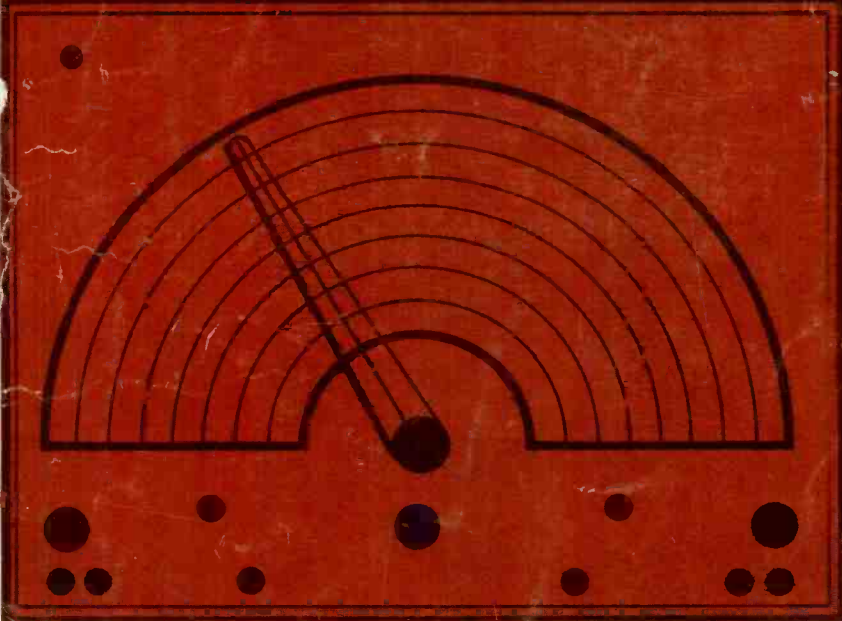


ELECTRONIC TECHNICIAN

SWEEP GENERATORS

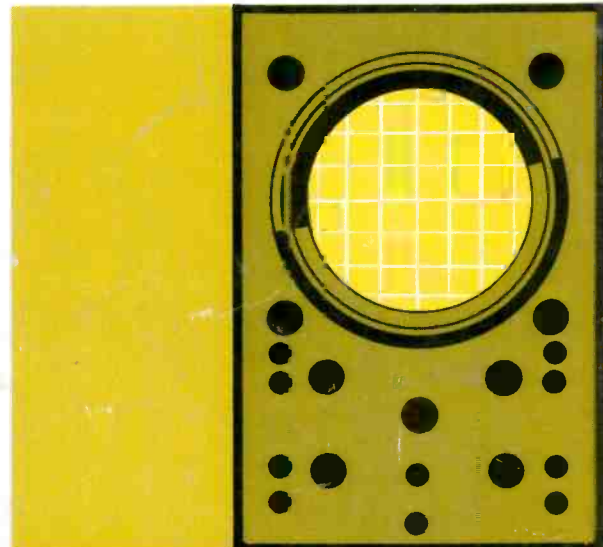


- Shop Relocation
- More Pull From Small Ads
- All in a Days Work

10
OCTOBER 1963



SCOPES



SEMI- CONDUCTOR TESTERS





Here's the **NEW** Jensen **Concert-Fidelity** ^{T.M.} Series

MR. SERVICE DEALER:

When you need a loudspeaker with substantially higher fidelity than you can get with general-purpose units, you'll find just what you want in Jensen's new CONCERT-FIDELITY Series. It is an important part of Jensen's new complete speaker line available from your distributor.

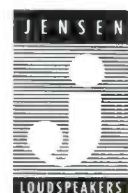
Special cone supports, made of cloth, improve bass; there are coaxial speakers offering increased clarity of speech and music; multi-way units and crossover networks let you tailor sound quality to meet special requirements (there are more than 500 custom combinations possible). Binding-post terminals make installation fast and easy.

Get the full story—send for Catalog 1090 today.

MODEL NO.	TYPE	SIZE	FREQUENCY RANGE	IMPED. OHMS	POWER RATING†	LIST PRICE
DC-80	High-Compliance Full Range, Dual Cone	8"	40-16,000	8	11 w.	\$19.95
DC-120	High Compliance Full Range, Dual Cone	12"	25-13,000	8	13 w.	22.95
KD-80	High-Compliance Two-Way Coaxial	8"	30-15,000	8	12 w.	28.25
KD-120	High-Compliance Two-Way Coaxial	12"	20-15,000	8	14 w.	33.25
W-80	High-Compliance Woofer	8"	30-2,000	8	15 w.	19.25
W-120	High-Compliance Woofer	12"	20-2,000	8	18 w.	22.25
W-150	High-Compliance Woofer	15"	20-2,000	8	20 w.	33.25
M-81	Midrange, Closed-Back	8"	600-4,000	8	25 w.	14.80
TW-350	Direct Radiator Tweeter	3½"	2,000-15,000	8	15 w.	5.95
TH-100	Compression Tweeter	—	1,000-16,000	8	25 w.	19.95
TH-200	Compression Tweeter	—	2,000-18,000	8	25 w.	17.80
XN-100*	2-Way Crossover	—	2,000 cycle Crossover	—	—	15.50
XN-200*	2-Way Crossover	—	2,000 cycle Crossover	—	—	15.50
XN-640*	3-Way Crossover	—	600/4,000 cycle Crossover	—	—	19.95

*Complete with H-F Control

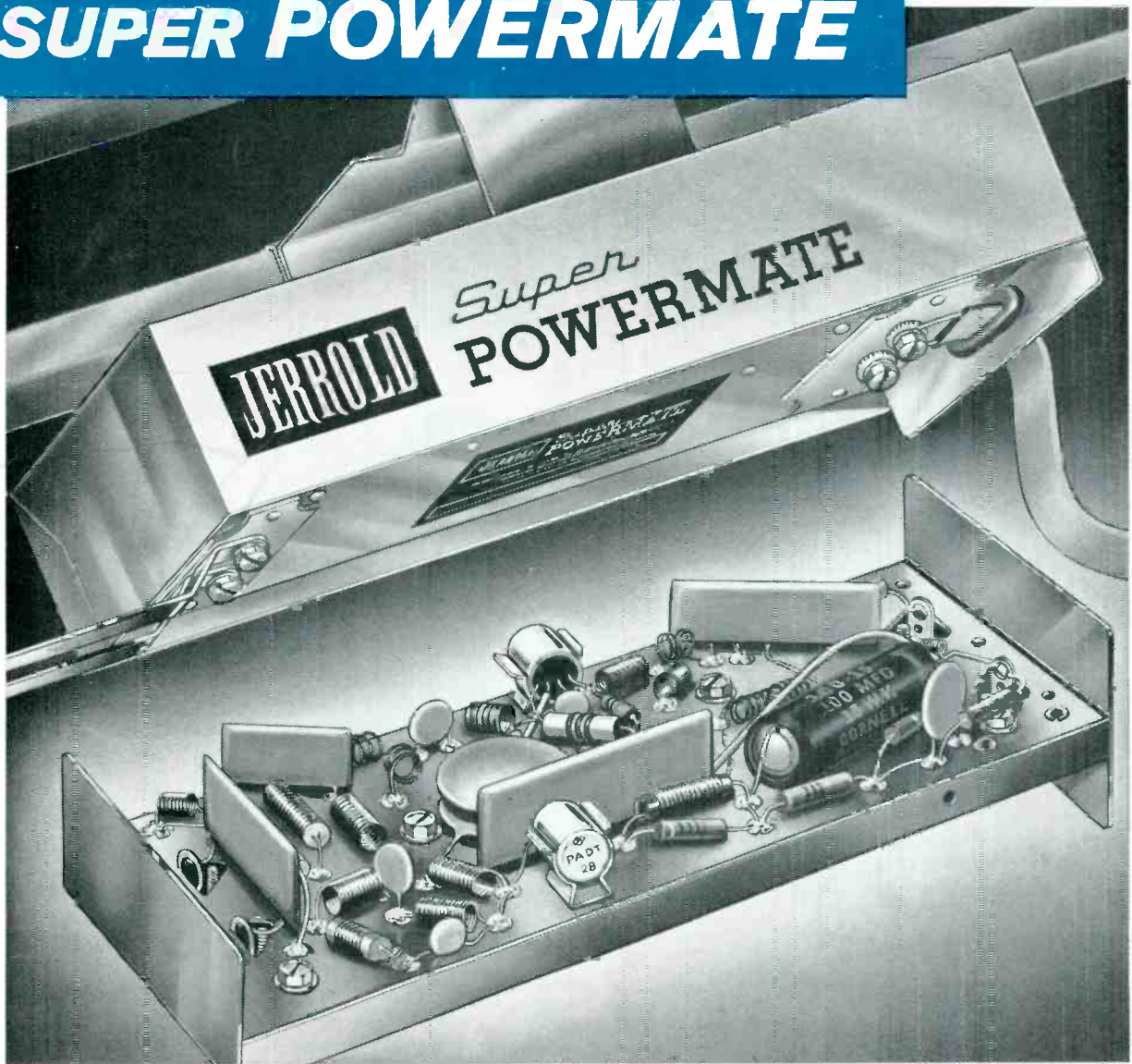
†Program rating. Peak power is twice the indicated figures.



JENSEN MANUFACTURING COMPANY / DIVISION OF THE MUTER COMPANY / 6601 SOUTH LARAMIE AVENUE, CHICAGO 38, ILLINOIS
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- - - for more details circle 32 on post card

NEW TWIN-TRANSISTOR SUPER POWERMATE

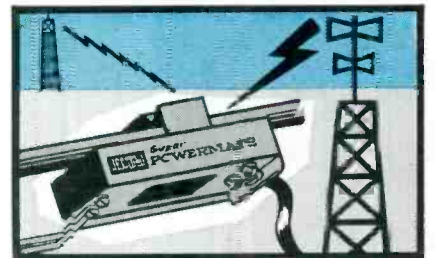


BREAKS THE GAIN/OVERLOAD BARRIER

Servicemen and the public long wanted it, but were told they couldn't have it—a transistorized TV antenna preamplifier with the overload capacity to handle local signals without sacrificing the gain that brings in distant stations.

But Jerrold did what couldn't be done. With the new twin-transistor SUPER POWERMATE, you have, for the first time, a transistor preamplifier with the high gain and low noise figure that made the original Jerrold Powermate famous—plus an unprecedented overload capability for local-signal situations. SUPER POWERMATE offers a gain range from 15.5db with 700,000 μ v max. output at Channel 2, to 11.3db with 200,000 μ v max. output at Channel 13. There are no tubes or nuvistors to replace. And frequency response is fantastically flat—a boon to color TV.

Sell new SUPER POWERMATE, the all-channel antenna preamplifier with G/O—the industry's best Gain/Overload capability. List \$44.95. See your Jerrold distributor or write Jerrold Electronics, Philadelphia 32, Pa.



GAIN to reach far-distant stations, OVERLOAD capability to prevent local-signal interference.

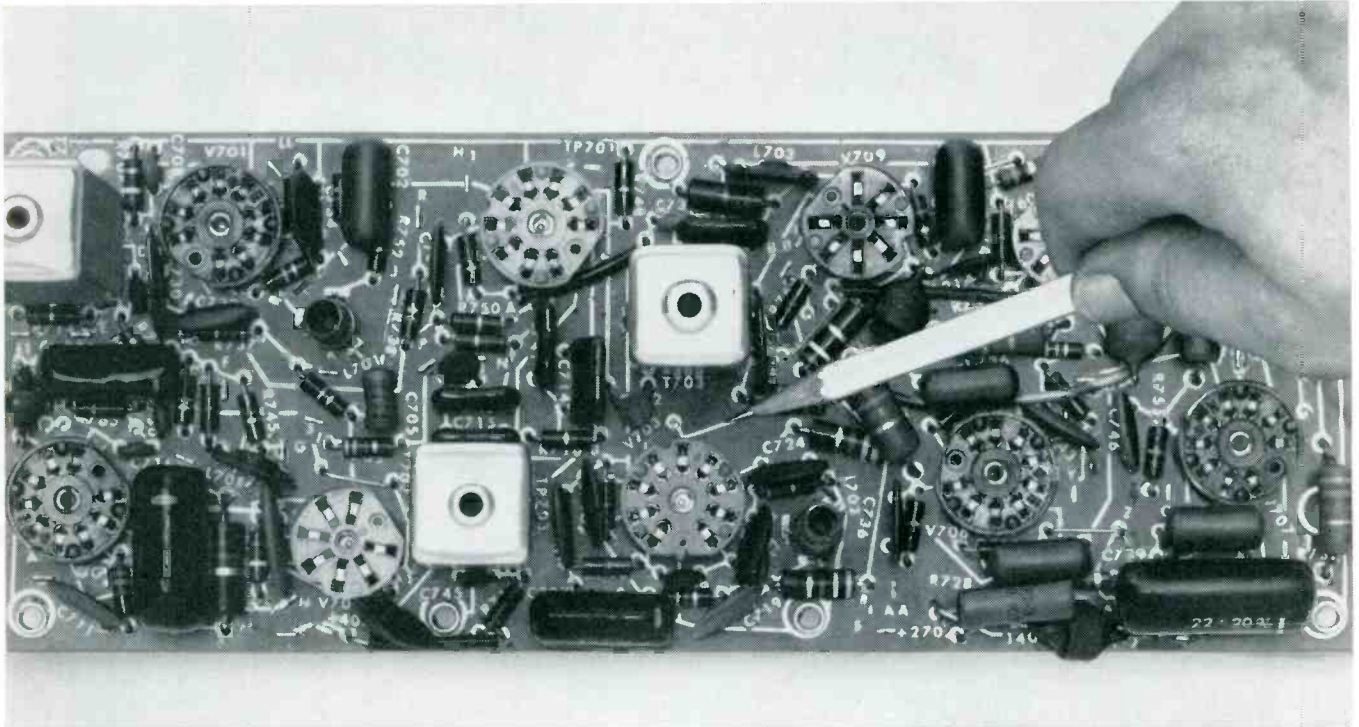
SUPER POWERMATE **G/O**
HAS
GAIN / OVERLOAD

JERROLD
ELECTRONICS

A subsidiary of The Jerrold Corporation

... for more details circle 33 on post card

From RCA Victor—another big advance in Space-Age Sealed Circuitry



RCA Victor Color TV Chroma Circuitry

You can see at a glance how new streamlined “road-mapping”
makes servicing faster, easier, surer than ever before

Pictured above is the “new look” in RCA Space Age Sealed Circuitry . . . the new precision-crafted boards that you’ll see in *all* 1964 New Vista Color and in most RCA Victor black-and-white television sets for 1964.

This new schematic diagram “road-mapping” consists of *straight white lines* that run *directly* from *point-to-point*. No confusion, no difficult paths. And the extra space gained has been used

to make the label markings larger. You can see and trace the circuits at a glance.

Here again RCA Victor has made a vitally important contribution to easier, faster and more accurate servicing. It is part of our continuing research program to offer the utmost in reliability with Space Age Sealed Circuitry.

See Walt Disney’s “Wonderful World of Color,”
Sundays, NBC-TV Network



The Most Trusted Name in Electronics

**WORLD'S LARGEST
ELECTRONIC TRADE
CIRCULATION**

ELECTRONIC TECHNICIAN

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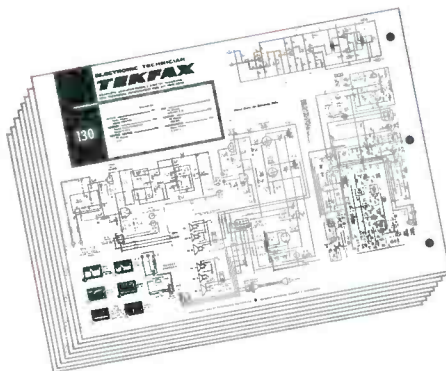
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TEKFAX 16 PAGES OF LATEST SCHEMATICS



ADMIRAL: TV Chassis Models 19K3U, -M3U, -R3U, -T3U, run 13

AIRLINE: Clock Radio Model GTM 18 27A

DELCO: Auto Radio Cadillac Model 7286315

DUMONT: TV Chassis 120677-A, 78-B, 79-A, 84-A, 89-A

MAGNAVOX: TV Chassis 44-01

WESTINGHOUSE: CB Transceiver Chassis V-2451-2

make extra dollars with Eico scopes

An oscilloscope gives a visual picture of what is happening in a circuit, something no other test instrument can do. This very feature makes a good scope a money maker for your shop. It saves you time, analyzes those intermittent faults, and makes routine servicing easier than ever. Once you start using a scope regularly you'll never be without one.

You've pulled a set with a buzz in the sound. Is it 60-cycle hum or 60-cycle buzz? A quick look with the scope and you'll know. You'll either see a 60-cycle sinewave caused by heater-cathode leakage or there'll be a vertical deflection sawtooth probably resulting from a defective bypass capacitor.

If alignment required? A scope is a must. Set it up along with your EICO post injection sweep generator, and you have only to adjust transformer and sound trap slugs to finish the job. Same thing for setting up the 4.5-mc sound takeoff network.

Losing the signal somewhere in the video circuits? Hook up the scope and see where it's going astray. There's a good chance you'll spot the bad component at the same time.

But when you go to buy a scope, what do you look for? Large screen, high sensitivity, frequency response, attenuators, synchronization, calibrator? All of these are important and are included in the design of any professional scope intended for the service technician.

Large screen: You can get by with 3 inches, but take the 5-inch screen of the EICO 460. Get a close look at what's happening. It's got an edge lit calibrated bezel too. **High sensitivity:** The 460's vertical amplifier delivers 25 mv per cm. All you'll ever need and more. **Frequency response:** EICO makes it flat from dc to 4.5 mc

in the 460. Ideal for color and black and white as well as industrial production and research, audio testing and experimenting. **Attenuators:** The vertical attenuator in the EICO 460 is a 4-step frequency compensated network. Can't beat this kind of design. **Sync:** Any signal reaching the screen is fully synced — automatically. And for special purposes you can inject your own external sync signal. **Calibration:** Accurate peak-to-peak voltage calibrator is built right into the 460.

All this adds up to the top scope for TV service. You can get it as a kit for \$89.95 or completely wired for \$129.50.

If you don't need so elaborate an instrument, take a careful look at the 427 dc to 1 mc scope or the new 3" General Purpose scope, the EICO 430 (kit, \$65.95; wired, \$99.95). The new 430 does everything bigger and more expensive scopes do. Vert amp/flat from 2 c to 500 kc, —6 db at 1mc. Sensitivity 25 mv/cm. Horiz amp. flat from 2 c to 300 kc. Sensitivity .25 V/cm. Flat face 3" tube; mu-metal shield eliminates effects of external fields.

There are plenty of accessories for EICO scopes too. An Electronic Switch to put two different signals on the scope screen at the same time (EICO 488: kit, \$23.95; wired, \$39.95). Voltage Calibrator for the less expensive 427 and 430 (EICO 495: kit, \$12.95; wired, \$17.95). Three accessory probes-demodulator, direct and low capacitance types.

Whether it's scopes, tube testers or VTVM's you get the best for less with EICO. Save money by building your instruments from kits, or buy them factory-wired at a substantial savings. See your distributor. Write for complete 28 page catalog. Dept. ET-10 *Add 5% in west*

LETTERS TO THE EDITOR

Color Generator

On page 40 of your August issue the statement that the Hickok model 661 color bar generator does not generate an NTSC pattern is not true.

... this and other Hickok color generators have always been NTSC.

T. P. CLEMENTS

Hickok Electric Instrument Co.
Cleveland, Ohio

● *I hope this clarifies the situation for the many confused readers who commented on it. — Ed.*

Comments Please

I would like to have some comments on the following: I was called to a customer's house and found their TV had no sound and no picture. I gave the customer \$25 estimate.

After restoration of sound and picture, I found other troubles which existed before total breakdown; black bars, bright lines and pie crust. Yet the customer says, "It was a perfect picture before it went entirely black." This, of course, is untrue. What about additional charges for this work, on which you did not quote a price, which you could not possibly foresee or tell until the picture had been restored to view? I know this had to be worked out one way or another. If the service man has to put additional time and money to fit unforeseen troubles, he loses, if he ups the price, he's still no good. Let's kick this around a bit, and see what we can come up with, how best to handle such a problem. Let's have a thorough analysis and comments from ET readers and service organizations.

WILLIAM M. PEACOCK

Hialeah, Fla.

● *The best way we know of is to make a thorough bench analysis. A charge has to be made for the estimate, of course.—Ed.*

On Canby

Hurray for your editorial of the May issue of ELECTRONIC TECHNICIAN. It is a shame that in our time people of the caliber of Mr.



EICO

EICO ELECTRONIC INSTRUMENT CO. INC., 3300 Northern Blvd, L. I. C. 1, N. Y.

EXPORT: ROBURN AGENCIES INC., 431 GREENWICH ST., N. Y. 13, N. Y.

... for more details circle 23 on post card

For window-size blow-ups of this message, send 10¢ to Sprague Products Co., 65 Marshall St., North Adams, Mass., to cover handling and mailing costs.



You'll never see your doctor advertise a special sale on appendectomies . . .

You'll never see your lawyer announce cut-rates for divorce cases . . .

You'll never see your dentist hold a "2-for-1" sale on extractions . . .

AND You'll never see the day when you can take your TV set in for a service "bargain" and be sure you're getting a square deal!

"Bargains" in home electronic service are as scarce as the proverbial hen's teeth! Here's why—

The expert service technician, just like other professional people, must undergo years of study and apprenticeship to learn the fundamentals of his skill. And a minimum investment of from \$3000 to \$6000 per shop technician is required for the necessary equipment to test today's highly complex sets. Finally, through manufacturer's training courses and his own technical journals, he must keep up with

changes that are developing as fast as they ever did in medicine, law, or dentistry. Those best equipped to apply modern scientific methods are almost certain to be most economical for you and definitely more satisfactory in the long run.

Unfortunately, as in any business, there will always be a few fly-by-night operators. But patients, clients, and TV set owners who recognize that you get only what you pay for, will never get gypped. "There just ARE no service bargains" . . . but there is GOOD SERVICE awaiting you at FAIR PRICES!

THIS MESSAGE WAS PREPARED BY SPRAGUE PRODUCTS COMPANY,
DISTRIBUTORS' SUPPLY SUBSIDIARY OF SPRAGUE ELECTRIC COMPANY, NORTH ADAMS, MASSACHUSETTS, FOR . . .

YOUR INDEPENDENT TV-RADIO SERVICE DEALER

LETTERS

TO THE EDITOR

Canby find their way into some of our magazines.

We would like to know if the rest of the pen staff of Audio Magazine agree with their distorted pal. And if Audio Magazine minds reprinting your answer.

We are enclosing a copy of a partial list of the testing equipment that we own. Maybe Mr. Canby needs a little more information on what it takes in the field that he, apparently, belittles without cost or cause.

Mockery, Mr. CAN . . . BUY, Mockery! !

1. Laboratory Standard Multiplex Generator with input for external modulation.
2. Sine and Square Wave Audio Generator.
3. FM-Sweep Generator.
4. RF Signal Marking Generator.
5. AC Vacuum Tube Voltmeter.
6. AC-DC Wide Band scope.
7. Intermodulation and Harmonic Distortion Analyzer.
8. Black and White and Color TV Analyzer with generator for Test Pattern, Color Rainbow and Bar and Dot for B&W and Color Servicing.
9. Transistor Radio Analyzer with Signal Generator, Power Supply, VTVM and in-out circuit Transistor Tester.
10. Sweep Circuit Analyzer.
11. Complete Stereo System, with professional Tape Recorder, Turntable, Multiplex Tuner, Control Center, Stereo Power Amplifier, Expander, Matched Speakers, High Frequency Tweeters and professional arm, cartridge and stylus.
12. Miscellaneous equipment such as substitution boxes, Dynamic Mutual Conductance Tube Tester, Cathode Ray Tube Tester and Rejuvenator, isolation transformers, variable voltage supply, voltage regulators, etc.

J. S. BUITRAGO

New York, N. Y.

Now or Never

I wish to take exception to your

ELECTRONIC TECHNICIAN



THE COMPLETE TESTER

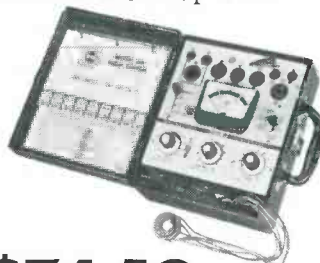
NEW SECO MODEL 88 TESTS PICTURE TUBES, TOO!

- Tests over 400 cathode ray picture tubes including 110° deflection types for cathode emission leaks and shorts grid emission gas error filament continuity cathode-to-heater emission
- Tests all receiving tubes including novars, nuvistors, 10 pin types, compactrons and magnovals for cathode emission leaks and shorts grid emission gas error filament continuity cathode-to-heater emission

Seco's patented Grid Circuit Test alone makes up to 11 simultaneous checks for tube faults. Tube Merit and Filament Continuity tests increase the test range even more—you locate those "hard to find" faults on your first try.

And now this same tester handles picture tubes, too. Merit test operates at half of rated cathode current—no possibility of damage if filament voltage is correct. Indicates leakage, gas, shorts and grid emission—tapping the tube neck shows up intermittent shorts. Even handles 110° deflection models with universal socket adaptor.

This *COMPLETE* tester saves you time and trouble—does more jobs quicker and better. New Model 88 comes to you with speed-indexed setup data, pin straighteners and 12-pin picture tube socket on a 3-foot cable. Guaranteed up-to-date—new tube data mailed periodically at no charge to all registered owners.



MODEL 88 - - - \$74.50 NET



For complete information see your distributor or write:

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A DIVISION OF DI-ACRO CORPORATION

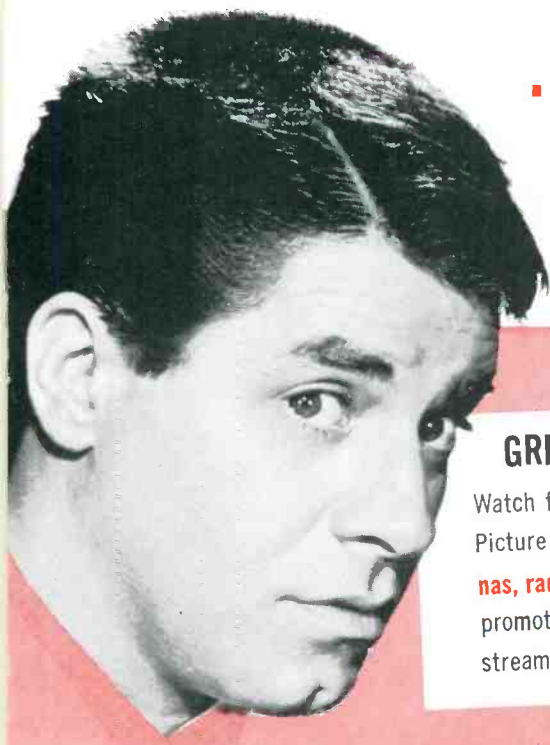
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Who's minding your store (and your business) this season?

CHANNEL MASTER

...from Fall through Christmas!

We help you sell with "BIG NAME" TIE-INS that will reach millions... and put millions of dollars worth of publicity, promotion and advertising behind every Channel Master product you feature.



GREATEST MOVIE TIE-IN PROMOTION OF THE YEAR!

Watch for Jerry Lewis, starring in "Who's Minding the Store," a Jerry Lewis-York Picture Production, released by Paramount... and featuring Channel Master antennas, radios, and TV sets in the film. See your distributor for details on sensational promotion to let you tie in with film's release in your city or town. Posters, streamers, ads, lobby displays, contests, premiums, etc.

4 SEPARATE NBC-TV NETWORK SHOWS

...on 170 NBC Stations!... featuring 4 "Top TV Salesmen."

Channel Master delivers nationwide TV saturation show (audio and visual closeups) during your most active sales period of the year:



"People Will Talk,"
featuring
DEMNIS JAMES.
Color TV.



"Concentration,"
featuring
HUGH DOWNS.



"Your First Impression,"
featuring
BILL LEYDEN.
Color TV.



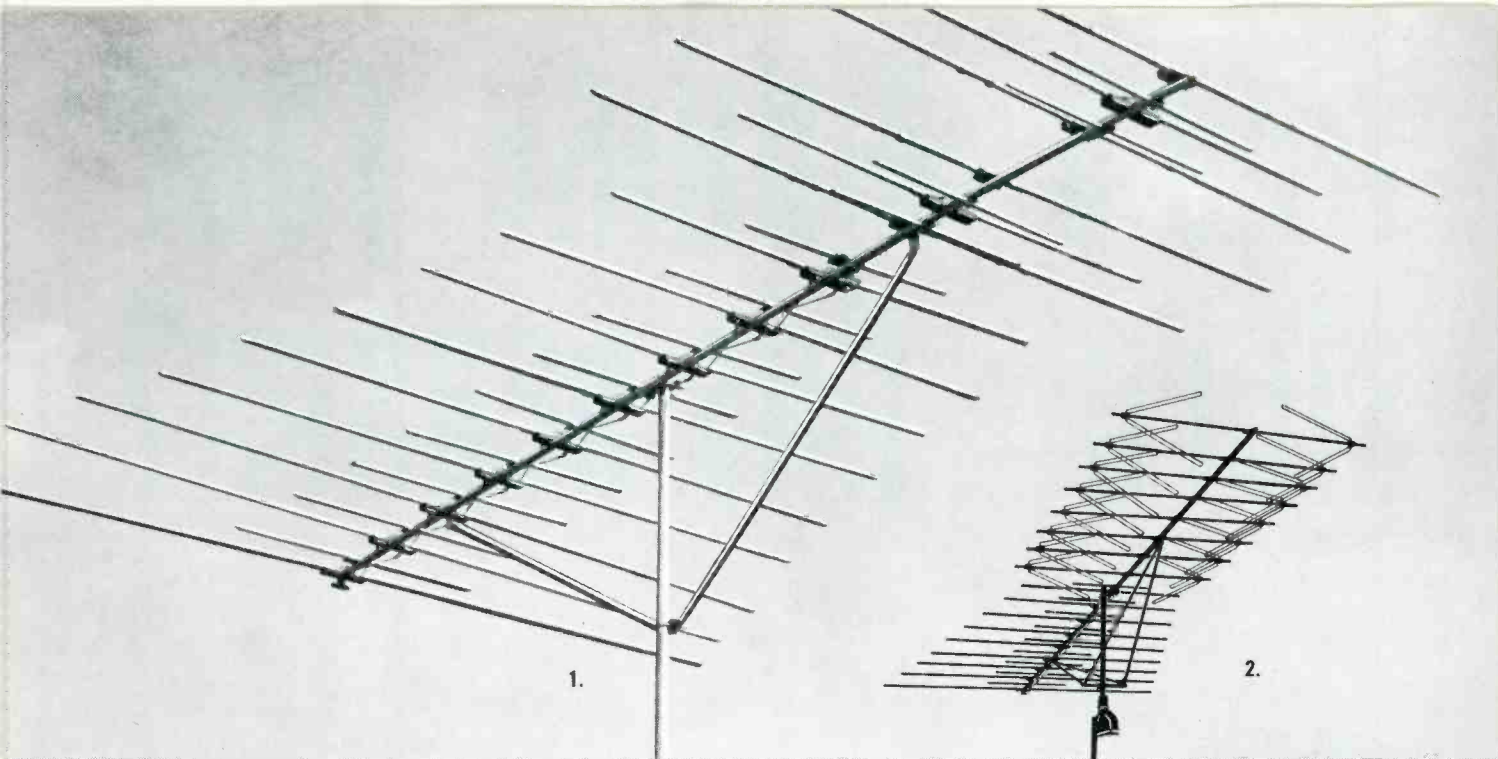
"You Don't Say,"
featuring
TOM KENNEDY.
Color TV.

GOOD HOUSEKEEPING
ADVERTISING CAMPAIGN AND
GUARANTEE SEAL



Hard-hitting ads for Channel Master antennas (indoor and outdoor), radios, receiving tubes, and picture tubes... through October, November, and December. Channel Master products now carry the Good Housekeeping Seal.

TURN THE PAGE AND SEE WHAT WE HAVE IN STORE FOR YOU...



PICK YOUR MARKET! Nail it down

"CROSSFIRE"—MOST POWERFUL TV ANTENNA DESIGN IN THE FIELD!

1. GOLDEN CROSSFIRE 3600 Series

U.S. PAT. NO. 3,086,206 CONFIRMS AND PROTECTS EXCLUSIVE DUAL-DIPOLE SYSTEM—THE SYSTEM THAT STILL GIVES HIGHER, CLEANER GAIN (WITH LEAST BULK) THAN ANY COMPETITIVE ANTENNA! DOES IT AT LOWEST COST. EVEN INCLUDES FM! COMPETITIVE FRINGE ANTENNAS DON'T.

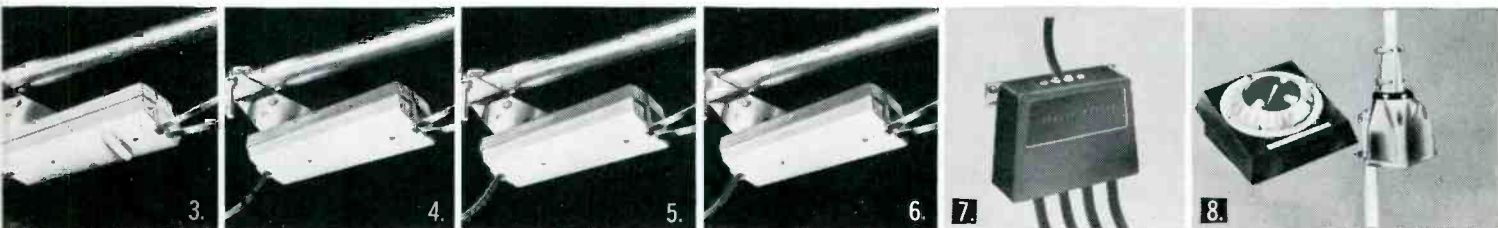
High-performance balance can be obtained only by using the right combination of both driven and parasitic elements. Only the Crossfire—with

its unique dual dipole system—has this power combination. The Crossfire patent protects this system—and no other antenna, old or new, can use it.

2. GOLDEN SUPER-CROSSFIRE Model 3607

The World's Most Powerful Antenna

1. Up to 48% more TV gain than 28-element Crossfire.
2. On FM Stereo... gives more gain than a 5-element yagi.



EXTRA-POWERFUL BOOSTERS THAT MEET EVERY NEED!

3. BRAND-NEW NuvistORIZED "TV ONLY" TELE-VISTA Model 0026

YOUR MARKET: TELEVIEWERS IN AREAS WHERE BOTH TV AND FM STRONG SIGNAL OVERLOADING FROM NEARBY STATIONS IS A PROBLEM. The only "TV/only" Amplifier with the long-life "Duo Nuvistor" circuit... and a built-in coupler! Strong local TV and FM signals won't overload it.

4. BRAND-NEW Transistorized "TV ONLY" TELSTAR Model 0027 with Built-In FM Trap ... plus 4-set coupler.

YOUR MARKET: TELEVIEWERS IN AREAS WHERE FM STRONG-SIGNAL OVERLOADING FROM NEARBY STATIONS IS A PROBLEM. Twice the TV overload protection of any other transistorized booster... thanks to Texas Instruments' brand-new EPITAXIAL MESA TRANSISTOR. Virtually eliminates possibility of local FM interference.

5. TV/FM TELSTAR WITH 4-SET COUPLER Model 0023A America's most outstanding, best-selling booster

YOUR MARKET: VIEWERS AND LISTENERS WHO WANT THE WORLD'S MOST POWERFUL BROAD-BAND AMPLIFICATION! Unbeatable Combination of High

Gain and Low Noise figure... plus built-in Lightning Resistance and other outstanding features.

6. TELSTAR FMX (for FM exclusively) WITH 2-SET COUPLER Model 0025

YOUR MARKET: THE EXPANDING NUMBER OF MONAURAL AND STEREO FM LISTENERS! Most powerfully stepped-up FM performance of all!

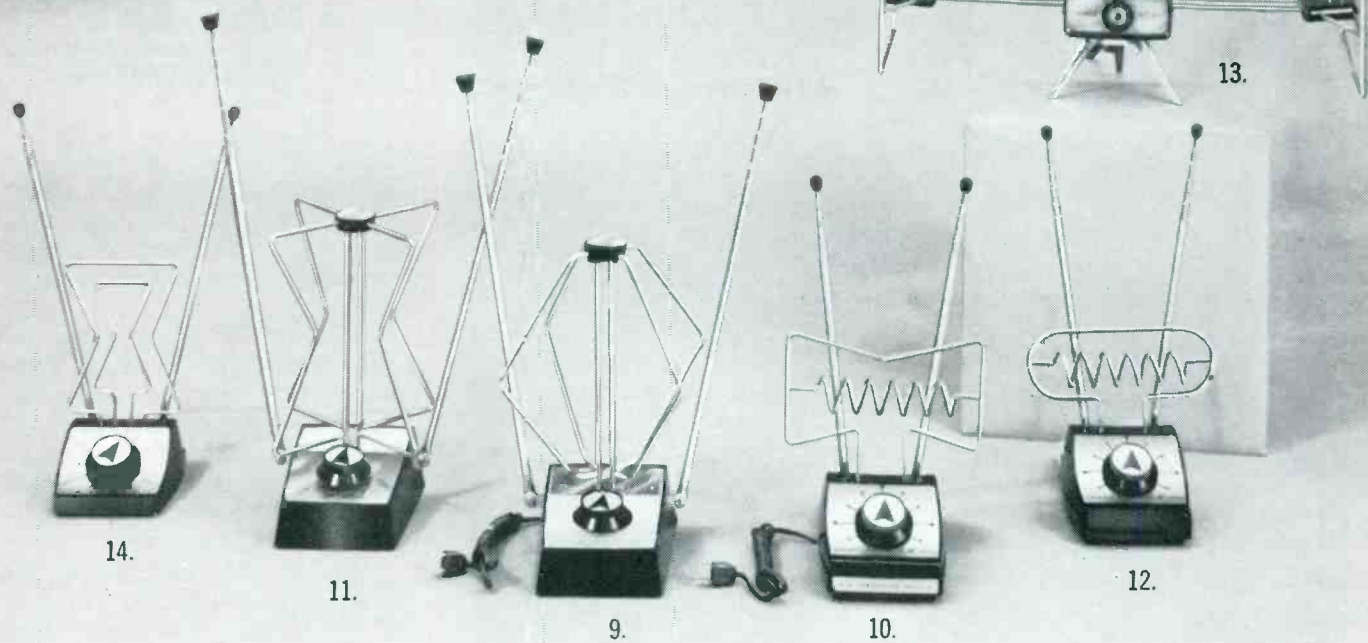
7. Improved! Higher Gain VUTRON II FOR TV/FM Model 0024

YOUR MARKET: THOSE WHO WANT THE BEST IN AN IN-THE-HOME SIGNAL AMPLIFIER AND COUPLER.

NOW FOR THE FIRST TIME... OUTSTANDING ALL-IN-1 ROTATOR AND TV AMPLIFIER!

8. GEMINI Model 9527

YOUR MARKET: THOSE WHO NEED AND WANT EXTRA POWER... PLUS DIRECTIVITY. Fast, neat installation saves money 4 ways! World's Finest Automatic Rotator (Tenn-a-liner)... plus Telstar TV booster. Built-in FM TRAP. Simple to Service. 2-set coupler.



With **CHANNEL MASTER**

WORLD'S MOST POWERFUL NEW INDOOR ANTENNAS

These beautifully-designed antennas open a whole new market ... because they work where only outdoor antennas could work before!

9. NEW! Revolutionary, Transistorized **APOLLO** Model 3721 (with Built-in Amplifier)

GETS CLEAR, GHOST-FREE, TV RECEPTION 15 TO 45 MILES OUT.
YOUR MARKET: SUBURBAN VIEWERS WHO WANT OUTDOOR ANTENNA POWER FROM AN INDOOR ANTENNA. Exclusive "Miraclick" Switch electronically adjusts to different signal strengths. Super-effective hidden amplifier gives extra pull-in power where needed.

10. NEW! World's First Transistorized **FM/STEREO INDOOR ANTENNA with Built-in Amplifier.** Model 3731

GETS POWERFUL FM RECEPTION 15 TO 60 MILES OUT!
YOUR MARKET: SUBURBAN LISTENERS WHO WANT TOP FM PERFORMANCE WITH EASY ANTENNA ADJUSTABILITY AND ROTATOR-TYPE DIRECTIVITY. Booster is peaked—dipoles tuned—for FM exclusively! Fidelity Switch.

11. Golden **CANAVERAL** Model 3720 (Non-Amplified)

YOUR MARKET: METROPOLITAN AREA VIEWERS WHO WANT TOP TV/FM RECEPTION UP TO 15 MILES FROM STATION. Same features as Apollo.

12. NEW! **FM/STEREO INDOOR ANTENNA** Model 3730 (Non-Amplified)

YOUR MARKET: METROPOLITAN AREA LISTENERS... WHO SEEK FM PERFORMANCE WITHOUT COMPROMISE! Same advance features as 3731.

13. Improved! **SHOWMAN** Model 3900 (Mahogany and Gold) Model 3901 (Blond and Gold)

YOUR MARKET: CUSTOMERS WHO WANT SOMETHING DIFFERENT! Beautiful ... improved ... priced to move! "Metro-Dyne" Variable Inductance Electronic Tuning. Like no other antenna.

14. NEW! **AURORA** Model 3718

YOUR MARKET: THOSE WHO WANT A LOW-PRICED LUXURY ANTENNA! Tops for the money! Magnificently styled. "Automagic" Clarifier Switch.

FREE GIFTS! SEE YOUR CHANNEL MASTER DISTRIBUTOR FOR FULL DETAILS ON INDOOR ANTENNA PREMIUM DEAL.



NEW! BEAUTIFUL, POWERFUL "VU-CON" UHF CONVERTERS

GIVE YOU THE EDGE IN EVERY RECEPTION AREA ... NOW AND IN THE FUTURE!

15. Model 6700. **YOUR MARKET:** FRINGE-AREA LISTENERS WHO WANT THE ULTIMATE IN RECEPTION. Capacitive tuning (no sliding contacts), 1 long-life Nuvistor, 1 oscillator tube. Prevents strong-signal overloading.

16. Model 6701. **YOUR MARKET:** FRINGE-AREA LISTENERS WHO WANT

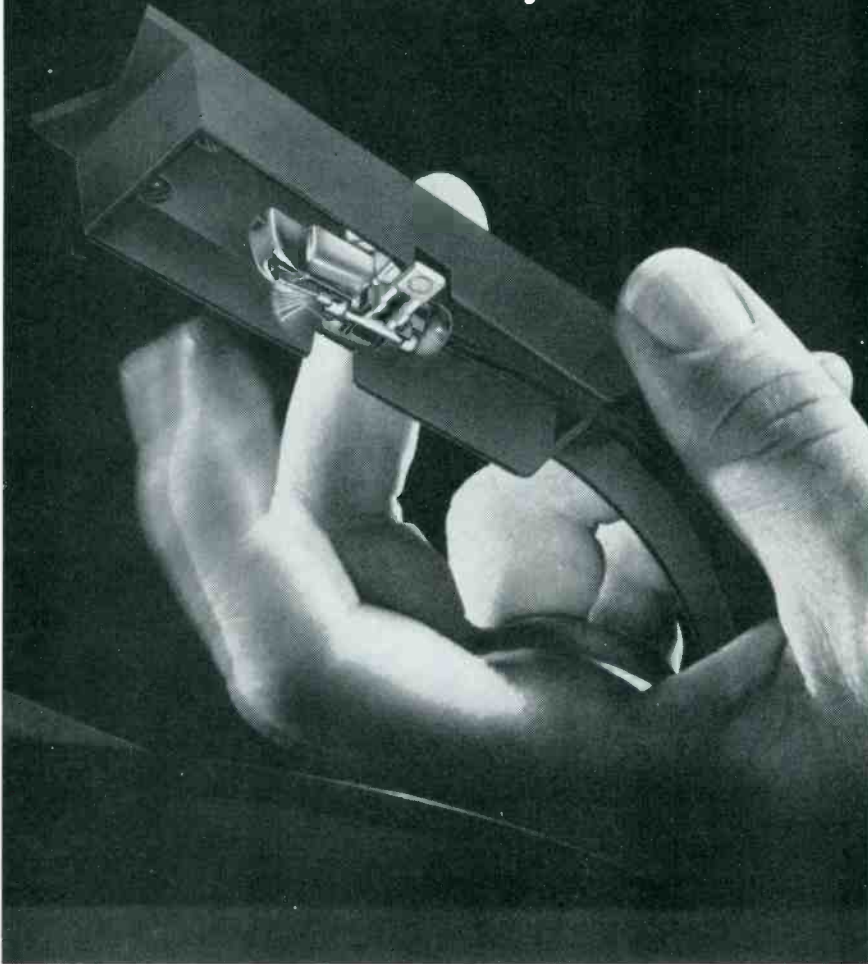
TOP QUALITY AT A MODERATE PRICE! Inductive Tuning, 2 long-life Nuvistors.

17. **Translator Model 6703.** Same as above but covers only channels 70-83.

18. Model 6702. **YOUR MARKET:** METROPOLITAN AND SUBURBAN AREA LISTENERS WHO WANT TOP QUALITY AT A MODEST PRICE! Your most profitable UHF conversion market. Inductive Tuning, 1 long-life Nuvistor.

19. **Translator Model 6704.** Same as above but covers only channels 70-83.

New Sonotone Sono-Flex[®] Stylus



try this with any other cartridge
(at your own risk)

No way to treat a cartridge, for sure—That is, any cartridge except the Sonotone models featuring the new Sono-Flex[®] needle. No more bent or broken needle shanks caused by flicking off some lint, dropping the arm, or scraping it across the record.

The newly developed Sonotone Sono-Flex[®] needle to the rescue! Gripped in a resilient butyl rubber mount, you can flex this needle shank in a 360-degree orbit without breaking. Pluck it—flick it—bend it—bump it—it will continue to perform as good as new.

Moreover, the Sono-Flex brings advantages in performance never before offered by any replacement cartridge: Higher compliance, wider and flatter frequency response, lower IM distortion, and longer needle and record life.

Sonotone Sono-Flex[®] increases your profits two ways

Sonotone cartridges are better than ever, easier to sell, because they're better performers. Further, you eliminate callbacks because of broken needle shanks. Sono-Flex needles are standard right now in these Sonotone cartridges models: 9TAF, 16TAF, 916TAF and the Velocitone Mark III.

Sono-Flex opens up lucrative needle replacement business for upgrading these Sonotone cartridges models: 9T, 9TA, 9TV, 9TAV, 16T, 16TA, 16TAF and 916TA, original equipment in over a million phonographs. Replacement is fast, simple—requires no tools—assembly snaps into position easily, and gives immediate proof of better performance plus abuse-proof, longer needle life.

See your distributor today and ask for Sonotone cartridges with the Sono-Flex[®] needle.

SONOTONE CORPORATION Electronic Applications Division Elmsford, New York
In Canada: Atlas Radio Corp., Ltd., Toronto • cartridges • speakers • batteries
• microphones • electron tubes • tape heads • hearing aids • headphones

- - - for more details circle 46 on post card

LETTERS

TO THE EDITOR

August "Viewpoint" in which you clearly join ranks with the manufacturers of color TV and allow yourself to be the judge of the independent service industry's conscience.

I will not allow my sales and service organization be a part of any pressure campaign on the public (such as, "Buy Color TV Now") or any such endeavor by any manufacturer to sell or promote a costly item that does not represent a practical and sound investment.

I, and not the manufacturer, am the representative of the merchandise which I sell. Today more than ever, my endorsement and service of a product is the biggest asset which I possess in retailing.

I have the obligation to my customers of stating my honest opinion regarding any product; an opinion based on my experience with retailing and servicing of the product. It is only this honest opinion by the retail and service organizations that allow the consumer the necessary facts for making an intelligent decision as to whether or not to buy a product and if so, what product. The consumer should not be brainwashed into a purchase by a tremendous advertising campaign.

In this case, my position of refusing to endorse color TV to the general public as not being a sound investment is a decision relative to conditions now existing: high original investment, expensive maintenance and a low number of adult entertainment programs being broadcast in color. But most of all, the problems of color TV reception; in that it is more susceptible to the problems of weak signals and reflections.

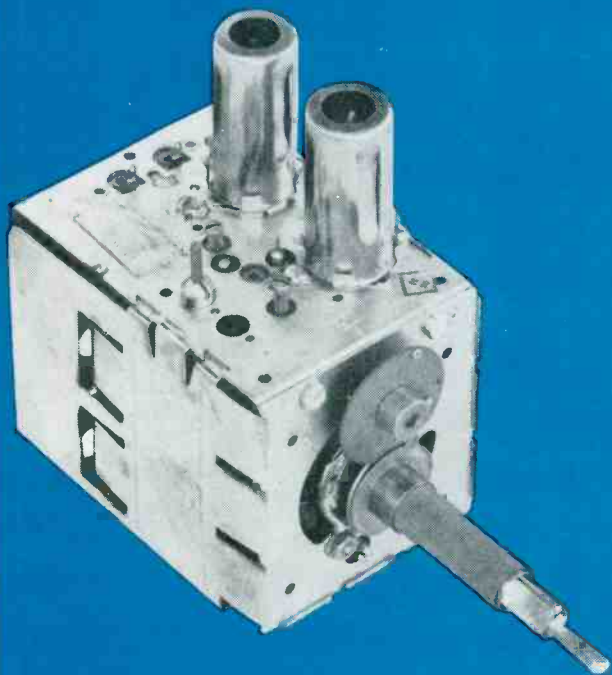
When in the future these conditions change for the better then, and only then, color TV will receive my endorsement.

ROBERT E. LOPES
Shawmut Electronics

Somerset, Mass.

● *The fact that people are buying color TV remains. It is the technician's job to sell and service what the customer wants. Additionally, it is not his job to decide which programs should be in color or which*

TUNER REPAIRS



\$9.50

FOR COMPLETE OVERHAUL

**Includes ALL parts (except tubes)
ALL labor on ALL makes**

**24-HOUR SERVICE with
FULL YEAR WARRANTY**

Sarkes Tarzian, Inc., largest manufacturer of TV and FM tuners, maintains two completely-equipped Service Centers to serve YOU. Both centers are staffed by well-trained technicians in this specialized field and are assisted by engineering personnel to assure you of FAST, DEPENDABLE service.

Ⓢ Tarzian-made tuners—identified by this stamping—received one day will be repaired and shipped out the next. A little more time may be required on other makes. Every channel is checked and re-aligned per manufacturer's specifications, not just the channels which might exist in any given area.

You get a 12-month guarantee against defective workmanship and parts failure due to normal usage. Cost to you is only \$9.50 and \$15 for UV combinations, including all labor and parts except tubes. No additional costs. No hidden charges. All tuners repaired on approved, open accounts. You pay shipping. Replacements on tuners beyond practical repair are available at low cost.

When inquiring about service on other than Tarzian-made tuners, always send TV make, chassis and Model number. Check with your local distributor for Sarkes Tarzian replacement tuners, parts, or repair service. Or, use the address nearest you for fast factory repair service.



SARKES TARZIAN, INC.

TUNER SERVICE DIVISION

See your distributor, or use the address nearest you

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Bloomington, Indiana
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Tel: 769-2720

Manufacturers of Tuners . . . Semiconductors . . . Air Trimmers . . . FM Radios . . . AM-FM Radios . . . Audio Tape . . . Broadcast Equipment



Pardon us while we change you into Santa Claus

Do your Christmas shopping early at your G-E Distributor's. He has lots of wonderful gifts that you can get with the purchase of General Electric tubes . . . gifts for your family, friends and favorite customers. And there're some you'll want for yourself . . . such as a tube caddy that

looks like fine luggage. You can also get Christmas cards designed only for service dealers . . . to mail to customers and friends.

See your General Electric Distributor and start packing your bag *today*. You're going to be a sensational Santa!

Start packing your bag!

These Kodak Flashfun camera outfits include everything that young photographers need: Hawkeye camera, film, clip-on neck strap, batteries, flash bulbs and instruction manual. They're yours when you buy G-E tubes.



Be good to yourself this Christmas. You can get these Armor Clad® tube caddies when you purchase G-E tubes. They look like fine pieces of luggage and the special vinyl coverings are longer lasting. They are reinforced with nickel plate at all stress points.



These Dick Tracy Power-Jet Squad Guns by Mattel® will be a hit with any boys you know. They're automatic cap-firing guns that shoot a stream of water 35 feet . . . farther than any water guns ever made. Give one to any boy and then stand clear.



Little girls will go wild over these Mattel® Sister Belle talking dolls. They're 17" tall and have a rag body and plastic head. Each one says eleven different things that little girls like to hear . . . like "Let's play house," "Give me a kiss." No batteries needed.



These G-E electric carving knives will make a great gift for the lady of the house. They even slice through hot bread or hot meat with smooth precision. Get several from your G-E Tube distributor.



Get these Christmas cards . . . prepared especially for you. They're in color on heavy, high-gloss stock and show a cartoon of you adjusting a TV set to say "Happy Holidays." 50 cards and 50 envelopes to a box. Get yours now for early mailing.



ANOTHER ACCENT ON VALUE FROM G-E ELECTRONICS DISTRIBUTORS

Progress Is Our Most Important Product

GENERAL  ELECTRIC

Heavy Duty... Dual Heat

LETTERS TO THE EDITOR

programs his customers should watch. You won't sell color TV to someone that doesn't really want it, but you can kill a lot of sales to people who might want it.—Ed.

Your "Editor's Viewpoint" needs some advice from an experienced technician on color television. You are not stating facts correctly or with good common sense.

I have owned color TV since the first RCA CTC-100, and service them as they come. Not one customer, after having a color set for a year, is happy with its performance and ends up with a good black-white again. Pictures are just not as sharp to begin with, get worse as CRT ages and they cost lots more to service. Few programs come through with good color via cables; UHF; and that second set has a *much* better picture. These are facts . . .

ED. N. HAUBER

Bradenton, Fla.

● *It sounds like you're the one that needs the advice. Color sets that are properly serviced provide excellent pictures and happy customers.—Ed.*

TEKFAX

I agree with the majority that ELECTRONIC TECHNICIAN is the best trade publication for TV-radio service technicians. Now if you would print the index for TEKFA X on a separate sheet you would make me a very happy technician.

Keep up the good work.

EARL M. JOHNSON

Tucson, Ariz.

● *A list is published every May and each issue on the contents page.—Ed.*

Dog Collars

I want to thank you for the response I received on the information for schematics, etc. on the electronic dog trainer. Also a special thanks to Joseph D. Materzich, and Hoyt G. Hall, Jr. for their information.

JOE W. MEEK

Gallup, N. M.

Continued on page 83

ELECTRONIC TECHNICIAN



Weller[®] SOLDERING KIT

with 240/325
watt gun

Professional, heavy-duty gun has two trigger positions—lets you switch instantly to the heat best suited for the job. Use of low heat prevents damage when soldering near heat-sensitive components and prolongs tip life. Heat comes on instantly when trigger is pulled—goes off when trigger is released. Spotlight illuminates work. Kit also includes break-proof metal-tone plastic utility case—smoothing tip—cutting tip—tip-changing wrench—and solder. MODEL D550PK.

Light...Efficient...Rugged



Weller[®] "Pencil" SOLDERING IRON

A low cost 25 watt, 115 volt iron that's ideal for miniature-type soldering. Use it as easily as a pencil. High efficiency and rapid recovery enable this Weller model to do the work of irons with much higher wattage ratings. Rugged heating element for extra durability and long service. Lightweight design reduces user fatigue, provides more accurate control. Complete with tip and cord set. Screwdriver-shaped tips available in three sizes. MODEL W-P.

Buy Weller Soldering Tools at your Electronic Parts Distributor

WELLER ELECTRIC CORP., 601 Stone's Crossing Rd., Easton, Pa.

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There's more profit in your hands with ITT tubes

Yes, you can pocket extra profit when you stock ITT receiving tubes . . . with full confidence that you are giving your customers the finest replacement tubes money can buy.

Your customers will appreciate it, too, because they know ITT's international

reputation for quality and leadership in electronics.

ITT can provide this "extra value" of finest quality at higher profit margins because ITT products are available from 154 factories and laboratories in 24 countries. Brands without these world-

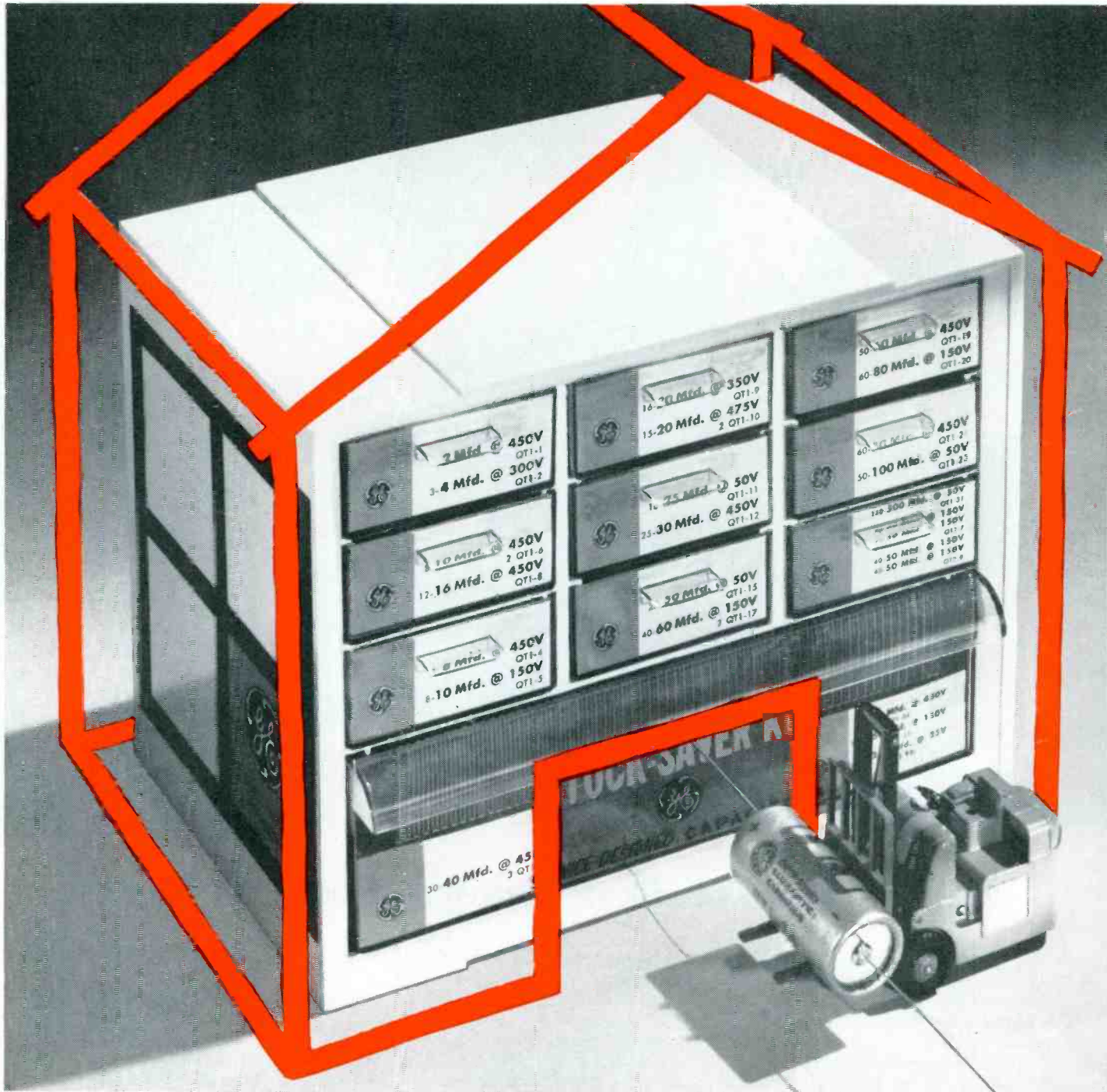
wide resources cannot offer you these advantages.

Ask your local distributor about ITT tubes. He'll give you *extra profit* details.

ITT Distributor Products Division, International Telephone and Telegraph Corporation, Box 99, Lodi, New Jersey.

ITT

Stock all the capacitors you need in a



ANOTHER ACCENT ON VALUE FROM YOUR

pint-size warehouse

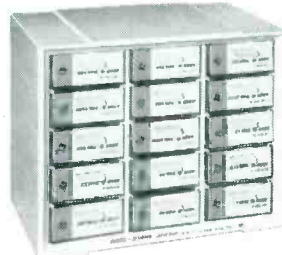
This small warehouse is stocked with enough capacitors to meet most of your replacement needs. We call it a Stock-Saver Kit because, on the average, one G-E capacitor replaces four types.

Before G.E. developed Stock-Saver Capacitors, it was practically impossible for you to keep a supply in your shop. It tied up too much money. But G.E. found a way to replace more than 150 different types with only 25 capacitors. This makes it possible for you to select the most-needed types and keep a supply on hand. The cost is low because *a few will do*. To make it even more convenient and profitable for you to use G-E capacitors, we have built selected stocks and put them in attractive storage units. You pay only for the capacitors... there's no charge for the pint-size warehouse. These kits will save you the cost of single-unit ordering...not to mention pesky trips for emergency pickups.

G-E ELECTRONICS DISTRIBUTORS

**FOR A LOW-COST START, WE'RE
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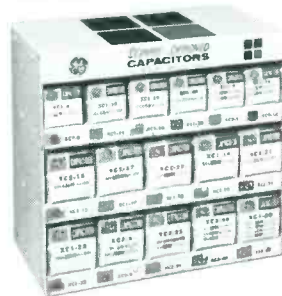
BUY ONE OF THESE...



KIT K-415
Contains 108 of 15 popular ratings of paper-mylar type capacitors.
List Price
Capacitors.....\$33.42
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VALUE..... 38.40
Your cost, complete, only \$19.92



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Kit..... 4.98
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KIT K-201
Contains 16 most popular electrolytic and twist-prong types.
List Price
Capacitors.....\$50.00
Kit..... 5.00
VALUE..... 55.00
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KIT K-202
Contains 10 twist-prong capacitors designed for auto replacement. In addition you get a magnetic service light, a tab adjuster and a handy auto replacement guide.
List Price
Capacitors.....\$33.30
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VALUE..... 36.55
Your cost, complete, only \$19.98

AND GET THIS ONE FREE...\$7.75 VALUE



This kit is a handy top-opening type... just the right size for carrying in your tool or tube caddy. It contains 21 of the five most popular paper-mylar ratings. This \$7.75 value is yours at *no extra charge* when you buy one of the shelf-type kits shown above.

SEE YOUR GENERAL ELECTRIC DISTRIBUTOR TODAY!

THIS OFFER EXPIRES OCTOBER 31, 1963

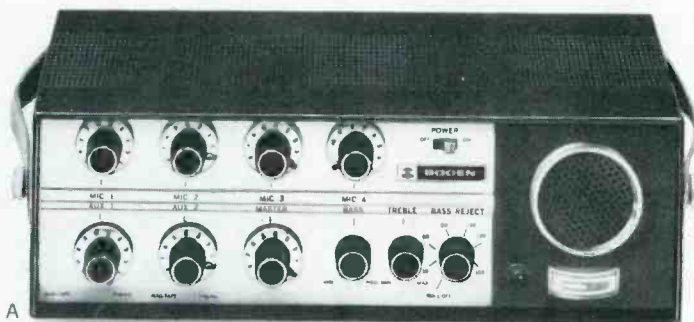
Progress Is Our Most Important Product

GENERAL  ELECTRIC

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Bogen stays number one in P.A. after 30 years by designing new products for new needs.



Case in point: six new amplifiers to widen your sales opportunities, strengthen your profit potential.

BOGEN's all-new, all-transistorized MTX30 P.A. amplifier (illustration 'A') is the latest addition to the deluxe Flex-Pak series. This uniquely versatile 30 watt amplifier sets new standards in reliability and flexibility.

Some of its important features: Continuous operation at full output even at -30°C or $+65^{\circ}\text{C}$ temperature • Low power consumption, reduced heat • 13 inputs, 6 of which may be mixed and faded simultaneously • 4 of 6 mic. inputs convert to low impedance with plug-in transformers • 32 transistors, 2 silicon diodes eliminate recurrent tube failures • Six unique push-pull controls instantly select wide or limited response for each channel (via variable, calibrated notch filter) to meet all acoustical conditions • Full 30 watt output at less than 2% distortion, peak power 50 watts • Optional monitor speaker and output meter (as illustrated), locking plate, remote and precedence control, rack panel.

Other Profit Producers from BOGEN include:

- B. New MU70 . . . 70 watt Amplifier
- C. New BT35 . . . 35 watt Transistor Mobile Amplifier
- D. New CHB20 . . . 20 watt Challenger Amplifier (shown with phono-top)
- E. New BT20 . . . 20 watt Transistor Mobile Amplifier
- F. New MT30 . . . Transistor Booster Amplifier

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BOGEN

Sound products for communications and entertainment for over 30 years

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ELECTRONIC TECHNICIAN

TECHNICAL DIGEST

DELCO

Auto Radio — Cadillac Model 7286315 Transistors

Transistors DS-46 and DS-47, used in the trigger circuits of these radios, are different from those previously used. The collector lead is located in the mount



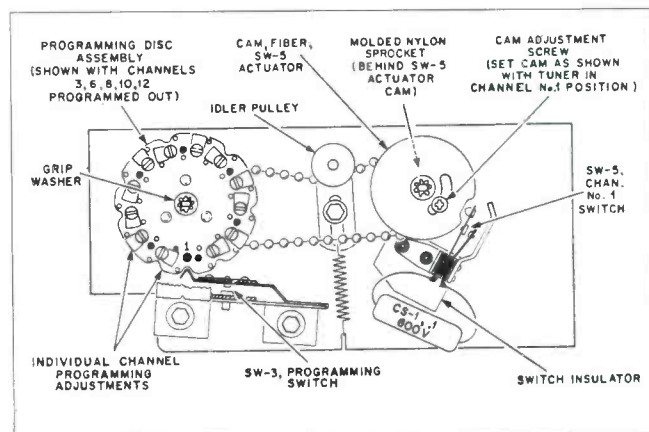
New Delco transistor mount has collector in center.

center rather than on one end. When viewing these transistors from the flat side, the leads read from left to right: emitter, collector and base. The emitter and base leads are on the outside of the transistor with the collector in the center. As all leads are equally spaced, lead identification must be performed with the flat side of the transistor toward the viewer. These are silicon NPN transistors that use completely different voltages. Bias, for example, is 0.6 v instead of the usual 0.2 v.

DUMONT

TV Chassis — Remote Control Unit 471345

Receivers are adjusted at the factory to stop at all



Programming adjustments for DuMont remote control unit.

channels (13 operating positions). Before using the remote control system, the tuner should be pre-set to skip all the channels not operating in the area, using the following procedure:

1. With the set turned OFF, rotate the front channel selector knob manually to a channel that does not telecast in your area.

2. Insert a screwdriver into the hole at the left top of the cabinet back (as viewed from the rear), and turn the accessible screw one-quarter turn clockwise until it reaches its stop point, taking care not to force it past its stop position. Repeat the same procedure for each of the remaining non-receivable channels in the area.

3. If it is later desired to receive a channel which has been previously skipped, follow the instructions outlined in steps 1 and 2, turning the slotted screw for the desired channel one-quarter turn counterclockwise instead of clockwise.

No adjustment is provided for the OFF position, between channels 13 and 2, since this is required for turning the receiver off by remote control.

GENERAL ELECTRIC

Color TV — Demagnetizing Coil

Some cases have been encountered where it was impossible to completely eliminate color shading with a 12-in. demagnetizing coil. It was necessary to use a 23-in. diameter coil wound to the following specifications:

Diameter	23 in.
Width	3¼ in.
Wire Size	#16 heavy Formex (approximately 1100 ft.)
Turns	210 total in 4 layers.
Resistance	5.2 Ω.
Input Rating	120 v 60 cps 6.8 amp.
Coil Form	1/16 in. Textolite, 3½ in. wide by 7 ft long. Ends overlapped until the required diameter is obtained and tape ends together.
Insulation	Wrap completed coil with black plastic electrical tape.

The front of the receiver may be demagnetized in the usual manner. If it is found necessary to demagnetize the receiver's sides, however, the coil center should not be moved toward the rear of the receiver any further than the plane of the cabinet front.

GENERAL ELECTRIC

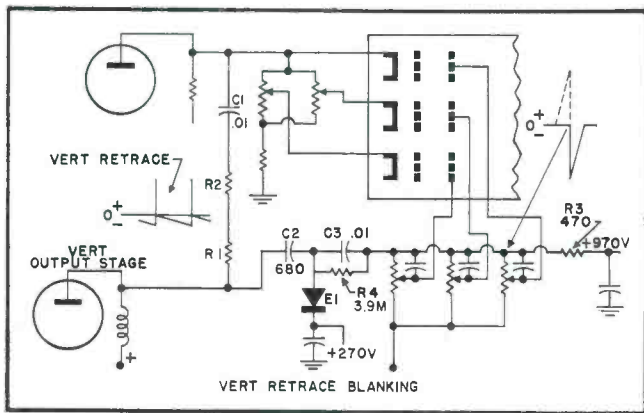
CW and CX Color TV Chassis — Dynamic Convergence Adjustment Chart

Dynamic convergence adjustments frequently consume more time than they should, particularly when it is not being done everyday. To expedite convergence set-up, a pocket-size chart has been developed which may be used for these chassis. The chart can be carried on color service calls. It may save much time and make convergence just a routine job.

MOTOROLA

Color Chassis BT5-908 — Vertical Retrace Blanking

Voltage from the vertical output stage is fed to the CRT cathodes and G-2s to turn the brightness off during vertical retrace to prevent retrace lines from



Motorola's vertical retrace blanking circuitry.

appearing in the picture. Voltage on the VOT plate has a large positive excursion during vertical retrace caused by the discharging yoke inductance.

The pulse portion of the sawtooth waveform is made up of high frequency information and is passed to the cathodes of the CRT by R1, R2 and C1. The RC time constant of these resistors and capacitors is short

enough to prevent the sawtooth voltage from passing. This positive pulse will drive the three CRT cathodes positive and turn it off during vertical retrace. The positive pulse is, however, not of sufficient duration to keep the CRT turned off for the entire trace period. Additional blanking is provided on the CRT G-2s to keep the tube blanked for the remaining portion of the retrace cycle.

Blanking voltage on the G-2s must be negative going and delayed in time from the positive pulse on the cathodes, to supply additional blanking. The positive pulse from the vertical output is differentiated into a positive and negative pulse by C2 and R3. Diode E1 limits the positive excursion of the voltage so that only the negative portion appears at the G-2s. When the voltage tries to go positive, diode E1 conducts and the voltage is lost across C2. When the voltage goes negative, the diode is reverse biased and the negative pulse appears at the grids. This negative voltage delayed in time by the differentiating action drives the G-2s negative and keeps the CRT turned off until the vertical retrace is complete.

PERMA-POWER

Garage Door Operator G560, G663, G664 — Trouble Diagnosis

When these units operate properly from the garage button but not from the automobile, the radio control unit (not the motor mechanism) should be suspected. In new installations, extremely short distance operation from the automobile usually indicates an improper antenna installation, improper car unit installation, or misuse, and not radio control failure.

ZENITH

AM/FM Radio — Isolation Transformer

When adjustments are made on the 7L04 or any ac/dc chassis, a line isolation transformer (120 v input to 120 v output) is recommended in order to avoid a "hot" chassis. If an isolation transformer is not available, check the ac voltage between chassis and bench ground, and if there is any indication of voltage, reverse the plug before handling the set.

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SENCORE

SIMPLIFIES SWEEP CIRCUIT TROUBLE SHOOTING

SS117 SWEEP CIRCUIT ANALYZER

For Color and Monochrome Testing

A professional trouble shooter that helps you methodically walk the trouble out of "tough-dog" sweep circuits in monochrome and color receivers. The SS117 provides a positive but simple push button test on all circuits indicated in the block diagrams. These time-consuming circuits are checked step-by-step with tried and proven signal injection and substitution methods. All checks can be made from the top of the chassis or from under the chassis when it is removed from the cabinet.

TV horizontal oscillator check is made by substituting a universal oscillator known to be good. Horizontal output check consists of a cathode current and screen voltage test. The TV horizontal yoke is checked by substituting a universal yoke from the SS117 and viewing brightness or restoration of 2nd anode voltage. Horizontal flyback is checked dynamically in circuit by measuring the power transfer to the yoke when TV is turned on. TV horizontal sync can be used to control the SS117 horizontal oscillator, providing a positive check on sync from the video amplifier to the TV oscillator. Vertical circuits are tested by simple signal injection from vertical yoke to oscillator for full height on CRT. The SS117 with the CA122 Color Analyzer provides a complete TV analyzer for virtually every stage in monochrome or color receivers.

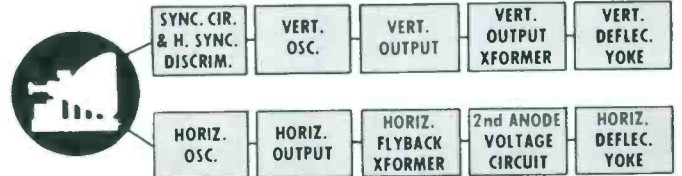
External checks for AC, DC, peak to peak voltage readings and DC current in the upper right hand corner save using a separate VTVM. Accurate 2nd anode measurements up to 30,000 volts are made with a sensitive 300 microamp meter and the attached high voltage probe. AC outlets, all steel construction and mirror in the cover makes every servicing job easier.

Size: 10 1/4" x 9 1/4" x 3 1/2". Wt. 10 lbs.

Dealer Net..... **89.50**



The SS117 checks them all



FREE—A 33 RPM half hour permanent record packed with every unit explains each test.

FOR FASTER MORE ACCURATE TUBE TESTING

TC114 MIGHTY MITE TUBE CHECKER

This is the famous Mighty Mite, acclaimed by over 25,000 servicemen, maintenance men and engineers as "the best they've ever used." A complete tube tester that is smaller than a portable typewriter yet finds tubes that testers costing hundreds of dollars miss, thus selling more tubes and reducing call backs. A real money maker for the serviceman and a trusty companion for engineers, maintenance men and experimenters. The Mighty Mite has been acclaimed from coast to coast as the real answer for the man on the go. Even though the Mighty Mite weighs less than 8 pounds, new circuitry by Sencore enables you to use a meter to check grid leakage as high as 100 megohms and gas conditions that cause as little as one half microamp of grid current to flow. Thus, too, it checks for cathode current at operating levels and shorts or leakage up to 120,000 ohms between all elements. And it does all this by merely setting four controls labeled A, B, C, & D with new type easy grip knobs. Check these plus Sencore features... Meter glows in dark for easy reading behind TV set... The new Mighty Mite has large size Speedy-Setup Tube Chart inside of cover—cuts setup time for even faster servicing. New stick proof D' Arsonval meter will not burn out even with shorted tube... Rugged, all steel carrying case and easy grip handle.

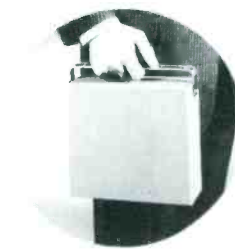
The improved Mighty Mite will test virtually every radio and TV tube that you encounter, nearly 2000 in all, including foreign, five star, auto radio tubes plus the new Compactrons, Novars, Nuvistors and 10 pin tubes. Has larger, easy-to-read type set-up booklet for faster testing.

Size: 10 1/4" x 9 1/4" x 3 1/2". Weight: 8 lbs.

Dealer Net..... **74.50**

TM116 TUBE TESTER MODERNIZING PANEL

New tube adapter for testing Compactrons, Novars, Nuvistors and 10 pin tubes in any tube tester except cardomatic types. Plugs into octal socket of your tube tester enabling you to test these new tubes in the same manner



Fast, Accurate . . .
never lets
you down



A must for color



that your tester checks conventional tubes. Tube set-up chart included with each adapter.

Dealer Net..... **24.95**

See your Electronic Parts Distributor

SENCORE, ADDISON, ILLINOIS
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An aerial photograph of a winding road through a forested area. A white truck is driving on the road, with a large, complex antenna structure extending from its back. The antenna is made of metal poles and cross-bracing, with several horizontal elements. The background shows a blue sky and a winding road that curves through the landscape.

FINCO'S

*9 Mobile Research Units
have traveled over
3,000,000 miles to conduct
13,833 "side-by-side"
performance tests
with competitors*

*The **FINCO** TV
Antenna is
always best!*

Want Proof?

*See your **FINCO** Distributor or write us.*

**THE
FINNEY
COMPANY
Bedford
Ohio**

EDITOR'S VIEWPOINT



What About Licensing?

Ambitious promoters of state and city licensing programs are at last being satisfied. Mandatory licensing is now law in at least three states and a number of cities. And although different legislators, councilmen and managers worked on each bill, the end results have been the same: a fruitless effort to keep moonlighters, night-crawlers, or whatever you want to call them, out of business and away from customers that many technicians can't seem to handle anyway.

All the city and state statutes I have seen have a glaring lack of protection for the customer and all have an unnecessarily high fee. Are these governments in such bad shape that a special taxation must be obtained from technicians? Or is this simply a way to make it more difficult to be a technician—a professional penalty? A good licensing program (there must be a few) is expensive, however, and if a good licensing program is ever attained, a fee which is higher than the cost of certification will be justifiable.

But how does this legislation eliminate the part-timer? In two words, it doesn't. Actually it will be much easier for the dishonest part-timer to scrape up the license fee than it will be for the honest technician. All the "fly-by-night" has to do is pull one or two crooked jobs the night before registration for the necessary funds.

It will be a sad day when the part-timer is eliminated and working hours are legislated. It sounds like the technicians are asking for a union; something professionals have never needed.

In many instances part-timers are more competent and better equipped than full time technicians. Will a licensing law which forces these people to stop work actually benefit anyone?

I grant that a large number of part-timers are incompetent or ill-equipped, but is this any reason to attempt to legislate him out of business? Although I have no statistics, there are probably many of the "let's put part-timers out of business" technicians who actually started with part time basement shops themselves. Good competition in any form never hurt an industry.

Analyzing the situation further it becomes obvious that most licensing is effected for the general public's protection. Governmental law alone cannot be used effectively in this case, however. Associations must also control members.

Associations can be extremely effective but they must drop from the social club category (where back-patting and complaining are the only accomplishments) and become a service to the industry and the public. (I don't intend to start an argument at this point regarding a need for socializing; to a certain extent it is necessary.)

Proof of the strength in associations can be had by examining the history of the American Medical Association. Before the AMA was formed, state laws to license doctors' practice were virtually nonexistent. Pressure from the AMA has effected powerful licensing which is very effective. The AMA has a very strong lobby and is almost frighteningly powerful.

The AMA polices its own members and bars them from the association as they see fit. When a doctor's license is revoked, it is frequently through prompting from the AMA. And where the AMA feels a doctor is unfit to practice while the state does not, the doctor's liberty to work is greatly restricted—it is rare indeed for a hospital to allow a non-member to practice there, for most of them are also AMA "members."

A TV association should work in the same manner, being careful as the AMA is, not to rake all technicians through the coals when one is found incompetent. Constant reminders that this or that technician has been punished only makes the public wonder how many rotten apples there are. To be effective it must have the backing of virtually every technician in the country. The "do-nothings" can poo-poo associations all they want, but the only way things will improve is with their support. Association people who jumped on the band wagon years ago with high hopes of an impressive office and those who are interested only in parties and picnics can be voted down only with the cooperation of technicians who up until now have been afraid to raise their voices in protest *through an organization*.

It takes time for all good things to happen, so don't expect results overnight, or for that matter, next year. As a matter of fact, the AMA was formed more than 100 years ago.

Vic Beale

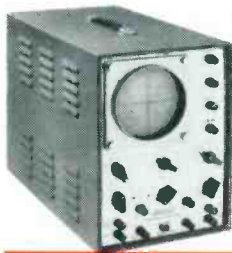
OSCILLOSCOPES

The most valuable piece of test equipment, next to the VOM, is the oscilloscope. It's not surprising, then, that the technician in the market for an oscilloscope is faced with a wide variety of configurations, capabilities and prices from which to choose. In using the chart, it should be remembered that there are many other oscilloscopes on the market and that the chart lists only the most common characteristics of representative types of oscilloscopes the technician would be most likely to need. Many factors, such as accuracy, design and component quality, warranty and repair service, and resale value are difficult to determine and do not show up in a general survey such as given here.



Hickok Model 770's horizontal sensitivity is 70 mv rms/in. ± 3 db 0 to 500 kc.

Sencore's Model PS-120 features 3-in. CRT, vertical sensitivity of 35 mv rms/in.



Hickok's Model 677 has Z-axis input and vertical channel response ± 3 db 5 cps to 4.5 Mc.

RCA Model WO-91A has vertical sensitivity of 53 mv rms/in. and vertical response ± 1 db 3 cps to 4.5 Mc.

Knight Model KG-2000's vertical sensitivity is 17.5 mv rms/in. and sweep rate is 5000 to 0.2 μ sec/cm.

Eico Model 427 has direct-coupled, push-pull vertical amplifiers throughout and sensitivity of 8.9 mv rms/in.

Precision's Model ES150 has 80-nsec rise time and vertical frequency response ± 3 db 0 to 4.5 Mc.

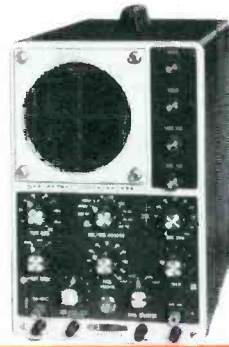
MANUFACTURER	MODEL	CRT SIZE (in.)	RISE TIME (nsec)	SENSITIVITY (rms mv/in.)	VERTICAL FREQUENCY RESPONSE					INPUT RESISTANCE (Meg Ω)	CAPACITANCE (pf)	SENSITIVITY (rms mv/in.)
					FLAT	± 1 db	± 3 db	OTHER	"USABLE"			
CONAR	250	5	50	20	13 cps-2.5 Mc			-1.5 db @ 3.85 Mc	-3.5 db @ 4.5 Mc			1000
EICO	427	5		8.9	0-500 kc			-6 db @ 1 Mc		1	30	460
EICO	430	3		25	2 cps-500 kc					1	30	250
EICO	460	5		25	0-4.5 Mc			-10 db @ 10 mc	± 2 db 0-200 kc	3	35	600
HEATH	10-10	3		400				± 2 db 0-200 kc		3.6	35	400
HEATH	10-12	5	80	25		8 cps 2.5 Mc	-2.2 db @ 3.85 Mc	+1.5 to -5 db 3 cps-5 Mc		2.7		300
HEATH	10-21	3		250				-2 db 2 cps-200 kc		10	20	250
HICKOK	675A	5	80	20	Through 3.85 Mc		0-4.5 Mc					250
HICKOK	677	5	80	40			5 cps-4.5 Mc			3	10	
HICKOK	770	5	70	35			0-5 Mc			2.2	50	75
KNIGHT	KG-630	5		20		@ 3.85 Mc	5 cps-5 Mc			2.9	21	600
KNIGHT	KG-2000	5	85	17.5			0-5 Mc			1	40	150
PRECISION	ES150	5	80	70			0-4.5 Mc	-5 db @ 5 Mc		1.5	23	600
PRECISION	ES550B	5		10		10 cps-3.5 Mc	10 cps-5 Mc					100
RCA	WO-33A	5	100	100			5.5 cps-5.5 Mc			1	50	900
RCA	WO-91A	5	100	53		3 cps-4.5 Mc				1	40	180
SENCORE	PS-120	3		35			@ 7.5 Mc	-0.5 db 20 cps-5 Mc	to 12 Mc	2.7	27	510
SIMPSON	458	7	50	40		20 cps-4.5 Mc		± 2 db 10 cps-5 Mc		3.3	20	115
SIMPSON	466	5		30		15 cps-100 kc		-5 db @ 250 kc	to 1 Mc			700



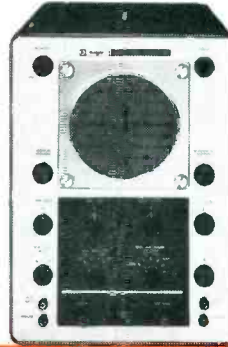
Hickok Model 675A has 20 mv rms/in. sensitivity and 80-nsec rise time.



Simpson Model 458 has 7-in. CRT and vertical response ± 2 db 10 cps to 5 Mc.



Heath's Model 10-12 features two preset sweep frequencies and external sync amplifier.



Knight's Model KG-630 features calibration output voltage and phasing control.



RCA's Model WO-33A has both wideband and narrowband vertical channels.



Simpson Model 466's horizontal frequency response is down 3 db at 600 kc.



Eico's Model 430 has 3-in. CRT, weighs only 11 lb.



Heath's Model 10-10 saves panel space with concentric controls.



Eico Model 460's vertical frequency response is flat 0 to 4.5 Mc.



Conar's Model 250 features 50-nsec rise time.

FLAT	HORIZONTAL FREQUENCY RESPONSE			"USABLE"	INPUT		SWEEP FREQ. RANGE	SYNC	Z INPUT	WEIGHT (lb)	DIMENSIONS (in.)	PRICE
	± 1 db	± 3 db	OTHER		RESISTANCE (Meg Ω)	CAPACITANCE (pf)						
20 cps-90 kc		@ 250 kc	-0.5 db				10-cps-500 kc	Int-ext	Yes	23	9 3/4 x 13 3/4 x 16 1/2	\$ 89.50 Kit
1 cps-450 kc			@ 7.3 cps		10	40	10-cps-100 kc	auto		28	12 1/2 x 8 1/2 x 16-7 1/8	139.50
2 cps-300 kc					10	40	10-cps-100 kc	Int-ext	Yes	11	8 1/2 x 5 3/4 x 11 1/4	100.95
1 cps-400 kc					5	35	10-cps-100 kc	Int-ext		29	13 x 8 1/2 x 16	65.95 Kit
					3.6	35	5 cps-50 kc	Int-ext		14	7 3/4 x 4 3/4 x 11	79.95 Kit
	1 cps-200 kc	1 cps-400 kc	± 2 db	to 9 Mc	4.9		10-cps-500 kc	Int-ext	Yes	23	14 1/8 x 8 3/4 x 16	129.50
			± 2 db		10	20	20 cps-100 kc	auto		14	9 1/2 x 6 1/2 x 10	79.95 Kit
		1 cps-450 kc	± 2 db				10-cps-100 kc	Int-ext	Yes	35	13 x 10 x 16	49.95
		3 cps-350 kc	-6 db		5	30	10-cps-500 kc	Int-ext		26	14 x 9 1/2 x 18 1/2	299.90
		0-500 kc			2.2	50	2 cps-30 kc	Int-ext	Yes	50	14 x 12 x 18	199.50
		@ 600 kc	-4 db	to 9 Mc	1		15 cps-600 kc	Int-ext	Yes	32	14 1/4 x 10 1/4 x 13 1/2	470.00
		0-500 kc	@ 1 Mc		1		5000-0.2 μ sec/cm	Int-ext		35	14 1/4 x 10 1/4 x 13 1/2	74.95 Kit
		1 cps-400 kc			5	23	10 cps-100 kc	Int-ext		30	18 1/4 x 13 1/4 x 8 3/4	109.95
	10 cps-1 Mc	10 cps-2 Mc			2	22	10 cps-100 kc	Int-ext	Yes	47	18 1/2 x 14 1/2 x 8 1/4	195.00 Kit
			-6 db		10		15 cps-75 kc	Int-ext		30	13 1/2 x 9 x 16 1/2	295.00
			3.5 cps-3.0 kc		2.2	30	10 cps-100 kc	Int-ext	Yes	30	13 1/2 x 9 x 16 1/2	149.95
			3 cps-500 kc		0.04	80	15 cps-150 kc	Int-ext		12	8 1/2 x 7 x 11	249.50
		45 cps-330 kc	± 6 db					Int-ext				124.50
	20 cps-200 kc		24 cps-500 kc					Int-ext	Yes	29	11 x 14 1/2 x 16 1/4	249.95
			± 2 db					Int-ext	Yes	19	7 3/4 x 12 1/4 x 16 1/4	149.9
			10 cps-300 kc	to 1 Mc	0.25	40		Int-ext				

ONE DAY—In A Technician's

by Homer L. Davidson

■ It was a hot, humid morning, and I had a feeling it was going to be a long day. George, my helper, was lining up our color calls for the morning.

Color programming in our area runs from 9:30 to 11:30 in the morning, so we started out on our color calls at 9 o'clock. Our first call was at Chester Samuelson's. We made this call first because he reported no picture, no sound—no nothing. I hoped to get the set re-

paired and be ready for color programs at 9:30.

Mrs. Samuelson came to the door in her housecoat, looking like the devil's own nightmare. She mumbled about how the set had been "nothin' but trouble." This surprised me, because we hadn't seen the set for a year. Maybe she had someone else fix it!

I was hoping she wouldn't go back to bed, because I wanted to collect on this job. She's the slow-paying kind.

Dead Set

George switched on the set: no

pilot light. Of course, the lamp could have burned out, but after waiting a minute or two, we pulled the set away from the wall and could see that no tubes were lit. Since this was a parallel-filament set, it obviously wasn't getting ac power. "Either the transformer is bad or both fuses in the secondary have blown," I prognosticated. I doubted it was fuses, though, because we'd had the same symptoms before on RCA CTC9s and CTC10s. No doubt about it, the set had to be pulled.

George began removing the tuning knobs and the small control knobs. Just as I started on the chassis mounts, Mrs. Samuelson came in and started breathing down my neck. I assured her that it wasn't the picture tube and that, most likely, we could repair it in the house.

The chassis was pulled back about five in., and the front controls had to be unhooked. (I sure wish they would make this operation a little easier.) I wasn't too far off: the fuses and transformer were OK, but the "surge" resistor in the ac primary winding was open (see Fig. 1).

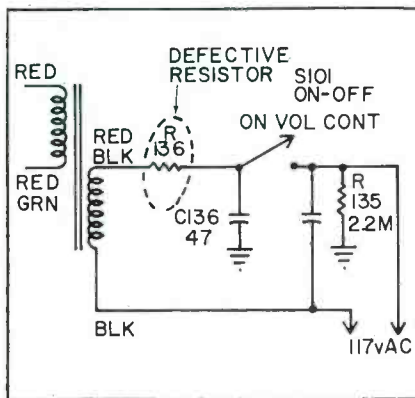


Fig. 1—'The surge resistor in the ac primary winding was open.'

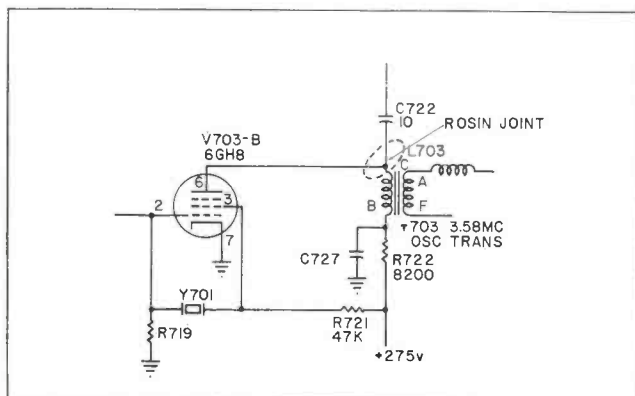


Fig. 2—'We took an ohmmeter reading from pin 6 at the 6GH8 to terminal B of T703. By pushing and pulling gently on the coil, the needle would flicker and become erratic.'

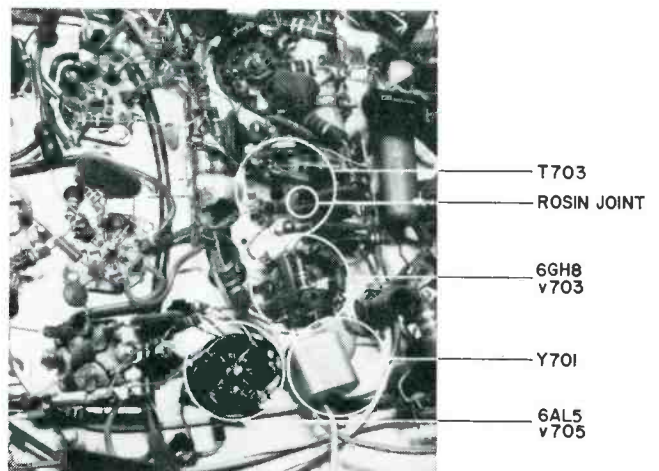


Fig. 3—'We plugged in the soldering iron and heated up a rosin joint.'

'The color picture started to flutter and the damper tube flashed. I always replace or check damper tubes when in doubt, but I was in too much of a hurry this time...'

The resistor was replaced and the set lit up.

The color dot generator was warm, thanks to George. (He's a good helper—make a fine service technician someday.)

I slipped the chassis back and plugged in the cheater cord. While George demagnetized the CRT, I connected the dot generator.

There was a tint of bluish green in the lower left corner. After touching up the purity ring, B/W purity wasn't bad, but a small outline of blue fringing appeared on the bottom. I switched the dot generator to channel 4, and I could see that the blue dots were down a little. When we adjusted the blue center convergence magnet the fringing cleared up. Just as we finished, the color program came on. The color was good!

I wrote up the bill while George replaced the set's back. "Be careful putting on that back," I cautioned George. "Don't bump those CRT adjustments!"

The repair job wasn't much trouble, but collecting for the job might be. This gal had tried every excuse under the sun for not paying

the last time we were here: She "pulled" a disappearing act—went next door to the neighbor's. Then she didn't have a blank check. Finally told us to "Send the bill to Chet down at the store."

This time we were ready for her. She dug deep several times in her suitcase-purse and paid the bill. "Who said this was going to be a long day?" I asked myself as George eased the panel truck out into traffic.

Intermittent Color

Ten blocks south on fifteenth street we pulled up in front of Dr. Cledy's house. The maid came to the door and directed us to the color set. The color picture was good at first, but then the color disappeared and the picture was just black and white. The color came back again, though, intermittently.

While George was removing the back, the color would come and go. A tap on the chassis showed that the color section was intermittent. This could be a "dog." George tapped each tube in the color section to see if it was shorting. If the 12AZ7 or the 6GH8 color oscillator

tube was moved, color would disappear, and when I moved the oscillator transformer, the same thing happened, so the trouble had to be close to these components. We pulled the chassis, being careful not to disturb the convergence assembly on the CRT neck.

George and I spread a drop cloth over the rug and turned the chassis over. This rug was a "beaut," two in. thick—we didn't want to soil this one!

George plugged in the service light and we visually checked the 12AZ7 and 6GH8 tube sockets. Everything looked OK.

A visual check was made on the oscillator transformer. Pin C terminal didn't look a bit good. "This could be a rosin joint," I told George, pointing to the terminal with a screwdriver. We took an ohmmeter reading from pin 6 of the 6GH8 to terminal B of T703 (see Fig. 2 and 3). By pushing and pulling gently on the coil, the pointer would flicker and become erratic. "That must be it," I thought. Leaving the chassis on its back, we plugged in a cheater cord and quickly checked the oscillator tube's plate voltage. When I moved the oscillator coil gently, down went the voltage. I plugged in the soldering iron and made a good joint.

We replaced the color chassis in the cabinet and checked it out. You could push and pull that color coil all you wanted now and color stayed

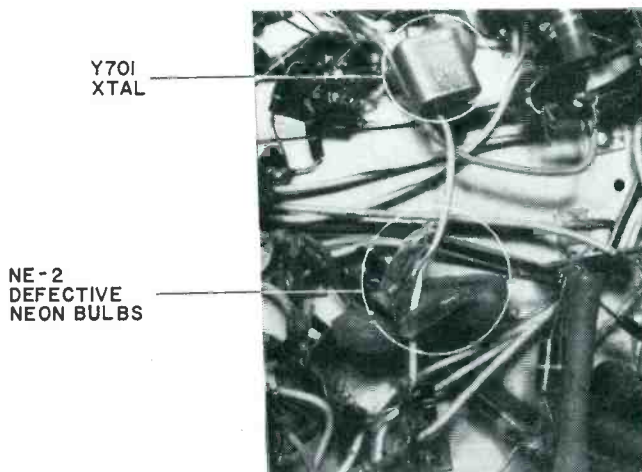


Fig. 4—'One neon bulb was flashing red. A couple of new lamps were soldered in and the color chassis was slipped back in place.'

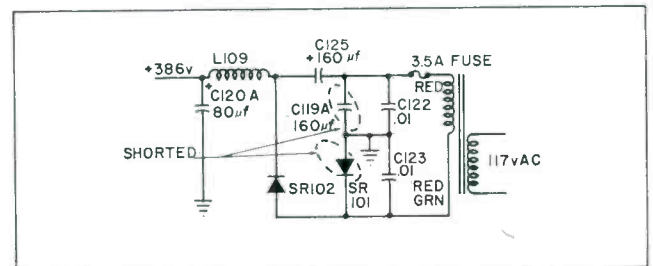


Fig. 5—'Silicon diodes were checked and one showed 10Ω. C119A was shorted.'

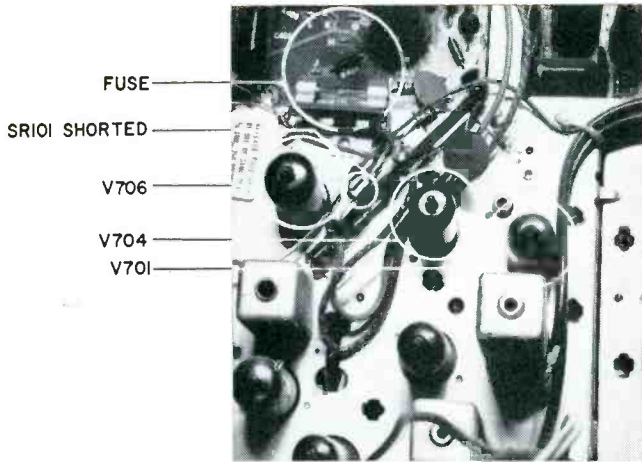


Fig. 6—'I replaced the bad filter and both silicon diodes.'

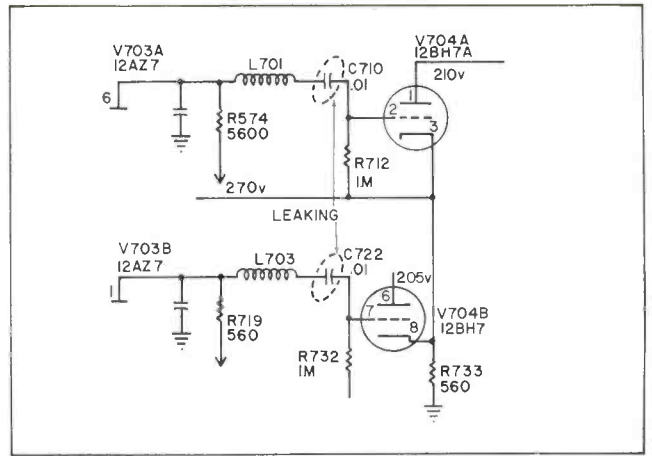


Fig. 7—'C710 was shorted directly and C722 had high leakage.'

put. I fastened down the TV chassis while George demagnetized the CRT, and then touched up the focus and killer controls. We finished up by checking and touching up the convergence.

When George flipped the channel selector to channel 5, the picture was a little snowy. We changed the 6BQ7 RF amplifier, and this cured the snow. When George replaced the set's back cover, the job would be finished—so we thought.

George was on the last screw when the picture started to flutter and the damper tube flashed. I always replace or check damper tubes when in doubt, but I had been in too much of a hurry this time. We pulled the back off again and replaced the 6AV4. Had a perfect picture now!

No Color

We had a half-hour left when we pulled up in front of Bill Day's house. Mrs. Day, a cheerful young woman, greeted us at the door. She had a lot of class—George said she was "cute as a bug's ear," and I agreed. Hated to see this set again though, because we'd had a lot of trouble with it before. The set wasn't a year old, but everything happened to it.

There was no color, but the B/W picture was good. We substituted the color oscillator tube, burst amplifier, phase detector and blanker tube, but to no avail. I remembered that we'd had this trouble before with a couple of CTC10 chassis, and the trouble had been the two

small neon bulbs located under the chassis.

After removing the chassis it was fired up behind the cabinet, and sure enough the neon bulbs were brighter than usual. In fact, one was bright red. George soldered in a couple of new lamps (see Fig. 4) and slipped the color chassis back in place. We reconnected the HV cable, convergence cables, CRT socket and yoke wires, and switched on the set. Color was real good—for two minutes. We had forgotten about the time. Color program time had slipped by. It was 11:30 and the programs were off.

The next time we have serious neon lamp trouble with a receiver we'll pull it into the shop for modification. RCA has a modification circuit to replace defective neon lamps. Although we replaced the original defective bulbs we have had no trouble with them.

The chassis was fastened down and checked out. When I advanced the brightness, a 2-in. black strip showed up on the left side, so I replaced the 6DQ5 HO tube. This fixed the width problem. While George touched up the focus, I clipped the dot generator to the antenna terminals. I checked the convergence and adjusted the dc magnets, and purity was good. I then set the color killer and checked the UHF stations. Channel 21 was fairly good but channel 70 wasn't there. When I replaced the 6AF4 oscillator tube, channel 70 popped in. Apparently the old 6AF4 tube would oscillate on the lower UHF channels

but wouldn't work on the higher ones. Mrs. Day paid the bill cheerfully and we were on our way. I glanced at my watch: fifteen minutes late for chow.

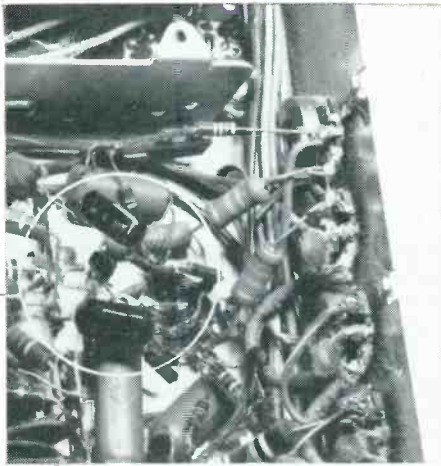
Three To Go

When we got back to the shop, we found that two color sets had come in for repair while we were gone: one from a TV dealer who in the northern part of the state, the other from a local farmer. After lunch I decided to tackle the color receiver I had left unfinished the day before, so that made three to go before suppertime.

There was no high voltage on this set, and the customer complained that he smelled something burning. The day before, I found that the focus control had charred through to the horizontal centering control and ground. I'd replaced the focus control but we didn't have a centering control on the shelf. I sent George for our order at the distributor and told him to pick up the control too. This job could be finished soon. I'd already checked the tubes and replaced the 6AZ4, 6DQ5 and 1V2 focus rectifier.

I connected the chassis to the color test rig and checked it out. Stations didn't center on-channel, so I adjusted the tuner. I checked the color bar with a rainbow generator. When George got back with the centering control I soldered it in.

George replaced the chassis in the cabinet while I started on another color set. We like to "cook"



LEAKING

Fig. 8—'If one coupling capacitor shows short or leakage, it's best to replace both.'

the color sets at least a half day after repair and then set up on a color station. I planned to check this receiver on color the next morning.

The TV dealer's receiver was next. The service tag read "no sound, no picture, no brightness." This could be an easy one: a blown fuse. Of course, the TV dealer should have thought of this, and he did. He had a piece of solder wrapped several times around the fuse holder! This spelled trouble.

When I checked the silicon diodes, one showed 10Ω. The rectifier had probably taken a heavy load. I checked the filter capacitors, and found that C119A was shorted, so I replaced the bad filter unit and both silicon diodes (see Fig. 5 and

Fig. 10—'I finished soldering in C401 and fired up the set.'

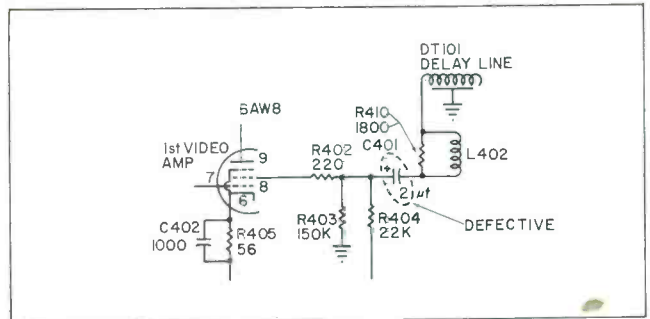
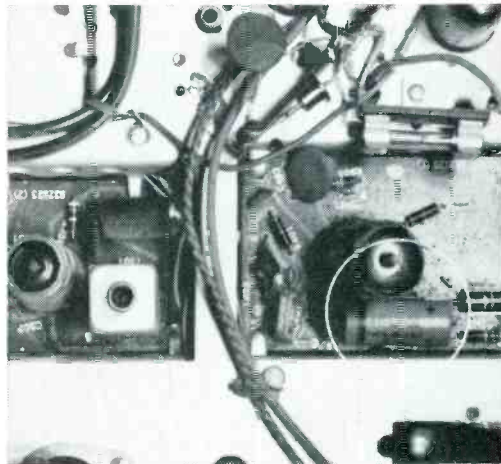


Fig. 9—'Vertical sync was improved by replacing electrolytic C401.'



C401

6). Although only one diode showed defective, I didn't want to take any chances on the other. I clipped a 3.5-amp fuse into the fuse holder and fired up the set. The supply voltage was good.

George checked all the tubes and hooked the chassis to the test color tube. The set was left to run for the

rest of the afternoon.

The farmer's color set was a CTC8. A bluish - green picture showed on B/W. It had poor vertical sync and no color. (These sets were never too hot on vertical and horizontal sync.) I pulled the chassis and checked the two coup-

Continued on page 84

Magnetic Tape Viewer

■ An instrument has been designed which makes recorded data visible on magnetic tape without damaging the tape. The instrument was developed by the 3M Co.

The magnetic tape viewer, No. 600, can be used to check recorder head alignment, track placement, pulse definition, interblock spacing and dropout areas in computer and instrumentation work.

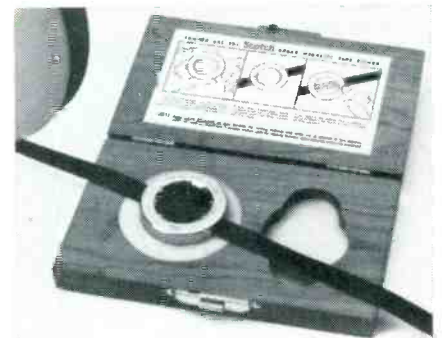
It can also be used to examine and synchronize the audio track on video tape and recorded sound patterns on audible range tapes. It will also determine if tools, heads or guides are magnetized.

One of the first tape-viewer prototypes was used to align pieces of airplane recorder tape which provided a clue to the cause of a military aircraft explosion. The tape had been broken and scattered widely by the explosion.

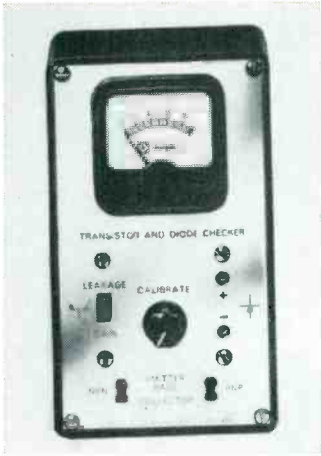
In another early case, the viewer was used to isolate an aerospace telemetry tape defect—caused by a faulty recorder.

The viewer has been used to determine that defects in a series of machine tool control tapes were caused by momentary power supply failures.

No preparation is needed. ■



Recorder head alignment, track placement, dropouts and pulse definition can be checked with the magnetic-tape viewer.

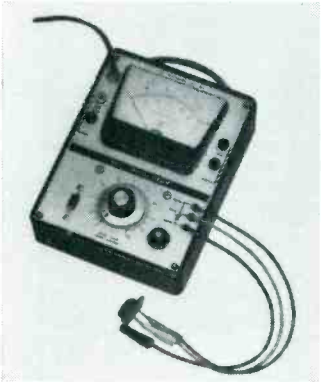


Knight's transistor tester checks diodes as well; has no provision for power transistor.



Transistor Radio Analyst is a troubleshooting instrument but checks transistors too.

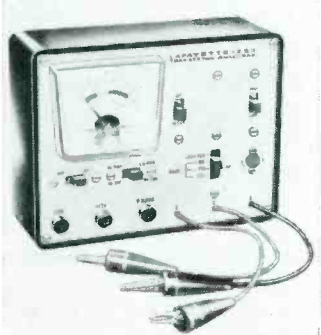
SEMICONDUCTOR



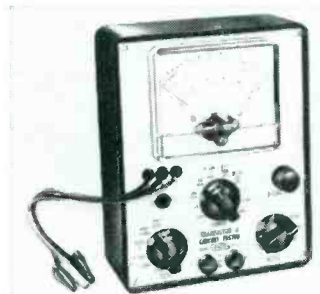
SECO's SCR analyzer.

Transistor and semiconductor testers come in all shapes and sizes. Some are simple less-than-ten-dollar units and others cost more than \$300. Some are as big as tube testers and others are actually part of a tube tester. What you need can only be decided by you, however.

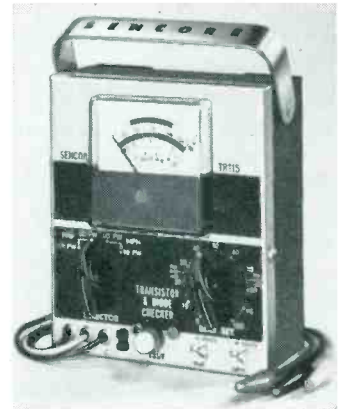
The photos and the list here are meant to give you an idea of what is available.



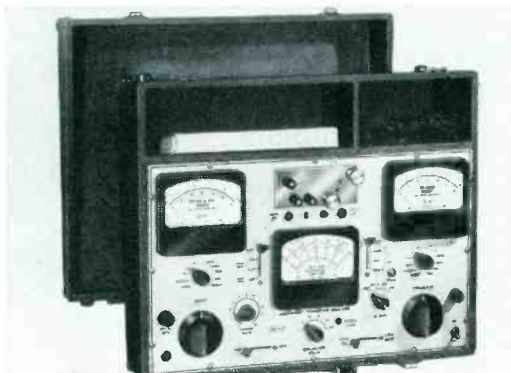
Lafayette transistor analyzer has three-range gain measurement.



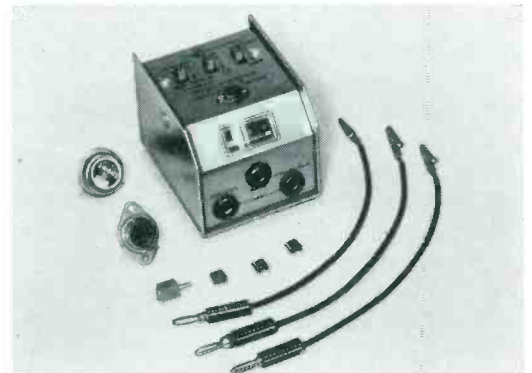
EICO transistor tester also functions as a VOM.



Sencore's small transistor tester reads Beta directly or on Good-Bad scale.



Triplett's transistor analyzer.



Smallest transistor tester by Heath doubles as continuity checker.



GC's Radio Trouble-Shooter.



GC tester checks transistors in or out of circuit.

TESTERS



Transi Master tests transistors and transistor circuits. Has built-in signal generator.



Semiconductor tester by SECO is available in ac or battery powered models.

Manufacturer	Model	TYPE OF TESTS				COMPONENT TESTS				Size	Remarks	Price
		Icbo	Iceo	ac Beta	ac Beta Leakage to Gain Ratio	In-Circuit	Power Transistors	Signal Diodes				
B&K	960	G-B	G-B	0-150		X	X	X	12-1/8 x 7-3/4 x 4-7/8	Transistor Radio Analyst—ac	\$ 99.95	
EICO	680	X	X	G-B					3 x 5-1/4 x 6-3/4		39.95	
G-C	36-568	X		X		X	X	X	9 x 8-1/2 x 2-7/8	Transistor Radio Troubleshooter	49.50	
G-C	36-570	X		0-100		X	X	X	8-1/2 x 5 x 1-7/8		24.95	
HEATH	1T-10	X		X			X	X	3-1/8 x 3-1/8 x 3-3/4	Continuity Tester—Kit	6.95	
HEATH	1M-30	X	X	X			X	X	N/Avail.	Kit	54.88	
HICKOK	810	X		X					9 x 11-1/4 x 7	Transistor Radio Analyzer—ac	138.50	
HICKOK	850P	X		X			X		13-1/2 x 16-1/2 x 8		169.60	
HICKOK	870	X	X	0-600	X		X		7-7/8 x 14-9/16 x 11-3/4	ac—Battery Charger	355.00	
HICKOK	890	X	X	0-200	X	X	X		6-1/2 x 10-3/4 x 9		137.50	
KNIGHT	Tr/di/checker				X			X	6-1/4 x 3-3/4 x 2-5/8		6.95	
LAFAYETTE	223	X		0-200		X	X	X	6-7/8 x 5-3/8 x 2-5/16		13.50	
PACO	960	X		X			X		18 x 10-1/2 x 6-1/4	Roll Chart—ac	109.95	
SECO	250	X	X	0-20		X	X	X	8-1/4 x 7-1/4 x 3	Test Zener & Tunnel Diode	86.50	
SECO	600								N/Avail.	Tests—SCRs	46.95	
SENCORE	TR110	X	X	0-200		X	X	X	8 x 7-5/8 x 3		58.31	
SENCORE	TR115			0-200G-B			X	X	4-1/2 x 5 x 2-1/4		24.45	
TRIPLETT	3490	X	X	0-300			X	X	N/Avail.	Transistor Analyzer—ac	399.95	

MAKING YOUR

■ Will yours be one of at least 150,000 businesses uprooted by renewal programs during the next six years? While urban renewal seems to have almost as many critics as advocates, close to 700 urban renewal projects are now under way in more than 400 cities, and many more are planned.

If you are ever faced with the prospect of relocation, you can increase your chances of survival and success by being aware of a few simple rules:

- Heed the notices of the redevelopment agency. On receipt of the first removal notice, start planning for relocation.

- Take a long, hard look at your operation. Carefully re-evaluate your location and space needs.

- Seek out the assistance—both financial and technical—that is available from local government agencies. Carefully follow their instructions for getting the benefits available, or you may forfeit them.

- Work closely with your real estate broker and be ready to take advantage of a good opportunity. Often an opportunity will arise for an advantageous move before foreclosure by the government. Be prepared to act independently of the government agencies if that, in your judgment, is the best course.

When an area is chosen for urban renewal, the typical businessman located there is not looking for new quarters. Now, forced to find a new location, he finds himself saddled with some severe handicaps. Unlike the man who is voluntarily shopping around for a new spot, the technician facing eviction is fighting a time limit and does not have the option of waiting for the perfect deal to come along.

When he starts looking for a new location, he must face the possibility that he is going to be paying a higher rent. The major reason for this is that he is moving out of an old and depressed section.

Many businesses are neighborhood in character and do not want to move away from their established area and the customers who know them. Therefore, the demand for space in the area immediately adjacent to the renewal site becomes premium property. There is competition from every other businessman in the neighborhood in this hunt for suitable space.

The redevelopment authorities charged with a renewal project report again and again that some businessmen refuse to believe that they must relocate until it is almost too late. In most cases, more than adequate warning is given, but people have a tendency to put off the decision and the necessary work until one day they discover, in panic, that the move is almost upon them and they are totally unprepared.

This first rule of successful relocation is to pay attention to your local relocation office and begin work as soon as possible on finding new quarters.

Dealer Case Histories

A good example of the businessman who thinks and plans ahead is a technician in New York City. Advised by his real estate broker that his shop would be involved in a renewal project, he began planning for the inevitable move even before he received official notice. Working closely with his broker, the technician decided to open a branch shop just one block away but out of the area to be renewed. As the time for foreclosure neared, he placed more and more emphasis on the branch operation and by the time his main shop was closed down, he was able to make an easy transition to the new location. When the renewal project was finished, so many new people were drawn into the area that his volume increased considerably.

Faced with relocation, the tech-

nician has an opportunity to take a good look at his operation and plan the changes in his business he thinks will do some good. This is an excellent time to judge where he wants to tighten or expand his operation. Once his future objectives are defined and careful thought is given to reorganizing, he can shop for a new location and space more suited to his needs, thereby effecting a more efficient and profitable operation.

Forced to vacate his old quarters, a servic technician in Chicago saw the move as an opportunity to reorganize his business in a way that was impossible in his old location. He had long been aware that the physical layout of his shop did not lend itself to proper display and customer traffic. With the spur of a necessary move, he chose store space more suited to his needs. He carefully laid out his sales floor, paying particular attention to display and he was able to rearrange the shop for more efficient operation. In addition, he modernized and reorganized his stock room so that it was easier for him to keep a running inventory. Six months after his move to the new location, he found he was doing more business even though he had less space.

Once the preliminary planning is done, the technician should turn to the local redevelopment agency and take advantage of all the assistance that is available. Benefits are prescribed by law, and there are forms to be filled out and documentation to be maintained.

Financial Assistance

In 1956, Congress passed a bill making it possible for local agencies to offer financial assistance to dislocated firms with a federal relocation grant. The legitimate moving expenses of a firm will be paid as will many of the personal property losses suffered as a result of the move. The ceiling for such assis-

MOVE



Relocation forced by urban renewal can be a blessing in disguise

by Paul O'Keefe

Mr. O'Keefe is a former real estate commissioner and deputy of New York City and is now president of Charles F. Noyes Co., one of the nation's leading real estate management and brokerage firms. He also is the author of two books on real estate, "How To Finance Real Estate" and "Leases."



tance is set at \$3000 for any one firm. All claims must be substantiated with receipted bills and other written proof of expenditure.

Moving expenses will of course vary according to the character of the business. A larger business with a heavy inventory will cost more to move than will a smaller one. The cost of moving can be kept remarkably low with the help of a few husky friends and rental truck or trailer. On the other hand, the service technician may be money ahead if he conducts "business as usual" (as well as possible), paying for professional and insured moving services. This would prevent loss of customers, it probably would result in a quicker move, and the revenue from the continued business might compensate for the moving expenses.

More often than not, the payment of moving expenses can mean the difference between success and failure for a dislocated firm. A small operator who went out of business two months after moving to a new location said that he could have succeeded if his moving expenses and fixture dismantling and reassembly costs had been paid for him. In this case, he would have received the money if he had applied for it properly. Unfortunately, he did not know about the benefits due him, and by the time he applied it was too late to collect.

In the case of personal property loss, an appraisal will probably have to be made by an outside expert in order to establish reimbursable value. It is sometimes necessary that the claimant pay for such an appraisal.

It is important to remember that in order to be eligible for any financial assistance from the redevelopment agency, the affected firm must remain in its old quarters until the building has been legally acquired by the local government. This rule applies whether the firm is the

owner of the building or a tenant.

Many tenant businesses make the mistake of assuming that a relocation order is the notice of acquisition by the government. It is not unusual in every renewal project to find some businesses that have lost their right to reimbursement of otherwise perfectly legitimate expenses because they neglected this most important point and moved out prior to the actual government acquisition.

Sources of Aid

When a municipal government decides to renew an area, it sets up a redevelopment agency to supervise the project. During an extensive renewal program in New Haven, Connecticut, the local government appointed a real estate man as business relocation officer. Drawing on his knowledge of the area and the needs of the firms involved, the redevelopment agency was able to keep informed about the availability of local business space. The agency kept records of the needs of each firm that was forced out of its location. With each storeowner, it analyzed the needs of his operation and offered advice and assistance. In this way, it was able to match dislocated firms with the most suitable

space available. Also, a staff appraiser investigated claims on any loss of personal property and expedited the reimbursement payments.

The New Haven agency was able to keep its dislocated businessmen apprised of all aspects of the real estate market confronting them. This is one of the prime reasons for the successful renewal operation in that city.

Aside from the help that is forthcoming from the government agency itself, there are other groups concerned with the plight of business in the community. The Chamber of Commerce often sets up advisory boards to help dislocated stores. In addition, Small Business Administration field offices offer a variety of services to the affected firms.

These excellent sources of aid plus the guidance and advice of an independent real estate counselor can help a radio-TV shop owner make the most successful move possible. The fact is that, while most stores take advantage of the financial and technical aid offered by the government, only 20 percent find new space through the municipal agencies. In many cases, a real estate expert is better able to help a

Continued on page 85

ELECTRONIC IGNITION

. . . a possible source of additional income through dealership or consultant service

by J. M. Crawford

Mr. Crawford is General Manager of Motion Inc., a subsidiary of Tung-Sol Electric Inc., 630 Mt. Pleasant Ave., Livingston, N.J. Motion Inc. has been formed expressly to manufacture and sell electronic ignition systems under Tung-Sol patents resulting from their research and development.

■ Sideline businesses for TV technicians has been discussed at great lengths. Some are in favor of diversification and some are not. The most logical approach to take, however, is that diversification is good if too much time is not consumed by it (and if time is available), if it is profitable, if it requires few or no additions to test equipment and is easily accomplished without undue study.

Since the technician is already a local "electronics authority," it is logical that he should diversify into service of other electronic devices in order to get the most mileage from his reputation. With this in mind, many technicians are investigating electronic ignition systems as a possible source of additional income. Let's compare a standard and electronic system and see just how feasible it would be for the average technician to service this equipment.

The Conventional System

The ignition system which we find on automobiles today has been in

existence for about 50 years. Improvements in detail have been made over the years, but the basic circuitry has remained unchanged. While this system has proved fairly reliable and easily serviceable, there is now room for improvement because over all vehicle reliability has been improved. Performance guarantees are being lengthened, and the time between regular maintenance cycles is being extended. It appears very likely that ignition system improvements will come through electronics.

The breaker points found in the conventional system act as a high current switch required to open and close a circuit many times in each mile of driving. The high current which flows momentarily through the breaker points creates very high temperatures resulting in metal transfer. This shows up as "pitting" on point surfaces after a few thousand miles of operation. In addition, in cold weather starting conditions, the heat generated at the points tends to build an oxide surface



Neatly packaged Motorola system includes special lubricant for point rubbing block in do-it-yourself package.

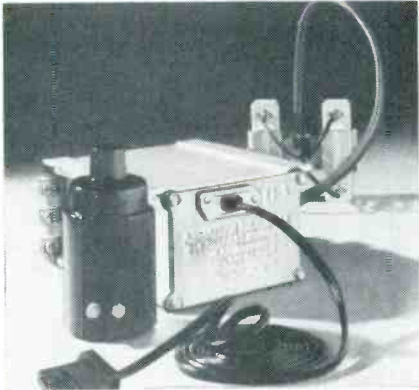


Banshee system made by Slep Electronics is switching type.

which makes current transfer difficult and brings about starting problems. Therefore, breaker point replacement every 5000 to 10,000 miles is necessary.

As engine compression ratios and RPM levels increase with improved engine design, the problem of firing spark plugs efficiently for long periods is becoming difficult for the conventional ignition system. This is because plug firing voltage requirements increase as plug gap erosion takes place and at high RPM levels voltage available to the plugs falls off, often to a level below the plugs' voltage requirement. Also, lead and carbon deposits on the ceramic insulator supporting the center electrode causes fouling which leads to misfiring or late firing and plugs must be cleaned or replaced every 10,000 to 20,000 miles.

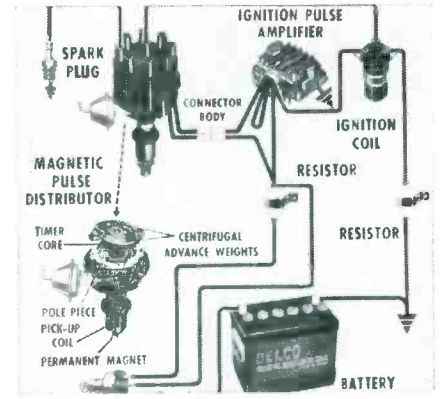
Because of breaker point and spark plug degradation, periodic engine tune-ups, involving replacement of ignition parts and adjustment of engine timing, is also needed at regular intervals.



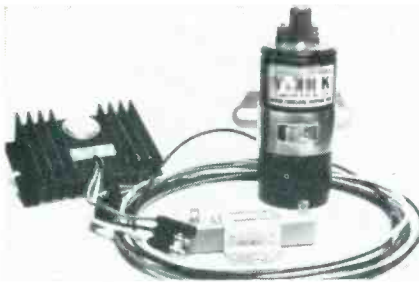
Motion's capacitive discharge system utilizes cold cathode thyatron and rectifier to discharge and charge capacitor.



Workman's trans-it is "bubble-packed" for easy display. This system employs standard coil.



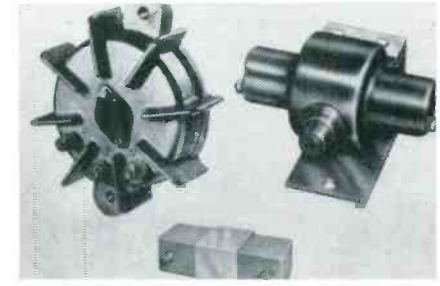
"Delcotronic" system completely eliminates points. Magnetic "points" generate voltage in pickup coil which triggers transistor system.



Anderson Engineering transistorized ignition is switching type.



Transfire unit, made by Palmer Electronics Inc., is switching type system.



Leece-Neville transistorized ignition system. The amplifier is shown in the upper left. The coil at right and the ballast resistor at the bottom.

Electronic Systems

By substituting a transistor for the points as the high current switch, and using the breaker points only as a signalling device, the heat generated at the points is very greatly reduced and breaker points retain like-new contact surfaces for 100,000 miles or more. The only remaining breaker point problem is the rubbing block which pushes the points open as the distributor shaft cam rotates against it. This rubbing block wears with use but, if proper lubrication methods are used, and the distributor is kept fairly clean, rubbing block life should be in the order of 50,000 to 75,000 miles and timing adjustments, owing to wear, should not be necessary more than every 25,000 miles.

Most electronic systems can supply considerably more voltage to the spark plugs than the standard system, so that, as spark plug gaps open, they will still fire. This will extend plug life considerably, probably to 50,000 miles or more. One

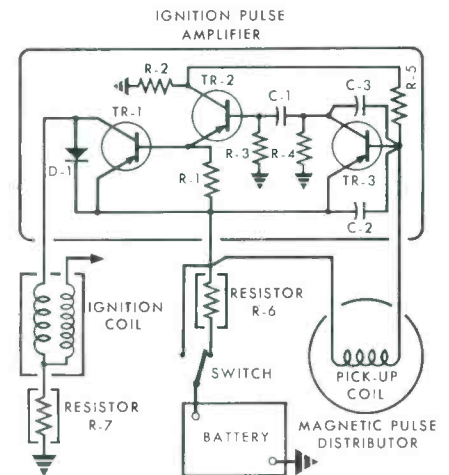
electronic ignition system design also overcomes the problem of fouling plugs and with this system, plugs should operate satisfactorily for an excess of 75,000 to 80,000 miles or more.

A fuel economy of 5 percent to 10 percent is claimed with most electronic ignition systems because the vehicle will perform as if just tuned for much longer periods.

Electronic Ignition Designs Available

There are three basic electronic ignition designs now available, either through the vehicle manufacturers or in the replacement market. The first of these is the straight transistorized system, which utilizes the standard distributor and a specially designed coil.

The second design replaces the standard distributor with a "magnetic pulse generator." The magnetic pulse generator eliminates breaker points entirely and is used as the device to signal a straight modified coil.



Schematic of Delco magnetic pulse system.

The third device uses a transistor to save breaker points but employs a capacitive discharge method of firing the plugs. In this design energy is stored in a capacitor and discharged through a step-up transformer when the breaker points open. Standard and transistorized systems use an inductive coil method

TABLE I

Engine Won't Start

1. Open ignition switch circuit
2. Moisture shorting distributor cap
3. Points not opening due to incorrect adjustment
4. Corroded or poor contact on distributor cap
5. Breaker arm binds on pivot pin . . . holds points open
6. Distributor rotor worn
7. Moisture on coil terminals
8. Resistive wiring has become opened if not removed during installation
9. Distributor cap cracked
10. Grounded Spark Plug Cable
11. Stiff motor oil from cold weather
12. Install back-up or stop light type car relay to by-pass Ballast Resistor on start position (See under Ballast Resistors)

Engine Misses At High Speed

1. Point gap set too wide
2. Breaker arm spring weak or sticking
3. Distributor camshaft bushing worn

Engine Misses At Low Or Idle Speed

1. Point gap set too narrow
2. Radial contacts in distributor cap worn or burned

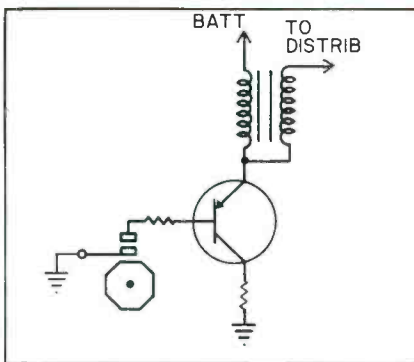
Engine Misses At All Speeds

1. Points set at incorrect gap
2. Points dirty or worn. Best to replace at time of installation
3. Cracked distributor cap
4. Worn Rotor
5. Intermittent short or open in ignition cable
6. Cracked spark plug
7. Arcing over of ignition wiring
8. Spark plugs opened too wide
9. Leakage across dirty distributor cap causes wrong cylinder to fire
10. Transistor mounted in too hot a location
11. Faulty grounding of green wire

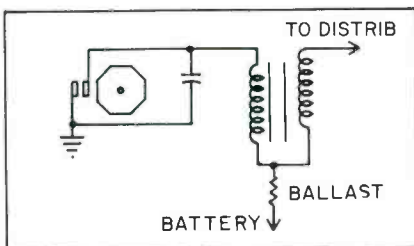
Engine Lacks Power and Top Speed

1. Timing set incorrectly
2. Centrifugal advance not working
3. Contact points needing lubrication
4. Vacuum advance not working
5. Loose terminal connections

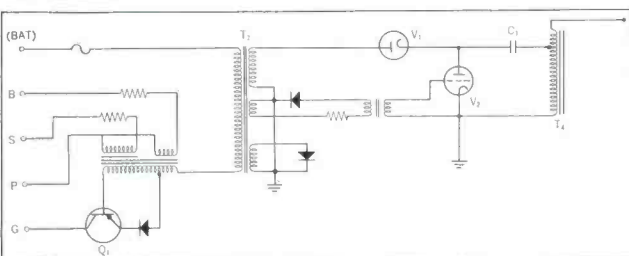
Courtesy Slep Electronics



Simplified diagram of transistor switch ignition system.



Standard ignition system.



Circuit diagram of the capacitive discharge system.

TABLE II

THE FOLLOWING CARS HAVE A PORCELAIN RESISTOR BETWEEN THE IGNITION SWITCH AND THE STANDARD COIL:

MAKE	YEAR	MAKE	YEAR
Buick	1953-1959	Lincoln	1956-1959
Cadillac	1953-1959	Mercury	1956-1959
Chevrolet	1955-1959	Nash Rambler V-8	1956-1962
Corvette	1955-1963	Oldsmobile	1953-1960
Chrysler	1956-1963	Packard	1955-1958
DeSoto	1956-1962	Plymouth V-8	1956-1963
Dodge V-8	1956-1963	Plymouth 6	1960-1963
Dodge 6	1960-1963	Pontiac	1953-1959
Edsel	1958-1959	Studebaker	1956-1960
Ford	1956-1959	Thunderbird	1956-1959

THE FOLLOWING CARS HAVE A RESISTANCE WIRE BETWEEN THE IGNITION SWITCH AND THE STANDARD COIL:

Buick	1960-1963	Mercury	1960-1963
Cadillac	1960-1963	Oldsmobile	1961-1963
Chevrolet	1960-1963	Pontiac	1960-1963
Ford	1960-1963	Studebaker V-8	1961-1963
Lincoln	1960-1963	Thunderbird	1960-1963

of firing the plugs. In this method energy is stored magnetically in the core of the induction coil. When the breaker points open, this energy is released in the form of a high voltage pulse as the magnetic field collapses.

The difference in the two methods of firing a spark plug is essentially in the length of time required to raise the voltage at the spark plug from zero volts to break-down potential (about 18 kv). The capacitive discharge system's rise time is 2 μ sec while the standard or transistorized systems take from 70 to 200 μ sec. The advantage of the quick rise in voltage is the ability to fire fouled spark plugs and eliminate misfiring or off-time firing due to fouling which occurs with either standard or transistorized systems.

Servicing

Two of the major Detroit vehicle manufacturers offered electronic ignition systems as optional equipment on certain 1963 cars and trucks. One of these systems is a straight transistorized system and the other is the magnetic pulse generator type. The units are installed as original equipment and are not transferable from one vehicle to another. Some '64 cars have electronic systems which are standard equipment.

In the replacement market all three basic electronic ignition systems

Continued on page 85



Fig. 1—The eye jumps to the blotched ad border (right) ignoring the standard line border.

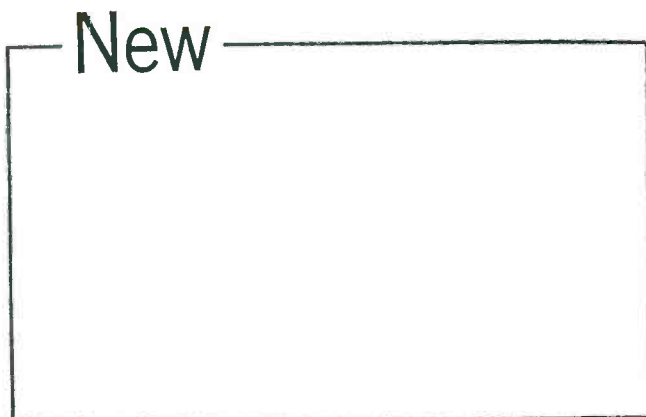


Fig. 2—An ad border broken by a headline or illustration becomes more eye-catching.

Revamp Your Small Ads

Get more 'mileage' from your ad dollar by updating lay-outs

by Bob Westenberg*

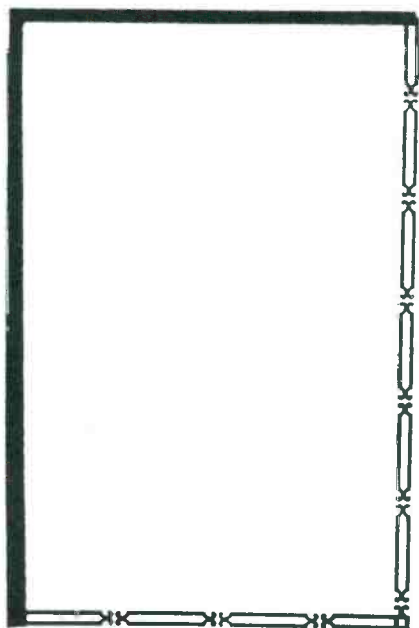


Fig. 3—Another attention-getting ad uses different borders around the same ad.

■ Many TV-radio service-dealers look scornfully at small newspaper ads. "What good are they?" is a common complaint. The answer is that they are as good as you make them. And a number of "wrinkles" can be used in small ads to get more for your advertising dollar.

Take the border of an ad, for example. Most ads have a plain black border. But you can give ads more punch and attention-getting value by using a little different border. It doesn't have to be a work of art. Look at Fig. 1. The border is a "blotchy" line. Compare it with the standard line border. There's no doubt which ad your eye would pick up first on a page of ads.

Practically every printer or newspaper has a number of borders in stock. Find out what you can get, then specify one for your ad. Borders can be almost anything. If you ask a question in an ad head, have a border made of question marks. If you want readers to save your ad, use a broken or dotted line border.

You can "break into" a border with an illustration or headline too,

as shown in Fig. 2. A few lines of ad copy is cut, but added interest and impact makes up for the sacrificed copy. And a border doesn't have to go all around your ad or be the same on all four sides. The one in Fig. 3 shows what effects you can get by using different borders in the same ad. (A note of caution: avoid too many kinds in a single ad. The result can be jumbled.)

Headlines can also gain more attention for your ads. The worn out standards "Special," "Announcing," or "Now Available," should be eliminated. Pick a head from the phone book classified section and use it in a small space ad "FOUND," for example, is always a stopper. You can easily write copy to follow it: "The magic way to obtain perfect color reception," for instance.

Build curiosity into your headlines. Coax readers to continue reading through the ad. Construct "different" eye-opening phrases—difficult to ignore. They eclipse a page of run-of-the-mill-ads.

Continued on page 86

*Former Corporation ad executive



Precision Model E-410 features built-in marker adder and is supplied with all five cables.

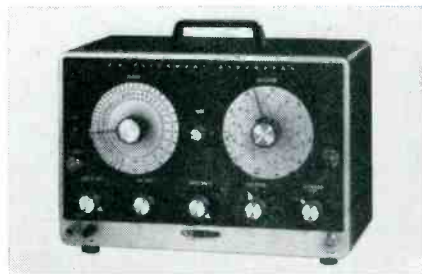


Knight sweep generator covers 0.3 to 250 Mc on fundamentals.

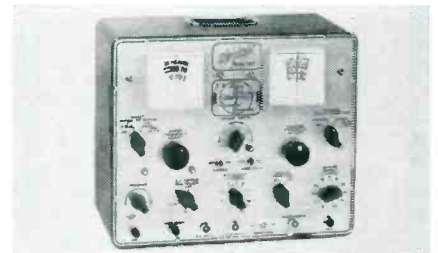
SWEEP GENERATORS

While only a few of the many sweep generators available are described here, it can be seen from the chart that they are made in many combinations of frequency range, sweep width, price and other considerations. This practically assures that any technician can find one that fits his needs and pocketbook.

MANUFACTURER	MODEL
EICO	360
EICO	368
EICO	369
HEATH	IG-52
HICKOK	288AX
HICKOK	615
HICKOK	695
KNIGHT	83-YX-123
PRECISION	E-410
RCA	WR-89A
RCA	WR-86A



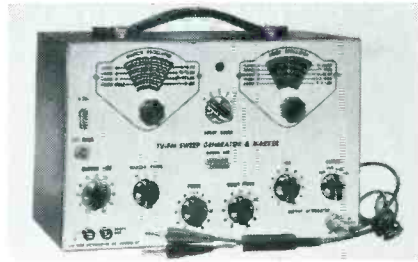
Heath Model IG-52 has provisions for external markers and range of 3.6 to 220 Mc on fundamentals.



Hickok Model 615 features output level meter.



This model has output level meter and three frequency bands.



Eico Model 368 has range of 3 to 216 Mc on fundamentals.



RCA Model WR-69A covers and TV and FM on 15 bands.

FREQ. RANGES (Mc)		NO. OF BANDS	OUTPUT Z (ohms)	SWEEP WIDTH (Mc)	HORIZ SWEEP OUTPUT	BLANKING	MARKERS			PHAS-ING CONT.	WEIGHT	DIMENSIONS	PRICE	REMARKS
FUNDA-MENTAL	HAR-MONICS						INTERNAL	EXT.	INPUT					
0.5-228				0-30	X		X		X	X	11	8 x 10 x 6-3/4	\$ 39.95 59.95	Kit } less Xtals
3-216		5	50	0-3 to 0-15 depending on band	X	X	X	X	X	X	16	8-3/4 x 13-1/2 x 7-1/4	69.95 119.95	Kit
3.5-216		5	50	0-20	X	X	X	X		X	16	8-1/2 x 12-1/2 x 7	89.95 139.95	Kit
3.6-220		4	50	0-4 to 0-42 depending on band		X	X	X	X	X	13	13 x 8-1/8 x 7	54.95	Kit
0.035-160 2.5-5.5		8		0-0.030, 0-0.150 or 0-0.450 depend. on band	X						33	16 x 13 x 7	315.00	Has output level meter
19-50 54-108 0-90	108-216	3		0-15		X	X	X	X	X	31	13-1/4 x 16-1/4 x 8	339.50	Has output level meter
170-220		3	90	0-15 ±3	X	X				X	30	16-1/4 x 13-1/4 x 8	391.00	
0.3-250		4		0-15	X	X	X		X	X	13 1/2	8-5/8 x 12-1/8 x 7	44.95	Kit, less Xtals
3-216 0.050-50	400-1080	6	50	0-3 to 0-30 depending on band	X	X	X		X	X	15	13 x 8-1/2 x 7	159.95	
54-72 76-108 174-216		15		12 Mc on TV bands 20 Mc on FM bands		X					16	13-5/8 x 10 x 7	295.00	
300-950		1	50 or 300	10% of dial freq. or 75 Mc, whichever is less	X	X				X	15	13-1/2 x 9-3/4 x 7-1/2	137.50	



Hickok Model 288AX has eight bands and flexible sweep-width selection.



Eico Model 369 features post-injection marker generator.



RCA Model WR-86A covers 300-950 Mc in one band with sweep widths up to 75 Mc.



Difficult Service Jobs Described by Readers

Sound Bars

A Philco 51-T-1870 was taken to the shop for no picture. This was easily remedied by replacing a shorted condenser but on giving it a check out I noted sound bars in the picture.

I figured this to be a simple filtering problem so I put the scope to work. I took readings off every filter section but found no traces of sound. I noticed then the sound bars were coming through even with the sound turned down to minimum. I touched up the IF alignment paying particular attention to the sound traps but this had no effect at all on the sound bars.

This was a strange case. Sound bars that were being caused by neither poor filtering nor misalignment. What else could give us these symptoms? I checked for microphonic tubes and connections for want of something better to do but turned up nothing.

I pulled out the sound IF amplifier tube and saw that the sound bars disappeared when this tube was removed. I pulled out the 6T8 and the same thing happened. When I pulled out the audio output tube the bars were still present. This seemed to suggest that whatever the trouble was it was somewhere in the sound detector circuit. I tried to isolate the problem further by shorting out different points with a jumper lead. When I jumped out the center tap of the ratio detector transformer,

the bars became reduced in intensity but they were still with me. When I shorted out pin 1 of the 6T8, I observed the same effect. By shorting out pin 3 I was able to eliminate the bars completely. This further served to prove that the trouble was somewhere in this detector circuit. Out of curiosity I began touching up the sound transformers and found that throwing the detector can a shade off alignment would eliminate the bars. For a moment I even considered doing this to repair the trouble but I began running into sync buzz so I peaked back the adjustments.

I decided to check the detector filter so I jumped a $2\ \mu\text{f}$ unit across the old one. Much to my surprise the sound bars disappeared. My surprise is attributable to the fact that through it all the sound itself was perfect. The $2\ \mu\text{f}$ capacitor was open but instead of causing sync buzz in the sound as I would ordinarily expect, it was giving us hum bars in the picture. — *Frank A. Salerno, Long Island City, N. Y.*

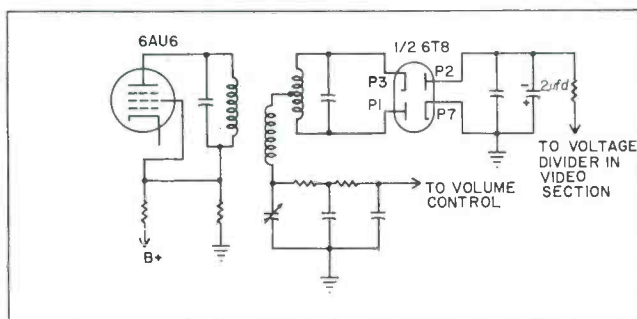
Line Filter Shorts B+

A Zenith model G516 clock radio obviously had a B+ short. The 35W4 rectifier had an open filament and the resistors in the B+ filter section were badly charred. An ohmmeter check showed there to be about 15 ohms between the B+ line and the common negative

line. I removed the filter capacitors from the circuit, but the short was still there. I pulled out all the tubes and the short persisted. The low resistance of the short meant that the defective part had to be hooked directly to the B+ line. That eliminated the screen bypass capacitors. The only parts left were the two IF transformers. A quick check with the ohmmeter showed a slightly higher reading on the plate side of both transformers reflecting the resistance of that winding. There was no evidence of a short on the grid or diode windings.

The transformers used in this radio were of a miniature type but they were not slug tuned. Instead they had two small trimmer capacitors in the top of the can. The transformers were stud mounted so I removed the 6-32 nuts holding them down. While I watched the ohmmeter, I pulled on first one and then the other. The short vanished when one of the transformers was free from the chassis. I pulled out the clip holding the coil and capacitors in the can and removed the can. The tape wrapping the connections to the trimmer capacitors was not covering the connection and the B+ connection was definitely shorting to the can. I removed the old tape and wrapped the connections with a new piece and assembled the transformer.

Since this was an ac-dc radio and the chassis was not connected to the common negative, this defective transformer should not have shorted out the B+. However, a quick check showed a 15 ohm resistance between the common negative line and the chassis. The $0.05\ \mu\text{f}$ capacitor hooked from the common negative line to the chassis was found to be shorted. — *Arnold E. Nemmers, Dell Rapids, So. Dak.*



Intermittant vertical bar was caused by short from filament to screen of horizontal output.

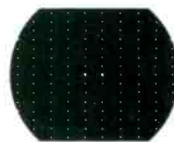
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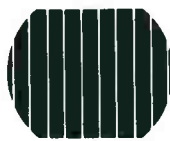
Compact Model 1074 TELEVISION ANALYST FOR BLACK & WHITE and COLOR



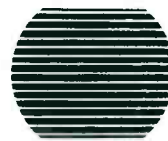
Dot Pattern



Crosshatch



Vertical Lines



Horizontal Lines



Color Pattern

Here is an exciting new addition to the famous B&K series of Television Analysts—*designed to give every service technician a faster, easier way to service more TV sets!*

The compact "1074" gives you a complete TV signal generating source of your own. Using the B&K *point-to-point signal injection technique*, you can isolate and pinpoint any performance problem for quick correction.

By injecting your own signals, with a visual check on the TV screen, *you can easily signal-trace and troubleshoot any stage* throughout the video, audio, r.f., i.f., sync and sweep sections of black & white and color television sets.

It becomes much easier to find and fix "tough dogs," and troublesome intermittents, as well as to solve other general TV set troubles—to the satisfaction of your customer, and to your own profit.

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Supplies complete r.f. and i.f. signals, with pattern video and tone audio. Video signals are switch selected for fast, visual troubleshooting. Provides FM modulated 4.5 mc sound channel, with built-in 900 cycle tone generator. Provides composite synchronizing signals. Provides separate vertical and horizontal plate and grid driving signals to check complete output circuit and interrelated components. Many other features.

Makes it Easy to Set-up and Service Color TV

Provides dot pattern, crosshatch, vertical lines, horizontal lines, burst signal and individual colors (Green, Blue, B-Y, R-Y, Red, I, and Q) one at a time on the TV set—all crystal controlled for maximum accuracy. Color phase angles are maintained in accordance with NTSC specifications. Thin lines and high stability assure fastest, easiest convergence and linearity adjustments. Color display makes demodulator alignment extremely simple.

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SHOP HINTS

SERVICE TIPS FOR THE PROFESSIONAL TECHNICIAN

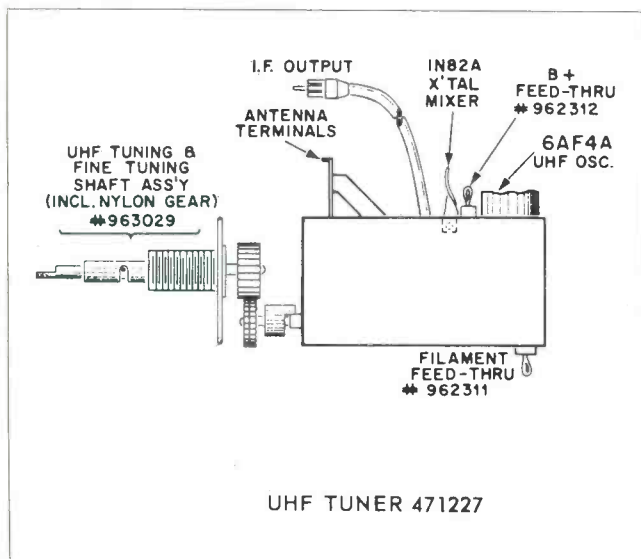
Wire Guide

A piece of spaghetti tubing of suitable diameter makes a useful guide when replacing or rerouting wiring through or under dense circuitry.

The tubing, more easily inserted and with less danger of damage to existing wiring and components, may be removed after the wire is pulled or allowed to remain.—*John W. Little, San Angelo, Tex.*

UHF Tuner Alignment

UHF tuners 471227, used on DuMont UHF/VHF chassis 120678-B, are present at the factory and should not require additional adjustments. Should it become necessary to change the 6AF4A oscillator tube try several, choosing the one which most closely resembles the original and provides the best sensitivity. If it is necessary to return this tuner for factory service or replacement, it should be delivered or shipped to the company complete with tube, crystal diode and tuning shaft assembly.—*DuMont*



DuMont UHF/VHF tuner is preset at the factory.

TV Service Note, Division of Emerson Radio, Inc.

Cleaning Tuners

When cleaning noisy tuners, cleaning the strip contacts alone will often not cure it. The defect can be cured sometimes by removing the tubes from the tuner and applying contact cleaner into their sockets.—*James Nawracaj, Chicago, Ill.*

Magnetic Nutdriver

We've made our hollow shaft socket nutdrivers into handier tools by magnetizing them so they hold nuts for positioning in cramped places. Magnetize them in a loop of a soldering gun.—*Harry J. Miller, Sarasota, Fla.*

Brush Locates Intermittents

I have found a small paint brush very handy for hunting down loose intermittent joints in hand wired chassis. The suspected areas can be

proded without fear of damaging components.—*P. Anderton, Sask, Canada*

Removing Components

Some service technicians have reported difficulty in removing some of the larger components: IF cans, transformers, couplers, etc., from the double-sided circuit boards used in GE models P830E and P820 without damaging the board. To remove a component, break apart the defective part with pliers or cutters, and then unsolder the individual component pins one at a time. To remove IF transformers, first unsolder the two ground connections from the transformer cover to the conductor pattern below and lift the cover off. The transformer coil forms and pins then become accessible.—*General Electric Company, Owensboro, Ky.*

To Tighten Screws

When a self-tapping screw becomes loose in a component where it is inadvisable to install a larger screw, a drop of solder flowed onto the threads near the screw head restores original thread grip.—*Stan Clark, East Bradenton, Fla.*

SHOP HINTS WANTED

\$3 to \$10 for acceptable items. Use drawings to illustrate whenever necessary. A rough sketch will do. Unacceptable items will be returned if accompanied by a stamped envelope. Send your entries to Shop Hints Editor, ELECTRONIC TECHNICIAN, Ojibway Building, Duluth 2, Minn. The hints published in this column have not necessarily been tried by ELECTRONIC TECHNICIAN editors and are the ideas of the individual writers.

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Model 700 DYNA-QUIK DYNAMIC MUTUAL CONDUCTANCE TUBE TESTER

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TESTS BOTH OLD AND NEW TUBE TYPES—SELLS MORE TUBES PER CALL

All over the nation, thousands of professional servicemen rely on the "700". Once you use it, you'll be as enthusiastic as they are. *Everyday use has proved its speed . . . its accuracy . . . its efficiency.* This up-to-date, obsolescence-proof tube tester is designed for maximum use *today and tomorrow.* Provides multiple-socket section to quick-check most of the TV and radio tube types *the true dynamic mutual conductance way—plus* simplified switch section to check new tube types in Dyna-Quik emission circuit. Also includes provision for future new sockets.

Makes test under set-operating conditions. Checks each section of multi-section tubes separately. Checks for *all* shorts, grid emission, leakage and gas. Makes quick "life" test. Exclusive *adjustable* grid emission test provides *sensitivity to over 100 megohms.*

Makes complete tube test in seconds. Checks average set in a few minutes. Discovers weak tubes that need replacement. *Satisfies more customers. Sells more tubes. Saves call-backs. Insures your reputation. Pays for itself over and over again.* Net, \$169⁹⁵

Time-Saving, Money-Making Instruments Used by Professional Servicemen Everywhere



Model 960 Transistor
Radio Analyst



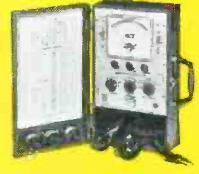
Model 360 V O Matic
Automatic VOM



Model 375 Dynamatic
Automatic VTVM



Model 1076
Television Analyst



Model 445 CRT
Rejuvenator Tester

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NEW PRODUCTS

FOR MORE INFORMATION CIRCLE PRODUCT NUMBERS ON POST CARD FOLLOWING PAGE 90

OVERLOAD-PROTECTED VOM 200

A new volt-ohm-milliammeter (VOM), Model 630-PLK, has a transistorized electronic switching



circuit that guards against accidental burnout and other overload damage. The mfr. reports 3% accuracy on the 20 K Ω /vdc range and 4% accuracy on the 5 K Ω /vdc range. A single selector switch is used to change ranges. The unit is protected from stray magnetic fields by the Triplett self-shielding bar-ring movement.

The Model 630-PLK is reportedly usable through 500 kc. A special diode network across the meter protects against instantaneous transient voltages. The transistorized switching circuit battery is checked for proper operation automatically by using the X100 K Ω range.

The VOM measures 3 11/32 by 5 1/2 by 7 1/2 in. and comes complete with leather carrying handle and leads. Suggested U. S. user net price is \$79.50. The Triplett Electrical Instrument Co.

SAFE-T-KLIP

201

This test clip is designed to provide fused protection for electrical and electronic work away from the test bench.



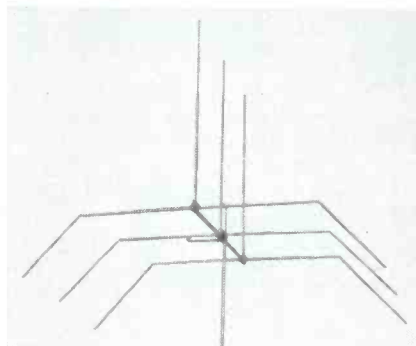
The "Safe-T-Klip," Model 1410F, consist of two completely insulated alligator clips, each with a fuse housing for type AGX or other fuses measuring 1/4 by 1 in. Test leads of any length may be connected to the clips. Visual check can easily be made for a blown fuse, since the fuse holder is made of clear "Lexan." The "Safe-T-Klip" screws off the housing for quick fuse replacement.

The two clips come in red and black and are nylon insulated. Industrial Devices, Inc.

CB BEAM ANTENNA

202

CB beam antenna, model MR-77, can be used either vertically or horizontally polarized. To operate vertically polarized, two coaxial feeder lines are used. The vertical-polarization feeder line is connected to the transceiver. When horizontal polarization operation is desirable, the horizontal-polarization feeder line is connected. The "Match-Maker" antenna, Model MR-77, produces a vertical-polarization forward gain of 7 db, and the forward gain horizontally polarized is 6 db. The front-to-back ratio is 15 db for both. The boom and elements are made of heat-treated aluminum. The beam reportedly will withstand 100 mph



winds. The MR-77 is 12 1/2 ft high, has a boom length of 10 ft and weighs 24 lb. A VSWR of 1.5:1 or less is claimed for either vertical or horizontal polarization. The antenna is gamma matched to a 50 Ω line. All components are color-coded. Antenna Specialists Co.

FM/AM TABLE RADIO

203

A new 10-transistor FM/AM cordless table radio, Model 6522, has two telescoping dipole FM an-



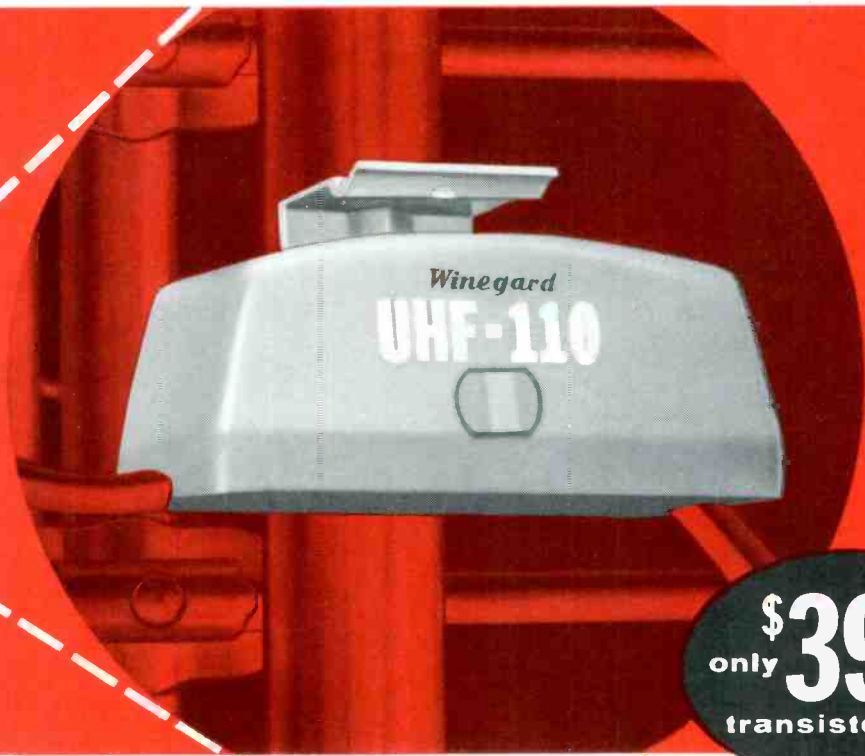
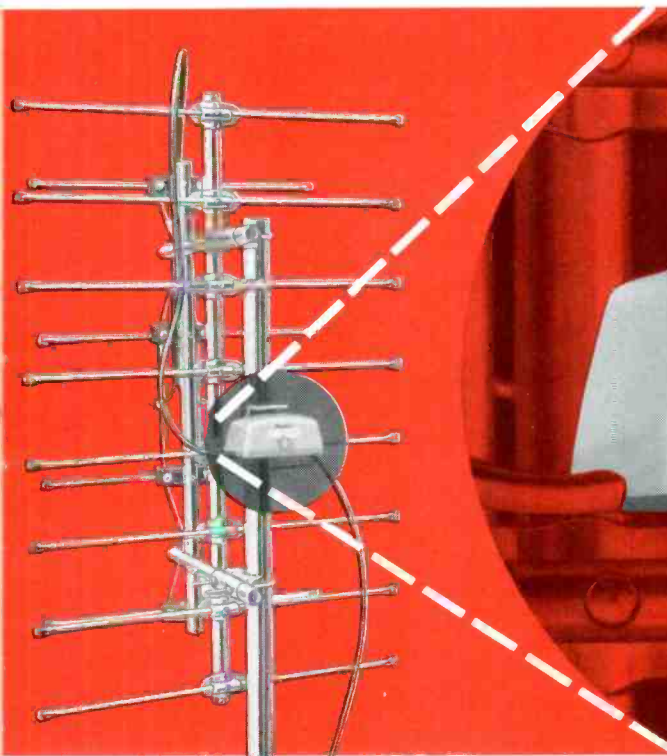
tennas, AFC, a 12 ft auxiliary antenna for use in shelters and emergencies, a 5 x 7 in. loudspeaker, and bass and treble tone controls. Provision is made for use of an exterior FM antenna in fringe reception areas. The radio operates on six long-life "D" flashlight batteries and has a 90-day warranty. Smartly styled in ivory with gold and caramel trim. List price is \$89.95. Channel Master Corp.

72-HOUR TIMER

204

The "Weekend" Lab Minder has a timing range of 1 to 72 hours and is electrically operated by a synchronous motor. It has two 3-prong convenience outlets on the front panel: one is used when the instrument or apparatus is to be turned off, the other outlet is used for turning it on. The timer is portable, requires no installation and is merely plugged into an ac line. In operation it works automatically. A selector knob permits use of either a jeweled signal light or an alarm buzzer, or a

Winegard brings you the first low cost all-channel UHF antenna amplifier (channels 14 to 83)



\$39⁹⁵
only
transistorized

look at what the UHF-110 will do!

ADDS MANY MILES TO RECEPTION DISTANCE.

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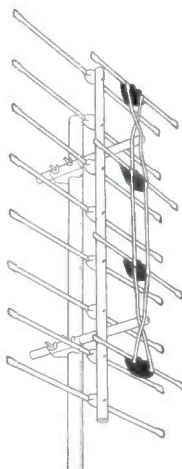
Never before has an all-channel antenna amplifier been available for UHF. Now, at a price that everyone can afford, the new Winegard Model UHF-110 brings to UHF the same sensitivity and low noise reception as VHF! This means you can clear up snowy UHF pictures, get distant stations,

and new clarity to color and black and white TV!

Model UHF-110 employs a new, ultra low noise RF transistor that amplifies UHF signals on all channels 14—83. It works on any UHF antenna and can be mounted on the antenna boom, mast or remote. Has balanced 300 ohm input and output, lightning protected circuit—no transistor burn-out, comes with an all AC power supply. No polarity problems.

For your next UHF installation, try the new Winegard MODEL UHF-110. Ask your distributor or write for spec. sheets.

other UHF products by Winegard . . .

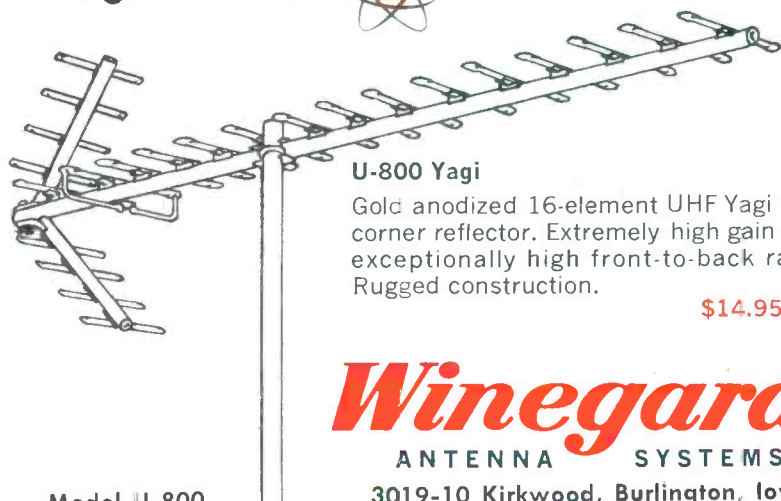


"Ultra-Beam" Antenna

Gold Anodized colinear UHF antenna for all areas including deep fringe. As much gain as an expensive parabolic.

\$12.50 list.

Model U-730



U-800 Yagi

Gold anodized 16-element UHF Yagi with corner reflector. Extremely high gain with exceptionally high front-to-back ratio. Rugged construction.

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Model U-800

Winegard

ANTENNA SYSTEMS

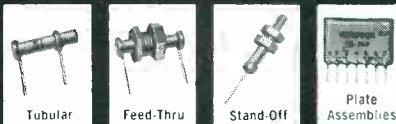
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NEW PRODUCTS



combination of both. The 2½ in. dial is calibrated in 1-hour divisions. The timer is housed in a two-tone, heavy gage steel cabinet and has a total capacity of 10 amp. The unit measures 7 by 6 by 4 in., and weighs only 4 lb. \$59.50 list. Lab-Line Instruments, Inc.

FM STEREO RECEIVER 205

The FA3000X receiver combines a stereo tuner, preamplifier and power amplifier rated at 30 w on a



single chassis. The unit has a new multiplex section with rated frequency response of ±1 db from 15 to 15,000 cps and 30 db separation. An FM stereo indicator light permits stereo broadcasts to be identified visually.

The new receiver has a zero-to-infinity balance control, variable blend control, which maintains proper stereo spatial separation and balance, ganged bass and treble tone controls, dynamic loudness contour control, and separately switched hi-cut and lo-cut filters to eliminate record hiss and rumble.

An illuminated push-button on/off switch permits the receiver to be turned on and off without changing pre-set controls. Price is \$224.95. Harmon Kardon, Inc.

NEW SPEAKER SYSTEM 206

Announcement is made of a new

speaker system, the ADC-12. This speaker system, like its larger counterparts, the ADC-14, ADC-16, and ADC-18, features a rigid rectangular styrene foam diaphragm covered with aluminum foil. The voice coil is suspended in a 9-lb ceramic magnet structure. A high compliance double surround of molded cloth supports the foam radiator.

According to the mfr., internal damping offered by the expanded foam radiator, combined with high stiffness and low mass, reproduces a most natural bass and mid-range.

The high frequencies are handled by a specially designed tweeter with a 1½ in. Mylar diaphragm driven by a voice coil of the same diameter.

The speaker cabinet is constructed of polished, oiled solid walnut, it measures 23½ by 13 by 11¾ in.



and it can be mounted either vertically or horizontally. Frequency response of 38-20,000 cps is claimed and the system is rated at 65 w. Impedance is 8 to 16 ohms. Audio Dynamics Corp.

MULTIBAND PORTABLE 207

Four-band portable radio Model 63R98 includes AM, FM and two separate short wave bands: 1.7 to 4.6 Mc and 4.0 to 10.0 Mc. The unit uses 9 transistors, 5 diodes, and 6 "D" size batteries. Special features include Automatic Frequency Control, vernier slide rule dial tuning, dial light, an external ac power adapter jack, dual telescoping antennas, earphone jack and full-

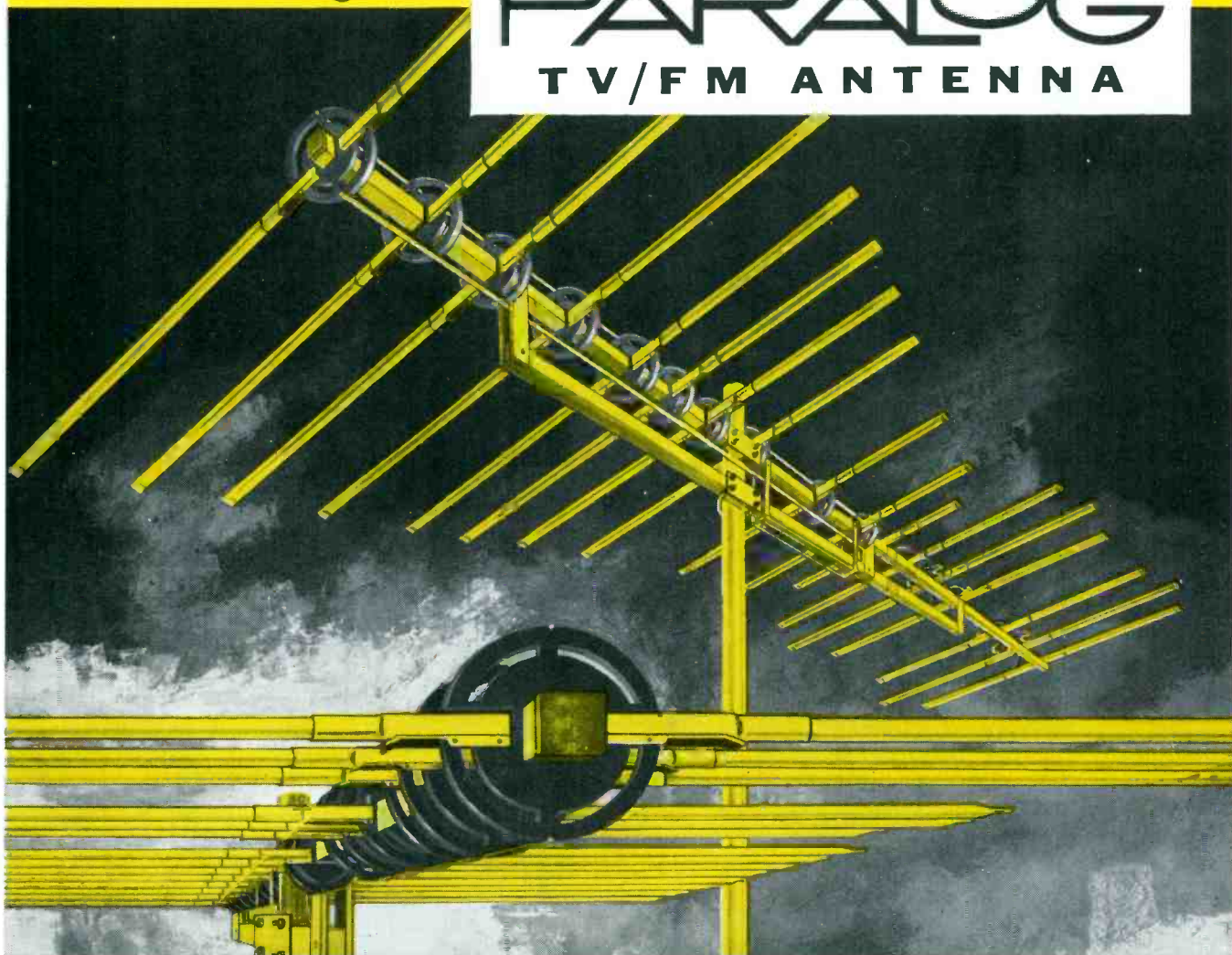


THE SAME ENGINEERING, SAME PLANT THAT PRODUCES AMERICA'S GREATEST SATELLITE-TRACKING AND TELEMETRY STATIONS, HAS CREATED

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PARALOG

TV/FM ANTENNA



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HERE IT IS—the space-age TV/FM antenna from the only manufacturer with actual experience in making space-probing antennas!

All new, the PARALOG is the first home antenna that really comes through with log-periodic

design plus a unique parasitic-element system for maximum all-channel gain and pinpoint directivity. Exclusive Cyclocac insulating mounts assure constant impedance, eliminate troublesome cross-feed design. Extremely rugged construction.



There are fourteen PARALOG antenna models, listing from \$19.95, including four electronic PARALOGs with Super Powermate preamplifier, and three special FM stereo models. See your Jerrold-TACO distributor now, or write Jerrold Electronics, Philadelphia 32, Pa.



How 6½ sq. ft. can speed up your picture-tube service:

10 versatile "Universal" picture-tube types from Sylvania's SILVER SCREEN 85 line may be all you need to fill 52% of your renewal needs! This fact, verified by a recent industry survey, stems from a remarkable streamlining of the Sylvania line—making fewer, more versatile types that can be used as replacements for many others. Already 54 types can replace 217.

Think what the versatility of these "Universal" tubes

can mean. An in-shop inventory of a few popular types can help you quickly take care of most of your renewal calls. Ordering is simplified...and distributor calls for special tubes can be cut way down.

Start profiting now from Sylvania's SILVER SCREEN 85 picture tubes. Call your Distributor and put an inventory in your own shop—where it can enhance your reputation for fast service and quality replacements.

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.



use it for **SILVER SCREEN 85[®]** tubes...
 (10 "Universal" types meet half of all renewal needs)



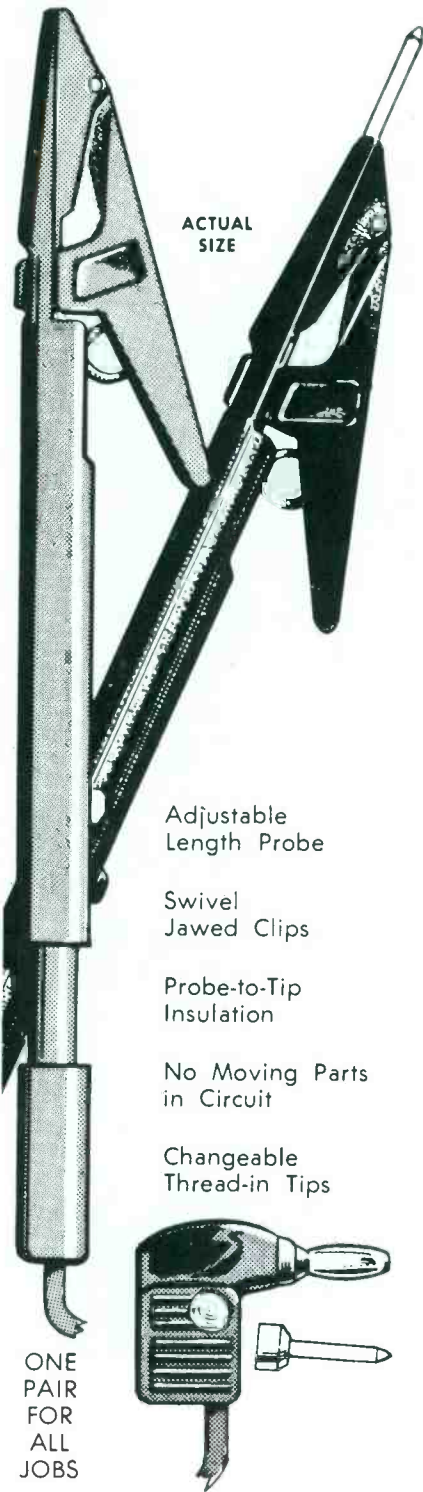
The "Big 10" Tubes that fill
 52% of all renewal needs:

21CBP4A	} 41% } 52%
21ZP4B	
21ACP4A	
21YP4A	
21EP4B	
21FP4C	
24AEP4	
21DFP4	
21AUP4A	
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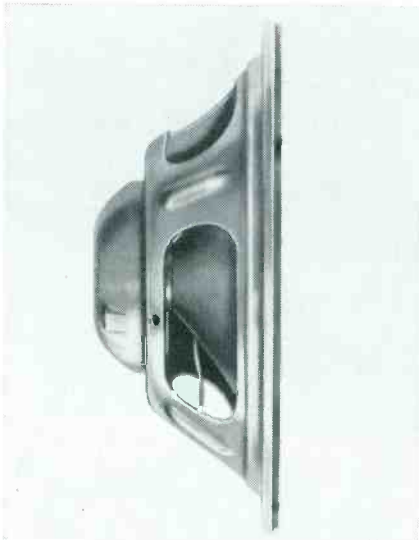
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NEW PRODUCTS

range tone control. The molded vinyl cabinet has a die cast chrome grille and bar type handle, plus external FM antenna connections. Suggested retail price is \$129.95. Arvin Industries, Inc.

ALNISPHERE SPEAKER 208

Loudspeaker Model 8HA8 utilizes a heavy-duty spherical Alnico V "Alnisphere" magnet which, ac-



ording to the manufacturer, results in greater efficiency and increased performance.

Model 8HA8, an 8-in. round loudspeaker, has a 3 in. profile, which allows it to be installed and flush-mounted within a standard 4-in. partition wall. Oaktron Industries.

NON-DESTRUCTIVE TESTERS 209

A series of high-potential insulation testers that are claimed to permit testing to the point of breakdown without risk of damage to the insulation has been announced. The new HSI instruments, available for either rack mounting or portable use, provide in one unit both dc and ac high-potential test voltages. A meter



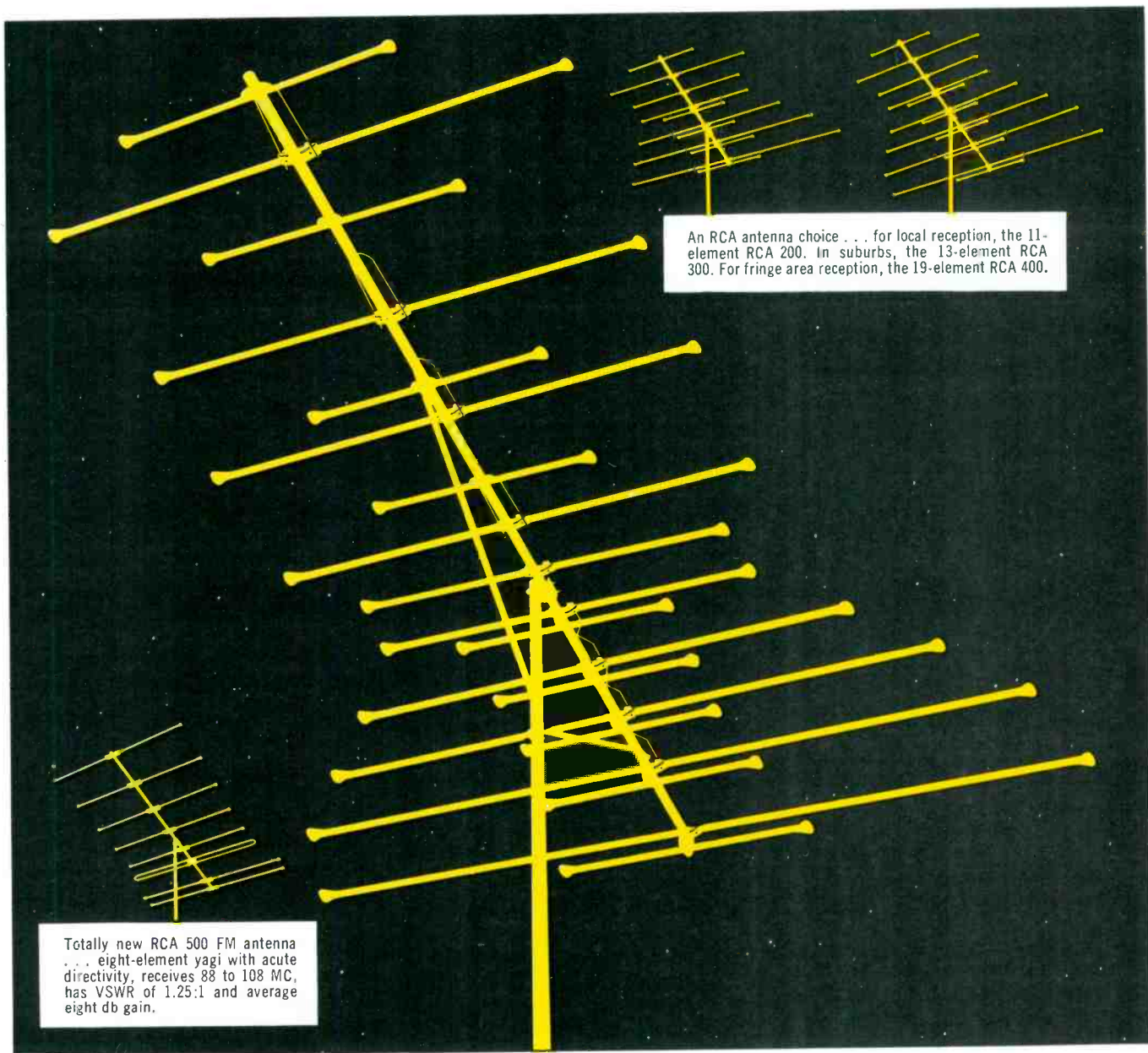
for insulation resistance measurement in megohms is also provided. The dc test section precisely measures the voltage level at which the insulation begins to break down. The fail-safe protective circuit reportedly shuts off the high-voltage dc before destructive currents can build up. Protective circuits can be set to cut off and hold test voltages at any leakage current level from 20 to 100 μ a. Both the rack unit and bench models are available in five models providing outputs up to 7000 vdc and 5000 vac. Depending on the model, current outputs are from 100 to 1000 μ a, full scale, and resistance ranges are from 500 to 50,000 Ω . The accuracy of all outputs is $\pm 5\%$. Prices start at \$510. Hammarlund Systems & Instrument Co.

ELAPSED TIME METER 210

The "Indachron" elapsed time meter measures actual hours of operation of electronic equipment. The Indachron is 1.81 in. long x 0.37 in. wide x 0.37 in. high, and utilizes an electrochemical meter element with traveling electrolyte gap to measure elapsed time. The 500 series elapsed time meter consists of a socket plate, a "plug-in" indicator and a separate molded zener diode power supply for rectifying and regulating the 115 vac. Only



two holes are required. Elapsed time is read directly from calibration marks on the Indachron, which is available in standard scales of 500, 600 and 1000 hours. Accuracy of 3 percent is claimed. When the indicator has completed a cycle it can be turned end-for-end and plugged in again; and the indicator will return to zero in 1000 hours of use.



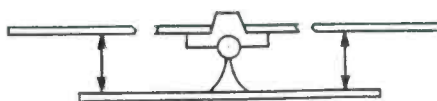
An RCA antenna choice . . . for local reception, the 11-element RCA 200. In suburbs, the 13-element RCA 300. For fringe area reception, the 19-element RCA 400.

Totally new RCA 500 FM antenna . . . eight-element yagi with acute directivity, receives 88 to 108 MC, has VSWR of 1.25:1 and average eight db gain.

RCA...Pioneer and developer of Color TV... Announces a new concept in outdoor antennas

Now the most trusted name in color TV brings you and your customers a whole new outdoor antenna line packed with top-value features. RCA puts together in a single line the best of all-channel yagi and multiple cross-driven element antenna types. You'll satisfy every customer's demand for sharpest color or black-and-white TV reception with this new RCA Series 200, 300 and 400 antennas.

RCA's electro-lens director system absorbs maximum incoming signal power, gives extremely high gain across



CAPACITIVELY COUPLED

the VHF band, offers excellent forward gain on the front end.

In addition to phasing low and high band directors for best high band performance, RCA and only RCA positions high band driven elements, *directly below* low band driven elements.

Through capacitance thus existing, RCA antennas feed energy *directly* into the transmission line from high band driven elements. An RCA exclusive!

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Here is a TV/FM receptacle designed to make every room a family room. Mosley engineered to fit popular interchangeable type electrical plates and straps. Now the AC and TV/FM outlets can be matched to fit any room decor. Convenient - Set can easily be moved for enjoyment in other rooms. Mosley FG-1PK combines efficiency with neatness and ease of installation in one compact outlet. Comes complete with mating polarized 303 plug. Available in brown and ivory to match interchangeable plates.

MOSLEY FG-1PK List \$.99

MOSLEY HAS A COMPLETE LINE OF TV/FM ACCESSORIES DESIGNED AND ENGINEERED TO PROVIDE BETTER TV/FM RECEPTION THROUGH A BETTER INSTALLATION!

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Electronics Inc.

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--- for more details circle 38 on post card

NEW PRODUCTS

Below-panel space requirements for mounting the power supply and socket plate are less than 0.40 in. x 1.5 in. x 0.50 in. Price: \$16.45 net. Curtis Instruments, Inc.

CAMPER INTERCOM 211

A fully transistorized intercom system, the "Camper 88," has been designed expressly for pick-up camp-



ers. The system consists of two units, a master and a remote. It is ruggedly built and has low power requirements. The master unit is designed for installation in the pick-up cab, while the remote unit is installed in the camper. The "Camper 88" pair is complete and ready to install, including all necessary wires and connecting cable. Suggested list price is \$49.50 per pair. Texas Communications.

CONTROL ACCESSORIES 212

Six new accessories are available for the Fastach II replacement control system. The items include three plug-in shafts for color TV controls, a 3/4 in. long universal plug-in shaft for single controls, a twist-tab mounting plate, which attaches to



bushings of Fastach II front controls for twist-tab mounting, and a doghouse bracket for mounting the control in a printed circuit board. Centralab.

BUSINESS RADIO 213

The FM 120 is a 60 w FM transceiver in the business-industrial 150-174 Mc band. It is rated by the



mfr. for continuous operation. The FM 120 has a dual power supply for operating from 115 vac or 12 vdc, so that each unit can be used as either a base or mobile installation. The FM 120 measures 4 1/2 by 8 by 10 1/2 in., and the unit has the "Snap-Rak" mounting feature. General Radiotelephone Co.

ALUMINUM SOLDER 214

Formula 121, a low-melting-temperature solder for aluminum and its alloys, reportedly can be applied with no flux whatsoever. The parts to be soldered are simply



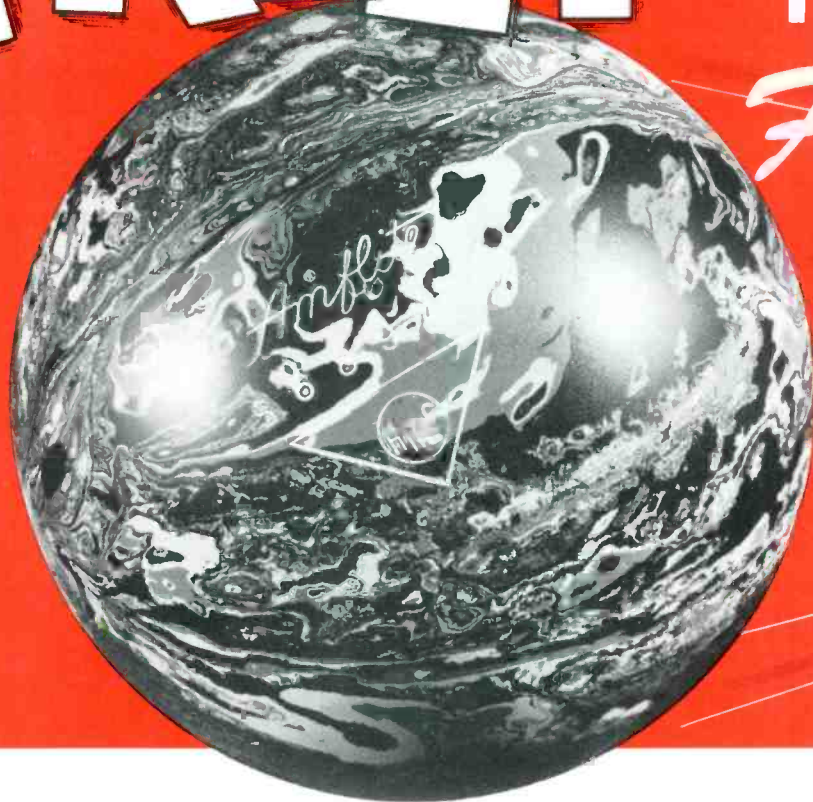
heated and then "tinned" by rubbing the solder stick lightly on the surface of the aluminum. The mfr. says that the solder also may be used on magnesium and its alloys and is useful in repairing blowholes and undersized machined areas in castings. Formula 121 has a melting temperature of 617°F. Its corrosion resistance is said to be approximately 20 times greater than that of tin/zinc or cadmium/zinc solders. The solder is furnished in triangle sticks 15 in. long and about 3/16 in. on a side, as well as in thin "blowpipe sticks" of about the same length. \$2.99 (including postage) per half-pound pack. Jensen Tools.

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AMF Roadmaster Hawk Bicycle	\$700
Bridal-Trousseau Doll Set	\$110
Famous Lionel Train Set	\$200
Daisy Thundercap Tank	\$ 55
Men's Million Miler Luggage	
One Suiter	\$400
Two Suiter	\$450
Three Suiter	\$500
Attache Case	\$275
Ladies' Million Miler Luggage	
16" Hat Box	\$250
21" Overnighter	\$275
26" Pullman Case	\$450
Ladies' Orlon Sweater	\$135
Ladies' Antron Cardigan Sweater	\$175
Ladies' Suburban Coat	\$350
Men's Melton Loden Coat	\$350
Men's Imported Rain Coat	\$350
Men's OuterJac	\$175
Men's Lambs Wool Cardigan	\$175
Men's Runabout Nylon Coat	\$350
Weather Trio (Instruments)	\$130
Outdoor Thermometer	\$ 15
Stanley Ratchet Driver Set	\$ 65
Oneida Dinner Ware	\$350
Oneida Stainless Flatware	\$450
8 Piece Cutlery Set	\$130
Hamilton Cosco Table and Chair Set	\$550



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PARTS & SERVICE OPERATIONS

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NEW PRODUCTS

Winegard

Dealer of the month



Voskuil Antenna Service
FOND DU LAC, WISCONSIN

Winegard congratulates this thriving 8-year old business on its new shop... and Taylor Electric, Milwaukee, Wis., its distributor.

When he was nineteen, Robert Voskuil started out with "nothing more than a used truck and some ladders." Today—8 years later—he has 4 full time employees, 2 trucks and has recently built a complete new shop consisting of an office-display room, work shop, garage and storage areas.

This aggressive antenna specialist does the antenna work for 15 television shops in his area in addition to his own direct calls, which number from 150 to 200 per month.

"I feel that much of our success is due to the fact that we have used Winegard antennas from the very start", he says. "We pride ourselves in using the highest grade of materials on the market. Thru the years we have tried other lines of antennas but have yet to find one which can measure up to the performance and quality of Winegard. Many of our customers ask for Winegard antennas by name."

 **Winegard**
ANTENNA SYSTEMS

D3019-10 Kirkwood • Burlington, Iowa
- - - for more details circle 53 on post card

SPEAKER SYSTEM 215

A new speaker system uses three 6 in. speakers reinforced with struts and incorporating a special ball dif-



fuser and a 3 in. tweeter. The special ball diffuser reportedly breaks up the normal narrow axis beam from the voice coil to provide a smooth response in the mid-range. The speaker system's impedance is approximately 80Ω , and it measures $6\frac{3}{16}$ by 20 by $26\frac{3}{4}$ in. Price is \$99.95 in a walnut cabinet. Paco Electronics Co., Inc.

SEMICONDUCTOR TESTER 216

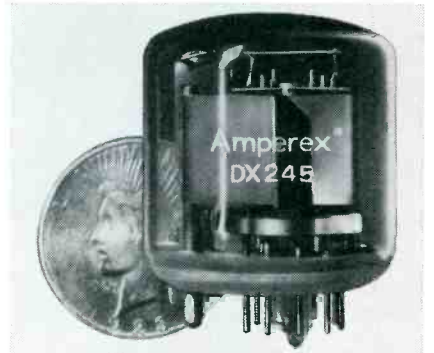
Model 250 tester is claimed to be the only "known" multimeter on the market which can be used with assurance of safety against burnout for the semiconductors used in the circuit under test. Instead of delivering currents as high as 130 ma and powers of approximately 50 to 60



mw on the Rx1 scale, the power output of the AEL Model 250 is reportedly limited to a maximum of $100\mu\text{W}$ on any resistance range. American Electronic Laboratories.

VHF POWER TUBE 217

Said to be the first popular priced VHF power tube using professional transmitting tube materials and manufacturing techniques, the DX245 tube is an indirectly heated beam power tetrode designed for use as an RF amplifier, frequency multiplier, oscillator, AF power amplifier or modulator at frequencies up to 250 Mc. The tube delivers 46w to the load with only 1.5w of drive at 175 Mc. High quality metals and materials reportedly are used throughout: kovar and molybdenum pins, gold plated grids, molybdenum grid wire, hard glass envelope, new magnoval powdered glass base and a separate gold plated



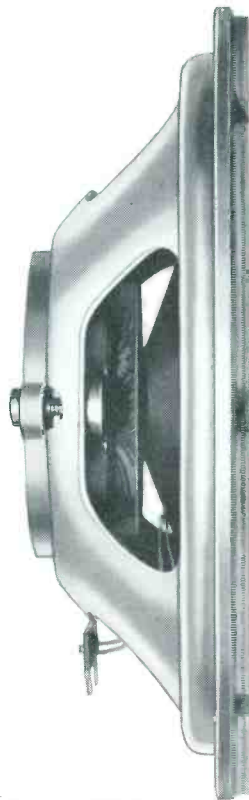
anode pin terminal which is brought out through the base. The DX245 utilizes a 13.5v center-tapped heater. Ampere Electronic Corp.

CB SIGNAL GENERATOR 218

The Model 24-D "Microvolter" is a signal generator that offers up to 32 switch-selectable crystal-controlled carrier and IF frequencies for Citizen's Band application, with a calibrated output adjustable from 0.01 to $100,000\mu\text{V}$ in seven ranges. The instrument is equipped with individual crystals for each of the 23 Citizen's Band frequencies and two crystals (frequencies chosen by the customer) in the intermediate-frequency band from 200 kc to 15 Mc. From one to seven additional IF crystals may be included, without modification of the instrument, at nominal additional cost. Each crystal circuit reportedly is factory-calibrated, by adjustment of individual



A Models 8C6PAX and 8C10PAX.
Model 12C10PAX similar, but
with round basket.



B Model 8C6PAS.
Very shallow construction.



C Model 12C6PAS.
Shallow 12" extended range
speaker with dual cone.

For your background music installations

5 new Quam speakers

Over the hubbub of other sounds, background music has to be audible without being obtrusive. Ordinary public address speakers, designed for capturing the primary attention of the audience, are *not* the answer. These new Quam Speakers—especially designed to handle background music—*are*.

Quam offers you five background music speakers,

three eight-inch models and two twelve-inch. All have ceramic magnets; four of these new units are extended range units with dual cones; two of the new speakers offer very shallow construction. (Complete specifications are given in the new Quam Catalog 63 . . . now available on request.) They meet the traditional Quam standards of utmost quality and performance satisfaction.

Remember Quam—for forty years the Quality Line for all your speaker needs.

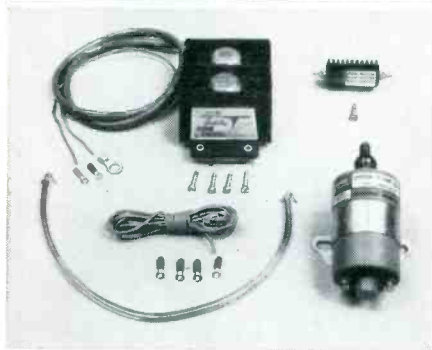
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transistorized electronic ignition system



Banshee TS-30

Up-date your old fashioned system with our new and completely different ignition... the biggest engine improvement in over 50 years.

ADVANCE STYLING AND DESIGN

- Universal installation on all makes of cars, trucks and boat distributors.
- Advanced styling, two heavy-duty transistors assure dependability.
- Die cast finned heatsink facilitates rapid cooling.
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- 30 Amp Heavy-Duty circuit for maintenance-free service.
- High-temperature resistant racing-type coils are of latest design for faster saturation. High voltage and primary terminals at opposite ends of coil to prevent high voltage leakage from primary to secondary and assure highest efficiency and safety.
- Open plugs 5 to 10 thousandths which eliminates plug fouling.
- Coil output 30 to 55KV... Point current 1/4 Amp... rids pitting and burning.
- Faster and Smoother acceleration with no misfiring.
- Increase in speed 10% to 30%.
- No ignition overheat problems in slow city driving.
- Complete engine combustion from hotter spark.
- Increases gas mileage to 10%.
- Reduces battery drain with no hard starting.
- Eliminates distributor-condenser breakdown.
- Tune-ups stay adjusted for peak performance.

Complete Banshee Systems are available in the following models:

- 30 KV Output with F-250T Coil, 250:1 turns ratio, neg. ground \$39.95
- 45 KV Output with F-400T Coil, 400:1 turns ratio, neg. ground 44.95
- 55 KV Output with F-500T Coil, 500:1 turns ratio, neg. ground 49.95
- Banshee TS-30 with F-500T, pos. ground... 59.95
- Free Color Brochure

PARTS FOR EXPERIMENTERS

- Special F-250T Coil 250:1 turns ratio. \$ 9.95
- New F-400T Coil, 400:1 turns ratio 14.95
- New F-500T Coil, 500:1 turns ratio 19.95
- Die-cast aluminum heatsink ballast resistor, .517 OHM designed for all above coils... 3.25

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YEAR _____ MAKE _____ MODEL _____

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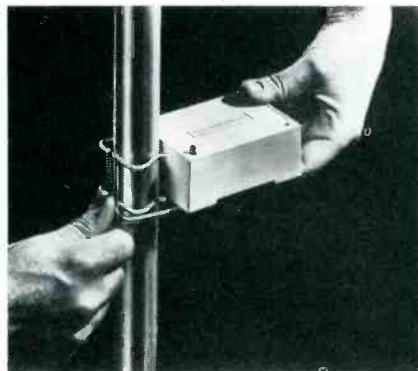
NEW PRODUCTS



piston-type glass capacitors, to within ± 0.005 percent of the nominal frequency for an ambient range from 0° to 50°C , and is said to exhibit an over-all stability of ± 0.001 percent for ambient temperature variations from 15° to 35°C . A total of seven metered output ranges are available from 0.1 to 100,000 μV , full scale. All outputs are rated for 50-ohm loading. Ferris Inst. Co.

COUPLER MOUNTING 219

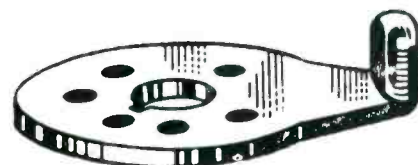
"Miracle Mount," a mast-mounted unit for multi-set TV couplers reportedly eliminates the



hazards of rooftop installation. The mount snaps to the mast and the coupler slips over the prongs of the mount. The attachment is said to withstand the strongest winds and can be used with all Blonder-Tongue couplers. \$1.14 net. Blonder-Tongue.

SWEEP CIRCUIT BOOSTER 220

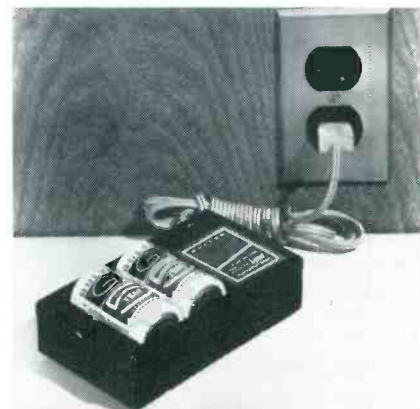
TV sets with insufficient width



due to component aging now can be cured by inserting a "Sweep Circuit Booster" under the damper tube, reports the mfr. The booster fits all octal dampers and is claimed to increase the picture width of older sets and also newer sets that do not have width controls. The booster is installed by removing the damper tube, plugging the tube into the booster and replacing the tube, with the booster attached, in its socket. Colman Electronic Products.

5-YEAR BATTERIES 221

Five-year nickle-cadmium "D" and "C" cell batteries and a battery charger are announced. The mfr.



claims that the charger, which plugs into any ac wall outlet, will recharge two "D" or 2 "C" cells thousands of times. Each rechargeable battery is leakproof and is fully guaranteed for five years. An overnight charge is said to fully restore peak power without danger of overcharging. A red indicator bulb on the 5/4 in. long recharger lights when the batteries are charging. Gulton Industries, Inc.

STEREO TAPE RECORDER 222

The Model 88 "Stereo Compact" tape recorder was released for production with the following features: The hyperbolic contour heads (erase, record and playback), of laminated, metal-face construction, require no pressure pads. The brake design reportedly permits the use of dissimilar reel sizes of up to 7 in. without danger of tape spillage. The amplifier uses silicon planar transistors in critical low-noise stages, and independent playback pre-amp circuitry permits monitoring off the tape. An "A-B" comparison switch for monitoring off the tape or program source



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half a
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When your customers come in for a truly portable TV, don't sell them half a television set. Just consider this: Only with the remarkable SONY Micro-TV, the Television of the Future, can they get total reception with the new transistorized UHF adaptor that tunes channels 14-83 for a whole new world of television enjoyment. Micro-TV, with 25 transistors including the advanced epitaxial type in the power supply, is only 8 lbs. to let them carry it anywhere; it operates on 3 types of power—its own rechargeable battery pack, 12v auto/boat power and AC. A full range of accessories for viewing fun everywhere, including the back of the car*. Micro-TV \$189.95. UHF adaptor \$49.95.

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Unexcelled Performance!



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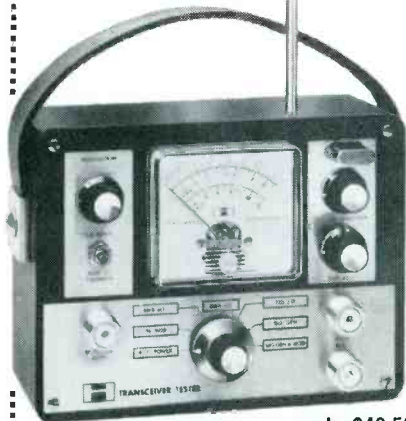
Hallmark 512

SMART STYLING! RUGGED RELIABILITY!

The Hallmark 512 has been designed and manufactured to give consistent unexcelled performance even under the most severe conditions. It features dual-power, 12 channel crystal-controlled, push-to-talk operation. Sensitivity better than $0.3\mu\text{v}$ for 10 db S/N ratio. Selectivity better than 30 db. RF power over 3.2 watts. Audio power 3 watts. Top quality components in rugged hand-wired chassis. 26.965 to 27.255 mc. High-level modulation, improved low-noise front end. "S" meter and neon modulation indicator standard.

Now! from Hallmark

Most advanced transceiver tester available!



only \$49.50

Here is the most versatile and reliable test instrument of its kind — a crystal-controlled signal generator for low power transceivers. It was specifically designed to assist the technician in installation and servicing of low power transceiver. Measures: RF power (absolute) 0 — 5 w.; 0 — 120% amplitude modulation; VSWR. Produces a 100 mw carrier (with or without amplitude modulation of a 1000 cps tone) for checking receivers. Use as a field strength meter.



HALLMARK INSTRUMENTS
6612 Denton Drive, Dallas 35, Texas

--- for more details circle 29 on post card

NEW PRODUCTS



is included. The unit delivers 2v output to music system. The record/playback frequency response is said to be 30 to 18,000 cps at 7.5 ips. The "Erase Protec" record interlock reportedly permits noiseless start/stop during recording. Sound-on-sound recording for multiple recording effects and filter for FM multiplex recording are built-in. Separate record/playback volume controls, record indicator light, professional VU meters, digital counter, head shift control, two-speed selector switch and automatic tape shut-off are standard equipment. The unit will be available with two head configurations: RMQ quarter track record and play, \$339.95 list; ERQ half track record and quarter track play, \$347.95 list. Viking of Minneapolis.

FM MICROPHONE 223

Said to be the first wireless microphone operating in the FM broadcast band, the IMP II FM microphone is so small that it can be concealed in a package of cigarettes,



yet reportedly will transmit up to 200 ft to any entertainment-type FM receiver. The transmitter is adjustable to operate anywhere between 88 and 108 Mc. The unit weighs only $7\frac{1}{2}$ oz, including its leather case, and may be used with its own built-in pin-head mike (which allegedly can pick up voices at a distance of 35 ft), or any low impedance microphone may be plugged in. Price without built-in microphone, \$39.95; \$49.95 with microphone. A contact microphone model for electric guitars is available at \$59.95. All include a leather case. Kinematix, Inc.

TRANSCIVER 224

The "Escort" multi-purpose two-way radiotelephone transceiver operates on class D Citizen's Band



Service channels. The unit weighs 15 lb and has a transistorized dual power supply for 12 vdc and 115 vac. It operates on 8 channels plus an external accessory crystal socket for use on any channel, and has a squelch circuit, preset noise limiter and universal mounting bracket. Pearce-Simpson, Inc.

CLOCK RADIO 225

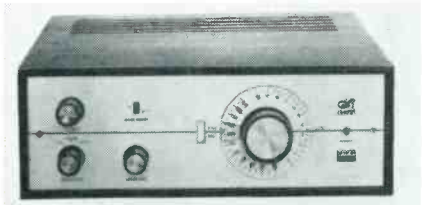
Model 53R20 is a full-feature 5-tube clock radio with "Wake-To-Music" or "Wake-To-Alarm" plus a



60-minute slumber switch to turn radio off automatically at a pre-selected time. The clock radio has luminous-tipped clock hands and a sweep second hand. The radio is said to feature hand vernier top tuning and set-saving low temperature tubes. Styled in break-resistant plastic, the unit is available in either off-white or rose beige. Suggested retail price is \$24.95. Arvin Industries.

MONO FM RECEIVER 226

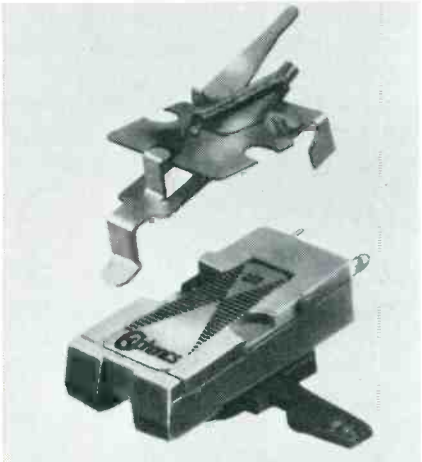
FM receiver model 2715 employs the standard "Classic Series" FM front end and 4-stage IF strip plus



a basic high fidelity power amplifier rated by the manufacturer at 18 IHFM music power and 14 continuous power. Ceramic phono and tape inputs and a three-position input selector are provided. The unit has a precision rotary tuning dial with illuminated readout and a bar-type electron-ray tuning indicator. Speaker outputs are 8 ohms, 16 ohms, and 25 line (45 ohms). The 2715 permits FM programming to provide a more pleasant environment in offices, waiting rooms, stores, restaurants, etc. It can also serve as a high quality FM tuner amplifier in the home. \$129.95 Eico.

PHONO CARTRIDGE 227

A new "Soft Touch" model V-11R phono cartridge reportedly protects stylus and records from damage due



to accidental mis-handling of the tone arm. Abnormal pressure on the tone arm lifts the stylus automatically and brings a soft plastic guard nib into position between cartridge and record, making it impossible for the stylus to come into contact with the record until the abnormal pressure is removed. Because the cartridge uses PZT ceramic elements, it is said to be impervious to heat and moisture, and magnetic hum pickup is eliminated. According to the mfr., frequency response is

RCA BRINGS YOU TWO IMPORTANT NEW TEST INSTRUMENTS

TO GENERATE RF SIGNALS

TO PROVIDE STEREO FM SIGNALS



RCA WR-51A FM STEREO SIGNAL SIMULATOR

RCA WR-50A RF SIGNAL GENERATOR

Generates continuous wave or amplitude-modulated rf signals of sinusoidal waveform from 85 Kc to 40 Mc. Particularly useful for aligning and signal tracing in AM and FM radio receivers and Citizens' Band transceivers—and for aligning if amplifiers, and for signal tracing in TV receivers.

- Wide frequency range—continuous coverage 85 Kc to 40 Mc in 6 overlapping ranges
- Built-in crystal-calibrating oscillator circuit with front panel crystal socket
- Permanently attached, shielded output cables prevent errors, minimize time loss and inconvenience. Built-in DC blocking capacitors
- Internal 400 cycle audio oscillator
- Individual inductance and capacitance adjustments for each range
- Two-step rf attenuator switch plus a continuously variable attenuator control
- Easy-to-read dial scale—vernier tuning
- Readily portable—weighs only 5 pounds

\$5995*

Generates signals necessary to service and maintain stereo multiplex FM receivers and adapters.

GENERATES:

- Four FM signals: Left stereo, right stereo, special phase test, monophonic FM
- Eight sine-wave frequencies: 400 cps, 1 Kc, 5 Kc, 19 Kc, 28 Kc, 38 Kc, 48 Kc, 67 Kc—available separately or for modulating FM signals.
- 100 Mc carrier signal tuneable ± 0.8 Mc to permit selection of a quiet point in the FM band
- 19 Kc subcarrier signal crystal-controlled within ± 2 cps
- 100 Mc sweep signal adjustable from 0-750 Kc at 60 cps sweep rate
- Choice of three composite stereo output signals: left stereo, right stereo, and special phase test

ALSO features crystal-controlled markers for receiver rf and if alignment. Zero-center meter for checking the balance of stereo amplifier output. Portable and compact: weighs only 14 pounds.

\$24950*

*User price (optional)

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First Folks . . . a quickie about quality design and construction of our antennas — like materials that cost us more but not you. Result: Easiest installations and fewer service problems than any brand going — honest!

Now . . . let's talk up a small storm starting with an important thought on pricing policy. With us, you order **only what you want and need**, all at the best price possible. Overloading is bad business for both of us. Right?

And speaking of orders — here's something no one else in the industry has . . . a whole bank of automatic order handling equipment that boils down the processing of your orders to just three days! (It took a bank to buy it too, but the world's fastest service means more profit to you as well as A/S!)



Holy Mackerel! Do we get the requests from CB clubs, hamventions and dealers for field assistance! Nobody — but nobody — travels as far to help you as much as our A/S field men.

Do we pre-sell your customers? You can't pick up a CB or amateur magazine without seeing one of our powerful ads — including the big electronic mags too. Like more than 5,300,000 messages a year to the novice and "pro."

Just can't help doodlin' with our famous display stand — only 2 sq. ft. of space, but it sells antennas and accessories like crazy. Yep — we've got loads of the most useful literature too! Like our five-section catalog — we had to put it in sections 'cuz there's over 400 models to choose from! Most complete line of communication antennas — by a country mile — all bands. You buy from one source and man, how that saves you trouble and expense!



I'm running out of space but you get the idea. We at Antenna Specialists are all out to help you sell, sell, and sell. We're one big happy family, out for a "picnic of profits." Won't you join us? Thanx!

"PS"

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Antenna Division



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Amateur, professional and CB antennas. ZEUS portable generators. ANZAC test instruments.

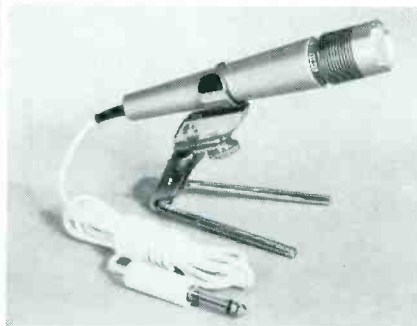
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NEW PRODUCTS

smooth from 20-20,000 cps; compliance is 8×10^{-6} cm/dyne, permitting use with tracking forces as low as 1.5 g; extended bass response is assured by the 1100-pf capacity per channel; separation is 25 db at 1000 cps; and output is 0.4 at 5 cm/sec. The cartridge is supplied with a 0.0007-in. diamond stylus and a 0.003-in. synthetic sapphire stylus. \$22.50 list. Euphonics Corp.

MICROPHONE 228

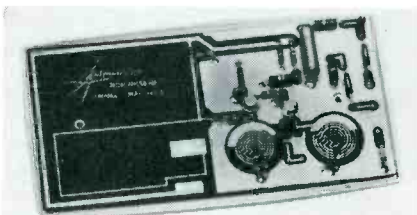
Model DF-1 is an omnidirectional dynamic microphone that can be used on a slip-on desk stand, floor



stand, or as a lavalier. Frequency response is ± 3 db 80 to 13,000 cps. Output impedance is 50K ohms ± 3 db at 1000 cps. Output level is -58 db at 1000 cps. User net \$29.95. Vernon Audio.

ELECTRONIC FM ANTENNA 229

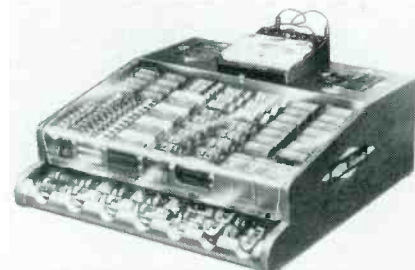
The Multitron is a compact, electronic antenna system specifically designed to overcome the special problems of FM and FM stereo reception. The unit reportedly can be connected to any tuner in two



minutes without special tools and, once installed, need never be adjusted. Minimum gain is 20 db over tuned dipole at any FM frequency. Draws negligible power from standard ac outlet and has outputs for 72 and 300-ohm tuners. \$29.95 list. Antronics, Inc.

BATTERY CENTER 230

The "Deluxe Battery Center and Tester" is drop-shipped, prepaid, no-charge to purchasers of the No.



600 battery assortment. The hardwood merchandiser combines self-dispensing and protected product merchandising and features a professional battery tester for checking both voltage and current. An added benefit is the chart on the display to help consumers select the right battery for the right job. The assortment offers 98-percent battery coverage of popular types for flashlight, radio, photoflash and other applications. Round cells are dispensed in the lower section by gravity feed action, and other batteries are displayed under a clear lucite cover that opens for service from the rear. Union Carbide Corp., Consumer Products Div.

PA SYSTEM 231

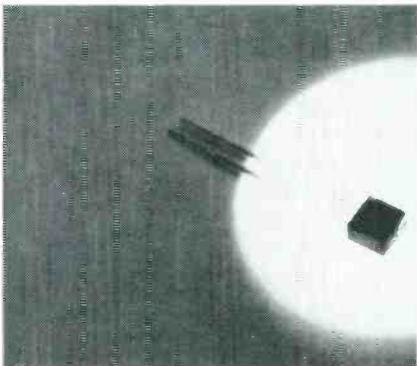
The 30-w 3000 public address system includes a tunable antifeed-back system. The unit has three microphone channels for separate or simultaneous use of one, two or three high or low impedance microphones (low impedance input matching transformers are available as accessories and can be plugged directly into the amplifier chassis). Two inputs permit the unit to be used with tuner, tape recorder, or other auxiliary equipment. Rated power output: 30w RMS, 42w peak; 60w RMS, 84w peak. Rated frequency response is 20 to 20,000 cps ± 2 db. Total harmonic distortion is reportedly less than 2 percent. Output impedances are 4, 8, 16 and 500 ohms; 25, 50 and



70.7v. \$272.50 list (ZOLE 2: \$275.17). Dynascan.

TOROIDAL INDUCTORS 232

Series 94 toroidal inductor covers an inductance range of from 100 μ h to 10,000 μ h. These miniature (0.375 x 0.375 x 0.187 in.) units are designed and fabricated to meet MIL-C-15305, grade 1, class B (-55°C to +125°C), making them shock resistant, moisture proof and immersion proof. The inductor is



also available in transformer configuration, with either two windings or tapped with up to four terminals. Vanguard Electronics Co.

AM-FM, AC-DC RADIO 233

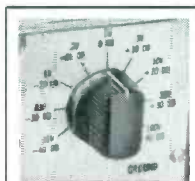
The Buccaneer Chest is an eight-tube, AM-FM ac/dc radio. The solid maple chest is trimmed with genuine leather and has solid brass fittings. Guild Radio & TV Corp.



MEASURE AC VOLTAGES .0002 VOLT to 500 VOLTS

New RCA WV-75A High-Sensitivity AC VTVM

A combination voltmeter-and-preamp for designed for audio applications in industry, laboratories, schools, broadcast studios, research and development work, production-line testing and general electronic servicing. Use to test frequency response of amplifiers, power amplifiers and tone control circuits; for signal tracing, audio level and power level measurements; gain measurements, amplifier balancing applications and a.c. voltage measurements.



Nine overlapping AC voltage ranges — from 10 mv to 100 v full scale. On 10-mv range accurate readings can be made to as little as 0.2 mv. With input probe set in "low-cap" position, up to 500 v may be measured.



Use either as a meter or preamplifier: 38 db maximum gain on 10 mv range

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NEW PRODUCTS

IGNITION SYSTEM 234

A two-transistor automobile ignition system is completely contained in a waterproof and shockproof aluminum case. No special additional coil is needed, as in other more expensive systems, says the mfr. High voltage is said to be maintained as RPM is increased, and the unit delivers a strong spark at all speeds. Model BX14 is designed to



operate on all 12v cars with negative ground; for 6v cars, model BX14A is available. Workman Electronics.

MINIATURE RECORDER 235

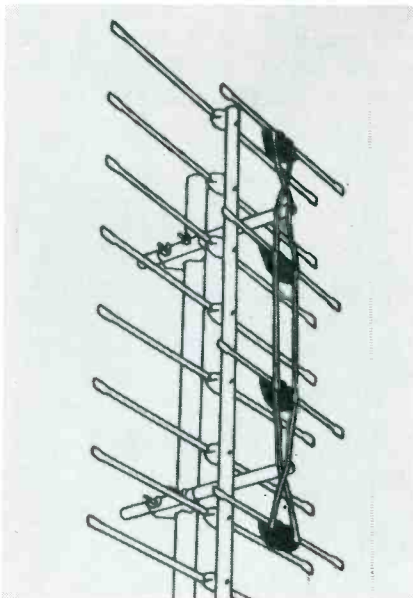
The "Electra 707 Candid Recorder" measures 1 5/8 x 2 1/2 x 6 1/4 in.; weighs less than a pound, is



fully transistorized and is completely pushbutton controlled, allowing it to be operated while concealed. The unit performs stop, start, record, playback and erase functions. A variety of microphones are available, among which is a tie-bar mike. When worn on a necktie, tie-bar mike allows confidential pickup of conversations. A useful desk top unit may also be obtained which can be used as either an amplifier with speaker, or as a microphone. Package includes the Candid Recorder, batteries, tape and magnetic mike-speaker, \$49.94 list. Electra-International Co.

UHF TV ANTENNA 236

The "Ultra Beam" Model U-730 all-channel (channels 14-83) antenna is a single bay, high gain colinear type UHF antenna. It is all-aluminum and is gold anodized



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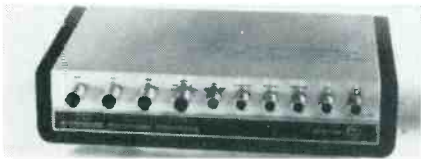
✓ CLEANER LUBRICANT	Cleans and leaves a lubricating film on contact surfaces—tuners, switches, etc.
✓ ELECTRIC MOTOR CLEANER	Removes grease, oil and dirt through mechanical and chemical solvent action.
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--- for more details circle 80 on post card

for permanent corrosion protection. One-piece mast clamps automatically align the antenna parallel to mast. Two offset mounting booms keep the antenna away from the mast to eliminate detuning effects. Shipped preassembled. \$12.50 list per bay. Winegard.

STEREO AMPLIFIER 237

"Laboratory Series" all-transistor stereo amplifiers are individually hand-assembled with a skilled technician directly supervising each operation and responsible for a unit's entire assembly and testing process. While similar in many respects to the Omega 1600 series, the components in these units are reportedly matched to a degree not possible with mass produced units. The amplifier has a power rating of 35w per channel for stereo and 70w monaural. Distortion is reportedly less than 0.5 percent at full output,



and the frequency range is said to be 18 to 20,000 cps ± 0.2 db at full output. Hum and noise are rated 75 db below full output at 10 mv input. \$349.50 list. Omega Electronics Corp.

SILICONIZED PAINTS 238

A line of "Siliconized" spray paints is resistant to heat, weathering and corrosive atmospheres. They

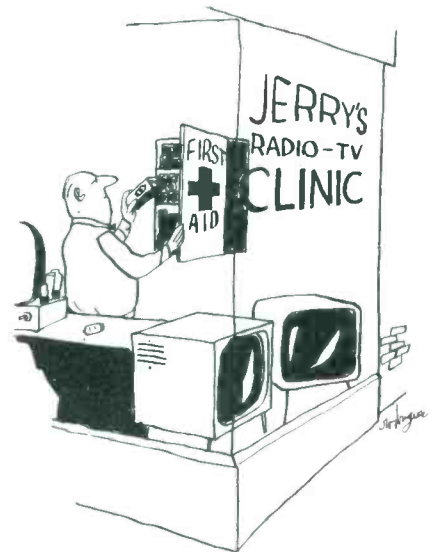


are said to have a longer paint life and retain their gloss and color longer than ordinary paints. Siliconized paints reportedly show excellent resistance to moisture, oxidation, chalking, fading and chemi-

cal attack. Available in 15 oz spray cans in black, white, aluminum, grey and gold. \$1.29 each dealer net. Interjectorall Co.

CB TRANSCEIVER SCHEMATIC

The 100 mw transceiver schematic mentioned on page 51 of August **ELECTRONIC TECHNICIAN** appears under **TEKFAX** number 817 in this issue.

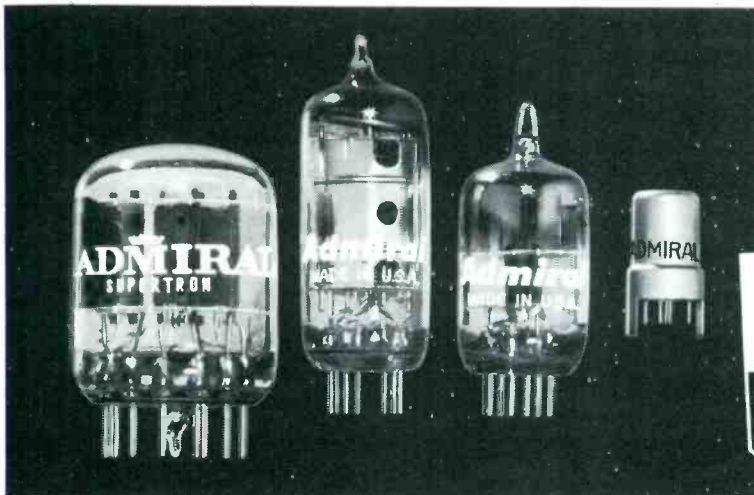


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This solid new book takes you from the basic physics of transistors and diodes into construction and manufacture. Then you'll see how the transistor operates as a circuit element, how it's applied in computers, with examples of diode-transistor logic (DTL) and NOR logic. There's a full chapter on tunnel diodes. *PLUS* these hows and whys of transistors: equivalent circuits • using characteristic curves • biasing, stabilizing • amplifiers • negative feedback • oscillators • electrical measurement • problems for self-testing. *The* basic book for the technician and serious amateur. 1963 278 pages \$6.50

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FREE LITERATURE

SPEAKER BROCHURE 300

A new two-color illustrated brochure, featuring the five-speaker four-way TF-4 unit, describes a line of bookshelf size Hi Fi speaker systems. Two models are described. Jensen Mfg. Co.

SOLDERING EQUIPMENT 301

Electric Soldering Iron Company's Catalog No. 763 provides specifications, construction details and operating data on their line of electric soldering equipment, including electric soldering pots, standard and miniature electric soldering irons, iron clad soldering tips, and soldering guns.

CRT REPLACEMENT CHART 302

A new "Television Picture Tube Replacement Chart," GE publication No. ETR-702H, including an interchangeability guide and essential characteristics of 575 tube types, now is available through authorized

General Electric distributors of electronic tubes. The chart is printed on heavy stock and measures 28x30 in.

TV-FM ANTENNAS 303

Catalog DS-CS-518.1 describes the new Jerrold-TACO line of Paralog TV-FM antennas. This 7-page, 2-color catalog includes an explanation of the modular parasitic element concept. "Cyclocac" insulators eliminate conventional crossed transmission lines. Vibration, wind and shock allegedly all make the Paralog only sturdier because of the patented "Wedge-Snap" anti-element locks. Specifications cover both the seven non-amplified Paralogs, with gain to 16 db and the four amplifier types, using a mast-mounted amplifier with gain up to 28 db. Also described are the Paralog FM antennas for fringe areas, featuring a gain of up to 12 db. Included are photographs, prices and lobe patterns.

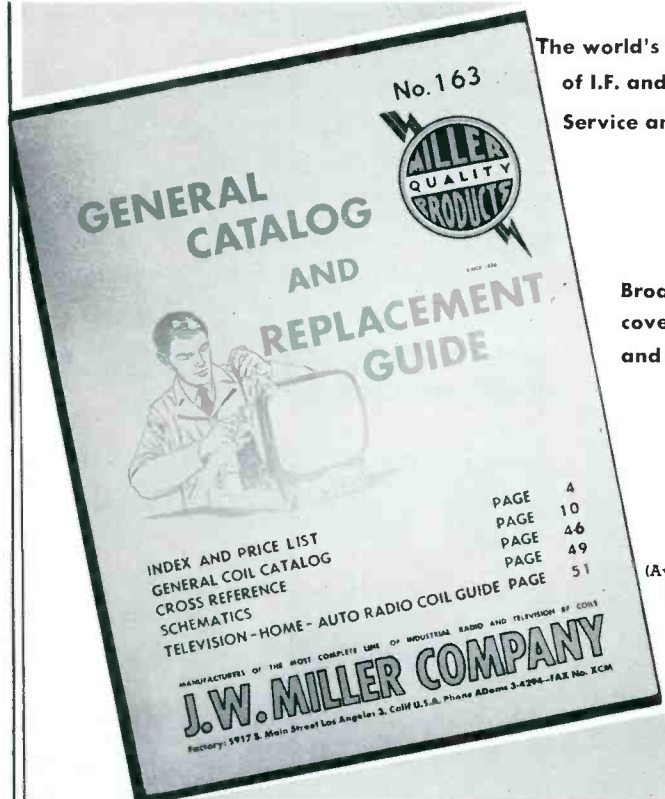
TAPE TIMING CHART 304

Saxitone Tape Sales now has available their newly compiled magnetic tape footage chart, which shows the playing time of magnetic recording tape for almost any conceivable footage; for one, two or four tracks; and for 15/16, 1 7/8, 3 3/4, 7 1/2 and 15 ips speeds.

PACKAGED CIRCUITS 305

Packaged Electronic Circuit Guide No. 7, prepared by Centralab, has just been issued. The guide contains information on how to select, test and replace PEC circuits used in radio, television and high fidelity equipment. The 8-page booklet con-

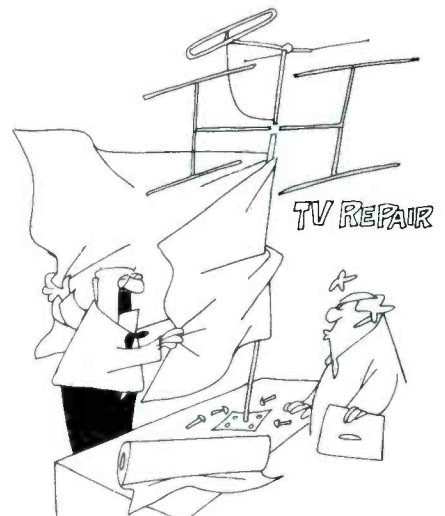
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tains a complete listing of all Centralab packaged electronic circuits, as well as complete replacement data. Included are the manufacturer's part numbers of 207 brands and their Centralab equivalents.

TRANSFORMER CATALOG 306

A new catalog of all Triad replacement transformers, catalog TV-63/64, is now available from Triad. Prices, application data, specifications and dimensions are given for transformers, yokes, flybacks and filter chokes, 18 of which are new listings.

LETTERS

Continued from page 32

Dog Electronics

I have read Joe Meek's letter concerning a dog trainer collar. Bill Boatman Co., Bainbridge, Ohio sells this equipment and can probably give him the information he wants.

EUGENE COCKE

Goode, Va.

In reference to Joe W. Meek's inquiry of an electronic dog training collar, July issue: Ed White of Morence, Ariz. has complete transistorized outfits and instructions.

JOSEPH D. MATRIZICH

Scepio Center, N. Y.

Crown TR-86

I have been trying to locate a schematic diagram for a Japanese transistor radio model Crown TR-86 but without success. I have written to the Distributors of the Crown radios published in your April issue, their reply is "We have no such model." I wonder that if you or any of the readers would know where I can obtain such diagram.

I would also like to see some servicing tips on tape recorders in your future issues of **ELECTRONIC TECHNICIAN**.

I enjoy your magazine very much. This is the best electronic periodical I've ever read.

JOHN K. SIT

Toronto, Ont., Canada

● *Maybe our readers can help you with the Crown TR-86. A tape recorder series for ET is in the works. —Ed.*

NEW BOOKS

PROFITABLE TELEVISION TROUBLESHOOTING. Second Edition. By Eugene A. Anthony. Published by McGraw-Hill Book Co., Inc. 418 pages, hard cover. \$7.25.

A blurb on this book's dust-cover says it is addressed to TV techni-

cians, on-the-job trainees, students, and (believe it or not) do-it-yourself repairmen! But don't let this mislead you. Book publishers' promotion departments write the blurbs — not the texts. The book was written by a former service technician and service manager and has the ear-marks of a professional approach to B/W and color TV servicing. In addition, the text may be used effectively by the trade school, self-study apprentice and as a valuable reference in the professional

More useful than ever!

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CRT 445

**Checks and Corrects
B & W and COLOR
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Gives new life to weak or inoperative tubes. Checks for leakage, shorts, open circuits and emission. Removes inter-element shorts and leakage. Repairs open circuits and low emission. Restores emission and brightness. Life Test checks gas content and predicts remaining useful life of picture tube. Quickly pays for itself. **Net, \$74⁹⁵**

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all picture tubes at correct filament voltage from 1 to 12 volts.

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all Hi G-2 and Lo G-2 picture tubes, including tubes that require as low a G-2 voltage as 30 volts. Supplies all three necessary voltages: Hi G-2, Low-1 G-2, and Lo-2 G-2.

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110° tubes and the new 19" and 23" tubes.

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color picture tubes, including the new 90° 23" 23BG22. Checks and corrects each gun of color tube separately.

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Specs: 6 watts; 8 ohms (also 45 ohms); Length 6 $\frac{3}{8}$ "; Bell Diameter 6 $\frac{1}{4}$ "; Weight 2 lbs. Special Model T-4 line matching transformer available.

*t.m. Rohm & Haas — new, tough, all-weather plastic.

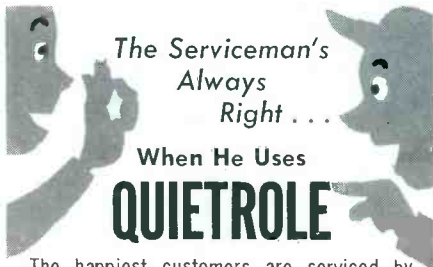


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NEW BOOKS

technician's library. The text is divided into 19 Chapters, including: Making Service Calls, Replacing Parts, Troubleshooting, Remote-Control Systems, Interference Problems, How Color TV Works, and Installing, Adjusting and Servicing Color Sets. The text is adequately illustrated with photos, drawings and schematics. The troubleshooting section contains many case histories that may help all technicians.

MASTER 45 SPINDLE REPLACEMENT GUIDEBOOK. By Jack Strong. Published by John F. Rider Publisher, Inc., 850 3rd Ave., New York 22, N. Y. Soft Cover, 53 pages. \$1.25.

This guidebook should be of great value to any technicians who ever work on changers. The book is divided into three sections: a listing of spindles alphabetically by manufacturer, giving model, changer number and spindle number. The second section is a 45 spindle chart and the third section breaks down the motor, turntable and spindle part numbers. An address directory is also included.

DICCIONARIO DE ELECTRONICA, INGLES-ESPANOL. Com-



"Replacement parts are no problem — just pick up your phone and ask the operator for Rome, Italy."

piled by Frank J. Lagueruela. Published by Editorial Omega, Inc., 666 N. W. 20th St., Miami 37, Fla. Soft cover, 347 pages. \$2.95.

This volume contains over 6000 Spanish translations of electronic terms in common parlance in this country. It can be useful for Spanish-speaking technicians who desire to read technical books printed in English. It can also assist English-speaking technicians who wish to know English terms in Spanish. Its utility is limited for those wishing to translate technical data from Spanish into English because it translates from English into Spanish only.

COMING EVENTS

- Oct. 7- 9: 9th National Communications Symposium, Hotel Utica, Utica, N.Y.
- Oct. 24-26: Fourth Armed Forces Television Conference, Lowry Air Force Base, Denver, Colo.
- Oct. 28-30: National Electronics Conference, McCormick Place, Chicago, Ill.
- Nov. 11-13: Radio Fall meeting, IEEE-EIA, Hotel Syracuse, Syracuse, N.Y.

TECHNICIAN'S DAY

Continued from page 47

ling capacitors to the color output tubes.

C710 was shorted and C722 had high leakage. V704A was drawing excessive current, causing the common cathode resistor (R733) to burn. Also, heavy current through the 12AZ7 plate load was warming it. This trouble has occurred on several older color chassis. If only one coupling capacitor shows short or leakage, it's best to replace both. This will save a call-back. I replaced the cathode and plate load resistors too (see Fig. 7 and 8).

I then checked the voltage dividing resistors (R160/R161). When they draw heavy current they become hot and burn. As a result, their resistance changes and they need to be replaced.

Vertical sync was improved by replacing electrolytic C401. This is a 2 μ f coupling capacitor to the delay line (see Fig. 9 and 10). The unit dries out, and by substituting a new one the vertical and horizontal sync is more stable. We replace the capacitor automatically on all CTC7, CTC8 and CTC9 chassis and make sure to observe correct polarity.

I finished soldering in the 2 μ f can and fired up the set. The picture looked good, but since it was six o'clock, this chassis would have to wait until morning for a final check on color.

Wonder what the wife's got for supper! ■

... MAKING YOUR MOVE

Continued from page 51

radio-TV shop owner find an attractive space. It is important to bear in mind that finding a new shop through private sources does not mean the loss of government financial aid if all the conditions for such aid are met. However, if a good opportunity calls for immediate action, it is sometimes better to forfeit government benefits for a prime location rather than wait, collect the benefits, and move into a spot less suitable to the shop's needs. The final decision is always in the hands of the owner based on his own judgment and his financial condition.

In the middle of the rush and inconvenience caused by urban renewal programs, one fact should be kept in mind: the great majority of businesses that do relocate successfully are better off in the new location within six months to a year. They generally find that they are able to operate more efficiently in their new space. In addition, the very fact that the shop is new in the area gives it a promotional and merchandising advantage over the established firms.

A technician faced with relocation through urban renewal should take advantage of all the assistance available to him. The success or failure of his business depends on the degree of planning and foresight which he brings to his situation.

Remember that studies of relocated businesses have proven conclusively that a forced move is in most cases a move for the better.

By being alert to the advantages as well as the pitfalls inherent in re-development projects, you can convert a seeming disaster into growth and prosperity. ■

... ELECTRONIC IGNITION

Continued from page 54
tems designs are available. The most readily available are straight transistorized systems and capacitive discharge systems. Most of these systems are easily installed and provide the same benefits that Detroit

manufacturers' systems offer. In addition, the replacement units are transferable from one vehicle to another and some are designed as dual installations so that the vehicle operator has both an electronic system and a standard system available.

While much automotive test equipment can be used in checking straight transistorized systems, the readings will differ greatly and the garage man must be educated to this new set of values. In addition, some systems such as capacitive discharge cannot be measured with

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All hand wired ...
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Will substitute up to 4 different components at the same time

A surge protector switch prevents arcing, sparking, or heating of electrolytics

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The Model 501 provides all the substitutes for electronic components you want and need in your every day work ... more than any other instrument of its type. No longer do you have to handle hard-to-manipulate crumpled parts ... solder and unsolder components as you trouble shoot a set. With a twist of a knob and a flip of a switch you can set the 501 to any one of over 80 component values ... substituting as many as four different components simultaneously. Smart, sturdy grey hammerstone steel housing ... handy storage compartment accommodates the insulated test leads provided with the instrument. Size: 10" wide x 6 1/4" high x 4 1/2" deep.

SUBSTITUTES FOR:

CARBON RESISTORS

12 VALUES 1 watt: 10, 18, 33, 56, 100, 180, 330, 560, 1000, 1800, 3300, 5600 ohms

12 VALUES 1/2 watt: 10,000, 18,000, 33,000, 56,000, 100,000, 180,000, 330,000, 560,000, 1,000,000, 1,800,000, 3,300,000, 5,600,000 ohms

POWER RESISTORS (20 watt Wire Wound)

20 VALUES: 2.5, 5, 7.5, 10, 15, 25, 50, 75, 100, 150, 250, 500, 750, 1,000, 1,500, 2,500, 5,000, 7,500, 10,000, 15,000 ohms

CAPACITORS (600 volts)

12 VALUES: .0001, .0005, .001, .0025, .005, .01, .015, .02, .05, .1, .22, .5 mfd.

ELECTROLYTICS (450 volts)

17 VALUES: 4, 8, 10, 12, 14, 18, 20, 28, 30, 40, 50, 70, 80, 130, 150, 200, 230 mfd.

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CRYSTAL DIODES—all general purpose low voltage types
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standard automotive test equipment. Here, the technician can be of assistance to the mechanic by making his services available for "tough dogs."

Local service stations will also undoubtedly have trouble diagnosing ignition problems. Offering help to them on either an appointment or a non-appointment basis may prove profitable.

In most cases service to the transistorized unit will not be possible because they are sealed in a potting compound. In some units the transistors can be changed but this will not usually be necessary as malfunctions will generally be found in the wiring or the ignition switch.

Table I shows symptoms and typical causes.

Most Delco systems will be serviced by United Motors Distributors and will not present a problem to the technician.

Technicians interested in dealerships for transistorized ignition systems should contact the manufacturer directly. Several different programs are available and some manufacturers have no program, but are relying on distributor sales.

The most puzzling problem you will encounter will be the transistor ignition system that refuses to work on a car that operates normally on a conventional system. When the wiring checks out okay, the plugs should be changed. Perhaps you should recommend this before you even look at the system; this will eliminate the trouble in many cases before you are needed. Some transistorized ignition systems have very slow rise time and, contrary to manufacturers' publicity, plugs will actually need to be changed more frequently. This is

true because standard ignition systems have rise times of about 80 μ sec while transistorized systems vary from 60 to more than 200 μ sec. The capacitive systems operate at about 2 μ sec.

It is always advisable to recommend a complete tune-up before any electronic ignition is installed. If the automobile is in good shape before the ignition is installed, it rarely causes any trouble. And don't blame the ignition for the carburetor's faults. ■

... REVAMP YOUR ADS

Continued from page 55

"Reverse" headlines stand out, but use them sparingly. A reverse is white lettering on a black background. Look over your newspaper and see if there are a lot of reverses in it. If they're few and far between, their use can make your ad stand out well. If there are a lot of them used, yours will only be lost. Check with your newspaper before you use reverse headlines. Some papers restrict them or permit only a certain copy percentage to be reversed. These restrictions keep pages from getting a "junky" look. Too many black blocks make a cheap looking page layout. They fight one another for attention.

Layout is your most versatile tool for achieving favorable small ad attention. Try to get away from the humdrum layouts you see in almost every ad. The simplest variations will give more punch and eye-appeal to small ads.

Try making the illustration dominant in your layout. Let it take up half or more of the space you buy. When the item you're advertising,

FOR THE NATIONAL ELECTRONIC CONFERENCE IN CHICAGO

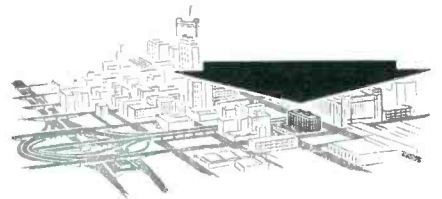
(OCT. 28-30)

Imperial Inn offers you added fun in the way of a swimming pool, Health Club (with sun and steam rooms, Swedish massage, bar), and that smash hit, the Frustration Room.

For details, phone 427-6969 or write for brochure.



Your host, Don Miller, former pro-footballer



All roads lead to DOWNTOWN CHICAGO'S

IMPERIAL INN

at the hub of Chicago's great expressway system

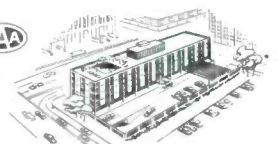
Easy to reach from everywhere . . . close to the city's business and night life . . . Chicago's most convenient motor hotel is also its newest and most luxurious. Plan now to stay at the glamorous Imperial Inn. Great for sales meetings, too.

Enjoy superb service:

- 201 sumptuous guest rooms and suites
- Famous Royal Hearth restaurant/Kings Taverne/Coffee house
- Health club and Roof-top pool
- Free transportation to and from your convention center
- Free parking/TV/Hi-Fi radio/Ice cubes
- Home of the "Frustration Room"
- Facilities for sales meetings, banquets and receptions.



Congress Expressway
at Conal Street
Chicago 7, Illinois
Telephone 427-6969



... for more details circle 30 on post card
ELECTRONIC TECHNICIAN

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 21 on post card

TO HELP MAKE FUSE HANDLING MORE PROFITABLE . . .

BUSS VISUAL- PAK



**CLEAR PLASTIC BOX,
THERE'S NO NEED
TO OPEN
TO SEE HOW MANY
FUSES ARE
IN IT**

- BUSS fuse 5-in clear plastic box—let's you check fuses in each box at a glance . . . guards against running short on needed fuses.
- Size and style of fuses printed in large type on lid of box makes it easier to pick out fuses you want.
- Box fits all fuse display stands and channels.

BUSS

PIONEERING NEW
DEVELOPMENTS IN
ELECTRICAL PROTECTION
SINCE 1914

BUSSMANN MFG. DIVISION, McGraw-Edison Co., St. Louis 7, Mo.

photographer needs — camera, film, flashgun with bulbs and batteries and clip-on neck strap; and a set of color Christmas cards with a service theme that offers the greeting "Happy Holidays" and shows a dealer adjusting a television set. All are available with the purchase of General Electric tubes through authorized distributors.

Ignition System Transistors

Semitronics Corp. announces availability of a complete line of transistors for original or replacement use in automotive and marine transistorized ignition systems. For those who wish to convert to transistorized ignition, available kits include the special semi-conductors needed along with full sets of instructions. The other components required (listed in the instructions) are standard resistors and coils, widely available at low cost.

Turn-Key CATV System

The Community Systems Division of Jerrold Electronics Corp., Philadelphia, Pa., has, according to Caywood C. Cooley, Jerrold Vice President and Div. Manager, signed a contract valued at over 3/4 million dollars for what is said to be the largest CATV (community antenna television) system in the United States.

The contract was concluded with Capital Cable Corp. of Austin, a wholly-owned subsidiary of Mid-West Video Corp., Little Rock, Ark.

BUSS : the complete line of fuses .

NEWS OF THE INDUSTRY

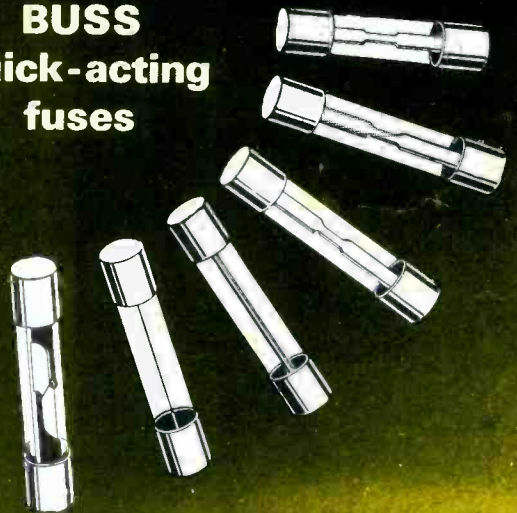
TV and Stereo Sales Up

Sylvania has announced that factory unit sales of TV and stereophonic Hi Fi sets in the first seven months of 1963 are substantially greater than for the same 1962 period. Stereophonic unit sales are said to be 30 percent ahead and TV unit sales are 16 percent ahead of last year. Console models accounted for most of the increased demand for Sylvania stereo units, it was reported.

Christmas Premiums

A wide selection of Christmas premiums will be available to radio and television service dealers in October and November through authorized distributors of General Electric tubes and other electronic components. They will include a pretty girl doll, 17-in. high, who says "Give me a kiss"; a water rifle, new on the market, that will warm any boy's heart as it spurts water 35 ft.; a new "Armorclad" tube caddy available that looks like a fine piece of luggage; an electric carving knife that slices easily through hot bread or meat; a camera outfit that includes everything the young

BUSS quick-acting fuses



"Fast Acting" fuses for protection of sensitive instruments or delicate apparatus; — or normal acting fuses for protection where circuit is not subject to starting currents or surges.

BUSS

Write for BUSS
Bulletin SFB.

BUSSMANN MFG. DIVISION, McGraw-Edison Co., St. Louis 7, Mo.

TO HELP MAKE FUSE HANDLING MORE PROFITABLE...

BUSS VISUAL-PAK



**CLEAR PLASTIC BOX,
THERE'S NO NEED
TO OPEN
TO SEE HOW MANY
FUSES ARE
IN IT**

- BUSS fuse 5-in clear plastic box—let's you check fuses in each box at a glance... guards against running short on needed fuses.
- Size and style of fuses printed in large type on lid of box makes it easier to pick out fuses you want.
- Box fits all fuse display stands and channels.

BUSS

PIONEERING NEW DEVELOPMENTS IN ELECTRICAL PROTECTION SINCE 1914

BUSSMANN MFG. DIVISION, McGraw-Edison Co., St. Louis 7, Mo.

Department. About 50 percent of the combinations manufactured during the first quarter of this year could receive FM stereo. The proportion for the entire year of 1962 was 46 percent. In the April-June period this year, the output of radio-TV and radio-phono combinations totaled 354,824, of which 203,324 contained FM-stereo capability. A total of 27,017 radio-TV combinations out of 57,829 produced could receive FM-stereo signals. Of 296,995 radio-phonos produced, 176,307 were equipped to receive the broadcasts.

TV-Hi Fi Line Bows

Philco Corp. has introduced its TV-Hi Fi "Fall Festival of Values." The package includes a new TV price leader in the 19-in. Starlite line, a revamped version of its Townhouse line of deluxe 19-in. TV receivers and a third set in the 9300 table model line. The new Starlite is Model 3501.

Service Station Opportunities

Sherwood Electronic Laboratories is setting up a nationwide network of qualified Hi Fi service stations. With more than 60 such stations in operation already, there are still opportunities, in some locations, for electronic service organizations specializing in high fidelity component service to obtain additional factory in-warranty work. Technicians interested should contact Sherwood Electronic Laboratories, Inc., 4300 N. California Ave., Chicago 18, Ill.

... of unquestioned high quality

Terms of the contract call for construction to begin immediately. All TV and FM signals will be received by an array of antennas atop Mt. Larson (outside of Austin), converted and transported to Austin via cable. The system will provide the citizens of Austin with eight TV channels (one is local weather) and an unspecified number of channels for FM stereo broadcasts.

Governor Lauds Technicians

Illinois Governor Otto Kerner has given official recognition to the independent radio-TV service business operators for their great contribution to the enlightenment and entertainment of the public.

In issuing a proclamation making the week of August 20-25, 1963 Television-Radio-Electronic Service Week in Illinois, he lauded the service people, whose national association, NATESA, is composed of independent radio-TV electronic service business operators throughout the U. S. and foreign lands.

Stereo Combo Production Up

Fifty-seven percent of all radio-TV and radio-phonograph combinations produced during the second quarter of this year were capable of receiving FM stereo broadcasts, according to a special quarterly report compiled by the Electronic Industries Association's Marketing Services

Let BUSS Fuses Help Protect Your PROFITS

To make sure BUSS fuses will operate as intended under all service conditions, each and every BUSS fuse is individually tested in a sensitive electronic device.

This is your assurance that when you sell or install BUSS fuses, you are safeguarded against complaints, call-backs and adjustments that might result from faulty fuses and eat away your profit.


It is just good business to sell fuses the BUSS way.

BUSS

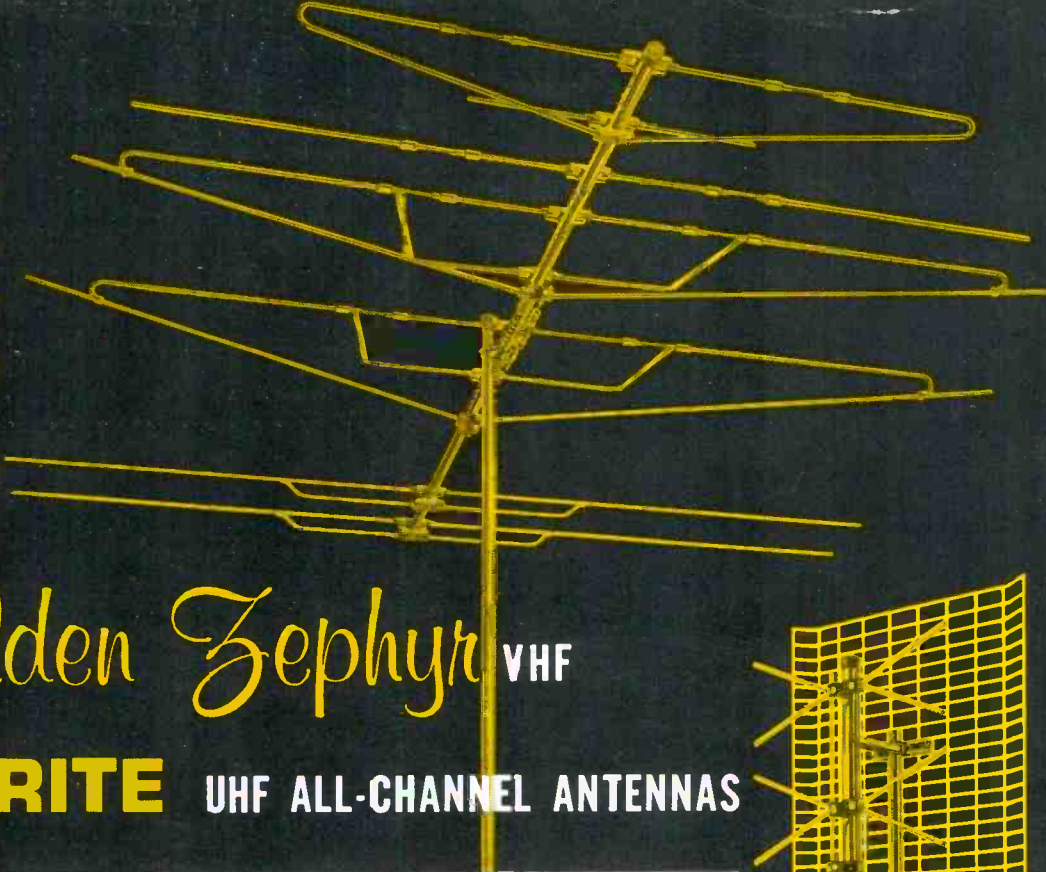
Write for BUSS Bulletin SFB.

BUSSMANN MFG. DIVISION, McGraw-Edison Co., St. Louis 7, Mo.

... for more details circle 18 on post card

 **FOR THE
GOLDEN AGE
OF COLOR TV
THE ALL NEW**

TRIO® Golden Zephyr VHF
COLOR-BRITE UHF ALL-CHANNEL ANTENNAS



with a written GUARANTEE!
offer: • IMPROVED PERFORMANCE! • IMPROVED
CONSTRUCTION! • IMPROVED APPEARANCE!
... OVER ANY OTHER TV ANTENNA OF EQUIVALENT SIZE AND TYPE
... REGARDLESS OF THAT ANTENNA'S MAKE OR PRICE!

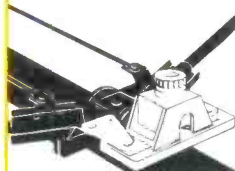
Yes! There's a written guarantee packed with each new TRIO antenna! Where conventional VHF antennas fail, you'll find TRIO's patented — and exclusive — WING DIPOLE, WING DIRECTOR and DYNACOIL PHASING capable of assuring complete customer satisfaction . . . for both COLOR and Black and White TV!

For UHF, there's no beating the TRIO COLOR-BRITE! Proved by independent engineering research **dollar-for-dollar** THE MOST POWERFUL UHF COLOR TV ANTENNA TODAY!

TRIO's Guarantee of Performance and Quality is YOUR Guarantee of Profits!

TRIO GOLDEN ZEPHYR • TRIO COLOR-BRITE
BEST FOR THE GOLDEN AGE OF COLOR!

A TRIO EXCLUSIVE!



**PATENTED NO-STRIP
LEAD-IN CONNECTOR**

NO STRIPPING!
NO SOLDERING!
NO EXPOSED WIRE!
NO BROKEN WIRES AT THE ANTENNA!

EXTRA VALUE AT NO EXTRA COST!

**BIGGER PROFITS!
ASSURED CUSTOMER SATISFACTION!**

WITH THESE **EXCLUSIVE** TRIO FEATURES:

no-strip Lead-in Connector — Stops Broken Leads at the Antenna!

Insta-Lok Element Clamps — Eliminate Roof-top Assembly!

TGP (TRIO GOLDITE PROCESS) — Unique TRIO Golden Finish Replaces Anodizing to Protect The Entire Antenna From Corrosion!



TRIO® **MANUFACTURING COMPANY**, GRIGGSVILLE, ILLINOIS

... for more details circle 49 on post card

