteristic is objectionable for stereo discs recorded with a center microphone. This technique is often used to achieve overall balance in the recording, but is cancelled out in the difference signal system.

Another shortcoming occurs when monophonic program material is played. If left and right channels are in perfect balance, no sound emanates from the center speaker.

Using Sum Signal

The system using the *sum* of the stereo signals is a more recent development and overcomes the pitfalls of its predecessor. A typical circuit employing this arrangement is shown in Fig. 4. This arrangement, as before, derives power for the third speaker by tapping off left and right amplifiers, but the connections are markedly different.

Note that the 4-ohm tap on each transformer is at chassis ground. This converts the output of each transformer to push-pull action. But, insofar as the left and right speakers are concerned, they are little affected by the ground at 4 ohms (their circuits are completed through the "Common" and "16 Ohm" taps).

This is not the case for the center speaker, however. A look at the respective polarities will show that

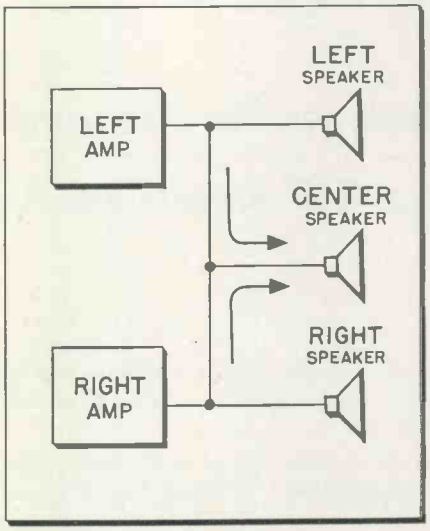
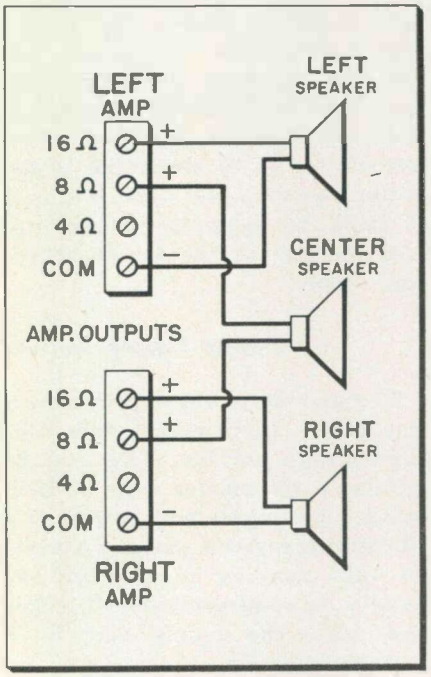


Fig. 2—Block diagram indicates a method of combining right and left channels at amplifier's output for center speaker operation. Center speaker can be either a *sum* or a *difference* signal.

Fig. 3—Hook-up of three speakers with the center speaker being operated by the *difference* signal of the two stereo outputs.



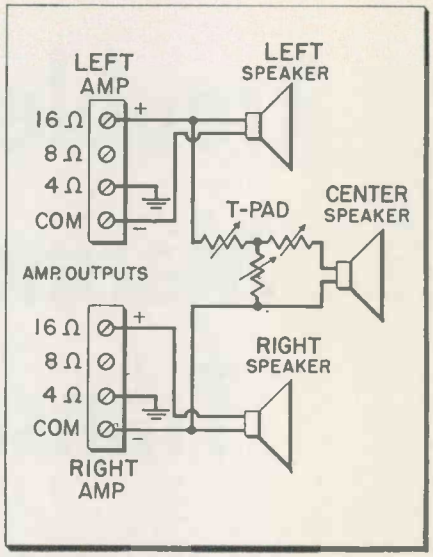


Fig. 4—Circuit for adding a third speaker operated from the *sum* of the two stereo signals. Action of each stereo amplifier is push-pull.

the speaker is strapped across a positive and negative potential—thus deriving a sum signal from the two outputs.

A circuit refinement here is the addition of the T-pad. This control permits center-channel volume to be varied without upsetting the impedance match between the amplifier's output and center speaker. Level is adjusted for the desired amount of "fill" sound, which will vary from one installation to the next. Without the pad, audio output from the center speaker is almost equivalent to the other two speakers.

The type of speaker selected for reproducing the third channel is not subject to the more stringent requirements of the end speakers. If the original stereo system is capable of full range, a low-cost "bookshelf" speaker system can serve the needs of the center. It does not have to contain a large bass driver, but should perform well at the mid and high frequencies. Directionality is not as evident below about 250 cycles and the left and right speakers will take care of the bass end of the audio spectrum.

A typical room layout for a 3-speaker system appears in Fig. 5. With the controls on the amplifier evenly balanced, the listener may experience a virtual "wall" of sound.

It is also worth mentioning that

(Continued on page 50)

Troubleshooting Marine Radio Transmitters

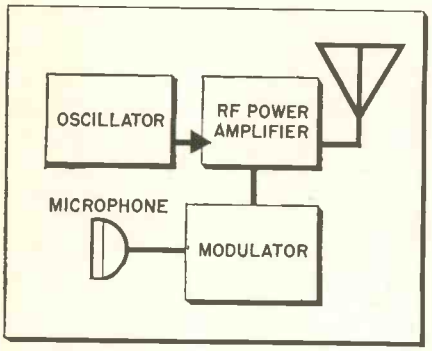


Fig. 1—Basic circuitry of typical marine type radio telephone transmitter.

Maintenance Techniques For Pleasure Craft Radiophone Power Supplies, R-F Amplifiers And Modulators

BARRON KEMP

• Methods normally employed in troubleshooting and repairing marine radio receivers are similar to those used to maintain all other type radio receivers. These procedures are already well known to every electronic technician.

Techniques employed in troubleshooting radio transmitters, however, are considerably different. Furthermore, the best approach to any transmitter is determined to a great extent by its particular design. For example, the r-f section of a transmitter may consist entirely of a crystal oscillator exciting an output power amplifier directly (as shown in Fig. 1). It may have a crystal oscillator exciting one or more frequency multiplier stages, with an additional buffer amplifier driving the final output amplifier. Whether the installation is a package or a separate transmitter receiver type can also influence the direction of over-all troubleshooting procedures.

Small craft marine radio installations can be divided into three general categories, as follows:

1. Citizen Band low-power transceiver packages.

2. Regular marine band transmitter-receiver low and medium power packages.

3. Higher power regular marine type transmitters with separate receivers.

For purposes of troubleshooting, transmitters in these installations should be divided into three major components: (A) R-F section, (B) audio or speech, and (C) power source and supply.

Because of the design nature of small transmitters in general, very few visual fault symptoms arise which reveal the possible area of difficulty. More comprehensive transmitter designs have fixed meters in various circuit stages which indicate trouble areas at a glance. Except in unusual circumstances, therefore, the technician's best initial approach to an inoperative transmitter is to check the transmitter's power input first. If this is at fault, he naturally should proceed directly to the power source and supply.

Power Supply Sources

The marine power supply source may be a 6, 12, or even higher voltage storage battery. This can be driving a dynamotor with a H.V. output. The supply may consist of a vibrator, transistor pack, or converter unit running from a storage battery. In some medium and larger size boats the supply may be a portable type gas driven d-c or a-c generator with varying voltage output values. The supply source, its wiring, fuses, relays, etc., should be checked. All exposed contacts, terminals, and tie points require close inspection in marine power supplies. Salt-water spray, and even brackish water spray in many inland water-ways can cause corrosion and consequent poor electrical contact in power source circuits.

Transmitter Troubleshooting

The schematic diagram of a typical low power transmitter section from a package installation is shown in Fig. 2.

When transmitters of this general type cease operating properly, with the input power supply normal, it is necessary to determine if the oscillator is working. This problem can be approached in a number of ways. Set the equipment switch to "TRANSMIT," turn on the equipment power and wait one minute.

If the oscillator has a jack in its circuit, and the equipment is provided with a test milliammeter, insert the milliammeter plug into the oscillator jack. If the meter reads from 5 to 10 milliamperes, the oscillator is probably working normal. If no jack is provided in the oscillator stage, mount a low wattage neon lamp (NE-2) on one end of a

length of insulated rod by using a rubber band. Solder a one inch loop of 2 or 3 turns of insulated wire to the neon lamp's leads. With the transmitter on, bring the loop close to the oscillator tube's plate lead. The lamp will light if the oscillator is working. If there is a plate milliammeter in the next stage or final amplifier plate circuit, another quick check is to shunt a 100 μf mica capacitor across the crystal being used. Detuning effect of the capacitor will cause the meter needle to change suddenly. If the oscillator is not operating, there will be no change in the milliammeter indication.

If the oscillator refuses to work, the crystal switch should be moved to place another crystal in the circuit. If the oscillator does not work on any of the crystals, the equipment manufacturer's schematic with voltage, resistance, and capacitance specifications should be consulted. Oscillator voltages should be checked first, followed by resistance and capacitance checks —depending upon voltage conditions found at the oscillator's plate or screen.

If the transmitter is separate from the receiver, and the receiver is a regenerative, super-regenerative; or superhet type equipped with a beat-frequency-oscillator (BFO), the receiver can be used to quickly determine if the transmitter's oscillator is functioning. Tune the receiver to the frequency of the crystal being used in the transmitter, and the beat note can be heard. Although this proves the oscillator is working, in certain cases the oscillator output may not be sufficient to excite the tube being driven. In this case, another crystal should be switched in to make a comparison.

If all crystals produce insufficient drive to operate the transmitter, components in the oscillator circuit should be checked. By using a separate receiver it can be determined if one or more of the transmitter's crystals are not oscillating.

If the oscillator appears to be operating normally on all crystals, and no obvious trouble appears in the oscillator circuitry as determined by current, voltage and component checks, the output amplifier (or next r-f stage) should be checked.

Troubles in a multiplier stage or the r-f power amplifier are similar in some respects to those found in receiver r-f amplifiers. The r-f voltages, however, are many times greater. It is not necessary to make initial voltage readings in a transmitter's r-f stage if a milliammeter is inserted in the amplifier's plate or cathode circuit. Current at either point indicates the circuit is operating. However, if too low or abnormally high current values are indicated, checks should be made to determine if the amplifier is being overloaded, not tuned to resonance, voltages are incorrect, or some component in the circuit is defective. A shorted or open plate-to-grid stage coupling capacitor can cause trouble. So can a changed value grid-leak bias resistor. If necessary, power can be removed from the circuits and resistance measurements made to determine the fault.

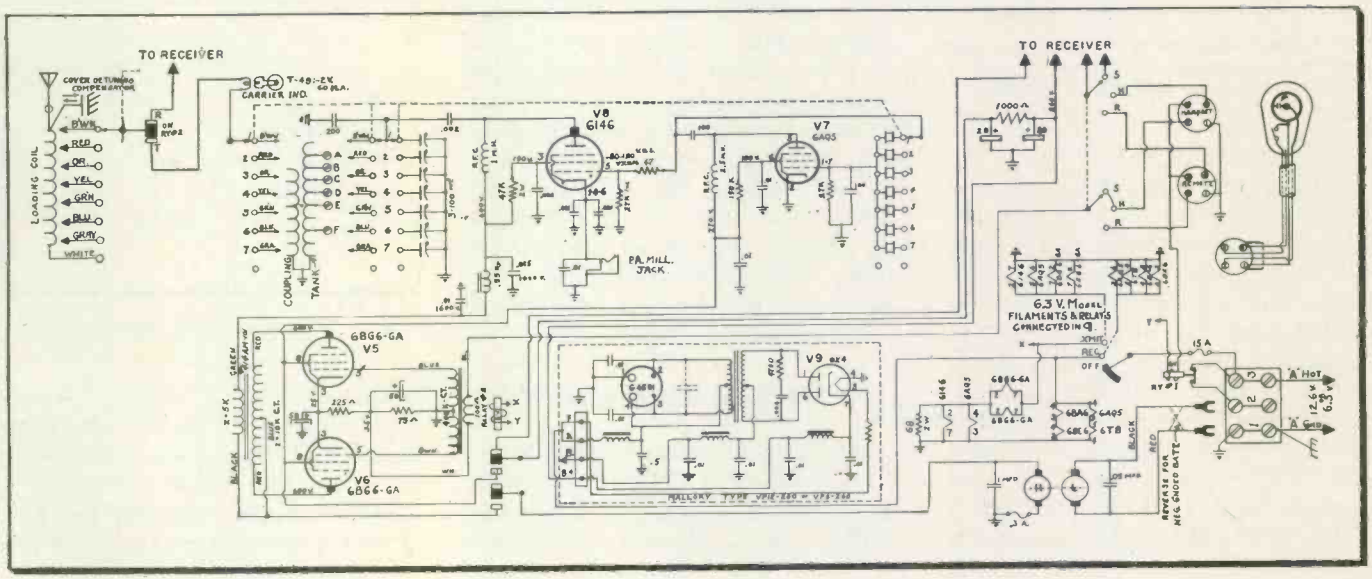
Complete absence of plate or cathode current can indicate power supply failure to the stage, an open r-f choke in the plate circuit, a defective tube, or open output winding of the modulation transformer. An open fuse or inoperative power transfer relay in the high voltage supply can also cause this trouble.

If the plate of an amplifier tube turns cherry red, the cause could be a gassy tube, the plate tank circuit may not be tuned to resonance, or no excitation is being received at the tube's grid. The tube will be drawing high current and the plate voltage will be low.

If it is suspected that the final amplifier tank circuit is out of resonance, couple the antenna to the final tank coil very loosely and quickly adjust the tank tuning capacitor both clockwise and counterclockwise. If the amplifier is working normally, a sharp dip will occur on a milliammeter inserted in its plate circuit. When the antenna is coupled closer and the tank capacitor is readjusted to give minimum reading on the milliameter (the dip will not be sharp), current reading should then increase but not abnormally, when antenna loading is

(Continued on page 50)

Fig. 2—Schematic diagram of transmitter section of a typical low power marine radiophone.



Servicing
UHF TV Tuners

Troubleshooting Techniques & Repair Methods Reduce Costs & Delays

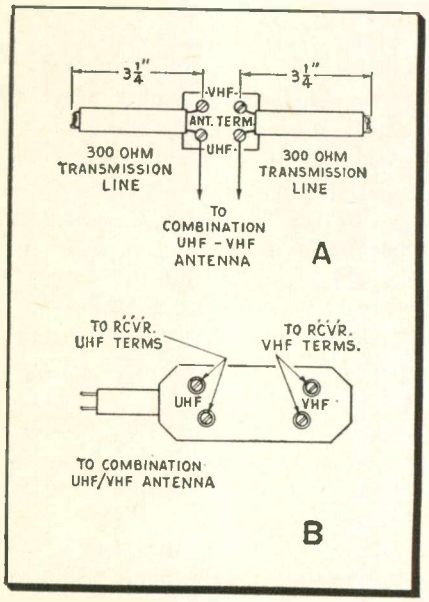


Fig. 2 (A)—Stub arrangement matches a single feedline UHF/VHF antenna combination to TV set and eliminates antenna switching. (B)—Commercially available cross-over net which is used for same purpose.

JOHN HASKELL

• Servicing TV UHF tuners and channel selector units is a "snap" if a few basic service techniques are employed. UHF tuners today function the same way as those used for VHF reception. (The only functional exception exists in certain double conversion types.)

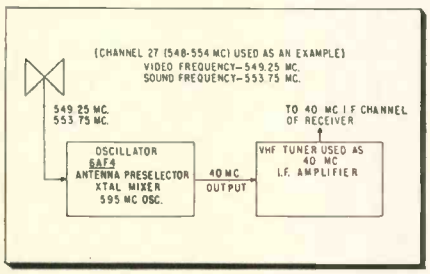


Fig. 1—Block diagram of a continuous type UHF tuner operating on channel 27 with a VHF tuner acting as first UHF i-f amplifier.

UHF tuners generally used in modern 40 mc i-f TV receivers employ a triode oscillator and a crystal mixer. The oscillator operates above the incoming TV carrier frequency and the 40 mc difference frequency from the crystal mixer output is fed directly into the UHF tuner's input (see Fig. 1). A UHF/VHF switch is employed to disable the VHF tuner's oscillator and perhaps the VHF antenna. If a UHF/VHF combination antenna is operated with one feed line, a stub arrangement or a cross-over network, as shown in Fig. 2, is used at the set and the antenna remains connected to both UHF and VHF terminals.

Because of higher frequencies to be received, we already know UHF tuner components are especially designed or have particular characteristics. For example, tube elements are smaller, with less spacing, and with shorter leads. Essentially, most tuners employ a form of tuned quarter wave line—two rigid spaced conductors with a sliding shorting bar—as tuning or frequency changing devices. Or they may use fixed shorted quarter wave coaxial or transmission lines with capacitive tuning. Tuning capacitors may be stator-rotor plate or piston types, and one capacitor is generally employed for r-f input or preselector tuning, and one each for mixer and oscillator tuning—all actuated by one tuning shaft. Some continuous types employ 3 partitioned tunable cavities. UHF tuner component leads are very short—or non-existent. A typical tuner schematic is shown in Fig. 3.

Troubleshooting And Repair

Oscillator tubes and mixer crystals employed in UHF tuner equipment probably account for most malfunctions. Narrow tolerances of these two components—sensitivity to voltage variations when border-line defects exist—only aggravate the situation.

One good way to "tie down" this frustrating problem is with a continuously variable voltage device at the TV set's a-c input. This method has been used for many years by technicians in locating oscillator-mixer faults in radio receivers. The set's line voltage is lowered slowly until a fault appears. Many partly defective tubes and crystals can be detected in this manner. Intermittent failures can also be located frequently.

Many technicians who use this system work up a "standard reference" chart with "good" and "questionable" voltage areas plotted on the chart for future reference. A VOM a-c meter scale can be used, of course, to measure the receiver's

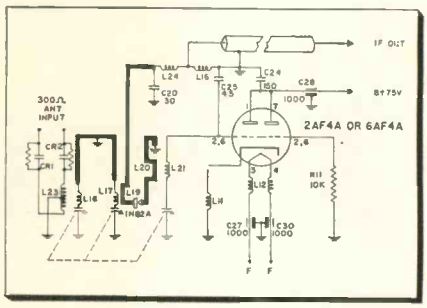


Fig. 3—"Piggyback" UHF tuner schematic.

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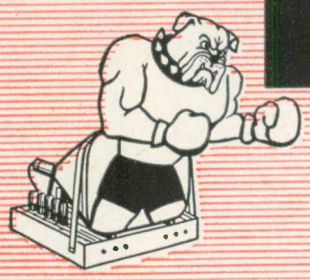


"Tough Dog" Corner

Difficult Service Jobs Described by Readers

Transistor Radio, Low Volume

Recently, a customer brought a Philco T45-124 Transistor Radio into the shop complaining of short battery life, poor tone, and weak volume; also, erratic operation. He said that after it cut out he could get the set to play by interchanging the four battery cells. Since the four cells were all in series, this didn't make much sense.

As it turned out the customer was right. A new set of batteries was tried with a 0-100 ma meter in series with the switch on the set. The

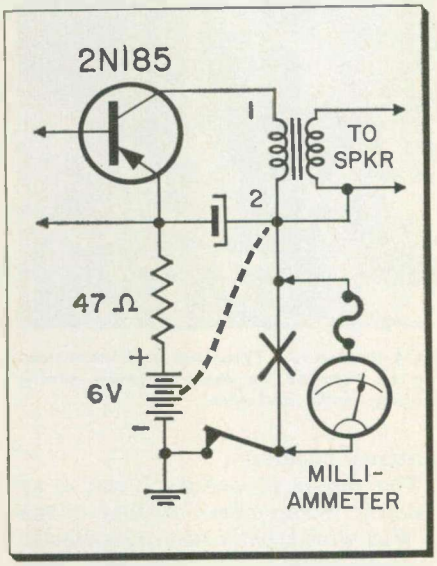


Fig. 1—In a Philco TR model T45-124, low battery life, weak volume and erratic operation were caused by the power supply "closing" at 3 volts instead of 6 volts.

set played poorly, and the meter kicked off scale. A 500 ma meter was placed in the circuit, replacing the original instrument, and the switch was momentarily closed. This meter read almost 200 ma which meant the load was about 30 ohms.

In the process of removing batteries to check load resistance (luckily the switch was still on) the set continued to play with the outer two cells removed. In fact, it played as well as when all four batteries were in the set. Here was a clue, and it tied to the customers remark about operating the unit by interchanging the batteries. I concluded that something was closing the input circuit at three volts instead of six volts. Wiggling almost anything in the battery compartment would cause the set to cut in and out.

Close inspection revealed that the edge of a metal end bracket (which is normally floating electrically) was digging into the printed circuit wiring, closing the B+ supply at the three volt point. See Fig. 1. It closed the battery circuit through one winding of the output transformer and caused the set to play at reduced volume.

A cure was effected by carefully removing a small amount of the printed lead and doping the spot with cement.—*M. G. Goldberg, St. Paul, Minn.*

"Upper" Vertical Compression

I had a G-E TV model 21C10 in the shop for repair. When the set was first turned on the raster would be from one to two inches short at the top. This could be corrected by adjusting the vertical linearity or vertical height controls. But as soon as the set was switched "off" and then back "on" the trouble would re-appear. I substituted the 6J5 vertical oscillator tube and 6AH4 output tube, to no avail. I then checked the voltages around the vertical output (6AH4) and they were all normal. This led me to believe the trouble originated somewhere in the vertical oscillator circuitry.

Checking the coupling capacitor from the plate of the oscillator to

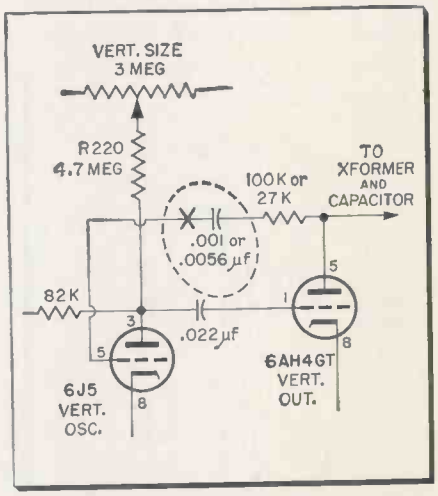


Fig. 2—A GE TV model 21C10's upper vertical compression was traced to a leaky plate-to-grid coupling capacitor.

the grid of the output tube indicated it was good. However, with the set on, checking the capacitor from the plate of the output tube feeding back to the grid of the oscillator revealed the capacitor leaked when voltage was applied to it. (This capacitor was checked by cutting the circuit at "X" and a VTVM's DC probe was attached to this point. The meter's common lead was attached to chassis ground.)

Replacing the .0056 μf. capacitor (shown in Fig. 2) restored the set to normal operation. This leakage, although slight, was sufficient to cause the raster to shrink at the top. In early productions of "F" series chassis this is a .001 μf. capacitor.—*John A. Beck, Centralia, Kansas.*

TOUGH DOGS WANTED

$10 for acceptable items. Use drawings to illustrate whenever necessary. A rough sketch will do. Photos are desirable. Unacceptable items will be returned if accompanied by a stamped envelope. Send your choice entries to "Tough Dogs" Editor, ELECTRONIC TECHNICIAN, 480 Lexington Ave., New York 17, N. Y.

SHOP HINTS

Replacing PC Tube Sockets

I have had several printed board TV sets in my shop with bad tube sockets. The chassis on these sets had a metal cover over the printed board which prevented easy removal of the tube socket for replacement. This frustrating problem was solved in the following way:

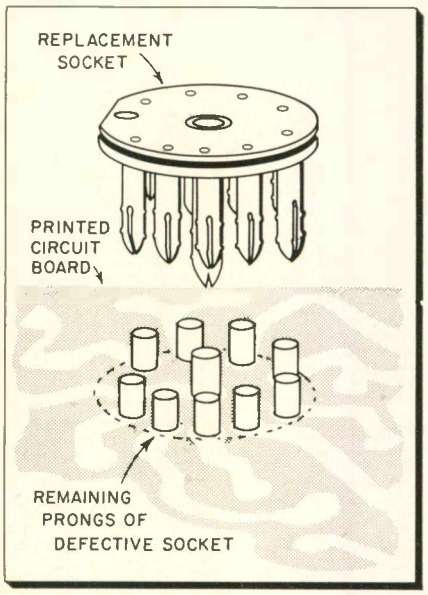


Fig. 1—Trimming the plastic around a broken printed circuit socket prepares it for easy replacement fitting. See text.

I first cut away all of the plastic composition material of the old tube socket with diagonal cutters, exposing the outer contacts which are soldered to the board itself. I then used a printed replacement socket (the type having sharp connector prongs) and plugged these points into the board contacts. Old and new contacts were soldered, as shown in Fig. 1, and the job was finished.—*Don Beroff, Rushford, N.Y.*

Signal Tracing Electric Blankets

Electric blankets may be brought to your TV shop for repair since customers frequently assume that you repair *anything* electrical—at least that has been my experience.

An electric blanket came in and I checked the control for operation and found it was not defective. An ohmmeter check across the a-c cord plug showed the blanket's heating circuit was open. Now the problem was to find the trouble without ripping the entire blanket apart! After considerable thought, I hit upon an idea to find the break by using my audio test equipment.

A modulated signal was first fed into the a-c plug. I checked the blanket's internal wiring through inductive pickup by moving a signal tracer probe over the wiring from outside the blanket—holding the probe tight against the fabric while moving it. After a few minutes of careful probing I found the exact point where the wire was broken. A two inch slit was made in the blanket with a razor blade at that point and the wire was spliced.

The signal from the generator should be set at a point to give sufficient signal pickup (in my case I had to set it at maximum level).—*Dennis M. Strange, Petaluma, Calif.*

Troubleshooting With Shaving Mirror

An ordinary shaving mirror with one side that magnifies, can serve as a valuable chassis inspection tool. I use one for observing the printed side of a TV or radio's wiring while the unit is still mounted in its cabinet.

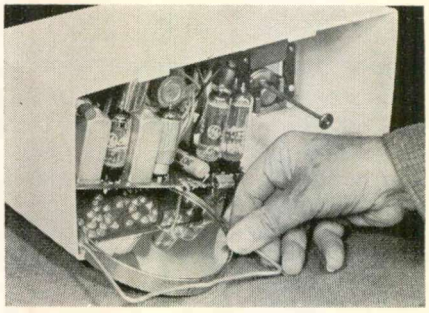
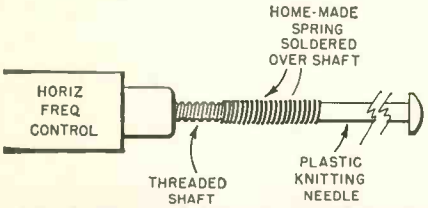


Fig. 2—A magnifying-type shaving mirror can be utilized in finding minute breaks in a printed circuit board.

As illustrated in Fig. 2, tube sockets, terminals and components may be checked for crack or breakage by utilizing this tool prior to separating chassis and cabinet.—*H. Leeper, Canton, Ohio.*

Plastic Control Shaft Repairs

The horizontal and vertical controls of many new portable TV receivers have plastic extension shafts protruding from the TV's back cover for external adjustments. These often break; however, they can be repaired with plastic knitting needles.



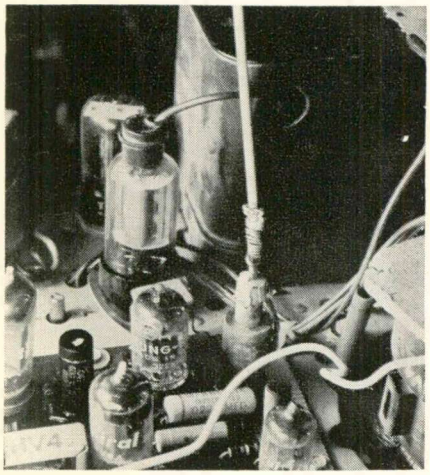


Fig. 3—Broken rear TV control shaft extensions can be repaired by using a heavy plastic knitting needle and wire.

The repair procedure I use is as follows: Wrap about twenty turns of #18 wire tightly around a plastic knitting needle. Push the wire back and cut the needle to the desired length. Pull the wire partially off the needle and engage it with the broken shaft end of the control. Then solder the wire to the shaft, being sure to also heat the wire so that it imbeds itself into the melted plastic (hold needle and wire straight so the joint is not bent).

After the plastic and wire are cool, the shaft can again be used to adjust the control without removing the rear cover. See Fig. 3—*H. L. Davidson, Fort Dodge, Iowa.*

Technician Associations—1961 Roster

List of groups who have verified activities, with name of secretary unless otherwise noted

NATIONAL

CHICAGO ILLINOIS—(NATESA) National Alliance of TV & Electronic Service Associations 5908 S Troy St—Frank J Moch Executive Director

ARIZONA

PHOENIX—Better Electronic Service Technicians P O Box 1284—David Gordon Exec Secy

ARKANSAS

FT. SMITH—TESA—Ft Smith Station "B" P O Box 127—Bill Gravley
N LITTLE ROCK—TESA—GLR P O Box 542—Harold Carter

CALIFORNIA

FRESNO—Calif State Electronics Assn 1029 E Belmont Ave—Howard Bogue
GLENDALE—Calif State Electronic Assn P O Box 4012—Win Howie
LONG BEACH—Radio TV Technician Assn P O Box 4085—Fred Abrams
LOS ANGELES—Appliance Profession Assn 5107 W 1st St—G D Ribnick Managing Dir
OAKLAND—Alameda County TV & Radio Assn 5585 Thomas Ave—P M Fisher Exec Secy
PASADENA—Radio Television Technicians Assn P O Box 1143—Dan Davitt
RIVERSIDE—Riverside County Chapter CSEA P O Box 7074—A L Barber
SAN FRANCISCO—San Francisco TV Service Assn 391 Sutter St—Albert Blanchard
SOUTH GATE—San Antonio RTA Chapter P O Box 626—Andrew Godwin
VAN NUYS—Society of Radio & TV Technicians P O Box 126—Ernest Larsen

CONNECTICUT

SPRINGDALE—TV Service Guild Woodbrook Drive—B Smolin

FLORIDA

MIAMI—TESA—Miami 6001 S W 20th St—Max Reiser Corres Secy

ILLINOIS

CHICAGO—Associated Radio & TV Servicemen (ARTS) 433 S Wabash Ave—John Sotor
CHICAGO—Electronic Service Guild 55 E Washington St—L T Green
CHICAGO—(NATESA) National Alliance TV & Electronic Service Associations 5908 S Troy St—W O Hirschberg
CHICAGO—(TESA) Television Electronic Service Assn of Chicagoland 5908 S Troy St—Angelo Chrysogelos
JOLIET—TESA of Will County 240 E Washington St—L R McAllister
PEORIA—Associated Radio & TV Servicemen Peoria Chapter 706 Wayne St—J F Stoll
ROCKFORD—Greater Rockford Appliance Dealers Assn 815 E State St—H L Berry

INDIANA

BEDFORD—Lawrence County Electronic Technicians Assn 2001 12th St—C W Hert
BLOOMINGTON—Bloomington Radio & TV Service Assn 304 W 2nd St—Jesse Boruff
ELKHART—(IESA) Indiana Electronic Service Assn 1017 S Main St—Lamar Zimmerman Jr
ELKHART—TV Bureau of Elkhart 1017 S Main St—Arden Gaerte
EVANSVILLE—RTSA of Evansville 500 8th St SE—Paul Wurtz Pres
FORT WAYNE—Bureau of Professional Technicians 808 E Jefferson—C Hostettler
FORT WAYNE—(IESA) Indiana Electronic Service Assn 1439 S Anthony St—J R Schupbach Dir
INDIANOPOLIS—(IESA) Indiana Electronic Service Assn 4622 E 10th St—Leon Howland Dir
INDIANAPOLIS—Indianapolis TV Technicians Assn P O Box 23125—Delbert Williams Recording Secy
KOKOMO—RTSEA of Kokomo 1008 Forrest Drive—Ernest Golieb
LOGANSPORT—Radio & TV Service Engineers Assn R R 2—Jack Hill
NEW CASTLE—ESTA of Henry County 124 S 7th St—G L Koons
SOUTH BEND—ARTS of St Joseph Valley 1410 Sorin St—Russ Bills
VINCENNES—TESA—Vincennes 408 N 7th St—John Davis

IOWA

DAVENPORT—TESA-Quint-Cities 532 Brady St—Len Gregson
DES MOINES—TESA of Des Moines 1300 55 St—W L Grommon

KENTUCKY

LOUISVILLE—Kentuckian TV & Radio Technicians Assn 2206 Wingfield Court—Charles Simmons

LOUISIANA

BATON ROUGE—TV Technician Service Assn 1290 Main St—Stanley Brohn
BOGALUSO—TESA of Bogaluso 209 Louisiana Ave—J P Morgan
LAKE CHARLES—TESA of Calcasieu 3426 Ryan—Roger Drost
NEW ORLEANS—TESA of the South 4210 Eagle St—S J Toca Recording Secy

MAINE

PORTLAND—Electronic Technicians Service Assn 42 Beckett St—P S Davis

MARYLAND

BALTIMORE—Maryland Electronics & TV Assn 3724 Ellerslie Ave—Edward Kernan

MASSACHUSETTS

LOWELL—Electronic Technicians Guild of Mass Greater Lowell Chapter 145 Bellevue St—Conrad Rondeau
NEW BEDFORD—Radio & TV Technicians Guild of Greater New Bedford 110 Topham St—J L Shepley
WOBURN—Electronic Technicians Guild Greater Boston Chapter 236 Main St—James Kelley
WORCESTER—Worcester County Assn of TV Technicians P O Box 1155—Ed Sulkoski

MICHIGAN

DETROIT—TESA of Wayne County 8510 McGraw Ave—J F McCulloch
DETROIT—TV Service Assn of Mich 8225 Woodward Ave—M T Graham
GRAND RAPIDS—TV Service Dealers Assn 49 40th St S W—William Katsma
ROYAL OAK—South Oakland County TV Assn P O Box 341—N C Estes

MINNESOTA

LITTLE FALLS—Mid-Minnesota TV Servicemen's Assn P O Box 102—Gerry Lesmeister
MINNEAPOLIS—TESA of Minneapolis 6613 50th Ave N—J A Farmer
ST PAUL—TESA of St Paul 485 S Griggs St—Wm Schorn

MISSOURI

GREENFIELD—TESA-Southwest Mo—Ernest Moudy
JENNINGS—TEAM-Electronic Assn of Mo 2063 Wedgewood—H J Wolf
KANSAS CITY—National Appliance Service Assn 2201 Grand Ave—J S McDermott
KANSAS CITY—Electric Assn of Kansas City 2201 Grand Ave—J S McDermott
KANSAS CITY—TV Service Engrs of greater Kansas City 2114 E 39 St—D A Quillin
MOREHOUSE—TESA of Semo—Alton Bahannon
MOUNTAIN GROVE—TESA of South Central Mo P O Box 31—W A Pryer
ST JOSEPH—TV Electronic Service Assn of N W Mo P O Box 102 Station A—Bill Childs
ST LOUIS—TESA-St Louis 2804 Chippewa—Morton Singer
SPRINGFIELD—TESA of the Ozarks 2524 S Campbell—Tom Leftwich

NEW JERSEY

GLOUCESTER—Allied Electronic Technicians of NJ Box 15—J J Papovich
TRENTON—Radio Servicemen's Assn 343 William St—M E Toth
WEST ORANGE—Electronic Guild of New Jersey 583 Valley Rd—A D Cosmo
WESTVILLE—Tri-State Council of TV Service Assn 216 Broadway—J J Papovich

NEW YORK

ALBANY—TSA 514 Second St—Roger Wells
BROOKLYN—Citizens Band Radio Relay League 189 16th St—John Boysko Exec Secy
BUFFALO—Radio Technicians Assn 694 Broadway—R A Wutz
BUFFALO—TV-Electronic Service Assn Box 1182 Station E—Vic Dafchik
BUFFALO—Western New York Electronics Guild 2326 Main St—Elmore Bement
CANTON—St Lawrence County Electronic Servicemen's Assn 109 Main St—Lyle Newvine
FOREST HILLS—Forest Radio & TV Assn 109-01 72nd Rd—G E Berger
HUDSON FALLS—Empire State Federations of Electronic Technicians RD #1—Melvin Cohen Corres Secy
KINGSTON—Ulster Electronic Technicians Assn 94 Furnace St—C A Kohl
LAURELTON—Radio-TV Guild (RTG of LI) 230-08 S Conduit Ave—Robert Larsen
NEW YORK—Alumni Assn of RCA Institute 350 W 4th St—P M Genduso Pres
NEW YORK—Certified Electronic Technicians Assn 304 E 67th St—Sol Fields
NEW YORK—Electronic Technicians Assn 125 E 46 St
NEW YORK MILLS—Mohawk Valley Radio-TV Technicians Guild 203 Main St—S J Niemiec
PEARL RIVER—Rockland Assn of TV & Electronic Services 55 E Central Ave—Larry Critchlow
PORTVILLE—Tri-County Electronic Technicians Assn 28 S Main St—J P Golden
SYRACUSE—Syracuse TV Technicians Assn 742 Butternut St—Bertrand Desmarais

NORTH CAROLINA

DURHAM—N Car Federation of Electronic Assns 520 E Main St—L L Leathers
DURHAM—Piedmont Electronic Service Assn P O Box 222 E Durham Station—J J Bralley
FAYETTEVILLE—Cumberland County Radio & TV Assn 3920 Bragg Blvd—E F Barbour Jr

OHIO

COLUMBUS—Associated Radio-TV Service Dealers 2552 N High St—Walter Driscoll
COLUMBUS—TESA-Ohio 2552 N High St—Gregory Barkoukis
WEST MIDDLETOWN—TESA of Middletown P O Box 5—O D Burdge
SANDUSKY—TESA of Sandusky Area P O Box 811—M A Williams
SPRINGFIELD—TESA of Springfield P O Box 851—Roy Henderson
TOLEDO—Electronic Technicians Assn of Toledo 1952 Sylvania Ave—Quentin Hannan

OKLAHOMA

OKLAHOMA CITY—TESA of Oklahoma 2321 S Robinson—Roy Allen

PENNSYLVANIA

EPHRATA—Electronic Technicians Assn of Lancaster County P O Box 264—G L Sweigart
HARRISBURG—Mid-State Electronic Service Dealers Assn (ESOA) 17th & Herr Sts—A W Mottern
PITTSBURGH—Electronic Service Dealers Assn of Western Penna (ESOA) 6026 Station St—J S Doyle Exec Secy
PITTSBURGH—Radio & TV Servicemen's Assn of Pittsburgh 3239 Ashlyn St—Thomas Ging
STATE COLLEGE—TV Service Assn of Centre County 232 S Allen St—C H Smith

RHODE ISLAND

RIVERSIDE—R I Radiomen's Business Assn 425 Willett Ave—E J Oliver

SOUTH CAROLINA

CHARLESTON—Charleston Appliance Radio TV Dealers Assn Box 214—W T Kennedy

TEXAS

SAN ANTONIO—Texas Electronics Assn of San Antonio 1020 Townsend—George Stowe
TYLER—Tyler Radio & TV Assn P O Box 3302 Station A—J F Havard

WASHINGTON

SEATTLE—King County TV Service Assn 500 E Pine St—J O Humphrey
SEATTLE—Northwest Appliance & TV Assn 512 1st Ave N—R L Thompson

WISCONSIN

GREEN BAY—TESA-Green Bay 914 Howard St—Oliver Davis
MILWAUKEE—TESA-Milwaukee 12217 W North Ave—Frank Schroeder
SHEBOYGAN—TESA-Sheboygan County 1125 Indiana Ave—Paul Miller

CANADA

HAMILTON ONTARIO—Radio Electronic Technicians Assn of Ontario 40 Westminster Ave—G F Leeks
WINNIPEG MANITOBA—Radio Electronic Technician Assn PO Box 391—Christian Harder

Technical Societies & Industry Associations

with name of secretary unless otherwise noted

Acoustical Society of America 335 E 45 St New York 17 NY—Wallace Waterfall
American Institute of Electrical Engineers 33 W 39 St New York 18 NY—N S Hibshman
American Institute of Physics 335 E 45 St New York 33 NY—Wallace Waterfall
American Management Assn 1515 Broadway New York 36 NY—Philip Jones
American Physical Society Pupin Physics Labs Columbia University New York 27 NY—Dr Karl K Darrow
American Radio Importers Assn 276 4 Ave New York 10 NY—David Simon
American Radio Relay League 38 La Salle Rd West Hartford 7 Conn—John Huntoon
American Society for Quality Control 161 W Wisconsin Ave Milwaukee 3 Wis—William P Youngclaus Jr Adm Secy
American Society For Testing Materials 1916 Race St Philadelphia 3 Pa—T A Marshall Jr
American Society of Mechanical Engineers 29 W 39 St New York 18 NY—O B Schier II
American Standards Assn 10 E 40 St New York 16 NY—Vice Admiral G F Hussey Jr USN (Ret) Managing Dir
American Welding Society 33 W 39 St New York 18 NY—F L Plummer
Armed Forces Communications & Electronics Assn 1624 Eye St N W Washington 6 DC—Colonel F T Ostenberg USA Ret
Assn for Computing Machinery 14 E 69 St New York 21 NY—Dr Bruce Gilchrist
Assn of Electronic Parts & Equipment Mfrs 11 S La Salle St Suite 1500 Chicago 3 Ill—Kenneth C Prince
Audio Engineering Society P O Box 12 Old Chelsea Station New York 11 NY—C J LeBel

Electrical Apparatus Service Assn (Formerly National Industrial Service Assn) 7730 Carondelet Ave St Louis Mo—J M Harrington Exec Vice Pres
Electronic Engineering Assn 11 Green St Mayfair London W1 England—L T Hinton Chairman
Electronic Industries Assn 1721 DeSales St N W Washington 6 DC—James D Secrest
Electronic Maintenance Engineering Assn 107 E 38 St New York 16 NY—Chris Lampel Exec Dir
Electronic Representatives Assn 600 S Michigan Ave Chicago 5 Ill—Grant Shaffer

Institute of the Aerospace Sciences 2 E 64 St New York 21 NY—Robert R Dexter
Institute of High Fidelity Mfrs 125 E 23 St New York 10 NY—Gordon Gow
Institute of Radio Engineers 1 E 79 St New York 21 NY—Dr George W Bailey
International Municipal Signal Assn 130 W 42 St New York 36 NY—Irvin Shulsinger

Joint Technical Advisory Committee 1 E 79 St New York 21 NY—L G Cumming

Metal Finishing Assn of Southern Calif 4475 Vineland Ave North Hollywood Calif—Harvey Stowers Exec Secy

National Appliance & Radio-TV Dealers Assn 1141 Merchandise Mart Chicago 54 ILL—Ken Stucky
National Association of Broadcasters 1771 N St NW Washington 6 DC—Everett E Revercomb
National Assn of Electrical Distributors 290 Madison Ave New York 17 NY—Arthur W Hooper Exec Dir
National Assn of Music Merchants 222 W Adams St Chicago 6 Ill—William R Gard Exec Secy
National Assn of Relay Mfrs P O Box 6 Stillwater Okla—Prof C F Cameron Technical Coordinator
National Audio-Visual Assn 1201 Spring St Fairfax Va—Don White Exec Vice Pres
National Electrical Mfrs Assn 155 E 44 St New York 17 NY—Joseph F Miller Managing Dir
National Electronic Distributors Assn 343 S Dearborn St Chicago 4 Ill—Gail S Carter Exec Vice Pres
National Electronics Conference 228 N LaSalle St Chicago 1 Ill—Joseph J Gershon Pres
Phonograph Mfrs Assn 37 W 53 St New York 19 NY—A D Adams
Precision Potentiometer Mfrs Assn 27 E Monroe St Chicago 3 Ill—R E Pritchard Exec Secy
Producers of Associated Components for Electronics (PACE) 261 Broadway New York 7 NY—Walter Jablon
Purchasing Agents of the Radio Television & Electronic Industry Box 62 Rosedale 22 NY—T. Trimboli
Radio Club of America 11 W 42 St New York 36 NY—James Morelock
Radio Technical Commission for Aeronautics Room 1072 Bldg T-5 16 & Constitution N W Washington 25 DC—Lewis M Sherer Exec Secy
Radio Technical Commission for Marine Services c/o Federal Communications Commission Washington 25 DC—G R McLeod
Record Industry Assn of America 1 E 57 St New York 22 NY—Henry Brief
Scientific Apparatus Makers Assn 20 N Wacker Drive Chicago 6 Ill—Kenneth B Andersen
Society of Motion Picture & Television Engineers 55 W 42 St New York 36 NY—Charles S Stodter Exec Secy
Special Industrial Radio Service Assn 711 14 St N W Washington 5 DC—G Kenneth Adams
Ultrasonic Mfrs Assn 900 N Federal Highway Pompano Beach Fla—C E Herington
Western Association of Circuit Manufacturing 4475 Vineland Ave North Hollywood Calif—Harvey Stowers
Western Electronic Mfrs Assn 1435 S La Cienega Blvd Los Angeles 35 Calif—Burgess Oempster

Electronic Schools

All have both Correspondence and Resident Courses, except those followed by R for Resident Courses or C for Correspondence Courses.

CALIFORNIA

ANAHEIM—Coast Electronic Institute 501 S Brookhurst St-1-2-3-4-5-6-R
HOLLYWOOD—Grantham School of Electronics 1505 N Western Ave-4
HOLLYWOOD—Hollywood Radio & TV Institute 7078 Hollywood Blvd-1-2-C
HOLLYWOOD—Pacific Int'l College of Arts & Sciences 5719 Santa Monica Blvd-10
LOS ANGELES—National Technical Schools 4000 S Figueroa St-1-2-3-4-5-6-8
LOS ANGELES—Radio-Television Training School 815 E Rosecrans-1-2-3-5-10
LOS ANGELES—RCA Institutes 610 S Main St-1-2-3-4-5-6

CONNECTICUT

HARTFORD—Ward School of Electronics of the University of Hartford 44 Niles St-5-10-R

DISTRICT OF COLUMBIA

WASHINGTON—Capitol Radio Engineering Institute 3224 16 St N W-5-7-9-10
WASHINGTON—Grantham School of Electronics 821 19 St NW-4-R
WASHINGTON—National Radio Institute 3939 Wisconsin Ave-1-2-3-4-5-8-C

ILLINOIS

BELLWOOD EI Electrical School P O Box 87-1-3-5-8-C
CHICAGO—Christy Trades School 3214 W Lawrence Ave-1-8-C
CHICAGO—Commercial Trades Institute 1400 W Greenleaf Ave-1-2-3-5-6-C
CHICAGO—Coyne Electrical School 1501 W Congress Pkwy-1-2-3-5-6-8
CHICAGO—DeVry Technical Institute 4141 Belmont Ave-1-2-3-4-5-6-7-8-10
CHICAGO—Industrial Training Institute 2150 W Lawrence Ave-1-2-5-8-C
CHICAGO—Motorola Training Institute 4501 W Augusta Blvd-4 (Specifically, "2-Way FM Mobile Radio")-C
CHICAGO—Sprayberry Academy of Radio-TV 1512 W Jarvis Ave-1-C

INDIANA

ANGOLA—Tri-State College 1612 College Ave-10-R
INDIANAPOLIS—Indianapolis Electronic School 633 N Pennsylvania St-1-2-3-4-5-6-10-R
VALPARAISO—Valparaiso Technical Institute Box 490-1-2-3-4-5-10-R

KENTUCKY

LOUISVILLE—United Electronics Labs 3947 Park Drive-1-2-3-4-5-6-7-10

MARYLAND

BALTIMORE—Baltimore Technical Institute 1425 Eutaw Place-1-2-3-4-5-10-R

MICHIGAN

DETROIT—Radio Electronics & TV Schools 2030 Grand River-1-2-3-4-5-6-10-R

MINNESOTA

MINNEAPOLIS—Chicago Vocational Training 3330 University Ave SE-1-2-3-5-6-8-9-C
MINNEAPOLIS—Northwestern TV & Electronics Institute 3800 Minnehaha Ave-1-2-3-4-5-6-R

MISSOURI

KANSAS CITY—Central Technical Institute 1644 Wyandotte St-1-2-3-4-5-6-7-8-9-10

(Continued on page 77)

1961 ELECTRONIC TECHNICIAN DIRECTORY

Alphabetical Listing of Manufacturers

A master listing of the names and addresses of manufacturers of replacement products, component parts, equipment, instruments and materials, as well as technical publishers

Accurate Instrument 9 W Prospect Ave Mt Vernon NY
Ace Lite Step Co 1706 S State St Chicago Ill
Acme Electric 31 Water St Cuba NY
Acme Lite Products Congers NY
Acme Wire 1255 Dixwell Ave New Haven Conn
Acoustica Associates Fairchild Court Plainview NY
Acoustic Research 24 Thorndike St Cambridge Mass
Acro Products 369 Shurs Lane Philadelphia Pa
Action Systems 34 Cambridge St Meriden Conn
Adage Inc 292 Main St Cambridge Mass
Adams & Westlake 1025 N Michigan Ave Elkhart Ind
AOC Inc 2833 13 Ave S Minneapolis Minn
Adler Electronics 1 LeFevre Lane New Rochelle NY
Admiral Corp 3800 W Cortland St Chicago Ill
Advance Electric & Relay 2435 N Naomi St Burbank Calif
Advanced Acoustics 391 Lakeside Ave Orange NJ
Ad-Yu Electronics 249 Techune Ave Passaic NJ
Aeronautical Electronics PO Box 6527 Raleigh NC
Aerovox Corp 740 Belleville Ave New Bedford Mass
AGA Div Elastic Stop Nut Corp 1027 Newark Ave Elizabeth NJ
Airborne Instruments Deer Park NY
Aircraft Radio Boonton NJ
Airflyte Electronics 535 Ave A Bayonne NJ
Air-Marine Motors 369 Bayview Ave Amityville NY
Airtron Inc 200 Hanover Ave Morris Plains NJ
Akro-Mils 820 Market St Akron Ohio
Alco Electronic Prods 3 Wolcott Ave Lawrence Mass
Alden Electronic & Impulse Recording Equip Westboro Mass
Alden Products 117 N Main St Brockton Mass
Aldshir Mfg 111 Lake Ave Tuckahoe NY
Alectric Mfg 7842 39 Ave Kenosha Wis
Alford Mfg 299 Atlantic Ave Boston Mass
All Channel Prods 47-39 49 St Woodside NY
Allegany Instrument 1091 Wills Mountain Cumberland Md
Allen-Bradley 136 W Greenfield Ave Milwaukee Wis
Alliance Mfg Alliance Ohio
Allied Control 2 East End Ave New York NY
Allied Radio 100 N Western Ave Chicago Ill
Alnor Instrument 418 N LaSalle St Chicago Ill
Alonge Products 163 W 23 St New York NY
Alpha Metals 56 Water St Jersey City NJ
Alpha Wire 200 Varick St New York NY
Alprodco Inc Mineral Wells Tex
Altec-Lansing 1515 S Manchester Anaheim Calif
American Concertone 9449 W Jefferson Blvd Culver City Calif
American Cystoscope Pelham Manor NY
American Electrical Heater 6110 Cass Ave Detroit Mich
American Electronics 1725 W 6 St Los Angeles Calif
American Enka Corp Wm Brand Rex Div North Windham Conn
American Geloso Electronics 251 4 Ave New York NY
American Instrument 8030 Georgia Ave Silver Spring Md
American Microphone Co Rockford Ill
American Pamcor 181 Hillcrest Ave Havertown Pa
American Rectifier 95 Lafayette St New York NY
American Scientific Devel PO Box 404 Janesville Wis
American Super-Temperature Wires 32 W Canal St Winooski Vt
American Time Products 580 5 Ave New York NY
American Tel & Tel 195 Bdwy New York NY
American TV & Radio 300 E 4 St St Paul Minn
Ameco Div Antennavision Inc PO Box 11326 Phoenix Ariz
Amp Inc 3822 Eisenhower Blvd Harrisburg Pa
Amperex Electronic 230 Duffy Ave Hicksville NY
Amperite Corp 561 Bdwy New York NY
Ampex Audio Corp 1020 Kifer Rd Sunnyvale Calif
Ampex Data Prods Box 5000 Redwood City Calif
Ampex Magnetic Tape Prods Orr Industries Co PO Box 190 Opelika Ala
Amphenol-Borg Electronics 2801 S 25 Ave Broadview Ill
Amphenol Connector Div Amphenol-Borg Electronics 1830 S 54 Ave Chicago Ill
Amplifier Corp of America 398 Bdwy New York NY
Amplitel Inc 342 W 40 St New York NY
Analab Instrument 30 Canfield Rd Cedar Grove NJ
Anchor Products 2712 Montrose Ave Chicago Ill
Anchor Wire 183-16 Jamaica Ave Jamaica NY
Andrea Radio 27-01 Bridge Pl N Long Island City NY
Antenna Designs Box 110 Burlington Iowa
Antenna Products 3753 Clark Chicago Ill
Antenna Specialists 12435 Euclid Ave Cleveland Ohio
Anton Electronic 1226 Flushing Ave Brooklyn NY
Antronic Corp 2712 W Montrose Ave Chicago Ill
Apex Wire & Cable Corp 237 37 St Brooklyn NY
Apparatus Devel PO Box 153 Wetherstield Conn
Applied Electronics E Grand Ave S San Francisco Calif
Arco Electronics Community Dr Lake Success LI NY
Arcturus Electronics 420 Kearny Ave Kearny NJ
Argos Products 6514 W Higgins Rd Chicago Ill
Argus Cameras 405 4 St Ann Arbor Mich
Arkay Int'l 88-06 Van Wyck Expressway Richmond Hill LI NY
Ark-Les Switch 51 Water St Watertown Mass
Armco Steel 703 Curtis St Middletown Ohio
Armour Electronics 4201 Redwood Ave Los Angeles Calif
Arnhold Ceramics 1 E 57 St New York NY
Arnold Magnetics 6050 W Jefferson Blvd Los Angeles Calif
Arrow Electronics 525 Jericho Tpk Mineola LI NY
Arrow Fastener 1 Junius Ave Brooklyn NY
Arrow-Hart & Hegeman Hartford Conn
Arvin Industries Columbus Ind
Assembly Prods 75 Wilson Mills Rd Chesterland Ohio
Associated Research 3777 W Belmont Ave Chicago Ill
Astatic Corp Jackson & Harbor Sts Conneaut Ohio
Astrex Inc 150 5 Ave New York NY
Astron Corp 255 Grant Ave East Newark NJ
Atlas Sound Corp 1449 39 St Brooklyn NY
Atohm Electronics 7648 San Fernando Sun Valley Calif
Audax Inc 38-19 108 St Corona NY
Audel Co Theo 49 W 23 St New York NY
Audio Development 2833 13 Ave Minneapolis Minn
Audio Devices 620 E Dyer Rd Santa Ana Calif
Audio Devices 444 Madison Ave New York NY
Audio Dynamics 1677 Cody Ave Ridgewood NY
Audio-Empire Div Dyna Empire 1075 Stewart Ave Garden City NY
Audiogersh Corp 514 Bdwy New York NY
Audiotex Mfg 400 S Wyman St Rockford Ill
Autenna Industries 3455 Vega Ave Cleveland Ohio
Automatic Controls Div General Controls 8080 McCormick Blvd Skokie Ill
Automatic Electric Co Northlake Ill
Automatic Switch Florham Park NJ
Automatic Timing & Controls King of Prussia Pa
Automation Devel Culver City Calif
Automation Electronics Div Arnoux Corp 11924 W Washington Blvd Los Angeles Calif
Autotronics Inc Box 208 Florissant Mo
Avnet Electronics 70 State St Westbury LI NY
Babcock Relays 1640 Monrovia Costa Mesa Calif
Bache & Co Semon 636 Greenwich New York NY
Bailey Meter 1050 Ivanhoe Rd Cleveland Ohio
Baird Atomic 33 University Rd Cambridge Mass
Baldwin-Lima Hamilton 42 4 Ave Waltham Mass
Ballantine Labs Boonton NJ
Barber-Colman Co Rockford Ill
Barker Products River St West Bridgewater Mass
Barker Sales 339 S Broad Ave Ridgefield NJ
Barker & Williamson Bristol Pa
Barry Controls 700 Pleasant St Watertown Mass
Barry Electronics 512 Bdwy New York NY
Baumker Mfg 3828 Summit St Toledo Ohio
Beattie-Coleman 1000 N Olive Anaheim Calif
Becker Electronics Mfg 1091 Rockaway Ave Valley Stream NY
Beckman Instruments Berkeley Div 2200 Wright Ave Richmond Calif
Beckman Instruments Scientific & Process Instr Div 2500 Fullerton Rd Fullerton Calif
Beckman Instruments Helipot Div 2500 Fullerton Rd Fullerton Calif
Behlman Eng'g 2911 Winona Ave Burbank Calif
Belden Mfg 4647 W Van Buren St Chicago Ill
Bell & Howell 7100 McCormick Rd Chicago Ill
Bell Sound Systems 555 Marion Rd Columbus Ohio
Belock Instrument 112-03 14 Ave College Point NY
Benco TV Assoc 27 Taber Rd Rexdale Ont Canada
Bendix Computer Div 5630 Arbor Vitae Los Angeles Calif
Bendix Eclipse Pioneer Div Teterboro NJ
Bendix Industrial Comm & Electr Prods Baltimore Md
Bendix Pacific Div 11600 Sherman Way N Hollywood Calif
Bendix Radio Div E Joppa Rd Towson Md
Bendix Red Bank Div Eatontown NJ
Bendix Scintilla Div Sidney NY
Bendix Semiconductor Products Westwood Ave Long Branch NJ
Benjamin Electronic Sound 97-03 43 Ave Corona NY
Berns Mfg 9853 Chalmers Detroit Mich
Beryllium Corp PO Box 1462 Reading Pa
B&F Instruments 3644 N Lawrence St Philadelphia Pa
Biddle Co James G 1316 Arch St Philadelphia Pa
Bird Electronic 303 Aurora Solon Ohio
Birnbach Radio 145 Hudson St New York NY
B&K Mfg 1801 W Belle Plaine Chicago Ill
Bliley Electric Union Station Bldg Erie Pa
Blonder-Tongue Labs 9 Alling St Newark NJ
B&M Electronics 2516 Dodge Ave Fort Wayne Ind
BNK Instruments 3040 W 106 St Cleveland Ohio
Boetsch Bros (Birch) 115 Cedar St New Rochelle NY
Bogen-Presto Box 500 Paramus NJ
Bogue Electric Mfg 52 Iowa Ave Paterson NJ
Bomac Labs Salem Rd Beverly Mass
Boonton Electronics 738 Speedwell Ave Morris Plains NJ
Boonton Radio Boonton NJ
Boro Electronics 69-18 Roosevelt Ave New York NY
Bosch Corp Robert 40-25 Crescent St Long Island City NY
Bourns Labs Box 2122 Riverside Calif
Bowmar Instrument 8000 Bluffton Rd Ft Wayne Ind
Bozak Co R T Box 1166 Darien Conn
Brach Mfg Corp 200 Central Ave Newark NJ
Branson Ultrasonic 40 Brown House Rd Stamford Conn
Bright Star Industries Clifton NJ
Bristol Co Waterbury Conn
British Electronics Sales Box 132 Oakland Gardens Sta Flushing NY
British Industries 80 Shore Rd Port Washington NY
Browning Labs 100 Union Ave Laconia NH
Bruno Tools 9330 Santa Monica Blvd Beverly Hills Calif
Brush Instruments 37 & Perkins Ave Cleveland Ohio
Buchanan Electric Hillside NJ
Buckeye Telephone & Supply 1250 Kinnear Rd Columbus Ohio
Bud Radio 2118 E 55 St Cleveland Ohio
Budelman Electronics 375 Fairfield Ave Stamford Conn
Buggie Inc H H Rte 795 & Lemoyne Toledo Ohio
Bulldog Electric 7610 Joseph Campeau Detroit Mich
Bulova Watch Electronics Div 40-01 61 St Woodside NY
Burgess Battery Exchange St Freeport Ill
Burndy Engineering Norwalk Conn
Burroughs Corp 707 W Milwaukee Ave Detroit Mich
Burroughs Corp Electronic Tube Div Plainfield NJ
Burroughs Corp Radnor Pa
Burton Rogers Corp Blade & Helen St Cincinnati Ohio
Bussmann Mfg 2538 W University St St Louis Mo
Cabinart Inc 35 Geyer St Haledon NJ
Cadre Industries Box 150 Endicott NY
Calcon Inc 100 Oakland Ave Washington Pa
Calibration Standards 1130 W 5 St Pomona Calif
Calif Technical Industries 1421 Old County Rd Belmont Calif
Calmart Int'l 429 S Western Ave Los Angeles Calif
Cambridge Therminonic 445 Concord Ave Cambridge Mass
Campro Prods 3131 Alliance Rd NE Canton Ohio
Cannon Electric 3208 Humboldt St Los Angeles Calif
Capcon Inc 61 Stanton St New York NY
Capitol Radio Eng'g Institute 3224 16 St NW Washington DC
Capital Records 1750 N Vine St Hollywood Calif
Capkit Int'l 816 W Olympic Blvd Los Angeles Calif
Capps & Co 20 Addison Pl Valley Stream NY
Carma Mfg 1879 Mullin Ave Torrance Calif
Carter Communications 6762 Greenville Ave Dallas Texas
Carter Motor 2711 W George Chicago Ill
Castle TV Tuner Service 5710 N Western Ave Chicago Ill
Cayo TV Eng'g 1904 Michigan Hwy 139 Benton Harbor Mich
CBC Electronics 2601 N Howard St Philadelphia Pa
CBS Electronics 100 Endicott St Danvers Mass
Centimeg Electronics 312 E Imperial Hwy El Segundo Calif
Centralab 900 E Keefe Ave Milwaukee Wis
Central Electronics 1247 W Belmont Ave Chicago Ill
Century Electronics & Instr 1333 N Utica Tulsa Okla
Cetron Electronic 715 Hamilton St Geneva Ill
Champion Dearment Tool South Main St Meadville Pa

Channel Master Corp Napanock Rd Ellenville NY
Charles Eng'g 6053 Melrose Los Angeles Calif
Chatham Electronics Div Tung-Sol Electric 1 Summer Ave Newark NJ
Checker Electronics Grays Lake Ill
Chemical Electronic Eng'g Jackson & Ravine Dr Matawan NJ
Chemtronics Inc 870 E 52 Brooklyn NY
Chester Cable Corp Chester NY
Chicago Miniature Lamp 1500 N Ogden Ave Chicago Ill
Chicago Standard Transformer 3501 Addison St Chicago Ill
Chicago Telephone Supply Elkhart Ind
Chicopee Mills 47 Worth St New York NY
Christie Electric 3410 W 67 St Los Angeles Calif
Cinch Mfg 1026 S Homan Ave Chicago Ill
Circon Component Corp Santa Barbara Municipal Airport Goleta Calif
Circo Ultrasonic 51 Terminal Ave Clark NJ
Circuit Controls 1500 E Colorado St Glendale Calif
Circuit Mfg 926 Shadeland Ave Drexel Hill Pa
Cisin Co Harry G Amagansett NY
CJS Electronics 745 W Wilkes-Barre St Easton Pa
Clairex Corp 19 W 26 St New York NY
Clare & Co C P 3101 Pratt Blvd Chicago Ill
Clarostat Mfg Dover NH
Clearbeam Antenna 21341 Roscoe Blvd Canoga Park Calif
Cletron Inc 1974 E 61 St Cleveland Ohio
Cleveland Institute of Radio-Electronics 4900 Euclid Ave Cleveland Ohio
Cleveland Instrument 6220 E Schaaf Rd Cleveland Ohio
Clevite Electronic Components 3405 Perkins Cleveland Ohio
Clevite Transistor Prods 221 Crescent St Waltham Mass
Clough-Brengle 6014 N Bdwy Chicago Ill
Coleman Cable & Wire Co 1900 N River Rd River Grove Ill
Collins Radio 2700 W Olive St Burbank Calif
Collins Radio 855 35 St NE Cedar Rapids Iowa
Collins Radio Co PO Box 1891 Dallas Texas
Colman Tool & Electronic Prod PO Box 2965 Amarillo Texas
Columbia Electric Mfg 4525 Hamilton Ave Cleveland Ohio
Columbia Records 799 7 Ave New York NY
Columbia Wire & Supply 2850 Irving Pk Rd Chicago Ill
Columbus Electronics 1010 Saw Mill River Rd Yonkers NY
Comapco Inc 17071 Ventura Blvd Encino Calif
Communication Eng'g Book Co Monteray Mass
Communications Co 300 Greco Ave Coral Gables Fla
Component Specialists 110 Northfield Rd Bedford Ohio
Component Specialties 3 Foxhurst Rd Baldwin LI NY
Components Corp Denville NJ
Components Inc 14621 Arminta St Van Nuys Calif
Comptometer Corp Communications & Electronics Div 5600 W Jarvis Chicago Ill
Computer Systems Culver Rd Monmouth Junction NJ
Computronics Inc 5310 E Pacific Pl Denver Colo
Conant Labs Box 3997 Bethany Station Lincoln Neb
Conley Electronics 8225 Christiana Skokie Ill
Connecticut Hard Rubber 407 East St New Haven Conn
Connector Corp 6025 N Keystone Ave Chicago Ill
Conrac Inc 19217 E Foothill Bldg Glendora Calif
Consolidated Electro-Dynamics 300 N Sierra Madre Villa Pasadena Calif
Consolidated Wire 1635 S Clinton St Chicago Ill
Continental Carbon 5221 Greene St Philadelphia Pa
Continental Connector 34-63 56 St Woodside NY
Continental Electronics 2724 Leonis Los Angeles Calif
Continental Electronics 19 Allegheny St Philadelphia Pa
Continental Mfg 1612 California St Omaha Neb
Continental-Wirt Electronics 5221 Greene St Philadelphia Pa
Control Electronics Huntington Station NY
Controls Switch Div Controls Co of America 4218 W Lake St Chicago Ill
Cook Electric 2700 Southport Chicago Ill
Cornell-Dubilier 333 Hamilton Blvd South Plainfield NJ
Corning Electronic Components Bradford Pa
Corning Glassworks Corning NY
Cornish Wire 50 Church St New York NY
Cox & Co 115 E 23 St New York NY
Coyne Electrical School Book Publ Div 1455 W Congress Pkwy Chicago Ill
Cramer Electronics 811 Boylston Boston Mass
Cratex Mfg 1600 Rollins Rd Burlingame Calif
Crest Labs 145 E Mineola Ave Valley Steam NY
Crosby Electronics 135 Eileen Way Syosset NY
Crown Controls Co 40-44 S Washington St New Bremen Ohio
Crown Int'l Box 261 Elkhart Ind
Cubic Corp 5575 Kearney Villa Rd Kearney Mesa Calif
Cummins Portable Tool 5055 N Lydell Ave Milwaukee Wis
Curtiss-Wright Electronics Div 35 Market St East Paterson NJ

Dage Electric 67 N 2 St Beech Grove Ind
Dage TV Michigan City Ind
Daven Co Livingston NJ
Davis Instruments 45 Halleck St Newark NJ
Dearborn Electronic Labs PO Box 3431 Orlando Fla
Decca Records 50 W 57 St New York NY
Decibel Products 3184 Quebec St Dallas Tex
Dejur-Amsco Corp Electronics Div 45-01 Northern Blvd Long Island City NY
Delco Radio Div GMC Kokomo Ind
DeMornay-Bonardi 780 S Arroyo Pkwy Pasadena Calif
DeRo Electronics 134 Nassau Rd Roosevelt LI NY
Deutschman Corp Tobe Providence Hwy Norwood Mass
DeVar Systems 494 Glenbrook Rd Glenbrook Conn
DeWald Electronics 35-15 37 Ave Long Island City NY
Dexter Chemicals 845 Edgewater Rd Bronx NY
Dialight Corp 60 Stewart St Brooklyn NY
Diamond Power Specialty Electronics Div PO Box 415 Lancaster Ohio
Diamond Tool 4602 Grand Ave W Duluth Minn
Dictograph Products 95-25 149 St Jamaica LI NY
Digital Equipment Maynard Mass
Digital Instruments 5115 Via Corona Los Angeles Calif
Diversa Electronics 5114 W Jefferson Blvd Dallas Tex
DMeter Mfg 68 N Bdwy Yonkers NY
Don-Ell Corp 1039 Custer Dr Toledo Ohio
Donner Scientific 888 Golindo Concord Calif
Doss Electronic Research 820 Baltimore Kansas City Mo
Dow-Key Co PO Box 711 Thief River Falls Minn
Drake Co R L 18 E Central Ave Miamisburg Ohio
Drake Electric Works 3656 Lincoln Ave Chicago Ill
Drake Mfg 4626 N Olcott Ave Chicago Ill
Dremel Mfg 2300 18 St Racine Wis
Dressen-Barnes 250 N Vinedo Ave Pasadena Calif
Dresser Electronics HST Div 555 N 5 St Garland Tex
Dresser Electronics SIE Div 10201 Westheimer Rd Houston Tex
Dubbings Sales 226 Franklin Ave Hewlett LI NY
DuKane Corp St Charles Ill
DuMont Labs Allen B Electron Tube Div 750 Bloomfield Ave Clifton NJ
DuMont Labs Allen B 35 Market St East Paterson NJ
Dunkle Electronics 740 S Western Los Angeles Calif
Duotone Co Locust St Keyport NJ
du Pont de Nemours Mylar Film Dept Wilmington Del
du Pont de Nemours Silicon Div Wilmington Del
Dutch Brand Div Johns-Manville 7800 S Woodlawn Ave Chicago Ill
Dutrex Industries 373 Park Ave S New York NY
Dymo Industries 2725 10 St Berkeley Calif
Dynaco Inc 3912 Powelton Ave Philadelphia Pa
Dyna-Empire 1075 Stewart Ave Garden City LI NY
Dynage Inc 75 Laurel St Hartford Conn
Dynamu Magnetronics 21 N 3 St Minneapolis Minn
Dynatron Labs 71 Glenn Dr Camarillo Calif

Eagle Electric 23-10 Bridge Plaza S Long Island City NY
Eastern Jewel 137-21 70 Ave Flushing NY
Easy-Up Tower 908 State St Racine Wis
Eby Sales 148-05 Archer Ave Jamaica LI NY
Efcon Inc Patterson Place Roosevelt Field Garden City LI NY
Eico Electronic Instr 33-00 Northern Blvd Long Island City NY
Eitel-McCullough 301 Industrial Way San Carlos Calif
Eklind Tool & Mfg Co 2627 N Western Ave Chicago Ill
Elco Corp M St below Erie Philadelphia Pa
Eldon Industries 1010 E 62 St Los Angeles Calif
Electra Mfg 4051 Bdwy Kansas City Mo
Electric Auto Lite 3529 24 St Port Huron Mich
Electric Auto Lite Champlain St Toledo Ohio
Electric Regulator Pearl St Norwalk Conn
Electric Soldering Iron 3852 W Elm St Deep River Conn
Electric Specialty 211 South St Stamford Conn
Electric Storage Battery Automotive Div PO Box 6266 Cleveland Ohio
Electric Storage Battery Exide Ind Div PO Box 8109 Philadelphia Pa
Electric Sweeper Service 2034 Euclid Ave Cleveland Ohio
Electrocraft Co 400 South Wyman Rockford Ill
Electro Impulse Lab 208 River St Red Bank NJ
Electromatic Industries Hollywood Fla
Electro-Measurements 7524 SW Macadam Ave Portland Ore
Electro-Mechanical Research PO Box 3041 Sarasota Fla
Electron Enterprises 6917 Stanley Ave Berwyn Ill
Electronic Applications 194 Richmond Hill Ave Stamford Conn
Electronic Associates Long Branch NJ
Electronic Chemical 813 Communipaw Ave Jersey City NJ
Electronic Devel Assoc 126 E 46 St New York NY
Electronic Devel Corp 423 W Bdwy Boston Mass
Electronic Devices 50 Webster Ave New Rochelle NY
Electronic Measurements 625 Bdwy New York NY
Electronic Measurements Lewis St & Maple Ave Eatontown NJ
Electronic Publishing 180 N Wacker Dr Chicago Ill
Electronic Research Assoc 67 Factory Pl Cedar Grove NJ
Electronic Specialties 52 Chandler St Worcester Mass
Electronic Technician 480 Lexington Ave New York NY
Electronic Transistors 9226 Hudson Blvd North Bergen NJ
Electronic Tube Corp 1200 E Mermaid Lane Philadelphia Pa
Electronic Utilities 2244 S Western Ave Chicago Ill
Electronic Ventures 472 Kuehnis Dr Campbell Calif
Electronics Missiles & Communications Inc 268 E 3 St Mount Vernon NY
Electrons Inc 127 Sussex Newark NJ
Electrophono & Parts 530 Canal St New York NY
Electro Products Labs 4501 N Ravenswood Ave Chicago Ill
Electro-Products 13144 W McNichols Detroit Mich
Electro Scientific Industries 7524 SW Macadam Portland Ore
Electro-Sonic Labs 35-54 36 St Long Island City NY
Electro Switch 167 King Ave Weymouth Mass
Electro-Voice Inc Buchanan Mich
Electrovox Co 60 Franklin St East Orange NJ
ELF Inc PO Box 302 Florissant Mo
Elgin Int'l 1410 Bdwy New York NY
Emerson Radio & Phono 14 & Coles St Jersey City NJ
Empire Service RD 3 Skaneateles NY
Engelhard Industries 113 Astor St Newark NJ
Entron Inc 4902 Lawrence St Bladensburg Md
Equipment Leasing Corp 814 W 4 St Wilmington Dela
Equipto Div Aurora Equip 401 S Highland Ave Aurora Ill
Ercona Corp 16 W 46 St New York NY
Eric Electronics Co 1823 Colorado Ave Santa Monica Calif
Erie Resistor 644 W 12 St Erie Pa
Essex Electronics 550 Springfield Ave Berkeley Heights NJ
Essex Wire Corp 6200 Concord Detroit Mich
Esterline-Angus Co PO Box 596 Indianapolis Ind
E-Z Hook Test Prods 1536 Woodburn Ave Covington Ky
E-Z Way Towers PO Box 5491 Tampa Fla

Fairbanks Morse Co 505 Oakwood Ave West Hartford Conn
Fairchild Recording Equip 10-40 45 Ave Long Island City NY
Fairchild Semiconductor 545 Whisman Rd Mountain View Calif
Fanon Electronic 439 Frelinghuysen Ave Newark NJ
Farmer Electric Prods 2300 Washington St Newton Lower Falls Mass
Fast Chemical Prods 965 Nepperhan Ave Yonkers NY
Fast & Co John E 3598 N Elston Ave Chicago Ill
Federal Electric Corp 17 & Garden State Pkwy Paramus NJ
Federal Pacific Electric 50 Paris St Newark NJ
Federal Telephone & Radio 100 Kingsland Rd Clifton NJ
Federated Industries 4477 N Elston Ave Ill
Federated TV Mart 513 Rogers Ave Brooklyn NY
Feiler Eng'g & Mfg 8026 N Monticello Skokie Ill
Fen-Tone Corp 106 5 Ave New York NY
Ferranti Electric Industrial Park No 1 Plainview LI NY
Ferrodynamics Corp Route 17 & Gregg St Lodi NJ
Fidelitone Inc 6415 Ravenswood Ave Chicago Ill
Fidelity Instrument 100 E Boundary Ave York Pa
Filtors Inc 30 Sagamore Hill Dr Port Washington NY
Filtron Co 131-15 Fowler Ave Flushing NY
Finney Co 34 W Interstate St Bedford Ohio
Fisher Radio 21-21 44 Dr Long Island City NY
Flotron Industries 1608 Centinela Ave Inglewood Calif
Fluke Mfg John 1111 W Nickerson St Seattle Wash
Forway Industries 122 Green Ave Woodbury NJ
Foto-Video Electronics 36 Commerce Rd Cedar Grove NJ
Fourjay Industries 2801 Ontario Ave Dayton Ohio
Foxboro Co Newponset Ave Foxboro Mass
Freed Transformer 1718 Weirfield St Brooklyn NY
FXR Inc 25-26 50 St Woodside NY

Garde Mfg 53 John St Cumberland RI
Gardiner Electronics 2545 E Indian School Rd Phoenix Ariz
Garlock Electronic Products 602 N 10 St Camden NJ
Garrard Sales 80 Shore Rd Pt Washington LI NY
Gaylord Products 1918 Prairie Ave Chicago Ill
G-C Electronics 400 S Wyman St Rockford Ill
Gee-Lar Mfg 418 S Wyman St Rockford Ill
Gem Electric 239 37 St Brooklyn NY
General Cement Mfg 400 S Wyman St Rockford Ill
General Electric Apparatus Div Schenectady NY
General Electric Audio Products Div 2200 N 22 St Decatur Ill
General Electric Capacitor Div Hudson Falls NY
General Electric Communications Products Div Lynchburg Va
General Electric Instrument Dept West Lynn Mass
General Electric Lamp Div Nela Park Cleveland Ohio
General Electric Power Tube Dept Schenectady NY
General Electric Receiver Div 1001 Broad St Utica NY
General Electric Receiving Tube Dept Owensboro Ky
General Electric Rectifier Components Div 66 W Genesee St Baldwinsville NY
General Electric Semiconductor Products Div Charles Bldg Liverpool NY

General Electric Specialty Control Dept Waynesboro Va
General Electric Voltage Regulator Prods Sec Pittsfield Mass
General Industrial Co 1760 W Montrose Ave Chicago Ill
General Industries Olin & Taylor Sts Elyria Ohio
General Instrument 65 Gouverneur Newark NJ
General Kinetics 2611 Shirlington Rd Springfield Va
General Mills 1620 Central Ave Minneapolis Minn
General Precision Inc GPL Div Grand Union Bldg Mount Kisco NY
General Radio Co 22 Baker Ave West Concord Mass
General RF Fittings 702 Beacon St Boston Mass
General Techniques Inc 1270 Bdwy New York NY
General Transistor 92-15 172 St. Jamaica NY
Gerbet Hairspring Co Thomaston Conn
Gernsback Library 154 W 14 St New York NY
Gertsch Products 3211 S La Cienega Blvd Los Angeles Calif
Giantview TV Network 901 Livernois Ferndale Mich
Girard-Hopkins 1000 40 Ave Oakland Calif
Gits Moulding 4600 W Huron Chicago Ill
Glaser-Steers 155 Oraton St Newark NJ
Glide-Lite Co 11 Moonachire Rd Hackensack NJ
Globe Electrical Mfg 1729 S 134 St Gardena Calif
Globe Electronics 41 South 34 St Council Bluffs Iowa
Gonset Div Young Spring & Wire PO Box 791 Burbank Calif
Good-All Electric 112 W 1 St Ogallala Nebr
Gordos Corp 250 Glenwood Ave Bloomfield NJ
Gorn Electronic 845 Main St Stamford Conn
Gotham Audio Corp 2 W 46 St New York NY
Grado Labs 4614 7 Ave Brooklyn NY
Gramercy Sound 175 5 Ave New York NY
Gramer-Halldorsen 2734 N Pulaski Rd Chicago Ill
Granco Products 83-30 Kew Gardens Rd Kew Gardens NY
Grant Pulley & Hdw 43 High St West Nyack NY
Graphic Controls 189 Van Rensselear Buffalo NY
Graphic Systems Yanceyville NC
Grayhill Inc 361 Hillgrove Ave La Grange Ill
Gray High Fidelity Div 16 Arbor St Hartford Conn
Gray Radio Co W Palm Beach Fla
Great Eastern Mfg 165 Remsen Brooklyn NY
Green Instrument 295 Vassar St Cambridge Mass
Greenlee Tool Rockford Ill
Greentree Electronics 1122 S La Cienega Blvd Los Angeles Calif
Gremar Mfg 7 North Ave Wakefield Mass
Greyhound Corp 140 S Dearborn St Chicago Ill
Greylock Electronics 438 Central Ave Albany NY
Griebach Instruments 315 North Ave New Rochelle NY
Grommes Div Precision Electronics 9101 King Ave Franklin Park Ill
Grove Electronic 4103 W Belmont Chicago Ill
Guardian Electric 1627 Walnut St Chicago Ill
Gudeman Co 340 W Huron St Chicago Ill
Guide Lamp Div GMC 2919 Pendleton Ave Anderson Ind
Gulton Industries 212 Durham Ave Metuchen NJ
Gurian & Co Edward E 2211 S State St Chicago Ill
G-V Controls Ockner Pkwy Livingston NJ
Gyra Electronics PO Box 184 La Grange Ill

Haddam Mfg Route 9 Haddam Conn
Hagan Chemical & Controls Hagan Center Pittsburgh Pa
Hallamore Electronics 714 N Brookhurst St Anaheim Calif
Hallicrafters Co 4401 W 5 Ave Chicago Ill
Hamilton-Hall Electronic Specialties 227 N Water St Milwaukee Wis
Hamlin Inc 423 10 St Wilmette Ill
Hammarlund Mfg 460 W 34 St New York NY
Handicraft Tools Div X-Acto Inc 48-41 Van Dam St Long Island City NY
Handley Inc 12960 Panama St Los Angeles Calif
Hardwick Hindle Inc 40 Hermon St Newark NJ
Harman-Kardon Inc Plainview LI NY
Harris Transducer Woodbury Conn
Harrison Labs 45 Industrial Rd Berkeley Heights NJ
Hartley Products Co 521 E 162 St. Bronx NY
Harvey-Wells 14 Huron Dr. E Natick Industrial Park Natick Mass
Hatfield Wire & Cable Hillside NJ
Hathaway Instrument 5800 E Jewell Ave Denver Colo
Haydon Co A W 232 N Elm St Waterbury Conn
Hayden Div General Time 245 E Elm Torrington Conn
Heath Co Benton Harbor Mich
Helland Div Minn-Honeywell 5200 E Evans Ave Denver Colo
Heinemann Electric PO Box 299 Trenton NJ
Hepco 74 Varick St New York NY
Heppner Mfg Co PO Box 612 Round Lake Ill
Hewlett-Packard 1501 Page Mill Rd Palo Alto Calif
Hexacon Electric 180 W Clay Ave Roselle Park NJ
Hickok Electrical Instr 10514 Dupont Ave Cleveland Ohio
Hi-Lo Mfg 1122 Newport St Chicago Ill
Hi-Par Products 347 Lunenburg St Fitchburg Mass
HITACHI (see Sampson Co)
Hitemp Wires 1200 Shames Dr Westbury NY
Hi-Test Premier Prods 361 Bdwy New York NY
Hobbs Corp J W 2078 Yale Blvd Springfield Ill
Hoffman Electronics Consumer Prods Div 3761 S Hill St Los Angeles Calif
Hoffman Electronics Semi-Conductor Div 1001 N Arden Dr El Monte Calif
Hoffman Electronics H L 35 Old Country Rd Westbury LI NY
Hoffman Publishers 469 E Ohio St Chicago Ill
Holloway Electronics Broward County Int'l Airport Fort Lauderdale Fla
Holt Rinehart & Winston 385 Madison Ave New York NY
Hoover Electronics 110 W Timonium Rd Timonium MD
Hopkins Eng'g 12900 Foothill Blvd San Fernando Calif
Houston Instruments Box 22234 Houston Texas
Howell Instrument 3479 Hickory St Fort Worth Texas
Hoyt Electrical Instr 42 Carleton St Cambridge Mass
HST Div Dresser Electronics Garland Texas
Huggins Labs 999 E Arques Ave Sunnyvale Calif
Hughes Aircraft Products Div Florence & Teal Sts Culver City Calif
Hughes Aircraft Semiconductor Div Int'l Airport Sta Los Angeles Calif
Hughes Aircraft Tube Div 2020 Shant Oceanside Calif
Hughes Electronics 5343 Crenshaw Blvd Los Angeles Calif
Hunter Sales R N 8951 Alburtis Santa Fe Springs Calif
Hupp Electronics 743 Circle Ave Forest Park Ill
Hurst Mfg Princeton Ind
H-V Assoc 28 E Sunrise Hwy Lindenhurst LI NY
Hycon Electronics 1030 S Arroyo Pkwy Pasadena Calif
Hy-Gain Antenna Prods 1135 N 22 St Lincoln Neb
Hymac Corp 1717 N Potrero S El Monte Calif

Ideal Industries Sycamore Ill
IE Mfg 3039 Carroll Ave Chicago Ill
IH Mfg Co 121 Greene St New York NY
Iliffe & Sons Dorset House Stamford St London SE England
Illinois Condenser 1612 N Throop St Chicago Ill
Illinois Testing Labs 420 N La Salle St Chicago Ill
Illumitronic Eng'g 680 E Taylor St Sunnyvale Calif
Imperial Electronics 250 Montgomery St Shreveport La
Indikon Co 76 Coolidge Hill Rd Watertown Mass
Industrial Condenser 3243 N California Ave Chicago Ill
Industrial Electronics Engrs 5528 Vineland Ave North Hollywood Calif
Industrial Electronics Hdw 109 Prince St New York NY
Industrial Instruments 89 Commerce Rd Cedar Grove NJ
Industrial Test Equip 55 E 11 St New York NY
Industrial Timer 1407 McCarter Hwy Newark NJ
Industro Transistor Corp 35-10 36 Ave Long Island City LI NY
Inertia Switch 311 W 43 St New York NY
Injectorall Co 6 Bay 50 St Brooklyn NY
Institute of Radio Eng'rs 1 E 79 St New York NY
InstruLab 1205 Lamar St Dayton Ohio
Instruments for Industry 101 New South Rd Hicksville LI NY
Instruments Publishing 845 Ridge Ave Pittsburgh Pa
Insuline Corp of America 186 Granite St Manchester NH
Interelectronics Corp 2432 Grand Concourse Bronx NY
Interlab Inc 116 Kraft Ave Bronxville NY
Int'l Business Machines 590 Madison Ave New York NY
Int'l Correspondence Schools 1001 Wyoming Ave Scranton Pa
Int'l Crystal Mfg 18 N Lee Oklahoma City Okla
Int'l Electronic Industries Box 9036 Nashville Tenn
Int'l Electronic Research 135 W Magnolia Blvd Burbank Calif
Int'l Electronic Mfg 2nd St Ext Greenwood Ave Annapolis Md
Int'l Electronics 81 Spring St New York NY
Int'l Electronics PO Box 13302 Dallas Texas
Int'l Instruments PO Box 2954 New Haven Conn
Int'l Prods 1289 S LaBrea Los Angeles Calif
Int'l Radio & Electronics Elkhart Ind
Int'l Rectifier 233 Kansas St El Segundo Calif
International Resistance 401 N Broad St Philadelphia Pa
Int'l Tel & Tel Corp 67 Broad St New York NY
Int'l Wire & Cable 1665 N Milwaukee Chicago Ill
Interstate Electronics 707 E Vermont Ave Anaheim Calif
Invar Electronics 323 W Washington Blvd Pasadena Calif
I-T-E Circuit Breaker 601 E Erie Ave Philadelphia Pa
ITT Components 100 Kingsland Rd Clifton NJ
ITT Distr Prods PO Box 99 Lodi NJ
ITT Industrial Prods 15191 Bledsoe San Fernando Calif

Jackson Electrical Instr 124 McOonough St Dayton Ohio
James Electronics 4050 N Rockwell St Chicago Ill
James Knights Co 2706 E Church St Sandwich Ill
Javex Electronics PO Box 646 Redlands Calif
J-B-T Instruments 61 Hamilton St New Haven Conn
Jefferson Inc Ray 40 E Merrick Rd Freeport NY
Jennings Radio Mfg 970 McLaughlin Ave San Jose Calif
Jensen Industries 7333 W Harrison St Forest Park Ill
Jensen Mfg 6601 S Laramie Ave Chicago Ill
Jerrold Electronics 15 St & Lehigh Ave Phila Pa
Jerrold Electronics of Canada 50 Wingold Ave Toronto Ont Canada
Jersey Specialty PO Box 576 Mountain View NJ
JFD Electronics 6101 16 Ave Brooklyn NY
JFG Electronics Hampshire Ill
Johnson Co E F Waseca Minn
Johnson Electronics PO Box 1675 Casselberry Fla
Jones Electronics MC Sub Bendix Corp 185 N Main St Bristol Conn
Jones Div Cinch Mfg Co 1026 S Homan Ave Chicago Ill
Jones & Laughlin Electricweld Tube Prods 401 Liberty Ave Pittsburgh Pa
Julie Research 603 W 130 St New York NY
JW Electronics 1538 W Jarvis St Chicago Ill

Kaar Eng'g 2998 Middlefield Rd Palo Alto Calif
Kapner Inc 1924 Washington Ave New York NY
Karg Labs 30 Meadow St South Norwalk Conn
Karlson Assoc 1610 Neck Rd Brooklyn NY
Kay Electric 14 Maple Ave Pine Brook NJ
Kay-Townes Antenna 1511 Dean Ave Rome Ga
Kedman Co Box 267 Salt Lake City Utah
Keithley Instr 12415 Euclid Ave Cleveland Ohio
Kellogg Switchboard & Supply 6650 S Cicero Chicago Ill
Kenwood Eng'g 265 Colfax Ave Kenilworth NJ
Kepco Inc 131-38 Sanford Ave Flushing NY
Kester Solder 4201 Wrightwood Ave Chicago Ill
Kierulff & Co 6303 Corsair St Los Angeles Calif
Kilovolt Corp 2 Manor House Square Yonkers NY
Kimberly Int'l 346 W 44 St New York NY
Kinematix Inc 1616 N Damen Ave Chicago Ill
Kingston Electronic Medfield Mass
Kin Tel Div Cohu Electronics 5725 Kearny Villa Rd San Diego Calif
Klein & Sons Mathias 7200 McCormick Rd Chicago Ill
KLH Research & Devel 30 Cross St Cambridge Mass
Klipsch & Assoc PO Box 96 Hope Ark
Knob Corp of America 469 Jericho Tpk Mineola NY
Koss Inc 2227 N 31 St Milwaukee Wis
Krauetер & Co 583 18 Ave Newark NJ
Krohn-Hite 580 Mass Cambridge Mass
Krylon Inc 18 W Airy Norristown Pa
KTV Tower & Comm Equip PO Box 294 Sullivan Ill
Kulka Electronic 633 S Fulton St Mt Vernon NY
Kupfrian Mfg 1 Henry St Binghamton NY
Kurman Electric 191 Newell St Brooklyn NY
Kwikheat Mfg 3732 San Fernando Rd Glendale Calif

Lab for Electronics 1079 Commonwealth Ave Boston Mass
Lafayette Radio 165-08 Liberty Ave Jamaica LI NY
LaGrange Welding & Machine Moores Mills Pleasant Valley NY
Lake Mfg 2323 Chestnut St Oakland Calif
Lambda Electronics 512 Broad Hollow Rd Huntington LI NY
Lampkin Labs RDF 1 Bradenton Fla
Lance Antenna 1730 1 Ave San Fernando Calif
Lansdale Tube Div Philco Corp Lansdale Pa
Lansing Sound Inc James B 3249 Casitas Ave Los Angeles Calif
Lavoie Labs Matawan Freehold Rd Morganville NJ
Lawrence Inc Box 5106 Seven Oaks Sta Detroit Mich
Lectronics of City Line Center 7644 City Line Ave Philadelphia Pa
Ledex Inc 123 Webster Ave Dayton Ohio
LEE Inc 625 New York Ave NW Washington 1 DC
Leeds & Northrup 4901 Stenton Ave Philadelphia Pa
Leemath Inc Oak Drive Syosset NY
Lektron Inc 242 Everett Ave Chelsea Mass
LEL Inc 75 Akron St Copiague LI NY
Lenk Mfg Co Franklin Ky
Lenz Electric 1751 N Western Ave Chicago Ill
Lerco Electronics 501 S Varney St Burbank Calif
Lesa of America 11 W 42 St New York NY
Librascope Inc 808 Western Ave Glendale Calif
Licon Div Illinois Tool 6606 W Dakin Chicago Ill
Ling-Altec Electronics 1515 S Manchester Anaheim Calif
Ling-Tempo Ling Electronics Div 1515 S Manchester Anaheim Calif
Lionel Industrial Electronic Div Irvington NJ
Littelfuse Inc 1865 Miner St Des Plaines Ill
Litton Industries 336 N Foothill Beverly Hills Calif
Litton Industries Electron Tube Div 960 Industrial Rd San Carlos Calif
Livingston Audio Prods Box 202 Caldwell NJ
Lockheed Electronics Plainfield NJ
Long Island Electo Labs 1186 Bdwy Hewlett LI NY
Los Angeles Tuner Exchange 4611 W Jefferson Los Angeles Calif
Lowell Mfg 3030 Laclede Sta Rd St Louis Mo
L&R Mfg 577 Elm St Kearny NJ
Lumatron Electronics 116 County Court House Rd New Hyde Park LI NY
Luminite Div Chicopee Mills 47 Worth St New York NY
Luxo Lamp Dock St Portchester NY

McCabe-Powers Body Co 5900 N Bdwy St Louis Mo
McCoy Electronics Mt Holly Springs Pa
McDowell Electronics 105 Forrest St Metuchen NJ
McGee Radio 1901 McGee St Kansas City Mo
McGraw-Hill Book Co 330 W 42 St New York NY
McIntosh Labs 2 Chambers St Binghamton NY
McKee Door 85 Hanks St Aurora Ill
McLean Eng'g 70 Washington Rd Princeton NJ

Macdonald & Co 714 E California Glendale Calif
Machlett Labs 1063 Hope St Springdale Conn
MacLeod Instr 4250 NW 10 Ave Fort Lauderdale Fla
Macmillan Co 60 5 Ave New York NY
Madison Fielding by Crosby 135 Eileen Way Syosset NY
Magnaflux Corp 7301 W Ainslie Ave Chicago Ill
Magnavox Co 2131 Bueter Rd Fort Wayne Ind
Magnecord Sales Dept Midwestern Instr Co PO Box 7186 Tulsa Okla
Magnecraft Electric 3352 W Grand Ave Chicago Ill
Magnetic Amplifiers 632 Tinton Ave New York NY
Magnetic Metals Co Hayes Ave at 21 St Camden NJ
Magnetics Inc Butler Pa
Maico Electronics 21 N 3 St Minneapolis Minn
Maier Co Wellington Ohio
Majestic Int'l 743 N LaSalle St Chicago Ill
Mallory & Co Inc P R 3029 E Washington Indianapolis Ind
Marantz Co 25-14 Bdwy Long Island City NY
Marconi Instruments 111 Cedar Lane Englewood NJ
Marina Communications 10328 Venice Blvd Culver City Calif
Marjo Technical Prods 1148 E Henry Linden NJ
Mark Mobile Inc 5439 W Fargo Skokie Ill
Mark Products 5439 W Fargo Skokie Ill
Markel & Sons L Frank Norristown Pa
Massa Div Cohu Electronics 280 Lincoln St Hingham Mass
Masterview Electronics 443 W 50 St New York NY
Mastra Co 2104 Superior Cleveland Ohio
Matthews Labs 3344 Fort Independence St New York NY
Maxson Electronics 475 10 Ave New York NY
Measurement Control Devices PO Box 505 Camden NJ
Measurements Corp PO Box 180 Boonton NJ
Mellotone Inc 1220 Bdwy New York NY
Melody Master Mfg 2149 W Roscoe St Chicago Ill
Melo-sonics Corp 249 E 49 St New York NY
Mepco Inc 35 Abbett Ave Morristown NJ
Merck & Co Electronic Chemicals Div Rahway NJ
Mercury Electronics 4306 W Victory Burbank Calif
Mercury Electronics 111 Roosevelt Ave Mineola LI NY
Mercury TV Tuner Co 890 River Ave Bronx NY
Meriam Instr 10920 Madison Ave Cleveland Ohio
Merit Coil & Transformer 2027 Sherman St Hollywood Fla
Merix Chemical Co 2234 E 75 St Chicago Ill
Methode Mfg 7447 W Wilson Ave Chicago Ill
Metrex Corp 819 Blake Ave Brooklyn NY
MGM Records 1540 Bdwy New York NY
Micamold Electronics 65 Gouverneur St Newark NJ
Michigan Magnetics Vermontville Mich
Microdot Inc 220 Passadena South Pasadena Calif
Microtran Co 145 E Mineola Ave Valley Stream NY
Microwave Assoc Northwest Industrial Park Burlington Mass
Mid-Eastern Electronics 32 Commerce St Springfield NJ
Midland Mfg 3155 Fiberglass Rd Kansas City Kans
Milgray/New York 136 Liberty St New York NY
Millen Mfg Co James 150 Exchange St Malden Mass
Miller Co J W 5917 S Main St Los Angeles Calif
Miller Mfg M A 4 & Church St Libertyville Ill
Millivac Instruments 2315 2 Ave Schenectady NY
Milo Electronics 530 Canal St New York NY
Milwaukee Resistor 700 W Virginia St Milwaukee Wis
Minneapolis-Honeywell Brown Instr Div Wayne & Windram Aves Philadelphia Pa
Minneapolis-Honeywell Marion Electronic Instr Div Manchester NH
Minneapolis-Honeywell Micro Switch Div Freeport Ill
Minneapolis-Honeywell Rubicon Instr Div Ridge Ave & 35 St Philadelphia Pa
Minneapolis-Honeywell Semiconductor Div 1015 S 6 St Minneapolis Minn
Minnesota Mining & Mfg Magnetic Prods Div 900 Fauquier St St Paul Minn
Minnesota Mining & Mfg Mincom Div 2049 S Barrington Los Angeles Calif
Miratel Inc 1080 Dionne St Paul Minn
Moeller Instrument Electronics Div 132 St & 89 Ave Richmond Hill NY
Mohawk Business Machines 944 Halsey St Brooklyn NY
Moisture Register 1519 W Chestnut St Alhambra Calif
Molecu Wire Eatontown-Freehold Pike Scobeyville NJ
Moletronics Corp 6344 Arizona Circle Los Angeles Calif
Monarch Electric Div El-Tronics Inc Jamestown NY
Monarch Electronics Int'l 7035 Laurel Canyon North Hollywood Calif
Monitoradio Div IDEA Inc 7900 Pendelton Pike Indianapolis Ind
Montgomery Ward 618 W Chicago St Chicago Ill
Morrow Radio Mfg 2794 Market St Salem Ore
Moseley Co F L 409 N Fair Oaks Ave Pasadena Calif
Mosley Electronics 4610 N Lindbergh Blvd Bridgeton Mo
Moss Electronic 3849 10 Ave New York NY
Motorola Inc 9401 W Grand Ave Franklin Park Ill
Motorola Semiconductor Prods Div 5005 E McDowell Rd Phoenix Ariz
Movic Co 12432 Santa Monica Blvd Los Angeles Calif
MP Eng'g Fairfield Conn
Mucon Corp 9 St Francis St Newark NJ
Mueller Electric 1581 E 31 St Cleveland Ohio
Muirhead Instr 441 Lexington Ave New York NY
Mullard (see Int'l Electronics)
Multicore Solders (see British Industries)
Musi-Pak Inc 103 E Hawthorne Ave Valley Stream NY
Muzak Co 220 4 Ave New York NY

Narda Ultrasonics 625 Main St Westbury LI NY
Nat'l Carbon Co 270 Park Ave New York NY
Nat'l Cash Register Main & K Sts Dayton Ohio
Nat'l Electronics 628 North St Geneva Ill
Nat'l Radio 37 Washington St Melrose Mass.
Nat'l Radio Institute 3839 Wisconsin Ave Washington DC
Nat'l Resistance Walter St Pearl River NY
Nat'l Technical Research Labs 6416 S Western Ave Whittier Calif
Nat'l Ultrasonic 111 Montgomery Ave Irvington NJ
Neshaminy Electronics 382 Easton Rd Neshaminy Pa
Neuses Inc P K 511 N Dwyer St Arlington Heights Ill
Newark Electronics 233 W Madison Chicago Ill
Newcastle Fabrics 75 N 11 St Brooklyn NY
Newcomb Audio Prods 6824 Lexington Hollywood Calif
Newcomb Electronics 6824 Lexington Hollywood Calif
New London Instrument 82 Union St New London Conn
Newman Corp M M 79 Clifton Ave Marblehead Mass
New-Tronics Corp 3445 Vega Ave Cleveland Ohio
Niagara Electrical Instr 45 Allen St Buffalo NY
Nielsen Inc E V 575 Hope St Stamford Conn
NJE Corp 20 Boright Ave Kenilworth NJ
Non-Linear Systems Del Mar Airport Del Mar Calif
North American Philips (NORELCO) 230 Duffy Ave Hicksville NY
North Atlantic Industries Terminal Dr Plainview LI NY
North Electric Co 553 S Market Galion Ohio
North Shore Nameplate 1270 NW 165 St North Miami Beach Fla
Nortronics Co 1015 S 6 St Minneapolis Minn
Nuclear Corp of America 2 Richwood Pl Denville NJ
Nucleonic Corp of America 196 DeGraw St Brooklyn NY
Nu-Line Industries 1015 S 6 St Minneapolis Minn

Oak Mfg Co Crystal Lake Ill
Oaktron Industries 17368 S 68 St Tinley Park Ill
Oelrich Publications 4308 Milwaukee Ave Chicago Ill
Ogura Jewel Bearing Stone Mfg 3-68 Iriarai Ohta-ku Tokyo Japan
Ohio Semiconductor 1035 W 3 Ave Columbus Ohio
Ohmite Mfg 3601 Howard St Skokie Ill
Olson Radio 500 S Forge St Akron Ohio
Omtronics Mfg PO Box 1419 Peony Park Sta Omaha Neb
Oneida Electronic 843 N Cottage St Meadville Pa
Opad Electric 43 Walker St New York NY
ORR industries Div Ampex Corp Shamrock Circle Opelika Ala
Ortron Electronics 29 Lincoln Ave Orange NJ
Osborne Electronic Sales 712 E Hawthorne Blvd Portland Ore
Oster Mfg Co John Avionic Div 1 Main St Racine Wis
Oxford Components 556 W Monroe St Chicago Ill
Oxford Electric 3911 Michigan Blvd Chicago Ill

Pace Electrical Instr 70-31 84 St Glendale LI NY
Packard Bell Electronics 12333 W Olympic Blvd Los Angeles Calif
Paco Electronics 70-31 84 St Glendale LI NY
Pacotronics Inc 70-31 84 St Glendale LI NY
Panoramic Radio Prods 540 S Fulton Mount Vernon NY
Parker Metal Goods 85 Prescott Worcester Mass
Partridge Transformers 258 Bdwy New York NY
Parts House 106 11 St W Billings Mont
PCA Electronics 16799 Schoenborn St Sepulveda Calif
Pearce-Simpson 2295 NW 14 St Miami Fla
Peerless Products 812 N Pulaski Rd Chicago Ill
Peerless Radio 92-32 Merrick Rd Jamaica LI NY
Pentron Corp 777 S Tripp Ave Chicago Ill
Perfection Mica Magnetic Shield Div 1322 N Elston Ave Chicago Ill
Performance Measurements 15120 3 Ave Detroit Mich
Perkin Electronics Corp 345 Kansas St El Segundo Calif
Perkin-Elmer Vernistat Div Norwalk Conn
Permacel Tape U S Hwy 1 New Brunswick NJ
Permadyne Div Melody Master Mfg 2149 W Roscoe St Chicago Ill
Permaflux Products 4101 San Fernando Rd Glendale Calif
Perma-Power Co 3100 N Elston Ave Chicago Ill
Permo Inc 6415 Ravenswood Ave Chicago Ill
Peschel Electronics Towners Patterson NY
Pfanstiehl Chemical Corp 104 Lake View Ave Waukegan Ill
Phalo Plastics 530 Boston Tpk Shrewsbury Mass
Phaostron Instr & Electronics 151 Pasadena South Pasadena Calif
Phelps Dodge Copper Prods Inca Mfg Div Fort Wayne Ind
Philbrick Researches G A 285 Columbus Ave Boston Mass
Philco Corp Tioga & C Sts Philadelphia Pa
Philco Corp Lansdale Div Lansdale Pa
Philips N V Gloeilampenfabrieken Eindhoven The Netherlands
Philmore Mfg 130-01 Jamaica Richmond Hill NY
Philosophical Library 15 E 40 St New York NY
Photomation Inc 96 S Washington Ave Bergenfield NJ
Physics Research Labs Uniondale LI NY
Pickering & Co Plainview NY
Pilot Radio 37-06 36 St Long Island City NY
Pitman Publishing 2 W 45 St New York NY
Planet Sales Corp 225 Belleville Ave Bloomfield NJ
Plastic Capacitors 2620 N Clybourn Ave Chicago Ill
PLM Products 3871 W 150 St Cleveland Ohio
Polar Electronics 1514 Oak St South Pasadena Calif
Polarad Electronics 43-20 34 St Long Island City NY
Polytechnic Research & Devel 202 Tillary St Brooklyn NY
Polytronics Lab Clifton NJ
Pomona Electronics 1500 E 9 St Pomona Calif
Portable Electric Tools 1200 E State St Geneva Ill
Post Machinery 159 Elliott St Beverly Mass
Potter & Brumfield Princeton Ind
Power Sources Burlington Mass
Powertron Ultrasonics Corp Patterson Pl Roosevelt Field Garden City NY
Precise Electronics & Devel 76 E 2 St Mineola LI NY
Precise Measurements R D 1 Milbrook Rd Flemington NJ
Precision Apparatus Sub Pacotronics Inc 70-31 84 St Glendale LI NY
Precision Electronics 9101 King Ave Franklin Park Ill
Precision Thermometer & Instr 1434 Bradywine Philadelphia Pa
Precision Tuner Service 601 N College Bloomington Ind
Premier Albums 356 W 40 St New York NY
Premier Instr 33 New Broad Port Chester NY
Premier Metal Prods 337 Manida St New York NY
Prentice-Hall Inc Englewood Cliffs NJ
Presto (See Bogen-Presto)
Price & Rutzebeck 22150 Meekland Blvd Hayward Calif
PRL Corp PO Box 215 East Brunswick NJ
Products for Industry 220 S Rose St Los Angeles Calif
Progress Mfg Co Castor Ave & Tulip St Philadelphia Pa
Pro-Tex Reel Band 2108 Payne Ave Cleveland Ohio
Proto Tool 2209 S Santa Fe Los Angeles Calif
Pulse Eng'g 2657 Spring Redwood City Calif
Pyramid Electric Orange St Darlington SC
Pyramid Instrument Corp 630 Merrick Rd Lynbrook LI NY

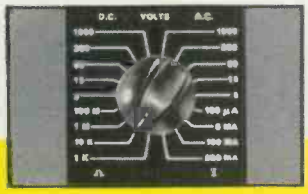
Qualitone Industries 102 Columbus Ave Tuckahoe NY
Quam-Nichols Co Jobber Div 234 E Marquette Rd Chicago Ill
Quan-Tech Labs 60 Parsippany Blvd Boonton NJ
Quik-Check Corp 5212 Pulaski Philadelphia Pa
Quick Mount Mfg 481 Sterling Pl Brooklyn NY
Quietrole Co 395 St John St Spartanburg SC

Racon Electric 1261 Bdwy New York NY
Radiart Corp 2900 Columbia Indianapolis Ind
Radiation Electronics Co 5600 Jarvis Ave Chicago Ill
Radio City Prods Centre & Glendale Sts Easton Pa
Radio Condenser Davis & Copewood Camden NJ
Radio Corp of America Front & Cooper Sts Camden NJ
Radio Corp of America RCA Service Co Cherry Hill Camden NJ
Radio Corp of America Electron Tube Div 415 S 5 St Harrison NJ
Radio Corp of America Semiconductor & Materials Divs Somerville NJ
Radio Corp of America Industrial Computer Div Natick Mass
Radio Corp of America 30 Rockefeller Plaza New York NY
Radio Corp of America Telecommunication Center Meadow Lands Pa
Radio-Electronic Master 60 Madison Hempstead LI NY
Radio & Electronic Parts 2118 E 55 St Cleveland Ohio
Radio Eng'g Labs 29-01 Borden Ave Long Island City NY
Radio Frequency Labs Boonton NJ
Radio Materials Co 4242 W Bryn Mawr Chicago Ill
Radio Merchandise Sales 2016 Bronxdale Ave New York NY
Radion Corp 345 Terra Cotta Crystal Lake Ill
Radio Products Sound Foyer Div 1421 S Hill Los Angeles Calif
Radio Receptor Sub General Instrument Corp 240 Wythe Ave Brooklyn NY

(Continued on page 62)

First real VOM advance in 20 years

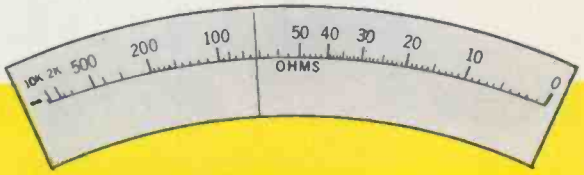
SET IT!



SEE IT!

READ IT!

DIRECTLY—ACCURATELY
WITHOUT MULTIPLYING



ALL-NEW B&K V O Matic 360

AUTOMATIC VOLT-OHM-MILLIAMMETER

- **Individual Full-Size Scale for Each Range**
- **Range Switch Automatically Sets Correct Scale**
- **Only One Scale Visible at Any Time**
- **No Multiplying . . . No False Readings**
- **Meter Protected Against Extreme Overload**
- **Mirrored-Scale for Precise Readings**

WITH BURN-OUT PROOF METER

EASIEST—FASTEST—ERROR-FREE READINGS

Once you set the range switch properly, *it is impossible to read the wrong scale.* Readings are easiest, fastest of all—so easy the meter "practically reads itself." Eliminates reading difficulties, errors, and calculations.

All scales, including the ohms scale, are *direct reading*. You do not have to multiply. Saves time and trouble. Gives you the right answer immediately. Ohms-adjust control includes switch that automatically shorts out test leads for "zero" set.

Every scale in the V O Matic 360 is the same full size . . . *and only one scale is visible at any one time*, automatically. Supplemental ranges are also provided on separate external overlay meter scales.

This new-type automatic VOM is another innovation by B&K that gives you features you've always wanted. Outdates all others.

Net, **$59.95**

Includes convenient stand to hold "360" for correct viewing in 4 positions.

Ranges: **DC Volts** — 0 - 3, 15, 60, 300, 1000, 6000 (20,000 Ω/v)
AC Volts — 0 - 3, 15, 60, 300, 1000, 6000 (5,000 Ω/v)
AF (Output) — 0 - 3, 15, 60, 300 volts
DC Current — 0 - 100 μa, 5 ma, 100 ma, 500 ma, 10 amps
Resistance — 0 - 1000 ohms (3 Ω center)
0 - 10,000 ohms (50 Ω center)
0 - 1 megohm (4 k Ω center)
0 - 100 megohms (150 k Ω center)

Supplemental Ranges: 18 separate external overlay meter scales for:
DC Volts— 0 - 250 mv **Capacitance**—100 mmfd to 4 mfd
Audio Power Output—up to 56 watts **DB** (decibels)
Peak-to-Peak AC (sine) Volts— 0 - 170, 850

Polarity Reversing Switch and **Automatic Ohms-Adjust Control**

Frequency Response AC: 5 - 500,000 cps

Burn-Out Proof Meter: Protected against overload and burn-out

Complete with 1½-volt and 9-volt batteries and test leads

Ask Your B&K Distributor for Demonetration or Write for Catalog AP17-T

B&K MANUFACTURING CO.
1801 W. BELLE PLAINE AVE • CHICAGO 13, ILL.
Canada: Atlas Radio Corp., 50 Wingold, Toronto 19, Ont.
Export: Empire Exporters, 277 Broadway, New York 7, U.S.A.

For more data, circle 5-49-1 on coupon, p. 57

Center Speaker

(Continued from page 37)

the center channel output terminals are also highly suitable for installations where a remote extension speaker for listening in another room of the house is desired. When these terminals are used for this purpose full-range monophonic sound of excellent quality is obtained at the remote location with a suitable speaker.

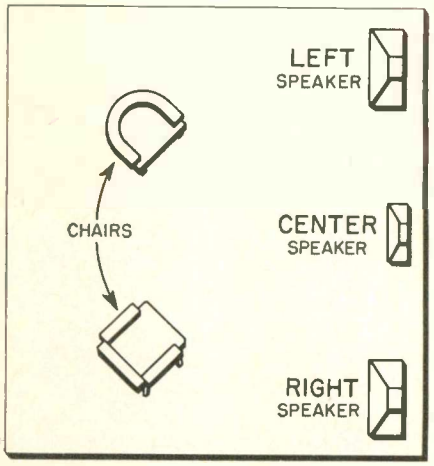


Fig. 5—Room lay-out using a third speaker from two stereo channels. Middle speaker can be relatively small but should respond well at mid and high frequencies.

The center channel terminals may still be used for their third channel function even when an extension speaker is added. In most cases, the extension speaker may be simply connected in parallel with the third channel speaker. •

Marine Radio

(Continued from page 39)

properly adjusted. If this operation requires more than a minute or two, the transmitter should be connected to a dummy antenna to prevent causing interference to other stations.

Modulation Problems

Most marine type transmitters designed today have "clamping" or other comparable circuitry for limiting modulation below 100%. In addition, some transmitters employ methods for compressing the audio frequency band width. Splatter-sup-

(Continued on page 53)

NEW

for the first time, a

B & K QUALITY TUBE TESTER

at this amazing low cost!

TESTS All TV and Radio Tubes —both old and new

TESTS the Nuvistors

TESTS the new 10-pin tubes

TESTS the new 12-pin Compactrons

TESTS voltage regulators, thyratrons, auto radio hybrid tubes, European hi-fi tubes, and most industrial types.

Checks for all shorts, grid emission, leakage, and gas

Checks each section of multi-section tubes separately

Checks tube capability under simulated load conditions

Rejects bad tubes —not good tubes

Model 600 DYNA-QUIK

only $69.95 NET

8½" x 11" x 4½"

Handsome, sturdy leatherette-covered carrying case

For the man who wants the performance and reliability of a B&K professional-quality tester at minimum cost . . . there's nothing like the new "600". No other tube tester in this price range is so complete and up-to-date. Tests the newest tube types, as well as the old. It's fast . . . it's accurate . . . it's easy to use. Quickly reveals tube condition. Saves customers. Sells more tube replacements. Stops call-backs. Steps up servicing profit . . . day after day. Pays for itself over and over again.

Exclusive adjustable grid emission test. Sensitivity to over 100 megohms. Phosphor bronze socket contacts. Complete tube listing in handy reference index. Extremely compact.

NEW TUBE INFORMATION SERVICE
available every 3 months for all B&K Dyna-Quik Tube Testers

B&K

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Canada: Atlas Radio Corp., 50 Wingold, Toronto 19, Ont.
Export: Empire Exporters, 277 Broadway, New York 7, U.S.A.

For more data, circle 5-51-1 on coupon, p. 57

(Continued from page 50)

pression filters and speech-clipping systems are also used.

Despite all these innovations, modulation problems still arise. Furthermore, FCC regulations require periodic checks of modulation percentages to be made and entered in the boat's transmitter log.

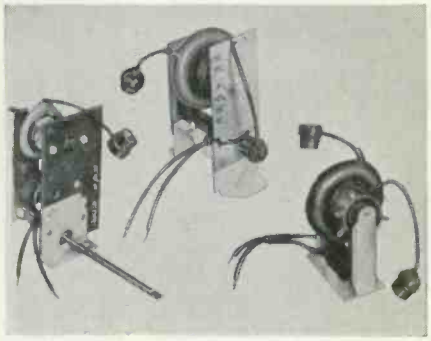
For over-all check of the transmitter's audio section, including modulation percentage, distortion, frequency shift, etc., the scope is desirable. A loop of one or two turns of wire, placed near the transmitter's tank coil or antenna, with the two open ends connected to the scope's vertical input, will usually provide sufficient pickup for observing the unmodulated and modulated carrier. A steady 1000 cycle audio tone, directly into the transmitter's microphone can usually reveal considerable information on the scope's graticule regarding operation of the audio section. Talking into the microphone and listening to the signal on a separate receiver can also show up a number of modulation problems, including distortion.

Most failures in the speech and, or modulator stages, are caused by unbalanced tubes in push-pull stages, defective tubes, modulation transformers, changed value or defective resistors and capacitors. •

Illustration credit: Gray Radio Co., West Palm Beach, Fla.

Stancor TRANSFORMERS

Three new exact replacement flyback transformers are: part HO-321, replaces RCA parts Nos. 104876 (972942-1) and 106063 (972942-2) used in 32 models and chassis; HO-



322, replaces RCA parts Nos. 104309 (972401-3) and 106533 (973908-1) used in 124 models and chassis. HO-336 replaces Motorola part No. 24C-739283 used in 86 models and chassis. Chicago Standard Transformer Corp., 3501 Addison, Chicago, Ill.

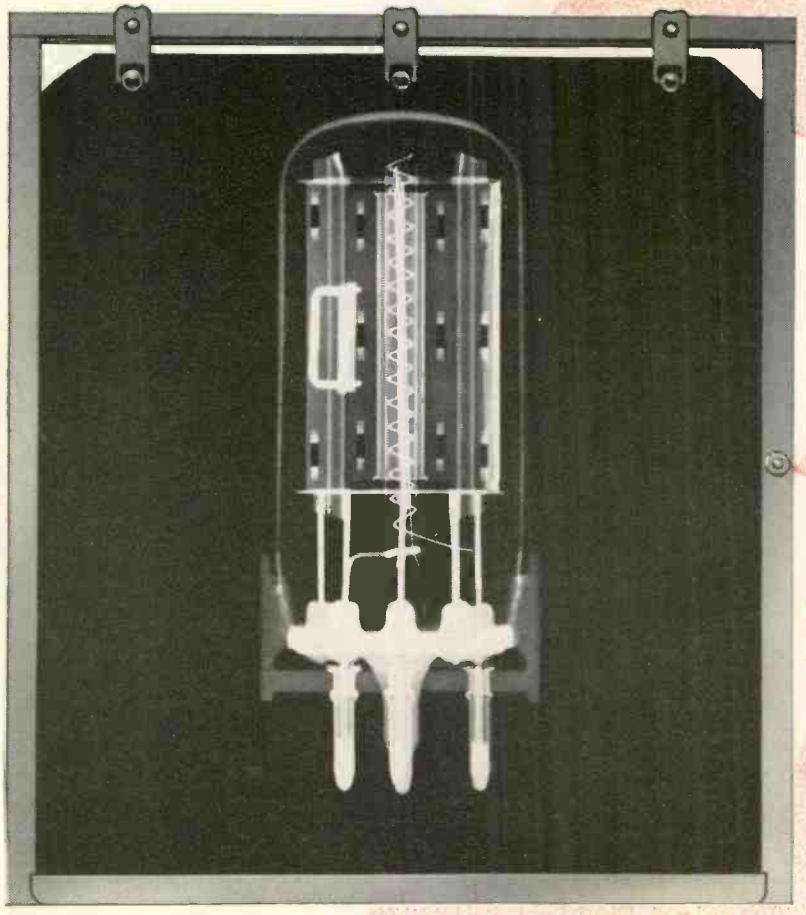
Perma-Power VU-BRITES

For a limited time, the serviceman who buys 12 Vu-Brites at the regular price of $9.95, will receive a specially assembled tool kit free. The kit contains eight wrenches of various types and sizes including every wrench needed to service all volume controls and all TV knobs with set screws. Many are especially made for this kit. The tool kit is included with twelve-packs of model C401 parallel Vu-Brites and the C402 series units. Perma-Power Co., 3100 N. Elston, Chicago, Ill.

For more data, circle 5-53-2 on coupon, p. 57

damper tube exhibits tolerance of high voltages

Thorough examination of the subject reveals physical characteristics conducive to exceptional longevity. Immunity to the high voltage ailments that plague so many less rugged damper tubes is due mainly to unusual care attending the tubes' formative stages. Outstanding qualities are noted in electrophoretically coated heater peaks and insulator coils; a "cool" running cathode; a copper core plate designed for maximum dissipation and less back emission. All of these minimize arcing. In addition, the electrically isolated insulator coil maintains high voltage insulation with the shortest possible warm-up time. In every respect, the Tung-Sol damper tube exhibits structural standards that approach an ideal far above more common types. Tubes of this family are certain to prove fully reliable under the most adverse conditions.



JUST WHAT THE DOCTOR ORDERED

All modern damper tubes trace their genealogy directly to improved designs created by Tung-Sol. Where diagnosis of a customer's TV set indicates damper tube replacement, be sure to prescribe Tung-Sol. These are some of the more popular Tung-Sol damper tubes:

6/12AF3	6DA4A
6/12/17AX4GTB	6DE4
6/19AU4GTA	6V3A
6/25W4GT	12D4A

the first name to ask for when ordering

TUNG-SOL®

DAMPER TUBES

TUNG-SOL ELECTRIC INC., NEWARK 4, N. J.

For more data, circle 5-54-1 on coupon, p. 57

1961 Parts Show Preview

Thousands To See Latest Products Displayed

• This year, as in 23 preceding years, the annual Electronic Parts Distributors Show will serve as the market place for manufacturers to show their wares to distributors from all parts of the country. These distributors will carry product data from 300 exhibitors back to their home towns, informing service technician customers of the latest components and equipment available.

The parts Show will be held in Chicago's Conrad Hilton Hotel, May 22-24. Registration is in advance of the Show, and admission is by badge only, issued in the following categories:

Commercial Sound, High-Fidelity, Sales Reps, Government Personnel, Advertising & Export Agency Personnel and Electronic Parts Distributors.

Show Sponsors

The five trade associations sponsoring the non-profit operator of the Show, the Electronic Industry Show Corp., are:

Western Electronic Manufacturers Assoc. (WEMA)

National Electronic Distributors Assoc. (NEDA)

Assn. of Electronic Parts & Equipment Mfrs., Inc. (EP&EM)

Producers of Associated Components for Electronics (PACE)

Electronic Industries Assoc. (EIA)

Innovations for the 1961 Show include an Industrial Conference Section, and for the first time, a limited number of double booths in the Exhibition Hall.

1961 Parts Show
DATE: May 22-24, 1961
TIME: 9:00 AM to 6:00 PM
PLACE: Conrad Hilton Hotel
Chicago, Ill.

LIST OF EXHIBITORS

Company	Booth	Room
Acoustic Research		613A
Advance Relays	406	
Aerovox Corp.	583	
Akro-Mils, Inc.	890	
All-Channel Prods.	131	
Alliance Mfg.	687	
Alpha Wire Corp.	403	
Alprodco	784	
American Concertone		556A
American Electrical Heater	788	
American Electronics	127	
American Geloso Electronics		665
American Radio Relay League		620
American Television & Radio	420	
Amperex Electronic Corp.		726
Amperite Co.	321	
Ampex Magnetic Tape Prods.		717
Ampex Professional Prods.		533A/34A
Amphenol-Borg Electronics		605-07
Antenna Designs		545
Antenna Specialists	126	
Antronic Corp.	582	
Arco Electronics	417	
Argos Products Co.		512A
Astatic Corp.	781	512
Astron Corp.	775	
Atlas Sound Corp.	422	
Audio Devices		602A
B&K Mfg. Co.		613/614
Belden Mfg. Co.	319	
Bell Sound Div.		617A/19A
Benjamin Electronic Sound		633A
Birnbach Radio	117	
Blonder-Tongue Labs	316	
Bogen-Presto Div.		605A/07A
British Industries Corp.		509A
Bud Radio		721/722
Burgess Battery	211/213	
Bussmann Mfg.	314	
Cadre Industries	3	
CBS Electronics	223	757
Calcon Mfg. Corp.		629
Campro Products	778	
Cannon Electric		719/720
Central Electronics		547
Centralab Div.	790	
Channel Master Corp.		501
Chicago Standard Transformer	409	
Cinch-Jones Sales	679	
Clarostat Mfg. Co.	419	
Clear Beam Antenna	402	
Cletron, Inc.		557A
Columbia Wire & Supply	216	
Columbus Electronics	886	
Comfort Lines	112	
Component Specialists		604
Conrac, Inc.		532A
Consolidated Wire	307	
Cornell-Dubilier Electric	214	
Cowan Publishing		516
Delco Radio Div.	311	756
Diamond Tool	875	
DuMont Labs., Allen B.	675	
Duotone Co.	306	
Dyna Empire		656A
Dynaco, Inc.		526A
Eastern Jewel Corp.	14	
Eby Sales Co.		509
Eico Electronic Instrument	202/204	517A
Elco Sales Co.		713
Electra Mfg.		751
Electrophono & Parts Corp.		652A
Electro Products Labs	414	
Electro-Voice		537A
Electronic Periodicals	133	
Electronic Publishing Co.		618/619
Electronic Technician	678	
Equipto Div.	680	
Ercona Corp.		654A
Eric Electronics	119	
Erie Resistor		710
Fanon Electronic Industries		542A/709
Federated Industries	6	
Ferrodynamics Corp.		535A/536A
Finney Co.		659 /661
Fisher Radio Corp.		650A
Fidelitone, Inc.	576	
GC Electronics Mfg.	572/574	
Garlock, Inc.		761
General Electric Co.	209	755
General Industries		714
General Instrument	774	
Glaser-Steers Corp.		616A
Globe Electronics	870	
Gramer-Halldorson	301	
Grayhill, Inc.		716
Great Eastern Mfg.		653
Greentree Electronics	877	
Guardian Electric Mfg.	874	758/759
Gurian & Co., Edward E.	783	

Visit
ELECTRONIC TECHNICIAN
at the Parts Show
Booth 678

(Continued on page 82)

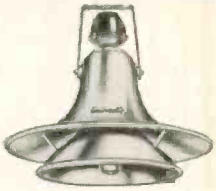
there are trumpets

and there are trumpets!

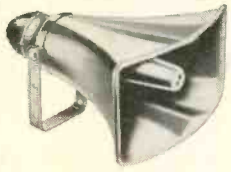
Which is another way of saying: *don't use a boy for a man's job!* Here are five performance- and time-proven features of University's loudspeaker trumpets that add up to complete coverage, top efficiency and life-long dependability: [1] the greatest choice of models in the industry, making possible the right solution to every public address installation problem. [2] Patented designs that result in maximum output, cutting power requirements and assuring lowest dollar-per-watt costs to the user. [3] Heavy gauge metals and rubber rim damping for positive elimination of acoustic resonances. [4] Electroplating, spraying and then baking of all parts guarantee peel-proof, destruction-proof finishes against all the elements. [5] Exclusive rib-reinforced heavy gauge steel "U" mounting bracket with fully adjustable serrated swivel joints and self-locking, positive grip nut for easy installation. Now pair up the exact model you need with a man-sized driver unit from University's complete line—ranging from 20 to 60 watts—and you'll hit that high note every time. For complete details on all University public address speakers and accessories, write Desk Z-5, University Loudspeakers, Inc., 80 So. Kensico Avenue, White Plains, N. Y.

A SELECTION OF NINE TRUMPET MODELS FOR TOTAL INSTALLATION FLEXIBILITY

4 DIFFERENT DIRECTIONAL REFLEX MODELS



3 DIFFERENT RADIAL REFLEX MODELS



2 DIFFERENT WIDE-ANGLE REFLEX MODELS

UNIVERSITY

WORLD'S LARGEST MANUFACTURER OF PUBLIC ADDRESS SPEAKERS

A Division of Ling-Temco Electronics, Inc.

FREE LITERATURE

To receive the literature below without charge, simply circle the numbers on the coupon.

Cut out and mail to ELECTRONIC TECHNICIAN, 480 Lexington Ave., New York 17, N. Y.

1 Tools: A new group of miniature safety pliers is covered in literature. Includes curved needle-nose, duck-bill, long-nose, and diagonal-cutting types. Beryllium Corp.
For more data, circle 5-57-1 on coupon

2 Generators: Literature covers: model G-34 combination sine and square wave generator, 6 cycles to 750 kc; and model G-32 sweep generator and marker adder, 3 mc to 220 mc in 5 ranges. Paco Electronics Co.
For more data, circle 5-57-2 on coupon

3 Tube Briteners: A new Britener selector guide and supplement lists every TV picture tube in general use, with recommendations for Briteners that are compatible with individual tubes. Perma-Power Co.
For more data, circle 5-57-3 on coupon

4 Identification Kit: Service business advertising and tie-in identification is the subject of a 16-page brochure, "Guide to Extra Impact Identification." Philco Corp.
For more data, circle 5-57-4 on coupon

5 Tubes & Parts: Brochure lists tubes and phono needles. Parts such as speakers, resistors, rectifiers, etc. are described. Prices included. Rad-Tel Tube Co.
For more data, circle 5-57-5 on coupon

6 Crystals: Catalog #860 covers crystals for citizens band and other uses. Also, booklet illustrates citizens band radios. Texas Crystals.
For more data, circle 5-57-6 on coupon

7 Tools: Colorful catalog #67 and price list #72 cover pliers, wrenches, snips, chisels, nail sets, screw drivers, etc. Utica Drop Forge & Tool.
For more data, circle 5-57-7 on coupon

8 Test Equipment: Catalog with specifications covers complete line including model 500 component substitutor. Mercury Electronics Corp.
For more data, circle 5-71-1 on coupon

9 Components: General catalog and replacement guide lists over 1,000 components, including over 100 new items. Merit Coil & Transformer Corp.
For more data, circle 5-22-1 on coupon

10 Phono Needles: Literature covers new Japanese-made diamond-and-steel needles for use in stereophonic or monaural cartridges. Ogura Jewel Bearing Stone Mfg. Co.
For more data, circle 5-20-1 on coupon

11 Radio-Phone: Literature covers the RCA Mark VII CB radiophone. Provides 4 crystal controlled channels. Radio Corp. of America.
For more data, circle 5-4-1 on coupon

12 CB Radios: Literature covers citizens band radio model CBD-5, five channel crystal controlled, dual voltage. Also model CBD-1 single channel. Pearce-Simpson, Inc.
For more data, circle 5-79-2 on coupon

13 Test Equipment: Literature covers new combination VTVM-VOM, model SM112, called the Service Master. Sencore.
For more data, circle 5-57-13 on coupon

---CUT HERE---

Use this coupon, or your letterhead, before June 20, 1961

Please send me literature of companies whose code numbers I have circled below (includes editorial and advertised items):

Note: Code 5-2-1 means May issue, Page 2, 1st item on page.

5-2-1	5-18-1	5-22-5	5-51-1	5-57-13	5-71-2	5-74-1	5-79-1	5-85-1
5-4-1	5-18-2	5-23-1	5-53-1	5-59-1	5-71-3	5-75-1	5-79-2	5-85-2
5-5-1	5-19-1	5-24-1	5-53-2	5-60-1	5-71-4	5-75-2	5-80-1	5-85-3
5-7-1	5-20-1	5-24-2	5-54-1	5-62-1	5-72-1	5-75-3	5-80-2	5-86-1
5-8-1	5-20-2	5-24-3	5-56-1	5-63-1	5-72-2	5-75-4	5-80-3	5-86-2
5-9-1	5-20-3	5-25-1	5-57-1	5-64-1	5-72-3	5-75-5	5-81-1	5-86-3
5-10-1	5-20-4	5-26-1	5-57-2	5-65-1	5-72-4	5-76-1	5-81-2	5-86-4
5-11-1	5-21-1	5-26-2	5-57-3	5-66-1	5-72-5	5-76-2	5-81-3	5-87-1
5-12-1	5-22-1	5-26-3	5-57-4	5-67-1	5-73-1	5-77-1	5-82-1	5-87-2
5-13-1	5-22-2	5-26-4	5-57-5	5-68-1	5-73-2	5-77-2	5-83-1	5-88-1
5-16-1	5-22-3	5-28-1	5-57-6	5-70-1	5-73-3	5-78-1	5-83-2	5-C2-1
5-17-1	5-22-4	5-49-1	5-57-7	5-71-1	5-73-4	5-78-2	5-84-1	5-C3-1

Name ..... Position .....

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Note: If you have given your residence address above, please enter your company name and address on this line: .....

.....

Florida auto-radio man applauds

THE WORD IS ROOMY! Mr. Fox gets the room he needs in his Volkswagen Kombi. This complete shop on wheels has 170 cubic feet of cargo space, wide double side doors to make loading easy. It weighs only 2,326 pounds yet it holds 1,786 pounds of cargo. And on weekends, with all three seats in place, Mr. Fox often takes 12 Boy Scouts camping!

Saves $450 monthly on overhead, $30 on gas!

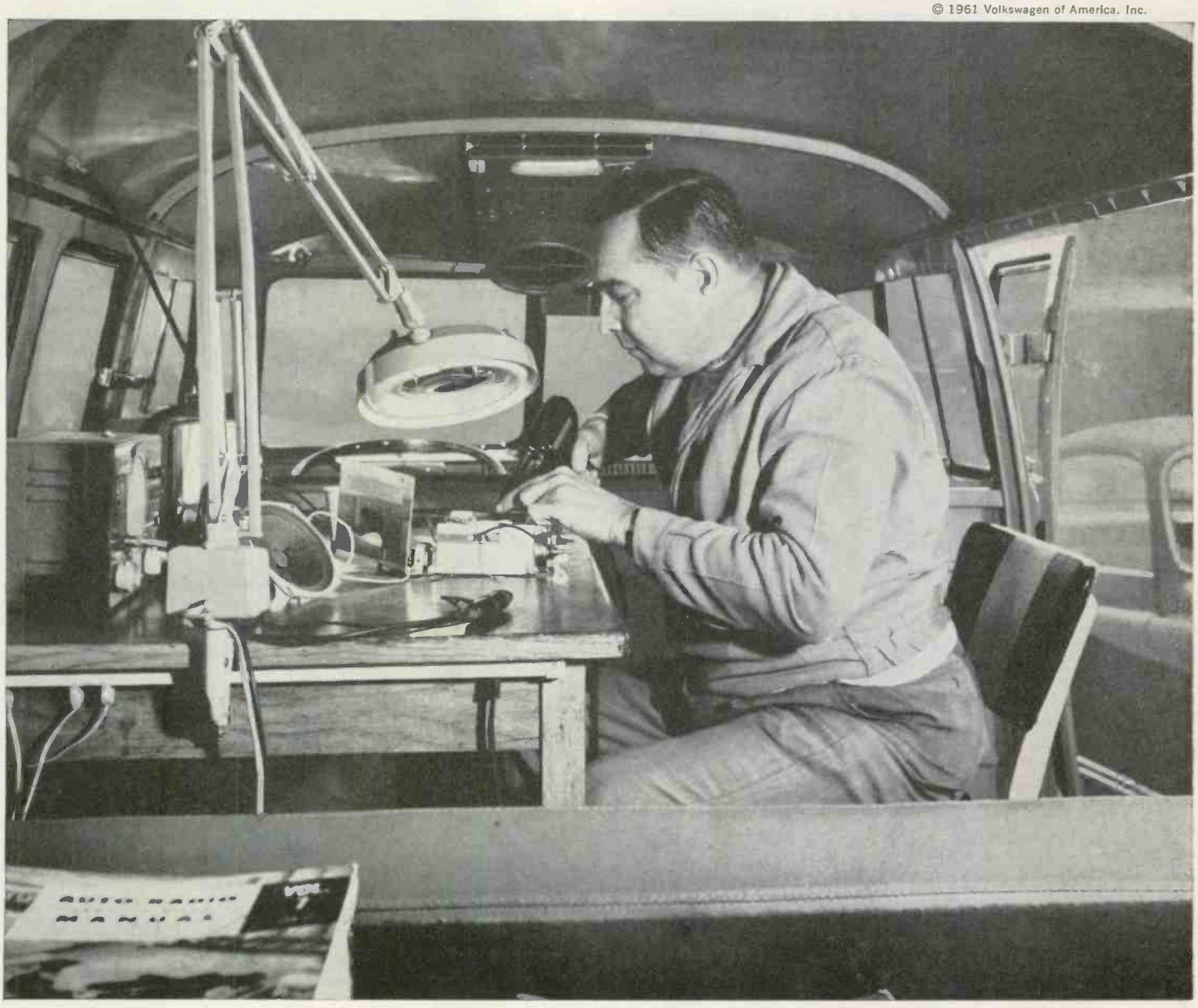
Five months ago, Hilliard Fox, Jacksonville, Florida, closed his shop, loaded his equipment in his new VW Kombi and went completely mobile. He reports:

"I operate out of my home now. That saves me $450 a month in overhead right off. *And* I can give better, faster, more economical service to my customers.

"My Kombi is just right for my business, too. Plenty of room and light. Easy handling. Easy parking. Real economy. Why, I save $30 a month on gas alone.

"I use it for weekend trips all the time, too. It's a great camper, goes anywhere—takes me where the hunting and fishing are best. I'd say that buying my Volkswagen Kombi was the smartest move

the Volkswagen Kombi



CONVENIENCE IS SPELLED VOLKSWAGEN! An auto-radio man needs plenty of light. He gets it in the VW Kombi. Easy to drive and park, too. Just 14 feet long, the Volkswagen Kombi is truly maneuverable in traffic, parks with ease. And the Kombi is functionally designed, ending in a rugged, air-cooled engine. No water or antifreeze ever needed.

I ever made. I'm really sold on the VW."

You've just heard from a real Volkswagen enthusiast. And he's not alone. There are over 100,000 Volkswagen Truck owners in the U.S. Volkswagen is the advanced truck idea that's been proven on the road for the past 11 years.

Are you ready for a VW Truck? You are if you want a truck that costs less to buy, less to operate, and less to service. The suggested retail price of the VW Kombi (East Coast Port of Entry) is $2,095 (West Coast, $2,215). To help you make the right decision, talk to your Authorized Volkswagen Dealer soon. Ask for a demonstration. And get your free copy of the 60-page illustrated booklet—"The Owner's Viewpoint." It documents with facts and figures VW Truck performance and owner experience in a wide variety of businesses. It shows what *you* can expect to get from Volkswagen, too.

For more data, circle 5-59-1 on coupon, p. 57

Audio NEWS LETTER

SHURE releases a revised edition of "The Art of Selecting, Playing & Preserving Records," featuring several new components.

ROBINS announces a new marketing plan to make available products of other manufacturers not currently available to the distributor.

UTAH RADIO appoints Frank Pyle, Jr. as Vice Pres., & Robt. L. Webster as Treas. UNIVERSITY LOUDSPEAKER names Stan Neufeld as Distributor Sales Mgr.

EICO announces the RP-100 stereo/mono 4-track tape deck with frequency response at 7½ ips 30-15,000 ±2 db, at 3¾ ips, 30-10,000 cps ±2 db. Available wired @ $395.00 or as semikit @ $289.95.

BURGESS BATTERY enters the magnetic tape field with all standard reel lengths in seven popular series. Separate Magnetic Tape Div. has been established.

SHERWOOD appoints four new service stations to handle warranty and general repairs: Associated Radio Corp., Cleveland; Thomas Audio Service, Dayton; Jamieson's High Fidelity, Toledo; and United Radio Service, Syracuse, N. Y.

JENSEN MANUFACTURING appoints Seversen & Assoc. sales reps for loudspeakers in Ill., Wisc., and Porter & Lake counties in Ind.

AUDIO DYNAMICS releases specs on the ADC-1 moving magnet stereo cartridge. Lateral and vertical compliance claimed is 10. Tracking less than one gram, response 10–20,000 cps ± 2 db. $49.50.

ASTATIC "Asta-Stock" system simplifies maintaining a balanced stock of needles. System includes stock cabinets with cross-reference information on index tabs and on package for each needle.

AMPEX announces the PR-10 series of professional tape recorders at $895 mono, $995 stereo/mono. Auxiliary units @ $345 in portable mount.

CROSBY ELECTRONICS announces two new hi-fi components: Model 680 14 watts/channel stereo preamp-amplifier with 20–35,000 cps ± 0.5 db, $119.95; and Model 690 FM Tuner featuring 1.0 uv for 20 db of quieting, $99.95.

A. BERNARD SMITH LABS., 2669 Ludlow Rd., Cleveland 20, Ohio, announces a new type of phono cartridge, the "photoSonic 120," priced @ $47.50. Power supply and preamp cost is not included. Limited production is set for year end. Unit uses photocells and a light beam modulated by the record groove to pick up sound. Stylus, for tracking only, requires 0.5–0.9 gram. Ratings are d-c to 100 kc flat response, V&H compliance 20, output 4 mv @ 5 cm/sec, claimed to be completely noninductive.

Manufacturers

(Continued from page 48)

Radio Shack Corp 730 Commonwealth Ave Boston Mass
Radio Specialty Mfg 2023 S E 6 Ave Portland Ore
Radix Wire Co 26262 Lakeland Blvd Cleveland Ohio
Rad-Tel Tube Co 115 Coit Irvington NJ
Ram Electronics 600 Industrial Ave Paramus NJ
Ramo-Wooldridge Corp 8433 Fallbrook Ave Canoga Park Calif
Rauland-Borg Corp 3515 W Addison St Chicago Ill
Rauland Corp 4245 N Knox Chicago Ill
Raven Electronics 2130 W Carroll Ave Chicago Ill
Rawson Electrical Instr 110 Potter St Cambridge Mass
Ray-O-Vac Co 212 E Washington St Madison Wis
Ray-Par Inc 7810 W Addison St Chicago Ill
Raytheon Co Commercial Apparatus & Systems Div Norwood Mass
Raytheon Co Distr Prods Div Westwood Mass
Raytheon Co Semiconductor Div Woburn Mass
R-Columbia Prods 305 Waukegan Ave Highwood Ill
Recoton Corp 52-35 Barnett Ave Long Island City NY
Redford Corp 262 Saratoga Rd Scotia NY
Reeves Instrument East Gate Rd Roosevelt Field Garden City LI NY
Reeves Soundcraft Great Pasture Rd Danbury Conn
Regency Div IDEA Inc 7900 Pendleton Pike Indianapolis Ind
Regent Electronics 8158 Orion Ave Van Nuys Calif
Rego Insulated Wire 830 Monroe Hoboken NJ
Reiter Co F 3340 Bonnie Hill Dr Hollywood Calif
Rek-O-Kut Co 38-19 108 St Corona NY
Relay Sales PO Box 186 West Chicago Ill
Remington Rand Univac Div Sperry Rand 315 Park Ave S New York NY
Reon Resistor 155 Saw Mill River Rd Yonkers NY
Rescon Electronics 151 Bear Hill Rd Waltham Mass
Resistance Prods 914 S 13 St Harrisburg Pa
Rheem Califone Corp 1020 N LaBrea Ave Hollywood Calif
Rheem Semiconductor 350 Ellis St Mountain View Calif
Rider Publisher Inc John F 116 W 14 St New York NY
Riemer Co David 601 W 26 St New York NY
Roberts Electronics 829 N Highland Ave Hollywood Calif
Robertshaw-Fulton Controls 2920 N 4 St Philadelphia Pa
Robins Industries 36-27 Prince St Flushing LI NY
Robotron Corp 21300 W 8-Mile Rd Detroit Mich
Rockbar Corp 650 Halstead Ave Mamaroneck NY
Rockford Special Furniture 1803 Belle Plaine Chicago Ill
Rogers Electronic 43 Bleeker St New York NY
Rogers Mfg 25 N Main St Lindsey Ohio
Rohn Mfg 116 Limestone St Bellevue Peoria Ill
Rotiform Co 1509 Colorado Ave Santa Monica Calif
Rowe Industries 1702 Wayne St Toledo Ohio
Royal Electric 76 Westminister St Pawtucket RI
Royal-McBee Westchester Ave Port Chester NY
Royson Eng'g Hatboro Pa
Russell Co F C Columbiana Ohio
Rust Industrial 130 Silver St Manchester NH
Rye Sound 145 Elm St Mamaroneck NY
S&A Electronics 1025 Nevada Toledo Ohio
Sampson Co 2244 S Western Ave Chicago Ill
Sams & Co Howard 1720 E 38 St Indianapolis Ind
Sanborn Co Wyman St Waltham Mass
Sangamo Electric 1301 N 11 St Springfield Ill
Sargent Electric 630 Merrick Rd Lynbrook NY
Sargent-Rayment Co 4926 E 12 St Oakland Calif
Sarkes Tarzian Inc Semiconductor Div 415 N College St Bloomington Ind
Sarkes Tarzian Inc Tuner Div E Hillside Dr Bloomington Ind
Saxton Products 4320 Park Ave New York NY
Scala Radio 2814 19 St San Francisco Calif
Scale Specialties Denville NJ
Schaevitz Eng'g PO Box 505 Camden NJ
Schauer Mfg Corp 4500 Alpine Ave Cincinnati Ohio
Schober Organ Corp 43 W 61 St New York NY
Schweber Electronics 60 Herricks Rd Mineola LI NY
Scopes Co PO Box 56 Munsey NY
Scott Inc H H 111 Powder Mill Rd Maynard Mass
Scott Instruments 17 E 48 St New York NY
Seco Electronics 5015 Penn Ave So Minneapolis Minn
Secon Metals 7 Intervale St White Plains NY
Seg Electronics 1778 A Flatbush Ave Brooklyn NY
Seigler Corp 875 S Arroyo Pkwy Pasadena Calif
Seiscor Div Seismograph Service Corp PO Box 159C Tulsa Okla
Selcin Corp Box 88 Medford Mass
Semitronics Corp 370 Bdwy New York NY
Sencore Service Instrument Co Addison Ill
Sensitive Research Instr 310 Main St New Rochelle NY
Sequoia Wire & Cable 2201 Bay Rd Redwood City Calif
Service Parts Systems PO Box 243 East Detroit Mich
Servo Corp of America 11 New South Rd Hicksville LI NY
Servo-Tek Prods 1086 Goffle Rd Hawthorne NJ
Setchell-Carlson Inc New Brighton St Paul Minn
Shallcross Mfg Preston St Selma NC
Shell Electronics 112 State St Westbury NY
Sherwood Electronic 4300 N California Chicago Ill
Shure Brothers 222 Hartrey Ave Evanston Ill
Sierra Electronic 3885 Bohannon Dr Menlo Park Calif
Sightmaster Corp 50 Aleppo St Providence RI
Sigma Instruments 70 Pearl St South Braintree Mass
Signalite Inc 37-41 Neptune Hwy Neptune NJ
Silicon Transistor 150 Glen Cove Ave Carle Place LI NY
Simpson Electric 5200 W Kinzie St Chicago Ill
Simpson Mfg Co Mark 32-29 49 St Long Island City NY
Skottie Electronics 204 Bridge St Peckville Pa
Smith-Florence Inc 4228 23 St West Seattle Wash
Smith Labs Bernard 2969 Ludlow Rd Cleveland Ohio
Smith Inc Herman H 2326 Nostrand Ave Brooklyn NY
Smolin Labs Woodbrook Dr Springdale Conn
Snyder Mfg 22nd & Ontario Sts Philadelphia Pa
Sola Electric 1717 Busse Rd Elk Grove Village Ill
Solar Systems Inc 8241 N Kimball Ave Skokie Ill
Solid State Electronics 15321 Rayen St Sepulveda Calif
Solitron Devices 67 S Lexington Ave White Plains NY
Sonar Radio Corp 3050 W 21 St Brooklyn NY
Sonic Industries 19 Wilbur St Lynbrook NY
Sonotone Corp Elmsford NY
Sono-Vision Co 156 Hempstead Tpk Hempstead NY
Sony Corp 514 Bdwy New York NY
Sorensen & Co Richards Ave South Norwalk Conn
Soundex Radio Co 959 Commonwealth Ave Boston Mass
Soundolier Inc PO Box 3848 St Louis Mo
South River Metal Prods 377 Turnpike Rd South River NJ
Southwestern Industrial Electronics 10201 Westheimer Houston Texas
Spaulding Products 550 W Barner St Frankfort Ind
Speer Resistor Div Speer Carbon Co Bradford Pa
Spellman High Voltage Co 3029 Webster Ave Bronx NY
Spencer Kennedy Labs 1320 Soldiers Field Rd Boston Mass
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Take along a Signet Sound Catalog and you will have all you need to make a sale. Without major time involvement, risk or investment, you can offer a complete choice . . . size and price-wise . . . of pre-planned, easy-to-install Signet Sound Packages backed by the greatest name in sound—STROMBERG-CARLSON®. In addition to a good profit on the equipment, you can earn a good service fee for installing it. For detailed information and your copy of the Signet Sound Catalog write:

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Dept. H, 1405 North Goodman Street
Rochester 3, New York

GENERAL DYNAMICS | ELECTRONICS

In modern sound systems . . . THERE IS NOTHING FINER THAN A STROMBERG-CARLSON®

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Spirling Products PO Box 411 Hicksville NY
Sprague Products North Adams Mass
Square D Co 4041 N Richard St Milwaukee Wis
Stackpole Carbon Electronics Div St Mary's Pa
Standard Electrical Prods Div General Control Inc 2240 E 3 St Dayton Ohio
Standard Electronics 2240 E 3 St Dayton Ohio
Standard Instrument 657 Bdwy New York NY
Standard Kollsman Industries 2085 N Hawthorne Ave Melrose Park Ill
Standard Rectifier 620 E Dyer Rd Santa Ana Calif
State Labs 215 Park Ave S New York NY
Statham Instruments 12401 W Olympic Blvd Los Angeles Calif
Stephens Tru-Sonic 8538 Warner Dr Culver City Calif
Sterling Electric Motors 5401 Telegraph Rd Los Angeles Calif
Sterling Mfg 7201 Wentworth Ave Cleveland Ohio
Sterling Precision 17 Matinecock Ave Port Washington NY
Sterling Transformer 510 Driggs Ave Brooklyn NY
Stevens Walden Inc 467 Shrewsbury St Worcester Mass
Sticht Co Herman H 27 Park Pl New York NY
Stromberg-Carlson 1400 N Goodman Rochester NY
Stuart & Co Matthew 156 5 Ave New York NY
Sunmaster Products 169 Commercial St Sunnyvale Calif
Sun Radio Service 320 Chestnut St Kearny NJ
Superex Electronics 4 Radford Pl Yonkers NY
Superior Electric Bristol Conn
Superior Instruments 2435 White Plains Rd New York NY
Superscope Inc 8150 Vineland Ave Sun Valley Calif
Surprenant Mfg 172 Sterling St Clinton Mass
Supreme Publications 1760 Balsam Rd Highland Park Ill
Swedgal M 258 Bdwy New York NY
Sweeney Mfg B K 6300 E 44 Ave Denver Colo
Swing-O-Lite Inc 13 Moonachie Rd Hackensack NJ
Switchcraft Inc 5555 N Elston Ave Chicago Ill
Sylvania Electric Products Electron Tube Div 1740 Bdwy New York NY
Sylvania Electric Products Semiconductor Div 100 Sylvan Rd Woburn Mass
Syntron Co Semiconductor Div 582 Lexington Ave Homer City Pa
Systems Inc 2400 Diversified Way Orlando Fla

Taber Instr 107 Goundry St North Tonawanda NY
TACO (See Technical Appliance Corp)
Talk-A-Phone Co 1512 S Pulaski Rd Chicago Ill
Tandberg of America 8 3 Ave Pelham NY
Tannoy (America) Ltd PO Box 177 East Norwich LI NY
Tap-A-Line Mfg PO Box 563 Pompano Beach Fla
Tape-Athon 523 S Hindry Inglewood Calif
Taylor Instr 95 Ames St Rochester NY
Tech-Master Corp 75 Front St Brooklyn NY
Technibilt Corp 905 Airway Glendale Calif
Technical Appliance Corp (TACO) 1 Taco St Sherburne NY
Technical Industries 389 N Fair Oaks Pasadena Calif
Technical Material 700 Fennimore Rd Mamaroneck NY
Technitrol Eng'g 1952 Allegheny Ave Philadelphia Pa
Technology Instrument Corp of Acton 533 Main St Acton Mass
Technology Instr Newbury Park Calif
Tecraft PO Box 84 South Hackensack NJ
Tektronix Inc PO Box 500 Beaverton Ore
Telco Electronics 919 Taylor Ave Rockford Ill
Telechrome Mfg Hammarlund Automation Div 28 Ranick Dr Amityville LI NY
Telectro Industries 37-18 37 St Long Island City NY
Telectrosonic Corp 35-18 37 St Long Island City NY
Telephone & Electronics 7 E 42 St New York NY
Tele-Test Instrument 92-24 Queens Blvd Rego Park LI NY
Tele-Tronics Co Ambler Pa
Teletype Corp 5555 Touhy Ave Skokie Ill
Telex Inc 1633 Eustis Ave St Paul Minn
Telonic Industries 60 N 1 Ave Beech Grove Ind
Teltron Electric 428 Harrison Ave Harrison NJ
Tenatronics Ltd 1011 Power Ave Cleveland Ohio
Tenna Mfg 7580 Garfield Blvd Cleveland Ohio
Tennalab 10 & State St Quincy Ill
Tensolite Insulated Wire W Main St Tarrytown NY
Tensor Inc 1873 Eastern Pkwy Brooklyn NY
Terado Co 1068 Raymond Ave St Paul Minn
Terminal Hudson 236 W 17 St New York NY
Tetrad Corp 62 St Marys Ave Yonkers NY
Tevco Insulated Wire 108 E Prospect Ave Burbank Calif
Texas Crystals 1000 Crystal Dr Fort Myers Fla
Texas Instruments Semiconductor Components Div 13500 N Centray Expressway Dallas Texas
Texas Instruments Apparatus Div Industrial Products Group PO Box 6027 Houston Tex
Theta Instrument Victor St Saddle Brook NJ
Thomas & Betts 36 Butler St Elizabeth NJ
Thomas Electronic Organs 8345 Hayvenhurst Ave Sepulveda Calif
Thomas Electronics 118 9 St Passaic NJ
Thompson-Ramo-Wooldridge Inc 8433 Fallbrook Ave Canoga Park (Los Angeles) Calif
Thordarson-Meissner 7 & Belmont Mount Carmel Ill
Thor Power Tool 1421 Barnsdale Rd LaGrange Park Ill
Thorens Co Thorens Ave New Hyde Park LI NY
Times Wire & Cable Co 358 Hall Ave Wallingford Conn
Tobe Deutschman (See Deutschman Corp Tobe)
Torwico Electronics 1090 Morris Ave Union NJ

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DIPPED AND MOLDED MYLAR* CAPACITORS AND SUBMINIATURE ELECTROLYTICS

Pyramid makes the capacitors you want for replacement. Every type of Pyramid capacitor is manufactured under the most rigid standards to insure their high reliability and long life. You can depend on them.

MOLDED MYLAR

Type 111 "Gold Standard" Molded Mylar Capacitors are now available in greatly reduced sizes. They have a noninductive polyester film extended foil section, and are molded in a noninflammable thermosetting plastic case. These capacitors have very high insulation resistance, are impervious to moisture and are extremely rugged.

Operating temperature range: —55°C to +100°C.

SUBMINIATURE ELECTROLYTICS

MLV Miniature Electrolytic Capacitors are ideally suited for transistorized radio receivers, hearing aids, portable TV sets, and miniaturized circuit requirements. These capacitors are noted for low leakage and a long shelf and operating life. They are designed for 85°C operation.

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Type 151 Gold-Dip Mylar capacitors are designed to be used for printed board circuitry as well as conventional applications. They are engineered for the highest reliability, are moisture resistant and have high insulation resistance.

Operating temperature range: —55°C to +110°C. Look for them on Pyramid's new Whirl-o-mat, five to a package, in Clear-Vu paks.

*DU PONT TM

PYRAMID ELECTRIC COMPANY
DARLINGTON, SOUTH CAROLINA

Canada: Wm. Cohen, Limited, 8900 Tanguay Street, Montreal
Export: Morhan Exporting Co., 485 Broadway, New York 13, N.Y.

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Tracerlab-Keleket 1601 Trapelo Rd Waltham Mass
Trad Electronics 1001 1 Ave Asbury Park NJ
Transistor Specialties Plainview LI NY
Transitron Electronic 163 Albion Wakefield Mass
Trav-Ler Radio 571 W Jackson Chicago Ill
Triad Transformer 4055 Redwood Ave Venice Calif
Trimm Inc 400 Lake St Libertyville Ill
Trio Labs Plainview NY
Trio Mfg Griggsville Ill
Triplett Electrical Instr 286 Harmon Rd Bluffton Ohio
Triton Tape Co 62-05 30 Ave Woodside NY
Tru-Ohm Prods Div Model Eng'g & Mfg 2800 N Milwaukee Ave Chicago Ill
Tru-Vac 438 Harrison Ave Harrison NJ
Tube-A-Rama Nationwide Bldg Harrison NJ
Tung-Sol Electric Inc 1 Summer Ave Newark NJ
Turner Co 909 17 St NE Cedar Rapids Iowa
TV Development 469 Jericho Tpk Mineola LI NY
TV Hardware Mfg Div General Cement 919 Taylor Ave Rockford Ill
TV Parts House PO Box 1971 Billings Mont
TV Utilities Corp 112-33 Colonial Ave Corona NY

Uher (see Warren J Weiss Assoc)
Ultra Electronics 235 E 60 St New York NY
Ultradyne Inc PO Box 3308 Albuquerque NM
Ultrasonic Industries Ames Court Engineers Hill Plainview LI NY
Ultravision Mfg 185 Goffle Rd Hawthorne NJ
Ultronix Inc 111 E 20 Ave San Mateo Calif
Ungar Electric Tools 1475 E El Segundo Blvd Hawthorne Calif
Ungar Co Sid 1729 Washington Blvd Venice Calif
Unimax Switch Div W L Maxson Corp Ives Rd Wallingford Conn
Union Carbide Consumer Products 30 E 42 St New York NY
Union Switch & Signal Braddock Ave Pittsburgh Pa
United Audio Prods 12 W 8 St New York NY
United Catalog Publishers 60 Madison Ave Hempstead NY
United Condenser 3400 Park Ave Bronx NY
United Electric Controls 85 School St Watertown Mass
United Electronics 42 Spring St Newark NJ
United Motor Service Div GMC Detroit Mich
United Radio Box 1000 Newark NJ
United Scientific Labs 35-15 37 Ave Long Island City NY
United Transformer 150 Varick St New York NY
Universal Teletronics 8 Gary Rd Syosset LI NY
Universal Transistor Prods 17 Brooklyn Ave Westbury LI NY
University Loudspeakers 80 S Kensico Ave White Plains NY
Up-Right Towers 1013 Pardee St Berkeley Calif
US Components 454 E 148 St New York NY
US Electronic Publ 480 Lexington Ave New York NY
US Gasket Co 600 N 10 St Camden NJ
US Recording 1347 S Capitol St Washington DC
US Relay-Electronics Div ASR Prods Co 717 N Coney Ave Azusa Calif
US Semiconductor Prods Div United Industrial Corp 3540 W Osborn Rd Phoenix Ariz
US Steel Corp Pittsburgh Pa
US Transistor Corp 149 Eileen Way Syosset LI NY
Utah Radio Prods 1123 E Franklin St Huntington Ind
U-Test-M Mfg 4325 W Lincoln Milwaukee Wis
Utica Communications 1834 W Foster Chicago Ill
Utica Drop Forge & Tool 2515 Whitesboro Utica NY

Vaco Products 317 E Ontario St Chicago Ill
Valpey Crystal 1244 Highland St Holliston Mass
Van Norman Industries Electronics Div 186 Granite St Manchester NH
Van Nostrand Co D 120 Alexander St Princeton NJ
Varian Assoc 611 Hansen Way Palo Alto Calif
Vari Corp 2825 Cedar Ave Minneapolis Minn
Vector Electronic 1100 Flower St Glendale Calif
Vector Mfg Keystone Rd Southampton Pa
Veeder Root Inc 70 Sargent St Hartford Conn
Vega Electronics 1071 N Hwy 9 Cupertino Calif
Vernitron Corp 136 Church St New York NY
Vibro Ceramic Div Gulton Industries 212 Durham Ave Metuchen NJ
Victor Electric Wire & Cable 618 Main St West Warwick RI
Victoreen Instr 5806 Hough Ave Cleveland Ohio
Victory Electronics 50 Bond St Westbury NY
Victory Eng'g Springfield Rd Union NJ
Vidaire Electronics 365 Babylon Tpke Roosevelt LI NY
Videon Electronics 902 E Michigan St Indianapolis Ind
Viking Industries 21343 Roscoe Blvd Canoga Park Calif
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Vis-U-All Products Co Hampshire Ill
Vitramon Inc Box 544 Bridgeport Conn
Vitrex Inc PO Box 10 North Miami Beach Fla
V-M Corp 4 & Park Sts Benton Harbor Mich
Vocaline Co of America Coulter St Old Saybrook Conn
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FROM GULFPORT MISSISSIPPI:
"Color reception is amazing. For the first time we will really be able to sell color television."

FROM GREAT BEND KANSAS:
"I've tested and used about every fringe antenna. Your Powertron gives the sharpest reception I have ever seen here."

FROM FARGO NORTH DAKOTA:
"It's fantastic! We're getting several stations with Powertron we've never seen before."

FIRST DEALER REPORTS ON THE WINEGARD POWERTRON

World's First Electronic TV Antenna

The Powertron antenna has caused more letters to flow into Winegard's offices than any thing we have ever made. TV service-technicians who have tried one are amazed at the tremendous reception and advantages of this new antenna.

The Powertron is an all channel yagi antenna with a built-in high gain RF amplifier in one integral unit. It comes equipped with a power supply that lowers 117 V. AC to a safe 24 volts which is fed up the lead-in to the antenna. It is 5 to 9 times more powerful than any other antenna made.

With the Powertron, you can get your customers many channels they couldn't even see before. For example, in Burlington, Iowa, we easily pull in 9 channels where we used to pull in only 5 with a Color'Ceptor—our finest antenna before we developed the Powertron.

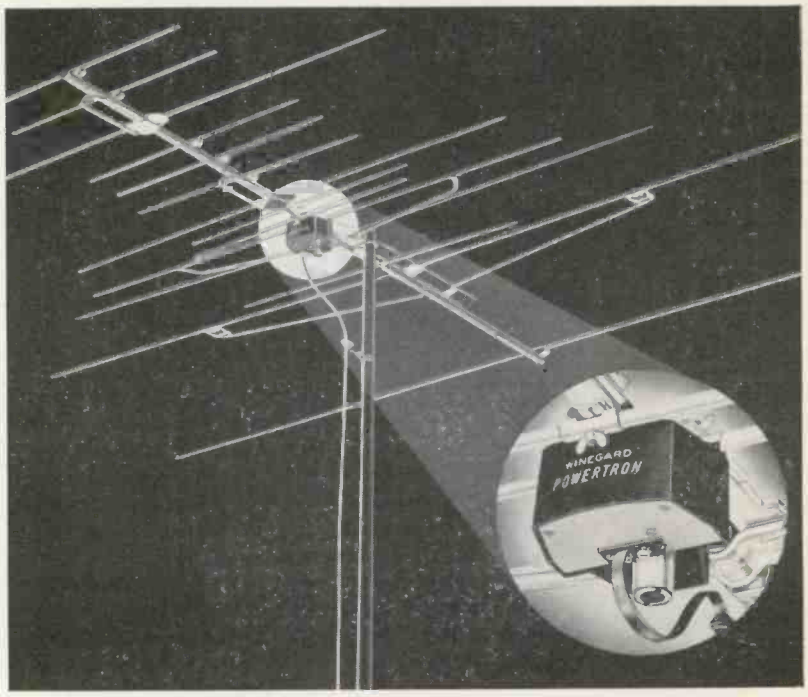
You can run 10 TV sets with a Powertron and all of them will have a better picture than you now get on one set with your present antenna.

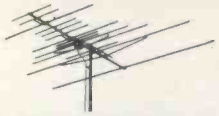
You can make your installations 30 to 40% lower in height with a Powertron without affecting reception, in most cases.

You can remote the Powertron antenna ¼ mile away from the TV set and get a better picture than with an ordinary antenna mounted next to the set.

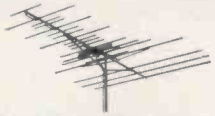
You can deliver the clearest, sharpest, truest, color TV you've ever seen because the Powertron's extremely linear response makes it *the only* antenna that should be installed with a color receiver.

In short, this antenna is amazing. But don't take our word for it—test one and see for yourself. Ask your distributor or write today for *free* technical bulletin.

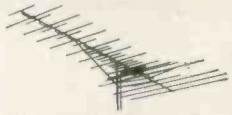




Model P-44 Powertron — $74.95 list, 14 elements. 5 times more voltage gain than Color-'Ceptor.



Model P-44X Powertron with Pack — $91.90 list, 21 elements. Up to 54% more gain, higher front to back ratio than Model P-44.



Model SP-44X Super Powertron — $104.95 list, 30 elements. Twice the gain of Model P-44.

Winegard

3019-5 Kirkwood Boulevard • Burlington, Iowa

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Waber Electronics Hancock & Somerset Sts Philadelphia Pa
Walco Electronics 60 Franklin St East Orange NJ
Wald Inc 119 Prospect Ave Burbank Calif
Waldom Electronics 4625 W 53 St Chicago Ill
Wall Mfg Co P Grove City Pa
Wallace Telaides (See H V Associates)
Walsco Electronics 100 W Green St Rockford Ill
Ward Leonard Electric 115 McQueston Pkwy Mount Vernon NY
Ward Products Edsom St Amsterdam NY
Waterman Products 2445 Emerald St Philadelphia Pa
Waters Conley Inc 17 E Chestnut Chicago Ill
Waters Mfg Boston Post Rd Wayland Mass
Waveforms Inc 333 6 Ave New York NY
Wayne Kerr Corp 1633 Race St Philadelphia Pa
Weatherford Co R V Glendale Calif
Weathers Industries 66 E Gloucester Pike Barrington NJ
Webcor Inc 5626 Bloomingdale Ave Chicago Ill
Webster Electric 1900 Clark St Racine Wis
Webster Mfg 317 Roebling Rd South San Francisco Calif
Webster Productomatic 182 Ave D Rochester NY
Weirton Steel Co Weirton W Va
Weiss Assoc 346 W 44 St New York NY
Wellcor Inc 1214 N Wells St Chicago Ill
Weller Electric 601 Stone's Crossing Rd Easton Pa
Wells Electronics 1701 S Main St South Bend Ind
Wells-Gardner 2701 N Kildare Ave Chicago Ill
Wen Products 5810 Northwest Hwy Chicago Ill
Wendell Fabrics 1220 Bdwy New York NY
West Instruments 4363 W Montrose Chicago Ill
Westinghouse Electric Corp PO Box 746 Baltimore Md
Westinghouse Electric Corp 3 Gateway Center Pittsburgh Pa
Westinghouse Electric Radio-TV Dept Metuchen NJ
Westinghouse Electric Semiconductor Div Youngwood Pa
Westinghouse Electric Tube Div Elmira NY
Weston Instruments Div Daystrom Inc 614 Frelinghuysen Ave Newark NJ
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Wheeler Electronic Div Sperry Rand 150 E Aurora St Waterbury Conn
Whitaker Cable 1301 Burlington St N Kansas City Mo
White Eng'g 238 Grand Ave Rutherford NJ
Wiancko Eng'g 255 N Halstead Pasadena Calif
Wilcox-Gay Corp Charlotte Mich
Wiley & Sons John 440 Park Ave S New York NY
Wilson & Co G C Huntington W Va
Wincharger Corp E 7 & Division Sts Sioux City Iowa
Windsor Electronics Glen Ellyn Ill
Winegard Co 3000 Scotten Blvd Burlington Iowa
Winpower Mfg 1207 1 Ave E Newton Iowa
Winslow Co 701 Lehigh Ave Union NJ
Winston Electronics 4000 NW 28 St Miami Fla
Wintriss Inc 20 Vandam New York NY
Wood Electric 244 Broad St Lynn Mass
Workman TV Inc Box 5397 Sarasota Fla
World Radio Labs 3415 W Bdwy Council Bluffs Iowa
Worner Electronic Rankin Ill
Wright Steel & Wire G F 243 Stafford St Worcester Mass
Wuerth Surgitron Div Hollywood TV Co 1949 Moffett St Hollywood Fla
Wyco Metal Prods 6918 Beck Ave North Hollywood Calif

X-acto Inc 48-41 Van Dam St Long Island City NY
Xcelite Thorne Ave & Bank St Orchard Park NY

Yardney Electric 40-5D Leonard St New York NY
Yashica Co 234 5 Ave New York NY
Yeats Appl Dolly 2124 N 12 St Milwaukee Wis
Yellow Springs Instr PO Box 106 Yellow Springs Ohio
Yokogawa Electric 40 Worth St New York NY

Zalytron Tube 220 West 42 St New York NY
Zenith Electric 152 W Walton St Chicago Ill
Zenith Radio 6001 Dickens Ave Chicago Ill
Ziff-Davis Pub 1 Park Ave New York NY

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For more data, circle 5-68-1 on coupon, p. 57

An authoritative answer to a ticklish consumer question . . .

ELECTRONIC TECHNICIAN has prepared the following bulletin as an aid to better customer relations. When an estimate can not be provided in the home, give your customer a copy. Reprint this bulletin yourself, or order extra copies postpaid from ELECTRONIC TECHNICIAN, 480 Lexington Ave., New York 17, N.Y. Price is $1 for first 100 copies; 75¢ additional 100's.

Why Can't You Give Me a TV Repair Estimate Right Now?

Every day many TV set owners ask this of their service technicians. It's a fair question. Here's the answer.

By their very nature, electronic parts—even the best made parts—are subject to unexpected failure at any time. A typical TV receiver contains over 585 separate tubes and components plus thousands of feet of wire. When a certain few of these components break down, they produce symptoms that sometimes are immediately traceable to the respective parts. When this happens, your TV technician can give you an estimate—and frequently even repair the set—immediately, right in your own home.

However, most of the 585 parts can cause symptoms identical with other parts. No guess work here, because a 25¢ resistor can cause the same apparent symptoms as a $25 transformer! To locate the troublesome part or parts requires costly and bulky test instruments frequently found only in the repair shop. So your service technician often cannot give you an estimate until your set is examined at the test bench to determine the cause of the failure and the cost of replacing the part that failed.

Your service technician wants you as a customer. All TV sets require periodic repair. To hold your good will for future business, he wants to give you an accurate estimate based on instrument tests, not guesswork. Unfortunately, it is often not technically possible for him to do so "right now"—in your home—much as he desires to please you.

Prepared as a public service by

ELECTRONIC TECHNICIAN

World's Largest Electronic Trade Circulation

New Books

SEMICONDUCTOR DEVICES. *By Rufus P. Turner. Published by Holt, Rinehart and Winston, Inc., 278 pages, hard cover. $6.95.*

This book surveys semiconductor devices from Atom to Zener. It's directed toward technicians instead of design engineers as evidenced by its minimal mathematics. The first chapter discusses semiconductor theory; current flow, N-type and P-type, PN junctions, and other basic information. From this vantage point the author continues to discuss various semiconductor types, their characteristics, operation, and circuit applications. Semiconductors thoroughly explored include: diodes, power rectifiers, transistors, photoelectric devices, varistors, thermistors, and magnetic devices. Many applications are reviewed, such as computer switching, decade counters, multivibrators, pulse generators, and other practical circuit uses. A final chapter covers the latest test and measurement procedures. The book is admirably illustrated and the writing style is pleasing and understandable throughout.

FUNDAMENTALS OF ELECTRONICS. *By Matthew Mandl. Published by Prentice-Hall, Inc. 574 pages, hard cover. $10.60.*

The title of this book precisely defines what it covers; an analysis of basic electronics. Commencing with basic electron theory, the text proceeds to discuss each electronic fundamental, such as: series & parallel circuits, magnetism, a-c current, inductance, capacitance, resonance. After laying this firm foundation, a chapter each on vacuum tubes and transistors brings the reader to circuit sections. Here, five chapters analyze the operations of: power supplies, basic amplifiers, power amplifiers, oscillator circuits, and modulation & demodulation. A chapter each on receiver principles and antennas follow to complete basic theory. An additional plum is offered in two more chapters which cover miscellaneous circuits (photoelectric, gating, magamps, etc.) and brief descriptions of popular service instrument types. This is an excellent book for beginners or techs wishing to review fundamentals. It is clearly written and includes many photos, schematics and charts. Each chapter concludes with review questions as a self-learning aid.

Management Guide To **HUMAN RELATIONS IN INDUSTRY**: *By Lewis & Pearson. Published by John F. Rider Publishers, Inc. 58 pages, soft cover. $1.25.*

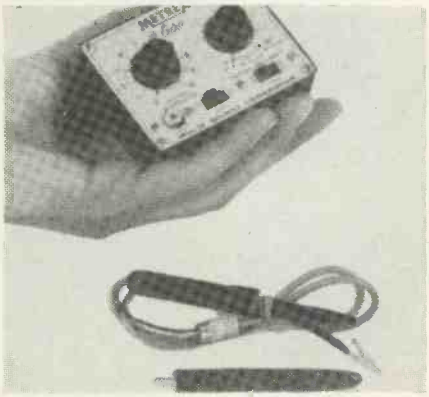
Human relations, a subject frequently neglected until serious problems arise, is described here as a tool for improving the effectiveness of modern management. The concept is adequately defined in understandable terms. A brief review of research studies is included. Applications, organization and executive planning, leadership and supervision elements are discussed. This is an important manual for anyone with management or supervisory responsibilities.

101 KEY TROUBLESHOOTING WAVEFORMS. *By Robert G. Middleton. Published by Howard W. Sams & Co., Inc. 128 pages, soft cover. $2.00.*

Four conventional horizontal output circuits are given the "service-by-scope" treatment by this popular author. Namely, the 110°, 90°, direct drive and primary-secondary horizontal sweep systems. The text is divided into four sections, each containing a circuit schematic and normal scope traces at selected test points. Built around these test points, the author illustrates oscilloscope traces as they will appear with various defective components. A "symptom," "test" and "evaluation" procedure is employed for each defect discussed. This excellent presentation should help many technicians further their knowledge of oscilloscope techniques for TV repair.

Metrex GENERATORS

Model Genie pocketsize, battery operated, transistorized, tunable, signal generated is designed for speedy dynamic troubleshooting alignment and calibration. Tunable range, 50 cycles

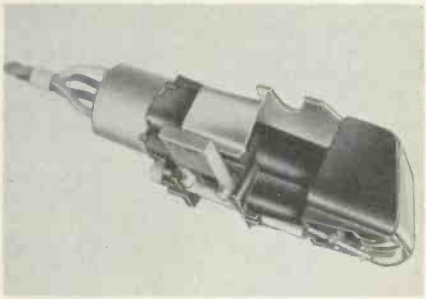


to 3.3 mc. Output, variable from zero to 9v peak-to-peak. It functions as an r-f, i-f, audio, video, pulse and bar signal generator and as a voltage calibrator. $14.95. Metrex Corp., 819 Blake Ave., Brooklyn 7, N. Y.

For more data, circle 5-71-2 on coupon, p. 57

Sonotone CARTRIDGES

The 16T has 20 to 10,000 cps response ± db. Tracking is 5 to 7 grams, compliance, 2.4, separation, 22 db and output is .5v/channel. Model 18T, recom-



mended where more output voltage is desired, has the same specifications as 16T except: channel separation is 20 db, compliance 1.5 and tracking is 7 to 9 grams. Output is .7v/channel. $12.50 with sapphire tips. $15.50 with diamond-sapphire styli. Sonotone Corp., Elmsford, N. Y.

For more data, circle 5-71-3 on coupon, p. 57

Sylvania TUBES

Two new cathode ray tubes are: type SC-3016, flat face, 1-⅛" diameter, low power heater, electrostatic focus and deflection, over-all length only 6"; electron gun provides high deflection sensitivity and employs newly-developed 1.5v, 140 ma heater-cathode assembly; type SC-3042, 5" flat face, high resolution CRT with electrostatic deflection and focus, reported to provide twice the resolution found in types 5ADP or 5AQP, intended for applications where line widths less than 0.010-inch are required. Can be supplied with P1, P2, P4, P7, P11, P12, P15, P16, P20, P25 phosphors. Sylvania Electric Products, Inc., Seneca Falls, N. Y.

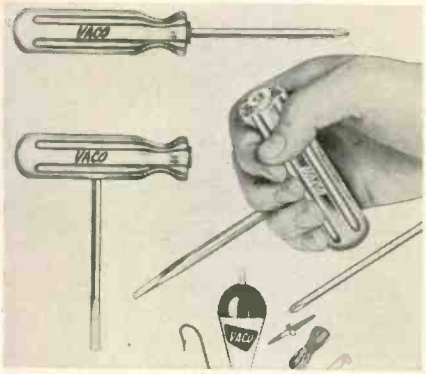
For more data, circle 5-71-4 on coupon, p. 57

For more data, circle 5-71-1 on coupon, p. 57

Vaco TOOLS

Features of the new side arm T-handle high torque screw driver set include: amberyl plastic handle, 4" in length, with regular clutch at the end for interchangeable blades and an extra clutch in the center of the handle, also for interchangeable blades, which provides the "T" handle; regular blade, ¼"×5"; genuine #2 point Phillips blade, also interchangeable, to be used as regular screw driver or "T" handle; and free bonus of "HandiAngler" complete fishing kit. $2.98. In Canada, $3.90. Vaco Products Co., 317 E. Ontario St., Chicago 11, Ill.

For more data, circle 5-72-2 on coupon, p. 57



Granco CONVERTERS

A number of advanced design features are reported for model ARC-60 FM car radio converter. It requires only 3 screws for installation, plugs into present AM car radio antenna

and 12v power source connections and, if desired, functions without affecting the AM radio operation. Equipped with the firm's Auto-G coaxial tuner and automatic frequency control. $49.95. Du Mont Emerson Corp., 14th & Coles St., Jersey City 2, N. J.

For more data, circle 5-72-3 on coupon, p. 57

JSC WIRE

A new look is reported for the 300 ohm twin lead items in the JSC flat lead-in line. All the lead-in has been widened out from edge to edge to a full 400 width, while retaining the necessary 300 ohm characteristics. A new, bold type face is also used to imprint the wire with large easily read letters. For convenience in measuring lengths from the spool, the firm's one-foot markers are on the wire. Jersey Specialty Co., Burgess Place, Mountain View, N. J.

For more data, circle 5-72-4 on coupon, p. 57

Eveready RADIO BATTERIES

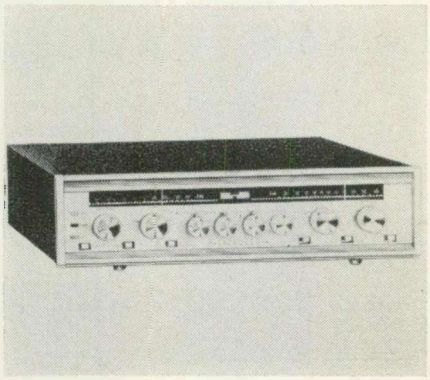
Announced as the latest addition to the "Eveready" line of transistor radio batteries is the new #206 Energizer, a compact low cost power source for 1961 transistor portable radios. Constructed of "Mini-Mix" round cells, this new 9v Energizer provides many hours of service at 10 ma drain. 75¢. Union Carbide Consumer Products Co., 270 Park Ave., New York 17, N. Y.

For more data, circle 5-72-5 on coupon, p. 57

For more data, circle 5-72-1 on coupon, p. 57

Sherwood STEREO RECEIVER

Model S-7000 compact stereo receiver, combining the firm's FM/AM tuner and 50 watt stereo amplifier, features 19 front panel controls and switches and 9 inputs. It requires only the addition of speakers and phono changer to complete a home stereo music system. Hum and noise, 80 db

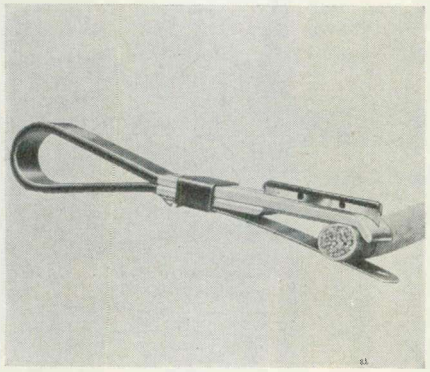


below 24 watts (radio) —60 db (phono). Frequency response, ± 1db 20-40,000 cps. IM distortion, 1.50%. Harmonic distortion, 0.50% at 24 watts continuous power output. Less case, $299.50. With brown leatherette case, $307.00. Sherwood Electronic Labs., 4300 N. California, Chicago 18, Ill.

For mare data, circle 5-73-2 on caupon, p. 57

Neuses TOOLS

Cable tool #N-2060, for ring cutting the sheathing of inside type plastic fabric or rubber covered cable, provides an accurate deep cut of .03125" when the tool is rotated around the cable circumference. Operation is simple: cable is pushed into the tool against the spring. It is most practi-



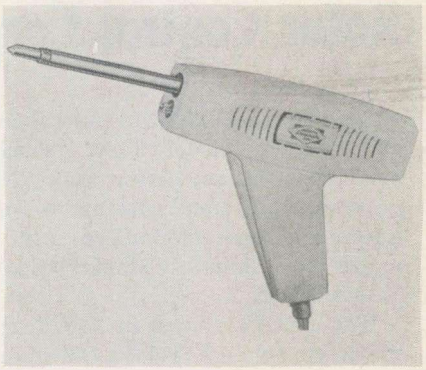
cally suited for the customary inside type 3/16", ¼", ⅜" or ½" cables, but will handle thin sheathed cable up to 1" diameter. Cuts are always 1/32" deep. $7.40. Also available, cable sheath slitter #N-62267 for slitting the cable lengthwise after circular cutting, $4.20. P. K. Neuses, Inc., 511 N. Dwyer St., Arlington Heights, Ill.

For more data, circle 5-73-3 on coupon, p .57

Portable SOLDERING GUNS

Shopmate SG-125B soldering gun plugs into any a-c outlet for immediate heat. It is reported that actual soldering can begin in five seconds. It has a rigid single-pole, with extensions up to 12", for soldering in inaccessible areas. Features include pre-focused "sight light"; finger-tip screw-in tips and glistening white streamlined nylon thermoplastic housing which is flame resistant and shatterproof. Operates at full 1.3 amps. on 115v a-c current. $7.95. Portable Electric Tools, Inc., 1200 E. State St., Geneva, Ill.

For more data, circle 5-73-4 on coupon, p. 57



For more data, circle 5-73-1 on coupn, p. 57

Rotor Control Converts "Manual" Types To "Automatic"

• An automatic rotator control console, Crown model 9526, permits conversion of any 1-rpm manual or automatic antenna rotator to fully automatic operation. The unit is made by Channel Master Corp., Ellenville, N.Y.

The control, shown in Fig. 1, employs no springs, relays, or potentiometers and has a circuit that permits full current flow directly to the rotator for high torque. The unit contains a step-down transformer and automatic current balancing device for rotor control and synchronization.

When the large red-pointed dial is set to the selected channel, the antenna rotor turns automatically until the antenna points in the desired direction. At the same time another pointer on the control follows the antenna rotor's movement until it lines up with the dial's red indicator—and the motor stops.

The device is said to provide antenna orientation within 1°. Pressure sensitive markers, numbered from 2 to 13, are included for channel identification.

The company announced that distributors will immediately replace any defective unit without charge any time within 90 days after purchase. A pro-rated replacement charge prevails after 90 days and continues up to 3 years from date of purchase.

Diagrams for wiring the unit to various rotators, shown in Fig. 2. •

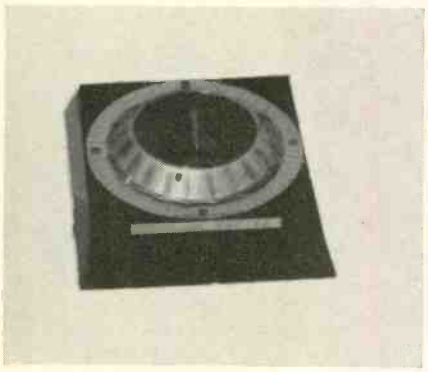


Fig. 1—Channel Master's Crown Automatic Control, model 9526, is used for modernizing older TV antenna rotating equipment.

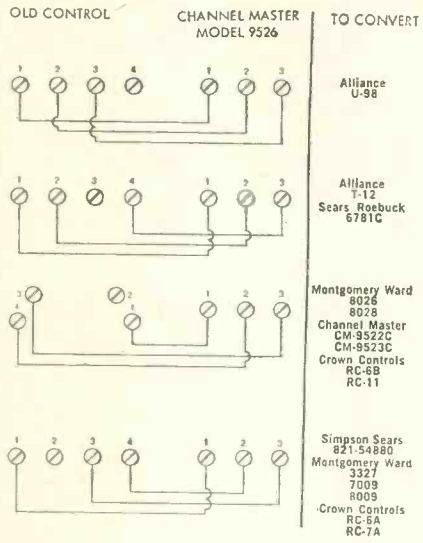
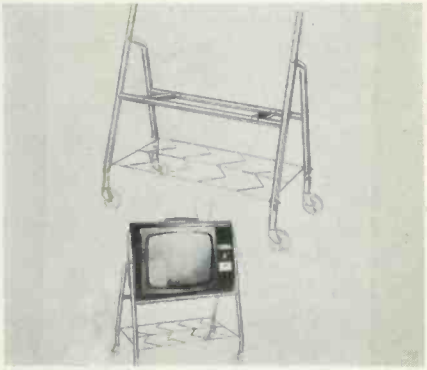


Fig. 2—Hook-ups for connectng control unit to convert other type rotators to fully automatic operation.

JFD TV TABLES

Announced are seven basic models in the Mardi Gras line. They are designed to accommodate any portable or table TV set. Available in polished brass, lacquered bronze, or satin black finish and in various heights. Innova-



tions include: instant swivel basset casters with 1" steel bearings; free-spinning polyethylene bushings; oversized clear lucite wheels; extension arms; and utility rack. JFD Electronics Corp., 6101 16th Ave., Brooklyn 4, N. Y.

For more data, circle 5-75-2 on coupon, p. 57

Sun STEREO REMOTE CONTROL

A new stereo remote control, to adjust stereo balance and volume, fits any stereo system using separate amplifier and preamplifier. The device is plugged into the cathode follower outputs of the preamp at one end and the power amplifier inputs at the other, permitting convenient control of balance and volume from as far away as 30 feet. A special low-capacitance cable minimizes high frequency loss. Control housing measures 5" x 3¾" x 2¼". $19.95 in walnut or mahogany. $15.95 in metal enclosure. Sun Radio Service, 320 Chestnut St., Kearny, N. J.

For more data, circle 5-75-3 on coupon, p. 57

Utah SPEAKERS

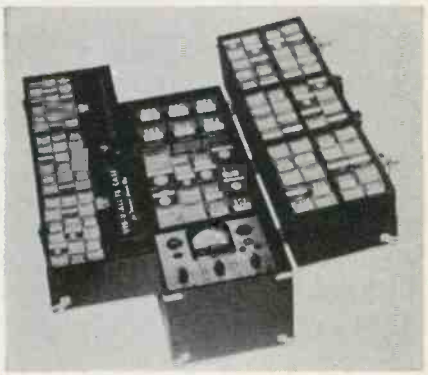
Model SP57NC, a new thin 5 x 7" speaker, has a total depth of only 1¾". This reduction in depth has been accomplished by using an inverted construction with the magnetic structure mounted in front of the cone. The space gained should prove a boon to technicians when making auto radio installations and when servicing sets in small cabinets. It has standard mounting centers to facilitate its use as a replacement speaker. Basic specifications: magnet, 1.47 oz; Alnico V voice coil, ⅝"; Impedance; 3-4 ohms, peak power, 8 watts. Utah Radio & Electronic Corp., Huntington, Ind.

For more data, circle 5-75-4 on coupon, p. 57

GC TUBE TESTER-CADDY

"Vis-U-All" (catalog #36-504), portable tube tester and caddy is reported as the first of its kind in the professional servicing field. The tester in the new caddy has an unusual circuit design with only four sockets. It provides for a dynamic check of tube emission, filament voltage and current leakage, and also indicates general operating conditions of cathode ray tubes. Exclusive master switch accommodates all new tubes as they are introduced. $89.50. GC Electronics Co., 400 S. Wyman St., Rockford, Ill.

For more data, circle 5-75-5 on coupon, p. 57



UHF TV Tuners

(Continued from page 40)

input voltage at various levels while observing tuner action under actual operating conditions.

When an oscillator tube is changed, channel strip oscillator slugs will usually require readjustment because of variations in the tube's interelectrode capacitances. Continuous type tuners usually require oscillator trimmer readjustments.

When adjusting UHF oscillator slugs, turn the slug only a slight amount—first in one direction, and then back in the other direction—the same amount. If the station does not come in, increase the amount of turn—first right, and then left. This method of adjustment will often prevent problems caused by turning the slug too far in or out.

Corroded, oxidized, or worn contacts are perhaps the next most frequent offender. Stationary spring, and strip contacts on turret tuners can cause flashing streaks across the screen, snowy, weak, or intermittent signals. Remember the trouble can also be in the VHF tuner—which may be a multiple wafer type. To solve this problem, contacts must naturally be cleaned and buffed with a clean cotton cloth, or sprayed with an appropriate cleaner. A commercial cleaner specially prepared for contacts should be used. If a spray cleaner is used on wafer type contacts—wait 15 or 20 minutes before making any trimmer or other adjustments—otherwise readjustments may be necessary.

It should be recalled that "flashing streaks" on a screen caused by tuner or i-f defects can seldom be differentiated from those caused by a defective antenna or feedline. The normal procedure here is to isolate the fault by disconnecting the antenna feedline from the set. Next short the two bare ends of the feedline and move it as far away from the set as possible. To pick up some signal, connect an indoor type antenna, or a short length of wire to one antenna terminal—or merely place a finger on one of the antenna terminals when strong signals prevail. If the flashing streaks are still in the picture, the trouble is probably in the tuner or i-f section. If the flashes have disappeared—they are no doubt being caused by antenna or feedline defects.

Shorted capacitors—especially in the oscillator plate circuit—charred resistors, misaligned trimmer or capacitor plates, are other frequent problems. Cracked feedthru capacitors can sometimes be found by carefully checking under a magnifying glass.

Precautions

Considerable care must be taken with UHF component replacements. In the first place, replacements should be made only with exact parts. *Exact* means identical electrical characteristics, size—and precise lead lengths. Small pick-up stubs, or partial turn cavity couplings should not be disturbed. Lead and component dressing should conform to that of the original part. Manufacturers' service manuals should be carefully followed. Alignment procedures are similar to those for VHF tuners—except marker and sweep generator test set-ups are more exacting, and instrument lead terminations become more critical.

The mere knowledge that TV tuner characteristics are extremely

critical, even at VHF frequencies, has "scared" many capable technicians away from UHF tuner adjustments and repair. In recent times, however, more technicians are repairing tuners instead of installing manufacturers' exchange replacements. Thus, repair delays are eliminated, customer costs are reduced—and a greater overall profit margin is established on tuner repair jobs.

• *Illustration credits: Hoffman Electronics Corp., RCA Service Co., Zenith Radio Corp.*

Channel Master RADIOS

Model 6516, a 7-transistor radio in the vest-pocket class, measures 4½" x 2⅞", and is reported to have unusual pull-in power for a set of its size. Features include: a 2½" speaker; easy-to-read Vernier fine-tuning dial; a dual-purpose carrying handle and easel stand; and a built-in ferrite antenna. The radio has 7 transistors, a diode, and a thermistor. It operates on a standard 9v battery, and is housed in an unbreakable nylon case. Available in black or red, with a gold anodized grille. $34.95. Channel Master Corp., Ellenville, N. Y.

For more data, circle 5-77-2 on coupon, p. 57

Electronic Schools

(Continued from page 44)

MISSOURI

KANSAS CITY—Electronics Institute 4600 Troost Ave-1-2-3-4-5-10
KANSAS CITY—Grantham School of Electronics 3123 Gilham Rd-1-4-10-R

NEW JERSEY

PENNSAUKEN—Electronics Training Center 7300 Crescent Blvd-1-2-3

NEW YORK

BROOKLYN—New York City Community College 300 Pearl St-5-6-10-R
NEW YORK—Board of Education of the City of New York Manhattan Trades Center 45 Rivington St-1-2-3-4-6-8-R
NEW YORK—Delehanty Electronics School 117 E 11 St-1-2-3-4-R
NEW YORK—Electronic Development Institute 125 E 46 St-1-2-3-4-5-6-7-10
NEW YORK—Lincoln School of Radio & Television 1851 Broadway-1-2-4-6-R
NEW YORK—New York Institute of Technology 135 W 70 St-5-8-9-10-R
NEW YORK—New York Trade School 304-326 E 69 St-2-5
NEW YORK—Pierce School of Radio & TV 52 E 19 St-1-3
NEW YORK—Radio-TV Training of America 52 E 19 St-1-2-3-4-9
NEW YORK—RCA Institutes 350 W 4 St-1-2-3-4-5-6

OHIO

CLEVELAND—Cleveland Institute of Electronics 1776 E 17 St-4-5-7-10-C

PENNSYLVANIA

ALLENTOWN—Electronics Training Center 29-31 N 7 St-1-2-3
PHILADELPHIA—Electronics Training Center 4322 N Broad St-1-2-3
PHILADELPHIA—Philadelphia Wireless Technical Institute 1533 Pine St-4-5-10-R
PITTSBURGH—Penn Technical Institute 5440 Penn Ave-1-4-5-R
SCRANTON—International Correspondence Schools Oak & Pawnee-1-2-3-4-5-6-7-8-9-10-C

RHODE ISLAND

PROVIDENCE—New England Technical Institute 184 Early St-1-2-3-4-5-6-7-10

TEXAS

PORT ARTHUR—Port Arthur College 1500 Procter (Box 310)-1-2-3-4-5-7-9-R

WASHINGTON

SEATTLE—Grantham School of Electronics 408 Marion St-4-R

WISCONSIN

MILWAUKEE—Milwaukee School of Engineering 1025 N Milwaukee St-1-2-3-4-5-6-10-R

CANADA

TORONTO ONTARIO—DeVry Technical Institute 970 Lawrence Ave W-1-2-3-4-5-6-8-10

HAWAII

HONOLULU—Electro Technical School 989 Oilingham Blvd-4-5-R

ASSOCIATION NEWS

Arkansas

TESA, Ft. Smith, has elected the following officers: Pres., Don Humphrey; V.P., Jack Skaggs; Sec'y, Bill Gravley; Treas., R. D. Feemster.

Florida

TESA, Miami, has elected the following officers: Pres., Daniel Proler; 1st V. P., Charles D. Pierce; 2nd V. P., James P. Cresswell; Corresponding Sec'y, Maxwell Resier; Recording Sec'y, Samuel Kessler; Treas., Charles W. Minter.

ESA, Broward County, has elected the following officers: Pres., Harry Richardson; 1st V.P., Jack Wolmer; 2nd V.P. Jim Tomkins: Rec. Sec'y, Hamilton Boyd; Corr. Sec'y, Bob Kelly; Treas., Bill Lewis.

Illinois

NATESA, Chicago, reports that St. Mary, Louisiana, has become a recent affiliate of the national organization. Its officers are: Pres., Charles Cronier; Sec'y, Jack J. Johanson; V.P's, Lee Benucho, Edward Vice and Allen Price; Treas., Jerry Jackson.

Indiana

RTSEA, Anderson, has elected the following officers: Pres., Don Claus; V.P., Ted Ball; Sec'y, Gerald Whitsel; Treas., Harold Scott.

FTTA, Fayette County, reports the following officers have been elected: Pres., Earl E. Hignite; V.P., Frank Hensley, Jr.; Sec'y, William Suttles; Treas., Jack Robinson.

IESA, Indianapolis, reports Licensing Bill 293 died in the 1961 legislature. The bill was said to have left committee on February 17 with a "do pass" recommendation, and it also passed second reading the following Wednesday. It was then scheduled for final action on Friday, the 24th, but that's when it died. IESA alleged that three TV set manufacturers and one TV service information and schematic publisher contributed to the bill's failure to pass.

Louisiana

LEA, Lafayette, has elected the following officers: Pres., B. M. Church; V.P., Allan Anslem; Sec-Treas., Henry Robertson, Jr.

Michigan

TSA, Detroit, reports that Quality Brands Associates of America, Inc., requests local association indorsement of House of Representative Bill 116. This bill is designed to help restore orderly national distribution of trade marked products. It is also said to offer a simple, direct, and effective Constitutional method for regulating manufacturers' stabilization of product quality.

Minnesota

TESA, St. Paul, has elected the following officers: Pres., Bob Rohweder and Sec'y, Bill Schorn.

Missouri

TEAM, St. Louis, reports its Certification & Bonding program has been extended to include non-TEAM members as well. Until now membership in TEAM was considered a necessary requirement. TEAM also reports that another license bill has been introduced in the Missouri State Senate. Designated Bill No. 263, it was introduced by Senator Johnson and TEAM stands firmly against its passage.

New York

ESFETA, Albany, reports their bill for licensing was defeated in the State Assembly on March 24th by a very narrow margin. They relate that, much to the local organization's surprise, not a single Assemblyman from New York City voted in favor of the Bill.

North Carolina

ETA, Winston-Salem, reports the following officers have been elected: Pres., Raymond Jones; V.P., Dave Drage; Sec'y, Harry Carruthers Treas., Harold Grubb.

NCFEA, Caldwell, elected the following officers: Pres., Jerry Harris; V.P., H. H. Griffin, Sr.; Sec-Treas., Ralph Hall.

NCFEA, Durham, has four license classes in the Bill it has introduced in the State Legislature at Raleigh. Classes include Apprentice Servicemen, Journeyman, Technician, and Shop Certificates. To hold an Apprentice certificate any individual wishing to learn the trade or business must certify that he is in the employ of a person or firm holding a Certificate to practice the trade as provided by the Bill. Initial fee is $5.00 and $2.50 for renewal. Journeymen Certificates would be available to individuals who have met the N. C. Vocational Education Department's requirements, and have received their Journeyman TV Serviceman Card. Initial fee is $15.00 and $10.00 upon renewal. The technician's Certificate is the same as the above except the applicant must meet the Vocational Education Department's Technicians requirements regarding the TV card. The Shop Certificate is issued to prospective TV dealer and repair shops and the fee is $75.00, and $50.00 upon renewal. Applicant must hold or show proof of employing a technician holding a Journeyman or Technician class certificate. The shop owner assumes responsibility for enforcing certain provisions of the bill.

Washington

TSA, Seattle, reports that licensing bill H.B. 139 died in the House Rules Committee on March 4, at 5.00 p.m., the deadline for consideration of House Bills. Prior to this it had been given a rough time in the recent legislature as it was rewritten four times to satisfy various groups and legislators. TSA also relates that the bill was opposed by a Seattle trade school, a mail-order concern and a few Tacoma organizations.

Coming Next Month!

ET Looks At

TRUCKS FOR TV SERVICE

Getting The Most Out Of

JACK DARR

• The Volkswagen "Transporter" is a very handy little vehicle, especially for radio and TV men. The box-car doors on the side of the body make it very easy to handle large console TV sets, and the back door, with its elevated shelf over the rear engine, is helpful. When carrying a bulky table-model TV, the overburdened technician just has to walk up to the shelf and lower the set about three inches.

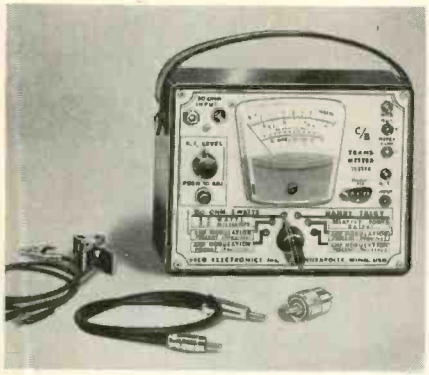
There *are* a few small things which can be added to the vehicle to make it even more useful to a TV technician. The addition of a couple of simple shelves at the back (Fig. 1) makes carrying test equipment and tool-boxes safe and easy. The right side is shown; another shelf can be used on the opposite side. The units seen are a picture-tube tester on the shelf and a tool-box on the floor, which holds small antenna hardware, standoffs, etc. The tester, being delicate, has a pad under it, and is held in place by a web strap and snap. A block screwed to the floor keeps the tool-box from sliding out; a similar block is used on the other side for the big tool-box.

Another helpful feature is "safety belts" across the body, at the

Fig. 1—Rear view shows shelving for test instruments and tools, and interior strapping for safe transport of units.

Seco CB TRANSMITTER TESTERS

Model 510, designed primarily for use with citizens band and other low power transmitters up to 160 mc, is a

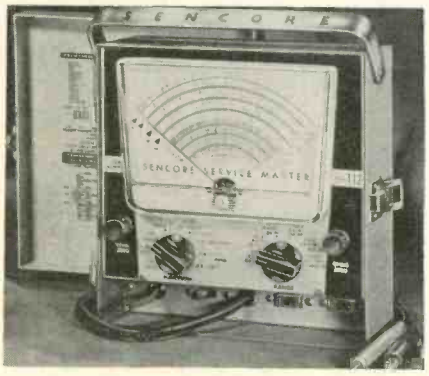


compact unit with a large 3" meter calibrated for direct reading of percentage of amplitude modulation on both positive and negative peaks. It has a direct reading scale for 0-5 watts r-f as well as a 0-400 ma r-f scale. Provides a high impedance input for use with Handy Talkies. A "T" pad attenuator is available as an accessory which adapts the model 510 for use with transmitters rated up to 50 watt input. Seco Electronics, Inc., 5015 Penn Ave. So., Minneapolis, Minn.

For more data, circle 5-80-2 on coupon, p. 57

Sencore VTVM-VOM COMBINATION

Model SM112, Service Master, vacuum tube voltmeter becomes a portable volt ohmmeter with a flick of the function switch. This combination, VTVM-VOM is designed so that it can be used anywhere, anytime, with or without 115v a-c. Features include automatic scale indication: each scale on the VTVM has an indicating arrow. The function or range switch can be set to any position and one of the ar-



rows will automatically glow indicating the exact scale to read, $69.50. Sencore, Addison, Ill.

For more data, circle 5-80-3 on coupon, p. 57

Volkswagens In TV Service

front edge of the shelf. These are 1-inch heavy web straps, with the buckle in the middle. They are fastened to standard screen-door pulls screwed to the body with self-tapping screws on each side. Why the safety belts? Put a table-model TV set on the rear shelf and start for the shop. If some one cuts you off at a corner, causing you to make a panic stop, you'll be mighty happy you have straps. This little buggy sits down very quickly and safely under full braking. However, everything loose in the body can pile up against the front wall in a panic stop. The straps keep the TV set from coming off the shelf and falling about 18 inches to the floor of the body! By the way, be sure to set the lower strap pretty close to the floor of the shelf. I had to move mine: A small 17-inch set shot right under it one day! (Fortunately, it landed on a folded furniture pad without damage.)

The straps will not impede loading of ladders, antennas and other long gear through the back door, as they can slide under the lower strap. If they do block an item, the straps can be unbuckled in the middle.

Fig. 2 shows the box-car doors open, and another handy addition—a sheet of Masonite on the floor.

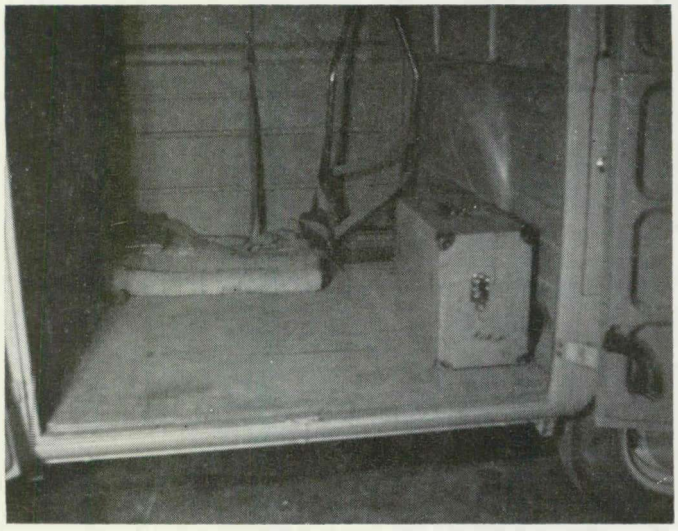


Fig. 2—Side-door view of vehicle shows masonite flooring used to permit easy rolling of console units when inside.

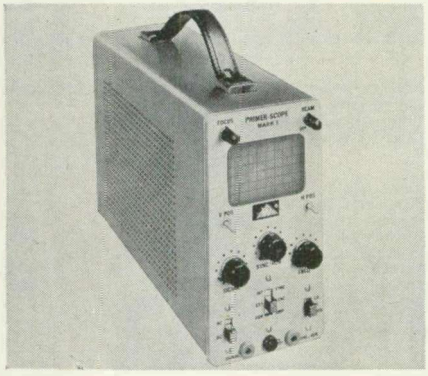
Coming In July!

ET Lab Staff Examines

TRANSISTOR TESTERS

Waterman OSCILLOSCOPE

Announced is the Primer-Scope, Mark I, a small, versatile instrument weighing under 6 lbs. The main scope

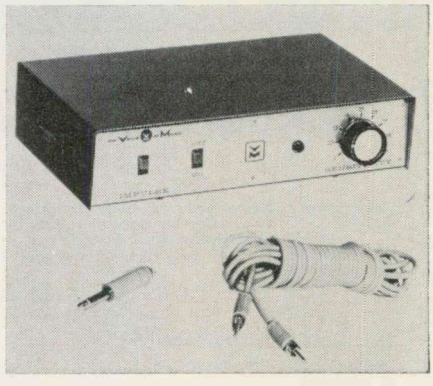


component is a special 3" Rayonic cathode ray tube of the 3RP type, incorporating an integral magnetic shield to prevent stray or spurious pickups. Accelerating potential is approximately 840v. The trace is bright and sharp. Sweep rate is continuously variable in three overlapping ranges from 20 cycles to 20,000 cycles. Synchronization is smooth and positive in operation. Power supply is a conventional transformer type. $69.95. Waterman Products Co., 2445 Emerald St., Philadelphia, Pa.

For more data, circle 5-81-2 on coupon, p. 57

V-M SYNCHRONIZER

Model 1412 tape recorder-slide projector synchronizer is completely compatible with most popular brands of remote control slide or strip film projectors. The user can add his own words and his own music to his own slides. This new device imposes a low 60-cycle pulse signal on the recording tape which will, during play-back, cycle or trip the projector in synchronism with the program recorded. It incites the projector to trip slides automatically at times previously selected thus replacing the remote con-



trol push-button switch furnished with the projector. $49.95. V-M Corp., 226 Pipestone St., Benton Harbor, Mich.

For more data, circle 5-81-3 on coupon, p. 57

The original floor is corrugated for strength; nice, but it makes it awfully hard to roll a huge console TV on casters across it! The Masonite gives you a smooth floor. It can be fastened down with a few sheet metal screws, if necessary, but we just laid ours down; it fits closely enough so that no fastening was needed. On the back (left) wall, two more straps are fastened, using the same screen-door pulls. These are used to hold large consoles in place while moving. The hand-truck can be backed up to the wall, and the straps tied around the set. The furniture pad seen folded on the floor can be used to protect the cabinet from scratches.

By the way, this pad is handy for hauling the new flat TV sets, especially the table models. These jobs are just a bit unstable in their natural position. So, fold the pad double or quadruple, lay the set face-down on it in the main cargo space, and they'll ride like a Pullman. •

Parts Show Preview

(Continued from page 55)

Company	Booth	Room
Hallicrafters Co.		513
Hammarlund Mfg.		550A
Handicraft Tools	5	
Hardwick Hindle	588	
Harlie Transistor		666A
Harman-Kardon		546A/548A
HEPCO—Haas Electronic Publ.		639
Hickok Electrical Instrument	405	
Hi-Lo Mfg. Co.	415	
H.I.S. Industries	124	
Hunter Tools	118	
Hurst Mfg. Corp.	4	
Hy-Gain Antenna Prods.	879/881	
IE Mfg.	302	
IH Mfg.	303	
Illinois Condenser	313	
Injectorall Co.	878	
International Electronics		521A
International Rectifier		704
International Resistance	22	
ITT Distributor Prods. Div.	672/674	
J-B-T Instruments	580	
JFD Electronics	418	737
Jackson Electrical Instrument	218	
James Electronics	206	
Jefferson Inc., Ray (Winston)	105	
Jensen Industries	408	637
Jensen Mfg.		659A/661A
Jerrold Electronics	671/673	
Jersey Specialty		657
Johnson Co., E. F.	681	522
Kester Solder Co.	109	
Kimberly International		635A
Kinematix		604A
Koss, Inc.		655A
Kraeuter Co.	780	
Kurman Electric	887	
Lake Mfg. Co.		658A
Lance Antenna Corp.	115	
Lansing Sound, James B.		623A/624A
Lerco Electronics	412	707
Licon Div.		718
Littelfuse, Inc.	416	
Lowell Mfg. Co.		639A/640A
Luminite Div., Chicopee Mills	123	
Luxo Lamp Corp.	776	
Majestic International	12/13	643A
Mallory & Co. Inc., P. R.	676	
Mark Mobile, Inc.	791	
Mellotone, Inc.	203	
Mercury Electronics	787	
Merit Coil & Transformer	222	
Metal Works, Inc.		760
Microtran Co.	114	
Millen Mfg., James	217	
Miller Co., J. W.	685	
Miller Mfg., M. A.	871	
Minnesota Mining & Mfg.	779	
National Radio Co.	305	
Newcastle Fabrics Corp.	682	
Newcomb Audio Products		524A
New-Tronic Corp.	782	
North American Philips		620A/626A
Oaktron Industries		621A/622A
Ohmite Mfg.	135/1	
Osborne Electronics	108	
Oxford Electric		505A/507A
Parker Metal Goods	130	
Peerless Products	591	
Pentron Electronics Corp.		600
Perma-Power Co.	411	711
Philco Corp.	686/688	
Philmore Mfg.		556
Pickering & Co.		500
Polytronics Labs	25/26	
Potter & Brumfield	220	
Precise Electronics & Dev.	421	
Precision Apparatus Co.	581	
Precision Electronics	107	
Premier Albums	7	
Premier Metal Prods.		560/561
Pyramid Electric	221	
Qualitone Industries	884	
Quam-Nichols Co.	413	

For more data, circle 5-82-2 on coupon, p. 57

Company	Booth	Room
RCA Electron Tube Div.	310	505/507/700
R-Columbia Prods. Co.	578	
Racon Electric	9	
Radio-Electronics-Gernsback Lib.		610
Radio Merchandise Sales		655
Radio & Television Weekly		612
Radion Corp.		622/623
Ram Electronics		536/537
Rauland-Borg Corp.		629A/631A
Rauland Corp.	122	
Raytheon Co.	23/24	
Recoton Corp.	584	
Reeves Soundcraft		513A
Rego Insulated Wire	410	
Rek-O-Kut Co.		544A
Rider Publishers, John F.	205	
Robins Industries		614A/615A
Rockbar Corp.		553A
Rogers Electronic Corp.	27	
Rohn Mfg. Co.	101/103	651/652
S&A Electronics	789	
Sams & Co., Howard W.	407	
Sampson Co.	110	
Sangamo Electric	317	549
Sarkes Tarzian		534
Saxton Products	579	
Seco Electronics		529
Semitronics Corp.	883	
Sencore Service Instruments	208	
Shell Electronics Mfg.	885	664A
Sherwood Electronic Labs.		515A
Shure Brothers		539A
Sightmaster Corp.	120	
Sigma Instruments		733
Simpson Electric	125	521
Simpson Mfg. Co., Mark		601
Smith, Inc., Herman H.	207	
Sola Electric	589	
Sonar Radio Corp.		636A
Sonotone Corp.	129	641A
Soundolier, Inc.	113	
South River Metal Prods.	587	
Spaulding Prods.		649
Sprague Products Co.	210	
Spirling Products Co.	322	
Standard Electrical Prods.	312	
Standard Kollsman Industries	691	
Sterling Precision Corp.	116	
Stromberg-Carlson Co.		560A/561A
Stuart & Co., Matthew		647A
Superex Electronics		533
Swing-O-Lite	873	
Switchcraft, Inc.	585	
Sylvania Electric Prods.	571/573	557/752
TV Development Corp.	786	
Talk-A-Phone Co.		519A/520A
Tandberg of America		504A
Tape-Athon Corp.		634A
Tech-Master Corp.		609A
Technical Appliance Corp.	21	
Telex, Inc.	683	
Tenatronics, Ltd.		612A
Terado Co.	111	
Tevco Insulated Wire	677	
Texas Crystals	777	
Texas Instruments		705/06
Thomas & Betts Co.	880	
Thordarson-Meissner	575	
Transis-Tronics, Inc.		628A
Triad Transformer Corp.	318	
Trimm, Inc.	212	
Trio Mfg. Co.	876	
Triplett Electrical Instrument	404	712
Tru-Ohm Prods. Div.	102	
Tung-Sol Electric	104	
Turner Co.	219	
U.S. Components	785	
Ungar Electric Tools	320	723
Union Carbide Consumer Prods.	590	632
United Audio Prods.		657A
United Catalog Publishers	689	732
United Scientific Labs		617
United Transformer Corp.	309	
University Loudspeakers		528A/530A
Utah Radio & Electronic	577	
Utica Communications	2	
V-M Corp.	586	
Vaco Prods. Co.	592	
Vidaire Electronics Mfg.		611
Vocaline Co. of America		504
Waber Electronics	106	
Walco Electronics	401	
Wall Mfg. Co., P.	304	
Waldom Electronics		502
Walsco Electronics Mfg.	10/11	
Ward Leonard Electric Co.	128	
Ward Prods. Corp.		602
Waterman Prods. Co.	888	
Waters Conley Co.		637A
Webcor Sales Co.	215	551A
Webster Mfg. Div.	8	
Webster Productomatic		666
Weller Electric	308	
Wen Products	315	
Westinghouse Electric	201	701-702
Winegard Co.	684	
Workman TV Prods.	121	
Worner Electronic Devices	882	
Xcelite, Inc.	225	
Ziff-Davis Publishing Co.		553

RCA BATTERIES

Four new alkaline batteries for use in portable radios, photoflash service, and flashlights feature long useful life, long storage life, and leakproof design. The RCA alkaline types include: VS1073, 1.5v "N" cell; VS-1334, 1.5v penlight cell; VS1149, 4.5v specifically designed for portable radios; and VS1335, 1.5v "C" cell. RCA Tube Division, Harrison, N. J.

TV Sweep Circuit Test "Analyzers"

(Continued from page 35)

oscillator and output circuits of a TV set.

We substituted a shorted coupling capacitor in the Admiral TV's vertical output tube grid (see Fig. 6). A horizontal white line, indicating "vertical trouble," was observed when the set was turned on, as shown in Fig. 7.

Using the **Sencore** SS105, a vertical signal was introduced to the vertical output tube's grid. The raster didn't open. Moving our test lead to the other side of the coupling capacitor (connected to the oscillator transformer in the oscillator tube's plate circuit) no change was noted. The unit's d-c voltmeter indicated B+ on the output tube's grid. Obviously, an analyzer wasn't absolutely needed to locate this vertical defect, though it handily located it. A VTVM would have indicated the same defect; however, it would have consumed more time since all tube pin voltages must be checked.

"How about linearity problems?" asked one of our Editors. The unhappy reply was: "None of the sweep instruments check out vertical linearity problems."

Experimenting with other defects, we opened the output transformer's yoke return side. We injected Sencore's signal into the yoke winding (after not getting a signal through the output tube's grid or plate). Turning the instrument's oscillator control to maximum, we noted what seemed to be a minute deflection (about a half inch). This indicated that some signal was going through the yoke, which absolved the yoke.

Our likely suspect was the autotype vertical output transformer. Putting a signal into the plate confirmed our suspicions since no deflection was noted on the CRT.

Curious about how much vertical deflection the Sencore provides from the vertical output plate, we disconnected the plate lead and injected a signal into it (the yoke return side was reconnected, naturally). We saw approximately two inches deflection (see Fig. 8), as the manufacturer's operating manual claimed we would.

Now we compared the operation of the **B&K** and **Winston** sweep instruments. Winston's instrument approximated that of Sencore's (See Fig. 9). The B&K sweep instrument, however, was able to drive the output transformer and/or yoke to issue a fully deflected raster, as shown in Fig. 10. (B&K has a separate output jack for vertical yoke tests). No squinting to see if the raster is opening with the B&K! The image appearing on the CRT is not linear, however, the prime purpose of the test is to detect vertical sweep defects.

Sync Checks

The three TV sweep instruments examined here can be helpful, in varying degrees, to check sync defects. The **B&K** instrument provides composite sync signals with reversible polarity for investigating sync separator and amplifier stages. For example, the user can signal inject going from plates to grids until the CRT image stops locking in (assuming that initial tests started with the plate of the sync amplifier, working back toward the sync separator). When the instrument's composite signal no longer locks in the picture, it indicates that this is the stage to investigate with a VTVM or VOM. Since the sync provided by B&K is composite sync, the user cannot sync a TV set past the input side of the coupling capacitor of the vertical integrating circuit or the horizontal input capacitor.

Winston's model 820, on the other hand, has *separate* sync jacks (vertical and horizontal) that can be used to troubleshoot their respective circuits, such as: vertical oscillator or oscillator control tube. Additionally, both signals can be combined for sync separator and amplifier composite sync signals. This unit also has positive and negative sync. Horizontal sync has two separate jacks, + and −, while vertical sync has one jack with a + or − switch.

Sencore's model SS105 has provisions to sync the horizontal oscillator. Polarity changes must be accomplished by reversing test leads. No vertical sync or composite sync is available.

Conclusions

Summarizing ET's study of seven sweep circuit test instruments (instruments without signal injection provisions were discussed in last month's ET), we find that signal injection instruments offer greater test versatility than static test instruments. Signal injection instruments enable a technician to isolate defective stages, *in addition* to checking flybacks or yokes as individual components. Consequently, the added helpfulness of substituting a signal under dynamic conditions is obvious.

Referring to the signal injection instruments, both B&K and Winston offer static component checks too. Sencore, on the other hand, substitutes a yoke load for flyback and horizontal yoke winding tests. This is a dynamic check. However, if the flyback reads defective, another component in the flyback circuit can be causing the defect. The user, though, has isolated the defect to a stage. Sencore does not provide for static vertical yoke winding tests, though its oscillator signal will indicate if a signal is getting through by a half inch deflection on the CRT screen. Winston also causes some deflection when a signal is applied directly to the yoke. B&K, as previously mentioned, directly drives a vertical yoke winding to full raster.

Both B&K and Winston can drive the horizontal output stage directly. Sencore cannot. However, Sencore does provide horizontal output cathode current readings, which will indicate a defect in the immediate output stage. A socket adapter automatically breaks the cathode circuit for milliamp readings.

B&K's models 1070 and 1076 employ a neon indicator with a red plastic covering to automatically show the presence or lack of B+ boost voltage. The "light" works admirably. An r-f high voltage indicator is helpful, too, to check if high r-f is reaching the high voltage rectifier. It clips on the instrument when not being used.

Sencore provides a d-c voltmeter to check B+ boost, though it's not "automatic." It can also be employed to measure screen and plate voltages. Coupled with its miniature size, it can be carried in a tube caddy without any trouble. A

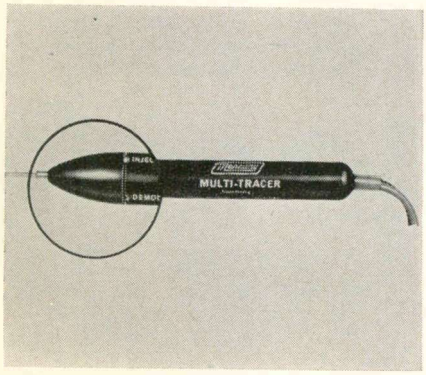
thoughtful item is a neon to indicate if the instrument is oscillating or not.

Winston does not provide any boost indication, or cathode current reading provisions. It does provide an overload lamp that brightens if a component in the flyback circuit is shorted.

Recapping sync provisions, Winston offers: Vertical, horizontal, and composite; B&K has composite sync and Sencore has horizontal sync.

We would like to emphasize, at this point, that no one instrument is available to displace all other instruments. Each has its place. The same can be said for analyzers. They are especially helpful in speeding up TV repairs in frustrating sweep circuits. However, they rarely "light up" and point directly to a defective component. They *do* indicate, in many instances, that a specific component is logically defective. A VOM or VTVM is frequently necessary to finalize their indications. •

Mercury MULTI-TRACERS



Model MT-1 is reported to do the work of four different instruments: signal injector; signal demodulator; signal tracer; and voltage tracer. Exclusive rotating head, with detent action, selects instrument position. Features include: transistorized signal generator with a 10v peak output with strong harmonics in the r-f range; r-f crystal detector circuit; low loss signal circuit; and a neon a-c or d-c voltage indicator. $12.75. Mercury Electronics Corp., 77 Searing Ave., Mineola, N. Y.

For more data, circle 5-86-3 on coupon, p. 57

Paco TUBE-CHECKERS

A self-service tube checker kit, designed for use in retail stores, is available as a floor model, T-61F, and as a more compact counter model, T-61C. Both incorporate large easy-to-follow instruction-data cards and illuminated display header. The tube testers are identical to model T-61, and designed so that even a first-time user can operate them easily and quickly. Floor model includes storage space. T-61F, $124.95. T-61C, $99.95. Paco Electronics Co., 70-31 84th St., Glendale 27, L. I., N. Y.

For more data, circle 5-86-4 on coupon, p. 57

INDEX TO ADVERTISERS

MAY 1961

While every precaution is taken to insure accuracy, we cannot guarantee against the possibility of an occasional change or omission in the preparation of this index.

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(Please note: Most projects, including diagrams, are appearing in current magazines. We don't have diagrams.)

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	1AX2	.62		6BA6	.50		12AJ6	.46
	1B3GT	.79		6BC5	.61		12AL5	.45
	1DN5	.55		6BC7	.94		12AL8	.95
	1G3	.79		6BC8	.97		12AQ5	.52
	1J3	.79		6BD6	.51		12AT6	.43
	1K3	.79		6BE6	.55		12AT7	.76
	1LN5	.59		6BF6	.44		12AU6	.50
	1R5	.62		6BG6	1.66		12AU7	.61
	1S5	.51		6BH6	.65		12AV5	.97
	1T4	.58		6BH8	.87		12AV6	.41
	1U4	.57		6BJ6	.62		12AV7	.75
	1U5	.50		6BK7	.85		12AX4	.67
	1X2B	.82		6BL7	1.00		12AX7	.63
	2AF4	.96		6BN4	.57		12AZ7	.86
	3AL5	.42		6BN6	.74		12B4	.63
	3AU6	.51		6BQ5	.65		12BA6	.50
	3AV6	.41		6BQ6GT	1.05		12BD6	.50
	3BA6	.51		6BQ7	1.00		12BE6	.53
	3BC5	.54		6BR8	.78		12BF6	.44
	3BE6	.52		6BU8	.70		12BH7	.77
	3BN6	.76		6BY6	.54		12BL6	.56
	3BU8	.78		6BZ6	.55		12BQ6	1.06
	3BY6	.55		6BZ7	1.01		12BY7	.77
	3BZ6	.55		6C4	.43		12BZ7	.75
	3CB6	.54		6CB6	.55		12C5	.56
	3CF6	.60		6CD6	1.42		12CN5	.56
	3CS6	.52		6CF6	.64		12CR6	.54
	3DK6	.60		6CG7	.61		12CU5	.58
	3DT6	.50		6CG8	.77		12CU6	1.06
	3Q5	.80		6CM7	.66		12CX6	.54
	3S4	.61		6CN7	.65		12DB5	.69
	3V4	.58		6CR6	.51		12DE8	.75
	4BC8	.96		6CS6	.57		12DL8	.85
	4BN6	.75		6CU5	.58		12DM7	.67
	4BQ7	1.01		6CU6	1.08		12DQ6	1.04
	4BS8	.98		6CY7	.71		12DS7	.79
	4BU8	.71		6DA4	.68		12DZ6	.56
	4BZ6	.58		6DB5	.69		12EL6	.50
	4BZ7	.96		6DE6	.58		12EG6	.54
	4CS6	.61		6DG6	.59		12EZ6	.53
	4DE6	.62		6DQ6	1.10		12F8	.66
	4DK6	.60		6DT5	.76		12FM6	.45
	4DT6	.55		6DT6	.53		12K5	.65
	5AM8	.79		6EU8	.79		12SA7M	.92
	5AN8	.86		6EA8	.79		12SK7GT	.74
	5AQ5	.52		6H6GT	.58		12SN7	.67
	5AT8	.80		6J5GT	.51		12SQ7M	.78
	5BK7A	.82		6J6	.67		12U7	.62
	5BQ7	.97		6K6	.63		12V6GT	.53
	5BR8	.79		6S4	.51		12W6	.69
	5CG8	.76		6SA7GT	.76		12X4	.38
	5CL8	.76		6SK7	.74		17AX4	.67
	5EA8	.80		6SL7	.80		17BQ6	1.09
	5EU8	.80		6SN7	.65		17C5	.58
	5J6	.68		6SQ7	.73		17CA5	.62
	5T8	.81		6T4	.99		17D4	.69
	5U4	.60		6U8	.83		17DQ6	1.06
	5U8	.81		6V6GT	.54		17L6	.58
	5V6	.56		6W4	.60		17W6	.70
	5X8	.78		6W6	.71		19AU4	.83
	5Y3	.46		6X4	.39		19BG6	1.39
	6AB4	.46		6X5GT	.53		19T8	.80
	6AC7	.96		6X8	.80		21EX6	1.49
	6AF3	.73		7AU7	.61		25BQ6	1.11
	6AF4	.97		7A8	.68		25C5	.53
	6AG5	.68		7B6	.69		25CA5	.59
	6AH6	.99		7Y4	.69		25CD6	1.44
	6AK5	.95		8AU8	.83		25CU6	1.11
	6AL5	.47		8AW8	.93		25DN6	1.42
	6AM8	.78		8BQ5	.60		25EH5	.55
	6AQ5	.53		8CG7	.62		25L6	.57
	6AR5	.55		8CM7	.68		25W4	.68
	6AS5	.60		8CN7	.97		25Z6	.66
	6AT6	.43		8CX8	.93		35C5	.51
	6AT8	.79		8EB8	.94		35L6	.57
	6AU4	.82		11CY7	.75		35W4	.42
	6AU6	.52		12A4	.60		35Z5GT	.60
	6AU7	.61		12AB5	.55		50B5	.60
	6AU8	.87		12AC6	.49		50C5	.53
	6AV6	.41		12AD6	.57		50DC4	.37
	6AW8	.90		12AE6	.43		50EH5	.55
	6AX4	.66		12AF3	.73		50L6	.61
							117Z3	.61

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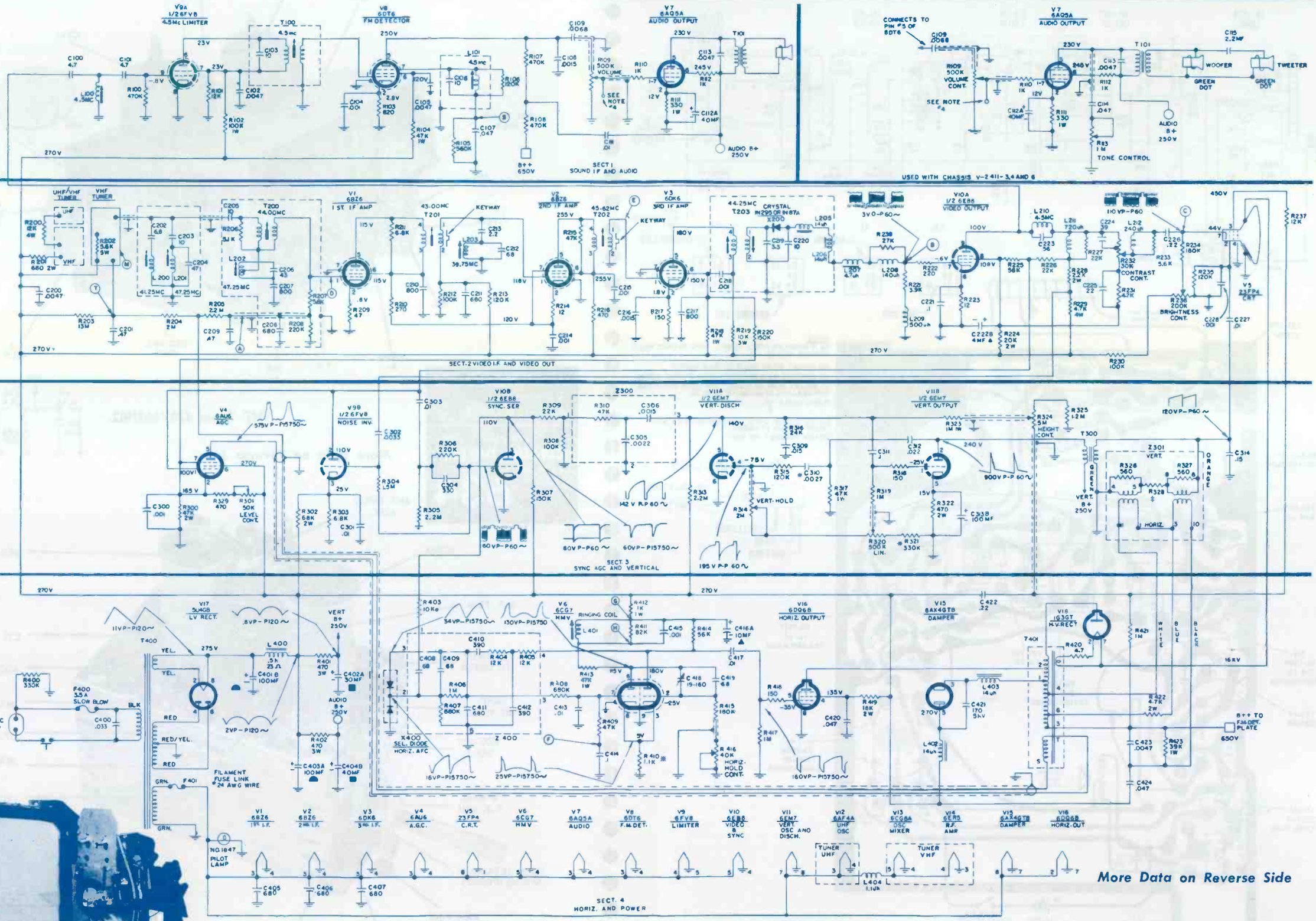
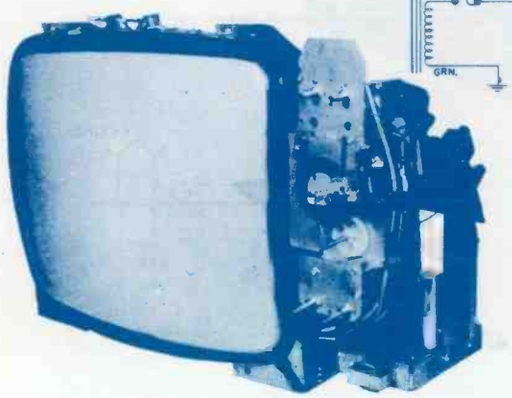
ELECTRONIC TECHNICIAN CIRCUIT DIGEST 634

WESTINGHOUSE
TV Chassis
V-2411-1, V-2411-3





V1 6BZ6 1ST I.F. · V2 6BZ6 2ND I.F. · V3 6DK6 3RD I.F. · V4 6AU6 A.G.C. · V5 23FP4 C.R.T. · V6 6CG7 HMV · V7 6AQ5A AUDIO · V8 6DT6 F.M.DET. · V9 6FV8 LIMITER · V10 6EB8 VIDEO & SYNC · V11 6EM7 VERT. OSC AND DISCH. · V12 6AF4A UHF OSC · V13 6CG8A OSC MIXER · V14 6ER5 R.F. AMP · V15 6AX4GTB DAMPER · V16 6DQ6B HORIZ. OUT

SECT. 4 HORIZ. AND POWER

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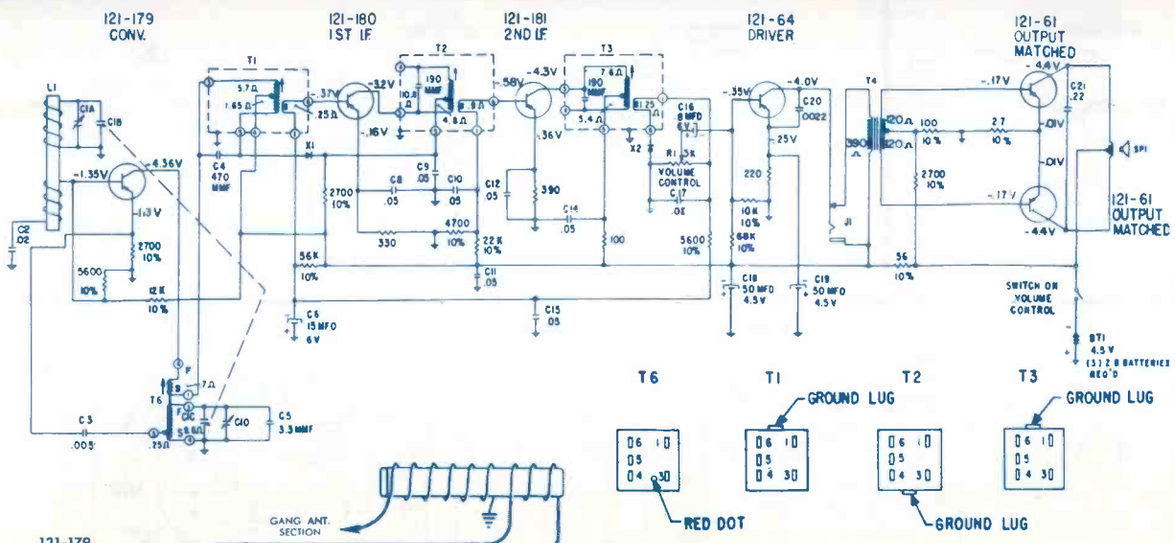
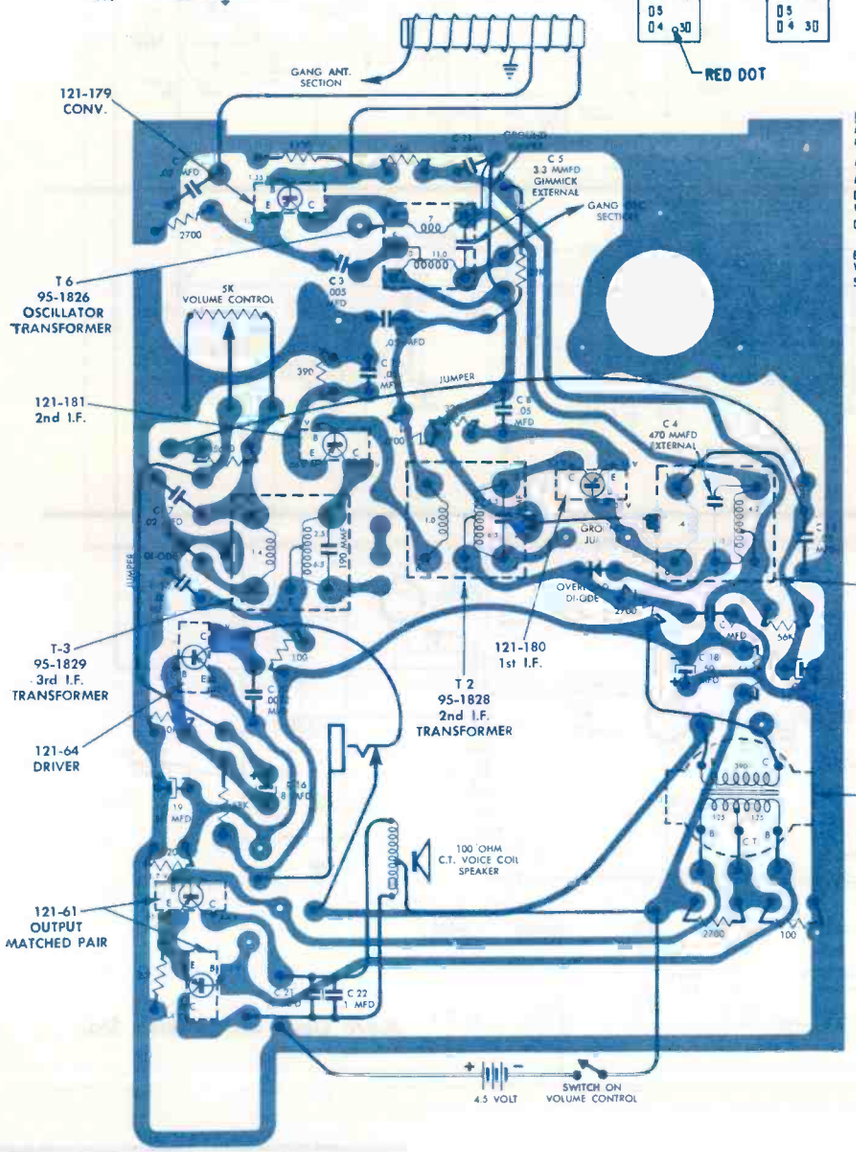
Electronic Technician CIRCUIT DIGEST 634

ELECTRONIC TECHNICIAN CIRCUIT DIGEST 635

ZENITH
Transistor Portable Radio
Model Royal 150
Chassis 6GT42Z2





NOTES:
ALL RESISTORS ARE CARBON, 1/2 WATT, ±20% TOLERANCE UNLESS OTHERWISE SPECIFIED.
ALL VOLTAGES ARE D.C. UNLESS OTHERWISE SPECIFIED.
ALL CONDENSERS ARE IN MICROFARADS UNLESS OTHERWISE SPECIFIED.
D.C. VOLTAGES SHOWN ARE MEASURED FROM CHASSIS WITH NO SIGNAL USING AN A.C.-D.C. OR VACUUM TUBE VOLTMETER.
⊥ DENOTES CHASSIS
BATTERY CURRENT DRAIN: APPROXIMATELY 12 M.A. WITH VOLUME CONTROL AT MINIMUM
SPEAKER IMPEDANCE 100 OHM

PNP TRANSISTOR

CHASSIS, WIRING AND COMPONENTS VIEWED FROM WIRING SIDE

Electronic Technician
CIRCUIT DIGEST 635

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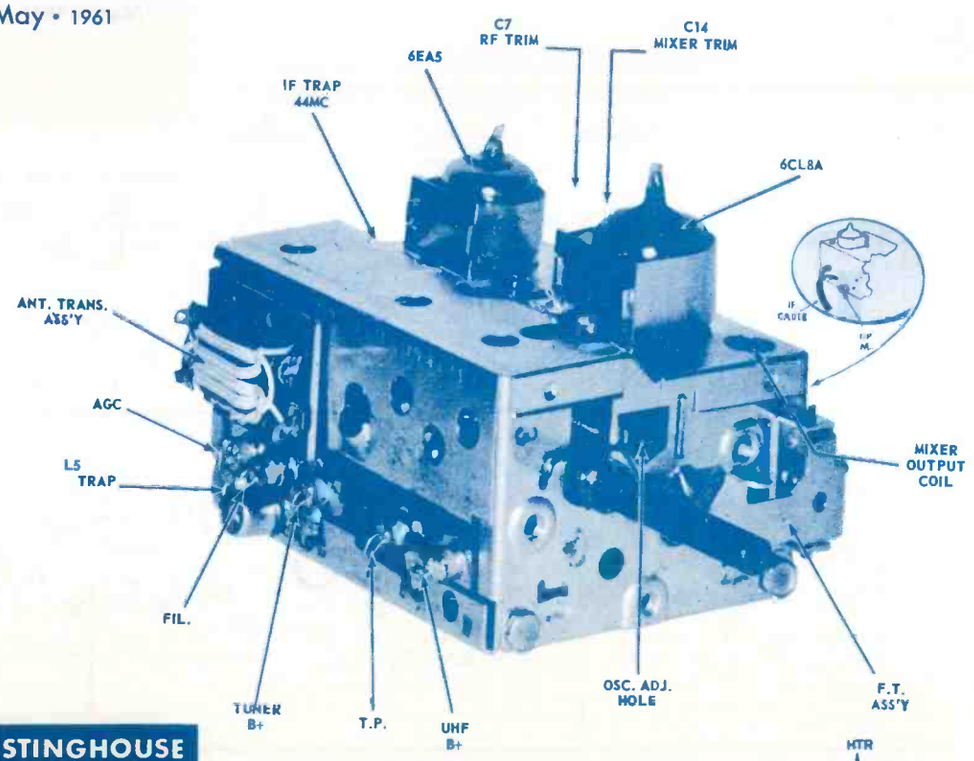
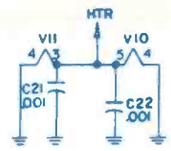


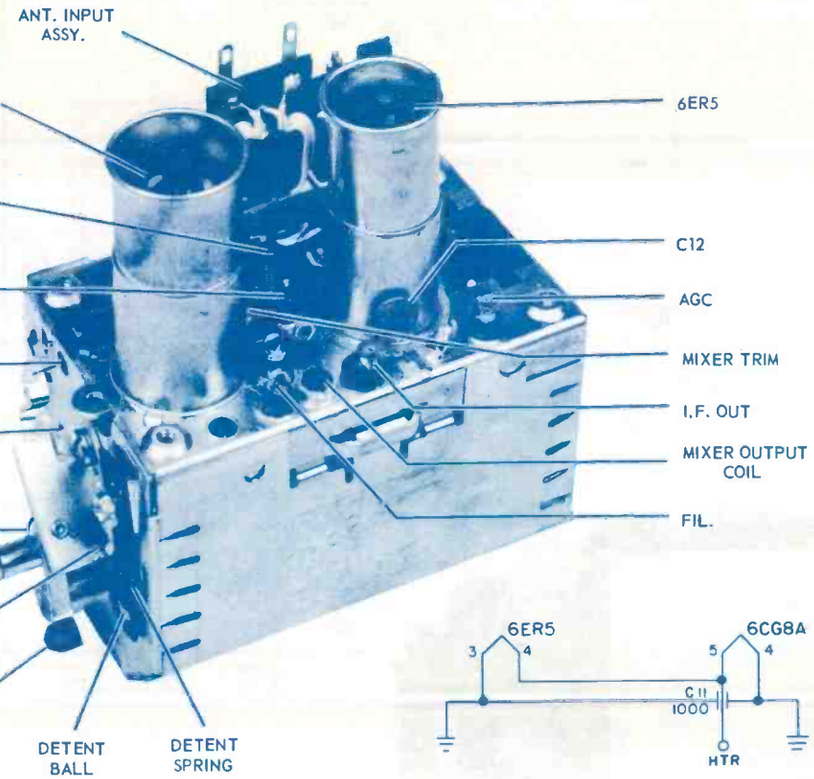
WESTINGHOUSE
TV Chassis
V-2411-1, V-2411-3

Electronic Technician
CIRCUIT DIGEST 634

VHF Tuner 470V063H02.



More Data on Reverse Side



VHF Tuner 470V071H01.

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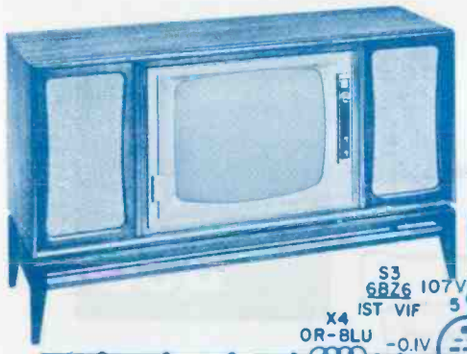
ELECTRONIC TECHNICIAN CIRCUIT DIGEST 636

PHILCO
TV Chassis 11N56



VIDEO IF PANEL

VOS PANEL

IF PANEL

More Data on Reverse Side

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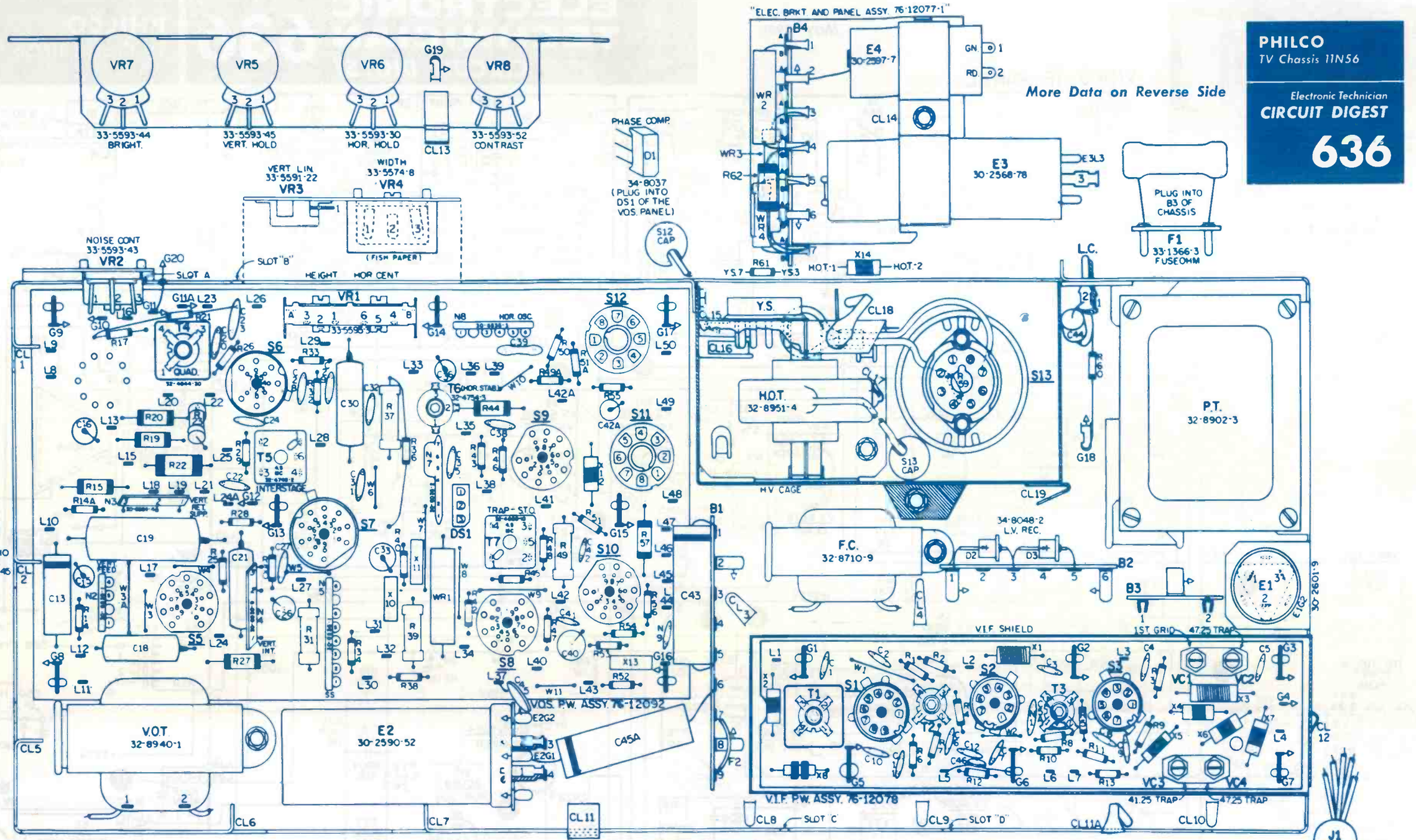
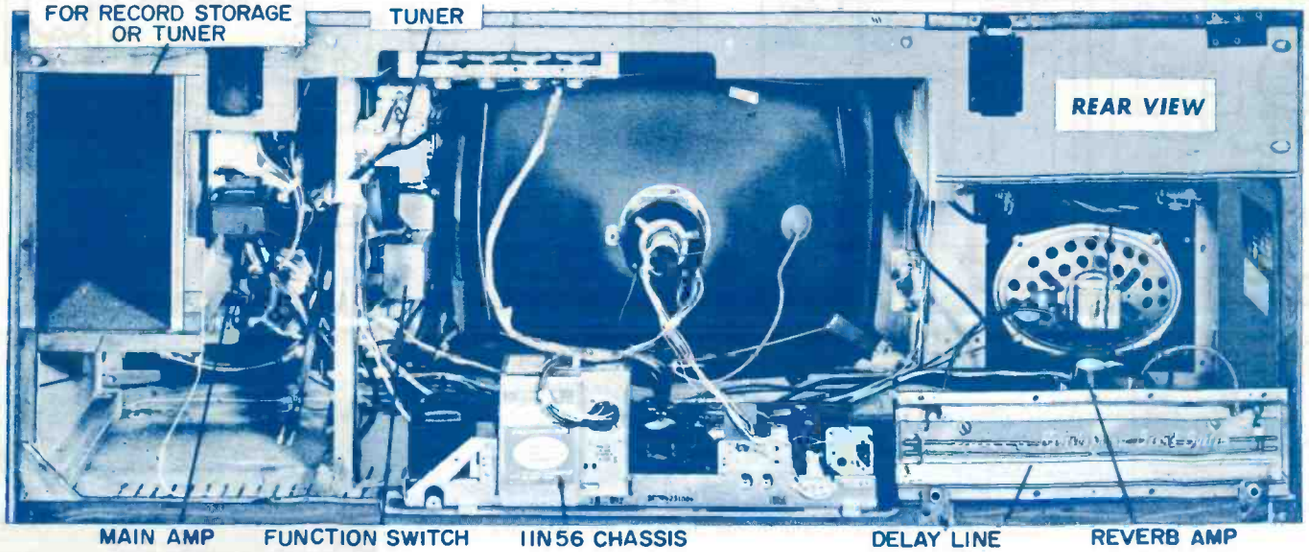
Electronic Technician CIRCUIT DIGEST 636

PHILCO
TV Chassis 11N56

Electronic Technician
CIRCUIT DIGEST
636

More Data on Reverse Side





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RCA *(Continued)*

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ELECTRONIC TECHNICIAN
CIRCUIT DIGESTS
Cumulative Index To Date
1952 to 1961

ELECTRONIC TECHNICIAN CIRCUIT DIGESTS

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In This Issue (No. 105)

Circuit Digest Schematic No.

GROUP 105

Complete Index of

ALL "CIRCUIT DIGESTS" TO DATE

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17- 24,	Nov. 1952	327-332,	Mar. 1957
25- 30,	Dec. 1952	333-338,	Apr. 1957
31- 36,	Jan. 1953	339-344,	May 1957
37- 43,	Feb. 1953	345-350,	June 1957
44- 49,	Mar. 1953	351-358,	July 1957
50- 58,	Apr. 1953	359-364,	Aug. 1957
59- 64,	May 1953	365-371,	Sept. 1957
65- 70,	June 1953	372-376,	Oct. 1957
71- 76,	July 1953	377-382,	Nov. 1957
77- 81,	Aug. 1953	383-388,	Dec. 1957
82- 88,	Sept. 1953	389-394,	Jan. 1958
89- 94,	Oct. 1953	395-400,	Feb. 1958
95-100,	Nov. 1953	401-406,	Mar. 1958
101-105,	Dec. 1953	407-412,	Apr. 1958
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121-125,	Apr. 1954	433-438,	Aug. 1958
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131-133,	June 1954	445-451,	Oct. 1958
134-138,	July 1954	452-458,	Nov. 1958
139-143,	Aug. 1954	459-465,	Dec. 1958
144-149,	Sept. 1954	466-472,	Jan. 1959
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174-178,	Feb. 1955	501-507,	June 1959
179-184,	Mar. 1955	508-513,	July 1959
185-190,	Apr. 1955	514-519,	Aug. 1959
191-198,	May 1955	520-524,	Sept. 1959
199-204,	June 1955	525-531,	Oct. 1959
205-210,	July 1955	532-536,	Nov. 1959
211-216,	Aug. 1955	537-542,	Dec. 1959
217-222,	Sept. 1955	543-548,	Jan. 1960
223-228,	Oct. 1955	549-553,	Feb. 1960
229-235,	Nov. 1955	554-558,	Mar. 1960
236-241,	Dec. 1955	559-563,	Apr. 1960
242-247,	Jan. 1956	564-566,	May 1960
248-255,	Feb. 1956	567-571,	June 1960
256-261,	Mar. 1956	572-576,	July 1960
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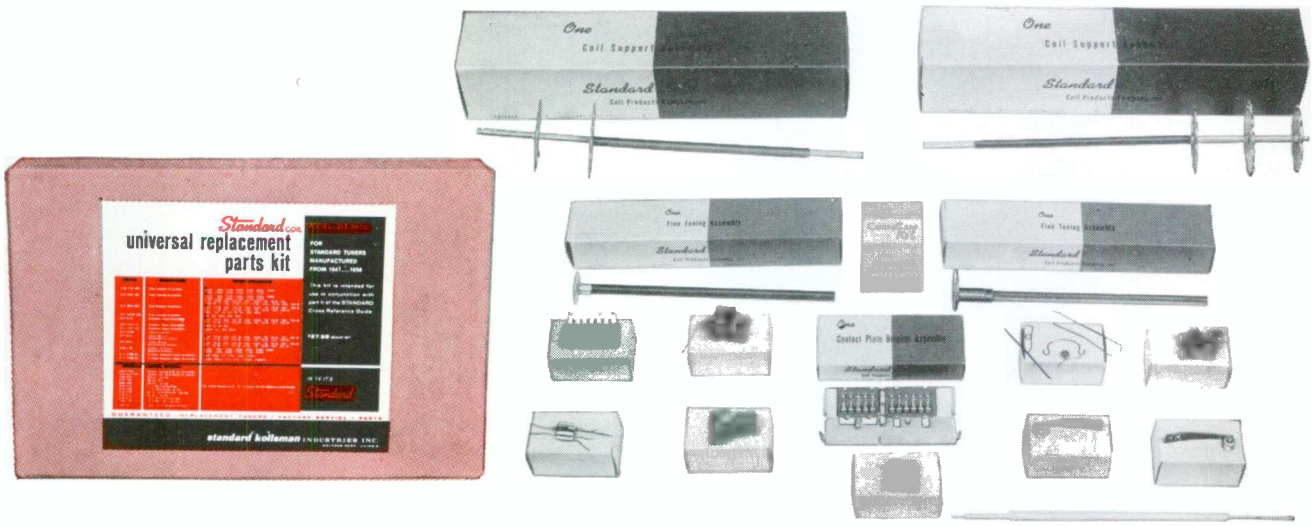

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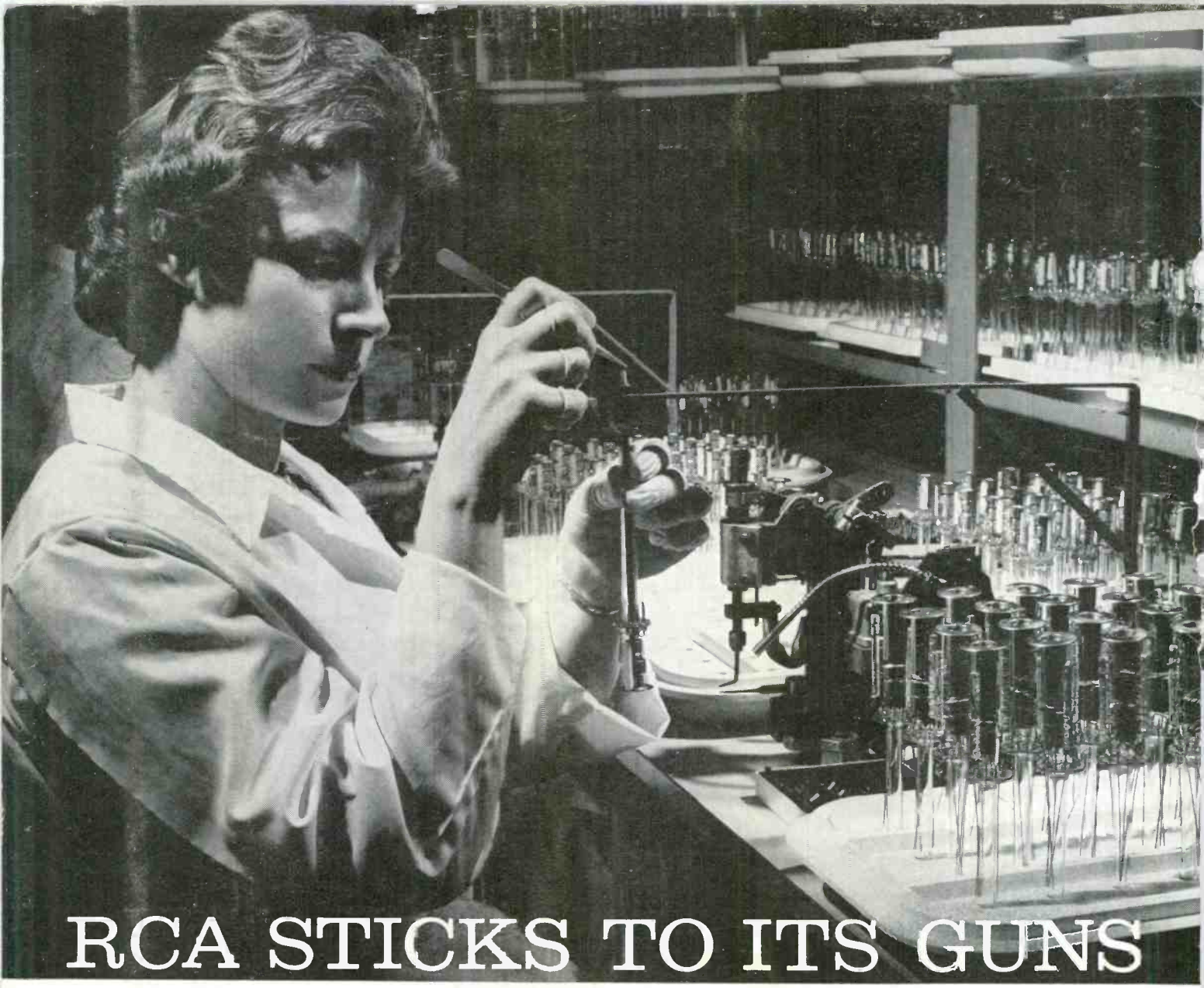

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