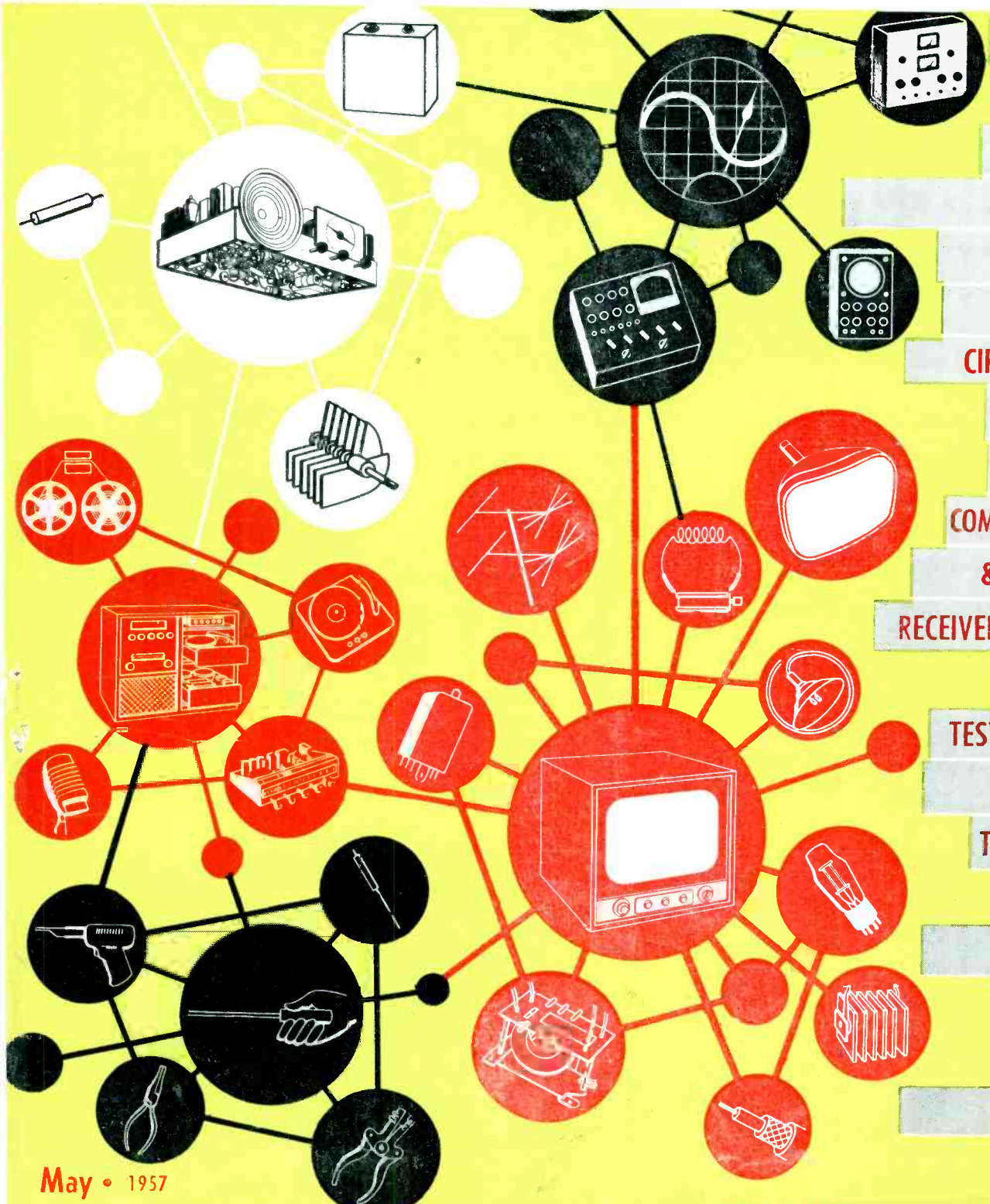
ELECTRONIC TECHNICIAN

Including 16 pages of
Circuit Digests



50¢

May • 1957
In Two Sections • Section One

Preview of ELECTRONIC PARTS SHOW

You are more apt to get the volume control you need from your IRC® distributor than from any other source

Whether you need a special exact duplicate control or a standard replacement carbon or wire-wound control, you are almost sure to find it at your IRC Distributor.

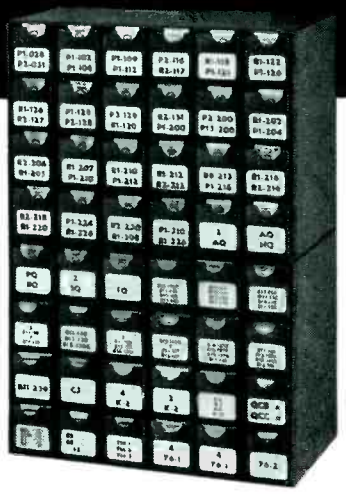
He carries the most versatile line of controls in the industry. He offers you better, more complete replacement coverage. He can supply an almost endless variety of combinations of resistance elements and shafts.

He can take care of your needs far more frequently than any other source.

And you can depend upon IRC quality and dependable performance. Exact duplicate TV and Auto Set controls (over 850 of them) are specified to manufacturers' procurement prints—they will fit and operate without modification.

Make your IRC Distributor Your Volume Control Headquarters.

BIGGEST BARGAIN IN VOLUME CONTROL COVERAGE IN THE INDUSTRY



New IRC Dealer Parts Stocks No. 21 and No. 22 afford you amazing coverage of not only exact duplicate controls but also standard carbon and wire-wound control coverages. As much as $1245 coverage for an amazingly low investment! See your IRC Distributor today!

Wherever the Circuit Says—

IRC®

INTERNATIONAL RESISTANCE CO.

Dept. 573 401 N. Broad St., Phila. 8, Pa.

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

ELECTRONIC TECHNICIAN

Including **Circuit Digests**

TELEVISION • ELECTRONIC • RADIO • INDUSTRIAL • AUDIO

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Printed in U.S.A. by Hildreth Press, Bristol, Conn.

May, 1957

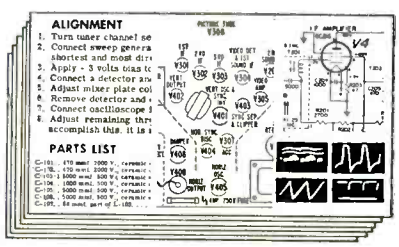
Section One

FRONT COVER

A multitude of electronic parts and equipment, mutually dependent in a manner symbolized by an atomic structure, are classified in 12 major product categories of the 1957 Electronic Technician Buyers Directory starting on page 59 of this issue.

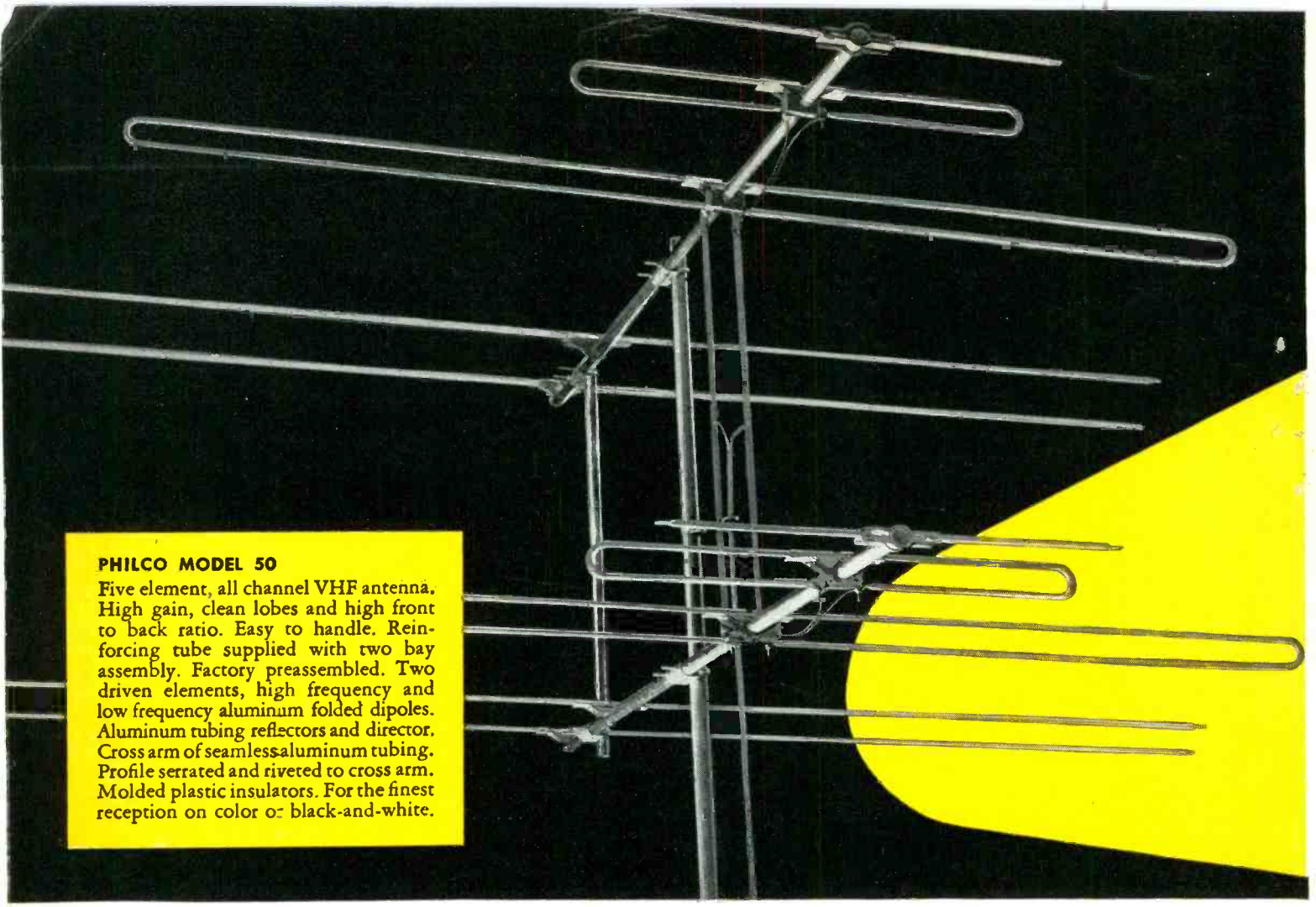
FEATURES and ARTICLES

DEPARTMENTS

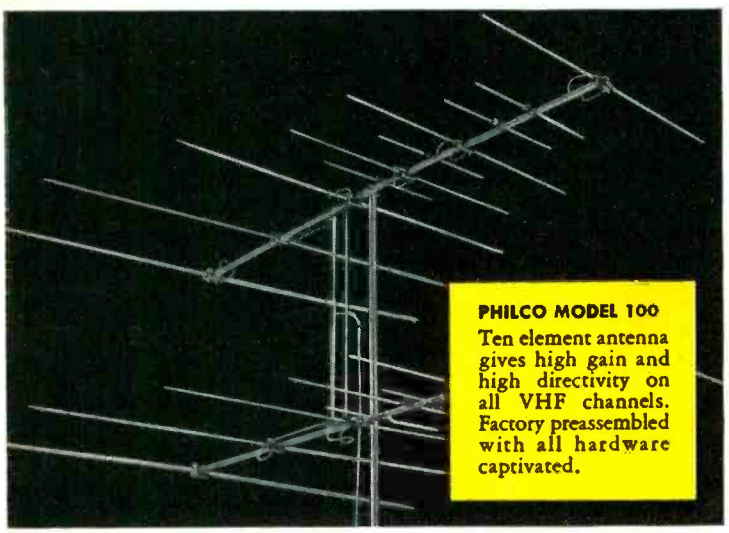


IN THIS ISSUE

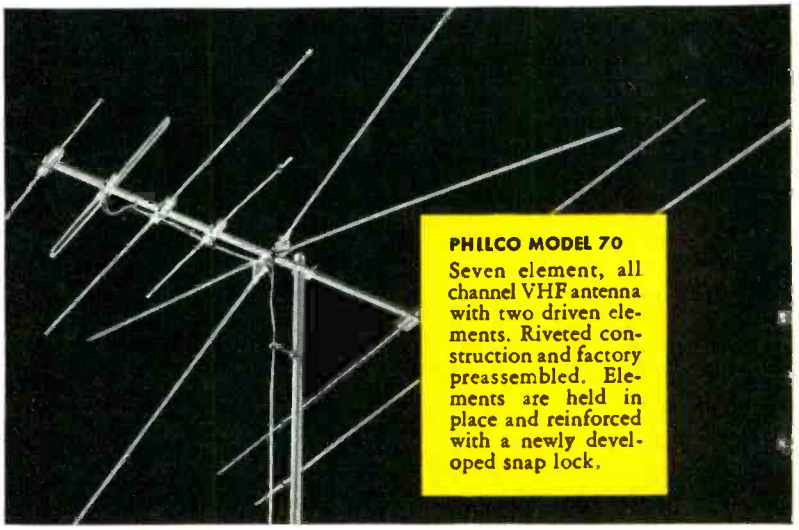
(16 pp. latest schematics—see last page)
INDEX: All circuits to date
ADMIRAL: TV Chassis 19SZD4 series
EMERSON: TV Chassis 120343E series
MOTOROLA: Transistor Radio Chassis HS-563
OLYMPIC: TV Chassis DD series
PHILCO: Auto Radio Model P-5703 series
ZENITH: Hi-Fi AM/FM Radio/Amp Chassis 11Z20



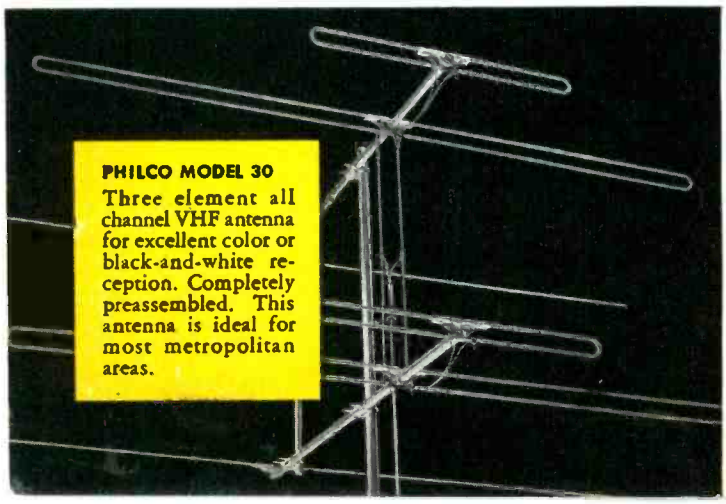
PHILCO MODEL 50
Five element, all channel VHF antenna. High gain, clean lobes and high front to back ratio. Easy to handle. Reinforcing tube supplied with two bay assembly. Factory preassembled. Two driven elements, high frequency and low frequency aluminum folded dipoles. Aluminum tubing reflectors and director. Cross arm of seamless aluminum tubing. Profile serrated and riveted to cross arm. Molded plastic insulators. For the finest reception on color or black-and-white.



PHILCO MODEL 100
Ten element antenna gives high gain and high directivity on all VHF channels. Factory preassembled with all hardware captivated.



PHILCO MODEL 70
Seven element, all channel VHF antenna with two driven elements. Riveted construction and factory preassembled. Elements are held in place and reinforced with a newly developed snap lock.

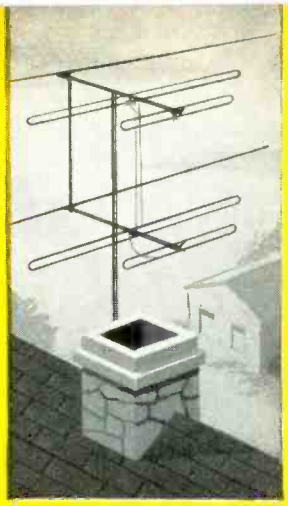


PHILCO MODEL 30
Three element all channel VHF antenna for excellent color or black-and-white reception. Completely preassembled. This antenna is ideal for most metropolitan areas.

PHILCO MODEL 262F
The Philco "Fast Lock" element retainer is featured in this conical antenna. With the "Fast Lock", elements can be installed after the cross arm is mounted.

Mr. Service Dealer

BIG NEWS from PHILCO!



Fringe tested, color tested TV Antennas, now at volume prices!

Give picture power equal to antennas priced two to three times higher. Compare! Now, Philco brings you a complete line of quality antennas with a wide range of models to give outstanding performance over the entire VHF range. These antennas were designed and engineered to reproduce the best pictures whether in strong signal areas or far out into the fringe and whether receiving a picture in color or black and white. In many locations you can give your customers stations they never received before. Field and laboratory comparison tests conducted under the most exacting circumstances on actual on-the-air programs give you the complete insurance that you can always sell Philco antennas with complete confidence in any TV area.

Philco Super Power TV Antenna ROTORS

color or black-and-white at its best

P11 CONTROL
Manually operated antenna rotor that will easily handle two bays. Designed for years of dependable service. Fits masts up to 1⅜" diameter.

P4A CONTROL
A heavy duty rotor. Accurate direction control provided by manually operated motor switch and indicator meter. Plastic cabinet of modern design.

AP22 CONTROL
Heavy duty, long-life automatic rotor with new automatic control unit providing dependable and fool proof operation. Also available as AP1.

P11
AP1
Rotor

P4A
AP22
Rotor

a complete line, Mr. Service Dealer, for every installation need!

Get the full story on Philco antennas and rotors with more quality and performance for your dollar. See your local Philco distributor or mail this coupon now!

PHILCO CORPORATION

ACCESSORY DIVISION · PHILA. 34, PA.

Philco Corporation Accessory Division
"A" Street and Allegheny Ave.
Philadelphia 34, Pa.

Please send me information on Philco antennas and rotors with more performance per dollar.

NAME_____

ADDRESS_____

CITY_____ ZONE____ STATE_____

ET-557

EMPLOYMENT OPPORTUNITIES

For further information about employment openings, write directly to address noted in advertisement, or to:

Personnel Dept.
ELECTRONIC TECHNICIAN
480 Lexington Avenue
New York 17, N.Y.

Positions Wanted

ELECTRONIC TECHNICIAN with 11 years experience TV-radio, audio, commercial & industrial electronics seeks position anywhere except Eastern U.S. 2½ years college. Formerly service engineer, owned business. Salary $125 or business interest. Age 33, single. Peter A. Andronaco, 1731 Tytus Ave., Middletown, Ohio.

TV REPAIRMAN, 4 years bench and outside calls, 1½ years school, wishes to locate in Minn. Age 31, married. Box 501, ELECTRONIC TECHNICIAN.

RADIO-TV troubleshooter, 5 years experience, graduate Lincoln and RCA Institutes courses, desires to locate in Manhattan, N.Y.C. Salary $85-$90 to start. Age 36, married. John Dell'Edera, 400 W. 118 St., New York 27, N.Y.

SERVICEMAN with part-time shop seeks radio-TV repair position in Midwest. Instructed electronics in army for 2 years. Servicing courses from military and National Radio Institute. Age 23, married. Eddie A. Fidler, 501 Matthews St., Shenandoah, Iowa.

SHOP OWNER with extensive experience as TV technician and mechanic wishes to join company where advancement opportunity exists. Age 43. Eugene W. Brach, Broadway, R.D. 1, Amsterdam, N.Y.

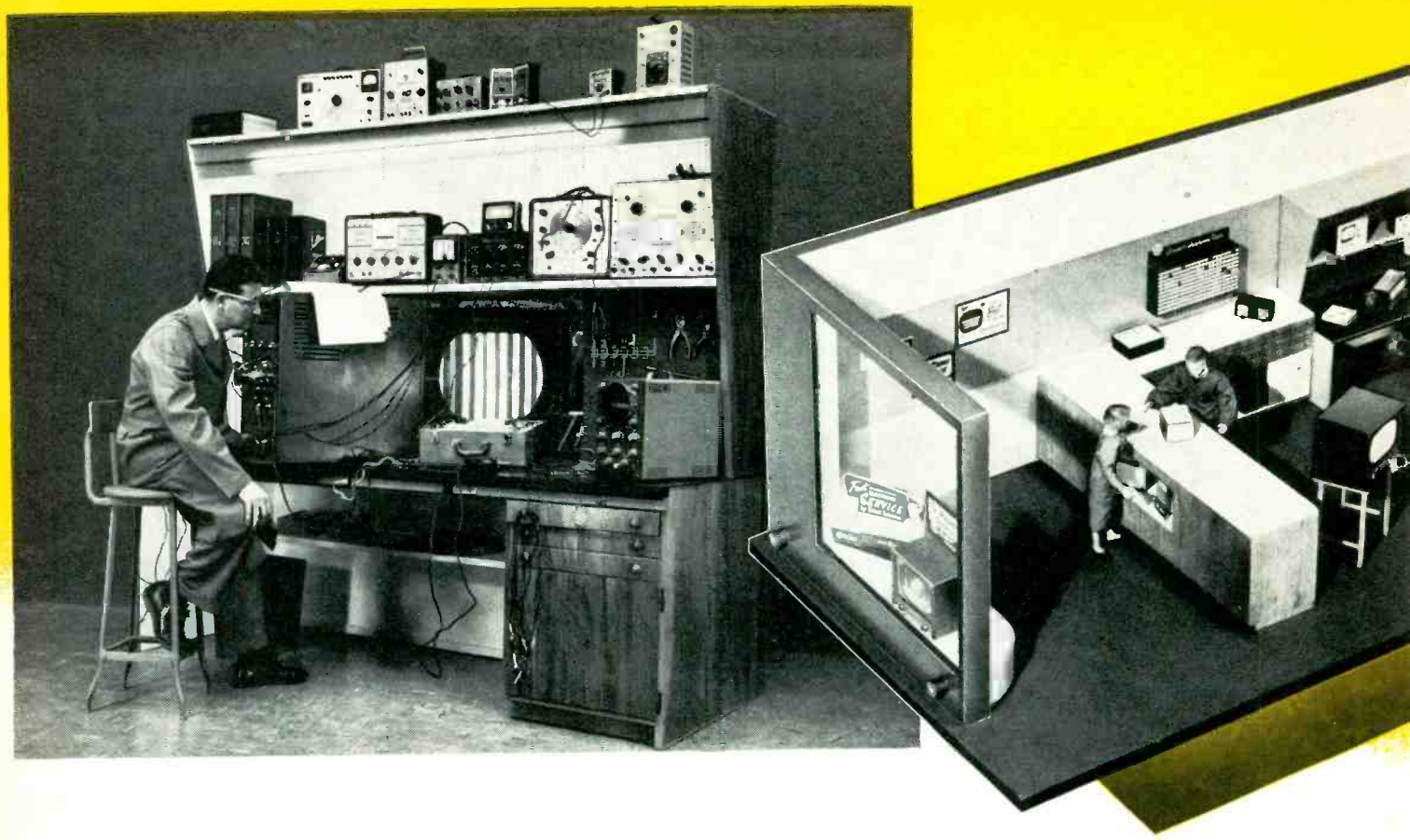
TO OBTAIN YOUR FREE "POSITION WANTED" LISTING

Simply write to the Personnel Dept., ELECTRONIC TECHNICIAN 480 Lexington Ave., New York 17, N.Y., briefly stating the following:

1. Your name, address and phone number.
2. Your experience and training, giving number of years.
3. Area in which you wish to locate. Will you relocate?
4. Optional: Salary requirements, age and marital status.

If you are interested, DO IT TODAY!

(Continued on page 8)



JOIN THE 50,000 PROGRESSIVE READY TO MODERNIZE WITH NEW

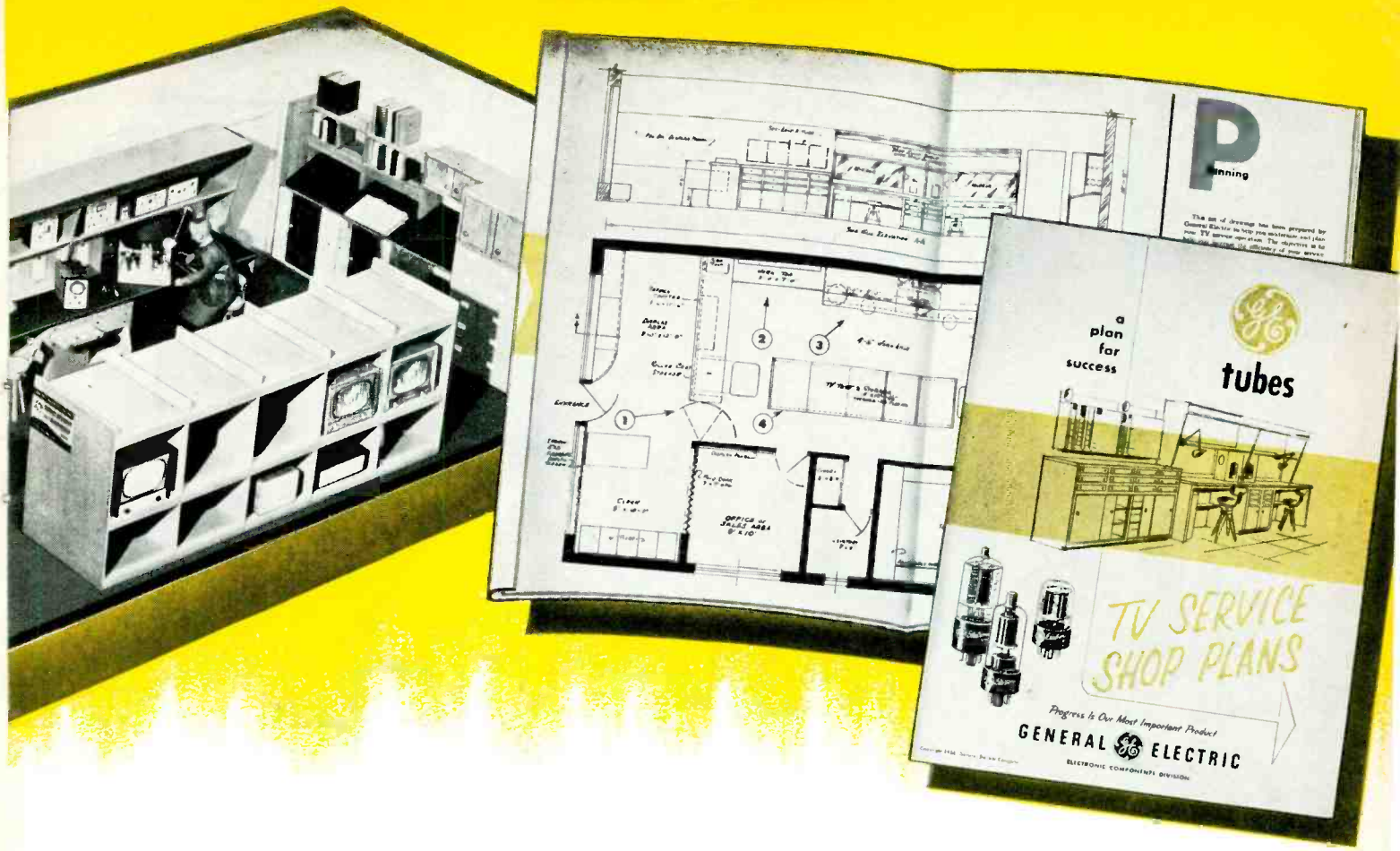
Over 50,000 TV-radio service dealers already have asked for the new General Electric shop plans (above) that were specially developed for the independent technician. Dealers in every part of the country know that today's growing market for service, calls for improved facilities... and that proper planning saves space, costs, time, and labor.

You too can modernize for the increased volume that lies ahead... by following the practice of other progressive technicians, and using General Electric's shop layout to equip your shop for top-efficiency service to more customers. Phone your local General Electric tube distributor for complete plans! They include dimension drawings and material lists, so a carpenter or builder can start work at once.

Progress Is Our Most Important Product

GENERAL ELECTRIC

161-1A20

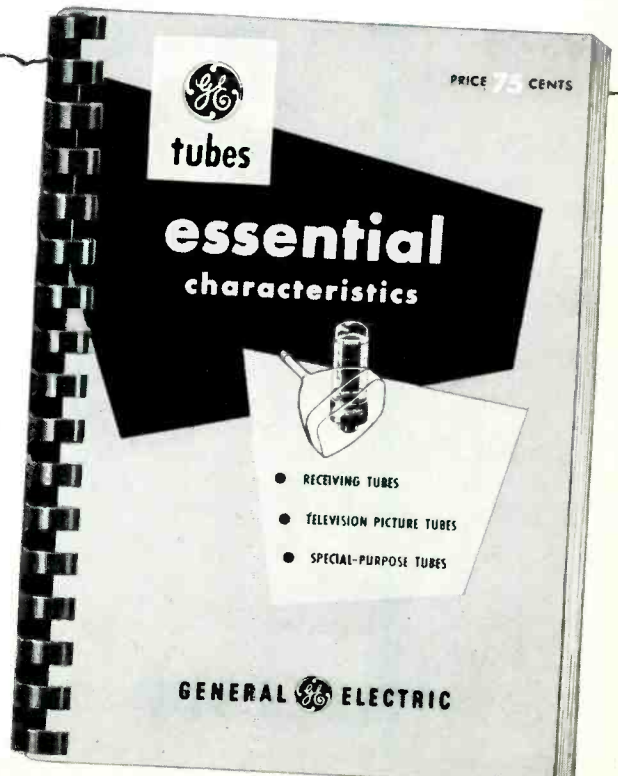


SERVICE DEALERS GENERAL ELECTRIC SHOP PLANS!

AND NOW

ANOTHER G-E BUSINESS-BUILDING, TIME-SAVING AID TO THE INDEPENDENT SERVICE TECHNICIAN...

Most complete tube guide ever published—the new edition of "Essential Characteristics"! Over 1500 types, with descriptions, ratings, and basing diagrams. Pocket size. See your General Electric tube distributor immediately!



(*Continued from page 4*)

Help Wanted

TELEVISION BENCHMAN wanted in Klamath Falls, heart of the hunting and fishing country of Southern Oregon. Our firm in business over 20 years. Well rated. Job permanent for a television benchman who can get out the work. If interested write us airmail giving all details. We will give and expect references. Derby's Music Co., P. O. Box 728, Klamath Falls, Oregon.

Business For Sale

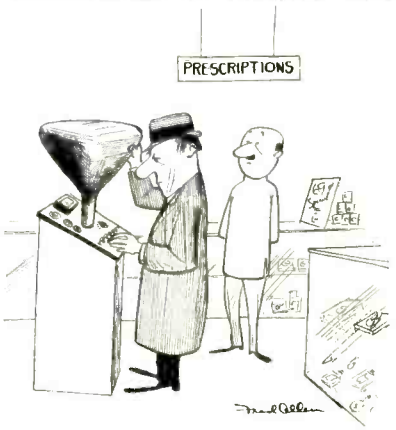
RADIO & TV servicing business for sale, $3.500 cash. Established in fast growing town on Long Island, N.Y. Gross income $15,000 plus. Store 20' x 50' in heart of town. Owner going south for health. Inquire Box S551, ELECTRONIC TECHNICIAN.

ESTABLISHED TV SALES & service business, central New England, with 7 room house sale or rent. Position with electronics firm requires quick sale. Very reasonable price. Books open. Inquire Box S552, ELECTRONIC TECHNICIAN.

"Business for Sale" and "Help Wanted" listings are available in this section to aid shop management and owners in obtaining qualified personnel or selling their business. This section is not open to manufacturers.

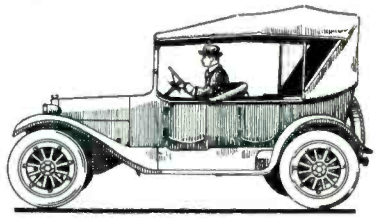
Cost for an announcement in this section is 25¢ per word, with numbers and address words counted. Remittance must accompany insertion order.

Those service shops wishing to have a box number listing instead of including their names and addresses may have one assigned for an extra charge of $2. All inquiries directed to such box numbers will be routed directly to the shop inserting the announcement.



HE DOES

HE DOESN'T



STOCK AND SELL RCA BATTERIES!

The modern, up-to-date dealer stocks and sells RCA Batteries. He knows that customer acceptance of RCA quality assures him of profit-making battery sales throughout the year.

There's an RCA Battery for virtually every need . . . in the home, in the factory, or on the road.

Order your stock of RCA Batteries *today* for profit-making sales all year long!

RADIO CORPORATION of AMERICA
COMPONENTS DIVISION CAMDEN, N.J.

CONSUMER • INDUSTRIAL • GENERAL • RCA IS YOUR BEST BATTERY BUY!

You Have More TO SELL WITH A *Winegard*

The more sound selling facts you can put before a customer, the more chance you have of closing a sale! And the Winegard Color'Ceptor gives you selling points no other antenna can offer . . . exclusive buying appeals that clinch 9 out of 10 sales!

They See the Gold and They're Sold

The gold-anodized finish of the Color'Ceptor gives it a rich, quality appearance not found in any other antenna. When you show the Color'Ceptor alongside competitive models, the Color'Ceptor is so distinctive, so *finished-looking* that it is invariably selected by your customers. Gold-anodizing has a practical sales advantage, too. It provides immunity to corrosion—prevents deterioration in performance.

If the Winegard Color'Ceptor won't bring in a station you want to see . . . nothing will! Proof of performance was dramatically illustrated when Robert Seybold of Dunkirk, New York—using a Winegard Antenna—broke all long-distance reception records in 1956 (see Radio-Electronics Magazine Jan. '57). Equipped with optional signal-boosting Power-Pack and patented "Electro-Lens"* focusing, the Color'Ceptor is second to none for long-distance reception and clear watchable pictures in both black-and-white and color!

factory-authorized
ANTENNA SPECIALISTS
Installation • Service • Sales
Winegard
TELEVISION ANTENNAS

The Sign of Better Business

The Winegard Authorized-Dealer decal (pictured above) is proving a real business-builder for every dealer who displays it. Heavily promoted in Winegard's national advertising, the decal tells the world that "here's the place to buy the gold-anodized Color'Ceptor."

Want More Details?

Mail coupon below for all the facts on Color'Ceptor's spectacular success story! Winegard gives you everything you need to make antenna sales boom—the product, free display, national advertising, proven sales techniques. Join the swing to Winegard—it's the best move you can make!

WINEGARD COMPANY
Dept. C-5, 3000 Scotten Blvd., Burlington, Iowa

Name .....

☐ Please rush me free 4-color descriptive literature on your gold-anodized Color'Ceptor and information on display material.

☐ I'm interested in the complete line of new 1957 Winegard antennas.

Company .....

Address .....

City ..... State .....

Gold Anodized

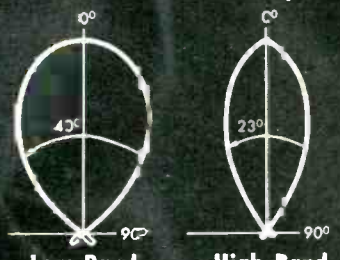
Winegard Color'ceptor TV Antenna

all 12 VHF Channel Reception For Both Black-and-White and Color

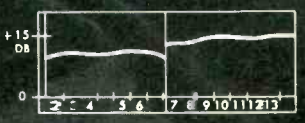
Color so bright they sell on sight!

Note:
Each gold Color 'Ceptor you install helps sell another. Once folks see these bright gold antennas sprouting up in their neighborhood, they won't be satisfied until they own the gold antenna, too!

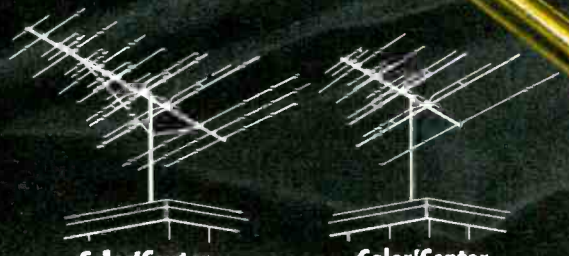
Horizontal Directivity



Low Band **High Band**



Gain Chart CL-4X with Power-Pack



Color'Ceptor Model CL-4X — $44.90

Color'Ceptor Model CL-4 — $29.95

If Color 'Ceptor won't bring in a station you want to see . . . nothing will!

Exclusive Color'Ceptor features

- Completely non-corrosive gold-anodized finish.
- Power-Pack—up to 47.1% more sensitivity.
- Pat. "Electro-Lens"* - clearer pictures at greater distance.

Winegard Color 'Ceptors are consistently advertised in leading national magazines your customers read:

Farm Journal · Household · House Beautiful · Journal · Better Homes and Gardens · POST

Winegard Co.
3000 Scotten Blvd., Burlington, Iowa
Cable Address: Western Union JRWCO

*Pat. No. 2,770,105 Copyright USA, 1957

"I cut testing time in half" ..."doubled our tube sales" *

"Adds to my income and saves me unprofitable call-backs."

"We have two...one for the shop and one for house calls."

"Paid for itself several times. Really indispensable."

"Best tube tester I've ever owned. Simple to operate. Saves time."

"Makes lots of money for us. Wonderful instrument."

"Serves my purpose best for speed and dependability."

B&K MODEL 500

DYNA-QUIK

DYNAMIC MUTUAL CONDUCTANCE TUBE TESTER

FASTEST SELLING TUBE TESTER IN THE WORLD

Tests over 95% OF ALL POPULAR TV TUBES—IN SECONDS

Accurately makes each tube test in seconds. Checks average TV set in minimum minutes

Tests each tube for shorts, grid emission, gas content, leakage, and dynamic mutual conductance.

Ingenious life test detects tubes with short life expectancy.

One switch tests everything. No multiple switching. No roll charts.

Shows tube condition on "Good-Bad" scale and in micramhos. Large 4½-inch plastic meter has two highly accurate scales calibrated 0-6000 and 0-18,000 micramhos.

Automatic line compensation is maintained by a special bridge that continuously monitors line voltage.

Built-in 7-pin and 9-pin straighteners are mounted on the panel.

* NAMES ON REQUEST

One extra tube sale on each of 5 calls a day pays for the Model 500 in 30 days

Enthusiastic comments like those above* come from servicemen all over the country. *Actual experience shows an average of close to 2 additional tube sales per call.*

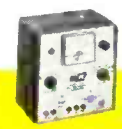
Instead of the "trial and error" method of substitution testing, the Dyna-Quik 500 quickly detects weak or inoperative tubes. Cuts servicing time, saves costly call-backs, shows each customer the true condition and life expectancy of the tubes in the set, and makes more on-the-spot tube sales. Helps keep customer good-will, give a better service guarantee, *and make more profit.*

The B&K Dyna-Quik 500 measures *true dynamic mutual conductance.* Completely checks tubes with laboratory accuracy under actual operating conditions right in the home *...in a matter of seconds.* Saves time and work in the shop, too. Simple to operate. Easily portable in luggage-type case. Weighs only 12 lbs. NET, **$109.95**

See Your B&K Distributor or Write for Bulletin No. 500-T

Model 1000 DYNA-SCAN
Picture and Pattern Video Generator Complete Flying Spot Scanner. Net, $199.95

Model 400 CRT
Cathode Rejuvenator Tester. Tests and repairs TV picture tubes. Net, $54.95



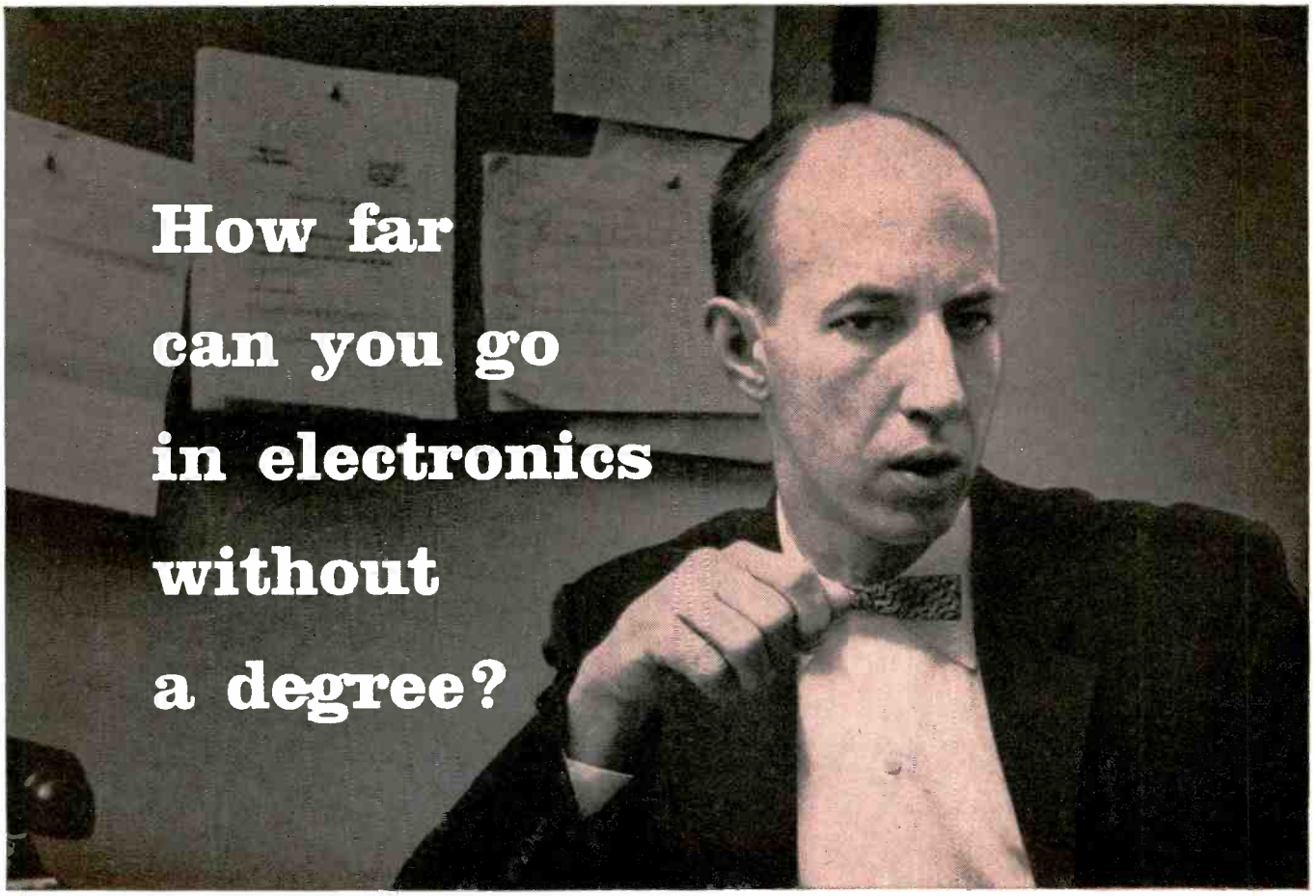
Model 750 CALIBRATOR
Designed to check and adjust test instruments with laboratory accuracy. Net, $54.95

B&K

Makers of Dyna-Quik, CRT, Dyna-Scan and Calibrator

B & K MANUFACTURING CO.
3726 N. Southport Ave. · Chicago 13, Illinois

How far can you go in electronics without a degree?



Bill Miles talks frankly about the technicians' biggest problem

2 years ago, degreeless Bill Miles had reached a blind alley in his career. Yet today, with IBM, he's actually supervising engineers in America's biggest electronics project. Here's how this technician broke through the "education barrier."

"*Training* and *local assignments*," recalls Bill Miles, "were what caught my eye when I saw an IBM ad in 1955. So I investigated. Now here I am with an advanced electronics education under my belt—and responsibility as a Group Supervisor in Project Sage. I work on the world's largest and most advanced computer. I live in my home town. And my future in the company is what I make it. Yet only 2 years ago, I thought I'd gone as far as a technician ever could!"

Becomes radar technician

Bill's background is typical of thousands of capable, ambitious technicians who never acquired a formal engineering degree. His interest in electronics, aroused in Camden, New Jersey, high school, was nourished by a 3-year stint as Aviation Radar Technician in the Navy's "Black Cat" air-sea rescue squadron.

Takes night courses

Discharged in 1946, Bill married a girl he'd known in high school. During the next 9 years, Bill was teacher in a radio-TV institute, TV service man, TV company technician, and chief supervisory TV technician. All the while he pursued an engineering education at night. But growing family responsibilities made it more and more difficult.

Finds doors barred

However, feeling he was equipped for greater responsibility, Bill, now 30, investigated several companies but found that, while they liked his abilities, his lack of degree barred the door to any significant future advancement.

Enters IBM school

In May 1955, when he moved his family to Kingston, New York, and started at IBM, Bill wasn't quite sure what to expect. The 9-month training course—valued at many thousands of dollars per man—had been the big magnet for him. He hoped the future would match his expectations.

Meets head of school

"Sixty of us started school at IBM, attending class 8 hours a day. The course consisted of about 20 subjects, mostly dealing with computer circuits and units, and maintenance techniques. The teaching was adult, superb. After the first 20 weeks, we received a living expense allowance, over and above salary. We kept our own grades, and every 6 weeks when we reviewed them with the instructors, *they* asked *us* for ways to improve the course. I expected a casual 'hello' when I met the Division Manager of Education, but he talked to me for an hour about myself and my interests. The real concern IBM has for you as an individual, both before and after they hire you, is undoubtedly one reason why we all began to take a lot of pride in this outfit."

Joins home-town computer site

Bill had joined IBM as a Field Systems Engineer. After graduation, when 10 of his classmates were immediately promoted to specialized assignments, Bill was assigned to a computer site near his home in Mt. Holly, New Jersey, with IBM paying his moving expenses. For the first two months he helped install the SAGE computer, an important link in America's air defense. Ultimately, such computers will ring America's entire air defense perimeter. Looking back, Bill notes, "I'll admit the work was laborious and difficult, but still I have a sense of great accomplishment. Together we all helped create something of value from almost nothing."

World's largest computer

"The computer is probably the largest one in the world, with over a million components. Flattened out, it would probably fill a ball field. The computer analyzes radar data on every object in the sky. Then it checks each object against available traffic information and identifies it as either friendly or hostile. It can make suggestions, but it can't send a Nike missile against what it thinks is a 'baddie.' Only airmen can make that decision."

Bill gets electronic computer education at IBM Kingston

Supervises fifteen

Recently promoted to Group Supervisor, Bill now directs an entire shift of 15 men, reporting to a Group Manager. His job: to maintain the computer in combat readiness. "I have to be familiar with the entire system. I rely on two types of specialists to help me: computer units men who are specialists in certain areas; systems engineers for the over-all computer."

Miles does diagnostic programming on the Operating Console of the Sage Computer

Miles nails down problem with Site Manager R. Schimmel

Buys house, car

Bill has bought a 7-room house in Mt. Holly. When not busy with his son and twin daughters, he likes to bowl. He drives a new automobile. He's enjoying the good life, and expects it to get even better. His employee benefits alone represent a cash value of many hundred dollars a year. He expects the IBM-sponsored General Education Program will prepare him for higher management responsibilities. Later, Bill's manager said, "He's currently assuming the responsibilities of an electrical engineer."

But the question remains: Is Bill really an engineer?

The "professional" engineer

"No, I certainly don't consider myself a 'professional' engineer, qualified to design machines, for instance. But the point is, I'm doing work ordinarily done by engineers . . . work usually denied to men without a degree."

IBM upgrades technicians

Could he do this elsewhere? "Of all the companies I know, IBM appears to be one of the few upgrading the technician to the level of engineering responsibility. Fortunately for me, IBM had the imagination to get men without degrees and encourage them to rise in responsibility and income to the level of their native talents . . . not what their formal education dictates."

"Student" Bill Miles diagrams computer circuit

Both titles gain

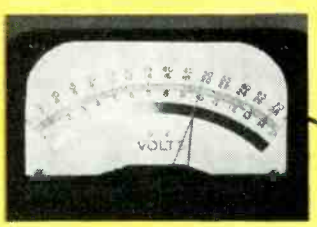
Is this a sign that the educational system is wrong? "Not at all," answers Bill Miles. "A Doctor's, a Master's, a B.S. degree stand for something and always will. But if a technician can perform many jobs that traditionally belong to the engineer, they both stand to gain. The technician, because he gets much of the engineer's salary, satisfaction and recognition; the engineer, because he is free to do work which *only* a man with his formal training can do. When everybody wins, and nobody loses, it's the sign of a good thing."

Since Bill Miles joined IBM, opportunities in the Project Sage program, destined for long-range national importance, have grown more promising than ever. If IBM considers your experience equivalent to an E.E., M.E. or Physics degree, you'll receive 8 months' training, as a Computer *Systems Engineer*. If you have 2 years' technical schooling or the equivalent experience, you'll receive 6 months' training, as a Computer *Units Field Engineer*, with opportunity to assume full engineering responsibility. Assignment in area of your choice. Every channel of advancement in entire company open—and IBM is leader in a field that's sky-rocketing in growth. All the customary benefits and more. WRITE to Nelson O. Heyer, Room No. 11505, IBM, Kingston, New York. You'll receive a prompt reply.

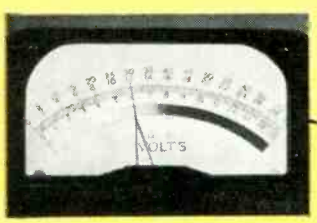
Home-town assignment pleased Miles' wife, son, twin girls

Sylvania IF Amplifier Tubes

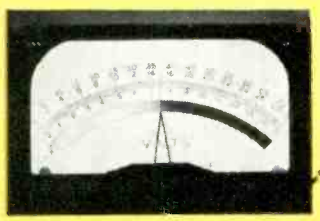
"fixed-bias" tested



Low "fixed bias" point at −1 volt (bottom scale)



Mid-range "fixed bias" point at −3 volts (top scale)



High "fixed bias" point at −7.5 volts (bottom scale)

In determining the plate current (I_b) and Transconductance curves, grid bias is fixed at three points. These points, representing conditions of weak, average, and strong signals establish the nature of the plate current characteristic curve. The "fixed bias" points selected vary according to tube type.

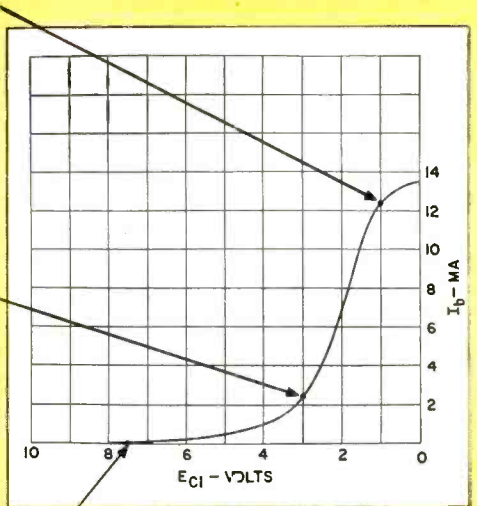


Plate current characteristics, shown on this typical test curve, are carefully controlled by the "fixed bias" test, assuring good performance and stable AGC functioning over a wide range of TV signal conditions.

Dynamic TV set conditions are set up in these test bridges making the "fixed bias" test a true measure of how the tube will perform in TV sets encountered by you in the field.

for stable performance and service dependability

It has always been Sylvania's policy to search for new and better ways to test tubes under dynamic conditions for closer control over performance. The "fixed bias" test is typical of these techniques. It places a more stringent, realistic measure on the tube's ability to perform under varying circuit conditions.

By controlling the plate current characteristics and transconductance of IF amplifier tubes, the "fixed bias" test gives the serviceman an extra measure of dependability regardless of make, model, or age of the TV set serviced.

The range of stable operation is controlled, too, for smooth AGC action over wide variations in signal strength.

These are the same reasons that Sylvania IF types are the choice of leading TV set manufacturers, attested by the wide assortment of Sylvania original types listed among IF tubes now in popular use.

In addition to the "fixed bias" test many other electrical tests are performed on Sylvania IF amplifier types including stability during life. During life tests, close controls are placed on interelectrode leakage.

In every way, Sylvania IF amplifier types offer you maximum assurance of trouble-free service based on sound, newly developed testing methods. Specify Sylvania IF amplifier tubes in the new yellow and black carton.

SYLVANIA

Sylvania Electric Products Inc.
1740 Broadway, New York 17, N. Y.
In Canada: Sylvania Electric (Canada) Ltd.
University Tower Bldg., Montreal

LIGHTING • RADIO • ELECTRONICS • TELEVISION • ATOMIC ENERGY

GUIDE

AUTRONIC-EYE®

TRAINING COURSES MEAN MORE BUSINESS FOR YOU!

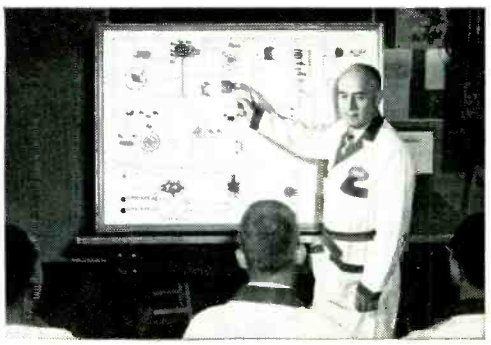
Courses for experienced service technicians provide latest repair information—enable you to do the job faster and more efficiently.

Quick, accurate circuit diagnosis and repair to factory specifications boosts your profits. That's why so many qualified auto technicians attend these Guide training courses at no cost other than transportation and living expenses.

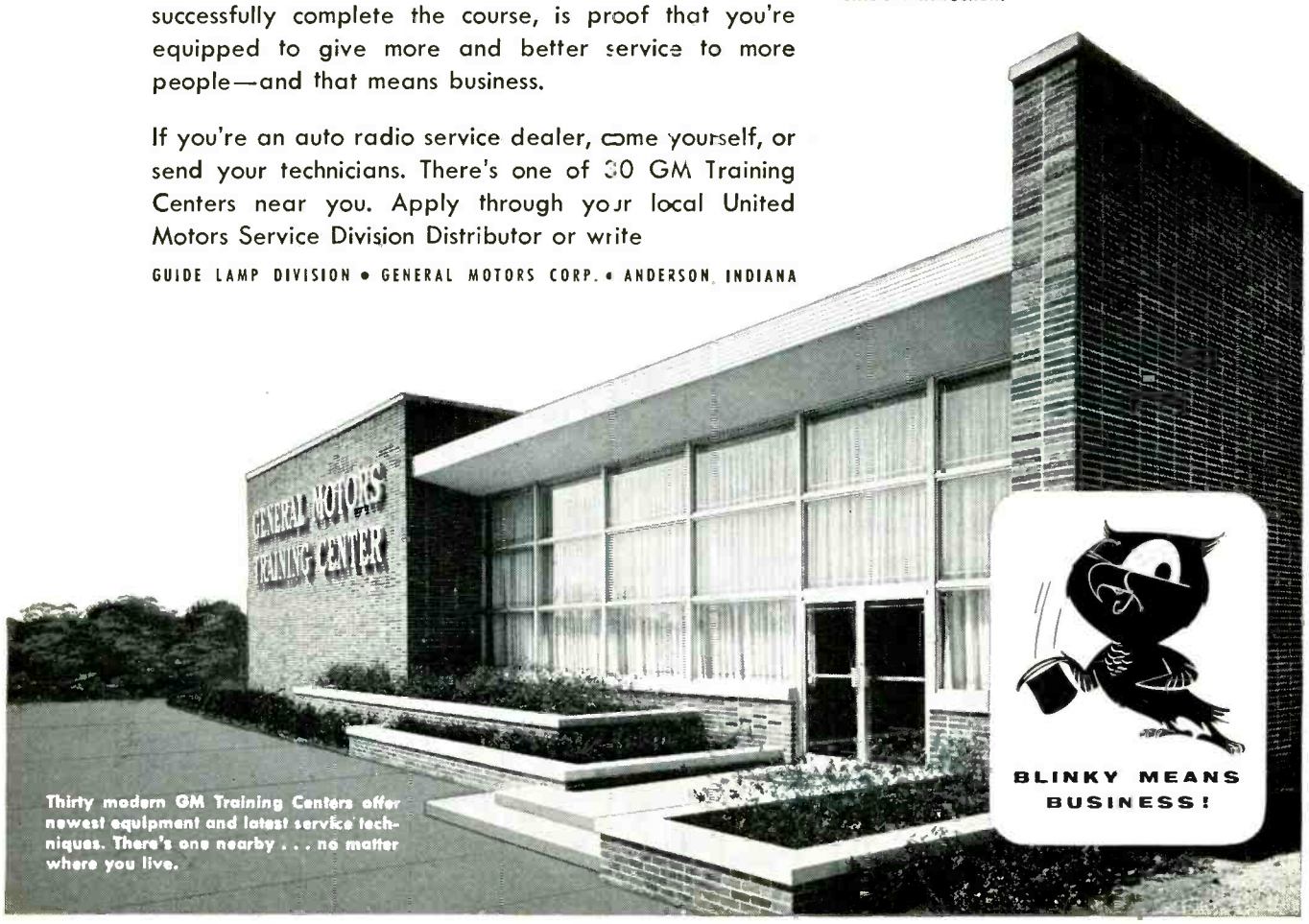
The Guide Lamp diploma, awarded only to those who successfully complete the course, is proof that you're equipped to give more and better service to more people—and that means business.

If you're an auto radio service dealer, come yourself, or send your technicians. There's one of 30 GM Training Centers near you. Apply through your local United Motors Service Division Distributor or write

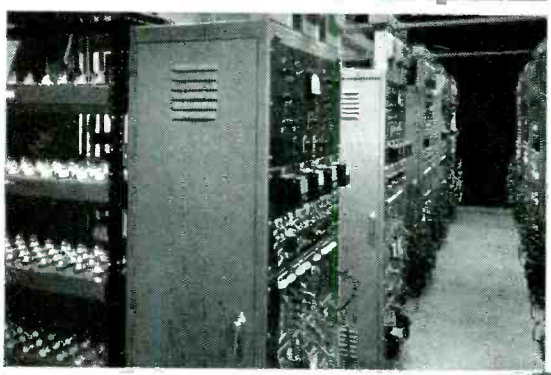
GUIDE LAMP DIVISION • GENERAL MOTORS CORP. • ANDERSON, INDIANA

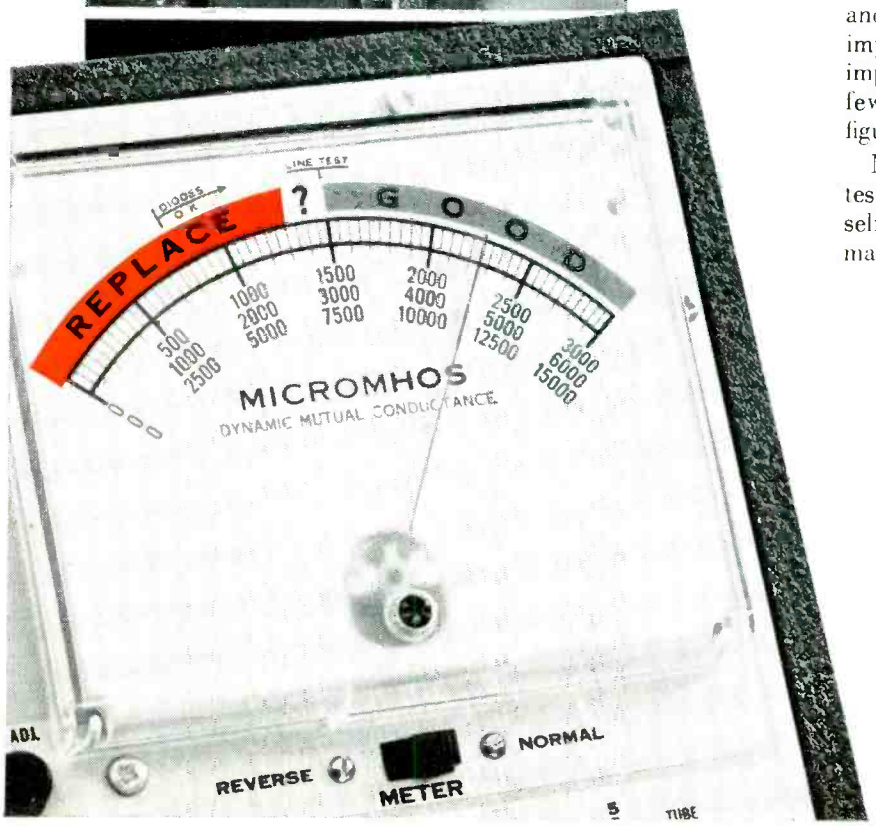


Jumbo-size operational panel of Guide's Autronic-Eye Circuit puts all parts out front for better, more efficient instruction.



Thirty modern GM Training Centers offer newest equipment and latest service techniques. There's one nearby . . . no matter where you live.





Here's why we added dealer meter testing

For years, you service-dealers have been checking your tubes in dealer meters. This was in addition to many exhaustive tests — materials control, production, quality, design, and life — that we tube manufacturers have been running ourselves. And you found it good insurance, or you wouldn't have continued to do this extra work.

As another step in our program to serve you independent service-dealers, and to correlate our tests with yours, we decided to do this job for you. Instead of making our last check a simple conventional short test, we put CBS tubes through the latest type of dealer meter.

If you are one of the thousands of dealers who have been buying CBS tubes, you know the result. You have been getting, in addition to a high average quality, practically no inoperables.

And you have discovered that double-checking CBS tubes confirms it. When you do test them in front of your customer, the tubes and you always look "good" to him. And the impression lasts because the tubes last. Most important of all, you have been experiencing fewer call-backs . . . and, if you took time to figure it out, more profit.

Make us prove our point. Try CBS tubes . . . test them, put them to work, find out for yourself: It is a fact that there are no better tubes made than CBS tubes.

Reliable products
through Advanced-Engineering

CBS-HYTRON
Danvers, Massachusetts

A Division of
Columbia Broadcasting System, Inc.

LETTERS

To the Editor

NATESA Award

Editor, ELECTRONIC TECHNICIAN:

It gives NATESA great pleasure to confirm that Electronic Technician has been voted a NATESA "Friends of Service Management" award.

ROBERT HESTER
President
National Alliance of Television & Electronic Service Associations
Chicago, Ill.

How Much Factory Service?

Editor, ELECTRONIC TECHNICIAN:

To answer the insinuation in your January "Associations" article of the danger to independent servicing by the so-called captive service concerns, maybe the following statistics will clarify this matter. In 1949, RCA was servicing 18% of all TV receivers, as against 1½% currently. A study made by our association indicated that of the 180,000 electronic technicians in the U.S., slightly less than 3,000 are engaged in so-called factory service. There are approximately 40,000 part-time operators. Regarding Mr. Chambers' letter in your March issue, where part-timers are called chiselers, may we remind him that they are American citizens exercising their inherent rights to earn a living.

ROBERT RUSSELL
President
ELECTRONIC TECHNICIANS ASSOCIATION:
Houston, Texas

• *Our own figures indicate that while there may on the order of 180,000 electronic technicians in the U.S., only ⅔ of this total are in full-time independent radio-TV work. Others are in labs and plants. We've never seen a full fledged research study on the number of part-timers, but we've seen estimates ranging from 20,000 to over 200,000!—Ed.*

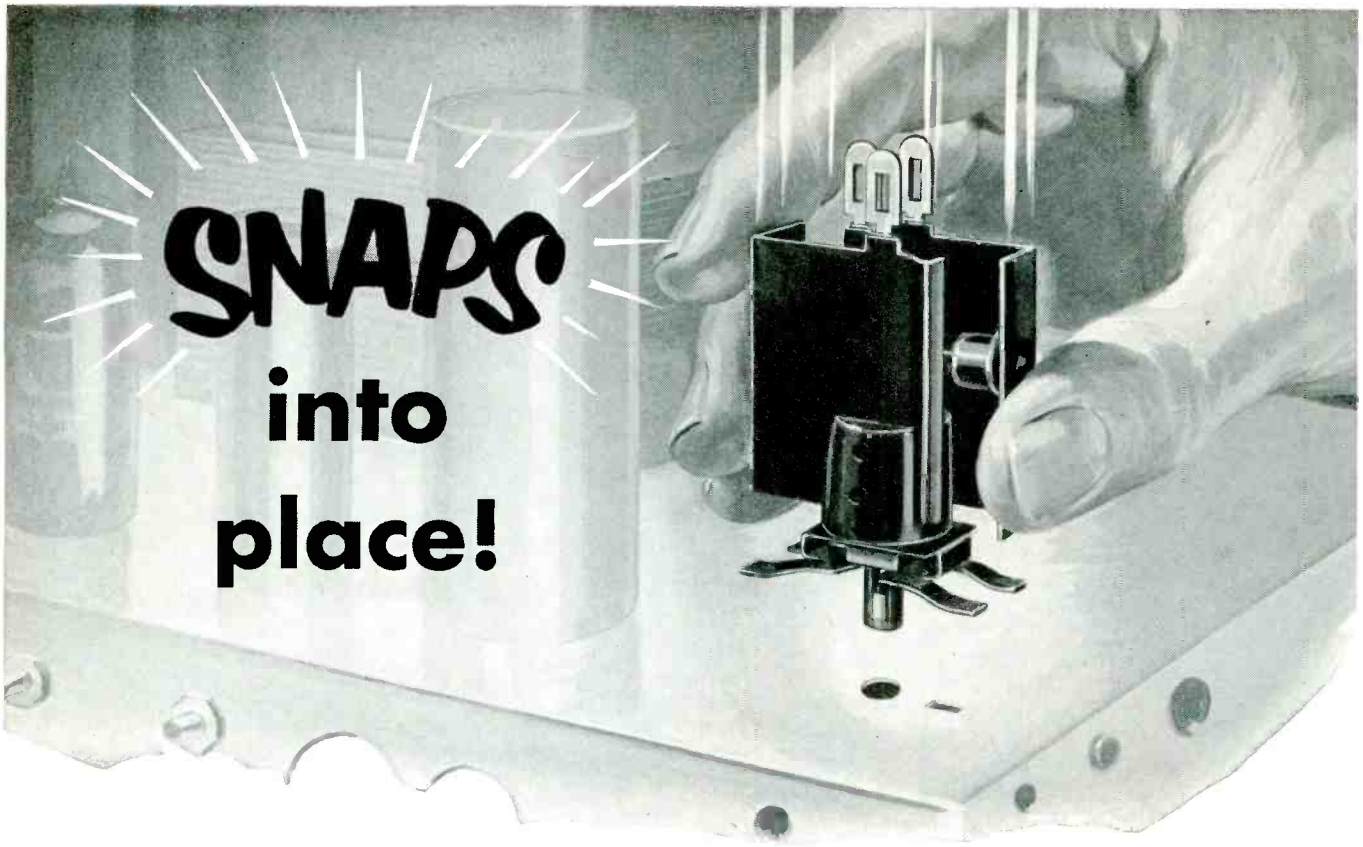
Caddy Design

Editor, ELECTRONIC TECHNICIAN:

I have been using a tube carrying case of my own design during the past five years. It has occurred to me there might be a market for it for other techs. It weighs just 13 lbs. loaded, yet contains 113 tubes, VOM, 3 cheater cords, control cleaner, 13 tools, mirror, order book, tape, solder, pilot lights, fuses and hardware—all boxed or clipped in. Every tech I have shown it to has wanted to know where he could get one. I wonder if there is some manufacturer interested in producing such an item.

WILLIAM R. BURGESS
Bill's Radio & TV Service
1615 Scoggin
Cedar Falls, Iowa

(*Continued on page 22*)



This General Electric Germanium TV Rectifier is the *QUICK* way to the long-time answer to low voltage problems

Snaps in for easiest installation! Holds full voltage output, without aging! Carries full year's written warranty... *and* is *competitively priced!*

You can depend on General Electric GERMANIUM rectifiers... because they have a record of over six years of *successful* service in the field. They are presently being used as original equipment by two leading TV Manufacturers, and in other TV sets their performance has been tested and checked by the Howard W. Sams & Company, Inc.

The high efficiency of the germanium junction in these rectifiers provides increased sensitivity and brighter pictures, particularly in low line voltage areas. Unprofitable rectifier callbacks are virtually eliminated by this reliable rectifier, backed by a full year's written warranty.

Installation time is cut to a minimum by its *snap-in-design*. The spring clip mounting locks the General Electric rectifier into the hole made for the mounting stud of the original rectifier. You can actually install this new unit in less time than it takes you to remove the old one!

And, on top of everything else, you can sell them at a competitive price. See them today at your General Electric Tube Distributor.

* * *

FREE... REPLACEMENT GUIDE

The General Electric Germanium TV Rectifier REPLACEMENT GUIDE tells you exactly which model fits your customer's set, and is the result of an analysis of all leading sets built since 1953. Only proved replacements are recommended. Get your copy, *free*... at your G-E tube distributor now. Or, write today to *General Electric Company, Semiconductor Products, Section S8357, Syracuse, New York.*

CUSTOMER CONFIDENCE 10th ANNIVERSARY SEMICONDUCTOR PROGRESS

Progress Is Our Most Important Product

GENERAL ELECTRIC

(*Continued from page 18*)

Part-Timer View

Editor, ELECTRONIC TECHNICIAN:

As a part-timer, I resent the implications that part-timers are a bunch of hammer and screwdriver mechanics who only replace tubes and charge very little for their services. The TV service industry resents it when the public judges it as a whole by the actions of the few dishonest service organizations. So why does it make a judgment against the part-timers? I have enclosed ads from full-time shops ("TV repair in your home—98¢ plus parts"). Apparently they are working for next to nothing, but I doubt it. They must make their money some way.

There are quite a few full-time shops that are not qualified. One of them uses students to run service calls, and pays them $2 for each set brought into the shop. On the other hand, I know quite a few part-timers, and only one is not fully qualified; I handle the tough ones for him. I like TV servicing very much, but why should I work a minimum of 48 hours for less money than I can make working 40 hours with a lot of security?

ROBERT G. DONNELL
Rockville, Md.

• *See this month's editorial, page 33, for our views on the subject.—Ed.*

Microphone Evaluation

Editor, ELECTRONIC TECHNICIAN:

The article "What's Good Microphone?" in your March issue contained some points which are misleading, though we feel certain this was not the intent. The author recommends the use of a ribbon bidirectional microphone for home recording, apparently because of its pickup pattern. Further investigation would have disclosed that the unidirectional microphone is more acceptable. The output level of the ribbon type is lower than that of crystal, dynamic and reluctance types, and is rapidly being made obsolescent by the superior performance of the dynamic cardioid type. Ribbon types have limited range response, objectionable proximity effects and inherent fragility.

We have begun to spend a great amount of money on distributor, dealer and consumer education. Already we have a 25-minute slide film on our Power Point phono-pickup cartridge, and a 35-minute slide film on microphones, consisting of 50% education and 50% product.

GEORGE R. RILEY, Manager
Distributor Sales
Electro-Voice, Inc.
Buchanan, Mich.

Circuit Digests Offer

Editor, ELECTRONIC TECHNICIAN:

From issue #1 dating back to 1952 to the present, I have almost every number of Circuit Digests. They are in new condition, and I would like to send them to any needy person requesting them.

FRED ROSENTHAL
870 Riverside Drive
New York, N.Y.

Only one Manufacturer Specializes in TV Replacement Tuners ...that is STANDARD COIL

See the ultimate in TV tuners
Standard Coil's new line of APPROVED
NEUTRODE REPLACEMENT TUNERS
Booth 691—Room 2405-6 Conrad Hilton
May Parts Show

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Burton Browne Advertising

Overseas: Scheel
International, Inc.
Chicago, Ill.

News of the Industry

INTERNATIONAL RESISTANCE CO. announces the appointment of FRANK G. DAVELER to Division Mgr., Computer Components Div.

FEDERAL TELEPHONE & RADIO CO. reports that JAMES CONTO has been appointed Sales Mgr. of the Semi-Conductor Div.

ERIE RESISTOR CORP. announces the appointment of E S. WILLIS to Sales Manager of the Electro-Mechanical Div.

RAYTHEON MFG. CO. names JAMES M. IGOE as Distributor Sales Coordinator for the Operations Sales Services Dept. and ROBERT F. SIM, JR. to Manager of the Distributor Order Service Dept. for receiving and picture tubes.

WILLIAM M. WEINER has been added to the staff on production and account service of the HENRY H. TEPLITZ ADVTG. AGENCY.

HORACE R. DELANEY has been assigned Sales Manager of the AEROVOX CORP., CROWLEY DIV.

ASSOCIATION OF ELECTRONIC PARTS & EQUIP. MFRS. announces the following new positions for the officers: A. N. HAAS, Pres.; HELEN STANILAND, 1st vice-pres.; KEN HATHAWAY, Treas.; KENNETH C. PRINCE, exec. secty; GAIL CARTER, 2nd Vice-Pres.

PYRAMID ELECTRIC CO. announces the promotion of ABE KOSAKOWSKY to Assistant Sales Mgr., Jobber Div. . . . PYRAMID reports that in conjunction with its servicemen's contest running from March thru June, a duplicate grand prize, of a weekend at the Waldorf, will be awarded to the PYRAMID jobber and his wife who sells the grand prize winner his capacitors.

JERROLD ELECTRONICS CORP. has formed an Instrument and Test Equipment Div.

ELECTRO-VOICE announces a factory sales department reorganization. Three regional sales mgrs. will cover the domestic sales area divided into Eastern, Central and Western territories.

ELECTROVOX CO. (WALCO needles) announces the 20/20 card, a colorful new display card of 3-speed conventional needles.

TEXAS INSTRUMENTS INCORPORATED announces two new customer services. You can now order locally for immediate delivery many products from the complete stock of one of the new franchised distributors. There is now a direct line, all-day teletype service from Dallas to the three region offices.

PRECISION APPARATUS CO. has a new, convenient payment plan that places any PRECISION test instrument in the Purchaser's hands for a 10% down payment with a whole year to pay the rest.

BLONDER-TONGUE LABS. has consolidated its engineering, manufacturing and administrative operations in a spacious three level building in Newark, N. J.

SEL-SON ELECTRONIC TUBE CORP. has added approximately 40,000 sq. ft. of mfg. and warehouse space to its plant in Darby, Penna.

GENERAL TRANSISTOR CORP. announces the formation of a new subsidiary, GENERAL TRANSISTOR DISTRIBUTING CORP., for the purpose of merchandising the company's products through the jobber trade.

(*Continued on page 74*)

ASTRON "Staminized" CAPACITORS ARE

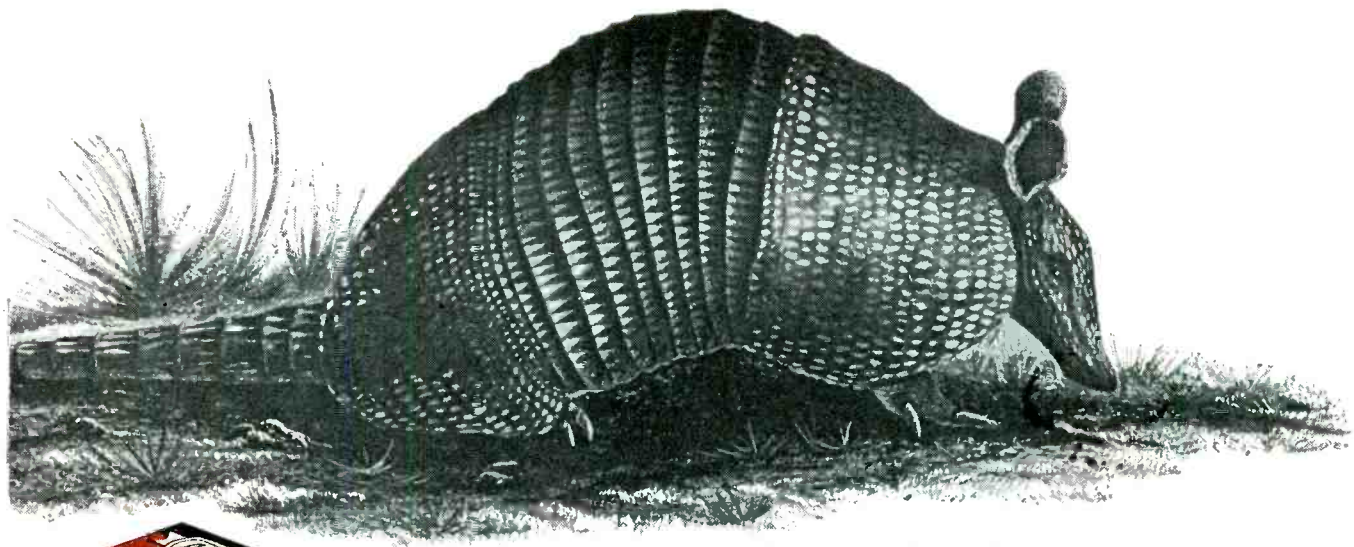
born -- protected

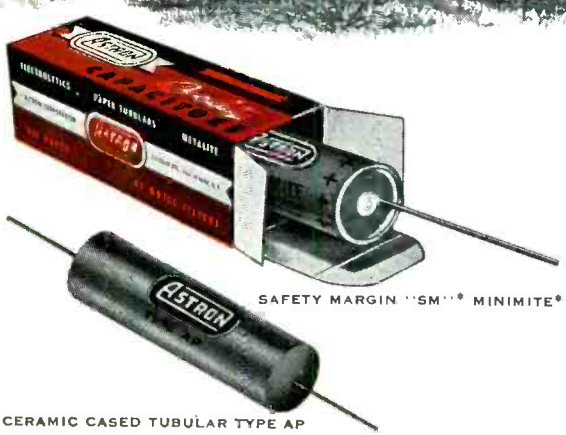
TO INSURE REAL STAYING-POWER
AFTER INSTALLATION

From the first conception of design, Astron's protection insures highest capacitor quality and reliability.

Only the very finest of raw materials pass Astron's "Selected Purchasing System." Time-proven production techniques assure "surgically clean" assembly. Meticulous quality controls are strictly enforced . . . over 10 separate production line tests are performed, **plus a 100% final inspection of every unit before shipment!**

Astron's climatic protection processes are many . . . each designed to guard the quality of Astron capacitors against moisture and temperature long after installation.





SAFETY MARGIN "SM"* MINIMITE*

CERAMIC CASED TUBULAR TYPE AP

The Astron "Staminizing" method of manufacture guarantees you a "no-call-back" capacitor **with real staying power!**

Remember your reputation is **our** business. Build it, guard it, protect it . . . Buy Astron Capacitors . . . they're born-protected.

FREE Servicing Aid

Save time, use handy Astron pocket-size Replacement and Pricing Guide (AC-4D)
Write Today!

*Trade-mark

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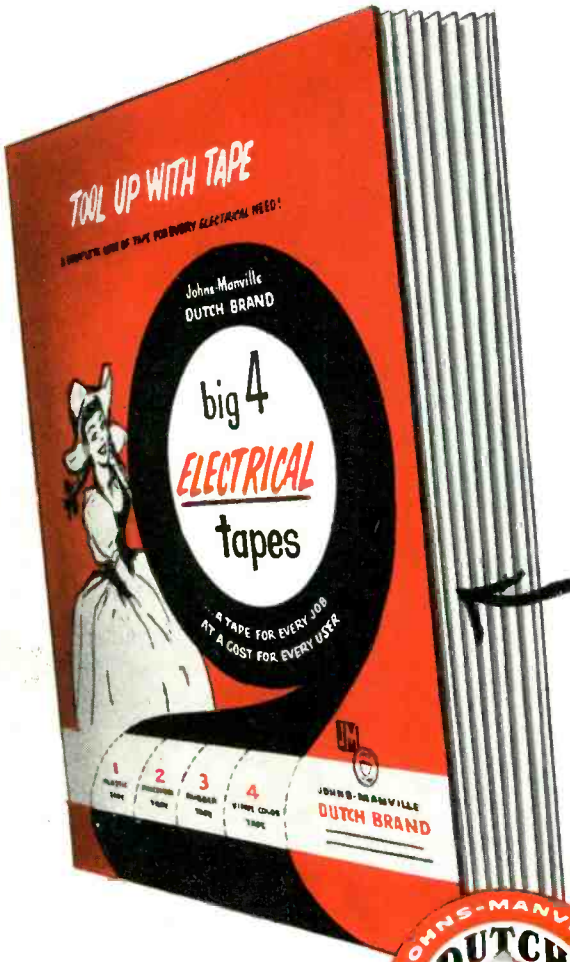
In Canada: Charles W. Pointon, 6 Alcina Ave., Toronto 10, Ontario

DUTCH BRAND
FRICTION TAPE

DUTCH BRAND
VINYL COLOR TAPE

See how the Big Four in electrical insulation

MAKES ANY JOB EASIER, FASTER, BETTER



DUTCH BRAND
PLASTIC TAPE

DUTCH BRAND
RUBBER TAPE

SEND FOR THIS NEW FACT-PACKED
Big Four BOOKLET NOW!

The right tape is the *best* tape for the *best* job! So . . . you'll want to "tool up" with Dutch Brand's "Big Four" — friction tape, vinyl color tape, plastic tape and rubber tape . . . to cut installation costs.

Dutch Brand's new "Big Four" booklet describes these tapes thoroughly, tells you just what jobs tape will do, shows how "tooling up" with the proper tape can improve your electrical work . . . make jobs easier, faster and better. It's a valuable booklet worth getting . . . write for it today!

JOHNS-MANVILLE DUTCH BRAND PRODUCTS OF QUALITY

Johns-Manville
DUTCH BRAND
PRODUCTS

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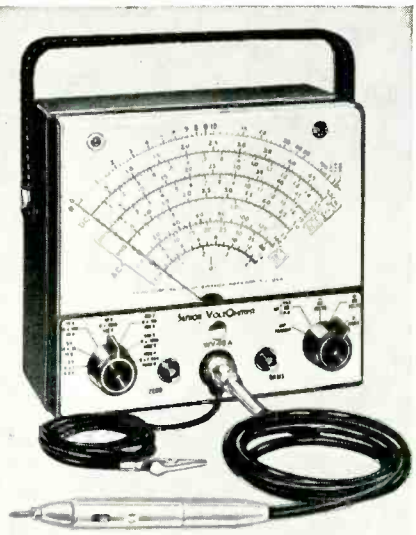


RCA-WV-98A . . . ALL-NEW SENIOR VoltOhmyst . . . incorporates all the important time-proved performance features of the earlier Senior VoltOhmyst including direct peak-to-peak readings of complex waveforms. The new Senior VoltOhmyst includes an improved circuit providing greater accuracy, and a BIG full-vision meter face with the easiest-to-read scales ever designed into a VTVM! Complete with WG-299B DC/AC-Ohms probe and cable, instruction booklet 79.50*

RCA-WV-77C . . . ALL-NEW JUNIOR VoltOhmyst . . . one of the greatest values in vacuum-tube volt-ohmmeters. Embodies several new design features in addition to operational characteristics which have made earlier versions of the instrument the choice of thousands in radio and TV servicing, industry, electronics, communications, broadcasting, and in the armed forces. Complete with WG-299B DC/AC-Ohms probe and cable, instruction booklet 59.50*

RCA-WV-87B . . . MASTER VoltOhmyst . . . features a 27 sq. in. meter with mirror scale. Its easy-to-read peak-to-peak scales are particularly useful for TV, radar, and other types of pulse work. Has accuracy and stability necessary for many laboratory applications. Current ranges from 0.01 ma. to 15 amperes. Complete with probes and cables, including: WG-299C DC/AC-Ohms probe and cable, alligator clip, clip insulator and instruction booklet 137.50*

*User Price (optional)

Accurate • Stable • Reliable • Portable • Easy-to-set-up • Easy-to-read

"VoltOhmyst®"

describes the finest test instruments for SERVICING . . . LABORATORY . . . PRODUCTION TESTING

Modern engineering, testing, and production techniques demand test instruments with *practical* operating features. The VoltOhmyst instruments are "packed" with practical features which make them especially suited for operation over extended periods under rigorous production-line conditions. Features include: electronically protected meters; accuracy unaffected by normal line voltage fluctuations; easy-to-read expanded scales; one zero setting holds for all voltage and resistance ranges; accessory probes extend dc ranges to 50 KV, and extend frequency response to 250 Mc.

Factory-built, factory-tested, and calibrated to *laboratory* standards, each VoltOhmyst is the finest VTVM for the money. For the VoltOhmyst to fit your needs, see the chart at the right.

CHOOSE THE VoltOhmyst THAT SUITS YOUR NEEDS

Features	Master VoltOhmyst WV-87B	Senior VoltOhmyst WV-98A	Junior VoltOhmyst WV-77C
Measurements:			
DC Voltage	0.02-1500v	0.02-1500v	0.05-1200v
AC (rms) Voltage	0.1-1500v	0.1-1500v	0.1-1200v
AC (peak-to-peak) Voltage	0.2-4200v	0.2-4200v	—
Resistance	0.2-1000 meg.	0.2-1000 meg.	0.2-1000 meg.
Current	10 uamp.-15 amp.	—	—
Accuracy:**			
DC Current	±3%	—	—
DC Voltage	±3%	±3%	±3%
AC Voltage	±3%	±3%	±5%

**At full-scale points
+For positive voltages, ±5% for negative voltages

RCA Ultra-Sensitive DC Microammeter, WV-84A. For Reading Extremely "Feeble" Currents.

WV-84A measures minute currents from 0.002 to 1000 ua—in six ranges! It can be used as a very high-resistance voltmeter—up to 1005 megohms on 100-volt range. And, the WV-84A can be used as a megohmmeter for measuring resistance up to 90,000 megohms. $110.00* less batteries.

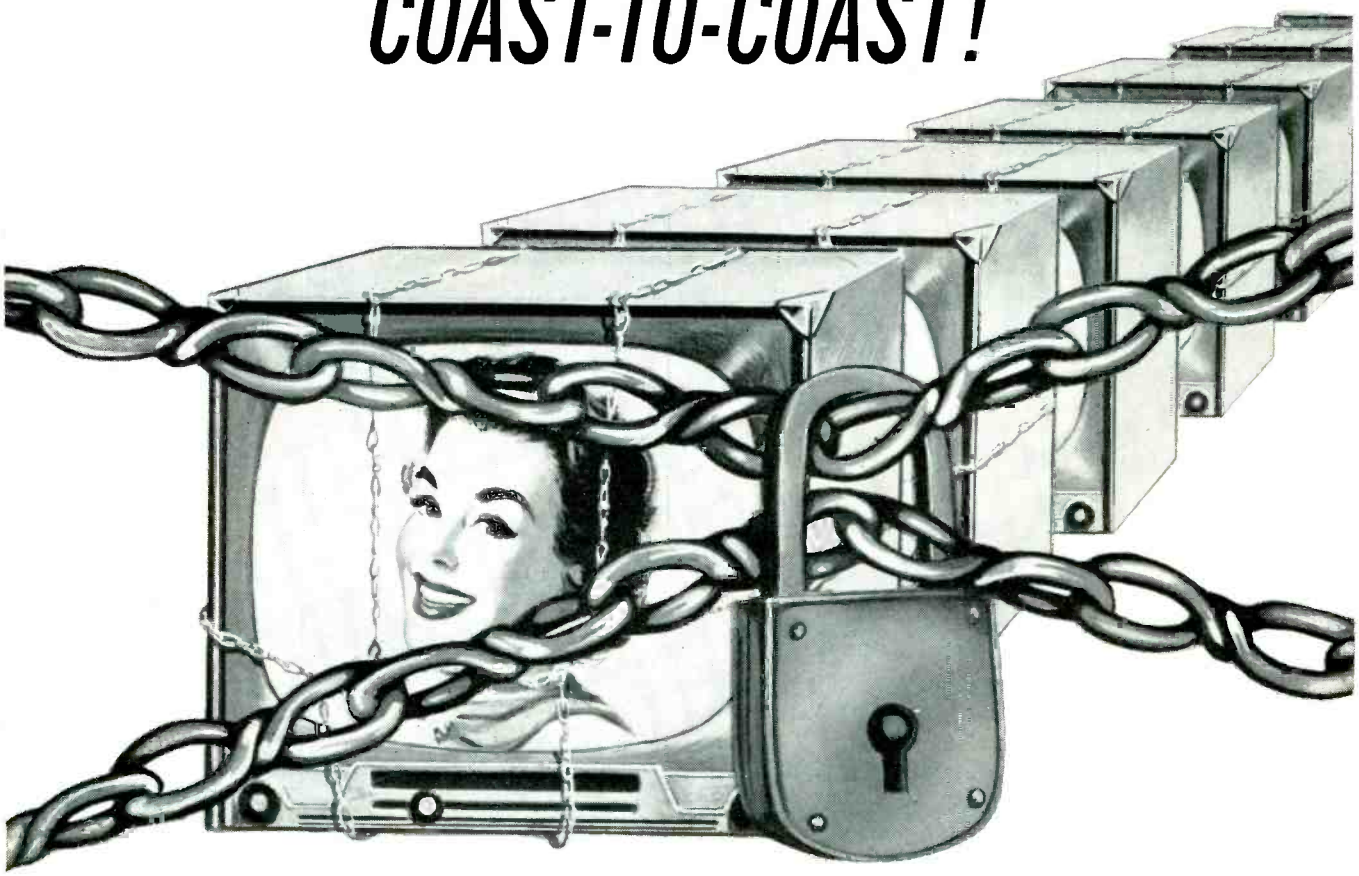
Well-suited for applications in such fields as biology, nucleonics, chemistry, and electro-mechanics—as well as electronics—the WV-84A is completely portable, with a self-contained battery power supply.

RADIO CORPORATION of AMERICA
COMPONENTS DIVISION CAMDEN, N. J.

For technical details on the precision built VoltOhmyst line, call your RCA Distributor!

103 TV TUBE "TORTURE TESTS"

COAST-TO-COAST!



"Locked TV" prove WESTINGHOUSE tubes work better, cut call-backs!

RIGHT NOW leading Electronic Parts Distributors across the nation are giving Westinghouse RELIATRON® Tubes the most grueling test in TV history!

RIGHT NOW 103 standard make TV sets—like those used by your customers—are performing continuously! Every set is locked tight. Every set is 100% equipped with Westinghouse RELIATRON Tubes taken right from regular Distributor stock to prove they outlast, outperform other tube brands—in any make TV!

RIGHT NOW these 103 sets are racking up fantastic performance records! For example, one "Locked TV" has run over 17,000 hours . . . more than 11 years' average viewing time!

SEE THE "LOCKED TV" TEST right now at *your* Westinghouse Tube Distributor. Find out how it can pay off in profits for *you!*

Electronic Tube Division • Elmira, New York

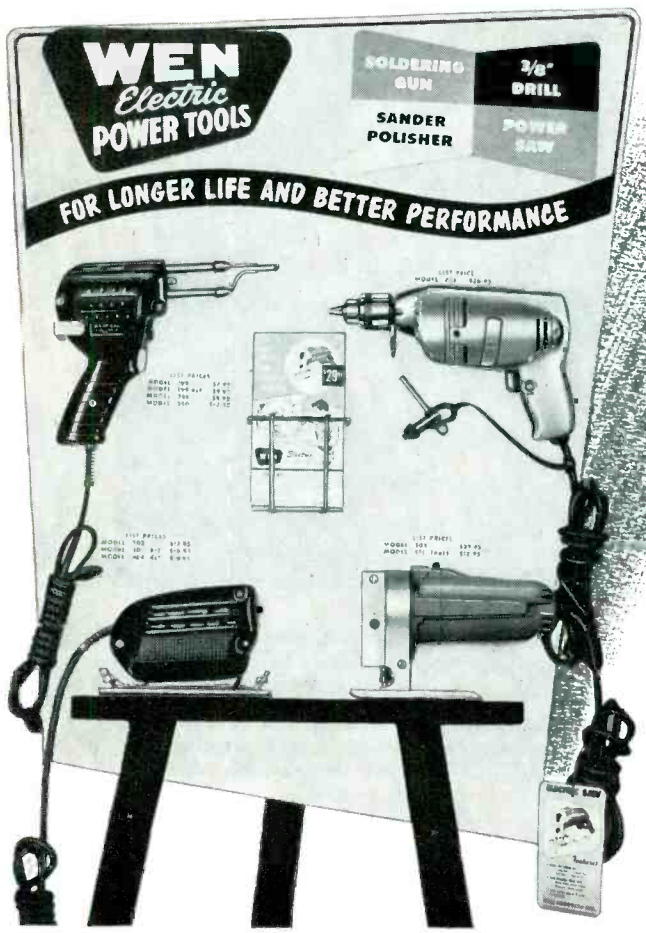
YOU CAN BE SURE...IF IT'S Westinghouse

Add to Your Income this Easy Way

SELL AS WELL AS USE WEN TOOLS

1 SMALL COMPACT DISPLAY

4 BASIC POWER TOOLS *Plus*



PUTS YOU IN THE TOOL BUSINESS

Goes Anywhere

- —ON COUNTER
- —IN WINDOW
- —FLOOR DISPLAY
- —ON WALL

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Editor's Memo

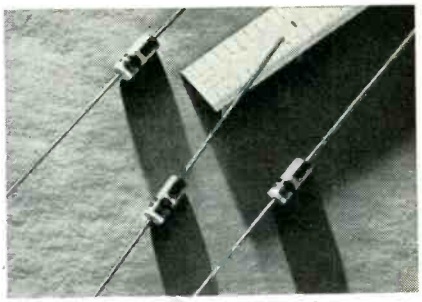
•

We've been having some fun with electronic components. Take a look at the picture below. What do you think those parts are? Before you jump to the conclusion that any fool knows what a resistor looks like, listen.

We received one of these parts in the mail from Delevan Electronics of East Aurora, N.Y. It's about the size of a half-watt resistor, and has four color code bands, silver, brown, black and gold, reading from the end left-to-right. Dimensions are 0.156" D x 0.375" length.

Our technical editor, Bob Cornell, took the part up to a meeting of the Certified Electronic Technicians Association (CETA, N.Y.). There were some 40 technicians present, and it's fair to say that each knows his electronic onions.

What is it?



The two questions put to the members were: What is it? What value is it?

Everyone knew it looked like a resistor, but what would be the sense of asking these questions if it were? Quite a few fellows guessed that it was a capacitor. Others thought it might be a transistor or diode in disguise. One man guessed it was a choke. Another, in tongue-in-cheek desperation, ventured that it was an ultra-miniature record changer.

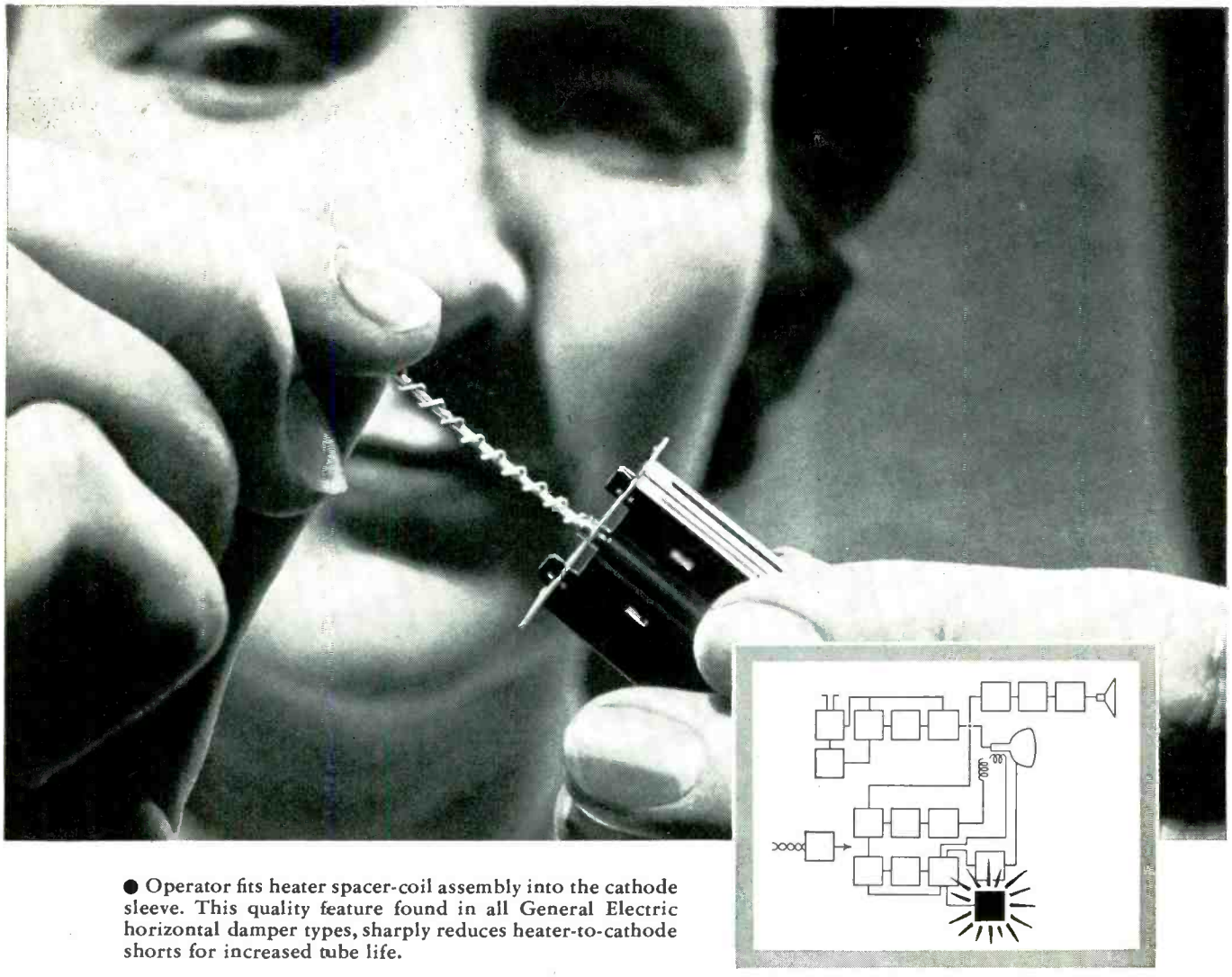
No one was sure. And no one knew what values were involved, although one man said it was "one-something."

Well, the answer (and I can be so smart because the manufacturer sent the info with the part) is that it's a subminiature r-f choke. I think it's value is 1 microhenry. Anyhow, the boys at CETA enjoyed the guessing game.

This hidden identity business is not unusual. We recently ran into a German battery (well, it looked like a battery) that turned out to be rated in microfarads.

It's getting so you can't tell the R from L or C without a scorecard.

Al Forman



● Operator fits heater spacer-coil assembly into the cathode sleeve. This quality feature found in all General Electric horizontal damper types, sharply reduces heater-to-cathode shorts for increased tube life.

High quality spacer-coil design cuts heater-cathode shorts, reduces G-E horizontal damper tube failures!

IN all General Electric horizontal damper tubes, a spacer coil permanently centers the heater in the cathode sleeve. This increases electrical insulation between heater and cathode and greatly lessens possibility of heater-to-cathode shorts, the largest single cause of horizontal-damper failure.

Other quality features of General Electric horizontal damper tubes further promote long-life, superior service. Micas are sprayed and slotted to reduce electrical leakage, and improved, highly adhesive cathode coating guards against plate-to-cathode arcs.

Testing is thorough. *All* General Electric horizontal dampers are flyback tested at maximum rated voltages. And, to protect full-life performance under extreme current loads, the tubes are life-tested in actual circuits reflecting severe usage.

Always replace with General Electric tubes! Their uniform high quality will build widespread customer goodwill . . . help bring you increased service business. *Distributor Sales, Electronic Components Division, General Electric Company, Schenectady 5, New York.*

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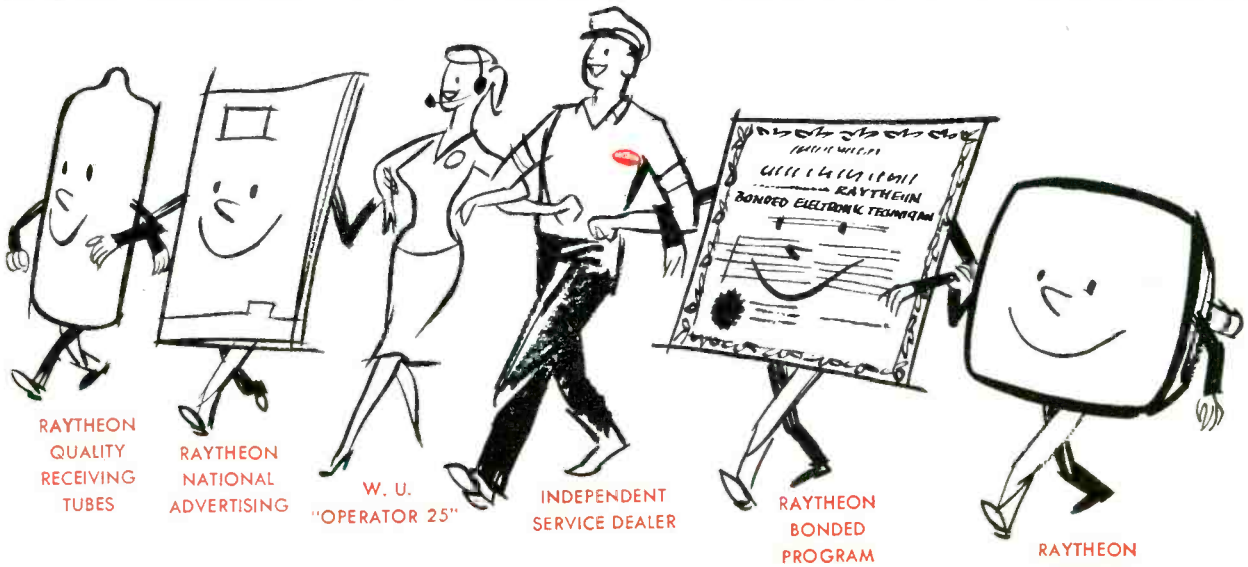
161-1A5

How RAYTHEON Helps

Independent Service Dealers with their TV-Radio Service Business



Here are some of the many ways in which the makers of Raytheon TV and Radio Tubes help the Independent Service Dealer with his business.

1 For nearly *12 years* Raytheon has offered the Raytheon Bonded Electronic Technician program to Independent Service Dealers. Dealers who qualify have their service and parts guarantee backed by a bond issued through Continental Casualty Company, one of the country's largest insurance companies. It gives them real prestige in the eyes of the customer.

2 Raytheon provides "Western Union Operator 25" service for Bonded Dealers in 23,000 cities and towns. In answer to phoned requests for fast, dependable, *bonded* TV-Radio service, "Operator 25" sends customers to Bonded Dealers.

3 Raytheon consistently runs national advertising, presenting Independent Service Dealers as the best in the business.

4 Raytheon has a network of *independent* distributors with well trained personnel who are eager to help *independent* dealers.

5 Raytheon makes a complete line of TV and Radio Tubes that are tops for replacement work — Raytheon All-Set Tubes — designed to help the versatile service dealer who repairs all makes and models.

For the whole Raytheon story, get in touch with your nearest Raytheon Tube Distributor.

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ELECTRONIC TECHNICIAN
Including Circuit Digests

The Part-Time Versus Full-Time Slugfest

In recent months we've noticed an increased number of attacks on part-time technicians by full-timers, and vice-versa. Hardly a day goes by without a letter denouncing either the "night crawler" or "gyp shop." Some of these letters have been published in our Letters to the Editor column to keep all readers informed of what their fellow technicians are thinking.

A few readers have mistakenly concluded that certain of these letters reflect our viewpoint. That's simply not true. Each letter speaks solely for its author, making the Letters column a kind of open forum.

The fact that there is such confusion and antagonism, at a time when unity is vital, prompts us to present our views on the full-time vs. part-time controversy.

Full-Time Technicians

The overwhelming majority of our more than 53,000 subscribers are either full-time electronic technicians, shop owners or service department managers. They are the foundation and prime element of the electronic servicing industry. They service most of the sets and account for most of the dollar volume. That this work constitutes their complete careers lends a great measure of stability and continuity to the industry.

While there is nothing in full-time work which inherently assures competent repair, there is a stake in a lifetime career which does induce a sense of responsibility. Besides, you can't fold up a shop like a tent and quietly steal away in the night.

In a nutshell, the full-timer is the heart of the industry.

Part-Time Technicians

The expanding electronic industry requires the continuous flow of new talent into the field. In times of national emergency, a reserve pool of part-time electronic technicians would be vital. And don't forget, there are part-timers who are working toward full-time status.

The part-time technician has every right to continue his work, *providing* he adheres to proper business practices. This includes technical competence, obeying the law (for example, charging sales tax, where required), and charging a fair price.

By the very nature of part-time operation, one could, so to speak, fold his tent and quietly steal away, leaving the industry at large to hold the bag. This is all the more of a reason for part-time technicians to impose a stringent sense of responsibility on themselves if they expect to be recognized as a legitimate element of the industry.

Mutual Recognition

Boiled down to its essentials, we believe that full-timers should recognize the right of the part-timer to make repairs as long as he meets the criteria of proper business practices noted above.

At the same time, part-timers should recognize that full-timers have a livelihood at stake, and that they must oppose unfair competition with all the forces at their command.

Let's hope that both full-time and part-time technicians will stop villifying each other, and start attacking those two small, yet potent elements in both camps that are doing injury to all. We refer to Incompetence and Irresponsibility. That's a slugfest worth having!

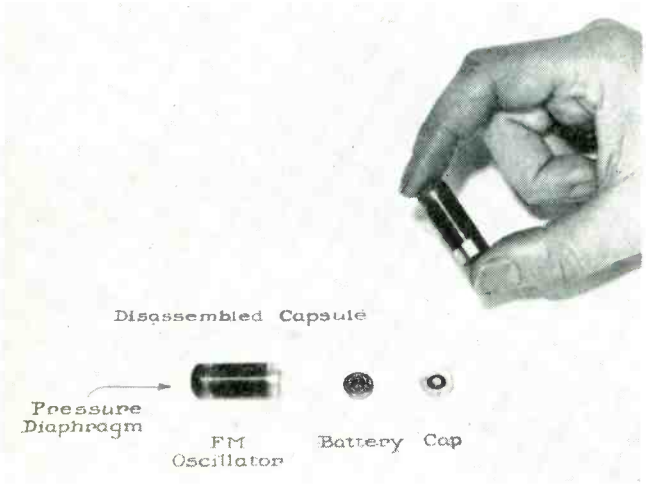
Tuning In the

MAY 5-11, NATIONAL RADIO WEEK, is being sponsored by four groups—Radio-Eelectronics-Television Mfrs. Assoc.; National Appliance, Radio-TV Dealers Assoc.; National Assoc. of Radio & Television Broadcasters and the Radio Advertising Bureau.

COLOR CODING and component recognition can be tricky (see Editor's Memo this issue). A part looking like a resistor turned out to be a coil. The manufacturer, Delevan Electronics, reports that the wide and narrow bands used in the current RETMA system for marking coils may be ambiguous. Instead, this company uses four narrow bands. The first one, silver, identifies the component as a coil. The second and third bands are significant figures, with colors the same as resistor coding. The fourth is the standard decimal multiplier. Units are in microhenries. Tolerance is unmarked but 10% is the standard.

YOUR YEAR-ROUND REFERENCE. Three of the features in this May issue of Electronic Technician are among the bonus extras for readers to refer to during the coming months. First. there's the bound-in directory of electronic products, cross-referenced by manufacturer. Compilations of electronic schools and technician associations are also given. Second, there's the giant Electronic Spectrum Chart of all frequency allocations. See the loose insert, Section 2. Third, this month's Circuit Digest section offers a complete cumulative index of all schematics published therein to date.

RADIO PILL FOR MEDICAL ELECTRONICS



Transistor "radio pill" which is swallowed by patient has been developed by Rockefeller Institute, New York VA Hospital and RCA for research in the human intestinal tract. It consists of an FM transmitter modulated by action of intestine fluid or gas pressures on the capsule's diaphragm. Rechargeable battery has 15-hour life. Frequency is 1 mc, and signal travels 1 ft.

"And what happened when you told him the price of putting up a new antenna?"

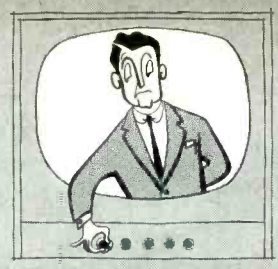
HI-FI STATISTICS. The Institute of High Fidelity Mfrs. announces that 1956 sales of home hi-fi components and tape recorders exceeded $166,000,000, compared with $121,000,000 for 1955. Prediction for 1957 is $221,000,000. Last year, speakers and enclosures accounted for 25% of sales; amplifiers and preamps 25%; tape recorders 10%; tuners 15%; phonos, including changers, cartridges and the like, 25%. Add hi-fi packaged systems and you have a sizable chunk of repair business potential.

TV TECHNICIAN LICENSING is getting to be a pretty controversial issue in Canada, as well as the United States. Reader John Burkitt of Napanee, Ontario, reports the move by some province legislators to regulate repair company operations. Latest word is that the legislation did not pass; the Dept. of Labor was reluctant to administer the act. The licensing proposal will probably come up again at the next session of the Legislature.

TELEMOVIES, which brings motion pictures from local theaters to home TV screens via a wired system, looks like a growing business. A Jerrold-equipped pilot operation in Bartlesville, Okla., a city of 28,000, is underway. In other areas, including Oklahoma City, telemovie groups are getting cable-stringing franchises from the respective cities. One present plan is to charge $9.50 monthly, or less if there are over 10,000 subscribers.

MEANWHILE, back at the toll TV ranch, video which relies on scrambled TV broadcasts, there are no new developments as we go to press. Proponents and opponents of pay-as-you-see TV are awaiting FCC decision on whether the service will be authorized. Some FCC commissioners are known to favor a test, others are against it, others are considering throwing the problem into Congress' lap.

Picture .....



TETRODE TRANSISTORS are in mass production at GE. These germanium semiconductors are designed to amplify up to 120 mc, opening up application possibilities in TV, radar and two-way radio. Secret of the high frequency performance is the use of a "meltback" process which produces p-type layers so thin that 20 layers would be required to equal the thickness of this magazine page.

A DEADLY DISEASE has been taking a frightful toll of lives, and TV technicians on house calls are top prospective victims. It's called "heavy accelerator foot." Yes, last year 40,000 Americans were killed and 2,368,000 injured in U. S. highway accidents. That's one in 70 Americans. So take it easy on the road; don't become a statistic.

ELECTRONIC PHOTOGRAPHY system described by RCA engineers can take a series of photos with each exposure as short as ten billionths of a second. An image converter tube picks up light images by means of a photosensitive cathode. The images are transferred electronically to a viewing screen where they can be photographed. A pulse applied to the image converter turns it on and off.

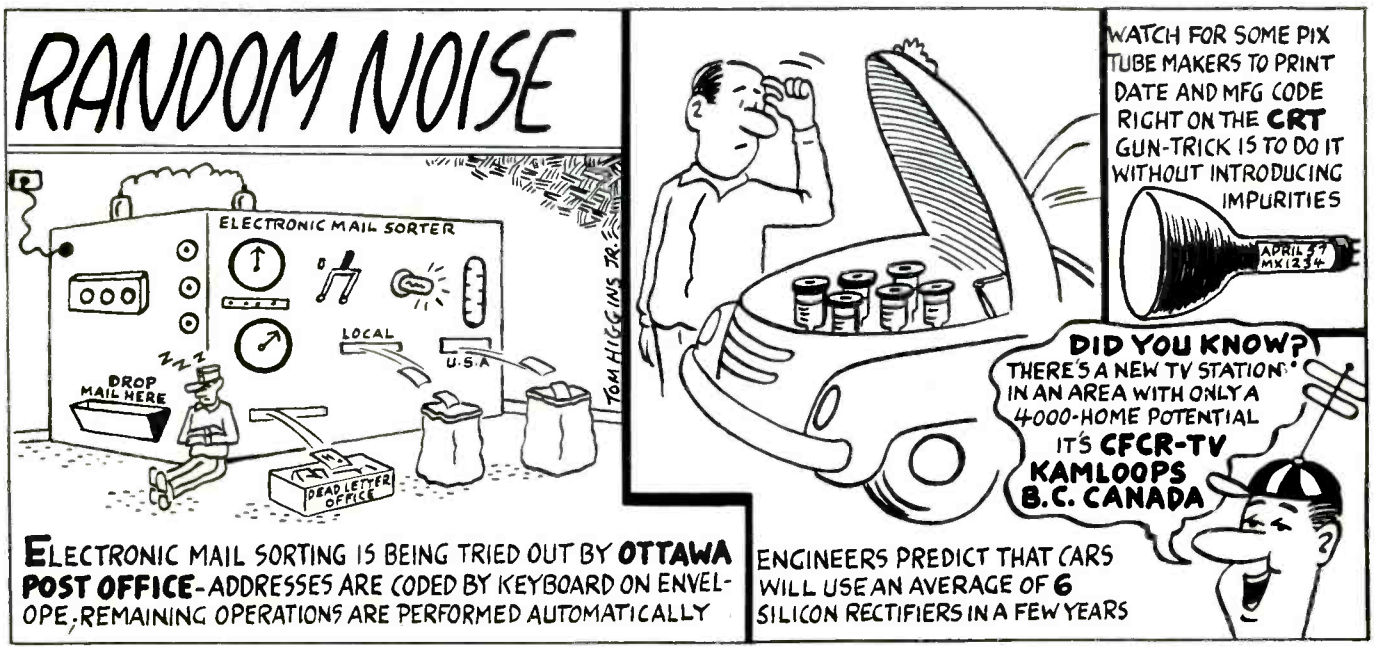
HEARD THE RUMOR that the military had designs on grabbing TV channels 2-6 for their own use? These whisperings caused quite a stir recently; however they can now be safely laid to rest. Top brass at Joint Chiefs of Staff have flatly stated that nothing of the sort is being considered.

CALENDAR OF COMING EVENTS

May 20-23:	1957 Electronic Parts Distributors Show, Conrad Hilton Hotel, Chicago, Ill.
Aug. 2-3:	Texas Electronic Association Clinic and Fair, Hotel Texas, Fort Worth, Texas.
Aug. 16-18:	National TV-Radio-Electronic Service Industry Convention, sponsored by NATESA, Sheraton Hotel, Chicago, Ill.
Aug. 20-23:	Western Electronic Show & Convention (WESCON), Cow Palace, San Francisco, Calif.
Sept. 24-25:	Sixth Annual Industrial Electronics Symposium, Morrison Hotel, Chicago, Ill.
Oct. 7-9:	1957 National Electronics Conference, Hotel Sherman, Chicago, Ill.
Oct. 16-18:	Institute of Radio Engineers' Canadian Convention, Automotive Bldg., Exhibition Park, Toronto, Ontario.
Nov. 11-13:	Radio Fall Meeting, King Edward Hotel, Toronto, Canada.

INCIDENTAL INFORMATION DEPT. The address of Collaro Limited, British record changer manufacturer, is Ripple Works, By-Pass Road, Barking Essex.

SEEN IN NEW YORK CITY: A high-gain yagi antenna with rotator, located 10 blocks from the Empire State Building, site of all the local high-power VHF transmitters. Who knows, perhaps reflections in the metropolitan canyons are opening a market for fringe antennas right in the heart of an area where signal attenuators are often used!



Photoelectric Control

Operating Principles and Practical Applications of the Phototube.

SIDNEY PLATT

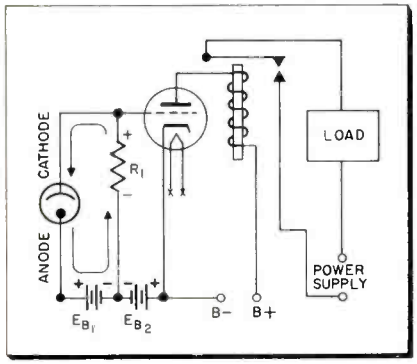
• Photoelectric control of industrial processes and applications is becoming more and more widespread because of the practicability and versatility offered by this method of control. It has been applied to industrial methods involving counting, cutting, weighing, security, illumination, quality, color, heat, etc. Because this method of control is extremely common, and gaining in popularity, it is important that the electronic technician be familiar with the circuitry and techniques involved.

The Phototube

The heart of the photoelectric control circuit is the phototube. This tube consists of a cathode and a plate, housed in an evacuated envelope. The cathode, generally a curved, semi-cylindrical electrode, is coated with a photosensitive material which emits electrons when exposed to light. The plate, usually a thin wire, collects the electrons emitted by the cathode. The schematic symbol of the phototube is shown in Fig. 1.

In a circuit, the plate is maintained at a positive potential with respect to the cathode. When light or other radiant energy falls on the photosensitive cathode, it emits electrons which are drawn to and collected by the plate. The current through the tube varies directly with the intensity of the light striking the cathode and the potential difference existing between the tube elements. Increasing the light intensity or the tube potential will cause the phototube current to increase up to saturation.

Fig. 1—Tube conducts when bias is offset



The maximum phototube current that flows is extremely small and may be in the neighborhood of 5 to 10 microamperes. This current is not generally of sufficient magnitude to directly drive a relay control circuit for power load. As a result, the output of the phototube is normally applied to an amplifier. A simple but useful phototube amplifier circuit is illustrated in Fig. 1. To understand its operation, assume that no light is shining upon the phototube. At this time the bias voltage E_{B_2} is sufficient to cut off the triode-plate current or at least to hold it below the value at which the relay-coil load will energize. In the presence of light, current flows through the

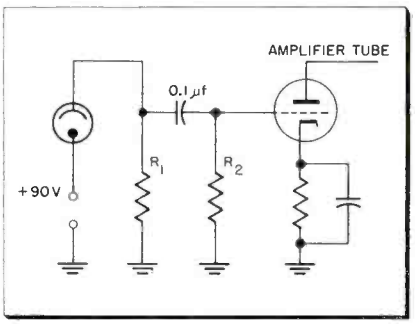


Fig. 2—RC amplifier for sound reproduction

phototube and resistor R1. It can be seen that the voltage developed across the resistor offsets the triode-amplifier bias voltage and permits the amplifier plate current to increase. The relay coil becomes energized and any circuit action controlled by the relay contacts is initiated.

An example of a practical phototube application is in the pickup of the sound track on movie film. In this case, light is passed through a slot and then through the sound track to the cathode of a phototube. The sound track, which appears as light and dark gradations on the film, modulates the light intensity striking the phototube corresponding to the audio signal. The circuit

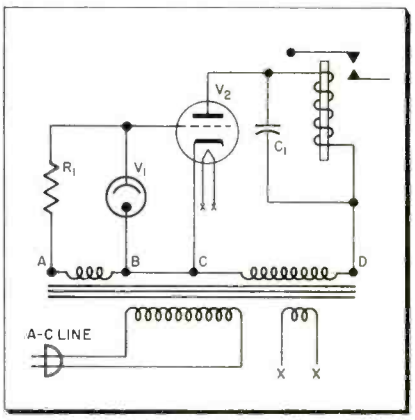


Fig. 3—Basic a-c operated amplifier circuit

shown in Fig. 2, is similar to an ordinary RC coupled audio amplifier.

A.C. Operation of Phototubes

Although the circuits described above require a d-c power source the prevalence of a-c sources in industry should lead one to believe that a-c operated phototube circuits would be common, and indeed they are. A basic a-c operated circuit is shown in Fig. 3. To understand its operation, let us assume that initially the phototube V1 is operated in darkness. Under this condition, no current flows; the tube acts as an infinite resistance (open circuit); the voltage between grid and cathode of amplifier V2 is the voltage developed across the secondary winding AB of the transformer. If, under this darkness condition, the polarity of the applied line voltage is such that point A is negative with respect to point B, and point C is negative with respect to point D, no amplifier plate current can flow because the voltage AB cuts the tube off. On the next half cycle, when point A is positive with respect to point B, and point C is positive with respect to point D, plate current cannot flow since the plate of the amplifier V2 is negative with respect to its cathode. Thus it can be seen that, with the phototube in darkness, amplifier plate current can not flow.

Let us now assume that light is permitted to fall upon the phototube.

In Industrial Electronics

AC or DC Operation in the Presence or Absence Of Light

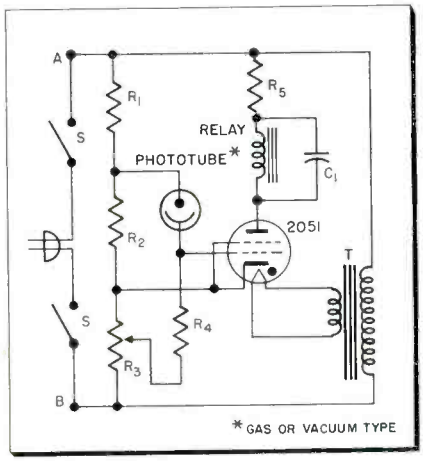


Fig. 4—Increase in light starts relay action

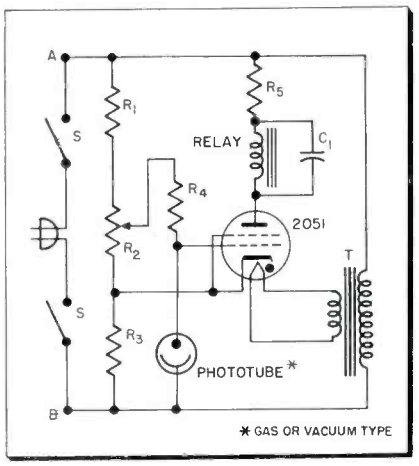


Fig. 5—Decrease in light actuates control

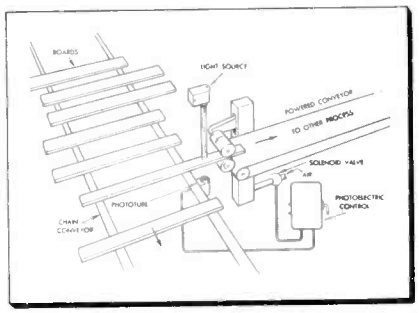


Fig. 6—Automatic removal of quality boards

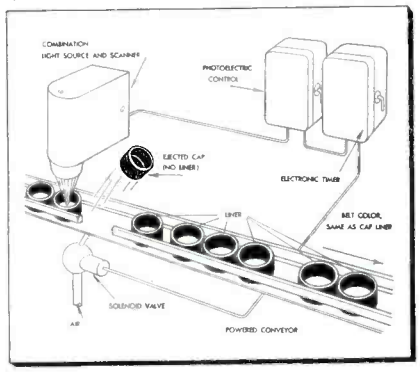


Fig. 7—Detector ejects gasket-less caps

When the a-c line polarity is such that point A is negative with respect to point B the plate of V1 is positive with respect to its cathode. The phototube now conducts and acts as a low resistance between grid and cathode of the amplifier. Because the plate of the amplifier is positive on this half cycle, plate current flows, excites the plate relay, and initiates the relay action.

On the next half cycle, the polarity of the voltage of winding AB does not allow phototube current to flow, and in addition the voltage across winding CD drives the amplifier plate negative. On this half cycle, capacitor C1, which had charged during the previous half cycle, discharges through the relay coil, causing it to remain energized.

Fig. 4, illustrates an a-c operated relay circuit in which the relay action is initiated by an increase in light. To follow the circuit operation, assume that the line polarity is such that point A is positive with respect to point B. At this time, the following points should be noted: the plate of the thyratron is positive with respect to its cathode; the plate of the phototube is positive with respect to its cathode; voltage is developed across the voltage divider comprising resistors R1, R2 and R3 such that the arm of potentiometer R3 is negative with respect to the upper end of the pot. If an insufficient amount of light falls upon the phototube at this time, no plate current can flow in the thyratron circuit, because the grid of the thyratron is held negative with respect to its cathode by the voltage developed across a portion of R3.

When enough light strikes the phototube, current flows through R4 reduces the grid bias of the thyratron and causes it to fire. The plate relay will then become energized. In actual operation, the setting of R3 is determined by the illumination level at which relay action is to occur. As the arm of the potentiometer is moved downward more light will be required before the thyratron will fire. Resistor R5 acts as a relay current limiter. In some circuits the resistance of R3 and the relay coil is sufficient to keep the relay current below its peak value and thus eliminates the need for R5.

This circuit may be modified so that a decrease in light rather than an increase will initiate the circuit action. This is shown in Fig. 5. The level of light below which the relay will be energized is determined by R2.

Where gaseous phototubes are used the values of R5 and the relay coil should not be less than 1500 ohms to prevent a high enough voltage across the phototube to cause ionization. Ionized gas glows and any light on the light sensitive elements from this source will reduce the efficiency and may even cause the equipment to become inoperative. However the presence of a controlled amount of inert gas will introduce an amplification characteristic, in that a small change of light intensity will cause a large change in plate current.

Industrial Applications

In a lumber mill, an inspector spots and selects quality boards as they move by him on a conveyor belt. He pushes these boards approximately a foot out of line across the conveyor, as in Fig. 6. When an extended board breaks the light beam by passing between the light source and the phototube, the photoelectric control actuates the pull-off rolls. These engage the board and transfers it to another conveyor.

In another instance the bottling industry uses photoelectric control to detect the absence of gaskets inside the bottle caps. If the insert is missing, bottles may leak and damage the contents of a filled case. A

(Continued on page 73)

Increasing Scope Sensitivity

Practical Solutions and Hints Aid the Technician, Modernize

ROBERT G. MIDDLETON
SIMPSON ELECTRIC CO.

•There are various modifications which can be made to increase the sensitivity and frequency response of an oscilloscope. Some of these are relatively simple, while others will require a substantial amount of time and effort.

Tube Selection

The basic circuit configuration for a single-ended vertical-amplifier stage is shown in Fig. 1 (A). The gain obtainable from the stage is equal to

$$\frac{\mu R_L}{R_P + R_L}$$

where R_P is the plate resistance of the tube, R_L is the value of the load resistor, and μ is the amplification factor of the tube. By selecting tubes, it is usually possible to increase the gain of the stage—there is a production tolerance on μ which can be turned to advantage in this case.

The stage gain can also be increased by raising the value of R_L, but this is not a satisfactory approach, in most cases, because the product of bandwidth times stage gain is a constant, for a given value of μ. In other words, if we double the stage gain by increasing the value of R_L, the bandwidth of the stage will be cut in half. Of course, if wide-band frequency response is not required, it is quite practical to increase R_L to obtain additional gain. Note, also, that if the value of R_L is greatly increased, it may be necessary to increase the B+ supply voltage, to maintain the plate voltage of the tube at its required value.

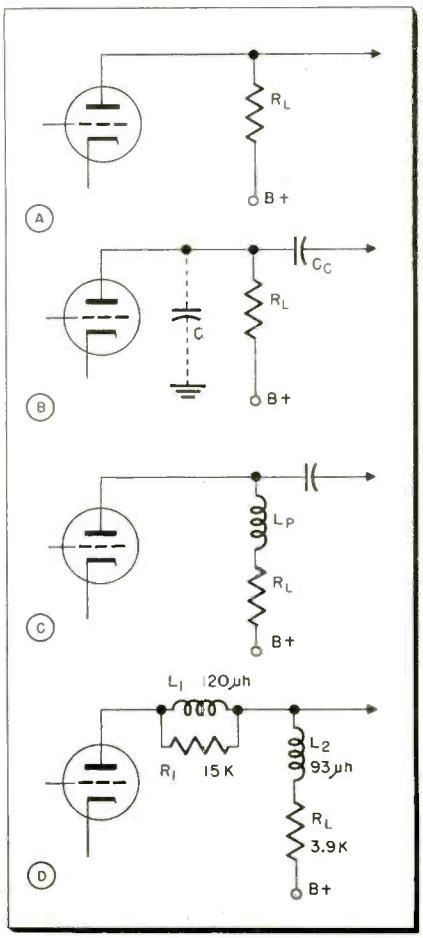
Stray Capacitance

Older types of service scopes utilize simple resistive loads in the plate circuit, as depicted in Fig. 1A. Bandwidth is limited, because of the stray capacitance from wiring to ground, inter-electrode capacitance from plate to grid of the driving stage, and inter-electrode capacitance from grid to plate and cathode of the driven stage. These capacitances can be lumped into a single stray shunt capacitance C_S, as indicated in Fig. 1B.

C_S limits frequency response because its reactance becomes less as the signal frequency becomes higher and eventually the reactance of C_S will be less than the value of R_L. The plate of the tube is now working into a much lower value of effective plate load and the gain decreases accordingly at the higher signal frequency.

We can use this knowledge to advantage in some cases. Inspect the wiring of the coupling circuit to see

Fig. 1—Shunt and series peaking coils improve frequency response in amplifier circuit.



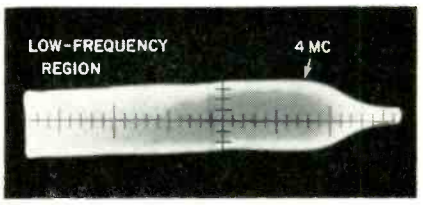


Fig. 2—Excellent response to beyond 4 mc.

that it is dressed well away from the chassis and metal surfaces. The resistor R_L and coupling capacitor C_C could be half an inch or more above the chassis surface. This will reduce the value of C_S, and make it possible to use a larger value of R_L without reducing the bandwidth of the stage.

Peaking Coils

The next consideration is the use of peaking coils to permit higher gain and greater bandwidth to be obtained from a stage. A shunt peaking coil can be included in series with the load resistor, as shown in Fig. 1C, and will provide increased gain over the band of approximately 1.4 times that obtainable from a simple resistive plate load alone. The optimum value for L_P is an inductance which resonates at 1.4 times the highest frequency to be amplified. If it is desired to maintain a flat frequency response to 4 Mc, the shunt peaking coil should resonate with the stray capacitance at about 5.6 Mc.

It will be found that the value of R_L is critical for low-frequency response and that the high-frequency end of the response is maintained by the inductance of the peaking coil.

If a series-peaking coil is also utilized, as shown in Fig. 1D, the gain can be raised another 80%, or more than 2½ times over that of a simple resistive plate load. Typical values used in a modern service scope are as shown in the illustration. Several points should be noted when peaking coils are utilized in an amplifier stage:

1. The value of the plate-load re-

and Frequency Response

His Oscilloscope for Wide-frequency and Low-level Applications.

sistor (3900 ohms in Fig. 1D) may have to be reduced to a smaller value, if the stray capacitance is not kept to a minimum value. The low-frequency end of the response is determined by the value of R_L.

2. The value of the series peaking coil (shown as 120 μh) may also require adjustment, depending upon the tube type which is used and the value of the stray capacitance. A tunable peaking coil, with a center value of 120 μh is advisable, to obtain the best stage gain.

3. Damping resistor R_1 in Fig. 1D must not be omitted, or a flat frequency response will not be obtained. Try different values, if required, ranging from 10K to 20K.

Checking Response

A video sweep generator, covering the frequency range up to 5 Mc is most useful for checking the operation of a stage. Start with the last stage first—apply the output from the sweep generator to the grid of the output tube and the CRT of the scope will display the frequency response, as shown in Fig. 2.

The plate-load values are then adjusted for the flattest possible frequency response. Remember that the low-frequency end is controlled by the value of the plate-load resistor, and that the high-frequency end will be controlled by the value of L_1 (Fig. 1D).

Be sure to use a good sweep generator, since you can be misled in this test if the output from the generator is not flat. Use a 0.25-μf blocking capacitor in series with the output lead from the generator, so that the grid bias of the tube will not be compromised.

Sensitivity

It is possible to increase the sensitivity of the scope by reducing the value of accelerating voltage to the CRT. However, this is usually a questionable expedient, inasmuch as a dimmer trace and poorer focus are the price which must be paid for the increase in sensitivity.

Reduction of the CRT voltage increases deflection sensitivity because the electrons then travel slower from cathode to screen, and take a longer time to pass through the deflection plates; this gives the signal voltage more time to attract or repel the electron beam, so that greater deflection is obtained.

However, at the same time, a dimmer trace results, because the electrons do not hit the phosphor screen as hard, and less light is emitted. Furthermore, since electrons are mutually repulsive, the longer transit time from cathode to grid affords greater opportunity for the electrons to push apart from one another and produce a broader trace.

As shown in Fig. 3, two of the deflecting plates in the cathode-ray tube are nearer the base than the other two plates. In the tube handbooks, the pair of plates nearer the base are identified as DJ_3 and DJ_4. The plates nearer the base are more sensitive than the other pair and if the output from the vertical amplifier is applied to DJ_3 and DJ_4, higher sensitivity is realized. The CRT can be rotated 90° as desired to make either pair of deflection plates fall in the vertical plane.

It is conventional to arrange the connections so that application of a positive-going voltage to the vertical-input terminals of the scope will produce an upward deflection of the scope beam. This is arranged by suitable connection of the vertical amplifier output to the CRT plates; in case the beam deflects vertically in the undesired direction, terminals 7 and 8 may be reversed (Fig. 3). To determine whether or not the beam deflects in the desired direction, a battery voltage can be applied to the vertical-input terminals of the scope, to determine which way the beam "kicks."

Cathode Follower

The continuous gain control of a scope is usually arranged as part of a cathode-follower circuit, as shown in Fig. 4. Here, R_1 is a grid leak; R_2 and R_3 provide a d-c path for plate

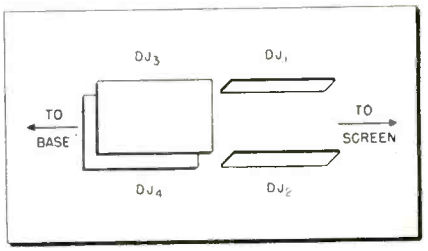


Fig. 3—For maximum sensitivity use the pair of deflection plates closer to the base of the CRT. Tube may be rotated to allow proper waveform display.

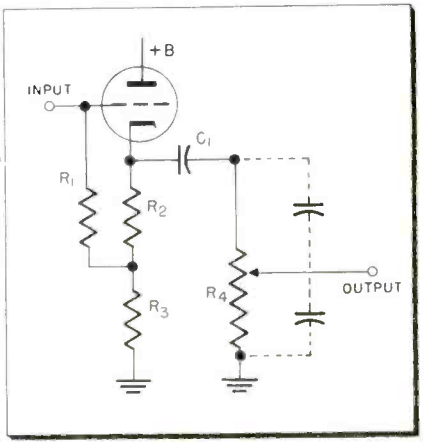


Fig. 4—Lower value of R_4 improves frequency response. Approximately 1500 to 3000 ohms.

current—the grid bias is determined by the relative values of R_2 and R_3. The potentiometer R_4, provides an a-c load, across which a portion of the output signal is developed. Capacitor C_1 is a blocking capacitor and prevents entry of d-c current into R_4; entry of d-c current would cause vertical "bounce" as the operator adjusts the vertical gain of the scope.

The value of R_1 is made quite high: from 1 to 2 megohms. Since R_2 and R_3 are in shunt to R_4, their value should be made as high as possible, consistent with the required dynamic operating range of the cathode follower. In general, the value of $R_2 + R_3$ can be made at least four times the value of R_4. It is necessary to proportion the values of R_2 and R_3 to provide proper operating bias on the grid, so that the signal will not be clipped on either

(*Continued on page* 80)

Don't Overlook The Reflex

Basic Principles, Advantages, Weaknesses, Amplifier Requirements,

LAWRENCE J. EPSTEIN

UNIVERSITY LOUDSPEAKERS, INC.

• The oft neglected radial projector can most assuredly use a good publicity agent. Orphan of the family of p.a. horns, the radial has been the willing and worthy servant of a relatively small society of soundmen who have come to understand its strong points along with its weaknesses.

One generally thinks in terms of round and wide-angle trumpets when planning a sound installation. Yet, when used properly the radial will perform equally as well at less cost. Radial reflex projectors are the answer for those applications requiring uniform 360° horizontal dispersion and where ambient noise levels are moderate. The considerably higher efficiency of reflex radial projectors using driver unit mechanisms for sound energy is responsible for the increasing popularity of this type speaker over radial and wall baffles employing cone speakers, especially in commercial and light industry applications. The sturdy, weather-resistant construction of reflex trumpets makes them ideal, as well, in installations subject to high humidity and dirt or dust-laden atmosphere.

To better appreciate the reasons for these statements, examine the cut away illustration in Fig. 1. The use of a reflexed horn not only achieves considerable baffling of the driver unit output to result in excellent low-frequency responses and high efficiency within a reasonably small physical space, but provides a natural barrier to rain, snow, spray and dirt, protecting the driver mechanism from weather. The length of the sound path from the driver unit to the bell mouth is referred to as "air column" and is most often given in feet. The longer the air column length, the better the low-frequency response. The rate of flare which follows definite acoustical principles together with the size of the bell mouth determines the polar dispersion pattern. Contrary to popular notion, the larger trumpets with long air column lengths and large diameter bell mouths have a sharper beamed output than the smaller horns. The sound-pressure output of the larger horns will thus be greater at a given point, due to the confinement of sound to a narrow dispersion angle. Because of this, round-mouthed trumpets are generally referred to as directional horns.

Air Column Deflection

By terminating the air column in a "cobra" or slit-type diffraction bell or by splitting the air column into two identical halves as shown in Fig. 2, the dispersion pattern may be widened, at the expense of relative sound pressure. In comparison with a directional horn of otherwise comparable characteristics, the wide-angle trumpet will deliver some 3 to 5 db less sound pressure at a given point.

Fig. 3, shows how the air column can be terminated in a combination bell and deflector arrangement which spreads the sound in a 360° horizontal pattern, and at the same time projects the sound downward. At first it may seem to be producing a sort of doughnut of sound that travels downward. The fact is that the hole in the center of the doughnut is filled with sound that results from diffraction occurring at the tip of the deflector. The best way to envision the resulting sound pattern, is to imagine an expanding hemispherical shape traveling downward from the trumpet until it strikes the ground. Quite naturally, inasmuch as the sound energy is being spread out still more than with the wide-angle horn, its sound pressure level for an equivalent air column would be about 10 to 14 db below that of the comparable directional horn.

Fig. 4 shows a typical radial cone speaker type projector. The lack of space to provide for proper baffling of the cone speaker is greatly compensated for by the larger diaphragm area of the cone as compared to the diaphragm of a driver unit. However, the efficiency of replacement type cone speakers generally used in such installations is usually around 2 to 3%. If a genuine high-fidelity cone speaker is employed, the efficiency goes up to around 5 to 7% at best. A driver-unit driven reflex horn operates at an efficiency (depending

Fig. 1—Sturdy, reflexed high-efficiency horn has relatively narrow dispersion angle.

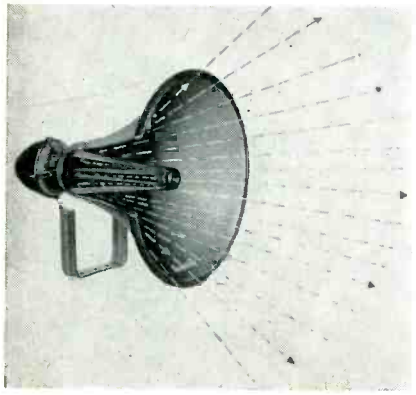


Fig. 2—Pattern widened by split-air column.

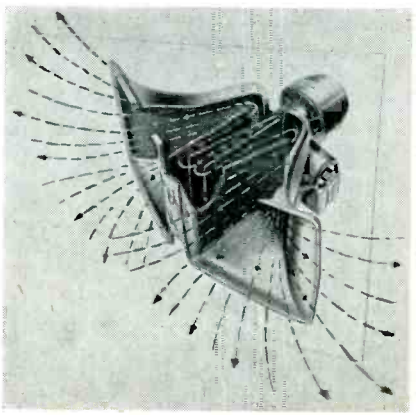
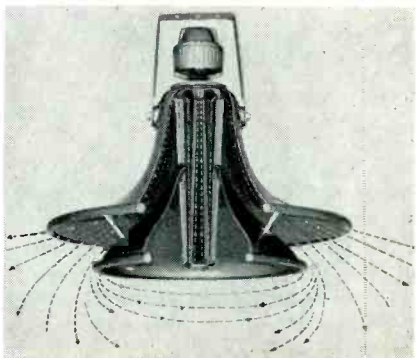


Fig. 3—Reflex radial trumpet has 360°-horizontal pattern. Sound spread by deflector.



Radial Trumpet Projector

Distribution Pattern and Practical Data Chart Presented

upon the quality of the driver unit) of 30 to 45%. In terms of amplifier power, the savings amounts to several hundred per cent.

The "db" (decibels) in audio, is a convenient means of expressing a ratio of power. As a rule of thumb, think of sound pressure and db as follows: We must double the amplifier power input to the speaker to achieve a 3-db gain in sound pressure and naturally it follows that for every 3 db we can save by using more efficient acoustical devices, we need only half the amplifier power to do the same work. We think in terms of 3 db because it has been found that the human ear requires that amount of change in order to detect that a difference in sound level has occurred. On the other hand to be able to hear reproduced sound over ambient noise levels, the sound pressure produced by a speaker at the point of listening should preferably be some 6 db more than the ambient to ensure good intelligibility. The specific amount depends a great deal upon the nature of the noise.

When To Use A Radial Projector

To achieve a 360°-dispersion pattern would require at least three 120°-wide-angle projectors or four or more 90°-directional horns. Because the angle of projection is not equal for all frequencies, being wider for the lower frequencies and sharper for the higher frequencies, the use of either the wide-angle or directional horns will not provide uniform 360° dispersion; unless more than the minimum number of horns are used to provide sufficient overlapping. Thus, if a reflex radial is centrally suspended above the area to be covered it would do the work of several other type of horns and speakers.

While obviously more economical to install and use, we already know that sound pressure level at any one point will be considerably less than would be obtained from a circular cluster of directional speakers. We should bear in mind too, that a single driver (or two), when using an

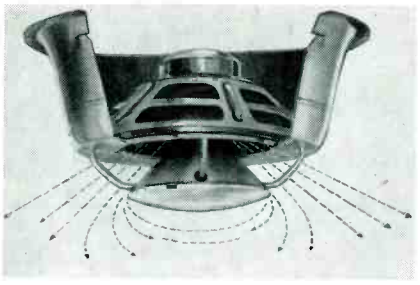


Fig. 4—Radial cone-speaker type projector.

adapter is called upon to supply all the sound energy. The available sound is spread throughout a circular ground area, the diameter of which is determined by the height of the horn. As a rule, the greatest advantage of the projection characteristics of a reflex radial is achieved in cube-like rooms, warehouses, aircraft hangars, gymnasiums, high-ceilinged factories, etc., where reasonable suspension heights are possible and ambient noise levels are moderate.

Which Size Radial To Use

A radial trumpet with a 5-foot air column is suggested where maximum low-frequency response is desired. Reproduction of chimes and liturgical music in church towers is another natural application of this size horn, especially if it is desired to keep equipment costs to a minimum. A 4-foot air column radial, with higher cut-off, is used for both music and speech; a 3-foot radial is most suited where high clarity of speech is essential and high fidelity music reproduction is not an important factor. There is also a difference in sound pressure output between the three model sizes; the 4-foot horn is about 1-db lower than the 5-foot horn and the 3-foot radial is 2-db lower.

How To Use The Reflex Radial

The special chart provides just about all the practical data needed to use radials properly. In preparing the chart, a desirable amount of overlap has been introduced in determining the span of coverage, in

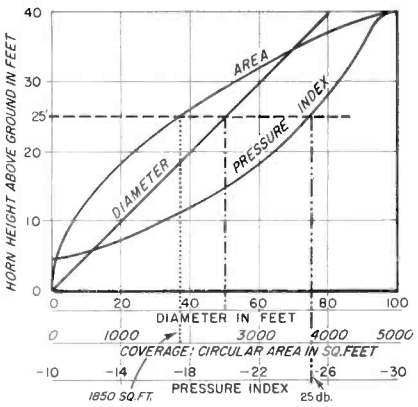


Fig. 5—Reflex radial characteristic chart. Projections from the intersections of the height above ground line (— — —) and the area, diameter and pressure index curves, indicate: area in sq. ft. (. . . .); diameter in feet (— . —); and pressure index (— . . —) respectively.

order that sound pressure level will remain fairly constant between adjacent horns in multiple speaker installations. The first step in using the chart is to survey the installation area and determine the maximum and minimum suspension heights possible, since these are the factors that will determine the range of sound pressure levels and hence the number of radials required to cover a given area.

For example, let us assume that the highest we can mount a 5-foot radial trumpet in a certain location is 25 feet. By reading across the chart from the vertical scale (see— line) on the 25 ft. line, the first curve represents area coverage. By following the point of intersection downward (· · · line) to the area scale at the bottom, we find that for a 25 ft. height the circular area covered is 1850 sq. ft. By continuing across the chart the next intersection is the diameter curve and if we follow that point down to the scale at the bottom showing diameter (·—·— line) we find that the diameter of the circular coverage on the ground is 50 feet. This also means that if more than one radial is to be used because of the length and breadth of the room, each horn should be 50 ft. apart for uniform sound pressure level. Now then, to determine what the sound pressure level would be

(*Continued on page* 79)

1957 Parts Show Preview

Latest products of 277 exhibitors to be displayed to 12,000 visitors

• The annual Electronic Parts Distributors Show will once again be held in Chicago's Conrad Hilton Hotel, May 20-23, 1957. Some 12,000 people are expected to view the displays of 277 exhibitors. A total of 40,000 sq. ft. of floor space will be devoted to the Show.

Admission to the show is by badge only. Badges are issued free in advance of the Show by mail to the following groups:

Exhibitors
Sales Representatives
Distributors
Government Personnel
Accredited Advertising and Export Agency Personnel

Persons who fail to register in advance can obtain badges at the Show, at $5 charge, by being approved by a one-man Credentials Committee.

The Electronic Parts Distributors Show is sponsored by the Assn. of Electronic Parts & Equipment Mfrs., the Sales Managers Club Eastern Group, the West Coast Electronic Mfrs. Assn., the Radio-Electronic-TV Mfrs. Assn., and the National Electronic Distributors Assn.

A festival highlight of the Show is the dinner on May 20, which will feature a number of guest stars.

This year, the display room areas, covering the fifth and sixth floors of the hotel, will be divided into two areas, the Sound Demonstration Area, and the Parts and Equipment Area.

1957 Parts Show
DATE: May 20-23
PLACE: Conrad Hilton Hotel, Chicago
TIME: 10:00 AM to 6:00 PM

LIST OF EXHIBITORS

Company	Booth	Room
Aerovox Corp.	404	
Akro-Mils, Inc.	780	
All Channel Products Corp.	124	609A
The Alliance Mfg. Co.	221	
Alpha Wire Corporation	416	
American Electronics, Inc.		520
American Elite, Inc.		620
American Television & Radio	415	
Amperex (See Norelco)		
Amperite Company, Inc.	584	
Amphenol Electronics Corp.	207	560A-516A
Anchor Products Co.	25	
Arco Electronics, Inc.	113	
Argos Products Co.		626A
The Astatic Corp.	779	553A
Astron Corp.	775	
Atlas Sound Corp.	422	
Audio Devices, Inc.	225	604
Audiogersh Corp.		635-636
Baker Manufacturing Co.	117	
Barker Sales Company	3	
Belden Manufacturing Co.	223	
Bell Sound Systems, Inc.		647 & 649
Birnbach Radio Co., Inc.	205	
B & K Mfg. Co.	120	641A-642A
Blonder-Tongue Labs, Inc.	133	644
David Bogen Co., Inc. / Presto Recording Corp.		505
Brach Manufacturing Corp.	680	
British Industries Corp.	410	639-640
Bud Radio Inc.		512A
Burgess Battery Co.	313	
Bussmann Mfg. Co.	311	
Caldwell-Clements		612A
Cannon Electric Co.	677	
Carter Motor Co.	674	
CBS-Hytron	419	
Centralab	790	
Central Electronics, Inc.		629
Channel Master Corp.		530A
Chicago Standard Transformer	305	
Cinch Manufacturing Co.	872	
Clarostat Mfg. Co., Inc.	590	
Clear Beam Antenna Corp.	581	
Cletron, Inc.	131	523
Colman Tool & Machine Co.	777	
Columbia Wire Supply Co.	216	
Comfort Lines, Inc.	2	
Conrac, Inc.		500
Consolidated Wire	310	
Continental Carbon	787	
Cornish Wire Company Inc.	591	
Cowan Publishing Corp.		524-A-526A
Crest Transformer Corp.		625A
J. W. Davis & Co.	8	
Davis Electronics Co.	870	
DeJur-Amsco Corp.		536
Delco Radio Div.	783	
D & M Products	122	
Drake Electric Works Inc.	222	
DuKane Corporation		539 & 553
Allen B. DuMont Labs., Inc.	580	
Duotone Company, Inc.		655
Dyna Company		633
Dynamics Electronics-N.Y. Inc.	873	660A
Eby Sales Co.	111	
Elco Corp.	885	
Eldico Electronics		648A-649A
Electronic Devices Inc.	786	
Electronic Instrument Co.	202	
Electronic Measurements	112	
Electronic Periodicals Inc.		504A
Electronic Publishing Co.		619
Electronic Technician		612A
Electro Products Labs.	318	
Electro-Voice, Inc.	215	605
Electrovox Co., Inc.	402	
Elgin National Watch Co.	575	
Equipto Div., Aurora Eqpt.	682	
Erie Resistor Corp.		515A-517A
Fanon Electric Co., Inc.		634
Federal Telephone and Radio	210	
The Finnel Co.	4	632A
Fisher Radio Corp.		653
Freed Transformer Co., Inc.	123	
Fretco Inc.	588	
Gee-Lar Manufacturing Co.	206	
General Cement Mfg.	321	610A-611A
General Electric Co.	209	
The General Industries Co.	411	
General Transistor Corp.	781	
Gramer-Halldorson Transformer	312	
Grayhill		617A-618A
Great Eastern Mfg. Co.		652A
Guardian Electric Mfg. Co.	574	
The Hallicrafters Co.		605A
Hammarlund Mfg. Co.	681	535A
Hardwick, Hindle, Inc.	101	
Harman-Kardon, Inc.		547
Hickok Electrical Instrument	589	
Hi-Lo TV Antenna Corp.	109	
Hycon Electronics, Inc.	14	633A
IDEA, Inc.		546A-548A
IE Manufacturing Co.	24	257A
Insuline Corp. America	409	
International Electronics Corp.	879	625
International Rectifier Corp.	1	
International Resistance Co.	407	
Jackson Electrical Instrument	417	
James Vibrapower Co.	213	
J-B-T Instruments, Inc.	576	
Jensen Industries, Inc.	418	528A
Jensen Manufacturing Co.		512-513
Jerrold Electronics Corp.	671	
Jersey Specialty Co. Inc.	102	
JFD Manufacturing Co., Inc.	412	
E. F. Johnson Co.	21	521A
Johnson Electronics, Inc.	875	
Johns-Manville Dutch Brand Div.	208	
Kester-Solder Co.	119	
Lance Antenna Mfg. Co.	886	
James B. Lansing Sound		621-622
Littelfuse, Inc.	583	
Lowell Manufacturing Co.	110	646A
P. R. Mallory & Co. Inc.	585	
Mechanical Steel Tubing Corp.		650A-651A
Merit Coil & Transformer Corp.	689	
Metzner Engineering Div.		616
James Millen Mfg. Co. Inc.	217	
J. W. Miller Company	126	
M. A. Miller Manufacturing Co.	577	
Milwaukee Resistor Co.	688	
National Carbon Co.	686	604A
National Company, Inc.	204	
Newcastle Fabrics Corp.	6	
Newcomb Audio Products Co.		521
North American Philips Co.	789	626

Company	Booth	Room
Ohmite Manufacturing Co.	301	
Orradio Industries Inc.	7	
Oxford Electric Corp.		502 & 509
Parker Metal Goods Co.	105	637A
Peerless Products Indus.	673	
Pentron Corp.		609-610
Permacel Tape Corp.	108	
Perma-Power Co.	413	
Permo, Inc.	308	
Phaostron Instrument Co.		621A-622A
Philmore Manufacturing Co.	219	532A
Pickering and Co., Inc.		602
Pilot Radio Corp.		529
Potter & Brumfield, Inc.	421	
Precise Development Corp.	130	
Precision Apparatus Co., Inc.	403	513A
Premier Metal Products Co.	874	
Pyramid Electric Co.	309	
Q-Line Manufacturing Corp.	11	
Quam-Nichols Co.	306	632

Visit
ELECTRONIC TECHNICIAN
at the show
Room 612A

Scene of the Show: Conrad Hilton Hotel

Racon Electric Co., Inc.		557
The Radiart Corp.	420	536A
Radio Corp. of America	405	542A & 544A
Radio Craftsmen		516
Radio-Electronics		501
Radio Kits, Inc.	13	652
Radio Merchandise Sales Inc.		519A-520A
The Radion Corp.		635A-636A
Radionic Div.		643
Radio Receptor Co. Inc.		638A
Popular Electronics / Radio & TV News		634A
Radio and Television Weekly		658A
Ram Electronics		533A
Rauland-Borg Corp.		533-534
Raytheon Manufacturing Co.	322	
R-Columbia Products Co.	884	
Recoton Corp.	315	
Reeves Soundcraft Corp.	121	
Rego Insulated Wire Co.	578	613A
Rek-O-Kut Co.		522
Rhein Sound Systems, Inc.		623-624
Richards Electrocraft, Inc.	883	
John F. Rider Publisher, Inc.	587	
Robins Industries Corp.		651
Rockbar Corp.	880	
Rogers Electronic Corp.	116	
Rohn Manufacturing Co.	785	614A-615A
Ronette Sales Corp.	887	612
S & A Electronics	791	
Howard W. Sams & Co.	408	
San Fernando Electric Mfg.	27	
Sangamo Electric Co.	214	537A
Saxton Products Inc.	127	
Herman Hosmer Scott, Inc.		618
Service Instruments Corp.	118	
Service		611
Sherwood Electronic Labs, Inc.		645
Shure Brothers, Inc.	684	657
Sigma Instruments, Inc.		620A
Simpson Electric Co.	685	539A
Mark Simpson Mfg. Co., Inc.		556
Herman H. Smith, Inc.	107	
Snyder Mfg. Co.	303	
Sola Electric Co.	414	
Sonotone Corp.	878	504
Soundolier, Inc.	5	
South River Metal Products Co.	774	
Spaulding Products Co.	672	
Spirling Products Co., Inc.		556A-557A
Sprague Products Co.	579	
Standard Coil Products Co.	691	
Standard Electrical Products	106	
Stephens Tru-Sonic Inc.		600-601
Stevens Walden, Inc.	12	
Stromberg-Carlson Co.		613-614
Superex Electronics Corp.		654A
Switchcraft, Inc.	401	
Sylvania Electric Products	676	550A-551A
Talk-A-Phone Co.	212	505A
Sarkes Tarzian, Inc.		619A
Tech-Master Corp.		549
Technical Appliance Corp.	22	
Telematic Industries Inc.	675	537
Teletest Instrument Corp.		616A
Telex, Inc.	203	
Telrex Labs.	135	
Tenatronics Limited		653A
Tenna Manufacturing Co.	23	
Terado Co.	9	
Tevco Insulated Wire	776	
Thomas Electronics Inc.	103	
Thordarson-Meissner	572	
Todd-Tran Corp.		628A
Tran-Kit Electronics Co.	877	
Trans-Tel Corp.	881	
Triad Transformer Corp.	679	
Tricraft Products Corp.	316	
Trimm, Inc.	319	
Trio Manufacturing Co.	876	639A-640A
Triplett Electrical Inst. Co.	314	
Tru-Ohm Products Div.	115	
Tung-Sol Electric Inc.	104	
The Turner Co.	218	
Ungar Electric Tools, Inc.	406	
United Audio Products		628
United Catalog Publishers	687	656A
United Transformer Corp.	302	
University Loudspeakers, Inc.	871	545-546
Utah Radio Products Corp.	320	
Utica Drop Forge & Tool	8	
Vaco Products Co.	317	655A
Vidaire Electronics Mfg.	114	
V-M Corp.	220	
Vokar Corp.	888	
Waldom Electronics Inc.		602A
P. Wall Manufacturing Co.	211	
Walsco Electronics Corp.	586	
Ward Leonard Electric Co.	304	
Ward Products Corp.		509A
Webcor, Inc.	582	637
Webster Electric Company	683	
Welco Manufacturing Co.	26	661A
Wellcor, Incorporated		617
Weller Electric Corp.	571	
Wendell Plastic Fabrics Corp.	125	629A
Wen Products, Inc.	107	
Westinghouse Electric Corp.	201	630A-631A
Weston Electrical Instrument Corp.	573	
Wilcox-Gay Corporation	678	
Winegard Company	128	659A
Winston Electronics Inc.		623A-624A
Workman TV Inc.	129	
Worner Electronic Devices	882	
Xcelite Incorporated	592	

Convergence Techniques

In the "Advanced Static and Dynamic Convergence," article which appeared in the April 1957 issue, the colors indicated in Fig. 6 on page 53 should be disregarded. Magenta, not cyan, is the result of a mixture of the red and blue beam. However, if the red beam only were displaced, the area marked blue would be cyan, the product of green and blue; the area marked cyan would be white, and red would be red.

Right Or Wrong In Labor Relations

A roundup of day-to-day employee problems and how they were handled. Each incident is taken from a true-life grievance which went to arbitration. Names of some principals involved have been changed. Readers who want the source of any of these case histories may write to Electronic Technician.

If Two Employes Engage in Horseplay, Should They Both Be Disciplined?

What Happened:

Roy Olson was a "card." He liked to fool around and tease people. His specialty was teasing the female employees. His supervisor talked to him a few times but never took any action. One day Olson picked up an empty wire spool and "playfully" tossed it at Mary Wellus. It hit her in the thigh. She wheeled around, grabbed the spool up off the floor, wound up like a pitcher and heaved it back at Olson. The toss narrowly missed the head of another worker. The boss felt he'd had enough of this sort of nonsense, and fired both employees.

Olson took what was coming to him without complaint, but Mary filed a grievance. She argued:

1. I didn't start the horseplay, so I shouldn't get the same penalty as Olson.
2. I got no warning. The boss knew that horseplay was going on and never did anything about it.

The company maintained:

1. Mary's action almost injured another worker.
2. She should not have reacted in kind but should have told her supervisor about Olson's childish behavior.
3. She knew that horseplay is a serious offense.

Was Mary: RIGHT ☐ WRONG ☐

What Arbitrator Harold C. Havighurst, Chairman Arbitration Board Ruled: "Roy Olson, from the time he came to Warwick, had engaged in a vicious form of teasing directed toward all female employes who worked in his vicinity; he had subjected Mrs. Wellus to repeated annoyances; supervisory employes had known of this situation at least to some extent, and they had done nothing about it. These facts place a measure of responsibility upon the

(*Continued on page 77*)

Servicing Air Conditioners

Trouble Shooting, Repair and Preventative Maintenance of Electrical, Mechanical and Refrigerant Systems.

JOSEPH DERMAN

• The last few years have seen an increase in the number of air-conditioners in use in homes, stores and factories. All indications are that this growing trend will continue. Many radio and TV shops have been installing and maintaining these units and have been responsible, in a large measure, for the successful merchandising and customer satisfaction. Air conditioners are no different from any other machine in the sense that a certain amount of normal depreciation and loss of efficiency increases with age. Here too preventive maintenance can check the aging process and prolong the life of the equipment. Some maintenance techniques such as clean, check and oil are obvious. Some manufacturers may have specific instructions. A knowledge of the different types of troubles and how to correct them will suggest additional check points when performing a routine maintenance assignment. When troubleshooting, most of the difficulties can be isolated to the electrical or refrigerating system. A third grouping of troubles may be classified as mechanical. These would include mounts, vibration and noise.

The present air conditioning units have a number of movable parts, most of which are capable of developing objectionable noises. (The swirling or swishing sound of air thru the blower wheel is something we must live with). The differences in noise level of different units are due to inherent design characteristics.

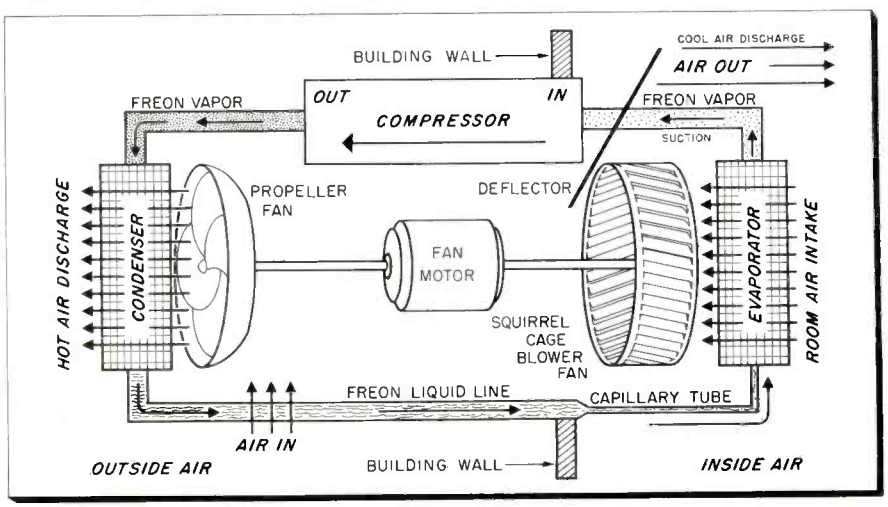
Noisy Unit

To check a noisy fan blade, disconnect the power cord, rotate the fan by hand and see if the blades are loose, or too close and touching some other portion of the unit. The fan may require changing or, more likely, just in need of tightening and repositioning on the motor shaft. The fan motor should also be checked for lack of lubrication, excessive end play, defective or worn out bearings and for loose mounting brackets or supports.

While in transit, the compressor is kept in place by means of hold-down bolts. To permit the shock mounts to perform properly, these bolts must be loosened prior to operation. Where compressor noises are severe and are caused by defective internal elements, such as broken inner springs, no field repairs can be made.

Occasionally, a unit that has been idle for a long time, will be noisy when first started. This is a temporary condition caused by con-

Fig. 1—Simplified version of a refrigerant circulation system showing high and low-pressure areas and relative position of the system's components. Unrestricted airflow is essential.



siderable portions of the freon being absorbed by the lubricating oil and upsetting the pressure distribution in the system. This condition will disappear as soon as the normal internal operating conditions establish themselves. Other sources of noise may be loose damper doors, housing, covers, etc. They can be located by observation and carefully touching or holding the suspected part. A peculiar noise may, infrequently, be developed in the copper tubing by the rhythmic action of the refrigerant. The area of disturbance can be located by grasping the tubing at various places and feeling for the vibration. This condition can be minimized by tying or supporting the vibrating length of tubing.

Water Leaks

In addition to temperature reduction, the air conditioner also removes a great amount of moisture from the atmosphere. The water accumulates in a drain pan under the evaporator. It is then fed to a slinger ring. Leakage can be caused by any of the following conditions: clogged or disconnected hose, a broken or leaky drain pan, unit not level or pitched with the outside slightly lower than the inside of the unit and entry of rain.

Frozen Evaporator

The evaporator of the air conditioner may freeze thus preventing circulation of room air and effectively stopping all cooling action. It is important to correctly determine the cause of this condition because an incorrect diagnosis may result in unnecessary pulling of the unit. Freeze up may be caused by improper freon circulation or obstructed air flow.

The modern mechanical refrigeration system is based on the fact that heat is absorbed by a liquid when it evaporates and becomes a gas. This action takes place in the evaporator. The compressor serves the purpose of removing the freon gas from the evaporator at a suitable rate. This is the low pressure side of the freon cycle. The compressor also compresses the gas and pumps it into the condenser. There the high temperature of the gas is released to the outside air. The reduction in heat and increased pressure liquifies the freon gas. The capillary tube is the gate or metering device separating the high and low pressure areas.

With this picture in mind we can see what happens when the amount of freon in the system is decreased as a result of a gas leak. Since the compressor will tend to remove the normal amount of freon gas from the evaporator, the pressure in the evaporator will become lower than normal, evaporation and consequently cooling becomes excessive and the evaporator freezes. If there is a restriction in the system, usually in the strainer, too little freon may get to the evaporator and cause the same type of difficulty.

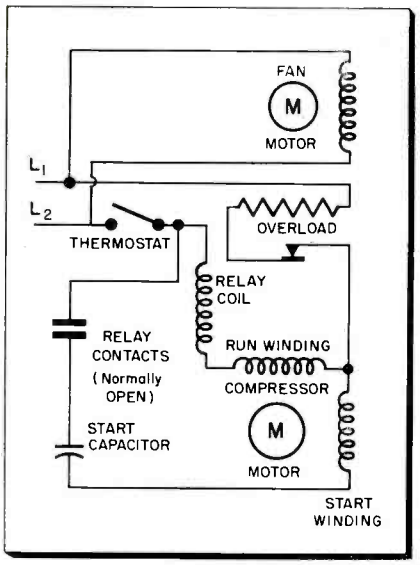


Fig. 2—Initial surge current through the relay coil momentarily closes the normally open contacts and activates the start circuit.

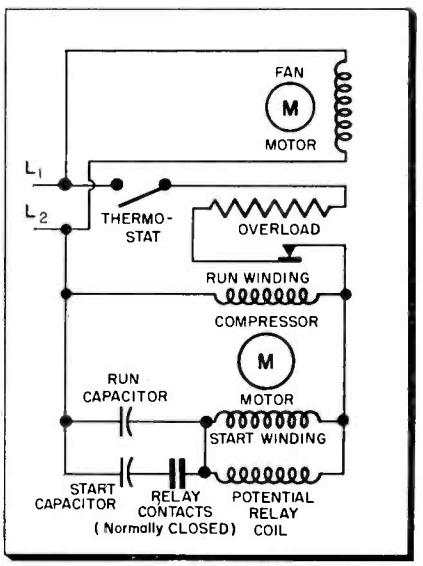


Fig. 3—The potential relay coil becomes energized and opens the relay contacts after compressor motor reaches 80% of its full speed.

If the air passage to the condenser is obstructed, the effectiveness of the condenser action is reduced, not enough freon is liquified and the proportion of liquid returning to the capillary tube is decreased. Freeze up occurs. A dirty condenser or a slow slinger-ring fan will have the same effect. The same thing will happen if the air to the evaporator is obstructed. It is thus seen that a dirty filter, a freon leak or a restriction may cause freeze up. The importance of an unobstructed air-flow system cannot be overemphasized. Remove the filter if it is dirty and examine the air system carefully. In case of a leak, most service organizations before pulling the unit are room placed in the shop. Other considerations before pulling the unit are room and outside temperatures. Most units are designed to produce a maximum of 10° to 20° differential in temperature, so inside air temperature will depend to a large measure on how hot it is outside.

If an air conditioner has been idle for many months, the freon may be entirely absorbed in the lubricating oil in the compressor. Since there is no available freon to evaporate there can be no cooling. It may require several hours of operation to liberate sufficient freon to enable normal cooling.

Another cause of inadequate cooling is an inefficient compressor. This condition can be checked by noting whether the wattage readings taken are below that given in the manufacturers table for the operating temperatures.

Failure to start and blown fuses are the most common difficulties in the electrical system. The basic electrical circuits of the room air conditioners are all pretty much the same. The major differences may be found in the starting relays and current overload devices.

A high lag or thermal delay type of fuse should be used. Do not over fuse. This type of fuse permits an initial momentary surge of current, which is needed to start the motor and still afford protection against a sustained short. Other loads on the same branch circuit may contribute to a condition of current overload, particularly at the time of starting.

It is also important to note that low or high line voltage may also cause blown fuses. Line voltage at the unit should be within 10% of rated voltage, under load conditions.

When the unit fails to start, switches, plug, wire and outlet can be quickly checked out. A satisfied thermostat will keep the compressor from operating. Switches and other contactors can be momentarily bridged. A check to see whether the motor will start is to short the contacts for a brief instant. Once started the compressor will continue to operate. (Prolonged operation of the start circuit may ruin the start capacitor). An ohmmeter may be used to check the continuity of motor windings and

(*Continued on page 73*)

Channel Switch Knob Repairs

Quick Salvage Job Restores These Hard-to-Replace Items

By M. G. Goldberg

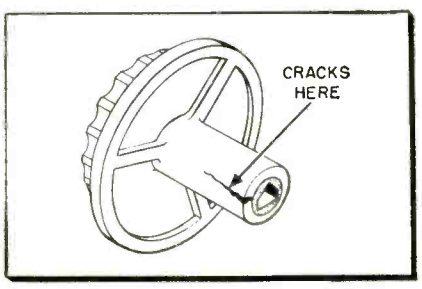
• As many technicians know, many of the channel selector knobs used on TV receivers, however high they may rate as appearance items, leave much to be desired from the standpoint of construction. They are especially subject to breakdown when they are subjected to continual beatings, like those they receive at the hands of children and other chronic "channel switchers."

Especially in the case of such units as the turret-type tuners, these knobs have much heavier weight to turn and force to overcome than any of the other front-panel controls, which may be made of the same plastic. Of course, the existence of many separated channels in a single reception area doesn't help matters. The knob does quite a bit of work when the tuner is turned from, say, Channel 4 to Channel 11.

Pressure on the knob and on its collar often becomes sufficient to split the collar, and even to crack this collar away from its metal insert. The insert contains the spring metal flat that grips against the tuner shaft. When the plastic collar no longer grips this insert or bushing, the latter remains stationary on the shaft when the knob is manipulated. Some customers then resort to the use of a pair of pliers to turn the shaft if a new matching knob is not immediately obtainable.

In one such case, the writer made a "temporary" repair on the broken knob to accommodate the customer during the period that a new knob was on order. This turned out to be so permanent that the customer never called back to pick up the knob. Since then, many another knob has been restored in the same manner. Not a single one has ever bounced back. When made in the manner described here, the repair appears to make the unit stronger than a new one.

Fig. 1—Location of crack on overworked knob.



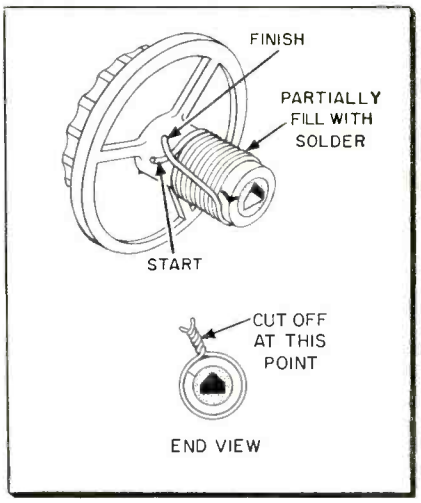


Fig. 2—Wire is wound, twisted around collar.

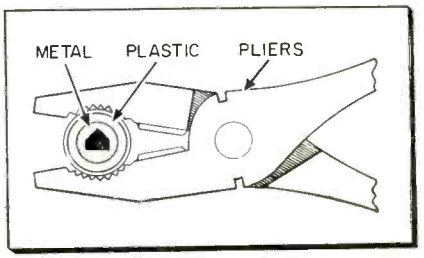


Fig. 3—Pliers shapes collar during cooling.

Wire Wrap Repair

Fig. 1 shows a rear view of a typical channel selector knob, with location of the split that often results from constant use. To repair a knob cracked in this manner, proceed as follows: First secure a piece of no. 22 or no. 24 copper wire. One strand of 7/22 or 7/24 antenna wire will do. Use a length that will be adequate enough to go around the collar eight to ten times, allowing a small amount extra for twisting purposes. Generally, this will mean about 20 in. of wire.

Holding one end tightly with either the fingers or the long-nose pliers, and starting at the innermost end of the collar (see Fig. 2), wind the wire around the collar for two thirds of its length. When this is done, bring the loose end back across the turns and twist the two ends together with the long-nose pliers. Be careful not to twist so tightly as to break the wire.

Now take a hot soldering iron and run some soft solder around the twist. Also run some solder around the turns, thus making a sort of tinned copper tube around the collar. Do not apply heat too long, as the plastic may soften so much that it will distort. However, a certain amount of softening is desirable, since the turns of wire will then be able to imbed themselves in the material to hold the collar solidly together as one piece.

Just before the unit begins to cool down, use a pair of regular gas pliers, as shown in Fig. 3, to re-form the collar to proper shape. Do not apply too much pressure, but apply it evenly, rotating the knob in the pliers during this procedure.

After a little practice on the first job or two, this procedure can be performed in only 5 or 6 minutes. This is quite a bit less time than would be spent awaiting the delivery of individualized, hard-to-procure replacement knobs. •

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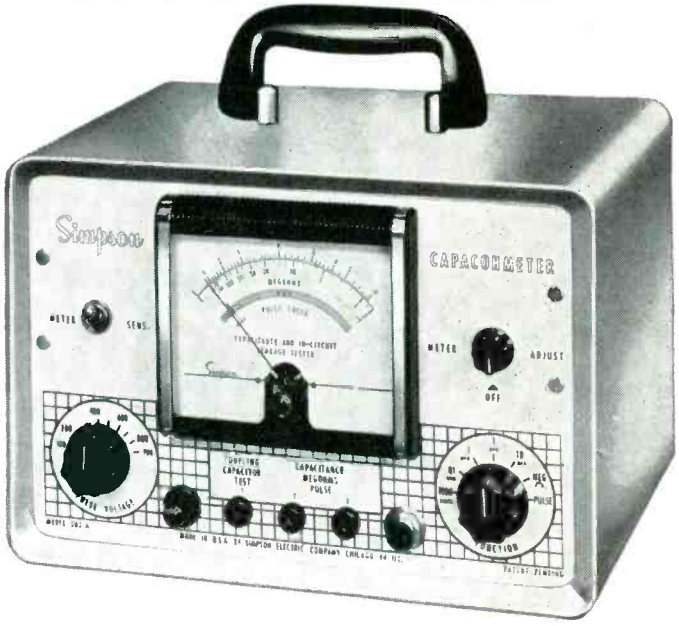

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Troubleshooting Microphonics

What It Is. What Caused It. How To Find It. How To Fix It.

A. R. Clawson

• Undesirable conversion of mechanical motion into electrical currents results in a class of symptoms commonly referred to as microphonics. Basically two conditions must exist; one is the part that acts like a microphone or transducer and the other is the noise source. Eliminating either one of both will do away with the microphonics complaint.

One type of noise source often encountered has a decaying characteristic and sets up a wave form as shown in Fig. 1. This may be either an occasional burst occurring at random periods or continually repeated at regular intervals. Other undesirable forms of noise may consist of a symetrical pattern such as that obtained from transformer vibration and asymetrical shapes derived from unwanted speaker feedback. In the speaker and transformer electrical energy is converted into mechanical energy and in turn excites another tube or component in the set in such a way as to revert back to electrical energy.

According to our definition the transformer, the speaker and the undesirable sound by itself is not the microphonic component. Both units may act as a noise source stimulating other electrical changes. On the other hand the speaker may be just an innocent witness testifying to activities occurring elsewhere in the circuit. The transformer and speaker becomes a factor when vibrations from these units cause other electrical disturbances.

If the motion changes the frequency or gain, FM or AM modulation occurs respectively. Both AM and FM may take place at the same time. In an audio system, a howl often sounding like ordinary feedback may be heard. In other circuits an oscilloscope can readily detect this condition. A TV picture may display a series of bars that keep in step with the noise source. The picture may show variations due to changes in tuning caused by a loose slug and other vibrating components. Pulling may occur on loud-sound passages due to amplitude modulation of the afc tube and in some extreme cases complete loss of horizontal sync may be experienced.

Two Ways To Cure

Unlike most other servicing procedures, microphonics may be cured without finding the actual microphonic component. Either the exciting noise source may be quieted or the component acting as a microphone can be stabilized, repaired or replaced. Sometimes the procedure for tracking down the trouble may be simplified by trying to determine the type of changes taking place. Troubles in and around oscillator circuits have a tendency to shift the frequency. Amplitude variations are more likely to shift the point on the E_gI_p curve and cause distortion, limiters not to limit, clipping, etc. Fortunately it isn't necessary to identify the AM or FM action or both. It could be difficult and time consuming. It is best to go after the cause of the trouble immediately.

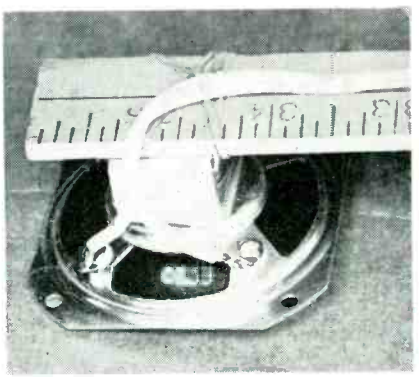


Fig. 3—Speaker probe aids trouble shooting

Endeavor to leave things as they are, i.e., do not pull the chassis unless absolutely necessary. Any change in the mechanical nature of the apparatus may temporarily remove the trouble. In most cases the culprit can be tracked down by tapping or holding. If a part has a tendency to cause trouble, but is behaving itself at the moment it can be caused to act up by vibrating it. On the other hand if the microphonic condition is in full bloom, restraining the defective component will cause a change if not a complete stop to the undesirable activities. If pushing, pulling, probing, tapping and holding doesn't indicate the troublesome part and if everything seems to be sensitive, a procedure for localizing the trouble to a particular stage should be followed.

First efforts should be directed to stages that operate at low level. Similar mechanical vibration in the 1st i-f stage of a TV will produce more havoc than the 2nd i-f. The oscillator-mixer will kick up even more. The preamplifier, 1st audio, driver and audio-output stages are sensitive in that order in P-A systems and tape recorders. The afc tube is more sensitive than the horizontal oscillator which in turn is more critical than the horizontal output stage. Some success in localizing trouble can be achieved by using a capacitor to bypass the signal to ground at grid and plate of successive stages. If the trouble is removed when the signal is shorted to ground, then it

(*Continued on page* 78)

Fig. 1—Noise with decaying characteristic

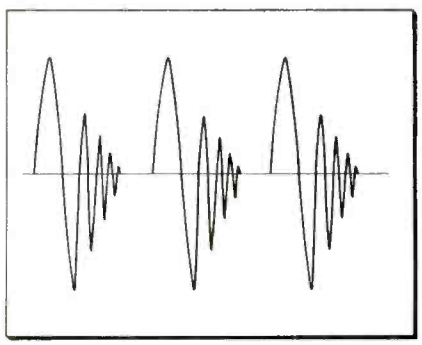
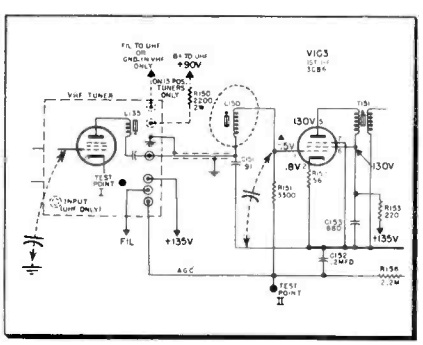


Fig. 2—Signal-shorting method finds defect



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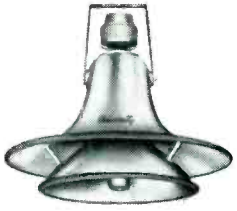

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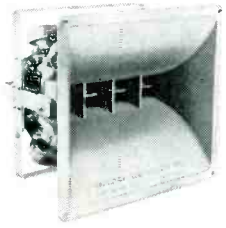

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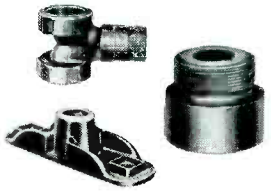

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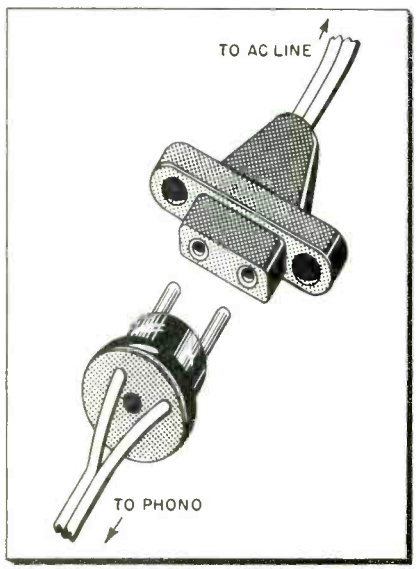
SHOP HINTS

Tips for Home and Bench Service by Readers

Cheater-Cord Extension

In many cases it is virtually impossible to remove the record player from its cabinet and still have the line cord and phono input cord attached to the amplifier. When servicing the record player, power may be obtained by using a TV cheater cord which makes a safe and handy extension line cord. Where there



Cheater cord helps phono-motor servicing.

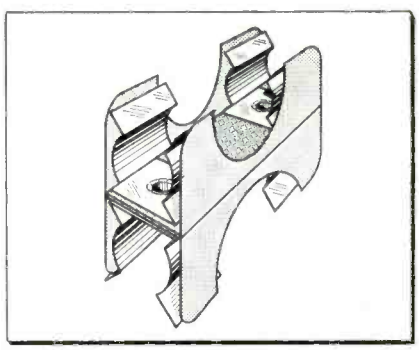
are more than two terminals, a careful check should be made to select the correct pair leading to the phono motor. Otherwise the fuses will pop. The cheater cord will accommodate the majority of record players. Some machines lend themselves quite readily to the use of regular electric-iron and the smaller waffle-iron type of plugs.—*Bill Ivan, Rahway, N. J.*

Tube Kink

A defective 6J5 vertical-output tube located in a 630 chassis, which was in a home about 15 miles from my shop, gave me a hard time because I did not have a replacement or even a poor substitute with me. What to do? I modified a 6K6 by snipping off part of pin 4 and soldering a jumper from pin 3 to pin 4. This tied the plate and screen together. Pin 4 was cut just in case the socket connection was used as a tie point. It worked very well. It saved me a long trip and the customer was happy. I replaced the contraption with a new 6J5 on my next visit to that area.—*Roy Hale, Middlesboro, Ky.*

Intermittent Fuse Clips

This could happen on any TV set equipped with a pigtail fuse which has been jumped by a fuse clip. This fuse is usually located in the horizontal damper stage. I have serviced many sets with intermittent rasters. On quite a number of them I have found one or both of the rivets in the fuse clip to be either loose or corroded; causing intermittent operation. How many hours of work or



Loose connections caused loss of raster.

waiting I could have saved if an article like this were written previously? The majority of the complaints were that the raster would operate at highly irregular periods of time, cutting in and out; thus making TV viewing a thing of chance rather than a certainty. Many times when the raster went out, it could be brought in again by flipping the on-off switch several times. The surge would cause the defective connections to arc together, momentarily effecting a cure. There are two things to watch for when the set is being serviced, assuming the tubes and fuses are all right. If the raster does not come in when the set is turned on, short out the original blown pigtail fuse using a jumper wire. If the clip is at fault the raster will come in. If the raster does come in when the set is turned on, grasp the insulated portion of the clip in your fingers and twist it. If the clip is at fault, the raster will go out with little effort. Soldering the fuse clip connections would eliminate this source of trouble. One hand on the cheater cord may save a flyback when jumping the fuse.—*John L. Mancini, Winthrop, Mass.*

Transformer First Aid

Here is an idea I have used several times to repair TV sets with open 5U4—filament windings in the power transformer. I replace the 5U4 with a 6AX6 heater-cathode type rectifier tube. I have tried several other tubes of this type but find that the 6AX6 gives the best service. The change is as follows: Remove all leads to the 5U4 socket; connect the plate leads of the power transformer to pins 3 and 5; tie the cathodes, pins 4 and 8 together and connect the B+ lead to pin 4 or 8; connect the heater pins 2 and 7 to the existing 6.3-volt winding on the power transformer and tape the old 5U4 filament leads. The 6AX6 requires 2.5 amperes for heater current; be sure the transformer can handle the extra load.—*Bill Gant, Nashville, Tenn.*

• *So as not to compromise the built-in margin of safety, another alternative to replacing the costly power transformer, in the above situation, is to install a separate filament transformer capable of delivering 6.3-volts at 2.5-amperes. If a separate transformer were not used and if a cathode-to-heater short developed, B+ would leak into the 6.3-volt filament string and cause much damage. If a separate transformer is used, then the technician may as well get a 5-volt job and continue using the 5U4 tube type.—Ed.*

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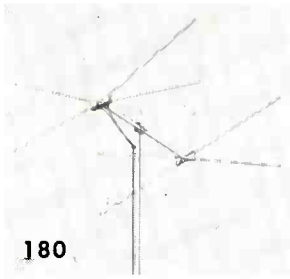

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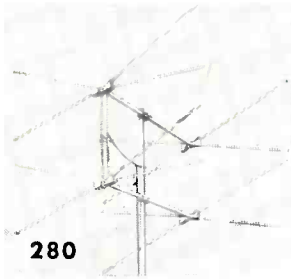

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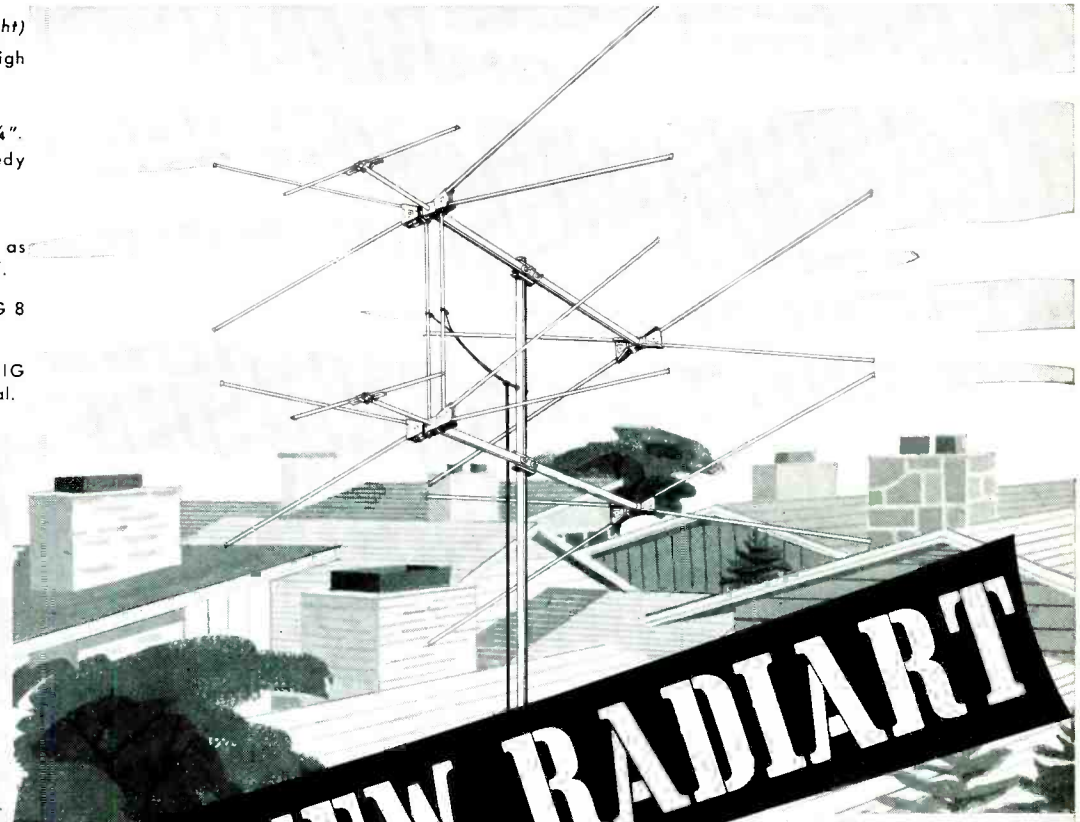
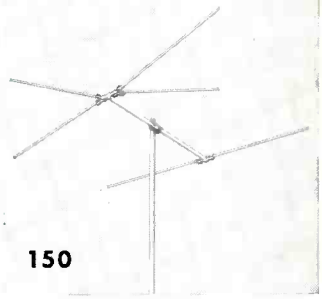


12 NEW RADIART TV ANTENNAS



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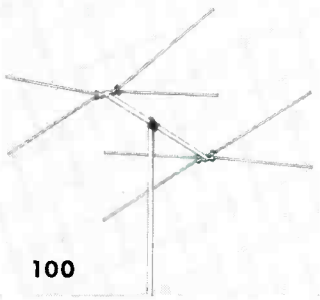

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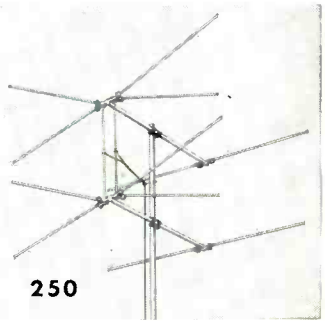

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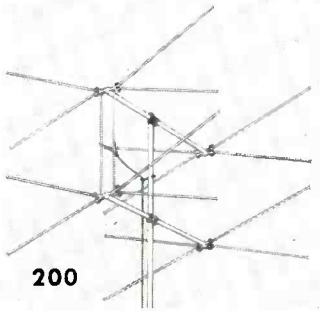

200

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LZX 100 single array

LZX 101 single array, unassembled

LZX 200 8 element conical completely assembled, stacked array

LZX 201 8 element conical unassembled, stacked array

LZX 150 single array

LZX 151 single array, unassembled

LZX 250 6 element conical assembled, stacked array

LZX 251 6 element conical unassembled, stacked array

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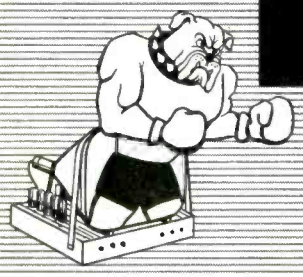
THE RADIART CORPORATION / CLEVELAND 13, OHIO



"Tough Dog" Corner

Difficult Service Jobs Described by Readers

Squeals, Birdies and Whistles

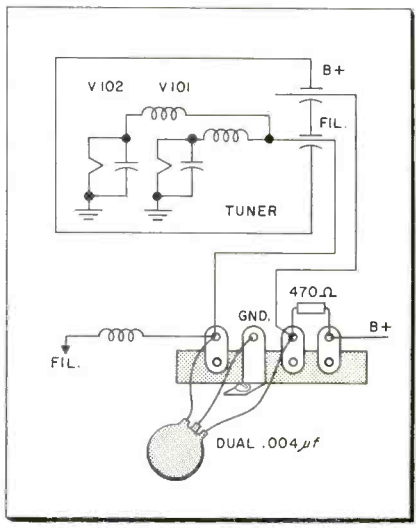
This Motorola, all transistor radio Model 56T1, came into the shop just after its warranty period. The complaint was birdies. The i-f stages were oscillating. It could be stopped by touching the i-f collector or base electrodes of either the 1st or 2nd stages. Detuning the i-f transformers furnished further proof of the nature of the trouble, but they could not be left that way. The selectivity and sensitivity were adversely affected. A larger capacitor was shunted across C-13. This helped but the oscillation persisted. Removal of this bypass capacitor and substitution of a 15 μf, 15-volt electrolytic (subminiature type) eliminated most of the birdies.

Complete cure was accomplished by an additional 0.01 μf ceramic capacitor from the emitter of the 1st i-f stage to ground, which provided added r-f bypass the decoupling.—*James A. McRoberts, Brooklyn, N. Y.*

• *It may be of interest to see how the manufacturer has attempted to solve this exact same problem. If a set being serviced is found to be unstable in operation (squeals or whistles), a gain adjusting resistor R-19 may have to be added to help eliminate this condition. The value of the resistor that should be used to attain maximum gain without unstable operation is determined by trial. Select several resistors of the 10%, ½-w type, ranging from 68K to 120K. As the resistor lowers the gain, the trial should start with the 120K resistor jumped across the primary of the 1st i-f transformer, then check results. If the 120K resistor did not eliminate the instability, try the next lower value and if necessary keep decreasing the value until the unstable condition is eliminated. Other production changes for this model are: electrolytic capacitor C-15 has been changed to 50 μfd to increase output power; capacitor C-18 (.0035 μf) has been added to the power output stage (it is wired from collector to base) to reduce off-station noise and sideband squeal.—Ed.*

60-Cycle Hum

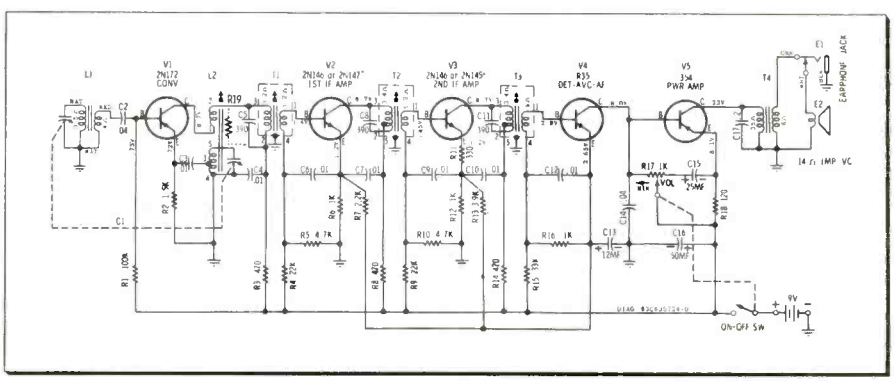
This Admiral chassis model 21F1, had a narrow and snowy picture. Replacing the horizontal-output and the r-f amplifier tubes eliminated these ailments, but the picture still had a distinct hum bar with accompanying garbled sound and erratic sync. The hum had been there all along but because of the new r-f amplifier it was now more noticeable. It was quite apparent that the hum was riding in on the signal, but a check of the local oscillator and the i-f tubes revealed nothing, so the set was taken to the shop.

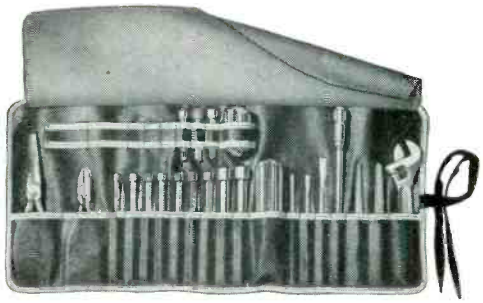


Leaky dual 0.004 μf capacitor caused hum.

Seeing the hum on the scope and tracing it down are two different things. Wave shapes in the whole i-f system showed the hum modulation. B+ had a slight 60-cycle ripple that could not be filtered out. At last it was noticed that the 470-ohm tuner B+ decoupling resistor was slightly overheated and suddenly the solution suggested itself. A dual 0.004 μf button type capacitor, one side is used in the B+ decoupling network and the other side is used as a filament bypass, developed a leak between sections and injected the hum into the tuner via the B+. An interesting afterthought is, how much damage would have been caused, if the capacitor had a dead short and placed B+ across the whole parallel filament string?—*Frank A. Salerno, Long Island City, N. Y.*

Insertion of proper R19 stabilizes the Motorola Model 56T1 all transistor portable radio.





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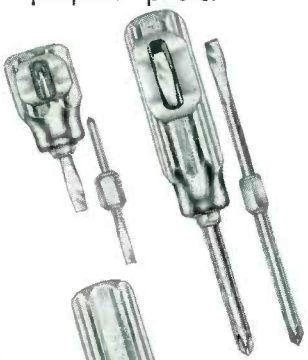
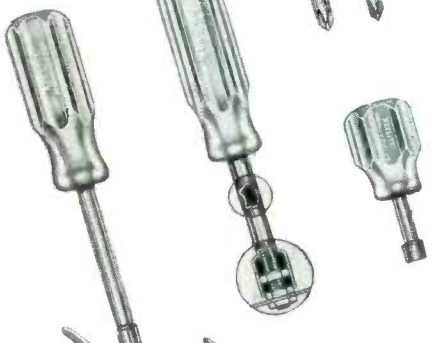
Besides its regular popular line, XCELITE brings you a continual supply of new and original tools — the new No. 99-X10 Snap-in Shaft Extension — reamers with the T-handle leverage feature — pocket clip nut drivers and screwdrivers — adjustable wrenches and "special-purpose" pliers.





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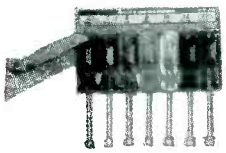

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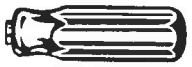
— 7 Color Coded
Nutdrivers

SERIES "99" TOOLS



No. 99-1 Handle (Regular)

No. 99-2 Handle (Junior)

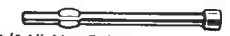
No. 99-3 Handle (Stubby)

No. 99-6 3/16" Nut Driver

No. 99-7 7/32" Nut Driver

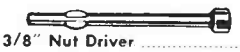
No. 99-8 1/4" Nut Driver

No. 99-9 9/32" Nut Driver



No. 99-10 5/16" Nut Driver

No. 99-11 11/32" Nut Driver



No. 99-12 3/8" Nut Driver

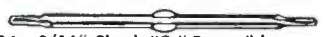
No. 99-14 7/16" Nut Driver

No. 99-16 1/2" Nut Driver

No. 99-81 3/16" & 9/32" Slotted, Reversible

No. 99-82 #1 & #2 Phillips, Reversible

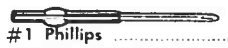
No. 99-83 3/16" & 9/32" Frearson, Reversible



No. 99-84 3/16" Clutch "G," Reversible

No. 99-811 3/16" Slotted

No. 99-812 9/32" Slotted



No. 99-821 #1 Phillips

No. 99-822 #2 Phillips

No. 99-38 Reamer (1/8"-3/8")

No. 99-39 Reamer (1/4"-1/2")

No. 99X10 Extension

Stubby Nut Drivers

No. 99-S8 No. 99-S10 No. 99-S12

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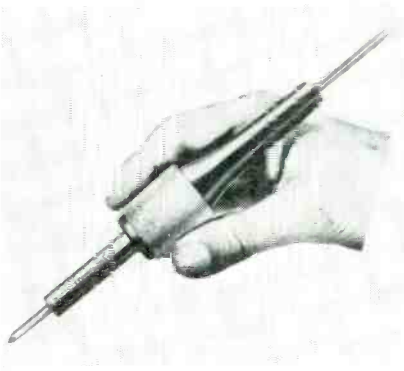
New Products for Technicians

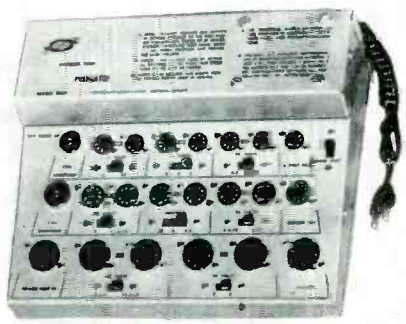
Hexacon SOLDERING PENCIL →

A new soldering pencil equipped with a long-life ¼" tip, rated at 50 watts, weighing only 2 oz. has been announced. A stainless steel alloy element housing plus a unique design in ventilation insures a cool, comfortable handle and maximum soldering efficiency; also has a high grade nickel-chromium and mica-wound element. Tip and element are separate parts and are replaceable independently. AC or DC, 110 or 120 volts. Hexacon Electric Co., 180 W. Clay Ave., Roselle Park, N.J. (ELECTRONIC TECHNICIAN 5-1)



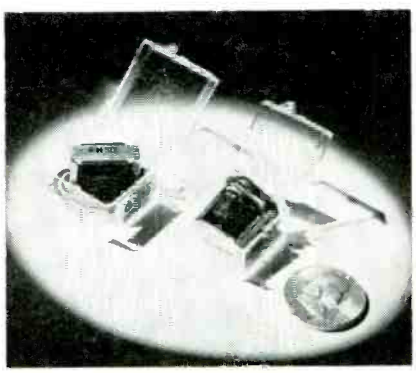
Sencore TUBE PREHEATER →

The Model FP22, vacuum tube preheater accommodates up to 20 tubes at a time, including the latest types of series-filament tubes. A quick-heat switch provides for increased filament voltages by 10%, thus accelerating the testing time for gassy and intermittent conditions. 7 and 9-pin miniature tube straighteners are also provided. A 10-ampere transformer enables the user to preheat the tubes for an indefinite period. Dealer net $18.95. Service Instruments Corp., 171 Official Road, Addison, Ill. (ELECTRONIC TECHNICIAN 5-2)



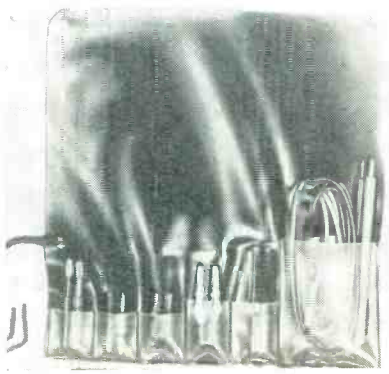
GH TRANSFORMERS →

Ready for shipment is a complete line of miniature audio transformers for transistorized circuit applications consisting of 32 items in two series, a 150-milliwatt series weighing 0.6 ounces and a 300-milliwatt series, weighing 1.1 ounces. The units come individually packaged in plastic containers complete with installation instructions. The insulation on the leads is a quickly removable sleeve which does not require time-consuming stripping. Gramer Halldorson Corp., 2734 N. Pulaski Rd., Chicago 39, Ill. (ELECTRONIC TECHNICIAN 5-3)



G-C TEST PROD KIT →

Developed to meet the need for a compact test outfit is the new Klipzon KK test prod and adapter kit complete with self-holding points. Besides the basic Klipzon test leads and prods the kit includes five pairs of adapters, banana plugs, alligator clips, etc., for maximum versatility in all situations. The durable fitted case is designed for hanging on the wall or it may be rolled up. Catalog No. 6037, list price is $9.95. General Cement Mfg. Co., 400 South Wyman St., Rockford, Ill. (ELECTRONIC TECHNICIAN 5-4)



Welco ANTENNA

The new Model Z-100 all-channel VHF antenna has been designed with particular emphasis on extra power for channels 7 to 13. It is also designed to meet the most stringent requirements for color and b&w reception on all VHF channels. Completely factory preassembled. Welco Mfg. Co., Burlington, Iowa. (ELECTRONIC TECHNICIAN 5-7)

Hunter SCREWDRIVER

An all new screw-holding screwdriver makes a snap of cartridge and needle changing. The E3's overall length is 2⅞" when cocked. This enables it to work even on arms that allow the serviceman only 3" clearance. The bit is ground down to 0.017 of an inch. The tool works on practically all phonographs. Hunter Tool Co., P.O. Box 564, Whittier, Calif. (ELECTRONIC TECHNICIAN 5-6)

Workman RESISTORS

Miniature Globar Resistors, ¼" long by 1/16" diameter are specially designed for modern circuitry where severe space limitations demand the tiniest of components. Capable of dissipating ⅛-watt of power continuously, these resistors are very stable in value even at temperatures as high as 125°C and have negligible reactance components. Each resistor is RETMA color-coded for easy identification. Workman TV Inc., 309 Queen Anne Road, Teaneck, N.J. (ELECTRONIC TECHNICIAN 5-5)

Snyder TV CART

The new TV cart with utility shelf, Model TT-9, allows the use of the pressed-steel top shelf for a TV set and the bottom shelf for magazines or refreshments. The cart can also be used as a movable cocktail bar or snack server. It comes fully assembled with ¾" steel tubing and six-inch rubber tire wheels. The top shelf is 26 inches above the floor level and the entire TV cart is 31½" high to avoid stooping or bending. Suggested retail price is $19.95. Models TT-12 and TT-13 is a tilt-top table on wheels, packaged folded and retails for $9.95. Snyder Mfg. Co., 22nd & Ontario Sts. Philadelphia, Pa. (ELECTRONIC TECHNICIAN 5-8)

OVER 53,000 PROFESSIONAL PAID SUBSCRIBERS ARE READING THIS ISSUE OF *ELECTRONIC TECHNICIAN* . . . INCLUDING 16,000 MORE SERVICEMEN THAN THE SECOND LARGEST TV-ELECTRONIC-AUDIO TRADE PUBLICATION IN THE FIELD.

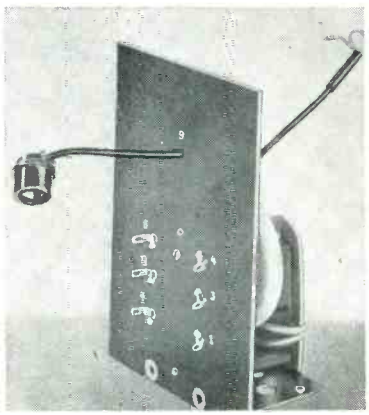
New Audio Electronic Products

Quam HUMI-GARD CONE →

The new outdoor theatre speaker has a Humi-Gard cone which is highly resistant to moisture and abrasion and has response characteristics that are almost exactly the same as those of an untreated paper cone. Made of a plastic-impregnated synthetic fabric, it is now standard on all outdoor speakers. It can also be supplied on any speaker at regular prices and offers 3 times the life of conventional moisture-proofed paper-cone speakers. Quam-Nichols Co., 236 Marquette Rd., Chicago 37, Ill. (ELECTRONIC TECHNICIAN 5-9)

Ram FLYBACKS →

The X140 is an exact replacement for the Stromberg Carlson 161048 flyback; for 70°-deflection-angle systems and anode voltages up to 16 kv. This is an unusual transformer in that the large heavy type phenolic terminal board serves as part of the cage. It is an autotransformer supplying a pulse for keyed AGC. The X141 is an exact replacement for Stromberg Carlson 161282; 70°-deflection-angle systems and anode voltages up to 16 kv. It is an autotransformer having only 3 taps. Ram Electronics, Irvington-on-Hudson, N.Y. (ELECTRONIC TECHNICIAN 5-11)



Sonotone AMPLIFIER →

The HFA-50 is a smartly styled, newly engineered high-fidelity amplifier that incorporates many features. Among these are: DC on all voltage-amplifier filaments; individual pre-set level controls; six inputs, provide connections for phono, tape recorder, tuner, TV sound, etc; a separate continuous-contour-control infinitely variable from flat to 26 db of contour compensation; and push-pull controls which switch in rumble and noise filters independently. Standard net price: $79.50. Optional cover: $3.50. Sonotone Corp., Elmsford, N.Y. (ELECTRONIC TECHNICIAN 5-10)

Comet CRT BRITENER

The SP43 is a well constructed heavy duty, 6-wire, multi-purpose tube britener for use in bringing back normal contrast and restoring brightness to dim CRT's. It can be used with either series or parallel-wired filament circuits and for tubes requiring either electromagnetic or electrostatic focusing. It is quickly installed and fits all makes of TV sets. Anchor Products Co., 2712 W. Montrose Ave., Chicago 18, Ill. (ELECTRONIC TECHNICIAN 5-15)

Wuerth SURGISTOR

The Surgistor offers a unique means of tube protection to eliminate destructive in-rush currents in all electronic devices, including TV, radio and Hi-Fi sets. It combines the functions of a resistor and a relay. It limits the in-rush current until the tube heaters are warmed sufficiently to accept the full voltage without damage. In addition, B+ voltages are temporarily held down to prevent cathode stripping. Wuerth Tube Saver Corp., Detroit, Mich. (ELECTRONIC TECHNICIAN 5-14)

Recoton CARTRIDGE

The new Goldring Model 555 SDM magnetic turnover cartridge is complete with sapphire stylus for 78 rpm and diamond stylus for 33⅓ and 45 rpm. Its cantilever-stylus-armature construction is capable of rougher treatment than most moving-coil mechanisms. It will fit just about any American made arm and is smooth and free of strain even on heavily recorded passages. Recoton Corp., 52-35 Barnett Ave., Long Island City 4, N.Y. (ELECTRONIC TECHNICIAN 5-13)

Bogen STEREOPHONIC AMPLIFIER

The ST-10 incorporates dual preamplifiers and a 10-watt amplifier in a single compact unit, plus volume control and tone control. This makes possible conversion to stereophonic reproduction utilizing inexpensive tape decks without preamplifiers. When used with a tape playback deck, the outputs of a stereophonic tape head are fed into both preamplifiers. One of these drives the built-in amplifier, the other drives an external amplifier from a cathode follower. Audiophile net, $52.50 in chassis form; $59.50 with cage and legs. David Bogen Co., Inc., Paramus, N.J. (ELECTRONIC TECHNICIAN 5-12)

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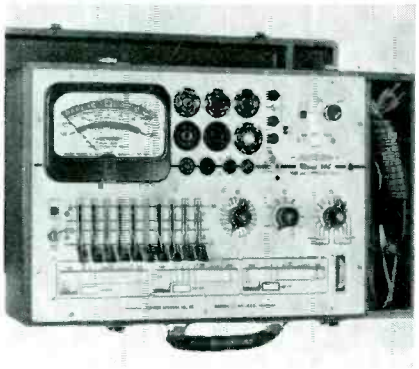
Latest Test Instruments

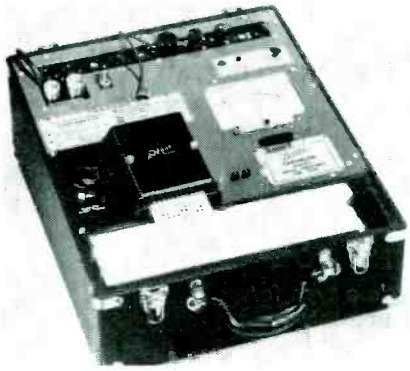
Precision TUBE TESTER →

The Model 660, tests all modern TV and radio tubes and provides, in addition, comprehensive tests on all RF, AF, power and tetrode transistors for I_{CBO}, gain, leakage and other important performance characteristics. It also tests crystal diodes for both forward and reverse current and has special circutry for beam-current testing all popular TV picture tubes. It has a free-point 10-lever element selector system. This instrument is in the medium-price category. Precision Apparatus Co., 70-31 84th St., Glendale 27, New York. (ELECTRONIC TECHNICIAN 5-16)



Hickok TUBE CHECKER →

A new concept of automatic, high-speed tube testing has been produced in the Model 123. It utilizes a punched card system to automatically set and test to a user's specific circuit requirements. Pre-selected voltages on screen, plate, grid or filament are tabulated on vinyl type cards. An infinitely large number of exactly controlled voltages are furnished. Tests for shorts, leakage, gas and Gm. It also has a "knee test." The Hickok Electrical Instrument Co., 10523 Dupont Ave., Cleveland 8, Ohio. (ELECTRONIC TECHNICIAN 5-17)



Simpson LOW-OHM-METER →

The new ohmmeter features accurate measurements of low resistance values and utilizes low circuit currents. The Model 362, gives readings from 0.1 to 25 ohms, in two ranges, with an accuracy of 3% of the full scale value. Circuit current is only 5 ma maximum. It should find wide application in checking wiring connections, contacts, transformers and other low-resistance components as well as in servicing electric motors and generators. Simpson Electric Co., 5200 W. Kinzie St., Chicago 44, Ill. (ELECTRONIC TECHNICIAN 5-18)

Heathkit FILTER →

The Model BF-1 is an L-type filter circuit exactly the same as the one incorporated in the new Model BE-5 Battery Eliminator. It is designed primarily for use with the Model BE-4 Battery Eliminator or other comparable units. It adds extra filtering to the d-c output for powering transistors and "hybrid" automobile radios. Functions at 6 or 12 volts, at up to 5-amperes maximum current. A valuable accessory. $10.95. Heath Co., 305 Territorial Road, Benton Harbor, Mich. (ELECTRONIC TECHNICIAN 5-19)

EDL METER-GUARDS

An invisible slip-over meter cover, made of impact absorbing "Involex," is so strong it withstands hammer blows. It fits over Simpson 260, 303, 276 or 880 instruments. Unconditionally guaranteed and priced at $2.50. Electronic Development Laboratories, 71 Nassau St., New York 38, N.Y. (ELECTRONIC TECHNICIAN 5-22)

Seco NEW PANELS

GCT-5 owners can bring their testers up-to-date. Many new tubes appear on this panel. In addition a folder has a numerical tube listing many of those seldom used tube types that can also be checked in the Grid Circuit Tester, including a number of industrial types. The net dealer price is $1.00. Seco Mfg. Co., 5015 Penn South, Minneapolis 19, Minn. (ELECTRONIC TECHNICIAN 5-21)

Century CONDENSER TESTER

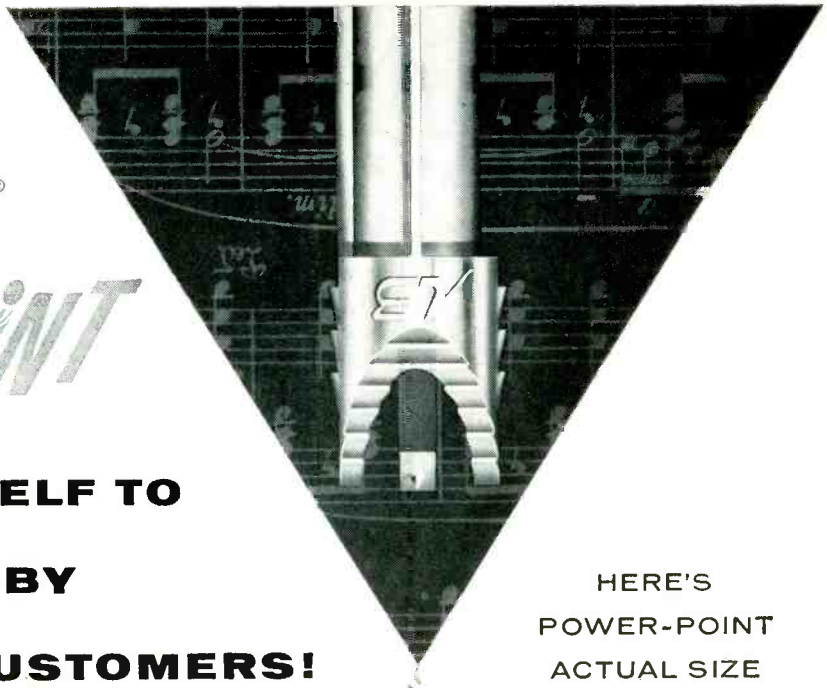
In-circuit and out-of-circuit tests can be made for quality of all size condensers including leakage, shorts, opens and intermittents; for values from 200μμf to 0.5μf; for electolytics ability to hold a charge; for transformer; socket and wiring capacity and for high resistance leakage up to 300 megohms. The CT-1 operates at low potentials and cannot damage circuit components under any circumstances. It is completely isolated from the power line and is shielded from stray pick-up. Priced at $34.95. Century Electronics Co. Inc., 111 Roosevelt Ave., Mineola, N.Y. (ELECTRONIC TECHNICIAN 5-20)

Du Mont OSCILLOSCOPE

A portable 3-inch oscilloscope, designed for field use or rack mounting, has a combination of features found only in high-precision laboratory instruments. The unit weighs 27 pounds and measures 5-inches high by 19-inches wide by 11⅛ inches deep. The 2.5 kilo-volt accelerating potential on the Type 3WP CRT permits a brighter trace. A beam gate circuit brightens the trace only on forward sweep and extinguishes it at all other times. Excellent stability is achieved by utilization of an internal self-regulating power transformer, regulated B+, and high-voltage power supply. Allen B. Du Mont Laboratories, Inc., 750 Bloomfield Ave., Clifton, N.J. (ELECTRONIC TECHNICIAN 5-23)

Electro-Voice®

POWER-POINT



HELP YOURSELF TO PROFITS BY HELPING YOUR CUSTOMERS!

HERE'S POWER-POINT ACTUAL SIZE

HERE'S YOUR PROFITABLE OPPORTUNITY

to do your customers—and yourself—a favor! Stock and sell E-V POWER-POINT, the unique phonograph cartridge-and-needle combination that ends service and inventory headaches, insures customer satisfaction, assures repeat business!

ONE SERVICE CALL DOES THE JOB!

You install the mount and cartridge—there's a type for almost any phonograph. From there on it's repeat, repeat business for you! Because . . . come replacement time, your customer slips out the old, returns it to you for replacement, slips in the new faster than you can read this sentence!

POWER-POINT

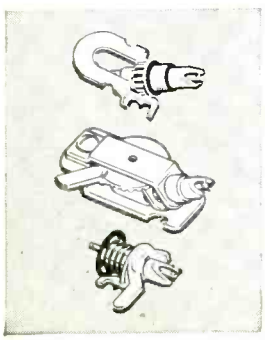
is a nylon-encased FRESH ceramic cartridge PLUS two Jeweled (Superior synthetic sapphire or natural diamond) playing tips—ALL IN A SINGLE UNIT! There's a POWER-POINT for every record speed. List prices, $3.95 (for two sapphire tips) to $21.50 (for two diamond tips).

Plenty of sales-stimulating merchandising aids are available, backed up by national ads. Millions of POWER-POINTS are in use as original equipment, guaranteeing volume replacement sales.

E-V POWER-POINTS

Model 51-1 (red) Two 1-mil sapphire tips . . . . . List	$ 3.95	Model 56DS (orange) One 1-mil diamond, one 3-mil sapphire tip . . . . . List	$21.50
Model 52-2 (green) Two 2-mil sapphire tips . . . . . List	3.95	Model 76S (white) One 1-mil, one 3-mil sapphire tip. . List	4.25
Model 53-3 (black) Two 3-mil sapphire tips . . . . . List	3.95	Model 76DS (pink) One 1-mil diamond, one 3-mil sapphire tip. . . . . List	21.50
Model 56 (blue) One 1-mil, one 3-mil sapphire tip. . List	3.95		

3 MOUNTING MECHANISMS



Model PFT-1, fixed mount, 50¢ List.

Model PT-1, turnover mount, $1 List.

Model PT-2, turnunder mount, $1 List.

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1957 ELECTRONIC TECHNICIAN BUYERS DIRECTORY

PRODUCT SECTIONS

50¢

ELECTRONIC TECHNICIAN, Inc.
480 Lexington Ave., New York 17, N.Y.

1957 ELECTRONIC TECHNICIAN BUYERS DIRECTORY

CLASSIFIED PRODUCTS LISTINGS, PAGE 61 **ALPHABETICAL LISTING OF MFRS., PAGE 66**

Product Finding Index

A fast reference guide that enables you to find the product you want in the *Product Directory*—quickly. Here's how to use the *Product Finding Index:* (1) Look for the product you want (under the name you ordinarily use to identify it). (2) Turn to the section number given in the *Product Finding Index*. (3) From the manufacturers listed in this section, select only those with the code numbers (listed in the *Product Finding Index*) after their names. These are the manufacturers of the products you want.

1957 ELECTRONIC TECHNICIAN BUYERS DIRECTORY

Product Listings

This is a complete listing of all service and replacement products, component parts, equipment, instruments, and materials in the radio-TV-electronic service industry—with the names of the companies that make them. Product categories are arranged according to major group headings. Manufacturers are listed alphabetically under these groups. Manufacturer address list starts on page 66.

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Coil Co of America-15-18
Coleman Cable & Wire-25
Colman Tool & Machine 6-9-14
Columbia Wire & Supply-5
Community Eng'g-19
Cons Wire & Assoc Cos-25
Cornell-Dubilier Electric Corp-16-24
Corning Glass Works-9-16
Cornish Wire Co-25
Cutler-Hammer Inc-18-21

Dage Electric Co-5
Daven Co-21
Daystrom Co-18
Delco Radio Div GMC-16-18-21
DeRo Electronics-3
D & M Products-5-7-8-21
Drake Mfg Co-11
DuMont Labs Inc Allen B (Clifton)-15
Dynamic Electronics NY 5

Eagle Electronics Corp-9-25
Eby Sales-1-7-12-16-18
Eicor Inc-15
Eitel McCullough-5-19
Elco Corp-5-16-19
Electralab Inc-16
Electronic Chemical-12
Electronic Designs-3
Electronic Measurements Corp-15
Electro Physics Co-17
Electro Prods Labs-15
Electro Sound Corp-15
Electro-Tech Equip Co-15-17-18-21
Elgin Electronic Corp-15
Elgin Nat'l Watch Co Electronics Div-18
Entron Inc-5-15
Erie Resistor Corp-16-19-21
Essex Wire Corp-18-25
E-Z Hook Test Products-1-5

Farnsworth Electronics Div IT&T-21
Fast Chemical Prods-12
Federal Anti-Capacity Switch Corp-21
Federal Electronic Sales 16
Federal Screw Products-9-23
Federal Telephone & Radio-8-15-16-17-25
Federated Metals Div Americal Smelting-20
Flexo Int'l Corp-11
Forsberg Mfg Co-9

Garde Mfg Co-23
Gee-Lar Mfg Co-1-4-5-7-8-9-21

Gen'l Cement Mfg Co Div Textron Inc-1-3-4-5-7-9-10-11-12-13-14-19-20-21-23
Gen'l Electric Co Apparatus Sales Div-15-17-18-21
G & M Equipment Co-15
Gonset Div L A Young Spring & Wire-1-15
Good-All Electric Mfg
Grayhill Inc-5-21-23
Great Eastern Mfg-3-12
Guardian Electric-18-21

Haydon Switch Inc-21
Heath Co-5-15
Heppner Mfg Co-10
Hercules Chemical Co-20
Hickok Electrical Instr-1-3
Hillburn Electronic Products Co-18
Hitemp Wires Inc-25
H M H Industries-5-21
Hobson Bros-5-23
Hoffman Electronics Corp Nat'l Fabricated Prods Div-19-23
Hoffman Electronics-17
Holub Industries Inc-9
Hubbell Inc Harvey-5-14-23
Hudson Lamp Co-11
Hunter Sales Co R W-19

Industrial Radio-15
Insuline Corp of America-1-5-7-8-9-17-19-21-23
Int'l Research Assoc-15
Int'l Resistance Co-23
Irwin Products-4-9-21

James Vibrapowr Co-15
Jan Hdw Mfg Co-6-9
Javex-14
Jerrold Electronics-5
Jersey Specialty Co-25
JFD Mfg Co-9-21
Johns-Manville Dutch Brand Div-22

Kepco Labs Inc-15
Kester Solder Co-20
Keystone Electronics Corp-5-7-9-23
Kings Electronics Co-5
Kin-Tel-15
Koiled Kords Inc-4-16
Krohn-Hite Corp-15
Krylon Inc-12
Kurman Electric-18-24

Leland Inc G H-18
Lerco Electronics-9-23
Littelfuse Inc-7-8
Livingston Electronic Corp-18-19
Luxo Lamp Corp-11
Magnadyne Co-18
Magnavox Co-2
Malco Tool & Mfg Co-23
Mallory & Co Inc P R-2-5-21-24
Marathon Battery Co-2
Matchless Electric Co-11
Merix Chemical Co-12
Mico Instrument Co-20
Micro Circuits Co-12
Micro Switch Div Minn-Honeywell Regulator-21
Microtran Co-3-15-17
Miller Mfg Co M A-12
Miller Co Sanford-15
Minn Mining & Mfg-5-22
Mobil Electronics-5
Modern Aire Mfg-4-9
Mohawk Wire & Cable-25
Mosley Electronics Inc-1-14-19
Mueller Electric Co-5
Mutual Electronic Industries-4-5-8-23

Nat'l Carbon Co Div Union Carbide & Carbon-2-11
National Co-5
Network Mfg Corp-5-15-21
New England Electrical Works-25
New York Coil Co-18
Nichols Wire & Aluminum Co-25
Non-Linear Systems-17
Nylock Corp-9

Oak Mfg Co-18-21-24
Ohmite Mfg Co-18-21
Oxford Electric Corp-11

Packard-Bell Electronics Corp-16
Paco Electronics Co-15
Palmer Inc M V-18-21-23
Parker Metal Goods Co-9
Pennwood Numechron Co-11
Perfection Mica Co-6
Permacel Tape Corp-22
Perma-Power Co-3-15
Peschel Electronics-15
Phalo Plastics Corp-25
Philco Corp-Access Div-2-24
Photocircuits Corp-16
Plastic Capacitors-15
Plastic Mold & Eng'g-4-19
Plastold Corp-25
Polymer Corp-22
Polytechnic Research-16-17
Pomona Electronics Co-1-4-5-19
Potter & Brumfield-18
Precise Development Corp-6-15-17

Quam-Nichols Co-10
Quietrole Co-12

Radiart Corp-24
Radio Corp of America Tube Div-2
Radix Wire Co-25
Ram Electronics-15
Rapid Electric Co-15
Rayline Inc-20
Ray-O-Vac Co-2
Raypar Inc-3-17-19
Rego Insulated Wire-25
Rhodes & Sons Co W M-9
Richards Electrocraft-5
Rodale Mfg-8-14-19-21
Rohn Mfg Co-9
Royal Electric-4-8-25
Rye Sound Corp-19

Saxton Products-5-9-25
Schauer Mfg Corp-15
Sequoia Process-25
Service Instruments-4-15
Shallcross Mfg-21
Signalite Inc-11-17
Simpson Electric Co-18
Sittler Corp-25
Smith Inc Herman H-4-5-7-9-19-21-23-25
Sonex Inc-15
South River Metal Prods 25
Sparton Electronics-15
Spencer-Kennedy Labs-15
Sprayway Inc-12
Stackpole Carbon-21
Stone City Machine & Tool-5-7-9-23
Superex Electronics-1
Switchcraft Inc-1-5-21
Sylvania Electric Prods-11

Technical Apparatus Bldrs
Technical Appliance Corp-21
Technicraft Co-9-12
Techniques Inc-5-14-16-19
Telectro Industries-18
Telematic Industries-6
Telkor Inc-15-24
Tenna Mfg-5
Terado Co-15-18
Tevco Insulated Wire-5-25
Texas Crystals Div Westronix Corp-15-18
Thompson-Bremer-9-23
Trico Fuse Mfg-5
Tri-Dex Electronics-16
Tung-Sol Electric-11
T V Development Co-9

Union Plastics Corp-25
United Electric Controls Co-21
United Motor Service Div GMC-24
United Transformer-17
Universal Circuit Controls Corp-21
U S Relay Co-18
U S Wire & Cable Co-25

Vaco Products Co-23
Vector Electronic Co-1-5-14-23
Vemaline Products-21
Victor Electric Wire & Cable-4-5-14-25
Victor Insulators Div I-T-E Circuit Breaker Co-9
Vidaire Electronics-1-3
Vokar Corp-24

Waldom Electronics Inc 5-9-12-13-19-23
Ward Leonard Electric Co-18
Weston Electrical Instr Corp-18
White Electrola J J-24
Wilco Corp
Willard Storage Battery Div Electric Storage Battery Co-2
Wirt Co Continental Carbon Div-21
Workman TV Inc-3-5-12
Wright Steel & Wire-25

Yardney Electric-2

Zierick Mfg Corp-9-23

6—COILS, FILTERS & TRANSFORMERS

Acme Electric-7-8-9
Acro Products-5-7
Acro Transformer & Mfg-5
Advance Electronics-4-10
Aerolite Electronics-1
Aerovox Corp-1-2-3-4-5-10
Allied Control Co-2
Altec Lansing-2-5-6-7-8
American Electronics (NYC)-4
Anchor Products Co-9
Anton Electronic Labs-9
Arco Transformer & Electric Corp-2-5-7-8
Astron Corp-4
Audio Devel Co-3-5-7

Barker & Williamson-2
Bogue Electric Mfg-7-9
Buckeye Bobbin Co-2
Bud Radio Inc-1

Calbest Electronics-2
CGS Laboratories Inc-2
Chicago Standard Transformer-1-2-3-5-6-7-8-11
Cinaudagraph Inc-5-7-8
Clegg Inc-4-10
Coil Co of America-2-5-7-8
Coil Winders Inc-1-2-3-4-5-7-10-11
Colman Tool & Machine-2
Cornell-Dubilier Electric Corp-3-4
Corning Glass Works-2

Delco Radio Div General Motors Corp-1-2-5-7
Delevan Electronics Corp-2
Deutschmann Corp Tobe-3-4
D & R Ltd-4-10
Drake Co R L-2-4
Dyna Co-5-7
Dynamic Electronics-NY 2-3-4

Electrend Products Corp 2
Electro-Physics Co-9
Electro-Tech Equipment-9
Electro-Voice Inc-3
Entron Inc-4-10
Epco Electronics Inc-4-10

Federal Electronics Sales-2-3-4-10
Federal Telephone & Radio Co-1-4
Filtron Co-2-4
Fisher Radio Corp-3
Forest Electric-1-2-5-7-8
Freed Transformer-1-5-7-8

Gen'l Cement Mfg Div Textron Inc-2-10
Gen'l Crystal Co-2
Gen'l Electric Apparatus Sales Div-5-7-9
Gen'l Electric Special Products Div-3
Gen'l Instrument Corp-1-2-4-6-8-11
Good-All Electric Mfg Co
Gramer-Halldorson Transformer Corp-5-6-7-8
Grayhill Inc-2
Great Eastern Mfg Co-1
Gudeman Co-4

Hevi-Duty Electric Co-7

I.D.E.A. Inc-4
Insuline Corp of America-1-2
Int'l Resistance Co-1

Jerrold Electronics-4

Knights Co James-4
Krohn-Hite Corp-3

Lynmar Engineers-3-4-10

McGohan Inc Don-5
McGregor Electronic-5-7
Marantz Co-3
Merit Coil & Transformer Corp-1-2-5-6-7-8-9-10-11
Micamold Electronics Mfg-4
Mico Instrument Co
Micotran Co-1-2-3-5-7-8-9
Miller Co J W-1-2-4-8-10
Mosley Electronics Inc-10
Munston Mfg-2-3-4-7

National Co-1-2
Newcomb Audio Products-5
New York Coil-1-2-5-7-8
North Hills Electric-2-4

Ohmite Mfg Co-1
Ortho Filter-3-4-5-7-10
Oxford Electric-5-7-8

Packard-Bell Electronics
Penn-Tran Corp-2-6-11
Perma-Power Co-9
Polytronic Research Inc 1-2-3-4-5-7-8
Premax Products Div of Chisholm-Ryder-2

Quam-Nichols Co-5

Radio Corp of America Tube Div-2-8-11
Radio Music-1-2-3-5-7
Ram Electronics-2-5-6-8-11
Ramsey Radio & TV Co-2
Raypar Inc-1-2-6-9
Raytheon Mfg Co-9
Reed & Reese Inc-1-2-5-7
R K Mfg Co-1-3-5-7
Rogers Electronic Corp-2-6-8-11
Rye Sound Corp-6

Sangamo Electric Co
Scientific Coil Co-2-6
Service Instruments-9
Sherwood Electronics-3
Sparton Electronics-1-2-10
Spencer-Kennedy Labs Inc-3-4-10
Standard Electrical Products Co-9
Sterling Transformer Corp-1-5-7-8
Superex Electronics Corp-1-2-4

Technical Apparatus-7
Telectro Industries-3-4
Telkor Inc-4
Televiso Corp-4
Thermador Electrical Mfg Co-1-3-4-5-7-8
Thordarson-Meissner Mfg—Maguire Industries-8
Todd-Tran Corp-5-6-7-8-11
Tresco Inc-5-7
Triad Transformer Corp-1-2-3-5-6-7-8-11

United Audio Products-3
United Transformer Co-2-3-5-7-9
University Loudspeakers-3-5

Vidaire Electronics Mfg Corp-3-4-9-10
Vokar Corp-1-2

Waters Mfg Inc-1-2
Wilco Corp-1-2
Workman TV Inc-7
Wuerth Tube-Saver Corp-9

7—COMMUNICATIONS & INDUSTRIAL ELECTRONIC EQUIPMENT

Allen-Bradley Co-1-8
Alliance Mfg Co-2
Allied Radio Corp-8-10
Altec Lansing Corp
American Electronics (LA)-6
American Electronics (NYC)-10
Ampex Corp
Anton Electronic Labs-6
A.R.F. Products Inc-2
Atlas Overhead Door-2
Atlas Sound Corp

Bell Sound Systems Inc
B & K Mfg Co-3
Blonder-Tongue Labs-3
Bogen Co David
Bogue Electric Mfg Co
Browning Labs Inc-7
Budelman Radio Corp-7-10

Calbest Electronics-2
Centralab Div Globe Union Inc-1
CGS Laboratories Inc-1-7
Chicago Industrial Instrument Co
Clegg Inc-10
Clough-Brengle Co-2
Crawford Door Co-2
Cutler-Hammer Inc-1

Dage TV Div Thompson Products Co-3
Dale Products Inc-2
Daven Co
Daystrom Inc-1
DeVar Electronics Co-3
Donner Scientific Co
Door Masters Inc-2
Drake Co R L
DuKane Corp
DuMont Labs Inc Allen B (Clifton)-3-4
Dynamic Electronics NY 7

Eby Sales Co-5
Eidson Electronic Co
Electrical Service Co-5
Electronic Development Associates-1-3-4-7-10
Electron-Radar Prods-1-2-5
Electro-Physics Co-1-5
Electro Sound Corp-3
Electro-Tech Equip-1-8
Electro-Voice Inc
Elgin Nat'l Watch Co Electronics Div
Entron Inc-3

Farnsworth Electronics Co Div IT&T-1-3
Federal Telephone & Radio Co-4-7-10
Feiler Eng & Mfg Co
Freed Transformer Co

Gen'l Electric Co Apparatus Sales Div-1-5-6-8
G & M Equipment Co
Gonset Div L A Young Spring & Wire Corp-7-10

Hallicrafters Co-7
Hammarlund Mfg Co-7
Hawkins Co P E-2
Haydon Mfg Co-8
Heath Co-7-8-10
Hickok Electrical Instrument Co
Hoffman Electronics Corp Radio Div-6
Hupp Electronics-1-2-5-7
Hy-Gain Antenna Products

I.D.E.A Inc-7
Industrial Radio-4-7-10
Industrial Test Equipment
Insuline Corp of America
Int'l Register Co-8
Int'l Research Assoc-7

Jan Hardware Mfg Co-1
Jerrold Electronics-3

Kaar Engineering-7-10
Kay Electric Co-3
Kellogg Switchboard & Supply Co
Kin-Tel-3
Kuhn Electronics Inc

Leitch Engineering-4-9-10
Livingston Electronic-8
Lynmar Engineers Inc-10

McKee Door Co-2
Magnavox Co-7
Marco Industries Inc-2
Michigan Electronics Inc-1-4-5-9
Mobil Electronics Mfg Co
Morrow Radio Mfg-4-7-9-10
Motorola Inc-4
Munston Mfg & Service 7-10

National Co-7
Newcomb Audio Products Co
New London Instrument Co
Nucleonic Corp of America-6
Nutronics Inc

Overhead Door Corp-2

Pacific Transducer-6
Packard-Bell Electronics Corp-2-6-7
Palmer Inc M V-4-10
Pennwood Numechron Co-8
Perma-Power Co-1-2
Peschel Electronics-1
Philmore Mfg Co-10
Photo Crystals Inc-5
Polytronic Research Inc
Portable Electric Tools-8
Precision Radiation Instruments Inc-6

Radio Corp of America RCA Eng'g Products Div-4-10
Radio Corp of America Tube Div-7
Radio Music Corp-1
Ram Electronics Inc-3
Richards-Wilcox Mfg-2
Robot Appliances Inc-2

Setchell-Carlson Inc-3
Simpson Electric Co-2
Sparton Electronics-1-7
Specialty Eng'g & Electronics Co-6
Stromberg-Carlson Co Special Products Div

Tarzian Inc Sarkes-3
Tech-Master Corp-3
Technical Apparatus Builders
Telechrome Mfg Corp-3
Telecom Inc-1
Telkor Inc
Telrex Labs
Tork Time Controls Inc-8

Vemaline Products Co-1-8

Ward Products Corp Div Gabriel Co
Warren Corp J C-4-7-9
White Electrola Inc J J-1
Worner Electronic Devices-1-5
Wunderlich Radio Co-4-7-10

Z & W Mfg Corp-2

8—RECEIVERS, TV-RADIO

Admiral Corp-3-6
Alliance Mfg Co-5
Allied Radio Corp-7
Altec Lansing Corp-7
American Elite Inc-3
American TV & Radio Co-6
AMI Inc-4
Amplitel Inc-2
Andrea Radio Corp-2-6
Ansley Mfg Co Arthur-3
A.R.F. Products Inc-3
Arvin Industries Inc-3
Automatic Radio Mfg Co-3

Bell Sound Systems-3-7
Berger Communications 4-5
Blonder-Tongue Labs-1-2
Bogen Co David-1-7

Calbest Electronics-3-6-7
CBC Electronics Co-1
Certified Radio Labs-6
Cinaudagraph Inc-5
Community Eng'g Corp-1
Conrac Inc-6
Continental Mfg Inc-5
Cornell-Dubilier Electric Corp-2

Davis & Co J W-3
DeRo Electronics-1-5
DeVar Electronics Co-2
DeWald Radio Mfg Co-3-6

D & M Products-5
DuMont Labs Inc Allen B (Clifton)-3-5-6

Eckstein Radio & TV Co-3
Electronic Designs Inc-1
Electro-Voice Inc-4-7
Elgin Electronic Corp-2
Emerson Radio & Phonograph Corp-3-6
Entron Inc-2

Fada Radio & Electric-6
Federal Electronics-5
Fisher Radio Corp-3-7

General Electric Co-3-6
General Instrument Corp-8
Gonset Div L A Young Spring & Wire Corp-3
Granco Products Inc-2-3-7
Guild Radio & Television-3

Hallicrafter Co-3
Harman-Kardon Inc-7
Hastings Products-3
Heath Co-3-7
Hinners-Galanek Radio Corp-3
Hoffman Electronics Radio Div-3-5-6
Hotpoint Co-6

I.D.E.A. Inc-1-2-3-5
Insuline Corp of America-1
Int'l Research Assoc-3

Jerrold Electronics Corp-1-2-5

Kay Electric Co-2
Kin Tel
Kuhn Electronics-2-7-8

Lynmar Engineers-1-2-3

McIntosh Laboratory-7
Madison Fielding Corp-7
Magnavox Co-3-6-7-8
Majestic Int'l Sales-3
Major Electronics Corp-3
Mattison TV & Radio Corp-1-3-4-6
Microtran Co-1
Motorola Inc-3-6-8
MP Engineering Co-6

National Co-3
Newcomb Audio Products Co-1-3-7

Oak Mfg Co-8
Olympic Radio & TV-3-6

Packard-Bell Electronics Corp-3-6
Philco Corp-3-6
Philmore Mfg Co-5
Pilot Radio Corp-7
Precision Radiation Instruments Inc-3-7

Radio Corp of America-3-6

Sargent-Rayment Co-7
Scott Inc Herman Hosmer-7
Setchell-Carlson Inc-3-6
Sherwood Electronics-7
Sonora Radio & TV-3-6
Sparton Electronics-3
Spencer-Kennedy Labs-2
Standard Coil Prods-8
Stromberg-Carlson Co Special Products Div-3-7
Superex Electronics-3
Sylvania Electric Prods-6

Tarzian Inc Sarkes-8
Tech-Master Corp-6-7
Trav-ler Radio Corp-3-6
Trutone Electronics-3-7-8

United Transformer Co-1

Vidaire Electronics-1
Videon Electronic Corp-1-2

Warren Corp J C-3
Westinghouse Electric TV-Radio Div-3-6 (Metuchen NJ)

Zenith Radio Corp-3-6

9—RESISTORS & RESISTIVE CONTROLS

Aerovox Corp-1-4-6-11
Allen-Bradley Co-3-4-5-10
American Electronics (LA)-4
Amplitel Inc-1
Anton Electronic Laboratories-4
Arnhold Ceramics-6-11
Atlas Resistor Co-10-11

Blonder-Tongue Labs-1
Bright Star Industries-2
British Electronic Sales Co-6

Calbest Electronics Co-4
Carborundum Co Globar Div-5-12
Carter Parts Co-4-10-11
CBC Electronic Co-6
Centralab Div Globe Union Inc-1-3-4-5-10-11
Chicago Industrial Instr Co-4
Chicago Telephone Supply Corp-3-4-5-10-11
Clarostat Mfg Co-1-2-3-4-5-6-7-10-11
Coil Co of America-2
Coil Winders Inc-1-11
Colman Tool & Machine-11
Continental Carbon Inc-5
Continental Mfg Inc-3
Corning Glass Works-1-8
Cutler-Hammer Inc

Dale Products Inc-4-6-7-10-11
Daven Co-1-4-6-7-8-9-10-11
Daystrom Inc-6-11
De Jur-Amsco Corp-4
DeRo Electronics-1
D & M Products-3-4-10-11
Dynamic Electronics NY-3

Electron-Radar Products-1-6-11
Electro-Tech Equipment Co
Entron Inc-1
Erie Resistor Corp-5-8

Federal Electronics-3-5
Federal Telephone & Radio Co-11

G-C Electronics Mfg Co-5-7-10-11
General Cement Mfg Co-3-4-5-7-10-11
General Electric Co Apparatus Sales Div-4-10-11
Great Eastern Mfg-7-11
Gulton Industries-12

Instrument Resistors-11
International Resistance Co-3-5-6-7-10-11-12
I-T-E Circuit Breaker-1

JFD Mfg Co-2

Lectrohm Inc-7-11
Lynmar Engineers Inc-1

Mallory & Co Inc P R-3-9-10-11
Matchless Electric-2
Micamold Electronics-11
Miller Electro-Research Labs-11-12

Ohmite Mfg Co-1-4-5-7-10-11

Phaostron Instrument & Electronics Co-6-11
Photo Crystals Inc-1-6-11

Reon Resistor Corp-4-10-11
Resistance Products Co-11
Resistors Inc-11

Shallcross Mfg-1-4-9-11
Simpson Electric Co-4
Stackpole Carbon-4-5-10
States Co

Technical Appliance-1
Tech-Ohm Resistor Corp 5-7-8-10-11
Tru-Ohm Products Div Model Eng'g Mfg Co-4-10-11

Vidaire Electronics Mfg-1
Vokar Corp-11

Ward Leonard Electric-10-11
Wirt Co Continental Carbon Div-4-6-10-11
Workman TV Inc-5-7-11-12
Wunderlich Radio Co-1

10—TEST EQUIPMENT

Aerolite Electronics-11
Aerovox Corp-4
Allen-Bradley Co-13
American Electronics Enterprises-10
American Electronics (LA)-6-11
American Scientific Development-6-16
Anchor Products Co-12
Anko Mfg Co-16
Anton Electronic Labs-9
ARF Products Inc

Beede Electrical Instr Co-9
Bergen Labs-9
Berkshire Labs-3-6
B & K Mfg-3-6-10-12-16
Blonder Tongue Labs-7
Brodney A I
Brush Electronics-1-10
Budelman Radio-8
Burton Rogers Co Sales Div Hoyt Meters-9

Centralab Div Globe-Union-13
Century Electronics Co-12-14-15-17
CG Electronics Corp-15
CGS Labs Inc-1
Chatham Electronics Div Gera Corp-13
Chicago Industrial Instrument Co-2-9-14-15-16
Chicago Telephone Supply-13
Circuit Mfg Co-12
Clarostat Mfg-4
Clough-Brengle Co-2
Cooper Electronics-16
Cornell-Dubilier Electric Corp-4-14
Cutler-Hammer Inc-13

Daven Co-9
Daystrom Inc-1-6-9-16
DeJur-Amsco Corp-9
DeRo Electronics-16
DeVar Electronics-6
D & M Products-13
Donner Scientific-1-6
D & R Ltd-5
DuMont Labs Inc Allen B (Clifton)-9-10
Dynamic Electronics NY-4-6-8

Eby Sales Co-17
Eitel McCullough-13
Electronic Designs
Electronic Instrument Co-9-10-16
Electronic Measurement Corp-4-6-9-10-14-15-16
Electronic Test Instr Corp-9-11-12
Electronic Tube Corp-1-2-10
Electro-Tech Equipment Co-1-2-4-9-10-16
Entron Inc
Epco Electronics-4
Erie Resistor Corp-13
E-Z Hook Test Prods-11

Farnsworth Electronics Co Div IT&T-6
Federal Telephone & Radio-1-2-4-6-7-8-10
Feiler Eng'g & Mfg Co 1-10-14
Ferris Instrument Co-6
Freed Transformer Co-2
Fretco Inc-15
Futuramic Co-11

G-C Electronics Mfg-13
Gee-Lar Mfg Co-13
Gen'l Cement Mfg Co Div Textron-11-12-13
Gen'l Electric Co Apparatus Sales Div-9
Gen'l Transistor-15
G & M Equipment-1-10
Gulton Industries-15

Haydon Switch Inc-13
Heath Co-3-6-8-9-11-13-16-17
Hickok Electrical Instr-1-2-3-6-7-9-10-12-16-17
Hughes Prods Electron Tubes-10
Hycon Electronics-6-9-10-11

Industrial Devel Labs-2-9
Industrial Instruments-2
Industrial Test Equipment-2-5-9-14
Instrument Labs-1-9
Insuline Corp of America-11
Int'l Research Assoc-15
Irwin Products-11
I-T-E Circuit Breaker-1

Jackson Electrical Instr-6-10-11-16
Javex-11
Jerrold Electronics-6-7
JFD Mfg Co-13

Kay Electric-1-3-6-9-15
Keystone Electronics-11
Kin-Tel-6-9
Kingston Electronic Corp-1
Kit-Tronics-15
Knights Co James-5

Lampkin Labs-5-7-8
Leitch Eng'g Corp-9

Meters Inc-9
Mico Instrument Co
Micro Switch Div Minn-Honeywell Regulator-13
Microtran Co-12

Network Mfg Corp-13-14
New London Instrument Co-1-5-6-16
Non-Linear Systems-9
Nutronics Inc-16

Ohmite Mfg Co-4

Pacific Transducer-6
Packard-Bell Electronics
Paco Electronics Co-2-9-10-16
Peschel Electronics-13
Phaostron Instrument & Electronic Co-9-11
Philco Corp—Accessory Div-1-6-7-9-11-12-16
Photocircuits Corp-13
Polytronic Research-2-10
Precise Devel Corp-2-3-4-6-9-10-11-14-15-16
Precision Apparatus Co-2-6-9-10-16
Precision Electronics-9-10-16
Presto Recording Corp-5
Pyramid Electric Co-1

Radio City Products-9
Radio Corp of America Tube Div-6-9-10-16
Radion Corp-7
Radionic Div Raven Electr Co-11
Research Inventions & Mfg-7-9-11-17

Scala Radio Co-11
Scott Inc Herman H-1
Seco Mfg Co-14-16
Semon Bache & Co-19
Service Instruments-4
Shallcross Mfg Co-2-4
Shurite Meters-9
Simpson Electric Co-1-2-3-7-9-10-11-14-16
Smith Inc Herman H-13
Smolin Labs-6-12-14-16

Sonex Inc-15
Sparton Electronics-3-7-8
Specialty Eng'g & Electronics-6-9-10
Spencer-Kennedy Labs Inc
Sterling Mfg Co-9
Superex Electronics-12
Supreme Instrument-6-9

Technical Apparatus-16
Telechrome Mfg Corp-6
Telectro Industries
Telematic Industries-16
Tele-Test Instrument-16
Teievex Co
Tel-Instrument Electronics Corp-6
Telonic Industries-16
Tricraft Products-1-16
Triplett Electrical Instrument-6-9-10-11-16-17

United Audio Products-9
United Transformer-4
Universal Circuit Controls Corp-13

Vanguard Instruments Corp-13
Vemaline Products
Vidaire Electronics Mfg 12
Vis-U-All Corp-16

Waterman Products-10
Waters Mfg Inc-9
Waveforms Inc-6-9
Weston Electrical Instr Corp-1-3-6-9-10-11-16
Winston Electronics-1-6-7
Workman TV Inc-11-12

11—TOOLS & SHOP AIDS

Acro Tool & Die Works
Advance Electronics-19
Aerolite Electronics-1
Akro Mills Inc-5
Altec Lansing Corp-5
Altron Products
American Electrical Heater Co-16
American Mercantile-16
American Pamcor-9-22
AMI Inc-5
Amphenol Electronics-1
Argos Products Co-5-6
Arrow Fastener Co-17
Art Specialty Co-19
Arvin Industries-5-18

Baumker Mfg Co-2-5-18
Black & Decker Mfg-10-15
Blonder-Tongue Labs-22
British Electronic Sales-20-21
Bud Radio Inc-5

Cabinart Co Div G & H Wood Products Co-5
California Cabinet Co-5
CBS-Hytron-20-21
Champion DeArment Tool Co-11-13
Churchill Lighting Corp-5
Colman Tool & Machine-14
Cummins Portable Tools Div John Oster Mfg Co-11

Dormeyer Corp Power Tool Div-11
Drake Electric Works-16
Dreier Brothers-11
Dynamic Electronics-New York Inc-8

Eitel-McCullough Inc-21
Electric Soldering Iron Co-16
Electro-Tech Equipment Co-16
Equipto-2-3-5-7
Erwood Inc-11-19

Fairbanks Co-7
Farsberg Mfg Co-11-15-19
Futuramic Co-15

Gee-Lar Mfg Co-6-20-21
General Cement Mfg Co Div Textron Inc-1-9-14-15-18-19-20-21-22
Gerrard & Co A J-11
Greene Co L Charlton-5
Greenlee Tool Co-11
Gusdorf & Son-18

Hartley Products Co-5
Hexacon Electric Co-16
Hi-Lo TV Antenna Corp-18
H M H Industries-19
Holub Industries Inc-22
Hubbell Mfg Co N L-5-18
Hunter Sales Co R N-1-11-13-15-21

Ideal Industries-16-22
iE Mfg-21
Insuline Corp of America-1-5-8-15-16-19-21
Irwin Products -18

Jansa Woodworking Corp-5-6
JFD Mfg Co-22

Karlson Associates-5
Kedman Co-15
Keystone Electronics-1
Kleer-Vue Mfg Co-5
Klein & Sons Mathias-13
Kraeuter & Co-11-13
Kwikheat Mfg Co-16

Lowell Mfg Co-5

Magnavox Co-18
Markell Associates Jeff-5
Mastra Co-6
Mattison TV & Radio-5
Memco Aerial Ladder Co-12
Micro-Circuits Co-14
Millers Falls Co-10-11-15
Milwaukee Truck Co-7
Mitchell Industries-16
Mobil Electronics Mfg-5
Moody Machine Prods-11-15
Muckle Mfg Co-5

Newcomb Audio Prods-5

Oryx Co-16

Peerless Products Industries-18
Photocircuits Corp-14
Pomona Electronics Co
Portable Electric Tools Inc-10
Premier Metal Products-5
Proto Tool Co-11-13-15

Q-Line Mfg Corp-18

Radio Merchandise Sales Inc-6
Ramsey Radio & TV Co
Rayline Inc-19
Robertson & Ruth-11-19
Roche Co Paul C-16

Safety Nail Driver Corp 11
Saxton Products-18-22
Self-Lifting Piano Truck Co-7
Service Parts Systems-3
Sittler Corp-22
Smith Inc Herman H-1-20-21-22
Smolin Labs-14
South River Metal Prods-12
Speedway Mfg Co-10
Spencer-Kennedy Labs Inc-5-9
Standard Pressed Steel Co-2
Stanley Works Hardware Div-11
Stevens Walden Inc-1-11-13-15-19

Technicraft Co-10-11-16
Techniques Inc-14
Tipco Mfg Co
Transformer Metal Products Corp-5
Triton Mfg Co-16
Turner Brass Works-4

Ungar Electric Tool Co-16
University Loudspeakers Inc-5
U S Products Inc-7
Utica Drop Forge & Tool Div Kelsey-Hayes Co-13-15

Vaco Products Co-1-9-11-13-15
Vis-U-All Corp-6
Vulcan Electric Co-16

Waldom Electronics-9
Wall Mfg Co P-4-16
Wassco Electric Prods-16
Weller Electric Corp-16
Wen Products Co-16
Werner Co R D-12
Wright Inc-5

Xcelite Inc

Yeats Appliance Dolly-7

12—TUBES & SEMI-CONDUCTORS

American Electronics (LA)-6
American Elite Inc-9
Amperex Electronic Corp-2-4-6-8-9-10

Barry Electronics Corp-7-8-9-10
Bogue Electric Mfg-1-3-4
Bomac Labs Inc-4-8-10
British Industries-9
Burroughs Corp Electronic Tube Div-8

Calvideo Tube Corp-7
Cardinal Mfg Co-7
CBS-Hytron-1-2-4-7-9-10
Chatham Electronics Div of Gera Corp-3-9-10
Chromatic TV Labs-7
Claremont Tube Corp-7
Clevite Transistor Products-2-6
Conant Laboratories-5

Daystrom Inc-5
Delco Radio Div General Motors Corp-6
DuMont Labs Inc Allen B (Clifton)-7

Eitel McCullough-8-9-10
Electrical Service Co-8
Electronic Development Associates-7-8-10
Electronic Devices Inc-3
Electronic Tube Corp-7
Electron-Radar Prods-8
Electrons Inc-8
Electro-Tech Equipment-5

Farnsworth Electronics Co Div IT&T-7-8
Federal Telephone & Radio Co-2-3-4
Fretco Inc-2-4-6

Gahagan Inc-2
Gen'l Electric Co Apparatus Sales Div-2-5-8
Gen'l Electric Co Semiconductor Prods-2-4-6
Gen'l Electric Co Tube Dept-7-8-9-10
Gen'l Instrument Corp-1-4
Gen'l Transistor Corp-6
Germanium Products-6
Good-All Electric Mfg-7

Haydu Bros of N J Div Burroughs Corp-7
Hoffman Electronics Corp Semiconductor Div-4
Hughes Aircraft Co Semiconductor Div-2-4-6
Hughes Products Electron Tubes-7
Hupp Electronics Co-8

Int'l Rectifier-2-3-4
Int'l Resistance Co-3

Kemtron Electron Products Inc-2-4

Major Brand Tube-7-8-9-10
Microtran Co-6
Miller Co Sanford-3-4
Minneapolis-Honeywell Regulator Co-6

Nat'l Television Tube-7
Nat'l Video Corp-7

Philco Corp Accessory Div-3-4-7-9
Photo Crystals Inc-8

Radio Corp of America Tube Div-7-9-10
Radio Development & Research Corp-1-3-4-6
Radio Receptor Co-3
Rapid Electric Co-2-3
Rauland Corp-7
Raytheon Mfg Co Receiving & Cathode Ray Tube Operations-1-2-3-4-6-7-9-10
Rye Sound Corp-9-10

Schauer Mfg Corp-5
Sel-Son-7
Standard TV Tube Corp-7
Sylvania Electric Products Inc-1-2-4-6-7-8-9

Tarzian Inc Sarkes-1-3-4
Technical Apparatus Builders-2-3-4-5
Texas Instruments Inc-6
Thomas Electronics Inc-7
Transistor Products-6
Transitron Electronic Corp-2-4-6
Tung-Sol Electric-2-7-10

Waterman Products Co-7
Westinghouse Electric Corp (Elmira)-2-3-4-6-7-8-9-10

1957 ELECTRONIC TECHNICIAN BUYERS DIRECTORY

Alphabetical Listing of Manufacturers

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

Accurate Electronics Corp 169 S. Abbe Rd Elyria Ohio
Accurate Insulated Wire 25 Fox St New Haven 1 Conn
Acme Electric Corp Cuba NY
Acme Model Eng'g 8120 7 Ave Brooklyn 9 NY
Acro Products Co 369 Shurs Lane Philadelphia 28 Pa
Acro Tool & Die 4554 N Broadway Ave Chicago 40 Ill
Acro Transformer 26-02 4 St Long Island City 2 NY
Admiral Corp 3800 W Cortland St Chicago 47 Ill
Advance Electronics 8510 North End Ave Oak Park Mich
Aerolite Electronics Corp 507 26 St Union City NJ
Aermotor Co 2500 W Roosevelt Rd Chicago Ill
Aerovox Corp Belleville Ave New Bedford Mass
Affton Industries Valley Park Mo
Aircraft Marine Prods 2100 Paxton Harrisburg Pa
Airflyte Electronics Co 21 Cottage St Bayonne NJ
A-K Mfg Co 115 S Northwest Hwy Barrington Ill
Akro Mills P O Box 898 ET Akron 9 Ohio
Alden Products Co 117 N Main St Brockton 64 Mass
All Channel Antenna Corp 47-39 49 St Woodside 77 NY
Allen-Bradley 136 W Greenfield Ave Milwaukee Wis
Alliance Mfg Co Lake Park Blvd Alliance Ohio
Allied Control Co 2 East End Ave New York 21 NY
Allied Engraving & Stamping Co 17 Elm St Buffalo 3 NY
Allied Radio Corp 100 N Western Ave Chicago 80 Ill
Allweather Antennas 350 S Egg Harbor Hammonton NJ
Alonge Products Inc 163 W 23 St New York 11 NY
Alpha Metals Inc 56 Water St Jersey City 4 NJ
Alpha Wire Corp 200 Varick St New York 14 NY
Alprodco Inc P O Box 110 Mineral Wells Texas
Altec Lansing 1515 S Manchester Ave Anheim Calif
Altron Products P O Box 9038 Long Beach Calif
Aluminum Mfg Co 1629 Portland Ave Louisville 3 Ky
American Electrical Heater 6110 Cass Ave Detroit 2 Mich
American Electronics Enterprises 3603 E 10 St Long Beach 4 Calif
American Electronics 655 Washington Blvd Los Angeles 15 Calif
American Electronics 1203 Bryant Ave New York NY
American Elite Inc 7 Park Ave New York 16 NY
American Mercantile Co 33 W 42 St New York 36 NY
American Pameor Inc 181 Hillcrest Ave Havertown Pa
American Radio Hdw 153 MacQuesten Pkwy Mt Vernon NY
American Scientific 336 S Main St Ft Atkinson Wisc
American Solder & Flux 19 & Willard Philadelphia Pa
American Standard TV Tube 94-50 158 St Jamaica NY
American Technical Society 848 E 58 St Chicago Ill
American Tower Co Box 29 Shelby Ohio
American TV & Radio 300 E 4 St St Paul 1 Minn
AMI Inc 1500 Union Ave S E Grand Rapids 2 Mich
Amperex Electronic Corp 230 Duffy Ave Hicksville LI NY
Ampex Corp 934 Charter St Redwood City Calif
Amphenol Electronics Corp 1830 S 54 Ave Chicago Ill
Amplifier Corp of America 398 Bdwy New York NY
Amplitel Inc 342 W 40 St New York 18 NY
Ampro Corp 2835 N Western Ave Chicago 18 Ill
Anchor Metal Co 966 Meeker Ave Brooklyn 22 NY
Anchor Products Co 2712 Montrose Ave Chicago 18 Ill
Anchor Wire Corp 183-16 Jamaica Ave Jamaica 3 NY
Andrea Radio 27-01 Bridge Pl N Long Island City NY
Anko Mfg Co 5042 W State St Milwaukee 8 Wisc
Ansley Mfg Co Arthur New Hope Pa
Ansonia Wire & Cable Co 111 Martin St Ashton RI
Antenna Corp of America 1148 Euclid Ave Cleveland 0
Antenna Products 3753 Clark Chicago 13 Ill
Antenna Specialists 12435 Euclid Ave Cleveland 6 Ohio
Anton Electronic 1226 Flushing Ave Brooklyn NY
Arco Electronics 64 White St New York 13 NY
Arco Transformer 1602 S Hanna St Ft Wayne Ind
A R F Products 7627 Lake St River Forest Ill
Argos Products Co 310 Main St Genoa Ill
Arnhold Ceramics 1 E 57 St New York 22 NY
Arrow Fastener Co 1 Junius St Brooklyn 12 NY
Art Specialty Co 3245 W Lake St Chicago 24 Ill
Arvin Industries Inc Columbus Ind
Associated Specialties 1751 Main St Orefield Pa
Astatic Corp 250 Harbor St Conneaut Ohio
Astron Corp 255 Grant Ave E Newark NJ
Atlantic Wire & Cable 119-14 14 Rd College Point NY
Atlas E-E Corp 47 Prospect St Woburn Mass
Atlas Overhead Door Co 375 Mill St Quakertown Pa
Atlas Resistor Co 1128 Madison St Chester Pa
Atlas Sound Corp 1449 39 St Brooklyn 18 NY
Audak Co 500 5th Ave New York NY
Audel & Co Theo 49 W 23 St New York 10 NY
Audio Devel Co 2833-13 Ave S Minneapolis 7 Minn
Audio Devices Inc 444 Madison Ave New York NY
Audio Equipment 15749 Wyoming Ave Detroit Mich
Audiogersh Corp 514 Broadway New York 12 NY
Audio-Master Corp 17 E 45 St New York 17 NY
Audiomation Labs 7230 Clinton Rd Upper Darby Pa
Autocrat Electronics Co 5024 Elm St Skokie 8 Ill
Automatic Mfg Div Gen'l Instrument 65 Gouverneur St Newark 4 NJ
Automatic Radio Mfg Co 122 Brookline Boston Mass
Automatic Switch Co Florham Park NJ

Bache Semon & Co 636 Greenwich St New York 14 NY
Bakelite Corp Wire Cable Div 420 Lexington Ave New York NY
Baker Mfg Co 133 Enterprise Evansville Wisc
Barber-Colman Co PO Drawer 99 Rockford Ill
Barjay Co 145 W 40 St New York 18 NY
Barker & Williamson 235 Fairfield Ave Upper Darby Pa
Barry Electronics 512 Broadway New York 12 NY
Bauer & Black 309 W Jackson Blvd Chicago 6 Ill
Baumker Mfg Co 3826 Summit St Toledo 11 Ohio
Bead Chain Mfg Co 110 Mountain Grove St Bridgeport 5 Conn
Beam Industries Inc 624 S Michigan Ave Chicago 5 Ill
Becker Electronics 1091 Rockaway Valley Stream NY
Beede Electrical Instrument Co West St Penacock NH
Behr-Manning Corp 2957 Howe St Troy NY
Belden Mfg Co 4647 W Van Buren St Chicago 44 Ill
Bell & Howell 7100 McCormick Rd Chicago 45 Ill
Bell Sound Systems 555 Marion Rd Columbus 7 Ohio
Bennett Labs Inc 2700 Bay Rd Redwood City Calif
Bennett & Co Paul 230 E Ohio St Chicago 11 Ill
Bergen Labs 247 Crooks Ave Clifton NJ
Berger Communications 109-01 72 Rd Forest Hills NY
Berkshire Laboratories 692 Bank Village Greenville NH
Biggs Co Carl H 2255 Barry Ave Los Angeles Calif
Birnbach Radio Co 145 Hudson St New York 13 NY
B & K Mfg Co 3726 N Southport Chicago 13 Ill
Black & Decker Towson 4 Md
Blaco Mfg Co 6541 Euclid Ave Cleveland 3 Ohio
Blonder-Tongue Labs 9-25 Alling St Newark 2 NJ
B & M Electric Corp 838 4 Ave Brooklyn 32 NY
Boetsch Bros 115 Cedar St New Rochelle NY
Bogen Co David P O Box 500 Paramus NJ
Bogue Electric Mfg Co 52 Iowa Ave Paterson 3 NJ
Bomac Labs Salem Rd Beverly Mass
Bozak Co R T PO Box 966 Darien Conn
Brach Mfg Div Genl Bronze 200 Central Ave Newark NJ
Brady Co W H 727 W Glendale Ave Milwaukee 12 Wis
Brand & Co Wm 45 North St Willimantic Conn
Bright Star Industries 600 Getty Ave Clifton NJ
British Electronic Sales Box 132 Oakland Gardens Sta 64 NY
British Industries 80 Shore Rd Port Washington NY
Brodney A I 351 Atlantic Ave Brooklyn 17 NY
Browning Labs Inc 750 Main St Winchester Mass
Brush Electronics 3405 Perkins Ave Cleveland Ohio
Buchan Co R J 2994 Sibley Hwy St Paul 18 Minn
Buckeye Bobbin Co 12200 Sprecher Ave Cleveland 0
Budelman Radio Corp 375 Fairfield Ave Stamford Conn
Bud Radio Inc 2118 E 55 St Cleveland 3 Ohio
Burgess Battery Co Freeport Ill
Burroughs Corp Electronic Tube Div P O 1226 Plainfield NJ
Burton-Rogers Co 42 Carleton St Cambridge 42 Mass
Bussmann Mfg Co University at Jefferson St Louis 7 Mo

Cabinart Co Div G & H Wood Prods 99 N 11 St Brooklyn 11 NY
Calbest Electronics 4801 Exposition Blvd Los Angeles
Calcon Mfg Co 100 Oakland Ave Washington 1 Pa
Caldwell-Clements Manuals 480 Lexington New York NY
Califone Corp 1041 N Sycamore Ave Hollywood 38 Calif
Calif Cabinet 522 S San Pedro St Los Angeles 13 Calif
Calvideo Tube Corp 5232 W 104 St Los Angeles 45 Calif
Cannon Co C F Springwater NY
Cannon Electric 3208 Humbolt St Los Angeles 31 Calif
Capps & Co Frank L 120 Addisen Pl Valley Stream NY
Carbonneau Ind 100 Lexington SW Grand Rapids Mich
Carborundum Co Globar Div Niagara Falls NY
Cardinal Mfg Co 3151 Fiberglas Rd Kansas City Kans
Cardwell Electronics Productions A D Plainville Conn
Carling Electric 505 New Park W Hartford Conn
Carter Motor Co 2644 N Maplewood Ave Chicago 47 Ill
Carter Parts Co 3401 W Madison St Skokie Ill

CBC Electronics Co 2601 N Howard St Phila Pa
CBS-Hytron 100 Endicott Danvers Mass
Centralab Div Globe-Union Inc 900 E Keefe Ave Milwaukee Wisc
Central Electronics 1247 W Belmont Ave Chicago 13 Ill
Century Electronics Co 111 Roosevelt Ave Mineola NY
Certified Radio Labs 5507 13 Ave Brooklyn 19 NY
Certified Tube Co 16 & Luzerne Sts Philadelphia 40 Pa
CG Electronics 305 Dallas NE Albuquerque N Mex
CGS Labs Inc 391 Ludlow St Stamford Conn
Champion DeArment Tool Co S Main St Meadville Pa
Channel Master Corp Ellenville NY
Chase & Sons 26 Spruce St N Quincy Mass
Chatham Electronics Div Gera Corp Livingston NJ
Chemical Electronic Eng'g P O Box 203 Matawan NJ
Chester Cable Corp 1 Hill St Chester NY
Chicago Condenser 3255 W Armitage Ave Chicago 47 Ill
Chicago Industrial Instr 865 N Sangaman Chicago Ill
Chicago Std Transformer 3501 W Addison Chicago Ill
Chicago Telephone Sup 1142 W Beardsley Elkhart Ind
Christie Electric 3410 W 67 St Los Angeles Calif
Chromatic TV Labs 1501 Broadway New York 36 NY
Churchill Lighting 344 Franklin St Melrose 76 Mass
Cinaudagraph Inc 7334 N Clark St Chicago 26 Ill
Cinch Jones Sis Div Cinch Mfg 1026 S Homan Ave Chicago Ill
Circon Component Co Goleta Calif
Circuit Mfg 6211 Market St Philadelphia Pa
Cisin Harry G Amagansett NY
Claremont Tube 36-02 35 Ave Long Island City NY
Clarostat Mfg Co 1 Washington St Dover NH
Clear Beam Antenna 21341 Roscoe Canoga Park Calif
Clegg Labs Inc Box 641 Morristown NJ
Cletron Inc 1974 E 61 St Cleveland 3 Ohio
Clevite Transistor Prods 241 Crescent St Waltham Mass
Clippard Instrument 7350 Colerain Cincinnati Ohio
Clough-Brengle Co 6014 Broadway Chicago 40 Ill
Coaxial Connector Co 37 N 2 Ave Mt Vernon NY
Coil Co of America 207 Washington St Northvale NJ
Coil Winders Inc 100 New York Ave Westbury NY
Coleman Cable & Wire 3919 Wesley Terr Schiller Park Ill
Collins Radio Co Cedar Rapids Iowa
Colman Tool & Macvhine PO Box 7026 Amarillo Tex
Color Converter Inc PO Box 250 Columbia City Ind
Columbia Products P O Box 5207 Columbia S Car
Columbia Wire & Sup 2850 Irving Park Chicago Ill
Community Eng'g Box 824 State College Pa
Components Corp 106 Main St Denville NJ
Conant Labs 6500 O St Lincoln 5 Nebr
Concertapes Inc 522 Green Bay Rd Winnetka Ill
Connecticut Telephone & Electric Corp Meriden Conn
Conrac Inc 19217 E Foothill Blvd Glendora Calif
Consolidated Wire 1635 S Clinton St Chicago 16 Ill
Continental Carbon 13900 Lorain Ave Cleveland 11 Ohio
Continental Mfg City Nat'l Bank Bldg Omaha Nebr
Cooper Electronics Inc 5637 Tulip St Philadelphia 24 Pa
Cornell-Dubilier Electric Corp S Plainfield NJ
Corning Glass Werks Corning NY
Cornish Wire Co 50 Church St New York 7 NY
Crawford Door Co 20263 Hoover Rd Detroit 5 Mich
Crescent Industries 5900 W Touhy Chicago 30 Ill
Crest Transformer 1834 W North Chicago 22 Ill
Crown Controls 40 S Washington New Bremen Ohio
Commins Portable Tool 5055 N Lydell Ave Milwaukee Wisc
Cutler-Hammer Inc 315 N 12 St Milwaukee 1 Wisc

Dage Electric Co 67 N 2 St Beech Grove Ind
Dage TV Div Thompson Products Michigan City Ind
Dale Products Inc PO Box 136 Columbus Nebr
Dalmotron Co 534 Laurel St San Carlos Calif
Dane Electronics Labs PO Box 209 Salem Mass
Daven Co Route 10 Livingston NJ
Davis & Co J W 9212 Denton Drive Dallas 9 Texas
Daystrom Inc 430 Mountain Ave Murray Hill NJ
Daystrom Electric Corp 887 Main St Poughkeepsie NY
Deal Products Hellertown Rd (MR 37) Easton Pa
DeJur-Amsco 45-01 Northern Blvd Long Island City 1 NY
Delco Radio Div GMC 700 E Firmin St Kokomo Ind
Delco-Remy Div General Motors Corp Anderson Ind
Delevan Electronics Corp Royeroft Campus E Aurora NY
DeRo Electronics 134 Nassau Rd Roosevelt NY
Deutschmann Corp Tobe Norwood Mass
DeVar Electronics 3471 Ramona St Palo Alto Calif
DeWald Radio 35-15 37 Ave Long Island City 1 NY
Dictograph Products 95-25 149 St Jamaica 35 LI NY

D & M Prods 13144 W McNichols Rd Detroit Mich
Donner Scientific 888 Galindo St Concord Calif
Doormasters Inc 2310 Michigan Ave Santa Monica Calif
Dormeyer Corp 700 N Kingsbury Ave Chicago 10 Ill
D&R Ltd 402 E Gutierrez St Santa Barbara Calif
Drake Electric 3656 N Lincoln Ave Chicago 13 Ill
Drake Mfg Co 1713 W Hubbard St Chicago 22 Ill
Drake Co R L 18 E Central Ave Miamisburg Ohio
Dreier Bros 7301 Woodlawn Ave Chicago 19 Ill
DuKane Corp St Charles Ill
DuMont Labs A B 750 Bloomfield Ave Clifton NJ
DuMont Labs A B 35 Market St E Paterson NJ
Duotone Co Locust St Keyport NJ
Dyna Co 5142 Master St Philadelphia 31 Pa
Dynamic Electronics 73-39 Woodhaven Forest Hills NY
Dynamu Magnetics Div Malco 21 N 3 St Minneapolis
Dynavox Corp 40-05 21 St Long Island City 1 NY

Eagle Electronics Corp PO Box 775 Meriden Conn
Easy-Up Inc 1006 State St Racine Wisc
Eby Sales 130 Lafayette New York 13 NY
Eckstein Radio & TV 2601 E Franklin Ave Minneapolis 6 Minn
Educational Electronics 6322 N Clark St Chicago Ill
Eicor Inc 4235 W North Ave Chicago 39 Ill
Eldson Electronic Co 1902 N 3 St Temple Texas
Eitel-McCullough 798 San Mateo San Bruno Calif
Eico Corp M St Below Erie Ave Philadelphia 24 Pa
Electralab Inc Needham Heights 94 Mass
Electrend Products State & Water Sts St Joseph Mich
Electric Soldering Iron Co W Elm St Deep River Conn
Electric Sweeper Service Co 2034 Euclid Ave Cleveland 15 Ohio
Electrical Service 1271 Mission San Francisco 3 Calif
Electron Enterprises 6917 Stanley Ave Berwyn Ill
Electronic Chemical 813 Comminipaw Ave Jersey City NJ
Electronic Designs 28 School St Yonkers NY
Electronic Devel Assoc 125 E 46 New York 17 NY
Electronic Devices Inc 429 12 St Brooklyn 15 NY
Electronic Fabricators 682 Broadway New York 12 NY
Electronic Instrument 84 Withers St Brooklyn 11 NY
Electronic Measurements 625 Broadway New York 12 NY
Electronic Publishing 180 N Wacker Dr Chicago 6 Ill
Electronic Specialties Mfg 52 Chandler St Worcester Mass
Electronic Technician 480 Lexington Ave New York 17 NY
Electronic Test Instr 13224 Livernois Ave Detroit Mich
Electronic Tube Corp 1200 E Mermaid Lane Phila Pa
Electron-Radar Products 4806 W Chicago Chicago 51 Ill
Electrons Inc 127 Sussex Ave Newark 3 NJ
Electro-Physics Co 287U Broadway New York 7 NY
Electro Products 4501 N Ravenswood Ave Chicago Ill
Electro-Sonic Labs 35-54 36 St Long Island City NY
Electro Sound Corp 115 Halleck St Boston 20 Mass
Electro-Tech Equipment 308 Canal St New York 13 NY
Elektra Corp 361 Bleecker St New York 14 NY
Electrovox Co 60 Franklin St E Orange NJ
Elektra Records 361 Bleecker St New York 14 NY
Elgin Eletronic Corp PO Box 13 Bluffton Ind
Elgin Nat'l Watch Electronics Div 2435 N Naomi St Burbank Calif
Elgin Nat'l Watch Electronics Div 107 Nat'l St Elgin Ill
Emerson Radio & Phono 14 & Coles Jersey City NJ
Empire Electronics 24625 John R St Hazel Park Mich
Entron Inc 4902 Lawrence St Bladensburg Md
Epco Electronics 140 Liberty St New York 6 NY
Equipto Aurora Ill
Erie Resistor Corp 644 W 12 St Erie 6 Pa
Erwood Inc 1770 W Berteau Ave Chicago 13 Ill
Esoteric Records 238 E 26 St New York 10 NY
Essex Wire Corp 1601 Wall St Ft Wayne 6 Ind
E-Z Hook Test Prods 1536 Woodburn Ave Covington Ky
E-Z Way Towers 5901 E Broadway Tampa Fla

Fada Radio & Electric Co. 525 Main St Belleville NJ
Fairbanks Co 393 Lafayette St New York NY
Fairchild Recording Equip 10-40 45 Ave Long Island City 1 NY
Fanon Electric Co 98 Berriman St Brooklyn 8 NY
Farnsworth Electronics Div IT&T 3302 E Pontiac St Ft Wayne 2 Ind
Fast Chemical Prods 65 Page Ave Yonkers 4 NY
Federal Anti Capacity Switch 72 Kingsley Buffalo 8 NY
Federal Electronics Rockville Centre NY
Federal Screw Prods 3917 N Kedzie Chicago 18 Ill
Federal Telephone & Radio 100 Kingsland Rd Clifton NJ
Federated Metals 120 Broadway New York 5 NY
Feller Eng'g & Mfg 8026 N Monticello Skokie Ill
Fenton Co 15 Moore St New York 4 NY
Ferris Business Equip Inc 45 Seymour St Startford Conn
Ferris Instrument Co 110 Cornelia St Boonton NJ
Ferrodynamics Corp Lodi NJ
Filtron Co 131-15 Fowler Ave Flushing 55 LI NY
Finney Co 34 W Interstate Bedford Ohio
Fisher Radio Corp 21-21 44 Dr Long Island City 1 NY
Flahan Co 7615 Lanyard Dr Cleveland 29 Ohio
Flexo Int'l Co 3245 W Lake St Chicago 24 Ill
Forest Electric Co 7216 Circle Ave Forest Park Ill
Forsberg Mfg 125 Seaview Ave Bridgeport 1 Conn
Freed Transformer Co 1718 Weirfield St Brooklyn 27 NY
Fretco Inc 406 N Craig St Pittsburgh 13 Pa
Futuramic Co 915 S Broadway Park Ridge Ill

Gahagan Inc Waterman Ave Esmond 17 RI
Garde Mfg Co 588 Eddy St Providence 3 RI
G-C Electronics Mfg 400 S Wyman Rockford Ill
Gee-Lar Mfg Co 418 S Wyman St Rockford Ill
General Cement Mfg 400 S Wyman St Rockford Ill
General Crystal Co Burlington Wisc
General Electric Apparatus Sales Div Schenectady 5 NY
General Electric Co Tube Dept Schenectady NY
General Electric Co Semiconductor Prod Dept 1224 W Genesee St Syracuse NY
General Electric Co Special Prods Div P O Box 1122 Electronics Park Syracuse NY
General Electric Co Radio-TV Dept Syracuse NY
General Electric Co Test Equip Sales Syracuse NY
General Industries Co Olive & Taylor Sts Elyria Ohio
General Instrument Corp 65 Gouverneur St Newark NJ
General Phones Corp 5711 Howe St Pittsburgh 32 Pa
General Transistor 91-27 138 PL Jamaica LI NY
Germanium Products 26 Cornelison Ave Jersey City 4 NJ
Gernsback Library 154 W 14 St New York 11 NY
Gerrard & Co A J 1950 Hawthorne Ave Melrose Park Ill
G & M Equip Co 7315 Verna Ave N Hollywood Calif
Gonset Co 801 S Main St Burbank Calif
Good-All Elec Mfg Co Ogallala Nebr
Gramer-Halldorson 2734 N Pulaski Chicago Ill
Granco Products Inc 36-07 20 Ave Long Island City NY
Graybar Electric Co 420 Lexington Ave New York NY
Grayhill Co 561 Hillgrove Ave LaGrange Ill
Grayline Eng'g Co 12243 Ave O Chicago 33 Ill
Gray Research & Devel 658 Hilliard Manchester Conn
Great Eastern Mfg Co 165 Remsen Ave Brooklyn 12 NY
Greene L Charlton 314 Washington Newton 58 Mass
Greenlee Tool Co 1887 Columbia Ave Rockford Ill
Guardian Electric 1621 W Walnut Chicago 12 Ill
Gudeman Co 340 W Huron St Chicago 10 Ill
Guide Lamp Div GMC 2915 Pendleton Ave Anderson Ind
Guild Radio TV 460 N Eucalyptus Inglewood 3 Calif
Gulton Industries 212 Durham Ave Metuchen NJ
Gusdorf & Son 6900 Manchester Ave St Louis 17 Mo

Hallicrafters Co 4401 W 5 Ave Chicago 24 Ill
Hamilton Electronics 2726 Pratt Ave Chicago 45 Ill
Hammarlund Mfg Co 460 W 34 St New York 1 NY
Harman-Kardon 520 Main St Westbury LI NY
Hartley Products Co 521 E 162 St New York 51 NY
Hastings Products 171 Newbury St Boston Mass
Hawkins Co P E 631 Prospect Kansas City 24 Mo
Haydon Mfg Co 245 E Elm St Torrington Conn
Haydon Switch Inc 536 S Leonard St Waterbury Conn
Haydu Bros of N J Box 1226 Plainfield NJ
Heath Co 305 Territorial Rd Benton Harbor Mich
Helix Rotor Co 413 Norwood St Marlin Texas
Heppner Mfg Co P O Box 612 Round Lake Ill
Hercules Chemical Co 416 Broadway New York 13 NY
Herman & Stephens 200 E 37 St New York 16 NY
Hevi Duty Electric 4212 W Highland Milwaukee 1 Wis
Hewlett-Packard Co 481 Page Mill Rd Palo Alto Calif
Hexacon Electric Co 161 W Clay Ave Roselle Park NJ
Hickok Electrical Instr 10514 Dupont Cleveland Ohio
Hillburn Electronic Products 55 Nassau Ave Brooklyn NY
Hi Lo TV Antenna Corp 1122 N Newport Chicago 13 Ill
Hinners-Galanek Radio 25-14 Bdwy Long Island City NY
Hi-Par Products Co 347 Lunenburg St Fitchburg Mass
Hitemp Wires Inc 26 Windsor Ave Mineola LI NY
HMH TV Industries 746 N Pickering Whittier Calif
Hobson Bros 4940 W Lawrence Ave Chicago 30 Ill
Hoffman Electronics 3761 S Hill St Los Angeles Calif
Hoffman Electronics Corp Nat'l Fabricated Prods Div 2650 W Belden Chicago Ill
Hoffman Electronics Corp Semiconductor Div Evanston Ill
Holloway Electronics Corp Fort Lauderdale Fla
Holub Industries 413 DeKalb Ave Sycamore Ill
Hotpoint Co 227 S Seeley Chicago 12 Ill
Hubbell Inc Harvey State & Bostwick Bridgeport Conn
Hubbell Mfg Co H L 101 N State St Zeeland Mich
Hudson Lamp Co 528 Elm St Kearny NJ
Hudson Wire Co Winsted Div Winsted Conn
Hughes Aircraft Int'l Airport Los Angeles Calif
Hughes Products Electron Tubes Int'l Airport Station Los Angeles 45 Calif
Hunter Sales Co R W Box 564 Whittier Calif
Hupp Electronics 743 Circle Ave Forest Park Ill
Hycon Electronics 1030 S Arroyo Pkwy Pasadena Calif
Hy-Gain Antenna Products 1828 N St Lincoln Nebr

IDEA Inc 7900 Pendleton Pike Indianapolis 26 Ind
Ideal Industries 5106 Park Ave Sycamore Ill
IE Mfg 325 N Hoyne Ave Chicago 12 Ill
Illinois Condenser Co 1616 N Throop St Chicago 22 Ill
Illinois Transformer Co 412 S Green St Chicago 7 Ill
Industrial Condenser Corp 3243 N Calif Ave Chicago Ill
Industrial Development 17 Pollock Ave Jersey City NJ
Industrial Instruments 89 Commerce Rd Cedar Grove NJ
Industrial Radio Corp 428 N Parkside Ave Chicago Ill
Industrial Test Equip Co 55 E 11 St New York 3 NY
Instrument Labs 315 W Walton Pl Chicago 10 Ill
Instrument Resistors Co 1036 Commerce Ave Union NJ
Insuline Corp of America 186 Granite St Manchester NH
Interelectronics Corp 2432 Grand Concourse New York
Int'l Business Machines Kingston NY
Int'l Electronics Corp 2649 Brenner Dr Dallas 20 Texas
Int'l Radio & Electronics Box 123 Route 4 Elkhart Ind
Int'l Rectifier Corp 1521 E Grand Ave El Segundo Calif
Int'l Register 2620 W Washington St Chicago 12 Ill
Int'l Research Assoc 2221 Warwick Santa Monica Calif
Int'l Resistance 401 N Broad St Philadelphia 8 Pa
Irwin Products 4937 N Damen Ave Chicago 45 Ill
Isolantite Mfg Corp Warren Ave Stirling NJ
ITE Circuit Breaker 19 & Hamilton Philadelphia Pa

Jackson Electr Instrument 18 S Patterson Dayton Ohio
James Instrument Labs 9110 S 52 Ct Oak Lawn Ill
James Vibrapowr Co 4050 N Rockwell Ave Chicago 18 Ill
Jan Hdw Mfg Co 75 N 11 St Brooklyn 11 NY
Jansa Woodworking Corp 315 Meserole St Brooklyn NY
Javex PO Box 646 Redlands Calif
Jensen Industries Inc 7333 W Harrison Forest Park Ill
Jensen Mfg 6601 S Laramie Chicago Ill
Jerrold Electronics Corp 2222 Chestnut Philadelphia Pa
Jersey Specialty Co Burgess Pl Mountainview NJ
JFD Mfg Co 6101 16 Ave Brooklyn 4 NY
Johns-Manville Dutch Brand Div 7800 Woodlawn Chicago
Johnson Co E F 3110 2 Ave S W Waseca Minn
Jones & Laughlin Steel Corp 3 Gateway Pittsburgh 30 Pa
Jontz Mfg Co 1101 E McKinley Ave Mishawaka Ind
Jordon Mfg Co Morrice Mich

Kaar Eng'g Corp 2995 Middlefield Rd Palo Alto Calif
Karlson Assoc 1610 Neck Rd Brooklyn 29 NY
Kay Electric Co 14 Maple Ave Pine Brook NJ
Kay-Townes Antenna Co 1511 Dean Ave Rome Ga
Kedman Co 233 S 5th St West Salt Lake City 1 Utah
Kellogg Switchboard 79 W Monroe St Chicago Ill
Kemtron Electron Prods 14 Prince Pl Newburyport Mass
Kenwood Eng'g Co 265 Colfax Ave Kenilworth
Kepco Labs 131-38 Sanford Ave Flushing 55 NY
Koster Solder Co 4201 Wrightwood Ave Chicago Ill
Keystone Electronics 423 Broome St New York NY
Kings Electronics Co 40 Marbledale Rd Tuckahoe NY
Kingston Electronic Corp 17 Tudor St Cambridge 39 Mass
Kin-Tel (Formerly Kay Lab) 5725 Kearny Villa Rd San Diego 11 Calif
Kirsch Music Corp 797 8 Ave New York 19 NY
Kit-Tronics 2315 Hendola Dr N E Albuquerque NM
Kleer-Vue Mfg Co PO Box 10304 Pittsburgh 34 Pa
Klein & Sons Mathias 7200 McCormick Chicago 45 Ill
Klipsch & Associates PO Box 64 Hope Ark
Knights Co James Sandwich Ill
Koiled Kords Inc 100 Pershing St New Haven 14 Conn
Kraeuter & Co 563 18 Ave Newark 3 NJ
Krohn-Hite Instrument 580 Mass Ave Cambridge Mass
Krylon Inc 18 W Airy St Norristown Pa
KTV Tower & Comm Equip 5520 South Shore Dr Chicago Ill
Kuhn Electronics 1801 Mills Ave Norwood 12 Ohio
Kurman Electric 191 Newel St Brooklyn 22 NY
Kwikheat Mfg 3732 San Fernando Rd Glendale Calif

Lampkin Labs Bradenton Fla
Langevin Mfg 47-37 Austell Pl Long Island City 1 NY
Lansing Sound J B 2439 Fletcher Dr Los Angeles Calif
LaPointe Electronics 155 W Main St Rockville Conn
Lectrohm Inc 5560 Northwest Hwy Chicago 30 Ill
Leitch Eng'g Corp 326 Lincoln St Manchester NH
Leland Inc G H 123 Webster St Dayton 2 Ohio
Lenk Mfg Co 30-38 Cummington St Boston 15 Mass
Lerco Electronics Inc 501 S Varney St Burbank Calif
Lindgren & Assoc E A 4515 N Ravenswood Chicago Ill
Lipps E A 5485 W Washington Los Angeles 16 Calif
Littelfuse Inc 1865 Miner St Des Plaines Ill
Livingston Electronic Corp 27 Runnymede Rd Essex Falls NJ
Loge Sound J M 2171 W Washington Los Angeles Calif
Lowell Mfg Co 3030 Laclede Station Rd St Louis 17 Mo
Luper & Sundberg Avon Ill
Luxo Lamp Corp 102 Columbus Ave Tuckahoe NY
Lynmar Engrs 1432 N Carlisle St Philadelphia 21 Pa

McGohan Inc Don 3700 W Roosevelt Rd Chicago 24 Ill
McGraw-Hill Book Co 330 W 42 St New York 36 NY
McGregor Electronic Industries McGregor Iowa
McIntosh Lab Inc 2 Chambers St Binghamton NY
McKee Door Co 85 Hankes Ave Aurora Ill
MacMillan Co 60 S 5 Ave New York 11 NY
Madison Fielding Corp 863 Madison St Brooklyn 21 NY
Magnadyne Co Box 607 Port Chester NY
Magnasync Mfg 5546 Satsuma Ave N Hollywood Calif
Magnavox Co 2131 Bueter Rd Ft Wayne 4 Ind
Magnecord Inc 1101 S Kilbourn Ave Chicago 24 Ill
Majestic Int'l Sales 79 Washington St Brooklyn 1 NY
Major Brand Tube Romano Bldg Harrison NJ
Major Electronics 762 Wythe Ave Brooklyn 11 NY
Malco Tool & Mfg Co 4025 W Lake St Chicago 24 Ill
Mallory & Co P R 3029 E Wash Indianapolis Ind
Marantz Co 44-15 Vernon Blvd Long Island City 1 NY
Marathon Battery Co 840 Henrietta St Wausau Wisc
Marco Industries 3 & Franklin Sts Womelsdorf Pa
Marjo Technical Prods 1150 E Henry St Linden NJ
Markell Associates Jeff 764 6 Ave New York 10 NY
Master Mobile Mounts 1306 Bond Los Angeles Calif
Mastra Co 2104 Superior Ave Cleveland 14 Ohio
Matchless Electric 1700 Washington Chicago 12 Ill
Mattison TV & Radio 10 W 181 New York 53 NY
Measurements Corp Div Thomas Edison Boonton NJ
Medal Mfg Co P O Box 292 Sharon Pa
Memco Aerial Ladder 1007 NW 36 Oklahoma City Okla
Mercury Scientific Prods 1725 W 7 St Los Angeles 17 Calif
Merit Coil & Transformer 4427 N Clark Chicago Ill
Meritenna Mfg Co 120 W Thomas St Seattle 99 Wash
MeRix Chemical Co 1021 E 55 St Chicago 15 Ill
Metal Treating Equip 9825 Greeley Ave Detroit 11 Mich
Meters Inc 5353 N Keystone Ave Indianapolis 20 Ind
Metzner Eng'g 1041 N Sycamore Ave Hollywood 38 Calif
Micamold Electronics 1087 Flushing Ave Brooklyn NY
Michigan Electronics 854 N Rockwell St Chicago 22 Ill
Mico Instrument 80 Trowbridge Cambridge 38 Mass
Micro-Circuits Co New Buffalo Mich
Micro Switch Div Minn-Honeywell Regulator Freeport Ill
Microtran Co 145 E Mineola Ave Valley Stream NY
Midwest Naturlite Co 6651 N Clark St Chicago 26 Ill
Miller Co J W 5917 S Main St Los Angeles 3 Calif
Miller Co Sanford 691 Bedford Ave Brooklyn 6 NY
Miller Electronics 2840 Naomi St Burbank Calif
Miller Electro-Research 5529 S 5 St Milwaukee Wisc
Miller Mfg Co M A 4 & Church St Libertyville Ill
Millers Falls Co 57 Wells St Greenfield Mass
Milwaukee Resistor 700 W Virginia Milwaukee 4 Wisc
Milwaukee Truck Co 250 N 12 St Milwaukee 3 Wisc
Minn-Honeywell Reg Co Transistor Div 2753 4 Ave S Minneapolis 8 Minn
Minn Mining & Mfg 900 Fauquier Ave St Paul Minn
Mitchell Industries PO Box 17 Mineral Wells Texas
Mobil Electronics 1111 State Rd 67 E Anderson Ind
Modern-Aire Mfg 4436 W Roosevelt Rd Chicago Ill
Mohawk Wire & Cable Corp 320 River St Fitchburg Mass
Moody Machine Products 42 Dudley St Providence 5 RI
Morrow Radio Mfg Co 2794 Market St Salem Ore
Mosley Electronics 8622 St Charles Rock St Louis Mo

Motorola Inc 4543 Augusta Blvd Chicago 51 Ill
MP Eng'g Co Fairfield 3 Conn
Muckle Mfg Co Owatonna Minn
Mucon Corp 9 St Francis St Newark 5 NJ
Mueller Electric Co 1583 E 31 St Cleveland Ohio
Munston Mfg & Service Beech St Islip NY
Mutual Electronic Industries 85 Beechwood Ave New Rochelle NY

Nat'l Carbon Co 30 E 42 St New York 17 NY
Nat'l Co 61 Sherman St Malden 48 Mass
Nat'l TV Tube Inc Highway 46 Saddle Brook NJ
Nat'l Video Corp 4300 W 47 St Chicago 32 Ill
Network Mfg Corp 213 W 5 St Bayonne NJ
Newcastle Fabrics 80 Wythe Ave Brooklyn 11 NY
Newcomb Audio Prods 6824 Lexington Hollywood Calif
New England Electrical Works 365 Main St Lisbon NH
New London Instrument 82 Union New London Conn
New York Coil Co 40 2 Ave Phoenixville Pa
New York Institute of Technology 500 Pacific St Brooklyn NY
Nichols Wire 1725 Rockingham Rd Davenport Iowa
Non-Linear Systems Del Mar Airport Del Mar Calif
North American Philips Co 100 E 42 St New York NY
North Hills Electric Co 402 Sagamore Ave Mineola LI NY
Nucleonic Co of America 196 Degraw St Brooklyn 31 NY
Nutronics Inc 520 W Michigan Ave Chicago 11 Ill
Nylok Corp 611 Industrial Ave Paramus NJ

Oak Mfg Co 1260 Clybourn Ave Chicago 10 Ill
O'Brien Electric 6514 Santa Monica Hollywood Calif
Oelrich Publications 4308 Milwaukee Ave Chicago 41 Ill
Ohmite Mfg Co 3601 Howard St Skokie Ill
Olympic Radio-TV 34-01 38 Ave Long Island City NY
Orradio Industrial 120 Marvyn Rd Opelika Ala
Ortho Filter Corp 196 Albion Ave Paterson 2 NJ
Oryx Sales Co 9015 Wilshire Blvd Beverly Hills Calif
Overhead Door Corp Hartford City Ind
Oxford Electric Corp 3911 S Michigan Blvd Chicago 15 Ill

Pacific Transducer 11836 W Pico Los Angeles Calif
Packard-Bell 12333 W Olympic Blvd Los Angeles Calif
Paco Electronics 70-31 84 St Glendale 27 NY
Palmer Inc M V 4002 Fruit Valley Rd Vancouver Wash
Paraplegics Mfg 10068 Franklin Ave Franklin Park Ill
Parker Metal Goods Co 220 5 Ave New York NY
Pedersen Electronics PO Box 572 Lafayette Calif
Peerless Prods Industries 812 N Pulaski Chicago 51 Ill
Peirce Dictation 5900 N Northwest Hwy Chicago 31 Ill
Penn-Tran Corp Bellefonte Pa
Pennwood Numechron 7249 Frankstown Ave Pittsburgh Pa
Pentron Corp 777 S Tripp Ave Chicago 24 Ill
Perfection Mica Co 20 N Wacker Dr Chicago Ill
Permacel Tape Corp Highway US #1 New Brunswick NJ
Perma-Power Co 4727 N Damen Ave Chicago 25 Ill
Permo Inc 6415 N Ravenswood Ave Chicago 26 Ill
Peschel Electronics 13 Garden St New Rochelle NY
Pfanstiehl Chemical Corp 104 Lake View Waukegan Ill
Phalo Plastics Corp 25 Foster St Worcester 8 Mass
Phaostron Instrument & Electronic Co S Pasadena Calif
Philco Corp Tioga & C Sts Philadelphia Pa
Philco Corp Access Div A & Allegheny Philadelphia 34 Pa
Philmore Mfg Co 113 University Pl New York 3 NY
Philson Mfg Co 60 Sackett St Brooklyn NY
Photocircuits Corp Sea Cliff Ave Glen Cove NY
Photo Crystals Inc 15 S 1 St Geneva Ill
Pickering & Co 309 Woods Ave Oceanside LI NY
Pilot Radio Corp 37-06 36 St Long Island City NY
Pipestone Sales Co Box 311 Pipestone Minn
Planet Sales Corp 225 Belleville Ave Bloomfield NJ
Plastic Capacitors 2620 N Clybourn Ave Chicago Ill
Plastic Mold & Eng'g 157 Clifford St Providence RI
Plastoid Corp 42-61 24 St Long Island City NY
Polymer Corp 2120 Fairmont Ave Reading Pa
Polytronic Research 7660 Woodbury Dr Silver Spring Md
Pomona Electronics Co 1126 W 5 Ave Pomona Calif
Portable Elec Tools 320 W 83 St Chicago 20 Ill
Potter & Brumfield Princeton Ind
Powers Co J J 1317 S 5 Ave Maywood Ill
Precise Development 2 Neil Court Oceanside LI NY
Precision Apparatus Co 70-31 84 St Glendale 27 LI NY
Precision Electronics 9101 King Ave Franklin Park Ill
Precision Equip 3716 Milwaukee Chicago 41 Ill
Precision Radiation Instr 4223 W Jefferson Los Angeles Calif
Premax Products Niagara Falls NY
Premier Metal Products Co 337 Manida St New York 59 NY
Prentice-Hall Pub Co 70 5 Ave New York NY
Presto Recording Corp PO Box 500 Paramus NJ
Proto Tools 2209 S Santa Fe Los Angeles 54 Calif
Pyramid Electric Co 1445 Hudson Blvd North Bergen NJ

Quam-Nichols Co 234 E Marquette Rd Chicago 37 Ill
Quietrole Co 395 St John St Spartanburg SC
Q-Line Mfg Corp 1562 61 Brooklyn 19 NY

Radiart Corp 3455 Vega Ave Cleveland 13 Ohio
Radio City Products Co Centre & Glendale Sts Easton Pa
Radio Condenser Co Davis & Copewood Sts Camden NJ
Radio Corp of America Camden NJ
Radio Corp of America RCA Tube Div Harrison NJ
Radio Craftsmen Div Precision Radio Instr 4223 W Jefferson Blvd Los Angeles Calif
Radio Devel & Research 100 Penna Ave Paterson 3 NJ
Radio Merchandise Sales 2016 Bronxdale New York NY
Radio Music Corp 84 S Water St Port Chester NY
Radion Corp 1130 W Wisconsin Ave Chicago 14 Ill
Radionic Div Raven Electronics 3215 W North Ave Chicago 47 Ill
Radio Receptor Co 240 Wythe Ave Brooklyn 11 NY
Radix Wire Co 26260 Lakeland Blvd Cleveland 32 Ohio
Ram Electronics 600 Industrial Ave Paramus NJ
Ramsey Radio & TV Co 925 St Louis Ave Vandalia Ill
Rapid Electric Co 2881 Middletown Rd Bronx 61 NY
Rauland-Borg Corp 3515 W Addison St Chicago 18 Ill
Rauland Corp 4245 N Knox Ave Chicago Ill
Rayline Inc 307 Willis Ave Mineola NY
Ray-O-Vac Co 212 E Washington St Madison 10 Wisc
Ray-Par Inc 7810 W Addison St Chicago 13 Ill
Raytheon Mfg Co Equip Sales Waltham Mass
Raytheon Mfg Co 55 Chapel St Newton 58 Mass (Receiving and Cathode Ray Tube Operations)
R-Columbia Products Co 305 Waukegan Ave Highwood Ill
Recoton Corp 52-35 Barnett Ave Long Island City 4 NY
Reed & Reese 717 N Lake Ave Pasadena Calif
Reeves Soundcraft Corp 10 E 52 St New York 22 NY
Rego Insulated Wire Co 830 Monroe St Hoboken NJ
Reiter Co F 3340 Bonnie Hill Dr Hollywood 28 Calif
Rek-O-Kut Co 38-01 Queens Blvd Long Island City 1 NY
Reon Resistor Corp 117 Stanley Ave Yonkers NY
Research Inventions 617 F St NW Washington 1 DC
Resistance Products Co 914 S 13 St Harrisburg Pa
Resistors Inc 5226 W 26 St Chicago 50 Ill
Revere Camera Co 320 E 21 St Chicago Ill
Rhodes & Sons M M 12 Porter St Taunton Mass
Richards Electrocraft 3751 N Kedzie Ave Chicago Ill
Richards-Wilcox Mfg 174 3 St Aurora Ill
Rider Publisher Inc John F 116 W 14 St New York NY
Rinehart & Co 232 Madison Ave New York 16 NY
R K Mfg Co PO Box 112 Marion Ill
Robertson & Roth Box 534 Elmhurst Ill
Robins Industries Corp 214-26 41 Ave Bayside 61 NY
Robot Appliances 7041 Orchard Dearborn Mich
Roche Co Paul C 11 Park Place New York 7 NY
Rockbar Corp 650 Halstead Mamaroneck NY
Rodale Mfg Co Emmaus Pa
Rogers Electronic Corp 49 Bleecker St New York 12 NY
Rohn Mfg Co 116 Limestone Bellevue Peoria 5 Ill
Ronette Sales 190 Earle Ave Lynbrook NY
Royal Electric Co 95 Grand Ave Pawtucket RI
Rye Sound Corp 21 Rye Rd Rye NY

S & A Electronics 1025 Nevada St Toledo 5 Ohio
Safey Nall Driver 70 Rosalie Ave Clifton NJ
Sams & Co Howard W 2201 E 46 St Indianapolis 5 Ind
Sangamo Electric 11 & Converse Sts Springfield Ill
Sargent-Rayment 4926 E 12 St Oakland 1 Calif
Saxonburg Ceramics Box 157 Saxonburg Pa
Saxton Products 1661 Boone Ave Bronx 60 NY
Scala Radio Co 2814 19 St San Francisco Calif
Schauer Mfg 4500 Alpine Ave Cincinnati 36 Ohio
Scientific Coil Co 5619 Broadway Chicago 40 Ill
Scott Inc H H 385 Putnam Ave Cambridge 39 Mass
Seco Mfg Co 5015 Penn Ave S Minneapolis 19 Minn
Self-Lifting Piano Truck Co Findlay Ohio
Sel-Son Electronics Darby Pa
Semon Bache & Co 636 Grenwich St New York 14 NY
Sequoia Process Corp 2201 Ray Rd Redwood City Calif
Service Instruments Co 171 Official Rd Addison Ill
Service Parts Sys 13380 E 9 Mile Rd E Detroit Mich
Setchell-Carlson New Brighton St Paul 12 Minn
Shallcross Mfg Co 520 Pusey Ave Collingdale Pa
Sherwood Electronic Labs 2802 W Cullom Chicago 18 Ill
Shure Bros 222 Hartrey Ave Evanston Ill
Shurite Meters 61 Hamilton St New Haven Conn
Sightmaster Corp 111 Cedar St New Rochelle NY
Signalite Inc 37-41 Neptune Hwy Neptune NJ
Simpson Electric Co 5208 W Kinzie St Chicago 44 Ill
Simpson Mfg Mark 32-29 49 St Long Island City 3 NY
Skottie Elecronics Inc 204 Bridge St Peckville Pa
Sky Ray Mfg Co 109 Heard St McLeansboro Ill
Sittler Corp 18 N Ada St Chicago 7 Ill
Smith Inc H H 2326 Nostrand Ave Brooklyn 10 NY
Smolin Labs 721 Walton Ave New York 51 NY
Snyder Mfg Co 22 & Ontario Sts Philadelphia Pa
Sola Electric Co 4633 W 16 St Chicago 50 Ill
Sonex Inc 73 S State Rd Upper Darby Pa
Sonora Radio & TV 325 N Hoyne Ave Chicago 12 Ill
Sonotone Corp Elmsford NY
Sound Apparatus Co Main St Stirling NJ
Soundoller Inc P O Box 3848 St Louis 22 Mo
South River Metal Prods 377 Turnpike South River NJ
Sparton Electronics 2400 E Ganson St Jackson Mich
Spaulding Products Co 550 W Barner St Frankfurt Ind
Specialty Eng'g & Electronics 79 Clifton Pl Brooklyn NY
Speedway Mfg Co 1834 S Laramie Ave Cicero 50 Ill
Spencer-Kennedy 1320 Soldiers Field Rd Boston 35 Mass
Spirling Products Henrietta St & Duffy Hicksville NY
Sprague Products Co North Adams Mass
Sprayway Inc 7644 Vincennes Ave Chicago 20 Ill
Stackpole Carbon Electronic Components Div St Marys Pa
Stancil-Hoffman 921 N Highland Ave Hollywood 38 Calif
Standard Coil Prods 2085 N Hawthorne Melrose Park Ill
Standard Electrical Products 2240 E 3 St Dayton 3 Ohio
Standard Pressed Steel Box 394 Jenkintown Pa
Standard TV Tube 706 Dryades St New Orleans 12 La
Stanley Works Hdw Div 195 Lake St New Britain Conn
Starbeam Co P O Box 5087 Waco Texas
Star Expansion Products 142 Liberty St New York 6 NY
States Co 19 New Park Ave Hartford 6 Conn
Stephens Trusonic 8538 Warner Dr Culver City Calif
Sterling Mfg Co 7201 Wentworth Ave Cleveland Ohio
Sterling Transformer 297 N 7 St Brooklyn 11 NY
Stevens Products 86 Main St E Orange NJ
Stevens Walden 400 Shrewsbury St Worcester 4 Mass
Stone City Machine & Tool 1206 7 St Bedford Ind
Stromburg Carlson Special Prods Cir 1700 University Ave Rochester 10 NY
Superex Electronics Corp 4-6 Radford Pl Yonkers NY
Superior Instrument 2435 White Plains Rd New York NY
Supreme Instrument Corp PO Box 552 Greenwood Miss
Supreme Publications 1760 Balsam Rd Highland Park Ill
Swedgal M 258 Broadway New York 7 NY
Switchcraft Inc 1328 N Halsted St Chicago 22 Ill
Sylvania Electric Products 1740 Bdwy New York 19 NY
Symphonic Radio & Phono Co 160 Washington St N Boston 8 Mass

Talk-A-Phone Co 1512 S Pulaski Rd Chicago 23 Ill
Talkmaster Inc 534 Laurel St San Carlos Calif
Tannoy (America) Ltd 38 Pearl St New York 4 NY
Tape of the Month Club 449 W 51 St New York NY
Tarzian Inc Sarkes 415 N College Ave Bloomington Ind
Tayloreel Corp 185 Murray St Rochester 6 NY
Tech-Master Corp 75 Front St Brooklyn 1 NY
Technicraft Co 1156 Commonwealth Ave Boston 34 Mass
Tech-Ohm Resistor 36-11 33 St Long Island City NY
Technical Apparatus Builders 108 Liberty New York NY
Technical Appliance Corp 1 Taco Ave Sherburne NY
Technical Material Corp Mamaroneck NY
Techniques Inc 178 Central Ave Hackensack NJ
Tektronix Inc P O Box 831 Portland 7 Ore
Telechrome Mfg 28 Renick Dr Amityville NY
Teleeom Inc 1019 Admiral Blvd Kansas City 8 Mo
Telectro Industries 35-16 37 St Long Island City NY
Telematic Industries Inc 16 Howard Ave Brooklyn 21 NY
Teletenna Co 1033 Indiana Ave La Paz Ind
Tele-Test Instrument 92-24 Queens Blvd Rego Park NY
Teletone Co of America 1178 E 180 St New York NY
Teletronic Labs 1835 W Rosecrans Ave Gardena Calif
Televex Co 46 Lakeview Ave Yonkers NY
Televiso Corp 1415 Golf Rd Des Plaines Ill
Tele-Vue Towers 701 49 St S St Petersburg 7 Fla
Telex Inc 1633 Eustis St St Paul Minn
Tel-Instrument Electronics 728 Garden St Carlstadt NJ
Telkor Inc PO Box 186 Elyria Ohio
Telonic Industries 73 N 2 Ave Beech Grove Ind
Telrex Labs Hwy 35 Asbury Park NJ
Telvision Labs Wauconda Ill
Tennalab 417 S 10 St Quincy Ill
Tenna Mfg Co 7580 Garfield Bldg Cleveland 25 Ohio
Tenna Tronics Ltd 1011 Power Ave Cleveland 14 Ohio
Tensitron Inc 28 Depot Rd Harvard Mass
Terado Co 1068 Raymond Ave Depot 2 St Paul 14 Minn
Tetrad Corp 62 St Marys Ave Yonkers 2 NY
Teveo Insulated Wire 108 E Prospect Burbank Calif
Texas Crystals Div Westronix Corp River Grove Ill
Texas Instruments Inc 6000 Lemmon Ave Dallas 9 Texas
Thermador Electrical Mfg Co Electronics Div 2000 Camfield Ave Los Angeles 22 Calif
Thomas Electronics 118 9 St Passlac NJ
Thompson-Bremer 520 N Dearborn St Chicago 10 Ill
Thompson Prods Electr Div 2196 Clarkswood Cleveland 0
Thordarson Meissner Mt Carmel Ill
Thorens Co New Hyde Park NY
Tipco Mfg 14760 Calvert St Van Nuys Calif
Todd-Tran Corp 156 Gramatan Ave Mt Vernon NY
Toman & Co E 8700 W 47 St Lyons Ill
Tork Time Controls 1 Grove St Mt Vernon NY
Transformer Metal Prods 35 York St Brooklyn 1 NY
Transistor Products 241 Crescent St Waltham 54 Mass
Transitron Electronic 168 Albion St Wakefield Mass
Transvision Inc 460 North Ave New Rochelle NY
Trav-Ler Radio 571 W Jackson Blvd Chicago 6 Ill
Tresco Inc 3824 Terrace St Philadelphia 28 Pa
Triad Transformer Corp 4055 Redwood Ave Venice Calif
Trico Fuse Mfg Co 2948 N 5 St Milwaukee 12 Wisc
Tricraft Products 1535 N Ashland Ave Chicago 22 Ill
Tri-Dex Electronics PO Box 1207 Lindsay Calif
Trio Mfg Co Griggsville Ill
Triplett Electrical Instrument Bluffton Ohio
Triton Mfg Co E Haddam Conn
Tru-Ohm Products Div Model Eng & Mfg Co 2800 N Milwaukee Ave Chicago 18 Ill
Trutone Electronics 812 N Highland Ave Hollywood Calif
Tung-Sol Electric Inc 95 8 Ave Newark 4 NJ
Turner Brass Works 821 Park St Sycamore Ill
Turner Co 909 17 NE Cedar Rapids Iowa
TV Development 187-61 Hollis Ave Hollis 23 NY
TV Remote Control 820 N Fairfax Ave Los Angeles Calif

U M & F Mfg 10929 Vanowen St N Hollywood Calif
Ungar Electric Tool Co PO Box 312 Venice Calif
Union Plastics 1627 Paterson Plant Rd Secaucus NJ
United Audio Prods 202 E 19 New York NY
United Catalog Publishers 60 Madison Ave Hempstead NY
United Electric Controls 85 School Watertown Mass
United Electronic Mfg Corp 542 39 St Union City NJ
United Motor Service Div GMC Gen'l Motors Bldg Detroit
United Transformer Co 150 Varick St New York 13 NY
Universal Circuit Controls 3610 Oakton St Skokie Ill
Universal Microphone 424 Warren Lane Inglewood Calif
Universal Products 4100 Taylor Ave Racine Wisc
University Loudspeakers 80 S Kensico White Plains NY
U S Products Inc 1549 Hutchins St Columbus Ind
U S Recording 1121 Vermont NW Washington 5 DC
U S Relay Co 1744 Albion St Los Angeles 31 Calif
U S Wire & Cable Co Progress Ave & Monroe Union NJ
Utah Radio Products 1123 E Franklin Huntington Ind
Utica Drop Forge & Tool 2415 Whitesboro Utica 4 NY
Utilities Service Co 1 Pine St Allentown Pa

Vaco Products Co 317 E Ontario St Chicago 11 Ill
Valpey Crystal Corp 1244 Highland St Holliston Mass
Vanguard Instruments Corp Valley Stream NY
Van Nostrand Co D 120 Alexander St Princeton NJ
Vector Electronic 3352 San Fernando Los Angeles Calif
Vemaline Products Co PO Box 222 Hawthorne NJ
Victor Electric Wire & Cable 618 Main St W Warwick RI
Victor Insulators Inc Maple Ave Victor NY
Vidaire Electronics Mfg 576 W Merrick Rd Lynbrook NY
Video Accessory Mfg 205 S Houston Tulsa 1 Okla
Videon Electronic 902 E Mich St Indianapolis 2 Ind
Viking of Minn Inc 3520 E 43 St Minneapolis 6 Minn
Vis-U-All Corp 3325 W Bryn Mawr Ave Chicago 45 Ill
V-M Corp 280 Park St Benton Harbor Mich
Vocaline Co of America Coulter St Old Saybrook Conn
Vokar Corp 7300 Huron River Dr Dexter Mich
Volpar 4404 W 22 St Panama City Fla
Vulcan Electric Co 88 Holten St Danvers Mass
Vulcan TV Mast & Tower P O Box 6537 Birmingham 7 Ala

Waldom Electronics 4625 W 53 St Chicago Ill

Wallaces Telaides 136 Day St Jamaica Plain Mass
Wall Mfg Co P Grove City Pa
Walsco Electronic 3225 Exposition Pl Los Angeles Calif
Ward Leonard Electric Co Mt Vernon NY
Ward Prods Div Gabriel 1148 Euclid Cleveland Ohio
Warren Corp 21 Hanse Ave Freeport NY
Wassco Electric Prods 204 S Larkin Ave Joliet Ill
Waterman Products 2445 Emerald St Philadelphia Pa
Waters Mfg P O Box 368 S Sudbury Mass
Waveforms Inc 333 6 Ave New York 14 NY
Weathers Industries 66 E Gloucester Pike Barrington NJ
Webster-Chicago 5610 W Bloomingdale Chicago 39 Ill
Webster Electric Co 1900 Clark St Racine Wisc
Welco Mfg Co 225 S 3 St Burlington Iowa
Weller Electric 601 Stone's Crossing Rd Easton Pa
Wells-Gardner & Co 2701 N Kildare Ave Chicago 39 Ill
Wen Products Inc 5806 Northwest Hwy Chicago 31 Ill

Werner Co R D 295 5 Ave New York 16 NY
Western Coil & Electrical Co 215 State St Racine Wisc
Westinghouse Electric Corp Metuchen NJ
Westinghouse Electric Corp PO Box 284 Elmira NY
Weston Electrical Instrument Corp Subsidiary Daystrom Inc 614 Frelinghuysen Ave Newark 12 NJ
Wheeler Insulated Wire Co Div Sperry Rand Corp 150 E Aurora St Waterbury 20 Conn
White Electrola 7517 N Clark St Chicago 26 Ill
Whitley Electronics 411 S Chauncey St Columbia City Ind
Wilco Corp 546 Drover St Indianapolis 21 Ind
Wilcox-Gay Corp Charlotte Mich
Wiley & Sons John 440 4 Ave New York 16 NY
Willard Storage Battery 246 E 131 Cleveland Ohio
Wind Turbine Co E Market St & Penna RR W Chester Pa
Winegard Co 3000 Scotten Blvd Burlington Iowa

Winston Electronics 4312 Main St Philadelphia 27 Pa
Wirt Co 5221 Green St Philadelphia 44 Pa
Workman TV Inc 309 Queen Anne Rd Teaneck NJ
Worner Electronic Devices Rankin 1 Ill
Wright Inc 2235 University Ave St Paul Minn
Wright Steel & Wire 243 Stafford St Worcester 3 Mass
Wuerth Tube-Saver Corp 9125 Livernois Ave Detroit Mich
Wunderlich Radio 2 5 Ave New York 11 NY

Xcelite Inc 19-42 Bank St Orchard Park NY

Yardney Electric Corp 40 Leonard St New York 13 NY
Yeats Appliance Dolly 2124 N 12 St Milwaukee 5 Wisc

Zenith Radio Corp 6001 Dickens Ave Chicago 39 Ill
Zierick Mfg Beechwood & Rockdale New Rochelle NY
Z & W Mfg Corp 30240 Lakeland Blvd Wickliffe Ohio

Technician Associations — 1957 Roster

with name of secretary unless otherwise noted

ALABAMA

GADSEN—Radio & TV Technicians' Guild 404 N 16 St Guy Brooks

ARIZONA

PHOENIX—Better Electronic Service Technicians P O Box 1284 Bob Eisenstein

ARKANSAS

FT SMITH—Ft Smith Radio & TV Technicians Assn P O Box 133 Charles Erwin
N LITTLE ROCK—TV Service Assn of Ark P O Box 542 H T Hicks

CALIFORNIA

ANAHEIM—Radio-TV Assn of Orange County P O Box 105 Geo Morgan
ARLINGTON—Citrus Belt Radio-TV Technicians Assn P O Box 74 A Kirstein
BAKERSFIELD—TV Service Assoc of Kern County P O Box 553 Gordon Coburn
GLENDALE—Society of Radio-TV Technicians Box 1669 Jim Mendell
LONG BEACH—Long Beach Radio-TV Technicians Assn P O Box 4085 Vern Edwards
LOS ANGELES—Electric League of Los Angeles 2508 W Olympic Floyd Lovelace
LOS ANGELES—Society of TV Engineers 11840 W Olympic Blvd B S Angwin Press
MENLO PARK—TV Service Dealers Assn of San Mateo City c/o TV Service 3255 Middlefield Rd
MONTEREY PARK—RTTA-Pasadena c/o Ben Leff 215 E Garvey Ave
OAKLAND—TV & Radio Assn of Alameda Co 4223 E 14 St F W Rock
POMONA—Pomona Valley Radio Technicians Assn P O Box 567 Dave Laycox
RICHMOND—TV & Radio Servicemen's Assn of Costa Cty H E Power
SAN CARLOS—TV Service Dealers Assn (TSDA) P O Box 801 Jack Gardiner
SANTA CLARA—Radio & TV Assn of Santa Clara Valley 2428 Prune Ridge Ave Jim Wright
SANTA PAULA—Radio Electronic Specialists Assn 622 Main St Robt Simmons
VALLEJO—North Bay Radio & TV Assn P O Box 52 Rudy Wessel
VAN NUYS—Society of Radio-TV Technicians P O Box 126 A J Meyer Pres

COLORADO

COLORADO SPRINGS——Radio-TV Technicians Assn 2530 W Colo Ave R C Storm
PUEBLO—Pueblo Radio Servicemen's Assn P O Box 1314 G E Nix

CONNECTICUT

HARTFORD—TV Service Assn of Conn P O Box 1711 Dean Gould
MANCHESTER—TELSA of Manchester P O Box 452 Francis Barlow
WATERBURY—TELSA of Waterbury P O Box 683 A Rolli

DISTRICT OF COLUMBIA

WASHINGTON—TV Service Assn of Metropolitan Wash New York Ave & 15 St H Nussbaum

FLORIDA

MIAMI—Radio-TV Technicians Guild of Fla 119 N W 12 Ave C D Pierce
TAMPA—Radio & TV Service Assn 3410 N Armenia Anne Carper

IDAHO

NAMPA—Radio-TV Technician's Assn of Canyon Cty 1314 5 St South Marvin Kistler

ILLINOIS

BERWYN—Professional TV Service Assn 2137 S Euclid Ave Bill Bewsfield
CHICAGO—Associated Radio & TV Servicemen 433 S Wabash Ave Stephen Jacyna Press Rep
CHICAGO—Nat'l Alliance TV & Electronic Service Assn (NATESA) 5908 S Troy St F B Koepnick
CHICAGO—Nat'l Appliance & Radio-TV Dealers' Assn 1141 Merchandise Mart Ken Stucky Pres
CHICAGO—Nat'l Electronics Distributing Assn 343 S Dearborn St J G Bowman
CHICAGO—Refrigeration Service Engineers Society 433 N Waller Ave H T McDermott
CHICAGO—TV Electronic Service Assn of Chicagoland (TESA) 5908 S Troy St Sydney Terman
JOLIET—Will County Radio & TV Assn 35 W Van Buren St Leslie McAllister
O'FALLON—TV Electronic Service Assoc of St Clair Cty (TESA) 125 W First St Ray Keller
ROCKFORD—Greater Rockford Appliance Dealers Assn 815 E State St H L Berry

INDIANA

BROWNSTOWN—TV Servicemens' Assn of Jackson Cty Cliff Lockman
COLUMBUS—Radio-TV Service Dealer Assn 728 11 St H L Perry
EVANSVILE—Chamber of Commerce TV Ethics Committee 117 Main St Wm Morrow
EVANSVILLE—Radio & TV Servicemen's Assn Box 592 K E Smith
FORT WAYNE—Ft Wayne TV-Radio Appliance Assn 2627 Parnell K D Ross
INDIANAPOLIS—Ind TV Technicians' Assn 2912 Clifton Frank Teshey
KOKOMO—Radio & TV Service Engrs' Assn 1136 N McCann St Paul Rayls
MUNCIE—Radio & TV Servicemen's Assn P O Box 646 Kenneth Bullock

IOWA

DES MOINES—TV Servicemen's Assn 2216 Harding Rd Robt Kurtz
OTTUMWA—Ottumwa TV Dealers' Assn 515 Church St Gerry Brown

KANSAS

ELLENWOOD—TV Electronic Service Ass'n E A Redmon
GREAT BEND—Midwest Chapter of TESA R C Renfro
SALINA—TV Electronic Service Ass'n 139 N 7 St Milton Shelton
WICHITA—Kansas Appliance Dealer Ass'n C D Hughes
WICHITA—TV Electronic Service Ass'n 333 N Waco St E A Redmon

KENTUCKY

LOUISVILLE—Kentuckiana TV & Radio Technicians' Ass'n 2519 Portland Ave J M Hall

LOUISIANA

NEW ORLEANS—Radio & Electronic Technicians' Ass'n 4107 Magazine St C W Osborne

MASSACHUSETTS

LOWELL—Professional TV Servicemen's Ass'n P O Box 604 C R Rondeau
NEW BEDFORD—Radio Technician's Guild 110 Topham St J L Shepley
WORCESTER—Worcester County Ass'n of TV Technicians P O Box 1155 A J St Pierre

MICHIGAN

DETROIT—TV Service Ass'n of Mich 8225 Woodward Ave Steve Raboczkay
JACKSON—Jackson TV Service Ass'n 657 Oakhill Ave Ken Griewahn
MT CLEMENS—Macomb Electronics Ass'n 309 Monitor Leader Bldg R H Valusek
MUSKEGON—Muskegon Radio & TV Dealers' Ass'n (MARDA) 903 Pine St John Kelley
ROYAL OAK—South Oakland County TV Ass'n P O Box 267 S W Baldwin Jr

MINNESOTA

MINNEAPOLIS—American Institute of TV Service 801 44 Ave NE Columbia Heights J W Hemak Exec Dir
MINNEAPOLIS—Minnesota TV Service Engrs P O Box 4429 Warren Schel
MINNEAPOLIS—Radio TV Service Ass'n 314 3 Ace SE Ben Katzman
ST PAUL—TV Electronic Service Ass'n 2068 Ford Pkwy Joe Driscoll

MISSOURI

BUFFALO—TESA-Southwest Mo Ray Richardson
KANSAS CITY—Electric Ass'n 2201 Grand Ave J S McDermott Exec Mgr
KANSAS CITY—TV Service Dealers Div Elec Ass'n 20th & Grand J S McDermott
KANSAS CITY—TV Service Engineers 1342 Winchester St Earl Steffes
ST LOUIS—TESA-St Louis 1724 S 39 St Owen Cosper

NEBRASKA

LINCOLN—Nebr Electronics Service Ass'n 1617 S 17 St T M Duffield
OMAHA—TV Electronics Service Ass'n 1104 W O W Bldg R J Harrison

NEW JERSEY

TRENTON—Radio Servicemen's Ass'n 72 S Olden Ave M E Toth

NEW HAMPSHIRE

MANCHESTER—Radio & TV Ass'n 334 Mitchell St E R Gelinas

NEW YORK

BETHPAGE—Radio & TV Guild of Long Island P O Box 87 R T Guidera Exec Secy
BINGHAMTON—Southern Tier Chapter of RSA P O Box 201 J A Kucher Pres
BROOKLYN—Associated Radio-TV Servicemen of N Y P O Box 32 Marty Boxer
BUFFALO—Radio Technicians' Ass'n 694 Broadway R A Wutz
BUFFALO—TV & Electronic Service Ass'n Station E Box 28 I J Toner Pres
BUFFALO—Western N Y Electronics Guild 2011 Hertel Ave L Marschall
ELMIRA—Southern Tier Electronics Ass'n 1000 Sullivan St R M Hapeman
FOREST HILLS—Forest Radio & TV Ass'n 109-01 72nd Rd G E Berger Pres
JAMESTOWN—Electronic Technician's Ass'n 69 Forest Heights George Carlson
KINGSTON—Ulster Electronic Technician's Ass'n 94 Furnace St C A Kohl
MINEOLA—Nat'l Electronic Service Dealers' Ass'n 138 Jerome Ave J A Wheaton
NEW YORK—Alumni Ass'n of RCA Institutes 350 W 4 St Patsy Genduso Pres
NEW YORK—Certified Electronic Technicians' Ass'n (CETA) 312 E 67 St Robert Cornell
NEW YORK—Electronic Technician Ass'n 125 E 46 St

OCEANSIDE—Long Island Electronic Technicians' Ass'n 3156 4th St Aram Chankalian
PEARL RIVER—Rockland Ass'n of TV & Electronic Services 55 E Central Ave Tom Coleman
PORTVILLE—Tri-County Electronic Technician Ass'n J P Golden
ROCHESTER—TESA_RTG of Rochester 536 Jay St Norbert LeMay
STATEN ISLAND—TV Servicing Div Staten Island Electrical League 80 Bay St R E Acker
SYRACUSE—Empire State Federation of Electronic Tech Ass'ns 601 S West St J A Wheaton
SYRACUSE—Syracuse TV Technicians' Ass'n 139 Fabius St Joseph Marrota

NORTH CAROLINA

FAYETTEVILLE—Cumberland County Radio & TV Ass'n 2731 Bragg Blvd E F Barbour Jr
GREENSBORO—Greensboro TV Service Ass'n 1708 Spring Garden St Robt Best
GREENSBORO—Tri-City Radio & TV Service Dealers' Ass'n 1708 Spring Garden St J R Woods
HIGH POINT—High Point Radio & TV Technicians' Ass'n 129 S Wrenn St Tom Guy

OHIO

CINCINNATI—TESA-Cincinnati 1405 1st Nat'l Bank Bldg Cyril Howes
CLEVELAND—Cleveland Radio & TV Service Ass'n 5827 Turney Rd Dick Cooley
COLUMBUS—Associated Radio-TV Service Dealers 2552 N High St Don Sisk
COLUMBUS—TEXA-Ohio 2552 N High St John Graham
HILLSBORO—Southern Ohio Radio & TV Technicians' Ass'n Box 33 W E Jimison
SPRINGFIELD—Radio & TV Ass'n P O Box 851 Jack Carpenter
TIFFIN—Tiffin Electronic Ass'n 207 S Washington St James Weimeskirch
YOUNGSTOWN—Mahoning Valley TV & Service Dealers Ass'n 2516 Kirk Rd John Hanlon

OREGON

EUGENE—Radio & TV Service Dealers' Ass'n 50 Coburg Rd C R Wolf
KLAMATH FALLS—TV Radio Ass'n 734 S 6 St Bill Golden
PORTLAND—Appliance Parts Jobbers' Ass'n 215 N W Park Ave W L May
PORTLAND—Northwest Electronic Technical Ass'n 1233 S E 44 St L E Becker Pres
PORTLAND—TV Appliance Ass'n 424 Failing Bldg R E Watts

PENNSYLVANIA

CARBONDALE—Federation of TV-Radio Service Ass'ns 67 S Main St L J Helk
CHESTER—TV Service Dealers' Ass'n of Del County 3020 W 9 St John Mathews
EPHRATA—Northern Lancaster County Electronics P O Box 264 Raymond McCoy
HOLLIDAYSBURG—Blair County Ass'n of Radio & TV Service Engrs 506 Allegheny St Edwin Brannon
MAHONOY CITY—Mahonoy City Radio-TV Service Ass'n 215 W Center St Lawrence Kaczmarczyk Act'g Chairman
OLYPHANT—Lackawanna Radio-TV Technician Ass'n 104 Hull Ave Henry Govan Treas
PHILADELPHIA—Council of Radio & TV Service Ass'ns of Dela County 525 S 15 St
PHILADELPHIA—Northeast TV Service Dealers' Ass'n 6321 Frankford Ave Harvey Morris
PHILADELPHIA—Phila Radio Service Men's Ass'n 1643 S Wilton St W P Humes
PHILADELPHIA—TV Service Dealers' Ass'n of Phila 5016 Old York Rd Richard Schofield
PITTSBURGH—Radio & TV Servicemen's Ass'n of Pgh PO Box 6844 P W Davis Jr
STATE COLLEGE—Centre County Radio & TV Technicians' Ass'n 232 S Allen St C H Smith
WILKES-BARRE—Radio & TV Servicemen's Ass'n of Luzerne County P O Box 309 M J Krupa
WILLIAMSPORT—Associated Radio Servicemen of Central Pa 1643 Memorial Ave C W Smith

RHODE ISLAND

PROVIDENCE—R I Radiomen's Business Ass'n 959 Hope St E J Oliver

SOUTH CAROLINA

CHARLESTON—Charleston TV & Appliance Dealers' Ass'n 285 Meeting St E L Marlow

TENNESSEE

CHATTANOOGA—Radio TV Service Ass'n 3507 Rossville Blvd David Oehlson
MEMPHIS—TV & Electronic Service Ass'n 966 E Mc-Lemore Ave Mrs Juanita Denton Grover

TEXAS

CONROE—Texas Electronic Ass'n 525 N Frazier St Don Sills
CORPUS CHRISTIE—Corpus Christie Radio & TV Ass'n P O Box 3102 A G Murray
DALLAS—Dallas Radio-TV Sales & Service Ass'n P O Box 2955 D F Comer
FORT WORTH—Ft Worth Radio & TV Ass'n 1513 W 7 St W A Shaw Exec Sec'y
HARLINGTON—Valley Electronics Technician Ass'n 813 W Tyler St G L Weseman
HOUSTON—Houston Ass'n or TV Servicemen 1822 Berry Rd F B Koepnick
HOUSTON—TEA Clinic Headquarters 1972 W Gray St W A Galbreath Chairman
LONGVIEW—Longview TV Service Ass'n 504 E Methvin St W R Beasley
LUBBOCK—Radio & TV Technician Ass'n P O Box 3161 J A Bruce
SAN ANTONIO—San Antonio Radio & TV Ass'n 1204 West Ave Charles Kayser
TYLER—Tyler Radio & TV Ass'n P O Box 3302 Robt Burns

UTAH

OGDEN—Ogden Electronic Technicians' Ass'n 456 27 St Ron Read

WASHINGTON

SEATTLE—King County TV Service Ass'n 101 Jones Bldg Clayton Faller
SEATTLE—Northwest Appliance & TV Ass'ns 512 1st Ave North D M Lombardo
VANCOUVER—Radio & TV Technicians' Ass'n of Clark County P O Box 522 R C Walters

WEST VIRGINIA

HUNTINGTON—Electronic Technicians' Ass'n 39 Adams Ave F D Gerber

WISCONSIN

EAU CLAIRE—Indianhead Radio-TV Servicemen's Ass'n 409 Water St Richard Presme
MADISON—Radio Technician Ass'n 1314 Williamson St George Karabas Treas
MILWAUKEE—Milwaukee Ass'n of Radio & TV Services PO Box 91 Station "F" Lawrence Zechel

WYOMING

CHEYENNE—Western Electronics Ass'n 1410 Logan St Alvin Pope

CANADA

HAMILTON ONTARIO—Radio Electronic Technicians' Ass'n 29 Wavell Ave C F Leeks
VANCOUVER B C—Radio Electronic Technicians' Ass'n 918 Rogers Bldg F T Walters
WINNIPEG MANITOBA—Radio Electronic Technicians' Ass'n Box 391 Christian Harder

Electronic Schools

Resident courses 1
Correspondence courses 2
Advanced TV-radio servicing ..... A
Color TV servicing ..... B
Communications, FCC licenses C
Industrial electronics ..... D
Military electronics ..... E
Electrical appliance servicing ..... F
Business management ..... G

CALIFORNIA

HOLLYWOOD—Emig School of Electronics 4902 Sunset Blvd-2-C
HOLLYWOOD—Grantham School of Electronics 1505 N Western Ave-1-2-C
HOLLYWOOD—Pacific International Univ 5719 Santa Monica Blvd-1-2
LOS ANGELES—National Schools 4000 S Figueroa St-1-2-A-B-C-D-E
LOS ANGELES—Western TV Institute 341 W 18 St-1
SAN FRANCISCO—Heald Eng's College Van Ness at Post St-1
SOUTH GATE-VSI TV School 4570 E Firestone Blvd-1-2-A-B-C-D

CONNECTICUT

HARTFORD—Ward School of Electronics 44 Niles St-1
STAMFORD—Lincoln School of Radio & TV 170 Atlantic St-1-2-A-B-C-D-E-F

DISTRICT OF COLUMBIA

WASHINGTON—Capitol Radio Eng'g Institute 3224 16 St N W-2
WASHINGTON—Grantham School of Electronics 821 19 St N W-1-2-C
WASHINGTON—National Radio Institute 3939 Wisconsin Ave N W-2-A-C-F

ILLINOIS

CHICAGO—Coyne Electrical School 500 S Paulina St-1-2-A-B-D-F
CHICAGO—DeVry Technical Institute 4141 Belmont Ave-1-2-A-B-C-D-E
CHICAGO—Sprayberry Academy of Radio 111 N Canal St-1

INDIANA

ANGOLA—Tri-State College 1617 College Ave-1
FT WAYNE—Indiana Technical College 917 E Washington Blvd-1
INDIANAPOLIS—Indianapolis Electronic School 312 E Washington St-1-A-B-C-D
VALPARAISO—Valparaiso Technical Institute Box 490 -1-A-B-C-D-E

MARYLAND

BALTIMORE—Baltimore Technical Institute 1425 Eutaw Pl-1

MASSACHUSETTS

BOSTON—Saunders Radio & Electronic School 285 Huntington Ave-1-2-A-B-C-D-E

MISSOURI

KANSAS CITY—Central Technical Institute 1644 Wyandotte St-1-2

NEW YORK

NEW YORK—Alexander Hamilton Institute 71 W 23 St-2-2G
NEW YORK—Electronic Development Institute 125 E 46 St-1-2-A-B-C-D-F
NEW YORK—Lincoln School of Radio & TV 1851 Broadway-1-2-A-B-C-D-E-F
NEW YORK—Manhattan Trade Center Board of Education 45 Rivington St-1-A-B-C-F
NEW YORK—Pierce School of Radio & TV 48 E 19 St-1-A-B-C
NEW YORK—RCA Institutes Inc 350 W 4 St-1-A-B-C-D
NEW YORK—Radio-TV Institute 127 Columbus Ave-1-A-C-D
NEW YORK—Radio-TV Training Ass'n 52 E 19 St-1-2-A-B-C-G
NEW YORK—TV Workshop of N Y 1780 Broadway-1-C
NEW YORK—YMCA Trade & Technical School 15 W 63 St-1-C
NEW YORK—YMCA Hervey Junior College 15 W 63 St-1-G

OHIO

CLEVELAND—Cleveland Institute of Radio Electronics 4900 Euclid Ave-1-C

PENNSYLVANIA

SCRANTON—International Correspondence Schools 1001 Wyoming Ave-2-A-B-C-D-F-G

TEXAS

PORT ARTHUR—Port Arthur College 1500 Procter St-1-A-C-G

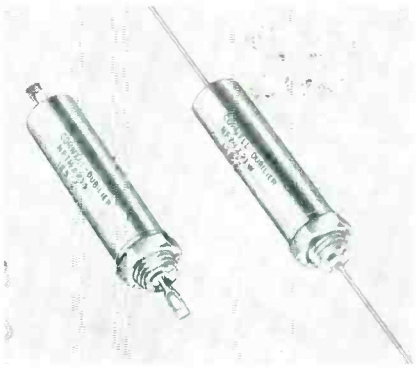
WISCONSIN

MILWAUKEE—Milwaukee School of Eng's 1025 N Milwaukee St-1

New Tubes & Components

CD CAPACITORS →

These feed-thru capacitors, for r-f noise suppression, are 3-terminal designs, intended for easy installation in a chassis, bulkhead, firewall, shield or other grounded metal partition. Current ratings are: 5, 15 and 25 amperes, at voltages from 100 to 600-volts dc and 125 to 250-volts ac at frequencies up to 400 cycles. Capacitances range from 0.001 to 2.0 μf, depending on voltage. Operating temperature ranges: —55°C to 85°C and 125°C. Cornell-Dubilier Electric Corp., South Plainfield, N.J. (ELECTRONIC TECHNICIAN 5-28)

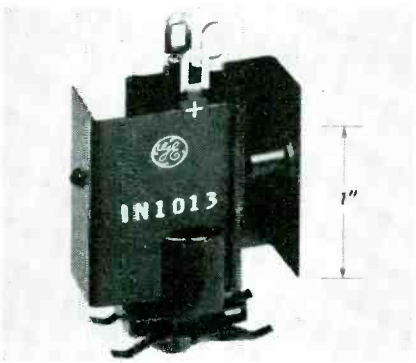


Pyramid CAPACITOR →

A new plastic tubular capacitor type BTS, for printed circuits has been announced. It is designed to withstand the most exacting requirements for minimum board space, close mechanical tolerances and is keyed for automation assembly. It's size, depending on capacity and voltage ratings is 3/8" dia. x 1 3/8" long to 3/4" dia. x 1 7/8" long. Available in values from 0.001 μf to 0.47 μf, from 200 to 600-volts. Temperature range is —40°C to 85°C. Pyramid Electric Co., 1445 Hudson Blvd., North Bergen, N.J. (ELECTRONIC TECHNICIAN 5-25)

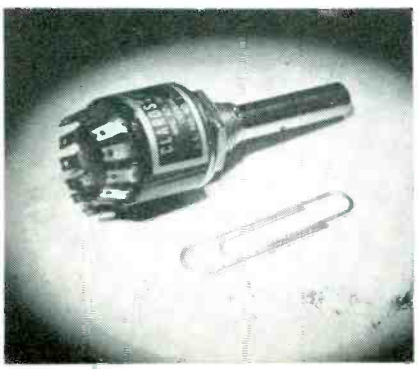
GE GERMANIUM RECTIFIER →

Unlike materials used in other rectifiers, germanium does not age, wear out or burn out. Thus the life expectancy of a germanium rectifier is characterized by engineers as unlimited. The 1N1005, 1N1007 and 1N1008 are half-wave restifiers capable of 250, 350 and 400 ma d-c output respectively. Type 1N1013 consists of two germanium rectifiers connected in a voltage-doubler configuration and has a d-c output rating of 250 ma. Competitively priced. GE Semiconductor Prod., Syracuse, N.Y. (ELECTRONIC TECHNICIAN 5-26)



Clarostat ROTARY SWITCH →

Multiple switching functions in compact form, the Series BHM miniaturized rotary-selector switch is particularly applicable to military and commercial assemblies including pocket radios and hearing aids. They are rated at 50-ma at 300-v, ac or dc and 500-ma, at 30-v, ac or dc. All moving parts and contact mechanism are totally enclosed and the switch assembly is sealed for protection from dust and atmospheric conditions. Only 3/4" dia. x 3/4" deep. Clarostat Mfg. Co. Inc., Dover, N.H. (ELECTRONIC TECHNICIAN 5-27)



RCA 17CDP4 CRT

The rectangular shaped picture tube type 17CDP4, with a projected screen area of 155 square inches, is the latest addition to the 110° diagonal deflection angle family. It is designed with a 450-ma, 8.4-v heater having a controlled warm-up time to insure dependable performance in TV sets employing a single, series-connected heater string. A "straight" type electron gun eliminates the need for an ion-trap magnet. It is of the low-voltage electrostatic-focus and magnetic-deflection type, having an aluminized screen. RCA Tube Div., Harrison, N.J. (ELECTRONIC TECHNICIAN 5-29)

Amperex 6939 TUBE

The new type 6939 twin-tetrode, noval-base miniature tube is designed for low-power VHF transmitter applications. With a seated height of only 2 9/32", it can deliver 5.5 watts of useful power in the load (ICAS rating) at any frequency up to 500 mc. "Frame-Grid," construction insures extreme accuracy of interelectrode spacing. Elimination of entire stages in original equipment design, resulting in lowered manufacturing cost is frequently possible. Communications Tube Div., Amperex Electronic Corp., 230 Duffy Ave., Hicksville, N.Y. (ELECTRONIC TECHNICIAN 5-31)

Genelex KT88 TUBE

New audio-amplifier tube, the Genalex KT88, has been designed to keep pace with the trend toward more compact and powerful amplifiers. It may be regarded essentially as a more powerful version of the popular KT 66, with up to twice the output and even lower distortion. Yet the new tube is considerably smaller than the KT66. With fixed bias, an output of 100 watts may be obtained from a pair of KT88 tubes with a plate supply of 560 volts. It has an increased plate dissipation of 35 watts, together with a higher mutual conductance based upon a larger cathode. It fits the standard octal socket and has the same pin connections as the 6L6. British Industries Corp., Port Washington, N.Y. (ELECTRONIC TECHNICIAN 5-30)

TECHNICAL NEW PRODUCTS BEGIN ON PAGE 54

Discussions with various electronic technicians have turned up some interesting facts and opinions. Item One: Almost all are doing some audio servicing, and a goodly number are selling audio products. Item Two: Most of the shops now deep in audio work were initially reluctant or suspicious of audio business potential. Item Three: Technicians meet less price resistance in repairing and selling audio gear for the home than they do for equivalently priced radios and TV sets.

Here's an idea for a stereophonic music arrangement. A loudspeaker built into each wing of a wing-back chair could be hooked up to a stereo playback. Why doesn't someone manufacture it? Someone does . . . it's Stereo Products Co., Severna Park, Md.

A 3-speed transistorized portable record player called the Buton is now on the market. This German import introduced by Audio-Master has a 6-volt battery-operated motor, and lists for $89.50.

If you hear someone talking about a sleek, slim silhouette, he may be referring to the new line of Bell hi-fi amplifiers. That's how the manufacturer is describing the new look in the company's products.

New audio products briefly noted:

H. H. Scott is offering the Models 280 and 240 amplifiers, rated at 80 and 40 watts, respectively.

Allied Radio's Knight "Tri-Fi" 12: 3-way speaker is rated at 25 watts, sells for $49.50.

Sherwood has unveiled its S-2000 FM-AM tuner, featuring better than 1 microvolt sensitivity, 1/3 of 1% IM at 100% modulation. Price $139.50.

(*Continued on page* 81)

Air Conditioners

(*Continued from page 45*)

shorts to ground. Capacitors should also be tested. If the start capacitor is open, there will be no current in the starting circuit and the motor will fail to start. A shorted capacitor permits current in the circuits, but it will be inadequate and of improper phase. The start winding in Fig. 2, is thrown into the circuit when the relay contacts are closed. These contacts are normally open and are momentarily closed by initial surge currents in the relay winding. In Fig. 3, the contacts are normally closed. They are opened by the potential relay coil after the compressor motor attains approximately 80% of its full speed.

In spite of the above mentioned troubles, air conditioners are dependable and usually trouble free. The bulk of income will come from installations and preventive maintenance. •

Photoelectric Control

(*Continued from page 37*)

reflector-type photoelectric scanning devise is used; incorporating both the light source and phototube in a single housing using a common lens system. As the caps move past the light beam as shown in Fig. 7, the amount of reflected light as determined by the presence or absence of the gasket. When a defective cap is detected, the photoelectric relay actuates the ejector device, which is an air blast controlled by a solenoid valve. An electronic timer is used to control the duration of the air blast so that no other bottle caps are displaced.

Typical Parts List for Fig. 4

C—2 to 8 μf, 250 volts
R1—0 ohms
*10,000 ohms, ½ watt
R2—20,000 ohms, 1 watt
*9,000 ohms, 1 watt
R3—1,000 ohms, 1 watt
R4—1 to 10 megohms
R5—see text
S—dpst
T—filament transformer 6.3 volt, 0.6 amp.
Relay—should operate on 25 ma or less.

Fig. 5, same as Fig. 4, except:

R1—0 ohms
*3,000 ohms, 2 watt
R2—5,000 ohms, 4 watts
*2,000 ohms, 1 watt
*For Gas-Type Phototube

ILLUSTRATION CREDITS RCA & Photoswitch Div., Electronics Corp. of America. •

(Industry News continued from page 24)

SOUTH RIVER METAL PRODUCTS CO. reports that it has developed a successful prototype of a Light Weight Aircraft Maintenance Stand to be airborne.

HEATH CO. broke ground for its new plant on Hilltop Rd. in South St. Joseph, Michigan. The new structure will contain 135,000 sq. ft. of floor space.

ROHN MFG. CO. now has a new "rolling display" for its products all in the "package" of a uniquely outfitted house trailer.

WELLER ELECTRIC CORP. operations will be described in a TV film story on QUENTIN REYNOLDS' national "Operation Success" program to be shown during the Spring and early Summer.

Reps & Distributors

HARRY N. REIZES has formed a new manufacturer's rep organization covering the metropolitan New York area, including Long Island, Westchester and New Jersey. Headquarters are at 1473 Sylvia Lane, East Meadow, L. I., N. Y.

WESTINGHOUSE ELECTRIC has appointed WESTLAKE ELECTRONIC SUPPLY and MOTORADIO DISTRIBUTING CO., both of Seattle, Wash., as distributors of its reliatron tubes in that area.

SYLVANIA ELECTRIC PRODUCTS has named FRANK EDWARDS CO. as its distributor in Northern Calif. for TV and radio receivers.

LEONARD D. ALLEN INC., sales reps, announce the addition of CHARLES POLADIAN to cover Western New York State and DAVID E. COON to handle Eastern New York State.

PHILCO announces a new replacement parts program for all its consumer products to insure prompt service throughout the U. S. Known as "Factory-Distributor 90 Day Service Parts Program," it calls for a balanced inventory of service parts in each distributing territory.

MERIT COIL & TRANSFORMER CORP. announces the appointment of ANDERSON SALES CO. as its rep in territories Nos. 1 and 2, as provided in the Unit Territorial Plan published by RETMA and W. H. CONNORS has been named rep in territories No. 26 and 27-A.

Catalogs & Bulletins

RIDER BOOKS: A 32-page Spring-Summer 1957 catalog describing the contents of the books which are presently in the Rider line and also identifies approximately 19 titles which will be released between now and June 1957. Available along with a leather book-mark from John F. Rider Publisher Inc., 116 W. 14th St., New York 11, N. Y. (ELECTRONIC TECHNICIAN No. B5-2)

TRANSFORMERS: A new catalog describing and illustrating over 700 transformers, of which 117 are now items. New items include toroids, pulse, transistors, hermetically sealed, geophysical, power, filament and audio transformers, chokes and TV components. Catalog TR-57 available from any Triad distributor or by writing Triad Transformer Corp., 4055 Redwood Ave., Venice, Calif. (ELECTRONIC TECHNICIAN No. B5-6)

TEST EQUIPMENT: A new 6-page bulletin containing up-to-date listing of test equipment for servicing TV, radio, and industrial electrical equipment, as well as refrigeration, air-conditioning, appliances and heating equipment. Bulletin No. 2058 available free from Simpson Electric Co., 5200 W. Kinzie St., Chicago 44, Ill. (ELECTRONIC TECHNICIAN No. B5-4)

CONTROL GUIDE: A handy control cross reference guide containing the latest replacement control information. Hundreds of new listings are in this 3¾" x 8½", 106 page guide. Priced at 20 cents it is available to all Centralab distributors or by writing direct to Centralab, Div. Globe Union Inc., 900 E. Keefe Ave., Milwaukee 1, Wisc. (ELECTRONIC TECHNICIAN No. B5-5)

WIRE: A new 2-color 4-page catalog describes all the engineering characteristics of Altemp "Teflon" high-temperature insulated hook-up wire. Both the extruded and spiral-wrapped insulation types are available in put-ups of 10' to 1000' and are detailed as to conductor sizes, conductor strands, insulation showing characteristic curves and other data. Manufacturer's Available free from Alpha Wire Corp., 200 Varick St., New York 14, N. Y. (ELECTRONIC TECHNICIAN No. B5-7)

New Books

WAVE PROPAGATION. *By Alexander Schure. Published by John F. Rider Publisher, Inc., 116 W. 14 St., New York 11, N.Y. 64 pages. Paper cover. $1.25.*

The fundamentals of electromagnetic radiation and the wave mechanics by which signals travel are clearly and concisely presented. Among the subjects covered are tropospheric and scatter propagation, ionospheric effects, and various characteristics such as skip, fading and meteorological effects. It would have been desirable for the author to refer the reader to the inexpensive propagation predictions available from the Central Radio Propagation Lab., National Bureau of Standards, Washington, D.C. This volume is to be recommended for anyone interested in commercial or amateur radio transmission.

GE TUBE HANDBOOK, ESSENTIAL CHARACTERISTICS. *Prepared and Published by The Tube Section, Electronic Components Div., General Eelectric Co., Schenectady, N.Y. 228 pages. Paper cover. 75¢.*

Data on 1,593 tubes types contained in the revised and enlarged seventh edition. 299 late receiving, cathode ray and special purpose tubes have been added. The new edition also contains a column listing plate-dissipation ratings, a page of basic data on construction of loudspeaker enclosures, information on interpreting technical data, tube classification charts, tube-envelope outline drawings and dimensions, characteristic curves, and typical circuits.

TRANSISTOR CIRCUITS AND APPLICATIONS. *Edited by John M. Carroll. Published by McGraw-Hill, 327 W. 41st St., New York 36, N.Y. 285 pages. Hard cover. $7.50.*

A new book on transistor structures, techniques, circuits and equipment, giving a complete picture of the development and present status of the transistor art, presents circuit designers a handy source of detailed information on how to apply transistors in miliary, industrial and home-entertainment equipment. It covers typical transistor operating characteristics, important circuit parameters, transistor types, problems of temperature and gain stabilization and a large number of typical transistor circuits.

AN INTRODUCTION TO JUNCTION TRANSISTOR THEORY. *By R. D. Middlebrook. Published by John Wiley & Sons Inc., 440 Fourth Ave., New York 16, N.Y. 296 pages. Hard cover. $8.50*

The author's starting point is a qualitative discussion of crystal structure and the motion of electrons in crystals. The quantitative treatment is begun with the assumption of two results of statistical and quantum mechanics. Upon this foundation a continuous development of the basic theory of transistor action is presented, leading to a circuit representation of the small-signal performance of the transistor.

Association News

ESFETA Elects

Gordon Vrooman, of the Syracuse TV Technicians Assoc., was reelected President of the Empire State Federation of Electronic Technicians Assoc., at the 8th annual meeting. Robert Larson, of the Radio TV Guild of L.I., V.P.; George Carlson, of the Electronic TV Assoc., of Jamestown, Sec.; P. P. "Pat" Pratt, of the TV Electronic Service Assoc. of Western N. Y., Treas.; and Thomas Salisbury of the Mohawk Valley TV Technicians Guild, Sgt. of Arms. In addition to the seven associations already active in ESFETA, four more applied for membership and were unanimously accepted: Tri County Electronic Technicians Assoc., Olean; Rockland Assoc. of Electronic TV Services, Pearl River; Mohawk Valley TV Technicians Guild, Utica, and Tompkins County TV Dealers Assoc., Ithaca. Officers will be installed at the next meeting on June 9th, 1957.

TESA Licensing Forum

TESA-Chicagoland conducted its second open forum on the proposed Illinois State Licensing Bill. The first meeting was for parts jobbers, set distributors and area set manufacturers; the second meeting was open to all area service people with more than 969 invitations being extended. The meeting was opened with a brief greeting by Pres. Joe Issak who introduced Frank J. Moch who outlined the situation which precipitated the decision to license. He cited the grave dangers which attend service of TV and radio sets, the requirements of being in business, the bad effect of often repeated articles in the public press, the loss of man power due to sub-par wages and conditions, the bankruptcies of honest operators with consciences and other factors. He demonstrated how licensing will be a blessing to both the public and the ethical service people. An invitation was extended to Howard Wolfson to attend the meeting. He attended and spoke against licensing.

Toward the end of the meeting the chairman asked that those in attendance indicate their reaction to licensing by marking an informal ballot to which they would affix their signature, strictly to determine trends. The poll showed less than 2% opposed to licensing with about 3% undecided. The balance was for licensing.

TSA Elects

King County TSA in Seattle, Washington, elected and installed the following officers for the coming year: Harold Hart, Pres.; Clayton Faller, V.P. and Ray Murphy, Sec.-Treas.

CSEA Convention

At a regular meeting of the Radio TV Technicians Association Pasadena, a delegates' report was made on the recent meeting of the Board of Delegates of the California State Electronics Association, at Fresno. The report covered the growth in membership to approximately double what it was 8 months ago. A large part of the report covered the proposed State Licensing Bill sponsored by CSEA, which has been introduced by State Senator Kraft of San Diego. Copies of the bill were distributed to all members and are available to others. President Frank Fisher reported on the recent President's council for the Los Angeles area, which has begun plans to join all 10 service groups into a formal organization.

The 2-day 2nd annual convention and installation of officers, May 4th and 5th, at the Hacienda Motel, featured: a series of discussions on servicing and business management; a fashion show and electronic range demonstration for the women: luncheons, dinner, dancing; manufacturer's displays in booths; and a business meeting.

RETA National Convention

The Radio Electronic Technician's Association of New Orleans affiliated with NATESA, held a national convention at the Monteleone Hotel on April 28th, 1957, in the city of New Orleans, Louisiana. In addition to technical lectures, there was a cocktail party, a floor show and an evening of dancing. All servicemen were invited to attend this convention and lectures.

Labor Relations

(*Continued from page* 43)

company for the incident, which we believe it is proper to take into account in connection with the question of justification for the discharge. Mary Wellus should be reinstated."

Can You Fire a Worker for Sabotage on Circumstantial Evidence?

What Happened:

After being repaired at the bench, numerous TV sets kept breaking down. Each time it was found that a piece of metal had been jammed in to cause a short. For a long time, the company had no luck tracking down the culprit. Finally, after a breakdown, the manager fished up a small U-shaped piece of metal. When the technicians were questioned, nobody "knew from nothing." But one employee said that another worker had told him that he'd seen Jim Bates take a U-shaped piece of metal from a storage bin and put it in his pocket just before the breakdown. The worker who was said to have seen Jim Bates pocket the metal "hemmed and hawed" a lot when asked about it, but finally admitted he *had* seen Bates do it. Bates was fired for sabotage though he denied everything.

The company pointed out:

1. Bates was seen taking that particular piece of metal from a storage bin.
2. The piece of metal could have been put in the set only in the storage room.

(*Continued on page* 78)

(*Continued from page 77*)

Bates was in the storage room at the time it must have been done.

3. Bates' denial doesn't mean a thing. He's lied before now for no good reason, and has admitted doing so.
4. Although his work has been good, he has a bad record in other respects. He's just the type to go in for something like this.

Bates argued from his position that:

1. Nobody claims to have seen me me put anything in the set.
2. The guy you say SAW me take the metal from the storage bin has told other people he knew nothing about it.
3. All of us go through the storage area. It could have been anybody. Why pick on me?

Was The Worker:

RIGHT ☐ WRONG ☐

What An Arbitration Board ruled: "Much of the evidence against the dischargee is circumstantial. He admits that he was in the storage area at the time the object had to be placed in the set. He also admits being present at work when other instances of sabotage occurred. There is also the testimony of an employee who testified he saw the dischargee take the object from a storage bin. The dischargee denies this and disclaims any knowledge of sabotage. The weight is against the dischargee, for by his own admission he had lied when there was little reason to do so. No challenge of the credibility of the company witness was made. No motive was established that would cause him to lie. The circumstantial evidence and the corroborating testimony indicate the guilt of the dischargee. The Board of Arbitration holds that it was proven beyond reasonable doubt that the dischargee was guilty of sabotage and that his discharge was proper."

Microphonics

(*Continued from page 48*)

can be assumed that the defective component is before the test point. Fig. 2, illustrates this troubleshooting method. A wobbly slug L 150, in the 1st i-f stage of a TV set causing trouble will not be evident if the 1st i-f grid is bypassed. The sympton will appear when the capacitor is removed and will remain with us even when the mixer grid is grounded. This isolates the trouble to a component between these two points. Vigorous tapping may be necessary, most times it will require just the slightest touch of the defective part.

Perhaps the most frequent exciter is the speaker. It may be extended away from the equipment by long leads. If this is not easy to do, substitute a resistor for the voice coil and turn up the volume control. If the symptom persists, it may be a case of electrical rather than mechanical feedback. Removing the speaker from its mount and suspending it in free air will help reveal whether or not the sound vibrations

"Don't ask me why—but that's where our antenna gives us the best picture!"

are transmitted via the chassis or through the air. If the chassis behaves like a carrier then various shock-mounting techniques will enable a cure in most instances. If on the other hand the air waves act upon the microphonic component, a small speaker probe, as shown in Fig. 3, may be used to help localize the affected area.

Baffles and sound absorbing material may be used. In a particularly sensitive audio preamplifier the tube socket was shock mounted and the chassis set on springs. Tubes may be shielded mechanically by heavy metal shields. Wires may be dressed away from critical components. Pigtail suspended components may have their leads shortened or reinforced to add stiffness to the part if it cannot be clamped or taped securely against a rigid support. Metal shields and transformer laminations can be tightened. One interesting case involved a shield that was attracted by the magnetic field of an audio transformer. The shield was made more rigid by adding more weight. Loose turns on tuned inductances, small feed-through capacitors may have loose parts and broken dielectric material in ceramic trimmers may cause microphonics too. All these defects may be eliminated by using a cement or lacquer dope either in spray or brush-on form. If doping will not cure, the best remedy is to replace the troublesome parts. Mica in trimmers may be held down with dope. This cured a microphonic change of drive in a horizontal-sweep circuit. Rubber cement applied to a loose slug will make it stop dancing. Cement held an i-f coil to its supporting bracket when the eyelet worked loose.

Patient and systematic trouble-shooting should prove successful in most cases. For the remaining few tough dogs only experience and more patience is required. •

Radial Trumpet

(*Continued from page* 41)

with a given driver, continue following the 25-foot line across the chart to where it hits the index curve. At this point, follow the chart down (— • • — line) to the pressure index scale at the bottom. This is the figure in db (in this case about 25 db) which should be deducted from the sound pressure levels specified by a manufacturer for a given selected driver unit when such unit has been measured using a directional horn with an air column length of 6 or 6½ ft. (usually the case) and taken at a distance of 10 feet from the mouth of the horn.

For example, let's assume we selected a particular driver yielding a sound pressure of 122 db with 30-watts input. Deduct 25 db according to the findings on the chart when the horn is 25 ft. in the air. This gives us 97 db for use at the ground surface. A 4-foot radial provides 1 db less than the given 5-foot; in which case the pressure would be 96 db if we were to use that model instead. In the case of the 3-foot radial, the pressure would be 95 db, being 2 db less in output than the 5-foot horn. Of course, by using two drivers by means of a special adapter that is available, and operating at double input power, we could increase the sound pressure level by 3 db. If we wanted to stay with the one driver as originally, we could lower the height of the speaker, say to 15 feet, in which case we would have a sound pressure of 102 db instead of the 97 db we had at 25 ft. However, at the same time we would be able to cover a lesser circular area (about only a

(*Continued on page* 80)

(*Continued from page 79*)
third of the original) and the distance between speakers would have to be shortened.

Besides the highly professional appearance these radial trumpets present, they do not require any further baffling which contributes to further savings in both labor and material. So, the next time you're asked to sharpen your pencil for a quote, don't cut your profit . . . cut the waste. See whether or not the right reflex radial projector can be used. There is even a small radial paging speaker for applications not requiring high power. •

Scope Sensitivity

(*Continued from page 39*)
the positive or negative peak. Or, if the signal level is raised to the overload point, the grid bias should be such that the tube goes into grid current on positive peaks, and to plate-current cut-off on negative peaks at the same time.

Other considerations govern the value of R_4; there are stray capacitances inevitably associated with the output lead of the cathode follower; there are also stray capacitances inherent in the potentiometer construction. These stray capacitances set an upper limit on the value of resistance which can be utilized in the potentiometer. Of course, by careful selection of potentiometer type, and careful control of lead capacitance, the limit can be raised, and the efficiency of the stage increased. In general, it is found that an upper limit for the value of the potentiometer is about 3,000 ohms; in some arrangements, the value must be maintained at 1,500 or 2,000 ohms in order to avoid high-frequency attenuation. The only practical way to maintain good high-frequency response is to reduce the value of R_4 until the reactances of C_1 and C_2 no longer dominate the circuit action.

When revamping an old-type scope to obtain better gain or better frequency response, or both, it may be found that the desired value of plate-load resistance for the output stage does not provide sufficient signal swing to obtain full-screen deflection vertically. In such case, a useful expedient is to increase the value of the plate-load resistance in the output stage until full-screen deflection can be obtained without clipping. Then, the value of the plate-load resistance in the preceding stage may be decreased somewhat, to maintain an over-all flat-frequency response.

This is a form of stagger-peaking, which is quite effective, if not carried to extremes. In any case, the values of the series peaking coils should be adjusted when the job is completed so that the frequency response observed on the scope screen is quite flat, when the scope is swept from the vertical-input terminals.

Objection is sometimes made to combination series and shunt peaking, on the basis that although maximum gain is obtained for a given bandwidth, that the square-wave response may exhibit ringing and overshoot. Ringing and overshoot occur only when a square-wave generator with very fast rise time is utilized—insofar as waveforms encountered in TV service are concerned, a scope with series and shunt peaking will not show visible overshoot and ringing. •

Editor, TECHNICIAN:

I am looking for information on pix tube replacement for an early Philharmonic TV Model 1700, serial #4165. It takes a 16" round tube fitting a regular 5-wire socket.

JOHN H. GOLLER

Merril Place
Montpelier, Vt.

(*Audio News—Continued from page 72*)

The Madison Fielding FM-15 tuner with excellent response sells for $79.95.

Precision Electronics has a new line of PA sound system amplifiers with phono tops. The 30-watt model covers 100,000 sq. ft.

Tape aids: The Irish no-spill reel has two notches on opposite sides so a rubber band can be slipped on to hold the tape in place. The versatile BIB tape splicer available from Ercona.

Laminated magnetic sound tracks for motion picture film are clearly axplained in Minnesota Mining's "Sound Talk" bulletin 33.

Trying to describe stereophonic sound without an aural demonstration is almost like trying to explain a color without seeing it. So a pat on the back to Federated Purchaser, audio distributor in Mountainside, N.J., for their enlightening demonstrations.

Another distributor, George D. Barbey & Co., Reading, Pa., is doing his bit by publishing an 80-page hi-fi catalog prepared by Electronic Publishing Co.

Ear-level listing is being promoted by Whitley Electronics, makers of "Murasonde." Included in this home audio system is a speaker arrangement which is decorated like a picture, and hangs on the wall in mural fashion.

OXFORD COMPONENTS, INC. announces the addition of RUSSEL S. BARNES as a member of the sales department of the firm.

HARRISON VAN AKEN, JR. has been named General Manager of the newly-created GENERAL ELECTRIC Communication Products Dept.

HERBERT LEVINSON, Manager of RADIO ELECTRIC SERVICE CO.'s North Philadelphia branch, was presented with the firm's first "Manager of the Year" award at a meeting of all branch store managers and company officials.

ORRADIO INDUSTRIES announces that CECIL S. STOWE has been named Sales Promotion Manager.

(*Continued on page 82*)

WESTINGHOUSE, Elmira announces that RAYMOND W. ANDREWS has been named to the newly created position of Manager of Finished Goods Planning and Tube Industry Sales for the tube division.

WESTINGHOUSE ELECTRIC CORP. and **MONTGOMERY WARD & CO.** announced they have entered into an agreement whereby WESTINGHOUSE will manufacture a new line of automatic washers and clothes dryers, and radio and TV receivers for MONTGOMERY WARD.

ROBERT C. WHITESELL & ASSOC. has been appointed to represent the Antenna Div. of SNYDER MFG. CO. in the states of Indiana and Kentucky.

HARVEY RADIO CO. has just released a new 284 page catalog. The ELECTRONIC PUBLISHING CO., INC. of Chicago, who produced the catalog for HARVEY, report it is one of the largest distributor catalogs ever prepared for the electronic industry.

CONTINENTAL MFG., INC., mfrs. of CONTROLA-TONE, has announced the appointment of the following reps: FARNSWORTH ASSOC. to cover N. Ill., E. Wisc. and Metropolitan Chicago; CECIL W. BAATZ SALES CO. will handle Ind. and Kentucky; NICKERSON & RUDAT in N. Calif., N. Nevada and Hawaii; ERLANGER SALES CO. in S. Calif., S. Nevada and Ariz.; RAY JOHNSTON CO. will cover Pacific Northwest and British Columbia.

ALLEN B. DU MONT LABS., INC., has now completed its second year of marketing mobile radio equipment and accessories. New Du Mont appointments are JOHN C. WOLKE, assistant manager of replacement sales, Cathode-Ray Tub Div., ARTHUR H. FOGELMAN, assistant to the manager of the Washington, D.C. office, and FRED MAYHEW, manager of Du Mont National Distributors, Inc.

Catalogs & Bulletins

BORON CARBON PRECISTORS: Catalog Data Bulletin B-6b gives comprehensive data on construction, characteristics, applications, types, identification, resistance element, terminals, insulation, etc. Detailed charts and graphs. 4 pages. International Resistance Co., 401 N. Broad St., Philadelphia 8, Penna. (ELECTRONIC TECHNICIAN No. B5-34)

SOCKETS: Eby announces its new line of transistors, sub-miniature and printed circuit sockets; representing all types of sockets presently used by manufacturers in printed circuit, TV and radio receivers, transistor and sub-miniature equipment. New line available from local electronic distributors who stock this line in its entirety. Eby Sales Co., 130 Lafayette St., New York 13, N. Y. (ELECTRONIC TECHNICIAN No. B5-33)

REPLACEMENTS: Up-to-date replacement sheets for Motorola, RCA, Philco and Admiral. Covers all TV receivers manufactured up through the first half of 1956 and cross references and lists authentic replacements for all deflection yokes, horizontal output flyback transformers, vertical output transformers and vertical blocking oscillator transformers. Available from Todd-Tran Corp., Mt. Vernon, N. Y. (ELECTRONIC TECHNICIAN No. B5-32)

TRANSISTOR CHART DISTRIBUTION: A new system of distribution on transistor set up charts and booklets. Charts contain new set up information on transistors and the latest information on testing of new crystal diode, selenium rectifiers and silicon rectifiers. This service is available by writing a letter requesting to be added to the mailing list and including $1.00 for one year from date of letter. Service Instruments Corp., 171 Official Rd., Addison, Ill. (ELECTRONIC TECHNICIAN No. B5-31)

"TRANSISTOR MANUAL": A booklet containing basic information on transistors and their operation in circuits. Designed to assist the service technician, hobbyist and design engineer in working with transistors. Available for 50¢ from Semiconductor Prods. Dept., General Electric Co., Syracuse, N. Y. or local GE tube and transistor distributors. (ELECTRONIC TECHNICIAN No. B5-30)

POWRPAGE BULLETIN: A new bulletin which graphically illustrates the wide variety of uses for new ultra-lightweight portable soundcasting systems. Two models are discussed—each perfectly suited wherever crowd-control is a problem, or wherever one's voice has to cut through noise or carry over long distances. Available from University Loudspeakers, Inc., 80 South Kensico Ave., White Plains, N. Y. (ELECTRONIC TECHNICIAN No. B5-38)

TRANSFORMERS: A 20-page booklet listing a new stock line of miniaturized transistor drivers and output transformers available for typical servo-missile, or airborne applications in MIL-T-27 hermetic, molded, or open constructions. The New 1957 Transformer Catalog available from Microtran Co., Inc., 145 E. Mineola Ave., Valley Stream, N. Y. (ELECTRONIC TECHNICIAN No. B5-39)

ELECTRONIC EQUIPMENT: 1957 Spring Supplement No. 5-10 illustrates, describes and gives prices for tape recorders, test equipment, amateur gear, Knight PA systems. Order blanks included in this 72 page booklet. Allied Radio, 100 N. Western Ave., Chicago 80, Ill. (ELECTRONIC TECHNICIAN No. B5-40)

HERMETICALLY SEALED COMPONENTS: A promotion piece describing a free 75¢ replacement manual and 50¢ product discount on TV transformers. Rogers Electronic Corp., 43-49 Bleeker St., New York 12, N. Y. (ELECTRONIC TECHNICIAN No. B5-41)

WIREWOUND CONTROL: A flyer describing a new model wirewound control. A 5 watt control with a 2 watt size and 2 watt price. Unit is packaged individually in an attractive display carton. List price $1.50. Centralab, 900 E. Keefe Ave., Milwaukee 1, Wisc. (ELECTRONIC TECHNICIAN No. B5-42)

LOUDSPEAKERS: A free pamphlet of reprints of articles on the basic principles of loudspeakers, acoustical resistance units and friction-loaded enclosures. Written for the non-engineer; of interest to all hi-fi fans. Rockbar Corp., 650 Halstead Ave., Mamaroneck, N. Y. (ELECTRONIC TECHNICIAN No. B5-43)

IMPORTANT NOTICE TO SUBSCRIBERS

Changes of address require four weeks' notice. Notify your Postmaster and ELECTRONIC TECHNICIAN Circulation Department at the earliest possible moment.

When ordering change, please INCLUDE IMPRINTED STRIP showing exactly how magazine is now addressed. This will enable us to put the change into effect with a minimum of delay.

Letters cont'd. from page 22

Here's to More Laughs

Editor, ELECTRONIC TECHNICIAN:

Congratulations on your March "Editor's Memo" concerning humor and cartoons. I agree that the ability to "poke a little fun" at your chosen profession is important in these days of high pressures, high costs and high taxes. More power to the cartoons.

Now let me suggest a cartoon . . . from personal experience I might add. The scene is the inroming set desk of a shop, with a customer setting a table model TV receiver before the technician. Parts, wires and tubes hang out the rear of the cabinet. The caption: "And just what seems to be the trouble?"

B. VAN SUTPHIN

Washington, D.C.

Circuit Digest Index

Editor, ELECTRONIC TECHNICIAN:

When you print the next complete index of schematics, would it be possible to print it the same size as the Circuit Digest? It would be very convenient.

C. E. GREGG

Ontario, Calif.

• *No sooner said than done. See index in this month's Circuit Digest section. —Ed.*

INDEX TO ADVERTISERS

May, 1957

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.

How to add $1,040 to your profit this year

One simple fact will put at least $1,040 extra profit into the pockets of many men in your business this year. That fact is: *Every fourth car on the road needs a car radio.*

This means one out of every four of your customers is a good car radio prospect. And you can close most car radio sales in less than five minutes—just by telling prospects these two things:

They can own a Motorola® Car Radio for as little as $39.95.

There's a Motorola Car Radio custom-designed to fit like it came with their car.

And even if you sell only one Motorola Car Radio a week, your yearly profit will amount to at least $1,040!

Sales higher than ever. Car radio sales increased by 25% last year. And this year—with the most revolutionary improvement in 27 years—Motorola Car Radios are selling faster than ever.

Transistor-powered '57 Motorola Car Radios give you selling advantages like these: Transistors (1) have extra long life, (2) replace 16 parts that cause 75% of the trouble in other car radios, (3) cut battery drain by 50% or more, and (4) end *all* mechanical noise and vibration.

Priced to move fast. Motorola Car Radios retail at prices your customers are ready to pay—as low as $39.95, with a big profit margin for you.

No installation problems. You can do it yourself for extra profit or your Motorola installation depot will do it for you.

Why miss out on this easy, plus-profit opportunity any longer? Just mail this coupon today for all the facts. No obligation, of course.

Motorola, Inc., Dept. T-5
4545 W. Augusta Blvd.
Chicago 51, Illinois
Attn: Car Radio Department
Please give me all facts about the plus-profit Motorola Car Radio business. Thank you.

Name _____

Address _____

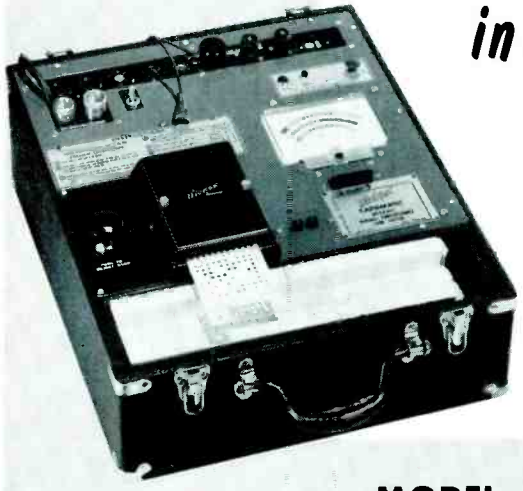
City _____ Zone ____ State _____

MOTOROLA
World's Largest Exclusive Electronics Manufacturer

HICKOK

FIRST

Basically NEW Development in Tube Tester Design in over 25 Years



Automatic and by far the Fastest, but . . . the real news is the Greatly Improved Circuit of this equipment which is the first important New Tube Tester Design in the past 25 years.

300% MORE ACCURATE: Tests Gm to an accuracy of 1%
(Most portable Gm testers attain 5% accuracy or less. Emission type testers cannot test for Gm and therefore have very poor performance in detecting weak tubes.)

SCREEN and PLATE VOLTAGES: 12 to 160 volts
This wide selection of voltages protects against obsolence. For instance, new car radios use 12 volt plate voltage.

FILAMENT VOLTAGES: 0.1 to 119.9 volts in 1/10 volt steps
More and more tubes are now in use with odd filament voltages. The 123A will accurately test all of them at their exact filament voltage.

200 MA LOAD ON RECTIFIER TUBES:
This gives an accurate test of the operation of a rectifier tube under load.

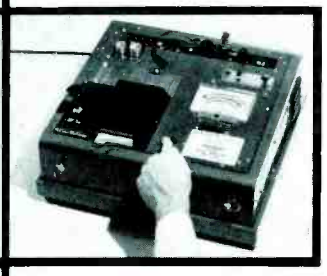
NEW KNEE TEST:
This new test evaluates the ability of a tube to perform in TV horizontal or vertical output circuits. As a tube gets older it loses its ability to deliver current which results in non-linearity of raster, (crowding of the raster where one side pulls away, etc.). The 123A tests this "Knee" point to determine whether the tube will cause trouble in a TV set.

MODEL 123A

Cardmatic®

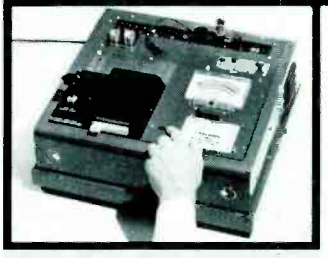
1 Shorts-Leakage

2 Quality Value



TESTS SHORTS and LEAKAGE TO 20 MEGOHMS
(Users have detected as high as 50 megohms leakage.)

EXTRA SENSITIVE GAS TEST and Grid Emission Test
Here is what a CARDMATIC user said, "My 123A paid for itself in 2 months simply by weeding out weak tubes in four kinds of TV circuits—Horizontal Output, Damper, Rectifier, I.F. This is in addition to time saved me in hit-or-miss tube substitution or hunting for other troubles when the tube was actually at fault. Another said, "My wife tests all the radio-TV tubes in my shop. She says the 123A saves her so much time she absolutely will not give it up."



3 Gas Content

8-Second HIGH-SPEED Test
(after tube warm-up)

Ask your jobber for a free demonstration of the 123A CARDMATIC in your shop.

Free technical booklet is available.

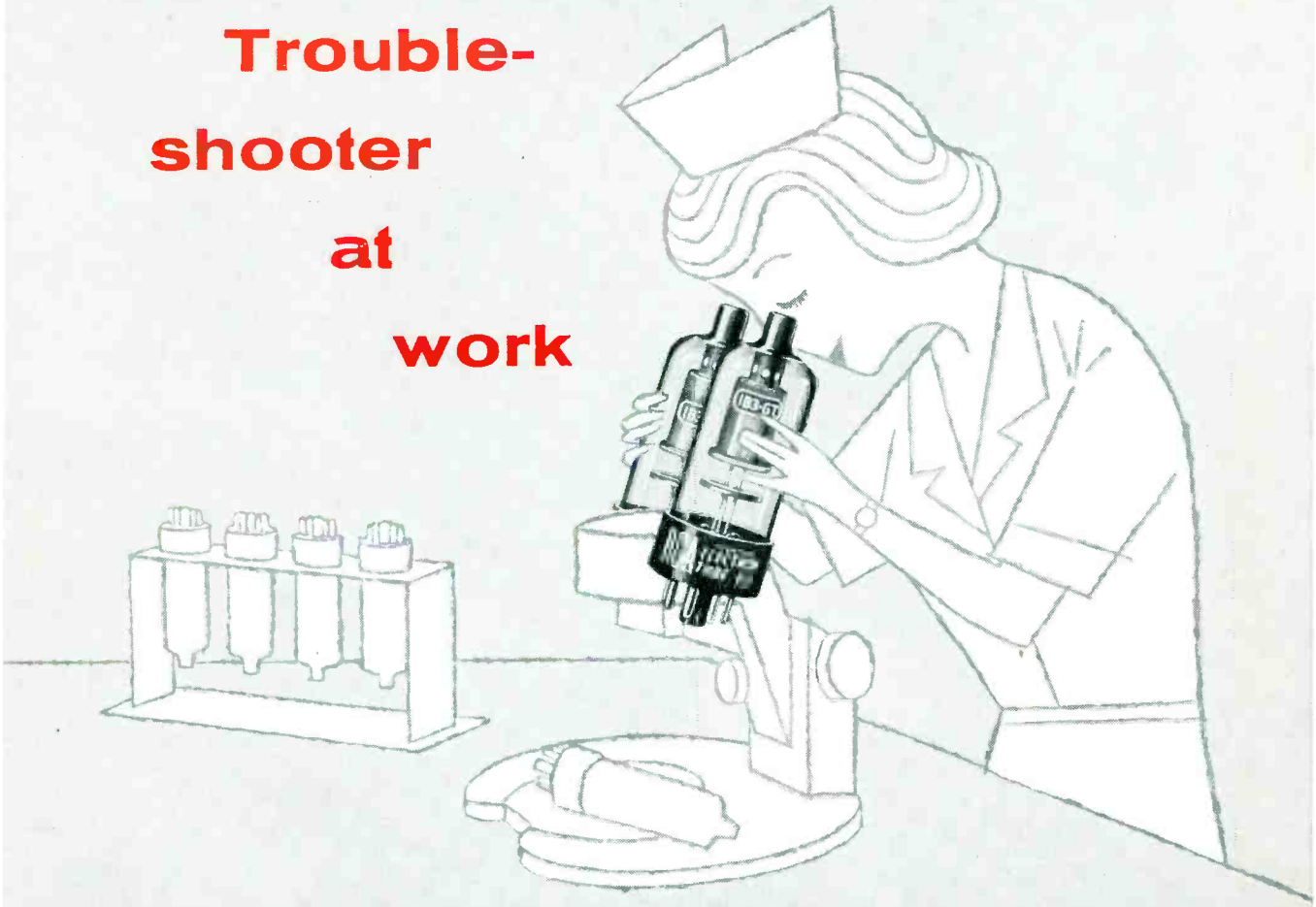
Write to . . .

This equipment includes the New Hickok Service-Instruction Warranty

THE HICKOK ELECTRICAL INSTRUMENT CO.
10523 Dupont Avenue • Cleveland 8, Ohio

QUIET

Trouble-shooter at work



Here's how Microscopic Inspection by RCA helps reduce costly callbacks...

A bad tube, or a potential trouble-maker—can it get by this gal? Not likely. She's part of the specially trained RCA group of inspectors whose important job it is to find trouble and help prevent it from happening *to you*.

RCA Quality-Control Procedures include MICROSCOPIC INSPECTION OF POPULAR TV RECEIVING TYPES! These types are closely examined for possible poor welds, weld splatter, bad crimps, damaged stems, improper assembly, and many other factors that can affect top quality, long-term performance. Though the tubes may pass all electrical tests, such defects could slip by and mean the difference between a profitable service call and a costly callback.

You gain valuable assurances from this *extra* care: (1) that popular TV receiving types shipped to RCA Tube Distributors have had the *extra* benefit of the MICROSCOPIC INSPECTION PROGRAM and (2) that you can always service your customers with the confidence that RCA TV Receiving Types are top quality replacement tubes.

When you order—tell your distributor "RCA only" and watch your profits grow.

RCA®

RECEIVING TUBES

RADIO CORPORATION OF AMERICA

Tube Division, Harrison, N. J.