

NEW-AND MOST VERSATILE

TRIPLET

**MODEL 850
ELECTRONIC
VOLT-OHMMETER
IS BEST
FOR YOU**

MODEL 850 \$79.50



FEATURES:

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

2 BETTER STABILITY through improved current design.

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

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

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

New pencil thin test probe used for all functions: DC, AC, and ohms. No need to change cables. Beautifully styled case for professional appearance and functional utility, 7 7/8" x 6 1/16" x 3 3/4".

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

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

CARRYING CASE

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



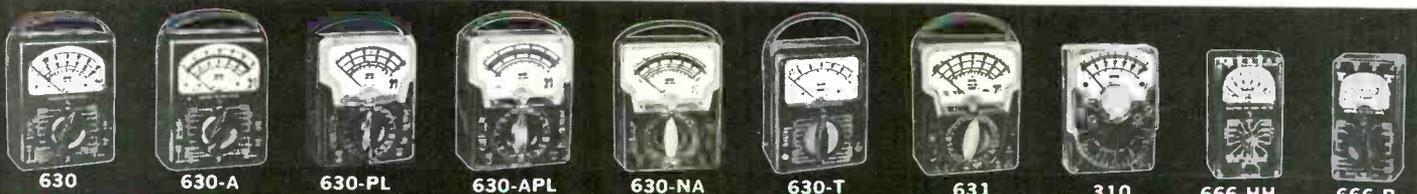
RANGES

8 DC VOLTS RANGES	0-.5-1.5-5-15-50-150-500-1500
7 AC RMS VOLTS RANGES	0-1.5-5-15-50-150-500-1500
7 PEAK-TO-PEAK VOLTS RANGES	0-4-14-40-140-400-1400-4000
7 RESISTANCE RANGES	0-1000-10,000-100,000 OHMS; 1-10-100-1000 MEGOHMS.

FREQUENCY RANGE 15 CPS to 3MC; (Up to 250 MC with accessory diode probe available extra.)

INPUT IMPEDANCE DC Volts 11 Megohms; AC Volts minimum of .83 Megohms.

TRIPLET ELECTRICAL INSTRUMENT COMPANY, BLUFFTON, OHIO



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

ELECTRONIC TECHNICIAN

Including
SERVICE
Magazine

World's Largest Electronic Trade Circulation

May, 1961

ALBERT J. FORMAN *Editor*
ARTHUR P. SALSBERG *Managing Editor*
JACK HOBBS *Technical Editor*
B. V. SPINETTA *Assistant Editor*
HARVEY WETZLER *Assistant Editor*
ROBERT TALL *Washington Editor*
C. F. DREYER *Art Director*
M. FARRIS *Editorial Assistant*



Address all mail to
480 Lexington Ave., New York 17, N. Y.
Telephone YUkon 6-4242

HOWARD A. REED *Publisher*

BUSINESS DEPARTMENT

R. L. KIPP *National Sales Manager*
N. McALLISTER *Production Manager*
M. RUBIN *Circulation Manager*
A. KANE *Accounting Manager*
M. MOYLAN *Accounting Supervisor*

P. H. DEMPERS, JR. *Regional Manager*
10 E. Huron St., Chicago 11, Ill.
Telephone Michigan 2-4245

CHRIS DUNKLE & ASSOCIATES

California Representative
740 S. Western Ave., Los Angeles 5, Calif.
Telephone DUnkirk 7-6149
420 Market St., San Francisco 11, Calif.
Telephone SUtter 1-8854

BERNIE EDSTROM *Regional Manager*
15605 Madison Ave., Cleveland 7, Ohio
Telephone LAkewood 1-7900

JOHN R. KIMBALL & CO.

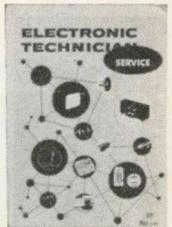
Mountain States
420 Market St., San Francisco 11, Calif.
Telephone DOuglas 2-9183



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

Second-class postage paid at Concord, New Hampshire. Subscription rates: United States and Canada, \$5.00 for one year; \$8.00 for two years; \$10.00 for three years. Pan American and foreign countries: \$9.00 for one year; \$14.00 for two years; \$18.00 for three years; Copyright 1961 by Electronic Technician, Inc., New York. H. Reed, President, A. Forman, Executive Vice-President. Title registered in U. S. Patent Office. Reproduction or reprinting prohibited except by written authorization of publisher. Printed in U.S.A. by Rumford Press, Concord, N. H.

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



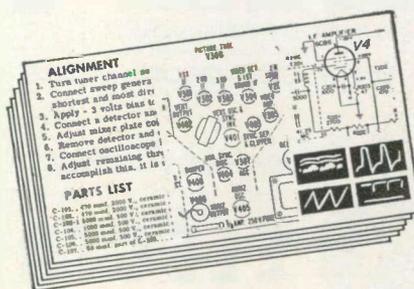
FEATURES and ARTICLES

"Tuning in the Picture"	14
The Price of Mandatory UHF (Editorial)	29
TV Manufacturers Technical Digest	30
TV Sweep Circuit Test "Analyzers" Part II	ET Editorial Staff 32
Center Speaker for Stereo	L. M. Dezettel 36
Troubleshooting Marine Radio Transmitters	Barron Kemp 38
Servicing UHF TV Tuners	John Haskell 40
"Tough Dog" Corner	J. A. Beck, M. G. Goldberg 41
Shop Hints	Don Beroff, H. L. Davidson, H. Leeper, D. M. Strange 42
1961 ELECTRONIC TECHNICIAN DIRECTORY	43
Technician Associations • Societies • Schools • Manufacturers	
1961 Parts Show Preview	55
Free Literature	57
Getting the Most out of Volkswagens in TV Service	Jack Darr 80

DEPARTMENTS

Editor's Memo	4	Catalogs & Bulletins	20
Letters to the Editor	8	New Products	24
Calendar of Coming Events	15	Audio Newsletter	60
News of the Industry	18	New Books	70
Reps. & Dists.	18	Association News	78

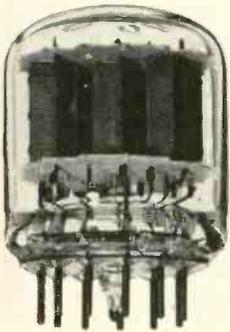
CIRCUIT DIGESTS Preceding Back Cover



IN THIS ISSUE

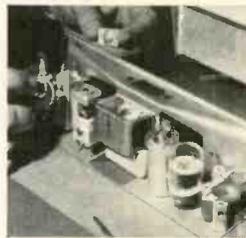
(16 pp. latest schematics & data)
CUMULATIVE INDEX of all schematics published to date
PHILCO: TV Chassis 11N56
WESTINGHOUSE: TV Chassis V-2411-1, V-2411-3
ZENITH: Transistor Portable Radio Model Royal 150 Chassis 6GT42Z2

Up goes the showroom curtain on in the most advanced



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

CIRCUITRY. COMPACTRON devices package a combination of functions into a single miniature envelope. The result: fewer components, less space per function, more compact circuitry than is possible with miniature tubes—and higher power output, greater sensitivity than transistors. Circuits with COMPACTRONS require fewer sockets and clips. Twelve stem leads serve as rigid mounting pins which can be inserted directly into clips on simplified circuit boards. Large $\frac{3}{4}$ -inch diameter pin circle reduces clustering of associated components.



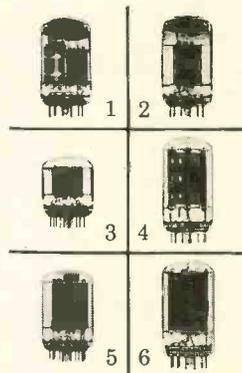
SERVICE. As more and more equipment with COMPACTRON devices comes on the market, you're the man who will need the answers to your customers' service and replacement needs. Equipment with COMPACTRONS offers the appeal of miniaturization plus the advantages of vacuum device reliability. Compatible functions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

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

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

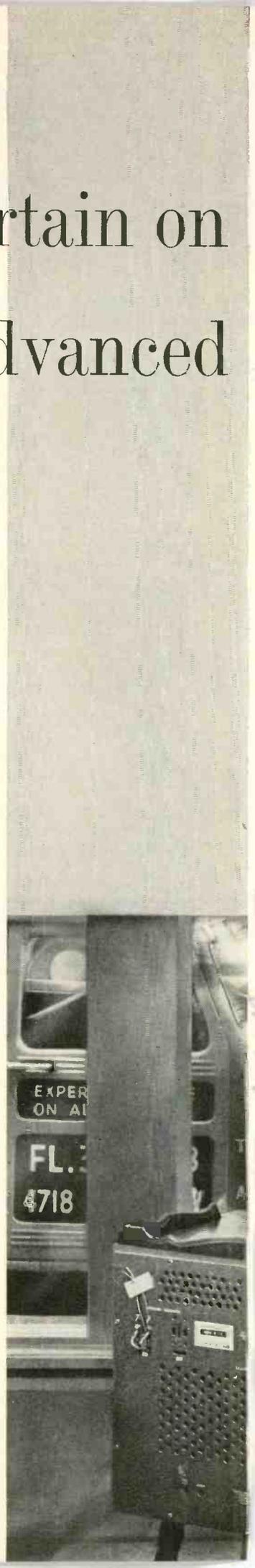
*T. M. General Electric Co.

RECEIVING TUBES, CATHODE RAY TUBES, CAPACITORS, AUDIO PRODUCTS



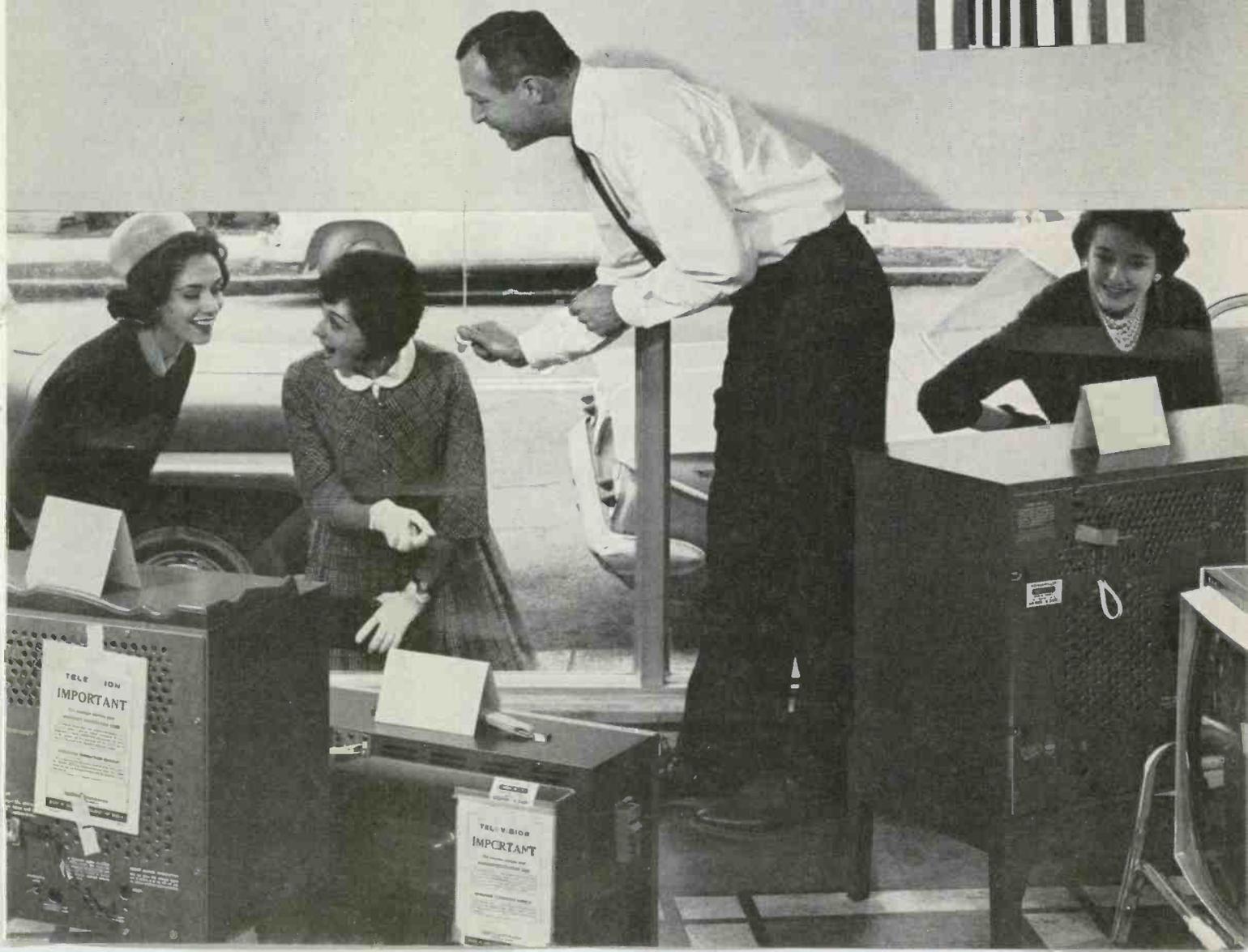
Progress Is Our Most Important Product

GENERAL  ELECTRIC



new **COMPACTRON** devices

TV sets ever



Sell the 2-Way Radio that Sells Itself...

RCA MARK VII Radio-Phone



The name "RCA" on this quality 2-way equipment is your best assurance of customer acceptance, dependable performance. Operates from car, home, office, boat or truck. Can be used at any location having 6 or 12 volt DC or standard 115 AC power source. Saves time! Saves money! Provides four crystal controlled channels for transmit and receive; manual receiver tuning for all 23 channels. Sensational value from RCA!

Additional RCA sales outlets are now being considered in many areas. Backed by a continuous national advertising program in leading publications, and by colorful promotional material and point of purchase sales aids. For full particulars, write RCA Telecommunication Center, Dept. U-417, Meadow Lands, Pa.



The Most Trusted Name
in Radio

RADIO CORPORATION OF AMERICA

See the complete RCA
Citizens' Band Line at
the Parts Show

Editor's Memo



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

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

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

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

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

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

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

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

Al Forman

the table line TV sets have been waiting for!

MARDI GRAS by JFD

...the new look that puts new sell in TV tables



JFD leads again with another great TV accessory line that brings back *decent* profits for dealers.

— the Mardi Gras, featuring . . .

QUALITY AND DURABILITY that make sense to portable and table TV owners. Gleaming lacquered brass or satin black finish . . . a height to satisfy any viewing angle . . . feather-touch roll-ability . . . tubular steel ruggedness . . . adjustable arms that snugly cradle any cabinet.

SELECTION OF STYLES to suit any decor or budget—sell every prospect. . . . Stunning new designs combining the very finest and the latest in exotic furniture woods and metals.

PRESOLD BY A SOLID MERCHANDISING PROGRAM that includes spectacular 4-color cartons . . . colorful brochures and wall streamers . . . eye-catching hang-tags . . . newspaper mats that “snow-ball” sales.

PRICED FOR FULL DEALER PROFIT through creative JFD marketing that opens new markets . . . clean distribution that protects dealer profits.

Call your distributor now, then *watch* your profits grow with Mardi Gras TV Tables by JFD.

THE BRAND THAT PUTS YOU

JFD

IN COMMAND OF THE MARKET

JFD ELECTRONICS CORPORATION
6101 Sixteenth Avenue, Brooklyn 4, New York

JFD International, 15 Moore Street, New York, New York

JFD Canada Ltd., 51 McCormack Street, Toronto, Ont., Canada

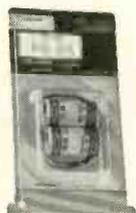
"When it's Mallory...I know it's reliable"



Don Domers (center), shown here with servicemen Everett Hammond and Jess Cody, has built a growing business on a reputation for quality servicing of radio, TV, auto radio, hi fi and stereo sets, and antennae

installation. Don has had his own shop for 29 of his 34 years in radio servicing, now has 7 employees. He's also an authorized Philco, Motorola and Sylvania dealer, having carried the first two lines for 20 years.

Your Mallory distributor stocks these quality components



TC TUBULAR ELECTROLYTICS

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



FP ELECTROLYTICS

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



STA-LOC® CONTROLS*

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

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



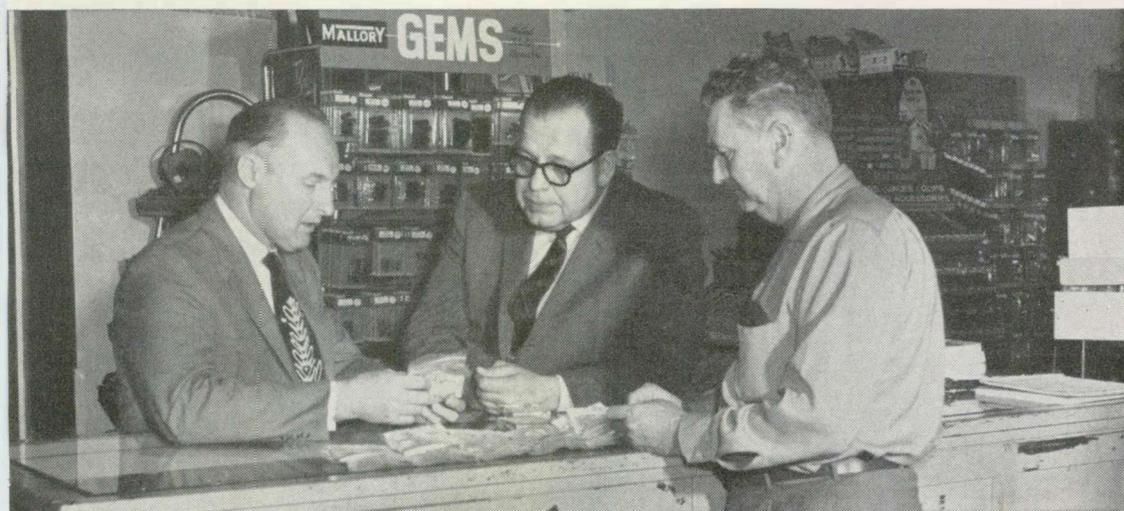
GOLD LABEL® VIBRATORS

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

says Don Domers, Terre Haute service dealer

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

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



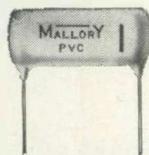
Don Domers buys all his parts from Mallory distributor C. T. Evinger Co., Terre Haute, a quality distributor who handles quality parts. He's shown here with Charlie Evinger and salesman Max Springer.

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

Distributor Division, Indianapolis 6, Indiana

P. R. MALLORY & CO. Inc.
MALLORY

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



MALLORY PVC CAPACITORS

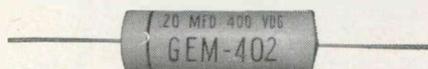
New, blue Mylar** capacitors. Withstand moisture, heat, bending of leads and overloads.

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



MALLORY MERCURY BATTERIES

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



GEMS

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



RMC DISCAPS®

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

®Trademark Radio Materials Company, a Mallory division.

**NEW CB VERSATILITY
WITH EICO®**

*New Deluxe Citizens
Band Transceivers
give you everything
you need for fast,
reliable, economi-
cal communication*



770 Series

	kit	wired
Model 770: 117 VAC only	\$69.95	\$99.95
Model 771: 117 VAC and 6 VDC*	79.95	109.95
Model 772: 117 VAC and 12 VDC*	79.95	109.95

*Including Posi-Lock® Mounting Bracket (Pat. Pend.)

Front panel selection of one of 3 transmit crystals with continuous receiver tuning over all 23 CB channels, or a fourth transmit crystal with appropriate receiving crystal. Press-to-talk button on microphone; transmit-receive switching accomplished by high-quality relay with minimum capacity between contacts to prevent current leakage at RF frequencies. Superhet receiver with RF stage for high sensitivity & proper signal-to-noise ratio. 1750 KC IF strip for unequalled image rejection & freedom from oscillator "pulling" on strong signals. IF strip prealigned so that only "touchup" alignment without instruments is needed. Current metering jack in series in cathode circuit allows checking of input power to transmitter final & adjusting it to FCC limit. 13-tube performance (4 dual function tubes, 4 single function tubes, plus germanium diode). Adjustable squelch control (in addition to automatic noise limiter). Optimum adjustment to any popular CB antenna assured through use of variable pi network in output. AVC. 3" x 5" oval PM speaker. Supplied complete with 8 tubes & 1 transmit crystal (extra crystals, \$3.95 each).

The entire transmitter oscillator circuit and RF final in every EICO transceiver kit is premounted, prewired, pretuned, and sealed at the factory (about 3 hours of skilled labor, precision adjustments and testing), complying with FCC regulations (section 19.71, part d), and permitting you to build the kit and put it on the air without the supervision of a commercial radiotelephone licensee.

**You profit with EICO
Test Equipment & Hi-Fi**



DC-5 MC
5" Scope #460
Kit \$79.95
Wired \$129.50

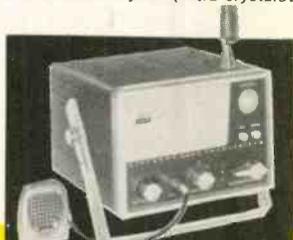


Stereo/Mono
4-Track
Tape Deck
Wired Model
RP100W \$395.00
Semi-Kit Model
RP100K,
Electronics In
Kit form,
\$289.95

An exclusive EICO product designed and manufactured in the U.S.A. (Pat. Pend.)



Electronic Instrument Co., Inc. 3300 N. Blvd., L.I.C. 1, N.Y.
ADD 5% IN THE WEST © 1961



**Standard 760 Series
of CB Transceivers**
from
Kit \$59.95 Wired \$89.95



NEW FM-AM Stereo Tuner ST96
Kit \$89.95 Wired \$129.95 inc. FET



NEW 70-Watt Integrated
Stereo Amplifier ST70
Kit \$94.95 Wired \$144.95



NEW 40-Watt Integrated
Stereo Amplifier ST40
Kit \$79.95 Wired \$124.95

Over 80 products to choose from.
Write for free Catalog ET-5 &
name of nearest distributor.
Most EICO distributors offer
budget terms.

LETTERS To the Editor

On Part Timers

Editor, ELECTRONIC TECHNICIAN:

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

J. F. CULLEN

San Francisco, Calif.

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

Intercom Shop Hint

Editor, ELECTRONIC TECHNICIAN:

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

LANDO K. MOYER

Bedminster, Pa.

Fire Department Alarm System

Editor, ELECTRONIC TECHNICIAN:

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

ROBERT C. MARSHALL

Television Equipment Co.
West Salem, Ill.

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

TV Apprentices

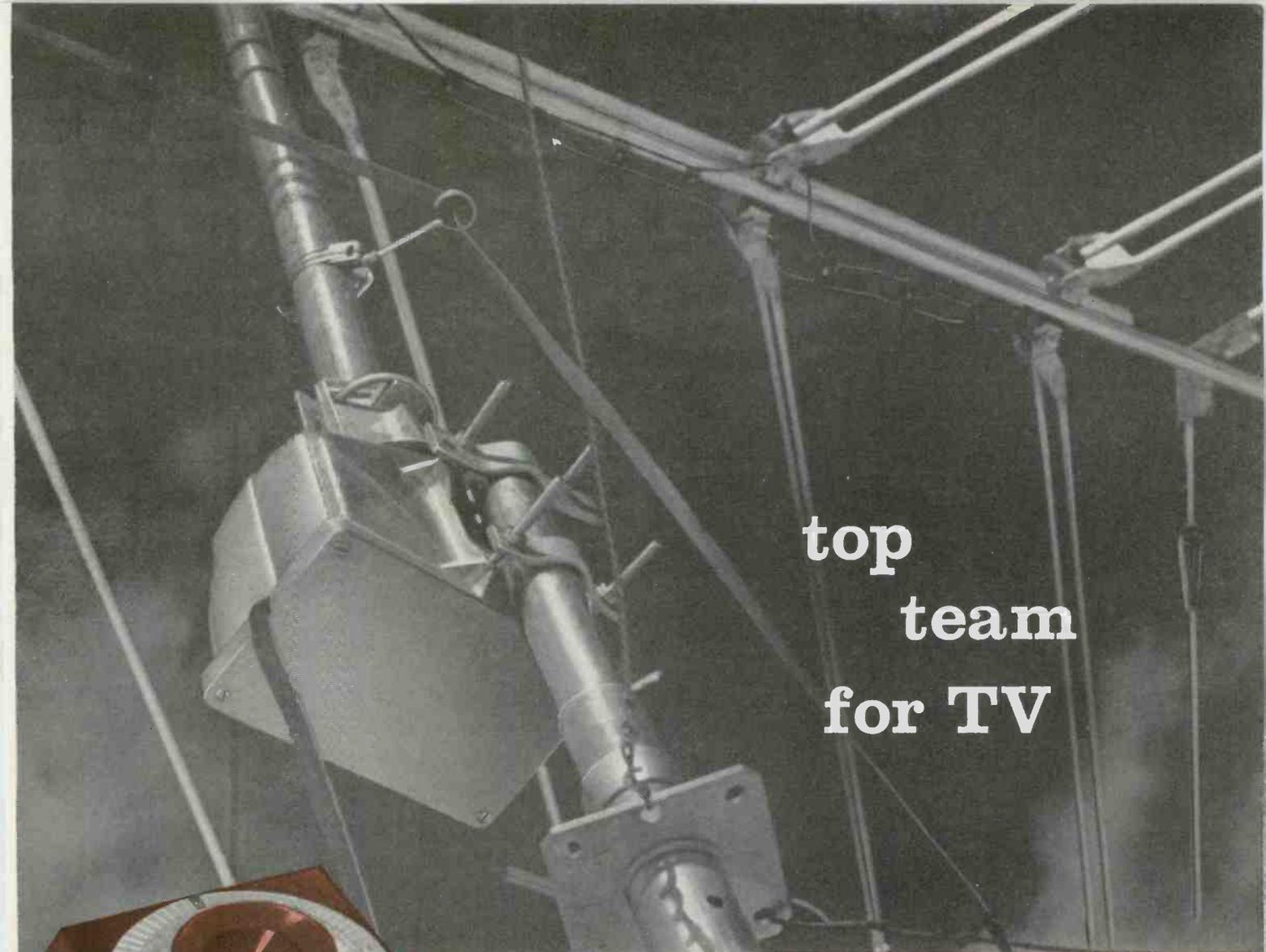
Editor, ELECTRONIC TECHNICIAN:

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

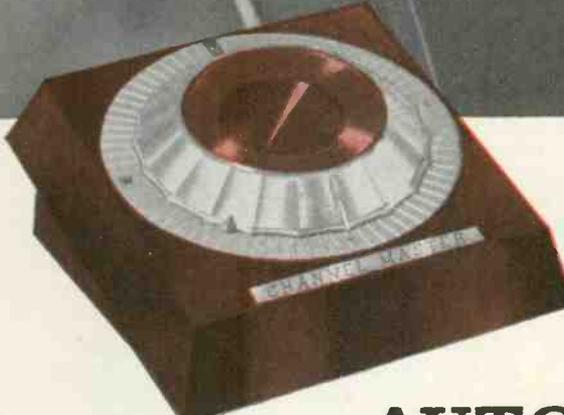
GUS BATTALIO

Clinton, Wis.

(Continued on page 10)



top
team
for TV



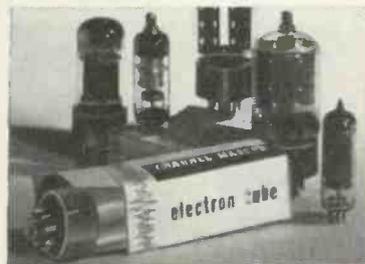
CHANNEL MASTER[®]
T-W ANTENNA and
AUTOMATIC TENN-A-LINER

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

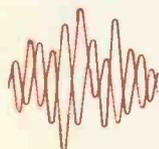
The Channel Master T-W is the most powerful broad-band antenna yet devised. It owes its superiority to a new and different approach in antenna technology . . . Channel Master's patented Traveling Wave principle.

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

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



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



CHANNEL MASTER works wonders in sight and sound
ELLENVILLE, N. Y.

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

GENERAL ELECTRIC

Dual Diodes



6GC1, 6GDI, 6GX1 UNIVERSAL REPLACEMENTS FOR TELEVISION RECEIVERS

For maximum dependability at lowest cost in horizontal phase detector circuits, most major TV manufacturers design-in G-E miniature Vac-u-Sel® Dual Diodes. As a matter of fact, there are more G-E Dual Diodes in use than any other type. So build customer confidence and satisfaction by replacing with top quality, high dependability G-E Dual Diodes. There's a type available for each basic circuit.

RECTIFIER COMPONENTS DEPARTMENT, AUBURN, NEW YORK

See your Authorized G-E Distributor today!

Progress Is Our Most Important Product

GENERAL  ELECTRIC

(Continued from page 8)

Louisiana License

Editor, ELECTRONIC TECHNICIAN:

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

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

JOE'S RADIO & TV SERVICE

Lafayette, La.

Tape Strobe Source

Editor, ELECTRONIC TECHNICIAN:

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

LEONARD BLECHMAN

Coatesville, Pa.

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

Bats In Belfry

Editor, ELECTRONIC TECHNICIAN:

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

H. E. BRAUER

Radart
Pueblo, Colo.

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

"Unavailable Parts" Reprint

Editor, ELECTRONIC TECHNICIAN:

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

H. E. MCELHENNEY

Hemcor Radio Supply
Spartanburg, S.C.

Safety Reminder

Editor, ELECTRONIC TECHNICIAN:

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

C. R. WEBB

Sugar Land, Tex.

(Continued on page 12)

WOW!



IT'S NEW FROM CLAROSTAT

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



**CLAROSTAT
MFG., CO.**
DOVER, NEW HAMPSHIRE.

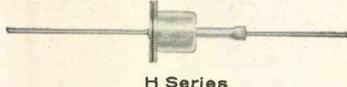
**YOUR CLAROSTAT
DISTRIBUTOR
FILLS YOUR NEEDS
BEST! FOR ALL YOUR
REPLACEMENT PARTS
—ASK HIM FIRST!**

TARZIAN

Silicon rectifiers that mean fewer call-backs for you

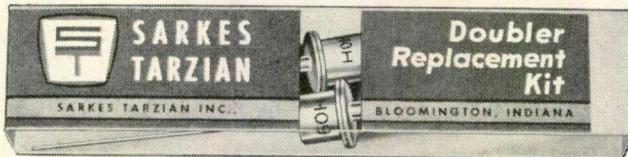


F Series



H Series

Now 600 piv F Series and H Series units for stereo...hi fi...television



Tarzian 600-volt F and H series units are now available to meet the popular demand for them for servicing stereo, hi fi, television. The 600-volt units reduce failures due to line voltage transients. 400 and 600 volt F and H series rectifiers are available in Doublor Replacement Kits—also in Ten Packs and in bulk. And remember—M 150 and M 500 conversion Kits are available for those who prefer snap-in mounting.



M 150



M 500

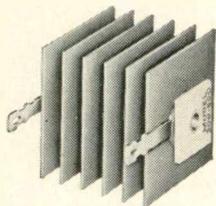
Plus



Tarzian Tube Replacement Silicon Rectifiers

Tarzian's 9 standard models of tube replacement rectifiers are directly interchangeable with over 95% of all popular vacuum tube rectifiers. An added plus is the Full Wave Silicon Rectifier (S5347), replacing 6BW4 or 12BW4 in Citizen's Band radios for maximum performance in reception quality and range.

Plus

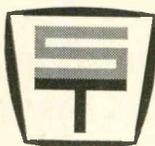


Model 300-500 now 1/3 smaller than before; only 1 1/4" wide. Other models are 50-75, 100-150, 200-250

Tarzian "Condensed-Stack" Selenium Rectifiers

Tarzian's four "condensed-stack" selenium rectifiers replace the 20 types that formerly made up the 50 to 500-milliamper line. Their small size eases both your application and inventory problems. Improved production processes have substantially reduced watt losses by as much as 50%.

Send for Tarzian "Distributor Line" Rectifier Catalog



SARKES TARZIAN, INC.

World's Leading Manufacturers of TV and FM Tuners • Closed Circuit TV Systems • Broadcast Equipment • Air Trimmers • FM Radios • Magnetic Recording Tape • Semiconductor Devices

SEMICONDUCTOR DIVISION • BLOOMINGTON, INDIANA

In Canada: 700 Weston Rd., Toronto 9 • Export: Ad Aurlima, Inc., New York

(Continued from page 10)

Indiana Licensing Trend

Editor, ELECTRONIC TECHNICIAN:

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

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

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

FRANK J. TESKEY,
Editor

The Hoosier Test Probe
Indianapolis, Ind.

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

Solution to Auto Radio Noise

Editor, ELECTRONIC TECHNICIAN:

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

JOSEPH J. DUERLOO

Oakland, Calif.



"Your Picture Tube's Gone . . ."



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

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

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

"Preferred Line"—the Dealer Line

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

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

CBS ELECTRONICS

Danvers, Massachusetts

A Division of Columbia Broadcasting System, Inc.

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

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

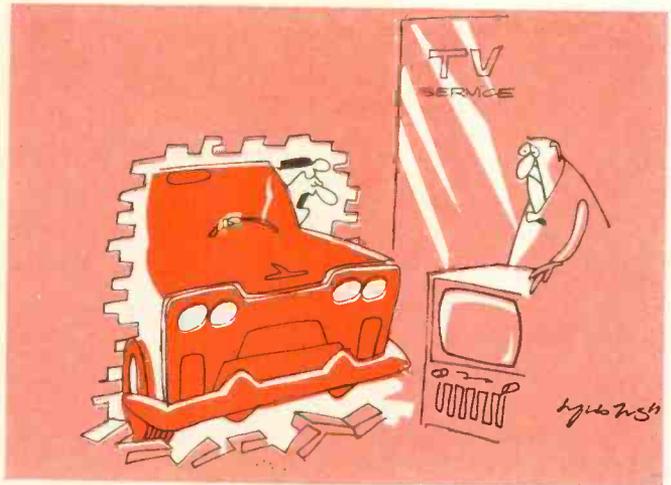
All CBS "P-L" tubes are specifically engineered for utmost dependability. Total Reliability features include non-emissive plates (5U4GB), anti-gas bulb coating and anti-sag molybdenum screen grid (6CB6A), low-microphonic mount (6SN7GTB), long-life coil heaters (6BQ7A and 12AU7A).

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



Tuning In the

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



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

CHECKOUT OF COLOR TV PICTURE TUBE



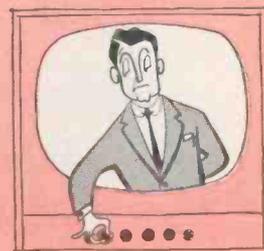
A rainbow of color is produced on RCA's new 21-inch color tube during one of many tests at the company's Lancaster, Pa. plant. Providing up to 50% brighter pictures with greater sharpness and contrast, the tube also enhances black and white images. Improved phosphors are largely responsible for advantages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

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

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

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

Picture



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

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

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

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

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

CALENDAR OF COMING EVENTS

- May 22-24: 1961 Electronic Parts Distributors Show, Conrad Hilton Hotel, Chicago, Ill.
- May 22-24: 5th Global Communications Symposium (GLOBECOM V), Sponsored by PGCS and AIEE, IRE, Sherman Hotel, Chicago, Ill.
- June 19,-20: Second National Conference on Broadcast Television Receivers (IRE & PGBTR), O'Hare's Inn, Des Plaines, Iowa.
- Aug. 22-25: Western Electronics Show & Conference (WESCON), Cow Palace, San Francisco, Calif.
- Oct. 2-4: IRE Canadian Electronics Conference, Automotive Bldg., Exhibition Park, Toronto, Canada

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

NEW PRINCIPLE PRODUCES IMAGE



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

New Type BUSS FUSE SERVICE-STAND ASSORTMENTS

*Supplies fuse needs and
saves service time*

Most Practical Stand Yet Devised

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

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

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

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

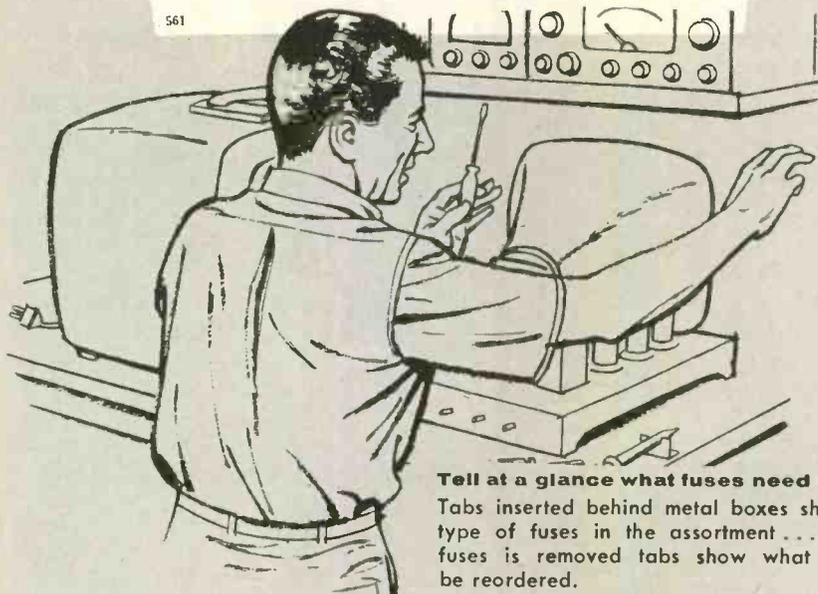
Two Quick-Service Assortments with Stand

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

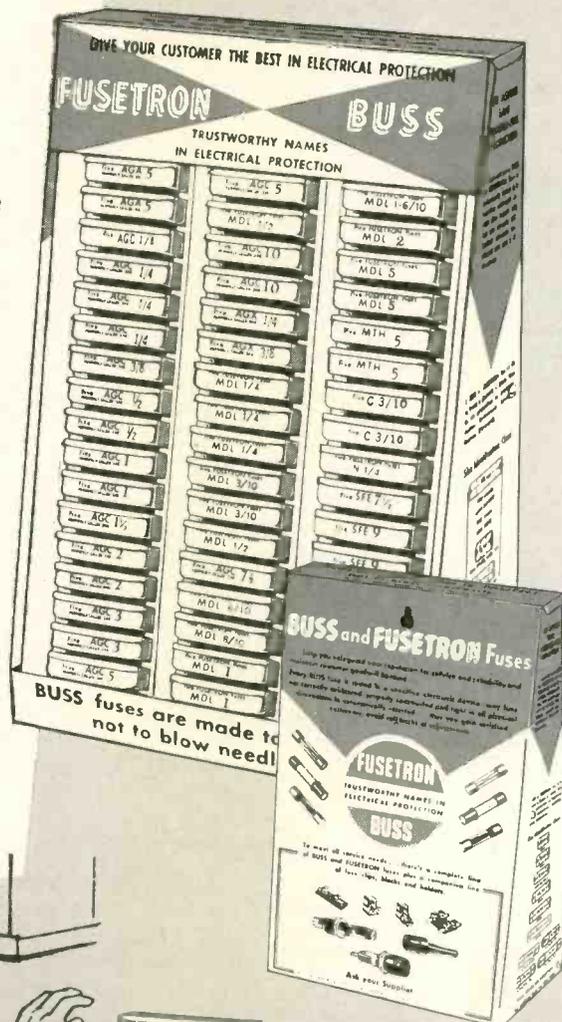
No. 130 Special electronic fuse assortment contains 130 fuses. It gives you one box of each size and type of all the popular fuses at a minimum investment.

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

561



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



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



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



RAYTHEON
UNILINE
FIRST IN QUALITY

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

RAYTHEON

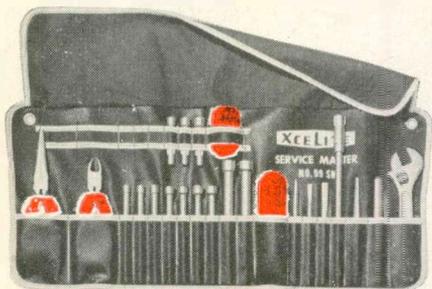
RAYTHEON
COMPANY

DISTRIBUTOR PRODUCTS DIVISION

411 Providence Turnpike • Westwood, Mass.

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

SERVICE MASTER... EVERY TOOL YOU NEED 99% OF THE TIME



complete 23-piece kit for radio, TV,
and electronic service calls

2 HANDLES:

shockproof plastic.
Regular 4" length
... 2" Stubby. Inter-
changeable. Patented
spring holds snap-in
tools firmly in place.



9 NUTDRIVERS:

High Nickel chrome
finish, 3/16" to 1/2"



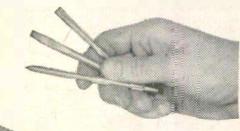
3 STUBBY

NUTDRIVERS:
1/4", 3/8", 1/2"



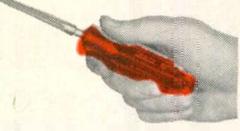
EXTENSION BLADE:

Adds 7". Fits
both handles.



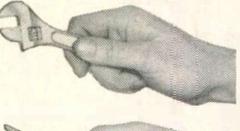
3 SCREWDRIVERS:

Two slotted...
3/16", 1/8"
#1 Phillips



2 REAMERS:

1/8"-3/8", 1/4"-1/2"



ADJUSTABLE WRENCH:

6" thin pattern,
1" opening



LONG NOSE PLIER:

"Cushion Grip",
2 1/4" nose



DIAGONAL PLIER:

"Cushion Grip"
hand-honed
cutting edges

ROLL UP KIT:

Durable, plastic-
coated canvas.
Compact, easy-
to-carry.

Ask your distributor to show you kit 99 SM



XCELITE, INC. • ORCHARD PARK, N. Y.

Canada: Charles W. Pointon, Ltd., Toronto, Ont.

For more data, circle 5-18-1 on coupon, p. 57

News of the Industry

AEROVOX resumes publication of the "Research Worker."

BELDEN MFG. has named WARREN STUART as Sales Mgr.

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

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

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

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

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

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

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

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

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

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

Reps & Distributors

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

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

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

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

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

(Continued on page 20)

THE NEW DYNAMIC RAPID TROUBLE SHOOTER

METREX GENIE

POCKET-SIZED — TRANSISTORIZED
SIGNAL GENERATOR
Tunable 50 cy. to 3.3 mc.

7 INSTRUMENTS IN ONE!



FUNCTIONS AS • RF • IF • AUDIO
VIDEO • PULSE • BAR GENERATOR
& VOLTAGE CALIBRATOR



Services — RADIO, TV, HI-FI,
RECORDERS, PHONES AND INTERCOMS

The GENIE has a tunable range of 50 cycles to 3.3 mc. Output variable from zero to 9 volts peak to peak. The uniquely designed circuitry makes possible unusually stable operation and extremely low battery drain. The rugged diecast housing insures extreme durability and perfect shielding. 2 3/4" x 3 1/2" x 2" size is ideal for shop, lab, and field use.

Pat. Pend.

METREX 519 HENDRIX ST., BKLYN 7, N. Y.

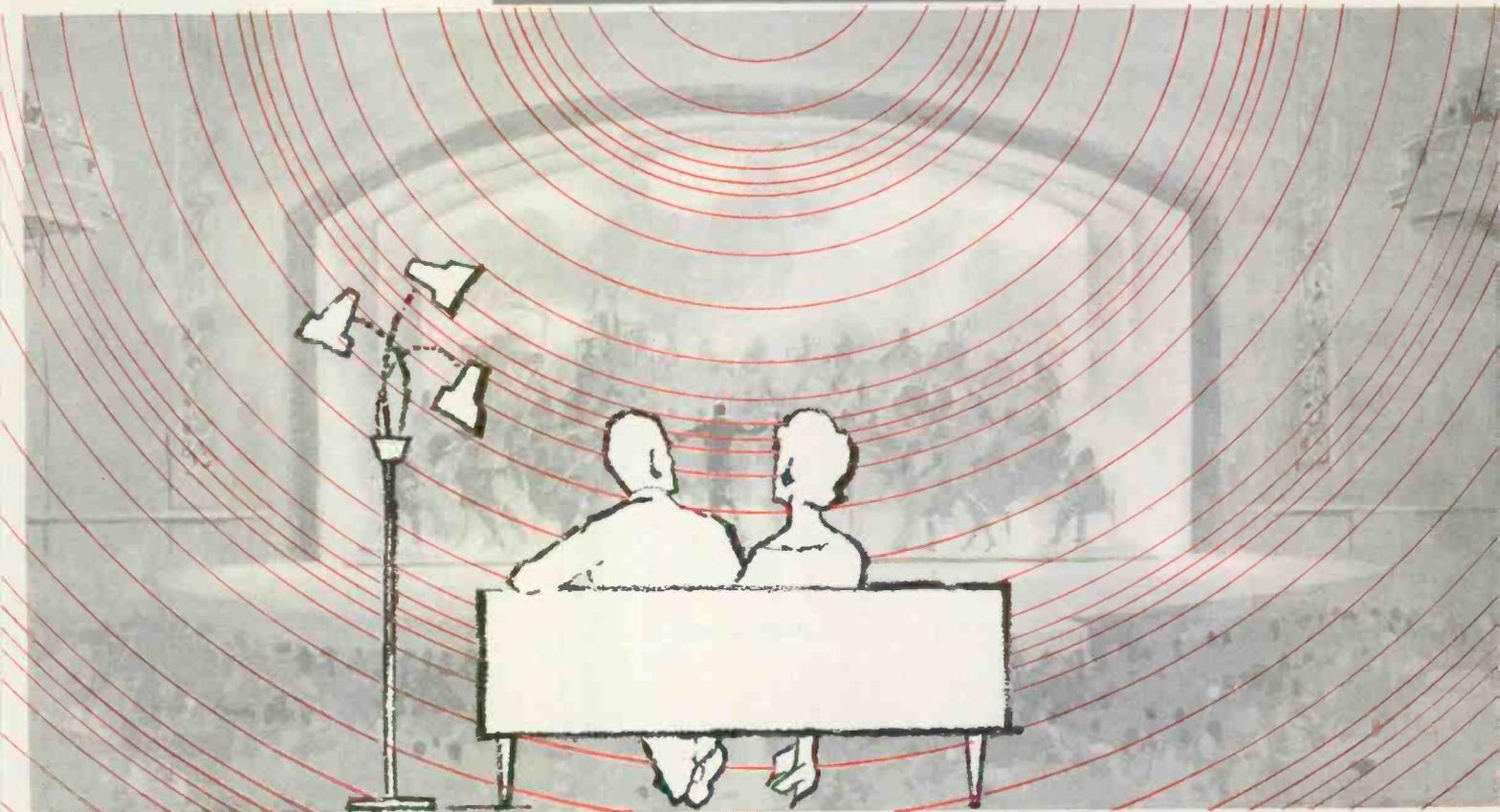
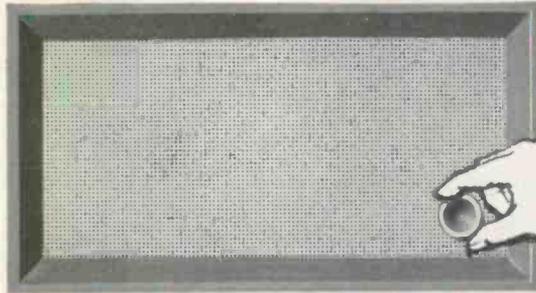
1495
less
Batt.

WRITE TODAY FOR
FREE TROUBLE
SHOOTING
GUIDE

For more data, circle 5-18-2 on coupon, p. 57

ELECTRONIC TECHNICIAN • May, 1961

NEW FROM UTAH — ADD-ON REVERBERATION



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

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

Here's how it works: Hook Utah's "Acousti-Control" unit into any speaker system. Part of the original signal feeds through a carefully tuned device which delays the sound for 1/30th of a second. This delayed sound blends with the original sound to add acoustic dimension to the room. (The further you turn the knob,

the larger the room sounds.) Makes monaural FM sound like stereo—adds startling dimension to stereo itself. Ask for a demonstration at your dealer's—or write for free literature and prices.

utah

UTAH RADIO & ELECTRONIC CORP.
Huntington, Indiana

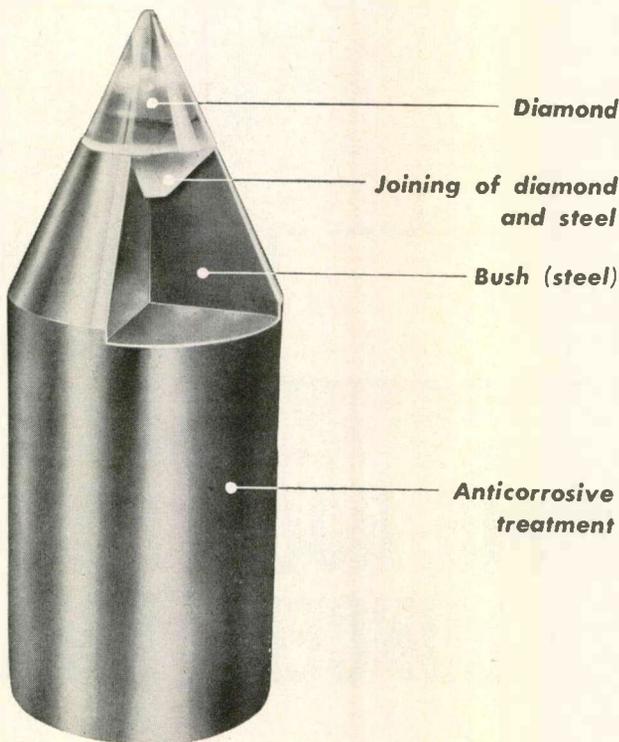
For more data, circle 5-19-1 on coupon, p. 57

Diamond Needle - New Product



THE JEWEL OF JAPANESE CRAFTSMANSHIP

Only in Japan — where tradition is blended with the ultimate in modern techniques — could such a product as Ogura's diamond-and-steel needle be realized. The latest of Ogura's long line of diamond and sapphire needles and jewels for precision instruments dating back to 1894, the new diamond-and-steel needles feature a diamond welded very securely to the metal holder through a chemical process. They can be used with any stereophonic or monoaural cartridge with complete confidence of unequalled longevity. (Patents pending in Japan, U.S.A., Great Britain, Germany and Switzerland.)



Long Life Stereo-LP
Diamond Tip Needle

Ogura is also known for sapphire and agate-bearing products of various kinds, such as sapphire needles, watt hour meters, electric meters, flow meters and aircraft instruments. Catalogue on request.

OGURA JEWEL BEARING STONE MFG. CO., LTD.

3-68 IRIARAI, OHTA-KU, TOKYO, JAPAN

(Continued from page 18)

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

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

Catalogs & Bulletins

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

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

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

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

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

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

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

(Continued on page 22)

Two outstanding products by the HIDDEN

500*

who plan for your future:



DIFILM[®] BLACK BEAUTY[®] CAPACITORS
molded tubular



DIFILM[®] ORANGE DROP[®] CAPACITORS
dipped tubular

TWO GREAT TUBULARS . . . TAKE YOUR CHOICE!

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

- Sprague Difilm Capacitors can't be beat! Dual-dielectric construction combines the best features of both Mylar[®] polyester film and special capacitor tissue. And for additional reliability, Difilm capacitors are impregnated with Sprague's HXC[®], a solid impregnant which produces a rock-hard capacitor section—there's no wax to drip, no oil to leak!
- **BLACK BEAUTY Molded Tubulars** are actually low-cost versions of the famous Sprague high-reliability capacitors used in modern military missiles. They're engineered to withstand 105°C (221°F) temperatures . . . even in the most humid climates! And their tough, molded phenolic cases can't be damaged in handling or soldering.
- **ORANGE DROP Dipped Tubulars** are the perfect replacement for radial-lead capacitors now used by leading manufacturers of TV sets. Leads are crimped for neat mounting on printed wiring boards. Extremely small in size, they'll fit anywhere, work anywhere. And they're double-dipped in epoxy resin for extra protection against moisture.

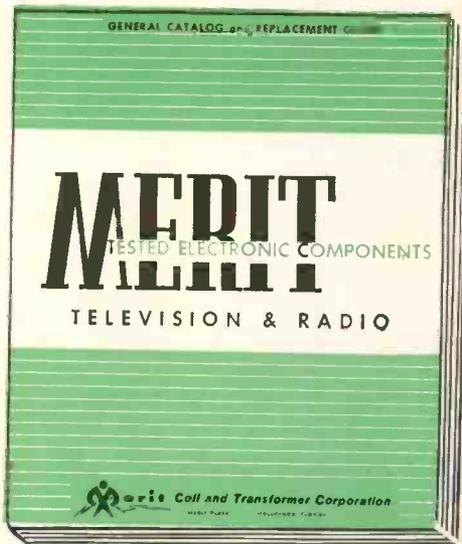
* The "Hidden 500" are Sprague's 500 experienced researchers who staff the largest research organization in the electronic component industry and who back up the efforts of some 7,000 Sprague employees working in 14 manufacturing operations—four at North Adams, Mass.; Bennington and Barre, Vt.; Concord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

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

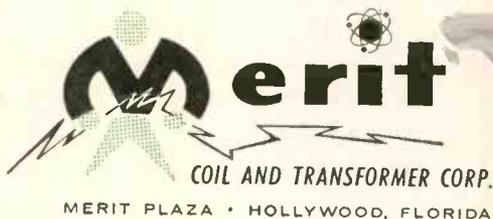
SPRAGUE[®]
THE MARK OF RELIABILITY

WORLD'S LARGEST CAPACITOR MANUFACTURER

NO...I'm not listed in the new MERIT General Catalog and Replacement Guide



... but here's a "quick picture" of what is! Over 100 new items including 27 most-wanted transistor transformers. Over 200 Merit flybacks. Many 110° and 114° yokes—a total of sixty-five 70°, 90°, 110° and 114° exact replacement yokes. In the vertical output transformer section, four new exact replacement units plus a new group of RF exact replacement coils. In all, over 1,000 quality-proved Merit Electronic Components, each individually tested, each with schematics illustrated... 144 pages of valuable information for the service technician, completely indexed and referenced for quick identification of every part. Got your copy? If not, mail us the coupon below.



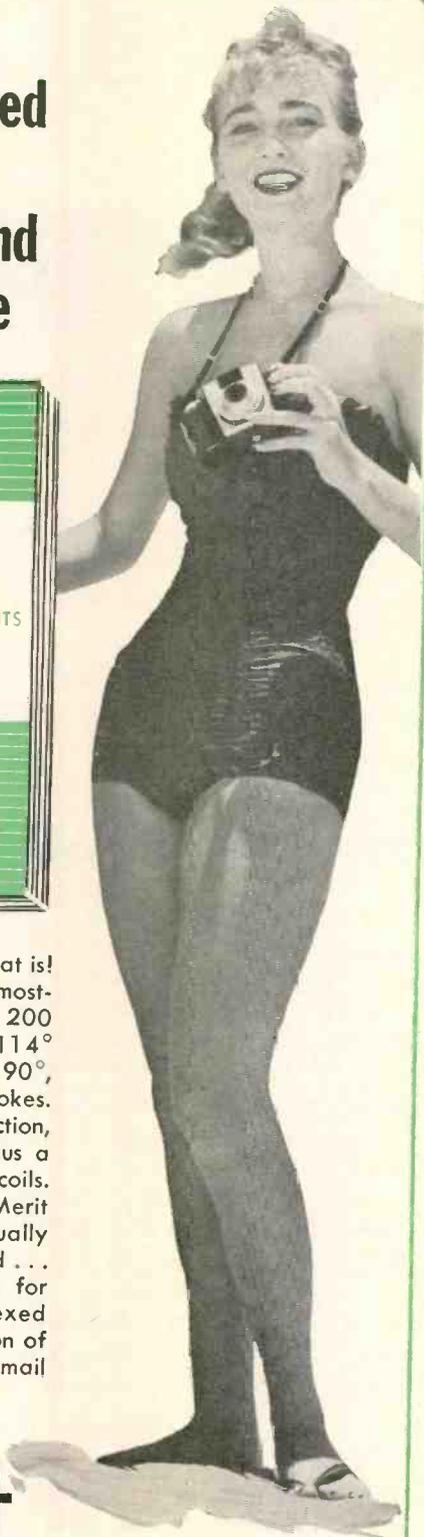
MERIT COIL & TRANSFORMER CORP., Merit Plaza B, Hollywood, Fla.

Please send me the new Catalog and Replacement Guide.

Name.....

Street Address.....

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



(Continued from page 20)

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

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

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

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

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

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

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

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

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

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



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



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

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

MODEL TCA-1RM FOR RACK MOUNTING

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

MODEL TCA-1RM \$207.50 net

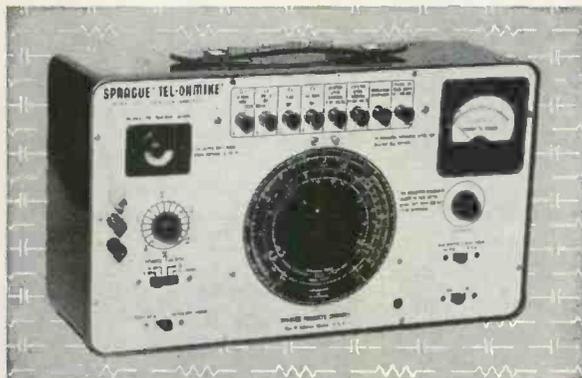
*Trademark

TCA-1 TRANSFARAD*

THE FIRST ANALYZER SPECIFICALLY DESIGNED TO SAFELY TEST TRANSISTOR CIRCUIT CAPACITORS

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

TO-5 TEL-OHMIKE® CAPACITOR ANALYZER



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

MODEL TO-5RM FOR RACK MOUNTING

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

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



- **CAPACITANCE BRIDGE** measures up to 2000 mf in five overlapping ranges. The special 1 mmf to 100 mmf range is exclusive with the Tel-Ohmike.
- **INSULATION RESISTANCE** directly read on large meter up to 20,000 megohms for papers, ceramics, and micas. No guessing with neon lamps.
- **LEAKAGE CURRENT** of electrolytics measured directly on meter, with exact rated voltage up to 600v. applied from continuously adjustable power supply. Two ranges: 0-6-60 ma. No guessing on eye-width or counting lamp blinks!
- **POWER FACTOR** of electrolytics measured by Wien Bridge up to 55% in three ranges.
- **TURNS RATIO SCALE** to measure turns ratio of power and audio transformers.
- **MAGIC-EYE TUBE** simplifies bridge balancing for capacitance and power factor measurements.
- **PUSH-BUTTONS** for instant range selection, also discharge capacitors for safety upon release.
- **MODERN CASE** finished in two-tone gray; measures 8 7/8" high, 14 5/8" wide, 6 1/8" deep. Weight only 12 1/2 pounds.

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

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

SEE THEM AT YOUR SPRAGUE DISTRIBUTOR

JUST RIGHT

for Profit-Minded Service Technicians



\$335.00

JACKSON 600

for wide band or high sensitivity operation

Your profit potential goes up when you're equipped with a new Jackson 600 Oscilloscope. You can do all these jobs:

- Peak to peak voltage measurements
- Square Wave Testing from 10 cycles to 200 KC
- Modulation Checks
- Transformer Ringing
- Low Frequency Measurements
- Checking Audio and Video Distortion low frequency and high frequency response... phase shift.

This is a fine quality instrument "service-engineered" by Jackson to best suit the needs of the really active radio and TV Service Technician.

SPECIFICATIONS:

Linear Sweep:

10 cycles to 100 KC

Sensitivity:

20 mv/inch

Wide Band

Vertical Amplifier:
Flat within 1 db from
less than 10 cycles
to 4.9 MC.

Ask your electronic distributor to demonstrate a Jackson 600 or write for Bulletin 106.



ELECTRICAL INSTRUMENT COMPANY

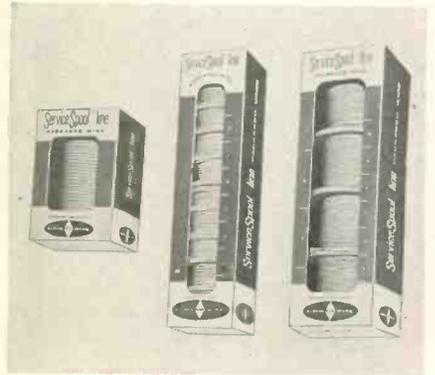
124 McDonough St., Dayton, Ohio

In Canada: The Canadian Marconi Co.

New Products

Alpha WIRE

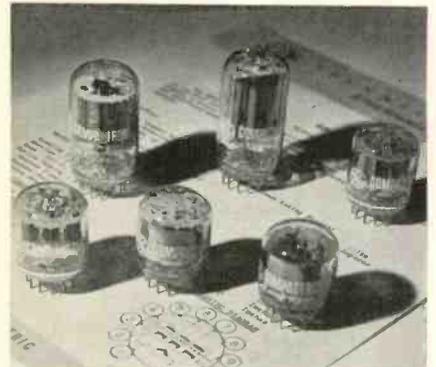
A new method of packaging ServiceSpools for self-display and self-dispensing is announced. ServiceSpool wire items are now packaged in three types of boxes, known as Protected-



Packs, to eliminate dirt and dust problems. The new boxes have a plastic window, an inventory indicator, and are designed to load into present floor or counter racks. Alpha Wire Co., 200 Varick St., New York, N. Y. For more data, circle 5-24-2 on coupon, p. 57

G-E "COMPACTRONS"

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



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

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

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

NEW ELECTRO-VOICE

PA 15



Model PA15 (8-ohms) \$30.00 List
Model PA15-45 (45-ohms) \$31.20 List
Model PA15T (70.7-volt transformer) \$36.00 List

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

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

insure wider range and smoother high frequency response!

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

Better check these other PA15 features:

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

ELECTRO-VOICE, INC.

Commercial Products Division, Dept. 516T
Buchanan, Michigan

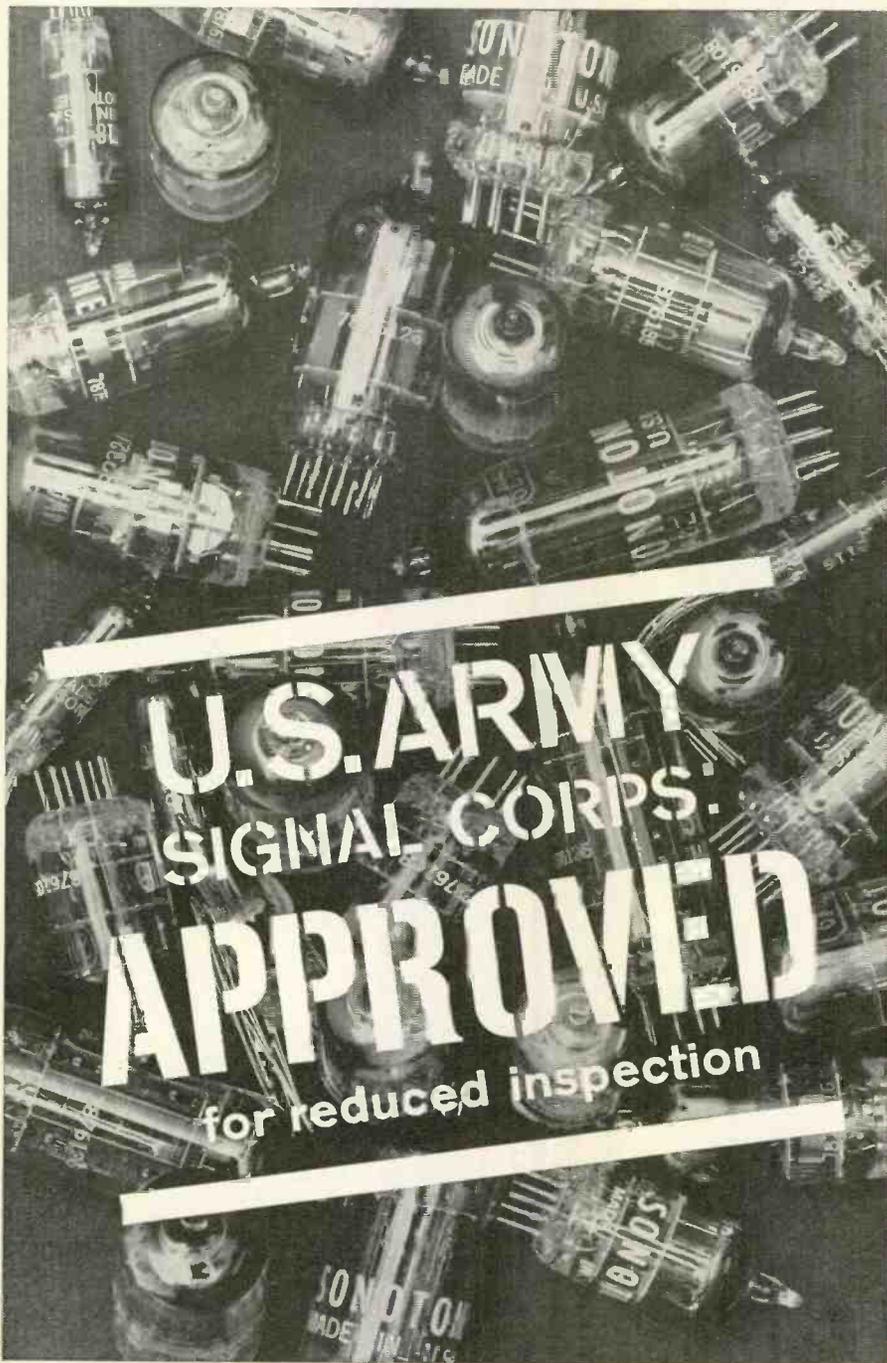
FURTHER PROOF THE SMART MOVE IS TO ELECTRO-VOICE!

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



Write for full specs
on the PA15 today!

Electro-Voice®



**U.S. ARMY
SIGNAL CORPS:
APPROVED**
for reduced inspection

SONOTONE GRANTED FULL PARTICIPATION IN U.S. ARMY SIGNAL CORPS R.I.Q.A.P. PROGRAM

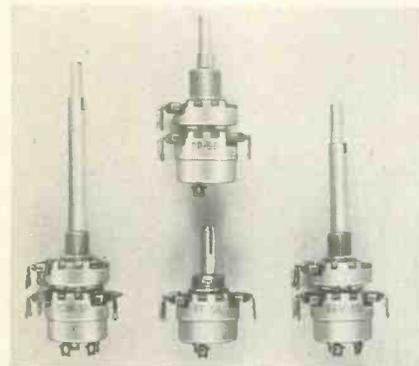
Sonotone's methods of production and quality control on electronic tubes are so rigid, the U.S. Army Signal Corps has officially reduced inspection of the company's full line of military tubes. This company is the first electronic tube manufacturer to qualify for complete R.I.Q.A.P. participation utilizing the concept of "paired attributes-verification" for acceptance by government inspection. All Sonotone tubes — military and industrial — conform to the same high standards. Over 200 to choose from — including many hard-to-get European types. Specify Sonotone when you want to be sure of quality.

Sonotone [®] _{CORP.} ELECTRONIC APPLICATIONS DIVISION,
ELMSFORD, N.Y. DEPT. T9-51

IN CANADA, CONTACT ATLAS RADIO CORP. LTD., TORONTO • LEADING MAKERS OF PHONO CARTRIDGES, SPEAKERS, MICROPHONES, TAPE HEADS, ELECTRONIC TUBES AND RECHARGEABLE BATTERIES

Centralab CONTROLS

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



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

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

G-T VTVM

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



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

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

Sarkes Tarzian REGULATORS

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

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

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

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

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

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

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

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

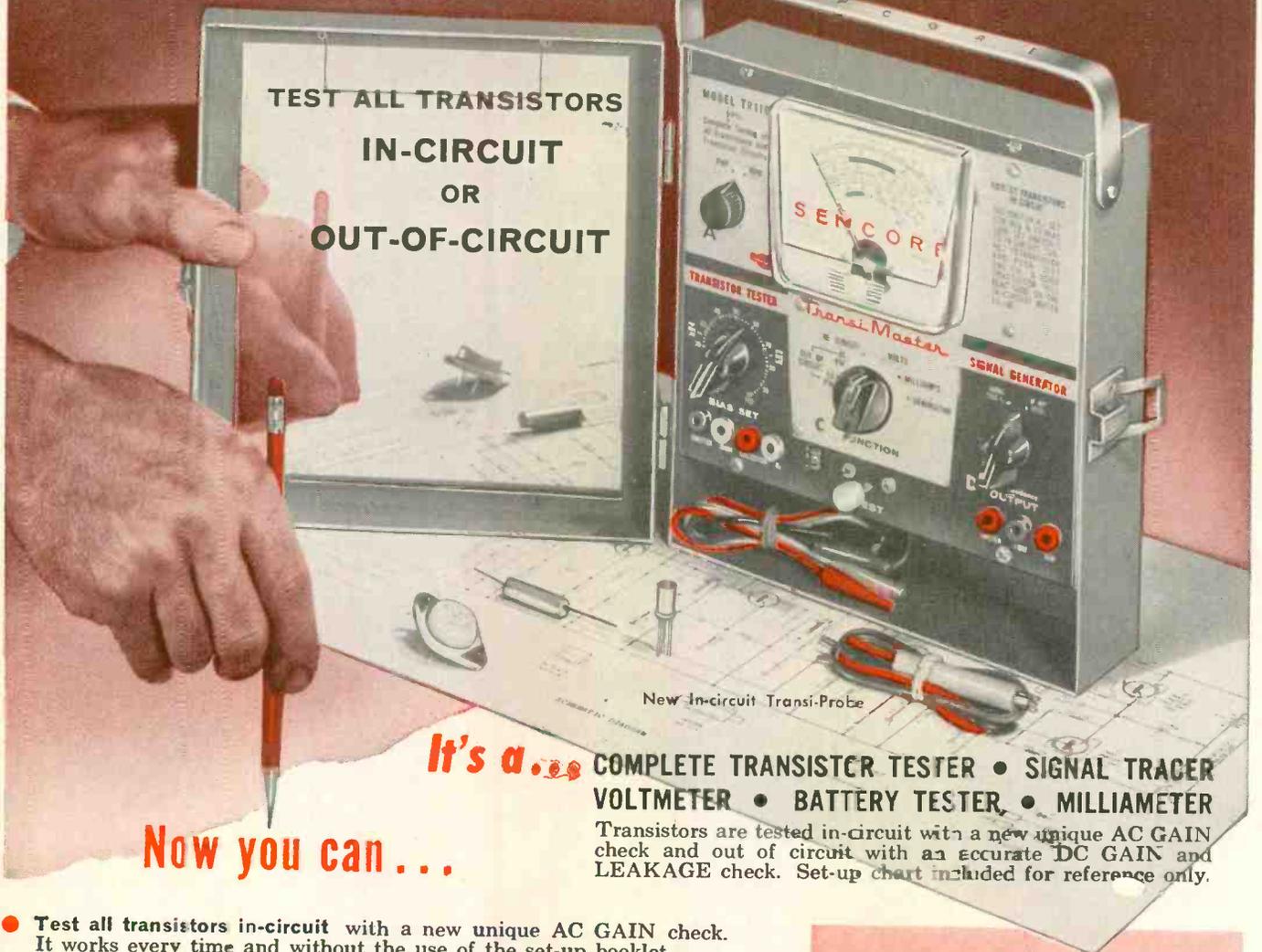
Electronic Tubes Division, Sylvania Electric Products Inc., Dept. 216, 1740 Broadway, New York 19, New York.



SYLVANIA

Subsidiary of **GENERAL TELEPHONE & ELECTRONICS** 

Analyze Every Transistor Circuit Trouble in Minutes!



Now you can...

It's a... **COMPLETE TRANSISTOR TESTER • SIGNAL TRACER
VOLTMETER • BATTERY TESTER • MILLIAMETER**

Transistors are tested in-circuit with a new unique AC GAIN check and out of circuit with an accurate DC GAIN and LEAKAGE check. Set-up chart included for reference only.

- Test all transistors in-circuit with a new unique AC GAIN check. It works every time and without the use of the set-up booklet.
- Test all transistors out of circuit with the AC GAIN check or with a more accurate DC current gain and leakage check.
- Read current gain (beta) direct for experimental, engineering work or for matching transistors.
- Check diodes simply and accurately with a forward to backward ratio check.
- Signal trace from speaker to antenna with a special low impedance generator. No tuning, adjustments, or indicating device needed for transistor radio trouble shooting. Just touch output leads to transistor inputs and outputs until 2000 cycle note is no longer heard from speaker. (Generator output monitored by meter.) It's a harmonic generator for RF-IF trouble shooting and a sine wave generator for audio amplifier trouble shooting.
- Check batteries under operating conditions as well as the voltage dividers with a special 12 volt scale.
- Monitor current drawn by the entire transistor circuit or by individual stages with a 0 to 50 Ma current scale. A must for alignment and trouble shooting cracked boards.

Benefit from these Sencore extras

- Lists Japanese equivalents.
- Automatically determines NPN or PNP.
- Mirror in detachable cover to reflect opposite side of printed board.
- Special clip to fit between batteries for current check.
- Transi-probe for making in-circuit transistor checks.

Color.....modern two tone gray
Size.....8" x 7½" x 3"
Weight.....only 5 lbs.
Meter.....0 to 3 Ma, 3½", 5% tolerance,
modern plastic
Batteries.....two size "C" cells

Model TR-110 ONLY **49⁵⁰**

ALL PARTS ARE **SENCORE** MADE IN AMERICA

SENCORE

ADDISON, ILLINOIS



Sencore Sam says, "If you'd like to get rid of those batteries during repair time, get the Sencore PS103 Battery Eliminator. It's the best and it's only \$19.95."

ELECTRONIC TECHNICIAN

Including
SERVICE
Magazine

The Price of Mandatory UHF

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

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

That's a pretty penny!

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

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

Lest we forget, when FCC set up its TV allocation program, intermixing VHF and UHF sta-

tions in the same area, knowledgeable industry observers said it wouldn't work. The sad results have underscored this monumental FCC error. UHF stations in UHF-only areas fared well; in intermixed UHF-VHF areas one UHF station after another has folded, unable to compete with VHF.

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

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

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

TV MANUFACTURERS

DELCO

Wonder Bar Radios—Battery Eliminator Testing

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

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

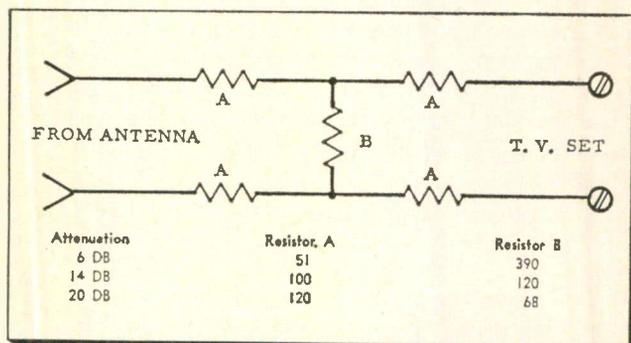
FLEETWOOD

Chassis 1000 & 1010—Secondary Controls

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

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

Definition Control—After the TV set has been ad-



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

justed to give a satisfactory picture with the control set in its normal position (center), this control may be adjusted to create a soft or sharper picture, whichever is more pleasing. Turning the control counter-clockwise will cause the CRT to exhibit a softer picture and advancing this control clockwise creates a sharper picture. Note that this control has no effect

unless the fine tuning control has been properly adjusted.

Area Control—This control adjusts the sensitivity of the receiver. It should be adjusted so that the weakest station will have a minimum of snow and the strongest station will not overload the CRT causing hum or buzz. In cases of extreme overload it may be necessary to add an attenuation network of $\frac{1}{2}$ watt resistors between the antenna lead and the receiver's antenna terminals (see illustration).

GENERAL ELECTRIC

Chassis M6—Overloaded Contrast Control

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

MAGNAVOX

Radio-Phonograph—Static Voltage Discharge

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

This static voltage discharge condition can be eliminated by adding a 10 ohm ($\frac{1}{4}$ watt) resistor from the high side of the phonograph stereo pickup circuit to ground. Mount this component across the muting switch. Only one resistor is required and it may be connected to either channel 1 or 2 with equally good results.

MOTOROLA

Chassis TS-432—Production Changes

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

... code C-02 and above, resistor R317 (22 ohms 10%, $\frac{1}{2}$ watt) has been added between the base of transistor TR-11 (audio i-f) and lug 4 of terminal board 301 in place of the jumper lead. C-302 (.01 μ f) ground lead has been relocated and tied to the emitter

TECHNICAL DIGEST

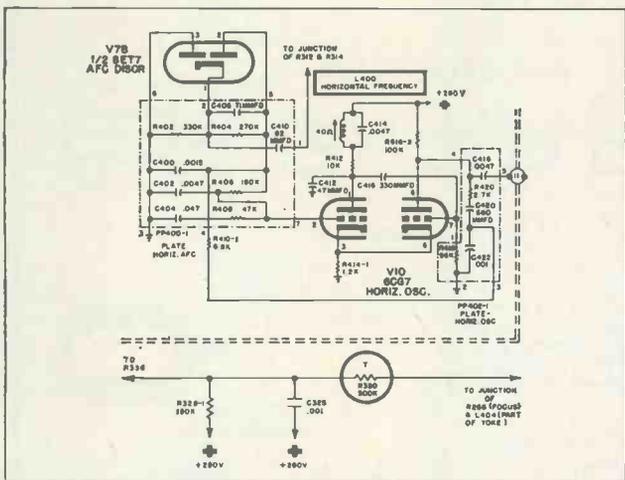
of TR-11. TR-11 has been coded with a red dot on its top to indicate the higher gain type. The TR-11 part number remains the same. On chassis stamped prior to C-02 do not use the higher gain part unless the production change has been included in the set. Using it without the production change may cause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

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

SYLVANIA

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

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



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

changed to PP400-1. The new part number is 190-0062. (2) PP402 (printed circuit in the plate-horizontal oscillator circuit) has been changed to PP402-1. This new part is labeled #190-0061. (3) Resistor R410

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

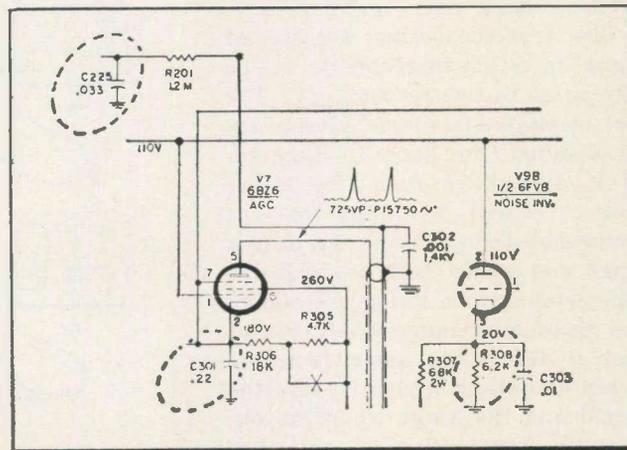
Later chassis already incorporate these circuit changes.

WESTINGHOUSE

V-2378-1, 2, 3 & 4—Improved Sync & AGC (See ET Circuit Digest #576 7/60)

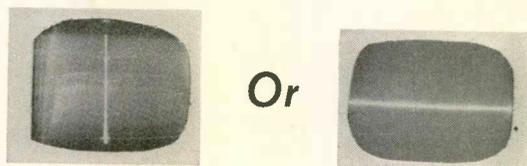
The values of capacitors C225 and C301, and resistor R308 have been changed to eliminate sync lock-out and age floating when switching relatively strong signal channels. The manufacturer recommends that this change be made on early production sets. The value of the three parts forms a matched network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

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



TV Sweep Circuit Analyzers

How To Use Signal-Injection Instruments To Repair Defects Like



ELECTRONIC TECHNICIAN
Editorial Staff

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

What Is Signal Injection?

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

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

accurate. The set is examined under dynamic conditions which ferrets out components that don't break down except under load.

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

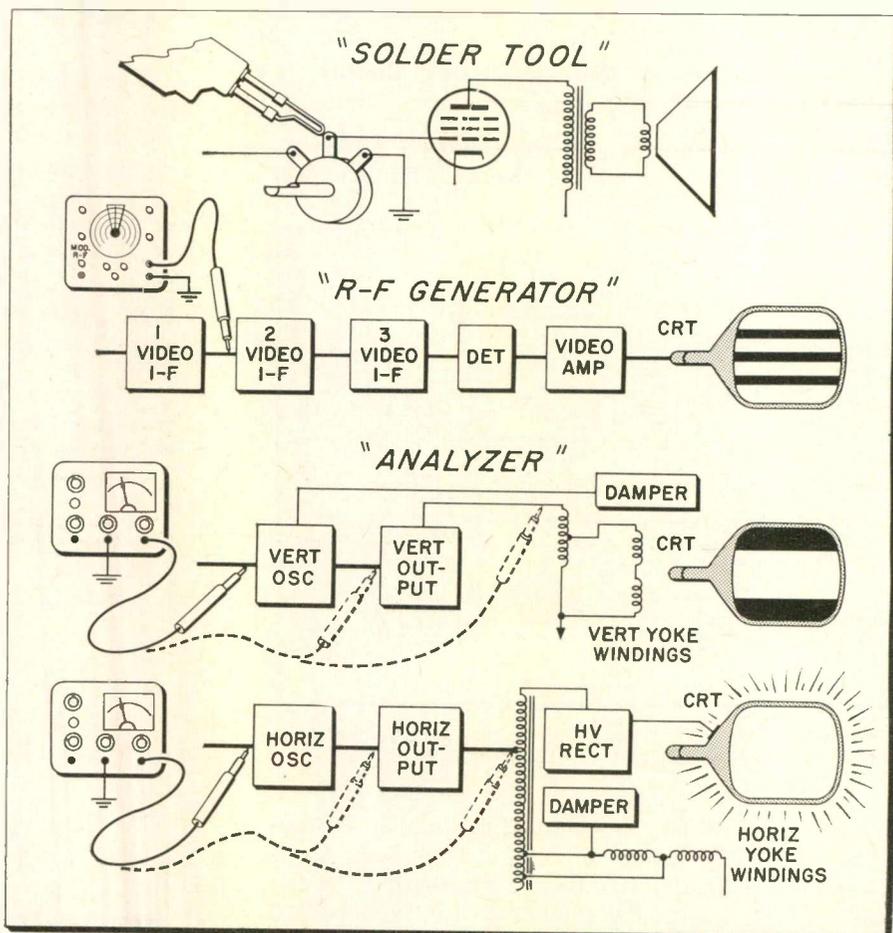
All three signal injection instru-

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

"Horizontal" Troubleshooting

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

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



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

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

◆ Another "bug" put into the Garod 16" TV was substituting a 1/2 meg resistor for the 8.2K screen resistor of the 6BG6 tube. This simulated a likely output circuit problem: Increased screen resistor value. We lost our raster, of course.

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

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

After de-energizing the set, the output tube's plate cap lead and voltage rectifier's plate cap lead were removed. B&K's high voltage neon indicator was clipped to the rectifier lead. Using the instrument's Plate Drive jack, the test lead was clipped to the flyback's output plate lead and the set was

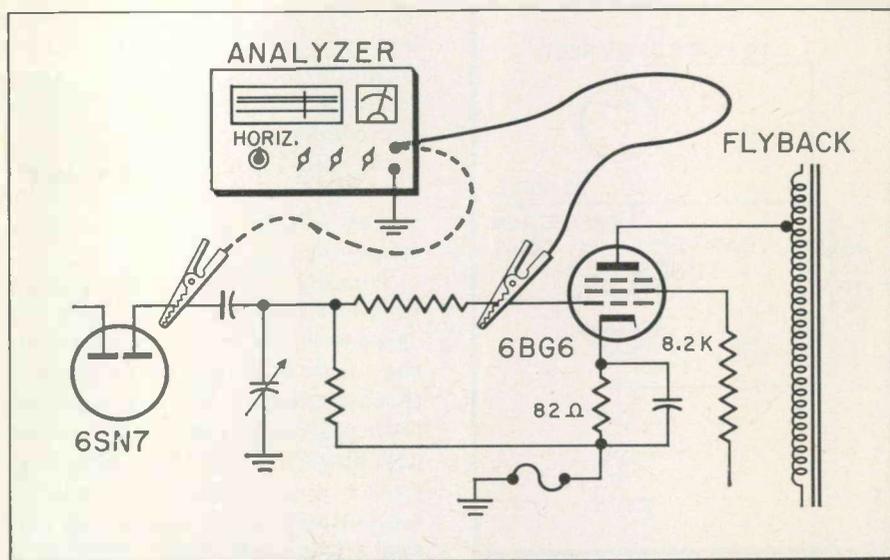


Fig. 2—Substituting an open coupling capacitor in the horizontal oscillator plate-to-output tube grid effected an open signal path, as shown. Using an analyzer instrument, a raster appeared when a pulse was applied at the 6BG6's grid, but didn't appear when applied at the 6SN7's plate. This isolated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

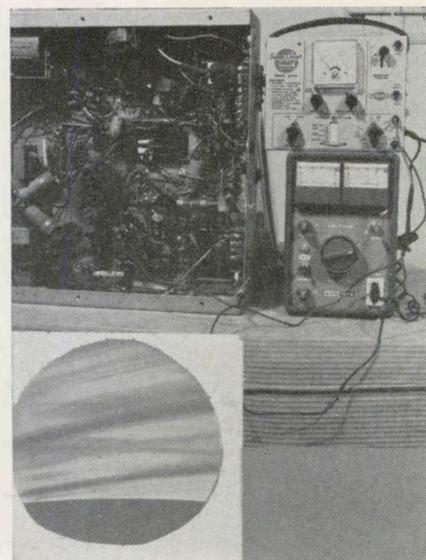
turned on. The clipped-on high voltage indicator glowed, indicating r-f pulses in the lead and the instrument's B+ boost indicator came on, indicating the presence of boost voltage. This exonerated the flyback; the defect must be either in the high voltage rectifier circuit or the output tube circuit (screen resistor, screen bypass capacitor, or cathode resistor or capacitor).

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

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

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

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



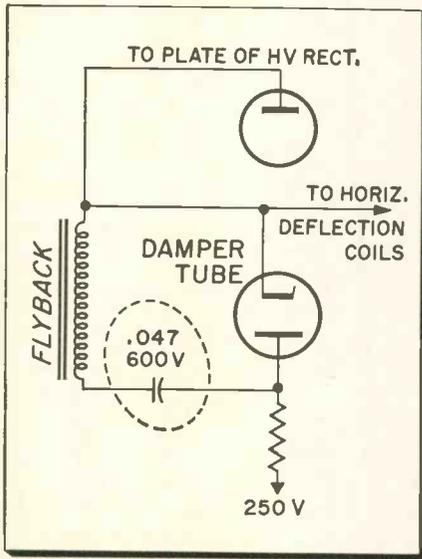


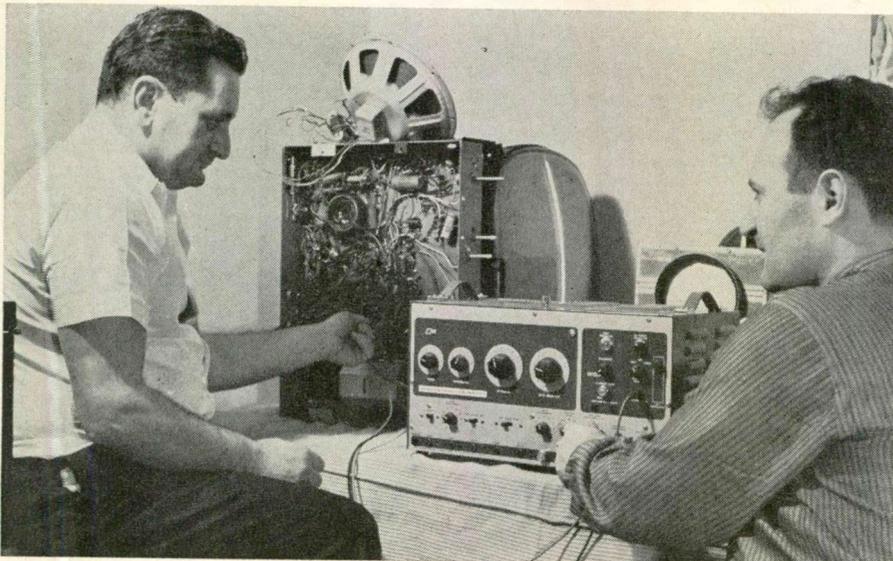
Fig. 4—A shorted .047 μ f capacitor was installed between plate and cathode of a damper tube, killing B + boost.

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

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

Removing the horizontal output tube, it was inserted into Sencore's male socket adapter, which automatically breaks the cathode circuit for milliamp measurement.

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



The adapter with inserted tube was reinserted into the chassis socket. We switched the meter selector to cathode current and the cathode selector to pin 3 (unit has a roll-chart which identifies various output tube cathode current, screen voltage, grid drive and corresponding pin numbers).

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

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

The Winston unit, which also has a plate drive jack, also indicated a defect in the flyback to second anode circuit, but aside

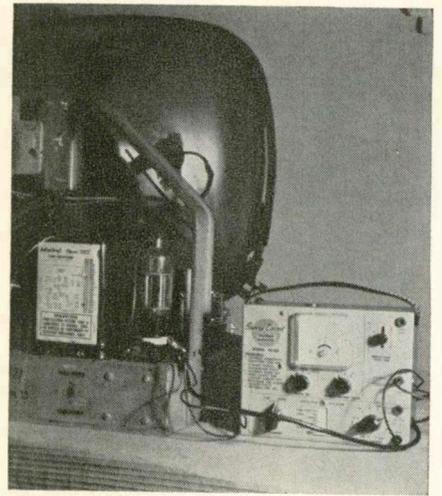


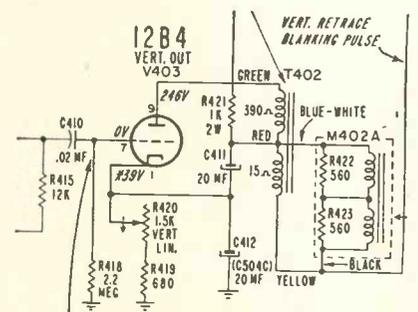
Fig. 5—Horizontal output cathode current is measured by employing Sencore's adapter socket which switches a milliammeter in series with the cathode.

from a rectifier arc test, didn't isolate the defect further. The arc test, however, is fairly reliable in this instance. Sencore's unit also indicated a defect in the flyback to second anode circuit. An arc test here isolated the defect further.

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

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

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



Sweep Signal-Injection Facilities

Models & Prices	Horizontal		Vertical		Sync	Level Controls	Output Drives	Indicators (other than TV's CRT)
	Grid	Plate	Grid-Plate	Yoke				
B&K Model 1070* \$74.95	↙	↙	↙	↙ Full Defl.	Comp + or - Blank Bars	Sync	V & H Grid V-H Plate Vert Yoke Comp Sync Blank Bars	B+ Boost neon R-f HV neon
Sencore Model SS-105 \$42.95	↙		↙	↙ Max. 1/2" Defl.	Horiz	Osc	V-H Osc Horiz Sync	D-c volt, Millimeter to monitor cathode
Winston Model 820 \$69.95	↙	↙	↙		Comp, horiz, Vert + or -		V Osc H Osc Horiz Plate V & H Sync	Overload pilot

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

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

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

B+ boost measured about 260 volts; the schematic (ET Circuit Digest #142) called for 500 volts. Obviously, we were not obtaining any boost voltage, only the power supply's normal B+ voltage. A voltage check on the damper plate

side of the capacitor read 260 volts, too. Turning the set off, a separate VTVM's ohmmeter confirmed our defect: a shorted capacitor between the damper plate and flyback-damper cathode circuit.

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

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

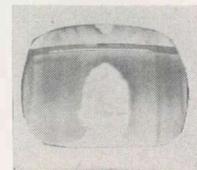
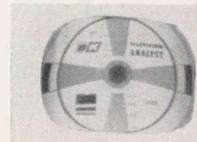


Fig. 10—B&K's 1076 opens raster fully.

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



Model 1076 also transmits video test pattern.

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

Vertical Troubles

Each test instrument has provisions for investigating the vertical
(Continued on page 84)

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

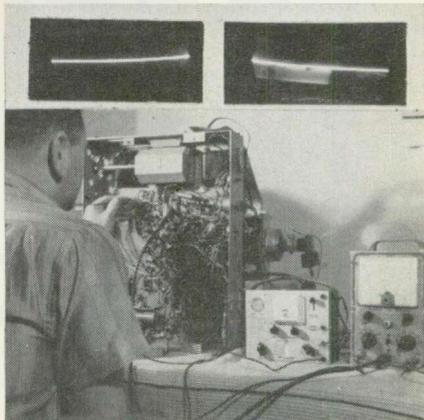
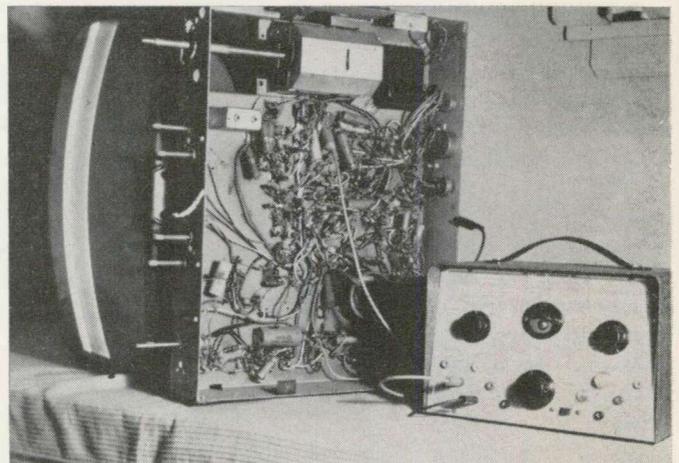
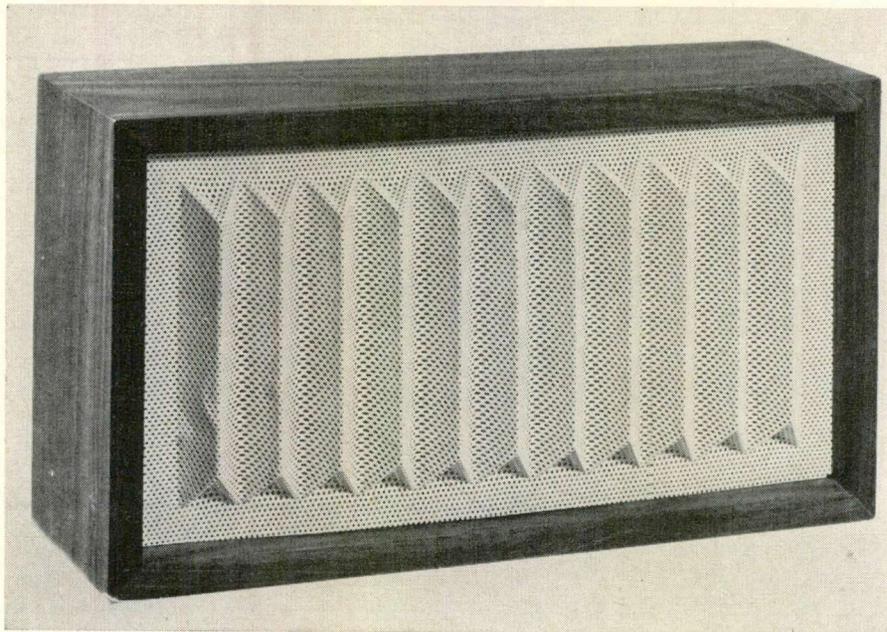


Fig. 9—Injecting Winston's vertical pulse into a TV set's vertical output transformer opens the raster a few inches.





Center Speaker For Stereo

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

L. M. DEZETTEL
Allied Radio Corp.

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

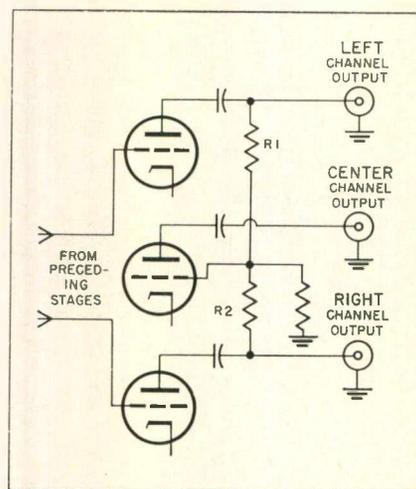
After living with this kind of unnaturalness for a while, the listener usually became annoyed with an illusion of two separate performances; one in the left and one is the right speaker.

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

Aside from filling the hole in the

middle, an important reason for a third speaker is to widen the listening area. The listener is no longer restricted to a precise point in the room to hear the full stereo

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



effect. Group listening is more comfortable, too.

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

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

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

output for operating a center amplifier.

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

Objectionable Characteristics

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

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

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

Using Sum Signal

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

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

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

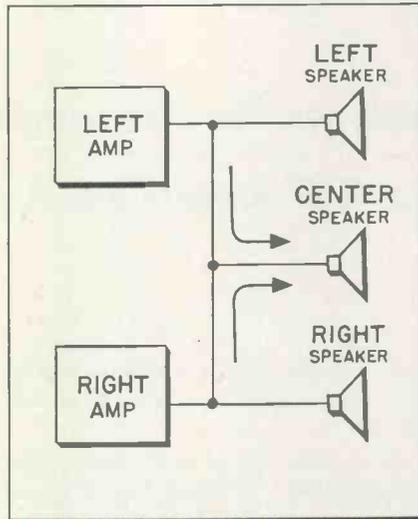


Fig. 2—Block diagram indicates a method of combining right and left channels at amplifier's output for center speaker operation. Center speaker can be either a *sum* or a *difference* signal.

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

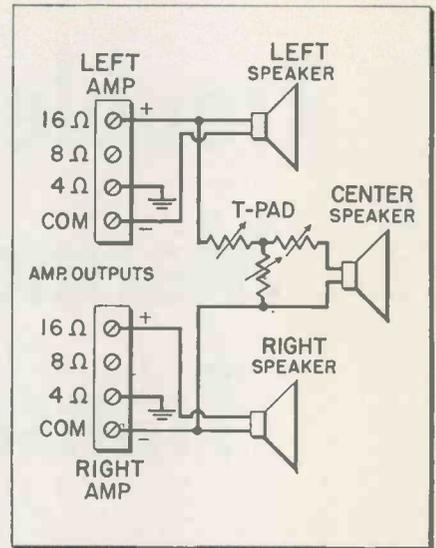
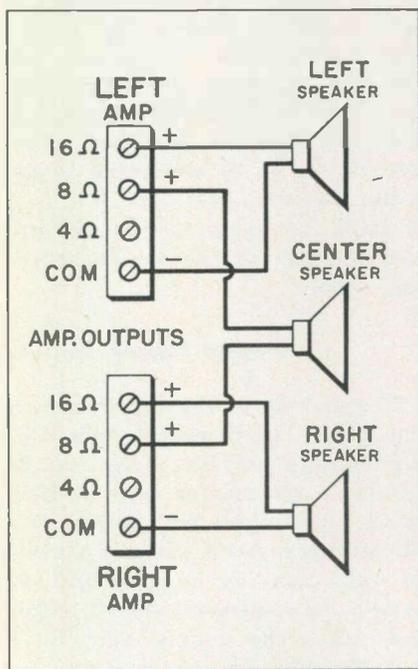


Fig. 4—Circuit for adding a third speaker operated from the *sum* of the two stereo signals. Action of each stereo amplifier is push-pull.

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

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

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

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

It is also worth mentioning that
(Continued on page 50)

Troubleshooting Marine Radio Transmitters

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

BARRON KEMP

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

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

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

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

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

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

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

Power Supply Sources

The marine power supply source may be a 6, 12, or even higher voltage storage battery. This can be driving a dynamotor with a H.V. output. The supply may consist of a vibrator, transistor pack, or converter unit running from a storage battery. In some medium and larger size boats the supply may be a portable type gas driven d-c or a-c

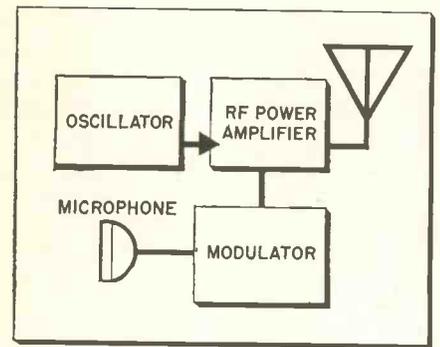


Fig. 1—Basic circuitry of typical marine type radio telephone transmitter.

generator with varying voltage output values. The supply source, its wiring, fuses, relays, etc., should be checked. All exposed contacts, terminals, and tie points require close inspection in marine power supplies. Salt-water spray, and even brackish water spray in many inland water-ways can cause corrosion and consequent poor electrical contact in power source circuits.

Transmitter Troubleshooting

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

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

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

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

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

If the transmitter is separate from the receiver, and the receiver is a regenerative, super-regenerative; or superhet type equipped with a beat-frequency-oscillator (BFO), the receiver can be used to quickly determine if the transmitter's oscillator is functioning. Tune the receiver to the frequency of the

crystal being used in the transmitter, and the beat note can be heard. Although this proves the oscillator is working, in certain cases the oscillator output may not be sufficient to excite the tube being driven. In this case, another crystal should be switched in to make a comparison.

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

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

Troubles in a multiplier stage or the r-f power amplifier are similar in some respects to those found in receiver r-f amplifiers. The r-f voltages, however, are many times greater. It is not necessary to make initial voltage readings in a transmitter's r-f stage if a milliammeter is inserted in the amplifier's plate or cathode circuit. Current at either point indicates the circuit is operating. However, if too low or abnormally high current values are indicated, checks should be made to determine if the amplifier is being overloaded, not tuned to resonance, voltages are incorrect, or some component in the circuit is defective. A

shorted or open plate-to-grid stage coupling capacitor can cause trouble. So can a changed value grid-leak bias resistor. If necessary, power can be removed from the circuits and resistance measurements made to determine the fault.

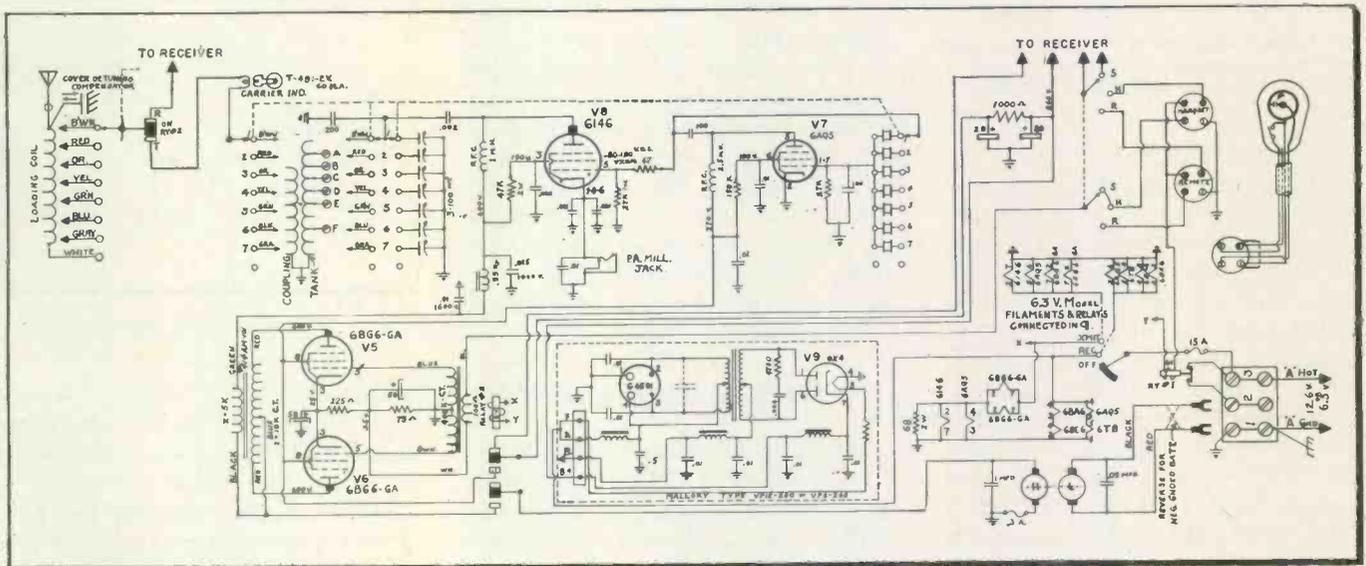
Complete absence of plate or cathode current can indicate power supply failure to the stage, an open r-f choke in the plate circuit, a defective tube, or open output winding of the modulation transformer. An open fuse or inoperative power transfer relay in the high voltage supply can also cause this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

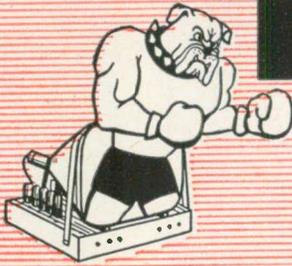
If the plate of an amplifier tube turns cherry red, the cause could be a gassy tube, the plate tank circuit may not be tuned to resonance, or no excitation is being received at the tube's grid. The tube will be drawing high current and the plate voltage will be low.

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

(Continued on page 50)

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





"Tough Dog"

Corner



Difficult Service Jobs Described by Readers

Transistor Radio, Low Volume

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

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

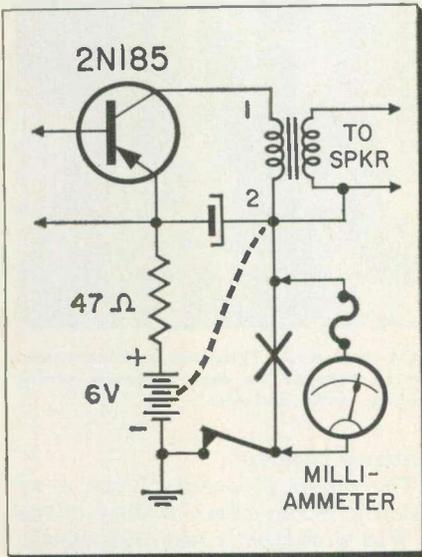


Fig. 1—In a Philco TR model T45-124, low battery life, weak volume and erratic operation were caused by the power supply "closing" at 3 volts instead of 6 volts.

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

In the process of removing bat-

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

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

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

"Upper" Vertical Compression

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

Checking the coupling capacitor from the plate of the oscillator to

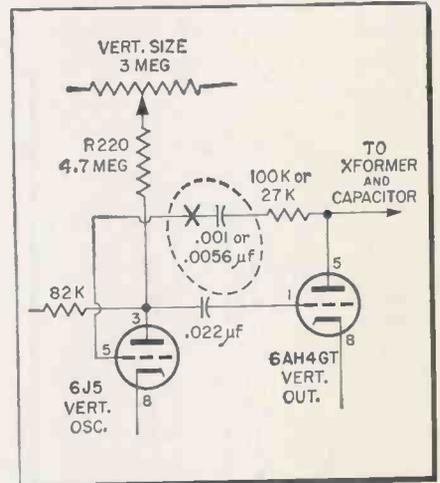


Fig. 2—A GE TV model 21C10's upper vertical compression was traced to a leaky plate-to-grid coupling capacitor.

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

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

TOUGH DOGS WANTED

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

SHOP HINTS



Replacing PC Tube Sockets

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

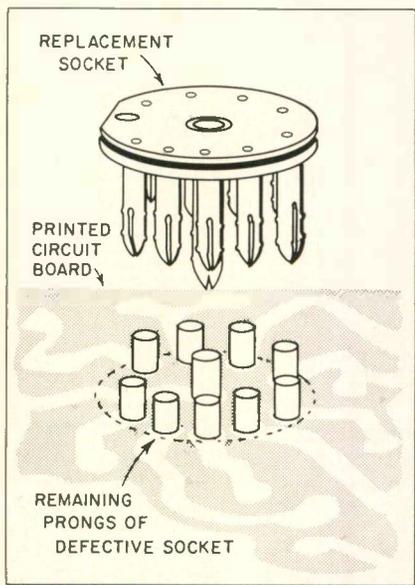


Fig. 1—Trimming the plastic around a broken printed circuit socket prepares it for easy replacement fitting. See text.

lem was solved in the following way:

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

Signal Tracing Electric Blankets

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

An electric blanket came in and I checked the control for operation and found it was not defective.

An ohmmeter check across the a-c cord plug showed the blanket's heating circuit was open. Now the problem was to find the trouble without ripping the entire blanket apart! After considerable thought, I hit upon an idea to find the break by using my audio test equipment.

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

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

Troubleshooting With Shaving Mirror

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

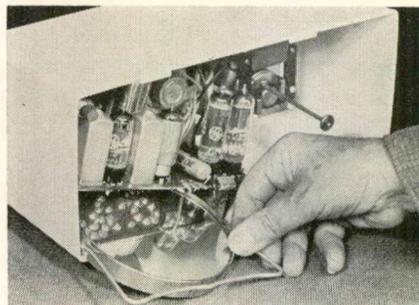


Fig. 2—A magnifying-type shaving mirror can be utilized in finding minute breaks in a printed circuit board.

ing while the unit is still mounted in its cabinet.

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

Plastic Control Shaft Repairs

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

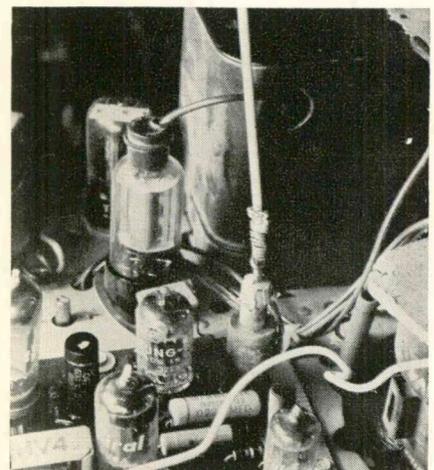
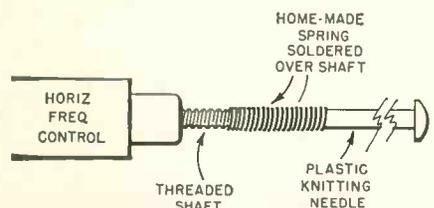


Fig. 3—Broken rear TV control shaft extensions can be repaired by using a heavy plastic knitting needle and wire.

knitting needles.

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

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

Technician Associations—1961 Roster

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

NATIONAL

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

ARIZONA

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

ARKANSAS

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

CALIFORNIA

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

CONNECTICUT

SPRINGDALE—TV Service Guild Woodbrook Drive—B Smolin

FLORIDA

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

ILLINOIS

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

INDIANA

BEDFORD—Lawrence County Electronic Technicians Assn 2001 12th St—C W Hert
BLOOMINGTON—Bloomington Radio & TV Service Assn 304 W 2nd St—Jesse Boruff
ELKHART—(IESA) Indiana Electronic Service Assn 1017 S Ma'n St—Lamar Zimmerman Jr
ELKHART—TV Bureau of Elkhart 1017 S Main St—Arden Gaerte
EVANSVILLE—RTSA of Evansville 500 8th St SE—Paul Wurtz Pres
FORT WAYNE—Bureau of Professional Technicians 808 E Jefferson—C Hostettler
FORT WAYNE—(IESA) Indiana Electronic Service Assn 1439 S Anthony St—J R Schuppach Dir
INDIANAPOLIS—(IESA) Indiana Electronic Service Assn 4622 E 10th St—Leon Howland Dir
INDIANAPOLIS—Indianapolis TV Technicians Assn P O Box 23125—Delbert Williams Recording Secy
KOKOMO—RTSEA of Kokomo 1008 Forrest Drive—Ernest Golieb
LOGANSPORT—Radio & TV Service Engineers Assn R R 2—Jack Hill

ELECTRONIC TECHNICIAN • May, 1961

NEW CASTLE—ESTA of Henry County 124 S 7th St—G L Koons
SOUTH BEND—ARTS of St Joseph Valley 1410 Sorin St—Russ Bills
VINCENNES—TESA—Vincennes 408 N 7th St—John Davis

IOWA

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

KENTUCKY

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

LOUISIANA

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

MAINE

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

MARYLAND

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

MASSACHUSETTS

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

MICHIGAN

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

MINNESOTA

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

MISSOURI

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

NEW JERSEY

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

NEW YORK

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

NORTH CAROLINA

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

OHIO

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

OKLAHOMA

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

PENNSYLVANIA

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

RHODE ISLAND

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

SOUTH CAROLINA

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

TEXAS

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

WASHINGTON

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

WISCONSIN

GREEN BAY—TESA-Green Bay 914 Howard St—Oliver Davis
MILWAUKEE—TESA-Milwaukee 12217 W North Ave—Frank Schroeder

SHEBOYGAN—TESA-Sheboygan County 1125 Indiana Ave—Paul Miller

CANADA

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

Technical Societies & Industry Associations

with name of secretary unless otherwise noted

Acoustical Society of America 335 E 45 St New York 17 NY—Wallace Waterfall
American Institute of Electrical Engineers 33 W 39 St New York 18 NY—N S Hibshman
American Institute of Physics 335 E 45 St New York 33 NY—Wallace Waterfall
American Management Assn 1515 Broadway New York 36 NY—Philip Jones
American Physical Society Pupin Physics Labs Columbia University New York 27 NY—Dr Karl K Darrow
American Radio Importers Assn 276 4 Ave New York 10 NY—David Simon
American Radio Relay League 38 La Salle Rd West Hartford 7 Conn—John Huntoon
American Society for Quality Control 161 W Wisconsin Ave Milwaukee 3 Wis—William P Young-claus Jr Adm Secy
American Society For Testing Materials 1916 Race St Philadelphia 3 Pa—T A Marshall Jr
American Society of Mechanical Engineers 29 W 39 St New York 18 NY—O B Schier II
American Standards Assn 10 E 40 St New York 16 NY—Vice Admiral G F Hussey Jr USN (Ret) Managing Dir
American Welding Society 33 W 39 St New York 18 NY—F L Plummer
Armed Forces Communications & Electronics Assn 1624 Eye St N W Washington 6 DC—Colonel F T Osterberg USA Ret
Assn for Computing Machinery 14 E 69 St New York 21 NY—Dr Bruce Gilchrist
Assn of Electronic Parts & Equipment Mfrs 11 S La Salle St Suite 1500 Chicago 3 Ill—Kenneth C Prince
Audio Engineering Society P O Box 12 Old Chelsea Station New York 11 NY—C J LeBel
Electrical Apparatus Service Assn (Formerly National Industrial Service Assn) 7730 Carondelet Ave St Louis Mo—J M Harrington Exec Vice Pres

Electronic Engineering Assn 11 Green St Mayfair London W1 England—L T Hinton Chairman
Electronic Industries Assn 1721 DeSales St N W Washington 6 DC—James D Secrest
Electronic Maintenance Engineering Assn 107 E 38 St New York 16 NY—Chris Lampel Exec Dir
Electronic Representatives Assn 600 S Michigan Ave Chicago 5 Ill—Grant Shaffer
Institute of the Aerospace Sciences 2 E 64 St New York 21 NY—Robert R Dexter
Institute of High Fidelity Mfrs 125 E 23 St New York 10 NY—Gordon Gow
Institute of Radio Engineers 1 E 79 St New York 21 NY—Dr George W Bailey
International Municipal Signal Assn 130 W 42 St New York 36 NY—Irvin Shulsinger
Joint Technical Advisory Committee 1 E 79 St New York 21 NY—L G Cumming
Metal Finishing Assn of Southern Calif 4475 Vineland Ave North Hollywood Calif—Harvey Stowers Exec Secy
National Appliance & Radio-TV Dealers Assn 1141 Merchandise Mart Chicago 54 Ill—Ken Stucky
National Association of Broadcasters 1771 N St NW Washington 6 DC—Everett E Revercomb
National Assn of Electrical Distributors 290 Madison Ave New York 17 NY—Arthur W Hooper Exec Dir
National Assn of Music Merchants 222 W Adams St Chicago 6 Ill—William R Gard Exec Secy
National Assn of Relay Mfrs P O Box 6 Stillwater Okla—Prof C F Cameron Technical Coordinator
National Audio-Visual Assn 1201 Spring St Fairfax Va—Don White Exec Vice Pres
National Electrical Mfrs Assn 155 E 44 St New York 17 NY—Joseph F Miller Managing Dir

National Electronic Distributors Assn 343 S Dearborn St Chicago 4 Ill—Gail S Carter Exec Vice Pres
National Electronics Conference 228 N LaSalle St Chicago 1 Ill—Joseph J Gershon Pres
Phonograph Mfrs Assn 37 W 53 St New York 19 NY—A D Adams
Precision Potentiometer Mfrs Assn 27 E Monroe St Chicago 3 Ill—R E Pritchard Exec Secy
Producers of Associated Components for Electronics (PACE) 261 Broadway New York 7 NY—Walter Jablon
Purchasing Agents of the Radio Television & Electronic Industry Box 62 Rosedale 22 NY—T. Trim-boli
Radio Club of America 11 W 42 St New York 36 NY—James Morelock
Radio Technical Commission for Aeronautics Room 1072 Bldg T-5 16 & Constitution N W Washington 25 DC—Lewis M Sherer Exec Secy
Radio Technical Commission for Marine Services c/o Federal Communications Commission Washington 25 DC—G R McLeod
Record Industry Assn of America 1 E 57 St New York 22 NY—Henry Brief
Scientific Apparatus Makers Assn 20 N Wacker Drive Chicago 6 Ill—Kenneth B Andersen
Society of Motion Picture & Television Engineers 55 W 42 St New York 36 NY—Charles S Stodter Exec Secy
Special Industrial Radio Service Assn 711 14 St N W Washington 5 DC—G Kenneth Adams
Ultrasonic Mfrs Assn 900 N Federal Highway Pompano Beach Fla—C E Herington
Western Association of Circuit Manufacturing 4475 Vineland Ave North Hollywood Calif—Harvey Stowers
Western Electronic Mfrs Assn 1435 S La Cienega Blvd Los Angeles 35 Calif—Burgess Oempster

Electronic Schools

CONNECTICUT

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

DISTRICT OF COLUMBIA

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

ILLINOIS

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

INDIANA

ANGOLA—Tri-State College 1612 College Ave-10-R

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

KENTUCKY

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

MARYLAND

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

MICHIGAN

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

MINNESOTA

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

MISSOURI

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

(Continued on page 77)

Basic TV-Radio Servicing	1
Advanced TV-radio servicing	2
Color TV servicing	3
Communications, FCC licenses	4
Industrial electronics	5
Hi-Fi & Audio	6
Military electronics	7
Appliance servicing	8
Business Management	9
Electronic Engineering Technology	10

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

CALIFORNIA

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

1961 ELECTRONIC TECHNICIAN DIRECTORY

Alphabetical Listing of Manufacturers

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

- Accurate Instrument 9 W Prospect Ave Mt Vernon NY
 Ace Lite Step Co 1706 S State St Chicago Ill
 Acme Electric 31 Water St Cuba NY
 Acme Lite Products Congers NY
 Acme Wire 1255 Dixwell Ave New Haven Conn
 Acoustica Associates Fairchild Court Plainview NY
 Acoustic Research 24 Thorndike St Cambridge Mass
 Acro Products 369 Shurs Lane Philadelphia Pa
 Action Systems 34 Cambridge St Meriden Conn
 Adage Inc 292 Main St Cambridge Mass
 Adams & Westlake 1025 N Michigan Ave Elkhart Ind
 ADC Inc 2833 13 Ave S Minneapolis Minn
 Adler Electronics 1 LeFevre Lane New Rochelle NY
 Admiral Corp 3800 W Cortland St Chicago Ill
 Advance Electric & Relay 2435 N Naomi St Burbank Calif
 Advanced Acoustics 391 Lakeside Ave Orange NJ
 Ad-Yu Electronics 249 Techune Ave Passaic NJ
 Aeronautical Electronics PO Box 6527 Raleigh NC
 Aerovox Corp 740 Bellevue Ave New Bedford Mass
 AEA Div Elastic Step Nut Corp 1027 Newark Ave Elizabeth NJ
 Airborne Instruments Deer Park NY
 Aircraft Radio Boonton NJ
 Airflyte Electronics 535 Ave A Bayonne NJ
 Air-Marine Motors 369 Bayview Ave Amityville NY
 Airtron Inc 200 Hanover Ave Morris Plains NJ
 Akro-Mils 820 Market St Akron Ohio
 Alco Electronic Prods 3 Wolcott Ave Lawrence Mass
 Alden Electronic & Impulse Recording Equip Westboro Mass
 Alden Products 117 N Main St Brockton Mass
 Aldshir Mfg 111 Lake Ave Tuckahoe NY
 Electric Mfg 7842 39 Ave Kenosha Wis
 Alford Mfg 299 Atlantic Ave Boston Mass
 All Channel Prods 47-39 49 St Woodside NY
 Allegany Instrument 1091 Willis Mountain Cumberland Md
 Allen-Bradley 136 W Greenfield Ave Milwaukee Wis
 Alliance Mfg Alliance Ohio
 Allied Control 2 East End Ave New York NY
 Allied Radio 100 N Western Ave Chicago Ill
 Alnor Instrument 418 N LaSalle St Chicago Ill
 Alonge Products 163 W 23 St New York NY
 Alpha Metals 56 Water St Jersey City NJ
 Alpha Wire 200 Varick St New York NY
 Alprodc Inc Mineral Wells Tex
 Altec-Lansing 1515 S Manchester Anaheim Calif
 American Concertone 9449 W Jefferson Blvd Culver City Calif
 American Cystoscope Pelham Manor NY
 American Electrical Heater 6110 Cass Ave Detroit Mich
 American Electronics 1725 W 6 St Los Angeles Calif
 American Enka Corp Wm Brand Rex Div North Windham Conn
 American Geloso Electronics 251 4 Ave New York NY
 American Instrument 8030 Georgia Ave Silver Spring Md
 American Microphone Co Rockford Ill
 American Pamcor 181 Hillcrest Ave Havertown Pa
 American Rectifier 95 Lafayette St New York NY
 American Scientific Devel PO Box 404 Janesville Wis
 American Super-Temperature Wires 32 W Canal St Winooski Vt
 American Time Products 580 5 Ave New York NY
 American Tel & Tel 195 Bdw New York NY
 American TV & Radio 300 E 4 St St Paul Minn
 Ameco Div Antennavision Inc PO Box 11325 Phoenix Ariz
 Amp Inc 3822 Eisenhower Blvd Harrisburg Pa
 Amperex Electronic 230 Duffy Ave Hicksville NY
 Amperite Corp 561 Bdw New York NY
 Ampex Audio Corp 1020 Kifer Rd Sunnyvale Calif
 Ampex Data Prods Box 5000 Redwood City Calif
 Ampex Magnetic Tape Prods Orr Industries Co PO Box 190 Opelika Ala
 Amphenol-Borg Electronics 2801 S 25 Ave Broadview Ill
 Amphenol Connector Div Amphenol-Borg Electronics 1830 S 54 Ave Chicago Ill
 Amplifier Corp of America 398 Bdw New York NY
 Ampplit Inc 342 W 40 St New York NY
 Analab Instrument 30 Canfield Rd Cedar Grove NJ
 Anchor Products 2712 Montrose Ave Chicago Ill
 Anchor Wire 183-16 Jamaica Ave Jamaica NY
 Andrea Radio 27-01 Bridge Pl N Long Island City NY
 Antenna Designs Box 110 Burlington Iowa
 Antenna Products 3753 Clark Chicago Ill
 Antenna Specialists 12435 Euclid Ave Cleveland Ohio
 Anton Electronics 1226 Flushing Ave Brooklyn NY
 Antronic Corp 2712 W Montrose Ave Chicago Ill
 Apex Wire & Cable Corp 237 37 St Brooklyn NY
- Apparatus Devel PO Box 153 Wetherstield Conn
 Applied Electronics E Grand Ave S San Francisco Calif
 Arco Electronics Community Dr Lake Success LI NY
 Arcturus Electronics 420 Kearny Ave Kearny NJ
 Argos Products 6514 W Higgins Rd Chicago Ill
 Argus Cameras 405 4 St Ann Arbor Mich
 Arkay Int'l 88-06 Van Wyck Expressway Richmond Hill LI NY
 Ark-Les Switch 51 Water St Watertown Mass
 Armco Steel 703 Curtis St Middletown Ohio
 Armour Electronics 4201 Redwood Ave Los Angeles Calif
 Arnhold Ceramics 1 E 57 St New York NY
 Arnold Magnetics 6050 W Jefferson Blvd Los Angeles Calif
 Arrow Electronics 525 Jericho Tpk Mineola LI NY
 Arrow Fastener 1 Junius Ave Brooklyn NY
 Arrow-Hart & Hegeman Hartford Conn
 Arvin Industries Columbus Ind
 Assembly Prods 75 Wilson Mills Rd Chesterland Ohio
 Associated Research 3777 W Belmont Ave Chicago Ill
 Astatic Corp Jackson & Harbor Sts Conneaut Ohio
 Astrex Inc 150 5 Ave New York NY
 Astron Corp 255 Grant Ave East Newark NJ
 Atlas Sound Corp 1449 39 St Brooklyn NY
 Atohm Electronics 7648 San Fernando Sun Valley Calif
 Audax Inc 38-19 108 St Corona NY
 Audel Co Theo 49 W 23 St New York NY
 Audio Development 2833 13 Ave Minneapolis Minn
 Audio Devices 620 E Dyer Rd Santa Ana Calif
 Audio Devices 444 Madison Ave New York NY
 Audio Dynamics 1677 Cody Ave Ridgewood NY
 Audio-Empire Div Dyna Empire 1075 Stewart Ave Garden City NY
 Audiogersh Corp 514 Bdw New York NY
 Audiotech Mfg 400 S Wyman St Rockford Ill
 Autenna Industries 3455 Vega Ave Cleveland Ohio
 Automatic Controls Div General Controls 8080 McCormick Blvd Skokie Ill
 Automatic Electric Co Northlake Ill
 Automatic Switch Florham Park NJ
 Automatic Timing & Controls King of Prussia Pa
 Automation Devel Culver City Calif
 Automation Electronics Div Arnoux Corp 11924 W Washington Blvd Los Angeles Calif
 Autotronics Inc Box 208 Florissant Mo
 Avnet Electronics 70 State St Westbury LI NY
- Babcock Relays 1640 Monrovia Costa Mesa Calif
 Bache & Co Semon 636 Greenwich New York NY
 Bailey Meter 1050 Ivanhoe Rd Cleveland Ohio
 Baird Atomic 33 University Rd Cambridge Mass
 Baldwin-Lima Hamilton 42 4 Ave Waltham Mass
 Ballantine Labs Boonton NJ
 Barber-Colman Co Rockford Ill
 Barker Products River St West Bridgewater Mass
 Barker Sales 339 S Broad Ave Ridgefield NJ
 Barker & Williamson Bristol Pa
 Barry Controls 700 Pleasant St Watertown Mass
 Barry Electronics 512 Bdw New York NY
 Baumker Mfg 3828 Summit St Toledo Ohio
 Beattie-Coleman 1000 N Olive Anaheim Calif
 Becker Electronics Mfg 1091 Rockaway Ave Valley Stream NY
 Beckman Instruments Berkeley Div 2200 Wright Ave Richmond Calif
 Beckman Instruments Scientific & Process Instr Div 2500 Fullerton Rd Fullerton Calif
 Beckman Instruments Helipot Div 2500 Fullerton Rd Fullerton Calif
 Behlman Eng'g 2911 Winona Ave Burbank Calif
 Belden Mfg 4647 W Van Buren St Chicago Ill
 Bell & Howell 7100 McCormick Rd Chicago Ill
 Bell Sound Systems 555 Marion Rd Columbus Ohio
 Bellock Instrument 112-03 14 Ave College Point NY
 Benco TV Assoc 27 Taber Rd Rexdale Ont Canada
 Bendix Computer Div 5630 Arbor Vitae Los Angeles Calif
 Bendix Eclipse Pioneer Div Teterboro NJ
 Bendix Industrial Comm & Electr Prods Baltimore Md
 Bendix Pacific Div 11600 Sherman Way N Hollywood Calif
 Bendix Radio Div E Joppa Rd Towson Md
 Bendix Red Bank Div Eatontown NJ
 Bendix Scintilla Div Sidney NY
 Bendix Semiconductor Products Westwood Ave Long Branch NJ
 Benjamin Electronic Sound 97-03 43 Ave Corona NY
 Berns Mfg 9853 Chalmers Detroit Mich
- Beryllium Corp PO Box 1462 Reading Pa
 B&F Instruments 3644 N Lawrence St Philadelphia Pa
 Biddle Co James G 1316 Arch St Philadelphia Pa
 Bird Electronic 303 Aurora Solon Ohio
 Birnbach Radio 1425 Hudson St New York NY
 B&K Mfg 1801 W Belle Plaine Chicago Ill
 Billey Electric Union Station Bldg Erie Pa
 Blonder-Tongue Labs 9 Alling St Newark NJ
 B&M Electronics 2516 Dodge Ave Fort Wayne Ind
 BNK Instruments 3040 W 106 St Cleveland Ohio
 Boetsch Bros (Birch) 115 Cedar St New Rochelle NY
 Bogen-Presto Box 500 Paramus NJ
 Bogue Electric Mfg 52 Iowa Ave Paterson NJ
 Bomac Labs Salem Rd Beverly Mass
 Boonton Electronics 738 Speedwell Ave Morris Plains NJ
 Boonton Radio Boonton NJ
 Boro Electronics 69-18 Roosevelt Ave New York NY
 Bosch Corp Robert 40-25 Crescent St Long Island City NY
 Bourns Labs Box 2122 Riverside Calif
 Bowmar Instrument 8000 Bluffton Rd Ft Wayne Ind
 Bozak Co R T Box 1166 Darien Conn
 Brach Mfg Corp 200 Central Ave Newark NJ
 Branson Ultrasonic 40 Brown House Rd Stamford Conn
 Bright Star Industries Clifton NJ
 Bristol Co Waterbury Conn
 British Electronics Sales Box 132 Oakland Gardens Sta Flushing NY
 British Industries 80 Shore Rd Port Washington NY
 Browning Labs 100 Union Ave Laconia NH
 Bruno Tools 9330 Santa Monica Blvd Beverly Hills Calif
 Brush Instruments 37 & Perkins Ave Cleveland Ohio
 Buchanan Electric Hillside NJ
 Buckeye Telephone & Supply 1250 Kinnear Rd Columbus Ohio
 Bud Radio 2118 E 55 St Cleveland Ohio
 Budelman Electronics 375 Fairfield Ave Stamford Conn
 Buggie Inc H H Rte 795 & Lemoine Toledo Ohio
 Bulldog Electric 7610 Joseph Campeau Detroit Mich
 Bulova Watch Electronics Div 40-01 61 St Woodside NY
 Burgess Battery Exchange St Freeport Ill
 Burndy Engineering Norwalk Conn
 Burroughs Corp 707 W Milwaukee Ave Detroit Mich
 Burroughs Corp Electronic Tube Div Plainfield NJ
 Burroughs Corp Radnor Pa
 Burton Rogers Corp Blade & Helen St Cincinnati Ohio
 Bussmann Mfg 2538 W University St St Louis Mo
- Cabinart Inc 35 Geyer St Haledon NJ
 Cadre Industries Box 150 Endicott NY
 Calcon Inc 100 Oakland Ave Washington Pa
 Calibration Standards 1130 W 5 St Pomona Calif
 Calif Technical Industries 1421 Old County Rd Belmont Calif
 Calmart Int'l 429 S Western Ave Los Angeles Calif
 Cambridge Thermanonic 445 Concord Ave Cambridge Mass
 Campro Prods 3131 Alliance Rd NE Canton Ohio
 Cannon Electric 3208 Humboldt St Los Angeles Calif
 Capcon Inc 61 Stanton St New York NY
 Capital Radio Eng'g Institute 3224 16 St NW Washington DC
 Capital Records 1750 N Vine St Hollywood Calif
 Capkit Int'l 816 W Olympic Blvd Los Angeles Calif
 Capps & Co 20 Addison Pl Valley Stream NY
 Carma Mfg 1879 Mullin Ave Torrance Calif
 Carter Communications 6762 Greenville Ave Dallas Texas
 Carter Motor 2711 W George Chicago Ill
 Castle TV Tuner Service 5710 N Western Ave Chicago Ill
 Cayo TV Eng'g 1904 Michigan Hwy 139 Benton Harbor Mich
 CBC Electronics 2601 N Howard St Philadelphia Pa
 CBS Electronics 100 Endicott St Danvers Mass
 Centimeg Electronics 312 E Imperial Hwy El Segundo Calif
 Centralab 900 E Keefe Ave Milwaukee Wis
 Central Electronics 1247 W Belmont Ave Chicago Ill
 Century Electronics & Instr 1333 N Utica Tulsa Okla
 Cetron Electronic 715 Hamilton St Geneva Ill
 Champion Dearthment Tool South Main St Meadville Pa

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

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

Eagle Electric 23-10 Bridge Plaza S Long Island City NY
Eastern Jewel 137-21 70 Ave Flushing NY
Easy-Up Tower 908 State St Racine Wis
Eby Sales 148-05 Archer Ave Jamaica LI NY
Efcron Inc Patterson Place Roosevelt Field Garden City LI NY
Eico Electronic Instr 33-00 Northern Blvd Long Island City NY
Eitel-McCullough 301 Industrial Way San Carlos Calif
Ekland Tool & Mfg Co 2627 N Western Ave Chicago Ill
Elco Corp M St below Erie Philadelphia Pa
Eldon Industries 1010 E 62 St Los Angeles Calif
Electra Mfg 4051 Bdwg Kansas City Mo
Electric Auto Lite 3529 24 St Port Huron Mich
Electric Auto Lite Champlain St Toledo Ohio
Electric Regulator Pearl St Norwalk Conn
Electric Soldering Iron 3852 W Elm St Deep River Conn
Electric Specialty 211 South St Stamford Conn
Electric Storage Battery Automotive Div PO Box 6266 Cleveland Ohio
Electric Storage Battery Exide Ind Div PO Box 8109 Philadelphia Pa
Electric Sweeper Service 2034 Euclid Ave Cleveland Ohio
Electrocraft Co 400 South Wyman Rockford Ill
Electro Impulse Lab 208 River St Red Bank NJ
Electromatic Industries Hollywood Fla
Electro-Measurements 7524 SW Macadam Ave Portland Ore
Electro-Mechanical Research PO Box 3041 Sarasota Fla
Electron Enterprises 6917 Stanley Ave Berwyn Ill
Electronic Applications 194 Richmond Hill Ave Stamford Conn
Electronic Associates Long Branch NJ
Electronic Chemical 813 Communipaw Ave Jersey City NJ
Electronic Devel Assoc 126 E 46 St New York NY
Electronic Devel Corp 423 W Bdwg Boston Mass
Electronic Devices 50 Webster Ave New Rochelle NY
Electronic Measurements 625 Bdwg New York NY
Electronic Measurements Lewis St & Maple Ave Eatontown NJ
Electronic Publishing 180 N Wacker Dr Chicago Ill
Electronic Research Assoc 67 Factory Pl Cedar Grove NJ
Electronic Specialties 52 Chandler St Worcester Mass
Electronic Technician 480 Lexington Ave New York NY

Electronic Transistors 9226 Hudson Blvd North Bergen NJ
Electronic Tube Corp 1200 E Mermaid Lane Philadelphia Pa
Electronic Utilities 2244 S Western Ave Chicago Ill
Electronic Ventures 472 Kuehnis Dr Campbell Calif
Electronics Missiles & Communications Inc 268 E 3 St Mount Vernon NY
Electrons Inc 127 Sussex Newark NJ
Electrophono & Parts 530 Canal St New York NY
Electro Products Labs 4501 N Ravenswood Ave Chicago Ill
Electro-Products 13144 W McNichols Detroit Mich
Electro Scientific Industries 7524 SW Macadam Portland Ore
Electro-Sonic Labs 35-54 36 St Long Island City NY
Electro Switch 167 King Ave Weymouth Mass
Electro-Voice Inc Buchanan Mich
Electrovox Co 60 Franklin St East Orange NJ
ELF Inc PO Box 302 Florissant Mo
Elgin Int'l 1410 Bdwg New York NY
Emerson Radio & Phono 14 & Coles St Jersey City NJ
Empire Service RD 3 Skaneateles NY
Engelhard Industries 113 Astor St Newark NJ
Entron Inc 4902 Lawrence St Bladensburg Md
Equipment Leasing Corp 814 W 4 St Wilmington Dela
Equipto Div Aurora Equip 401 S Highland Ave Aurora Ill
Ercona Corp 16 W 46 St New York NY
Eric Electronics Co 1823 Colorado Ave Santa Monica Calif
Erie Resistor 644 W 12 St Erie Pa
Essex Electronics 550 Springfield Ave Berkeley Heights NJ
Essex Wire Corp 6200 Concord Detroit Mich
Estorline-Angus Co PO Box 596 Indianapolis Ind
E-Z Hook Test Prods 1536 Woodburn Ave Covington Ky
E-Z Way Towers PO Box 5491 Tampa Fla

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

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

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

Haddam Mfg Route 9 Haddam Conn
Hagan Chemical & Controls Hagan Center Pitts-
burgh Pa
Hallamore Electronics 714 N Brookhurst St Anaheim
Calif
Hallcrafters Co 4401 W 5 Ave Chicago Ill
Hamilton-Hall Electronic Specialties 227 N Water St
Milwaukee Wis
Hamlin Inc 423 10 St Wilmette Ill
Hammarlund Mfg 460 W 34 St New York NY
Handicraft Tools Div X-Acto Inc 48-41 Van Dam St
Long Island City NY
Handley Inc 12960 Panama St Los Angeles Calif
Hardwick Hindle Inc 40 Hermon St Newark NJ
Harman-Kardon Inc Plainview LI NY
Harris Transducer Woodbury Conn
Harrison Labs 45 Industrial Rd Berkeley Heights NJ
Hartley Products Co 521 E 162 St Bronx NY
Harvey-Wells 14 Huron Dr. E Natick Industrial Park
Natick Mass
Hatfield Wire & Cable Hillside NJ
Hathaway Instrument 5800 E Jewell Ave Denver
Colo
Haydon Co A W 232 N Elm St Waterbury Conn
Hayden Div General Time 245 E Elm Torrington
Conn
Heath Co Benton Harbor Mich
Heiland Div Minn-Honeywell 5200 E Evans Ave Den-
ver Colo
Heinemann Electric PO Box 299 Trenton NJ
Heppo 74 Varick St New York NY
Heppner Mfg Co PO Box 612 Round Lake Ill
Hewlett-Packard 1501 Page Mill Rd Palo Alto Calif
Hexacon Electric 180 W Clay Ave Roselle Park NJ
Hickok Electrical Instr 10514 Dupont Ave Cleveland
Ohio
Hi-Lo Mfg 1122 Newport St Chicago Ill
Hi-Par Products 347 Lunenburg St Fitchburg Mass
HITACHI (see Sampson Co)
Hitemp Wires 1200 Shames Dr Westbury NY
Hi-Test Premier Prods 361 Bdw New York NY
Hobbs Corp J W 2078 Yale Blvd Springfield Ill
Hoffman Electronics Consumer Prods Div 3761 S
Hill St Los Angeles Calif
Hoffman Electronics Semi-Conductor Div 1001 N
Arden Dr El Monte Calif

Hoffman Electronics H L 35 Old Country Rd West-
bury LI NY
Hoffman Publishers 469 E Ohio St Chicago Ill
Holloway Electronics Broward County Int'l Airport
Fort Lauderdale Fla
Holt Rinehart & Winston 385 Madison Ave New York
NY
Hoover Electronics 110 W Timonium Rd Timonium
MD
Hopkins Eng'g 12900 Foothill Blvd San Fernando
Calif
Houston Instruments Box 22234 Houston Texas
Howell Instrument 3479 Hickory St Fort Worth
Texas
Hoyt Electrical Instr 42 Carleton St Cambridge
Mass
HST Div Dresser Electronics Garland Texas
Hughes Labs 999 E Arques Ave Sunnyvale Calif
Hughes Aircraft Products Div Florence & Teal Sts
Culver City Calif
Hughes Aircraft Semiconductor Div Int'l Airport Sta
Los Angeles Calif
Hughes Aircraft Tube Div 2020 Shant Oceanside
Calif
Hughes Electronics 5343 Crenshaw Blvd Los An-
geles Calif
Hunter Sales R N 8951 Alburts Santa Fe Springs
Calif
Hupp Electronics 743 Circle Ave Forest Park Ill
Hurst Mfg Princeton Ind
H-V Assoc 28 E Sunrise Hwy Lindenhurst LI NY
Hycon Electronics 1030 S Arroyo Pkwy Pasadena
Calif
Hy-Calif Antenna Prods 1135 N 22 St Lincoln Neb
Hymac Corp 1717 N Potrero S El Monte Calif

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

Jackson Electrical Instr 124 McDonough St Dayton
Ohio
James Electronics 4050 N Rockwell St Chicago Ill
James Knights Co 2706 E Church St Sandwick Ill
Javex Electronics PO Box 646 Redlands Calif
J-B-T Instruments 61 Hamilton St New Haven Conn

Jefferson Inc Ray 40 E Merrick Rd Freeport NY
Jennings Radio Mfg 970 McLaughlin Ave San Jose
Calif
Jensen Industries 7333 W Harrison St Forest Park
Ill
Jensen Mfg 6601 S Laramie Ave Chicago Ill
Jerrold Electronics 15 St & Lehigh Ave Phila Pa
Jerrold Electronics of Canada 50 Wingold Ave To-
ronto Ont Canada
Jersey Specialty PO Box 576 Mountain View NJ
JFD Electronics 6101 16 Ave Brooklyn NY
JFC Electronics Hampshire Ill
Johnson Co E F Waseca Minn
Johnson Electronics PO Box 1675 Casselberry Fla
Jones Electronics MC Sub Bendix Corp 185 N Main
St Bristol Conn
Jones Div Cinch Mfg Co 1026 S Homan Ave Chicago
Ill
Jones & Laughlin Electricweld Tube Prods 401 Lib-
erty Ave Pittsburgh Pa
Julie Research 603 W 130 St New York NY
JW Electronics 1538 W Jarvis St Chicago Ill

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

Lab for Electronics 1079 Commonwealth Ave Boston
Mass
Lafayette Radio 165-08 Liberty Ave Jamaica LI NY
LaGrange Welding & Machine Moores Mills Pleasant
Valley NY
Lake Mfg 2323 Chestnut St Oakland Calif
Lambda Electronics 512 Broad Hollow Rd Hunting-
ton LI NY
Lampkin Labs RDF 1 Bradenton Fla
Lance Antenna 1730 1 Ave San Fernando Calif
Lansdale Tube Div Philco Corp Lansdale Pa
Lansing Sound Inc James B 3249 Casitas Ave Los
Angeles Calif
Lavoie Labs Matawan Freehold Rd Morganville NJ
Lawrence Inc 516 Seven Oaks St Detroit Mich
Electronics of City Line Center 7644 City Line Ave
Philadelphia Pa
Lexus Inc 123 Webster Ave Dayton Ohio
LEE Inc 625 New York Ave NW Washington 1 DC
Leeds & Northrup 4901 Stenton Ave Philadelphia Pa
Leemath Inc Oak Drive Syosset NY
Lektron Inc 242 Everett Ave Chelsea Mass
LEL Inc 75 Akron St Copiague LI NY
Lenk Mfg Co Franklin Ky
Lenz Electric 1751 N Western Ave Chicago Ill
Lercio Electronics 501 S Varney St Burbank Calif
Lesco of America 11 W 42 St New York NY
Librasone Inc 808 Western Ave Glendale Calif
Licon Div Illinois Tool 6606 W Dakin Chicago Ill
Ling-Altec Electronics 1515 S Manchester Anaheim
Calif
Ling-Tempo Ling Electronics Div 1515 S Manchester
Anaheim Calif
Lionel Industrial Electronic Div Irvington NJ
Littelfuse Inc 1865 Miner St Des Plaines Ill
Litton Industries 336 N Foothill Beverly Hills Calif
Litton Industries Electron Tube Div 960 Industrial
Rd San Carlos Calif
Livingston Audio Prods Box 202 Caldwell NJ
Lockhead Electronics Plainfield NJ
Long Island Electro Labs 1186 Bdw Hewlett LI NY
Los Angeles Tuner Exchange 4611 W Jefferson Los
Angeles Calif
Lowell Mfg 3030 Laclede Sta Rd St Louis Mo
L&R Mfg 577 Elm St Kearny NJ
Lumatron Electronics 116 County Court House Rd
New Hyde Park LI NY
Luminate Div Chicopee Mills 47 Worth St New York
NY
Luxo Lamp Dock St Portchester NY

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

Macdonald & Co 714 E California Glendale Calif
 Machlett Labs 1063 Hope St Springdale Conn
 MacLeod Instr 4250 NW 10 Ave Fort Lauderdale Fla
 Macmillan Co 60 S Ave New York NY
 Madison Fielding by Crosby 135 Eileen Way Syosset NY

Magnaflux Corp 7301 W Ainslie Ave Chicago Ill
 Magnavox Co 2131 Bueier Rd Fort Wayne Ind
 Magnecord Sales Dept Midwestern Instr Co PO Box 7186 Tulsa Okla

Magnecraft Electric 3352 W Grand Ave Chicago Ill
 Magnetic Amplifiers 632 Tinton Ave New York NY
 Magnetic Metals Co Hayes Ave at 21 St Camden NJ
 Magnetics Inc Butler Pa

Maico Electronics 21 N 3 St Minneapolis Minn
 Maier Co Wellington Ohio
 Majestic Int'l 743 N LaSalle St Chicago Ill
 Mallory & Co Inc P R 3029 E Washington Indianapolis Ind

Marantz Co 25-14 Bdwy Long Island City NY
 Marconi Instruments 111 Cedar Lane Englewood NJ
 Marina Communications 10328 Venice Blvd Culver City Calif

Marjo Technical Prods 1148 E Henry Linden NJ
 Mark Mobile Inc 5439 W Fargo Skokie Ill
 Mark Products 5439 W Fargo Skokie Ill
 Markel & Sons L Frank Norristown Pa

Massa Div Cohu Electronics 280 Lincoln St Hingham Mass
 Masterview Electronics 443 W 50 St New York NY
 Mastra Co 2104 Superior Cleveland Ohio
 Matthews Labs 3344 Fort Independence St New York NY

Maxson Electronics 475 10 Ave New York NY
 Measurement Control Devices PO Box 505 Camden NJ

Measurements Corp PO Box 180 Boonton NJ
 Mellotone Inc 1220 Bdwy New York NY
 Melody Master Mfg 2149 W Roscoe St Chicago Ill
 Melo-sonics Corp 249 E 49 St New York NY
 Meppo Inc 35 Abbebt Ave Morristown NJ

Merck & Co Electronic Chemicals Div Rahway NJ
 Mercury Electronics 4306 W Victory Burbank Calif
 Mercury Electronics 111 Roosevelt Ave Mineola LI NY

Mercury TV Tuner Co 890 River Ave Bronx NY
 Meriam Instr 10920 Madison Ave Cleveland Ohio
 Merit Coil & Transformer 2027 Sherman St Hollywood Fla

Merix Chemical Co 2234 E 75 St Chicago Ill
 Methode Mfg 7447 W Wilson Ave Chicago Ill
 Metrex Corp 819 Blake Ave Brooklyn NY

MGM Records 1540 Bdwy New York NY
 Micamold Electronics 65 Gouverneur St Newark NJ
 Michigan Magnetics Vermontville Mich

Microdot Inc 220 Pasadena South Pasadena Calif
 Microtran Co 145 E Mineola Ave Valley Stream NY
 Microwave Assoc Northwest Industrial Park Burlington Mass

Mid-Eastern Electronics 32 Commerce St Springfield NJ

Midland Mfg 3155 Fiberglass Rd Kansas City Kans
 Milgray New York 136 Liberty St New York NY
 Millen Mfg Co James 150 Exchange St Malden Mass
 Miller Co J W 5917 S Main St Los Angeles Calif
 Miller Mfg M A 4 & Churrh St Libertyville Ill
 Millivac Instruments 2315 2 Ave Schenectady NY

Milo Electronics 530 Canal St New York NY
 Milwaukee Resistor 700 W Virginia St Milwaukee Wis

Minneapolis-Honeywell Brown Instr Div Wayne & Windram Aves Philadelphia Pa
 Minneapolis-Honeywell Marion Electronic Instr Div Manchester NH
 Minneapolis-Honeywell Micro Switch Div Freeport Ill

Minneapolis-Honeywell Rubicon Instr Div Ridge Ave & 35 St Philadelphia Pa
 Minneapolis-Honeywell Semiconductor Div 1015 S 6 St Minneapolis Minn

Minnesota Mining & Mfg Magnetic Prods Div 900 Fauquier St St Paul Minn
 Minnesota Mining & Mfg Mincom Div 2049 S Barrington Los Angeles Calif

Miratel Inc 1080 Dionne St Paul Minn
 Mosler Instrument Electronics Div 132 St & 89 Ave Richmond Hill NY

Mohawk Business Machines 944 Halsey St Brooklyn NY
 Moisture Register 1519 W Chestnut St Alhambra Calif

Molecu Wire Eatontown-Freehold Pike Scobeyville NJ
 Moletronics Corp 6344 Arzonica Circle Los Angeles Calif

Monarch Electric Div El-Tronics Inc Jamestown NY
 Monarch Electronics Int'l 7035 Laurel Canyon North Hollywood Calif

Monitoradio Div IDEA Inc 7900 Pendelton Pike Indianapolis Ind

Montgomery Ward 618 W Chicago St Chicago Ill
 Morrow Radio Mfg 2794 Market St Salem Ore

Moseley Co F L 409 N Fair Oaks Ave Pasadena Calif

Mosley Electronics 4610 N Lindbergh Blvd Bridgeton Mo

Moss Electronic 3849 10 Ave New York NY
 Motorola Inc 9401 W Grand Ave Franklin Park Ill
 Motorola Semiconductor Prods Div 5005 E McDowell Rd Phoenix Ariz

Movic Co 12432 Santa Monica Blvd Lps Angeles Calif

MP Eng'g Fairfield Conn

Mucon Corp 9 St Francis St Newark NJ
 Mueller Electric 1581 E 31 St Cleveland Ohio
 Muirhead Instr 441 Lexington Ave New York NY
 Mullard (see Int'l Electronics)
 Multicore Solders (see British Industries)
 Musi-Pak Inc 103 E Hawthorne Ave Valley Stream NY
 Muzak Co 220 4 Ave New York NY

Narda Ultrasonics 625 Main St Westbury LI NY
 Nat'l Carbon Co 270 Park Ave New York NY
 Nat'l Cash Register Main & K Sts Dayton Ohio
 Nat'l Electronics 628 North St Geneva Ill
 Nat'l Radio 37 Washington St Melrose Mass.
 Nat'l Radio Institute 3839 Wisconsin Ave Washington DC

Nat'l Resistance Walter St Pearl River NY
 Nat'l Technical Research Labs 6416 S Western Ave Whittier Calif

Nat'l Ultrasonic 111 Montgomery Ave Irvington NJ
 Neshaminy Electronics 382 Easton Rd Neshaminy Pa

Neuses Inc P K 511 N Dwyer St Arlington Heights Ill

Newark Electronics 233 W Madison Chicago Ill
 Newcastle Fabrics 75 N 11 St Brooklyn NY
 Newcomb Audio Prods 6824 Lexington Hollywood Calif

Newcomb Electronics 6824 Lexington Hollywood Calif

New London Instrument 82 Union St New London Conn

Newman Corp M M 79 Clifton Ave Marblehead Mass
 New-Tronics Corp 3445 Vega Ave Cleveland Ohio
 Niagara Electrical Instr 45 Allen St Buffalo NY
 Nielsen Inc E V 575 Hope St Stamford Conn
 NJE Corp 20 Boright Ave Kenilworth NJ
 Non-Linear Systems Del Mar Airport Del Mar Calif

North American Philips (NORELCO) 230 Duffy Ave Hicksville NY
 North Atlantic Industries Terminal Dr Plainview LI NY

North Electric Co 553 S Market Galion Ohio
 North Shore Nameplate 1270 NW 165 St North Miami Beach Fla

Nortronics Co 1015 S 6 St Minneapolis Minn
 Nuclear Corp of America 2 Richmond Pl Denville NJ
 Nucleonic Corp of America 196 DeGraw St Brooklyn NY

Nu-Line Industries 1015 S 6 St Minneapolis Minn

Oak Mfg Co Crystal Lake Ill
 Oaktron Industries 17368 S 68 St Tinley Park Ill
 Oelrich Publications 4308 Milwaukee Ave Chicago Ill

Ogura Jewel Bearing Stone Mfg 3-68 Iriarai Ohta-ku Tokyo Japan

Ohio Semiconductor 1035 W 3 Ave Columbus Ohio
 Ohmite Mfg 3601 Howard St Skokie Ill
 Olson Radio 500 S Forge St Akron Ohio
 Omtronics Mfg PO Box 1419 Peony Park Sta Omaha Neb

Oneida Electronic 843 N Cottage St Meadville Pa
 Onad Electric 43 Walker St New York NY
 ORR Industries Div Ampex Corp Shamrock Circle Opelika Ala

Ortron Electronics 29 Lincoln Ave Orange NJ
 Osborne Electronic Sales 712 E Hawthorne Blvd Portland Ore

Oster Mfg Co John Avionic Div 1 Main St Racine Wis

Oxford Components 556 W Monroe St Chicago Ill
 Oxford Electric 3911 Michigan Blvd Chicago Ill

Pace Electrical Instr 70-31 84 St Glendale LI NY
 Packard Bell Electronics 12333 W Olympic Blvd Los Angeles Calif

Paco Electronics 70-31 84 St Glendale LI NY
 Pacotronics Inc 70-31 84 St Glendale LI NY
 Panoramic Radio Prods 540 S Fulton Mount Vernon NY

Parker Metal Goods 85 Prescott Worcester Mass
 Partridge Transformers 258 Bdwy New York NY
 Parts House 106 11 St W Billings Mont

PCA Electronics 16799 Schoenborn St Sepulveda Calif

Pearce-Simpson 2295 NW 14 St Miami Fla
 Peerless Products 812 N Pulaski Rd Chicago Ill
 Peerless Radio 92-32 Merrick Rd Jamaica LI NY
 Pentron Corp 777 S Tripp Ave Chicago Ill

Perfection Mica Magnetic Shield Div 1322 N Elston Ave Chicago Ill

Performance Measurements 15120 3 Ave Detroit Mich

Perkin Electronics Corp 345 Kansas St El Segundo Calif

Perkin-Elmer Vernistat Div Norwalk Conn
 Permacel Tape U S Hwy 1 New Brunswick NJ
 Permadyne Div Melody Master Mfg 2149 W Roscoe St Chicago Ill

Permaflux Products 4101 San Fernando Rd Glendale Calif

Perma-Power Co 3100 N Elston Ave Chicago Ill
 Permo Inc 6415 Ravenswood Ave Chicago Ill

Peschel Electronics Towners Patterson NY
 Pfanstiehl Chemical Corp 104 Lake View Ave Waukegan Ill

Phalo Plastics 530 Boston Tpk Shrewsbury Mass
 Phaostron Instr & Electronics 151 Pasadena South Pasadena Calif

Phelps Dodge Copper Prods Inca Mfg Div Fort Wayne Ind

Philbrick Researches G A 285 Columbus Ave Boston Mass

Philio Corp Tioga & C Sts Philadelphia Pa
 Philco Corp Lansdale Div Lansdale Pa
 Philips N V Gloeilampenfabrieken Eindhoven The Netherlands

Philmore Mfg 130-01 Jamaica Richmond Hill NY
 Philosophical Library 15 E 40 St New York NY
 Photomation Inc 96 S Washington Ave Bergenfield NJ

Physics Research Labs Uniondale LI NY
 Pickering & Co Plainview NY

Pilot Radio 37-06 36 St Long Island City NY
 Pitman Publishing 2 W 45 St New York NY

Planet Sales Corp 225 Belleville Ave Bloomfield NJ
 Plastic Capacitors 2620 N Clybourn Ave Chicago Ill
 PLM Products 3871 W 150 St Cleveland Ohio

Polar Electronics 1514 Oak St South Pasadena Calif
 Polarad Electronics 43-20 34 St Long Island City NY
 Polytechnic Research & Devel 202 Tillary St Brooklyn NY

Polytronics Lab Clifton NJ

Pomona Electronics 1500 E 9 St Pomona Calif
 Portable Electric Tools 1200 E State St Geneva Ill
 Post Machinery 159 Elliott St Beverly Mass

Potter & Brumfield Princeton Ind
 Power Sources Burlington Mass

Powertron Ultrasonics Corp Patterson PI Roosevelt Field Garden City NY

Precise Electronics & Devel 76 E 2 St Mineola LI NY

Precise Measurements R D 1 Milbrook Rd Flemington NJ

Precision Apparatus Sub Pacotronics Inc 70-31 84 St Glendale LI NY

Precision Electronics 9101 King Ave Franklin Park Ill

Precision Thermometer & Instr 1434 Bradywine Philadelphia Pa

Precision Tuner Service 601 N College Bloomington Ind

Premier Albums 356 W 40 St New York NY
 Premier Instr 33 New Broad Port Chester NY
 Premier Metal Prods 337 Manida St New York NY
 Prentice-Hall Inc Englewood Cliffs NJ

Presto (See Bogen-Presto)

Price & Rutzebeck 22150 Meekland Blvd Hayward Calif

PRL Corp PO Box 215 East Brunswick NJ
 Products for Industry 220 S Rose St Los Angeles Calif

Progress Mfg Co Castor Ave & Tulip St Philadelphia Pa

Pro-Tex Reel Band 2108 Payne Ave Cleveland Ohio
 Proto Tool 2209 S Santa Fe Los Angeles Calif

Pulse Eng'g 2657 Spring Redwood City Calif
 Pyramid Electric Corp St Darlington SC

Pyramid Instrument Corp 630 Merrick Rd Lynbrook LI NY

Qualitone Industries 102 Columbus Ave Tuckahoe NY

Quam-Nichols Co Jobber Div 234 E Marquette Rd Chicago Ill

Quan-Tech Labs 60 Parsippamy Blvd Boonton NJ
 Quik-Check Corp 5212 Pulaski Philadelphia Pa
 Quick Mount Mfg 481 Sterling Pl Brooklyn NY

Quietrole Co 395 St John St Spartanburg SC

Racon Electric 1261 Bdwy New York NY
 Radiart Corp 2900 Columbia Indianapolis Ind

Radiation Electronics Co 5600 Jarvis Ave Chicago Ill
 Radio City Prods Centre & Glendale Sts Easton Pa
 Radio Condenser Davis & Copewood Camden NJ
 Radio Corp of America Front & Cooper Sts Camden NJ

Radio Corp of America RCA Service Co Cherry Hill Camden NJ

Radio Corp of America Electron Tube Div 415 S 5 St Harrison NJ

Radio Corp of America Semiconductor & Materials Divs Somerville NJ

Radio Corp of America Industrial Computer Div Natick Mass

Radio Corp of America 30 Rockefeller Plaza New York NY

Radio Corp of America Telecommunication Center Meadow Lands Pa

Radio-Electronic Master 60 Madison Hempstead LI NY

Radio & Electronic Parts 2118 E 55 St Cleveland Ohio

Radio Eng'g Labs 29-01 Borden Ave Long Island City NY

Radio Frequency Labs Boonton NJ

Radio Materials Co 4242 W Bryn Mawr Chicago Ill
 Radio Merchandise Sales 2016 Bronxdale Ave New York NY

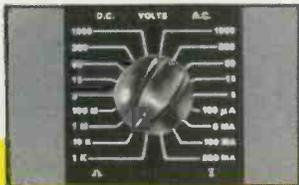
Radion Corp 345 Terra Cotta Crystal Lake Ill
 Radio Products Sound Foyer Div 1421 S Hill Los Angeles Calif

Radio Receptor Sub General Instrument Corp 240 Wytthe Ave Brooklyn NY

(Continued on page 62)

First real VOM advance in 20 years

SET IT!

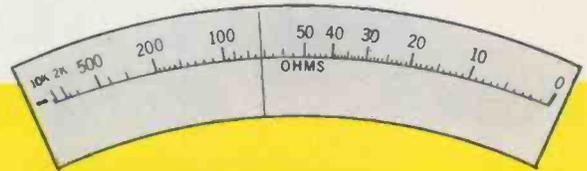


SEE IT!



READ IT!

DIRECTLY—ACCURATELY
WITHOUT MULTIPLYING



ALL-NEW

B&K

V O Matic 360

AUTOMATIC VOLT-OHM-MILLIAMMETER

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



WITH
BURN-OUT PROOF
METER

EASIEST—FASTEST—ERROR-FREE READINGS

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

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

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

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

Net, \$59⁹⁵

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

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

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

Polarity Reversing Switch and Automatic Ohms-Adjust Control

Frequency Response AC: 5 - 500,000 cps

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

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

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

B&K

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

NEW RCA ALKALINE BATTERIES

increase your profit opportunities



Now, you can increase your profit while reducing the number of battery types you have to stock. What makes this possible? The new RCA Alkaline Battery! This new type of cell outlasts comparable zinc-carbon batteries yet sells at a lower price than premium mercury types.

here's how you benefit...

- **MORE PROFIT PER SALE:** Provides perfect opportunity to "sell up".
- **SIMPLIFIED INVENTORY NEEDS:** The RCA Alkaline multi-purpose type is designed for use in radios, flashlights, photoflash, toys and electronic instruments. A few types cover a wide range of applications.
- **LONGER SHELF AND OPERATING LIFE:** A useful life of 2-to-8 times that of zinc-carbon types, depending on application.
- **NO REST PERIOD NEEDED:** A big advantage in portable radios.

Four of these money-making new Alkaline types are now available from your Authorized RCA Distributor. These include: VS1334, a 1.5-volt penlite cell; VS1335, a 1.5-volt "C" cell; and VS1073, a 1.5-volt "N" cell. Each of these is a multi-purpose type. The VS1149, a 4.5-volt battery, is specifically designed for transistor radios.

RCA Batteries... Zinc-Carbon, Mercury, and the new Alkaline types... mean more opportunities for dealer profit right down the line. See your RCA Distributor now for full details.



The Most Trusted Name in Electronics
RADIO CORPORATION OF AMERICA

RCA Electron Tube Division, Harrison, N. J.

Center Speaker

(Continued from page 37)

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

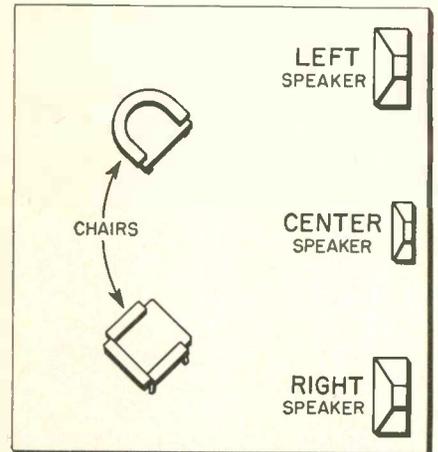


Fig. 5—Room lay-out using a third speaker from two stereo channels. Middle speaker can be relatively small but should respond well at mid and high frequencies.

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

Marine Radio

(Continued from page 39)

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

Modulation Problems

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

(Continued on page 53)

NEW

TESTS All TV and Radio Tubes
—both old and new

TESTS the Nuvistors

TESTS the new 10-pin tubes

TESTS the new 12-pin Compactrons

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



Model 600 DYNA-QUIK

only \$69⁹⁵
NET

8½" x 11" x 4½"
Handsome, sturdy
leatherette-covered
carrying case

NEW TUBE INFORMATION SERVICE

available every 3
months for all B&K
Dyna-Quik Tube Testers



for the first time, a
B & K QUALITY
TUBE TESTER
at this
amazing low cost!

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

Checks each section of multi-
section tubes separately

Checks tube capability under
simulated load conditions

Rejects bad tubes
—not good tubes

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

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

B & K MANUFACTURING CO.

1801 W. BELLE PLAINE AVE • CHICAGO 13, ILL.

Canada: Atlas Radio Corp., 50 Wingold, Toronto 19, Ont.

Export: Empire Exporters, 277 Broadway, New York 7, U.S.A.

Transmission Line Cables



8225



8226



8230



8285



8235

Microphone and Shielded Power Supply Cables



8410

RUBBER



8411



8413

PLASTIC



8420

Mr. Service Technician:

Ask your Belden jobber about this complete wire and cable line

What types of wire and cable do you need? Ask your Belden electronics jobber for complete specifications on types, sizes, insulations, and convenient spool lengths. Available from stock.

Hi-Fi, Stereo, and Phonograph Cables



8421



8430



8419

Rubber-Vinyl Multiconductor Portable Cordage



8462

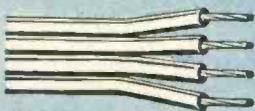
8888

Power Supply Cords

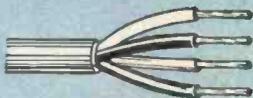


17106

Antenna Rotor Cables



8464

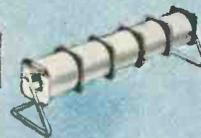


8484

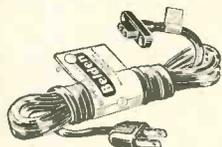
Hook-Up Wire



8800



TV and Cheater Cords



8874



8875

Aluminum Ground Wire



8018



Belden
WIREMAKER FOR INDUSTRY
SINCE 1902
CHICAGO

- power supply cords • cord sets and portable cordage • electrical household cords • magnet wire • lead wire • automotive wire and cable • aircraft wires • welding cable

(Continued from page 50)

pression filters and speech-clipping systems are also used.

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

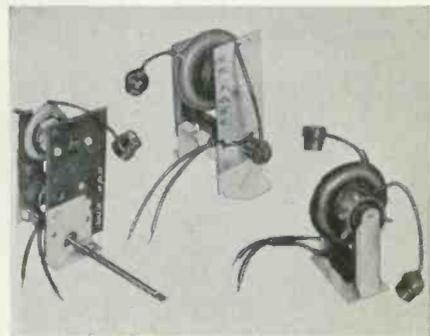
For over-all check of the transmitter's audio section, including modulation percentage, distortion, frequency shift, etc., the scope is desirable. A loop of one or two turns of wire, placed near the transmitter's tank coil or antenna, with the two open ends connected to the scope's vertical input, will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

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

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

Stancor TRANSFORMERS

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



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

Perma-Power VU-BRITES

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

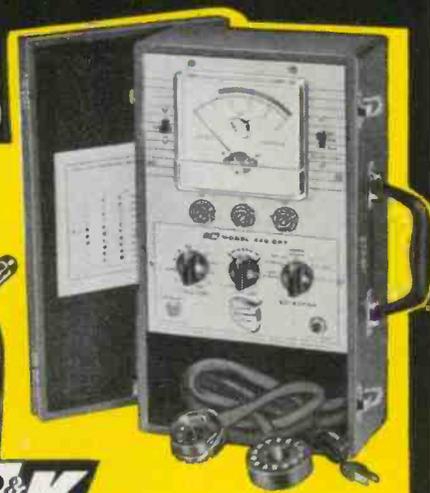
For more data, circle 5-53-2 on coupon, p. 57



Now Completely SELF-CONTAINED

For Testing & Rejuvenating
BLACK AND WHITE and COLOR including 110° TUBES

NEW CRT 440



TESTS AND REJUVENATES

all black & white and color picture tubes at correct filament voltage from 1 to 12 V.

TESTS AND REJUVENATES

110° tubes with 2.34, 2.68, 6.3 and 8.4 volt filaments.

TESTS AND REJUVENATES

color picture tubes. Checks each color gun separately same as black & white tubes.

Used by Thousands of Professional Servicemen
MAKES NEW PICTURE TUBE SALES EASIER

Gives you more value than ever—all-in-one. Quickly checks and corrects most TV picture tube troubles in a few minutes right in the home without removing tube from set. Gives new useful life to weak or inoperative tubes. Checks leakage. Restores emission and brightness. Repairs inter-element shorts and open circuits. Life test checks gas content and predicts remaining useful life of picture tube. Completely self-contained in leatherette-covered carrying case. Net, \$74.95

ACCESSORIES for USE ONLY with FORMER B&K Models 400 and 350 CRT



Model C40 Adapter. For use only with all previous B&K Model 400 and 350 CRT's. Tests and rejuvenates TV color picture tubes and 6.3 volt 110° picture tubes. Net, \$9.95

Model CR48 Adapter. For use only with all previous B&K Model 400 and 350 CRT's. Tests and rejuvenates 110° picture tubes with 2.34, 2.68, and 8.4 volt filaments. Net, \$4.95



See your B&K Distributor
or Send now for Bulletin AP17-T

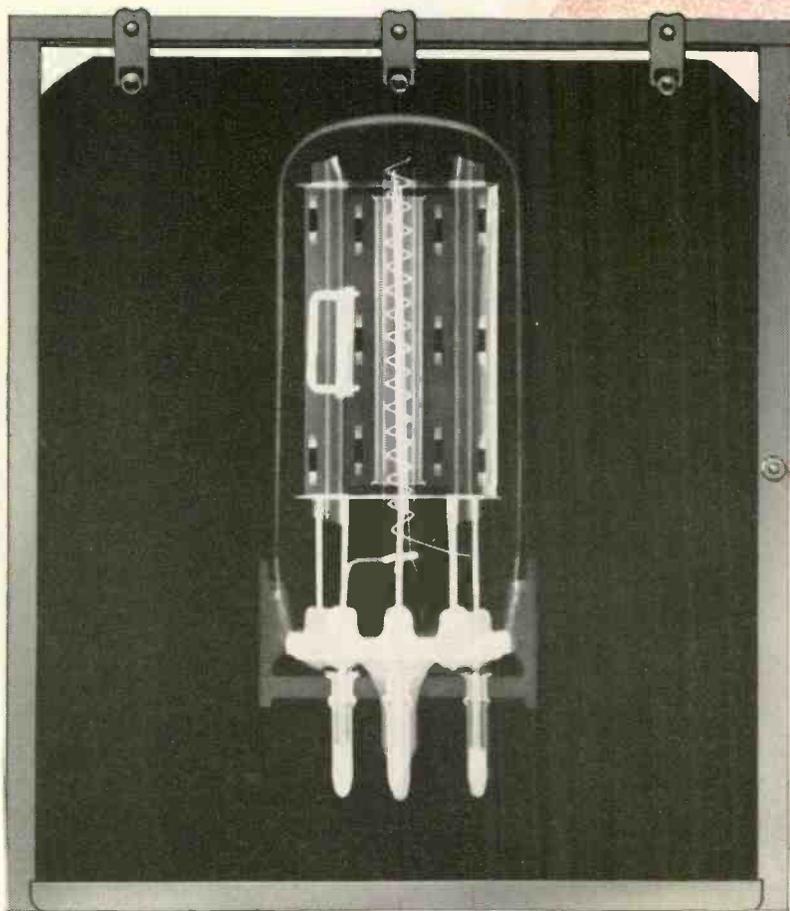


B & K MANUFACTURING CO.
1801 W. BELLE PLAINE AVE • CHICAGO 13, ILL.
Canada: Atlas Radio Corp., 50 Wingold, Toronto 10, Ont.
Export: Empire Exporters, 277 Broadway, New York 7, U.S.A.

damper tube exhibits tolerance of high voltages



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



JUST WHAT THE DOCTOR ORDERED

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

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



the first name to ask for when ordering



TUNG-SOL®

DAMPER TUBES

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

1961 Parts Show Preview

Thousands To See Latest Products Displayed

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

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

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

Show Sponsors

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

Western Electronic Manufacturers Assoc. (WEMA)

National Electronic Distributors Assoc. (NEDA)

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

Producers of Associated Components for Electronics (PACE)

Electronic Industries Assoc. (EIA)

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

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

LIST OF EXHIBITORS

Company	Booth	Room
Acoustic Research		613A
Advance Relays	406	
Aerovox Corp.	583	
Akro-Mils, Inc.	890	
All-Channel Prods.	131	
Alliance Mfg.	687	
Alpha Wire Corp.	403	
Alproco	784	
American Concertone		556A
American Electrical Heater	788	
American Electronics	127	
American Geloso Electronics		665
American Radio Relay League		620
American Television & Radio	420	
Amperex Electronic Corp.		726
Amperite Co.	321	
Ampex Magnetic Tape Prods.		717
Ampex Professional Prods.		533A/34A
Amphenol-Borg Electronics		605-07
Antenna Designs		545
Antenna Specialists	126	
Antronic Corp.	582	
Arco Electronics	417	
Argos Products Co.		512A
Astatic Corp.	781	512
Astron Corp.	775	
Atlas Sound Corp.	422	
Audio Devices		602A
B&K Mfg. Co.		613/614
Belden Mfg. Co.	319	
Bell Sound Div.		617A/19A
Benjamin Electronic Sound		633A
Birnbach Radio	117	
Blonder-Tongue Labs	316	
Bogen-Presto Div.		605A/07A
British Industries Corp.		509A
Bud Radio		721/722
Burgess Battery	211/213	
Bussmann Mfg.	314	
Cadre Industries	3	
CBS Electronics	223	757
Calcon Mfg. Corp.		629
Campro Products	778	
Cannon Electric		719/720
Central Electronics		547
Centralab Div.	790	
Channel Master Corp.		501
Chicago Standard		
Transformer	409	
Cinch-Jones Sales	679	
Claroostat Mfg. Co.	419	

Clear Beam Antenna	402	
Cletron, Inc.		557A
Columbia Wire & Supply	216	
Columbus Electronics	886	
Comfort Lines	112	
Component Specialists		604
Conrac, Inc.		532A
Consolidated Wire	307	
Cornell-Dubilier Electric	214	
Cowan Publishing		516
Delco Radio Div.	311	756
Diamond Tool	875	
DuMont Labs., Allen B.	675	
Duotone Co.	306	
Dyna Empire		656A
Dynaco, Inc.		526A

Eastern Jewel Corp.	14	
Eby Sales Co.		509
Eico Electronic Instrument	202/204	517A
Elco Sales Co.		713
Electra Mfg.		751
Electrophone & Parts Corp.		652A
Electro Products Labs	414	
Electro-Voice		537A
Electronic Periodicals	133	
Electronic Publishing Co.		618/619
Electronic Technician	678	
Equipto Div.	680	
Ercona Corp.		654A
Erlc Electronics	119	
Erie Resistor		710
Fanon Electronic Industries		542A/709
Federated Industries	6	
Ferrodynamics Corp.		535A/536A
Finney Co.		659 /661
Fisher Radio Corp.		650A
Fidelitone, Inc.	576	

Visit
ELECTRONIC TECHNICIAN
 at the Parts Show
Booth 678

GC Electronics Mfg.	572/574	
Garlock, Inc.		761
General Electric Co.	209	755
General Industries		714
General Instrument	774	
Glaser-Steers Corp.		616A
Globe Electronics	870	
Gramer-Halldorson	301	
Grayhill, Inc.		716
Great Eastern Mfg.		653
Greentree Electronics	877	
Guardian Electric Mfg.	874	758/759
Gurlian & Co., Edward E.	783	

(Continued on page 82)



there are trumpets



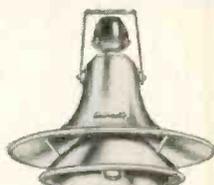
and there are trumpets!

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

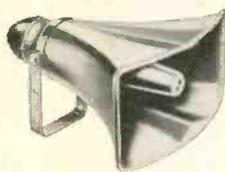
A SELECTION OF NINE TRUMPET MODELS FOR TOTAL INSTALLATION FLEXIBILITY



4 DIFFERENT DIRECTIONAL REFLEX MODELS



3 DIFFERENT RADIAL REFLEX MODELS



2 DIFFERENT WIDE-ANGLE REFLEX MODELS



WORLD'S LARGEST MANUFACTURER OF PUBLIC ADDRESS SPEAKERS

A Division of Ling-Temco Electronics, Inc.



FREE LITERATURE

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

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

1 Tools: A new group of miniature safety pliers is covered in literature. Includes curved needle-nose, duck-bill, long-nose, and diagonal-cutting types. Beryllium Corp.

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

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

For more data, circle 5-57-2 on coupon

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

For more data, circle 5-57-3 on coupon

4 Identification Kit: Service business advertising and tie-in identification is the subject of a 16-page brochure, "Guide to Extra Impact Identification." Philco Corp.

For more data, circle 5-57-4 on coupon

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

For more data, circle 5-57-5 on coupon

6 Crystals: Catalog #860 covers crystals for citizens band and other uses. Also, booklet illustrates citizens band radios. Texas Crystals.

For more data, circle 5-57-6 on coupon

7 Tools: Colorful catalog #67 and price list #72 cover pliers, wrenches, snips, chisels, nail sets, screw drivers, etc. Utica Drop Forge & Tool.

For more data, circle 5-57-7 on coupon

8 Test Equipment: Catalog with specifications covers complete line including model 500 component substitutor. Mercury Electronics Corp.

For more data, circle 5-71-1 on coupon

9 Components: General catalog and replacement guide lists over 1,000 components, including over 100 new items. Merit Coil & Transformer Corp.

For more data, circle 5-22-1 on coupon

10 Phono Needles: Literature covers new Japanese-made diamond-and-steel needles for use in stereophonic or monaural cartridges. Ogura Jewel Bearing Stone Mfg. Co.

For more data, circle 5-20-1 on coupon

11 Radio-Phone: Literature covers the RCA Mark VII CB radio-telephone. Provides 4 crystal controlled channels. Radio Corp. of America.

For more data, circle 5-4-1 on coupon

12 CB Radios: Literature covers citizens band radio model CBD-5, five channel crystal controlled, dual voltage. Also model CBD-1 single channel. Pearce-Simpson, Inc.

For more data, circle 5-79-2 on coupon

13 Test Equipment: Literature covers new combination VTVM-VOM, model SM112, called the Service Master. Sencore.

For more data, circle 5-57-13 on coupon

CUT HERE

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

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

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

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

Name Position

Firm Address

City Zone State

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

Florida auto-radio man applauds



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

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

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

"I operate out of my home now. That saves me \$450 a month in overhead right off. And I can give

better, faster, more economical service to my customers.

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

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

the Volkswagen Kombi

© 1961 Volkswagen of America, Inc.



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

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

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

Are you ready for a VW Truck? You are if you want a truck that costs less to buy, less to operate, and less to service. The suggested retail price of the VW Kombi (East Coast Port of Entry) is \$2,095

(West Coast, \$2,215). To help you make the right decision, talk to your Authorized Volkswagen Dealer soon. Ask for a demonstration. And get your free copy of the 60-page illustrated booklet—"The Owner's Viewpoint." It documents with facts and figures VW Truck performance and owner experience in a wide variety of businesses. It shows what *you* can expect to get from Volkswagen, too.



NEW

CBS CERAMIC MIKE MEETS 90% OF YOUR REPLACEMENT NEEDS



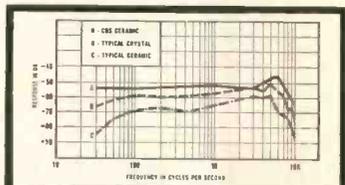
Concealed stand folds flat into microphone case.

CBS Mark VI-A Ceramic microphone. — \$10.95, suggested list price.

High output, wide frequency response, low cost and modern styling are combined in the new CBS Mark VI-A Ceramic microphone. That's why, for example, this one mike is the ideal replacement for just about every tape recorder made.

This is a mike with features your customers can easily understand and appreciate—features that make it easier to sell at full mark-up. Look at the exceptionally flat frequency response and high output. The secret lies in the unique way the ceramic element and its suspension are designed. The handsome case—rugged, yet lightweight plastic—has a cleverly concealed built-in stand. And there are no heat or humidity problems with this ceramic mike.

In performance and price, the CBS Mark VI-A is equal to virtually every application. Ask also to see the communications type Mark VI-B with push-to-talk button and coiled cord. Stock up at your CBS Electronics distributor.



CBS Ceramic compared with crystal and conventional ceramic mikes.



CBS ELECTRONICS

Danvers, Massachusetts

A Division of

Columbia Broadcasting System, Inc.

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



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

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

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

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

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

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

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

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

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

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

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

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

NOW IN KIT FORM!

The RCA Senior VoltOhmyst®

WV-98B(K)

ONLY \$62.50*

With probe, cable, clips and instruction booklet.

Featuring Pre-Assembled Etched-Circuit Board and Pre-Assembled DC/AC-OHMS Probe (WG-299D)

- Easy-to-read meter—6½" wide
- 200-microampere meter movement with less than 1% tracking error
- Precision multiplier resistors accurate to ± 1%
- Meter electronically protected against burnout
- Separate color-coded peak-to-peak and rms-voltage scales
- Die-cast aluminum case with leather carrying handle

MEASURES:

DC voltages, 0 to 1500 volts.
AC voltages, 0 to 1500 volt rms or 0 to 4200 volts peak-to-peak.
Resistances from 0.2 ohm to 1,000 megohms.

RCA WV-98B available factory-wired and calibrated: \$79.50*

Real dollar-savings! Assembly time is cut to the bone!

This extra-heavy etched-circuit board comes with all components completely mounted and soldered. The input probe and cable, likewise, comes to you already assembled and wired.

OTHER OUTSTANDING RCA KIT VALUES...



RCA VOLTOHMYST® KIT WV-77E(K) Only \$29.95*

Famous VoltOhmyst® quality and performance at a low price! Special test features include: separate 1.5-volt rms and 4-volt peak-to-peak scales for accurate low AC measurements. Measures AC and DC voltages to 1500 volts, resistances from 0.2 ohm to 1,000 megohms. Complete with ultra-slim probes, long flexible leads, special holder on handle to store leads.

RCA WV-77E available factory-wired and calibrated: \$43.95*



RCA WV-38A(K) VOLT-OHM-MILLIAMMETER KIT Only \$29.95*

The V-O-M with the extras! • 0.25-volt and 1.0-volt DC ranges • Big easy-to-read 5¼" meter • Non-breakable sealed plastic case—no glass to crack or shatter • Jacks located below switches to keep leads out of the way • Spring clips on handle to hold leads • Attractive, scuff resistant, rugged carrying case, only \$4.95* extra.

RCA WV-38A available factory-wired and calibrated: \$43.95*



RCA SUPER-PORTABLE OSCILLOSCOPE KIT WV-33A(K) Only \$79.95*

Now in kit form. A 'scope you can carry anywhere! Rugged and compact, yet weighs only 14 pounds. Just right for in-the-home and shop troubleshooting and servicing of black-and-white and color TV, radio, hi-fi components, tape recorders, etc. Ample gain and bandwidth for the toughest jobs. Scaled graph screen and internal calibrating voltage source for direct reading of peak-to-peak voltage.

RCA WV-33A available factory-wired and calibrated: \$129.95*

*User Price Optional

See them all at your Authorized RCA Test Equipment Distributor



The Most Trusted Name in Electronics
RADIO CORPORATION OF AMERICA

Manufacturers

(Continued from page 48)

Radio Shack Corp 730 Commonwealth Ave Boston Mass
 Radio Specialty Mfg 2023 S E 6 Ave Portland Ore
 Radix Wire Co 26262 Lakeland Blvd Cleveland Ohio
 Rad-Tel Tube Co 115 Coit Irvington NJ
 Ram Electronics 600 Industrial Ave Paramus NJ
 Ramo-Wooldrige Corp 8433 Fallbrook Ave Canoga Park Calif
 Rauland-Borg Corp 3515 W Addison St Chicago Ill
 Rauland Corp 4245 N Knox Chicago Ill
 Raven Electronics 2130 W Carroll Ave Chicago Ill
 Rawson Electrical Instr 110 Potter St Cambridge Mass
 Ray-O-Vac Co 212 E Washington St Madison Wis
 Ray-Par Inc 7810 W Addison St Chicago Ill
 Raytheon Co Commercial Apparatus & Systems Div Norwood Mass
 Raytheon Co Distr Prods Div Westwood Mass
 Raytheon Co Semiconductor Div Woburn Mass

R-Columbia Prods 305 Waukegan Ave Highwood Ill
 Recoton Corp 52-35 Barnett Ave Long Island City NY
 Redford Corp 262 Saratoga Rd Scotia NY
 Reeves Instrument East Gate Rd Roosevelt Field Garden City LI NY
 Reeves Soundcraft Great Pasture Rd Danbury Conn
 Regency Div IDEA Inc 7900 Pendleton Pike Indianapolis Ind
 Regent Electronics 8158 Orion Ave Van Nuys Calif
 Rego Insulated Wire 830 Monroe Hoboken NJ
 Reiter Co F 3340 Bonnie Hill Dr Hollywood Calif
 Rek-O-Kut Co 38-19 108 St Corona NY
 Relay Sales PO Box 186 West Chicago Ill
 Remington Rand Univac Oliv Sperry Rand 315 Park Ave S New York NY
 Reon Resistor 155 Saw Mill River Rd Yonkers NY
 Rescon Electronics 151 Bear Hill Rd Waltham Mass
 Resistance Prods 914 S 13 St Harrisburg Pa
 Rheem Califone Corp 1020 N LaBrea Ave Hollywood Calif
 Rheem Semiconductor 350 Ellis St Mountain View Calif
 Rider Publisher Inc John F 116 W 14 St New York NY
 Riemer Co David 601 W 26 St New York NY
 Roberts Electronics 829 N Highland Ave Hollywood Calif

Robertshaw-Fulton Controls 2920 N 4 St Philadelphia Pa
 Robins Industries 36-27 Prince St Flushing LI NY
 Robotron Corp 21300 W 8-Mile Rd Detroit Mich
 Rockbar Corp 650 Halstead Ave Mamaroneck NY
 Rockford Special Furniture 1803 Belle Plaine Chicago Ill
 Rogers Electronic 43 Bleeker St New York NY
 Rogers Mfg 25 N Main St Lindsey Ohio
 Rohn Mfg 116 Limestone St Bellevue Peoria Ill
 Rotiform Co 1509 Colorado Ave Santa Monica Calif
 Rowe Industries 1702 Wayne St Toledo Ohio
 Royal Electric 76 Westminister St Pawtucket RI
 Royal-McBee Westchester Ave Port Chester NY
 Royson Eng'g Hatboro Pa
 Russell Co F C Columbianna Ohio
 Rust Industrial 130 Silver St Manchester NH
 Rye Sound 145 Elm St Mamaroneck NY

EXCLUSIVE FRANCHISES AVAILABLE TO QUALITY RADIO & TV SERVICE ORGANIZATIONS

WHO WANT TO ADD \$3,000 TO \$20,000
 NET INCOME TO THEIR OPERATION

WE NEED *ambitious, hard-working servicemen* who want to add substantially to their present earnings. We are in the **BACKGROUND MUSIC BUSINESS** with an exclusive product and program that can earn **BIG PROFITS** for the organizations we choose and appoint to work with us. It's not a one shot program, but a continuing earning program that can win you real business stability.

WE MANUFACTURE a commercial tape cartridge playback machine that serves up to 25 speakers, complete with microphone for paging, and a complete tape cartridge library totaling over 300 hours of Background Music. We do your advertising and supply you with a cartridge library *free*. We develop your sales leads for you and the only thing you must do is demonstrate our package, install the unit and supply change of music cartridges.

YOUR TOTAL INVESTMENT is \$699.95 or \$1199, depending on area, for a demonstrator, service parts kit, and our time to put you in business. Each unit installed (average installation time, forty seven minutes) nets you \$75.00 plus \$7.50 for each speaker over 2, plus \$5.00 each month for exchange of cartridges. **OUR PRICE TO ULTIMATE USERS IS ONE THIRD THE PRICE OF ANY OTHER BACKGROUND MUSIC THEY CAN PURCHASE!**

WE GIVE YOU a protected territory of at least 30,000 population with a minimum of 300 business establishments which can **NET YOU FROM \$3,000 to \$20,000** a year.

IF THIS PROPOSITION INTERESTS YOU, YOU MAY BE OF INTEREST TO US!

MUSI-PAK Incorporated

NATIONALLY ADVERTISED—LOCALLY PROMOTED—FOR YOU!

MUSI-PAK Inc., 103 E. Hawthorne Avenue, Valley Stream, New York

Gentlemen:

I would be interested in hearing from one of your registered salesmen.

I have been in business for _____ years and feel that I can absorb both financially and technically the type of business about which you advertise.

NAME

ADDRESS

MY BANK IS

SIGNED

ADDRESS

S&A Electronics 1025 Nevada Toledo Ohio
 Sampson Co 2244 S Western Ave Chicago Ill
 Sams & Co Howard 1720 E 38 St Indianapolis Ind
 Sanborn Co Wyman St Waltham Mass
 Sangamo Electric 1301 N 11 St Springfield Ill
 Sargent Electric 630 Merrick Rd Lynbrook NY
 Sargent-Raymont Co 4926 E 12 St Oakland Calif
 Sarkes Tarzian Inc Semiconductor Div 415 N College St Bloomington Ind
 Sarkes Tarzian Inc Tuner Div E Hillside Dr Bloomington Ind
 Saxton Products 4320 Park Ave New York NY
 Scala Radio 2814 19 St San Francisco Calif
 Scale Specialties Denville NJ
 Schaewitz Eng'g PO Box 505 Camden NJ
 Schauer Mfg Corp 4500 Alpine Ave Cincinnati Ohio
 Schober Organ Corp 43 W 61 St New York NY
 Schweber Electronics 60 Herricks Rd Mineola LI NY
 Scopes Co PO Box 56 Munsey NY
 Scott Inc H H 111 Powder Mill Rd Maynard Mass
 Scott Instruments 17 E 48 St New York NY
 Seco Electronics 5015 Penn Ave So Minneapolis Minn
 Secon Metals 7 Intervale St White Plains NY
 Seg Electronics 1778 A Flatbush Ave Brooklyn NY
 Seigler Corp 875 S Arroyo Pkwy Pasadena Calif
 Seiscor Div Seismograph Service Corp PO Box 159C Tulsa Okla
 Selcin Corp Box 88 Medford Mass
 Semitronics Corp 370 Bdw New York NY
 Sencore Service Instrument Co Addison Ill
 Sensitive Research Instr 310 Main St New Rochelle NY
 Sequoia Wire & Cable 2201 Bay Rd Redwood City Calif
 Service Parts Systems PO Box 243 East Detroit Mich
 Servo Corp of America 11 New South Rd Hicksville LI NY
 Servo-Tek Prods 1086 Goffle Rd Hawthorne NJ
 Setchell-Carlson Inc New Brighton St Paul Minn
 Shallcross Mfg Preston St Selma NC
 Shell Electronics 112 State St Westbury NY
 Sherwood Electronic 4300 N California Chicago Ill
 Shure Brothers 222 Hartrey Ave Evanston Ill
 Sierra Electronic 3885 Bohannon Dr Menlo Park Calif
 Sightmaster Corp 50 Aleppo St Providence RI
 Sigma Instruments 70 Pearl St South Braintree Mass
 Signalite Inc 37-41 Neptune Hwy Neptune NJ
 Silicon Transistor 150 Glen Cove Ave Carle Place LI NY
 Simpson Electric 5200 W Kinzie St Chicago Ill
 Simpson Mfg Co Mark 32-29 49 St Long Island City NY
 Skottie Electronics 204 Bridge St Peckville Pa
 Smith-Florence Inc 4228 23 St West Seattle Wash
 Smith Labs Bernard 2969 Ludlow Rd Cleveland Ohio
 Smith Inc Herman H 2326 Nostrand Ave Brooklyn NY
 Smolin Labs Woodbrook Dr Springdale Conn
 Snyder Mfg 22nd & Ontario Sts Philadelphia Pa
 Sola Electric 1717 Busse Rd Elk Grove Village Ill
 Solar Systems Inc 8241 N Kimball Ave Skokie Ill
 Solid State Electronics 15321 Rayen St Sepulveda Calif
 Solitron Devices 67 S Lexington Ave White Plains NY
 Sonar Radio Corp 3050 W 21 St Brooklyn NY
 Sonic Industries 19 Wilbur St Lynbrook NY
 Sonotone Corp Elmsford NY
 Sono-Vision Co 156 Hempstead Tpk Hempstead NY
 Sony Corp 514 Bdw New York NY
 Sorensen & Co Richards Ave South Norwalk Conn
 Soundex Radio Co 959 Commonwealth Ave Boston Mass
 Soundlier Inc PO Box 3848 St Louis Mo
 South River Metal Prods 377 Turnpike Rd South River NJ
 Southwestern Industrial Electronics 10201 Westheimer Houston Texas
 Spaulding Products 550 W Barner St Frankfort Ind
 Speer Resistor Div Speer Carbon Co Bradford Pa
 Spellman High Voltage Co 3029 Webster Ave Bronx NY
 Spencer Kennedy Labs 1320 Soldiers Field Rd Boston Mass
 Sperry Gyroscope Electron Tube Div Great Neck NY
 Sperry Microwave Electronics Div Sperry Rand Clearwater Fla
 Sperry Semiconductor Div Sperry Rand Norwalk Conn
 Sperry Products Shelter Rock Rd Danbury Conn



You can buy your second car with a Signet Sound catalog

Within one year you can earn enough spare-time profits to buy your wife that badly needed second car. All you need is a Signet Sound Catalog and a sharp eye.

Take a good look around your neighborhood. There are hundreds of profit opportunities right there—in meeting halls, churches, sports and social clubs, fraternities, taverns, restaurants . . . all ready to be sold on the convenience, effectiveness and comparatively low cost of good sound equipment.

Take along a Signet Sound Catalog and you will have all

you need to make a sale. Without major time involvement, risk or investment, you can offer a complete choice . . . size and price-wise . . . of pre-planned, easy-to-install Signet Sound Packages backed by the greatest name in sound—STROMBERG-CARLSON®. In addition to a good profit on the equipment, you can earn a good service fee for installing it. For detailed information and your copy of the Signet Sound Catalog write:

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

GENERAL DYNAMICS | ELECTRONICS

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

For more data, circle 5-63-1 on coupon, p. 57

NEW! CITIZEN'S BAND TRANSMITTER TESTER



SECO MODEL 510—CHECKS PERCENTAGE OF MODULATION AND R. F. POWER OUTPUT!

Boost range and performance! Fast, accurate trouble shooting!

Ideal for alignment and tuneup of Citizens Band and other low power transmitters up to 160 MC. Portable, fast and easy to use . . . large 3" meter calibrated for direct reading of both positive and negative modulation peaks (also connect scope, or headphones for further modulation checks); 0-5 watts RF output; 0-400 ma. RF output. High impedance input for use with Handy Talkies. Excellent for field or laboratory testing, installation checks, routine maintenance—selector switch removes the 50 Ohm load from meter for small RF signal tune-up! Measure losses in transmission lines . . . test coaxial insertion devices such as connectors, switches, relays, filters, tuning stubs and patch cords. Complete with necessary cables and adapters—Attenuator cable available as an accessory for remote RF metering up to 15 feet. "T" pad attenuator available to adapt Model 510 for use with transmitters rated up to 50 watts.

Model 510 . . . Transmitter Tester . . . \$46.95 Net

HANDY ACCESSORIES FOR YOUR MODEL 510

ATTENU-LOAD—Ten db "T" pad attenuator for reducing power levels by ratio of 10 to 1 . . . fully shielded 50 ohm termination for coaxial cable applications!

Model 511A Attenu-Load . . . \$21.50 Net

REMOTE CABLE—Attenuator cable with all necessary connectors for remote RF metering up to 15 feet. Fits the Seco Model 500 and Model 510.

Model 501A . . . \$4.95 Net

ANOTHER POPULAR SECO CITIZENS' RADIO TEST SET

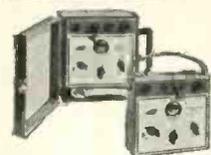


Cuts servicing and installation time—compact, portable, use it anywhere! Checks fundamental crystal types at fundamental frequency—5th and 7th overtone types at fundamental frequency—3rd overtone types in 25-30 mc range in special overtone circuit. RF power indicator for direct or remote metering—15 ft. remote cable furnished with unit. Modulated RF crystal-controlled signal generator . . . modulation checker . . . beat frequency demodulator . . . plate milliammeter for RF tuning . . . audio frequency signal generator! Fully transistorized.

Model 500 . . . \$29.95 Net

New Seco bulletin "Selling and Installing Citizens Band Equipment" tells how you can make money in this mushrooming market. Write us for your free copy.

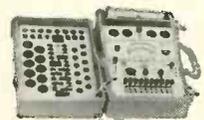
SAVE TIME... MAKE MONEY... WITH SECO TEST EQUIPMENT



ONLY GRID CIRCUIT TUBE TESTER WITH FULL TV TUBE COVERAGE! Test for Grid Emission, Leakage, Shorts and Gas in one operation—indicates result instantly. Two exclusive new tests: 1. Cathode Continuity Check; and 2. Complete Inter-Element Short Test, with shorts identified to pin numbers. Wired and factory tested in sturdy metal case (GCT-9S) or portable carrying case (GCT-9W)—with easy to read tube set-up data and "Piggy-Back" caddy adaptor.

Model GCT-95 . . . \$32.95 Net

Model GCT-9W . . . \$34.95 Net



MOST COMPLETE TESTER AVAILABLE! Model 107—Finest, fastest tester at a popular price—won't be obsolete—offers every important test you need! Dynamic Mutual Conductance Test on pre-wired chassis. Cathode Emission Test by free point selector system. Nationally accepted Grid Circuit Test patented by Seco—up to 11 simultaneous checks for leakage, shorts and grid emission. In carrying case with handy chart for tube set-up data.

Model 107—Wired and Tested . . . \$139.50 Net



Dynamic check on transistors "in" or "out" of circuit!

Fast and easy to use! Dynamic check for "opens", shorts or gain—permits matching of similar transistor types. Wide range. No set-up necessary. MODEL 100 . . . \$19.95



Fast, low-cost tester—complete TV tube coverage!

Checks all modern TV tubes and heater type Cathode Emission Test. In carrying case. MODEL 78 . . . \$69.50 NET

WRITE TODAY!
NEW LITERATURE AND SPECIFICATIONS AVAILABLE ON ALL SECO TEST EQUIPMENT.



SECO ELECTRONICS, INC.

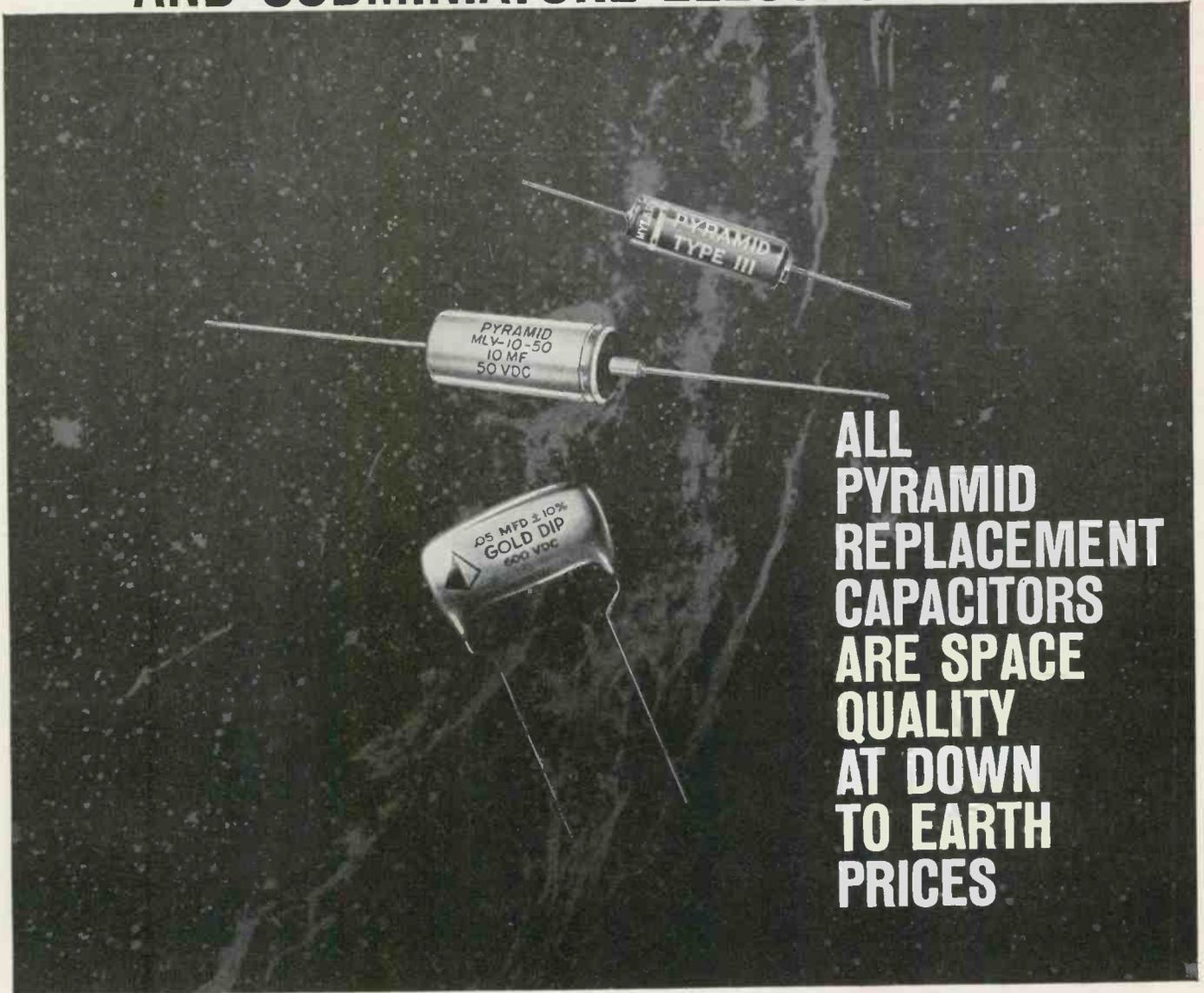
5015 Penn Ave. So. • Minneapolis 19, Minn.

EAST CANADA: Daveco Agencies, Ltd., Montreal, Quebec WEST CANADA: Ron Merritt Co., Vancouver 1, B. C.

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

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

DIPPED AND MOLDED MYLAR* CAPACITORS AND SUBMINIATURE ELECTROLYTICS



**ALL
PYRAMID
REPLACEMENT
CAPACITORS
ARE SPACE
QUALITY
AT DOWN
TO EARTH
PRICES**

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

MOLDED MYLAR

Type 111 "Gold Standard" Molded Mylar Capacitors are now available in greatly reduced sizes. They have a noninductive polyester film extended foil section, and are molded in a nonflammable thermosetting plastic case. These capacitors have very high insulation resistance, are impervious to moisture and are extremely rugged. Operating temperature range: -55°C to $+100^{\circ}\text{C}$.

SUBMINIATURE ELECTROLYTICS

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

DIPPED MYLAR

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

Operating temperature range: -55°C to $+110^{\circ}\text{C}$. Look for them on Pyramid's new Whirl-o-mat, five to a package, in Clear-Vu paks.

REG. PONT. TM

**PYRAMID ELECTRIC
COMPANY**

DARLINGTON, SOUTH CAROLINA

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



We're not much on FLAT TIRES



But try us on Auto Radio Controls!

Although your CENTRALAB distributor is your best source for auto radio controls, he won't be of much help to the character with the flat tire. The comprehensive CENTRALAB auto radio control line only goes back to 1942 model automobiles.

From 1942 on, though, it's a different story. CENTRALAB is the *only* control manufacturer offering a complete line of *exact replacement* auto radio controls . . . not to mention SP on/off switches. They cover 202 different automobile models, domestic *and* foreign.

CENTRALAB auto radio controls are listed in COUNTERFACTS and PHOTOFACTS, as well as in the Sams Industry Control Guide.

Changing tires is man's work, but changing auto radio controls is child's play—with CENTRALAB exact replacements.

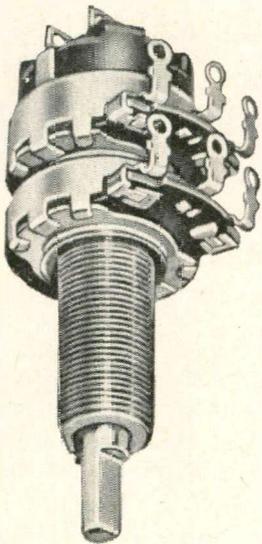


PHOTO: BETTMAN ARCHIVE

Centralab

B-6045

THE ELECTRONICS DIVISION OF GLOBE-UNION INC.
902 E EAST KEEFE AVENUE • MILWAUKEE 1, WISCONSIN
CENTRALAB CANADA LIMITED—AJAX, ONTARIO

ELECTRONIC SWITCHES • VARIABLE RESISTORS • CERAMIC CAPACITORS
PACKAGED ELECTRONIC CIRCUITS • ENGINEERED CERAMICS

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

Uher (see Warren J Weiss Assoc)
Ultra Electronics 235 E 60 St New York NY
Ultradyn Inc PO Box 3308 Albuquerque NM
Ultrasonic Industries Ames Court Engineers Hill Plainview LI NY
Ultravision Mfg 185 Goffle Rd Hawthorne NJ
Ultratronics Inc 111 E 20 Ave San Mateo Calif
Ungar Electric Tools 1475 E El Segundo Blvd Hawthorne Calif
Ungar Co Sid 1729 Washington Blvd Venice Calif
Unimax Switch Div W L Maxson Corp Ives Rd Wallingford Conn
Union Carbide Consumer Products 30 E 42 St New York NY
Union Switch & Signal Braddock Ave Pittsburgh Pa
United Audio Prods 12 W 8 St New York NY
United Catalog Publishers 60 Madison Ave Hempstead NY
United Condenser 3400 Park Ave Bronx NY
United Electric Controls 85 School St Watertown Mass
United Electronics 42 Spring St Newark NJ
United Motor Service Div GMC Detroit Mich
United Radio Box 1000 Newark NJ
United Scientific Labs 35-15 37 Ave Long Island City NY
United Transformer 150 Varick St New York NY
Universal Teletronics 8 Gary Rd Syosset LI NY
Universal Transistor Prods 17 Brooklyn Ave Westbury LI NY
University Loudspeakers 80 S Kensico Ave White Plains NY
Up-Right Towers 1013 Pardee St Berkeley Calif
US Components 454 E 148 St New York NY
US Electronic Publ 490 Lexington Ave New York NY
US Gasket Co 600 N 10 St Camden NJ
US Recording 1347 S Capitol St Washington DC
US Relay-Electronics Div ASR Prods Co 717 N Coney Ave Azusa Calif
US Semiconductor Prods Div United Industrial Corp 3540 W Osborn Rd Phoenix Ariz
US Steel Corp Pittsburgh Pa
US Transistor Corp 149 Eileen Way Syosset LI NY
Utah Radio Prods 1123 E Franklin St Huntington Ind
U-Test-M Mfg 4325 W Lincoln Milwaukee Wis
Utica Communications 1834 W Foster Chicago Ill
Utica Drop Forge & Tool 2515 Whitesboro Utica NY

Vaco Products 317 E Ontario St Chicago Ill
Valpey Crystal 1244 Highland St Holliston Mass
Van Norman Industries Electronics Div 186 Granite St Manchester NH
Van Nostrand Co D 120 Alexander St Princeton NJ
Varian Assoc 611 Hansen Way Palo Alto Calif
Vari Corp 2825 Cedar Ave Minneapolis Minn
Vector Electronic 1100 Flower St Glendale Calif
Vector Mfg Keystone Rd Southampton Pa
Veeder Root Inc 70 Sargent St Hartford Conn
Vega Electronics 1071 N Hwy 9 Cupertino Calif
Vernitron Corp 136 Church St New York NY
Vibro Ceramic Div Gulton Industries 212 Durham Ave Metuchen NJ
Victor Electric Wire & Cable 618 Main St West Warwick RI
Victoreen Instr 5806 Hough Ave Cleveland Ohio
Victory Electronics 50 Bond St Westbury NY
Victory Eng'g Springfield Rd Union NJ
Vidaire Electronics 365 Babylon Tpke Roosevelt LI NY
Videon Electronics 902 E Michigan St Indianapolis Ind
Viking Industries 21343 Roscoe Blvd Canoga Park Calif
Viking of Minn 9600 Aldrich St Minneapolis Minn
Vis-U-All Products Co Hampshire Ill
Vitramon Inc Box 544 Bridgeport Conn
Vitrex Inc P3 Box 10 North Miami Beach Fla
V-M Corp 4 & Park Sts Benton Harbor Mich
Vocaline Co of America Coulter St Old Saybrook Conn
Voisham Electronics 13259 Sherman Way North Hollywood Calif
Vokar Prods 201 E Catherine St Ann Arbor Mich
Volkswagen of America 476 Hudson Terr Englewood Cliffs NJ
Vulcan Electric Co 88 Holton St Danvers Mass

**FROM GULFPORT
MISSISSIPPI:**

"Color reception is amazing. For the first time we will really be able to sell color television."

**FROM GREAT BEND
KANSAS:**

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

**FROM FARGO
NORTH DAKOTA:**

"It's fantastic! We're getting several stations with Powertron we've never seen before."

FIRST DEALER REPORTS ON THE WINEGARD POWERTRON

World's First Electronic TV Antenna

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

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

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

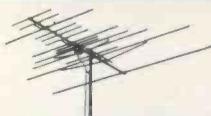
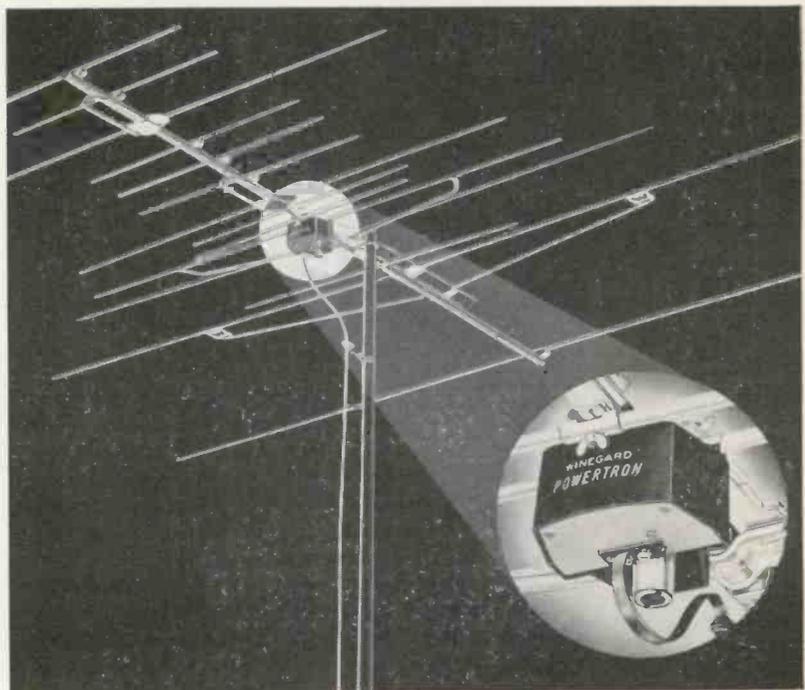
You can run 10 TV sets with a Powertron and all of them will have a better picture than you now get on one set with your present antenna.

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

You can remote the Powertron antenna 1/4 mile away from the TV set and get a better picture than with an ordinary antenna mounted next to the set.

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

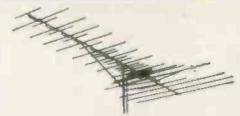
In short, this antenna is amazing. But don't take our word for it—test one and see for yourself. Ask your distributor or write today for free technical bulletin.



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



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



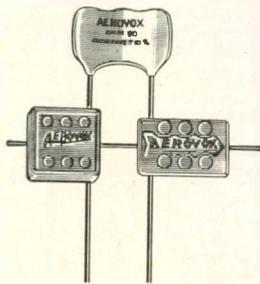
Model SP-44X Super Powertron — \$104.95 list, 30 elements. Twice the gain of Model P-44.



Winegard

3019-5 Kirkwood Boulevard • Burlington, Iowa

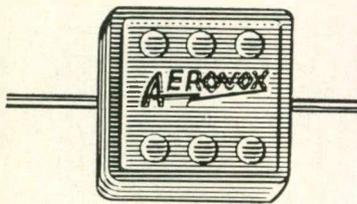
Quality you can count on EVERY SINGLE TIME!



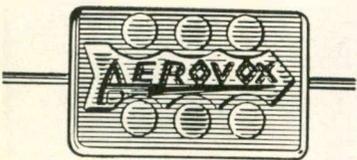
AEROVOX MICA CAPACITORS

"Trouble-free" best sums up the many advantages in using top-quality Aerovox mica capacitors. Quality isn't a matter of chance—it's a result of engineering and manufacturing know-how gained from years of experience in producing the industry's leading line of capacitors for both initial equipment and replacements.

The superior quality of Aerovox mica capacitors is your best protection against the costliness and inconvenience of premature failures. Yes, it's good to know you can service a set and forget about call-backs.



POSTAGE STAMP MICAS... for all those applications where only the smallest axial leads will do. Perfect for critical applications such as horizontal or vertical oscillators. All units are color-coded and stamped with capacity value.



HIGH VOLTAGE MICAS... designed especially for TV and low power transmitters and power amplifier applications. These top-quality units feature the highest voltages available in these can sizes. Every unit is marked with capacity and working voltage, and tested at double the rated voltage to insure dependable service and long life.



Plastic-Coated DIPPED MICAS... superior in many instances to conventional molded units. High operating temperatures, excellent long-life characteristics, ideal for printed-circuit assemblies. Smaller physical sizes with unsurpassed performance and stability features.

AEROVOX mica capacitors are available in a complete range of capacitance values. Your local Aerovox Distributor is your one-step source of supply—call on him for all your capacitor needs. Remember—it pays to use Aerovox!

AEROVOX CORPORATION

DISTRIBUTOR DIVISION

NEW BEDFORD, MASSACHUSETTS

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

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

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

WARNING!

Readers who order their subscriptions from field representatives instead of by mail from the publisher are cautioned to make checks payable only to ELECTRONIC TECHNICIAN. Do not pay cash.

Certain sales people not authorized to represent the magazine have defrauded technicians by claiming to be authorized. In particular, any attempt by Ray Barnes or Raybar Publishers Service to collect payment from you for an ELECTRONIC TECHNICIAN subscription is an effort to defraud. Your local police should be notified immediately. If Mr. Barnes is taken into custody, wire us collect to obtain added evidence for prosecution.

An authoritative answer to a ticklish consumer question . . .

ELECTRONIC TECHNICIAN has prepared the following bulletin as an aid to better customer relations. When an estimate can not be pro-

vided in the home, give your customer a copy. Reprint this bulletin yourself, or order extra copies postpaid from ELECTRONIC TECH-

NICIAN, 480 Lexington Ave., New York 17, N.Y. Price is \$1 for first 100 copies; 75¢ additional 100's.

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

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

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

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

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

Prepared as a public service by

**ELECTRONIC
TECHNICIAN**

World's Largest Electronic Trade Circulation

New Books

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

This book surveys semiconductor devices from Atom to Zener. It's directed toward technicians instead of design engineers as evidenced by its minimal mathematics. The first chapter discusses semiconductor theory; current flow, N-type and P-type, PN

junctions, and other basic information. From this vantage point the author continues to discuss various semiconductor types, their characteristics, operation, and circuit applications. Semiconductors thoroughly explored include: diodes, power rectifiers, transistors, photoelectric devices, varistors, thermistors, and magnetic devices. Many applications are reviewed, such as computer switching, decade counters, multivibrators, pulse generators, and other practical circuit uses. A final chapter covers the latest test and measurement procedures. The book is admirably illustrated and the writing style is pleasing and understandable throughout.

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

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

Ralph
Woertendyke
tells

Why

HE USES

STANCOR
TRANSFORMERS
EXCLUSIVELY

"I just finished installing a Stancor replacement transformer in a TV set, and as per usual, it fit perfectly and works perfectly. So thanks for making my job easier by making available these fine exact replacement components.

"I found this transformer replacement by looking it up on the Stancor TV Replacement Guide. This saves me time. This makes me money. Stancor offers a vital service in addition to a good product. So, thank you for this service.

"I have been using Stancor exclusively for the last two years, as obtained through my distributor, Electronics, Inc. of this city. I am glad to buy your transformers, and I just wanted to take a few minutes to say Thank You."



Salina, Kansas
Independent Service Dealer
likes the time-saving,
money-making features

(The above is from an unsolicited letter, quoted with permission, received by Chicago Standard Transformer Corporation from the head of Television Engineering, 225 N. Santa Fe, Salina, Kansas.)

CHICAGO STANDARD TRANSFORMER CORPORATION

3501 West Addison Street • Chicago 18, Illinois

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

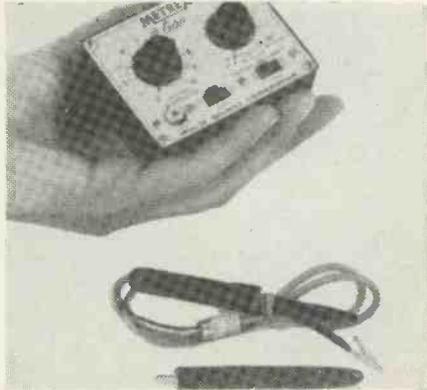
Human relations, a subject frequently neglected until serious problems arise, is described here as a tool for improving the effectiveness of modern management. The concept is adequately defined in understandable terms. A brief review of research studies is included. Applications, organization and executive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

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

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

Metrex GENERATORS

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

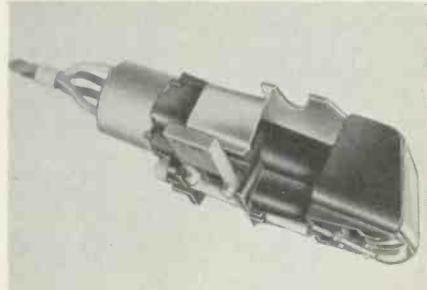


to 3.3 mc. Output, variable from zero to 9v peak-to-peak. It functions as an r-f, i-f, audio, video, pulse and bar signal generator and as a voltage calibrator. \$14.95. Metrex Corp., 819 Blake Ave., Brooklyn 7, N. Y.

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

Sonotone CARTRIDGES

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



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

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

Sylvania TUBES

Two new cathode ray tubes are: type SC-3016, flat face, 1-1/8" diameter, low power heater, electrostatic focus and deflection, over-all length only 6"; electron gun provides high deflection sensitivity and employs newly-developed 1.5v, 140 ma heater-cathode assembly; type SC-3042, 5" flat face, high resolution CRT with electrostatic deflection and focus, reported to provide twice the resolution found in types 5ADP or 5AQP, intended for applications where line widths less than 0.010-inch are required. Can be supplied with P1, P2, P4, P7, P11, P12, P15, P16, P20, P25 phosphors. Sylvania Electric Products, Inc., Seneca Falls, N. Y.

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

WE WANT MERCURY!

and no wonder they do! MERCURY TEST EQUIPMENT meets all their every day servicing requirements and will meet all yours too! You want test instruments that save you valuable time, increase your earning power and build customer goodwill.

You want all these things but you don't want to go overboard on price! And you don't have to! Mercury test equipment is priced sensibly low and represents extraordinary value... Brilliantly engineered — constructed of top name brand components — carefully hand-wired throughout. Ask to see them at your jobber today! Learn why thousands of servicemen from coast-to-coast say "We Want Mercury".

Model 103 TUBE TESTER



SPOT
HARD-TO-
FIND
TUBE DEFECTS
IN JUST
SECONDS!

\$47⁷⁵
Net

The Model 103 is compact in size but is a whale of a money-maker. Although unusually low in price it has a range of operation that will outperform far more expensive testers. It checks all radio and TV tubes (including all black and white picture tubes) for cathode emission, shorts, grid leakage and gas content. The speed and accuracy achieved with the 103 is so great that you will find it profitable to check all tubes when repairing a TV set.

Model 500 COMPONENT SUBSTITUTOR



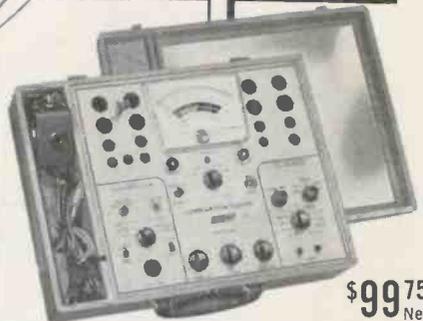
A complete range
of components
at your fingertips
for fast
substitution

The Model 500
does the whole job

\$29⁹⁵
Net

All the substitutes for electronic components you want and need in your every day work are here in this advanced design component substitutor... more than any other instrument of its type! Covers a full range of resistors, condensers, electrolytics... and also contains many exclusive features covering the substitution of crystal diodes, power rectifiers, power resistors and bias voltages.

Model 300 COMBINATION TESTER



\$99⁷⁵
Net

3 ESSENTIAL INSTRUMENTS COMBINED INTO
ONE COMPACT UNIT!

- ✓ Multiple socket tube tester
- ✓ CRT tester-reactivator
- ✓ Volt ohm milliammeter and capacity meter

Here is a complete portable service shop at your side wherever you go. As a TUBE TESTER, it will check cathode emission, inter-element leakage and gas content of all tubes... As a CRT TESTER-REACTIVATOR it will test, repair and reactivate all black and white and all color picture tubes... As a VOM sensitivity is 20,000 ohms per volt/DC, 5,000 ohms per volt/AC... Capacity Range: .001 mfd. to 80 mfd. Handsome wood carrying case.

Model 800 CRT TESTER-REACTIVATOR

- TESTS
- REPAIRS
- REACTIVATES
- ALL
- BLACK AND
- WHITE
- AND ALL
- COLOR
- PICTURE
- TUBES



\$49⁹⁵
Net

The Model 800 employs a new brilliantly engineered circuit designed to handle every black and white or color picture tube made — whether in the set or in the carton. It will TEST for emission, inter-element leakage and life expectancy... REPAIR inter-element shorts and weld open elements... REACTIVATE low emission tubes with a controlled high voltage pulse (reactivation is seen and controlled on the meter). Wood carrying case.

Other Mercury profit-making instruments

- Model 201-F Self-Service Tube Testers
- Model 600 In-Circuit Rectifier Tester
- Model 700 Transistor-Diode Tester
- Model 102-P Tube Tester
- Model 400 VOM-Capacity Tester
- Model MH-1 Multi-Head
- Model MP-1 Multi-Probe
- Model MT-1 Multi-Tracer

SEE THEM AT YOUR LOCAL DISTRIBUTOR OR WRITE FOR CATALOG



ELECTRONICS CORP.

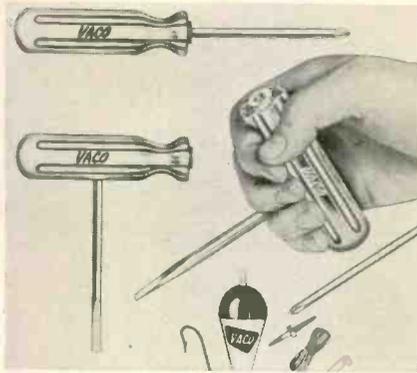
111 Roosevelt Ave.,
Mineola, N. Y.

manufacturers of quality electronic products

CANADA: Wm. Cohen Ltd., 8900 Park Ave., Montreal • EXPORT: Terminal Radio Int., 240 W. 14 St., N.Y., N.Y.

Vaco TOOLS

Features of the new side arm T-handle high torque screw driver set include: amberyl plastic handle, 4" in length, with regular clutch at the end for interchangeable blades and an extra clutch in the center of the handle, also for interchangeable blades, which provides the "T" handle; regular blade, 1/4" x 5"; genuine #2 point Phillips blade, also interchangeable, to be used as regular screw driver or "T" handle; and free bonus of "HandiAngler" complete fishing kit. \$2.98. In Canada, \$3.90. Vaco Products Co., 317 E. Ontario St., Chicago 11, Ill. For more data, circle 5-72-2 on coupon, p. 57



Granco CONVERTERS

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



and 12v power source connections and, if desired, functions without affecting the AM radio operation. Equipped with the firm's Auto-G coaxial tuner and automatic frequency control. \$49.95. Du Mont Emerson Corp., 14th & Coles St., Jersey City 2, N. J. For more data, circle 5-72-3 on coupon, p. 57

JSC WIRE

A new look is reported for the 300 ohm twin lead items in the JSC flat lead-in line. All the lead-in has been widened out from edge to edge to a full 400 width, while retaining the necessary 300 ohm characteristics. A new, bold type face is also used to imprint the wire with large easily read letters. For convenience in measuring lengths from the spool, the firm's one-foot markers are on the wire. Jersey Specialty Co., Burgess Place, Mountain View, N. J. For more data, circle 5-72-4 on coupon, p. 57

Eveready RADIO BATTERIES

Announced as the latest addition to the "Eveready" line of transistor radio batteries is the new #206 Energizer, a compact low cost power source for 1961 transistor portable radios. Con-



structed of "Mini-Mix" round cells, this new 9v Energizer provides many hours of service at 10 ma drain. 75¢. Union Carbide Consumer Products Co., 270 Park Ave., New York 17, N. Y. For more data, circle 5-72-5 on coupon, p. 57

**JUST \$32.95
PUTS THIS
DELUXE
HEATHKIT®
VTVM
ON YOUR BENCH!**

Designed specifically for service bench use, the Heathkit IM-10 incorporates an outstanding array of features for convenient operation and precision performance. An over size 6" 200 ua meter with multi-colored scales and high contrast panel screening show at a glance the correct range and scale to use for fast, easy reading of all measurements. Recessed "zero" and "ohms" adjust controls prevent accidental change in control settings. Separate 1.5 and 5 volt AC scales allow highly accurate measurement of low voltage AC. The IM-10 measures AC and DC voltage to 1500 volts in seven ranges and resistance from .1 to 1000 megohms in seven ranges. Db calibrations are provided for relative voltage measurements with 10 db steps between ranges. 1% precision resistors and husky capacitors provide high accuracy and wide frequency response. High impedance 11 megohm input circuit. Clean, open circuit layout and wiring harness assure easy assembly and maintenance. Complete with test leads. 9 1/2" H x 6 1/2" W x 5" D.

Kit Model IM-10 . . . 7 lbs. . . . \$3.30 dn., \$5 mo. **\$32.95**



HEATH COMPANY

Benton Harbor 24, Michigan
Please send Free Heathkit catalog.

NAME _____

ADDRESS _____

CITY _____

ZONE _____ STATE _____

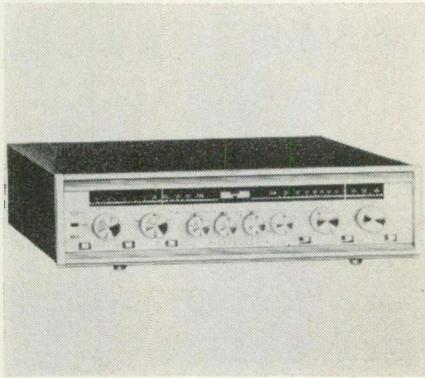
Order direct by mail or see your local dealer.

Send for your free Heath catalog describing over 200 different kits in Hi-Fi, Test, Amateur Radio, Marine and General Lines.



Sherwood STEREO RECEIVER

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

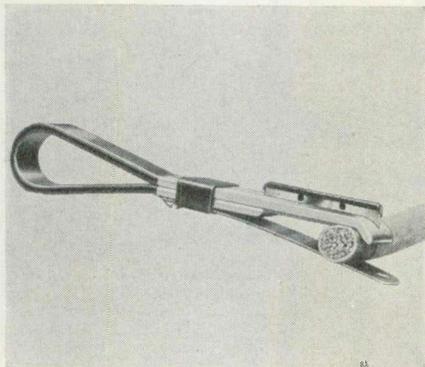


below 24 watts (radio) -60 db (phono). Frequency response, ± 1 db 20-40,000 cps. IM distortion, 1.50%. Harmonic distortion, 0.50% at 24 watts continuous power output. Less case, \$299.50. With brown leatherette case, \$307.00. Sherwood Electronic Labs., 4300 N. California, Chicago 18, Ill.

For more data, circle 5-73-2 on coupon, p. 57

Neuses TOOLS

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

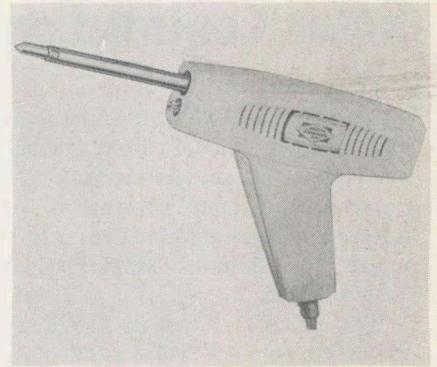


cally suited for the customary inside type $\frac{3}{16}$ ", $\frac{1}{4}$ ", $\frac{3}{8}$ " or $\frac{1}{2}$ " cables, but will handle thin sheathed cable up to 1" diameter. Cuts are always $\frac{1}{32}$ " deep. \$7.40. Also available, cable sheath slitter #N-62267 for slitting the cable lengthwise after circular cutting, \$4.20. P. K. Neuses, Inc., 511 N. Dwyer St., Arlington Heights, Ill. For more data, circle 5-73-3 on coupon, p. 57

Portable SOLDERING GUNS

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

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



now you can
**resist
resistor
fumbling**

- save time
- save lost "dimes"
- speed up service
- speed up inventory
- simplify storage

with **MONARCH OHMIC RESISTORS*** in "Quindex-Pacs"

Monarch's astounding miniature resistor, marked as 10% but guaranteed to test $\pm 5\%$ from deviation 0, and to be equal or superior to any other resistor in quality, now available in color-coded standard index card pacs for utmost convenience in selling, handling, and storage. 77 of the most popular values in $\frac{1}{2}$, 1, and 2 watt - and priced below all quality 10% resistors.

*Resistors still available in bulk. (Minimum order 1,000 pieces - 100 each of any 10 values.)



FREE! 18 drawer metal "Equipto" cabinet with removable and adjustable dividers, prepaid with your initial order for 1,000 "QUINDEX-PACS."



Contact your local rep. or write -

MONARCH ELECTRONICS International, Inc.
7035 LAUREL CANYON BOULEVARD, NORTH HOLLYWOOD, CALIFORNIA

MAIL COUPON TODAY FOR FREE "QUINDEX-PAC" SAMPLE

Monarch Electronics International, Inc.
7035 Laurel Canyon Blvd., North Hollywood, California

Gentlemen: Please send me, without obligation, a sample of your Monarch Ohmic "Quindex-Pac."

NAME _____

FIRM _____

ADDRESS _____

CITY _____

ZONE _____

STATE _____

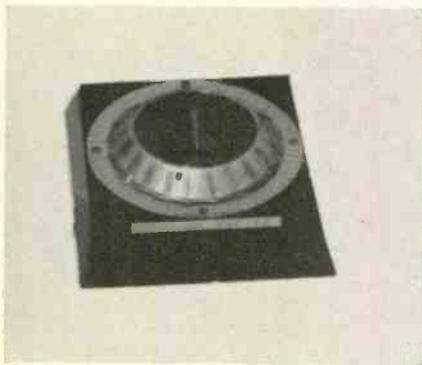


Rotor Control Converts "Manual" Types To "Automatic"

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

The control, shown in Fig. 1, employs no springs, relays, or poten-

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



tiometers and has a circuit that permits full current flow directly to the rotator for high torque. The unit contains a step-down transformer and automatic current balancing device for rotor control and synchronization.

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

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

The company announced that distributors will immediately replace any defective unit without charge any time within 90 days after purchase. A pro-rated replacement charge prevails after 90 days and

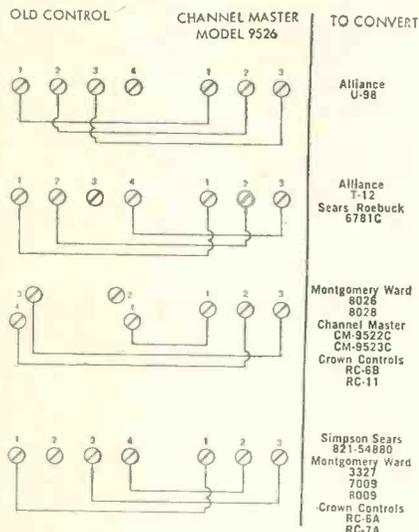


Fig. 2—Hook-ups for connecting control unit to convert other type rotators to fully automatic operation.

continues up to 3 years from date of purchase.

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

Buy With Confidence At Lowest Prices!

FAMOUS MAKE

ACCRA TRON

TV & RADIO TUBES

EA

40

USED TV CONSOLES

Just a minor repair or some tube replacement will make these sets work like new! Fix up for your or second year re-sale! 16", 17", 19" Sets shipped FOB, Harrison, N.J. **\$17.99** as is

\$37 PER 100 TUBES

FULLY GUARANTEED FOR 1 YEAR!

TUBES MAY BE USED OR FACTORY SECONDS

Get More Use Out Of Our USED Tubes. We Put THE USE IN USED. TUBE-A-RAMA will replace FREE any tube that becomes defective in use within 1 year from date of purchase!

0Y4	3BN6	6BQ7	6CU6	6SF7	7B4	12A8	12CN5	19T8
0Z4	3BZ6	6BR8	6D6	6SG7	7B5	12AB5	12D4	24A
1A7GT	3CB6	6A8	6DE6	6SH7	7B6	12A05	12F5	25Z6GT
1B3CT	3Q4	6AV5GT	6DC6CT	6SJ7	7B7	12AT6	12F8	27
1H5CT	3S4	6AV6	6BZ6	6DF6	6SM7	12AT7	12K5	35A5
1L4	3V4	6AW8	6BZ7	6E5	6S07	12A06	12K7	35B5
1L6	4BQ7A	6AF4	6A8	6F6	6S17	12A07	12L6	35C5
1L6	4BS6	6AC5	6B8	6F6	6S17	12A07	12L6	35C5
1NSCT	4CB6	6AC5	6B8	6F6	6S17	12A07	12L6	35C5
1R5	4CB6	6AC5	6B8	6F6	6S17	12A07	12L6	35C5
1T4	5AM8	6AK5	6B8	6F6	6S17	12A07	12L6	35C5
1U4	5AN8	6AL5	6B8	6F6	6S17	12A07	12L6	35C5
1U5	5AT8	6AM8	6B8	6F6	6S17	12A07	12L6	35C5
2B4	5AV8	6AN8	6B8	6F6	6S17	12A07	12L6	35C5
2AF4	5BR8	6AO6	6B8	6F6	6S17	12A07	12L6	35C5
2B4	5CC8	6AQ7	6B8	6F6	6S17	12A07	12L6	35C5
2C5	5J6	6AR5	6B8	6F6	6S17	12A07	12L6	35C5
3A5	5R4	6AS5	6B8	6F6	6S17	12A07	12L6	35C5
3AL5	5T8	6AT6	6B8	6F6	6S17	12A07	12L6	35C5
3AUG	5U4	6AUG	6B8	6F6	6S17	12A07	12L6	35C5
3BC5	5UB	6AU4GT	6B8	6F6	6S17	12A07	12L6	35C5

ALL TUBES INDIVIDUALLY BOXED, CODE DATED & BRANDED "ACCRA TRON"

PRODUCERS OF ACCRA TRON

TUBE-A-RAMA

NATIONWIDE BUILDING HARRISON, NEW JERSEY

POSTAGE FREE on \$5 or more in USA & Terr. Canadian & foreign orders send approximate postage. 25¢ handling charge on orders less than \$5. Send 25% deposit on C.O.D's.

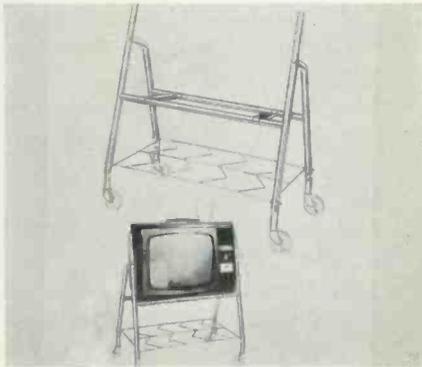
RECONDITIONED CONSOLE SELF-SERVICE TUBE TESTERS

Customers can check own tube. Complete with attract. key for bottom tube compartment. F.O.B. Harrison, N.J. **\$38.95**

Weight Approx. 45 Lbs.

JFD TV TABLES

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



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

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

Sun STEREO REMOTE CONTROL

A new stereo remote control, to adjust stereo balance and volume, fits any stereo system using separate amplifier and preamplifier. The device is plugged into the cathode follower outputs of the preamp at one end and the power amplifier inputs at the other, permitting convenient control of balance and volume from as far away as 30 feet. A special low-capacitance cable minimizes high frequency loss. Control housing measures 5" x 3 3/4" x 2 1/4". \$19.95 in walnut or mahogany. \$15.95 in metal enclosure. Sun Radio Service, 320 Chestnut St., Kearny, N. J.

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

Utah SPEAKERS

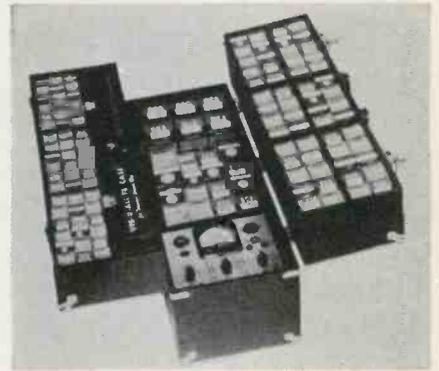
Model SP57NC, a new thin 5 x 7" speaker, has a total depth of only 1 3/4". This reduction in depth has been accomplished by using an inverted construction with the magnetic structure mounted in front of the cone. The space gained should prove a boon to technicians when making auto radio installations and when servicing sets in small cabinets. It has standard mounting centers to facilitate its use as a replacement speaker. Basic specifications: magnet, 1.47 oz; Alnico V voice coil, 3/8"; Impedance; 3-4 ohms, peak power, 8 watts. Utah Radio & Electronic Corp., Huntington, Ind.

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

GC TUBE TESTER-CADDY

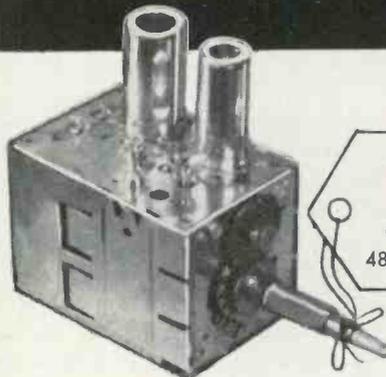
"Vis-U-All" (catalog #36-504), portable tube tester and caddy is reported as the first of its kind in the professional servicing field. The tester in the new caddy has an unusual circuit design with only four sockets. It provides for a dynamic check of tube emission, filament voltage and current leakage,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

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



Professional Technicians Use CASTLE'S

Complete TV TUNER OVERHAUL



**SAME DAY
SERVICE!**

on Popular Types
48 Hours most Others

Castle overhaul charge includes all labor and minor parts and written 90 day warranty. Tubes and major parts are extra at net prices. Tuner to be overhauled should be shipped complete; include tubes, shield cover and any damaged parts. Write down model number and state complaint. Pack well and insure.

NOW ALSO IN THE EAST

CASTLE

TV TUNER SERVICE, INC.

- 5710 N. WESTERN AVE., CHICAGO 45, ILLINOIS
- NEW!** 653 PALISADE AVE., CLIFFSIDE PARK, NEW JERSEY
- IN CANADA: 136 MAIN ST., TORONTO 13, ONTARIO

ALL MAKES
ONE PRICE
\$9⁹⁵

VHF TUNERS
UHF TUNERS
UV Combinations*

*UV combination tuner must be of one piece construction. Separate UHF and VHF tuners with cord or gear drives must be dismantled and the defective unit only sent in



Overhauling TV tuners is our only business. We do not manufacture and sell you a so called "universal" replacement tuner. When the original equipment tuner is overhauled by Castle you are assured that it will fit properly and the electrical specifications, set by the receiver manufacturer, will be met exactly.

Castle



UHF TV Tuners

(Continued from page 40)

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

When an oscillator tube is changed, channel strip oscillator slugs will usually require read-

justment because of variations in the tube's interelectrode capacitances. Continuous type tuners usually require oscillator trimmer readjustments.

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

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

It should be recalled that "flashing streaks" on a screen caused by tuner or i-f defects can seldom be differentiated from those caused by a defective antenna or feedline. The normal procedure here is to isolate the fault by disconnecting the antenna feedline from the set. Next short the two bare ends of

the feedline and move it as far away from the set as possible. To pick up some signal, connect an indoor type antenna, or a short length of wire to one antenna terminal—or merely place a finger on one of the antenna terminals when strong signals prevail. If the flashing streaks are still in the picture, the trouble is probably in the tuner or i-f section. If the flashes have disappeared—they are no doubt being caused by antenna or feedline defects.

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

Precautions

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

The mere knowledge that TV tuner characteristics are extremely

BREAKTHROUGH IN KIT DESIGN!

H. H. SCOTT TAKES TOTALLY NEW APPROACH... MAKES KITS EASIER-TO-BUILD, BETTER-PERFORMING!



LK-72 72-Watt Stereo Complete Amplifier kit, \$149.95.*



LT-10 Wide-Band FM Tuner kit (2.2μv sensitivity) \$89.95.*

BREAKTHROUGH! Here, for the first time, are kits with the performance, features and handsome good looks of H. H. Scott factory-assembled components... kits so expertly designed that you can achieve professional results in just a few hours.

Look at these innovations: ● All mechanical parts such as terminal strips and tube sockets are firmly pre-riveted to chassis. ● All wires pre-cut and pre-stripped. ● Electronic parts are mounted on special cards in order used. ● Full color diagrams in easy-to-follow instruction book reduce errors. ● New Kit-Pak container acts as worktable.

H.H. SCOTT

H. H. SCOTT Inc. 111 Powdermill Rd., Dept. 140-05, Maynard, Mass.

Rush me complete technical specifications on H. H. Scott kits. Include your new "1961 Guide to Custom Stereo."

Name _____
Address _____
City _____ Zone _____ State _____

*Prices slightly higher West of Rockies
Export: Telesco International Corp., 171 Madison Ave., N. Y. C.

For more data, circle 5-76-1 on coupon, p. 57

QUICK and LASTING

When You Use

HUSH®

Chemically-Electronically, engineered for Tuners and Switching Mechanisms.

When New HUSH is applied it will wash-away that dirt, leaving clean and positive contacts protected by a lasting lubricant. New HUSH is made from the finest solvents and it contains Electro-Silicone oils.

6 oz. Spray can. Also available—2 oz., 8 oz., 32 oz. containers

EVER-QUIET®

Since 1949

VOLUME CONTROL AND CONTACT RESTORER

EVER-QUIET is a free-flowing liquid that leaves no powder residue. Scientifically designed to seep around the shaft and penetrate the control or potentiometer, cleaning the contacts and leaving a safe protecting film. Harmless to metals, wire or carbon.

2 oz. Bottle & dispenser. Also available—6 oz. Spray can

FREE 6" Plastic Extender With Every Can

CHEMICAL ELECTRONIC ENGINEERING, INC., Matawan, New Jersey

For more data, circle 5-76-2 on coupon, p. 57



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

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

Electronic Schools

(Continued from page 44)

MISSOURI

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

NEW JERSEY

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

NEW YORK

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

OHIO

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

PENNSYLVANIA

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

RHODE ISLAND

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

TEXAS

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

WASHINGTON

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

WISCONSIN

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

CANADA

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

HAWAII

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

Channel Master RADIOS

Model 6516, a 7-transistor radio in the vest-pocket class, measures 4½" x 2¾", and is reported to have unusual pull-in power for a set of its size. Features include: a 2½" speaker; easy-to-read Vernier fine-tuning dial; a dual-purpose carrying handle and easel stand; and a built-in ferrite antenna. The radio has 7 transistors, a diode, and a thermistor. It operates on a standard 9v battery, and is housed in an unbreakable nylon case. Available in black or red, with a gold anodized grille. \$34.95. Channel Master Corp., Ellenville, N. Y.

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



Now—24-Hour Tuner Service

Tarzian Offers 24-hour
Direct Factory Service
on TUNER REPAIRS

... \$8.50



TARZIAN tuners received one day will be repaired and shipped out the next. No increase in price: \$8.50 per unit and \$15 for UV combinations. That includes *all* replacement parts, and a 6-month warranty against defective workmanship and parts failure due to normal usage. Tuners repaired on approved, open accounts. Replacements available at low cost on tuners beyond practical repair.



Tarzian-made tuners easily identified by this stamping. When inquiring about service on other than Tarzian-made tuners, always give tube complement . . . shaft length . . . filament voltage . . . series or shunt heater . . . IF frequency . . . chassis identification. And, allow a little more time for service on these tuners. Use this address for fast, factory repair service:

SERVICE MANAGER • TUNER DIVISION • DEPT. 28



SARKES TARZIAN INC

east hillside drive • bloomington, indiana
edison 2-7251

Mfgs. of Tuners, Semiconductors, Air Trimmers, FM Radios, AM-FM Radios, Audio Tape, Broadcast Equipment and Shish-Kabob Grilles

PLANET

SIZE:
1/4" x 7/8"



TRANSISTOR LYTICAPS TYPE "TL"

TYPE "TL" . . . Sub-miniature aluminum foil capacitors . . . hermetically sealed in aluminum tubes . . . clear plastic outer insulating sleeves . . . all mechanical internal connections . . . no "cold weld" nor "pressure" connections . . . engineered for quality for replacement in all transistorized circuits.

Write today for complete information.

PLANET SALES CORPORATION
225 Belleville Avenue Bloomfield, New Jersey

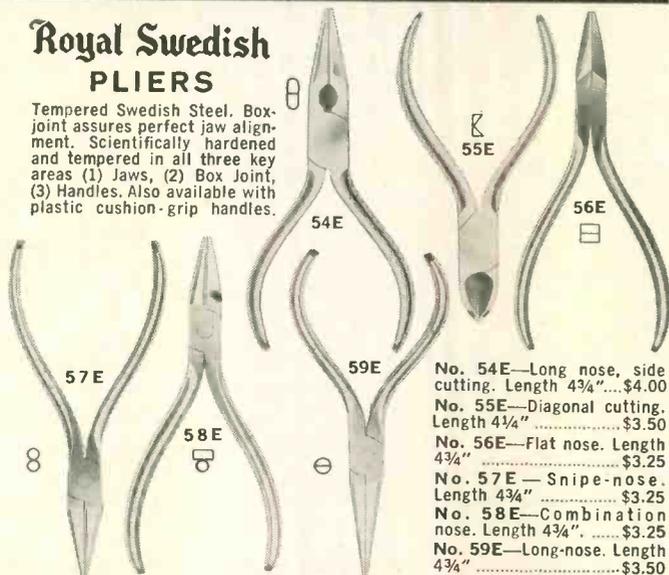
For more data, circle 5-78-1 on coupon, p. 57

x-acto Precision hand tools

The line of tools that "fit-the-job" to save you time and money

Royal Swedish PLIERS

Tempered Swedish Steel. Box-joint assures perfect jaw alignment. Scientifically hardened and tempered in all three key areas (1) Jaws, (2) Box Joint, (3) Handles. Also available with plastic cushion-grip handles.



No. 54E—Long nose, side cutting. Length 4 3/4".....\$4.00
No. 55E—Diagonal cutting. Length 4 1/4".....\$3.50
No. 56E—Flat nose. Length 4 3/4".....\$3.25
No. 57E—Snipe-nose. Length 4 3/4".....\$3.25
No. 58E—Combination nose. Length 4 3/4".....\$3.25
No. 59E—Long-nose. Length 4 3/4".....\$3.50

X-acto Products are available through leading industrial and mill supply outlets. Send for free catalog illustrating complete line of X-acto Precision Hand Tools.



HANDICRAFT TOOLS Inc.

Division of X-ACTO, Inc.

48-423 Van Dam Street, Long Island City 1, N. Y.

Nearly a Half-Century experience in precision manufacturing

ASSOCIATION NEWS

Arkansas

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

Florida

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

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

Illinois

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

Indiana

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

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

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

Louisiana

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

Michigan

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

Minnesota

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

Missouri

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

New York

ESFETA, Albany, reports their bill for licensing was defeated in

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

North Carolina

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

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

NCFEA, Durham, has four license classes in the Bill it has introduced in the State Legislature at Raleigh. Classes include Apprentice Servicemen, Journeyman, Technician, and Shop Certificates. To hold an Apprentice certificate any individual wishing to learn the trade or business must certify that he is in the employ of a person or firm holding a Certificate to practice the trade as provided by the Bill. Initial fee is \$5.00 and \$2.50 for renewal. Journeyman Certificates would be available to individuals who have met the N. C. Vocational Education De-

partment's requirements, and have received their Journeyman TV Serviceman Card. Initial fee is \$15.00 and \$10.00 upon renewal. The technician's Certificate is the same as the above except the applicant must meet the Vocational Education Department's Technicians requirements regarding the TV card. The Shop Certificate is issued to prospective TV dealer and repair shops and the fee is \$75.00, and \$50.00 upon renewal. Applicant must hold or show proof of employing a technician holding a Journeyman or Technician class certificate. The shop owner assumes responsibility for enforcing certain provisions of the bill.

Washington

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

SO SAFE!



won't damage glass tubing
let alone wire or cable!

ARROW STAPLE GUNS can't damage wire or cable because driving blade automatically stops staple at right height! That's why Arrow Staple Guns are proved safer on jobs all over the country. And Arrow staples have tremendous holding power because they're rosin-coated, have diverging points that lock into wood.

T-25 (shown) for wires up to 1/4" in diameter. (Hi-Fi wire, radiant heating, bell, thermostat, telephone, inter-com, etc.) tapered striking edge gets into tight corners. Uses 3/8", 1/2", and 5/8" staples. List \$15
T-25B For burglar alarm wiring. Drives staples flush . . . List \$15
T-75 For non-metallic sheathed cable, Romex cable or any other object (such as copper tubing) up to 1/2" in diameter. Uses 3/8", 1/2", and 5/8" Arrow staples . . . List \$15

ARROW FASTENER COMPANY, INC.
1 Junius St., Brooklyn 12, N. Y.

For more data, circle 5-79-1 on coupon, p. 57

ELECTRONIC TECHNICIAN • May, 1961

CITIZEN'S BAND RADIO

CBD-5

5 Channel,
crystal
controlled —
Dual voltage



12 Volts DC/115 Volts AC . . . 3.2 Amps full standby current
. . . Transistor power supply . . . Highly sensitive, selective, superheterodyne receiver with RF stage . . . 2 IF stages . . . Automatic noise limiter . . . Adjustable quieting squelch . . . Full 5 watt transmitter . . . Dual tuned pi-network output circuit . . . Universal mounting bracket included.

Five Channel • CBD-5 w/1 pair crystals \$179.50
ALSO AVAILABLE
Single Channel • CBD-1 w/1 pair crystals \$159.50

PEARCE-SIMPSON, INC.

A Leader in Creative Electronics

2295 N. W. 14th ST., MIAMI 35, FLORIDA

DEALER INQUIRIES INVITED

For more data, circle 5-79-2 on coupon, p. 57



Duotone needles, of course . . . tipped with genuine diamonds, sapphires or osmium. Most people forget to change their styli or don't know how to change them. Why not suggest a Duotone diamond needle replacement for every phonograph that comes into your shop? It's the stylus with the whole diamond tip that's handset and hand polished. Your customers will appreciate the service and you'll appreciate the increase in business.

Write for Free 1961 Duotone Needle Wall Chart and see DUOTONE Distributor.

DUOTONE

COMPANY, INC. KEYPORT, N. J.

Parts Show Booth 306

For more data, circle 5-80-1 on coupon, p. 57

Coming Next Month!

ET Looks At

TRUCKS FOR TV SERVICE

Getting The Most Out Of

JACK DARR

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

There are a few small things which can be added to the vehicle to make it even more useful to a TV technician. The addition of a couple

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

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

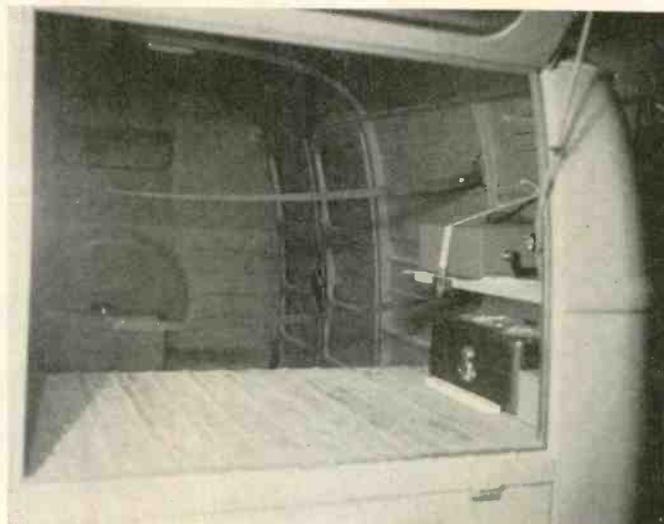


Fig. 1—Rear view shows shelving for test instruments and tools, and interior strapping for safe transport of units.

Seco CB TRANSMITTER TESTERS

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



compact unit with a large 3" meter calibrated for direct reading of percentage of amplitude modulation on

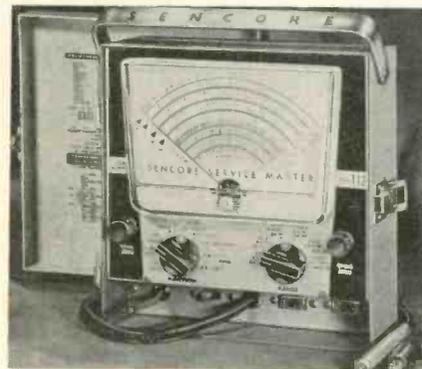
both positive and negative peaks. It has a direct reading scale for 0-5 watts r-f as well as a 0-400 ma r-f scale. Provides a high impedance input for use with Handy Talkies. A "T" pad attenuator is available as an accessory which adapts the model 510 for use with transmitters rated up to 50 watt input.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

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

Sencore VTVM-VOM COMBINATION

Model SM112, Service Master, vacuum tube voltmeter becomes a portable volt ohmmeter with a flick of the function switch. This combination, VTVM-VOM is designed so that it can be used anywhere, anytime, with or without 115v a-c. Features include automatic scale indication: each scale on

the VTVM has an indicating arrow. The function or range switch can be set to any position and one of the ar-



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

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

Volkswagens In TV Service

front edge of the shelf. These are 1-inch heavy web straps, with the buckle in the middle. They are fastened to standard screen-door pulls screwed to the body with self-tapping screws on each side. Why the safety belts? Put a table-model TV set on the rear shelf and start for the shop. If some one cuts you off at a corner, causing you to make a panic stop, you'll be mighty happy you have straps. This little buggy sits down very quickly and safely under full braking. However, everything loose in the body can pile up against the front wall in a panic stop. The straps keep the TV and fall-

ing about 18 inches to the floor of the body! By the way, be sure to set the lower strap pretty close to the floor of the shelf. I had to move mine: A small 17-inch set shot right under it one day! (Fortunately, it landed on a folded furniture pad without damage.)

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

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

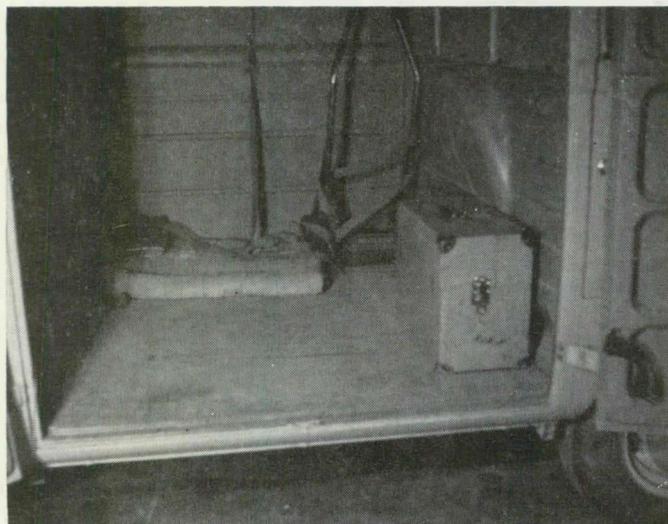


Fig. 2—Side-door view of vehicle shows masonite flooring used to permit easy rolling of console units when inside.



... WORTH
ITS
WEIGHT
IN GOLD ...

... the NEW 1961 edition of the *GREENSHEET CATALOG.

*A complete 48 page catalog of specialized industrial ELECTRONIC TUBES and COMPONENTS ... featuring BARRY ELECTRONICS savings to industry.

Circle Reader Service Card No. 460 for your copy.

Start the New Year off on the right foot. Before you purchase TUBES, COMPONENTS or EQUIPMENT ... look at your *GREENSHEET and compare our high quality and sensible prices.

11 YEARS OF BUYERS' CONFIDENCE

Prove these values to yourself! Complete and mail the coupon below for your copy of the "GreenSheet".

We also purchase your equipment and unused tubes. Send details.

(ET-5)
Name Title.....
Company
Address
City State.....

Walker 5-7000
TWX: NY1-3731

BARRY ELECTRONICS
CORPORATION
512 BROADWAY, NEW YORK 12, NEW YORK

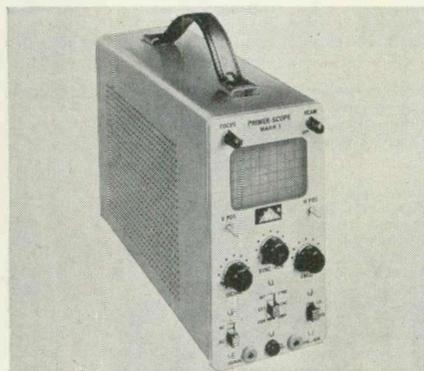
For more data, circle 5-81-1 on coupon, p. 57

Coming In July!

ET Lab Staff Examines
TRANSISTOR TESTERS

Waterman OSCILLOSCOPE

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



component is a special 3" Rayonic cathode ray tube of the 3RP type, incorporating an integral magnetic

shield to prevent stray or spurious pickups. Accelerating potential is approximately 840v. The trace is bright and sharp. Sweep rate is continuously variable in three overlapping ranges from 20 cycles to 20,000 cycles. Synchronization is smooth and positive in operation. Power supply is a conventional transformer type. \$69.95. Waterman Products Co., 2445 Emerald St., Philadelphia, Pa.

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

V-M SYNCHRONIZER

Model 1412 tape recorder-slide projector synchronizer is completely compatible with most popular brands of remote control slide or strip film projectors. The user can add his own words and his own music to his own slides. This new device imposes a low 60-cycle pulse signal on the recording tape which will, during play-back, cycle or trip the projector in synchro-

nism with the program recorded. It incites the projector to trip slides automatically at times previously selected thus replacing the remote con-



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

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

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

can be backed up to the wall, and the straps tied around the set. The furniture pad seen folded on the floor can be used to protect the cabinet from scratches.

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

Parts Show Preview

(Continued from page 55)

Company	Booth	Room
Hallcrafters Co.		513
Hammarlund Mfg.		550A
Handicraft Tools	5	
Hardwick Hindle	588	
Harlie Transistor		666A
Harman-Kardon		546A/548A
HEPCO—Haas Electronic Publ.		639
Hickok Electrical Instrument	405	
Hi-Lo Mfg. Co.	415	
H.I.S. Industries	124	
Hunter Tools	118	
Hurst Mfg. Corp.	4	
Hy-Gain Antenna Prods.	879/881	

IE Mfg.	302	
IH Mfg.	303	
Illinois Condenser	313	
Injectorall Co.	878	
International Electronics		521A
International Rectifier		704
International Resistance	22	
ITT Distributor Prods. Div.	672/674	

J-B-T Instruments	580	
JFD Electronics	418	737
Jackson Electrical Instrument	218	
James Electronics	206	
Jefferson Inc., Ray (Winston)	105	
Jensen Industries	408	637
Jensen Mfg.		659A/661A
Jerold Electronics	671/673	
Jersey Specialty		657
Johnson Co., E. F.	681	522

Kester Solder Co.	109	
Kimberly International		635A
Kinematix		604A
Koss, Inc.		655A
Krauter Co.	780	
Kurman Electric	887	

Lake Mfg. Co.		658A
Lance Antenna Corp.	115	
Lansing Sound, James B.		623A/624A
Lenco Electronics	412	707
Licon Div.		718
Littelfuse, Inc.	416	
Lowell Mfg. Co.		639A/640A
Luminite Div., Chicopee Mills	123	
Luxo Lamp Corp.	776	

Majestic International	12/13	643A
Mallory & Co. Inc., P. R.	676	
Mark Mobile, Inc.	791	
Mellotone, Inc.	203	
Mercury Electronics	787	
Merit Coil & Transformer	222	
Metal Works, Inc.		760
Microtran Co.	114	
Millen Mfg., James	217	
Miller Co., J. W.	685	
Miller Mfg., M. A.	871	
Minnesota Mining & Mfg.	779	

National Radio Co.	305	
Newcastle Fabrics Corp.	682	
Newcomb Audio Products		524A
New-Tronic Corp.	782	
North American Philips		620A/626A

Oaktron Industries		621A/622A
Ohmite Mfg.	135/1	
Osborne Electronics	108	
Oxford Electric		505A/507A

Parker Metal Goods	130	
Peerless Products	591	
Pentron Electronics Corp.		600
Perma-Power Co.	411	711
Philco Corp.	686/688	
Philmore Mfg.		556
Pickering & Co.		500
Polytronics Labs	25/26	
Potter & Brumfield	220	
Precise Electronics & Dev.	421	
Precision Apparatus Co.	581	
Precision Electronics	107	
Premier Albums	7	
Premier Metal Prods.		560/561
Pyramid Electric	221	

Qualitone Industries	884	
Quam-Nichols Co.	413	

ATLAS "Job Rated" P. A. SPEAKERS



There is an Atlas Speaker Ideally Suited for Every Job

All Atlas P. A. speakers are highly efficient, especially in the voice frequency range, providing the extra "punch" needed to override high level background noise. Most are 100% weatherproof; aluminum and diecast parts are treated with corrosion inhibitors, then finished in "stone hard" baked enamel. The CJ Cobra-Jector horns are constructed of nonresonant, indestructible fiberglass, and HU and TP speaker horns of aluminum, finished in gun-metal grey. The HU and TP speakers are particularly designed for efficient talkback operations. The peaked characteristics within the voice frequencies increase the sensitivity of these speakers as pickup devices.

All HU and CJ speakers are equipped with versatile "Versalock" . . . This rugged, reliable mounting bracket, completely adjustable both horizontally and vertically, provides positive locking in any position.

The DU-12 and DC-5, Atlas' renowned DeCor projectors, are styled to harmonize with any decor, modern or traditional. Send for free catalog to Dept. ET-5

Model	HU-12N	HU-15N	HU-24N	CJ-14N	CJ-30N	CJ-44	TP-15N	TP-24N	DU-12	DC-5
POWER*	7.5 w	25 w	25 w	7.5 w	25 w	60 w	25 w	25 w	7.5 w	6 w
IMPEDANCE**	8 ohm	8 ohm	8 ohm	8 ohm	8 ohm	16 ohms	8 ohm	8 ohm	8 ohm	8 ohm
FREQUENCY	350-	250-	200-	400-	250-	150-	250-	200-	400-	120-
C.P.S.	10,000	10,000	10,000	10,000	10,000	9000	10,000	10,000	10,000	7000
LENGTH OVERALL	7 1/4 in.	8 3/4 in.	12 in.	8 in.	11 1/4 in.	23" x 13"	16 1/2 in.	23 in.	14 in.	14 in.
BELL DIAMETER	7 1/2 in.	9 3/4 in.	11 1/4 in.	9 1/2" x 5 1/2"	14" x 6"	19 in.	9 3/4 in.	11 1/4 in.	7 in.	7 in.
NET PRICE	\$16.20	\$20.10	\$22.35	\$18.00	\$24.60	\$43.50	\$31.20	\$34.50	\$19.80	\$13.20

*Input range limited to frequencies above horn cutoff **All models available in 45 ohms at slightly higher prices



ATLAS SOUND CORP.

1449 39th Street
Brooklyn 18, N. Y.

In Canada:
Atlas Radio Corp., Ltd.,
Toronto, Ontario

For more data, circle 5-82-1 on coupon, p. 57

BINDERS for your CIRCUIT DIGESTS

... are now available to ELECTRONIC TECHNICIAN subscribers!
10 3/4" x 14 1/4"

These sturdy spring-type (no holes to punch) binders are bound in dark red, hard bookcover material . . . they hold 24 monthly issues of CIRCUIT DIGESTS plus other reference literature. . . and are embossed in gold on the front and the back binding. Another ELECTRONIC TECHNICIAN service—to help you preserve and get more convenient use out of your valuable CIRCUIT DIGESTS!

\$2.95 each—Postpaid

(for Canada & Foreign—add 50¢ postage)

ELECTRONIC TECHNICIAN

480 Lexington Ave., New York 17, N. Y.

Please ship . . . "CIRCUIT DIGEST BINDERS." I enclose \$
(please print)

Name
Street & No.
City Zone State

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

RCA BATTERIES

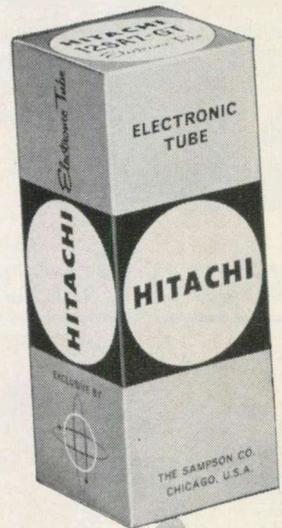
Four new alkaline batteries for use in portable radios, photoflash service, and flashlights feature long useful life, long storage life, and leakproof design. The RCA alkaline types in-



clude: VS1073, 1.5v "N" cell; VS-1334, 1.5v penlight cell; VS1149, 4.5v specifically designed for portable radios; and VS1335, 1.5v "C" cell. RCA Tube Division, Harrison, N. J.

TOP PERFORMER

...and profitmaker!

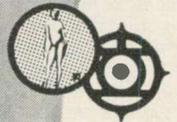


SELL—SERVICE—SATISFY

RECEIVING TUBES

MADE BY
GRAND PRIX AWARD-WINNING

HITACHI



CHOICE AS ORIGINAL EQUIPMENT BY
MANUFACTURERS IN THE U.S. AND ABROAD

- OUR FLEXIBLE PRIVATE LABELING PROGRAM makes Hitachi certified-quality tubes available to you under your own label or trademark.
- BE SURE TO VISIT US AT THE MAY PARTS SHOW—Booth No. 110, Exhibition Hall, Conrad Hilton Hotel, Chicago. May 22-24
- SPECIAL ATTRACTION! You're invited to see our private film showing in full color—"The Story of Hitachi"—Sunday, May 21 and Wednesday, May 24, at 6, 8 and 10 P.M., Presidential Suite, Blackstone Hotel, Chicago. Tickets available at our booth, or write to—

THE SAMPSON COMPANY
ELECTRONICS DIVISION, 2244 S. Western Ave.,
Chicago 8, Ill.

For more data, circle 5-83-2 on coupon, p. 57

MERCURY

TV TUNER REPAIR SERVICE "LARGEST IN THE EAST"

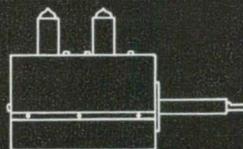
TV TUNERS
ALL TYPES

REBUILT or EXCHANGED

\$9.50

Includes parts and labor
(Broken parts extra—at cost)

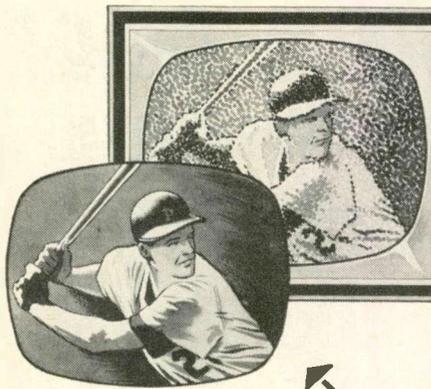
1. Same day service on most tuners
2. 90 day warranty
3. U/V combinations \$17.95



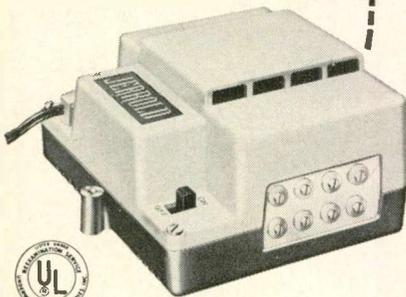
890 River Avenue
Bronx 52, New York

Phone CY 39062
CY 39060

For more data, circle 5-83-1 on coupon, p. 57



Picture Punch



and FM Magic!

NEW JERROLD® TV-FM AMPLIFIED COUPLERS

Models HSA-43 and HSA-44

The same Jerrold know-how that produced the famous MF-2 Coupler now brings improved reception to one, two, three, or four Television and/or FM sets.

Jerrold's new HSA-43 and HSA-44, the most powerful amplified couplers available today, are designed to eliminate ghosting and smearing in both color and black-and-white. Both units feature extra-long-life circuitry for the single 6DJ8 tube; built-in termination for unused outputs; no-strip terminals; on-off switch; and UL approval.

HSA-43 • Extra-powerful output for two sets, with better than normal reception for the third set.

\$17.95 net

HSA-44 • Equally powerful reception for four sets. Ideal for use with Jerrold's new no-loss HS-140J plug-in outlets.

\$18.95 net

See your Jerrold distributor or write for Jerrold's new 12-page catalog.



**ELECTRONICS
CORPORATION**
Distributor Sales Division

Dept. IDS-143, Philadelphia 32, Pa.
Jerrold Electronics (Canada) Ltd., Toronto
Export Representative: CBS International,
New York 22, N. Y.

TV Sweep Circuit Test "Analyzers"

(Continued from page 35)

oscillator and output circuits of a TV set.

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

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

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

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

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

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

the manufacturer's operating manual claimed we would.

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

Sync Checks

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

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

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



MAD?

...because you had to call back?

Why waste time with cold solder joints...risk your reputation?

Be sure, use ERSIN Multicore 5-core solder—makes a fast-holding perfect solder joint every time!



World's Finest
ERSIN Multicore
FIVE-CORE SOLDER

S & I
Guaranteed
Quality

Sold only by Radio Parts Distributors.
MULTICORE SALES DIVISION BRITISH INDUSTRIES CORP., Port Washington, N. Y.

For more data, circle 5-85-1 on coupon, p. 57



SILENT SERVICE

with

QUIETROLE



the first, the quality, the proved silencing "Lubri-Cleaner" for noisy controls and switches on TV, radio and electronic instruments. SPRAY IT or DROP IT . . . it's easy—efficient—effective. Make QUIETROLE your silent partner in providing satisfactory service.

manufactured by
QUIETROLE Company
SPARTANBURG, South Carolina

In Canada: CROSS CANADA ELECTRONICS
12 Laurel St., Waterloo, Ont.

For more data, circle 5-85-2 on coupon, p. 57
ELECTRONIC TECHNICIAN • May, 1961

Conclusions

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

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

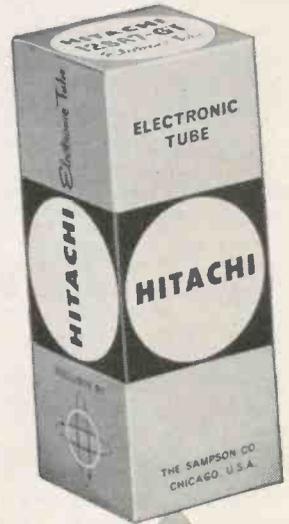
Both B&K and Winston can drive the horizontal output stage directly. Sencore cannot. However, Sencore does provide horizontal output cathode current readings, which will indicate a defect in the immediate output stage. A socket adapter automatically breaks the cathode circuit for milliamp readings.

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

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

MORE PROFIT

per call...satisfaction for all!



SELL—SERVICE—SATISFY

RECEIVING TUBES

MADE BY
GRAND PRIX AWARD-WINNING

HITACHI



CHOICE AS ORIGINAL EQUIPMENT BY
MANUFACTURERS IN THE U.S. AND ABROAD

- OUR FLEXIBLE PRIVATE LABELING PROGRAM makes Hitachi certified-quality tubes available to you under your own label or trademark.
- BE SURE TO VISIT US AT THE MAY PARTS SHOW—Booth No. 110, Exhibition Hall, Conrad Hilton Hotel, Chicago. May 22-24
- SPECIAL ATTRACTION! You're invited to see our private film showing in full color—"The Story of Hitachi"—Sunday, May 21 and Wednesday, May 24, at 6, 8 and 10 P.M., Presidential Suite, Blackstone Hotel, Chicago. Tickets available at our booth, or write to—

THE SAMPSON COMPANY
ELECTRONICS DIVISION, 2244 S. Western Ave.,
Chicago 8, Ill.

For more data, circle 5-85-3 on coupon, p. 57

CITIZEN BAND CLASS "D" CRYSTALS
 All 22 Frequencies in Stock
 3rd overtone. .005% tolerance—to meet all FCC requirements. Hermetically sealed HC6/U holders. 1/2" pin spacing holders. 1/2" pin spacing holders. **\$2.95 EACH**
 —.050 pins. (.093 pins available, add 15¢ per crystal).

The following Class "D" Citizen Band frequencies in stock (frequencies listed in megacycles): 26.965, 26.975, 26.985, 27.005, 27.015, 27.025, 27.035, 27.045, 27.055, 27.065, 27.075, 27.085, 27.105, 27.115, 27.125, 27.135, 27.155, 27.165, 27.175, 27.185, 27.205, 27.215, 27.225.

Matched crystal sets for Globe, Gonset, Citi-Fone and Hallcrafters . . . \$5.90 per set. Specify make.

RADIO CONTROL CRYSTALS IN HC6/U HOLDERS
 Specify frequency. 1/2" pin spacing . . . pin diameter .05 (.093 pin diameter, add 15¢) **\$2.95 ea.**

FUNDAMENTAL FREQ. SEALED CRYSTALS
 In HC6/U holders
 From 1400 KC to 4000 KC .005% Tolerance **\$4.95 ea.**
 From 4000 KC to 15,000 KC any frequency .005% Tolerance **\$3.50 ea.**

SEALED OVERTONE CRYSTALS
 Supplied in metal HC6/U holders
 Pin spacing .486, diameter .050
 15 to 30 MC .005 Tolerance **\$3.85 ea.**
 30 to 45 MC .005 Tolerance **\$4.10 ea.**
 45 to 60 MC .005 Tolerance **\$4.50 ea.**

QUARTZ CRYSTALS FOR EVERY SERVICE
 All crystals made from Grade "A" imported quartz—ground and etched to exact frequencies. Unconditionally guaranteed! Supplied in:
FT-243 holders MC-7 holders
 Pin spacing 1/2" Pin spacing
 Pin diameter 3/8" Pin diameter .093
DC-34 holders FT-171 holders
 Pin spacing 3/4" Pin spacing
 Pin diameter 3/8" Banana pins .156

MADE TO ORDER CRYSTALS
 1001 KC to 2600 KC:
 .01% tolerance **\$2.00 ea.**
 .005% tolerance **\$2.75 ea.**
 2601 KC to 9000 KC:
 .005% tolerance **\$2.50 ea.**
 .005% tolerance **\$3.00 ea.**
 Specify holder wanted

Amateur, Novice, Technician Band Crystals
 .01% Tolerance . . . \$1.50 ea.—80 meters (3701-3749 KC), 40 meters (7152-7198 KC), 15 meters (7034-7082 KC), 6 meters (8335-8650 KC) within 1 KC
 FT-241 Lattice Crystals in all frequencies from 370 KC to 540 KC (all except 455 KC and 500 KC) **50¢ ea.**
 Pin spacing 1/2" Pin diameter .093
 Matched pairs ± 15 cycles **\$2.50 per pair**
 200 KC Crystals, **\$2.00 ea.**; 455 KC Crystals, **\$1.50 ea.**; 500 KC Crystals, **\$1.50 ea.**; 100 KC Frequency Standard Crystals in HC6/U holders **\$4.50 ea.**;
 Socket for FT-243 crystal **15¢ ea.**; Dual socket for FT-243 crystals, **15¢ ea.**; Sockets for MC-7 and FT-171 crystals **25¢ ea.**; Ceramic socket for HC6/U crystals **20¢ ea.**
 Write for new free catalog #860 complete with oscillator circuits

YOUR PARTS DEALER HAS TEXAS CRYSTALS
 See big red display . . . If he doesn't stock them, send us his name and order from our Florida plant.

Now! Engineering samples and small quantities for prototypes now made either at Chicago or at Ft. Myers Plant. 24 Hour Service.
IN CHICAGO, PHONE GLADSTONE 3-3555

RUSH YOUR ORDER TO OUR NEW PLANT
 Use coupon below for 1st Class shipment.
TEXAS CRYSTALS
 Dept. T-51, 1000 CRYSTAL DRIVE, FORT MYERS, FLORIDA
 For extra fast service, Phone WE 6-2100

ATTACH THIS COUPON TO YOUR ORDER FOR SHIPMENT VIA 1ST CLASS MAIL AT NO EXTRA COST
TERMS: All items subject to prior sale and change of price without notice. All crystal orders must be accompanied by check, cash or M.O. with **PAYMENT IN FULL.** No COD's. Dept. T-51

For more data, circle 5-86-1 on coupon, p. 57

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

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

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

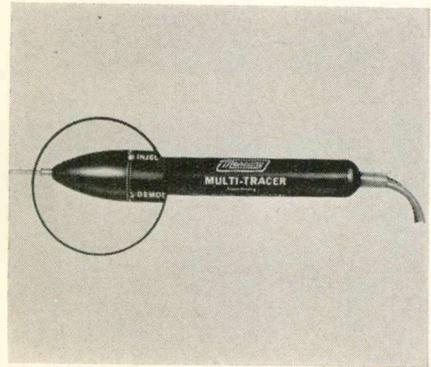
We would like to emphasize, at

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

Mercury MULTI-TRACERS

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

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



Paco TUBE-CHECKERS

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

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



TV PARTS HOUSE
 Parts Supplier to TV Servicemen Only
 P. O. BOX 1971
 BILLINGS, MONT.
TIRED OF TRADING WITH THE "SELL ANYBODY" BOYS? TRY US FOR DYNAMITE SERVICE ON YOUR NEXT ORDER! STANDARD LINES AND DISCOUNTS, WE PREPAY POSTAGE ANYWHERE WITH JUST A BUCK DEPOSIT FOR COD --- DROP US A CARD! - LET'S GET ACQUAINTED.
BOB BAKER

For more data, circle 5-86-2 on coupon, p. 57

INDEX TO ADVERTISERS

MAY 1961

Aerovox Corp.	68	Pearce-Simpson, Inc.	79
American Television & Radio Co.	87	Planet Sales Corp.	78
Arrow Fastener Co., Inc.	79	Precision Tuner Service	87
Atlas Sound Corp.	82	Pyramid Electric Co.	65
B & K Manufacturing Co.	49, 51, 53	Quietrol Co.	85
Barry Electronics Corp.	81	Radio Corporation of America	
Belden Manufacturing Co.	52	4, 50, 61, Cover IV	
British Industries	85	Rad-Tel Tube Co.	88
Bussmann Manufacturing Co.	16	Raytheon Company	17
Castle Television Tuner Service	75	Sampson Co.	83, 85
CBS Electronics	13, 60	Sarkes Tarzian, Inc., Semiconductor Div.	12
Centralab Division, Globe-Union, Inc. ...	66	Sarkes Tarzian Tuner Service	77
Channel Master Corp.	9	Scott, H. H., Inc.	76
Chemical Electronic Engineering, Inc. ...	76	Seco Electronics, Inc.	64
Chicago Standard Transformer Corp.	70	Sencore	28
Clarostat Manufacturing Co., Inc.	11	Sonotone Corp.	26
Duotone Co., Inc.	80	Sprague Products Co.	21, 23
EICO	8	Standard Kollsman Industries, Inc. Cover	III
Electro Voice, Inc.	25	Stromberg-Carlson	63
General Electric Co.	2, 3, 10	Sylvania Electric Products, Inc.	27
Heath Co.	72	Texas Crystals	86
Jackson Electrical Instrument Co.	24	Triplett Electrical Instrument Co.	Cover II
Jerrold Electronics Corp.	84	Tube-A-Rama	74
JDF Electronics Corp.	5	Tung-Sol Electric, Inc.	54
Mallory & Co., Inc., P. R.	6, 7	TV Parts House	86
Mercury Electronics Corp.	71	University Loudspeakers, Inc.	56
Mercury Television Tuner Service	83	Utah Radio & Electronics Corp.	19
Merit Coil & Transformer Corp.	22	Volkswagen of America, Inc.	58, 59
Metrex	18	Winegard Co.	67
Monarch Electronics International, Inc. ...	73	X-Acto, Inc.	78
Multicore Sales Corp.	85	Xcelite, Inc.	18
Musi-Pak, Inc.	62		
Ogura Jewel Bearing Stone Mfg. Co. ...	20		

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.

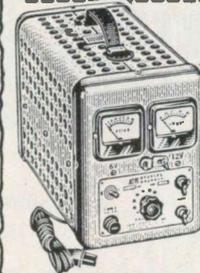
ATR PRODUCTS FOR MODERN LIVING



ATR PLUG-IN TYPE PORTABLE INVERTERS*

A.C. HOUSEHOLD ELECTRICITY Anywhere... in your own car!
Operates Standard A.C.
● Record Players
● Dictating Machines
● Small Radios
● Electric Shavers
● Heating Pads, etc.
In your own car or boat!

MODELS
6-RMF (6 volts) 60 to 80 watts. Shipping weight 12 lbs. DEALER NET PRICE... \$33.00
12T-RME (12 volts) 90 to 125 watts. Shipping weight 12 lbs. DEALER NET PRICE... \$33.00
*Additional Models Available



ATR "A" Battery ELIMINATOR

For Demonstrating and Testing Auto Radios TRANSISTOR or VIBRATOR OPERATED!
Designed for testing D.C. Electrical Apparatus on Regular A.C. Lines—Equipped with Full-Wave Dry Disc-Type Rectifier, assuring noiseless, interference-free operation and extreme long life and reliability.

MAY ALSO BE USED AS A BATTERY CHARGER
MODEL 610C-ELIF... 6 vpts at 10 amps. or 12 volts at 6 amps. Shipping weight 22 lbs. DEALER NET PRICE... \$49.95
MODEL 620C-ELIT... 6 volts at 20 amps. or 12 volts at 10 amps. Shipping weight 33 lbs. DEALER NET PRICE... \$66.95

AUTO-RADIO VIBRATORS

By every test ATR Auto-Radio Vibrators are best!... and feature Ceramic Stack Spacers, Instant Starting, Large Oversized Tungsten Contacts, Perforated Reed, plus Highest Precision Construction and Workmanship and Quiet Operation!

There is an ATR VIBRATOR for every make of car!
Ask your distributor for ATR's Low Priced type 1400, 6 volt 4-prong Vibrator; and 1843, 12 volt 3-prong; or 1840, 12 volt 4-prong Vibrator. THE WORLD'S FINEST!

ATR CUSTOMIZED KARADIO

Vibrator-Operated with Tone Control
ATR KARADIO... is ideal for small import cars or compact American cars! Unit is completely self-contained—extremely compact. Powerful 8-tube performance provides remarkable freedom from engine, static, and road noises. The ATR Customized Karadio comes complete with speaker and ready to install. Can be mounted in-dash or under-dash—wherever space permits! No polarity problem. Neutral Gray-Tan, baked enamel finish. Overall size, 7" deep, 4" high, and 6 1/2" wide. Shipping weight, radio set, 7 lbs. Model K-1279—12 for 12V Dealer Net Price... \$33.57 Model K-1279—6 for 6V Dealer Net Price... \$33.57

Airplane Style Overhead Mounting under Cab Roof NO PRINTED CIRCUITRY

ATR TRUCK KARADIO

Excellent Tone, Volume, and Sensitivity!
Compact, yet powerful. Fits all trucks, station wagons, most cars and boats. Just drill a 3/8 inch hole in roof and suspend the one-piece unit (aerial, chassis and speaker) in minutes. Watertight mounting assembly holds antenna upright. Yoke-type bracket lets you tilt radio to any angle.
Extra-sensitive radio has 6 tubes (2 double-purpose), over-size Alnico 5 PM speaker for full, rich tone. Big, easy-to-read illuminated dial. Fingertip tuning control. Volume and tone controls. 33-in. stainless steel antenna. Neutral gray-tan enameled metal cabinet, 7 x 6 1/2 x 4 in. high over-all. Shipping weight 10 1/2 lbs.
Model TR-1279—12A for 12V Dealer Net Price \$41.96
Model TR-1279—6A for 6V Dealer Net Price \$41.96

SEE YOUR ELECTRONIC PARTS DISTRIBUTOR WRITE FACTORY FOR FREE LITERATURE...

ATR AMERICAN TELEVISION & RADIO Co. Quality Products Since 1931 SAINT PAUL 1, MINNESOTA—U.S.A.

For more data, circle 5-87-2 on coupon, p. 57

PHONE ED 9-9653

\$7.50

plus parts, C.O.D. and postage charges

Precision Tuner Service

ALL TYPES T.V. TUNERS REPAIRED AND ALIGNED TO FACTORY SPECIFICATIONS ON CRYSTAL-CONTROLLED SWEEP GENERATORS
24-HOUR SERVICE ON MOST TUNERS
UHF - VHF COMBINATIONS — \$13.50

See your local distributor or send to:

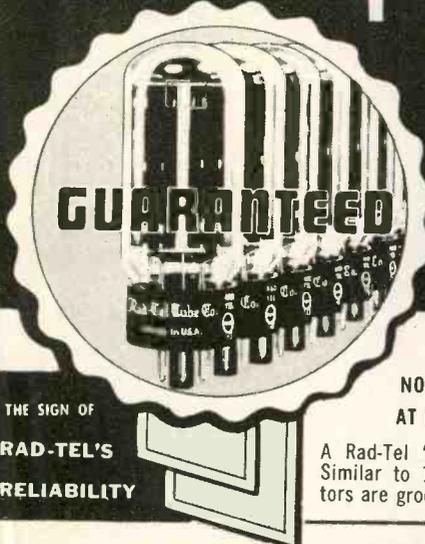
P.O. Box 272, 601 N. College BLOOMINGTON, INDIANA

State make and model. Send all parts, tubes and shields.

For more data, circle 5-87-1 on coupon, p. 57

NOW! FAST ONE DAY SERVICE BRAND NEW RADIO & TV TUBES

RAD-TEL'S FIRST QUALITY TUBES SAVE up to 75% ONE FULL YEAR GUARANTEE



THE SIGN OF
RAD-TEL'S
RELIABILITY

1st TIME OFFERED

NOW! RAD-TEL'S "SET TESTED" TRANSISTORS . . .
AT FABULOUS LOW PRICES

A Rad-Tel "general purpose transistor" for each class. Similar to 100's specified in many projects. All transistors are grouped into 4 general classes:

LOW POWER AF TYPE
DRIVER AND OUTPUT



39¢ ea.



LOW POWER RF
MIXER AND IF



49¢ ea.

79¢ ea.
HI POWER AF UNITS
CAR RADIO TYPE
POWER OUTPUT



POWER SUPPLY TYPE
HI POWER \$1.39 ea.

SPECIAL PURPOSE

TETRODES, ETC.
(Not available at this time)

YOU CAN SUBSTITUTE AND replace with Rad-Tel transistors when working with transistor projects. Transistor substitutions are based on "similar operating characteristics." All Rad-Tel transistors have expensive features, broad tolerances and are tested in AM radio, as radio frequency converter at 1.5 KC and 450 KC intermediate frequency, AF as audio frequency driver. You're safe building numerous projects when you use Rad-Tel's "set tested" transistors. Each Rad-Tel Transistor is fully tested and guaranteed to give sound operating performance without confusing you with COMPLICATED NUMBERS AND CHARACTERISTICS. Here are just a few suggested transistor projects:

Solar Powered Radio,
Shirt Pocket Radio,
Carrier Power Receiver,
Sine, Square-Wave Generator,
Transistor Preamp for VTVM,
Regulated Power Supply,
Meter Sensitivity Multiplier,
Oscillator Audio & RF
Electronic Counters.

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

59¢ ea.
LOTS OF 5

RAD-TEL'S
SELECTED
KITS . . .
UNBELIEVABLY
LOW PRICED!
WHILE THEY
LAST!
79¢ ea.

- 50 ASST'D TIE LUGS, NO. 1
- 10 ASST'D F.P. CONDENSERS, NO. 6
- 50 ASST'D RADIO KNOBS, NO. 8
- 15 ASST'D T.V. COILS, NO. 13
- 20 ASST'D MOLDING SOCKETS, NO. 5
- 50 ASST'D BRACKETS & HARDWARE, NO. 17
- 15 SETS ASST'D CONNECTORS, NO. 15
- 10 ASST'D T.V. SLUG TUNED COILS, NO. 25
- 10 ASST'D VOLUME CONTROLS, LG & SH SHAFT, NO. 2
- 8 ASST'D T.V. CONTROLS, SHORT SHAFT, NO. 21
- 8 ASST'D VOLUME CONTROLS, LONG SHAFT, NO. 22
- 10 ASST'D SWITCHES, DOUBLES, LONG & SHORT SHAFT, NO. 23
- 10 ASST'D T.V. PEAKING COILS, NO. 24
- 25 ASST'D TRIMMERS, NO. 7
- 10 ASST'D TUBE SHIELDS, NO. 26
- 1 LB. PROX. NUTS & BOLTS, NO. 20
- 4 ASST'D SOUND COILS, NO. 18
- 20 ASST'D HI-WATT RESISTORS, NO. 9
- 7 ASST'D HORIZONTAL COILS, NO. 19
- 15 ASST'D BINDING POST TERMINALS, NO. 16

RAD-TEL TUBE CO. NOT
AFFILIATED WITH ANY
OTHER MAIL ORDER
TUBE COMPANY

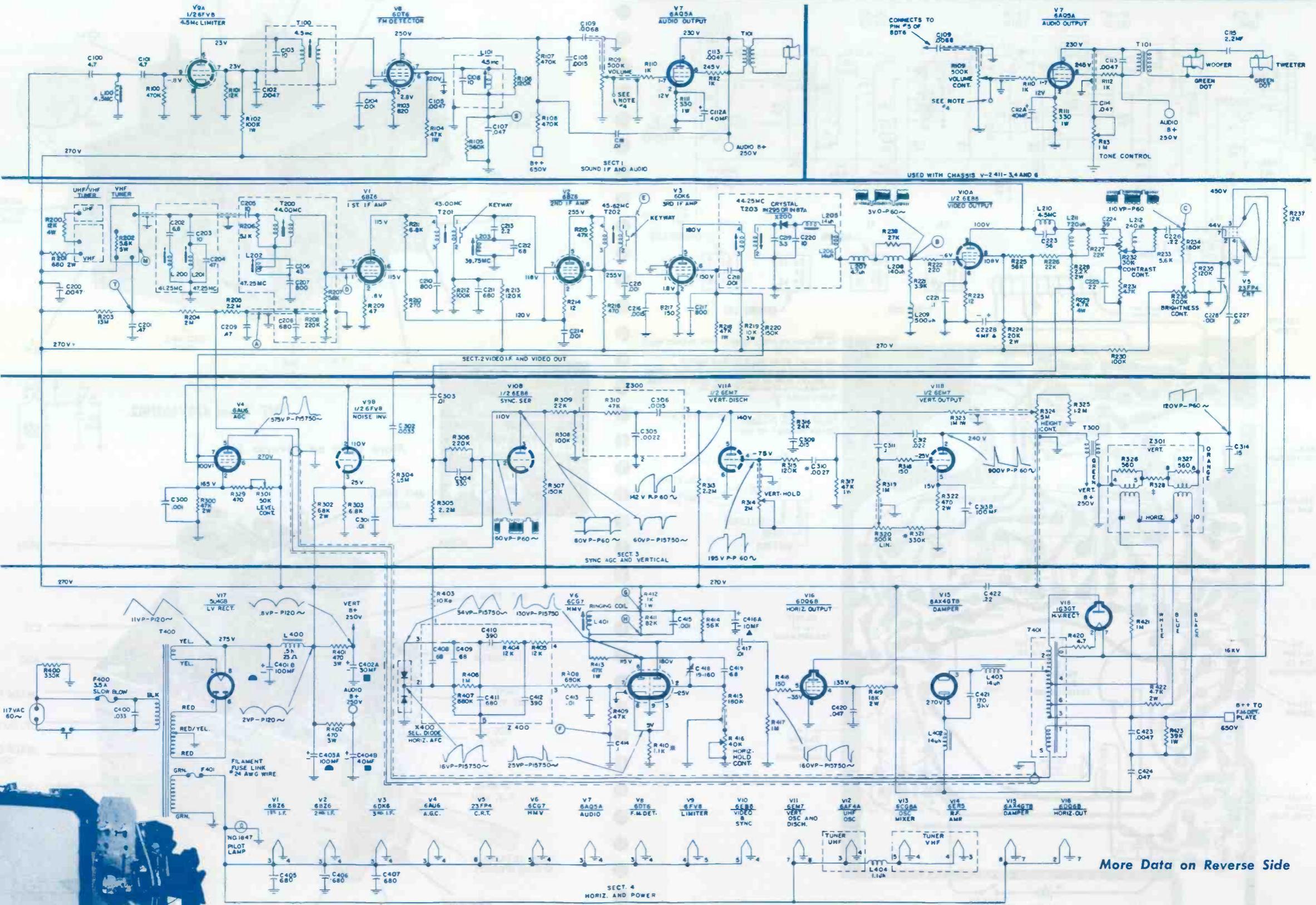
SEND FOR FREE TROUBLE SHOOTER
GUIDE AND NEW TUBE & PARTS CATALOG

RAD-TEL TUBE CO.

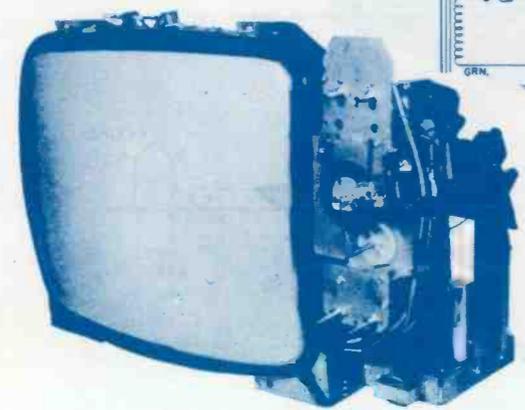
DEPT. ET-561 55 CHAMBERS STREET, NEWARK 5, N. J.

TERMS: 25% deposit must accompany all orders, balance COD. Orders under \$5: add \$1 handling charge plus postage. Orders over \$5: plus postage. Approx. 8 tubes per 1 lb. Subject to prior sale. Prices subject to change. No COD's outside continental USA.

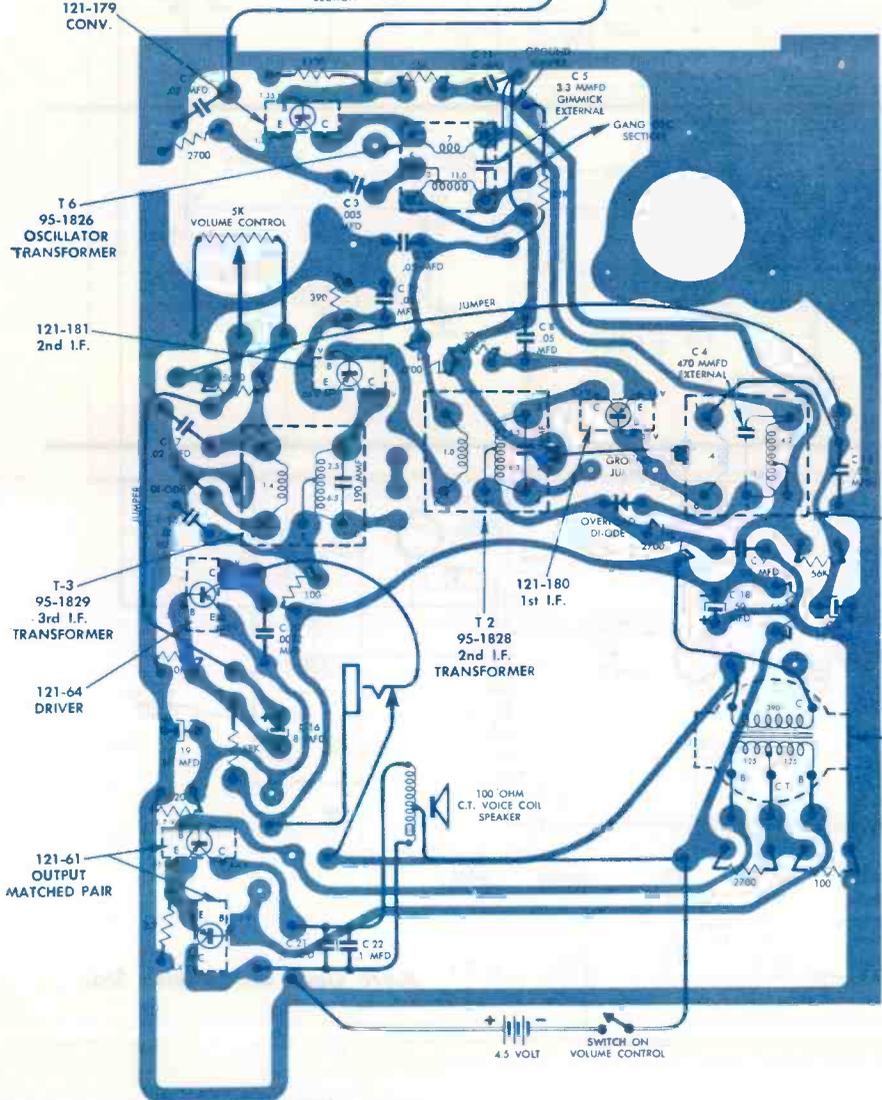
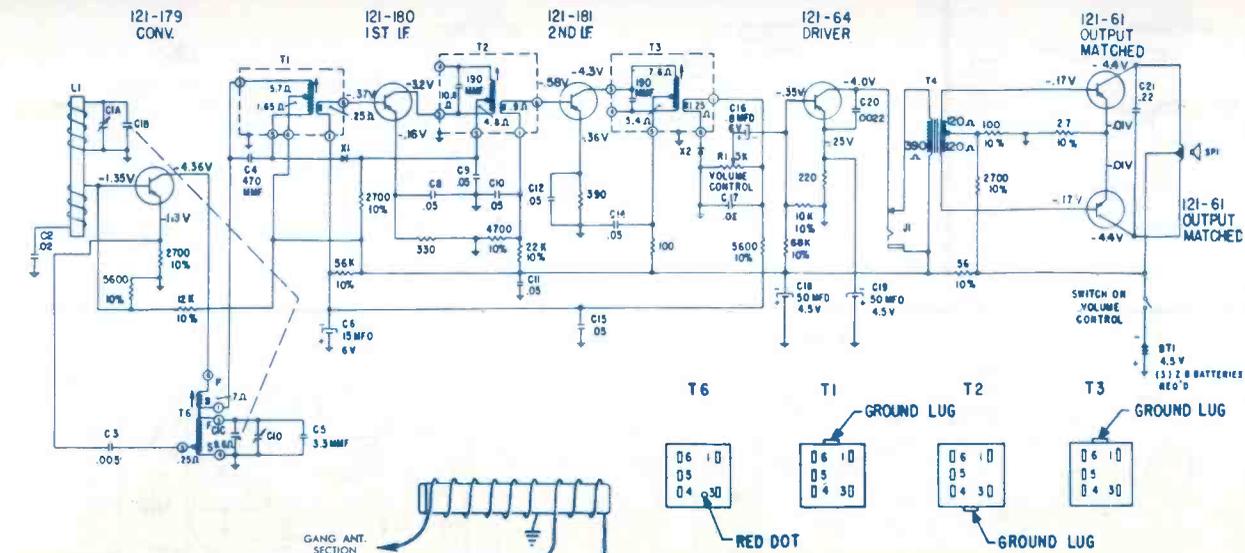
Qty.	Type	Price	Qty.	Type	Price	Qty.	Type	Price
—	QZ4M	.79	—	6AX7	.64	—	12AF6	.49
—	1AX2	.62	—	6BA6	.50	—	12AJ6	.46
—	1B3GT	.79	—	6BC5	.61	—	12AL5	.45
—	1DN5	.55	—	6BC7	.94	—	12AL8	.95
—	1G3	.79	—	6BC8	.97	—	12AQ5	.52
—	1J3	.79	—	6BD6	.51	—	12AT6	.43
—	1K3	.79	—	6BE6	.55	—	12AT7	.76
—	1LN5	.59	—	6BF6	.44	—	12AU6	.50
—	1R5	.62	—	6BG6	1.66	—	12AU7	.61
—	1S5	.51	—	6BH6	.65	—	12AV5	.97
—	1T4	.58	—	6BH8	.87	—	12AV6	.41
—	1U4	.57	—	6BJ6	.62	—	12AV7	.75
—	1U5	.50	—	6BK7	.85	—	12AX4	.67
—	1X2B	.82	—	6BL7	1.00	—	12AX7	.63
—	2AF4	.96	—	6BN4	.57	—	12AZ7	.86
—	3AL5	.42	—	6BN6	.74	—	12B4	.63
—	3AU6	.51	—	6BQ5	.65	—	12BA6	.50
—	3AV6	.41	—	6BQ6GT	1.05	—	12BD6	.50
—	3BA6	.51	—	6BQ7	1.00	—	12BE6	.53
—	3BC5	.54	—	6BR8	.78	—	12BF6	.44
—	3BE6	.52	—	6BU8	.70	—	12BH7	.77
—	3BN6	.76	—	6BY6	.54	—	12BL6	.56
—	3BU8	.78	—	6BZ6	.55	—	12BQ6	1.06
—	3BY6	.55	—	6BZ7	1.01	—	12BY7	.77
—	3BZ6	.55	—	6C4	.43	—	12BZ7	.75
—	3CB6	.54	—	6CB6	.55	—	12C5	.56
—	3CF6	.60	—	6CD6	1.42	—	12CN5	.56
—	3CS6	.52	—	6CF6	.64	—	12CR6	.54
—	3DK6	.60	—	6CG7	.61	—	12CU5	.58
—	3DT6	.50	—	6CG8	.77	—	12CU6	1.06
—	3Q5	.80	—	6CM7	.66	—	12CX6	.54
—	3S4	.61	—	6CN7	.65	—	12DB5	.69
—	3V4	.58	—	6CR6	.51	—	12DE8	.75
—	4BC8	.96	—	6CS6	.57	—	12DL8	.85
EACH TUBE INDIVIDUALLY & ATTRACTIVELY BOXED								
—	4BN6	.75	—	6CU5	.58	—	12DM7	.67
—	4BQ7	1.01	—	6CU6	1.08	—	12DQ6	1.04
—	4BS8	.98	—	6CY7	.71	—	12DS7	.79
—	4BU8	.71	—	6DA4	.68	—	12DZ6	.56
—	4BZ6	.58	—	6DB5	.69	—	12EL6	.50
—	4BZ7	.96	—	6DE6	.58	—	12EG6	.54
—	4CS6	.61	—	6DG6	.59	—	12EZ6	.53
—	4DE6	.62	—	6DQ6	1.10	—	12F8	.66
—	4DK6	.60	—	6DT5	.76	—	12FM6	.45
—	4DT6	.55	—	6DT6	.53	—	12K5	.65
—	5AM8	.79	—	6EU8	.79	—	12SA7M	.92
—	5AN8	.86	—	6EA8	.79	—	12SK7GT	.74
—	5AQ5	.52	—	6HG6T	.58	—	12SN7	.67
—	5AT8	.80	—	6J5GT	.51	—	12SQ7M	.78
—	5BK7A	.82	—	6J6	.67	—	12U7	.62
—	5BQ7	.97	—	6K6	.63	—	12V6GT	.53
—	5BR8	.79	—	6S4	.51	—	12W6	.69
—	5CG8	.76	—	6SA7GT	.76	—	12X4	.38
—	5CL8	.76	—	6SK7	.74	—	17AX4	.67
—	5EA8	.80	—	6SL7	.80	—	17BQ6	1.09
—	5EU8	.80	—	6SN7	.65	—	17C5	.58
—	5J6	.68	—	6SQ7	.73	—	17CA5	.62
—	5T8	.81	—	6T4	.99	—	17D4	.69
—	5U4	.60	—	6U8	.83	—	17DQ6	1.06
—	5U8	.81	—	6V6GT	.54	—	17L6	.58
—	5V6	.56	—	6W4	.60	—	17W6	.70
—	5X8	.78	—	6W6	.71	—	19AU4	.83
—	5Y3	.46	—	6X4	.39	—	19BG6	1.39
—	6AB4	.46	—	6X5GT	.53	—	19T8	.80
—	6AC7	.96	—	6X8	.80	—	21EX6	1.49
—	6AF3	.73	—	7AU7	.61	—	25BQ6	1.11
—	6AF4	.97	—	7A8	.68	—	25C5	.53
—	6AG5	.68	—	7B6	.69	—	25CA5	.59
—	6AH6	.99	—	7Y4	.69	—	25CD6	1.44
—	6AK5	.95	—	8AU8	.83	—	25CUG	1.11
—	6AL5	.47	—	8AW8	.93	—	25DN6	1.42
—	6AM8	.78	—	8BQ5	.60	—	25EH5	.55
—	6AQ5	.53	—	8CG7	.62	—	25L6	.57
—	6AR5	.55	—	8CM7	.68	—	25W4	.68
—	6AS5	.60	—	8CN7	.97	—	25Z6	.66
—	6AT6	.43	—	8CX8	.93	—	35C5	.51
—	6AT8	.79	—	8EB8	.94	—	35L6	.57
—	6AU4	.82	—	11CY7	.75	—	35W4	.42
—	6AD6	.52	—	12A4	.60	—	35Z5GT	.60
—	6AU7	.61	—	12AB5	.55	—	50B5	.60
—	6AU8	.87	—	12AC6	.49	—	50C5	.53
—	6AV6	.41	—	12AD6	.57	—	50DC4	.37
—	6AW8	.90	—	12AE6	.43	—	50EH5	.55
—	6AX4	.66	—	12AF3	.73	—	50L6	.61
—			—			—	117Z3	.61



Special Full-Width SPRING BINDER Holds 24 Groups of ELECTRONIC TECHNICIAN'S CIRCUIT DIGESTS Available @ \$2.95



More Data on Reverse Side

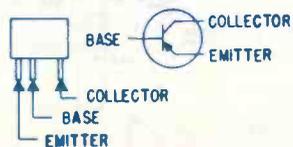


CHASSIS, WIRING AND COMPONENTS
VIEWED FROM WIRING SIDE

NOTES:
ALL RESISTORS ARE CARBON, 1/2 WATT, 20% TOLERANCE UNLESS OTHERWISE SPECIFIED.
ALL VOLTAGES ARE D.C. UNLESS OTHERWISE SPECIFIED.
ALL CONDENSERS ARE IN MICROFARADS UNLESS OTHERWISE SPECIFIED.
D.C. VOLTAGES SHOWN ARE MEASURED FROM CHASSIS WITH NO SIGNAL USING AN A.C.-D.C. OR VACUUM TUBE VOLTMETER.
DENOTES CHASSIS

BATTERY CURRENT DRAIN: APPROXIMATELY 12 M.A. WITH VOLUME CONTROL AT MINIMUM
SPEAKER IMPEDANCE 100 OHM

PNP TRANSISTOR

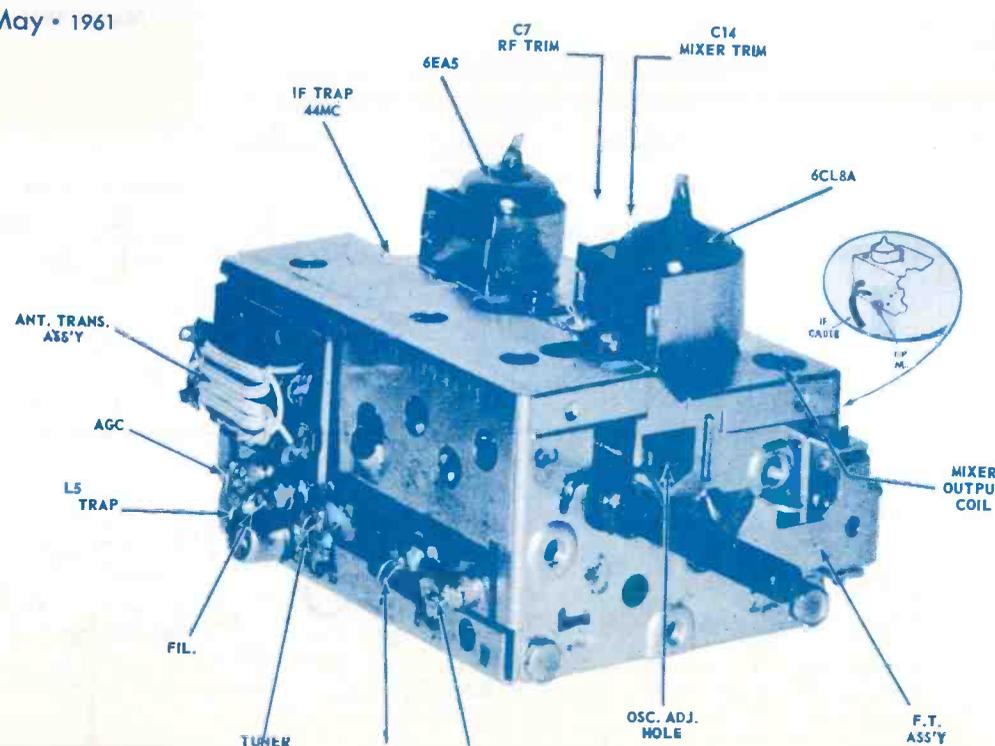


T1
95-1827
1st I.F.
TRANSFORMER

T2
95-1828
2nd I.F.
TRANSFORMER

T4
95-1883
DRIVER
TRANSFORMER

LEGEND
C—COLLECTOR
B—BASE
E—EMITTER

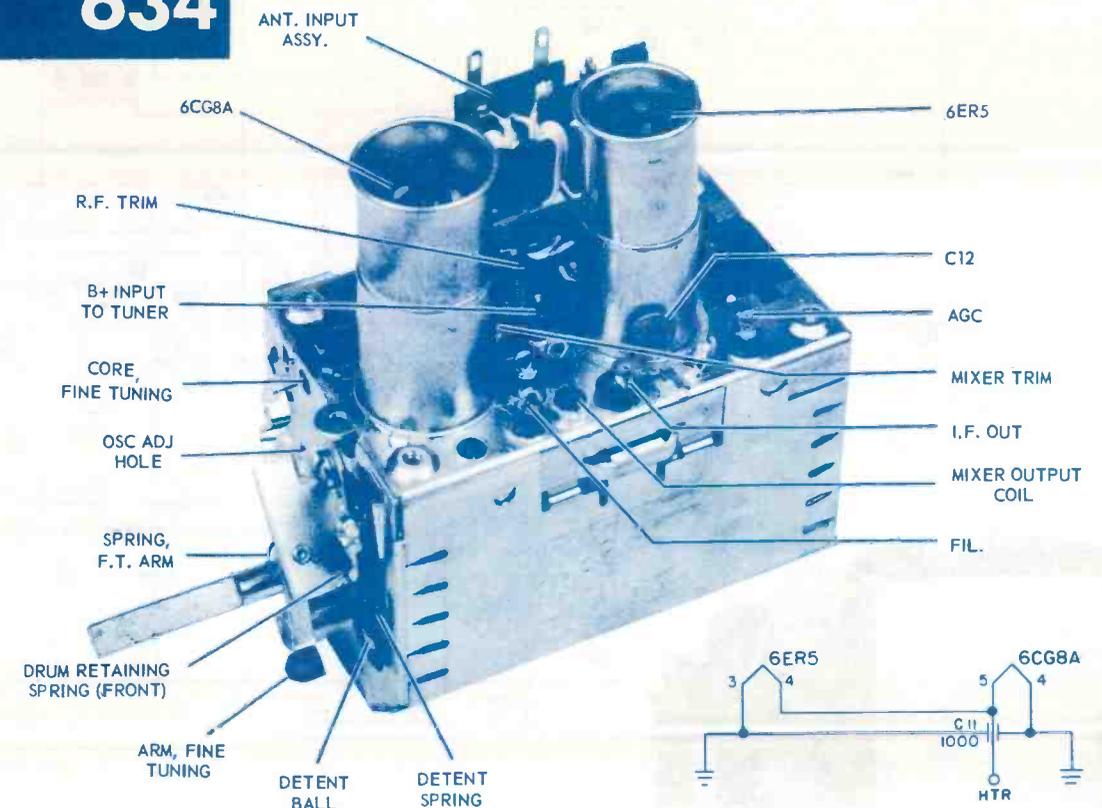


WESTINGHOUSE
TV Chassis
V-2411-1, V-2411-3

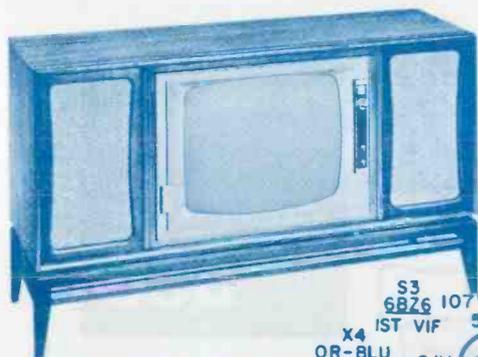
Electronic Technician
CIRCUIT DIGEST

634

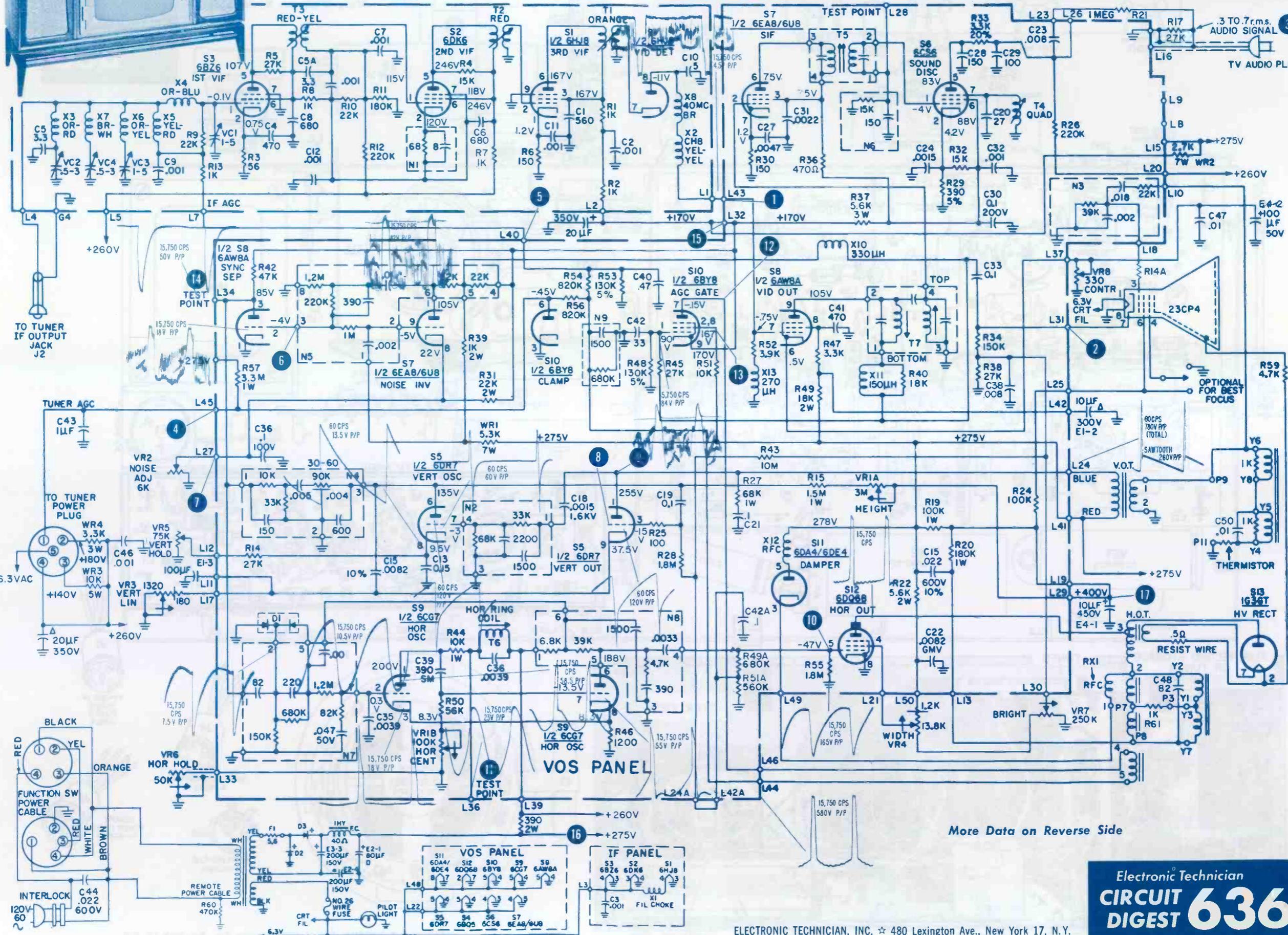
More Data on Reverse Side



VHF Tuner 470V071H01.

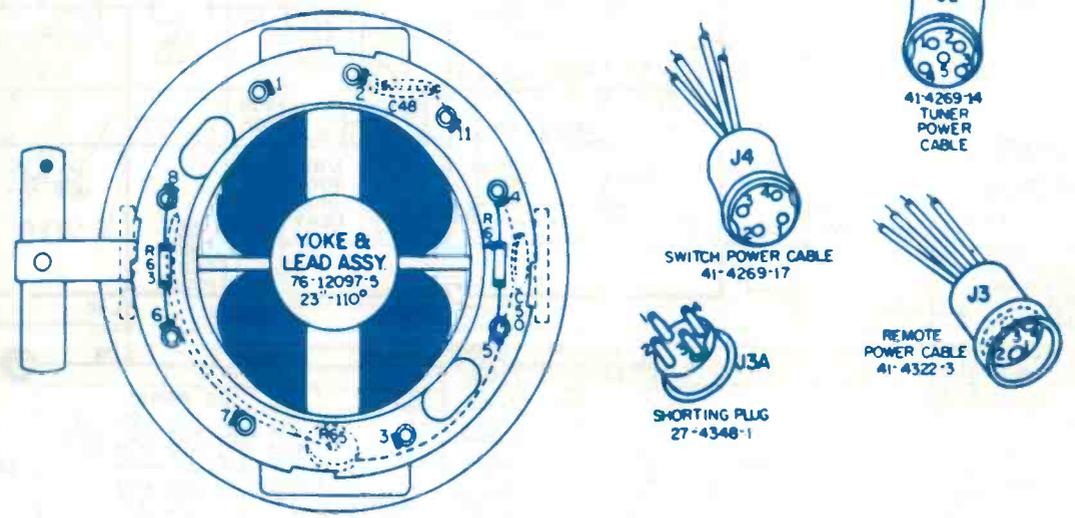
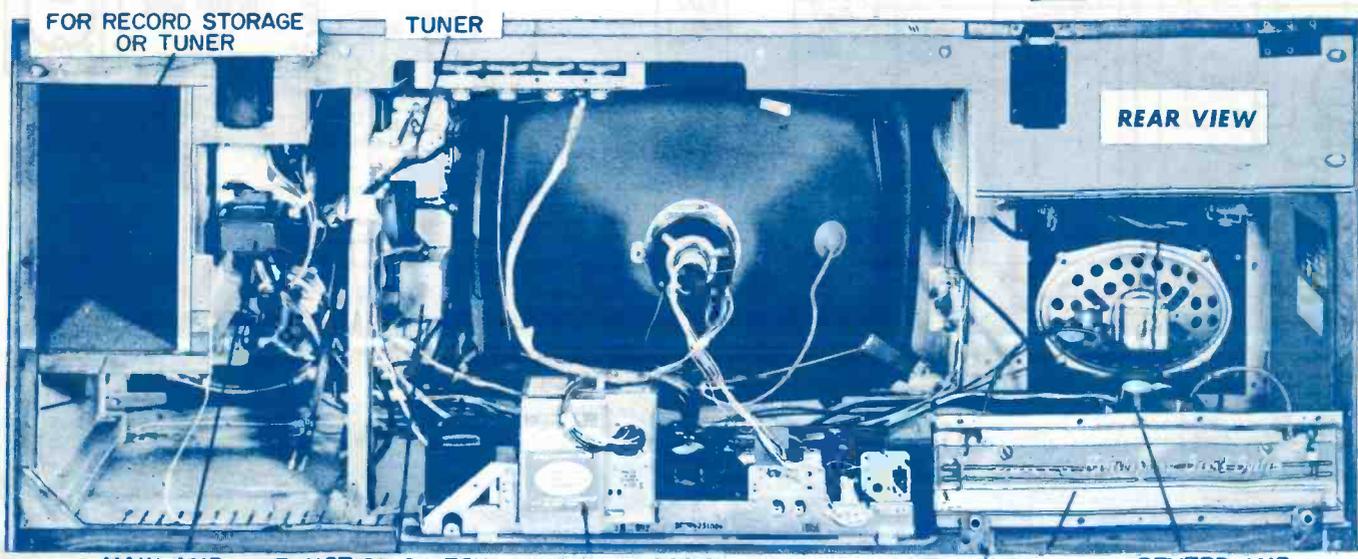
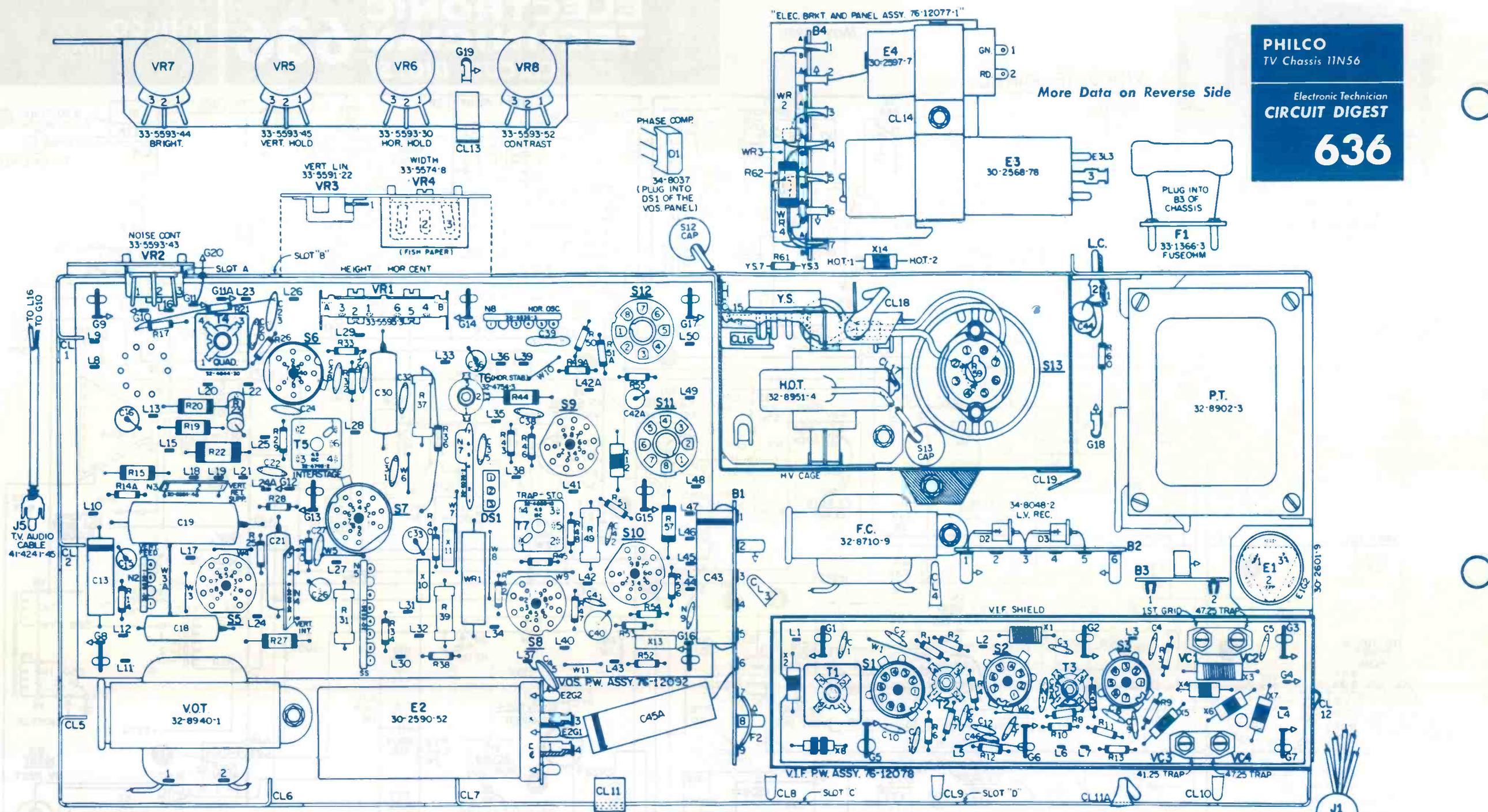


VIDEO IF PANEL



More Data on Reverse Side

More Data on Reverse Side



Circuit Digest
Schematic No.

RCA (Continued)

Chassis 5377: Models 17-S-7090, 17-S-7092, 17-S-7093, 17-S-7099 Chassis 5378: Models 17-S-7090U, 17-S-7092U, 17-S-7093U, 17-S-7099U **333**

Radio

(Transistor Portable Radio) Chassis RC-1156: Model 7-BT-10K **250**
 Transistorized portable Chassis RC-1156A: Model 8-BT-10K **313**
 (Transistor Portable Radio) Chassis RC-1159: Model 7-BT-9J **249**

AC-DC-Battery Portable Radio, Chassis RC-1161, RC-1161A: Models 8-BX-6 series, 8-BX-7 series **363**

Transistor 7-Band Portable Radio Chassis RC-1184: Model 1-MBT-6 **450**
 Transistor Radio & Battery Charger Chassis RC-1187A: Models 1-BT-3 Series; BC-3; BCS-4 **460**

Transistor Radio 1-T-4 Series **556**

Hi-Fi

Tape Recorder; Ampl. Chassis RS-156F, Tape Transport TR-2-2, TR-2-1, Models 7-TR-2, 7-TR-3 **345**

Hi-Fi Record Player Chassis RS-158: Model 7-HF5 **290**
 Hi-Fi Chassis: RS-164B Models HFP, HFR, HFA, STD-2, STD-3 **410**

Reverberation Amplifier Chassis RS-194A **615**

Hi-Fi AM/FM Radio Chassis RC-1168A: Model 8-RF-13 **351**

Stereo Hi-Fi Console: Models PM-17, PM-18 **559**

Stereo Hi-Fi Combination Amplifier Chassis RS-171: Models SHC-8, SHP-8; AM-FM Tuner Chassis RC-1155AX: Model 9-T-2 **433**

Appliances

Air Conditioners & Electronic Filters: Models C-7100-2; C-8150-2; CH-775-2; CH7100-3; CP-8100-2; D-8100-3 **504**

RCA (Canada)

Chassis CT2128(U), CT2132(U), CT2133(U), CT2410(U), CT2411(U): Models 21T194(U), 21T203(U), 21T204(U), 21T205(U), 21T206(U), 21T207(U), 21T209(U), 21T210(U) **417**
 Chassis CT2138: Models 21T351, 21T3290, 292 **492**

REGENCY

UHF Converter Model RC-600 **73**

SCOTT

Hi-Fi 40-watt Stereo Amplifier: Type 299 **476**

SENTINEL

Chassis 118: Models 454, 1U-454, 455, 1U-455, 456, 1U-456, 457, 1U-457 **18**

Models: 1U-532, 1U-552, 1U-554 **85**
 Models: 1U-581, 1U-582, 1U-584, 1U-585 **108**
 Models: 1U-901, 1U-911, 1U-914, 1U-921, 1U-924, 1U-991 **159**

Models 1U-1101, 1U-1111, 1U-1121, 1U-1124, 1U-1126, 1U-1127, 1U-1131, 1U-1134, 1U-1136, 1U-1137, 1U-1145, 1U-1147, 1U-1155, 1U-1157, 21101, 21121, 21145 **227**

Models 1U-1202, -1205, -1208, -1212, -1215, -1218 **272**

SETCHELL CARLSON

TV Chassis 361A Models 19T61, 19C61, TL61 & 61C **629**

Chassis C100: Portable, Unitized. Model P61 **218**

SHERATON

Chassis 250XL: Models T1750, T2150, T1755, T2120, T2155, C2125 **81**

Circuit Digest
Schematic No.

SHERWOOD

FM Stereo Tuner Model S-3000 III **612**

SONY, Japan

Transistor Radio TR63 **488**

Transistor Radio Model TR-610 **529**

SPARTON

Chassis 15V215 **220**

Chassis type 23U214: Models 14A204 (Cornell), 12A204 and 12A210 (Princeton), 11E-210 (Stanford) **138**

Chassis 25D213: Models 5342, 5343, 5382, 5383, 5384, 5386, 5390, 5391 **24**

Chassis 27D213: Models 5342A, 5343A, 5384A, 5386A, 5382A, 5383A, 10352, 10353 **40**

Chassis 29U213: Models 22312, 22313, 23322, 23323 **71**

SPARTON CANADA

Chassis 21G1 **386**

AM/FM Tuner and Amplifier Chassis CR 741 **356**

Kingston UHF Converter **105**

STANDARD COIL

Tuner Models TV-1532, TV-2232 **86**

Model "T" series **184**

The "Fireball" tuner **373**

STEWART WARNER

Chassis 9210: Models 9210-C, 21-T-9210A, 21C-9210C **34**

Models: 24C-9370A, 24C-9370AB **109**

Models 17T-9620A, 17T-9620B, 21C-9630C, 21C-9630CB, 21C-9630D, 21T-9630A, 21T-9630AB **164**

All Units are TV Receivers
Unless Otherwise Noted

STRIBEL

Auto Radio **622**

STROMBERG CARLSON

Chassis 21T-22T series: Models 21TQ, 21TM, 21TB, 21TW, 21TF **165**

Chassis 421 series: Models 421 TX, 421 CM, 421 CDM **19**

521 series: Models 521T, 521TO, 521CM, 521CDM, 521CSM, 521C50, 521C5Dec **66**

Chassis 621A series **110**

SYLVANIA

Chassis 1-504-1, 1-504-2: Models 105B, 105BU, 105M, 105MU. Chassis 1-510-1, 1-510-2: Models 120B, 120BU, 120M, 120MU, 126B, 126BU, 126L, 126LU, 126M, 126MU **35**

Chassis 1-508-1, 1-508-2: Models 172K, KU, M & MU; 175B, BU, L, LU, M & MU; 176B, BU, L, LU, M & MU; 177B, BU, M & MU; 178B, BU, M & MU **12**

Chassis 1-509-1, 1-509-2: Models 187B, BU, M, MU **41**

Chassis 1-514-1, -3, -4: Models All 105-14, 300 series **132**

Chassis 1-520-1, -3, -4, -7, -8: Models All 120-20, series **132**

Chassis 1-518-1, -2, -3: Models 175-18, 372, 373, 375, 376, 377 **97**

Chassis 1-526-1, -2, -3, -4, -5, -6: Models 612, 614, 622 series **191**

Chassis 1-533-1, -2: Models 21T201, 21T301, 21C501, 21C502, 21C601, 21D802, 24T301, 24C-601 series **230**

Chassis 1-537-1-3-4: Models 17P101, 17P102, 17P201 **364**

TV Chassis 1-537-5, -6 Models 17P Series **611**

Circuit Digest
Schematic No.

Chassis 1-539-1, -2; 1-540-1, -2, -3, -4: Models 21C407, 21C408, 21C409, 21C512, 21C513, 21P101, 21T113, 21T114, 21T115, 21T213 **432**

Chassis 1-541-3-4-5-6: Models 21C529, 21C534, 21C626 series **445**

TV Chassis 1-541-7, -8, -9, -0: Models 23S23, 23S24 **527**

Chassis 1-543-1-2: Models 17D203, 17D303 series **473**

TV Chassis 546-1, 2 Models 19P10, 19P11 **604**

Radio

Transistor Radio Chassis 1-616-1: Model 3102 **366**

UHF Converter Models C31M, C32M, C33M **87**

TANDBERG

Tape Recorder, 4-Track Model S **583**

TRAV-LER

Chassis 46A3, 46A4, 46B3: Models 317-44, 317-44A, 317-47, 321-R45, 321-46, 321-48, 321-54, 321-55, 321-480, 3210-60, 3210-61 **137**

Chassis 86A2: Models 217-32, 217-38, 220-35, 221-36 **27**

Chassis 412E4, 412E5: Models 517-82, 521-74, 521-79, 521-80, 521-81, 5210-60, 5210-61. Chassis 412G5: Models 521-R90, 521-R91. Chassis 412F4, 412F5: Models 524-84, 524-85, 524-86 **214**

Chassis 417E4, 417E5, 417G5, 417F4, 417F5 **192**

Chassis 510A4, 511A4 **160**

Chassis 510A4, 511A4, 513A4, 513A5, 514A4, 514A5: Models 317-56, 317-67, 321-75, 321-76, 321-77, 521-56, 517-67, 521-75, 521-76, 521-77, 521-78 **253**

Chassis 627A6: Models 617-33, 617-34, 621-30, 621-31, 621-32, 621-R40 **295**

Chassis 1051-19 **471**

TV Chassis 1051-60 **598**

Chassis 1150-59 **568**

TRUETONE

Model 2D1344A **61**

Models 2D1530B, 2D1530B, 2D2530B **240**

Models 2D1634A, 2D1636A, 2D2634A **257**

Models 2D1824B, 2D1826B, UHF-2D1825B, 2D1827B **380**

TV Models 2DC1840B, 2DC1841B, 2DC1842B, 2DC1843B, 2DC1844B, 2DC1845B, 2DC2840B, 2DC2841B, 2DC2842B, 2DC2843B **408**

TV Chassis 2DC3030A **530**

Models 2DC3840B, 2DC3841B **484**

Chassis A2015 **380**

Chassis 21T2A: Model 2D1326A **98**

Chassis 21T58, 21T59, 21T558, 24T118: Models 2D1720B, 1721B, 1724B, 2726B, 2727B, 2728B **355**

Portable TV Models 2D3770C, 2D3775C **329**

Radio

Table Radio: Models D2684A, D2685A **297**

Radio

UNITED MOTORS SERVICE (Div. GMC)
 Auto Radio Model 7265885 (Cadillac) **215**

V-M

High Fidelity Tuner and Amplifier Model 568 **398**

V-M Record Changer

Model 1201 **513**

VOCALINE

Citizens Band Transceiver Model ED-27 **534**
 Intercom "Vocatron" Model CC-60 **579**

Circuit Digest
Schematic No.

WEBCOR

4-Speed Record Changer Model 151-152 **357**

Webcor Model 210 Tape Recorder **62**

High-Fidelity Imperial Tape Recorder: Models 2816, 2896 **376**

WELLS-GARDNER

Models: 321MS31-35A6-386-1, 2321MS31-35A6-388-1 **123**

Series Models 324A59C-A-576, 324A59-U-A-576, 2324A59C-A-560, 2324A59U-A-560, 321A59C-A-554, 321A59U-A-554, 2321A59C-A-556, 2321A-59U-A-556, 321A59C-A-504, 321A59U-A-504, 2321A56C-A-508, 2321A59U-A-508 **232**

TV Chassis Models WG4424, WG4324, S2, S2V, TV2-9491, 2DC3144 **628**

Western Auto—See Truetone

WESTINGHOUSE

Chassis V-2207-1: Model H-706T16. Chassis V-2220-1: Model H-708T20 **11**

Chassis V-2208-1: Model H-716T17 **63**

Chassis Assembly V-2233-4: Models H-746K21, H-747K21 **78**

Chassis V-2243-1: Models H-770T21, H-771T21, H-772K21, H-773K21, H-774K21, H-775K21, H-776T21 **99**

Chassis Assembly V-2250-1: Models H-815T24 and H-817K24 **115**

Chassis Assembly V-2263: Models H-830K21, H-831K21 **127**

Chassis V-2313: Models H-838K218, H-841T21, H-842T21, H-843K21, H-844K21, H-847K21, H-848K21, H-861T21, H-862T21, H-867T21, H-868T21, H-871T21, H-872T21. Chassis V-2323: Models H-841TU21, H-842TU21, H-843KU21, H-844KU21, H-847KU21, H-848KU21, H-861TU21, H-862TU21, H-867TU21, H-867TU21A, H-868TU21, H-868TU21A, H-871TU21, H-872TU21 **148**

Chassis V-2311, V-2321, V-2370, V-2380: Models 14T170, 14T171, 14T172, 14TU170, 14TU171, 14TU172 **315**

Chassis V-2315: Models H-882T21 (V), H-882T21 (S), H-883T21 (V), H-883T21 (S), H-884K21 (V), H-884K21 (S), H-885K21 (V), H-885K21 (S), H-886K21 (V), H-886K21 (S), H-887K21 (V), H-887K21 (S). Chassis V-2325: Models H-882TU21, H-883TU21, H-884KU21, H-885KU21, H-886KU21, H-887KU21 **183**

Chassis V-2341: Models H-924T21A, H-924T21C, H-927T21C, H-928T21C, H-929T21C, H-965K-21C, H-966K21C, H-974T21, H-975T21, H-976T-21. Chassis V-2351: Models H-924TU21C, H-927TU21C, H-928TU21C, H-929TU21C, H-965KU21C, H-966KU21C, H-974TU21, H-975TU21, H-976TU21. Chassis V-2340: Models H-916T17A, H-919T17A, H-920T17A, H-921T17A, H-978T17, H-979T17, H-980T17. Chassis V-2350: Models H-916TU17A, H-919TU17T, H-920TU17A, H-921TU17A, H-978TU17, H-979TU17, H-980TU17 **254**

Chassis V-2342: Models H-934T21, H-935T21, H-938K21, H-939K21, H-941K21, H-942K21. Chassis V-2352: Models H-934TU21, H-935TU-21, H-938KU21, H-939KU21, H-941KU21, H-942KU21. Chassis V-2343: Models H-950T24, H-951T24, H-954K24, H-955K24, H-956K24. Chassis V-2353: Models H-950TU24, H-951TU24, H-954KU24, H-955KU24, H-956KU24 **219**

Chassis V2344: Models H21T101, 104, 105, 106, 107, 108, H21K111, 112, 113, 114. Chassis V2354: Models H21TU101, 104, 105, 106, 107, 108, H21KU111, 112, 113, 114. Chassis 2345: Models H24T117, 118, 119, 120, 121, 122, H24K125, 126, 127, 128. Chassis V2355: Models H24TU117, 118, 119, 120, 121, 122, H24KU125, 126, 127, 128 **284**

Chassis V-2346, V-2347, V-2356, V-2357: Models 21T107A, 21T108A, 21K112A, 21T101B, 21T107B, 21T108B, 21K112B, 21K113B, 21K113A, 21K1-114A,

Circuit Digest Schematic No.

MOTOROLA
 Models TC-101, TC-101B UHF Converters **59**
 Chassis TS-292: Models 21C1, 21C1B, 21F2, 21F2B, 21F3, 21F3B, 21K4, 21K4A, 21K4B, 21K4W, 21K5, 21K5B, 21K6, 21K7. Chassis TS-324: Models 21T4A, 21T4EA, 21T5A, 21T5BA **9**

Chassis TS-418 Series: Models 17T20, Y17T20, 17T20B, Y17T20B, 17T20E, Y17T20E, 17T20M, Y17T20M. Chassis TS-518 Series: Models 21T16, Y21T16, 21T16B, Y21T16B, 21T16E, Y21T16E, 21T17, Y21T17, 21T17B, Y21T17B, 21K19, Y21K19, 21K19B, Y21K19B **147**
 Portable Chassis TS-423: Models 14P3, 4 & 5 Series **327**
 Chassis TS427, TS427Y: Models 17P3-1, Y17P3-1, 17P3-2, Y17P3-2, 17P3-3, Y17P3-3 **390**

Transistorized Chassis TS-432: Model 19P1 "Astronaut" **588**

TV Chassis TS-433: Models 17P6 Series **553**

TV Chassis TS434: Model 14P14 **497 503**

TV Chassis TS-STS & WTS-435 **614**

Chassis TS-518: WTS-518 Series: Models 21T15, Y21T15 **147**

Chassis TS-525: Models 21C3A, Y21C3A, 21C3BA, Y21C3BA, 21K22A, Y21K22A, 21K24A, Y21K24A, 21K27, Y21K27, 21K27B, Y21K27B, 21K28, Y21K28, 21K28B, Y21K28B, 21T19A, Y21T19A, 21T19BA, Y21T19BA **181**

Chassis TS-533, TS-533Y: Models 21C4, Y21C4, 21C4B, Y21C4B, 21K41, Y21K41, 21K41B, Y21K41B, Y21K42, 21K42B, Y21K42B, 21K43, Y21K43, 21K43B, Y21K43B, 21K44B, Y21K44B, 21K44W, Y21K44W, 21K45, Y21K45, 24K10, Y24K10, 24K10B, Y24K10B, 24K11, Y24K11, 24K11B, Y24K11B, 24T4, Y24T4, 24T4B, Y24T4B **229**

Chassis TS-534, TS-534Y: Models 21K48M, Y21K48M, 21K48B, Y21K48B **258**

Chassis TS-537: Models 21T32BA, 21T32CA, 21T32MA, 21T32BA, 21T34MA, 21K53BA, 21K53MA, 21K55BA, 21K55MA **299**

Chassis TS-539, 539Y series (TTS, TS, WTS, VTS, prefix): Models 21C5, 21F6, 21K54, 56-63, 21T33, 35, 36; 24K14, 15; 24T6 (A, YA prefix) **320**
 Chassis TS-542: Models 21K70B, Y21K70B, 21K70M, Y21K70M, 21T37B, Y21T37B, 21T37M, Y21T37M **353**

Chassis PTS546, Y: Models 21PIB, BR, GY; Y21PIB, BR, GY **444**
 Chassis TS-552: Models 21K104B, M, W; 21K105B, MC, W; 21K108W, 21K109M, 21K110W **456**

TV Chassis TS-556: Models 21T64B, Y21T64B, 21T64M, Y21T64M **515**

Chassis TS & WTS 564: Model 23K1, 23K2, 23K3 **569**

Hi-Fi

Portable Hi-Fi phonograph Chassis HS-543: Models 57HFP1, 57HFP2 **306**

High Fidelity Preamp and Amplifier Chassis HS-607 & HS590: Models 15KT25B-1, 15KT25B-1S, 15KT25M-1, 15KT25M-1S, 15KT25MC-1, 15KT25MC-1S **399**

Hi-Fi Chassis HS696, HS706, HS709, HS719: Models SK11B, M; SK12B, M; S12B, M; SK13B, M, MC; SK14B, CW, M, W; S14B, CW, M, W **461**

Stereo Phonograph Chassis HS704: Models SH12E, SH12N, SH12S **469**

Circuit Digest Schematic No.

Radio
 Auto Radio: Models 5M, 5M-12 **201**

Auto radio Model 79MS, Ford FEJ-18806-C **312**

Auto Radio Transistor Powered: Model 406 **480**

Auto Radio, transistorized, Model 04MA **542**

(Auto Radio) Model 556 **266**

Auto Radio Mopar Models 610T **72**

Transistor Auto Radio: Model GY-800 **430**

Auto Radio Model FM-900 **590**

Auto Radio Model Mopar 923 **382**
 (Portable Radio) Chassis HS-454: Models 55J1, 55J2 **225**

Portable Radio, Chassis HS-562: Models 6P34E, 6P34S **361**

Table AM Radio Chassis HS-422: Models 55A1, 55A2, 55A3 **197**

(Transistor Portable Radio) Chassis HS-483: Model 56T1 **270**

Transistor Radio Chassis HS-563, HS-564: Models 6X31C, N, R; 6X32E **344**

Transistor Radio Chassis HS-678: Models 7X25P, 7X25W **483**

Home AM-Clock Radio Chassis HS-753: Models CSG, C5S, C5W **526**

Transistor Radio Chassis HS-797: Model X16 **581**

MUNTZ

Chassis 17B1 or 17B2: Models 2053-A, 2054-A, 2055-A, 2056-A. Chassis 17B2: Model 2055-B. Chassis 17B3 or 17B4: Models 2457-A, 2461-A. Chassis 17B5 or 17B6: Models 2158-A, 2159-A, 2162-A **39**

Chassis T37LOS, T37LO4U, T37POS, T37PO4U, T37SO5, T37SO4U **571**

All Units are TV Receivers Unless Otherwise Noted

OLYMPIC

Chassis AA: Models 17CA20, 17TA19, 17TA32, 17TA33. Chassis AB: Models 21CB35, 21CB41, 21DB71, 21KB24, 21KB26, 21KB36, 21KB76, 21TB34, 21TB40, 22DB series. Chassis AC: Models 21CC55, 21CC70, 21DC71, 21KC44, 21KC46, 21KC56, 21TC54, 22DC series. Chassis AJ: Model 24CJ68. Chassis AK: Models 24CJ-68BK, 24CJ68MK, 24CK77 **213**

Chassis 14"-AD, 17"-AE: Models 14TD30, 14TD31, 17TE37, 17TE38 **171**

BD Chassis: Models C2BD35, K21BD34, T21-BD19 BF Chassis: Models C21BF21, T21BF20 **252**

Chassis CA: Models 1CA20, 1KA40, 1TA10. Chassis CB: Models 1CB21, 1DB17, 1TB11. Chassis CE: Model 4CE15 **282**

Chassis CT, CU, SW, SX **318**

Chassis DD, DDU, DH, DHU: Models 1TD62, 1CD73, 1CD74, 1KD81, 1KD82, 1KD83, 1TD62U, 1CD73U, 1CD74U, 1KD81U, 1KD82U, 1KD83U, 4KH85, 4KH86, 4KH85U, 4KH86U **340**

Chassis GD, GDU, GH, GHU: Models CD10B, -U, CD109, -U, CD110, -U, CH402, -U, KD118, -U, KD119, -U, KD120, -U, KD188, -U, KH406, -U, KH407, -U, PKD118, -U, PKD119, -U, TD102, -U **431**

Chassis GT, GU, (VHF), GTU, GUU (VHF/UHF) **367**

Chassis HA, HB, HD, HE, HH: Models CA135, CB136, CB137, CB140, CF410, CF411, KA145, KB146, KD148, KD149, KH416, KH417, TA130, TA131 **477**

Chassis KU, KUU **573**

Circuit Digest Schematic No.

Chassis TK: Models 17T40, 17T48, 17C44, 17K41, 17K42, 17K50. Chassis TL: Models 20T46, 20T47, 20C45, 20C52, 20C53, 20D49, 20K43, 20K51 **30**

Chassis TMTN: Models 17T56, 17C57, 17K55, 21T58, 21T69, 21T70, 21T74, 21C65, 21C68, 21C72, 21C73, 21D60, 21D64, 21K61, 21K62, 21K63 **68**

PACIFIC MERCURY

Chassis 201 Series **124**

PACKARD-BELL

Chassis 88S1: Models 21ST1, 24ST1, 21SC1 **239**

Chassis 88S2 **301**

TV Chassis 88-9 Models 19T3 & 23T3 **607**

Chassis 98D4: Models 21DC9, 10; 24DC5 **440**

Chassis 98D6: Model 21DC16, 23DC5, 23DC6 **578**

Chassis T-1: Models 21103, 21202, 21401 **177**

Chassis T-10: Models 17101, 17104, 21102, 21201, 21204, 21206, 21402 **203**

Chassis V8-1: Models 17VT1, 21VT1, 17VT1-U, 21VT1U **263**

TV Chassis V8-3: Models 17VT10, 21VT6, 21VCB **523**

Chassis 2720: Models 2721, 2722. Chassis 2710: Models 2723, 2724 **60**

Chassis 2740: Models 2742, 2743, 2744, 2842, 2843, 2844 **117**

Radio
 (Table Model Radio) Model 5R1 **286**
 Combination Radio AM/FM/Phono: Models 10RP2, 11RP2 **358**

TV-Radio-Phono Combination, Model 21K2 **548**

PACO

Stereo Preamp-amplifier, Model SA-40W **540**

PHILCO

Chassis 7H20, 7H20-U: Model E3034 **338**

Chassis 7L70, 7L71, 7L70U, 7L71-U **350**

Chassis 8L35, 8L35U **395**

Chassis 8L41, 8L41U, 8L42, 8L42U, 8L43, 8L43U, 8P51, 8P51A, 8P51U **387**

Chassis 8L71, 8L71U, 8L72, 8L72U, 8L73, 8L73U **379**

Chassis 9H25: 9H25U **465**

Chassis 9L38, 9L38U **472**

Chassis 9L60 **449**

TV Portable a-c/battery Chassis 10AT10: Model Safari **519**

TV Chassis 10H25, 10H25U, 10H25R **532**

TV Chassis 10L41 & U, 10L42 & U, 10L43 & U **555**

TV Chassis 10L60, 10L60U, 10L60R, 10L60UR **520**

Chassis 10N41 **566**

TV Chassis 11H25 & 11J27 **613**

Chassis 11N51 **577**

Transistor Portable Radio Model T-66 **584**

R-F Chassis R-201, Deflection Chassis D-201: Models 4308, 4110, 4108, 3104, 4008 **89**

R-R Chassis 97, Deflection Chassis J-7: Model 2750 **47**

Chassis TV-300, TV-301: Models 22C41119, 4120, 4120L, 4123, 4310, 4310L, 4011, 4013, 4013S, 4013X, 4015, 4119X, 4124, 4124L, 4127, 4120X, 4123, 4124S, 4125H, 4125M, 4311H, 4311M **207**

Chassis 350: Models 22C4016, 22C4016L, 22C-4124, 22C4124L, 22C4126, 224312, 22C4412 **158**

AM-FM Radio Models J-996, J-997 **603**

Radio

Auto Radio Models P-5703, C5707 and C5709: Mopar Models 920HR, 921HR **342**

Auto Radio Model M-5841 **392**

Transistor Radio: Models T-4, T-4J **434**

Transistor Radio Trans-World Portable: Model T-9 **422**

Transistor Radio Model T-50 **502**

Transistor Radio T-75: Code 124 **491**

Hi-Fi

Hi-Fi Phonorama IV: Models F-1900, F-1907 **405**

All-Speed Record Changer: Model M-24 **29**

Stereo Console W/Reverberation Model J-1720R **626**

PHILHARMONIC

Models 54CM21, 54TW21 **172**

PILOT

Audio Amplifier & Preamp Model AA-903B **319**

Hi-Fi Audio Amplifier and Pre-amplifier, Model AA-920 **370**

HiFi AM-FM Tuner: Model FA-680 **506**

Stereophonic Hi-Fi, Stereo Preamp & Audio Control SP215 **424**

Stereo Preamp & Audio Control SP215 **448**

RADIART

(Antenna Rotor) Model TR-2 **278**

RADIO CRAFTSMEN

Chassis 17T1: Model M1733A, C1735A, C1736A. Chassis 17T2: Model M-1734A. Chassis 21T1. Model M-2107A, C-2108A, C-2110A, C-2111A. Chassis 21T2: Model C-2109A **16**

AM-FM Tuner C-800 **28**

RAYTHEON

Chassis 17T18 [Challenger series]: Models M-1750A, M-1750C, M-1750G, M-1750K, M-1751D, M-1751F, M-1752E, M-1752L **141**

Chassis 21T8: Models UM-2133, UM-2134, UM-2135, UM-2136, UM-2139, UM-2141, UM-2142, UM-2144, UM-2145 **94**

Chassis 21T11: Models M-2131A, C-2137A and C-2138A **114**

Chassis 21T19 [Challenger series]: Models M-2161D, M-2161F, M-2162E, M-2162L **141**

Chassis 21T20: Model C-2164 **141**

Chassis Aristocrat Series: Models 21T24AS, 21T25AS, 21T27AS **182**

Circuit Digest Schematic No.

Aristocrat Series Chassis 21T40: Models M-210-B, M-210-M, C-214-B, C-214-M. Chassis 21T41: Models UM-211-B, UM-211-M, UC-213-B, UC-213-M, UC-215-B, UC-215-M. Chassis 21T43: Model C-218. Chassis C21T44: Model UC-219. Chassis 21T45: Models C-216-B, C-216-M. Chassis 21T46: Models UC-217-B, UC-217-M **246**

Aristocrat Series Chassis 21T42: Models C-212B, C-212M, C220 **283**

Chassis 24T3: Models M-2401A, C-2402A **125**

Radio

(Transistor Portable Radio) Chassis 7RT4, Model T-2500 **268**

Transistorized Portable Radio Chassis 8RT1: Models 8TP1, 8TP2, 8TP3, 8TP4 **190**

UHF Tuner **54**

RCA VICTOR

Chassis CTC2: Model CT-100 (color) **131**

Chassis KCS88J: Models 21-S-503U (Arlan), 21-S-504U (Kent), 21-S-505U (Ellis), 21-S-506U (Rupert), 21-S-517U (Consolette), 21-S-519U (Radnor), 21-S-521U (Fellton), 21-S-522U (Benson), 21-S-525U (Wister), 21-S-5251U (Wister), 21-S-525U (Wister). Chassis KCS88K: Models 21-S-501U (Medalist), 21-S-502U (Lambert), 21-S-518U (Traffon), Chassis KCS88L: Model 21-S-537U (Bromley). Chassis KCS88M: Model 21-S-526U (Corral). Chassis KCS88VA: Model 21-S-523U (Pickford) **140**

Chassis CTC3: Model CT-100 (color) **131**

Chassis KCS98J: Models 21-S-503U (Arlan), 21-S-504U (Kent), 21-S-505U (Ellis), 21-S-506U (Rupert), 21-S-517U (Consolette), 21-S-519U (Radnor), 21-S-521U (Fellton), 21-S-522U (Benson), 21-S-525U (Wister), 21-S-5251U (Wister), 21-S-525U (Wister). Chassis KCS98K: Models 21-S-501U (Medalist), 21-S-502U (Lambert), 21-S-518U (Traffon), Chassis KCS98L: Model 21-S-537U (Bromley). Chassis KCS98M: Model 21-S-526U (Corral). Chassis KCS98VA: Model 21-S-523U (Pickford) **140**

Chassis KCS100B: Models 8-PT-7030, 8-PT-7031, 8-PT-7034 **279**

(Clock TV) Chassis KCS101, KCS101A: Models 21-T-639, 21-T-639U **256**

Chassis KCS102B, KCS102D: Models 14-S-7052(U), 14-S-7971(U), 14-S-7070(U), 14-S-7074(U) **309**

TV Chassis KCS108L: Models 21-VF-8695U, 21-VF-8696U, 21

Circuit Digest
Schematic No.

DUMONT
 Chassis RA-164: Model Clinton. Chassis RA-165: Models Beverly, Ridgewood, Shelbourne, Milford, Wakefield **3**
 Chassis RA-166/167, 170/171: Models 17T350, 21T327, 21T328, 21T329, 21T359, 21T366, 21T376, 21T377, 21T378 **51**
 Chassis RA-301, 302: Models RA-301-A1, RA-301-A2, RA-301-A3, RA-302-A1, RA-302-A2, RA-302-A3 **120**
 Chassis RA-306, 307: Models Summit RA-306A1 & RA-307A1, Warren RA-306A2 & RA-307A2, Hampton RA-306A3 & RA-307A3, Bristol RA-306A4 & RA-307A4, Newport RA-306A5 & RA-307A5, Rutland RA-306A6 & RA-307A6, Hartford RA-306A7 & RA-307A7, Sheffield RA-306A8 & RA-307A8, Westbrook RA-306A9 & RA-307A9, Windsor RA-306A10 & RA-307A10, Bradford RA-306A11 & RA-307A11, Warwick RA-306A12 & RA-307A12 **107**
 Chassis RA-312, 313: Models Barton, RA-312-A1, or RA-313-A1; Baylor, RA-312-A2 or RA-313-A2; Winsted, RA-312-A3 or RA-313-A3; Clifford, RA-312-A4 or RA-313-A4; Hamilton, RA-312-A5 or RA-313-A5; Dellwood, RA-312-A6 or RA-313-A6; Richfield, RA-312-A7 or RA-313-A7; Belvidere, RA-312-A8 or RA-313-A8; Bradley, RA-312-A9 or RA-313-A9 **139**
 Chassis RA-321, 322: Model The Glendale **170**
 Chassis RA-340/341, 342/343: Models Templar, RA-340-A1, RA-341-A1; Conover, RA-340-A3, RA-341-A3; Croft, RA-340-A4, RA-341-A4; Thorndyke, RA-342-A2, RA-343-A2; Culver, RA-342-A3, RA-343-A3; Darien, RA-342-A4, RA-343-A4; D'Orsay, RA-342-A5, RA-343-A5; Douglas, RA-342-A6, RA-343-A6 **247**
 Chassis RA-350, 351: Models Tabor, RA-350-A1, or RA-351-A1; Tolbot, RA-350-A2, or RA-351-A2; Toft, RA-350-A3, or RA-351-A3; Tarkington, RA-350-A4, or RA-351-A4; Cabot, RA-350-A5, or RA-351-A5; Carlisle, RA-350-A6, or RA-351-A6; Carol, RA-350-A7, or RA-351-A7 **228**
 Chassis RA-356, 357 **274**
 Chassis RA-370/371: Models Shelby, Wilshire, Windsor, Derbyshire, Stanford **302**
 Chassis RA380/381: Models Brewster, Berkeley, Bedford, Bryan, Bellmore **307**
 Chassis RA-392/393: Model Sportsman Portable TV **325**
 RA-400/401 Chassis: Models Chatham 21, Beverly 21, Revere 21, Essex 21, Palm Beach 21, Riviera 21, Biscayne 21, Versailles 21, Park Lane 21, Ridgewood 24, Sherwood 24, Flanders 24, Newport 24, Westminster 21, Beaumont 21 **369**
 Chassis RA-402/403 **393**
 Chassis RA406/407: Model Sportsman 17 **414**
 Chassis RA-500/501 **436**
 Chassis RA-502/503 **451**
 TV Chassis 120601-A: Model RA-601A **547**
 TV Chassis 120530-C, 531-D Models 600B-48, 600B-49 **606**

Hi-Fi
 [Hi-Fi AM-FM-Phono Console] Chassis RA-349 Tanglewood **251**
 Hi-Fi Radio, Phono, Amplifier Model RA-378/379 **328**

ELECTROHOME, Canada

Models Breton, Breton "A", Burnaby **585**
 TV Model "Selkirk" **617**
 Model Viscount, Viscount MK1, Viceroy, Viceroy MK1 **470**
 TV Chassis 17 Tube VHF Series Models: Viscount MK 11; Sheldon, Viceroy MK 11 **509**

Radio
 Hybrid Auto Radio: Models 51TR, 51ATR **429**

EMERSON

Chassis 120166-D: Models 721D, 728D **10**
 Chassis 120168-D: Models 716F, 717F, 719F, 727D, Chassis 120169-B: Models 711F, 712F, 720D, 732B, 734B **31**
 Chassis 120174-B: Models 752A, 755A, 784A; Chassis 120198-D: Models 753F, 785C, 785E **91**
 Chassis 120182-D: Models 741F, 757D, 758F, Chassis 120196-B: Model 781A, Chassis 120206-D: Models 792D, 781E, Chassis 120197-B: Models 784E, 784K, Chassis 120197-D: Model 784G, Chassis 120195-D: Models 785K, 759C, Chassis 120211-D: Model 784M **121**

Circuit Digest
Schematic No.

Chassis 120220-D: Models 1030D, 1032D, Chassis 120239-D: Models 1058D, 1060D, 1062D, 1064D **152**
 Chassis 120220-D: Models 1030D, 1032D, Chassis 120239-D: Models 1058D, 1060D, 1062D, 1064D, Chassis 120239-F: Models 1060F, 1062F, 1062H, Chassis 120251-D: Model 1104D, Chassis 120254-D: Models 1106D, 1106F **222**
 Chassis 120233-D: Models 1066D, 1070D, 1072D, Chassis 120235-D: Models 1000H, 1002H, 1004H, 1006H, 1008H, 1010H, 1018H, 1022H, 1028H, 1040H, 1042H, 1074D, 1084D, 1044D, 1046D, 1048D, 1054D, 1086D, 1088D, 1090D, 1092D, Chassis 120234-D: Models 1067D, 1071D, Chassis 120236-D: Models 1009J, 1011J, 1075D, 1047D, 1049D, Chassis 120238-F: Models 1041F, 1045F, 1047F **162**
 Chassis 120245-D: Model 1130D, Chassis 120255-D: Models 1106H, 1106J, Chassis 120255-F: Models 1106L, 1106N, Chassis 120256-D: Model 1104F, Chassis 120256-F: Model 1104J, Chassis 120259-D: Model 11140 **186**
 Chassis 120257-D: Models 1108D, 1110D, 1112D, 1116D, 1120D, 1126D, 1138D, 1140D, 1150D, 1152D, 1154D, 1162F, Chassis 120257-P: Models 1108F, 1126F, 1138F, 1140F, 1150F, 1152F, 1154F, 1162D, 1164D, Chassis 120258-D: Models 1109D, 1111D, 1113D, 1117D, 1121D, 1127D, 1139D, 1141D, 1151D, 1153D, 1155D, 1163D, 1165D, Chassis 120263-D: Models 1122D, 1124D, 1156F, Chassis 120263-P: Models 1112F, 1124F, 1156D, 1160D, Chassis 120265-D: Models 1123D, 1125D, 1157D, 1161D, Chassis 120277-D: Model 1144D, Chassis 120278-D: Model 1145D, Chassis 120282-P: Model 1158A **255**
 Chassis 120292-P, -V: Models 1176, 1178, 1180, Chassis 120299-V: Models 1186, 1188, Chassis 120293-T, -X: Models 1177, 1179, 1181, Chassis 120300-X: Models 1187, 1189 **280**
 Chassis 120292-P, 120292-V, 120299-V, 120293-T, 120293-X, 120300-X: Models 1176, 1178, 1180, 1186, 1188, 1177, 1179, 1181, 1187, 1189 **308**
 Chassis 120343E, 120344G, 120345E, V, 120346V: Models 2034S, 2038S, 2040S, 2042S, 2056, 2057, 2058, 2059, 2060, 2061, 2062, 2063 **341**
 Chassis 120351E: Models 1212, 1228, 1238, 1244, 1246, 1272, 1274, Chassis 120352-G: Models 1213, 1229, 1239, 1245, 1247, 1273, 1275 **360**
 Chassis 120380H, 120388H, 120381M, 120389M: Models VHF 1282, 1284, 1286; UHF-VHF 1283, 1285, 1287 **388**
 Chassis 120407S, 417S, 420S, 422S, 120408U, 418U, 421U, 423U: Models 1414, 1415, 1432, 1433, 1434, 1435, 1438, 1439, 1440, 1441 **413**
 Chassis 120424W, 425Y, 434W, N, 120435P, Y, 445W, 446Y: Models 1452, 1453, 1466, 1467, 1470, 1471 **438**
 TV Chassis 120488A, 489A, 496A, 497B, 498A, 499B **544**
 TV Chassis 120507A, 120508B, 120515C, 120516D, 120541C, 120542D **599**
 TV Chassis 120517E, 120518F, 120519C, 120520D, 120525E, 120526C **561**

Hi-Fi
 Hi-Fi Amplifier Chassis 120371B: Models 885B, 886B; and AM-FM Tuner **394**
 Hi-Fi Chassis 120455B: Model B96B **474**

Radio
 [Transistor Portable Radio] Model 842 **267**
 Portable Radio Chassis 120252-B: Model B308 **194**
 Table AM Radio Chassis 120266-B: Model 832B **233**
 [Transistor Pocket Radio] Chassis 120274: Model 838 **209**
 Portable Transistor Radio Chassis 120528 **624**
 Transistor Radio Chassis 12374: Models 888, 888R **428**
 Air Purifier Ionizer Model EP-40 **618**

ESPEY
 513-C AM-FM Tuner **70**

FADA
 The "Imperial" Series: Models 17T6, 17T9, 17C2, 17C4 **25**

Circuit Digest
Schematic No.

Deluxe 400 Series Chassis: Models DL400T, DL400TLO, DL400TB, DL400TBLO, DL400K, DL400KLO, DL400KD **243**
 Models U2100C, U2150C, U2100T, UDL2100T, UH21T **83**

FISHER
 Hi-Fi Model 400-C Master Audio Control **478**
 FM-AM Stereo Receiver Model 600 **535**

FLEETWOOD
 TV Chassis 1000 & 1010 Models 1001 & 1011 **632**

GENERAL ELECTRIC
 "Stratopower" Chassis "E": Models 17C125, 20C107, 21T1, 21C208, 21C204, 21C201, 21C-202, 21C214, 21C206 **4**
 Chassis "EE": Models 21T7, 21T8, 21T20, 21T21, 21C225, 21C226, 21C227, 21C228, 21C229, 21C230, 21C231, 21C232, 21C233 **113**
 Chassis "F": Models 17C127, 21T14, 21C115, 21C116, 21C117, 21C119, 21C120, 21C121, 17T15, 21T10, 21T12, 21T4 **84**
 Chassis "G" line: Models 17T20, 21T22, 21T23, 21T24, 21T25, 21C103 and 21C104 **135**
 Chassis "H" line: Models 21T26-72, 21C240-C241 **146**
 Chassis "J" line: Models 21T30, 21T31, 21C347, 21C348, 21C349, 21C350, 21C351 **347**
 Chassis "K" line: Models 17T14, 17T16, 21T17, 21T18, 21T28, 21C102, 21C238 **204**
 Chassis "M" series: Portable, Models 14T007, 14T008, 14T009, 14T010 **217**
 Chassis M3: Models 17S305, 17S306, 21S405, 21S505 and UHF **372**
 Chassis M4: Model 21T2425, 21T2426 & UHF **416**
 TV Chassis M5: Models 17T3310, 15, 16, 20, 21, 21T3430, 31 **501**
 Chassis M-6 **580**
 TV Chassis "LW" Models M202 through 205 **621**
 TV Chassis M554: Models CS-13B, CS-14B, CC-153, CC-154, CC-158, CC-174, CC-175 **563**
 TV Chassis M509: Models CS732MBV, CS732-M9V **554**
 TV Chassis M575 Models CS733, CS734, CS901, CS902 **609**
 Chassis "MM" line: Models 17S301, 17S302 **304**
 Portable TV Chassis "MM" series: Models 17-T025, 17T026 **321**
 Chassis "N" line: Models 21C106-C107-C108-C109, 21T32-T33-T36-T37 **180**
 Chassis "O" line: Models 21C40, 21C128, 21C-129, 21C130, 21C131, 21C151, 21C152, 21C156, 21C157, 21T029, 21T030 **244**
 Portable TV Chassis "Q" line: Models 14S201, 14S202, 14S203 & UHF **332**
 TV Chassis Q2: Models 14P1209, 14P1210, 14P1211, 14P1212 **401**
 Chassis Q3: Models 14S208, 14S209, & UHF **419**
 Chassis "S" line: Models 21T038, 39, 41, 42, 43, 45, 48, 21C110, 11, 12, 13, 23, 24, 25, 26, 27, 24T070, 71, 24C180, 181 **289**
 Chassis "ST" line: Models 21C133, -C134, -C135, -C136, -C141, -C142 **265**
 Chassis "ST" line: Models 21C133, 21C134, 21C135, 21C136, 21C140, 21C141, 21C142 **311**
 9-in. Portable TV Chassis "T" line: Models 9T001, 9T002 **294**
 Chassis "U" series: Models 21S401, 21S451, 21S452, 23S501, 21S502, 21S551, 21S552, 24S-801, 24S802 and UHF **324**
 Chassis "U2 and VHF": Models 21C1540, 21C1541, 21C1542, 21C1550, 21C1551 **359**
 Chassis U3: Model 21C2535, 21C2536, 21C2550, 21L2555, 21L2556, 21L2557, 21C2551, 21C2560, 21C2561 **459**
 TV Chassis U4: Models 21T3559, 21C3567, 21C-3570, 21C3571, 21C3573, 21C3575, 21C3576, 21C3580, 21C3581, 21C3585, 21C3586 **517**

Circuit Digest
Schematic No.

Radio
 AM-FM Radio Model C510A **596**
 Portable Radio Models 645, 646, 647, 648 **193**
 Transistorized Portable Radio Model 675 **234**
 Transistor Radio Models CT110, CP775 **619**
 Transistor Radio: Models P725A, P726A **426**
 Transistor Radio Model P776A **499**
 Transistor Radio: Models P-805, P-806 **489**

Hi-Fi
 [Hi-Fi Amplifier] Model A1-300 **208**
 UHF Tuner, Model S-UHF-80 **104**
 UHF-TUNER Model UHF-103 **52**
 Transistorized Intercom Model W300A **601**

GENERAL ELECTRIC CANADA
 Chassis M546 **389**
 Transistor Radio P750A **443**

GLASER-STEERS
 Record Changer GS-77 **582**

GONSET
 Citizens Band transmitter-receiver Model G-12 **552**

GRANCO
 UHF Converter Model CTU **74**
 FM-AM-Phono: Model RP-1000 **457**
 Table FM Radio: Model 610 FM **196**

HALLICRAFTERS
 Chassis A1200D, K1200D or W1200D: Models 1010P, 1012P, Chassis D1200D, L1200D or X1200D: Models 1021P, 1026P, Chassis F1200D: Model 1013C, Chassis G1200D: Models 1022C, 1027C, Chassis P1200D: Model 1056C, Chassis T1200D: Models 1051P, 1055C, 1056C, 1060C, 1061C, Chassis P1200D: Model 1052P, Chassis R1200D: Models 1053P, 1054P, Chassis P1200D: Models 1057C, 1062C, 1063C, Chassis Z1200D: Model 1057U **21**
 Chassis A1300D: Model 1075 **38**
 Chassis A1400D: Models 21K201B, 21K211M, 21K221B, 21K231M **102**
 Chassis B1600D: Models 21T320W, 21T320M, 21T320B, 21K330B, 21K330M **153**
 Chassis 1900D series **212**
 Chassis A2000D, B2000D, C2000D, D2000D: Models 21TT500, M, B: 21K520, M, B: 21K540, M, B: 21TT501, M, B: 21K521, M, B: 21K541, M, B: 24TT510, M, B: 24KT550, M, B: 24TT-511, M, B: 24KT551, M, B **245**
 Chassis A2005: Models 17TT700M, 17TT700E, 17TT760T, 17TT710, Chassis B2005: Models 17TT701M, 17TT701E, 17TT761T, 17TT711, Chassis C2005: Models 21TT750M, 21KT850M, 21KT-850B, Chassis D2005: Models 21TT751M, 21KT851M, 21KT851B **281**

Radio
 Model TW-1000 World-Wide 8-Band Portable Radio **49**

HARMAN-KARDON
 Stereophonic Conversion 20-Watt Amplifier: Model AX20 **446**
 Hi-Fi Amplifier and Preamplifier, Model PC-200 **335**
 Stereophonic Amplifier: Model Tri-Plex, A224 **427**

HOFFMAN
 Chassis 213: Models 21M903, 21B904, 21P905 **32**
 Chassis 306-21: Models 21M1755, 21M175C2, 21B1765, 21B176C2, 21P1775, 21P177C2, 21M-133, 21B184, Chassis 308-21: Models 21M183P, 21M183P2, 21B184P, 21B184P2, 21M357P, 21M357P2, 21B358P, 21B358P2 **169**
 Chassis 306-21: Models 21M1755, 27B1765, 21P-1775, 21M183, 21B184, 21P185, 21P2055, 21M-357, 21B358, 21P359, Chassis 307-17: Models 7M181, 7B182, 7W181, Chassis 308-21: Models 21M183P, 21B184P, 21B185P, 21M357, 21B358P, 21P359P, Chassis 309-21: Models 21K186, 21M-187, 21B188, 21-189, 21W360, 21M360, 21B361, 21P362, Chassis 310-21: Models 21W190, 21M-190, 21B191, 21P192 **206**

Circuit Digest
Schematic No.

Mark X Chassis 316, 318, 319 **237**
 Chassis 321 (U); Models K1081 (U), B1081 (U), B1091 (U), M1091 (U), M1111 (U), B1111 (U), W1111 (U), M3061 (U), B3061 (U), W3061 (U), SP3061 (U), M3101 (U), B3101 (U), W3101 (U), P3101 (U), Chassis 322 (U); Models M1121 (U), W1121 (U), B1121 (U), P1121 (U), M3071 (U), W3071 (U), B3071 (U), P3071 (U), P3091 (U), M3114 (U), W3114 (U), B3114 (U), P3114 (U) **276**
 [Featherlite] Chassis 326: Models PT1144, PT114U, SG1144, SG1144U, 1144 series **288**
 Chassis 338: Model Series 1707 **435**
 Chassis 344, 344A: Model Series 1327, 1331, 3561, 3571 **487**
 TV Chassis 348, 350; Models 3653, 3663, 3673, 3683 **541**
 Chassis 356, 358: Model 3803, 3813, 3823, 3833, 3843, 3853 **591**
 Chassis 360: Model 1777 **570**
 Chassis 403-24: Models 24M725, 24B726, 24P727 **92**
 Chassis 406-21: Models 21M160, 21B161, 21M333, 21B334 **130**
 Chassis 407-21: Models 21M178, 21B179, 21P-180, 21M345, 21B346 **156**
 Mark 5 Chassis 420, 420U **336**
 Mark 5 Chassis 421, 421U **371**

Radio
 Transistor & Solaradio P410 & P411 **397**

Hi-Fi
 Hi-Fi Amplifier Chassis 1121 **455**
 Stereo AM-FM Receiver Chassis 1130: Models 8007 Series **518**

HOTPOINT (see General Electric)

JACKSON
 Chassis 317A, 320A, 321A, 324A: Models 277, 217, 221-T, 321-C, 217-T, 317-C, 221-C, 621 **64**

All Units are TV Receivers
 Unless Otherwise Noted

LAFAYETTE
 Stereo Amplifier Model KT-236 **610**

MAGNAVOX
 Chassis 21 Series **421**
 Chassis 23 Series **493**
 Chassis 24 series V/U 24-01AA, 24-02AA, 24-03AA, 24-04AA, 24-06AA **381**
 TV Chassis 25 Series **510**
 Chassis 28 Series: Models 1-MV/U121L; 1-MV/U160L **466**
 Chassis 29 Series **458**
 Chassis 30 Series **482**
 TV Chassis 32 Series **533**
 TV Chassis 35 Series **633**
 Chassis 73 series: Models V/U73-01AA, V/U73-02AA **314**
 TV Chassis 74 Series **500**
 Model J, K-105 Series: CT331, 332 333, 334, 335, 336, 337, 338, 339, 340, 341, 342, 343, 344, 345, 346, 347, 348, 349 **23**
 Series 106C: Models CT 381C, CU 381C & CMU 381C **129**
 107 Series: Chassis CT 358 **65**
 Chassis 108A series: Models CT, CU & CMU 401A; CT, CU & CMU 402A; CT, CU & CMU 403A; CT, CU & CMU 404A **112**
 Chassis 111/350 Series: Models CTA/CMUA 458CB, CTD/CMUD 447CB **352**
 Chassis 117 series: Models CTA/CMUA 487AA, 488AA, 489AA, 490AA, CTA/CMUA 491AA **292**
 Chassis 250 series: Models CTA-435AA, CMUA-435AA, CTA436AA, CMUA436AA **157**

Chassis 300 series: Models CTA, CUA & CMUA, 401B; CTA, CUA & CMUA 402B; CTA, CUA & CMUA 403B; CTA, CUA & CMUA 404B **136**

Chassis 350 Series: Models CTA/CMUA 458CB, CTD, CMUD/CMUD 447CB **381**
 Chassis 600 series: Models CTA440AA, CMUA-440AA, CTA441AA, CMUA441AA, CTA442AA, CMUA442AA **193**
 Chassis 650 Series: Models CTA465AA, CMUA-465AA, CTA466AA, CMUA466AA, CTA469AA, CMUA469AA, CTA473AA, CMUA473AA, CTA-474AA, CMUA474AA, CTA470AA, CMUA470AA, CTD471AA, CMUD471AA, CTE472AA, CMUE-472AA **231**
 UHF Converter Tuner Model 700359 **53**
 UHF Converter Tuner 595461 (700359 Revised) **80**

Hi-Fi
 Amplifier Chassis AMP-129, AMP-128 **337**
 Stereo Amplifier Chassis 182: Models 1SR295H (00-10-20 Versions) **516**

</

ELECTRONIC TECHNICIAN

Trademark

CIRCUIT DIGESTS

In This Issue (No. 105)

Circuit Digest Schematic No.

PHILCO 636
TV Chassis 11N56

WESTINGHOUSE 634
TV Chassis V-2411-1, V-2411-3

ZENITH 635
Transistor Portable Radio

Model Royal 150
Chassis 6GT42Z2

CIRCUIT DIGEST

Cumulative Index To Date
1952 to 1961



Complete Index of

ALL "CIRCUIT DIGESTS" TO DATE

Gold embossed binders for Circuit Digests available at \$2.95. Binders to hold magazines at \$3.75.

(For either Binder add 50¢ for Canada or Foreign.)

Circuit Digest Schematic No.

ADMIRAL

Personal Portable TV, Chassis 14YP38 287

Chassis 14YP3D: Model T170, T171, T172AL, T173AL, T1710 467

TV Chassis 15A2, 15B2, 15B3: Models P17F1, 2, 3; P17F12, 13, 22, 23 507

Chassis 15C1: Models P17E30, P17E31, P17E32, P17E33, P17E34, P17E35 485

TV Chassis 15D1B: Models PL17F31B, PL17F32B, PL17F33B, PL17F41B, PL17F42B, PL17F43B 539

Chassis 15G1: Model PL19J131, PL19J133, PL19J135, PL19J140, PL19J141, PL19J149 567

TV Chassis 15H1 with Stereo Chassis 3Y1 608

Chassis 16A81, 16A81C, 16AD1, 16AD1C, 16AG1, 16AG1C, 16AL1, 16AL1C 425

Chassis 16F1, 16AF1, 16H1, 16AH1: Models P&PA14D11, P&PA14D12, P&PA14D13, P&PA14D14, P&PA17D21, P&PA14D22, P&PA17D23, P&PA14D24 407

TV Chassis 16X1, 16AX1 522

Chassis 17L1, 17AL1: Models HF21F32, HFA21F32, HF21F33, HFA21F33, HF21F34, HFA21F34; Hi-Fi Amplifier 4S2A; AM-FM Tuner BH1A 396

Chassis 17XP3: Models T1801 (Pasadenal), T1802 (Palm Beach), T1806 (Palm Springs), T1807 (Pala Alto) 168

Chassis 17Z3D: Models T23A1, 2, 3; Chassis 17Z3DC: Chassis C23A26, 7; Chassis 17Z3DT: Models T23A6, 7, 11, 12, 13 322

TV Chassis 17Z3DBM, 17Z3DBN: Models T23A-18M, T23A18M-1 536

Chassis 18C6C, 18C6T: Model CS21G62, CS21G63, CS21G64, LS21G42, LS21G43, TS21G22, TS21G23 454

Chassis 18XP4BZ: Models T2301Z (Nassau), T2302Z (Bahamas), T2326Z (Jamaica), T2327Z (Martinique), T2336Z (Hawaii), T2337Z (Honolulu) 203

HOW TO FIND MONTH

in which any

CIRCUIT DIGEST APPEARED

Circuit Digest No. Circuit Digest No.

1-8, Sept. 1952	316-321, Jan. 1957
9-16, Oct. 1952	322-326, Feb. 1957
17-24, Nov. 1952	327-332, Mar. 1957
25-30, Dec. 1952	333-338, Apr. 1957
31-36, Jan. 1953	339-344, May 1957
37-43, Feb. 1953	345-350, June 1957
44-49, Mar. 1953	351-358, July 1957
50-58, Apr. 1953	359-364, Aug. 1957
59-64, May 1953	365-371, Sept. 1957
65-70, June 1953	372-376, Oct. 1957
71-76, July 1953	377-382, Nov. 1957
77-81, Aug. 1953	383-388, Dec. 1957
82-88, Sept. 1953	389-394, Jan. 1958
89-94, Oct. 1953	395-400, Feb. 1958
95-100, Nov. 1953	401-406, Mar. 1958
101-105, Dec. 1953	407-412, Apr. 1958
106-110, Jan. 1954	413-416, May 1958
111-115, Feb. 1954	417-422, June 1958
116-120, Mar. 1954	423-432, July 1958
121-125, Apr. 1954	433-438, Aug. 1958
126-130, May 1954	439-444, Sept. 1958
131-133, June 1954	445-451, Oct. 1958
134-138, July 1954	452-458, Nov. 1958
139-143, Aug. 1954	459-465, Dec. 1958
144-149, Sept. 1954	466-472, Jan. 1959
150-155, Oct. 1954	473-480, Feb. 1959
156-161, Nov. 1954	481-486, Mar. 1959
162-167, Dec. 1954	487-495, Apr. 1959
168-173, Jan. 1955	496-500, May 1959
174-178, Feb. 1955	501-507, June 1959
179-184, Mar. 1955	508-513, July 1959
185-190, Apr. 1955	514-519, Aug. 1959
191-198, May 1955	520-524, Sept. 1959
199-204, June 1955	525-531, Oct. 1959
205-210, July 1955	532-536, Nov. 1959
211-216, Aug. 1955	537-542, Dec. 1959
217-222, Sept. 1955	543-548, Jan. 1960
223-228, Oct. 1955	549-553, Feb. 1960
229-235, Nov. 1955	554-558, Mar. 1960
236-241, Dec. 1955	559-563, Apr. 1960
242-247, Jan. 1956	564-566, May 1960
248-255, Feb. 1956	567-571, June 1960
256-261, Mar. 1956	572-576, July 1960
262-268, Apr. 1956	577-582, Aug. 1960
269-274, May 1956	583-588, Sept. 1960
275-280, June 1956	589-594, Oct. 1960
281-286, July 1956	595-599, Nov. 1960
287-292, Aug. 1956	600-606, Dec. 1960
293-299, Sept. 1956	607-613, Jan. 1961
300-304, Oct. 1956	614-620, Feb. 1961
305-309, Nov. 1956	621-627, Mar. 1961
310-315, Dec. 1956	628-633, Apr. 1961

Circuit Digest Schematic No.

Chassis 22A3, 22A3Z: Models 122DX12, 222DX-15B, 222DX16B, 222DX17B, 222UDX15, 222UDX16, 222UDX17, 222DX27B, 322DX16A, 322UDX16 101

COLOR Chassis 29Z1, 29Z1B, 29SZ1, 29SZ1B2: Models C322C2, CS322C2, C322C3, CS322C3, C322C16, CS322C16, C322C17, CS322C17, C322C26, CS322C26, C322C27, CS322C27, LC322C36, LCS322C36, LC322C37, LCS322C37, LC322C39, LCS322C39 316

Radio

Portable Radio Chassis 4E2, 4H2: Models 4E21, 4F22, 4F24, 4F26, 4F28, 4H24, 4H26, 4H28 305

Portable Radio Chassis 5K3: Models 5K31, 5K32, 5K34, 5K3B, 5K39 188

(Clock Radio) Chassis 5W3: Models 5W32, 5B42, 5W33, 5B43, 5W34, 5W38, 5B48, 5W39, 248

Transistor Radio Chassis 6S2: Models 221, 227, 228 403

Transistor Radio Chassis BT1: Models 711, 717 512

Chassis 4R2: Model 17J1 Son-r Tuner RT440A and Remote Control Amplifier BG1 378

Hi-Fi

(Hi-Fi Phonograph) Chassis 5N3: Models 5M36D, 5M37D, 5M56D, 5M57D 269

Stereo Portable Phonograph Chassis 3N1: Models 761, 767 531

AIRLINE

See Montgomery Ward

ANDREA

Chassis VM21: Models T-VM21, G-VM21, 2CVM-21, CO-VM21 44

Chassis VO21: Models T-VO21 (Montauk), MC-VO21 (Capri), C-VO21 (Hampton) 202

Chassis VP21: Models T-VP21 (Hollywood), C-VP21 (New Hampton), MC-VP21 (Catalina), LB-VP21 (Monte Carlo), CO-VP21 (Newport) 262

Chassis VQ 21 series 362

TV Chassis VR 121 Series 505

Chassis VRT-123 Series 587

TV Chassis VS-323 Series 558

TV Chassis VT 119 Series 630

Hi-Fi

Hi-Fi Phono and Amplifier Chassis PBW, Model TP-8W 346

ARVIN

Chassis 337-341: Models 7210, 7212, 7214, 7216, 7218, 7219 45

Chassis "D": 379-UHF, "D" 382-VHF: Models 21-550, 551, 552, 553 150

Chassis "E": 383-VHF: Models 21-544, 555, 557 174

Chassis TE331: Models 6175TM, 6179TM 13

Chassis TE 359: 9200 series 100

Chassis TE 373-UHF: Model 9245 128

TV Dual Tuner, used in Chassis TE 330, 332, 340, 341 75

ATR

Chassis 2600: Models 26001, 2, 3, 4, 5, 323

AUTOMATIC RADIO

Auto Radio 1959, 1960 Chevrolet 631

BENDIX

Chassis T14: Models 21K3, 21KD, 21T3, 21X3, OAK3 20

Chassis T14-3: Models FM27C, HB27C. Chassis T14-10: Models TM24DS, TB24DS, Chassis T14-11: Models TM24DU, TB24DU 116

Chassis T14-15, T14-16 144

Chassis T17: Models K521C, TS21C. Chassis T17-1: Model TS17C 50

Chassis T19: Models T2100E (Vanguard), T2100M (Valiant), T2101M (Vigilant) 271

Circuit Digest Schematic No.

BLONDER-TONGUE

AM-FM Tuner Model T-88 494

BOGEN

Hi-Fi FM/AM Receiver Model RB115 415

Hi-Fi Amplifier: Model DB130 368

High Fidelity AM-FM Tuner, Model R660 317

CAPEHART

Chassis CX-36, RF-IF chassis coded R-3, Deflection chassis coded D-4: Models 1T172M, 2C172M, 3C212M, 32212B, 4H212M, 8, 5F212M, 6F212M, 8, 7F212M, 8F212B, 9F212M, 12F212M, 10W212M, 11W212M 17

Chassis CX-37: Models 1T172MA, 1T172BA, 3C212MA, 3C212MG, 3C212BA, 4H212MA, 4H212BA, 5F212MA, 6F212B, 7F212MA, 8F212BA, 9F212MA, 11W212MA, 1C213M, 2F213F, 3C213M, 4T213M, 4T213B, 5H213B, 8F213B 37

Chassis CX-37 and CX-37-1, 1955 series 151

Chassis "CX-38" series 179

Chassis CX-38S Series: Models 3T216-MD-4 (MD-5, BD-4, BD-5), 6T216MD-4 (MD-5, BD-4, BD-5), 11C216MD-4 (MD-5, BD-4, BD-5) 16C-216MD-4 (MD-5, BD-4, BD-5, FD-4, FD-5) 242

Hi-Fi

Hi-Fi Table Phonograph Chassis CA-239: Models 46TP56M, 46TP56B 235

CAPITOL

Stereo Phonograph Models 930, 933 550

CHANNEL MASTER

Transistor Portable Radio Model 6506 545

CBS COLUMBIA

Models 205C1, 205C2 (Color Receiver) 167

Chassis 750-3: Models 17MO6, 22CO6, 22C38 95

Chassis 817: Model 17T18, 17M18, 17C18. Chassis 820: Models 20T18, 20M18, 20M28 14

Chassis 921-11: Models U22C05, U22C07, U22C07B, U22T09, U22T09B, U22T09EB, Chassis 921-13: Models U22T19, U22T19B. Chassis 921-14: Models 22C09, 22C09B, 22T19B 145

Chassis 921-93: Models U23T19, U23T19B, U23C39, U23C39B, U23C49L. Chassis 921-94: Models 23T19, 23T19B, 23C39, 23C39B, 23C49S, 23C49SB; 23C49L, 23C49LB, 23C59, 23C59B 211

Chassis 1027: Models 27C11, 27C21 77

Chassis 1603: Models 23T500S, 23T5006, 23T5007, 23T5008, 23C5013, 23C5014. Chassis 1605: Models 22TK301, 22TK321, 22CK009, 22CK010. Chassis 1607: Models 23TK001, 23TK002, 23TK003, 23TK004, 23CK011, 23CK012 198

Chassis 1610: Models U3T602, U3T615, U3T616, U3T621, U3T622, U3T623, U3T624, U3C627, U3C628, U3C631, U3C632, U3C633, U3C634, U3C635, U3C636. Chassis 161: Models 3T602, 3T615, 3T616, 3T621, 3T622, 3T623, 3T624, 3C627, 3C628, 3C631, 3C632, 3C633, 3C634, 3C635, 3C636 241

Chassis 3001: Models 7T307, 7T309, 7T310, 7K325, 7K326. Chassis 3002: Models 7T307U, 7T309U, 7T310U, 7K325U, 7K326U, 7K329U, 7K330U, 7K332U. Chassis 3003: Models 7TR11, 7TR312, 7KR329, 7KR330, 7KR332, Chassis 3012: Models 7KR333U, 7K334U, Chassis 3013: Models 7KR333, 7KR334. Chassis 3015: Models 7KR335, 7KR336 261

Chassis 1610: Models U3T602, U3T615, U3T616, U3T621, U3T622, U3T623, U3T624, U3C627, U3C628, U3C631, U3C632, U3C633, U3C634, U3C635, U3C636. Chassis 161: Models 3T602, 3T615, 3T616, 3T621, 3T622, 3T623, 3T624, 3C627, 3C628, 3C631, 3C632, 3C633, 3C634, 3C635, 3C636 241

Chassis 3001: Models 7T307, 7T309, 7T310, 7K325, 7K326. Chassis 3002: Models 7T307U, 7T309U, 7T310U, 7K325U, 7K326U, 7K329U, 7K330U, 7K332U. Chassis 3003: Models 7TR11, 7TR312, 7KR329, 7KR330, 7KR332, Chassis 3012: Models 7KR333U, 7K334U, Chassis 3013: Models 7KR333, 7KR334. Chassis 3015: Models 7KR335, 7KR336 261

Chassis 1610: Models U3T602, U3T615, U3T616, U3T621, U3T622, U3T623, U3T624, U3C627, U3C628, U3C631, U3C632, U3C633, U3C634, U3C635, U3C636. Chassis 161: Models 3T602, 3T615, 3T616, 3T621, 3T622, 3T623, 3T624, 3C627, 3C628, 3C631, 3C632, 3C633, 3C634, 3C635, 3C636 241

Chassis 3001: Models 7T307, 7T309, 7T310, 7K325, 7K326. Chassis 3002: Models 7T307U, 7T309U, 7T310U, 7K325U, 7K326U, 7K329U, 7K330U, 7K332U. Chassis 3003: Models 7TR11, 7TR312, 7KR329, 7KR330, 7KR332, Chassis 3012: Models 7KR333U, 7K334U, Chassis 3013: Models 7KR333, 7KR334. Chassis 3015: Models 7KR335, 7KR336 261

[Clock Radio] Chassis 636: Models C230, C231, C232. Chassis 656: Model C220 Chassis 616: Model C240 285

COLOR CONVERTER

Col-R-Tel color TV converter 264

COLUMBIA RECORDS

360 Phono Amplifier 43

CONTINENTAL

Transistor Portable Radio, Models TR-182, TR-300 538

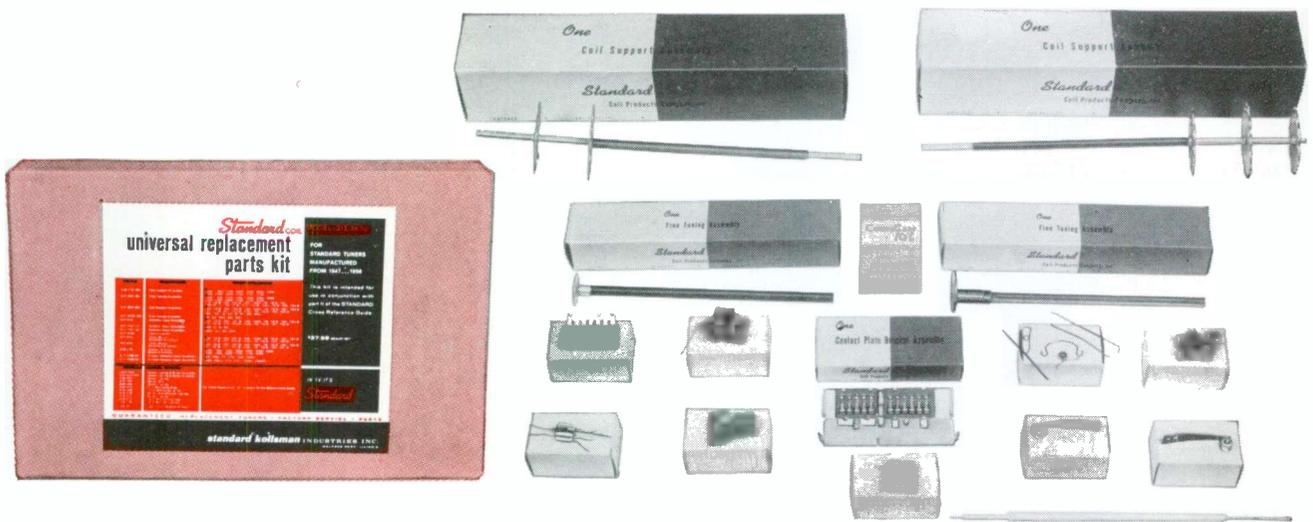
CRAFTSMEN

Model "Solitaire": 20-watt Amplifier-Preamplifier 200

Universal Replacement Parts Kit

MODEL 31T 3890

Popular Standard Coil field replacement parts used extensively by servicemen for STANDARD tuners manufactured from 1947-1956.



MODEL 31T 3890

A kit of mechanical and electrical parts for shop and field use to be used in conjunction with Section II of the STANDARD Cross Reference Guide. These parts make up 90% of the replacement parts most commonly used in field service.

INCLUDED

FREE

- Special IF alignment tool for late model STANDARD TV and FM tuners.
- Popular special springs, detent springs and roller assembly, detent ball assemblies, etc.

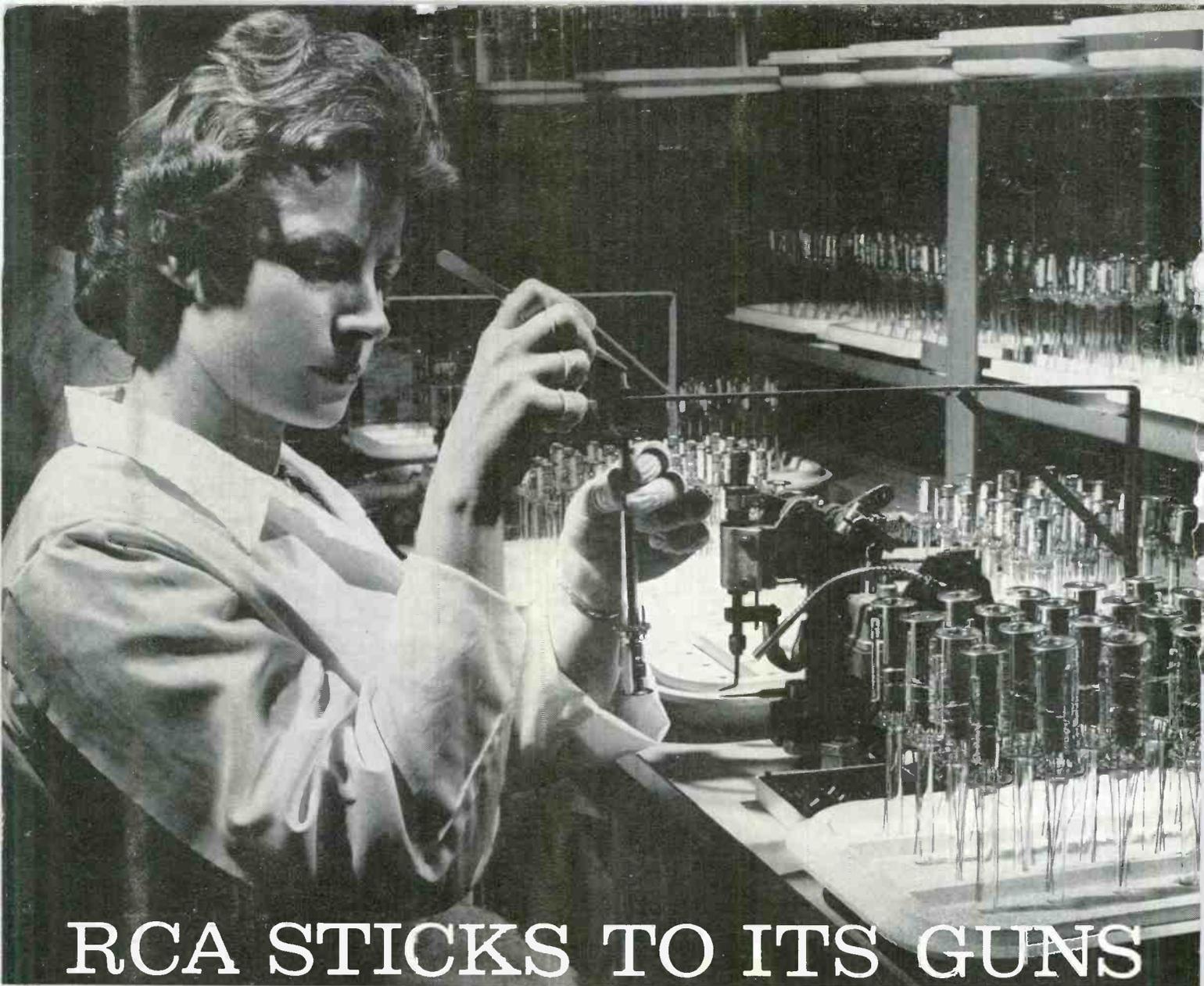
BE PREPARED... GET YOURS TODAY from any authorized

Standard COIL distributor

\$27.99 DEALER NET

standard kollsman INDUSTRIES INC.

FORMERLY STANDARD COIL PRODUCTS CO., INC., MELROSE PARK, ILLINOIS



RCA STICKS TO ITS GUNS

The life of RCA Picture Tubes depends on it

The electron gun, heart of every TV picture tube, is a precision instrument. A speck of dust in the wrong place can mean the difference between poor and outstanding performance in a picture tube.

RCA assures outstanding performance in Silverama Picture Tubes by assembling every electron gun in the super-clean, dust-free atmosphere of the "White Room" at RCA's modern plant in Marion, Indiana.

Measured in terms of your business—this extra precaution helps to substantially reduce troublesome "in-warranty failures" and costly call-backs. Sell the finest name brand picture tube—RCA Silverama.

Silverama contains all-new electron gun, all-new parts and materials except for the envelope which is used. See your Authorized RCA Distributor today.



Workers wearing lint-free smocks, must enter "White Room" through an airlock. Room is kept under constant pressure to force any air-borne dust out when a door is opened



Finished guns after ultrasonic cleaning in a super wetting agent are carried to the assembly line in these covered plastic cases—further protection against contamination.



Guns await final assembly in this pressurized plastic housing. Blower at top maintains pressure, prevents dust from entering housing.

RCA ELECTRON TUBE DIVISION, HARRISON, N. J.



The Most Trusted Name in Television
RADIO CORPORATION OF AMERICA