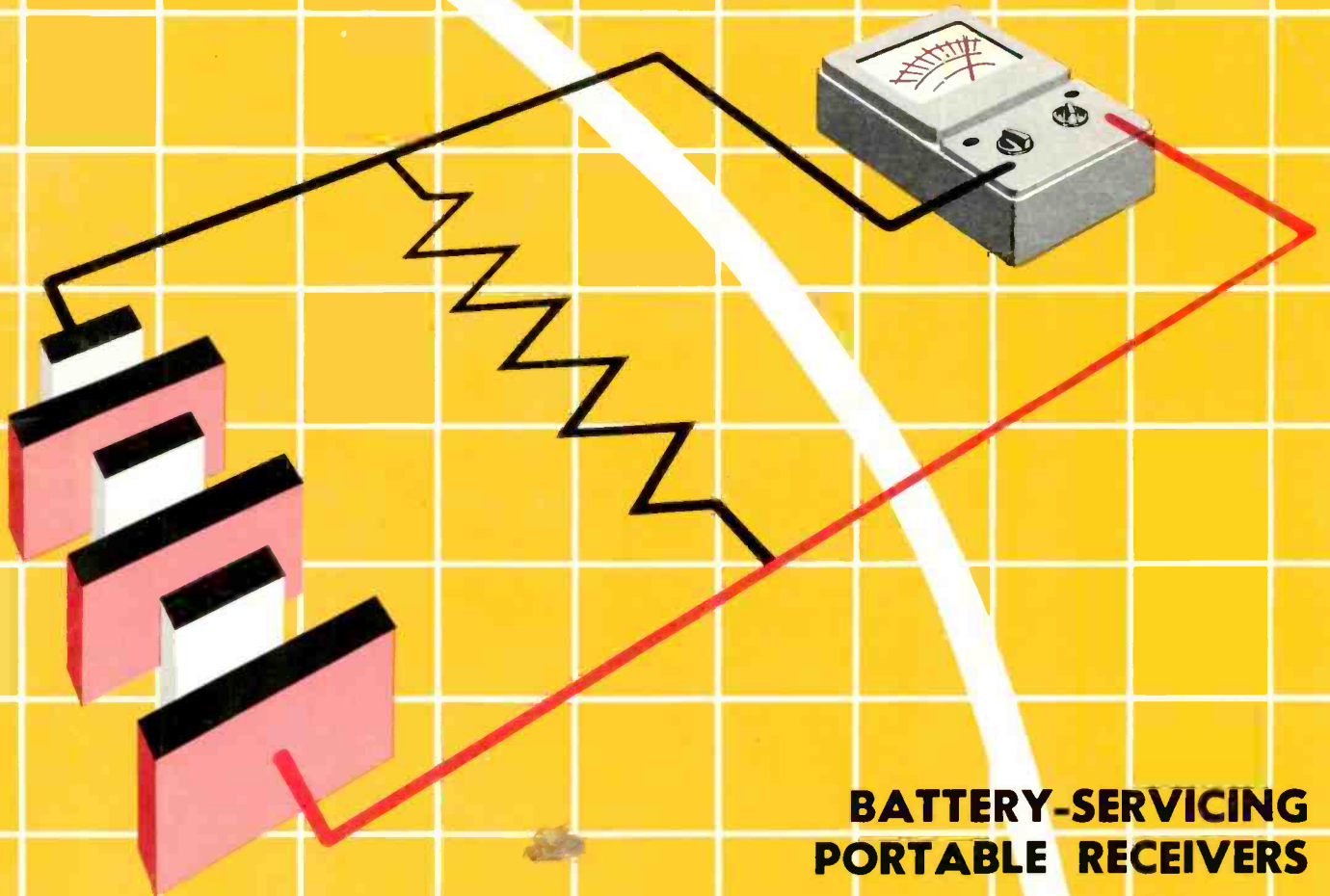


ELECTRONIC TECHNICIAN



BATTERY-SERVICING PORTABLE RECEIVERS

- F-M STEREO MULTIPLEX ALIGNMENTS
- ELIMINATING TV-RADIO RFI
- INCREASE YOUR BATTERY SALES

60¢

JUNE 1962

FOR THE INDUSTRY
TELEVISION ELECTRONICS
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CANTON, MASS. 01921
TELEPHONE 251-1111

Heathkit® develops continuing tube testing data program for all customers



SMALL ANNUAL FEE PROVIDES ROLL CHART DATA FOR ALL NEW TUBES

The unique tube test data console shown above was developed by Heath engineers for the express purpose of providing accurate, up-to-date roll-chart information on all new tube types as they are developed. With this new service all Heathkit tube checker owners can receive, automatically, latest test data on new tube types . . . eliminating obsolescence . . . assuring latest test facilities for all service operations. Arrangements have been made with tube manufacturers for necessary samples and data on new tube types which will then be compiled and transferred to roll-chart information for all Heathkit tube checkers. Subscribers will receive a supplement every three months and a new roll-chart incorporating this data at the end of the year. Availability of this service is another of the many advantages you enjoy with dependable Heathkit test instruments!

ANY TUBE CHECKER OWNER IS ELIGIBLE TO SUBSCRIBE TO THIS SERVICE

Subscription rates are \$2.50 per year on TT-1A type testers, \$1.50 per year for IT-21 and TC type checkers. If you own a Heathkit tube checker, send model no. of your checker along with your remittance . . . proper supplements and roll-chart will be sent automatically.

TWO NEW IMPROVED HEATHKIT MODELS OFFER FIRST YEAR'S DATA FREE

Heathkit IT-21 TUBE CHECKER

—Tests all tube types including new compactron, nuvistor, novar and 10-pin miniatures. Tests tubes for quality, shorts, leakage, open elements, and continuity. Individual tube element switches. "Bad-?-Good" meter scale. 11 lbs.

No money down, \$5 mo. . . \$44.95



Heathkit TT-1A Gm TUBE TESTER— Professional quality throughout! Indicates Gm to 24,000; micromhos. Constant-current heater supplies. Ultra-sensitive grid current test. Direct reading ohmmeter leakage test. Built-in adapter for testing new compactron, nuvistor, novar & 10-pin miniatures. Built-in switch operated calibration circuit. 32 lbs. No money down, \$14 mo. **\$149.95**

ADAPTER KIT TTA-1-1: converts earlier model TT-1 to TT-1A. Includes new cabinet, sockets, selector switches, and necessary tube test data. 13 lbs. **\$19.95**



HEATH COMPANY
Benton Harbor 24, Michigan

- Please Send My Free Copy of the 1962 Heathkit Catalog
- Enclosed is \$_____ for _____subscriptions to tube data service for Heathkit Model _____tube checkers.
- Enclosed is \$_____ (including postage) for _____(no.) Heathkit IT-21 Tube Checkers.
- Enclosed is \$_____ (including postage) for _____(no.) Heathkit TT-1A Tube Testers.
- Enclosed is \$_____ (including postage) for _____(no.) Heathkit TTA-1-1 Adapters.

NAME _____

ADDRESS _____

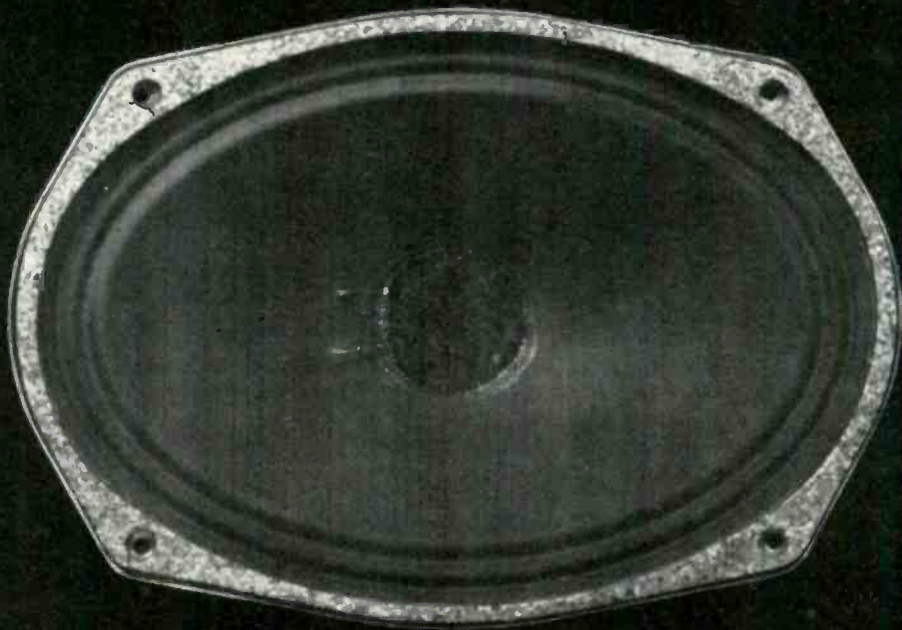
CITY _____ ZONE _____ STATE _____

ALSO AVAILABLE AT YOUR NEAREST HEATHKIT DEALER OR DISTRIBUTOR

For more details, circle 40 on page 56



NEW LOW PRICES—ONLY CHANGE WE COULD THINK OF



TO MAKE THESE SPEAKERS SOUND BETTER THAN EVER!

simply say **Delco**

You've *always* been able to install Delco Auto Radio Speakers with complete confidence in their quality. *Now* you can sell this popular line at competitive prices as well!

And Delco hasn't sacrificed a single one of these outstanding features: Highest sensitivity for greater range of distortion-free sound from precision-engineered magnetic circuits • Extra-efficient, premium grade Alnico-V magnets • Continuous life testing program to assure dependable

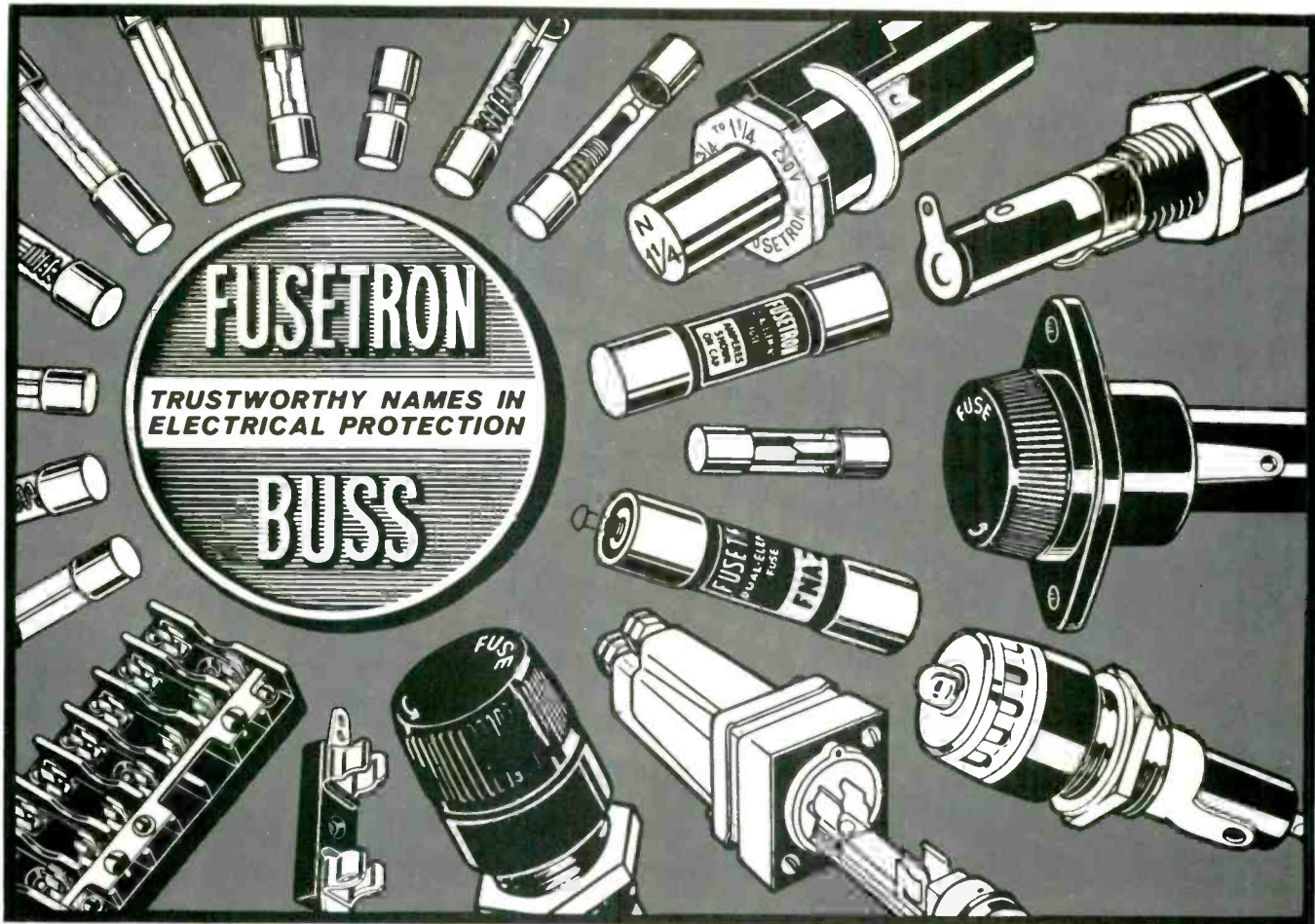
performance under the most severe climatic conditions.

There's news in Delco *packaging*, too. Your choice 6 x 9's in new bulk-packs, 20 speakers to a carton, or individually boxed speakers if you like. Now that you can sell top quality Delco Auto Radio Speakers at new, competitive prices, better stock up and start cashing in! Call your supplier and—simply say Delco. **Delco Radio** Service Parts are distributed nationally through **United Delco**.

DELCO RADIO, Division of General Motors, Kokomo, Indiana



--- for more details circle 20 on page 48



Save Time and Trouble by standardizing on BUSS Fuses—You'll find the right fuse every time...in the Complete BUSS Line!

By using BUSS as your source for fuses, you can quickly find the type and size fuse you need. The complete BUSS line of fuses includes: dual-element "slow-blowing", single-element "quick-acting", and signal or visual indicating types . . . in sizes from 1/500 amp. up—plus a companion line of fuse clips, blocks and holders.

BUSS Trademark Is Your Assurance Of Fuses Of Unquestioned High Quality

For almost half a century, millions upon millions of BUSS fuses have operated properly under all service conditions.

To make sure this high standard of dependability is maintained . . . BUSS fuses are tested in a sensitive

electronic device. Any fuse not correctly calibrated, properly constructed and right in all physical dimensions is automatically rejected.

Let BUSS Fuses Help Protect Your Profits . . . The dependability of BUSS fuses helps you avoid "kicks" and complaints that the fuses you sold or installed failed to protect or blew needlessly. This safeguards you against costly adjustments and "call-backs". That's why it pays to refuse to take a chance with anything less than BUSS quality fuses.

For more information on the complete line of BUSS and FUSETRON Small Dimension Fuses and Fuse-holders, write for BUSS bulletin SFB.

BUSS: The complete line of fuses and fuse mountings of unquestioned high quality.



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McGraw-Edison Co.
St. Louis 7, Mo.

--- for more details circle 16 on page 48

ELECTRONIC TECHNICIAN

ELECTRONIC TECHNICIAN

WORLD'S LARGEST ELECTRONIC TRADE CIRCULATION

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June • 1962

Vol. 75 • No. 6

FRONT COVER Every professional radio-TV technician knows the symbolical meaning of this month's cover. Here's an article many of you have asked for and have patiently awaited. It is crammed with useful information on battery trouble symptoms, battery types — both primary and rechargeable — and gives full information on proper methods for testing batteries. The article beginning on page 24 will provide information you need to successfully share in the booming battery replacement market which has increased almost 200 percent in the past 10 years. Also read "Get Your Share of Battery Sales," beginning on page 28.

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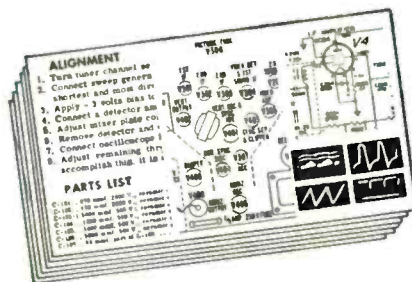
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PRECEDING BACK COVER

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OLYMPIC: TV Chassis JU-JCU

PACKARD — BELL: Stereo Adaptor Model MPX — 1-1

SPARTON: TV Chassis Model 23K2

TELEFUNKEN: Stereo Tape Recorder Model 77

TOSHIBA: TV Portable Chassis Model 10PG

WESTINGHOUSE: TV Chassis V-2417-1, -2, -3, -4, -5, -6

Now Sylvania puts more "silver" in SILVER SCREEN 85 Picture Tubes

[the kind you can spend]

Tube for tube, type for type, famous SILVER SCREEN 85* picture tubes have never meant more to your profit...any way you figure it.

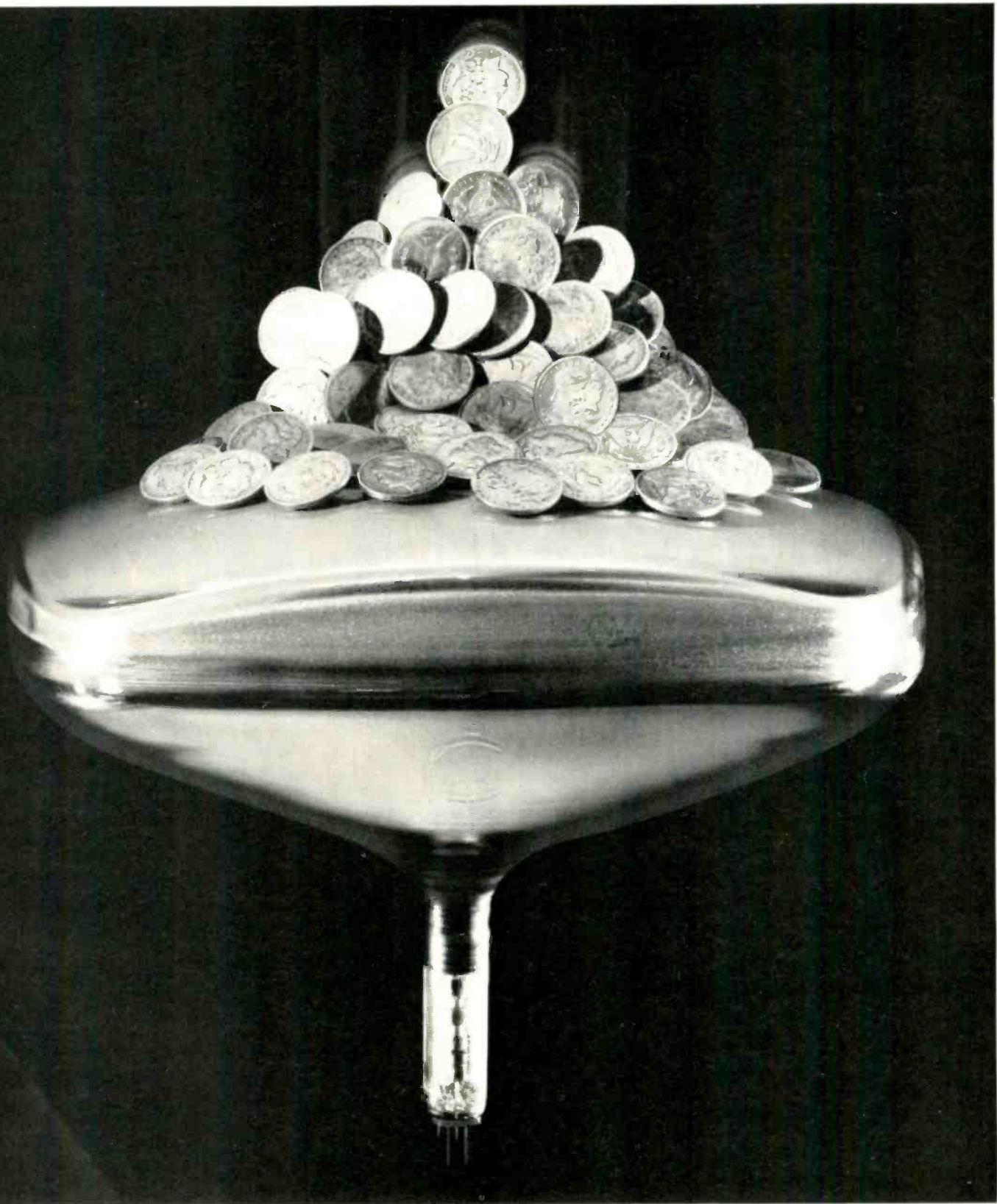
Cold cash? That's mighty important these days. From border to border, coast to coast—now Sylvania offers the industry's best quality and performance at more competitive prices. New distribution and a realistic universal replacement program are the big reasons.

It's good business to make a good profit, and to deal with a manufacturer who protects your profit with consistent quality and is there to support you when occasional adjustments are necessary.

Go solid on Sylvania—be solid with Sylvania. Remember—there's now more "silver" in SILVER SCREEN 85. Next time, ask your distributor for SILVER SCREEN 85 by name.

SILVER SCREEN 85 Picture Tubes are made only from new parts and materials except for the envelopes which, prior to reuse, are inspected and tested to the same standards as new envelopes.

*Trade Mark



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MAKING ROOM AT THE TOP



AC VTVM & AMPLIFIER #250

NEW EICO ENGINEERING ACHIEVEMENT Kit \$49.95 Wired \$79.95

Phenomenally good AC VTVM, bound to make room for itself at the top of the professional market. 12 ranges from 1 mv to 300 V full-scale, 10c-600kc ± 0 db response, 10 megohms input impedance, $\pm 3\%$ of full scale accuracy. At the flick of a switch, the internal wide-band amplifier is available for external use. Provides 8c-800kc ± 0 db response, 5 VRMS output, 5 kilohm output impedance, gain control, noise -40 db. Regulated power supply, frame grid tubes.

AC VTVM #255 Kit \$44.95 Wired \$72.95

All the precision VTVM facilities of the #250, less the external use of the wide-band amplifier.

EDITOR'S MEMO



Industry problems are frequently like icebergs. Only the top shows above the surface. (For readers who welcome analogies, it is also worth noting that sitting on either an industry problem or an iceberg can be a chilling experience.)

In other words, the underlying causes are too often hidden by day-to-day problems. For example, high quality service dealers are under heavy competitive pressure from cut-throat operators. It's a kind of Gresham's Law; if the solid businessmen don't fight back, they can end up profitless or out of business. You may recall from your school days that Gresham's Law said that bad money forces good money out of circulation. That is, if we had our choice of spending either a regular dollar or a Confederate dollar to pay a bill, we would spend the Confederate and hold on to the regular dollar.

The underlying problem is that good technicians find it difficult to charge adequately for their services. In areas where this situation exists, top grade techs are frequently inclined to leave TV repair and go into industrial work.

Here's another case. A customer comes into your store and asks for a tube. You tell him the price and he complains that it's a dollar more than he paid at a local retail distributor. Just another overly price conscious customer? He's more than that. He represents dozens of customers who never visit your store because of the cut price at the distributor.

The moral of all this can be summed up by telling you what happened several months ago when storms lashed the eastern seaboard. Many communities were flooded. Police and emergency facilities were so overtaxed that rescuers could be spared for only the most severe cases. People in moderate trouble were told to fend for themselves.

So a phone call comes through to the police station. A voice at the other end is yelling in panic: "Help! Help! You've got to come out here and save me from the flood."

The officer in charge asked how deep the caller was in water.

"I'm standing in two inches of water," he wailed.

"That's not enough for us to come out," the officer answered.

"But listen," shouted the complainant, "I'm on the second floor of my house!"



ARMED TO THE TEST LEADS FOR THE TRANSISTOR GAME

TRANSISTOR AND CIRCUIT TESTER #680

Kit \$25.95 Wired \$39.95

Measure ICEO, ICBO & dc β directly, ac β indirectly, without charts or special settings—plus all dc volts, currents, and resistances needed to service transistor equipment. 50 μ A, 3 1/2" face meter movement provides sensitivity and scale length necessary for accurate measurements. Built-in 20,000 ohms/volt VOM facilities let you work on transistor equipment with minimum equipment tie-up.



SITTING DUCKS FOR THIS SNOOPER

IN-CIRCUIT CAPACITOR TESTER #955

Kit \$19.95 Wired \$39.95

- Leave those capacitors where they are! Without unsoldering:
 - check for shorts (even in the presence of as little as 1 ohm shunt resistance)
 - check for opens (determine the presence of as little as 5mmf in the circuit), and to confirm open indication . . .
 - measure capacitance with $\pm 10\%$ accuracy between 0.1 mf and 50 mf
 - measure RC product, convertible into dissipation or power factor.

Also New From EICO:



Battery Eliminator and Charger #1064
Kit \$43.95
Wired \$52.95



AC Bench Supplies:
Model 1073—Kit \$35.95
Wired \$47.95
Model 1078—Kit \$42.95
Wired \$54.95



AC Volt-Watt Meter #260
Kit \$49.95
Wired \$79.95



For complete catalog of over 80 EICO kits and wired units—hi-fi, test equipment, citizens radio, ham gear—plus name of nearest distributor, write to dept. ET-6

ELECTRONIC INSTRUMENT CO., INC., 3300 N. BLVD., L. I. C. 1, N. Y.

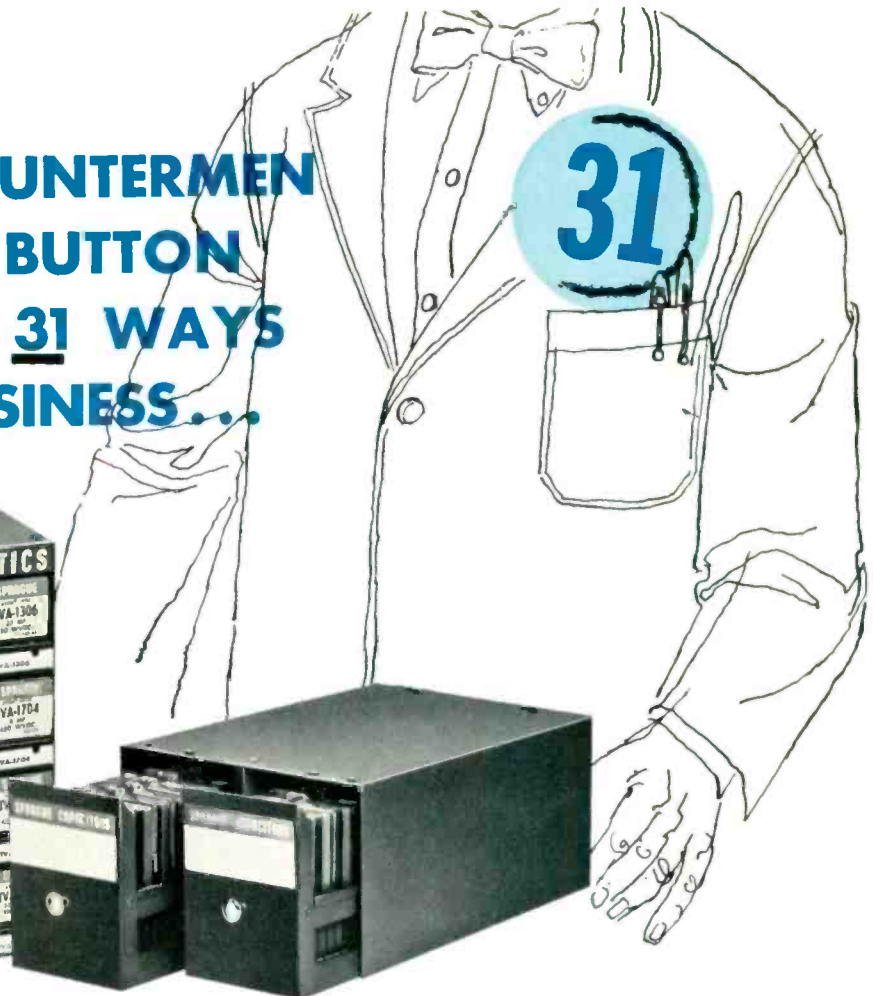
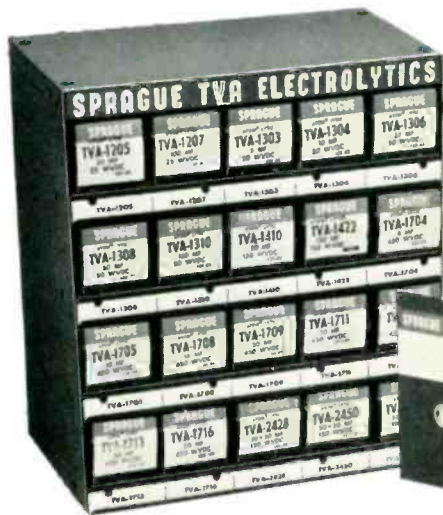
Add 5% in the West

Export Dept: Roburn Agencies, Inc. 431 Greenwich St., N. Y. 13, N. Y.

Al Forman

--- for more details circle 21 on page 48

**WHEREVER COUNTERMEN
WEAR THIS BUTTON
YOU'LL FIND 31 WAYS
TO HELP BUSINESS...**



31 Sprague Capacitor Assortments in FREE Stock Cabinets and Cases

Radio and TV Service Technicians swear by Sprague's Capacitor Assortments for **SEVEN** good reasons. Widest line in the industry, Sprague's **31** Assortments in Custom-designed Cabinets and Cases . . .

1. Convert wasted time to profits!

No need to run to your distributor when you need a capacitor. No searching through cluttered parts bins. Sprague Assortments give you more time at the service bench.

2. Assure balanced inventories—no dead stock!

Sprague Assortments include only the most popular, most frequently used ratings. No dogs. No slow movers. Every capacitor rating is one you need and use in your day-to-day service work.

3. Simplify inventory-taking!

You see at a glance what capacitors you have in stock. Clearly identified compartments in custom-designed cabinets and cases let you take inventory without loss of time.

4. Speed re-ordering! Whether you handle re-orders yourself, or let Distributors' Salesmen do it, Sprague's "see-at-a-glance" Assortments save time all around.

5. Put capacitors at finger tips! No hunting. No delay. Sprague Assort-

ments give you the types and ratings you need—when you need them. Repair jobs go out on time. Profits increase.

6. Make your shop more attractive!

A planned Capacitor Section saves space, looks business-like, makes a good impression on customers.

7. Cost you nothing extra!

When you buy Sprague Capacitor Assortments, you pay for capacitors only. Sprague Custom-designed Cabinets and Cases are yours FREE!

Take the first step to faster servicing and greater profit. Visit your Sprague Distributor and ask about Sprague's 31 Assortments. Or, write to Sprague Products Co., North Adams, Mass.



WORLD'S LARGEST MANUFACTURER OF CAPACITORS

--- for more details circle 45 on page 48



Why stock all these...



when one does the job



New Westinghouse Universal (type 21FLP4) is the picture tube you've been waiting for! It replaces 15 other tube types. It drastically cuts your inventory . . . simplifies your ordering . . .

makes stock control far easier . . . keeps you from "losing out" in on-the-spot tube replacements. Saves time and work on service calls, too; the Westinghouse Universal is a low-voltage electrostatic focus tube—needs no ion trap.

Now—you share in the profits! With the new Westinghouse Profit Sharing Plan you get a bonus on every tube you sell. Each tube comes with a Golden Profitab good for many valuable gifts—rifles, outboard motors, watches—scores of others. Each picture tube Profitab is worth 64 points; receiving tubes, 4 points. Start participating now! For complete details—and your free gift catalog—call your Westinghouse Distributor or write your nearest Sales Office. *You can be sure . . . if it's*



Westinghouse

--- for more details circle 54 on page 48

EVERYTHING IS A-OK--GO!



PHILCO STAR BRIGHT 20/20 PICTURE TUBES

Starlight, STAR BRIGHT . . . here's the finest tube you'll see tonight! Philco Star Bright 20/20 Picture Tubes are not exactly intended to sail through space to the moon, but we couldn't be more particular about how they are made if our lives depended on them.

Everything that goes into* a Philco Star Bright 20/20 Picture Tube is new! That means you need only open the carton . . . and install. Everything will be A-OK . . . no need to worry about checking, testing . . . or callbacks, either. Each Philco Star Bright 20/20 Picture Tube gets the same careful attention that we at Philco give to everything we make or sell . . . whether it is Philco equipment that rides the rockets to the moon . . . or Philco Star Bright 20/20 Picture Tubes to help you make more satisfied customers for your business.

*Except the envelope which, prior to re-use, is inspected and tested to the same standards as a new envelope.



**Depend on Your PHILCO Distributor
for Quality Replacements that
Match Original Parts.**



**PHILCO
Long Life Tested
Receiving Tubes**

A complete line of receiving tubes and numbers, manufactured under exacting quality standards, thoroughly tested and inspected. And each one bears the name PHILCO . . . a name your customers know and trust.

PARTS & SERVICE OPERATIONS

PHILCO
A SUBSIDIARY OF *Ford Motor Company*

LETTERS TO THE EDITOR

Education Versus License

EDITOR, ELECTRONIC TECHNICIAN:

It is with interest that I have been following the information published in regard to licensing laws in different parts of the country... These license laws can be used to an advantage by the fellows who cannot completely satisfy the customer. I find that if the customer is satisfied he will stay with you, license or no license... a one man shop has to stand on its own. If a job is not properly done the customer is gone. But the general public is trying to get something for nothing if it is willing to try one of those "gyp artists" who advertise big deals like "tubes tested in your home free," or "we loan you a tester, you can test them yourself," or "picture tubes installed free." Many times the pix tube is a rebuilt one although the price charged is for a new tube. How blind can people be?

If the service industry as a whole is interested in improving its lot then it should help educate its own servicemen and the money spent would pay bigger dividends than trying to eliminate competition with license laws... Keep up the good work...

FRED J. WILL

East St. Louis, Ill.

Solving Technician Shortage

EDITOR, ELECTRONIC TECHNICIAN:

As in other parts of the country, our area is plagued by a lack of qualified radio and TV technicians and this can be a sore problem. However, a thorough search will often uncover elderly men who may have a lifetime of experience in the work and have settled here in retirement. They don't care to go into any full-time occupation, but they can be lured into "retiring" from their retirement status if you let them work the hours they want. Thus some work mornings, some afternoons, some only work long enough so the extra money doesn't jeopardize their social security earnings. But these senior citizens are invaluable to any shop and their performance warrants their employment, on their own terms. We find their workmanship of extremely-high caliber, especially when it comes to tracing down obscure troubles which may otherwise slow up service performance.

H. J. MILLER

Sarasota, Fla.

Sparks From The Past

EDITOR, ELECTRONIC TECHNICIAN:

I started servicing radios in this town 34 years ago. The big names in early times were "Freshman Masterpiece," "King," "DeForest," "Crosley," "Fada," and "Atwater-Kent." I remember hearing about a young chap by the name of Ted Rogers who perfected a tube that would work on a-c. I well remember the first Rogers radio that I received. I plugged it into an a-c receptacle and turned on the switch—backing over to the other side of the room—not having too much confidence in a set that would work off the power lines. However, it worked all right and the dealer who was lucky enough to have the Rogers Agency had no competition since no one else had a radio that would work on a-c only. It was not too long, however, before other radios using a different tube from the "McCullough-Rogers" type, began coming out.

I don't know just how long I have been receiving ELECTRONIC TECHNICIAN. It is certainly a fine magazine for television service technicians.

G. RUSSEL BRADDON

Dutton, Ontario, Canada

JUNE 1962

Your PHILCO Distributor—One-Stop Center for Every Servicing Need

Part No. 326-5029
Part No. 326-5029-1
with volume control.



FREE—2 attractive card displays with every dozen.

Speakers of molded plastic in streamlined design. 8 ohm voice coil impedance with .68 oz. Alnico magnet. Coaxial connector socket, cable connection.

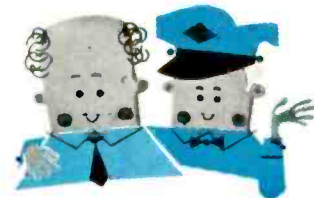


PHILCO Deluxe PF 65 Stereo-Phone Swivel Speakers

A truly deluxe speaker set for the most particular stereo customer. Exclusive with Philco, these speakers use the famous Philco Fidelitron curved push-pull electrostatic reproducer. Unit on each Stereo-Phone swivels for tonal direction. Installs in minutes in any 8 ohm amplifier system. Glowing gold finish. 2" x 10" oval speaker.

Part No. 423-1003-1

PHILCO
Direct-Pay Plans Totaled
Over \$1 Million to
"independents" Last Year



Thousands of independent service businessmen are registered members of Philco Factory-Supervised Service Association. You, too, can be factory-trained; enjoy special benefits plus extra income. Ask your Philco Distributor about joining PFSS today!



PHILCO
A SUBSIDIARY OF Ford Motor Company

MAIL THIS COUPON TODAY

Philco Parts & Service Operations, Dept. B6,
"C" and Westmoreland Sts., Phila. 34, Pa.

Please send me FREE, the Philco Calculator. (Saves hours of time figuring out net costs and selling prices.)

Name _____

Address _____

City _____ Zone _____ State _____

Retailer with Service Dept. Service Only.

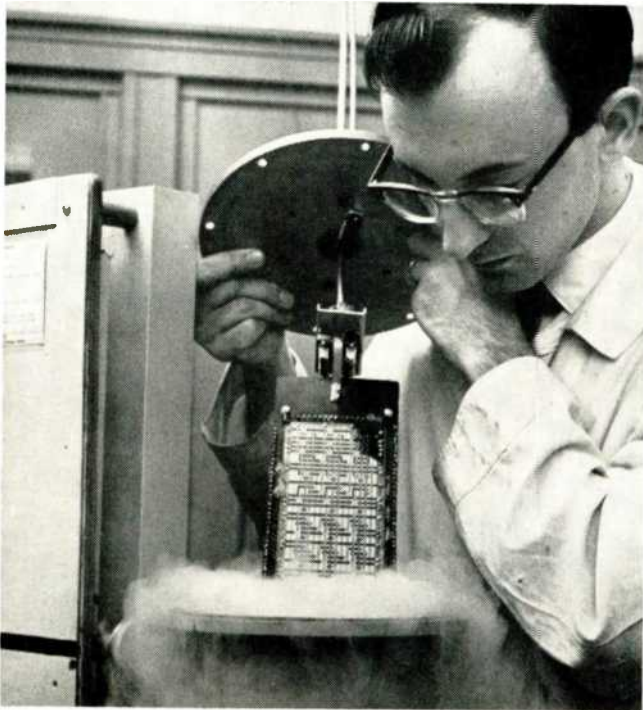
--- for more details circle 38 on page 48

TUNING IN

A TWO-WAY RADIO community program to coordinate citizens band facilities for the common welfare has been launched on a nationwide basis. The program is designed exclusively to provide more efficient two-way radio communications under local emergency conditions. REACT (Radio Emergency Associated Citizens Teams), with national headquarters in Chicago, is sponsored and supported by Hallicrafters Co.

ELECTRONIC PACKAGES for hospitals include audio-visual nurse calling, TV viewing, radio listening and doctors' paging. A compact patients' pillow speaker combines nurse call facilities, full control of TV and radio sound as well as station selection. The plan is being offered the nation's hospitals through an arrangement announced jointly by RCA and Executive.

Cold Logic



Cryogenic associative memory circuit, which operates more like the human brain than any memory circuit yet devised, is lowered into a Dewar flask used to maintain a liquid helium bath temperature of approximately -452 F. The device was developed by General Electric. When employed with computers, both military and commercial applications are foreseen, including air traffic control, air defense missile detection, and space satellite monitoring and control.



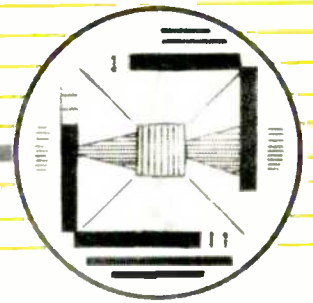
'I got your message!'

NEW BATTERIES will hasten development of cordless devices for the home, outdoors and in industry, it was predicted recently by an engineer before a meeting of the Lead Industries Association. He predicted many new types of cordless tools, appliances and lights; portable TV sets; thermoelectric heating and cooling units; and a multitude of consumer products—all powered by completely maintenance-free, non-leaking, non-gassing lead-acid storage batteries.

ELECTROCHEMICAL FUEL CELLS may replace today's "gas buggies" in future years, according to M. Shaw, Electric Autolite Co. His views on future possibilities of fuel cells were presented to a symposium conducted by the American Institute of Electrical Engineers. Before fuel cells are used on automobiles, however, they will probably be used by the military and somewhat later for powering garden tools, fork lifts and trucks.

MICRO-ELECTRONIC CIRCUITS one-third the size of aspirin tablets can perform all electronic functions from signal amplification to computer switching according to Dr. Alan M. Glover of RCA. The circuits, incorporating both active and passive materials,

THE PICTURE



are one hundred times smaller and potentially less expensive than equivalent conventional circuits for control, computer, and communication systems, he said. The components lend themselves to mass production by assembly-line techniques. Dr. Glover said that pilot production of the units will begin before the end of 1962.

NATIONAL BUREAU OF STANDARDS, Allen H. Shapley will spend the coming year in Aberystwyth, Wales, working on international plans for scientific research during the "International Year of the Quiet Sun." Shapley is Chief of the Central Radio Propagation Laboratory Liaison and Program Development Office at the NBS Boulder Laboratories. He will be primarily concerned with IGY observations on the ionosphere and the effects of solar activity on phenomena

Missile Whistle



The tiny device held by an attractive secretary can play a swan song for missiles that do not follow "orders." The musical rods of the device, made by Raytheon Company, will vibrate to a particular quintet of tones transmitted from ground control by push-button radio should a missile go out of control. It triggers an explosive charge to destroy the dangerous missile.

CALENDAR OF COMING EVENTS

- June 18-19: Chicago Spring Conference on Broadcast and TV Receivers, (PGBTR) Chicago Section. O'Hare Inn, Chicago, Ill.
- June 27-29: Joint Automatic Control Conference, New York University Campus, N. Y.
- June 28-29: 4th Nat'l Symp. on Radio Frequency Interference, (PGRFI) Town House Hotel, San Francisco, Calif.
- August 21-24: WESCON, Western Electronics Show and Conference, Sports Arena, Los Angeles, Calif.
- August 20-28: EIA Annual Maintainability Conference, University of Colorado, Boulder, Colo.
- August 31-Sept. 9: 1962 World's Fair of Music, McCormick Place, Chicago, Ill.

of the high atmosphere. Shapley helped to plan and coordinate the first U. S. earth satellite program and the IGY scientific expeditions to the Antarctic as one of the leaders in the U. S. IGY program.

A UHF TRANSLATOR has been installed high above the Hudson river on one tower of New York's George Washington Bridge to convert WUHF TV channel 31 to channel 77. The channel 77 signals are directed southeastward over Manhattan, lower Bronx, Brooklyn and Queens. The translator was developed by Adler Electronics and is used by the FCC in its New York experiments to test feasibility of employing more UHF TV channels in large cities.

MAGNETIC TAPE TERMINALS at the Veterans Administration Insurance center in Philadelphia will speed 4,000,000 words of insurance data daily. A Digitronics Dial-o-verter system functions with a Bell System Data-Phone subset to transmit and receive data over telephone lines. Similar terminals will be installed at insurance centers in Denver and St. Paul. It is expected the system will greatly reduce the time required to process insurance correspondence.

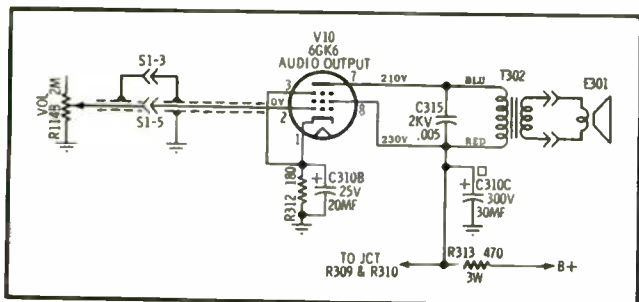
ELECTRONIC ALTERNATOR SYSTEMS can replace the d-c generators and regulators in today's automobiles, according to Frank C. Brewster of Motorola. The system, consisting of the alternator, a transistorized voltage regulator, and an isolation diode assembly, charges the battery even while the engine idles, and is designed to last the lifetime of the automobile, he said. The system is Motorola's first venture into under-the-hood auto products.

TV MANUFACTURERS TECHNICAL DIGEST

MOTOROLA

TV Chassis TS-568 Code A-01—Design Change

The audio output tube has been changed from a 6BQ5 to a 6GK6. To incorporate the 6GK6, the following changes must be made:



1. Relocate connections from pin 9 to pin 8.
2. Break the connection between pins 1 and 2.
3. Connect shielded cable to pin 2.
4. Connect jumper between pins 1 and 3.

TV Chassis TS-568 Code A-05 — to Reduce Blooming

To reduce blooming in these sets, R-510 should be changed from 8.2Ω to 5.6Ω.

RCA

Record Changers Models RP-211 and RP 212—Improved Idlerwheel

Idler wheels in early production models of these changers had insufficient traction. Improved wheels which are now being used can be identified by an orange ring painted on the top side or by a silver dot on the underside.

The old type wheel, No. 108609, has been discontinued and should be replaced with wheel No. 110040.

EMERSON

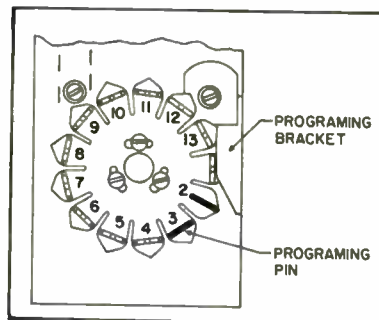
TV Combination Models—Line Cord Polarization

Combination sets which use a separate line cord for the amplifier and record player must be polarized. The power cord is connected to an auxiliary interlock on the power supply chassis and can be a source of hum if not properly polarized. If hum is encountered use the following procedure to polarize the plugs:

1. Set the volume control where the hum is noticeable.
2. Reverse the line cord in the wall outlet and leave in the position where minimum hum is found.
3. Reverse the supply cord for the stereo amplifier and record player and leave in the position of minimum hum.
4. Repeat step 2.

MAGNAVOX

TV Remote Receiver Model 704015-1—Replacement of Programming Pins



If keying pins become damaged in these units, they can be removed by squeezing the pin together with a pair of pliers and pulling out. Since the pins are only used when they must stop the motor,

pins on unused channels may be employed to replace those damaged.

PACKARD BELL

TV Chassis 98D14, 98D14C, and 98D 15—Vertical Linearity

A previous Packard Bell service note called for a change in value for C-79. This service note has been rescinded; the value should be .1 μf. Sets stamped 3753 or higher already have the original value capacitor installed.

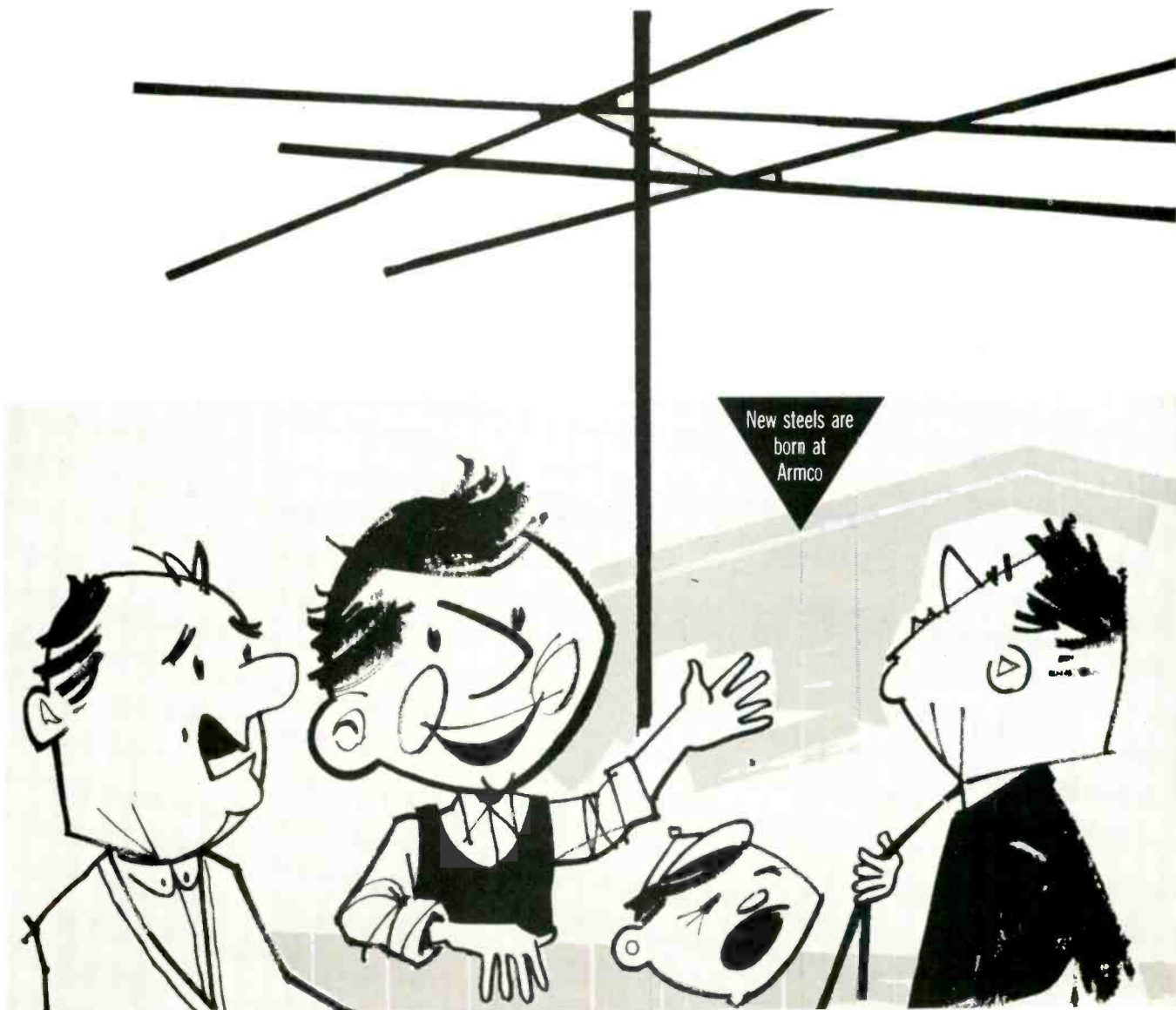
TV Chassis 88-13—Vertical Component Change

Some of these chassis have a 6EW7 tube in the vertical circuit instead of a 6DE7. Sets incorporating the 6EW7 tube should have resistor R-91 changed from 2.2 meg to 1.8 meg. Sets stamped 3688 or higher already have this change made.

SYLVANIA

TV Model 17P14 Series—Changes to Standardized Chassis

Changes should be made as follows:



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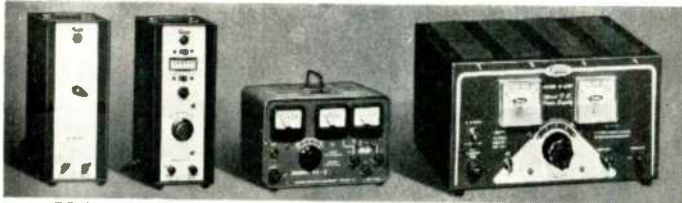
... for more details circle 11 on page 48

now ...

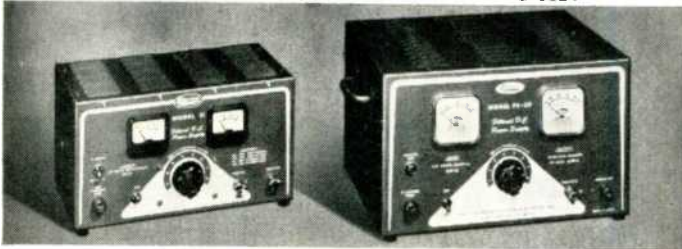
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39.95	EC-2	0-16	0-5	1.8 (0-5A)	0.5	0-20/10A
56.00	PS-2	0-20 0-16	0-75MA 0-5A	1.6 (0-5A)	0.15 0.5	0-20V, 0-10A & 0-75 MA
59.95	D-612T	0-16 0-8	0-10 0-10	.44 (3-10A) .3 (3-10A)	0.5 @ 5A, 2 @ 10A	0-20V, 0-10A
86.00	H	12* 6*	0-10 0-20	.23 (3-10A) .15 (3-20A)	5	0-20V, 0-30A
195.00	PS-30	12*	0-30	0.27 (0-30A)	1	0-20, 0-50

*adjustable (selector switch)

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Complete Line Bulletin PS-562 gives all details



ELECTRO PRODUCTS LABORATORIES

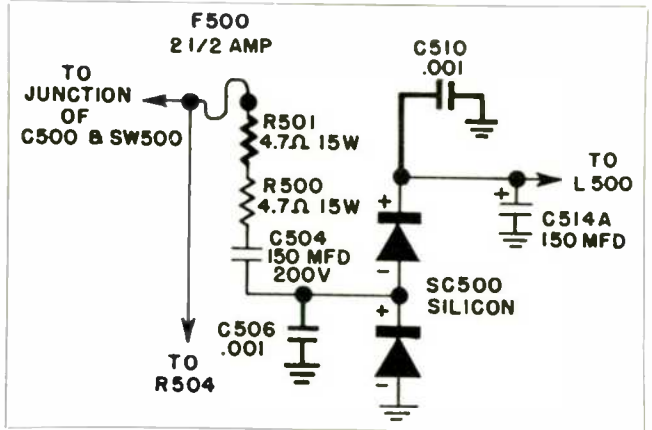
4501-V Ravenswood, Chicago 40, Illinois
L.Ongbeach 1-1707

Canada: Atlas Radio Ltd., Toronto

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... for more details circle 24 on page 48

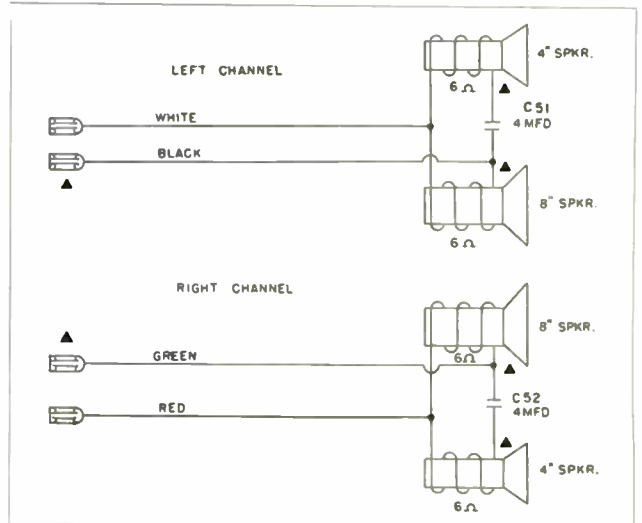
TV MANUFACTURERS TECHNICAL DIGEST



1. Remove selenium units and replace with SC500-1 (silicon unit), part number 517-0021.
2. Add R-501, 4.7Ω resistor, in series with R-500.
3. Add C-506, .001 μf capacitor.
4. Add C-501, .001 μf capacitor.

WESTINGHOUSE

Record Player Chassis V-2515-1—Speaker Connections



To insure proper phasing and correct channel hookup the accompanying diagram should be followed when reconnecting speakers on these Westinghouse chassis.

WEBCOR

Tape Recorder, Model 2202-1—Correcting Rewind Slippage

To correct rewind slippage between the intermediate idler and the rewind tire, a light coating of dial cord rosin should be applied to the intermediate idler wheel (part No. 49P385). This procedure is especially necessary when replacing the aforementioned parts.

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Here it is, the scope that technicians, engineers and servicemen from coast to coast have been demanding. A portable wide band scope that can be used on the job anywhere, yet has the highest laboratory specifications for shop or lab. Cumbersome color TV sets, remote audio and organ installations and computers are just a few of the jobs that make owning a scope of this type so essential. Why consider a narrow band scope, when for only a few dollars more, this professional wide band sensitive scope equips you for any job.

- The PS120 provides features never before offered. Only two major controls make the PS120 as easy to use as a voltmeter. Even its smart good looks were designed for functional efficiency. New forward thrust design, creating its own shadow mask, and full width calibrated graph increase sharpness of wave form patterns. A permanent chromed steel carrying handle instead of untidy leather strap and a concealed compartment under panel for leads, jacks and AC line cord make the

PS120 the first truly portable scope combining neatness with top efficiency.

- Electrical specifications and operational ease will surpass your fondest expectations. Imagine a wide band scope that accurately reproduces any waveform from 20 cycles to 12 megacycles. And the PS120 is as sensitive as narrow band scopes... all the way. Vertical amplifier sensitivity is .035 volts RMS. The PS120 has no narrow band positions which cause other scopes to register erroneous waveforms unexpectedly. Another Sencore first is the Automatic Range Indication on Vertical Input Control which enables the direct reading of peak-to-peak voltages. Simply adjust to one inch height and read P-to-P volts present. Standby position on power switch, another first, adds hours of life to CRT and other tubes. A sensitive wide band oscilloscope like the PS120 has become an absolute necessity for trouble shooting Color TV and other modern circuits and no other scope is as fast or easy to use.

SPECIFICATIONS

WIDE FREQUENCY RESPONSE:

Vertical Amplifier—flat within 1/2 DB from 20 cycles to 5.5 MC, down—3 DB at 7.5 MC, usable up to 12 MC.

Horizontal Amplifier—flat within —3 DB from 45 cycles to 330 KC, flat within —6 DB from 20 cycles to 500 KC.

HIGH DEFLECTION SENSITIVITY:

Vertical Amplifier—Vert. input cable	RMS .035V/IN.	P/P 0.1V/IN.
Aux. vert. jack	.035V/IN.	0.1V/IN.
Through Lo-Cap. probe	.35V/IN.	1.0V/IN.
Horizontal Amplifier—	.51V/IN.	1.44V/IN.

HIGH INPUT RESISTANCE AND LOW CAPACITY:

Vert. input cable	2.7 Meg. shunted by approx. 99 MMF
Aux. vert. input jack	2.7 Meg. shunted by approx. 25 MMF
Through low cap. probe	27 Meg. shunted by 9 MMF
Horiz. input jack	330 K to 4 Meg.

HORIZONTAL SWEEP OSCILLATOR:

Frequency range—	4 ranges, 15 cycles—150 KC
Sync Range—	15 cycles to 8 MC—usable to 12 MC

MAXIMUM AC INPUT VOLTAGE:

Vertical input cable—	} 1000 VPP (in presence of 600 VDC)
Aux. vert. jack—	
Lo-Cap probe—	
Horiz. input jack—	approx. 15 VPP (in presence of 400 VDC)

POWER REQUIREMENTS:

Voltage—	105-125 volts, 50-60 cycle
Power consumption—	On pos. 82 watts
	Stby. pos. 10 watts

SIZE: 7" wide x 9" high x 1 1/4" deep—weight 12 lbs.

The PS120 is a must for color TV servicing. For example, with its extended vertical amplifier frequency response, 3.58 MC signals can be seen individually.



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--- for more details circle 43 on page 48



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41 VCM SILVERED MICAS	15 VALUES	1000 VDCW $\pm 5\%$	\$26.60
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144 CAPACITORS	44 VALUES	TOTAL LIST PRICE	\$65.50

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TV MANUFACTURERS TECHNICAL DIGEST

Extreme caution should be exercised when applying the non-slip compound (Walsco, Non-Slip or equivalent). Too much compound may cause motor stalling, while too little will not correct the slip condition. The non-slip compound should be applied to the wheel only when the recorder is on.

Non-slip compound is not required on model 2202-1A.

PHILCO

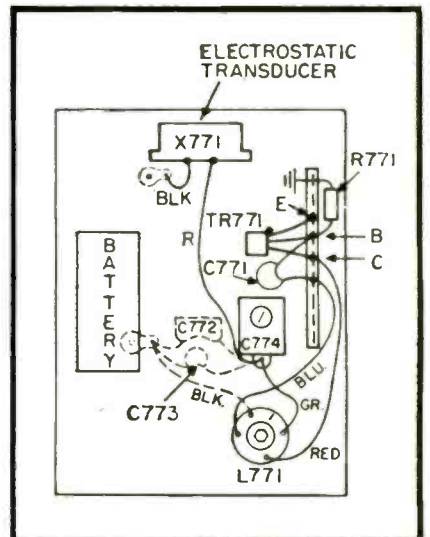
Radio Model T-902—Capacitor Addition

A .025 capacitor has been added to the second detector circuit of these radios. The capacitor should be connected from the detector side of the volume control to ground.

GENERAL ELECTRIC

Remote Transmitter Model RW 362 — Transmitter Alignment

1. Position the transmitter 1 ft. from the receiver with the transducers facing.
2. Connect a VTVM to test point three on the receiver, press the select



button on the transmitter and adjust L-771 for a minimum negative reading.

3. Connect the VTVM to test point 2 on the receiver and adjust C-774 for a minimum negative reading.

4. Repeat steps 2 and 3.

... for more details circle 10 on page 48



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--- for more details circle 28 on page 48

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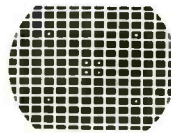
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UHF Progress Report

In previous issues, we described the efforts by the Federal Communications Commission to have Congress make all-channel UHF-VHF TV receivers mandatory. The reason for this FCC effort is to increase utilization of the high channels, and to provide greater TV broadcast service across the country.

At this writing, the bill to require all-channel sets for interstate commerce (H.R. 8031) has been favorably reported out of committee. So passage of the bill into law is likely.

You may recall that our position has been that the basis of UHF woes stems from fundamental errors made by the FCC when it allocated frequencies for this service. As many industry leaders advised, the FCC should never have intermixed UHF and VHF stations in the same area. Since the government was at fault, we believe that the least it could do is to protect the public from paying the extra costs of UHF provisions, when in fact, most of the public can not receive UHF broadcasts. This could have been done very simply, and have obviated the need for legislation, by removing the Federal Excise Tax on all-channel sets.

Here are some statistics recently released by the Electronic Industries Association. These numbers come remarkably close to information we obtained independently, and the result is ample support for our view. About 92 percent of U. S. citizens live outside the range of the 81 UHF stations. People buying new sets will pay an extra \$30, on the average, and most of them will be unable to view UHF during the life of the set. Only 7.2 percent of the population, or

13.2 million persons are within the range of one or more UHF stations, and some of the 7.7 million people in UHF-only areas are also able to tune in VHF from nearby communities. The current rate of production of UHF-equipped TV receivers is 8.4 percent.

A constructive suggestion put forth by EIA, is that the 458 VHF broadcast stations be licensed immediately to broadcast on UHF simultaneously. By using these UHF channels for public affairs, educational and cultural programs, the desires of the minority audience, as opposed to the mass audience, would be served.

Another important point is that the Federal law would cover interstate shipment, but not sales of sets within the state of manufacture. There is a market for more than 2.5 million VHF sets for sale within the eight states which have TV manufacturing plants. This is about 40 percent of total TV set production. These plants are located in New York, California, Pennsylvania, Illinois, New Jersey, Indiana, Minnesota and Tennessee. If a manufacturer makes VHF-only sets for sale in the state of manufacture, this could provide a distinct economic advantage to certain companies, based solely on the location of their manufacturing plants.

Let us emphasize that we are in favor of the development of the UHF band. However, we believe that the proposed legislation does not accomplish this end in a fair and orderly manner. Certainly the least the government could do is to hold the price line with a tax concession so that new set owners do not have to pay for a feature which they cannot use.

Comparing UHF and VHF

The FCC tests in the New York City area have resulted in some interesting findings concerning the relative merits of UHF and VHF television broadcasting. There are four grades of picture quality. Grade 1 is excellent; Grade 2 is fine; Grade 3 is acceptable and Grade 4 is fringe-area quality.

The tests show that if a viewer will accept a Grade 3 picture, UHF is inferior to VHF by 7 percent. However, if the viewer insists on a Grade 1 or 2 picture with an indoor antenna, UHF is inferior by 14 percent.

With an outdoor antenna, which benefits UHF more than VHF, a Grade 4 picture is the same for both UHF and VHF. UHF is a bit more susceptible to ghosts, and UHF receivers can use greater improvement with regard to thermal noise. Man-made interference is not a great problem for either UHF or VHF.

Since these results are based on only 100 installations, the contractor for the FCC tests, Jerrold Electronics Corp., cautions that the above information cannot be considered as conclusive.

Know your batteries and convert portable replacement demand into summer profits



by Steven Robb

BATTERIES Are

■ With the increasing number of transistor radios in use today, plus the appearance of more battery powered appliances and work tools on the market, battery sales and service are becoming increasingly important to the technician.

More battery powered radios are used during the summer than during any other season. The result is that the technician sells more batteries and in turn encounters more battery-related problems in summer than during other seasons.

Leaking batteries swollen and lodged in the radio and corroded contacts are among the problems. More recently too, a variety of battery types make it difficult to maintain adequate stock.

Chart I lists common transistor batteries which are interchangeable. National Electronic Distributors Association numbers and battery voltages are also given. The chart should help remove some of the confusion between interchangeable batteries. Charts alone, however, will not make your battery servicing all peaches and cream. A few testing and storage tips will go a long way to help you make it a profitable and desirable business.

Battery Trouble Symptoms

Transistor radios use dry cells almost without exception, but technicians must also become familiar with wet cells and rechargeable dry types. Portable TVs appearing on the market may use either wet or dry rechargeable batteries. Technicians not acquainted with rechargeable batteries can easily make a mistake which may cost the price of an expensive battery.

A great deal of time can be wasted probing and testing in transistor radios only to find that the battery is at fault. Distortion, intermittent operation and oscillation of all types can be caused by weak batteries. Often, a radio may operate only a minute or two, and then chirp, whistle or warble into a hush. Why the battery? Batteries are frequently capable of recouping their losses if they are allowed to rest. Then they can operate the radio again for a brief period. If the weak battery is placed in a warm area, it may come back to nearly new power—but only for a short time.

Aging nickel-cadmium batteries can develop intermittents which seem to defy reason: Full power,

then no power. The cause is usually a broken internal connection. Though repair is sometimes possible by disassembling the battery, it is not recommended. These batteries are sealed units and do not operate as designed when the seal is broken.

Constant or intermittent oscillations can also result from a battery with high internal resistance. Batteries that have low voltage will often not allow radios to operate even when another series battery brings the operating voltage to normal. But there is a way to avoid these problems: Change the battery first. Other problems can be skirted by a good understanding of battery operation, testing and storage practices.

Battery Types

Batteries can be put into several categories. Types used in the modern radio or TV, however, can be listed in one of three general categories: Primary or non-rechargeable; dry rechargeable; and wet cells. Naturally, the last is also a rechargeable type. Though there are many varieties in each of the three categories, those used today are Alkaline-manganese, zinc-carbon and

mercury in the dry types; nickel-cadmium in dry rechargeable types; and lead-acid wet cell types. Each have certain advantages and disadvantages. Before technicians can recommend proper batteries to customers the advantages and drawbacks of each must be understood.

Primary Cells

Three primary cells are now in common use and each does a specific job better than the other, though it may only be a matter of economics to differentiate their use in radio service. Zinc-carbon batteries are the least expensive, and are more easily run down under

long-time or heavy current demands than either mercury or the new alkaline-manganese types. For light drain usage, however, the zinc-carbon cell may approach the life of alkaline and mercury batteries. Price makes carbon-zinc cells more practical for light drain and short term use unless the convenience of longer battery service is a prime consideration.

When heavy current demands are required of a particular cell or battery, the alkaline and mercury types may have a life several times longer than zinc-carbon. Whether the increased cost is justified depends on the battery application. All the

aforementioned dry batteries operate on the same principle.

In carbon-zinc cells, a carbon rod (anode) is suspended in a zinc cylinder filled with a paste mixture of manganese dioxide, acetylene black, ammonium chloride, zinc chloride, chrome inhibitor and water. The mixture serves as the depolarizer which prevents the formation of hydrogen bubbles on the positive electrode as the discharge progresses.

Alkaline manganese cells differ primarily in the potassium hydroxide electrolyte used. The positive electrode is zinc and the negative electrode is a dense coating of man-

For 'Toters'

CHART I

VOLTAGE	BURGESS	EVER-EADY	MALLORY	MARATHON	MASTERCRAFT	MONTG. WARD	NEDA	PHILCO	RCA	RAY-O-VAC	SEARS	WIZARD	ZENITH
1.4	Hg - 1R	E1	RM-1				1100		VS143				
1.4	Hg - 12R	E12	RM12			62-103	1101		VS144				
1.35	Hg - 401	E401	RM-401				1102		VS401	R401			
1.4	Hg 9	E9 or E91	ZM-9			62-122	1103	P9	VS313	15M	644B	7D9015	Z9
1.35	Hg - 630	E630	RM-630				1104		VS147				
1.35	Hg - 640	E640	RM-640				1105	P640	VS150				
1.35	Hg - 400R	E400	RM-400				1106		VS145				
2.7	H132R	E132	TR-132R				1200		VS148				
4.035	H233	E233	TR-233				1300	P696	VS400				
4.5		2731					1303		VS321				
4.2	H133 or H133R	E133 or E133N	TR-133 or TR-133R				1304		VS149	1304M		7D9304	
4.2	H163	E163	TR-163			62-105	1305		VS163		6415		
6	AL - 133	333 or 523	Mn-1306				1306	P1306	VS1149	1304M			
6	4D4	274		1400			1400						
6		2713					1403		VS325				
5.6	H164	E164	TR-164			62-104	1404		VS164				
6.75	H165	E165	TR-165				1500		VS165				
7		E175	TR-175				1501						
9	P6	226	M-1600	1600A	SF82	96	1600	P91	VS5300A	1600	6418	7D7600	Z226
3, 6, 9	D6PI	2506		1601			1601		VS301	1601	6420		
9	2N6	246	M-1602	1602	SF84	92	1602	P178	VS305	1602		7D7602	
9	D6	276	M-1603	1603		93	1603	P88	VS306	1603	6419		Z276
9	2U6 or H146	216 or E146	M-1604 or TR-140	1604	SF85	123 or 124	1604	P-1604 or P-146	VS323 or VS312	1604 or 1604M	6417 or 6416	7D7604 or 7D9604	Z216 or Z146
9	M6	266	M-1605	1605	SF90		1605	P1605	VS322	1605			
9.8	Y6 or H177	E177	TR-177				1606		VS309A	1606			
9	D6S	2761	M-1608	1608			1608			1608			
9		2762		1609			1609						
4.5	223	243		1610			1610		VS324				
9	L6 or H126	206 or E126	M-1611 or TR-126	1611			1611		VS327 or VS328	1611M	6422	7D9611	
9	C6X	2356	M-1612	1952			1612						
9		2709	303145				1613		VS326				
9	303145	E303145					1614						
12		228					1810		VS329	1810M	6425		
9, 13.5	XX9	239	M-1900	1900	SF88	95	1900		VS304	1900			
12.6	H169	E169	TR-169				1901						
21		2314		2400			2400						

ganese dioxide on the outer steel shell. This combination assures a very low internal resistance.

Low internal resistance is also afforded with mercury cells. The mercury cell has the longest life expectancy of the three cells mentioned and has a relatively constant voltage throughout its life. A steel

cylinder holds a pellet containing mercuric oxide against the negative terminal. The pellet acts as a depolarizer. Mercury batteries use an electrolyte of potassium hydroxide; the anode is a pellet made of amalgamated zinc. The terminal connection from the anode is made to an insulated steel plate.

Rechargeable Cells

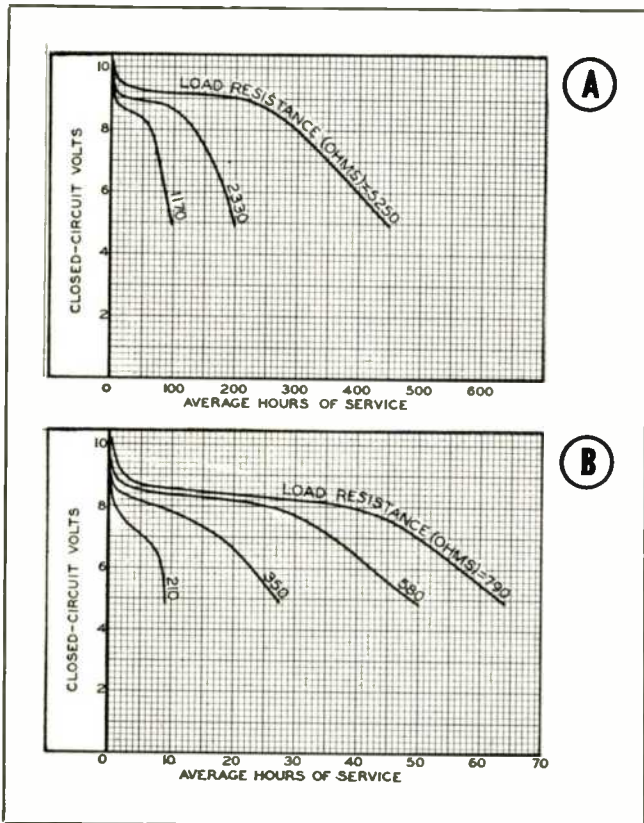
The most common secondary dry cell in use today is the nickel-cadmium battery. This type has compactness and non-spilling advantages of a dry cell with the rechargeable feature of the wet cell. This cell has been in use many years but only recently has been hermetically sealed in a compact unit. The cell is extremely rugged and provides a relatively flat voltage discharge curve. For heavy drain or long term drain uses, the cell is a good buy. Battery companies offer chargers at nominal costs or a simple charger can be arranged as shown in Fig. 1.

The electrolyte used in nickel-cadmium batteries is a solution of potassium hydroxide which does not enter into the chemical action but acts as an ion carrier. The positive electrode is nickel hydroxide and the negative electrode is cadmium. Both electrodes are wrapped in a fine mesh nickel screen. These are built in the form of plates and can be cut into any desired shape or rolled to form cylindrical cells.

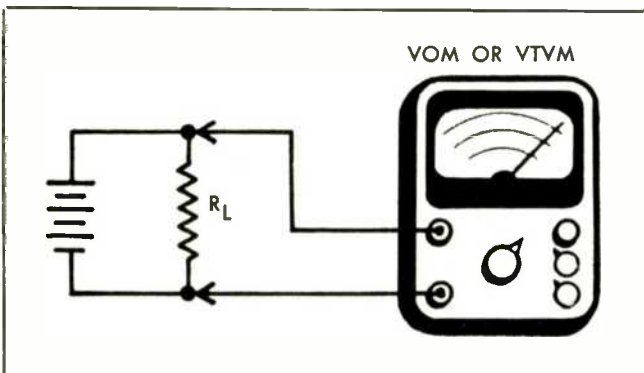
Some technicians may be more familiar with the conventional or lead-acid battery than any other wet type. This battery is used in American made automobiles and was first employed with radio in its infancy as "A," "B," and "C" batteries.

Portable TVs will probably contain the greater number of wet cells confronting the technician. The biggest drawback is that they *do require regular service* to obtain reasonable life.

Distilled water should be added



Discharge curves for a typical 9 v carbon-zinc battery. (A)—relatively long life is indicated with light loads. (B) — Heavy loads reduce the usable battery life to only a few hours.



Circuit employed to simulate normal load conditions when checking batteries. Resistance of R_L is determined by the current load of the particular radio.

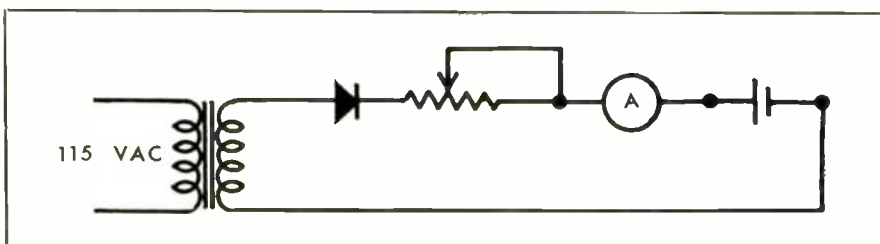
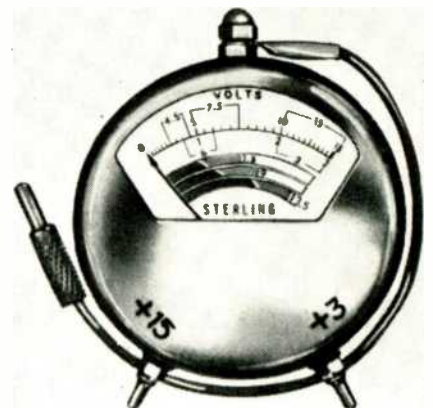


Fig. 1—Simple charging circuit schematic used for nickel-cadmium batteries.



Typical tester for transistor radio batteries.

to the lead acid battery as needed before each charge. Care should be taken not to overfill the battery. Most batteries have the electrolyte level marked on the battery case. If the battery is accidentally overfilled, an eye dropper or hydrometer should be used to extract the excess solution. It should also be understood that this solution is highly corrosive.

Should any be splashed on your body or clothes, the area should be flushed with water immediately for several minutes. When it is necessary to remove electrolyte from the wet cell, it may be necessary to adjust the specific gravity by adding sulfuric acid according to the manufacturer's instructions. Never add acid to a wet cell indiscriminately.

Batteries of the wet type should be charged at least once a month even though they are not used. After the wet battery is used, it should be brought to full charge as soon as possible. When not in use, wet batteries will give somewhat longer life if subjected to occasional total discharge and charge cycles.

Lead electrodes are used in the lead-acid cell with a dilute solution of sulfuric acid. The battery is comparable to the nickel-cadmium battery in ability to supply heavy currents and be recharged to full capacity. An explosive by-product (hydrogen) from the lead-acid battery during charging makes it imperative that all flames be kept away from the battery.

Testing

Like tubes or rectifiers, all batteries should be checked under normal load if the test is to be meaningful. In portable transistor radios normal load may be only a few ma or as much as 50 ma when the radio operates at high volume. TV sets which now use battery supplies are required to supply about three amps.

If the radio or TV is known to be in good condition (having proper current drain) the set itself may be used as a load. A VOM or VTVM is simply connected across the battery terminals with the set turned on. If the battery voltage drops to 70 percent of its rated output, primary cells should be replaced and

secondary cells should be recharged.

When wet batteries fail to charge fully or do not hold full charge after a short period of operation, the battery may require replacement.

Nickel-cadmium batteries can normally be recharged several thousand times and rarely require replacement.

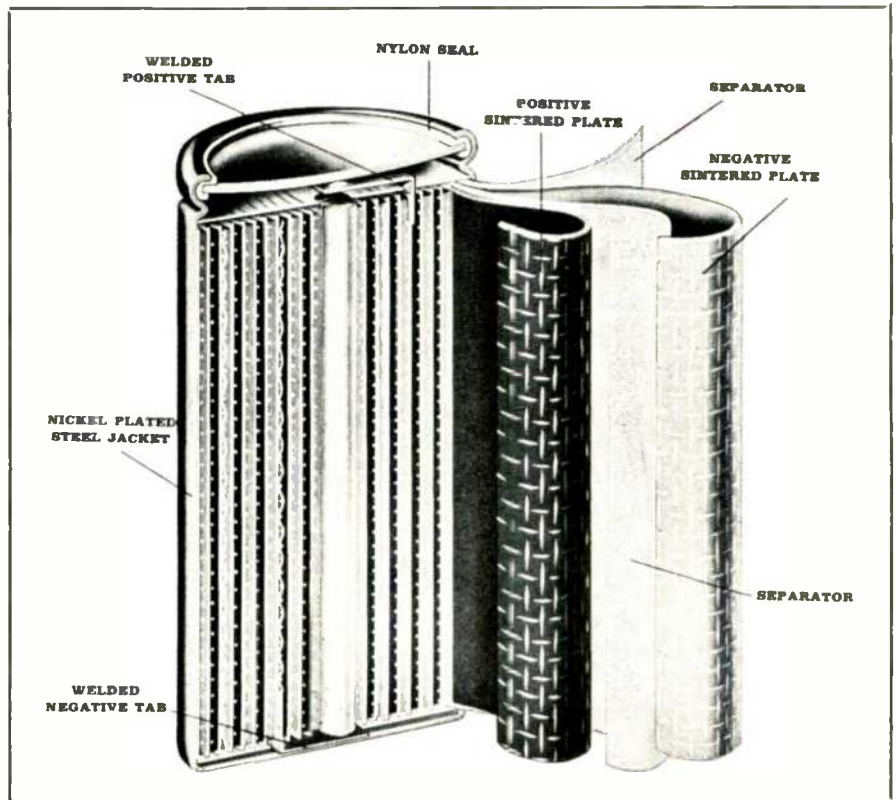
As primary cells age the internal resistance of the battery increases. Under no-load conditions, the battery voltage may remain near its

rated output. If a parallel load is placed on the battery, however, the internal resistance of the battery will drop the voltage.

When the device employing the battery can't be used as a load for testing, a resistor simulating the load must be used. If a 9 v battery is employed in a receiver which normally draws about 15 ma, by Ohms law: $9/.015=600$ ohms. Thus, a 600 ohm resistor would be required

Continued on page 49

A battery is checked with a VTVM while load resistor is held on battery terminals. Most batteries can be checked in this manner by bending resistor's leads.



Nickel-cadmium battery with cathode and anode wrapped together in a cylindrical cell.



by A. M. Anderson

Ray-O-Vac Co.

Transistor radios and other battery-powered devices have increased battery replacement sales nearly 200 percent in the past decade

Get Your Share of

■ "Are you getting a fair share of the business that rightfully belongs to you?"

That's the interesting question asked recently by a consultant at Madison, Wisconsin. He was looking for the answer to one local radio-TV shop's decline in profits.

Some radio-TV dealers and technicians are not getting their share of the radio battery business in their own neighborhoods.

Instead of ringing the cash registers of many local radio-TV shops, battery sales are going down the street to stores selling everything from bubble-gum to paper-back thrillers.

In a field where the radio technician is the only rightful authority, many are losing battery sales to "clerks" who know little more about radio batteries than their customers.

This appears to be a puzzler at first—especially when the battery replacement market alone has increased nearly 200 percent in the

last 10 years. Actually, it's just another case of "how to succeed without even trying."

How to Get Your Share

Alert technicians recognize batteries as a source of easy and fast profit. When properly located in the store they'll even sell themselves.

One of the first questions alert technicians ask is: "Who are my most likely customers?"

In most cases, it's the housewife who doesn't know anything about radio batteries, or how her radio works. She relies on the choice of her service technician, who is the only electronic expert she knows.

Alert manufacturers recognize that customers carry a particular mental image of individual brands, an image carried over from the advice of service technicians.

To manufacturers, this is real sales potential, and they have specially trained merchandising staffs to assist dealers and service techni-

cians. It is the job of this staff to know your problems and offer you the kind of merchandising help you need. The market research team investigates your problems and develops displays and promotions to fit your selling needs.

Case Histories

In one survey by a leading battery manufacturer it was found that many dealers did not have adequate stocks of radio batteries to service even the customers in their own neighborhoods. And these below-minimum stocks were haphazardly displayed and frequently covered with dust. New displays were developed which contained a balanced assortment of the most-asked-for radio batteries.

In some cases, dealers were found storing radio batteries, which are now "impulse" items, in back rooms or under counters. As a result, they were not taking full advantage of the opportunity available with im-

pulse items—namely, that sales are made when customers see the product displayed and are reminded of their need for it.

In other stores, it was found that battery sales increased when shoppers are given a chance to test both old and new batteries. As a result, simple easy-to-use battery testing stations were designed. These encouraged customers to test their batteries and replace with new ones. Displays contain a balanced assortment of the fastest selling radio batteries. Customers can test their bat-

teries on an easy to operate tester.

In still other cases, dealers were not promoting their stores as "neighborhood headquarters" for this type of equipment. None were convincing shoppers that they were the only real neighborhood authority on radio batteries. As a result, "headquarters departments" were developed by the manufacturer. Window banners and other "point of purchase" material were packed into the complete displays. These attractive displays helped the dealer sell shoppers on their "neighbor-

hood battery headquarters" idea.

It is this kind of basic research which has produced displays and merchandising help that will increase your sales. It is this material that manufacturers offer their dealers to help sell more of their brand of product.

Alert dealers who are taking advantage of manufacturers' merchandising aids are getting their share of battery sales. They are the dealers and technicians who seldom find cause to complain of "summer slumps" or declining profits. ■

Battery Sales

Total dollar-volume of battery sales since 1927

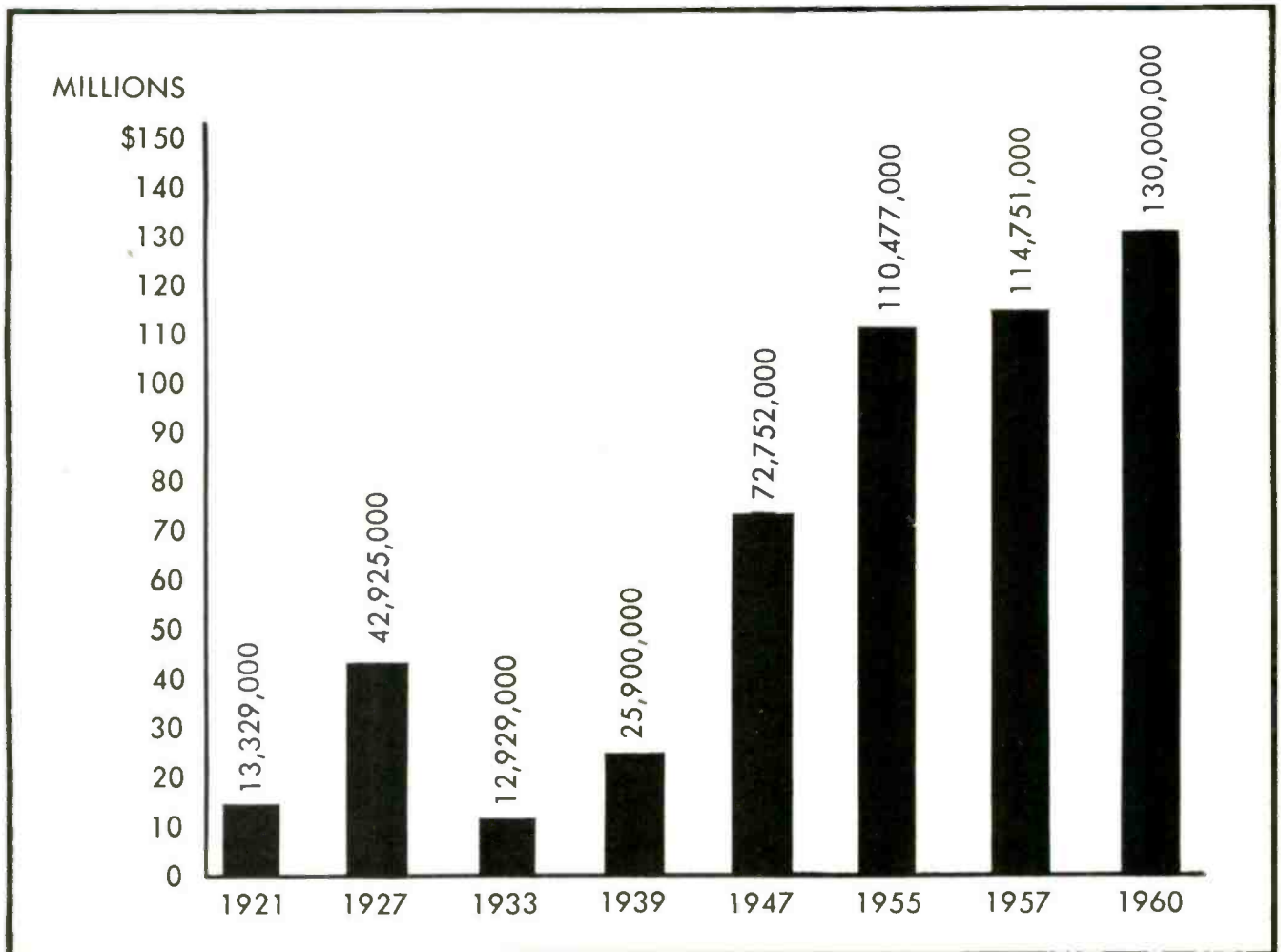
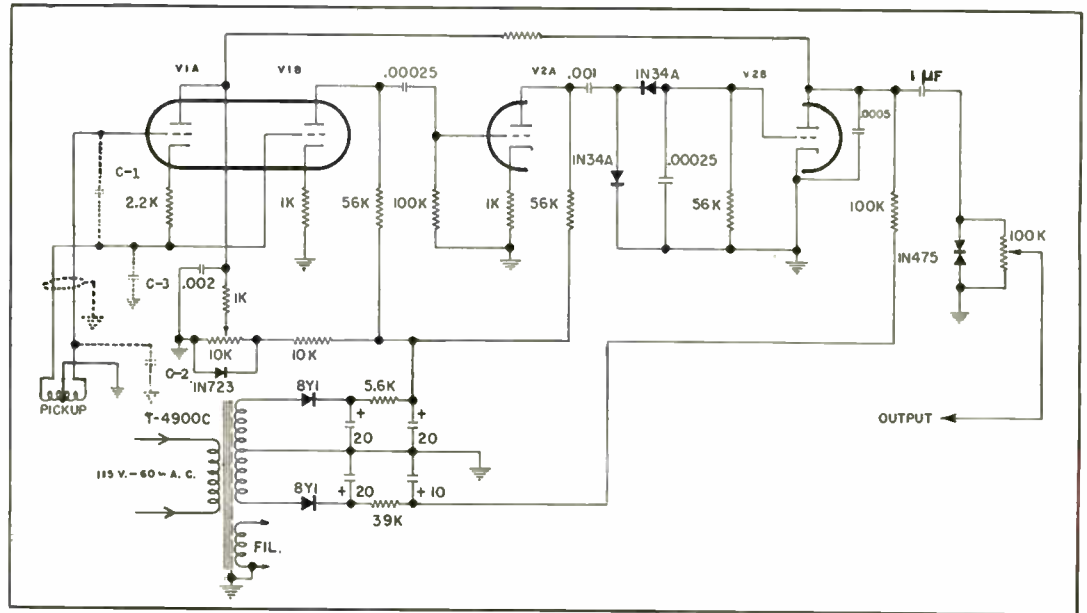


Fig. 1 — Typical oscillator type detector system schematic. V-1 functions as an oscillator-amplifier and V-2 amplifies the signal which is detected by the diodes. Zener diodes limit maximum output to about 15 v.



Application, theory and maintenance of industrial proximity detectors

by Allan Lytel

■ Automatic production lines and many types of machine tools are controlled by proximity detectors, sometimes called proximity switches. Sensing heads detect magnetic or non-magnetic materials, with or without contact. The head feeds other circuits which activate a relay controlling the production line action, machine-tool operation

or various other type controls.

One basic system uses an oscillator to create a magnetic field around the sensing coil. When a material enters the oscillator's magnetic field, the output amplitude is changed. This change is amplified, detected, and used to drive a relay, counter, or other "operators" or decoders.

A Typical Detection System

A typical detection system is shown in Fig. 1. Two dual triodes are used; V_{1A} functions as an oscillator and an amplifier. A sensor coil is connected between the grid and the low end of the cathode load for V_{1A}. Distributed capacitance of the twin conductor, which is shielded, is shown by C-1 across the coil. C-2 and C-3 represent the capacity of each wire lead to the grounded shield. The d-c path for the oscillator is from grid to cathode of triode B, and through the coil's grounded tap.

The high-frequency at the plate V_{1B} is coupled to V_{2A} and detected by two diodes which feed V_{2B}. The output amplifier V_{2B} is limited by two zener diodes and is amplitude controlled by the output pot.

When no object is in the sensing area there is no output. But when an object enters the sensor's field, and causes an amplitude change,

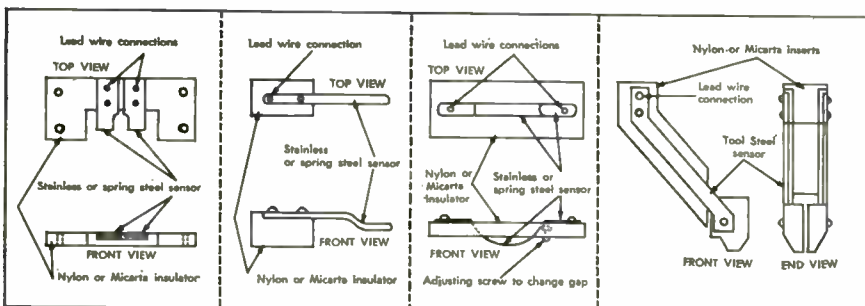


Fig. 2 — Pickups in contact type systems are used to count, check part positioning, and detect the presence of objects.

the detector produces a signal across the output load.

This particular control unit is capable of following field changes up to 1000 cps. It provides a nominal 15 v p-p pulse output across loads as low as 5000 Ω . At very low speeds (1-10 pps) and high impedance loads the output waveform appears "spiked" because of a differentiator network. At higher speeds the output is essentially a constant amplitude square wave. Near 1000 pps the negative portion of the waveform may be slightly rounded.

Pickup cable lengths 20 ft long may be used up to 100 pps but cannot be used for high speed operation. Ten ft cables permit opera-

tion up to 1000 pps and 5 ft cables increase the rate beyond 1000 pps.

hollow head may be required so that very small parts may be counted as they pass through it. Special sensitive probes may be used to detect double sheets of metal in a manufacturing process.

A careful study of technical data supplied by the manufacturer can serve as a guide to applications for specific sensing heads.

A different type pickup is shown in Fig. 4. A magnet which is part of a rotor, turns with the flow of fluid through a flow detector. As the magnet turns, it induces a signal in the pickup coil. This produces an alternating current at a frequency which is proportional to the rate of flow of liquid through the sensor. The total number of

is later "read" for sorting. An example of this type detector is shown in Fig. 5.

A loaded container with a "magnetic memory code patch" approaches an operator. The operator observes the approaching container and punches keyboard numbers corresponding to code for a desired divert or dump station. (This can also be performed by an automatic reading process.)

The transmitter unit receives keyboard information and translates it into memory logic. It is then transferred in the form of code to the magnetic writing head.

At the instant when the container passes over the magnetic writing head, a permanent magnet on the

Proximity Detection Systems

Sensors

Various sensor types are used depending upon the system and its application. Industrial uses—where it is necessary to check the ejection of small metal parts from an automatic die—often use contact types. Two stainless or spring steel strips are connected to an insulating base so that each small part is sensed. A signal is produced as the part is ejected. Other uses include checking position of blanks in dies, counting or measuring ball bearings and detecting rivets before a part is clinched. These types are shown in Fig. 2.

Non-contacting sensor heads come in several different designs for various applications. Typical heads are shown in Fig. 3. No one head is suitable for all jobs. The head may be used for cutting metal to a pre-determined length or a

alternations (pulses) produced is directly proportional to the flow rate. When the frequency of this signal is measured, the flow rate is indicated or recorded with a high degree of accuracy. The unit is made with fittings to match pipe where the element will be installed.

Other sensors are made for magnetic recording of information which

container triggers the transfer of code from the writing head to the container's magnetic memory code patch.

The container continues on the conveyor until it reaches the magnetic reading head coils corresponding to the code on its magnetic memory code patch. When the code on a container code patch cor-



Fig. 3—Actual heads which are used in various detection systems. Some use permanent cables, while others are fitted with plugs or receptacles.

Proximity Detection

responds with reading head coils (indicating desired divert station). it transmits an accurately timed signal to the divert station.

In closed loop systems the con-

tainer eventually returns to the beginning of the sorting operation where previous code is erased as a new code is inserted.

Other sensors utilize capacitive

and inductive pickups to detect, count, and control.

A typical contact system is shown in Fig. 6. This highly sensitive bridge-type transistorized control

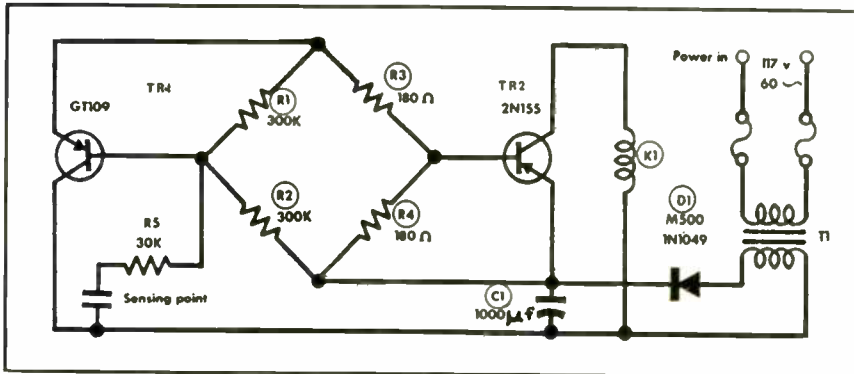


Fig. 6—Transistorized contact systems are used to count or detect the presence of conducting parts. Contact on the sensing points unbalances the resistive bridge circuit which causes transistor to saturate and energize relay.

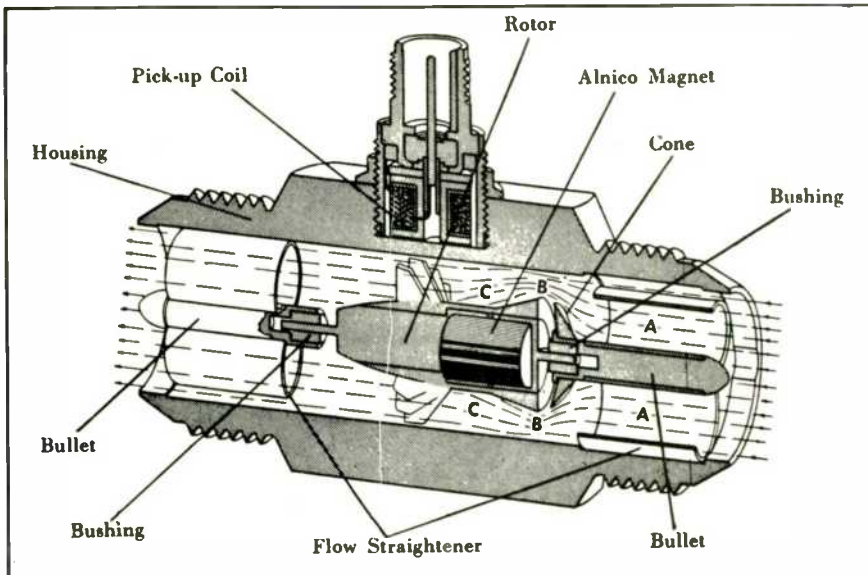


Fig. 4—Pickup used to measure liquid flow. Flow in pipe causes rotor to turn a magnet which induces a voltage in the stationary coil. Frequency of the induced voltage is proportional to the liquid's rate of flow.

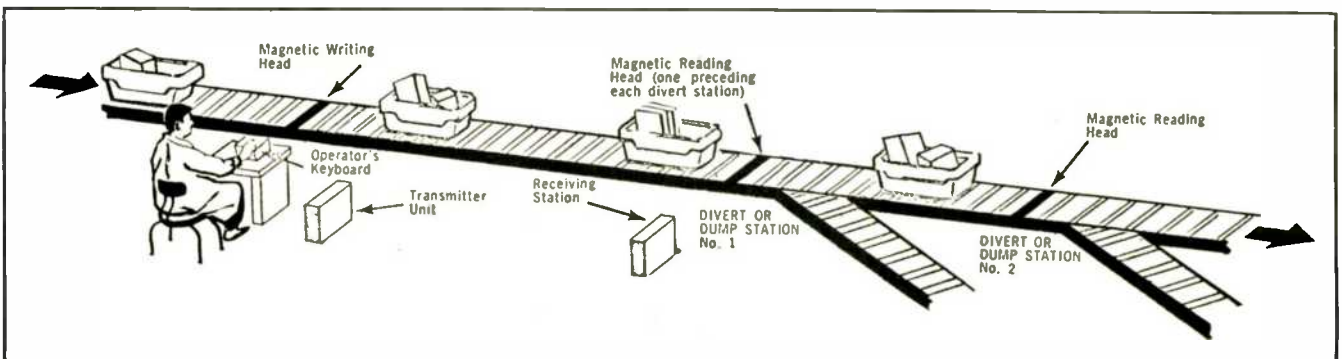


Fig. 5—Reading-sensors are used in this application to select destination of materials which have been electrically coded by operator.

Systems

uses very small currents, as low as 50 μ a, to prevent arcing at the point of sensing or switching. Two stages of transistor amplification are used to drive a standard 5-amp control relay. The control can use 1, 2, 4, 6 or 8 probes in series. All of these must be contacted to complete the circuit.

The detection of small, light, metal parts requires only their contact with the probe. Metal parts act as a resistor in the bridge used to bias the transistors. Unbalancing the bridge by decreasing the external resistance causes current to flow through the first transistor stage which triggers the second transistor. A relay in the collector circuit of the second stage is then energized to actuate control operations.

The low voltage and current present at the sensing point will allow the sensitive contacts to be only 0.0001 in. apart without causing actuation. A maximum of 20K ohms is required for sufficient unbalance to actuate the relay.

The unit detects up to 1500 parts per minute regardless of size.

Maintenance

Proximity detector systems can be divided into three parts: Sensor, detector-amplifier, and power supply. Of course, any part can be responsible for an inoperative or improperly operating system.

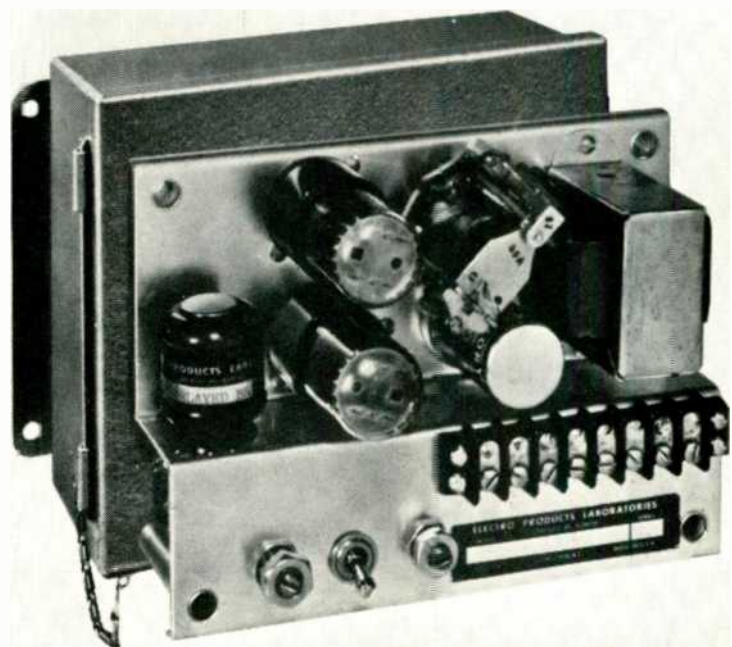
Sensing heads: When a coil is used, a resistance measurement on the coil's leads will quickly locate a break or open. A good spare unit, of the correct value, can quickly be substituted. If this restores operation, the original head is defective. Contact sensing devices can be tested by shorting the sensing points with an ordinary screwdriver to simulate the operating conditions. Care should be taken to insure that small contacts are not damaged.

Power Supplies: Techniques for determining the presence of a-c heater power and plate supply power are similar to those used with any electronic equipment.

Detector-amplifiers: in units which use a sensing bridge, shorting the terminals will simulate a detection. If this causes a proper output there is trouble in the sensing head. If this does not cause an output and the power supply is operating properly the trouble is in the amplifier.

Resistance and voltage checks can be used to isolate the defect.

Systems which use an oscillator can be checked with an a-m signal generator. The signal should be applied to the grid of the first amplifier to simulate the proper operation. A signal generator output of the frequency of the oscillator can be used, where the output level is varied to cause an output. This test should be first carried out on a good unit before it is used in troubleshooting. ■



Typical amplifiers used with proximity sensors, (top) Security Controls detector, and (bottom) Electro Products unit. Both units have built-in relays.

Alignment provides maximum channel separation and peak performance for f-m multiplexers

Servicing

by Paul Martin

■ Approval of an f-m stereo broadcasting system by the Federal Communications Commission brought new components to the hi-fi home entertainment field and new service problems for electronic technicians. Technicians are constantly faced with the need to become familiar with new theory and new repair techniques.

The stereo broadcasting system adopted by the FCC is compatible with monophonic and stereo receivers. An f-m multiplex adapter must be connected to a monophonic f-m tuner, however, to receive stereo broadcasts. The adapter is connected just ahead of the de-emphasis network in order not to attenuate portions of the composite stereo signal.

Frequency response of the f-m multiplex system is from 50 to 15,000 cps. Transmitting standards

prescribed by the FCC call for a separation of not less than 29.7 db between the two channels. This is comparable to channel separation on the best stereo disc or tape recording.

The integrated f-m multiplex receiving system consists of three basic parts: An f-m tuner and multiplex decoder, two audio amplifiers, and one speaker for each channel. If you know operating theory of f-m tuners and audio amplifiers, you'll have little difficulty understanding the multiplex system.

Although stereo multiplex equipment servicing is primarily confined to locating defective components and alignment, a knowledge of basic stereo broadcast principles is necessary before this job can be performed in a professional manner.

Stereo Broadcasting

A live stereo program is made before two microphones located a certain distance apart. This distance depends on the type of microphones and particular broadcast techniques. Each microphone (left and right) output is fed to separate inputs on a matrix where both signals are mixed. The matrix also has two separate outputs.

One matrix output consists of the algebraic sum of both left and right inputs ($L+R$); the other output consists of the left input minus the right input ($L-R$). Thus the two outputs are known as the sum and difference outputs, respectively. A schematic of a matrix (Fig. 1) illustrates the principle involved.

The $L+R$ signal is transmitted in the conventional manner. $L-R$ information, however, is used to amplitude modulate a 38 kc signal which in turn f-m modulates the main carrier. A 19 kc master oscillator and frequency doubler develop the 38 kc which is suppressed in transmission. Its sidebands carry the $L-R$ information. The 19 kc master oscillator (pilot frequency) also f-m modulates the main carrier. A functional diagram of an f-m multiplex transmitter is shown in Fig. 2.

A pilot frequency of 19 kc was selected because it "fits" between the maximum audio (15 kc) and the lower 38 kc sideband. The sideband frequencies are 23 kc and 57 kc. An f-m stereo frequency spectrum chart is shown in Fig. 3.

At the receiving end only the $L+R$ signal is utilized for monophonic reproduction. In the stereo receiver, the 19 kc pilot frequency is used to sync a 38 kc oscillator. This 38 kc is reinserted in the signal as shown in Fig. 4. A matrix is also used in the receiver (Fig. 5) to decode the sum and difference frequencies after they have been demodulated. Each signal (left and right) is then sent to its respective amplifier channel. Pilot and 38 kc sideband frequencies used in stereo broadcasts are above the range of normal hearing and are not heard in stereo or monophonic receivers.

Alignment

Adapter alignment is best accomplished by using the "dynamic system."

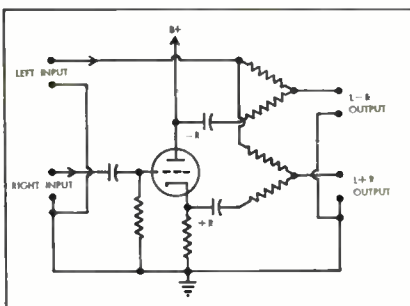


Fig. 1—Schematic of matrix used to form the difference signals from a left and a right channel input. The signals are added in resistive networks with isolation ($L+R$) and inversion ($L-R$) from the triode.

F-M Stereo Receivers

With a low reading a-c VTVM or a scope connected to the filter output and ground, feed a 67 kc (1 or 2 v) signal from an audio generator to the filter input. Adjust the 67 kc filter coil to minimum meter reading. The purpose of the 67 kc filter is to block the 67 kc subcarrier which is used for business music broadcasts (storecasting.)

The 23 kc and 53 kc bandpass coils are tuned using a similar technique. An audio generator signal

is fed to the input side of the band-pass filter with a meter or scope at the output. The coils are then adjusted for equal output when the generator is changed from 23 kc to 53 kc.

Tuning the 38 kc filters, oscillators, and traps require a stereo signal generator, an audio generator, an oscilloscope, and a wave analyzer. If a wave analyzer is not available, a 100 cps to 15 kc bandpass filter and an a-c VTVM may be used.

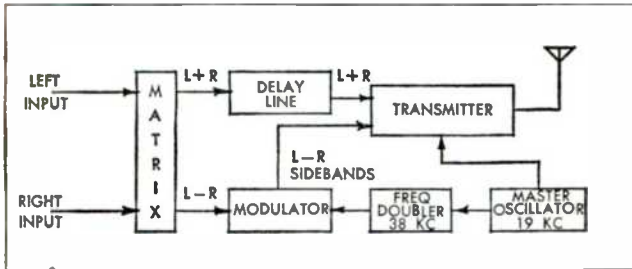


Fig. 2—Block diagram of a stereo transmitting station. Delay is incorporated to insure that left and right signals will be transmitted in phase.

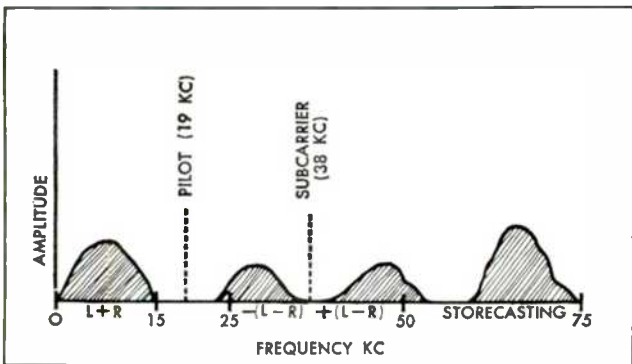


Fig. 3—Relative subdivision of the stereo broadcast spectrum.

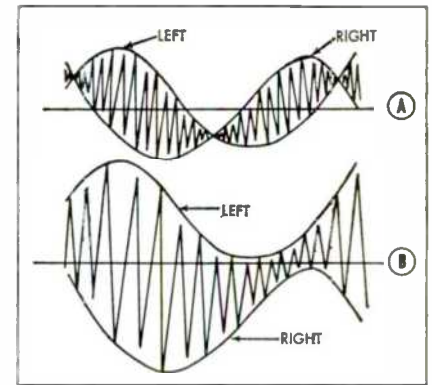


Fig. 4 (A)—Left and right channel signals as they are transmitted and (B)—after the 38 kc subcarrier is reinserted.

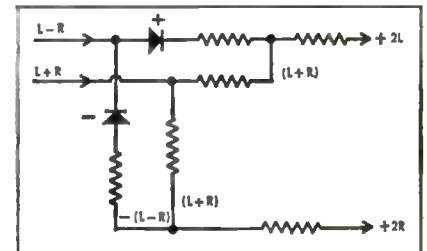


Fig. 5—Matrix circuit used to separate the sum and difference channels after the 38 kc subcarrier is reinserted in the receiver.

time delays are used to synchronize the signals. A typical test set-up is shown in Fig. 7. The wave analyzer or filter and meter is used to assure that only the audio signal is measured at the output. Some decoders are equipped with 38 kc filters. Although these ultrasonic frequencies cannot be heard, a

meter is able to measure them. Set the audio generator at 1 kc and connect it to the right channel of the stereo generator. Connect the scope to the stereo generator output and proceed as follows: Adjust the 1 kc audio until the composite is 10 times greater than the pilot signal as seen on the scope (the 19 kc

signal is 10 percent of the whole signal). Feed this 100 percent modulated signal to the multiplexer input. With the scope connected to a point just ahead of the detector, adjust the 38 kc coil for maximum deviation. The signal's amplitude will vary from 10 to 50 v p-p depending on the multiplexer design. This signal is the ultrasonic carrier of the L-R information. The 19 kc filter should be adjusted till the scope shows maximum symmetry and signal stability.

Next, with the audio generator still connected to the right stereo generator input, connect the wave analyzer or filter and meter to the multiplexer left output. Turn the L+R adjustment to obtain a minimum reading and note the signal's db level. Connect the audio generator to the stereo generator's left input and note the increase in signal output over the minimum db level previously recorded. The difference is the left channel separation. Twenty db is considered acceptable, although low. To measure right channel separation, connect the ana-

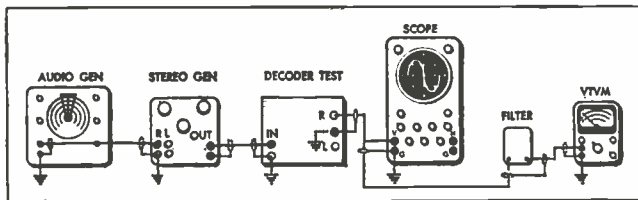


Fig. 6--Block diagram of a stereo generator used to test and align stereo multiplexers. Signals for the L and R input are obtained from a regular audio generator.

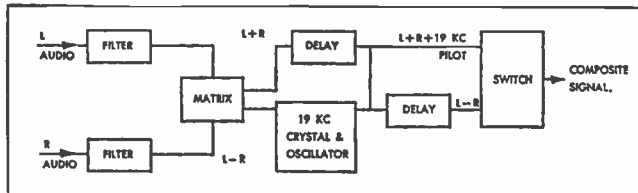
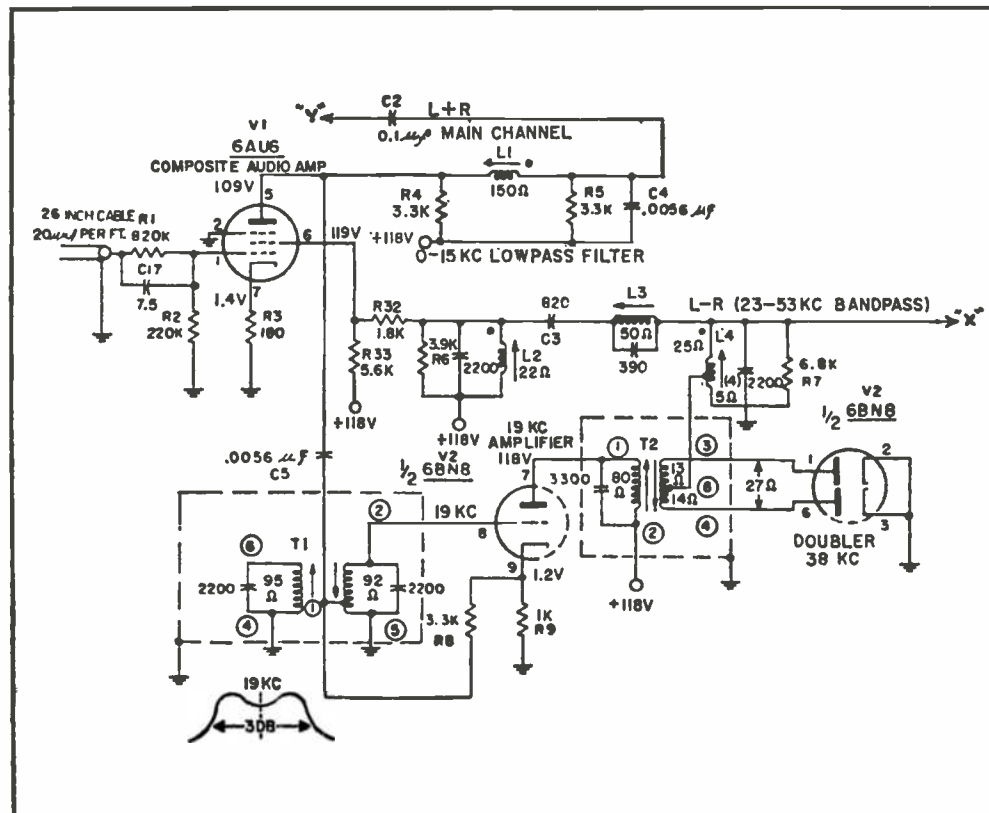


Fig. 7--Test setup to align multiplex units. Filter provides only an audio pass-band for signal measurement during alignment.

Fig. 8--Schematic of a typical stereo multiplex adapter.



lyzer or filter meter set-up to the right channel output. Note the signal's db level and then connect the generator to the left input. The difference in these readings is the right channel separation.

Aligning With BC Signal

Alignment for good channel separation can be accomplished whenever necessary by using only the stereo broadcast signal. Carefully set the tuner to a station broadcasting a stereo program. Check the tuner alignment, paying particular attention to the discriminator or ratio detector.

Separate the speakers a few feet at each side of the chassis. This will allow you to listen to the set while in a nearly normal listening position. Switch the stereo off and turn the balance control until the sound appears to be directly in front of you. Turn the stereo on again and ground the stereo modulation at the matrix input with a short clip lead. Adjust the 19 kc coil until you hear oscillations; then turn the slug in the opposite direction until

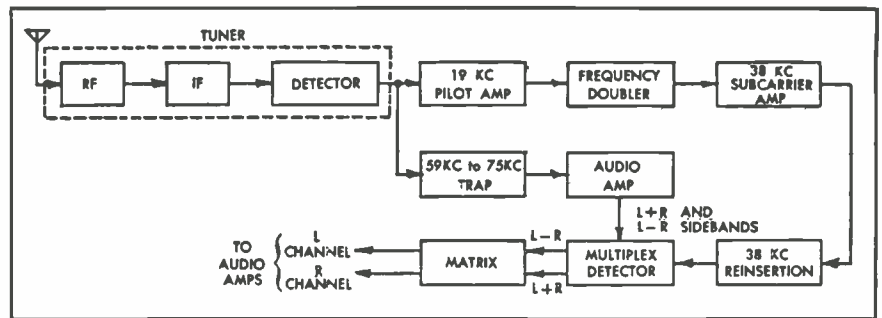
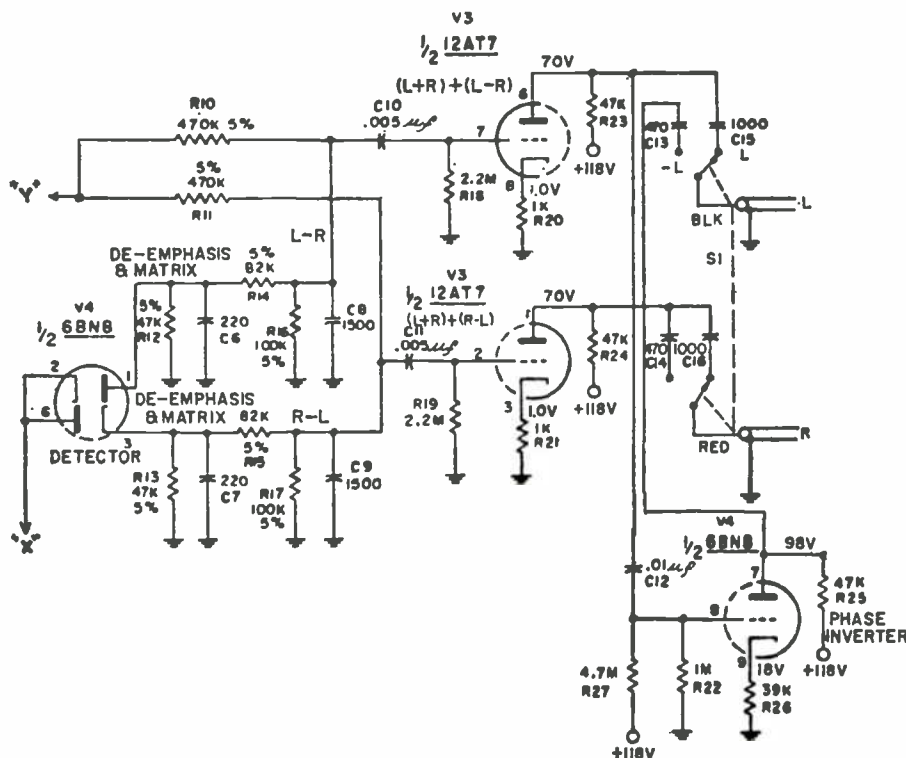


Fig. 9—Block diagram of a stereo receiver. The standard tuner portion is shown within the dotted block.

oscillations cease and once again become apparent. Leave the slug midway between settings where oscillations were noted. When the multiplexer is badly misaligned, this step may be difficult. Adjust this as well as possible, however, and proceed to the next step. Adjust the 38 kc coil for the loudest, clearest signal and readjust the 19 kc coil. Remove the short from the stereo modulation and listen carefully to the sound. It should appear to be coming from each speaker (stereo

effect); if not, adjust the L+R signal until the sound is proper. Should the set show a tendency to reproduce storecasting audio, adjust the 67 kc coils to minimize the storecasting signal.

Remember, the most important factor in servicing f-m multiplex equipment is careful and proper alignment. This produces the best channel separation. Troubleshooting the multiplexer is greatly simplified by using alignment procedures to locate defects.



Remodulation of a-m signals on clear channels and realignment of i-fs eliminates interference from TV receivers in cable distribution system

by Don Rogers

Jerrold Electronics Corp.



Put the 'Damper'

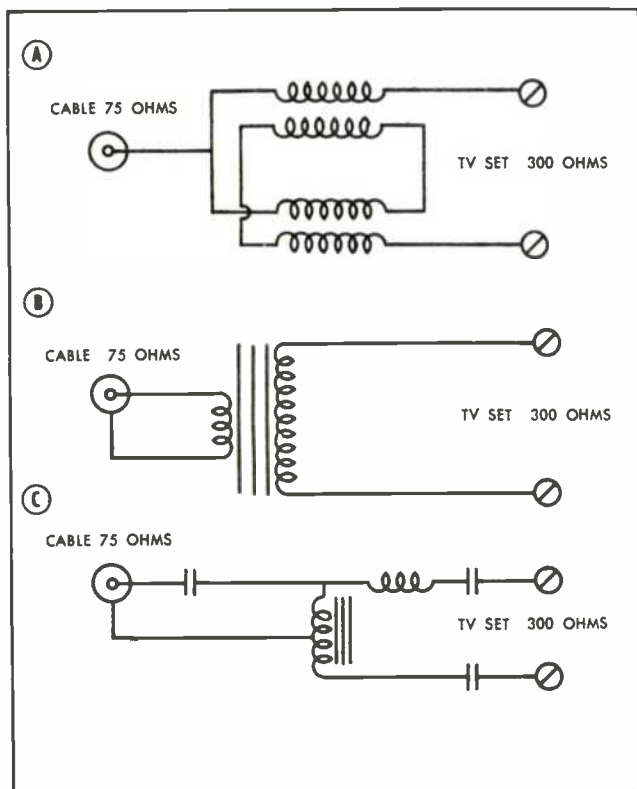
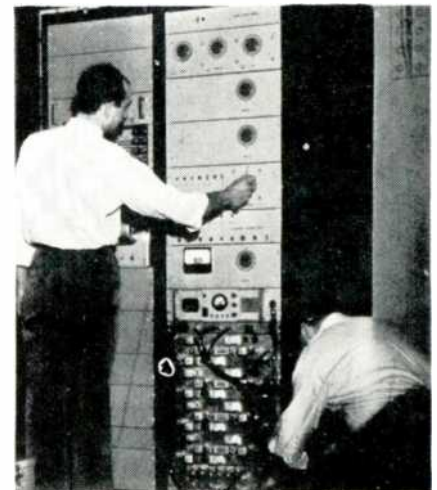


Fig. 2 (A) Transformer for matching coaxial cable to TV's 300 ohm input; (B) Matching transformer which provides isolation of low-frequency signals, and (C) Matching transformer hook-up for securing low-frequency isolation by using series capacitors (about 75 pf).

■ Interference from harmonics of TV horizontal deflection circuits is playing havoc with a-m radio reception. In many areas a-m radio dials are so full of "whistles" and "birdies" that satisfactory radio reception is frequently impossible. Whistles can even be heard on automobile radios while passing houses where "radiating" TV sets are operating.



Technicians installing components of cable distribution system.

on RFI

Problem Solutions

TV horizontal deflection interference can be controlled by observing certain manufacturing design precautions, and by shielding the TV's radiating circuits. But many sets now in use weren't designed with these precautions in mind. Additionally, many other TV sets now in operation do not have their original quota of shielding hardware. For example, the innumerable sets which have "lost" one or more high voltage cage screws. These screws were not placed here simply to hold the cover in place.

There is an alternate solution to this problem: The Federal Communications Commission could reassign all a-m station frequencies to fall half way between the offending TV harmonics. This solution appears too revolutionary, however, to offer immediate relief.

The aforementioned principle of "reassigning" all a-m station frequencies between offending harmonics *can* be applied satisfactorily to cable distribution systems han-

dling both a-m broadcast and TV signals. Although these systems are generally installed only in large hotels and apartment houses, the basic principle could be used in community and home TV distribution systems, too.

Practical Methods

A cable system carrying a-m and TV signals is usually laid out as shown in Fig. 1. Satisfactory performance of the system's a-m radio portion depends on a number of factors. These are: proper combination of a-m channel frequencies; the i-f of a particular a-m receiver; set design factors; physical spacing between TV and radio sets—whether in the same room or an adjoining apartment; and grounding of conduit and cable braid.

Another essential requirement is TV matching transformers which provide isolation at a-m frequencies. Schematics of matching transformers are shown in Fig. 2. Types shown at "B" and "C" give a-m frequency isolation. A final consideration is a-m signal strength. Sufficient signal is needed to suppress weak birdies through receiver AVC action.

A more thorough approach to "whistle-free" radio reception calls for demodulation of each radio station signal and then remodulation of each signal on a clean channel for the cable. Any good receiver or tuner may be used for demodulation. This method has the added advantage that f-m programs can also be placed on the cable

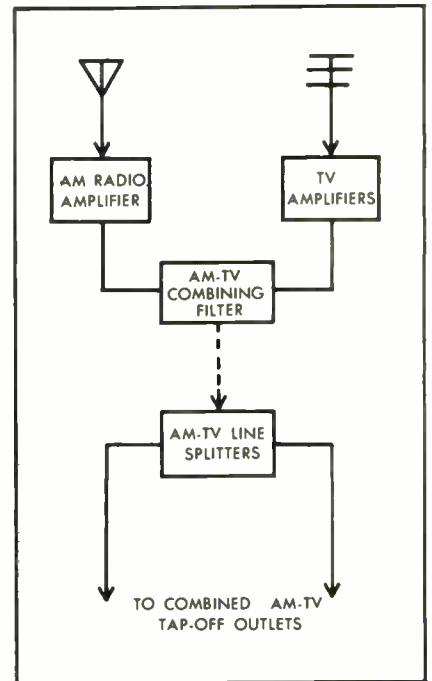


Fig. 1—Typical a-m/TV cable distribution system block diagram. Feeders go to a-m/TV tap-off outlets where isolation is provided.

through f-m tuners. A functional block diagram of this system is shown in Fig 3 on the next page.

Preferred channel frequencies for remodulation are shown in Table I. Channels are located at the odd harmonics of 7871.066 cps. This frequency has been selected because it represents the horizontal circuit frequency average of color and B/W. Accurate values are rounded off to the nearest kc.

Remodulation is accomplished with simple two-tube cable transmitters. A cable transmitter sche-

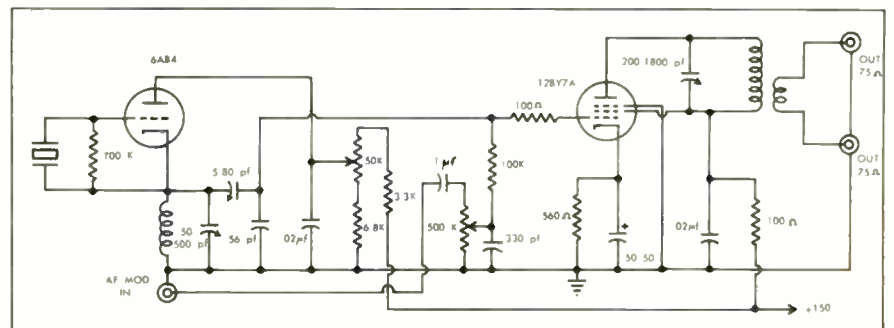


Fig. 4—Schematic of two tube crystal controlled cable transmitter for remodulating a-m signals.

Put the 'Damper' on RFI

matic is shown in Fig. 4. Each consists of a crystal oscillator and a modulated amplifier, with the output inserted in a through line so that a number of output signals can be mixed into the same cable.

Since the lower harmonics of a TV's horizontal circuit fundamental frequency are very strong, we must also consider a-m receiver intermediate-frequency interference. Fortunately, for example, a 465 kc

i-f receiver is aligned near a clear frequency at 464 kc and is generally free of i-f interference. But the 456 kc receiver is aligned near an objectionable harmonic and will often suffer from interference which changes pitch as the receiver is tuned across the station. (Direct r-f interference is fixed in pitch, of course.) The cure for this particular trouble is to realign these radios to 464 kc. Of course, it will be

necessary to touch up oscillator tracking.

Other popular intermediate frequencies shown in Table II are less common, but receivers can usually be realigned a few kc if variable pitch whistles are present. ■

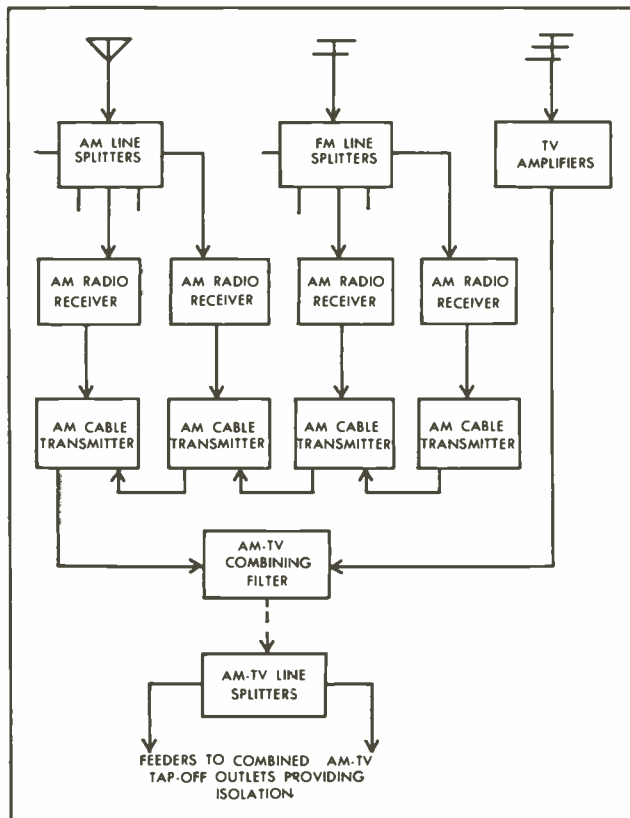


Fig. 3 — Functional diagram of improved a-m, f-m, and TV distribution system where a-m signals are demodulated and re-modulated on clear channels to avoid TV horizontal interference.

TABLE I
Interference-free channels for AM radio, KC.

559	827	1094	1362
575	842	1110	1377
590	858	1126	1393
606	874	1141	1409
622	890	1157	1425
638	905	1173	1440
653	921	1189	1456
669	937	1204	1472
685	953	1220	1488
701	968	1236	1503
716	984	1251	1519
732	1000	1267	1535
748	1016	1283	1551
764	1031	1299	1566
779	1047	1314	1582
795	1063	1330	
811	1078	1346	

TABLE II
Interference-free i-fs for a-m radio, kc

Nominal IF	Realign to
132	134
175	181
262	260
456	464

Improper i-f in radio receiver may result in tunable-pitch interference from TV receivers.

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--- for more details circle 15 on page 48



Difficult Service Jobs Described by Readers

Video Detector Clips Sync

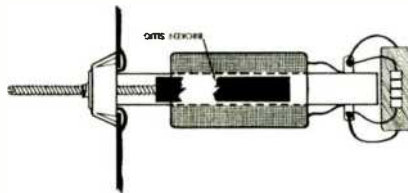
An RCA chassis KCS-122 BPM was brought into the shop with no sync. A substitute CRT was connected, and all sync tubes were checked. Voltages on the sync amplifier, sync separator and sync output appeared close to normal. I then proceeded to trace the sync with a scope. There was ample sync and video on the grid of the 6AW8 but nothing on the plate! Although the plate voltage was slightly lower than the schematic called for and the grid voltage was a little more negative, I did not consider them sufficiently off to cut out the sync all together. I checked to be sure there was continuity between the socket pins and the tube; checks in the plate circuit, and the 150v supply proved fruitless.

In desperation I put a positive bias on the amplifier grid (6AW8), and was delighted to find sync restored. All coils and resistors in the grid circuit checked out perfectly. I finally decided that the trouble had to be in the diode detector, CR1. Sure enough, substitution of a new diode restored normal operation. — *Robert Barron, Avalon, N. J.*

Slug Trouble

An Admiral C24M32 Chassis was checked out in the customer's home for no horizontal sync but had to be brought into the shop. The horizontal lock affected the frequency but would not sync the picture. The TV worked fine on the bench for several days and we returned it to the customer's home. About a month later, we received another call that the set had lost sync again. We removed the set and found that it worked fine during another bench test.

Six months went by before we got another call. Once again, the picture had lost sync and the custom-



Slug in horizontal coil was broken and movement corrected the hold problem each time the set was placed on the bench.

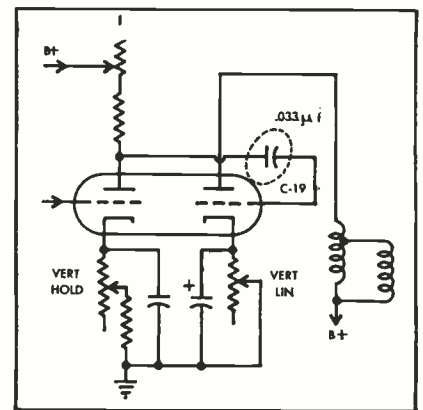
er could not adjust the lock control enough to sync the picture. The TV was put on the bench for a third time. This time I noticed that the lock control had little effect on frequency. I removed the 3900 pf capacitor and the 56K resistor to check their values and found the slug all the way to the rear of the coil even though the adjusting screw was all the way forward. The slug was broken. After I replaced it, the set worked fine.

Each time I had removed the set for a bench check I carried it so that the slug moved to its correct position at the rear of the coil. Questioning the customer, I found that each time he called with a complaint, the set had been moved. To move the TV, he stood in front and grasped the rear of the set tilting it forward on his legs. This caused the slug to move forward and the set to lose sync.—*Virgil J. Miller, Preston, Iowa.*

Hot Capacitor Shrinks Picture

On a house call for a Philco chassis 8L41, the customer complained of vertical shrinkage top and bottom. A new 6CS7 vertical oscillator corrected the shrinkage, but a call-back presented the same problem. The new tube had lowered in emission on the vertical output half. A new tube again corrected the trouble, but we had a call back two days later so we took the chassis into the shop. A bench check

showed everything normal, but after one hour the bottom started moving up. We found that a production change called for R-62 to be changed to 4.5K, 4 watts. The



Erratic vertical output was caused by heat-sensitive capacitor.

change was made and after five hours operation, it appeared normal. The set was allowed to cool; and turned on again; it operated about 45 minutes and began to shrink. Checking voltages I noticed that touching C-19, caused the set to slowly return to normal. When a heat lamp was directed on this capacitor a small positive voltage appeared on the vertical output grid. We used a freeze-can spray on the capacitor and changed the grid back to zero. Substituting this capacitor returned the set to normal operation.—*Howard Keilholtz, Elliott City, Md.*

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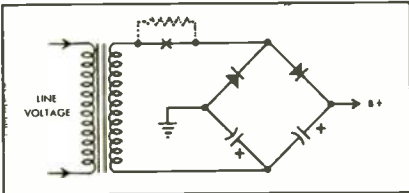
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SHOP HINTS

TIPS FOR HOME AND BENCH SERVICE

Seleniums to Silicons

When replacing selenium rectifiers with silicon units in TV sets a fuse resistor should be added unless



Selenium rectifier circuits which are modified with silicon units should be protected by the addition of a fuse resistor.

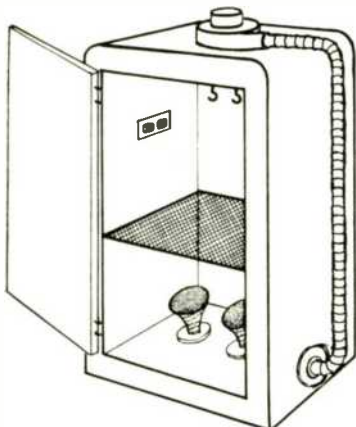
one is already installed. When a silicon rectifier shorts and a-c is placed across the filter capacitors, a damaging explosion may result. Since there is less voltage drop across a silicon rectifier, the added resistance of the fuse-ohm will not affect output voltage.—Frank M. Dickinson, Stony Point, N. Y.

● It is also wise to make certain that all electrolytic filters in the TV are in top condition before substituting silicon rectifiers — Ed.

'Hot Box' for Intermittents

Tracking down an intermittent in our shop used to be a trying job but not since we built a heat treatment cabinet to help us locate defective parts.

The cabinet is lined with fiberglass and has an expanded steel plate shelf half-way between the top



Hot Box can help heat-test electronic equipment and speed locating thermal intermittents.

and the bottom which is supported and braced with angle iron. Two hooks are installed in the top of the cabinet to hang small equipment and for quick-drying painted parts.

The heater consists of two 500 watt spiral cone-type heating elements which are mounted on the bottom of the cabinet. To help the circulation, we mounted a centrifugal fan outside the cabinet, which returns the air from the top to the bottom through flexible tubing.

Electrical outlets are installed inside the cabinet so the equipment can be operated while being heated. After a few minutes borderline components are "finished off" and are easy to find.—Harry J. Miller, Sarasota, Fla.

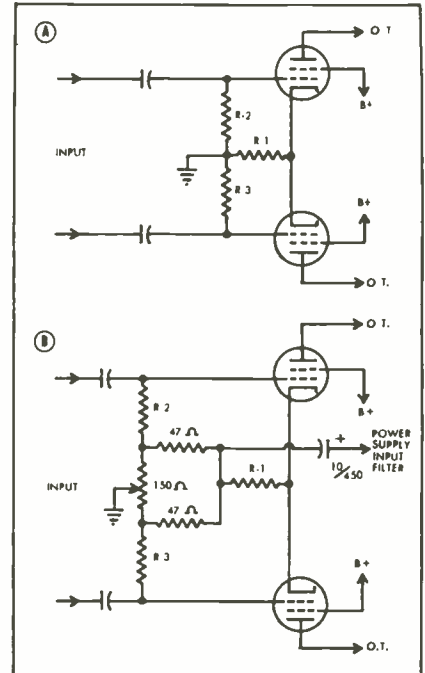
● Another kink to this would be a small glass window in the door so TV pictures could be viewed as sets are heated. A thermostat could be installed on the heaters to maintain any desired temperature.—Ed.

Hi-Fi Hum

Many Williamson type amplifiers have inexpensive anti-hum circuits which do not give optimum results. Technicians who wish to do the best job for their customers, can add a balancing pot and a few components to the output stage in about 15 minutes. The revised circuit reduces hum in the output stage. Existing anti-hum circuits reduce the hum in preamp and voltage amp stages.

The accompanying drawing shows how the circuit is changed so that the output stage can be balanced even if the output tubes and grid resistors are not matched. The components can usually be mounted on existing terminal strips or tube socket terminals.

The control I use is an IRC #112-150 (150 ohms). The circuit is similar in design to that used in the Williamson amplifier but has better hum-reducing characteristics. As components and tubes



Hi-Fi amplifier hum can be reduced with the addition of a balance control in the output stage.

age, the pot should be readjusted for minimum hum.—M. G. Goldberg, St. Paul, Minn.

Slotting Control Shafts

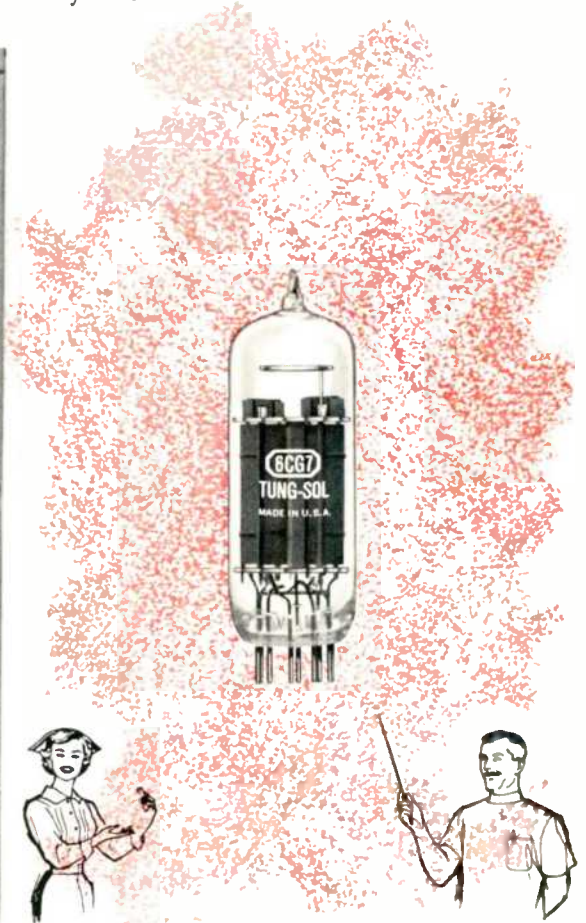
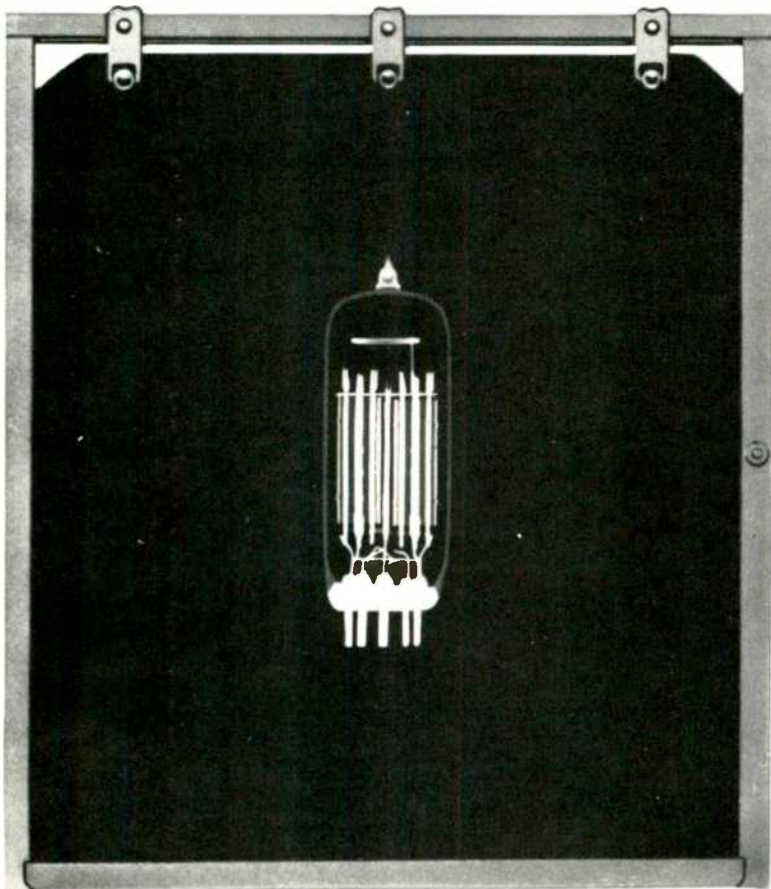
Some replacement volume control shafts must be slotted to accept push-on knobs. Using a standard hacksaw blade does not usually make the slot sufficiently wide. A spare blade can be taped to the one in the hacksaw, however, for cutting a slot twice as wide. The taped points should be about eight inches apart to allow sufficient cutting stroke. Score the shaft end with a three-cornered file. — H. Davidson, Fort Dodge, Iowa.

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"VERY STABLE AND GOOD DETAIL..."

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3 Solder Dispensers: Literature describes a wire solder dispenser which handles solder from 22 to 15 gage. Can be held in vertical, pointer, or pistol position. Weller Electric Corp.

4 CB Equipment: Catalog is a buying guide for precision radio crystals, electronic equipment, and Citizens Band accessories. Contains suggested oscillator circuits, plus technical information on selecting proper crystal. International Crystal Mfg. Co.

5 Soldering Guns: Literature describes trigger-heat soldering guns for either a-c or d-c operation, 75 to 150 w. Irons are provided with interchangeable tips. Wall Mfg. Co.

6 Electronic Equipment: Catalog lists a full line of d-c/a-c converters, chargers, relays, variable transformers, coaxial connectors, standard parts and components, plus many hard-to-obtain items. Tubes and transistors included. Barry Electronics Corp.

7 Push Button CB Selector: Specification sheet describes a channel push button selector for use with the HG-105 Tr Transceiver. Hammarlund Mfg. Co., Inc.

8 Speaker Systems: Illustrated, colorful, brochure covers Music/Aire weatherproof speaker systems designed for indoor and outdoor applications. Includes specifications. Also, catalog sheet on underwater speakers. University Loudspeakers, Inc.

9 Speakers: Illustrated literature covers the firm's line of micro-gap replacement speakers. Included are: 6x9" oval inverted auto speaker; 12" round speaker; 4" square outdoor speaker; 6x9 oval auto speaker; and 7½" inverted pin cushion speaker. Utah Electronics Corp.

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BATTERIES

Continued from page 27

in parallel with the battery when measuring its voltage with a VOM (neglecting the meter resistance). When the current drain of transistor radios or drains of batteries used in "B" supplies are not known, 100 ohms/volt resistive load is a good rule-of-thumb value.

Current drains on TVs and other devices vary widely. The manufacturer's literature should be consulted to obtain actual current figures if the device can not be used as the load.

Battery Storage

Temperature is an important factor in battery performance. Standard zinc-carbon batteries are designed to operate as specified, at about 70°F. When these batteries are exposed to temperatures above 130°F., sudden failure may result. With this qualification, the battery output of zinc-carbon types may be said to have a higher output with higher temperatures. Consequently, batteries of this type become almost useless after being exposed to very cold temperatures.

Zinc-carbon cells should be stored in a cool location to prolong operating life. Freezing temperature storage can prolong the "shelf life" of dry cells for several years. Before full power can be obtained from batteries stored in low temperatures, however, they must be allowed to warm to room temperature.

Alkaline-manganese batteries operate efficiently at very low temperatures but also have shortened lives when exposed to higher temperatures.

Nickel-cadmium batteries operate over the widest range of temperatures of all batteries. The power output from these batteries falls off at both temperature extremes, though they will operate efficiently from -58°F to 158°F.

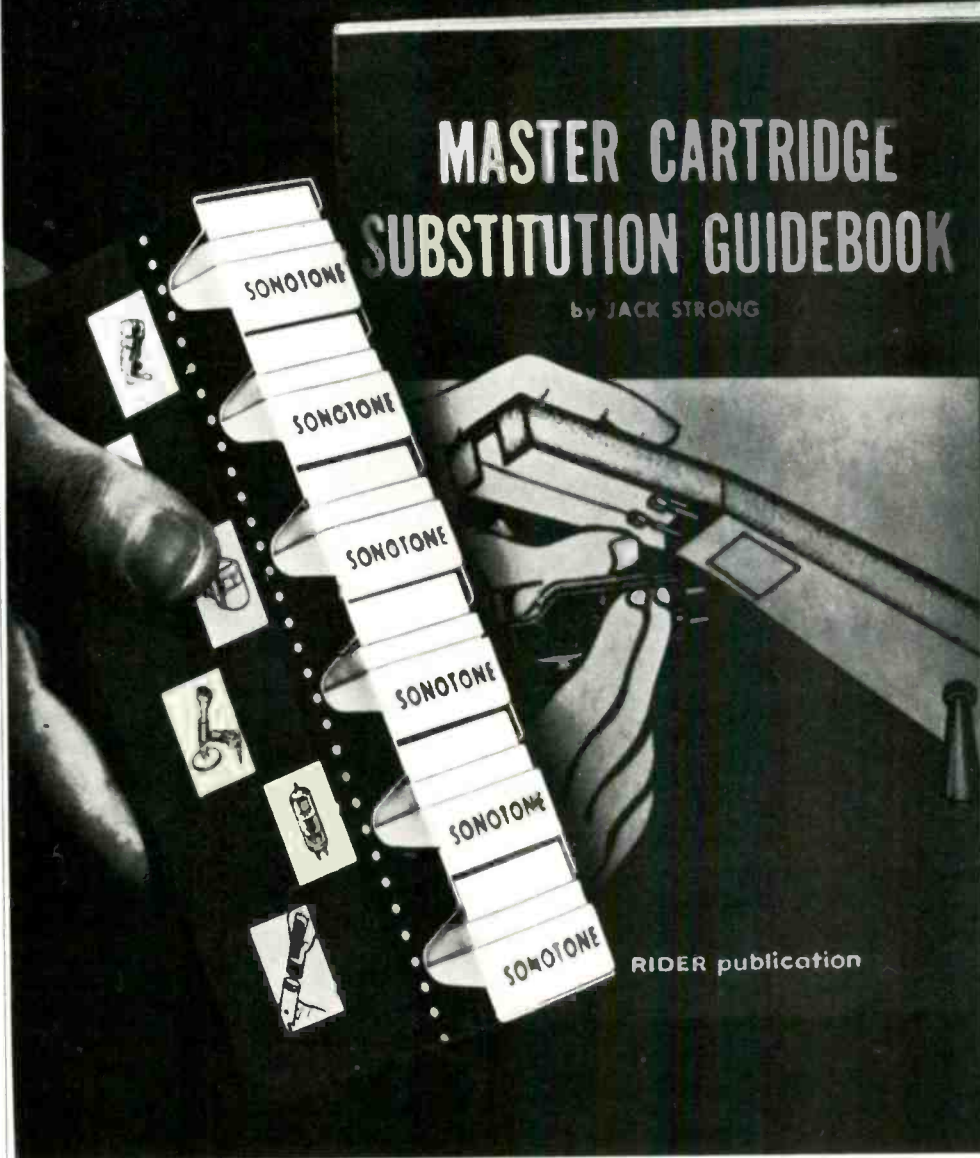
Manufacturers' recommendations should be followed for preserving lead-acid batteries during storage. Some types can be drained and stored for extended periods. ■

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JUNE 1962

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POWERFUL PROFIT-PRODUCING COMBINATION—YOURS FROM SONOTONE

What a profit-making combination — the industry's finest replacement cartridges in the new, handy Sonotone 6-PAK plus the new Rider "Master Cartridge Substitution Guidebook" (regularly \$2.00), for the price of the cartridges alone. This guidebook, world's greatest source of cartridge replacement data, enables you to locate the exact or equivalent replacement for nearly every record player manufactured since 1930.

HERE'S HOW TO GET YOUR FREE GUIDEBOOK— Visit your distributor and select any 6 Sonotone cartridges. Or choose one of the pre-selected 6-PAK combinations that include the most needed cartridges for the most frequent replacements. With your purchase, your distributor will

give you a valuable coupon — one for every six Sonotone cartridges. Mail the coupon to Sonotone Corp., Electronic Applications Division, Elmsford, New York. You'll receive your free Rider "Master Cartridge Substitution Guidebook" by return mail. It will make your stock of Sonotone cartridges more valuable than ever before.

Visit your parts distributor today. Order a Sonotone 6-PAK — and receive your valuable "Cartridge Substitution Guidebook" Coupon. (This offer expires Aug. 15, 1962).

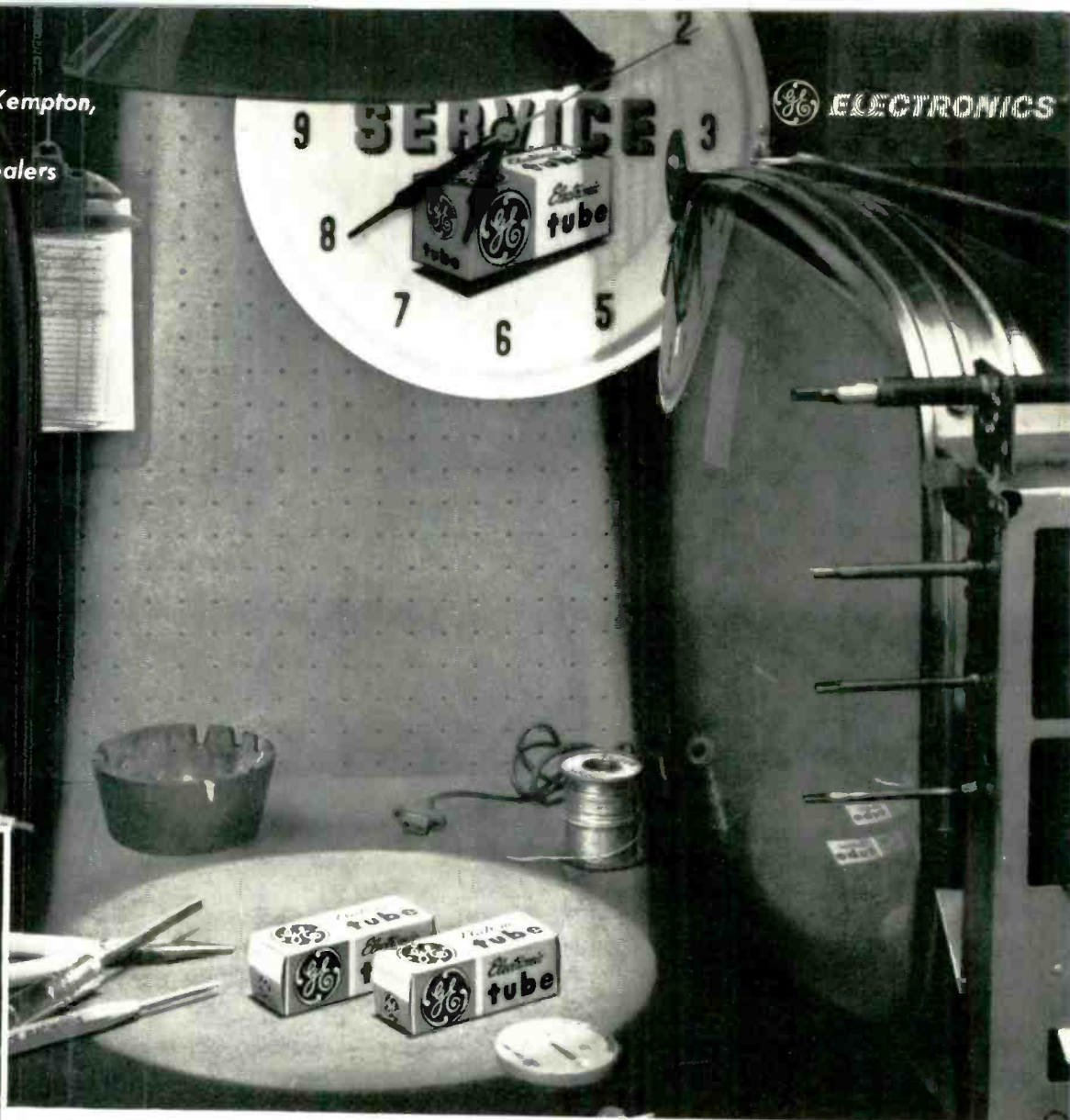
ELECTRONIC APPLICATIONS DIVISION
SONOTONE® CORPORATION

Elmsford, New York • Canada: Atlas Radio Corp., Ltd., Toronto
Cartridges • Speakers • Tape Heads • Microphones
• Electron Tubes • Batteries • Hearing Aids

— for more details circle 44 on page 48

G-E reporter, Roland Kempton,
makes the rounds with
independent service dealers

GE ELECTRONICS



No callbacks tonight for Jim Liston, thanks
to his in-warranty failure of less than 1%
with G-E *SERVICE-DESIGNED* receiving tubes

"In this business, a reliable replacement tube can make you look like a hero . . . a callback due to in-warranty failure gives you a black eye, and wastes time and money. So, it's real simple, why I use G-E *SERVICE-DESIGNED* tubes in almost everything that comes into the shop. I can't afford callbacks."

Jim Liston is the owner of SOUTH CITY TV, South San Francisco, Calif. G-E *SERVICE-DESIGNED* "universal" replacement tubes help protect his profits—and his reputation. Here are just a few of their typical high-reliability features: (1) Rhenium-tungsten heaters increase tube reli-

ability up to 4½ times. (2) **Three- and five-ply plate material** provides uniform heat conduction and radiation. (3) **Straight-sided bulbs** give more uniform heat dissipation. (4) **Tapered pins** prevent socket damage; save time. (5) **Tubes are interchangeable in all sets.** General Electric Company, Distributor Sales, Electronic Components Division, Room 1743, Owensboro, Kentucky.

Progress Is Our Most Important Product

GENERAL  ELECTRIC

NEW PRODUCTS

RADIO TROUBLESHOOTER 200

A transistor radio troubleshooting instrument promises to be indispensable and time saving to technicians. The ver-



satile unit, model 36-568, tests PNP, NPN, power transistors, diodes and semi-conductor rectifiers. Operates as a 400 cps signal generator, power supply — battery eliminator, battery substitutor. Operates on 110-125 v., 50-60 cps, and weighs 5½ lb. Dealer's net \$49.50. GC Electronics Co.

TUNER-AMPLIFIER 201

Integrated multiplex tuner-amplifier, designated the 5761 GMX Stereo Center. The unit has a Foster-Seely dis-



criminator circuit for low noise levels and minimum distortion. Tuner sensitivity rated at less than .5 μ v at 20 db quieting, and amplifier section provides 60 w stereo output. \$319.95. Complete specifications available Eric Electronics Corp.

HALF GRAM TONE ARM 202

A new tone arm, model 1200, offers ½ gram tracking for stereo records. This



new tone arm makes one half gram tracking possible through use of an exclusive single pivot bearing for friction-free motion in all planes and ultra light-weight construction for the lowest possible mass. The entire moving assembly weighs only 6 oz. Installation requires a single hole, and it is done in minutes with unique mounting. No soldering is necessary as signal cables plug into special receptacles which are an integral part of the mounting system. Pickering & Co., Inc.

TRIMMER CAPACITORS 203

Introduced is an economical new piston glass capacitor series models VC76-VC79. Available with a variety of mountings and terminals, the new units offer a high capacitance range in an intermediate diameter (13/64 in.), between the Pin-Trim diameter (7/64 in.) and the split bushing series diameter



(¼ in.). The VC79 is one of the smallest printed circuit type capacitors in its range of 0.5 min. to 7.0 max. pf. JFD Electronics Corp.

PAGING SYSTEM 204

A compactly packaged 10-call paging system called the Lokette is designed to locate key personnel in small offices, stores, banks or warehouses. To page a person away from his desk, the switch-board operator simply moves a switch on the Lokette to the position opposite his name, and his individual code is sounded on chimes, bells, horns, or other signals strategically located throughout



the plant or store. Unit is 7½ x 7¾ x 3½ in. and operates on 24 or 120 v., \$60, less power unit and signals. Edwards Co.

F-M ANTENNA 205

The Lark Ad-A-Kit, designed for mounting on an existing TV antenna mast, adds properties of a separate f-m



GE ELECTRONICS

New G-E Service Aid Provides Fast, New Way to Straighten Tube Pins

This original G-E Service Aid helps eliminate tube damage caused by bent pins; straightens pins on all 7-, 9- and 10-pin miniature tubes, large 9-pin and compactrons. Just insert tube pin base into pre-drilled bevelled holes and remove. Simple, fast, safe. This handy tool is small enough to carry in your pocket (2½" diameter), or mount it in your service case or on the bench with screws provided. Get it from your G-E tube distributor or mail coupon to Chicago warehouse address shown.



Progress Is Our Most Important Product

GENERAL ELECTRIC

General Electric Company, Dept. 1743
3800 N. Milwaukee Ave., Chicago 4, Ill.

Please ship prepaid:

ETR-3200 Multiple-Tube Pin Straightener,
60¢ each.

My check or money order is enclosed for the required amount plus any sales or use tax applicable in my area.

Name _____

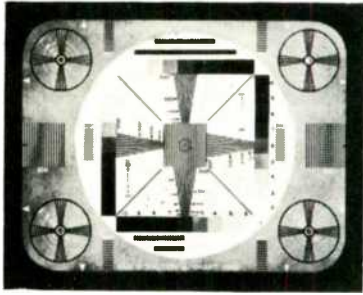
Address _____

City _____ Zone _____ State _____

... for more details circle 29 on page 48

TV TIPS FROM TRIAD

NO. 17 IN A SERIES



Junior PTM Joe contemplated the modulated milkbottle with a decided frown. The raster was in about 2 inches on each side, brightness was low, and excessive blooming occurred when the brightness control was varied.

He had checked the B+ output from the voltage doubler power supply, as well as all other voltages in the power circuit. Everything was normal, although the screen voltage on the horizontal output tube did seem a trifle low. "I've got another dog," he mumbled aloud.

"Things aren't always what they seem to be," said Bill, the Senior PTM, who had been eyeing the quandary. "Could be the screen voltage comes from a source you wouldn't ordinarily expect." He studied the schematic for several minutes, then said, "Replace the 12L6-GT audio output tube?"

"The audio tube?"

Bill nodded.

Joe did as directed. The raster filled out, and the picture returned to normal brightness.

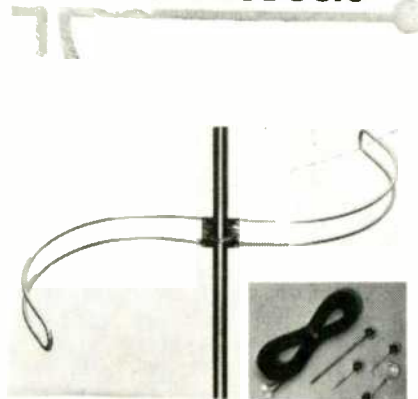
"You see, Joe, the H.O.T. screen voltage comes from the 135-volt line at the cathode of the audio tube which is used as a voltage divider. So, if the tube becomes gassy or a low emitter, voltage drops. Furthermore, make sure the large capacity electrolytics in the cathode circuit are OK. Otherwise, you'll have sound bar problems or even clipping in the video IF because the video IF strip is fed from the same source. Check the resistor that's in series with the screen carefully. If it needs replacing, use a wire-wound, 5-watt type of original value?"

MORAL: Unlike some servicing problems, things are always as they seem with Triad transformers. Their good looks seem to promise quality construction and top performance. And that's exactly what you get. For our new catalog TV-62 and other helpful literature, write Triad Distributor Division, 305 North Briant St., Huntington, Indiana.

A DIVISION OF LITTON INDUSTRIES

--- for more details circle 49 on page 48

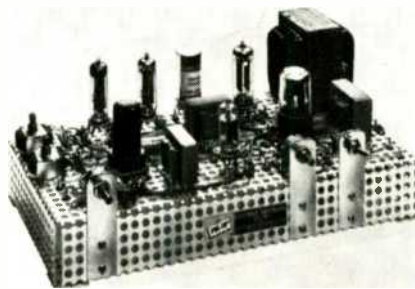
NEW PRODUCTS



antenna. The kit provides Taco's "Lark" S-type f-m antenna, with 50 ft lead-in, woodscrew and mast-type standoffs. Easily assembled, it can be installed in minutes. The antenna is omnidirectional, providing reception, without rotation, from all directions, up to 25 miles from the transmitter. The Lark antenna is golden anodized and cannot rust or deteriorate. The kit lists for \$8.95. Jerrold Electronics Corp.

BREADBOARD SYSTEM 206

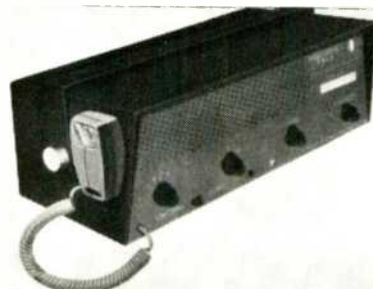
A new electronic circuit breadboarding system known as "Pin-Up" has been announced. The system incorporates a



simple idea in solderless terminations. Removable pins are inserted in elastic grommets to make common contact with up to eight wires or leads. The termination offers a fast means of making temporary hook-ups with low connection resistances. Kit CX-500, \$16.50. Photographic Instruments Co.

TWO-WAY CB RADIO 207

A new low-cost high-performance transceiver, model TRC-5, is designed to make two-way radio communications more attractive and practical to additional thousands of Citizens' Band operators. Unit is suited for base station operation in home or office or for installation (with accessory converters) in



Multicore Sales Corp. Port Washington, N.Y.

For information, write Department AT 552
--- for more details circle 35 on page 48

MOVING?

Be sure to let us know your new address at least 30 days in advance. And please enclose a complete address label from one of your recent issues.

ELECTRONIC TECHNICIAN

1 East First Street
Duluth 2, Minnesota
RA 7-8511

ONLY WINEGARD MAKES ELECTRONIC TV ANTENNAS WITH TUBES!



POWERTRON OUTFEATURES AND OUTPERFORMS ORDINARY ANTENNAS



POWERTRON CAPTURES MORE SIGNAL than any other all-channel antenna ever made. Patented design, electro-lens director system, dual "TAPERED T" driven elements.



POWERTRON'S THE ONLY TRUE ELECTRONIC ANTENNA. Only the Winegard Powertron is built with the amplifier as part of the driven element—not an "add-on" attachment.



POWERTRON ELIMINATES ALL SIGNAL LOSS that normally occurs between the driven element and the amplifier due to transmission and coupling mismatch.



POWERTRON BOOSTS WEAK SIGNALS UP OUT OF THE SNOW far better than any other antenna or antenna-amplifier combination made.

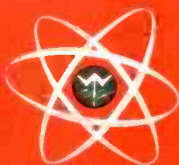


FOR VIVID COLOR, HIGH DEFINITION BLACK AND WHITE AND LONG DISTANCE RECEPTION, nothing can compare to the Powertron.

POWERTRON IS 100% CORROSION-PROOFED—ANTENNA IS GOLD ANODIZED, ALL HARDWARE IRRIDIZED, AMPLIFIER HOUSING OF HIGH IMPACT PLASTIC



POWERTRON HAS COMPLETELY AC POWER SUPPLY
No shock Hazard!



Winegard

3019-26 Kirkwood Street • Burlington, Iowa

Originators of Gold Anodized TV and FM antennas — makers of the World Famous Color/Receptor TV antenna.

Work Perfectly in Areas Where Transistors Fail!

Why Winegard Makes BOTH Tube and Transistor Electronic TV Antennas!

In December, 1960, Winegard introduced the first electronic TV antenna—the Powertron—a tube model that created an immediate reaction in the industry. Winegard had a transistor model ready for introduction within a few months. Later, competitive antenna amplifiers appeared, all of which were transistorized. But Winegard continues to make tube type Powertrons as well as transistor models, for very important reasons. *In fact*, more Winegard Powertrons have been sold than all competitive antenna amplifiers and so-called electronic antennas combined!

There are two types of signal area where electronic antennas can do wonders in improving TV and FM:

1. **Fringe areas:** where the nearest TV or FM stations are a considerable distance from the set.
2. **Mixed signal areas:** where some TV or FM stations are far away and weak, but other stations are strong because of being located fairly close.

The type of signal area is *extremely* important in determining your selection of tube versus transistor.

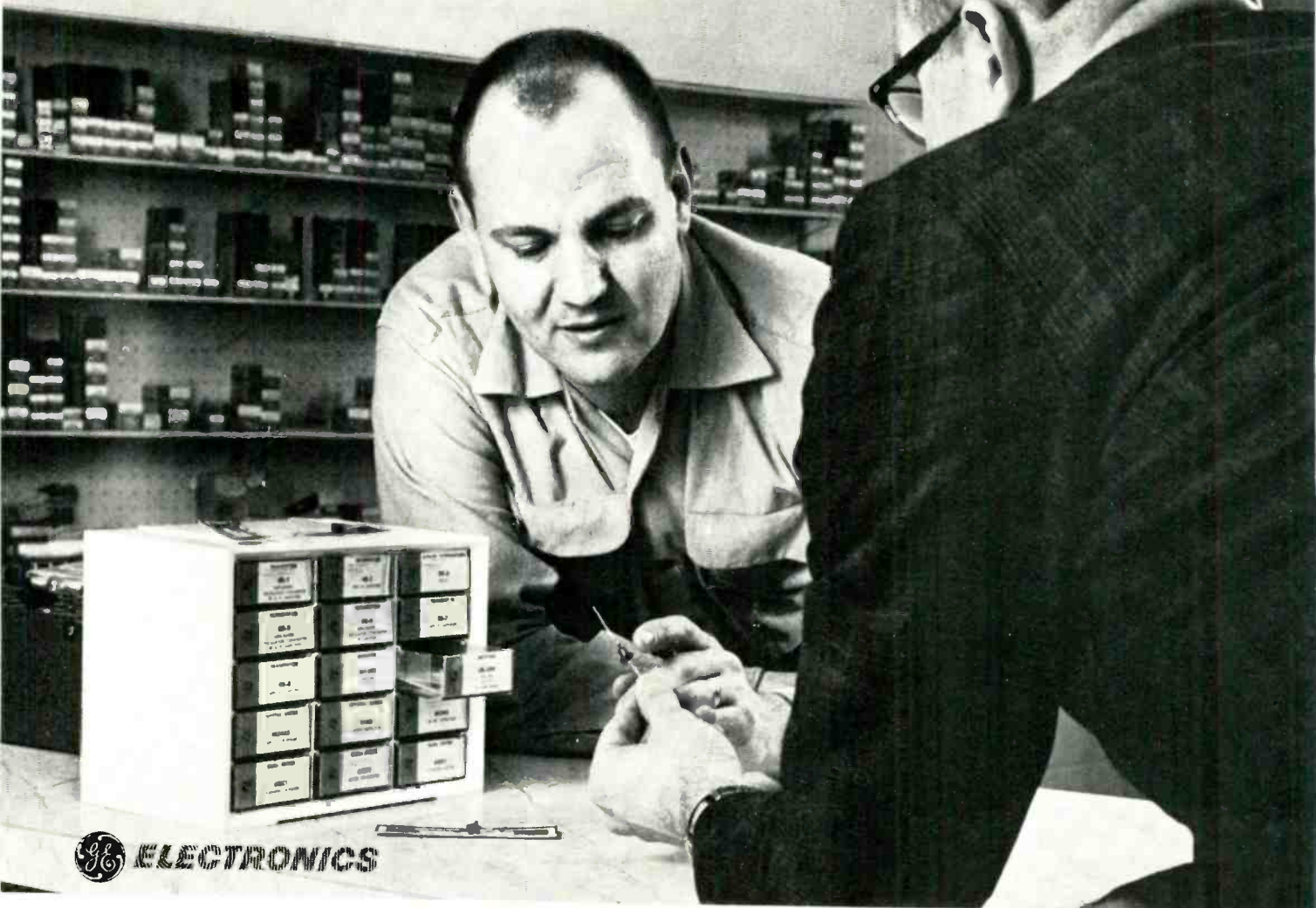
Transistors currently available, while they are very satisfactory for weak signals, often cause cross modulation interference when signal input is in excess of 20,000 microvolts. (It is possible to design a circuit that will prevent overloading transistors, but at too great a sacrifice in gain and noise figure.)


Because tube type electronic antennas will take many times more signal input than transistors without overloading, *there are areas where only Winegard tube type Powertrons can be used successfully.*

Both transistors and tubes have individual advantages. Transistors, for example, are small, use little power, and have a very long expected life. Tubes have the high gain and low noise characteristics of transistors, but do not normally overload.

Only Winegard gives you both! Get the facts, write for technical bulletin today or ask your distributor.

G. E. reporter, Roland Kempton, reports
on General Electric's new line of
entertainment semiconductors



 **ELECTRONICS**

Marvin Kleine figures he can fill 80% of his replacement needs from new G-E *SERVICE- DESIGNED* entertainment semiconductor kit

We gave Marvin Kleine, manager of ROGERS HORNSBY TV SERVICE, St. Louis, a preview of General Electric's new line of Service-Designed entertainment semiconductors. He saw several immediate advantages: "One of the main things in this business is *one time on the bench*—being able to put a set on the bench, check it out, fix it and get it out with a minimum of handling. These Service-Designed semiconductors will help because in about 80 percent of the cases I'll have the replacement right here in the shop. Should speed up our service and save a lot of shopping around for exact replacements. The blister-pack on cards makes a lot of sense, too, and I'm glad to see you've included interchangeability data. Saves us the trouble of looking it up."

If you still have to shop around for entertainment semiconductor replacements, it will pay you to check G.E.'s expanded new Service-Designed line, including:

GE-504 "Universal" Silicon TV Rectifier—a universal replacement for all silicon, germanium and selenium rectifiers used in TV receivers. It features a 45 amp. max. surge rating

which eliminates the need for a limiting resistor as is necessary with ordinary silicon rectifiers. 750 ma DC output; 400 PIV.

8 "Universal" Transistor Types—including 2 power transistors for auto radios—Service-Designed to replace over 600 types used in original equipment.

4 Crystal Diodes—Service-Designed to replace approximately 98% of all diodes used in entertainment applications.

A Replacement Guide and Catalog of entertainment semiconductors is available at your G-E distributor. Ask for ETR-2982 or write to: General Electric Company, Distributor Sales, Electronic Components Division, Room 1710, Owensboro, Kentucky.

Progress Is Our Most Important Product

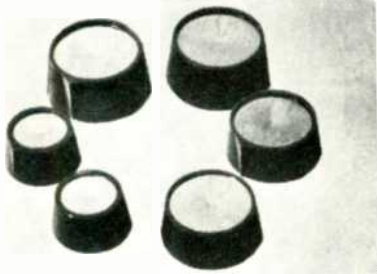
GENERAL  ELECTRIC

NEW PRODUCTS

boats, automobiles, trucks and in a broad range of commercial and industrial applications. \$69.95 (for 117 vac operation). Radio Shack Corp.

HI-FI COMPONENT KNOBS 208

Addition of six new knob heads to this line of universal knobs has been announced. Designed to be replacements



for a large number of Hi-Fi knobs, they are available with or without pointers. The heads, which are molded from tough plastic, come in four colors: black, brown, gray, and ivory. All the new heads will fit stems which are currently in dealer and jobber stocks. Colman Electronic Products.

COMMUNICATION TOWERS 209

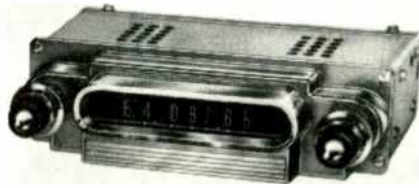
Five complete lines of new "Rigid Tube" communication towers permit antenna installations up to heights of



600 ft and can supply the needs for most microwave and other communication requirements. They are available either assembled or knocked down to facilitate easy transportation. These "Rigid Tube" towers are basically described as triangular-designed towers featuring all-bolted construction and manufactured from steel tubing of variable sizes. ROHN Mfg. Co.

CAR RADIOS 210

An all-new line of ATR Karadios to fit most American cars and imports



including compacts and trucks has been announced. Feature transistor powered and tube-operated radios in both the Customized and Full-Custom types for all popular cars. Also hand wired, finger-tip tone control, automatic volume control, and equivalent 8-tube performance. Built to look and fit like original equipment. ATR Electronics.

D-C TO A-C CONVERTER 211

A high powered transistorized converter, model 50-191, changes 12 v battery current to regular 110 v, 60 cps a-c. Has capacity of 275 w continuous; 300 w intermittent. Frequency maintained within ± 1 cycle. Designed for powering a wide variety of a-c operated instruments from autos, boats in



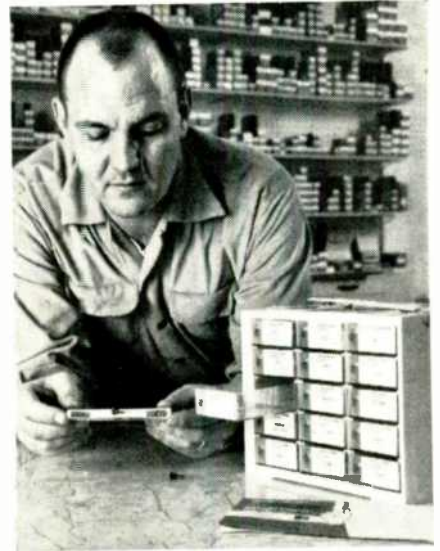
camp and other locations. Will operate TV, dictating machines, fans, radios, electric shavers, clocks, power tools, Hi-Fi, electric blankets, test equipment, and serves for emergency lighting. Comes complete with remote control cables and battery leads. Size 10 $\frac{3}{4}$ x 6 x 6 in. \$116.34. Terado Co.

SILENT FAN 212

A compact, super-silent fan that can be tucked into any high-fidelity enclosure and show measurable increases in the life and performance of the equipment is now available. Known as the Whisper Fan, the unit is only 4-11/16 in. square and is 1-1/2 in. deep. Moves 60 cubic ft. of air per minute. A series of recent field tests showed a reduction of 40 percent in service calls required on a commercially-packaged television receiver when it was equipped with the fan. \$14.85. Rotron Mfg. Co., Inc.

DEVIATION METER 213

A lightweight, fully - transistorized portable deviation meter is introduced. Designed for use in servicing f-m 2-way radio and other communications equipment, the new instrument covers a frequency range from 20 to 500 mc. Has direct-reading frequency deviation ranges of 1.6 kc, 8 kc and 16 kc full scale with accuracy of ± 5 percent on the latter two ranges. Unit measures 10-1/2



Now -
for just \$19.99
you get a
semiconductor
inventory that
replaces
hundreds of
entertainment
types

Why shop for semiconductor replacements? Stock them! Now you can— with this handy 23-item inventory of 15 entertainment semiconductor types in a space-saving 15-drawer kit that takes just 10" x 6" of space:

TYPE	QUANTITY
GE-1 "Universal" Transistor	1
GE-2 "Universal" Transistor	1
GE-3 "Universal" Power Transistor (25 watts)	1
GE-5 "Universal" Transistor	1
GE-6 "Universal" Transistor	1
GE-7 "Universal" Transistor	1
GE-8 "Universal" Transistor	1
1N1692 Rectifier (100 PIV, 600 MA)	2
GE 504 "Universal" TV Rectifier	2
1N34AS Crystal Diode	3
1N60 Crystal Diode	2
1N295 Crystal Diode	2
6GC1 Dual Diode	2
6GD1 Dual Diode	2
6GX1 Dual Diode	1

A regular \$33.22 value! You pay only for the semiconductors. No additional charge for the kit (K-915). Get it from your General Electric distributor. General Electric Company, Distributor Sales, Electronic Components Division, Room 1710, Owensboro, Kentucky.

Progress Is Our Most Important Product

GENERAL ELECTRIC

... for more details circle 30 on page 48

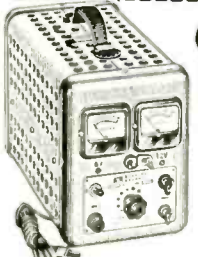
ATR PRODUCTS FOR MODERN LIVING



ATR PLUG-IN TYPE PORTABLE INVERTERS*

A.C. Household Electricity Anywhere . . . In your new car, boat or plane Operates Standard A.C. Record Players Dictating Machines Small Radios Electric Shavers Heating Pads, etc.

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 volts 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-1278—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 1/8 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—12 A for 12V Dealer Net Price \$41.96
Model TR-1278—6 A for 6V Dealer Net Price \$41.96

SEE YOUR ELECTRONIC PARTS DISTRIBUTOR WRITE FACTORY FOR FREE LITERATURE . . .

ATR ELECTRONICS, INC.
Formerly American Television & Radio Co.
Quality Products Since 1931
ST. PAUL 1, MINNESOTA—U.S.A.

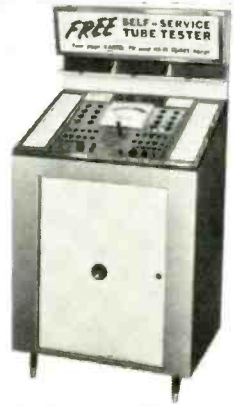
NEW PRODUCTS



x 6-1/2 x 5-3/4 in. Weighs 7 lb. Operated from 117 a-c or. as a portable, from two internal low-cost mercury batteries. Motorola Communications Div.

SELF-SERVICE TUBE TESTER 214

Designated as the Model 201-L Deluxe Self-Service Tube Tester, this unit is designed to better serve the technicians' "do-it-yourself" customers. Will test the new Nuvistors, Compactrons, Novars and 10-pin tube types. Has been constructed for rugged use and for unusual eye-appeal. Available from Electronic parts distributors at \$229.50. Mercury Electronics Corp.



Will test the new Nuvistors, Compactrons, Novars and 10-pin tube types. Has been constructed for rugged use and for unusual eye-appeal. Available from Electronic parts distributors at \$229.50. Mercury Electronics Corp.

TELEPHONE HANDSET 215

A telephone handset, model 3001S, designed for intercom and telephone systems and for citizen band, marine and aircraft audio equipment. is now being marketed. The earphone and microphone have frequency response of 300 to 4000 cps with impedance of 300 Ω nominal and 40 Ω nominal respectively. Electro Space Corp.



aircraft audio equipment. is now being marketed. The earphone and microphone have frequency response of 300 to 4000 cps with impedance of 300 Ω nominal and 40 Ω nominal respectively. Electro Space Corp.

TELEPROMPTER AMPHICON 190 TV PROJECTOR



the first large screen TV projector designed, engineered, and priced to capture the custom installation market.

Sell, install and service the Amphicon 190 TV Projector. It operates as safely and simply as any home TV set and sells for less than half the cost of other TV projectors. This lightweight (under 70 lbs.), portable unit, may be ceiling mounted. It will project (front screen or rear) a brilliant picture 3' by 4' or up to 12 feet wide—and its miniaturized remote control panel permits operation up to 50 feet from unit.

Most of your commercial sound customers are good prospects for the Amphicon 190. In schools and colleges, classroom and lecture halls, in custom home building and modernization and in hotels, motor inns, restaurants, there's a need and demand for the 190. An exciting advertising and publicity campaign will be telling your customers about the advantages of Amphicon 190 televiewing. Local distribution is now being established. Why not get the full picture now? Write to: Dept. ET-6,

TELEPROMPTER CORPORATION

50 West 44th Street, New York 36, N. Y.

BENCH CHASSIS HOLDER 216

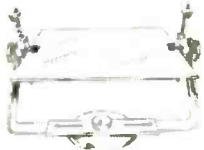
The latest of a complete line of work holding fixtures includes Model T-303 Chassis Holder, designed to hold a



MODEL T-303

EXTENDABLE

CHASSIS HOLDER



range of chassis sizes from 4 in. to 19 in. in length, depending upon which of 2 adjustable "standard" center sections is used. With either of the "standard" center sections, the unit will handle weights up to 50 lb. Can be rotated thru 360° in both the horizontal and vertical planes. Two rubber-padded vises, each with a grip range of 0 — 9½ in., provide positive holding of chassis or circuit boards. Flotron Industries, Inc.

SUPER FREEZE MIST 217

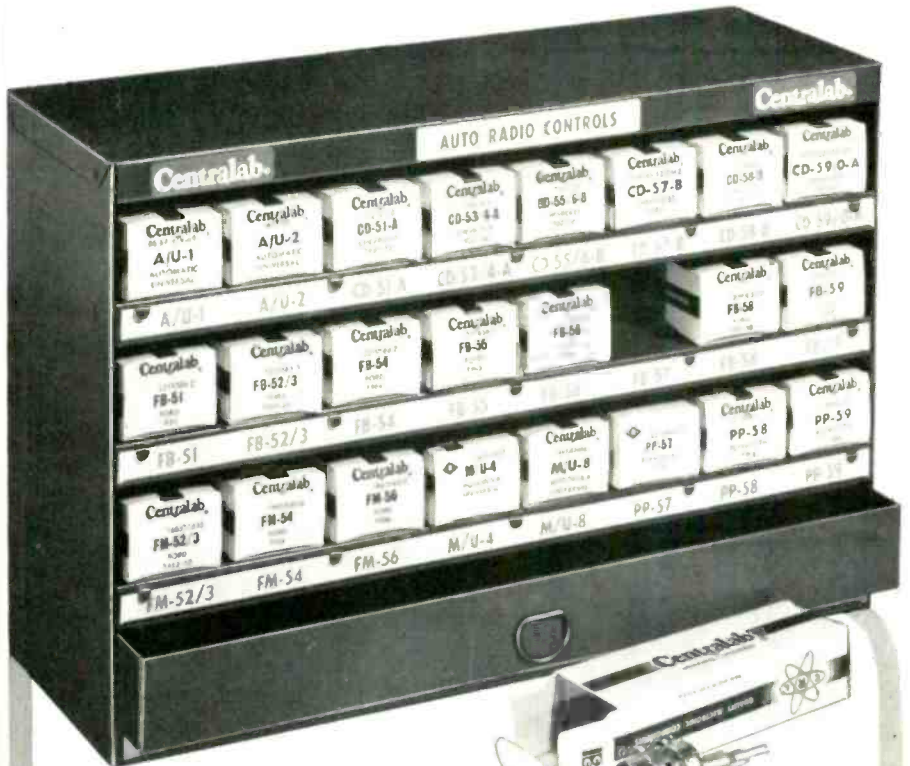


Super Freeze Mist cools circuits quickly and leaves no liquid residue. Non-toxic and non-flammable has a pleasant odor, and does the job three times faster, it is said. Enables service technicians to pinpoint bad capacitors, transistors, oxidized joints, by cooling components.

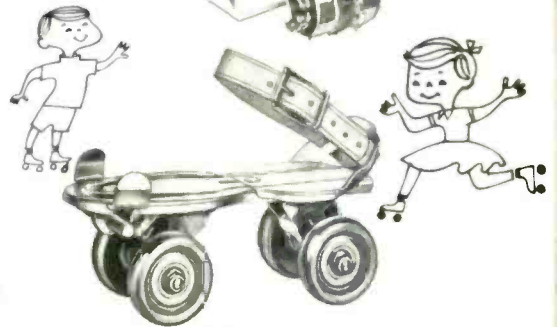
Comes supplied with a new pinpoint extension for hard to reach places. No. 216-06, 6 oz. size. Walasco Electronics Mfg. Co.

MINIATURE BATTERIES 218

A line of 44 miniature dry battery types is engineered and designed for transistorized circuits. The batteries use



FREE ROLLER SKATES



with each Centralab ACK-100
AUTO RADIO CONTROL KIT

YOU GET:

24 of today's fastest movers

- PLUS
- free sturdy steel cabinet
- PLUS
- auto-radio control cross reference
- PLUS
- free roller skates

ONLY \$49⁹⁵ THE PRICE OF THE CONTROLS ALONE!

See your distributor now!—Offer will be withdrawn when supplies are exhausted.

Centralab controls are listed in Sams' TV & Auto-Radio Control Replacement Guide.



THE ELECTRONICS DIVISION OF GLOBE-UNION INC.
902F EAST KEEFE AVENUE • MILWAUKEE 1, WISCONSIN
In Canada: Centralab Canada Ltd., P.O. Box 400, Ajax, Ontario

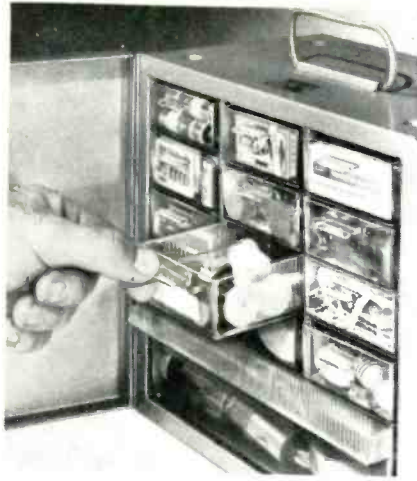
B-6227S

--- for more details circle 17 on page 48

NEW PRODUCTS

the principle of "Wafer Cell" construction and offer eight different power ratings, ranging from 3 to 13.5 v in 1.5 v increments. Each cell consists of a sandwich of artificial manganese dioxide mix between disk-electrodes of zinc and carbon, heat sealed in an airtight envelope. Burgess Battery Co.

REPAIR PARTS CABINET 219
This steel cabinet, 9 x 10 x 6 in.



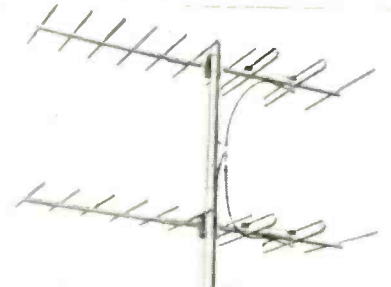
deep, provides protection from pilfering as well as keeping valuable small parts and tools neatly arranged and dust free. Designed with a handle for mobility, the "Guardian" can also be stacked or mounted on the wall. It is an excellent first aid and drug safe: cabinet safeguards poisons and drugs and keeps contents safe from children, also. All drawers are constructed of "see-thru" plastic. Akro-Mils, Inc.

SIGNAL GENERATOR 220
A portable f-m multiplex signal generator, model 300, is announced. Unit weighs 17 lb., is 8 x 10 x 12 in.,



and can be used to service Multiplex equipment on the job as well as in the shop. Has built-in f-m signal generator, and provides a composite MPX signal, in accordance with the FCC specifications for f-m stereo broadcasting. \$495. Fisher Radio Corp.

YAGI ANTENNAS 221
A group of 10-element Yagis offer continuous and overlapping frequency coverage in the 112 and 305 mc range



with high gain and low VSWR. Designed to withstand extremely severe environmental conditions, the High Band Y-100 series uses high strength 6061T6 aluminum alloy tubing and heli-arc welded construction. Technical Appliance Corp.

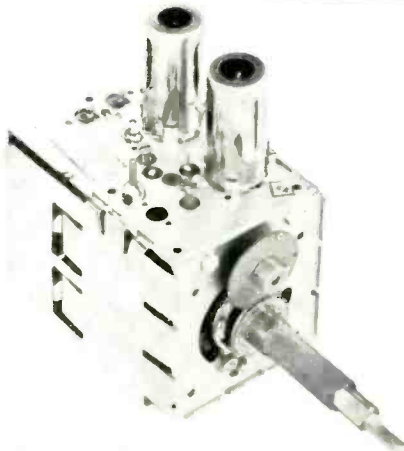
CB TRANSCEIVER 222
A new 12-channel, crystal-controlled



Tarzian offers

**FAST, DEPENDABLE
TUNER
REPAIR SERVICE**

**ALL
MAKES**



ONLY
\$850
INCLUDING

It just makes sense that a manufacturer of tuners should be better-qualified, better-equipped to offer the most dependable tuner repair and overhaul service.

Sarkes Tarzian, Inc., pioneer in the tuner business, maintains a complete, well-equipped Factory Service Dept.—assisted by Engineering personnel—and staffed by specialized technicians who handle **ONLY** tuner repairs . . . on ALL makes and models.

Tarzian-made tuners received one day will be fixed and shipped out the next. Cost is only \$8.50 and \$15 for UV combinations. That includes **ALL** parts (except tubes which are furnished at our cost) and labor, and a 6-month guarantee against defective workmanship and parts failure due to normal usage. Replacements available at low cost on tuners beyond practical repair.

Tarzian-made tuners are identified by this stamping. When inquiring about service on other tuners, always give tube complement . . . shaft length . . . filament . . . voltage . . . series or shunt heater . . . IF frequency . . . chassis identification. All tuners repaired on approved, open accounts. Check with your local distributor for Sarkes Tarzian replacement tuners, replacement parts, or repair service.

SERVICE MANAGER • TUNER DIVISION • DEPT. 28
SARKES TARZIAN INC
east hillside drive • bloomington, indiana
edison 2-7251

MANUFACTURERS OF TUNERS . . . SEMICONDUCTORS . . . AIR TRIMMERS . . . FM RADIOS . . . AM-FM RADIOS . . . AUDIO TAPE . . . BROADCAST EQUIPMENT and SHISH-KABOB GRILLES

**ALL PARTS
and LABOR**

**24-HOUR SERVICE
6-MONTH WARRANTY**

**Tuners Repaired on
Approved, Open Accounts**

See your distributor, or
use this address for
factory repair service

--- for more details circle 42 on page 48

Citizens Band Transceiver is designed for commercial service. The unit operates on both 115 vac or 12 vdc. Including an illuminated signal strength meter, this precision-engineered radio is ready for fixed or portable installation. Simplicity of operation makes possible unrestricted use. \$149.50. Texas Research and Electronic Corp.

PEC MINI-AMPLIFIERS 223

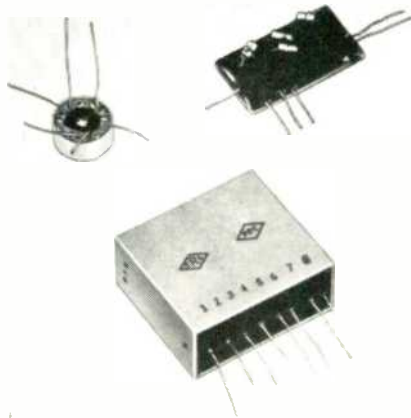
A line of PEC miniaturized semiconductor amplifiers is announced. Units utilize the PEC technique of in-



tegrated circuit construction. Seven different three stage and four-stage amplifiers are available covering a wide range of applications. Supplied in three basic sizes. The seven standard units cover a wide range of frequency response, gain and poser output requirements. Centralab.

TV HV SOCKET 224

Announced is an addition to this line of HV replacement sockets, #064-HV, designed to replace Admiral part num-



ber #33B91 for 1B3 tubes. Consists of a large low-loss housing, having 3 5/8 in. mounting centers and a specially designed octal socket which locks into the housing. EBY Sales Co.

INTERCOM 225

Wireless and fully transistorized, this Model FW-40 two-station intercom system needs no installation. Simply by plugging the units into a-c current outlets, the system is ready for instantaneous use. Because of its transistorized circuit, no "warm-up" period is required before two-way communication can be established. The two-station units may be expanded by adding additional single station units to the system so long as

These Servicemen Now Own Successful Lafayette Associate Stores



Mr. A. D. Mayo
Orlando, Florida



Mr. J. Blumenthal
Detroit, Michigan



Mr. A. Smeland
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If You Want Your Own Profitable Business—Mail the Coupon Below

You can join these and the other 28 men who now know the true independence and security that comes from owning your own business. As a franchised Lafayette Radio Electronics Associate, you benefit from more than 40 years experience selling hi-fi components, citizen band radios, recorders, science and electronics kits, tools, hobby supplies, TV repair equipment and all the other things that make this the fastest-growing industry in the country. You'll have your own exclusive marketing area and the same guidance and advertising support that has helped many men such as you (some with little or no business experience) become successful business leaders. If you have a basic knowledge of radio, television or electronics, and you're willing to invest from \$10,000 to \$30,000 to get the things you've always wanted out of life, mail the coupon today for further information.

Lafayette Radio Electronics Corporation
111 Jericho Turnpike, Syosset, L. I., New York
Mr. Robert Laub

ET-62

Please send me full information on how I can own my own profitable business. I understand there is no obligation.

NAME _____
ADDRESS _____
CITY _____ ZONE _____ STATE _____

--- for more details circle 32 on page 48

PLECTRON AUDIO OSCILLATOR

The first moderately priced accurate source of audio frequencies from 600 to 2600 cps. designed for servicing tone equipment. It's lightweight yet sturdy and compact.



Resetability and frequency drift guaranteed 0.1% or less

- HIGH STABILITY • CONSTANT OUTPUT • LOW DISTORTION
- HIGH RESOLUTION • INDIVIDUAL BAND CALIBRATION

Other products from Plectron include:

Tone alerting systems—for dependable split-second tone and voice messages; fully automatic tone generators; tone adapters—for use with 2-way radio communication receivers; medical power amplifiers; and face shields—for positive protection . . . fully unrestricted vision.

Write for detailed information on
PROGRESSIVE PRODUCTS BY PLECTRON

Designed and Manufactured by

PLECTRON CORPORATION
Overton, Nebraska

... for more details circle 39 on page 48

NEW PRODUCTS



they may all be plugged into a common a-c current power line. Two-station system \$89.95. Additional single station units \$46.25. Fanon Electronic Industries, Inc.

PC CONTROL KIT 226

Offered is a new low-cost printed circuit control kit, featuring coverage of 175 manufacturers' model numbers.



The compact kit contains 36 components arranged in a six-drawer plastic stock cabinet. Complete assembly instructions are included, as well as a listing of part numbers and components to be used. A backup stock assortment is also available. International Resistance Co.

RECEIVER KIT 227

Model KU-45 kit combines an a-m/f-m multiplex stereo tuner and a 32 w stereo amplifier in a single unit. Speakers



and a record changer are all that need to form a complete stereo high fidelity and broadcast music system. The kit is supplied complete with parts, tubes, wire, solder, and easy-to-follow instructions. Latest f-m multiplex circuitry is included. \$129.95. Allied Radio Corp.

R FOR "DOCTORS OF
SERVICING"



THE PROFESSIONAL
SERVICE MAN'S
CLEANER

good medicine for sick sets!

Want total cleaning power that helps you do a better servicing operation 3 ways? Spray electrical contacts and switches with triple action Contact Shield. Cleans, lubricates, and safeguards, like no other cleaner can! Gives lasting protection in seconds . . . thanks to Silicone base. Independent laboratory tests prove it! Technicians approve it! Write for handy guidebook to more efficient servicing . . . Channel Master Corp., Ellenville, N.Y.

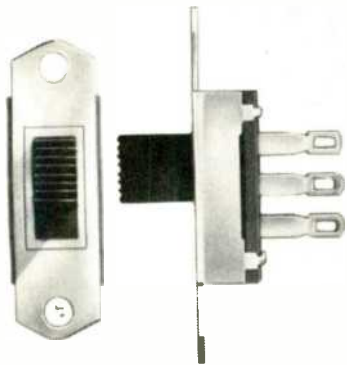
C 1962 CMC

... for more details circle 18 on page 48

SWITCHES

228

The series 200 Miniature Slide-Button operated switch is designed for radios, intercoms and similar circuitry. The



"200" has seven fewer parts and is 30 percent smaller in width than comparable slide switches now on the market and can be equipped with contacts to achieve 11 different switching configurations, according to the manufacturer. Contacts are double wiping and self-cleaning. Price: Approximately \$.09 ea. Oak Mfg. Co.

CAPACITANCE CHECKER

229

Announced is a wide range capacitance checker, model 691. Features a low voltage bridge for testing electro-



lytic capacitors in transistorized circuits with safety. Uses color-coded range push-buttons with matching scale colors for easy selection. Four ranges test capacity from 10 μf to 1000 μf . Graduated leakage tests for both polarized and unpolarized capacitors are possible. Factory wired and calibrated. \$69.95 net. Jackson Electrical Instruments Co.

VOLT OHM METER

230

Announced is a rugged pocket meter, model MT-2, with large, easy-to-read dial and 2K ohm-per-volt movement. Has d-c volt ranges: 0-5-25-250-1 KV-2.5KV. Ranges for a-c volts: 0-5-25-250-1KV-2.5KV. Current ranges (d-c): 0-250, 0-500 microamps. Resistance: X 10, X 1000. Db: -20 to +16. Case measures 3 1/4 in. x 4 1/2 in. x 1 in. Comes with test leads, battery and instructions \$11.50. Monarch Electronics International, Inc., 7035 Laurel Canyon Blvd., North Hollywood, Calif.

SOUND WAYS TO EXTRA PROFITS

Get into the all-year-round commercial sound trade and do away with seasonal repair work slumps! This steady-profit business — sales, installation and service — is available right in your own neighborhood! Factories, restaurants, schools, offices, bowling alleys... outdoors, athletic fields, swimming pools, etc. ... all are prospects for you.

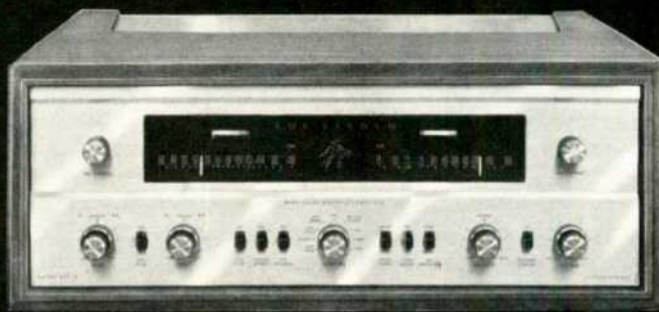
Atlas Sound products, built to quality standards and backed by over 25 years of "know-how", are insurance for your reputation. Your Atlas Distributor can supply you with a complete line of performance-proven job-rated equipment: speakers, mike stands and related accessories for a professional sound installation.

Write for latest catalog and names of Atlas Distributors.

ATLAS SOUND DIVISION
 American Trading and Production Corporation
 1419-51 39th Street, Brooklyn 18, New York
 In Canada: Atlas Radio Corporation, Toronto

... for more details circle 12 on page 48

For your custom stereo installations



THE FISHER 800-B

Three of the world's finest components on one chassis

1 AM-FM-Stereo Multiplex Tuner: separate tuning indicators for FM and AM; exclusive Fisher STEREO BEAM automatically shows whether an FM station is broadcasting in stereo.

2 High-Power Stereo Amplifier: 65 watts music power; special center-channel output connection for third speaker.

3 Master Audio Control-Preamplifier: complete, easy-to-use control system assures total flexibility; provisions for every type of input.

Price \$429.50*

*Walnut or Mahogany cabinet \$24.95; prices slightly higher in the Far West

USE THIS COUPON FOR DETAILED INFORMATION

Fisher Radio Corporation
 21-24 44th Drive, Long Island City 1, N. Y.

Please rush the following FREE literature:

Complete specifications on the Fisher 800-B Receiver.

The 1962 Fisher Handbook, a 40-page illustrated reference guide and component catalogue for custom stereo installations.

Name _____

Address _____

City _____ Zone _____ State _____

ETb

... for more details circle 27 on page 48

AUDIO NEWS LETTER

ALTEC-LANSING offers a fold open brochure covering their 1961-62 hi-fi products. The brochure, AL-1302-3, features details on the "ASTRO," a complete stereo, AM/FM multiplex, tuner-amplifier utilizing transistors in the power output stages. The unit provides a headphone jack, and index locks on the balance and tone controls.

BOGEN-PRESTO introduces a low-cost background music system for commercial use. Available with microphone and relay, metal or wood enclosures, at extra cost. Model RP100-BM is powered by a 15-watt amplifier and is said to drive up to 60 speakers. The AM/FM receiver has an FM sensitivity of 1.25 microvolts for 20-db quieting.

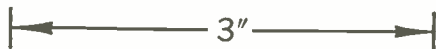
JENSEN MFG. CO. takes the first step in its new commercial sound program by introducing 8-inch loudspeakers for commercial sound systems.

H. H. SCOTT's instrument division offers a new solid state amplifier capable of 300 watts output. The tentative price is \$2,150. Expected delivery time is 90-days.

ZENITH introduces a portable clinical audiometer for use where large desk models are impractical. The portable audiometer weighs only 8½ pounds complete with batteries. Most major tests can be made with the ZA-100-T. Suggested retail price, complete, \$375.

IT'S NEW FROM QUAM

A mighty 8-inch ceramic magnet public address speaker!



Mighty narrow

(only 3 inches deep for in-wall mounting)

Mighty powerful

(easily handles 12 watts)

Mighty fine fidelity

(audible response from 55 to 13,000 cps assures perfect music and voice reproduction)

Now you can have a speaker with the shallow depth needed for in-wall mounting *PLUS* full range, response and angular coverage. Quam recognized the industry need for a speaker with these rigid specifications and developed the new 8C6PA which now joins the other fine ceramic and Alnico V magnet speakers in the Quam Public Address line.

Quam is the quality name in public address speakers well known for trouble-free operation, superior workmanship and engineering, and rigid quality control.

The brand-new up-to-date Quam Sound System Catalog gives full information on the 8C6PA and the other fine Quam Public Address speakers. Write for your free copy.

QUAM

QUAM-NICHOLS COMPANY

226 East Marquette Road • Chicago 37, Illinois

... for more details circle 40 on page 48

HARMAN KARDON's general manager Donald Spanier, while at the Los Angeles High Fidelity Music Show, said that the hundreds of millions spent on space research during the next decade will produce major dividends for the high fidelity industry. Refinement of solid state, printed circuits and miniaturization will produce high fidelity circuits that are superior in tone quality to anything now available to the consumer. Managers who fail to devote their time to transistorized components today will not get their share of the hi-fi market tomorrow.

ELECTRO-VOICE completes its move to a new expanded plant in Buchanan, Mich. Adolph Wolf, production vice president, said that lower overhead costs would allow E-V to compete without lowering product quality.

GEFCO purchases the loudspeaker department of General Dynamics Electronics for an undisclosed sum. All facilities will be combined at the Gefco plants in Grayslake and Antioch, Ill. Speaker capacity is expected to exceed 30,000 units per day by fall of 1962.

THORENS presents a transcription tone arm, Model BTD-12S, to be marketed in America. Features include resonance below 16 cps, dynamic balance, and a device for lifting or lowering the arm without touching it. A special pivot keeps adjustment. Available at \$50.

UNIVERSITY introduces the ES-50, replacing the SS-50. It is designed for general applications and operates on electronic siren signals above 400 cps. Unit is weather-proofed and handles up to 50 w.

WBCOR reports its "Music Man" student music competition promotion has boosted tape recorder sales by 136 percent.

WESTREX appoints Gale Livingston as general manager. Ralph Wright, former vice president, has been appointed to the staff of George T. Scharffenberger, executive vice president of Litton Systems, for special assignments.

NEWS OF THE INDUSTRY

Zenith Sales Corp. — National Service Director, **FRANK SMOLEK**, reports the independent service technicians and dealers of the country have made its color TV service training program a tremendous success. Up to now more than 10,000 service technicians have taken Zenith color training, he reported. "It has always been our policy to cooperate closely with independent service," Smolek said. "We build our receiver with the service technician in mind, and through our distributors provide top training facilities. This policy has paid off for everybody concerned: customers, technicians and Zenith. So, when we decided early last year to go into color TV, we naturally adhered to the same program. Independent service has demonstrated again its ability to handle the job." Smolek said that Zenith distributors are still conducting dealer color TV training schools.



Smolek



Anderson

Erie Resistor Corp.—names **RICHARD H. ANDERSON** as Regional Sales Manager of Erie's newly created Eastern sales region. The new region includes the New England states, Eastern New York and Pennsylvania.



Miller

Motorola Communications and Electronics — appoints **WALTER P. MILLER** Special Market and Product Sales Manager for the Midwest; **ERIC J. GOLEAS** as Manager of Two-Way Radio Sales for the Midwest; and **JOHN R. FED-ELL**



Goleas



Fedell

DELL as Regional Sales Manager for the Chicago area, Northern Illinois and Southern Wisconsin.

RCA — announced plans for the second major addition to its color television picture tube production facilities this year to meet industry demand.

The Belden Manufacturing Co. — has been granted patent number 3,032,604 covering their folded edge design for Beldfoil shielding.

Aerovox Corporation — reports first quarter sales climbed 21 percent over

the 1961 period — from \$5,259,000 to \$6,353,000—and net earnings nearly doubled, rising from \$59,181, or seven cents per share, to \$109,273, or 13 cents per share.

ROHN Manufacturing Co. — announced 10,000 square ft of additional space has been put into operation at its tower manufacturing plant.

Jerrold Electronics — appoints **HOWARD W. HIBSHMAN** as Manager of Marketing for Pilot Radio Corp. Hibshman will be responsible for directing an intensified marketing and sales promotion program.

are
Stancor
transformers

than anybody else's?



An illegitimate conclusion might be drawn from a set of strictly legitimate statistics. An impartial independent survey made in 1961 shows that more servicemen prefer Stancor transformers than any other replacement line—25% more than the next most popular brand.*

Of course, this preference does not of itself prove anything about relative quality—but it does show that a lot of professional servicemen feel that they get more for their money from Stancor.

And who are we to argue with them?

STANCOR
ELECTRONICS, INC.

(formerly Chicago Standard Transformer Corporation)
3501 WEST ADDISON STREET • CHICAGO 18, ILLINOIS

*According to Brand Name Survey, Chicago, Illinois, May, 1961. This survey has been made annually since 1954—and Stancor has come out first every time.

NEWS OF THE INDUSTRY

Vega Electronics Corp. — appointed a separate, newly formed sales company to market its Vega-Mike wireless microphone systems. C. ARTHUR FOY heads the new company, named Vega Microphone Sales Co.

Adler Electronics — names JOSEPH REED Manager of Systems Planning in the Systems Engineering Department of the Military Products Division.

EIA Board of Directors named DR. ELMER W. ENGSTROM, president of the Radio Corp. of America, to receive the Association's highest award, the EIA Medal of Honor.

Muntz TV — announced plans for a 50 percent expansion of its plant in Wheeling, Ill. WALLACE A. KEIL, president, said 36,000 square ft would be added with the construction of a \$240,000 addition to the 70,000 square ft plant which is leased by the company.

Philco Corp. — national sales manager, KENNETH A. COOPER, announced appointment of W. R. JOHNSON as branch

manager and DAVID C. MILLER as branch sales manager of **Philco Distributors Inc.**, of Houston, Texas.

Entron — appoints EDWARD SHAFER as General Sales Manager. The announcement was made by JAMES L. LAHEY, executive vice president.



Shafer



Chiarro

Stancor Electronics, Inc. — JOSEPH R. DICHIARRO has been appointed as supervisor responsible for preparation of catalogs, brochures, business paper advertisements, and other merchandising aids.

RCA Electron Tube Div.—the Harrison, N. J. plant has produced its second millionth thimble-size nuvistor electron tube. The RCA-6CW4 tube is employed in the tuners of television receivers. According to Division Vice President JOHN B. FARESE, "Industry demand for the nuvistor has been so great that we produced over a million units in the past five and a half months."

Roger Mark Corp.—HENRY E. NORTON has been named vice president, marketing, of the Chicago manufacturer. Mr. Norton will be responsible for carrying out a comprehensive marketing and merchandising program for Musical-Aire, a new electronic product that plays music through the warm air ductwork of a house.



Norton



Greenwood

General Electric Co. — WALTER F. GREENWOOD has been named manager for the northeastern region of the newly formed Defense Programs Operation. This organization will oversee the company's billion-dollar-a-year aerospace and defense business. Formerly manager of marketing for the company's Receiving Tube Dept., Mr. Greenwood will be responsible in his new post for full technical representation and other customer liaison in all of General Electric's aerospace and defense activities in the Northeast.

BUY A DOZEN VU-BRITES



get the clip board
FREE!

Attractive wood-grained Masonite clip board—just the right size for holding your service order book, or for dozens of other uses in shop or home—yours free with the purchase of 12-Vu-Brites!

WHAT A DEAL!

For a limited time, Perma-Power is offering you this wonderful gift *absolutely free* with the purchase of 12 Vu-Brites at the regular price. Vu-Brites are the brighteners that really do a job—on series or parallel sets (Model C401 for parallel; Model C402 for series). They come colorfully packaged in individual boxes . . . and are priced at \$9.95 the dozen, net.

Hurry—this special gift offer will end when current stocks are gone. Call your distributor today.

Perma-Power COMPANY

3100 N. ELSTON AVENUE • CHICAGO 18, ILLINOIS

--- for more details circle 37 on page 48

CATALOGS AND BULLETINS

RADIOS: Literature covers six new portable radios which brings to twenty-three the number of portables in the firm's 1962 line. Prices range from \$16.95 for a 6-transistor shirt pocket model to \$125 for an 11-transistor AM/FM model. Radio & Television Div., General Electric Co., Syracuse, N. Y.

CUSTOM CATALOGS: Initial distribution of the 1962 edition of HEPSCO's distributor catalogs is announced. Included is an expanded color-guide index to simplify location of products and brand names. The catalog contains the pages of only those manufacturers whose products are sold by the distributor. Hepco Mfg. Corp., 133 Spring St., New York, N. Y.

CLEANERS: Literature covers static-free, non-crazing, cleaners for many uses including radio cabinets, TV cabinets, fixtures, displays, etc. Merix Chemical Co., 2234 E. 75th St., Chicago 49, Ill.

PISTON TRIMMERS: New 32-page catalog describes and illustrates hundreds of standard or modified piston trimmer capacitors. Also listed is a section covering adjustment tools and test

fixtures. The catalog C-62, gives electrical and mechanical engineering data on many glass and quartz capacitors. JFD Electronics Corp.

ELECTRICAL CODE: Down-To-Earth Facts on Grounding Portable Electrical Equipment is the title of this 12-page, file-size booklet. Covers National Electrical Code's safety specifications for the design and connection of grounding devices. Harvey Hubbell, Inc.

TRANSISTOR TESTER: A six-page technical brochure, RD1880, describes a dynamic beta transistor tester. Includes technical specifications, simplified schematic diagrams, and circuit descriptions of the a-c beta, d-c beta, and leakage tests. Hickok Electrical Instrument Co.

PHONO CARTRIDGES: A cross-reference booklet, SAC-17, lists the latest, complete line of stereo-mono, ceramic and crystal replacement cartridges. Lists 1,200 models made by 33 leading manufacturers. The guide is five-hole, universal-punched for easy use in binders.

SERVICE GUIDE: A new radio service guide, covering all GE radios manufactured since World War II, contains detailed information including schematic diagrams, alignment procedures, parts lists, etc. Copies of the 1946-1961 guide are available at \$1.95 each. General Electric Co.

to SERVICE CHARGES and RECORD KEEPING

the business-like approach



For customer's prices on every replacement part, plus flat rate and hourly service charge data, regional and national. Dave Rice's OFFICIAL PRICING DIGEST, listing over 63,000 items. \$2.50.

▲ AVAILABLE FROM YOUR DISTRIBUTOR ▼

If you want to operate on a professional level, Dave Rice's OFFICIAL ORDER BOOKS give you triplicate forms for order, invoice, and office records... spaces for tubes, parts, serial numbers, labor and tax charges, signatures, etc. 75c per book, \$6.50 for dust-proof box of 10.

Dave Rice's

ELECTRONIC PUBLISHING COMPANY, INC.
133 N. Jefferson St., Chicago 6, Illinois
--- for more details circle 23 on page 48



1-YR. GUARANTEED RADIO & TV TUBES

NEW LOW PRICE

\$30

per 100 TUBES

Factory Used or Factory Second Tubes! TRU-VAC will replace FREE any tube that becomes defective in use within 1 year from date of purchase! ALL TUBES INDIVIDUALLY BOXED! CODE DATED & BRANDED "TRU-VAC"

Partial Listing Only... Thousands More Tubes in Stock!

0Y22	304	GAC7	8AT5	6CF6	6J7	6V6GT	7F8	12BA6	12V6GT
0Z4	384	6AF4	6AU6	6CG7	6KGT	6W4GT	707	12BA7	12W6GT
1A7GT	3V4	6AQ5	6AU4GT	6CQ8	6K7	6W6GT	7M7	12BD6	12X4
1B3GT	4B07A	6AH4GT	6AU5GT	6CM8	6N7	6X4	7M7	12BE6	1A7/12B7
1N5GT	4B88	6AM6	6AU8	6CL6	6Q7	6X5GT	707	12BF6	1488
1L4	4B27	6AK5	6AV5GT	6CM6	684	6X8	757	12BH7	14Q7
1L6	4CB6	6AL5	6AV6	6CM7	687	6Y6G	758	12BL6	17A24
1N5GT	5AM6	6AM8	6AW6	6CN7	688GT	7A5	7X7	12BR7	17D4
1RS	5AT8	6AQ5	6AX5GT	68C7	68C7	7A7	724	12B7	19B4G
1T4	5AV8	6AQ8	6BK3	6C86	6D07GT	7A8	774	12C45	19J8
1U4	5A24	6AQ7	6BK7	6C87	68F5	7B4	12AB5	12CM5	19Y8
1U5	5B07A	6AR5	6BL7GT	68G5	68G5	7B6	12AF6	12CP8	25Z8GT
1V2	5CC8	6AU7	68N6	6CUG	68G7	7B6	12AF6	12F8	25Z8GT
1X2	5J6	68B	68Q8GT	6D6	68H7	7B7	12AQ5	12F8	27
2A4	5R4	68A8	68Q7	6DE8	68J7	7B8	12A76	12K8	35B
2B4	5T8	68C3	68R8	6DQ8GT	68K7	7C4	12AT7	12K7	35B8
2C3	5U4	68C8	68S8	6DF6	68L7	7C5	12AU6	12L6	35C8
3A2	5U8	68D6	68Y5G	6E5	68M7GT	7C6	12A7	12Q7	35W4
3AL5	5V4G	68E6	68Z6	6F5	68O7	7C7	12AV6	12R5	35Z8
3A8	5V6GT	68F5	68Z7	6F6	68R7	7E5	12AV7	12S7	36
3BC5	5X8	68D6G	6C4	6H6	6T4	7E6	12AXGT	12S7	36
38N6	5Y3	68H6	6C4B	6J4	6T8	7A4/AXL	12A7	12M7	39/44
3Z6	6A6	68J6	6C4B	6J5	6U5	7E7	12A27	12S7GT	41
3CB6	6AB4	6A55	6C86G	6J6	6U8	7F7	12B4	12SQT	42

FREE BONUS! Plastic Universal Alignment Tool (196c regular value) with every order of \$8.00 or more.

1-YEAR GUARANTEED TV PICTURE TUBES. These tubes are made only from new parts and materials, except for the envelope which is re-used. Below Listed prices do not include dust Add additional \$3.00 Deposit on tube sizes to 20"; on 21" and 24" tubes—\$7.50. Dep. refunded when dust is returned prepaid. Aluminized tubes—\$4.00 extra. Picture tubes shipped only to continental USA and Canada—F.O.B. Harrison, N.J.

10BP4 8.95 18CP4 18.95 17BP4 10.95 21ALP4 23.95 21EP4 18.95 21KP4 21.95
12LP4 9.95 18KP4 18.95 17CP4 18.95 21AMP4 22.95 21FP4 17.95 21ZP4 23.95
14BP4 10.95 16LP4 10.95 17OP4 18.95 21AUP4 23.95 21MP4 24.95 24AP4 18.95
16AP4 13.95 16RP4 9.95 20HP4 17.95 21AVP4 23.95 21YP4 24.95 24CP4 37.95
18DP4 10.95 17AVP4 15.95 21AP4 27.95 21AWP4 23.95 21WP4 20.95 24DP4 38.95

ATTENTION QUANTITY USERS! Big Discounts Are Yours... Call or Write For Our 1000 Tube "Private Label" Special Attention Branding Dept., MGR. Money Cheerfully Refunded Within Five (5) Days, if not Completely Satisfied!

TRU-VAC (R) PAYS YOUR POSTAGE—On orders of \$5 or more in USA and Territories. Send approximate postage on Canadian and foreign orders. Any order less than \$5 requires 25c handling charge. Send 25c on C.O.D.'s. All orders subject to prior sale. Complying with Federal regulations, the following statement appears in all Tru-Vac advertising: Tubes in this ad may be FACTORY SECONDS or USED tubes and are clearly marked.

TRU-VAC Dept. E16
Harrison Avenue • Box 107 • Harrison, N. J. HUmboldt 4-9770

**THE INDUSTRY'S
ONLY COMPLETE
"LOOK-ALIKE" LINE**

**Exact Replacement
Needles/Cartridges**



Highest quality guaranteed! At your E-V distributor's or write for FREE replacement guide today! Electro-Voice, Inc., Buchanan, Michigan, Dept. 6277

Electro-Voice

... for more details circle 25 on page 48

**REPS AND
DISTRIBUTORS**

Wilrite Products, Inc., a Subsidiary of Globe-Union Inc.,—named the James J. Backer Co., Seattle, Logan Sales Co., San Francisco, Robert E. Nesbitt Co., Dallas and Walter S. Harmon Co., Los Angeles as sales reps for the Wilrite line of "Metalloy" film resistors in the West. Also selected were the Henger-Fairfield Co., Cleveland to cover Ohio, Jerry Vrbik Co., Cedar Rapids, for Iowa, Fred L. Tieggs, Chicago, in Ill. and Leslie M. DeVoe, Indianapolis, who will handle Indiana.

Olympic Radio & Television-Div., The Siegler Corp.—has named four new distributors in the Western and mid-Western U. S. The new distributors are: The Kane Co., Toledo, Ohio; Radio Electric Supply Co., Minneapolis, Minn.; Litteral Distributing Co., Indianapolis, Ind.; and Appliance Distributors, Tucson, Ariz.

Muntz TV, Inc.—named Steven M. David TV, Inc., 885 Folsom Avenue, San Francisco, as its exclusive dealer in the San Francisco area. President of the San Francisco dealership, Steven M. David, reports that he expects to

sell 300 TV sets per month from three store locations.

Eric Electronics Corp.—names R & D Sales Co., Denver, Colo., regional sales reps for the complete line of Eric stereophonic high fidelity components and commercial sound equipment. Herb Reichert and Bob Dunn, R & D principals, will service the entire Colo., Utah, Wyoming and N. M. area.

Centralab — Expansion of distributor activities at this electronics division of Globe-Union Inc. has led to establishment of a new headquarters building for the Distributor Div. A new 16,000-square-ft building, to house all sales, administrative and stocking operations is located in suburban Menomonee Falls, Wis.

International Resistance Co.—has appointed a new distributor to market its resistor products in the Middle Atlantic states, exclusive of New York City. Angus-Sloane Associates Inc., with offices in Moorestown, N. J., and Silver Spring, Md., will handle the resistor products for all IRC manufacturing divisions.

Robor Mark Corp.—manufacturer of Musical-Aire home music systems has named two new reps. Henry Fine Co.,

Superior's New Model 820

TUBE TESTER

**TESTS ALL MODERN TUBES
INCLUDING THE NEW**



- ✓ NOVARS
- ✓ NUVESTORS
- ✓ 10 PINS
- ✓ 12 PIN COMPACTRONS

- Employs new improved emission circuit.
- Tests over 850 tube types.
- Tests 0Z4 and other gas filled tubes.
- Employs new 4" meter with sealed air-damping chamber resulting in accurate vibrationless readings.
- Use of 26 sockets permits testing all popular tube types.
- Dual Scale meter permits testing of low current tubes.
- 7 and 9 pin straighteners mounted on panel.
- All sections of multi-element tubes tested simultaneously.
- Ultra-sensitive leakage test circuit will indicate leakage up to 5 megohms.

Model 820 comes complete with tube charts and instructions; housed in handsome, portable, Saddle-Stitched Texon case. Only **\$38.50**

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

Try it for 15 days before you buy. If completely satisfied then send \$5.00 and pay balance at rate of \$5.00 per month until total price of \$38.50 (plus postage) is paid — No Interest or Finance Charges Added! If not completely satisfied, return to us, no explanation necessary.

MOSS ELECTRONIC, INC.
DEPT. D-938949 Tenth Ave., New York 34, N.Y.
Please rush Model 820. If satisfactory, I will pay on terms specified. Otherwise I will return tester.

Name _____
Address _____
City _____ Zone _____ State _____
All prices net, F.O.B., N.Y.C.

... for more details circle 34 on page 48



**RAD-TEL SELLS
DIRECT TO YOU ...
AT LOW PRICES!
RAD-TEL'S QUALITY
BRAND-NEW TUBES
NOW } OVER 500 TYPES
UP / TO 75% OFF**

1-YEAR GUARANTEE • 1-DAY SERVICE

FREE SEND FOR NEW TUBE & PARTS CATALOG SEND FOR TROUBLE SHOOTING GUIDE

SAMPLE OF RAD-TEL'S AVAILABILITY

• NOT AFFILIATED WITH ANY OTHER MAIL ORDER TUBE COMPANY •

Qty.	Type	Price	Qty.	Type	Price	Qty.	Type	Price	Qty.	Type	Price
---	1B3	.79	---	6AL5	.47	---	6BZ6	.55	---	12AU7	.60
---	1X2B	.82	---	6AU6	.52	---	6CB6	.55	---	12BH7	.77
---	3CB6	.54	---	6AX4	.66	---	6CG7	.61	---	35W4	.42
---	4BQ7	1.01	---	6BQ6	1.05	---	6SN7GT	.65	---	35Z5	.60
---	5U4	.60	---	6BQ7	1.00	---	6U8	.83	---	50C5	.53

RAD-TEL TUBE CO.

ETG 55 CHAMBERS ST., NEWARK 5, NEW JERSEY

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. No COD's outside continental USA

... for more details circle 41 on page 48

Needham, Mass., will serve Maine, New Hampshire, Vt., Conn., Mass., and R. I. **Appliance Production Corp.**, Franklin Square, N. Y., will serve N.Y.C and L.I.

Allied Control Co.—announces the appointment of **Arco Electronics, Inc.**, as distributor in the New York City area and in Southern Calif. Arco, will handle the distributor line for the Metropolitan New York area. **Arco Capacitors** will handle distribution for Southern Calif.

Aerovox Corp.—has appointed **Gene Root**, Pittsburgh, as sales rep for all Hi-Q products in Western Penn. (west of north-south line joining Harrisburg and Sunbury, Pa.) and in the entire state of West Virginia. **Joseph Costello**, 6715 Island St., Orlando, Fla., has been appointed rep for the state of Mississippi, in addition to his present territory of Fla., Ala., Ga., S. C., and Tenn.

Philco Corp.—announced that **Wyatt-Cornick, Inc.**, of Richmond, Va., has become the first new independent distributor to join the Philco Corporation sales organization since that company became a Ford subsidiary.



"Now, take the wire off the top of your power tube. But, first disconnect your set . . . hello . . . hello . . . Fred . . . FRED . . ."

IF YOU CHANGE YOUR ADDRESS

Notify us at 1 East First Street, Duluth 2, Minn. Please include the address label from a recent issue and allow 30 days for the change.

ASSOCIATION NEWS

Indiana

IESA, Indianapolis, reports the following officers were elected: Chairman, Leon F. Howland; Vice Chairman, Charles F. Wilhelm; and Treas., James W. Baker.

Texas

TEA, Austin, announces the hiring of its first full-time employee Gerald E. Williams. Williams, Executive Direc-

tor of the organization, will be called upon to help build TEA into a "bigger, better and stronger" organization.

Missouri

TESA, Kansas City, reports results of cost accounting conducted by local TV repair shops to show that the average shop owner does not realize that operating costs include depreciation reserve and profit. Also, that almost every shopowner is too generous with his time, being more likely to give it away than to charge for it. The consensus is that many shop owners are basing charges on the \$5.00 hourly rate, which a survey in 1951 showed as the rate nec-



Model 1571 Shown with Accessory 45 rpm Spindle in Base Plate Spindle Well

V-M Deluxe 'Stere-O-Matic'® 4-Speed Automatic Record Changer with Stereo Cartridge and Diamond Needle

The Sales Pace Setter For ALL Custom and Replacement Hi-Fi and Stereo Installations! Sell customers a combination of true transcription-turntable fidelity and automatic record changer convenience . . . all in *ONE* unit with this functional V-M 'Stere-O-Matic'®! The eleven-inch turntable, scientifically balanced, assures minimum rumble and wow! V-M Automatic Manual-Play function saves possible needle damage by returning the extra-long, dynamically balanced tone arm to the rest post *AUTOMATICALLY* after single record play! *V-M Model 1571 . . . \$50.00* LIST* Available with 4-pole motor and plug-in tone arm head for magnetic cartridges as *Model 1572 . . . \$50.00* LIST*



*Slightly Higher West Attractive, functional Base or pre-cut mounting board available for mounting all V-M record changers in any kind of Hi-Fi Installation. Model 1438 . . . \$5.95 List.

GET THE SELLING FACTS ON THIS COMPATIBLE V-M DELUXE 'STERE-O-MATIC'® —YOU'LL PROFIT!



V-M CORPORATION • BENTON HARBOR, MICHIGAN • KNOWN FOR THE FINEST IN RECORD CHANGERS, PHONOGRAPHS AND TAPE RECORDERS -- for more details circle 52 on page 48

ASSOCIATION NEWS

essary to show a profit. The accountants state that, since costs have risen almost 60% since 1951, most shops must get \$8.75 an hour to show a profit after expenses.

TESA, St. Louis, elects: Pres., Marion Crane; V.P.'s, Howard Wigg, Wm. Pryor, Vincent Lutz, and Walter Round; Sec'y, Gene Love; Treas., Carl Adcock; Board Chairman, Benton Linder; and Board Members, James Hatcher, W. R. Drennan, Lawrence Enders, Earl Steffes,

and Ed Engel. Also reported is a call, received by an association member from an official of Channel 2, informing him that the words "Free" and "Free Service" would be deleted from future Videon Corp. advertising. After seven years, the last large advertising media in St. Louis will conform with the advertising standards drawn up jointly by TESA-St. Louis and the Better Business bureau in 1954; and approved and adopted by NATESA and the National Better Business Bureau. Recent service meetings: about 40 members turned out for a Radonics meeting on the new 1962 RCA color sets, circuitry and convergence were explained by an RCA engineer; about 45 members attended the Deltronics Distributing Co.

meeting on 1962 Delco auto radios, reported most informative on transistor radios and service procedures; about 220 members appear at another Radonics meeting, on B&K test equipment.

California

TSA, San Francisco, reports that more than 100 servicemen were present for a service meeting on multiplex receivers. The meeting was presented by the G-E Sales and Distribution Dept. in Burlingame. Jim Gabbert, station KPEN was guest speaker, and spoke on development of the G-E/Zenith multiplex system. Other speakers covered the G-E multiplex adaptor and wireless remote control in detail.

CSEA, Los Angeles, is fighting the Pacific Telephone Co. who have in the past accepted radio-TV service ads for the yellow pages with only an answering service listed. Mr. Johannot, of CSEA, said that some of these organizations have several listings on the same page with different answering service numbers for each. He said that one firm was listed under five names and seven answering services. Another firm had seven quarter page ads on two facing pages. Most of the "answering service" ads listed 24-hour service and "no fix - no pay" offers. The telephone company has agreed not to accept any 24-hour service ads unless proof-positive to support it is offered. The Better Business Bureau, which has been working with the phone company, alleged that the association was asking too much — that the problem could not be solved "overnight."

Delaware

TSDA, Delaware County, reported it had been asked by the FTC to submit its records for examination. The action was ordered after complaint had been made that members of the association were "boycotting" certain distributors. No report of the FTC findings has been released to date.

New York

License Law Passed

TESA, Buffalo, announces the passage of a city licensing law. The law states that no one, except licensed technicians shall work on any TV receivers for any compensation. To be eligible to take the license exam, a total of 4000 hours of TV servicing or 1000 hours and a certificate from an accredited N. Y. electronics school must be obtained. The board members for the licenses must have a total of 6000 hours of experience each. Board members are appointed by the mayor. To be exempt from the examination, a total of 4000 hours experience or 2000 hours and a certificate from a state approved course must be obtained prior to the effective date of the new law. TESA is only half-happy with the new law in that, less than half of the area residents live within the city. It is pressing for passage of the Cook-McClosky New York State Television License Bill.



Adjust frequencies accurately, fast — with Bailey Zero Beat Frequency Standard

- 25 to 470 megacycle spectrum without adding crystals or calibrations.
- All circuits locked to a single, temperature controlled crystal standardized against WWV.
- Will operate on 6 volt or 12 volt inverter, as well as 115 AC.
- Signal generator output for receiver quieting.
- Can be used to calibrate other frequency meters.
- Rugged portable instrument.
- Accuracy $\pm .00003\%$.

The Bailey Zero Beat portable secondary frequency standard now makes it possible for one man to align the transmitter and receiver frequency of two-way mobile radio equipment quickly and accurately.

With just a single cable connection both transmitting and receiving units can be adjusted. Frequency is established by setting an easy to read switch and a unique pre-calibrated dial.

And the Zero Beat eliminates service problems — can be standardized with WWV easily right in your shop.

Write for complete specifications and name of representative in your area who will be glad to demonstrate.



B LTEC LABORATORIES, INC.
14 ALSOP AVENUE
MIDDLETOWN, CONNECTICUT

... for more details circle 26 on page 48

NEW BOOKS

USEFUL ELECTRONIC SHOP HINTS. By *Electronic Technician Staff.* Published by *John F. Rider Publisher, Inc.* 103 pages, soft cover. \$1.95.

This book contains almost 200 practical shop hints which were first published in *ELECTRONIC TECHNICIAN Magazine*. Each hint was selected from the collection of shop hints which have been submitted to the magazine since 1953. The book is divided into sections covered by the type of hint: Tools, Television and Radio, Cheater Cords, Components and Tubes, Soldering, Testing Aids, Audio and Cathode Ray Tubes. Many of the shop hints are illustrated. Anyone who is engaged in electronic servicing can certainly save time and trouble by utilizing some of these shop hints.

COMMERCIAL SOUND INSTALLER'S HANDBOOK. By

Leo G. Sands. Published by *Howard W. Sams & Co., Inc.* 288 pages, soft cover. \$4.95.

Here's a well illustrated book on sound systems which can be a help in all types of sound installations. The book is written around each section of virtually every type sound system. Chapters included in the book are: Basic Amplifiers Circuits; Loudspeakers; Distribution; Control Circuits; Maintenance; and Installation. Photographs and explanations of the latest equipment is included in the text. Anyone who plans to install, service, or sell sound system equipment should be able to profit by adding this book to their library.

BENCH SERVICING MADE EASY. By *Robert G. Middleton.* Published by *Howard W. Sams & Co., Inc.* 160 pages, soft cover. \$2.95.

Prolific author Bob Middleton offers a great number of time-saving TV service methods here. He presents detailed troubleshooting steps in various circuit areas of TV sets to illustrate how to track down a defect quickly. Many fine draw-

Now . . .
New
Shortcuts
to
TV Profits



Yes . . . you can earn more money than you ever thought possible. Stop servicing the old-fashioned, time-consuming way. Learn hundreds of new shortcuts in this new way to television repair. Fixing just one TV receiver will more than pay for the cost of this new two-volume set. Work the troubleshooting chart way to faster repair, higher profits. We show you how in this new, complete two-volume set of the famous Sylvania sponsored **NEW SHORTCUTS TO TV SERVICING.**

FILL-IN the handy order blank below to get both deluxe bound volumes, only \$6.75 plus a special book-case binder. Send cash with order and we'll pay the postage.

WATERVIEW PUBLISHING CO.
226 Park Ave. South
New York 3, N. Y.—ET-62

Please send the complete two-volume set of **NEW SHORTCUTS TO TV SERVICING** immediately. Enclosed is \$6.75 Bill me (Send check or money order)

Name
Address Apt.
City
Zone State

... for more details circle 53 on page 48

What's Your Lucky Number?

Whenever you write us about your subscription, please enclose the address label from your latest copy . . .

. . . or AT LEAST give us your address exactly as it appears on the label, including the code number. The code is your lucky number because it enables us to serve you promptly.

JOHN DOE
67 MIDDLE STREET
HOMETOWN 3, OHIO
132-116-X-12XX9-14

ELECTRONIC TECHNICIAN

1 East First Street, Duluth 2, Minnesota

34¢
EACH
ELECTRONIC MARKET
1 YEAR
GUARANTEED
RADIO-TV TUBES

\$32
per 100

25¢
per tube
QUANTITY DISCOUNT

When purchasing lots of 50 or more same type tube Applies to tubes below only

6SH7	1L4	12AX7	12CH5	6J6	50C5	6EB5	12AT7	12BY7	6W4
6AZ4	1R5	6AB5	12BA6	6N7	6AW5	6AV5	6C5	6BD	6AF4
6AR4	6B4	6C7	12SH7	6K7	6AM6	12AR7	6AR5	6AC7	6AB5

All tubes not necessarily new, but may be electronically perfect factory 2nds or used. Each clearly marked. **ELECTRONIC MARKET** will replace FREE any tube that becomes defective in use within 1 year from date of purchase. All tubes individually tested and marked. Partial Listing Only — Thousands More Tubes in Stock!

6Z6	5AY6	6AT5GT	6CH6	6SL7	12BH7
1A7GT	5AZ6	6BB	6CL5	6SL7	12BH6
103GT	5C5B	6BB	6C0B	6SR7	12BH7
1W5GT	5D4	6BC5	6CM7	6SR7	12CA5
155	5T8	6BC8	6CH7	6T6	12SA
174	5M4	6BD6	6C9	6T6	12F6
1R5	5M6	6BE5	6C9	6U5	12K6
112	5V6GT	6BE6	6C9S	6V0GT	12K7
2AF4	5X8	6B6	6C9B	6V0T	12L6
2BN4	5Y7	6B6	6C9B	6X4	12Q7
2CY5	6AB4	6B6	6C9B	6X5GT	12R5
3C5	6AH4GT	6B6	6C9B	6X5GT	12R5
3B5	6AH6	6B6	6C9B	6X5GT	12R5
3BU6	6AL5	6B6	6C9B	6X5GT	12R5
3B7B	6AN6	6B6	6C9B	6X5GT	12R5
3C5C	6AN6	6B6	6C9B	6X5GT	12R5
354	6AQ7	6B6	6C9B	6X5GT	12R5
3V4	6AR5	6B6	6C9B	6X5GT	12R5
4B07A	6AS5	6B6	6C9B	6X5GT	12R5
4B50	6AT5	6B6	6C9B	6X5GT	12R5
4B77	6AM4GT	6B6	6C9B	6X5GT	12R5
4CB6	6AU5GT	6B6	6C9B	6X5GT	12R5
5AM6	6AV5	6B6	6C9B	6X5GT	12R5
5AN6	6AV5	6B6	6C9B	6X5GT	12R5
5AT8	6AZ4GT	6B6	6C9B	6X5GT	12R5

ORDER SHIPPED SAME DAY RECEIVED.
SHIPPING INSTRUCTIONS: **ELECTRONIC MARKET** PAYS YOUR POSTAGE on orders of \$10 or more in U.S.A. and Territories. Send approx. postage on Canadian and foreign orders. Any order less than \$10 requires 25¢ handling charge. Send 20% on C.O.D.'s.
ANY RECEIVER TUBE NOT LISTED ALSO AVAILABLE AT 34¢ EACH!

74¢
EACH
\$49
per 100

SILICON RECTIFIERS
ALL PURPOSE
Epoxy construction

COMPLETE LINE OF INDUSTRIAL TUBES
ONE OF THE LARGEST INVENTORIES IN THE COUNTRY
ELECTRONIC MARKET
3750 E. 10th CT., HIALEAH, FLORIDA
Phone: OXford 1-5331

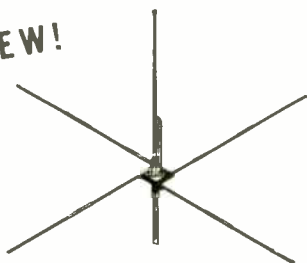
... for more details circle 22 on page 48

GETTING STARTED IN CITIZENS RADIO?

You will do right for yourself and your customers when you install MOSLEY base station antennas!

Old timers in Citizens and other 2-Way Radio work will tell you that MOSLEY antennas are respected throughout the industry for dependable performance and rugged durability. They can cite many cases where communications range — and customer appreciation — were significantly increased by simply switching to a MOSLEY antenna!

NEW!



Model V-11-UGP

Omni-directional Ground Plane Antenna

Net Price, \$21.95

Here is a low cost unity gain base station antenna you can install with full confidence that it will perform effectively . . . for many maintenance-free years!

FEATURES:

- 100% Rust Proof!
- Heavy-Wall, Heat Treated 6061-T6 Aluminum Elements!
- Vertical and Radial Elements Grounded for Positive Lightning Protection and Improved Signal to Noise Ratio!
- "Cyclocac" Base Supports Vertical Without Guys in Winds Up To 75 mph!
- Low Angle of Radiation for Greater Range!
- 360 degree Radiation Pattern!

MOSLEY MAKES A COMPLETE LINE OF FINE BASE STATION AND MOBILE ANTENNAS FOR BOTH 27 MC. CITIZENS BAND AND FOR THE VHF 2-WAY BANDS.

Write for free Catalog.

Mosley Electronics, Inc.

4610 N. Lindbergh Blvd. — Bridgeton, Mo.

--- for more details circle 57 on page 48

NEW BOOKS

ings, schematics and photos accompany the excellent text, including numerous scope traces. This is an especially fine book for learning how to increase bench repair efficiency.

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EXCLUSIVE! FRANCHISE OPPORTUNITY

PARTS UNLIMITED Electronic Center

The Parts Unlimited chain currently operating 43 stores in Metropolitan N. Y., N. J., Conn. & Pa. area has been in existence since 1953 and is geared toward meeting the tremendous consumer needs of the present and future in the field of electronic merchandise and servicing at low competitive prices. Parts Unlimited is nationally recognized as a leader in its field; being named by one nationally known manufacturer as the firm with the greatest growth potential in the country. The firm is offering an exclusive franchise to operate Parts Unlimited Electronic Centers in areas of 100,000 or more population. Applicants should have the following qualifications:

- Be under 50 years of age.
- Possess merchandising qualifications and familiarity with electronics to fully develop the annual volume projected for his area.
- Investment requirements should range from \$50,000 upward depending on size of market area to cover starting inventory, set-up, etc. Long term financing can be arranged.
- We will train applicants who possess the drive, vision and capacity for effort to achieve success within their own area while contributing to and participating in the over-all picture.

If you qualify, write now for more information.

PARTS UNLIMITED
3 State Street ■ Bloomfield, N. J.

--- for more details circle 36 on page 48

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
FREE 6" Plastic Extender With Every Can

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



CHEMICAL ELECTRONIC ENGINEERING, INC., Matawan, New Jersey

--- for more details circle 19 on page 48

ELECTRONIC TECHNICIAN



Tips for Technicians

Distributor Division, P. R. Mallory & Co. Inc.
P. O. Box 1558, Indianapolis 6, Indiana

The new generation of batteries ... how to use them

You may not realize it, but dry batteries used in modern electronic circuits are as different from old style dry cells as 1962 autos are from the Model T.

Of primary interest to you as a technician is the mercury battery. Instead of the ordinary combination of zinc, carbon, and electrolytic compounds, Mercury batteries use mercuric oxide and a zinc amalgam in combination with an alkaline electrolyte. This chemical system produces a dry battery uniquely matched to solid-state electronic circuits. For example, Mercury batteries have about four times the milliamper-hour capacity of ordinary batteries of the same physical size.

Not only do mercury batteries contain more actual power, they hold this power for long periods of time. Ordinary batteries start to lose power from the instant they are assembled *whether used or not*. On the other hand the storage life of a mercury battery is amazing. We've had some on storage test for more than nine years . . . AND THEY'RE STILL ALIVE.

Perhaps the best thing about mercury batteries is their steady output voltage. It stays nearly constant throughout the entire life of the battery (see chart). Ordinary battery voltage drops steadily. Constant voltage is important in solid state circuits . . . it means constant gain and linearity.

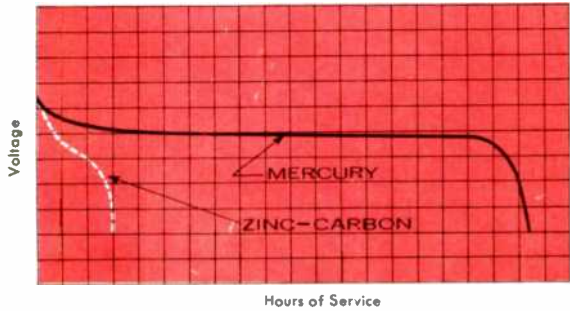
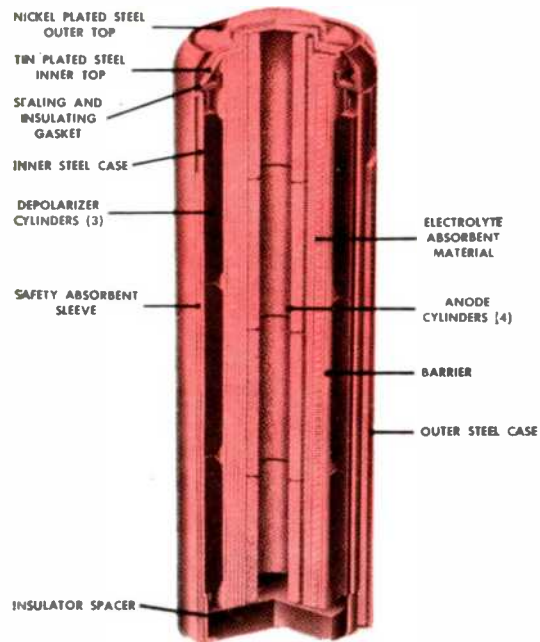
Terminal voltage on a mercury cell is 1.35 volts $\pm \frac{1}{2}\%$! This is so accurate there's a special multi-voltage reference battery (Pt. No. 303113) that's widely used as a secondary voltage standard. It's excellent for setting scopes, meters, etc., and all sorts of lab work. We'll be happy to send complete information. Just ask.

Mercury batteries are a Mallory development. We like to think we're experts on them. But we know there are jobs a mercury battery shouldn't do. Jobs where very high surge drains or continuous heavy drains are required . . . flash cameras, flashlights, movie cameras, etc. So we developed the Mallory Manganese Battery. It's the king of heavy drain batteries . . . with excellent storage life and moderate price.

There are literally dozens of other battery systems available from Mallory. We simply don't have space to go into them here. But if you're interested in rechargeable batteries, or ultra low temperature types, or extreme low or high voltage types, or other exotic types, write to Dept. 762. We'll send the information.

Meanwhile, when you need a battery for a grid bias circuit, or a portable instrument, or a transistor radio, use a Mallory Mercury Battery. For flashlights and similiar applications use Mallory Manganese Batteries. You can get them from your Mallory Distributor. He's the man to see for Mallory capacitors, controls, switches, semiconductors, and vibrators . . . and for all your electronic requirements.

--- for more details circle 33 on page 48



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