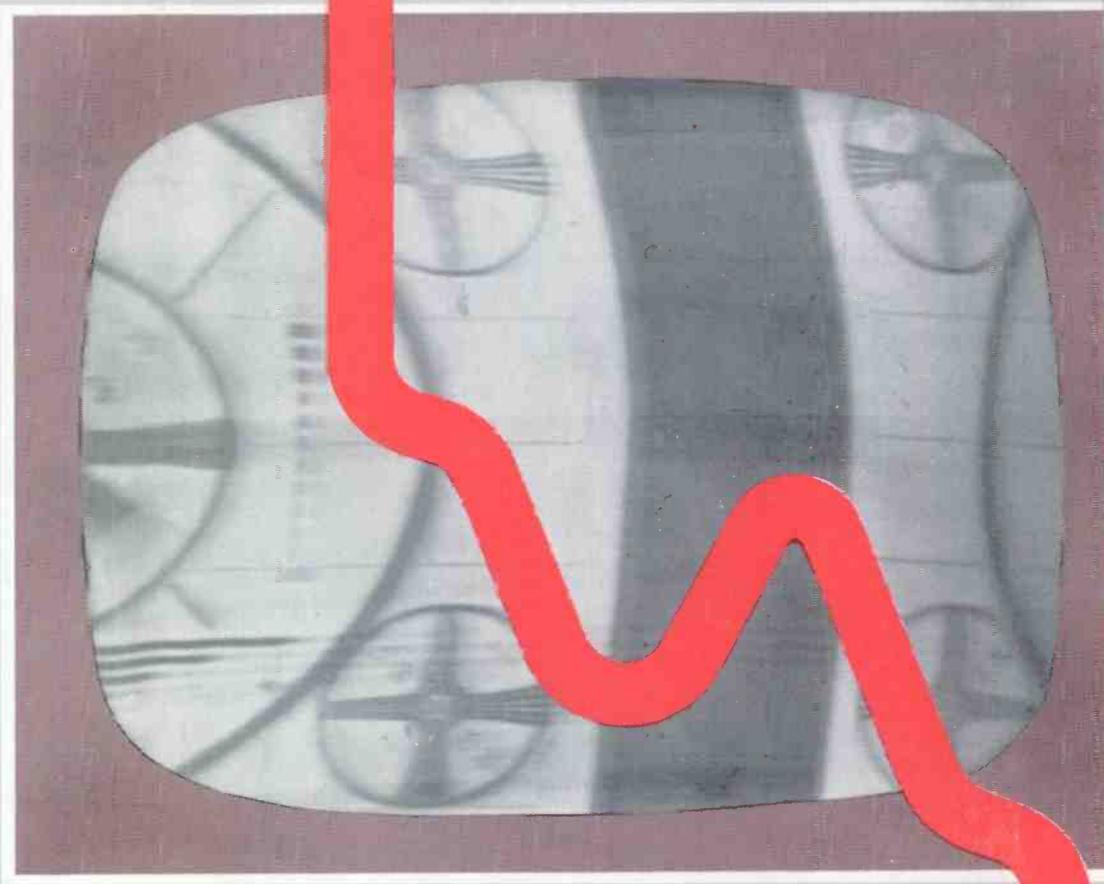


ELECTRONIC TECHNICIAN

Including
SERVICE
Magazine

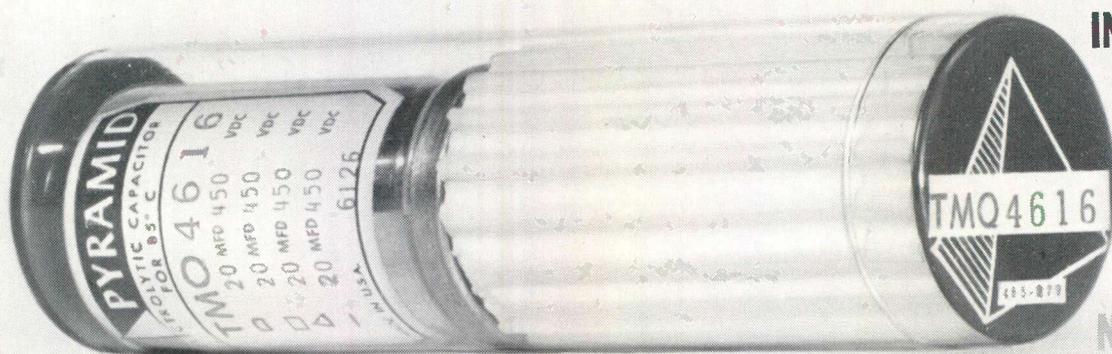
- **HOW TO CORRECT
TV SYNC INSTABILITY**
- **Replacing Components
in Transistor Radios**
- **New Test Instruments
for Bench and Caddy**



WALDO M. OWENS
BOX 42
JOSEPH, UTAH
103-1161-X-12XX9-13

60¢
November • 1961

**YOUR LAST CHANCE TO CASH IN ON MONEY-SAVING COUPON PACKAGED WITH EVERY
PYRAMID ELECTROLYTIC. OFFER ENDS DEC. 31, 1961. SEE YOUR DISTRIBUTOR TODAY.**



**INSIDE THIS VU-PAK IS
A MONEY-SAVING
COUPON ■ EVERY
PYRAMID TWIST-
PRONG ELECTRO-
LYTIC YOU BUY FROM
NOW TO DECEMBER 31,**

**WILL HAVE ONE WRAPPED IN IT. IT'S OUR WAY OF CELEBRATING WITH YOU THE MERGER
OF PYRAMID WITH MICAMOLD TO FORM THE GENERAL INSTRUMENT CAPACITOR
DIVISION ■ JUST GO TO YOUR PYRAMID DISTRIBUTOR, PICK THE TWIST-PRONG
VU-PAKS YOU NEED FROM HIS CAPAC-O-MAT RACK, UNROLL THE WRAPPER AND
CASH IN THE COUPON. EVERY VU-PAK HAS ONE! BUT THAT'S NOT ALL. YOU GET A
RELIABLE, PYRAMID ELECTROLYTIC THAT MEETS EVERY REQUIREMENT YOU SET FOR
A TWIST-PRONG, SO YOU'RE A WINNER TWO WAYS. SEE YOUR DISTRIBUTOR TODAY.
GENERAL INSTRUMENT CAPACITOR DIV., GENERAL INSTRUMENT CORP., DARLINGTON, S.C.**

Another reason why you're hearing so much about Philco...

PHILCO

outdates all TV for 1962 with new

ROCKET-RUGGED SOLID COPPER CIRCUITRY



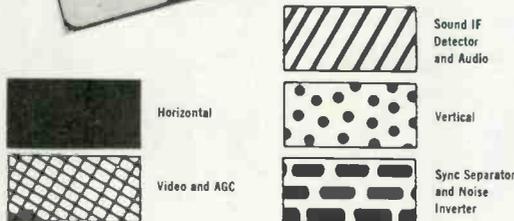
Just like in rockets and satellites... eliminates old fashioned loose wiring

In rockets and satellites, solid copper conductors, *NOT* loose wires, connect components. Nothing less assures dependability, precision, uniform quality. *That's Philco design...* circuits can't loosen or break from vibration or shock.

Now... New Coding makes it Easier than Ever to Service!

Just like a road map, Philco Solid Copper Circuitry is now coded for the easiest servicing ever! The legend, as shown at the left, provides an easy-to-follow guide for service technicians. Another advance in Philco Cool Chassis TV, designed with the serviceman in mind.

Just another reason why more dealers like to sell Philco TV (and their servicemen agree with them!). Talk with your Philco Distributor.



PHILCO'S ON THE MOVE!

GO WITH

PHILCO



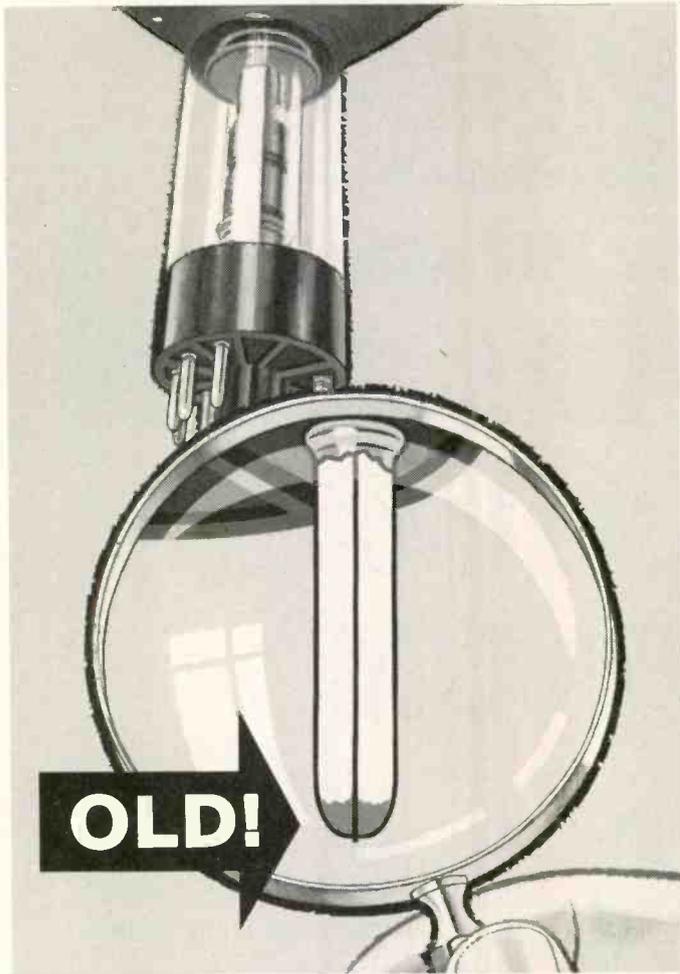
Famous for Quality the World Over

For more details, circle 10 on page 60

← For more details, circle 11 on page 60

New Sylvania Technique eliminates erratic pin soldering

Picture tube callbacks due to "open-pin connections" dramatically reduced



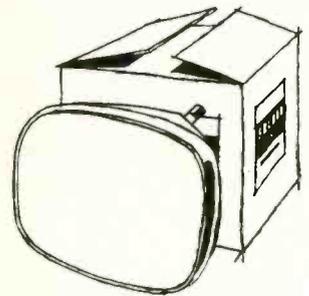
The "old" conventional pin soldering method relied upon contact between pin and wire only at their tips.



New Sylvania pin soldering technique extends solder far up into the pins—provides maximum contact with the wire—assures low electrical resistance and high mechanical strength.

What does the new Sylvania pin soldering technique mean to you? It means the solution of a long-standing, industry-wide pin soldering problem. Callbacks will be reduced—crimping and resoldering will be a thing of the past.

Thousands of service technicians have proven for themselves—in millions of service calls—that Sylvania SILVER SCREEN 85 TV PICTURE TUBES are the surest way to build a better business. You should, too. Electronic Tubes Division, Sylvania Electric Products Inc., 1740 Broadway, New York 19, N. Y.



SYLVANIA

SUBSIDIARY OF

GENERAL TELEPHONE & ELECTRONICS



ELECTRONIC TECHNICIAN

ELECTRONIC TECHNICIAN

Including
SERVICE
Magazine

WORLD'S LARGEST ELECTRONIC TRADE CIRCULATION

November • 1961

Vol. 74 • No. 5

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FRONT COVER Sync circuit defects are continually challenging TV service technicians. They're relatively simple circuits to repair, however, if you have a solid knowledge of how sync pulses travel through a TV receiver and what CRT fault symptoms are exhibited by circuit defects. This practical article discusses the foregoing, including sync separators, amplifiers, and sync-noise gates, starting on page 34.

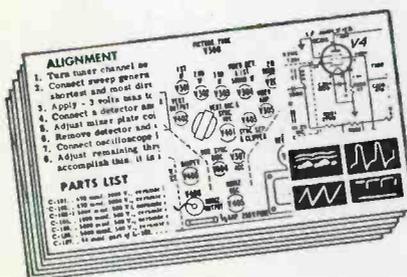
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CIRCUIT DIGESTS



... PRECEDING BACK COVER

IN THIS ISSUE

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OLYMPIC: TV Chassis JWR

MAGNAVOX: TV Chassis 36-02

MOTOROLA: Auto Radio 1961 Continental Model 1 TMC

TELEFUNKEN: AM-FM-SW Radio Caprice 5051W

ZENITH: TV Color Chassis 29JC20

 **ELECTRONICS**

ONE G-E 21FLP4 PICTURE TUBE REPLACES 13 TYPES

FILLS 25% OF YOUR REPLACEMENT NEEDS

The General Electric 21FLP4 just released. Here's the only picture tube you need for one out of every four replacements. It replaces 13 tube types. Thirteen replacement tubes you don't have to order—pick up—pay for—or carry in stock to meet your customers' requirements. It's almost like getting a 13-tube inventory in one picture tube! Quick availability for more of your replacement needs.

The General Electric 21FLP4 is a low-voltage electrostatic focus tube which does not require an ion trap magnet. Saves time and work on service calls and in the shop. The General Electric high-resolution electron gun and deep-cushion phosphor screen help provide the long-lasting, brighter picture your customers want.

The General Electric 21FLP4 replaces these 13 tube types:

21ALP4	21BAP4	21CBP4B
21ALP4B	21BNP4	21CMP4
21ATP4	21BTP4	21CVP4
21ATP4A	21CBP4	21CWP4
	21CBP4A	

Get full details on this 21-inch 90-degree "universal" replacement picture tube from your General Electric tube distributor. General Electric Company, Distributor Sales, Electronic Components Division, Room 8238B, Owensboro, Kentucky.

Progress Is Our Most Important Product

GENERAL  ELECTRIC

A	FEW
WILL	DO



New TRANSISTOR RADIO ANALYST

makes it Easy and Profitable to Service all Transistor Radios



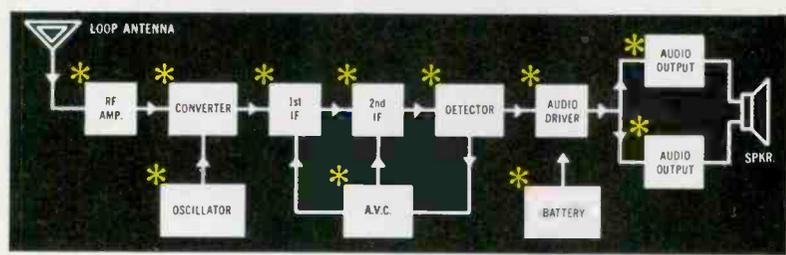
B&K Model 960
TRANSISTOR RADIO ANALYST
*with Exclusive DYNA-TRACE
 Single-Point Probe—and Built-in
 Metered Power Supply and VTVM*

**Complete Transistor Radio
 Service Shop in One Instrument**

*Signal-Generator, Power Supply,
 Milliammeter, VTVM, Battery Tester,
 Ohmmeter, and Both In-Circuit and
 Out-of-Circuit Transistor Tester—
 All in One*

Check all circuits - Pinpoint any trouble ... in minutes

Now you can profit from transistor radio servicing! This amazing new B&K "960" ANALYST gives you *everything* in one complete easy-to-use instrument. Makes transistor radio servicing *quick and easy*. Nothing else is needed except the transistor radios themselves waiting to be serviced. Brings you new customers for service, parts, and batteries. Makes this new business *yours*.



**EASILY TROUBLE-SHOOT ANY STAGE
 BY UNIQUE POINT-TO-POINT SIGNAL INJECTION**

The ANALYST gives you a complete signal-generating source for point-to-point signal injection. Easily enables you to trouble-shoot any transistor radio—check all circuits stage-by-stage—isolate and pinpoint the exact trouble in minutes.

Supplies modulated signals, with adjustable control, to check r.f., i.f., converter, and detector. Supplies audio signal to check audio driver and audio output. Provides unmodulated signal to test local oscillator. Provides separate audio low-impedance output for signal injection into loudspeaker voice coils to check speaker performance.

BUILT-IN METERED POWER SUPPLY FOR EASY SERVICING

Makes it easy to operate radio under test, while you inject your own signals. Provides from 1 to 12 volts in 1½ volt steps. Supplies all bias taps that may be required.

**SIMPLIFIES IN-CIRCUIT TRANSISTOR TEST
 WITH NEW DYNA-TRACE SINGLE-POINT PROBE**

Unique single-point probe needs only the one contact to transistor under test. No longer are three wires required to connect to emitter, base, and collector. Gives fast, positive meter indication. Saves time. Makes trouble-shooting simple and easy.

BUILT-IN VTVM

Includes high-input-impedance vacuum-tube voltmeter, which is so necessary for transistor radio servicing.

TESTS ALL TRANSISTORS OUT-OF-CIRCUIT

Meter has "Good-Bad" scale for *both* leakage and beta. Also has direct-reading Beta scale, calibrated 0-150. Assures quick, accurate test. Also automatically determines whether transistor is NPN or PNP. Meter is protected against accidental overload and burn-out.

Model 960. Net, **\$99⁹⁵**

Solve Every Service Problem and Profit with a Modern B&K Service Shop. See Your B&K Distributor or Write for Catalog, AP18T

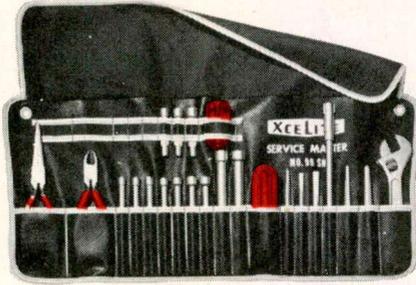


B & K MANUFACTURING CO.
 1801 W. BELLE PLAINE AVE • CHICAGO 13, ILL.
 Canada: Atlas Radio Corp., 50 Wingold, Toronto 19, Ont.
 Export: Empire Exporters, 277 Broadway, New York 7, U.S.A.

For more details, circle 26 on page 60

←For more details, circle 12 on page 60

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



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

2 HANDLES:

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

9 NUTDRIVERS:

High Nickel chrome
finish, $\frac{3}{16}$ " to $\frac{1}{2}$ "

3 STUBBY NUTDRIVERS:

$\frac{1}{4}$ ", $\frac{3}{16}$ ", $\frac{3}{8}$ "

EXTENSION BLADE:

Adds 7". Fits
both handles.

3 SCREWDRIVERS:

Two slotted...
 $\frac{3}{16}$ ", $\frac{1}{2}$ "
#1 Phillips

2 REAMERS:

$\frac{1}{8}$ - $\frac{3}{16}$ ", $\frac{1}{4}$ - $\frac{1}{2}$ "

ADJUSTABLE WRENCH:

6" thin pattern,
1" opening

LONG NOSE PLIER:

"Cushion Grip",
 $2\frac{1}{4}$ " nose

DIAGONAL PLIER:

"Cushion Grip"
hand-honed
cutting edges

ROLL UP KIT:

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

Ask your distributor to show you kit 99 SM

XCELITE

XCELITE, INC. • ORCHARD PARK, N.Y.
Canada: Charles W. Pointon, Ltd., Toronto, Ont.

For more details, circle 13 on page 60

EDITOR'S MEMO

We've had numerous requests to re-print this memo column, which was published here five years ago. So here goes . . .

What Is a TV Technician?

A TV technician is the fellow with the marvelous know-how in his head, a knob and number-filled test instrument in one hand, and a tube caddy in the other. He is found bending over the shop bench, squatting on the customer's living room floor, leaning on the jobber's counter, driving his delivery truck, perched precariously on a rooftop, and puffing his way down stairs with a TV chassis in tow.

His activities include squinting at circuit diagrams, soldering connections, reading meters, pushing probes against now unrecognizably marked components, plugging tubes in testers, scratching his head when he comes across an intermittent, keeping up with new technical developments and cussing (under his breath) the yoke stuck to the picture tube neck.

His vocabulary is filled with horrible-sounding words like choke, ghost, cheater, trap and bleeder; odd-sounding words like yagi, toggle and grommet; complicated-sounding words like electromagnetic deflection and intermodulation; and delicious-sounding words like spaghetti and cone.

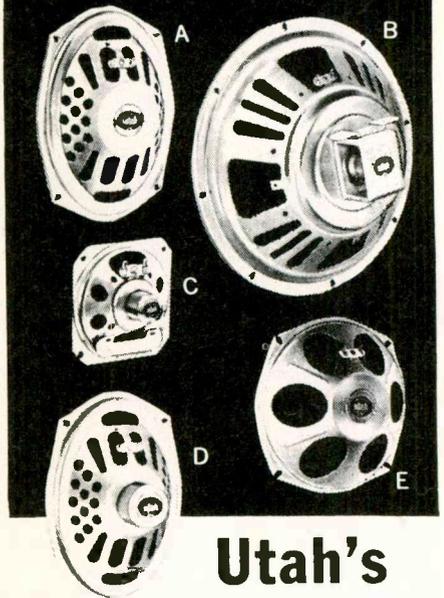
His arsenal in the never-ending battle against receiver failure is varied and expensive. Included among his weapons are soldering gun, oscilloscope, vtvm, vom, generators of several types, tube tester, capacitor tester, pliers, screwdrivers and a special little super-dooper device of his own design. His ammunition depot is stockpiled with tubes, capacitors, resistors, transformers, solder, screws, wire, speakers, controls, fuses, antennas, switches, batteries, rectifiers, vibrators (to mention just a few), and a drawer full of junk parts he's been saving (which will get thrown away at the next shop clean-up).

He is many things to many people: symptom detective, psychologist (specializing in pestering children), psychologist (specializing in suspicious adults), salesman, engineer, Doctor Fixit and grass roots spokesman for the entire electronic industry.

He's been attacked, slandered and slighted. He's been defended, praised and catered to. But most of all, he's been needed. And when he's made a TV set work again, and Momma, Poppa and Junior Video Viewer express their appreciation, the TV technician is the fellow with the satisfied feeling of a job well done.

Al Forman

VERY BIG ON RESPONSE

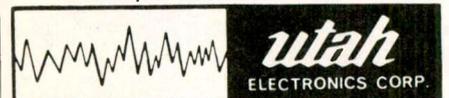


Utah's famous micro-gap replacement SPEAKERS

Better response — better sound reproduction than original equipment! Better customer response, too, when you install Utah Micro-Gap replacement speakers. Single-packed in custom-fitted cartons. Illustrated above:

- A** SP69NF 6x9" Oval Inverted Auto Speaker
- B** SP12J 12" Round Speaker
- C** SP4A 4" Square Outdoor Speaker
- D** SP69G 6x9" Oval Auto Speaker
- E** SP8NF 7 $\frac{1}{2}$ " Inverted Pin Cushion Speaker.

Write for illustrated literature



HUNTINGTON, INDIANA

For more details, circle 14 on page 60

**BUY
"ET"**



THE TRANSISTOR LINE THAT TUNG-SOL TAILORED TO YOUR NEEDS

- LOW INVENTORY ■ HIGH TURNOVER
- RELIABILITY ■ PROFIT
- CUSTOMER SATISFACTION

"ET" is your guide to the compact transistor line engineered and packaged specifically for entertainment replacement. You can make just about every radio and TV replacement from only a handful-size inventory. Eleven PNP and NPN types replace hundreds of older numbers.

Each package is plainly marked with the type of service as well as the part number to save you time in selecting the units you need. Every Tung-Sol

transistor is fully warranted. Tung-Sol takes *your* responsibility seriously and spares no effort to provide the very highest in transistor performance. So make your transistor purchases with an eye to convenience, profit and customer satisfaction. Tell your supplier you'd rather have Tung-Sol "ET" transistors. Write for the Tung-Sol Transistor Interchangeability Guide. Tung-Sol Electric Inc., Newark 4, New Jersey

 **TUNG-SOL®**

A TYPE FOR EVERY JOB

PNP TYPES

Low power

- ET1 Mixer/oscillator/converter
- ET2 IF amplifier
- ET3 AF amplifier 6v.
- ET4 AF amplifier 12v.
- ET5 AF amplifier 9v.

Medium power

- ET6 AF power amplifier

High power

- ET7 AF high power amplifier

NPN TYPES

Low power

- ET8 Mixer/oscillator/converter
- ET9 IF amplifier
- ET10 AF amplifier 9v.
- ET11 AF amplifier 12v.



ANNOUNCEMENT:

TACO joins JERROLD

to bring you an antenna line that will put new power in TV/FM reception... and in your antenna sales

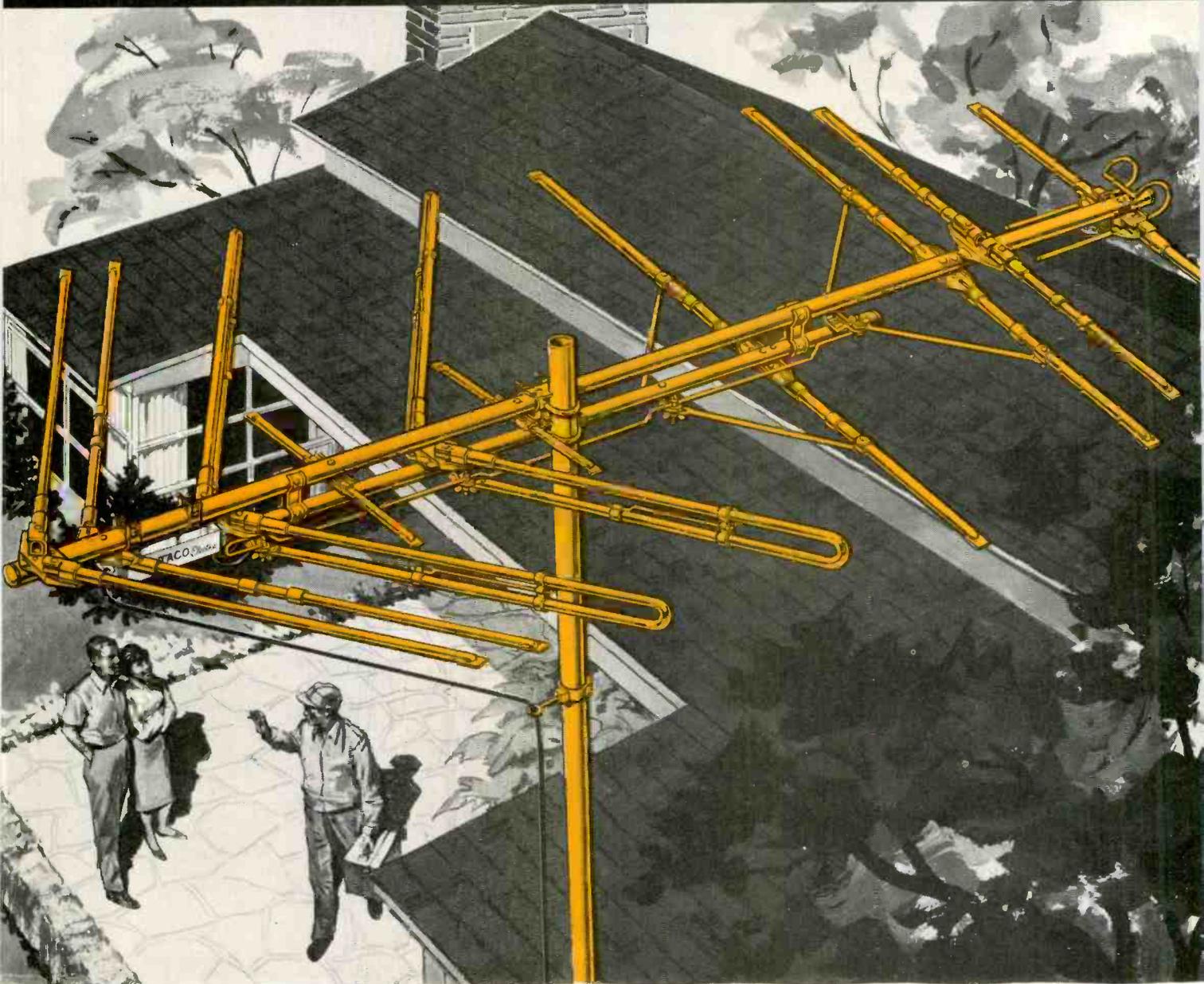
This news is of the greatest importance to you if you sell and install home television antennas.

There's a great new leader in the antenna business. TACO, internationally recognized by industry, the military, and the TV serviceman as the manufacturer of the best-performing, most rugged of antennas, is now a part of JERROLD ELECTRONICS CORPORATION, the industry's leader in TV/FM reception aids.

How does this news affect you? How will the new Taco-

Jerrold combination help you sell more antennas—better antennas—than ever before?

Here's how: By giving you, in the T-BIRD and the T-BIRD ELECTRA, the very best antenna line in the business today—a line having all the quality and precision that Taco builds into tough satellite-tracking, defense, and commercial antennas... a line that's tops in engineering, in performance in pricing, in packaging, in promotion, and in aids to you.

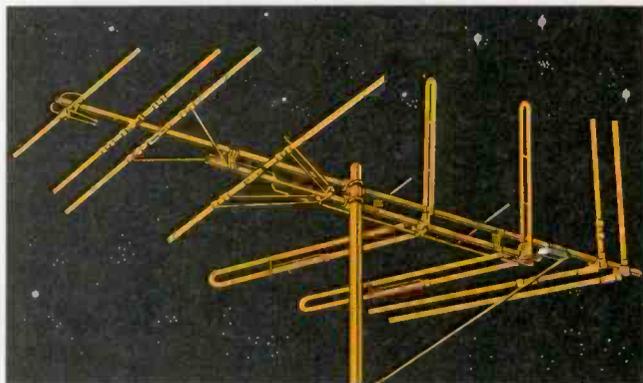


HOW THE NEW



combines the leading talents in electronics and antenna design

- Built rugged like all TACO antennas, the T-BIRD and T-BIRD ELECTRA use $\frac{7}{16}$ " tubing, sturdiest in the industry.
- "Delta" ("T"-match) feed system gives sharpest forward pattern—on every channel. Better than 10:1 front-to-back ratio.
- 100% rustproof. Gold-anodized and iridited (a conductive coating). Exclusive stainless-steel U-bolts.
- Engineered to eliminate unnecessary elements or harnesses that add weight and invite wind damage.
- Chrome-alloy aluminum used throughout—twice as strong as other antennas.
- Complete pre-assembly makes installation fast, sure and permanent.

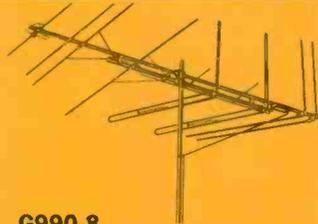


- TACO transistor preamplifier, designed by Jerrold, is matched to perform ideally with T-BIRD ELECTRA.
- Highest gain on both high and low channels, lowest System Noise Figure.
- No batteries, no polarity problems when connecting downlead.
- Remote a-c power supply feeds two sets.
- No maintenance worries—put up the T-BIRD ELECTRA and forget it!
- Every TACO antenna carries, in writing, a one-year warranty.



A T-BIRD and a T-BIRD ELECTRA for every home

With six models of T-BIRD (non-powered) and three models of T-BIRD ELECTRA (powered) antennas, TACO gives you the right antenna for every suburban-to-fringe-area requirement. Performance, reliability, and long life found in no other antenna at any price.



G990-8

The world's most powerful electronically-amplified antenna. Gets pictures and sound where others fail. Supplies the finest signal source for multi-set installations.

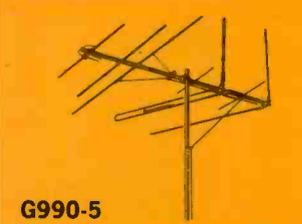
List \$109.75



G990-6

Just right for installations not requiring the ultra-powerful gain of the G990-8. Will provide sparkling clear, sharp pictures in black-and-white or color, on one, two, or more sets.

List \$91.75



G990-5

Lowest-price T-BIRD ELECTRA. Offers all the inherent advantages of transistor amplification plus a matched system of amplifier and antenna. Brings in stations beyond the reach of ordinary antennas.

List \$79.75

WATCH TACO GO!

The new T-BIRD and T-BIRD ELECTRA are without doubt the line to watch in the big months ahead. When you're handling the TACO line, you'll be watching from the driver's seat. So don't be passed by—get all the facts on T-BIRD and T-BIRD ELECTRA antennas—the line that's making antenna history! Ask your distributor, or write for details.

TACO

TECHNICAL APPLIANCE CORPORATION

A Subsidiary of Jerrold Electronics Corporation

Dept. JTD-1, Sherburne, New York

For more details, circle 12 on page 60



Do ALL Your Christmas Shopping at Your Philco Distributors... FREE OFFERS for you!



PHILCO® PARTNERSHIP BONUS PARADE



FREE OFFERS

We are celebrating 31 years of cooperation between Philco and the Independent Service Dealer with even better FREE OFFERS than ever before. Remember... Philco offers you these free gifts with your total purchase of Philco Branded Tubes, Parts, and Accessories!



Once in a Lifetime Offer! Imported White Cashmere Sweater with Genuine MINK Shawl Collar

Extravagantly trimmed with wide shawl collar of light Autumn Haze, dark Autumn Haze or white Ranch Mink! 100% full fashioned cashmere cardigan. Rhinestone button on front, cuffs. Sizes 34 to 40.

FREE

with your purchase of \$1200 worth of Philco Branded Tubes, Parts, Accessories

AD #3923



HALLMARK

or Plain (AD #3934)



With Initial (AD #3935)

Men's Genuine Jet Black ONYX 10K Solid Gold Ring

A most elegant style that every man would be proud to wear. Plain top or initial in gold.

FREE

with your purchase of \$250



AD #3920

Men's Zipper Jacket

32" length, water repellent, quilt lined. Knit collar, cuffs, pocket welts. "Natural" color, 34 to 46.

FREE

with \$200 order

AD #3914

TOY SHAGGY DOG

FREE with \$40 order



AD #3932

Tom Thumb TOY CASH REGISTER

FREE

with \$60 order



ALL OFFERS GOOD UNTIL DECEMBER 15, 1961

FREE OFFERS

Climb on the Bandwagon . . . Join the Parade!
Get Your Share of These Terrific FREE OFFERS . . .

Now . . . Your Total Order of Philco Branded Tubes, Parts, Accessories . . . Is Credited toward the FREE Items You Want!



HAMILTON-COSCO

Folding Table and Chair Set
Upholstered metal table, contour back upholstered chairs. Two tone, Tan frame, Mocha fabric.

Table Only (AD #3771)
FREE with \$110 order
2 Bridge Chairs (AD #3772)
FREE with \$170 order

FREE

Complete 5-Pc. Set
with your \$425 order.

AD #3785



Million Miler Men's and Ladies' LUGGAGE

Solid, seamless, scuff proof. Weather resistant U.S. Royalite, fiberglass reinforced. Feather-weight, aluminum dust-proof closure.

FREE with purchase of Philco Branded Tubes, Parts, Accessories

FOR MEN

COMPANION AD #3757 . . . 21" . . . **FREE** with \$245 order
TWO SUITER AD #3756 . . . 24" . . . **FREE** with \$375 order
THREE SUITER AD #3755 . . . 26" . . . **FREE** with \$425 order

FOR WOMEN

TRAIN CASE AD #3759 . . . 14" . . . **FREE** with \$245 order
ROUND HATBOX AD #3763 . . . 16" . . . **FREE** with \$225 order
OVERNIGHT CASE AD #3760 . . . 21" . . . **FREE** with \$245 order
WARDROBE AD #3764 . . . 24" . . . **FREE** with \$375 order
PULLMAN AD #3761 . . . 26" . . . **FREE** with \$375 order



Million Miler Air Exec ATTACHE CASE

18" x 14" x 5".
Removable file,
removable desk.

FREE

with \$245 order

AD #3758



AD #3930

Las Vegas Executive Game Chest

10½" Roulette Wheel, Bowling Dice Game, Dice, Dominoes, Chess, Checkers, Chips, Cards, Horse Race Game, Chess Board, directions and carrying case.

FREE

with \$150 order



AD #3933

Tom Thumb
**TOY BANK
VAULT
FREE**

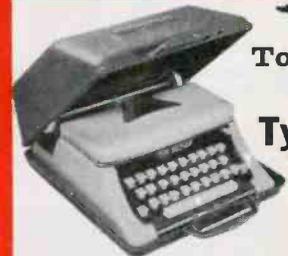
with \$40 order

Sportcraft
**DART
GAME
FREE**

with \$65 order



AD #3918



Tom Thumb
**Toy
Typewriter
FREE**

with \$200 order

AD #3929

SEE YOUR PHILCO DISTRIBUTOR For more details: circle 18 on page 60

Stancor. *n.* Synonym for quality and dependability in coils and transformers

It makes good sense for you to choose replacement parts from the manufacturer who is the world's largest supplier of electronic transformers to the original equipment market. The complete Stancor line includes the unit you need, at the fine performance level you expect. For quality and dependability in transformers and coils, always specify Stancor.

The Stancor TV Guide

gives you always up-to-date replacement information—through regular mailings of loose-leaf pages direct to you from Stancor. Register with your distributor to get the Stancor TV Guide.

STANCOR

ELECTRONICS, INC.

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

LETTERS TO THE EDITOR

Licensing

Editor, ELECTRONIC TECHNICIAN:

As licensing is about to come up for legislative debate in Pennsylvania, I'm learning the wrong people are being solicited and are being encouraged to engage in the fight for licensing. I encountered a representative of a commercial lobby group who was interviewing parts distributors, asking them which way they felt about licensing and, naturally, most would speak in favor of it. This leads me to believe it should not be the parts man, and not necessarily the repair dealer, whose opinion on this matter should count. It should be none other than the repairman. Of course many dealers are repairmen. But, among whom other than the employed repairmen—particularly the bench men—can honest-to-goodness repairmen be most universally found? Regardless of where repairmen are selected, whose opinion is being solicited, whether from dealers or employed repairmen, there should be some means of screening out the truly qualified men and finding out what they think.

I consider it important, though, to add that before a "yes" answer is accepted from a qualified man, he should be asked if he knows that the law now pending provides for excluding many license-exam takers from making the grade that will be customarily required. This will apply to men with certain proof of being already in business. Such news may cause our questioned man to see defeat in the purpose he has had in mind of licensing; he may prefer to change his "yes" to "no."

Thus, it seems far wrong for any distributor to seek to support licensing. (Reference to "Letters," August issue, by distributor.) Where he so seeks to kill his competitor, meaning well as far as the repairmen's interest is concerned, won't abolish the hardware store selling tubes at 40% off.

OSCAR SCHECTAR

Schectar TV Service
Pittsburgh, Pa.

Medical Electronics

Editor, ELECTRONIC TECHNICIAN:

I note on page 15 of the August issue, under "Tuning in the Picture," the article regarding the Medical Electronics Conference held in New York City.

Can you tell me where the headquarters of this association is located and the name of the secretary?

AL ANDERL

Salt Lake City 5, Utah

• *The Conference Committee is jointly sponsored by the Institute of Radio Engineers, 1 East 79th Street, New York, N. Y., the Instrument Society of America, 530 William Penn Place, Pittsburgh 19, Pa., and the American Institute of Electrical Engineers.*

TV Service Business

Editor, ELECTRONIC TECHNICIAN:

I have just finished reading Editor's Memo in the June issue. Very interesting, logical and sensible. May I, as a very small factotum but with technical training and experience over a 40-year period, add my few observations?

Let us rule out the manufacturers because they are, with some exceptions, big business and as this is a world of big business somehow or other they will succeed. Let us stipulate, by "service shops" you mean service only—any connection with sales ruled out. The five-store, 21-man operation sounds good. Frankly, I am a wee bit surprised there are any

ELECTRONIC TECHNICIAN

Wake Up



A new day is dawning in electronics. Transistors are here to stay... they are now being used everywhere; in radio, television, Hi-Fi, intercoms, and in nearly all new electronic equipment...

Why put off transistor circuit servicing any longer... there's gold in them thar hills. But you must be equipped to do the job fast and efficiently. Here are the tools that you will need.



NEW SENCORE TRANSI-MASTER

This Tester will analyze the entire circuit in minutes and test transistors in-circuit or out of circuit. Here is how you can pin point troubles step by step.

First, check the batteries with the 0 to 12 voltmeter. If the batteries are O.K., check the current drain with the 0 to 50 milliamp meter. A special probe is provided so that you do not need to break the circuit. Excessive current indicates a short; low current indicates an open stage or cracked board. All PF schematics indicate average current.

If trouble is not located by now, isolate the trouble to a specific stage by touching the output of the harmonic generator to the base of each transistor and note spot where sound from speaker (or scope where no speaker is used) stops or becomes weak. The generator becomes a sine wave generator for audio stages to help find distortion.

If trouble points to a transistor, check it in a jiffy with the exclusive in-circuit power oscillator check provided by the TR110. A special probe is also provided for this.

If the transistor checks bad in-circuit, remove it and give it an out of circuit check with the oscillator check or the more accurate DC check. The DC check is provided for comparison reasons, experimental or engineering work and to match transistors in audio output stages. Beta (current gain) is read direct or on a good-bad scale for service work.

DEALER NET. ONLY \$4950



Tests all transistors in-circuit or out-of-circuit

Model TR110

It's a COMPLETE TRANSISTOR TESTER

- SIGNAL TRACER • VOLTMETER
- BATTERY TESTER • MILLIAMMETER



NEW SENCORE TRANSISTOR AND DIODE CHECKER

Here is a low cost tester that has become America's favorite. The TR115 provides the same DC out of circuit checks as the TR110; leakage and current gain. Beta (circuit gain) can also be read direct or as good or bad. Opens or shorts in the transistor are spotted in a minute. The TR115 checks them all from power transistors to the small hearing aid type. Japanese equivalents are listed also. This famous tester is used by such companies as Sears Roebuck, Bell Telephone and Commonwealth Edison. New circuits enable you to make service checks without set-up charts even though charts are provided for critical checks.

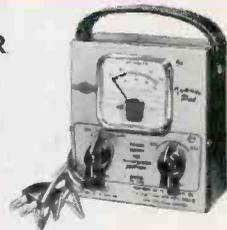


Model TR115
Dealer Net
\$1995



SENCORE BATTERY ELIMINATOR AND TROUBLE SHOOTER

For replacing batteries during repair. Many servicemen say that they wouldn't service transistor circuits without this power supply. The tried and proven PS103 is a sure fire answer. It can be used to charge the nickel cadmium batteries as well. Dial the desired output from 0 to 24 volts DC and read on meter. Low ripple insures no hum or feedback. Total current drawn can also be read on the PS103 by merely flicking the function switch to milliamps. The PS103 is the only supply that will operate radios with tapped battery supplies such as Philco, Sylvania and Motorola. No other supply has a third lead.



Model PS103
Dealer Net
\$1995

Now in stock at
your Authorized
Sencore Distributor



SENCORE

ADDISON, ILLINOIS

For more details, circle 20 on page 60

LETTERS

TO THE EDITOR

such. My observations have been that, even in the big cities, the service set-up is a big joke. The big stores make good use of service as an advertising gimmick, but if an experienced engineer could get behind the scenes he would find the shop set-up is not what it should be at all, usually in some entirely too small far off space. Rarely does one see an intelligent, well-trained business executive who would even slightly entertain the idea of investing in service. Service, it appears, has been made to be just a necessary sort of evil for sales.

I think you will agree by far the majority of small shops are just making ends meet—the one big thing that is holding this army together is “*The Fascination of Electronics.*”

E. F. SCHWARZ

Petersburg, Va.

Service Dealer Discounting

Editor, ELECTRONIC TECHNICIAN:

Your August 1961 editorial discusses, briefly, the pros and cons of service dealer discounting and how it is on the rise. I, personally, deplore the increasing number of service shops, small and large, which advertise through large win-

dow signs “Radio-TV tubes . . . 50% to 60% off.” I believe that any service dealer who is forced to meet his customers at that level is hastening his demise from business.

True, so-called distributors who sell at retail are making it tough for the service dealer. But why should we dealers aid and abet their cause by making it that much easier for the customer to buy parts wholesale—right around the corner? I say “If they want to buy wholesale, let ‘em look for it.”

To believe that meeting a customer through discounting tube prices will mean future service work is just wishful thinking. I have found that the majority of people who walk into my shop to have tubes checked are using me just for a stop-gap, before they call their regular serviceman. The others, who painfully agree to have me go up to the house and check the set after they have thoroughly mauled it, are usually looking for the cheapest job available.

The only way a service dealer can preserve his dignity and his wages is to stick to his guns and demand a decent price for the parts he sells. A customer, who has become accustomed to receiving tremendous discounts over the counter, expects the same on a house call. The same customer will laugh in your face if you present him with a bill something like “6SN7—\$1.10. Service—\$6.00.”

(Name withheld)

Disposal of Back Issues

Editor, ELECTRONIC TECHNICIAN:

In the August issue, D. Bernard Fritz asked for an outlet for 10 years back issues. My suggestion may not be what Mr. Fritz has in mind, but how about donating the magazines to a veterans' hospital or to a penal rehabilitation center? I take all my back issues to the hospitals in my area. After all, what better way to dispose of these wonderful magazines than giving them to some one they might help? Think it over, Mr. Fritz.

JAMES J. GARVIN

Garvin Radio Shop
Salem, Ore.

Likes Test Equipment Articles

Editor, ELECTRONIC TECHNICIAN:

I wish to tell you how very much I appreciate the articles on test instruments. The April and May articles on flyback checkers and the recent ones on transistor testers were very helpful to me.

I hope you will publish more articles of this type.

R. N. BEARD

Trinity Radio Shop
Hayfork, Calif.

• Scheduled for future issues of *ELECTRONIC TECHNICIAN* is the low-down on some of the new test instruments coming on the market.

JUST IN TIME FOR A
HOLIDAY BONUS!

FREE

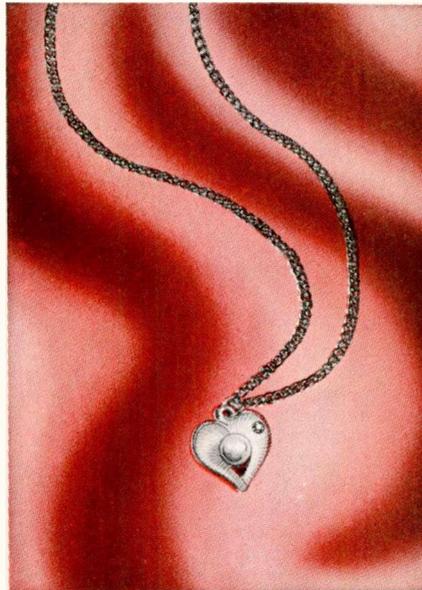
*genuine cultured pearl
in heart pendant*

NECKLACE

with gold-filled chain

\$3.95

RETAIL VALUE



with every **Perma-Power** VU-BRITE 12-PACK



Perma-Power Vu-Brite 12-Pack gives you

USUAL PRICE

\$10.68 12-C401 Parallel or C402 Series
Vu-Brites

DEALER NET

\$3.95 1-FREE Cultured Pearl
Necklace

\$14.63 TOTAL VALUE

\$9.95 SPECIAL OFFER

\$4.68 TOTAL SAVINGS

HURRY! DEAL ENDS DECEMBER 15, 1961

Perma-Power COMPANY • 3104 N. ELSTON AVE. • CHICAGO 18, ILL.
For more details, circle 21 on page 60

WORTH SHOUTING ABOUT!

NEW IMPROVED
MIGHTY MITE

NEW IMPROVED
MIGHTY MITE

NEW IMPROVED
MIGHTY MITE

Reaching New Peaks in
Performance, Portability and Price

MIGHTY MITE II

They're shouting from the hill tops. Technicians, engineers and test labs all say that the original Mighty Mite finds the tubes that large expensive testers miss. And now . . . here is the new improved Mighty Mite! Designed for the present and far into the future. Tests all of your present tubes plus the new RCA Nuvistors and Novars, GE Compactrons and Sylvania 10 pin tubes.

A complete tube tester that is smaller than a portable typewriter yet outperforms testers costing hundreds of dollars. A real money maker for the serviceman and a trusty companion for engineers, maintenance men and experimenters.

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. Then too, it checks for emission at operating levels and shorts or leakage up to 120,000 ohms between all elements. This analytical "stethoscope" approach finds troublesome tubes even when large mutual conductance testers fail. And it does all this by merely setting four controls labeled A, B, C, & D.

Check these plus Sencore features: Meter glows in dark for easy reading behind TV set • Stainless steel mirror in ad-



67⁵⁰
DEALER NET

Remember . . . there is
only one Mighty Mite

justable cover for TV adjustments • Rugged, all steel carrying case and easy grip handle • Smallest complete tester made, less than one foot square. Mighty Mite II will test every standard radio and TV tube that you encounter, nearly 2000 in all, including foreign, five star, auto radio tubes (without damage) plus the new GE Compactrons, RCA Nuvistors and Novars and Sylvania 10 pin tubes.

Mighty Mite II also has larger, easy-to-read type in the set-up booklet to insure faster testing. Why don't you join the thousands of servicemen, engineers, and technicians who now own a Mighty Mite tube tester? Tube substitution is becoming impossible and costly with nearly 2000 tubes in use today. Ask your authorized Sencore Distributor for the New Improved Mighty Mite. Size: 10¹/₄" x 9¹/₄" x 3¹/₂" Wt. 8 lbs.

MODEL TC114

Sencore Sam says . . . "They all agree . . .
the Mighty Mite is the real answer for the man on the go."



SENCORE ADDISON, ILLINOIS

For more details, circle 22 on page 60

Meet...and beat...the fringe-area challenge with the new CHANNEL MASTER

Channel Master's world-famous Antenna Development Laboratory has done it again! By using a brand new concept in antenna design...

PROPORTIONAL ENERGY ABSORPTION...

Channel Master meets the fringe area challenge

with the most powerful TV antenna ever produced...the Crossfire!

Proportional Energy Absorption works like this!

Each Crossfire element has a predetermined impedance, at each frequency, which determines its degree of energy absorption. This impedance, governed by the taper and spacing of the dipoles, decreases with the distance from the feed point. Each successive element therefore absorbs a larger percentage of the available energy.

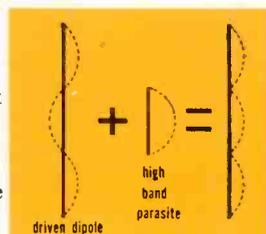
Since the amount of available energy decreases as it progresses along the length of the antenna, each element, by absorbing a larger percentage, absorbs approximately the same amount of energy as the other elements in the array.

This means that the Crossfire...unlike other antennas...has a large group of driven dipoles actively working to increase gain on every channel...on both low and high bands.

More working elements provide more picture power! This is the key to the remarkable performance of the Crossfire.

Revolutionary New Dual Dipole System

Each parasite reverses phase of high band current on the adjacent low band dipole, so that it operates as three driven half-wave high band elements.



... And the Crossfire is Gold!

The Crossfire's performance is matched only by its beauty. Channel Master's exclusive E*P*C Process gives the antenna a lustrous golden coating that enriches its appearance and protects it for years against corrosion.

Channel Master's E*P*C Process is *not* anodizing! The disadvantage of anodizing is that the anodized film is an electrical insulator, and must be removed by *abrasion* wherever metal-to-metal contact is required. Therefore, anodized antennas have no surface protection on the very parts that need it most!

THERE'S A CROSSFIRE TO MEET EVERY RECEPTION PROBLEM!

model 3600
28 elements

model 3601
23 elements

model 3602
19 elements

model 3603
15 elements

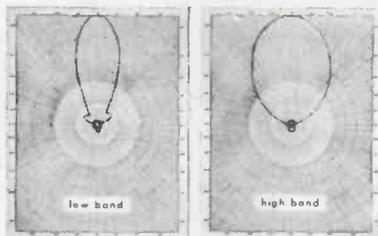
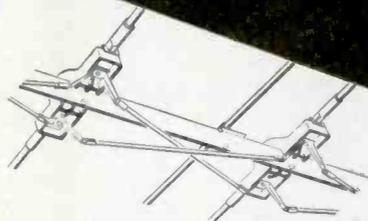
model 3604
11 elements

GOLDEN Crossfire

Transposed Feed Line Means Cleaner Gain!

Extremely high front-to-back ratios are accomplished by a Transposed Feed Line, from which the Crossfire gets its name. This feed line is transposed between each successive pair of elements. As a result, the radiations from each pair of adjacent elements are self-cancelling because they are 180° out of phase. This carefully engineered system is so efficient that the Crossfire needs no parasitic reflector element.

Because of these high front-to-back ratios, the Crossfire provides *cleaner* gain than any other all-channel antenna. It pulls in the signal you want while rejecting unwanted interference of every type (auto ignition systems, electrical noise, other TV signals, etc.) from both side and rear. See untouched photo of actual horizontal polar pattern.



The Crossfire is the only antenna you can sell with full confidence that it will outperform anything your customer is now using!

For still more power... add the new

CHANNEL MASTER JETRON

Antenna-mounted transistorized signal amplifier and set coupler
Most effective...most dependable...lowest noise figure!

model 0020



Power supply (with built-in 4-set coupler) is conveniently located in the home. Compact, only 5" x 3 3/4" x 1 3/4".

* Patent Pending

Copyright 1961 Channel Master Corp.

For more details, circle 23 on page 60

model 3605
7 elements

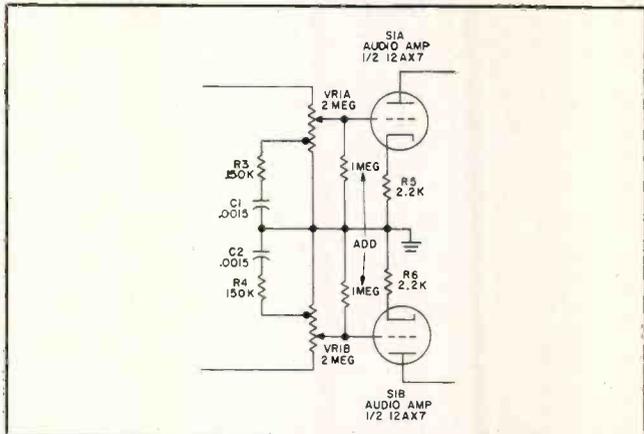


TV MANUFACTURERS TECHNICAL DIGEST

PHILCO

Model J-1826—Audio Distortion

Speaker distortion has been reported on some early production model J-1826 hi-fi phonographs. This distortion was particularly apparent at medium and high volume settings.



Speaker distortion in some Philco Model J-1826 hi-fi phonographs was corrected by installing a one megohm resistor in each control grid circuit (2) of the 12AX7 audio amplifier tube.

Investigation showed, in most cases, that the problem was being caused by an unusual microphonic condition.

To eliminate this possibility, install a one megohm resistor in each grid circuit of the 12AX7 audio amplifier. This component is connected between the control grid and ground.

Later models incorporated these resistors.

MOTOROLA

TV Chassis 436 Series, Code B-00— Production Changes

(See ET Circuit Digest No. 656, 8/61)

For increased audio sensitivity: Change audio i-f interstage transformer T301, part No. 24D65949A01, with part No. 24D65949A02. Replace audio take-off and 4.5 mc trap coils L108, part No. 24D65950A01, with 24D65950A02 (capacitor C311 and resistor R307 are mounted on the Quadrature coil base (L301) inside the can).

Resonant coils L104 and L105 are changed from 8.5 microhenry components to 8.8 microhenry parts. R301 is changed from 820K to 100K ohms. R302 is changed from 8.2K to 22K ohms, and capacitors C302 and C303 are changed from 10 μ f and 5.6 μ f to 6.8 μ f and 47 μ f respectively.

Vertical sync stability and linearity is improved by changing the following: C602, .0047 μ f capacitor coupling the vertical pulse to the control grid of the vertical oscillator, is changed to .006 μ f, C605 the .02 μ f capacitor is changed to .03 μ f.

In addition, R614, located in the control grid circuit of the vertical output stage, is changed from 470K to 1 megohm. R617, a 220K resistor, is added in series with the vertical hold control to ground in place of the originally installed jumper lead.

EMERSON

TV Models 1554 and 1555—Line Cord Polarization

A separate line cord is used in these TV-AM-FM-Stereo combination receivers to supply a-c power for the stereo amplifier and record changer motor. This line cord is connected to an auxiliary interlock on the set's power supply.

If hum is encountered with advanced settings of the volume control during radio and phono operation, the cord's polarity may be the cause.

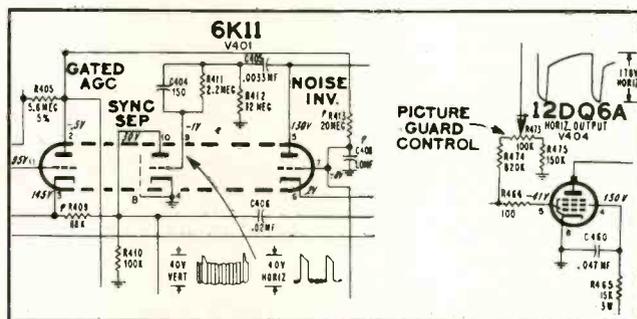
Check for proper line cord polarization by using this method:

- (1) Set the volume control at a level where hum is noticeable.
- (2) Reverse the a-c line cord in the wall socket, and leave it plugged-in in the minimum position.
- (3) Locate the stereo amplifier-phone motor a-c cord and reverse its connection on the power amplifier chassis. Leave the cord connected in the minimum position.

If the foregoing doesn't reduce hum, further circuit troubleshooting is needed.

ADMIRAL

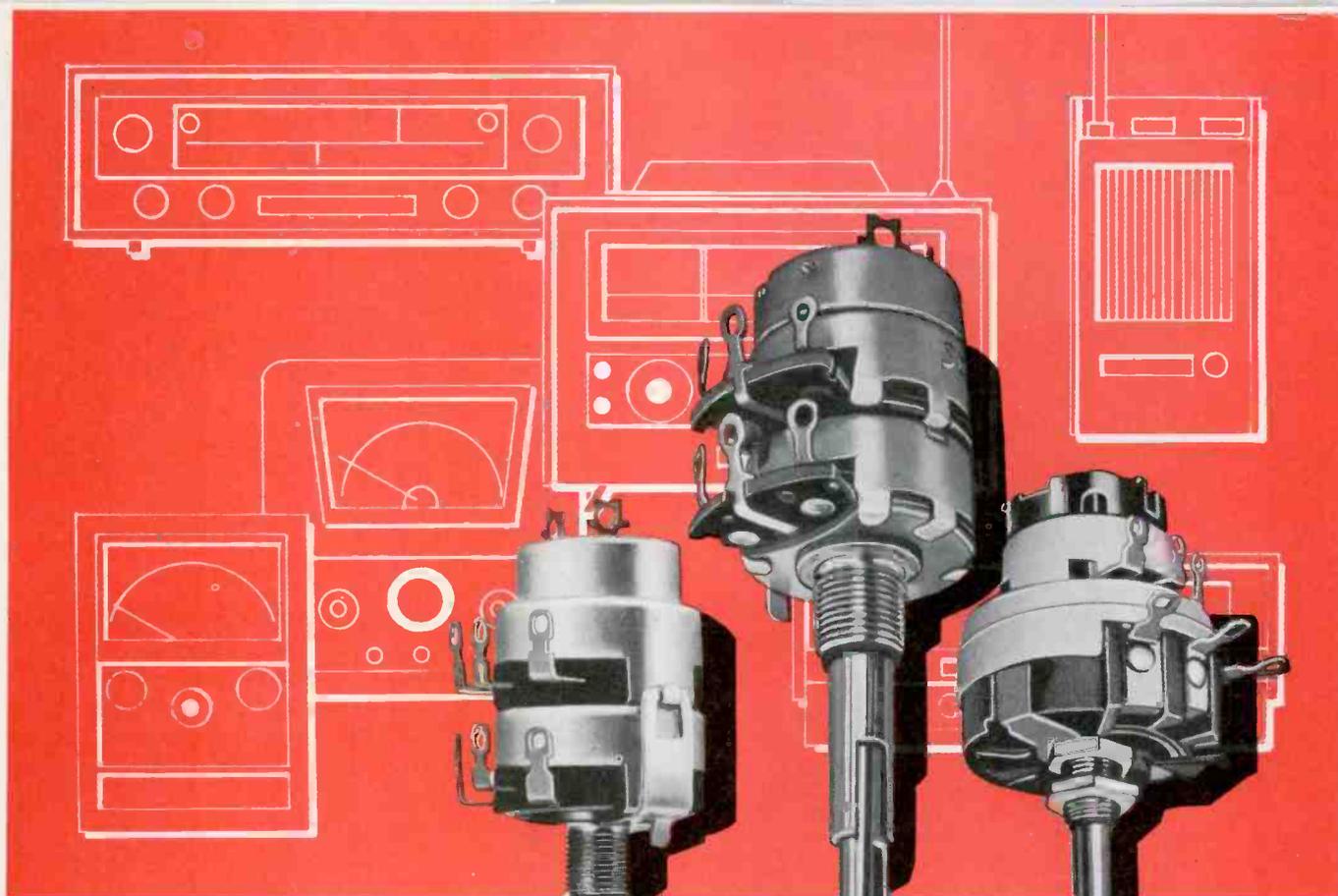
TV Chassis 16B9B—New Noise Immunity Circuit



Admiral's new noise immunicator circuit, Automatic Picture Guard, is connected to the grid of the horizontal output tube.

A one tube noise inverter, sync separator, and gated agc circuit, called "Automatic Picture Guard," is featured in the 16 Series TV chassis. This triple function circuit utilizes a 12 pin triple triode tube (6K11 or 6Q11).

The noise control is located in the control grid circuit of the horizontal output tube. This control is used to provide sync stability in areas where interference caused by ignition systems, switches, motors,



wherever control is needed . . .

**...USE
CLAROSTAT
REPLACEMENTS**

★
Dual and single carbon controls

★
Dual and single wire-wound controls

★
RTV exact-duplicate dual concentrics

★
Uni-Tite field-assembled dual concentrics

★
Switches

★
Sound system controls

Television, radio, auto radio, citizens' band, amateur equipment, hi-fi, multiplexers, stereo, marine equipment...and just about every place electronic control is required you'll find the right control at your Clarostat distributor.

Clarostat specializes in controls for replacement purposes. These controls are designed to fit right, work right in every single case. They save you time, money and headaches. Always ask for CLAROSTAT controls in the green box and back your skills and knowledge with the very finest performances available.

ASK YOUR DISTRIBUTOR FOR CLAROSTAT CATALOG...

CLAROSTAT

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

For more details, circle 24 on page 60

NEW CB VERSATILITY

WITH **EICO**®

New Deluxe Citizens Band Transceivers give you everything you need for fast, reliable, economical communication



U. S. Pat. No. D-170, 970
770 Series

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

*Including Posi-Lock Mounting Bracket

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

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

You profit with EICO Test Equipment & Hi-Fi



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



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



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



NEW 70-Watt Integrated Stereo Amplifier ST70
Kit \$94.95 Wired \$149.95

New 40-Watt Integrated Stereo Amplifier ST40
Kit \$79.95 Wired \$129.95

Over 80 products to choose from. Write for free Catalog ET-11 & name of nearest distributor. Most EICO distributors offer budget terms.



New Transistorized Stereo/Mono 4-Track Tape Deck
Wired Model RP100W \$399.95
Semi-Kit Model RP100K, Electronics in Kit form. \$299.95

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

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

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

TV MANUFACTURERS TECHNICAL DIGEST

etc., usually results in an unstable picture. Control setting should be as far to the left as possible while still maintaining good sync.

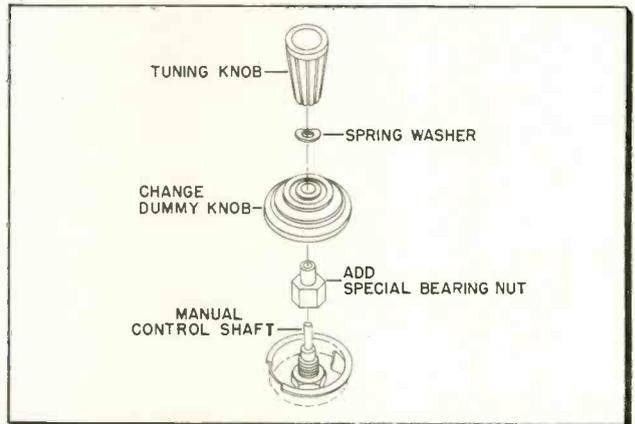
Note that the picture control will not function properly if the horizontal lock, vertical hold or agc controls are improperly adjusted. Do not adjust the control unless the set jitters or loses sync due to noise; it's been set at the factory for average conditions. If the control is advanced too far, the set may overload on strong signals.

DELCO

1961 Chevrolet Auto Radios — Touchy Manual Tuning

(See ET Circuit Digest Schematic #650 7/61)

Some early 1961 Chevrolet radios (model 988413) may have fairly touchy tuning. Later models had a production change to change the feel of the tuning.



Touchy tuning complaints in some 1961 Chevrolet auto radios can be corrected by utilizing Delco's new kit (Package #CKN-1).

If a customer complains about touchy tuning, a corrective modification may be made, as follows: (1) Remove the tuning knob and the dummy knob behind it. (2) A special bearing nut (contained in Delco's kit, CKN-1) is screwed on to the bushing in front of the regular hex nut. (3) Install a new dummy knob on the shaft (also contained in kit CKN-1). (4) Replace the old tuning knob.

Note: If the radio has a rear speaker the foregoing simple modification cannot be made. In these radios the threaded bushing on the manual shaft (#1221611) must be changed.

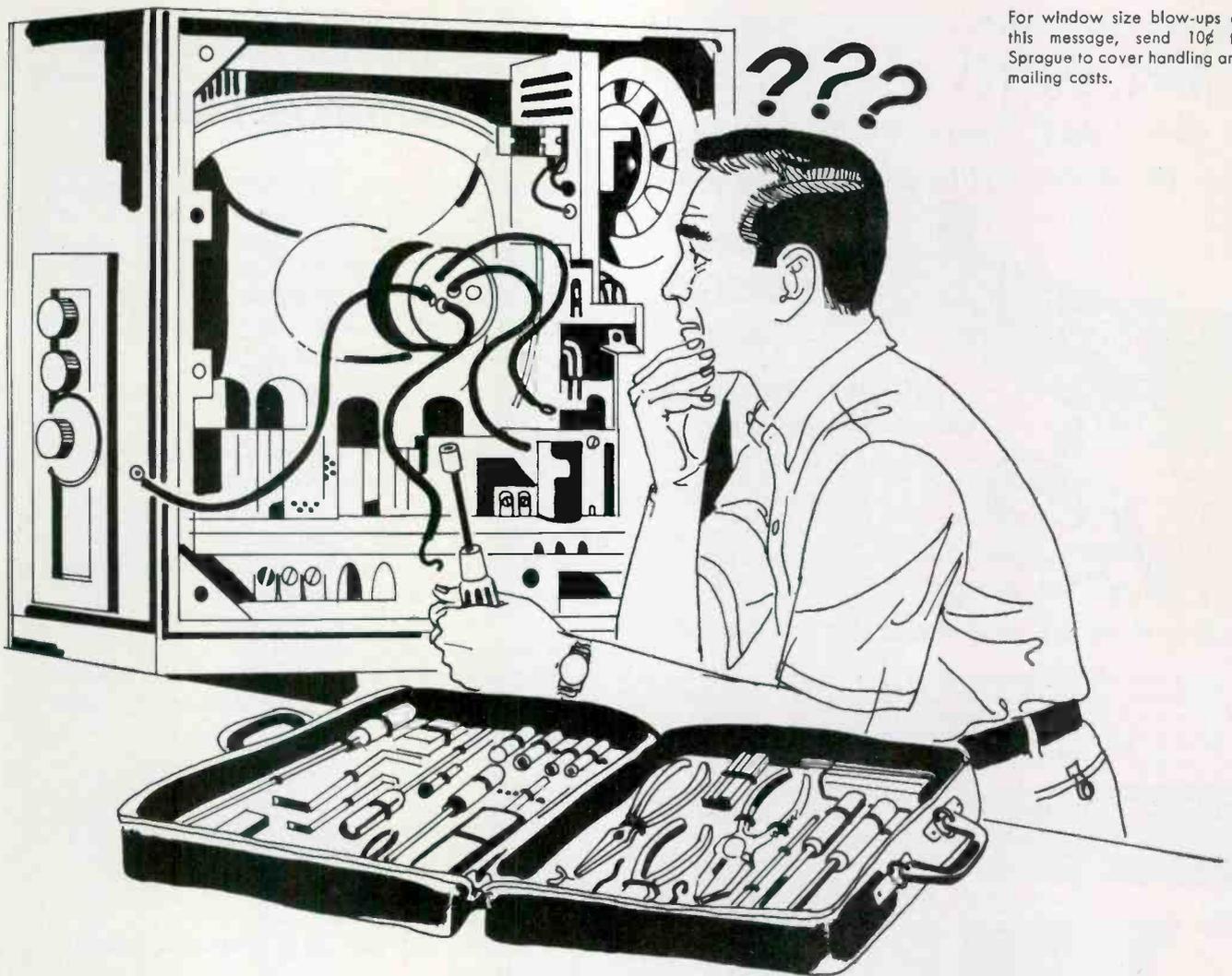
DELCO

1961 Cadillac Auto Radios — Removal Procedure

In the removal of auto radio model 7276605 from 1961 Cadillac cars some reports indicate that the tab at the bottom-center of the radio's bezel face panel has been breaking when it was removed.

To prevent this from happening, the following procedure should be used: Remove instrument panel bezel complete with clock and light switch by remov-

For window size blow-ups of this message, send 10¢ to Sprague to cover handling and mailing costs.



It takes MORE than TOOLS to be a TV Technician!

Just what IS the difference between the "screwdriver mechanic" and the expert TV-Radio Technician?

NOT expensive tools and test equipment—although they ARE essential.

TRAINING is the first big difference. The tinkerer guesses, but the expert technician KNOWS—because he spent years in the study of electronic theory and its application to television techniques.

EXPERIENCE is the next big difference. The professional TV specialist has repaired hundreds—perhaps thousands—of sets. He knows the complexities and the variations in circuits. He is familiar with the hundreds of parts which make up the "innards" of each type of TV. He can diagnose trouble and cure it quickly and safely.

PROGRESSIVENESS is another big difference. The expert TV Technician continually spends countless hours and hundreds of dollars on manuals, keeping up to date on new developments, new circuits, and new troubleshooting techniques. When trouble develops, he knows what to do about it.

Well-meaning, but poorly informed "screwdriver mechanics" and "do-it-yourself-ers," frequently unable to accurately diagnose TV trouble, often "butcher" a set to the point where it can be dangerous as well as expensive.

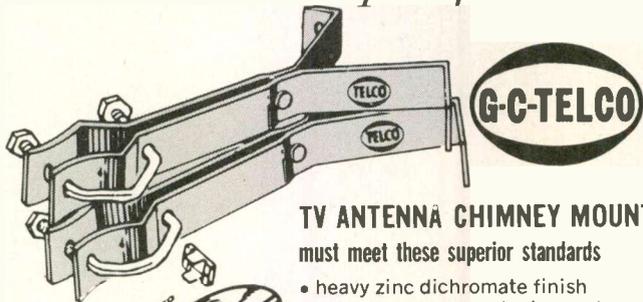
DON'T RISK YOUR SAFETY OR NEEDLESS EXTRA EXPENSE—CALL AN EXPERT TECHNICIAN AT THE FIRST SIGN OF TROUBLE! HIS FEE IS YOUR INVESTMENT IN SAFETY AND SATISFACTION.

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

YOUR NEIGHBORHOOD TV-RADIO TECHNICIAN

For more details, circle 16 on page 60

MR. SERVICEMAN...
*check and compare...do you get
 these valuable plus features?*



TV ANTENNA CHIMNEY MOUNTS
 must meet these superior standards

- heavy zinc dichromate finish
- extra heavy gauge steel mount
- extra wide mount and strapping
- fits masts to 1 3/4" diameter
- easy to handle ... quick to install ... just snap mast in, tighten bolts
- complete with hardware and 3/4" steel strapping

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write for the GC Catalog FR-62 for complete hardware listing



GC ELECTRONICS CO.
 a division of *Textron Electronics, Inc.*
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 For more details, circle 27 on page 60

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 KNIVES** • 28 BLADE SHAPES
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For more details, circle 28 on page 60

**TV MANUFACTURERS
 TECHNICAL DIGEST**

ing two screws from the top underside of the bezel, just above the radio. Remove the nut and stud on the left side of the bezel near the headlamp switch. Remove bracket from the tab at the bottom-center bezel and pull the bezel outward, laying it back on top of the instrument. Lastly, remove the connectors from the light switch and clock.

RCA

TV Chassis KCS 136 Series—Deciphering Model Numbers

TV receivers can be identified and described by deciphering the coded model number numerals. Model number designations for the 1962 line are assigned in accordance with the following system:

(A) The *first* and *second* characters indicate the kinescope size—19", 23", etc.

(B) The *third* character indicates the model line.

(C) The *fourth* character indicates the class of product—

- A=Black/White Portable
- B=Black/White Table Model
- C=Black/White Console Model
- D=Black/White Combination Model
- F=Color Table Model
- G=Color Console Model
- H=Color Combination Model
- W=Institutional Model

(D) The *fifth* and *sixth* characters indicate the model series.

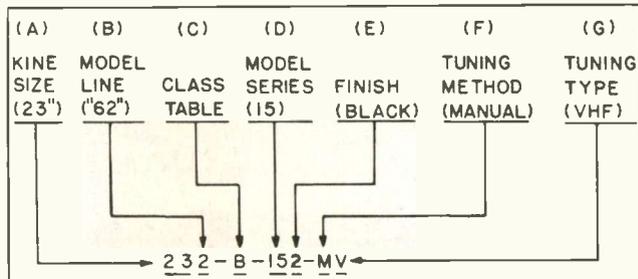
(E) The *seventh* character indicates the finish. Listed are finishes assigned to corresponding numbers:

Portables—19"		Tables, Consoles—21" & 23"	
2—Black/Shell Gray	0—Dark Cherry	2—Black	4—Maple
4—Tuscon Ivory/Desert Gold	5—Mahogany	6—Walnut	7—Oak
5—Shell Gray/Vermillion	8—Antique Cherry	9—Faber Cherry	
8—Shell Gray/Academy Blue			
9—Shell Gray/Maple Sugar			

(F) The *eighth* character indicates manual or remote tuning by the use of the letters "M" or "R."

(G) The *ninth* character indicates the type of tuning by the use of a single letter in each instance—

- V=VHF
- U=VHF plus UHF tuning
- S=Turret (strip type) tuning



The complete line of 1962 RCA TV receivers are coded in a nine digit system. Deciphering each model number code reveals the type, finish, CRT size and tuner of each set.

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The Radio Corporation of America guarantees to repair your radio or replace it with one of comparable value (at RCA's option) and supply the appropriate battery complement without charge, if ever damaged by leakage of an RCA mercury radio battery. If RCA mercury radio batteries should ever leak and damage your radio set, send radio with batteries, transportation collect to:

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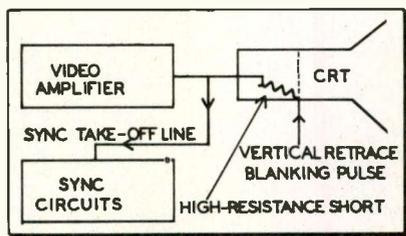


Difficult Service Jobs Described by Readers

CRT Causes Vertical Roll

A Silvertone 528-50146 TV chassis was brought to the shop with an intermittent vertical roll.

It was put on the bench, set up with a test CRT and switched on. Hours later the set was as steady



Intermittent vertical rolling in a Silvertone TV set was caused by the CRT's high cathode-control grid leakage.

as when originally turned on. After a few more hours of cooking the set was returned to the customer. As soon as the set was switched on in the house, it began rolling.

The customer's antenna was checked and reception quality observed, since trouble here could cause vertical instability. Video information was clear. Again the set was brought to the shop. With the shop CRT in place, the set locked-in strong without the least trace of weak vertical sync. The only thing left that could cause this problem in the customer's home was the customer's CRT; we went back and pulled it to the shop.

With the original CRT connected to the set the picture flipped intermittently almost as soon as the set was turned on. Using my scope I found that the vertical retrace blanking pulse at the CRT's control grid was being fed into the sync circuits through high resistance leakage between the control grid and cathode. (The leakage was high enough, however, so that CRT brightness operated normally.) Replacing the defective CRT with a new one stopped the vertical flip. —Harry Crystal, Brooklyn, N. Y.

TOUGH DOGS WANTED

\$10.00 paid for acceptable items. Use drawings to illustrate whenever necessary. A rough sketch will do. Photographs are desirable. Unacceptable items will be returned if accompanied by a stamped envelope. Send your entries to "Tough Dog" Editor, ELECTRONIC TECHNICIAN, 480 Lexington Ave., New York 17, N. Y.

Raster Disappears On Off-Channels

My customer complained that his set's raster became dim or disappeared altogether when the tuner was shifted off channel. He brought his set, an Admiral TV chassis 18XP4BZ, to my shop.

All tubes checked good. And so did all voltages in the horizontal oscillator, control and output circuits—except the plate voltage at pin 1 of the 12AU7 horizontal oscillator tube. Voltage was a little low, but the horizontal oscillator ringing coil functioned almost normal (hold control doesn't lock picture at extreme positions).

After turning the set off, I checked all resistors in the horizontal oscillator since I felt sure the

problem originated in this circuit. Resistors R-1 and R-3 both checked exactly as indicated on the schematic. However, the resistor in series with the ringing coil read 10K instead of 5.6K as shown on the diagram.

Replacing this resistor restored the set to normal operation.—Lawrence E. Jafelice, Willoughby, Ohio.

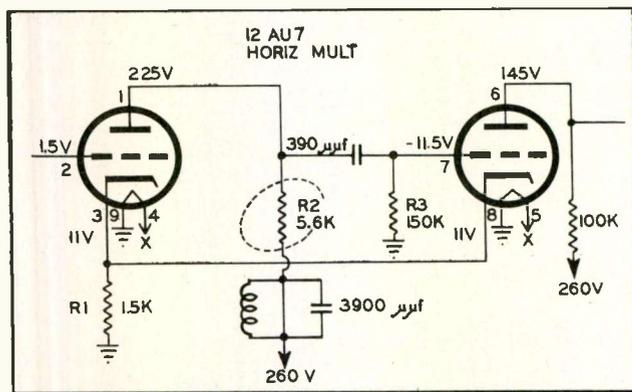
Ungrounded Tuner Twists Picture

I recently had a prolonged battle with an Admiral 19F1 (run 17). An "S" curve appeared in the picture on nearby stations, but distant stations were not affected. Also, there were a few slightly dark horizontal bars in the picture.

My caddy tube tester showed the 6AS5, audio output tube, was shorted; so was the 6BQ7 r-f tube, and one 6CB6 i-f amplifier tube. Tube replacements, however, did not correct the trouble, so I pulled the set to the shop.

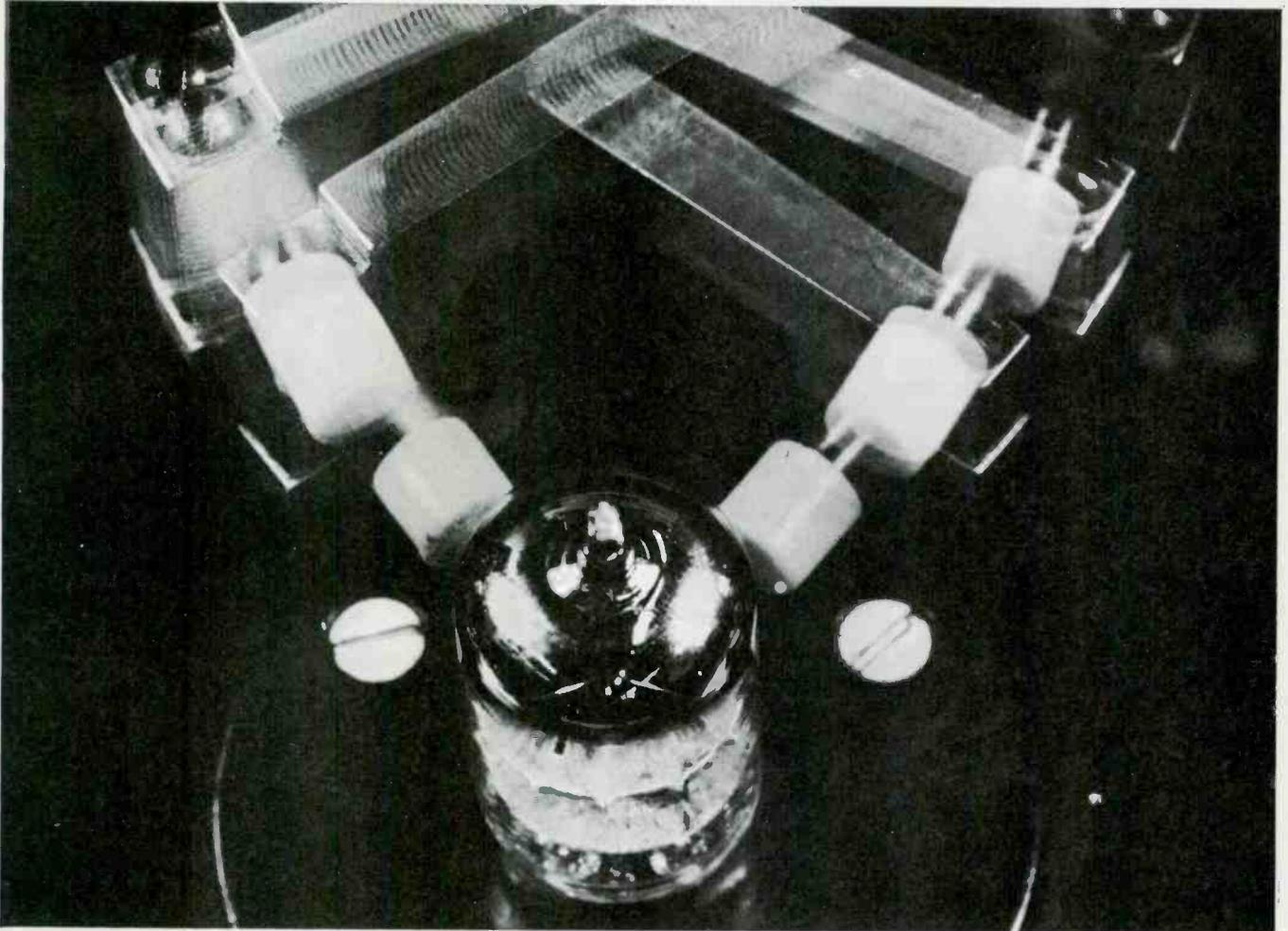
While in the shop, on a better antenna, I noticed a pulling tendency on distant stations as well. I quickly eliminated age as the trouble by substituting a bias box. Suspecting filter trouble I began checking filters with my capacitor tester.

Continued on page 81



No raster on blank channels, (Admiral 18XP4BZ) was traced to an increased-value 5.6K ringing coil resistor.

THERE'S NEW POWER IN WESTINGHOUSE TUBES



FOR EVERY TUBE- SEVERE "HAMMER" TEST PROVES WESTINGHOUSE QUALITY

Now, under a stringent program of quality-control every Westinghouse electronic tube is put through an exclusive shock test. Tubes are given repeated, uniform blows by each of two hammers—to detect shorts and any other defects which may occur during handling procedures in the plant. This final check guarantees all tubes are perfect before packing . . . assures you of more satisfied customers, repeat business, higher profits! Rigid quality-control is just one important feature that gives your distributor **NEW POWER** in Westinghouse tubes. Others include:

- **HIGHER PROFIT MARGINS**—realistic and constant—result of outstanding product quality and competitive product cost ratios.
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Westinghouse



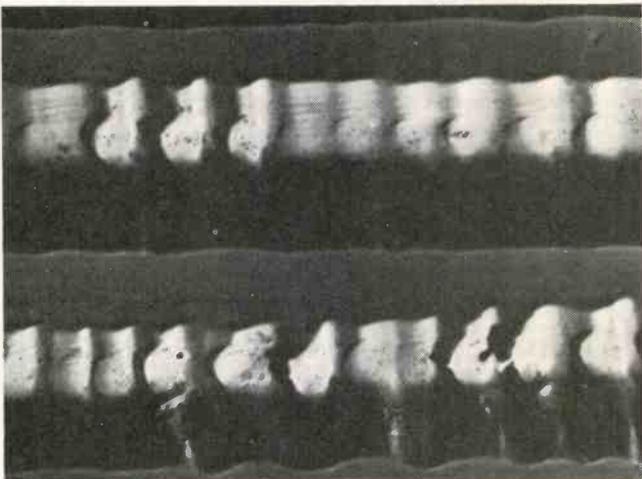
For more details, circle 31 on page 60

TUNING IN

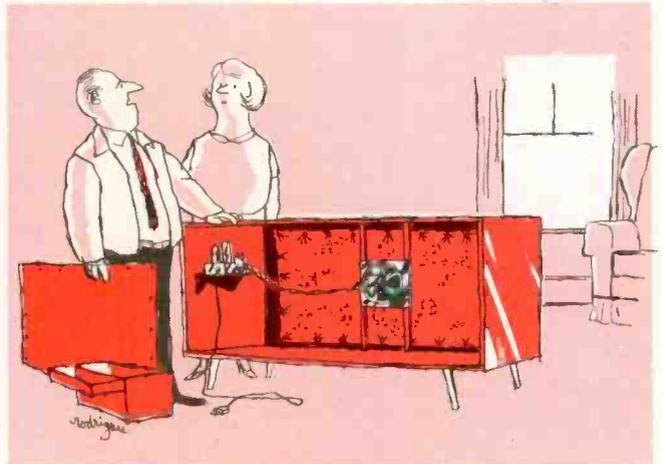
ELECTRONIC NURSE for ten patients has been developed from a system primarily designed to permit continuous and automatic gathering of physiological data of men (ultimately astronauts) under zero gravity conditions, according to Edward A. Hebditch, an official of Gulton Industries. The "nurse" could relieve understaffed hospitals. It is a monitoring system that can keep track of at least five bodily measurements of patients while one nurse sits at a machine and cares for as many as ten patients. System could cost up to \$75,000 to install, depending upon the hospital. It is estimated that a unit serving ten patients could replace four nurses a shift for a total saving of \$110,000 in yearly salary.

RADIO SERVICE WILL BE IMPROVED says National Association of Broadcasters if proposed FCC rules to allow multiple use of studio-transmitter and intercity relay systems are adopted. Using a single relay transmitter for AM, FM and TV would provide more economical station operation. However, NAB asked the Commission to spell out multi-program intercity use of a relay channel and to specify the fact that AM and FM as well as TV could be used on one frequency.

STEREO RECORD GROOVE DAMAGE



This is a magnified (300X) photomicrograph of a metal-shadowed replica of damaged grooves in a stereo record. According to a paper, presented at an Audio Engineering Society conference, much finer detail is seen with the new LP groove study technique, than with present direct microscope sightings.



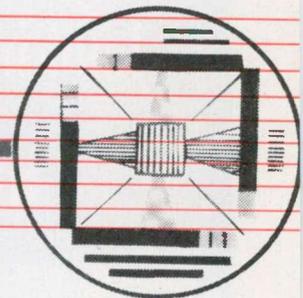
"You don't need a serviceman, lady—you need a lawyer."

NICKNAMED "ANGELS" for the past two decades were the snow-like images appearing on radarscopes. Now, science clears up the mystery with the aid of a radar filtering circuit. The "angels" are migrating birds. A study, printed in "Natural History" magazine, states the device filters out radar echoes corresponding to the size of birds. When the circuit was inserted in the experimental surveillance radar installations on South Truro, Mass., the "angels" disappeared.

MULTI-SET TV HOMES now exceed non-TV homes according to the Advertising Research Foundation. There are more multi-sets households, 6,388,000, than no-TV households. The total number of TV households has increased about 1,500,000 since the U. S. Census Bureau's May, 1960, survey. Nine out of ten American homes (89.4 percent) boast TV sets, for a total of 47,720,000 TV-equipped households. Eleven years ago there were only 5,000,000 families with their own TV sets. Other data includes: 47,720,000 TV households have 54,700,000 TV sets; 92.5 percent of the country's population, some 164 million people, are members of TV households.

COLOR TV SERVICE TRAINING is featured in an all-new service conference series inaugurated by The Magnavox Company. Included in the agenda is training on the new FM stereo radio system and the firm's new FM stereo receiving equipment. Magnavox holds day-long service conferences for its dealers

THE PICTURE



and service agencies in 101 cities from coast to coast twice each year.

EIA reports retail sales and production of both radio and TV sets dropped abruptly in July. The decrease in production was most marked, with radio output plunging to 1,030,399 sets — the lowest monthly total of the year. TV production declined to 383,378 during July, the lowest level since January. Retail sales of radios, excluding auto sets, dropped from 940,346 in June, the year's second highest month, to 697,851 in July. TV sales to consumers which stood at the 1961 high mark of 487,264 in June, fell off to 388,791 in July. Retail sales (units) statistics for first seven months are—TV: 1961, 3,027,975; 1960, 3,050,385. Radio, excluding auto radios: 1961, 5,088,031; 1960, 4,451,721. Production (units)—TV: 1961, 3,184,514; 1960, 3,231,898. TV with UHF tuner: 1961, 171,065; 1960, 259,468. Total radio: 1961, 8,567,689; 1960, 9,414,879. Auto radio: 1961, 2,701,919; 1960, 3,651,000. FM radio: 1961, 404,709, 1960, 494,540.

8-TUBE TV SET will shortly be made by Muntz TV. It utilizes 8 G-E compactrons and a Rauland specially developed 92° picture tube. The 19" set will carry a retail price of \$100.

ORGANIC SEMICONDUCTORS may result from current research by major chemical companies. Electronic manufacturers are interested because semiconducting metals, now used in transistors, rectifiers and diodes, have built-in limitations . . . and USSR reported development of a plastic transistor two years ago.

75,000 HIGH SCHOOL STUDENTS in four New England states will become acquainted with the ideology and policies of world communism, beginning November 13. The five half-hour TV programs, on alternate Mondays, are among 15 devoted to world affairs. They are being presented on WGBH-TV, the Massachusetts educational channel.

HURRICANE CARLA'S aftermath brought numerous queries on how to restore electric appliances, according to Ed Gaiden, National Service Manager of Motorola, Inc. Gaiden gives these pointers to service-

CALENDAR OF COMING EVENTS

- Nov. 14-16: Northeast Research & Engineering Meeting (NEREM), Somerset Hotel, Boston, Mass.
- Nov. 16-19: Northwest Hi-Fi, Music & Stereo Show, Audio Div. Paul Bunyan Chapter, ERA, Municipal Auditorium, Minneapolis, Minn.
- Nov. 30-Dec. 1: PGVC Conference, Professional Group on Vehicular Communications, Hotel Radisson, Minneapolis, Minn.

men: If the set does not have mud or silt in it, thoroughly dry it as quickly as possible. If the set does contain mud or silt, it should be washed out with clear water from a low pressure hose and then immediately dried. In a room at normal temperature, three to five days will be required for all components to dry thoroughly. In TV and radio, components needing special attention are transformers and remote control motors. For these, the outer shell or casing should be opened and the windings dried by forced air. Speakers generally need to be replaced due to cone damage. No appliance should be turned on until all components are thoroughly dried, and all safety checks should be made before sets are returned to customers.

ELECTRONIC KNOTHOLE



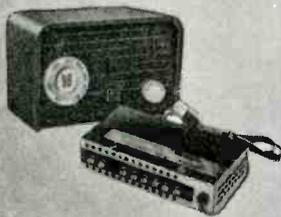
Construction kibitzers were forced off the New York City sidewalks, by traffic congestion, around Pan American's new building now under construction. To better serve these "sidewalk superintendents," Pan American Airways installed four TV monitors in a Grand Central Station lobby. The monitors were supplied by Conrac Division of Giannini Controls Corp.

Looking for better TV performance in these areas?

HOME TV • ETV • CCTV • MATV • CATV

HOME TV AND UHF

Most complete line of products to improve home TV reception - VHF or UHF. Blonder-Tongue UHF converters - model 99R for prime areas; model BTU-2S for weak signal areas; the BT-70 for translator and MPATI area conversions - are America's biggest selling UHF converters. In transistor home TV signal boosters - the AB-4 (mast-mounted) and IT-3 (indoor use) are complete home TV amplifier and distribution systems supplying signal to as many as 4 TV/FM sets. 6 different boosters - including the only UHF booster plus TV and antenna couplers round out the line.



ETV

Only Blonder-Tongue offers a complete line for ETV in which each unit is matched and integrated to bring out the best performance of the other units in the system. Important products include: Lock-Jax, an obsolescence-proof video/RF system that permits any room to be used as a TV studio or TV outlet; a variety of amplifiers, converters, splitters, tap-offs to provide multi-classroom reception.

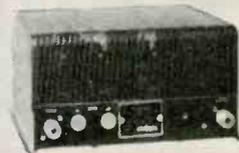
CCTV

For CCTV there are: Port-A-Studios (portable studio consoles capable of originating complete TV channels); Film Chains (to convert 16mm film into video or RF signals); manual and remote controlled transistor TV cameras; direct-view or projection monitors; video distribution equipment for flexibility and ease of operation.



MATV

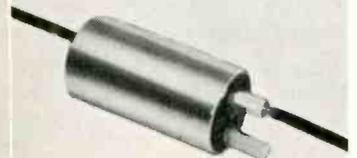
6 broadband amplifiers (transistor and tubed); 11 single channel amplifiers - 6 crystal-controlled converters and accessories (tap-offs; matching transformers; splitters; traps; filters; mixers, etc.) - the most complete product line available today. Each product engineered to do a specific job best - each matched and integrated to bring out the best in each other. With Blonder-Tongue equipment, there are no compromises - no design to cover-the-waterfront! You can select the amplifier, converter or accessory that's best suited to the job, paying for only the features the job requires.



CATV

Blonder-Tongue and its Canadian division, Benco, team up to provide a wide range of products - matched and integrated to bring the finest reception to entire communities. The Blonder-Tongue MCSc, single-channel amplifier for VHF or FM, and the Benco T-AMP-2, a cable powered transistor community system, are typical products in the line.

*Blonder-Tongue Services - our application engineering dept. offers Free System Layout. Field engineering at minimum cost.



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For more details, circle 39 on page 60



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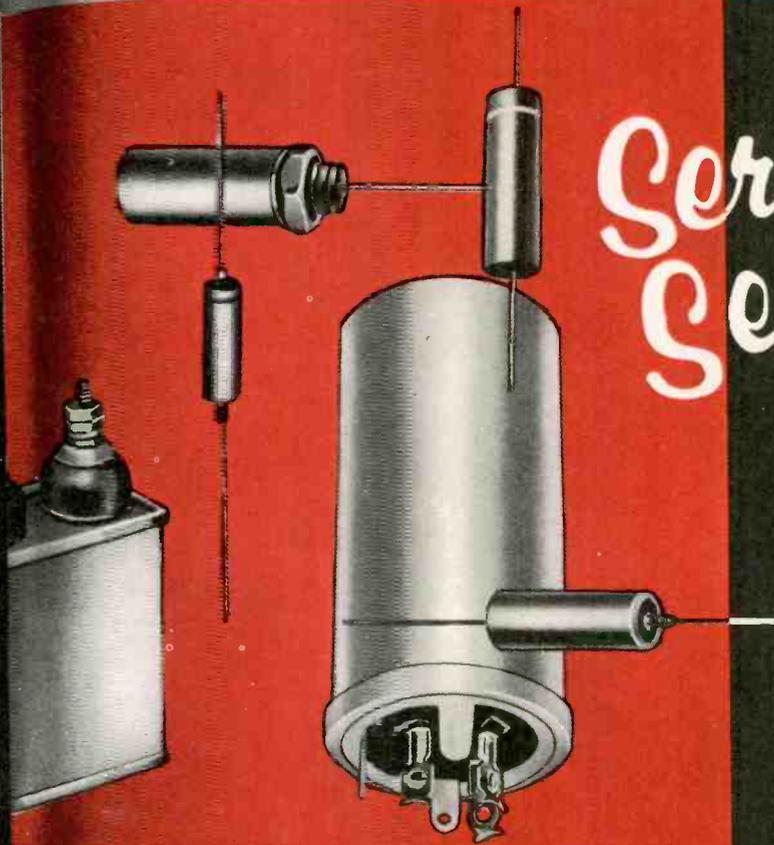
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ELECTRONIC TECHNICIAN

EDITOR'S COMMENTARY



Consumer Repair Attitude

The following letter was sent by the editor of ELECTRONIC TECHNICIAN to the editor of "CONSUMER BULLETIN" in response to an article criticizing appliance service. The points made should be of interest to all readers.

Editor
Consumer Bulletin
Consumers' Research, Inc.
Washington, New Jersey

Dear Sir:

As editor of a publication serving the electronic service industry, I was most interested in your October 1961 article, "A Homemaker Speaks." In that article, a housewife expresses her displeasure with the ways of appliance servicemen.

I am sorry that the homemaker who wrote the article ran into an unpleasant situation. However, it should be noted that, by her own admission, much of the trouble could have been avoided if she had given all of the details on operating difficulties the first time the repair request was phoned in. Furthermore, much of the trouble was billing procedure, which indicates difficulty in accounting, rather than servicing.

As a publication serving consumers, it would not be amiss for you to present the other side of the coin to readers. In particular, I would like to single out two points which indicate that much of the service problem derives from both the attitude of consumers themselves and from the very nature of a mass production society.

First, we should examine the bargain shopper who has become a major element in the consumer market. There is nothing wrong with looking for bargains and discounts. It is the way of the free market. However, the bargain shopper should recognize that it is not usually reasonable to expect something for nothing, particularly when it comes to servicing. Unlike discounts on packaged items where a small profit margin can be more than compensated by high volume, in servicing one pays for the skills and time expended by a man. Neither large scale merchandising nor costly capital equipment can substantially reduce the man hour cost of servicing, as it can be reduced in manufacturing and sales.

Unfortunately, bargain shoppers frequently

expect to get the same kind of cut rate service price as they do when they buy an appliance. A service dealer cannot stay in business very long if he takes this approach. The very nature of servicing modern appliances demands a considerable amount of a skilled technician's time. In addition to paying this technician, the consumer must also pay for transportation to the home, test equipment, parts inventory, business overhead, government taxes, and, lest we forget, a fair profit for the owner of the business. The consumer who is looking for a bargain in service often ends up paying more than the fair price to that small minority of sharp operators offering \$1 house calls. The best bargain a consumer can get in service is to pay a fair and adequate price to a reputable service dealer.

The second point is product quality. I do not doubt for one moment that the electronic industry could produce television receivers which would run for several years without any failure. With special designs, and the use of high reliability parts, this can be achieved. But would consumers be willing to pay, perhaps, the \$2,000 that such a set would have to cost? Quite reasonably, they would not. It would not be economically feasible to do so. So TV receivers are mass-produced as are cars, kitchen appliances and a host of other products. The need for periodic maintenance is built into them by the economic dictates of the consumer. Over an eight-year period, it is still more economical for a set owner to pay \$200 for his receiver, plus \$40 per year in repairs, than to lay out \$2,000 right at the start for a set with extreme reliability. TV set manufacturers strive for reliability, but of necessity this is within the economic framework of a price level that will permit mass production.

Struggling against a myriad of TV-appliances, makes, models and product designs, all with their own inherent failure problems, the service technician has done a remarkably fine job. Consumers should understand that there really are no cut rate bargains in service, and that electrical/electronic products do require periodic repairs.

Sincerely,

Al Forman

Separator, clipper, inverter and phase splitter problems analyzed

■ A TV SYNC PROBLEM can "throw" the expert at times, as well as the tyro. But a thorough understanding of sync circuitry and its basic functions can alleviate these problems.

There are a variety of symptoms indicating sync circuit faults. For example, complete loss of sync—vertical rolling and horizontal slipping; the horizontal may be slipping while the vertical locks, or, vice versa, the entire picture may have vertical "jitters."

Synchronizing signals are transmitted with, and are included in, the picture information picked up by the antenna.

The sync pulses are separated from the composite video signal by the sync separator stage. Most sets made today tap off the signal for the sync separator at the video amplifier's output.

The sync clipper or separator

tube's grid bias is adjusted so that the tube remains at cut-off for all signal amplitudes appearing below the sync pulse blanking or black level. Hence, only the sync tips pass to the tube's output. These pulses may or may not be fed to a sync amplifier tube, depending upon the sync circuit's design.

Since it may be necessary to invert the sync pulse for proper polarity at the vertical and horizontal inputs, an additional triode section—sync inverter, or combination inverter-amplifier may be used to reverse the sync pulse phase. On sets having horizontal phase detectors, a triode section of a tube, or a double diode may be used to "split" the horizontal sync signal's phase—with one phase being taken from the plate and the other phase from the cathode. The double diode may be a tube or double crystal. There are other sync circuit variations.

Because the final sync amplifier's output contains both the vertical and horizontal pulses, they must be separated from each other. This is done by inserting a low pass filter—a vertical integrator RC network—in the grid input to the vertical oscillator. This filter allows the vertical pulses to pass but blocks the horizontal pulses. And a high pass filter—horizontal differentiator RC network—in the horizontal afc/oscillator grid input circuit—allows the 15,750 cycle horizontal sync signal to pass, but the 60 cycle vertical sync signals are blocked.

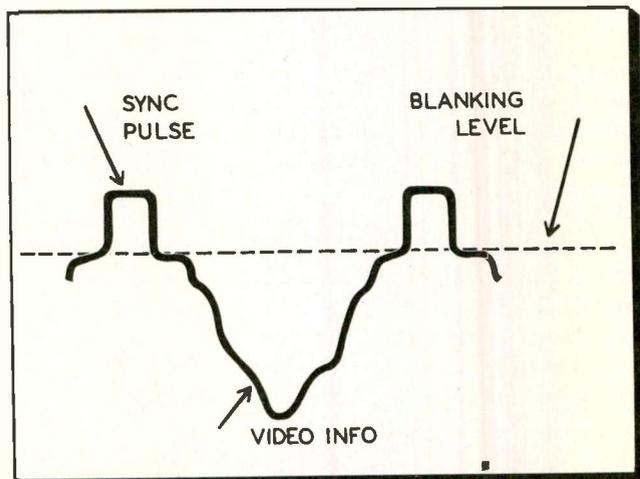
Weak Tubes

In addition to these standard sync clipper and separator configurations, modern TV sets include noise suppressing innovations to stabilize sync circuits.

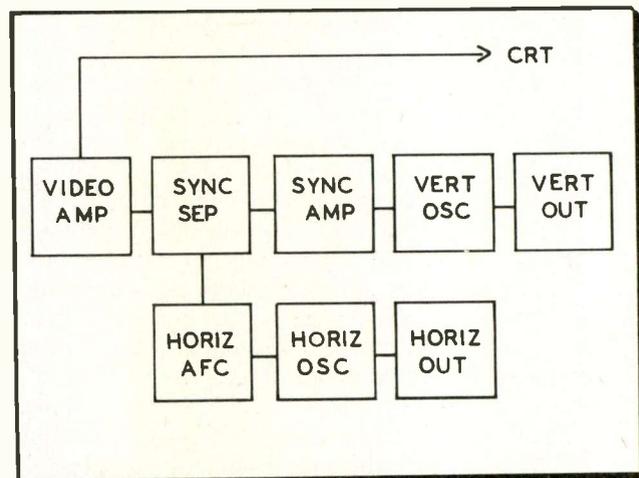
Some sync complaints can be eliminated by replacing one or more

How To Correct TV Sync Instability

by John Haskell



Sync pulses are "clipped" near blanking or black level by adjusting separator tube's grid bias at cutoff for video information.



Simplified block diagram shows sync separator and amplifier's position in relation to video amplifier, vertical and horizontal oscillators.

tubes—generally a video amplifier output tube, sync separator, inverter, horizontal afc or agc tube. But in many other cases the set must be removed to the shop for more extensive checks.

For example, referring to the ordinary sync amplifier-clipper circuit shown in Fig. 1, a number of faults can develop here to cause a wide variety of symptoms indicating sync defects. Waveforms shown are approximately correct for a normally functioning TV. The "HF" waveforms portray horizontal sync information with the scope set near 5250 cycles. "VF" waveforms show vertical information with the scope set at 30 cycles.

If C-2 or C-3 input capacitors to V-1 and V-2 should open, there would naturally be a complete loss of both vertical and horizontal sync. If either capacitor should leak or become completely shorted, it may be possible to obtain a synchronized picture (see Fig. 2B), but the horizontal and vertical range would be extremely critical. Fig. 2A shows how the screen appeared with C-2 leaking badly. Compare scope waveforms of VF-5 and HF-5 (Fig. 1) with the distorted forms shown at VF-5D and HF-5D, in Fig. 2.

Should C-4 or C-5 open, there would be a complete loss of horizontal sync. In the event either are shorted, both vertical and horizontal sync could be upset, with horizontal sync probably more drastically affected.

Check Capacitors

Leakage or a short in C-2 or C-3 can be quickly isolated by using a VOM or VTVM, since voltages at tube plates, grids and cathodes would be out of tolerance. The suspected individual capacitor could then be checked with an in-circuit capacitor checker (after turning the set off), or by clipping one end of it from the circuit and checking it for leakage under load with a volt meter, or with an ohmmeter with the set turned off.

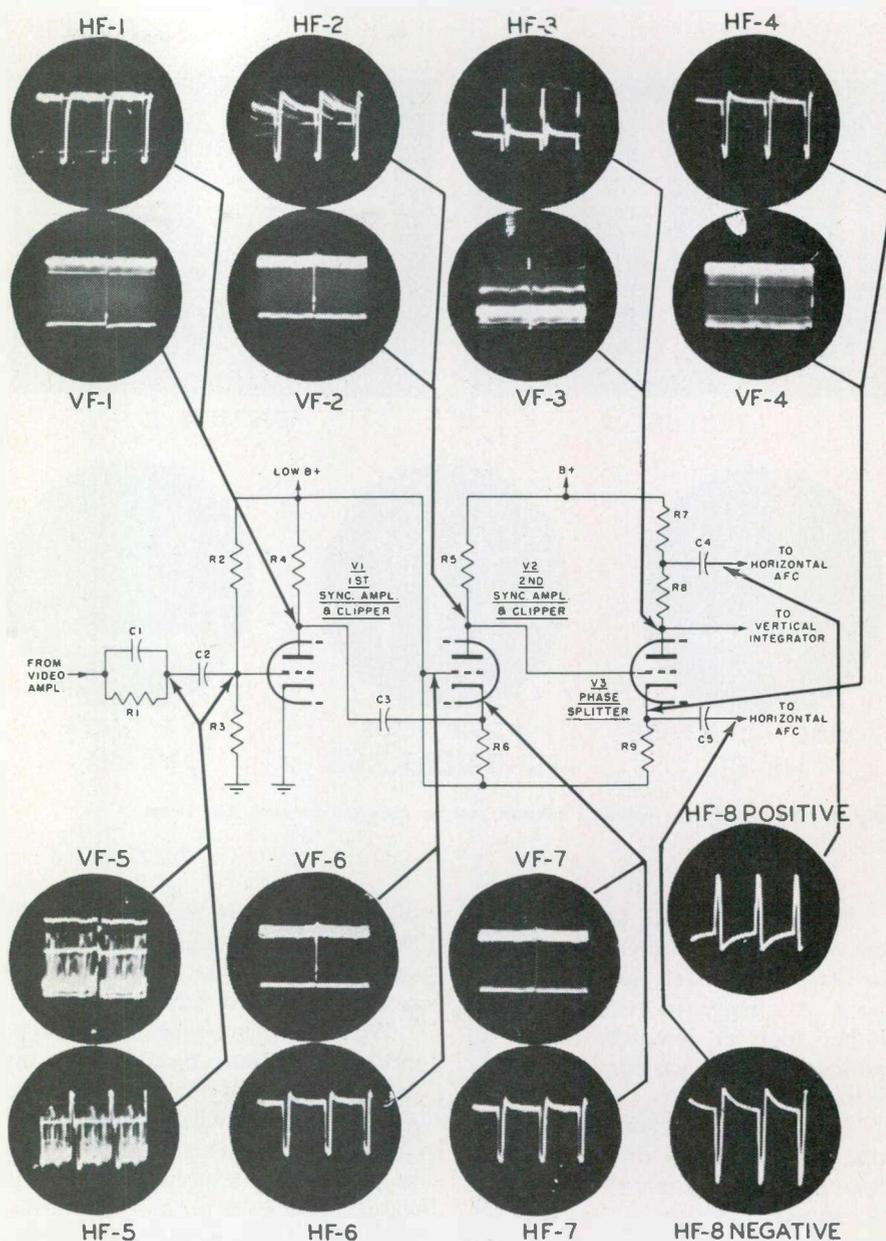


Fig. 1—Typical sync clipper-amplifier and phase splitter with normal horizontal and vertical waveforms at various points.

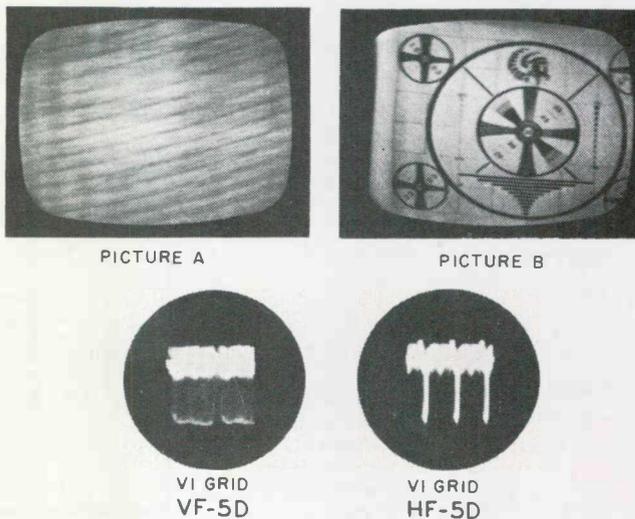
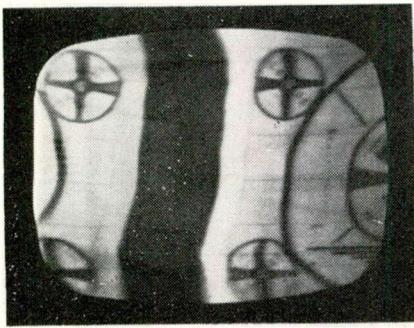
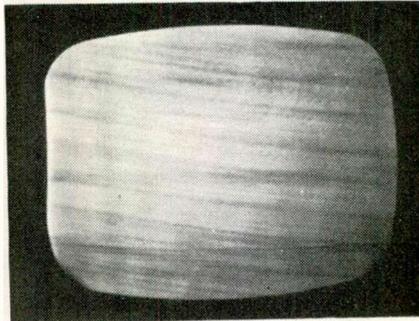


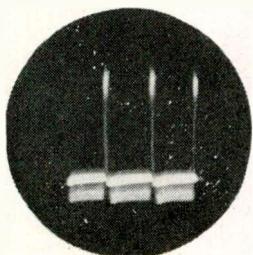
Fig. 2 — Symptoms and scope traces obtained with open sync separator input capacitor.



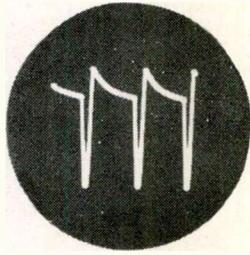
PICTURE A



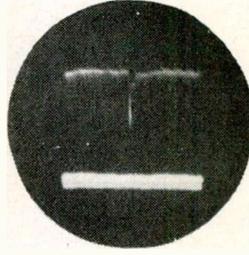
PICTURE B



JUNCTION R7-R8
HF-8D



V3 CATHODE
HF-8NEGATIVE



V3 PLATE
VF-3D

Fig. 3—Results of sync splitter's cathode resistor changing to very low value.

Sync clipper and phase splitter circuits are generally designed to operate at relatively low plate voltages. A change in resistor values, either high or low, can cause an almost infinite variety of trouble symptoms.

For example, when V-3's cathode resistor (R-9) drops to a very low value, conditions shown in Fig. 3 can exist. Picture at "A" was obtained after careful adjustment of the horizontal hold control. Compare the positive going horizontal sync pulse HF-8 (Fig. 1) with the distorted pulse shown at HF-8D, in Fig. 3. Note that V-3's cathode horizontal waveform is approximately correct in shape but its p-to-p value was very low. V-3's vertical waveform (VF-3D) was also compressed and distorted (see proper waveform at VF-3, Fig. 1), and the set's vertical sync was poor.

Dropping Resistor

Some time ago I ran into a Sylvania TV set using a combination sync separator-clipper, age rectifier, noise gate circuit using a 12AX7 and 12AU7. The customer com-

plained the set would flip vertically and shift horizontally—on strong stations. Different contrast control settings adversely affected the sync.

After checking tubes in the sync circuits without discovering any faults, I checked the waveforms as shown on the manufacturer's diagram. Waveforms at the first sync separator-clipper tube's input and output appeared normal. However, the second separator-clipper tube's output waveform was very weak.

Pulses should have been around 75 to 80 p-to-p volts. A quick check of the tube's plate voltage, and then a check of a plate dropping resistor turned up the faulty component.

Hot Intermittent

Another sync circuit job was a Traveler 36A2. This customer complained that the set played fine for about two hours and then lost both vertical and horizontal hold. This trouble could have been almost anything!

After the set operated normally for about two hours on the bench it began to slip horizontally and flip vertically. The picture quality also deteriorated.

I quickly took my VTVM's probes and checked the video output tube's voltage. It appeared to be normal. I noted that a 6C4 tube (see Fig. 4) was being used as a sync separator and d-c restorer. The VTVM showed the grid of this tube was running slightly positive. The diagram indicated zero. I clipped a .01 μ f coupling capacitor from the video output tube's plate circuit, and the capacitor read considerable d-c voltage on the clipped end! Obviously, this was the defect. It was shorting after the set operated about two hours. A new capacitor solved the problem. ■

Illustration credit: John F. Rider, Publisher, New York, N. Y.

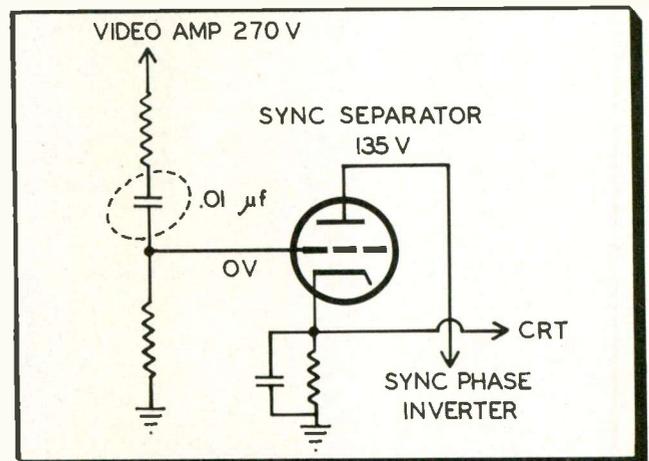


Fig. 4—A shorted capacitor at the sync separator's input caused failure of horizontal and vertical sync.

ELECTRONIC DEVICES FOR TV ANTENNAS

Signal boosters and master antenna systems promise better reception through improved signal-to-noise characteristics

■ **RADIO FREQUENCY** preamplifiers for "boosting" TV or FM signals are not new. But many new, improved models are available today. They are becoming increasingly popular in fringe and other areas where TV or FM antenna gains are inadequate for normal reception of one or more sets.

These preamplifiers are available for mounting on the antenna boom, on the mast, on the house wall or for attaching to the receiving equipment. They may be designed with tubes or transistors. Power supplies are usually mounted on or near the equipment in the home. Some antenna-mounted boosters may have the d-c power supply integrated within the booster itself, with a 117v step-down supply at the set which furnishes 24 to 28 v a-c to the booster. Others may power the preamp with batteries located in the remote (set-mounted) power supply unit.

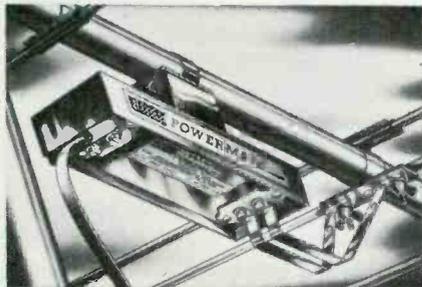
Signal outputs for one or more sets are provided on multi-set couplers incorporated in the remote, set-attached power supply. Low-cost 4-set transistor master antenna systems are available, too, that are attached directly to the TV set. Of course, amplifiers are also available

for master-antenna operation of a hundred or more sets when units are combined into a multiple system. And the amplifiers are available in narrow-band types for single-channel reception, or in broadband types for amplifying signals over a number of channels. Some are equipped with a gain control adjustment.

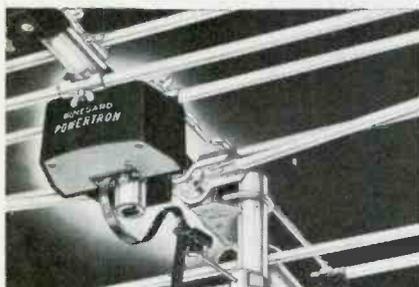
Gain from TV preamplifiers generally ranges from about 6 to 20 db—depending upon the unit's design, and the particular frequency of the channel being received. This presents voltage gain from about two to ten times over that being picked up by the antenna.

Suppose a TV set operating in a very poor reception area has a high gain antenna which provides 100 microvolts of usable signal to the TV set from a certain distant station. However, this particular TV set requires 200 microvolts for a reasonably snow-free picture. An amplifier with a 6 or 8-db gain would supply the necessary additional signal for satisfactory reception of the distant station.

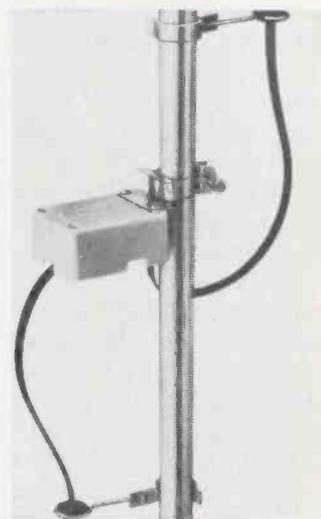
Another example can demonstrate other possible advantages of preamplifiers. Suppose a high gain fringe area antenna's location is



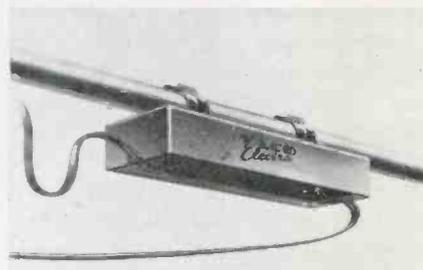
Jerrold's "Powermate" APM-101 antenna-mounted transistorized preamplifier.



Winegards "Powertron" antenna mounted preamplifier has a twin-triode tube.



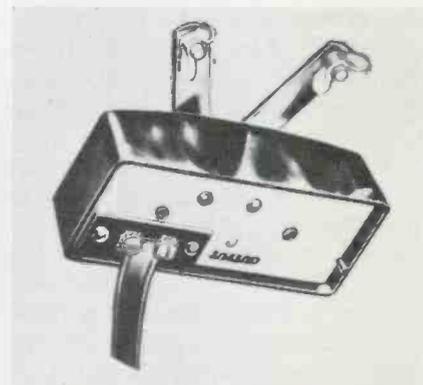
Blonder Tongue's AB-4 "Signal Master" mast-mounted transistorized preamplifier.



Taco's "T-Bird Electra" transistorized antenna-mounted preamplifier.



Channel Master's "Jetron" 0020 antenna-mounted transistorized preamplifier.



JFD's TNT-25 transistorized antenna-mounted preamplifier.

somewhat below the transmitter's line-of-sight. The diffracted signal varies and the picture has "snow" most of the time, but with some signal always remaining above the noise level.

Assume, in this case, it has previously been determined that reception could be improved by installing a high antenna mast or stacking antennas. It may be possible to solve this and comparable problems satisfactorily by installing a high-gain preamplifier, leaving the antenna as is. An enterprising technician would be prepared with a sample amplifier to demonstrate improved reception to his customer.

Of course, a preamplifier cannot boost a signal which isn't present. If the signal is riding at or below the noise level, it is doubtful if the preamplifier will help. Useful signal for the preamplifier's input is naturally that amount which appears above the noise level.

It may be wise to consider some other factors when selecting a TV or FM r-f preamplifier for an individual application.

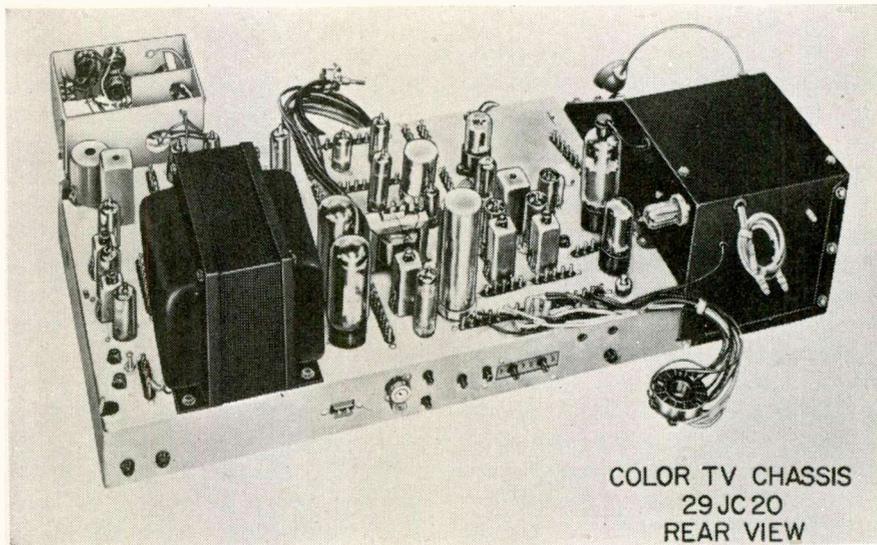
For instance, if the receiver's location has a high ambient noise level and the feedline is unusually long, it may prove advantageous to use a preamplifier mounted directly on the antenna boom. This assumes, of course, that the amplifier meets all other requirements of the particular application. Antenna feed-lines can pick up considerable noise. Hence, antenna-mounted preamps can provide higher signal-to-noise ratio.

It may also be advisable, under certain critical conditions, to investigate the preamplifier's signal-to-noise design characteristics. These characteristics vary in different amplifiers. If this information is not included with regular specifications, the preamp's manufacturer will usually furnish it on request.

Recent developments forecast wider public acceptance of color TV. And color TV's signal requirements are even more demanding than black and white. Equally significant is the fast-growing infant—FM multiplexing. It also demands higher antenna-signal standards.

The antenna preamplifier's future appears bright. ■

Analyzing a New COLOR TV



Zenith's new 29JC20 color TV chassis

■ A SUBSTANTIAL number of manufacturers are selling color TV sets. One of the latest sets being marketed is Zenith Radio Corp.'s color TV receiver (see circuit diagram in this issue's *Circuit Digest* section).

How It Works

Zenith's video i-f channel consists of three amplification stages that use three tubes: two 6EH7's and a 6EJ7. A 45.75 mc carrier, 42.17 mc color sub-carrier and a 41.25 mc sound i-f carrier are used.

The first and second stages are tuned to the video and subcarrier frequency sides of the video i-f response curve. Thus, the sound carrier is kept at a low amplitude to prevent cross-modulation between the sound and color sub-carrier.

A 6GH8-6AU6 color amplifier system is used to secure color information from the composite video signal. The stagger-tuned color amplifiers provide an essentially flat response of one megacycle.

Since it is also desirable to have the color amplifier system inoperative during black and white transmissions, circuitry to prevent color streaks is included. Automatic bias voltage from the color killer stage is applied directly to the control grid of the second color amplifier tube.

During color reception the color killer function is cut off, permitting the color output stage to conduct and amplify the color signal.

A push-pull switch on the rear of the color level control can be used by the set owner to turn color on or off without disturbing the setting of the color level. Engaging the color off switch causes the killer bias voltage to be applied to the color output tube. This enables the viewer to see a color show in black and white if desired, or, to operate his receiver as a black and white set should the color portion require servicing.

In the color synchronizing stages,

one-half of a 6GH8 is used as the 3.58 mc color oscillator, while the other half functions as a reactance control for the oscillator. Adjustment of a variable coil in the oscillator section determines the oscillator's frequency while the crystal in the oscillator section maintains frequency stability. Phase is controlled by an afc phase detector circuit in conjunction with the reactance tube.

Output of the oscillator is coupled to the primary of a tuneable transformer with two secondary windings. Operation of this circuit is similar to the afc circuit in the horizontal oscillator system.

In addition, a new color demodulator system is included. Two 6JH-8's, used as (R-Y) and (B-Y) color demodulators, provide balanced output signals of both positive and negative polarities. This eliminates the need for phase-inverter stages to obtain (G-Y) following the demodulators. The (G-Y) signal is recovered from the negative outputs of the two demodulators. The three color difference signals (R-Y), (B-Y), and (G-Y) are fed to the respective CRT color grids. Matrix-

ing is then accomplished in the CRT, resulting in the proper beam intensities for correct reproduction of red, blue and green.

A convergence clover leaf assembly has been developed for use with the three gun shadow mask cathode ray tube. It is a one-piece plastic unit which mounts three coils and three out of four static convergence PM magnets around the CRT's neck. These are adjusted for convergence in the center area of the CRT only, even though they affect the entire raster. A fourth magnet (blue) located near the CRT's base affects the lateral movement of the blue electron beam. It also moves the green and red beams in the opposite lateral direction.

A new focus voltage adjustment circuit, which consists of a focus adjustment coil, damping resistor and capacitor, is also used. A sine wave of approximately 2000 volts peak-to-peak is developed at the horizontal frequency, with a pulsed voltage of about 4500 volts peak-to-peak added. Adjusting the coil causes a phase shift of the sine wave, shifting its position in relation to the pulse.

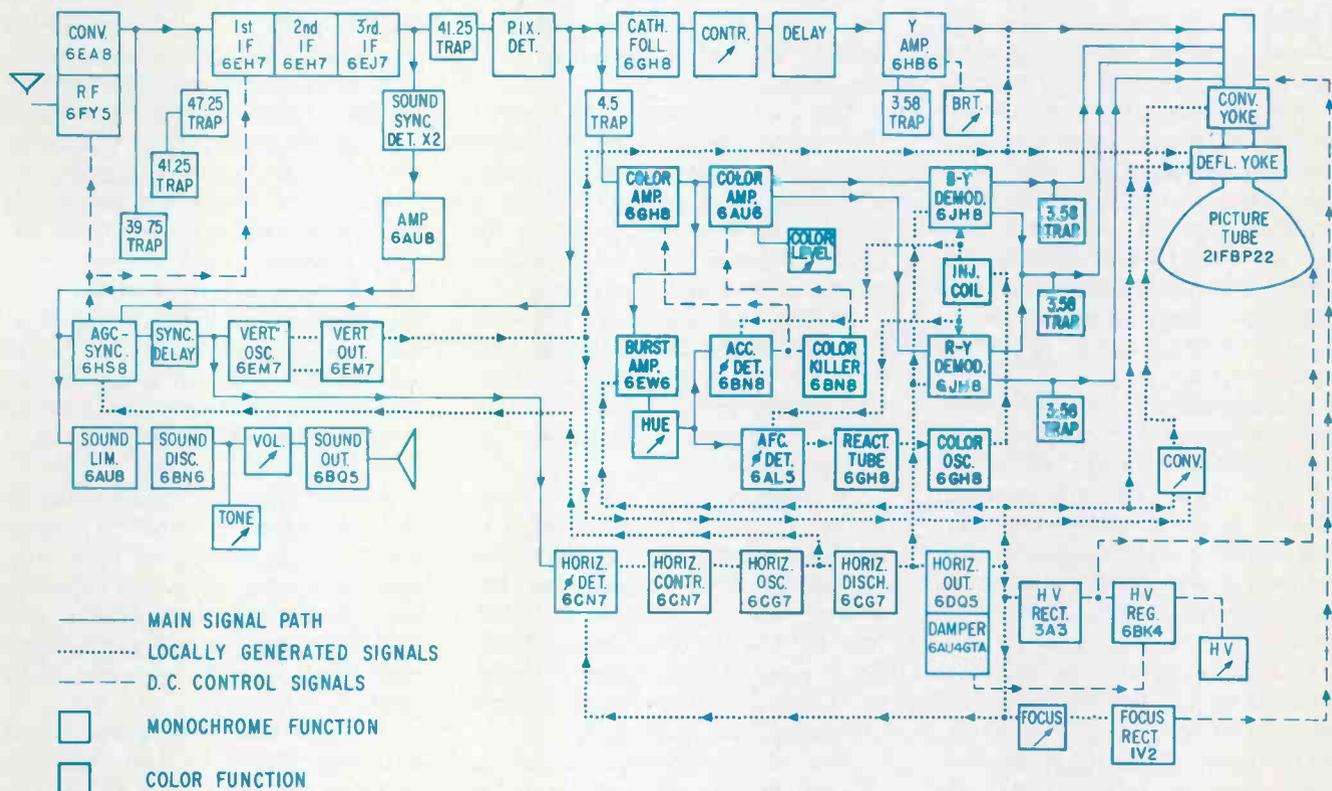
Thus, the setting of the coil determines the over-all peak-to-peak value of the voltage fed to the focus voltage rectifier. Approximately 4900 volts d-c is required for adequate focus.

Service

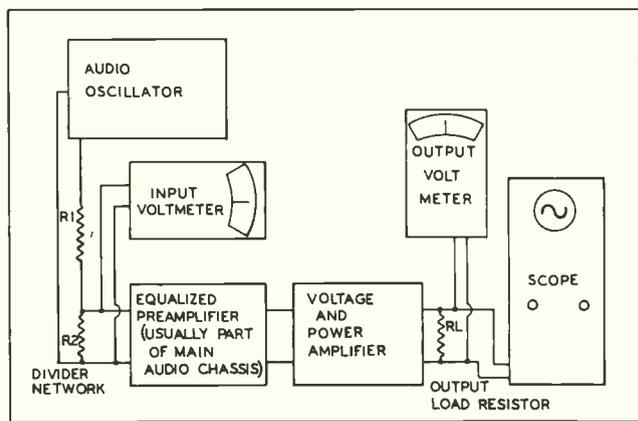
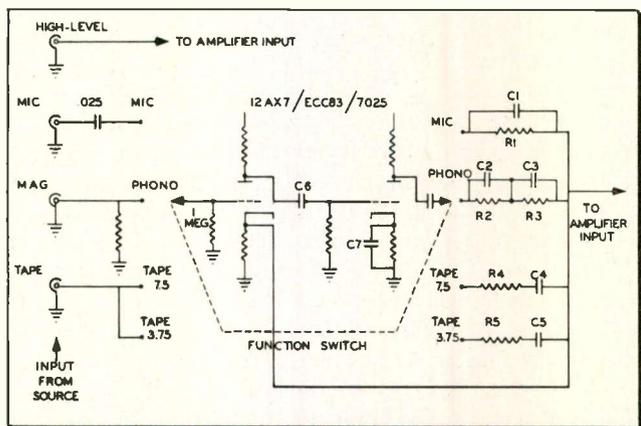
Twelve convergence adjustments are located on a dynamic convergence panel and receive signals from the vertical and horizontal sweep sections. Three controls each are used for convergence at the top of the raster, bottom of the raster, left side of the raster and right side of the raster.

The Zenith picture centering system is adjusted in a manner similar to that of their B&W black and white centering device. The tuner is a plug-in type so it can be removed for easy service.

The color receiver's back can be removed by turning one screw and 5 turn buttons. Consequently, tube replacement for home TV technicians is simplified. Also, a metal cone terminal system is employed whereby all check points for servicing are located on top of the chassis. ■



Examining Hi-Fi



Schematic of a typical preamplifier with switch for selecting source and equalization. Both functions may be ganged to one control.

Block diagram of test set-up for checking preamplifier and amplifier characteristics. Divider network (R-1/R-2) is extremely important.

Operation, problems, test set-up and checking procedures

by *Mannie Horowitz*
Electronic Instrument Co.

■ A HIGH FIDELITY preamplifier is the nerve center of a hi-fi system. In effect, it is a control amplifier.

Besides typical control functions, such as selection of signal sources, volume and tone controls, etc., it amplifies extremely small signals of magnetic cartridges and tape playback heads, among others, to drive a power amplifier satisfactorily. It also provides correct equalization. That is, it compensates for bass and treble recording deviations, which would otherwise result in untrue sound playback.

A preamplifier (or preamplifier section if it's part of a single-chassis power amplifier) can be subdivided into two signal strength sections: low-level amplifier section and high-level amplifier section. The first section, which will be discussed here, has an output voltage of about 0.5 volts.

This preamplifier stage increases electrical signals which are in the lower millivolts region. For example, outputs from magnetic cartridges average 5 millivolts) and

tape heads average 2 millivolts. High output devices, such as tuners, generally bypass this initial amplification stage. The second amplification stage includes controls and filters. The timer's high output, about 0.5 volts, is sufficient to drive the rest of the amplifier to full output.

The basic preamplifier circuit shown here, with slight variations, has been generally adopted by manufacturers. The circuit features a switched input and equalization for proper reproduction from microphone, phono and tape head.

Inverse feedback is provided from the output of the second tube back to the cathode of the first. Component values in the RC networks determine the various response curves.

Microphone stage gain is controlled by the amount of negative feedback determined by the value of resistor R-1. Because no frequency compensation is required, only the resistor is used in the feedback loop. To maintain stability, C-1 controls the high frequency roll-off outside the audio range.

The phono response curve is shaped by two RC networks in

series: R-2/C-2 and R-3/C-3. Tape head equalization networks R-4/C-4 and R-5/C-5 determine response curves for 7½ and 3¾ ips speeds.

Troubleshooting procedures with preamplifiers are conventional in most respects as far as circuits are concerned. Naturally, tube plates, cathodes and grid voltages must be proper so that the various sections will operate on the linear portion of the tubes' characteristic curves.

Hum is a frequent problem. In addition to leaking power supply filters, excessive hum is frequently caused by a defective tube. Careful selection of tubes is normally required. A good 7025 or ECC83 will usually clean up this problem. Readjustment of the hum-bucking control is often required when a tube is replaced.

Always load the inputs down to the equivalent transducer impedance before measuring hum voltage. A resistor of 3,000 ohms in the phono and tape inputs and 470,000 ohms in the microphone input, will provide optimum input loads.

The tape head or magnetic phono cartridge should be connected directly to the appropriate input. The

Preamplifiers

phono motor and chassis as well as the tape mechanism must also be grounded to the amplifier chassis to avoid buzz or hum. These should be connected through individual grounds to the amplifier chassis, and should *not* use the signal ground from the head or cartridge.

In stereo amplifier systems, other problems arise. Two signal grounds must come from the tape head or cartridge—one for each stereo channel. When the grounds at the cartridge are separate (individual for each channel), no hum problems occur.

If the two grounds are connected together at the cartridge, either internally or externally, the shield sleeve from only one of the shielded cables should be connected to the ground at the cartridge. Both shield sleeves should be connected to the ground at the preamplifier. In any case, a separately independent ground must be connected from the mechanism to the preamplifier chassis.

Problems can also arise in any of the input switching positions. Excess low frequency rolloff may be caused by a defective capacitor (C-6 or C-7). Also common high frequency rolloff may be caused by leakage in the shielded cables usually employed in this type preamplifier.

The test set-up shown here can be used to check the over-all preamplifier, voltage amplifier, power amplifier characteristics.

Note that a divider network is inserted between the signal generator and the preamplifier stage. This network should be added externally to an oscillator when testing high gain, high sensitivity preamplifier stages.

Furthermore, the usable minimum output from most oscillators is between 0.1 and 0.7 volt. If a lower voltage is required, it is not sufficient merely to turn down the output control. At extremely low settings of this control, operation

may become erratic, since signal-to-hum ratio also decreases.

By placing a divider network at the output of the oscillator you will permit level control settings to be reasonably smooth over its rotation range.

Ratio of the divider network's two resistors (R-1 and R-2) should be about 100:1. The larger resistor should be about ten times the generator's output impedance to avoid loading down the oscillator. An input monitor meter, connected across the smaller resistor, indicates voltage being fed to the preamplifier. Final adjustment of this voltage can be made with the level control on the signal generator.

Another factor to be observed is the output. Noting it on the scope, the output signal must never reach

the point of distortion at any frequency. If it does, the output meter reading will not be valid.

To determine the preamplifier's accuracy, its response is checked against the curves shown here while using the previously mentioned test set-up.

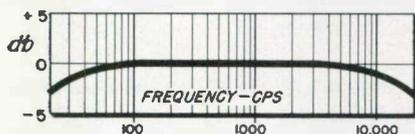
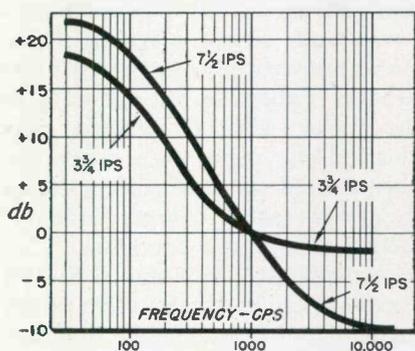
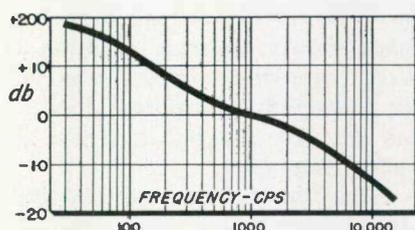
The test procedure is straightforward. All frequency compensating controls on the amplifier are set for maximum flat position. Set the level control on the signal generator so that 1000 cycle signal will read at a convenient point on the output meter. Note this reading in db's.

Now switch to various convenient frequencies throughout the range, keeping the input voltage constant. Note the variation from the db reading at 1000 cycles. If this variation agrees with the curves—within 2-db—from 50 to 10,000 cycles, and within 3½-db, from 20 to 30, and from 10,000 to 15,000 cycles, preamp characteristics are accurate.

To check gain, set the input to 1000 cycles. Then turn the level and loudness controls on the amplifier to maximum. Input voltage should be as indicated on the particular manufacturer's service specifications. If the output meter reads the amplifier's rated output, gain is normal.

Since gain varies over the audio spectrum, all gains are specified at 1000 cycles. Gain varies considerably at other frequencies, following a predetermined curve. The curves are fitted to the standard recording characteristics as well as transducer response. Setting 1000 cycles as the 0-db level, the ideal variation around this level is shown in the appropriate transducer graph.

Although the curves shown are ideal, many manufacturers roll off the high frequency end in the microphone preamplifier in the interest of stability and low noise. Insufficient bass boost in the tape and phono position are usually provided to improve the hum characteristic. ■



A preamplifier's response curve with magnetic phono cartridge input (top). (Middle) Frequency response curves for preamplifier at two tape-head speeds. (Bottom) Microphone preamplifier's response curve. Flat portion may be extended further with some equipment.

■ **TEST EQUIPMENT** manufacturers are continually introducing new instruments that can simplify electronic service work. Some are improved versions of older models. Others, however, incorporate new test functions and/or practical innovations to enable service dealers to repair audio, radio and television sets faster than previously possible. Some instruments in this latter category are described here.

RCA, Power-Line Monitor, Model WV-120A at \$14.95—Here's a new piece of equipment for an electronic service shop. It's an a-c line-voltage watchdog.

Technicians know that either excessively low or high line-voltage can create many unnecessary problems in radio-TV servicing. For example, low voltage can cause a multitude of false trouble symptoms such as: horizontal drift, insufficient height, etc. Excessively high voltage, on the other hand, can damage some components. Thus, it's important to know when the line-voltage dips or rises at all times. This is the Power-Line Monitor's forte—it offers *continuous* a-c voltage readings.

It's easy to read the meter from a distance of ten feet or more. The meter has an expanded BIG scale for this purpose. Additionally, the meter's pointer tip is wide for easy distance reading and the 120 standard line volts number is printed in red.

The meter face is marked from 100 to 140 a-c volts. It has a 25 to 400 cps frequency range. Accuracy at normal room temperatures is: $\pm 2\%$ at 120 volts and $\pm 3\%$ at 100 and 140 volts, which are the extreme voltage reading points of the unit. The instrument has a moving-vane type meter which indicates rms values even when the waveform is distorted. Meter movement is only slightly damped to permit fast meter action that reveals line-voltage bounce and fluctuations. We observed many slight variations in voltage with only casual glances at the prominent meter face. For instance, we noted a distinct pointer movement of only $\frac{1}{2}$ volt.

The instrument has mounting

New Test Instruments for



RCA's Power-Line Monitor provides continuous line-voltage readings on an expanded meter scale. Quickly reveals fluctuations.

holes at the rear of its case so that it can be hung in a location with the best visibility. It should be mounted in an upright position, by the way, for highest accuracy. The manufacturer suggests allowing at least five minutes for warm-up. After this initial warm-up period, it can be left plugged into an a-c outlet indefinitely.

Since the voltage monitor utilizes a moving-vane type meter, the user should keep the instrument away from strong magnetic fields such as developed from power transformers. Otherwise, the accuracy of the meter will be affected. The clear plastic meter face cover has been treated with anti-static solution to prevent static charges from affecting the meter's operation.

An adjustable 500 ohm, 100 watt rheostat permits recalibration of the meter if it is required for any reason. A reference standard is needed, however.

Sencore, VTVM/VOM Combination, Model SM-112 at \$69.95—Who says you can't have your cake and eat it too? This notable instrument combines a VTVM and a VOM in one unit. Thus, the advantages of both are offered: The VTM's high input impedance

doesn't change circuit conditions and the VOM's battery-powered supply eliminates the need for a 115-volt a-c outlet. A simple flip of a switch selects which one is used.

In addition to the obvious utility of a two-in-one instrument like this, the manufacturer has incorporated some practical features that should delight owners. For example, a neon indicating arrow points out which VTVM scale to read. Thus, you can't read the wrong scale by mistake when the function knob position is changed. Further, you don't lose time floundering around for the right scale every time you take your eyes off the scale to apply a test probe to a circuit point.

Another feature of the Service Master is an easy-to-read giant meter scale. The half-foot wide scale has peak-to-peak readings printed in red. Also, VOM scales have a light gray overlay color to further simplify readings.

A single test lead and ground lead, permanently secured, relieves users of plugging and unplugging leads which is an annoying time consumer. Two 115-volt a-c outlets are provided, too, in the event that outlets aren't available.

The reasonably-sized unit is encased in an attractive steel case with a detachable protective cover. A metal carrying handle and special lead storage compartment completes the thoughtful packaging of this instrument. Oh, yes, one more consideration included by the manufacturer can be most helpful. The inside of the protective case cover is jammed with needed, but frequently forgotten, circuit data. Fingertip service information includes transformer hook-up data, transistor testing guide, resistor color codes, etc.

The meter movement is 200 mi-

Bench and Caddy

croamp, $\pm 2\%$. The VOM and VTVM a-c and d-c voltage ranges, on six scales, are from 0 to 1000 volts. (An accessory high voltage probe that fits on the end of the instrument's permanent test lead permits measuring TV 2nd anode voltage.) The VTVM also has six peak-to-peak ranges from 0 to 2800 volts and a zero center scale for discriminator alignment. The VTVM has six resistance ranges, from 0 to 1000 megohm; the VOM has two ranges, from 0 to 1 megohm. The VOM also has current readings on one scale, from 0 to 1000 milliamps.

Accuracy is: 3% on d-c volts, 5% a-c volts. Circuit loading is 10 megohms on highest range. VOM's sensitivity is 5000 ohms. The VTVM utilizes a 12AU7 and 6BN8 tube; the VOM part of the instrument uses one $1\frac{1}{2}$ volt "D" cell.

Paco, In-Circuit Capacitor Tester, Model C-25W at \$29.95—Defective capacitors are difficult to detect. Unless they're severely affecting circuit voltages it's often necessary to disconnect one end to check them. Obviously, this is a bothersome (and sometimes messy) method. An *in-circuit* capacitor checker can, in many instances, locate a defective capacitor without a technician unsoldering or cutting one of its leads.

Paco's in-circuit capacitor tester is an excellent example of this type instrument. It reveals open (as low as $5 \mu\text{f}$) or shorted capacitors, including electrolytics, without removing components from the circuit. In addition, it measures the capacity of electrolytics from $2 \mu\text{f}$ to $400 \mu\text{f}$.

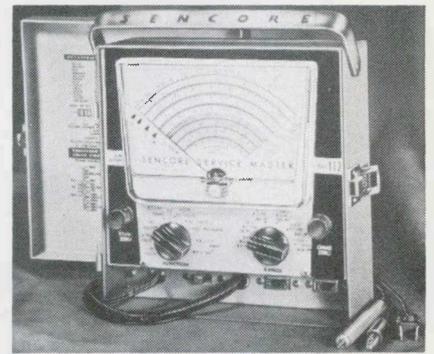
The instrument uses an EM-84 tuning eye tube as an indicator. Test indications are simple. If the green fluorescent eye closes when

testing non-electrolytic capacitors, such as coupling or bypass capacitors, the capacitor is defective. A defective electrolytic capacitor, on the other hand, is indicated by no eye movement. The electrolytic automatically indicates that it isn't open or shorted if a capacity reading can be obtained. The capacity reading, by the way, is shown on a calibrated scale. A dual pot control knob is adjusted for minimum eye opening.

Operation of the circuit is simple. When the function switch is placed in the SHORT TEST position, and a shorted capacitor is connected across the clip probes, the 6C4 oscillator tube's grid voltage is physically shorted to ground through a small resistive load, and becomes zero. This causes the 6C4 plate voltage to increase. Since the EM84 grid is connected direct to the 6C4 plate, a sharp rise in the EM84's plate current causes the "eye" to close.

When the switch is in the OPEN

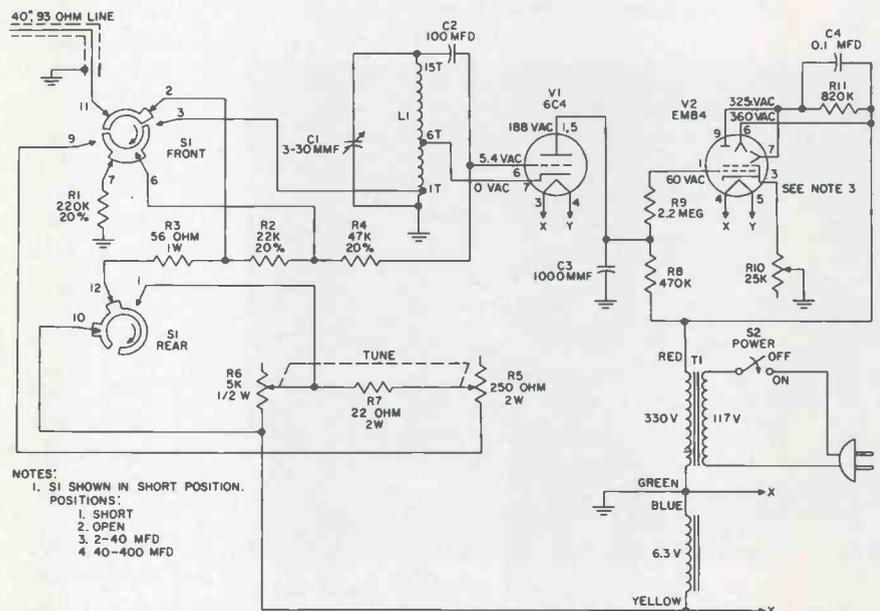
Continued on page 54



Sencore's "Service Master" combines a VTVM and VOM in one unit. One of its many helpful features includes neon-lighting arrows which indicate the right VTVM scale to read.

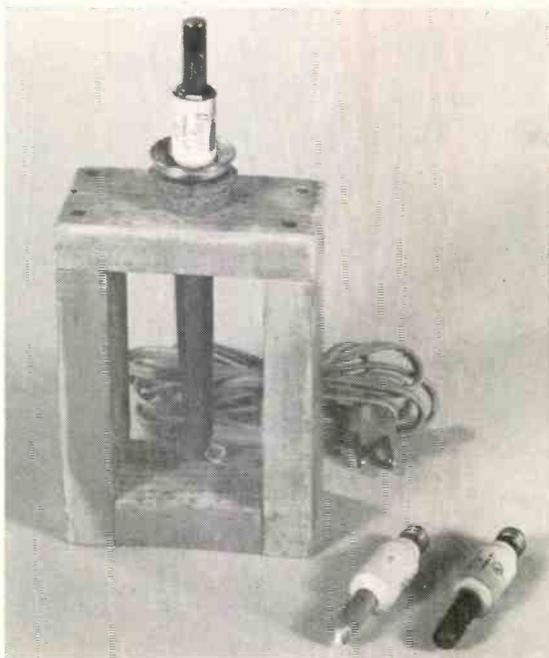


Paco's "In-Circuit" Capacitor Tester checks bypass and coupling capacitors, and electrolytics for shorts and opens without disconnecting them. Also identifies capacitance of electrolytics.





An i-f transformer is easily removed from shirt-pocket radio with solder pot.



Stand used for holding solder pot. The left element at lower right has a shallow well drilled in its tip.



Bridging badly damaged PC wiring with a piece of hook-up wire is usually the best and easiest way to make the repair.

REPLACING

Soldering pot, tuning "paddle" and

■ SMALLER, smaller and still smaller—that's the trend of portable radio design today. It's a trend that started with the development of the transistor.

In 1961, over five million American-made transistor sets are expected to be sold. The sheer quantity of such radios in every-day use makes it a safe bet that they'll be showing up on service benches in increasing numbers.

The service problem these days, particularly with miniature portables, is: what to do about the defect after you've found it with transistor testers, analyzers and VOM or VTVM instruments. All of today's portables employ printed circuit construction. In units where all the parts of a 6-transistor set must be crowded on a chassis little larger than a silver dollar, there's hardly enough room for test prods, let alone conventional tools such as long-nosed pliers or diagonal cutters.

Moreover, in order to give the over-all chassis a degree of reliability matching that of its transistors, common manufacturing practice is to bend the component leads on the foil side of the board, before soldering, to make a more secure mechanical connection. This makes the removal of most small parts a time consuming procedure. It often leads to damaging the suspected part or adjacent components, because patience is frequently supplanted by the "brute force" technique while trying to extricate a part.

In recognition of this problem, some manufacturers have instituted designs facilitating parts removal. For example, one manufacturer plates the copper laminate through each hole to form an eyelet through which the component lead is passed. During soldering, the molten solder flows readily through the copper eyelet and provides a rivet-like solder connection.

Compared with conventional type boards, this technique gives added strength to the connection, so that there is no need for bending or crimping the leads. As a result, each component can easily be lifted from the board, merely by heating the bottom of the foil to melt the solder.

Printed Circuit Repairs

Although the aforementioned PC manufacturing method simplifies removal of small parts, such as resistors and capacitors, with an ordinary soldering iron, the removal of multi-prong parts calls for special methods. Where two or more connections must be heated simultaneously to remove a particular component, a solder pot is an almost indispensable implement. The

COMPONENTS in Transistor Radios

other specialized techniques aid repairs

by Lothar Stern

molten solder in the pot makes intimate contact with all connections so that the part can easily be lifted out.

Standard commercial solder pots are relatively large. It takes considerable time to bring them up to proper operating temperature and, if left on continuously, there is some hazard in accidental solder splashing. Moreover, when used to repair today's subminiature sets, they cover such a large area of the chassis that careful inspection is required to locate possible solder shorts caused by bridging of closely adjacent plated foils. These, of course, can usually be eliminated with a stiff wire brush, but, again, much valuable time is often expended in this procedure.

A home-made solder pot which circumvents most objections can be constructed. This pot is small enough to permit localization of the unsoldering operation to a small portion of the chassis. It holds so little solder that the associated hazards are greatly reduced. It heats up quickly and should be turned on and off as required. It's so simple and inexpensive to make that it will quickly repay the serviceman for the time used in its construction.

To make the pot, simply take a suitable 37½ watt iron, remove the soldering tip and drill a shallow hole in the tip receptacle using a 7/32" drill. The hole should be only as deep as the lip of the drill bit, as no advantage is gained by making it deeper.

The iron can be held firmly in an upright position by wedging it into a 1" hole drilled in a simple wooden frame. Alternatively, a hole drilled into one end of the workbench serves a similar purpose, but at the expense of mobility.

In use, the cord of the iron is plugged into the line outlet and the shallow "well" is filled to the brim with molten solder. Use enough solder so that a convex "bubble" is formed above the rim of the pot to eliminate the need of actually touching the rim with the board. This assures a good solder contact with the various points of a small multi-pronged component, and makes for quick and easy removal of the defective part.

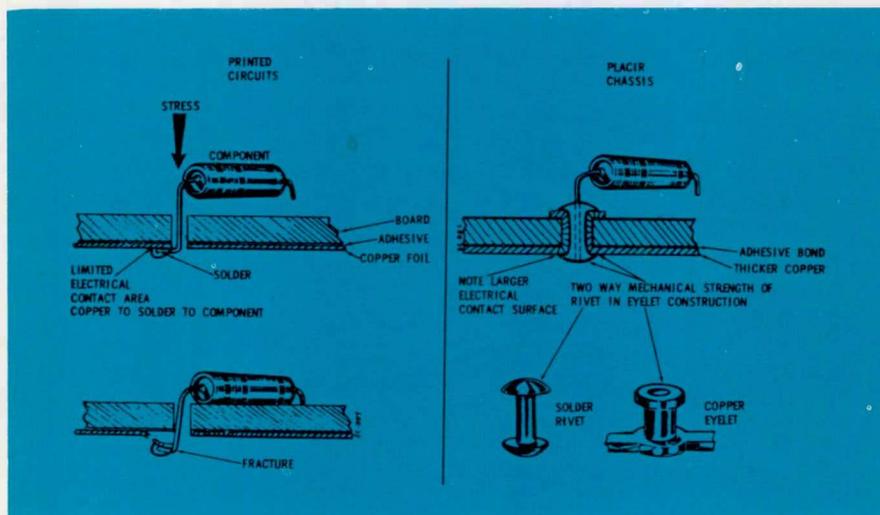
The "pot" should be unplugged after each operation to assure a long, useful life. It takes only a couple of minutes to melt the small amount of solder to the proper operating point and little time is lost by this procedure.

Other Repair Hints

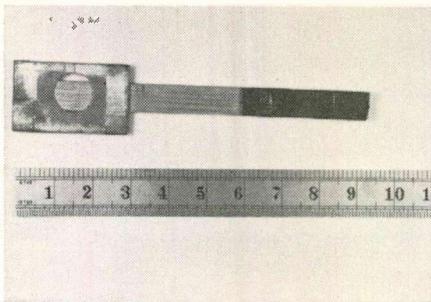
Chassis having bends or crimps in the component leads complicate the job a bit. Removal of transistors and other multi-terminal parts is facilitated with a soldering iron equipped with tips of various shapes. Terminals are straightened with a soldering aid. If a resistor is known to be bad, much time can often be saved by breaking the part before trying to remove it



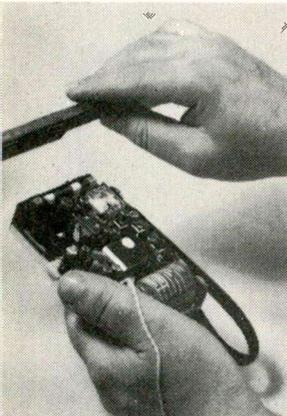
A close-up of modified element after well has been drilled in tip.



Early method of attaching components to PC boards (shown at the left), and the modern method employing copper eyelet and solder rivet (shown at the right).



A tuning "paddle" is easily made from scrap pieces of copper and ferrite. Each are taped to ends of wooden handle.



Determine if a radio's oscillator is tracking properly by alternately bringing tuning paddle ends near loop.

causing intermittent operation when the radio is jarred. If a fracture is discovered, it can be corrected by first removing the resin coating for a distance of approximately 1/2 inch on each side of the break and then flowing molten solder across the fractures. A more secure bond is obtained by soldering a short length of pre-tinned wire across the break. As in the case of lifted plating, however, it is often easier and quicker to jumper the fracture with a short length of hookup wire whose ends are soldered into mounting holes on opposite ends of the break.

Regardless of what type of radio is brought in for repair, it is good practice to check and adjust (if necessary) the radio's alignment before it is returned to the customer. Often the aging of parts can cause misalignment, with a subsequent gradual loss of sensitivity. The owner is usually not even aware of the deterioration. When such a set is realigned in the shop, the performance difference is sometimes quite dramatic, and results in a satisfied customer and repeat business.

The i-f transformers, even in small sets, are easily aligned, but the oscillator circuit often presents problems. Unlike tube sets, the adjustment provisions for proper oscillator tracking in miniature radios have considerable interaction.

As a result, proper tracking adjustments can be a time-wasting effort and, unless carefully done, can actually cause deterioration of radio performance. To help the service technician determine whether or not tracking adjustments are needed, a simple "tuning paddle" is an exceptionally useful service aid.

An effective tuning paddle can be made from scrap material found around any service shop. It consists of a narrow wooden handle with a piece of copper and a piece of ferrite material glued to opposite ends. The copper piece should be about 2 to 3 inches square with a 1-inch hole in the center, but the dimensions are not critical. The ferrite can be a salvaged core from a typical transistor antenna coil.

To use the paddle, tune the receiver to a station at the high end of the band and bring the copper end

Continued on page 61

from a conventional board. The new resistor leads can be attached to the original leads, crimped and soldered.

If a part *has* been desoldered from a printed circuit board, the mounting holes will be filled with molten solder. This will have to be removed before the new part can be inserted. A round wooden toothpick will do this job in a matter of seconds and a box of these handy accessories should be standard equipment on every transistor-radio service bench.

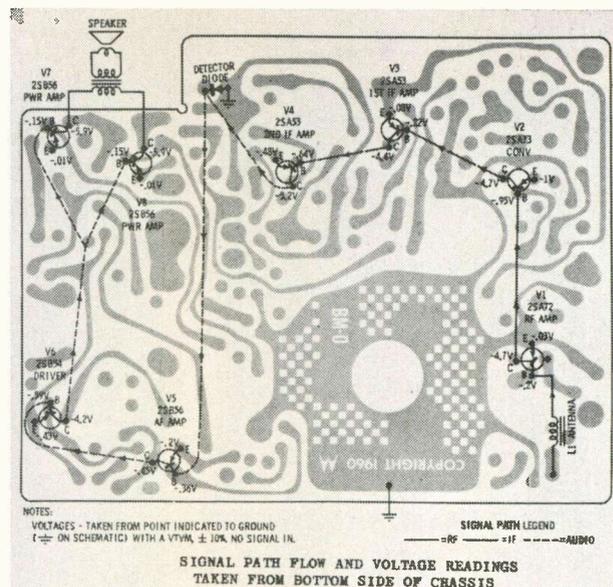
You'll find your wife's tweezers a handy substitute for long-nosed pliers when working in the cramped quarters of a shirt-pocket transistor radio. They can get into places inaccessible to the pliers.

Printed circuit boards have come a long way in the last few years. Today's boards are more rugged, more reliable and more trouble free than earlier types. Still, troubles can occur, either through the rough handling received by portable radios in the field, or because of repair procedures in the shop. These sometimes take the form of lifted plating, or fractured plated leads.

Lifted plating, which may have loosened from the board due to excessive application of heat, or to excessive force used in the removal or reinstallation of a part, may be reattached with a resin adhesive especially made for this purpose. Sometimes, however, it is easier and more practical to remove the lifted lead and replace it with a short length of hookup wire. The lead should be pulled away from the board in both directions until a point is reached which can serve as a solid connection point for the wire.

Before attempting to solder to the plated foil at a point where no previous solder connection existed, the coating covering the foil must be removed. This can be done either with a solvent or by careful scraping with a solder aid.

The same procedure applies to fractured plating which sometimes shows up in the form of hairline cracks



Some manufacturers provide easy-to-trace PC drawings in their service manuals.

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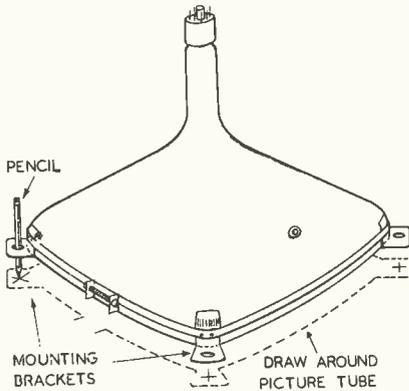
For more details, circle 34 on page 60

SHOP HINTS

TIPS FOR HOME AND BENCH SERVICE

Simplify CRT Replacement

I use a simple method to insure proper cabinet mounting of replacement CRT's that employ sep-



Replacement CRT installation is simplified for bracket-mounted tubes if you follow a physical layout drawing of the original.

arate bracket-mounts. You know, if the replacement tube isn't installed in the same position as the original one, the CRT will not fit the mask. This usually results in light seepage, or the viewer sees the CRT's edge.

Before I remove the old CRT from its mounting bracket I trace the mounting outline on a piece of paper. The paper sheet used to protect the replacement CRT's face is just the right size. I mark the exact position of the clamps and clamp hole centers on the paper.

When the brackets are loosened and the old tube removed I now have an exact mounting outline to simplify installation of the new tube. No more callbacks on repositioning CRT's for me!—*Pat Horvath, Port Alberni, B. C., Canada.*

Revamped Ratio Transformer

When I needed an immediate ratio detector transformer replacement for a DuMont Chassis RA-356/357, I found that all available makes, except the difficult-to-obtain original, required some change in mounting. The plate supplied

by one manufacturer was too large for the space, and the job would have entailed some chassis work also.

Then I considered that the old and the new transformers were identical in size. Why not put the new transformer windings in the old can? No change in mounting required!

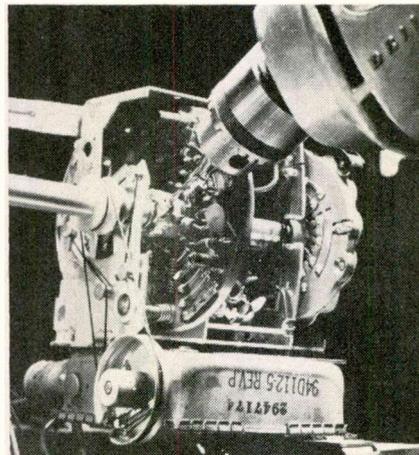
Simple, easy, and perfect. —*Nicholas B. Cook, Totowa Boro, N. J.*

Loose Tuner Wafer

Admiral's 16AB1 TV chassis uses a printed type turret tuner. The front wafer on this tuner frequently becomes loose on the tuner's shaft. The result is often absence of sound and picture simply because the contact points do not line up.

These large bakelite wafers are soldered or sweated on to a steel shaft by the manufacturer. (The front of the shaft is insulated, of course.) It's impractical to tighten wafers in a similar manner.

We correct loose wafers by drilling a small hole with a 3/32 drill bit through the metal cover, bakelite wafer, and metal shaft. The shaft is hollow and extreme care must be observed during drilling. (Before drilling place a drop cloth inside the tuner so that filings



Loose wafers in Admiral 16AB1 TV tuners can be secured by drilling a hole in the tuner shaft and inserting a pin.

will not fall into the printed wiring.)

After lining up the tuner's stationary contacts and the drum's contact points, the loose wafer is secured by inserting a cotter pin, small finishing nail, or nylon pin into the drilled hole. Excess length is cut off after it's inserted.

It works fine since we have had no recalls for poor contacts to date. —*H. L. Davidson, Ft. Dodge, Iowa.*

Contact Cleaner Unplugs Corona Dope Spray

Here is a shop hint we have found very useful. If a spray can of Corona Dope becomes clogged simply remove the spray nozzle, hold the valve down, and put a few drops of contact cleaner into the tube. Within a few seconds the nozzle will be clear again and Corona Dope can flow when the valve is pressed.—*G. Hooper, Alberta, Canada.*

Test CRT Modification

While servicing a Philco TV chassis that uses a 21EAP4 CRT, I couldn't use my test CRT in place of the set's picture tube. The control grid of a standard picture tube is generally connected to pin 2 of its socket. This is how my 8YP4 test CRT is connected, too. But the Philco's control grid was connected to pin 3.

To permit using my test CRT with either type of pin arrangements, I modified the 8YP4's in this manner: First, I cut the cable's wires that connected to pins 2 and 3. I soldered a pin from an old octal type tube to one end of each of the cut wires. At the other ends I soldered corresponding tube socket pins. I completed the work by using two pieces of spaghetti insulators.

Now when a TV receiver uses a CRT that connects pin 2 and 3 in reverse, all I do is reverse the pin connections. —*Fred J. Will, East St. Louis, Ill.*

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For more details, circle 35 on page 60

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B & K QUALITY
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at this
amazing low cost!

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

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CATALOGS AND BULLETINS

SPEAKERS: A newly designed magnetic pillow speaker and also a dynamic pillow speaker are featured in a two-color catalog sheet. Specifications, features and various models included. Communications Accessories Div., Telex, Inc., Telex Park, St. Paul 1, Minn.

--- for more details, circle 300 on page 60

TAPE-TO-SLIDE SYNCHRONIZERS: Literature covers the new Mark-Q-Matic model MQM-1. Designed to add sound to slides without installation onto or

into the tape recorder, it is placed next to the tape recorder and tape is looped through a sensing slot. Tape is recorded and cued to slides with a pencil mark. Dept. MP, General Techniques, Inc., 1270 Broadway, New York 1, N. Y.

--- for more details, circle 301 on page 60

VACUUM - TUBE VOLTMETERS: Catalog AP18 covers new direct-reading Dynamatic 375 VTVM. Designed to provide quick, direct, error-free readings without multiplying. Utilizes a single DC-AC ohms probe, anti-parallax mirror and other features. B & K Mfg. Co., 1801 W. Belle Plaine Ave., Chicago, 13, Ill.

--- for more details, circle 302 on page 60

PIN STRAIGHTENERS: Literature covers a new pin straightener for 12-pin miniature tubes. Made of tough steel, cadmium plated. Engineered to accept badly bent pins and straighten them to close tolerances. Colman Electronic Products, P.O. Box 2965, Amarillo, Tex.

--- for more details, circle 303 on page 60

COMPONENTS: Full listings of the firm's components for radio, hi-fi and TV service, clearly index-tabbed, are contained in catalog C-457, up-to-date issue of the Hanging Wall Catalog. Cost, 10c. Send orders with payment direct to Sprague Electric Co., North Adams, Mass.

PARTS & EQUIPMENT: 1962 general catalog lists over 60,000 items. 444 pages. Includes a complete line of stereo hi-fi components. Allied Radio Corp., 100 N. Western Ave., Chicago 80, Ill.

--- for more details, circle 304 on page 60

TV KNOBS: Literature covers the President line of exact replacement TV knobs. It consists of 103 of the most popular G-E, Emerson, Philco, RCA and Sylvania knobs not included in the two previously issued lines. TVDevelopment Corp., 469 Jericho Turnpike, Mineola, N. Y.

--- for more details, circle 305 on page 60

TWO-WAY RADIOS: Units from 10 to 100 watts are described in new 24-page brochure, ECR-904, entitled "Two-Way Mobile Radio." It features tubed and transistorized VHF types. Section P. General Electric Communication Products Dept., Box 4197, Lynchburg, Va.

--- for more details, circle 306 on page 60

TUBES: A new replacement chart, for oscilloscope cathode ray tubes, lists the oscilloscopes of 78 manufacturers by name and model number with the proper Sylvania replacement CRT. Sylvania Electric Products Inc., 1100 Main St., Buffalo 9, N. Y.

COMMUNICATIONS RECEIVERS: Covered in literature are the design changes of model HQ-145, now designated as model HQ-145X. Crystal accuracy, reported now possible, through the addition of a single crystal controlled channel which can be fixed at any point of the instrument's entire frequency range. Hammarlund Mfg. Co., 460 W. 34th St., New York 1, N. Y.

--- for more details, circle 307 on page 60

NOW! FROM SPACE AGE TECHNOLOGY. An important development brings you a single rectifier that replaces all other rectifier types. This development is as significant as the introduction 4 years ago of silicon rectifiers, which have come to be almost universally used in TV-Radio-Audio circuits.

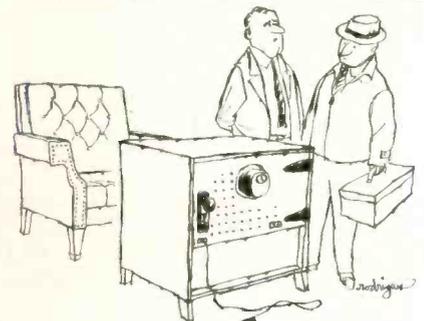
NOW! HIGHER RATING—SMALLER SIZE. The IR "Mark VII" is rated at 750 mil minimum and has a surge capacity of 50 amps. Looks like and is no larger than a half watt resistor. Insulated, completely safe; can't short to chassis.

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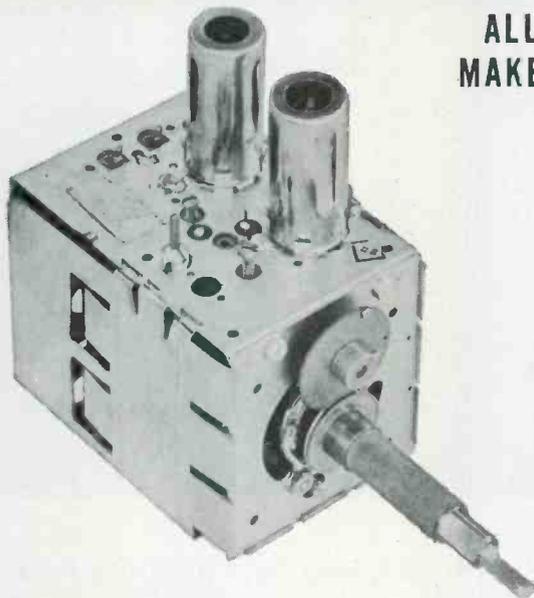


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Tarzian-made tuners are identified by this stamping. When inquiring about service on other tuners, always give tube complement . . . shaft length . . . filament . . . voltage . . . series or shunt heater . . . IF frequency . . . chassis identification.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

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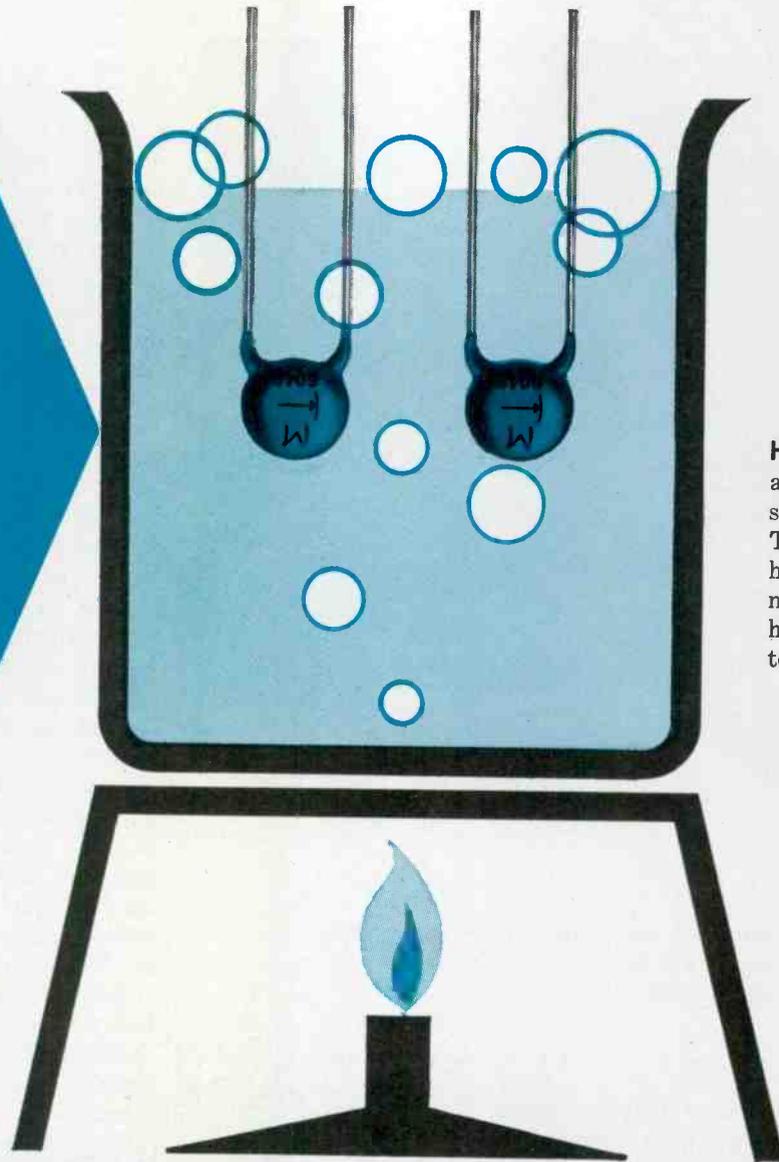
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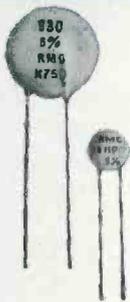
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For more details, circle 37 on page 60



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offer these advantages
in any
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less than $1\frac{3}{16}$ " deep from mounting surface, these units fit into any standard junction or switch box with room to spare... diameter is only $1\frac{3}{32}$ ".

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the "play" frequently found in dual controls is eliminated. The wiper contacts move in unison, assuring that there will be no alteration in frequency response due to variations in wiper position on the resistance tracks.

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PACKAGED ELECTRONIC CIRCUITS • ENGINEERED CERAMICS

For more details, circle 38 on page 60

New Test Instruments...

Continued from page 43

TEST position, the oscillator provides a 40 mc voltage to the 6C4's grid. The coax probe cable's length is a quarter-wave at this frequency. When an open capacitor is connected to the clip probes, the quarter-wave open line appears as a short circuit at the one-turn coil tap (1-T). The 6C4's feed-back voltage is reduced and the grid voltage drops. This causes the "eye" to close, as previously described.

Our quick location of a shorted 30 μf capacitor in a Japanese transistor portable's emitter circuit attests to the usefulness of an in-circuit capacitor test instrument. Without it, we would have been forced to clip a lead to confirm our suspicions. If our suspicions were wrong, we'd have a tough time resoldering the lead in a tight printed circuit area.

The in-circuit tests are not infallible, as the manufacturer points out. Sometimes other circuit components shunting the capacitor under test can interfere with accurate indications. The tester, however, is calibrated to indicate shorts when a capacitor is shunted with as low a resistance as 7 ohms. On the other hand, capacitors, other than electrolytics, that are not completely shorted may not show up as defective due to the inherent nature of in-circuit tests.

Electrolytic capacitance value tests are not intended to yield exact readings. Rather, they are intended to show drastic reduction of capacitance.

The unit is encased in an attractive metal cabinet and has a leather carrying handle. Test leads are permanently secured to the instrument. The instrument is available in kit form, too, for \$19.95.

Metrex, Harmonic Signal Generator, "Genie" at \$14.95—This is a versatile, two-transistor, pulsed signal generator for signal-injection troubleshooting use. It's small enough to hold in one's hand, and, of course, can fit into a tube caddy without trouble.

The unit is powered by a 9-volt battery. It has two controls (output and frequency), two switches (on-off and high-low frequency band) and one output jack. A 30-

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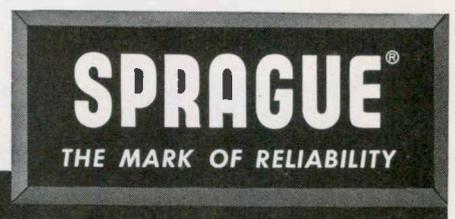
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- **BLACK BEAUTY Molded Tubulars** are actually low-cost versions of the famous Sprague high-reliability capacitors used in modern military missiles. They're engineered to withstand 105°C (221°F) temperatures . . . even in the most humid climates! And their tough, molded phenolic cases can't be damaged in handling or soldering.
- **ORANGE DROP Dipped Tubulars** are the perfect replacement for radial-lead capacitors now used by leading manufacturers of TV sets. Leads are crimped for neat mounting on printed wiring boards. Extremely small in size, they'll fit anywhere, work anywhere. And they're double-dipped in epoxy resin for extra protection against moisture.

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

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

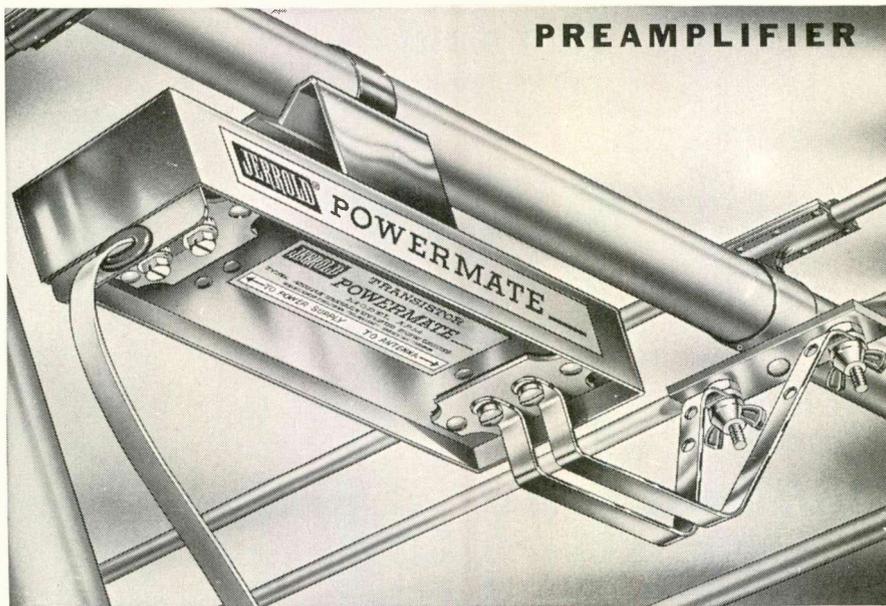


WORLD'S LARGEST CAPACITOR MANUFACTURER

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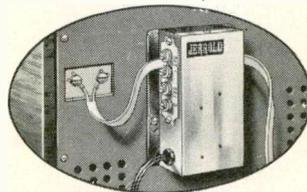
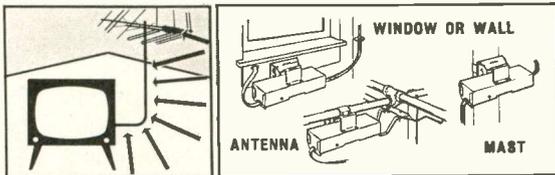
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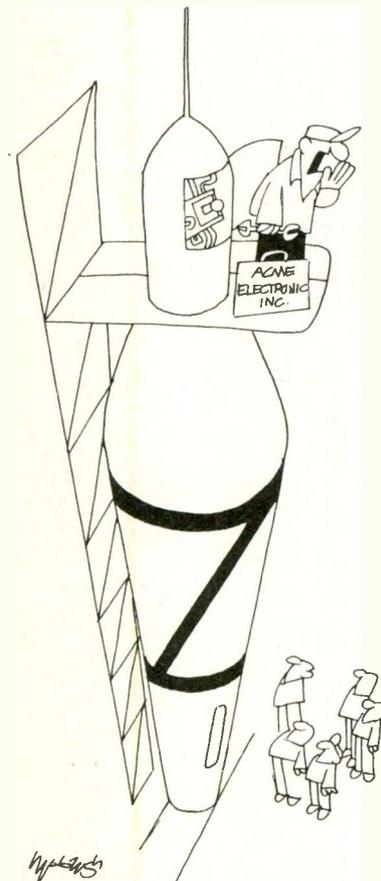
AMERICA'S LEADING MANUFACTURER OF TV-FM RECEPTION AIDS AND MASTER-ANTENNA-SYSTEM PRODUCTS
 For more details, circle 40 on page 60

inch shielded cable with probe is provided; also, a rod antenna for loose-coupling signals to antennas. The frequency range of the instrument is variable: from 50 cycles to 3.3 mc, in two bands.

The output of this miniature generator is a series of damped waves, with fast rise and fall time. Thus, it's a square wave type of output. No warm-up time is needed due to its battery-transistor circuitry.

Injecting a signal from the instrument into an audio amplifier produces a sound that varies from a buzz to a whistle, depending upon the frequency employed. The output is continuously variable from zero to 9-volts peak-to-peak. Inserting a signal into a hi-fi set's preamplifier input resulted in full speaker sound output with the instrument's attenuator barely adjusted to the first scale division, whereas maximum generator output is achieved at the tenth division.

A helpful troubleshooting applications brochure accompanies the instrument. ■



"I'll have to take it back to the shop."

AUDIO NEWS LETTER

BENJAMIN ELECTRONIC SOUND announces new Miracord studio series automatic 4-speed turntable and record charger. Studio H model has hysteresis synchronous motor.

SHURE has established Shure Electronics, Ltd., London, England, as a wholly owned subsidiary. John W. Maunder is managing director of the operation.

EMPIRE announces model 980 tone arm. Features the Dyna Lift self-lifting device to eliminate stylus abuse and run out groove sound at record's end. \$50.00.

TELECTRO's 900-Series includes 5 tape decks. Pushbutton operated. Three speeds. Automatic shutoff. Designed for horizontal or vertical mounting. \$89.95 to \$139.00.

IHF's four-day New York Hi-Fi Show, just closed, had an increase of 25 percent in attendance over that of the 1960 five-day show. Total, 33,500. Resigned, Abraham Schwartzman as executive administrator of the Institute.

PHILCO releases 20-page catalog covering: needles, mono and stereo; cartridges; changers and record accessories. Includes cross-reference of all needles and cartridges of some 24 different manufacturers.

KOSS ELECTRONICS announces the "Portable Listener," a 4-speed phonograph equipped to play through headphones. Has 4-speed motor, diamond sapphire turn-over cartridge, and separate volume control for each channel.

RCA announces model WG-360A Phase Checker at \$14.95. It determines correct speaker phasing in stereo and public address systems without electrical connections to sets. The device operates on the sound power energy from speakers.

ROBINS INDUSTRIES has made available boxed tape reels in 3" and 5" diameter sizes. The two new reels are added to a third already available, the TR-70, 7" diameter listing at 75c. TR-30, 3" reel, 25c. TR-50, 5" reel, 60c. Both include box.

EIA reports sales of stereo phonos for first six months of 1961 as behind 1960. Factory sales, mono, 1961, 432,647; 1960, 482,353. Stereo, 1961, 1,307,415; 1960, 1,618,069. Retail sales, mono, 1961, 459,199; 1960, 499,750. Stereo 1961, 1,408,917; 1960, 1,605,029.

CROSBY-TELETRONICS has filed suit in Federal Court, Southern District, New York, against General Electric Co., charging infringement on a Crosby patent covering the method and equipment necessary for the broadcasting and reception of stereo FM, in accordance with standards adapted by the FCC last April 19.

ALTEC LANSING introduces a merchandising display shaped in the form of the letter "A." Measures 7' high by 5'3" wide at base. Has six shelves. Featured with the display are speaker systems 838A Carmel and 837A Avalon. Also announced is model 351A 50-watt transistorized power amplifier for mono, stereo, third channel or hi-fi music distribution use. Compact unit provides 8 and 16 ohm speaker connections, plus an isolated 70v line output for distributing sound to distant speakers. Frequency response, ± 1 db 20c to 20kc. \$215, including cabinet.

NOVEMBER 1961

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1st in a series:

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*T. M. duPont Company

For more details, circle 41 on page 60

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ELECTRONIC TECHNICIAN editors have carefully selected these books by the world's leading technical publishers. Order direct from our Book Department. Fill in coupon or separate sheet. Money-back guarantee.

TWO-WAY RADIO

By Allan Lytel. For the communications technician, and those interested in entering the field, this book covers mobile and fixed base stations. Theory is presented with a minimum of math. Antennas, selective calling, power supplies and test instrument chapters are included. Photos, drawings and charts are generously used. Hard cover, 304 pages. Price \$9.50.

101 WAYS TO USE YOUR SIGNAL GENERATOR

By Robert G. Middleton. A fine collection of brief explanations on how to use the generator for various tests. Twenty-five equipment checks are presented, seven antenna tests, 27 AM-FM receiver tests, 28 TV tests, 10 component tests and four miscellaneous. Each description briefly lists the required equipment connections etc. Soft cover, 123 pages. Price \$2.00.

MANAGEMENT GUIDE FOR PREVENTIVE MAINTENANCE

By Bernard T. Lewis and William W. Pearson. This text, included in the publisher's Industrial Management Series, outlines considerations needed for organizing a preventive maintenance program, systems and procedures for controlling maintenance—including inspection and work orders, inspection record systems, time studies, etc. Soft cover. 64 pages. Price \$1.25.

IMPEDANCE MATCHING

By Alexander Schure. Divided into five major sections, this informative book covers power transfer, impedance matching devices, matching at audio and r-f, and matching in transistor circuits. Complete with tables, schematics and computation examples. Soft cover, 128 pages. Price \$2.90.

INFRARED RADIATION

By Henry L. Hackforth. From the basic laws, through transmission and detection, to design and practical application in various industries, this book details theory and practice of infrared. Hard cover. 304 pages. Price \$10.

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By John F. Rider. This handbook shows how to get the most out of your oscilloscope. Over 800 traces are shown, including sine, square, rectangular, trapezoid, sawtooth differentiated and integrated types. Explains scope connections, manipulating, controls and test setups. 190 pages. Price \$3.00.

MAGNETIC AMPLIFIERS (Principles and Applications)

By Paul Mali. Written at an intermediate technical level in the tried and proven picture/text style of presentation, this excellent book covers: magnetism; electro-magnetism; saturable reactors; core, compensating and polarized magnetic amplifiers. Well illustrated. Soft cover. 261 pages. Price \$2.45.

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APPLICATIONS OF ELECTRONICS

By **Bernard Grob** and **Milton S. Kiver**. Assumes a knowledge of elementary electronics. Subjects discussed include: vacuum tubes and transistor theory; audio amplifiers; oscillators; receiver, transmitter and pulse circuits; and industrial and military electronics. Math is kept to a minimum. Well illustrated. Hard cover. 628 pages. Price \$10.00.

HOW TO INSTALL AND SERVICE AUTO RADIOS

By **Jack Darr**. This second edition contains much practical information of real use to technicians. In addition to service data on antennas, intermittents, noise suppression, speakers and troubleshooting, transistorized and hybrid radios are covered. 6-12 volt conversions are explained. Soft cover. 160 pages. Price \$3.25.

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By **H. A. Middleton**. A pocket size guide for caddy use, includes a list of foreign tube substitutions. It covers direct substitutions only and is divided into 4 sections. Sec. 1: lists substitutions with a "good" or "excellent" coding. Sec. 2: some ruggedized substitutions. Secs. 3 & 4: European-American substitutions. Soft cover. 56 pages. Price \$0.90.

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By **Julian Bernstein**. This interesting and authoritative reference thoroughly treats the system used to rebroadcast live TV programs. Written at a level understandable to all interested in video recording, with mathematical formulas absent. The text outlines methods used and circuitry employed. Many photos and drawings. Hard cover. 272 pages. Price \$8.95.

BASIC ULTRASONICS

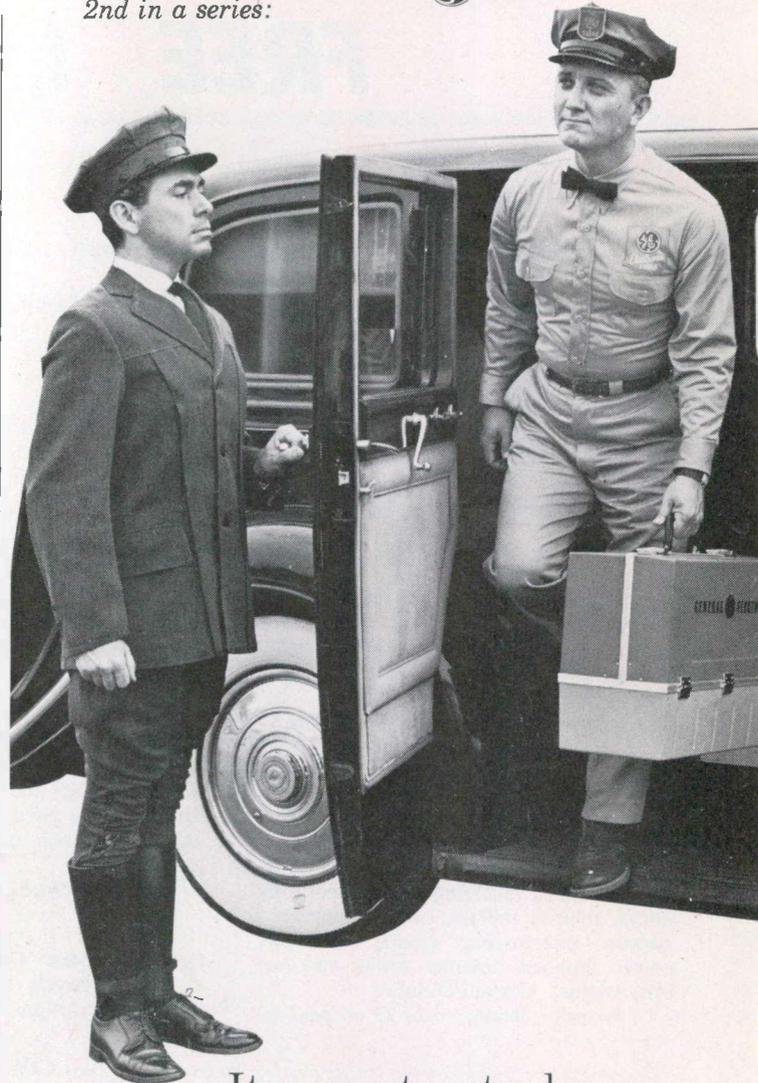
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FREE LITERATURE

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

1 Components: Illustrated 16-page catalog, No. 100, gives detailed specifications and prices for some 40 lines of controls, switches, ceramic capacitors and PEC packaged circuits. Also covers packaged circuit kits and has two control taper charts. Centralab.
- - - for more details, circle 38 on page 60

2 Switches: Literature covers new series AG push-pull switch for control/switch combinations. Reported to save 60% assembly time costs of wiring operations. Clarostat Mfg.
- - - for more details, circle 308 on page 60

3 Capacitors: Announced is the "Service Selector." 40 pages. Covers tubular electrolytics, twist-prong electrolytics, disc ceramics, receiving and transmitting micas, tubular mylars, tubular metalized papers, interference filters, vibrators, power supplies, antenna rotors and test instruments. Cornell-Dubilier.
- - - for more details, circle 33 on page 60

4 Stereo Components: Offered is a component system guidebook to guide the consumer in choosing matched components within a given price range. 12 pages. Seventy component systems described and illustrated. Electro-Voice, Inc.
- - - for more details, circle 309 on page 60

5 Tube Testers: Model 1100, described in literature, tests for dynamic cathode emission, shorts and leakage, grid leakage and gas content of over 2,000 tubes. Mercury Electronics.
- - - for more details, circle 310 on page 60

6 Power Supplies: Literature covers model RS-24. Reported perfect for circuit testing and development, as it eliminates the need for a separate power supply for each new circuit. Precision Apparatus.
- - - for more details, circle 311 on page 60

7 Turntables: Colorful, 6-page brochure covers 5 models and accessories. Description of a tone arm in-

cluded. Well illustrated. Features and prices included. Thorens Div.
- - - for more details, circle 312 on page 60

8 Crystals: Quartz crystals for all uses are covered in new catalog and price list, No. 961. Diagrams of oscillator circuits are included. Texas Crystals.
- - - for more details, circle 74 on page 60

9 TV Knobs: A new simplified TV knob cross reference guide lists more than 3,500 different TV set model numbers in chronological order, together with the firm's exact replacement TV knobs. TVDevelopment Corp.
- - - for more details, circle 313 on page 60

10 Hi-Fi Speaker Systems: Two color catalog sheet covers new Wafaire Bi-Phonic coupler thin speaker system. It reproduces the full range of the audio spectrum by means of its large panel section which vibrates as a single piston resulting in a system only 3 3/8" thick. Advanced Acoustics Corp.
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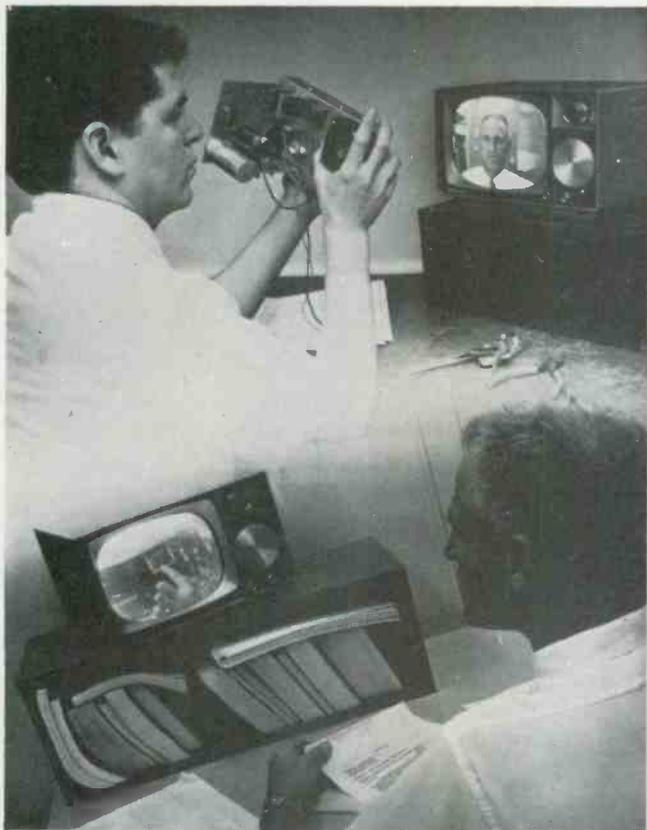
Continued from page 46

of the paddle close to the antenna loop. The copper acts as a shorted turn which decreases the loop inductance. With a properly adjusted receiver, this procedure should cause a reduction in radio volume since it purposely introduces a mis-track condition.

The same effect, however, will also occur if the oscillator frequency is already too low for proper tracking. Therefore, to determine whether the loss in volume is caused by misadjustment of a properly tracking circuit, or merely by increasing the tracking error, the ferrite part of the paddle is brought into proximity with the antenna coil.

The effect of the ferrite increases the coil inductance and will, in a properly adjusted circuit, also cause a loss in volume. If the circuit was misadjusted, however, the volume will increase as the effect of the ferrite tends to improve tracking. Thus, unless the volume decreases for both ends of the paddle, some tracking adjustment is required.

This same procedure should be followed on a station near the low end of the band to make sure that the oscillator is tracking over the entire tuning range. The entire job takes only a few seconds and can, in the case of a well-adjusted set, save considerable adjustment time. ■



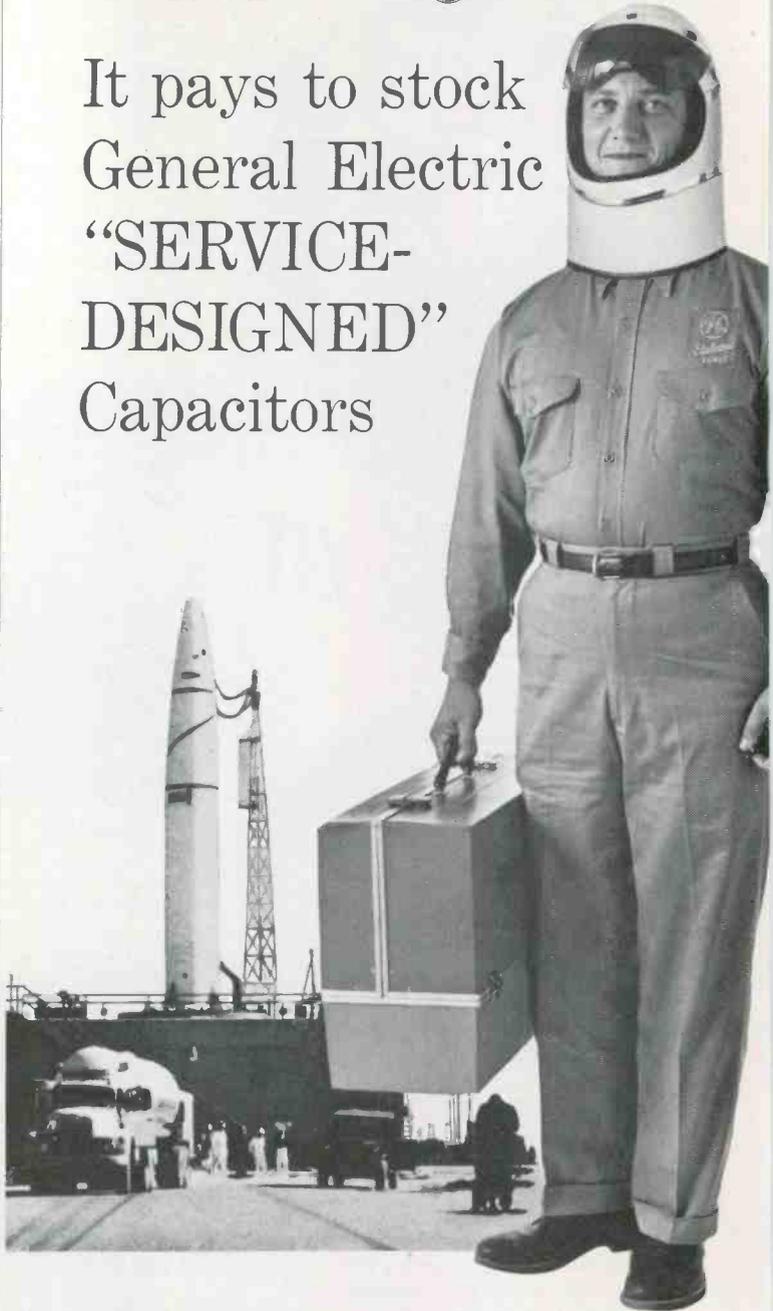
PROTOTYPE of an audio-visual communications system built by Motorola, Inc. is called "Visicom," and allows two or more persons to see each other while speaking together from a distance. Each unit contains a TV camera and receiver. Company has no plans to market at present.

NOVEMBER 1961

3rd in a series:

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skin. Comes in a convenient aerosol container, and has a pleasing scent. Doesn't spill or evaporate, and wipes off with a cloth. Ideal for technicians who haven't access to cleaning facilities between TV service calls. Chemtronics, Inc., 870 E. 52nd St., Brooklyn 3, N. Y.

--- for more details, circle 400 on page 60

Channel Master RADIOS

Trans-World model 6523, 10-transistor radio, features two short wave bands plus standard broadcast. Equipped with



telescoping antenna, tuning and battery indicators, provision for extension speaker and earphone and special tone controls. Model 6532 tube-type table model has a large air loop antenna, five multi-purpose tubes including rectifier, acoustical closed back, automatic volume control and twin dual-speakers. Model 6533 clock radio with twin dual speakers has self-starting, self-regulating Telechron clock movement and acoustical closed back; five multi-purpose tubes including a rectifier and large air loop antenna. Model 6535 AM/FM table radio

features a 6-inch speaker in a solid walnut cabinet. Reported to give the equivalent of nine-tube performance with six multi-purpose tubes and a selenium rectifier. Equipped with outlet for stereo multiplex adaptor. Special line cord FM antenna is built into the set. Provision is made for an external FM antenna. FM tuning is non-drift. There are separate tone controls. Channel Master Corp., Ellenville, N. Y.

--- for more details, circle 401 on page 60

Raytheon TWO-WAY RADIOS

Model Ray-Tel 2, five-channel citizens band two-way radio, operates from 115v a-c and from either 12v or 6v batteries.



Features include: yoke mount which tilts the radio to any angle and permits floor, shelf or under-the-dashboard mounting; on-off light on face of radio, fully adjustable squelch circuit, full-range automatic volume control and 4-inch speaker. Has ten tubes. Input, 5 watts. Delivers 2.9 watts nominal power output when connected to 20 to 100 ohm resistive antenna loads. 9½" x 5" x 9¼". \$189.95. Raytheon Distributor Products Div., 411 Providence Turnpike, Westwood, Mass.

--- for more details, circle 402 on page 60

Mosley RECEIVERS

Features of model CM-1 communications receiver include: double conversion with crystal controlled first oscillator, 5 crystals included; diode detector for AM and product detector for SB and CW; range, 80 meters through 10 meters; 10-meter band segmented in 3 overlapping increments of 650 kc each; calibration every 5 kc; WWV re-



ELECTRONIC TECHNICIAN

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December

Proceedings

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No matter what your field in electronics, having a working knowledge of plasmas is greatly to your advantage. Why? Because plasmas are becoming increasingly important in electronics research and application.

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Proceedings of the IRE devotes its entire December issue to a survey of plasma research and findings to date . . . More than 15 technical papers, each one written by an authority, will spell out what plasmas are, how they behave, what they can do. Guest editor is Dr. E. W. Herold, Vice President, Research, Varian Associates.

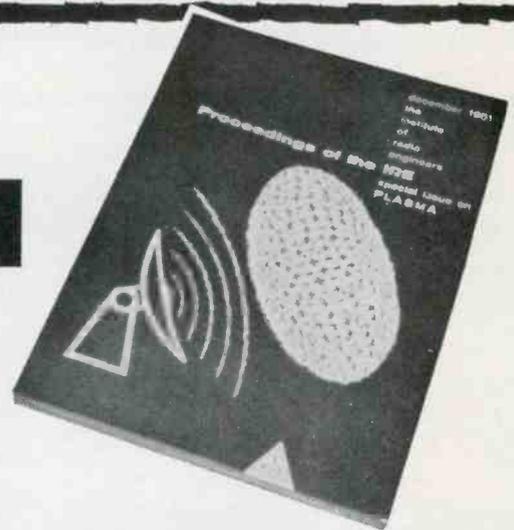
Every special issue of *Proceedings* in the past has remained a definitive reference work for years. Many were sold out almost immediately. If you are not a member of the IRE, make sure of your copy of the December special issue on plasmas by sending in the coupon immediately.

Proceedings of the IRE

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For more details, circle 45 on page 60

NOVEMBER 1961



more than 15 definitive papers
covering the following areas
of plasma research
and application:

- 1 Fundamental plasma processes
- 2 Applications to communications
- 3 Electric power generation
- 4 Propulsion systems
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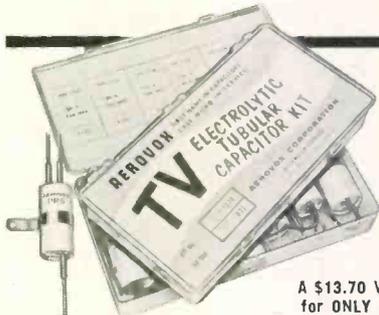


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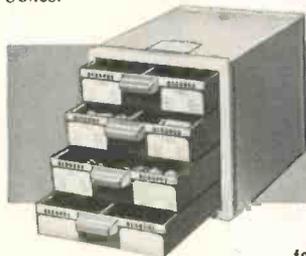
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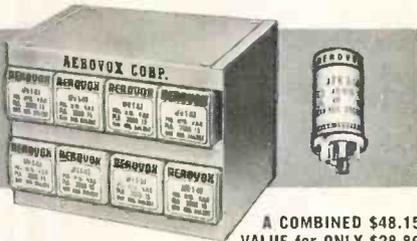
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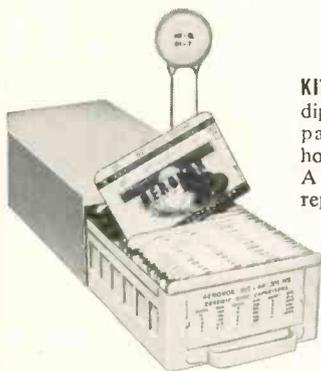
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For more details, circle 46 on page 60

NEW PRODUCTS

ception at 15 mc; selectivity, 2.5 kc at -6db; sensitivity, $\frac{1}{2}$ μ v for 10 db signal-to-noise ratio on 10 meters; audio output, $\frac{1}{2}$ watt at 6% distortion; power consumption, 33 watts (117v a-c, 50-60 cps.) \$169.95. Matching speaker, model CMS-1, \$16.95. (Slightly higher west of the Rockies and outside USA.) Mosley Electronics, Inc. 4610 N. Lindbergh Blvd., Bridgeton, Mo.

... for more details, circle 403 on page 60

Heath TRANSISTOR TESTERS

Heathkit IM-30 is designed to provide complete d-c analysis of all PNP, NPN transistors up to 15 amps. D-c



gain (beta, alpha) is read directly on calibrated scales. Other features include: 15 ua basic range for leakage (Icbo, Icco) tests; four lever switches to provide rapid test selection; built-in battery supply and provision for using external supply. The gain control is a 3% wire-wound potentiometer to assure high accuracy. Internal batteries, for use in making all basic tests, provide test voltage up to 9v in 1.5v steps. \$54.88. Heath Co., Benton Harbor, Mich.

... for more details, circle 404 on page 60

Webster INTERCOM SYSTEMS

New 2500 series Teletalk provides facilities for connecting 10 stations, giving





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Does a Volkswagen ever get stuck?

We cannot tell a lie.
Yes.

Then why do you see so many of our trucks zipping through the snow when others can't?

Well, it's just a little harder for a VW to get stuck.

We put the engine in the rear.

The weight presses your drive wheels

down that much harder on the snow, ice or whatnot.

It's the extra traction that turns the trick.

Our air-cooling helps, too. Volkswagens have no radiator, no water to freeze. You always go.

Our winter performance is one reason General Electronics in St. Paul, Minn. For more details, circle 47 on page 60

Minnesota, bought 7 VWs. When snow socks in their other trucks (they have 16 in all), their VWs still get through to customers.

Of course, another reason is that the VW's low operating cost—half that of a half-ton—also makes it easier to get through the end of the month.



NEW PRODUCTS

ing a maximum of 11 stations in a system. Speaker-microphone picks up normal conversational voice within radius of 15 feet. Individual master station turns off without affecting other units. Has three selector switches, two-position call-listen switch, volume control, silencing circuit, busy light and a 2 x 6-inch permanent magnet dynamic type speaker with 1.47 oz. alnico v magnet. Voice coil impedance, 45 ohms. Uses one centralized amplifier; audio output, 2 watts; power supply, 110-125v, 60

cycles. Webster Electric Co., 1900 Clark St., Racine, Wis.
 --- for more details, circle 405 on page 60

Clarostat CONTROLS

The Uni-Tite Service Center is announced as a new concept in field-assembled controls that slash time and stocking requirements. It provides a choice selection covering over 75 dual replacements with rear and panel units, plus appropriate shafts. Assembly procedure is unique. The proper rear and panel units are selected, appropriate shafts snapped into place, then slipped together and twisted 90°. The units automatically lock together permanently



without the use of tools. Cost for the entire Service Center, including a limited number of introductory offerings of a convenient steel automatic-feed bin, is \$19.75. Clarostat Mfg. Co., Dover, N. H.

--- for more details, circle 406 on page 60

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From GC Electronics laboratories comes a new service product that eliminates noise from all electrical sliding contacts and stops corrosion, too! And now you save 56¢ when you buy the carry-out carton containing the New Super Contact Cleaner and the popular and accepted Spra-Kleen and Super Freeze Mist. See your GC Distributor today.

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400 S. WYMAN ST., ROCKFORD, ILLINOIS

For more details, circle 48 on page 60

B&K TUBE CHECKERS

Dyna-Quick model 700 has a multi-socket section to check most TV and radio tubes, and a switch section to



check new types in a Dyna-Quick emission circuit. Checks for all shorts, grid emission, leakage and gas. Checks nuvisors, 10-pin tubes, 12-pin compactrons, European hi-fi tubes, voltage regulators and most industrial types. Includes provision for future new sockets. Adjustable grid emission test provides sensitivity to over 100 megohms. \$169.95. B&K Mfg. Co., 1801 W. Belle Plaine Ave., Chicago 13, Ill.

--- for more details, circle 407 on page 60

Sylvania TUBES

Four new strap frame miniature receiving tubes are: Semi-remote cutoff triodes, used in VHF tuners as an r-f amplifier, type 2GK5 a T5½ 7-pin—a 600 mil heater version of type 6GK6; type 3GK5, a 450 mil heater version of 6GK5; pentodes, used as an i-f amplifier in TV receivers, 4EH7 a T6½ 9-pin—a 450 mil heater version of type 6EH7 and identical except for heater char-

At last! A quick, simple, positive way to check speaker phasing...

NEW RCA SOUND-POWERED PHASE CHECKER

This remarkable new device uses no tubes, transistors or batteries! Powered entirely by sound waves, it checks phase alignment of low and mid-range speakers in stereo installations, hi-fi, public address systems, and FM multiplex radio.

The RCA WG-360A Phase Checker is designed to be used with your VOM, VTVM or CRD. It consists of two receptor units and a connecting cable. To check stereo phasing, place one receptor against front of left-hand speaker. Place the other against right-hand speaker and feed musical music or audio tone into system. Move switch on receptor to its "In-Phase" and then its "Out-of-Phase" position; and note which results in the higher test instrument reading. If it occurs in "Out-of-Phase" position, reverse the connections to either speaker assembly.

The inexpensive RCA WG-360A takes all the guesswork out of speaker phasing. You'll like the simplicity, speed, and reliability of this new phase-checking device.



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AUDIO GENERATOR
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Check response of stereo, hi-fi, and p-a amplifiers, speakers, and enclosures, with the RCA WA-44C Audio Generator. Sine wave and square wave output over range of 20 to 200,000 cps. Less than one quarter of one percent total harmonic distortion over range of 30 to 15,000 cps. Provision for inter-modulation checks.

Available factory-wired & calibrated, only.



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

Separate 1.5-volt rms and 4-volt peak-to-peak scales for accurate low AC measurements. Measures AC and DC voltages to 1500 volts, resistances from 0.2 ohm to 1000 megohms. Complete with ultraslim probes, long flexible leads, special holder on handle to store leads.

Available factory-wired & calibrated: \$43.95*



RCA V-O-M KIT
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The V-O-M with extra value! 0.25-volt and 1.0-volt DC ranges. Response is flat to 800,000 cps on 2.5- and 10-volt ranges. Easy to read 5 1/2" meter. Non-breakable sealed plastic case. Jacks located below switches to keep leads out of way. Spring clips on handle to hold leads.

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RCA OSCILLOSCOPE KIT
WO-33A(K) Only \$79.95*

Weighs only 14 pounds. Light enough for "on the job" troubleshooting and servicing of black and-white and color TV, radio, hi-fi components, tape recorders, etc. Ample gain and band-width for the toughest jobs. Scaled graph screen and internal calibrating voltage source for direct reading of peak-to-peak voltage.

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The Most Trusted Name in Electronics

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For more details, circle 83 on page 60

NEW PRODUCTS

acteristics; and 4EJ7 a T6½ 9-pin sharp cutoff—a 450 mil version of 6EJ7 and identical except for heater characteristics. Also, two 9T9 dissimilar double triodes: 6FD7 used as a vertical deflection oscillator and output tube in TV receivers and 13FD7 used as the vertical deflection oscillator and output tube in 450 mil series string TV receivers. Remaining two of the eight tubes announced are: type 7591, a T-9 beam octal power pentode used in audio power output applications, and 6DA4A, a T-9

octal single diode for use in horizontal frequency damper service, a higher rated version of 6DA4. Sylvania Electronic Tubes Div., 1100 Main St., Buffalo 9 N.Y.

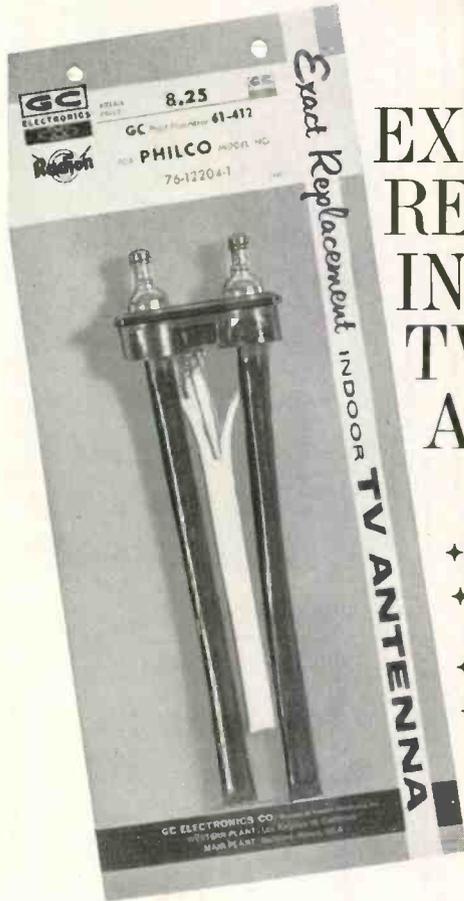
Lafayette TUBE AND TRANSISTOR CHECKERS

Model TE-21 features removable grid caps, eight standard tube sockets, three miniature tube sockets, and transistor sockets and pilot lamp receptacles. Filament adjustment switch provides voltages of 63 to 110v in 14 steps. Variable line voltage potentiometer and large test meter insure greater accuracy. Con-



tains an illuminated gear-driven roll chart of anti-backlash design. Designed for 105-125v a-c operation. Uses a fused transformer circuit. \$48.75. Optional adaptors, TE-35 for 110° tubes, \$2.95. TE-36 for 90° tubes, \$3.95. Lafayette Radio Electronics Corp., 165-08 Liberty Ave., Jamaica 33, N. Y.

- - - for more details, circle 408 on page 60



EXACT REPLACEMENT INDOOR TV ANTENNAS

- ✦ Pre-priced for full profit markup
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Radion exact replacement indoor antennas let you cash in on big profit potential. Each package is cross referenced to manufacturer's Part Numbers, and contains fresh, new equipment.

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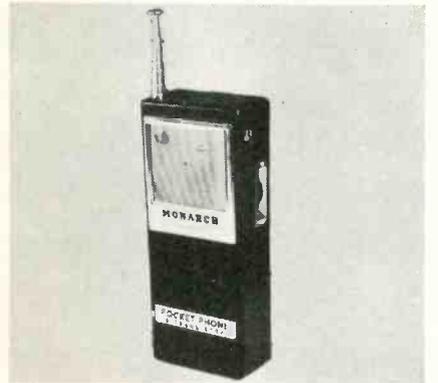


GC ELECTRONICS COMPANY
a division of Tectron Electronics, Inc.
400 S. WYMAN ST., ROCKFORD, ILLINOIS

For more details, circle 49 on page 60

Monarch TWO-WAY RADIOS

Model TC-900, pocket-size, citizens band transceiver is announced. Range, a mile or more. Output power, 100mw.



Transmitter is a crystal controlled r-f oscillator. Receiver is crystal controlled superheterodyne. Has nine transistor circuits, powered by seven standard penlight cells. Rugged case is black impact plastic, 6⅞" x 2½" x 1⅝". Comes with leather case, shoulder strap, belt clamp, earphone, earphone case, batteries and crystals. \$64.95. Monarch Electronics International, Inc., 7035 Laurel Canyon Blvd., North Hollywood, Calif.

- - - for more details, circle 409 on page 60

Hitachi RADIOS

Model WH817 (shown) and Model WH829 employ the advanced mesa transistor to achieve a reported 50% reduction in background noise and greater sensitivity. Both models have eight tran-



ELECTRONIC TECHNICIAN



GMW TRON FUSE

Diameter: .270 inch
Length of Body: 1/4 inch



HWA FUSEHOLDER

Diameter: .500 inch
Length with Knob and Terminals: 15/16 inch

ACTUAL SIZES SHOWN

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Rigid construction of fuse and holder assures extraordinary reliability under high shock and vibration conditions. Fully insulated ceramic body isolates fusible element from effect of dust, corrosion, moisture and vapors.

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Panel Mounted. Holder can be mounted on panel by hand. No special tool required to run down holding nut.

Prong type contacts on fuse make it easy to install or replace.

A knob for the holder may be used to make holder water proof from front of panel.

HOLDER CAN BE MOUNTED IN PRINTED CIRCUITS

Terminals of holder can be inserted into holes and soldered on printed circuit board without additional forming.

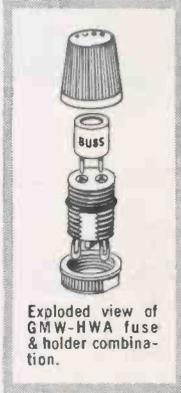
If desired, GMW fuse may be used without holder and mounted directly into printed circuit boards.

AVAILABLE RATINGS FOR GMW FUSES.

Fuses are made in sizes from 1/10 to 5 amperes for use on circuits of 125 volts or less where fault current does not exceed 50 amperes.

Transparent window in end of fuse body permits visual inspection of fusible element.

Before crystallizing your design using sub-miniature fuses be sure to get full data on the Buss GMW fuse and HWA holder combination.



IN THE BUSS LINE, you'll find the type and size fuse to fit your every need . . . plus a companion line of clips, blocks and holders.



BUSSMANN MFG. DIVISION, McGraw-Edison Co., UNIVERSITY AT JEFFERSON, ST. LOUIS 7, MO.



NEW HEATHKIT® TRANSISTOR TESTER



only \$54⁸⁸

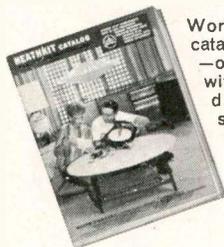
- Complete DC analysis of all PNP, NPN transistors up to 15 amps
- DC gain (beta, alpha) read directly on calibrated scales
- 15 ua basic range for leakage (Icbo, Iceo) tests
- Four lever switches provide rapid test selection
- Built-in battery supply—provision for using external supply
- Ideal for servicing, design work, incoming inspection, production testing, etc.

Superbly engineered with unique features, the new Heathkit IM-30 offers thorough DC analysis of all transistor types and checks of diode characteristics with high accuracy. Operation is simple! Four lever switches select tests of base current, gain, collector current, collector voltage, leak voltage, short test, diode or collector-to-emitter leakage (Iceo), and collector-to-base leakage (Icbo). Four rotary switches, one for voltage and one for current on both gain and leakage set desired conditions. DC Beta and DC Alpha are read direct from the calibrated panel scale after meter is nulled. Gain control is 3% wire-wound potentiometer for high accuracy. Variable bias control allows setting collector current to any value up to 15 amps. Basic tests are made using internal batteries (up to 9 v. in 1.5 v. steps). External DC supply terminals provided for higher voltages and current with appropriate meter ranges provided. Detailed instructions included. 7 lbs.

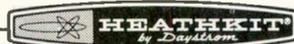
Kit IM-30...NO MONEY DOWN, \$6 mo. \$54.88

SPECIFICATIONS—Checks: Transistors up to 15 amps and diodes up to 1.5 amps. **Tests:** Shorts, DC Gain (Beta 0-300) (Alpha 0-.9967), Leakage (Icbo, Iceo), Diode Forward and Reverse Current. **Meter:** Current Ranges; 15 ua, 150 ua, 1.5 ma, 15 ma, 150 ma, 1.5 A, 15 A; Voltage Ranges; 1.5 V, 5 V, 15 V, 50 V, 150 V (100 K ohm/volt). **Power supply:** Internal, seven 1.5 volt size D batteries provide 1.5, 3, 4.5, 6, 7.5, 9 volts collector supply for gain or leakage and 1.5 volts for bias; External, 0-50 volts for gain, 0-150 volts for leakage and 1.5 volts for bias. **Bias control:** Permits any collector current from 10 ua to 15 amps for gain tests. **Gain control:** 3% wire-wound potentiometer has calibrated scales to give DC Beta and DC Alpha directly when meter is at null. **Lever switch:** Four spring return levers will individually select the following tests: Base Current, Gain, Collector Voltage, Collector Current, Leak Voltage, Short Test, Icbo and Iceo or diode currents. **Two voltage selector switches:** Gain and Leak Test Voltages can be individually preset at different voltage levels. **Two current range switches:** Collector and Leak currents can be individually preset on different ranges. **Transistor and diode connections:** Universal transistor socket and binding posts. **External power supply connections:** Binding Posts for Gain, Leak and Bias supplies.

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For more details, circle 51 on page 60

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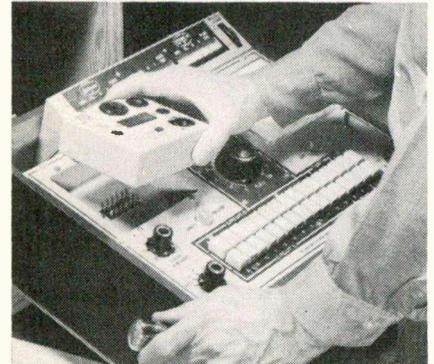
NEW PRODUCTS

sistors, two diodes and one varistor in a specially designed circuit which provides r-f amplification at the antenna end to push-pull amplification at the speaker end. Additional features include: fine tuning, wide-range automatic volume control, self-contained ferrite antenna with an eight-stage telescopic external rod, earphone jacks, SW coverage on 2 bands from 3.8 to 18 mc for WH817 and on one band from 3.8 to 12 mc for WH829. WH817, \$79.95. WH829, \$59.95. The Sampson Co., 2244 S. Western Ave., Chicago, Ill.

... for more details, circle 410 on page 60

Jackson TUBE TESTERS

Improved model 648S tests all new tube types including compactrons, novars and muvistors, plus all TV and radio



tubes. Has push-button sequence switching. Features 23 separate heater voltages from .75 to line voltage. Variable sensitivity shorts tests, up to 2 megohms, may be made quickly. An angled view zig-zag roll chart and an automatic line voltage indicator are standard. \$154.95. Also, improved model 658A, designed primarily for industrial lab, engineering and service applications, \$214.95. Jackson Electrical Instrument Co., 124 McDonough St., Dayton, Ohio.

... for more details, circle 411 on page 60

G-E TUBES

Universal type 21FLP4, 21-inch picture tube can be used as a replacement for 13 different types currently used in TV receivers. These types are: 21CBP4, 21CBP4A, 21CBP4B, 21ALP4A, 21ALP4B, 21ATP4, 21ATP4A, 21BAP4, 21BNP4, 21BTP4, 21CMP4, 21CVP4 and 21CWP4. The new 13-in-one tube incorporates a new straight-line gun with electrostatic focusing which requires no ion trap, and a new high-temperature phosphor which results in improved picture clarity and brightness. It is 2 inches shorter than the longest of the 13 types it can replace. Designed with maximum ratings and operating characteristics. \$45.90. General Electric Co., Owensboro, Ky.

... for more details, circle 431 on page 60



THE FINEST OF COMPONENTS COMBINED ON A BEAUTIFULLY ENGINEERED CHASSIS DESIGNED FOR PERFECT INSTALLATION IN MINUTES

Everything You Need, On One Magnificent Chassis

FISHER 800-B

65-Watt AM-FM-Multiplex Receiver

The best of everything—AM and FM-Multiplex Tuners for every existing type of broadcast (mono or stereo), a Stereo Master Audio Control Center of grand organ flexibility and *simplicity*, a stereo amplifier capable of producing 65-watts of pure, undistorted power—all these have been joined on one gleaming chassis whose capabilities belie its easy-to-install size. And the 800-B features Stereo Beam, the Fisher invention that tells you *instantly*

whether or not the FM station is broadcasting in Stereo Multiplex. No need to consult program listings in the paper, or trot between the two speaker systems to know what is going on. There is no easier way to install a complete stereo system in your home—simply add two speaker systems and a turntable and you can look forward to virtually unlimited years of musical enjoyment. **\$429.50**
Fine Cabinets Available In Walnut or Mahogany \$24.95

FISHER 500-B

65-Watt FM-Multiplex Receiver

■ Outstanding FM and Multiplex with STEREO BEAM, stereo master control center and powerful, 65-watt amplifier—all on *one* magnificent, easy-to-install chassis. **\$359.50**
Walnut, Mahogany Cabinets, \$24.95



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Build Your Own Superb Scott Kits

Have fun . . . save money . . . get the best! Now you can build your own world-famous Scott components . . . and you can make substantial savings compared to the costs of the nearest equivalent factory assembled units.

H. H. Scott kits feature the same engineering, same high performance, same features and parts as do the factory wired components. Tuners have exclusive Scott Wide-Band design with factory aligned silver-plated front ends. Amplifiers use H. H. Scott's superb conservatively rated transformers.

Scott kits are fun to build, too. The wires are pre-cut to exact length and pre-stripped. Instruction books are in full color to help you see exactly what you're doing. Mechanical parts are factory-riveted to the chassis.

For a genuine H. H. Scott system at a real saving, choose from these fine kits:

LT-110 FM Multiplex Stereo Tuner Pre-wired and aligned front end and multiplex sections; Wide-Band design; 2.2 uv sensitivity (IHFM); \$159.95*

LK-48 48-Watt Stereo Complete Amplifier Kit A truly superior amplifier with power enough to drive even the most inefficient speaker systems. Only \$119.95*

LK-72 72-Watt Stereo Complete Amplifier Kit Fabulous Scott features never before available in a kit: derived center channel controls; tape monitor; \$159.95*

LT-10 FM Tuner Kit Unique Ez-A-Line alignment system. Sensitivity 2.2 uv (IHFM). \$99.95*

LC-21 Stereo Pre-Amplifier Kit Exceptional versatility. 16 front panel controls; frequency response for optional laboratory applications 8 to 50,000 cps! \$99.95*

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*slightly higher West of Rockies.

LT-110 FM Multiplex Stereo Tuner Kit



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H. Scott, Inc., Dept. 140-11
111 Powdermill Rd., Maynard, Mass.

For more details, circle 54 on page 60

THE NEW DYNAMIC RAPID TROUBLE SHOOTER

METREX GENIE

POCKET-SIZED — TRANSISTORIZED SIGNAL GENERATOR

7 INSTRUMENTS IN ONE!

Tunable 50 cy. to 3.3 mc.



Pat. Pend.



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

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

1495
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WRITE TODAY FOR FREE TROUBLE SHOOTING GUIDE

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

For more details, circle 55 on page 60

NEW PRODUCTS

Eico FM-MULTIPLEX ADAPTER

Self-powered model MX-99 is reported to provide entirely automatic stereo-mono operation. Includes low impedance



cathode follower outputs. External controls include a multiplex defeat switch to permit mono operation on a stereo signal when desired, and a separation control. It will synchronize with any usable output from the FM tuner. Channel separation, 35db. Kit, \$39.95. Wired, \$64.95. Eico Electronic Instrument Co., 33-00 Northern Blvd., Long Island City 1, N. Y.

for more details, circle 412 on page 60

Atlas SPEAKERS

Announced is a line of compact, rugged all-weather speakers for applications where super-power projection is



required but space and weight limitations are imposed. They are reported easily capable of handling 75 watts at voice frequencies. HP-75, with a bell diameter of 9" and a total length of 8 3/4", weighs 7 lbs. SHP-75, with a bell diameter of 7 1/4" and a total length of 6 3/4" weighs about 6 1/2 lbs. Supplied with cast aluminum bracket. Wiring connections are made within the mounting bracket with solderless connectors provided. Atlas Sound Corp., 1449 39th St., Brooklyn, N. Y.

for more details, circle 413 on page 60

CDE CAPACITORS

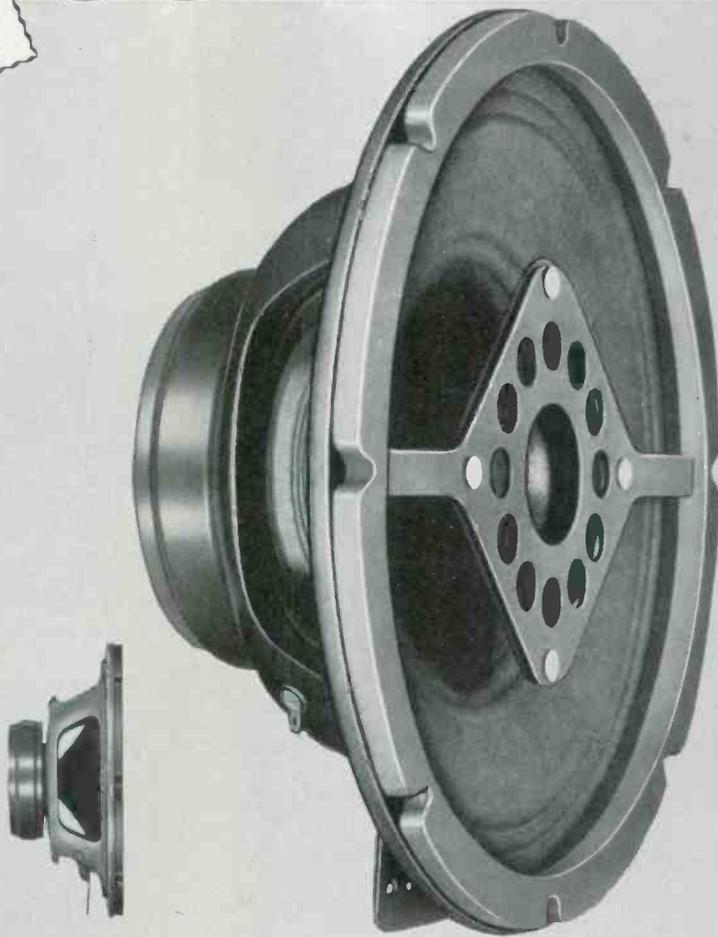
"Black Cat" (PKM) molded capacitors employ a dual-dielectric which affords the long-life characteristics of impregnated paper and the moisture resistance of polyester film. They are suitable for a-c, d-c and pulsed d-c applications and

K-950

... 8" 2-way coaxial distributed sound loudspeaker... **MORE**

NEW

**THAN
50%
LOWER
INSTALLED
COST!**



Available with factory installed 70.7 or 25 volt transformers.

KWIKON* instant connectors and tap adjustments are a cost saving feature.

It's simple arithmetic to show that with the full 110 degree coverage angle of the K-950 (compared with 90° or less for conventional types) you can use *half as many speakers, transformers, ceiling baffles . . . have less than half* the installation cost, because KWIKON* instant connectors and factory preattached transformers further cut on-the-job time importantly. And amplifier cost goes down, too, due to reduction in the number of speakers plus higher efficiency.

When the K-950 is used with conventional "90 degree" spacing, reproduction quality is substantially improved, and loudness and articulation variations with position are drastically reduced compared with the performance of simple cone speakers.†

So whether you're designing for lowest installed cost or highest quality distributed sound, investigate the advantages of the outstanding K-950. Write for Specification Sheet CSP-102 for complete technical details.

†Results of an impartial test by a world famous firm of acoustical consultants.

NO OTHER DISTRIBUTED SOUND SPEAKER HAS ALL THESE FEATURES

1. Genuine coaxial 2-way system with electrically and acoustically independent tweeter.
2. High fidelity wide range response.
3. High efficiency.
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6. Super-shallow depth . . . will mount in the wall.
7. SYNTAX-6* ceramic magnet (10 oz.).
8. Available with factory mounted 70.7 or 25-volt transformers.
9. Handy 10-pack is economical, easy to handle.
10. KWIKON instant connection and transformer tap adjustments.

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For more details, circle 56 on page 69

PLANET

SIZE:
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TRANSISTOR LYTICAPS TYPE "TL"

TYPE "TL" . . . Sub-miniature aluminum foil capacitors . . . hermetically sealed in aluminum tubes . . . clear plastic outer insulating sleeves . . . all mechanical internal connections . . . no "cold weld" nor "pressure" connections . . . engineered for quality for replacement in all transistorized circuits.

Write today for complete information.

PLANET SALES CORPORATION

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Bloomfield, New Jersey

For more details, circle 57 on page 60

only **5**
semicon
kits replace
more than



1,000
of the most
popular transistors,
diodes & rectifiers!

Now—from the leader in packaged-semiconductor replacements—5 pocket-sized new kits that fill 95% of your service needs. Semitron 'Popular-Quick' kits end costly and inconvenient duplications. Only 37 transistors, diodes and rectifiers do the job of more than 1000. You slash non-profitable, slow moving inventory that ties up your purchasing dollar. You can always carry in stock all the replacements you need for better than 9 out of 10 semiconductor service calls. Comprehensive replacement and interchangeability guide included.

- Finest quality American-made components.
- Manufactured and fully tested to meet the strictest standards for radio-tv replacements.
- Full EIA warranty.
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Kit No. 8JP—A complete assortment of 8 top quality semiconductors for replacing components in Japanese and other foreign-made sets • Kit No. 5PT—5 power transistors for auto radio service • Kit No. 9TK—9 transistors and diodes for replacing nearly all PNP transistors and diodes • Kit No. 10SP—10 replacement silicon rectifiers for half-wave and voltage-double TV and radio circuits • Kit No. 5GP—5 germanium glass diodes.



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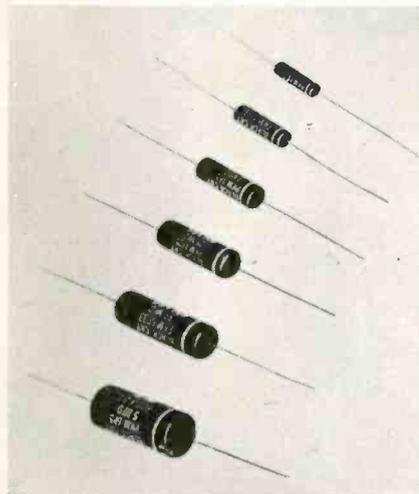
SEMITRONICS CORPORATION

370 Broadway, New York, N. Y.

For more details, circle 58 on page 60

NEW PRODUCTS

available in ratings of 200, 400, 600, 1000 and 1600 volts over the capacity range of .001 through 1 μ fd. Standard



tolerance, \pm 20%, but closer tolerances are available. Use of "fixfil" impregnant permits operation over a temperature range of -40°C to $+125^{\circ}\text{C}$, with no derating. Cornell-Dubilier Electronics Division, Sanford, N. C.

--- for more details, circle 414 on page 60

Weller SOLDERING GUNS

New soldering gun kit, model WK81, consists of a 100-watt gun, model 8100B, and a Weller-Kormat solder dispenser



which handles wire solder sizes from .028 to .074". Gun tip heats instantly when trigger is pulled, cools immediately when trigger is released. Tip is copper for maximum heat transfer, iron-plated for long life. Dispenser keeps wire solder clean, provides back-up support of solder at terminal point, reloads in 30 seconds. \$9.95. Weller Electric Corp., 601 Stone's Crossing Rd., Easton, Pa.

--- for more details, circle 415 on page 60

Eric AMPLIFIER

Model 7061 Pageboy is reported to utilize high fidelity circuitry throughout with full range controls. Frequency response, 20-20,000 cps. Two separate mike inputs have independent volume controls and provision for mixing either one or both mikes with phono input or



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Rochester 1, New York

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For more details, circle 59 on page 60

NEW PRODUCTS

tuner. Rated output, 17 watts, 24w peak. Mike gain, 120 db; phono, 85 db. Hum and noise level, 65 db below rated out-

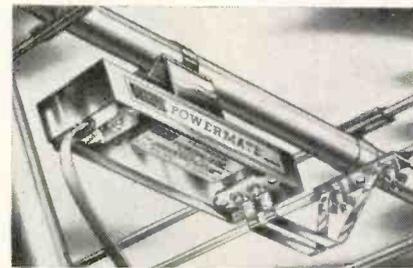


put. Output impedances, 4-8-16-500 ohms (70v line). \$69.95. Eric Electronics Co., 1823 Colorado, Santa Monica, Cal.

- - - for more details, circle 416 on page 60

Jerrold PREAMPLIFIERS

Announced as the firm's first transistorized antenna preamplifier, the new Powermate model APM-101 is reported to create a powerful TV/FM system for



fringe area reception, when added to any TV or FM antenna. It is mounted directly on the antenna boom. Alternate installation is provided which permits connection at any point along the mast, on the wall, the windowsill or behind the set. Signal power gain averages 13.9 db (25 times power gain) at channel 13, and 18.25 db (67 times power gain) at channel 2. \$39.95. Jerrold Electronics Corp., 15th & Lehigh Ave., Philadelphia 32, Pa.

- - - for more details, circle 417 on page 60

STEREO MULTIPLEX ADAPTORS

Special multiplex adaptors announced are: Model MPX-50, to fit the chassis space already present in FM-100, 100-T and 202-T; also model MPX-200 for FM-40, FM-50, FM-80, FM-90, FM-200, 50-R, 70-RT, 80-R, 80-T, 90-R, 90-T, 100-R, 202-R, TA-500, 500-S, 600 and 800. This small unit requires no controls. Fisher Radio Corp., 21-21 44th Drive, Long Island City 1, N. Y.

- - - for more details, circle 418 on page 60

Precision SIGNAL TRACERS

Model ST-22 RF-AF signal tracer is reported capable of handling all receiver or amplifier signal levels, including the gain needed for direct tracing of the actual signal at the receiver antenna input terminals. Features include: high gain



amplifier for both r-f and a-f investigation, extra-high sensitivity, visual and audible signal indicators plus output terminals for use with oscilloscope for VTVM, fine and coarse attenuators; noise test circuit, wattmeter circuit for checking power drain of equipment under test over the range of 36 to 500 watts, test amplifier, etc. \$59.95. Precision Apparatus Co., 70-31 84th St., Glendale 27, N. Y.

- - - for more details, circle 419 on page 60

ATR TUBE PROTECTORS

Designed to protect TV picture tubes and other vacuum tubes in TV and hi-fi sets, etc., this device offers a thermal cushion-action principle which protects electrical components by eliminating initial damaging surge currents. Wall model for use where the instrument plugs directly into a wall outlet, \$3.95. Floor

Watch your SWL volume "take off" with this new, low-cost receiver from hallicrafters!

Here's Hallicrafters' answer to soaring demand for a high-performance, low-cost general coverage receiver in the beginner category—the sparkling new S-119 SKY BUDDY. Heavy national advertising schedule and attractive discounts for exceptional profit opportunity. Designed with ingenious simplicity for trouble-free performance. Order today from your Hallicrafters distributor!



DEALER FRANCHISES AVAILABLE. For information write to: Hallicrafters, Communications Div., 4401 W. 5th Ave., Chicago 24, Ill.

S-119 "Sky Buddy"
factory wired \$49.95

S-120 Deluxe Receiver (not shown)—List \$69.95



"SKY BUDDY" FEATURES

- AM plus 2 short wave bands (2-5.5mc. and 5.7-16.4mc.) covering aircraft, ships, foreign stations, amateurs, etc.
- Transformer-type power supply. Superheterodyne circuit with superb sensitivity and planetary drive for sharp, selective tuning.
- Built-in speaker and headphone jack, with function switch. Separate switch for voice or code reception.

For more details, circle 60 on page 60

NEW...Home TV Signal Amplifier



Model AT-6
ONLY
\$34⁹⁵
LIST

EXCLUSIVE!
GAIN CONTROL SWITCH

EXCLUSIVE!
300 AND 75 Ω OUTPUT

EXCLUSIVE!
AC RECEPTACLE FOR TV

**TRANSISTORIZED
WINEGARD "BOOSTER-PACK"**

**Clears up snow, improves contrast,
adds miles to reception distance!**

Here's the most unusual (and most useful) home TV-FM signal amplifier you've ever seen! Winegard "Booster-Pack" utilizes new low noise, high gain transistor* to give you a flat gain of 16 db on the low band and FM... a flat gain of 14 db on the high band.

Shock-proof... full AC chassis with AC isolation transformer (not AC-DC). Draws only 1.2 watts... cost only 27c per year to operate if left on continuously. No heat radiation. Can be mounted on back of TV set, on baseboard, in basement, attic, etc. Use "Booster-Pack" as a single set booster or as a home system amplifier for up to 6 or 7 sets. (See right)

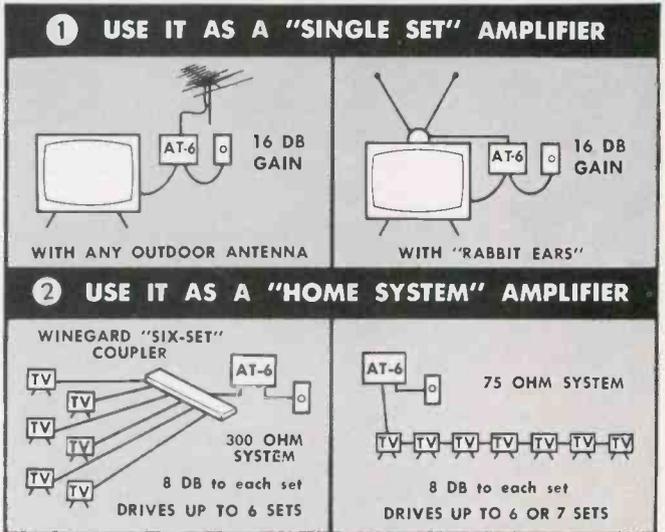
*Special transistor so new that this amplifier could not have been produced until now.

**No other amplifier under \$80.00
has all these features!**



- Drives from 1 to 7 TV/FM sets
- Ideal for color
- Power Consumption: 1.2 watts

- Gain: Low and FM: 16 db
High: 14 db
- Input: 300 ohm
- Output: 300 ohm and 75 ohm
- Transistor*: Low noise, high gain type
- Power Transformer: AC isolation type
- Gain Control: 3-position switch
- AC Outlet: To receive TV set power plug
- Precision Wiring... finest quality throughout



New! Winegard "Six-Set" SIX SET TV COUPLER

For connecting up to 6 TV sets to "Booster-Pack" or to Winegard Powertron antenna. 300 ohm input and outputs. Low insertion loss, positive isolation between sets.



Mod. LT-63
\$7.95 List

ASK YOUR DISTRIBUTOR OR WRITE TO:

Winegard
ANTENNA SYSTEMS

WINEGARD CO., 3019-11 Kirkwood Ave., Burlington, Iowa

For more details, circle 61 on page 60

NEW PRODUCTS

model, with 6 feet of cord, for use where the wall outlet is some distance from the appliance, \$4.95. Both may be used with any equipment having an input



wattage of 100 to 300 watts. Are fuse protected. ATR Electronics, Inc., 300 E. 4th St., St. Paul 1, Minn.

- - - for more details, circle 420 on page 60

RCA TUBES

New 21-inch color TV picture tube, RCA-21FJP22, features a bonded "glare-proof" window, reported to practically eliminate roomlight reflections. It is being utilized in all the current RCA Victor color receivers of the Mark Series line. The new tube is an improved version of RCA-21FBP22, designed for color sets employing separate safety glass. Both tubes are said to provide up to 50% brighter color pictures with greater

sharpness, and both tubes also reproduce black-and-white pictures with greater brightness, contrast and sharpness. RCA Electron Tube Division, Harrison, N. J.

Delco POWER SUPPLIES

Designed especially as a bench power supply for use in automotive radio repair shops, model P-612 power sup-



ply operates any auto radio including Wonder Bar and all-transistor types. Rated output, 8 amps continuous at 12v and 5 amps continuous at 12v with only .01% ripple at the rated load. Other features include: rheostat voltage control from 0-16v, electronic filtering, 20 amps instantaneous output and lightweight, compact, portable design. \$55.95. Delco Radio Div., General Motors Corp., Kokomo, Ind.

- - - for more details, circle 421 on page 60

Ray-O-Vac BATTERIES

Battery testing-merchandising station, RB-8, is offered free with the purchase of radio batteries. It is a permanent unit, made of wood, metal, glass and masonite. 8¼"D, 15½"W, 26½"H. Front is enclosed with glass. Back has sliding wood panel. Has four shelves which slide out and accommodate every size and shape of radio battery. A voltage tester is mounted on top. Ray-O-Vac Co., 212 E. Washington, Madison, Wis.

- - - for more details, circle 422 on page 60



Customized Quality!



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

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

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

*Slightly Higher West.



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

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

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V-M CORPORATION • BENTON HARBOR, MICHIGAN • KNOWN FOR THE FINEST IN RECORD CHANGERS, PHONOGRAPHS AND TAPE RECORDERS
For more details, circle 62 on page 60

TRU-VAC

1-yr. guaranteed Radio & TV Tubes

35¢

Per 100 TUBES
Any tube not listed also available at 35¢ each!

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UP TO 100
1-YR. GUARANTEED
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Now quantity buyers get a FREE assortment of individually-boxed, regular stock TRU-VAC tubes with each order.

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

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

SPECIAL! 6SN7GT . . . 30¢ 6W4GT . . . 30¢

0Y4	3BN6	5V4G	6AU5GT	6BQ6GT	GCS7	6SA7	7A4/XXL	7Q7	12BA7	12SN7GT	36
0Z4	3RZ6	5V6GT	6AU6	6BQ7	6CU5	6SC7	7A5	7S7	12BD6	12SQ7	38
1A7GT	3CB6	5X8	6AU8	6BR8	6CU6	6SD7GT	7A6	7X6	12BE6	12V6GT	39/44
1B3GT	3Q4	5Y3	6AV5GT	6BS8	6D6	6SF7	7A7	7X7	12BF6	12W6GT	41
1H5GT	3S4	6A6	6AV6	6S7G	GDE6	6SF7	7A8	7Y4	12BH7	12X4	42
1L4	3V4	6AB4	6AW8	6B26	6DGG6GT	6SG7	7B4	7Z4	12BL6	14A7/12B7	43
1L6	4BQ7A	6AC7	6AX4GT	6B27	6DF6	6SH7	7B5	12A8	12BQ6	14B6	50A5
1N5GT	4BS8	6AF4	6AX5GT	6C4	6E5	6SJ7	7B6	12AB5	12BR7	14Q7	50B5
1R5	4BZ7	6AG5	6BB	6CA8	6F5	6SK7	7B7	12AD6	12BY7	17AX4	50C5
1S5	4CB6	6AH4GT	6BA6	6CB6	6F6	6SL7	7B8	12AF6	12CA5	17D4	50L6
1T4	5AN8	6AH6	6BC5	6CDB6	6H6	6SQ7	7C4	12A05	12CN5	19AU4GT	56
1U4	5AN8	6AK5	6BC8	6CF6	6J4	6SR7	7C5	12AT6	12D4	19B6G6	80
1U5	5AT8	6AL5	6BD6	6CG7	6J5	6T4	7C6	12A77	12F5	19J6	84/624
1V2	5AV8	6AM8	6BE6	6CG8	6J6	6T8	7C7	12AU6	12F8	19T8	117Z3
1X2	5AZ4	6AN8	6BF5	6CH8	6J7	6U5	7E5	12AU7	12K5	24A	
2AF4	5BR8	6AQ5	6BG6G	6CL6	6K6GT	6U8	7E6	12AV6	12L6	25Z6GT	
2BN4	5CG8	6AQ6	6BH6	6CM7	6K7	6V6GT	7E7	12A7	12L6	27	
2CY5	5I6	6AQ7	6BJ6	6CM7	6N7	6W6GT	7F7	12AX4GT	12Q7	35A5	
3A5	5R4	6AR5	6BK5	6CN7	6Q7	6X4	7F8	12AX7	12R5	35B5	
3AL5	5R8	6AS5	6BK7	6CQ8	6S4	6X5GT	7G7	12AZ7	12SA7	35C5	
3AU6	5U4	6AT6	6BL7GT	6CR6	6S7	6X8	7H7	12B4	12S17	35W4	
3BC5	5U8	6AU4GT	6BN6	6CS6	6S6GT	6Y6G	7H7	12BA6	12SK7	35Z5	

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GET UP TO 100 TUBES FREE!
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TUBE CHECKERS
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Let your customers test their own tubes! These reliable, reconditioned 22-socket tube checkers will return your investment in one week or less with little or no effort on your part! Handsome, field-tested console models COM-PLATE WITH KEY FOR BOTTOM DOOR AND NEON-LIGHTED HEAD!

Below Listed prices do not include duty. Add Additional \$5.00 Deposit on tube sizes to 20"; on 21" and 24" tubes — \$7.50 Deposit refunded immediately when duty is returned unpaid. Aluminized tubes — \$4.00 extra. Picture tubes shipped to continental USA and Canada — All tubes F.O.B., Harrison, N. J.

10B4	5.90	18K14	11.99	17B14	16.99	20H14	17.99	21AW14	17.49	21X14	17.49
12L14	10.49	16L14	12.19	17L14	16.99	21A14	21.49	21E14	17.29	21F14	18.99
14B/CP14	11.99	18R14	11.99	17Q14	13.89	21ALP14	18.79	21F14	18.39	21Z14	17.49
18A14	16.99	17A14	15.49	17I14	18.99	21AP14	18.79	21K14	18.39	24P14	29.79
16D14	12.19	17B14	13.49	18A14	18.39	21AM14	17.99	21M14	22.39	24C14	27.79
16G14	16.09	17C14	16.99	20C14	15.89	21AU14	18.79	21V14	18.39	24P14	29.79
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TRU-VAC (R) PAYS YOUR POSTAGE—On orders of \$5 or more in DRA and Territories. Send approximate postage on Canadian and foreign orders. Any order less than \$5 requires 25¢ handling charge. Send 25¢ on C.O.D.'s. All orders subject to prior sale. Complying with Federal regulations, the following statement appears in all Tru-Vac advertising: Tubes appearing in this ad may be FACTORY SECOND or USED tubes and are clearly marked.

TRU-VAC

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For more details, circle 63 on page 60

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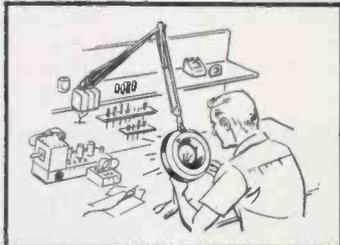
Please ship . . . "CIRCUIT DIGEST BINDERS." I enclose \$. . .

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3 to 11 diopter magnifications
The Luxo Illuminated Magnifier combines magnification, large viewing area, cool fluorescent light and maneuverability in one fixture. Built into every Luxo magnifier are provisions to increase the magnification whenever required. This system gives you a range of 3, 7, and 11 diopter magnifications.



MODEL LFM-1
illustrated with C-bracket
Color: grey

EXCELLENT FOR:

- Quality control
- Locating and repairing printed circuit breaks
- Reading small parts numbers
- Assembly of miniature components

FEATURES:

- 5 inch dia. Bausch & Lomb glass lens
- Stays put in any position without tightening devices
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- LFM-4 and LFM-9 models also available
- UL APPROVED

There is a Luxo model for every requirement. Contact your supply house or write for catalog.

LUXO LAMP CORPORATION
Chicago PORT CHESTER, N. Y. San Francisco

For more details, circle 64 on page 60

NEW PRODUCTS

Eveready BATTERIES

Flashlight and radio batteries, pre-mounted in blister packing on colorful 4 x 5-inch cards for pegboard or spindle display are: No. 915 penlite batteries, size AA, packed 2 per card; No. 1015, size AA transistor radio batteries, 4 per card; and No.'s 216 and 226 9-volt ener-



gizers for transistor radios, packed one per card. Union Carbide Consumer Products Co., 270 Park Ave., New York 17, N. Y.

- - - for more details, circle 423 on page 60

Robins BULK TAPE ERASERS

Model ME-77 removes unwanted signals and reduces background noise levels



from 2 to 4 db below normal erase head levels, from reels of magnetic tape up to 7 inches in diameter. Reported to demagnetize reels of 1/4" tape in seconds. Size, 2 3/8" x 3 3/4" x 6 1/4". Weight, 4 lbs. Operates on 120v a-c, drawing 2.2 amps. \$22. Also, not shown, model ME-99 to erase reels of tape up to 1/2" in width and 10" in diameter. \$33. Robins Industries Corp., 36-27 Prince St., Flushing 56, N. Y.

- - - for more details, circle 424 on page 60

Hallmark TWO-WAY RADIOS

Model HI-104 two-way citizens band radio is reported to provide a range of up to 25 miles. The transmitter and



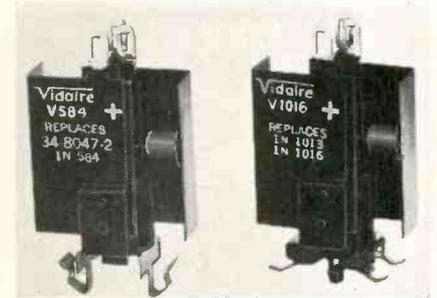
receiver are constructed with rugged, harness-type wiring (no printed circuit

try). Power consumption, 5.5 amps on 12v d-c, or 55 watts on 115v a-c. A single crystal per channel is employed for both transmitting and receiving. \$149.50. Hallmark Instruments Corp., 2215 Commerce St., Dallas, Texas.

- - - for more details, circle 425 on page 60

Vidaire RECTIFIERS

Announced are two models of silicon rectifier voltage doubler stacks as exact replacements in late model TV sets. Part

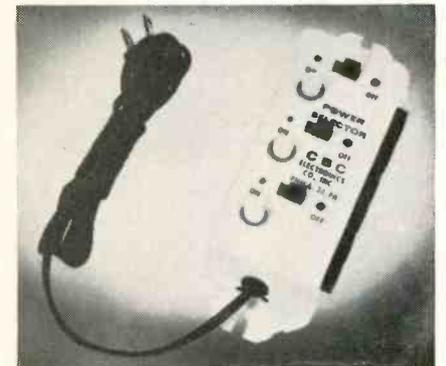


No. V-584 replaces the voltage doubler stacks in Philco and Du Mont TV sets. This number corresponds to Philco No. 34-8047-2 and EIA IN584. Part No. V-1016 replaces voltage doubler stacks in G-E, Hotpoint and Sylvania TV sets. This model corresponds to EIA IN1013 and IN1016. Packaged in plastic boxes. Packed 12 to a counter display box. Vidaire Electronics Mfg. Corp., 365 Babylon Turnpike, Roosevelt, N. Y.

- - - for more details, circle 426 on page 60

C-B-C SWITCHES

Model PS power selector switch plugs into any convenient wall or bench outlet and controls power to three built-in



outlets individually. Each outlet is controlled by its own individual switch. A power indicator light, provided for each receptacle, shows which is receiving power. Rated for 5 amps, 115v. Comes with 6-foot line cord. Is enclosed in an ivory case. C-B-C Electronics Co., Inc., 2601 N. Howard St., Philadelphia, 33, Pa.

- - - for more details, circle 427 on page 60

Erie CAPACITORS

The line of "Gold Seal" button mica capacitors now incorporates a flag-type terminal for faster soldering. Both stand-

Solves all your TV Tuner Problems

VHF TUNERS
UHF TUNERS
UV COMBINATIONS*

*UV combination tuner must be of one piece construction.

ALL MAKES ONE PRICE **9⁹⁵**

90 Day Warranty

Simply send us your defective tuner complete; include tubes, shield cover and any damaged parts with model number and complaint.

Send for FREE Mailing Kit and complete details.

CASTLE TV TUNER SERVICE, INC.

5710 N. Western Ave., Chicago 45, Illinois • 653 Palisade Ave., Cliffside Park, New Jersey
In Canada: 136 Main St., Toronto 13, Ontario

For more details, circle 66 on page 60

NEW BOOKS

TRANSISTORS. Compiled by the staff of Gernsback Library, Inc. Published by Gernsback Library, Inc. 96 pages, soft cover. \$1.95.

Section one of this book covers basic theory involved in testing various transistor characteristics, "how-to-construct" and use a number of particular types of transistor testers. Section two discusses construction, calibration and use of nine different transistorized test instruments. Included is a harmonic distortion analyzer, compact signal injecting instrument, mini-tracer, TV bar generator, three-way signal generator, scope calibrator and others. Text material is well illustrated with schematics, photos, charts and detailed construction drawings.

HOW TO LOCATE AND ELIMINATE RADIO AND TV INTERFERENCE. By Fred D. Rowe. Published by John F. Rider Publisher, Inc. 168 pages, soft cover. \$2.00.

Representing an expanded, revised, second edition of a text originally published in 1954, this book lists many forms of interference encountered today in industrial, business, residential and rural areas, in addition to particular types found in hospital, hotel, and office building areas. Methods of locating and eliminating various interference types are clearly explained. Equipment used for interference location is also listed. Text material is augmented by photos, drawings and schematics. One appendix includes questions and answers on interference and interference elimination. FCC rules on interference are included in another appendix.

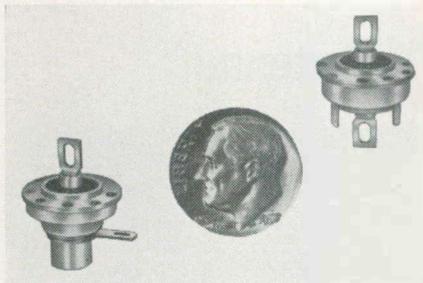
TOUGH DOG CORNER . . .

Continued from page 26

One 20 μ f capacitor, on the 6AS5 cathode, showed considerable leakage, but replacing it did not correct the trouble. To complicate things, I discovered at this point that the new 6AS5 and 6BQ7 were leaking.

It appeared that the trouble was most noticeable when the set was in its normal operating position. On its side the bars were gone, except when the tuner was rocked slightly. This gave me an idea.

A thorough check showed that the tuner was not properly grounded, despite the four bolts holding it to the chassis. A short piece of #18 wire was connected from chassis to the tuner housing which eliminated all problems except a slight sync instability which was cured by replacing a leaky coupling capacitor in the sync clipper.—
Carl Fisher, Carbondale, Kansas.

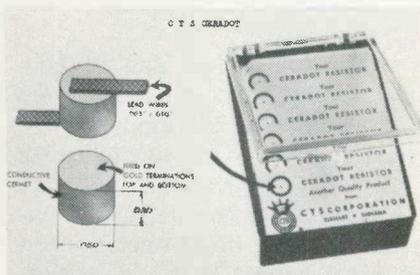


off and feed-through styles are available in capacitance ranges from 15 to 2500 pf. Tolerances are +2 percent or 1 pf, whichever is greater, to +20 percent. Price \$0.79 to \$2.49 each. Eric Resistor Corp., 644 W. 12th St., Erie, Pa.

- - - for more details, circle 428 on page 60

CTS CERMET RESISTORS

This experimental kit contains seven microminiature solid cermet resistors, with resistance values in the range of

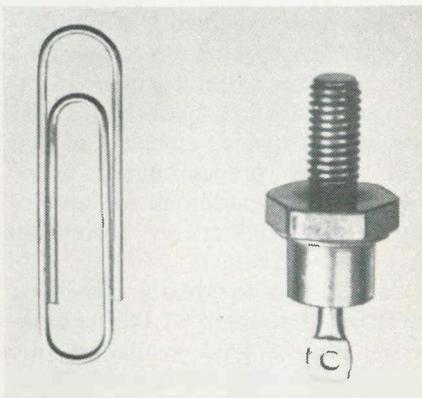


250 to 12,000 ohms. Each unit is 0.050 inch dia. and 0.030 inch thick and is supplied without leads. Other shapes both with and without ribbon leads are available. Price \$7.00 per kit. CTS Corp., Elkhart, Ind.

- - - for more details, circle 429 on page 60

Tucor SILICON RECTIFIERS

Type MA "Trans-Sil" silicon rectifiers measure only 1 3/16 inches overall. Peak inverse voltages range from 50 to 800v in 50v multiples. Nominal



current rating is 1.6 amp and single cycle surge current is 30 amp. Thermal resistance is specified as 5C per w. Construction is a hermetically sealed, double-diffused silicon junction. Tucor, Inc., 59 Danbury Road, Wilton, Conn.

- - - for more details, circle 430 on page 60

CAUTION

a \$1.00 investment
that can save you
hundreds of dollars in
legal entanglements

HOW TO AVOID LAWSUITS IN TV-RADIO- APPLIANCE SALES & SERVICE

by Leo Parker (Attorney at Law)

- When can a serviceman collect for repairs?
- When is a service guarantee enforceable?
- When can a serviceman demand cash payment?
- When does a lien protect a serviceman?
- How can a knowledge of contract law earn profits?
- How valid are written contracts?
- What are the insurance laws? These are just a few of the vital questions that are answered straight from the shoulder in down-to-earth English in this book written by an experienced lawyer and a contributor to many magazines. This particular book covers actual lawsuits involving other servicemen and dealers and important laws and decisions affecting their livelihoods. The content reflects the laws and rulings everywhere in the United States. It covers many situations that you may face if you sell equipment, enter a home to service it or receive equipment for servicing in your shop. *Here's how it will benefit you:*

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2. learn the difference between hearsay and actual law.
3. learn what you can do and cannot do according to modern law.

At \$1.00, this book is the best investment anyone who sells and services TV, radio, and appliances can make. You can't afford to be without it! #283, \$1.00

The Most Timely, Exciting Area of Audio
FM STEREO MULTIPLEXING
by Norman H. Crowhurst

This book is of great value to every service technician. It tells you how it works. It shows you and explains the typical receiver circuits in the equipment available on the market. The information on conversion of Monaural FM tuners into stereo units is complete. It includes antenna installation, matching different adapters to different tuners; matching adapter or tuner to a stereo system. Several chapters are devoted to servicing, alignment, performance check and general troubleshooting procedures. This practical book will help you cash in on FM stereo this fall. #282, \$1.50

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**WHAT
EVERY
NEEDLE
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SHOULD
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DISPENSER!**

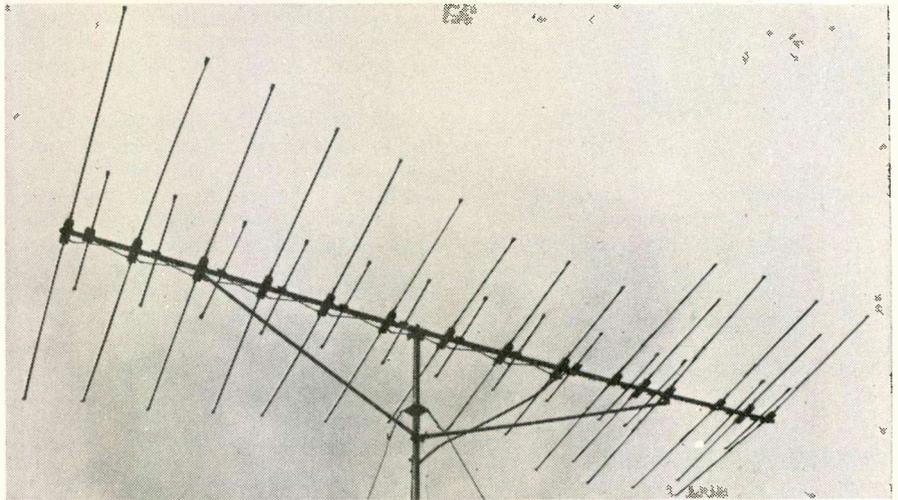


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**SEE YOUR DUOTONE
DISTRIBUTOR TODAY!**
DUOTONE
COMPANY, INC.
KEYPORT, N. J.

For more details, circle 68 on page 60

Powerful Fringe-Area TV Antenna



The "Crossfire" TV antenna, top antenna in Channel Master's new "Gold Medal" line, is designed for optimum broad-band TV reception in deep fringe areas.

■ CHANNEL MASTER Corporation, Ellenville, N. Y., introduces the "Crossfire" antenna. The company says it will make better television reception available to set owners throughout the country, particularly for an estimated four-and-one-half million viewers located in "fringe" areas where weak TV signals make reception difficult.

The antenna is characterized by a number of significant features:

1. It is front fed.
2. There are a number of driven elements, all connected in parallel with a two wire feed line, running from the transmission line.
3. The feed line is transposed between each successive pair of elements.
4. The antenna employs the principal of Proportional Energy Absorption, on both bands.
5. The design of the antenna is such that, at any particular frequency, many elements are active simultaneously.
6. There is a short parasitic element in front of each driven dipole; both dipole and parasite can be considered as a single element unit.
7. The antenna does not have a reflector element.

The key to the high gain of this antenna is the fact that a large group of dipoles functions at any given high or low band frequency. The broad-band gain of this anten-

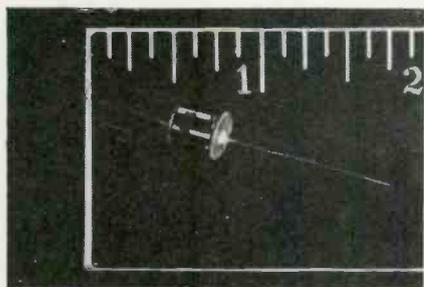
na is due to the fact that Proportional Energy Absorption from the transmission line is maintained for a large number of antenna elements at all VHF frequencies.

This dipole system is said to enhance harmonic mode operation on the high band. There is out-of-phase high band current distribution on a low band dipole and a strong forward current flow of the high band parasitic element. The combined effect of both these elements creates an in-phase current flow on each section of the driven dipole.

At high band frequencies, the parasitic elements provide a sharp directivity pattern for the active elements and hence for the array as a whole.

This design, utilizing a transposition-type of interconnecting feed line, provides extremely high front-to-back ratios on both bands. By cutting and spacing elements so that they follow predetermined impedance paths, conditions for obtaining proportional energy absorption are achieved.

In addition to greatly increasing mechanical strength of the new antenna line, a gold insulating film covers the entire antenna which affords long-term protection against corrosion. The design principles have been incorporated into six different "Gold Medal" antennas, scaled from a super-fringe model to a compact antenna for suburban markets.



Solid State I-F Transformers

■ TWO SOLID-STATE 455 kc i-f transformers have been introduced by U. S. Sonics Corp., Cambridge, Mass.—model A10L for transistor, and model A25H for vacuum tube circuits.

The components are physically smaller than most conventional miniature i-f transformers and use axial leads that permit mounting anywhere in the set. Only single input, output and ground leads are required to wire this ceramic type i-f transformer in a circuit. In addition, the transformer can be mounted automatically in a circuit board by standard equipment used for automated resistor and capacitor mounting.

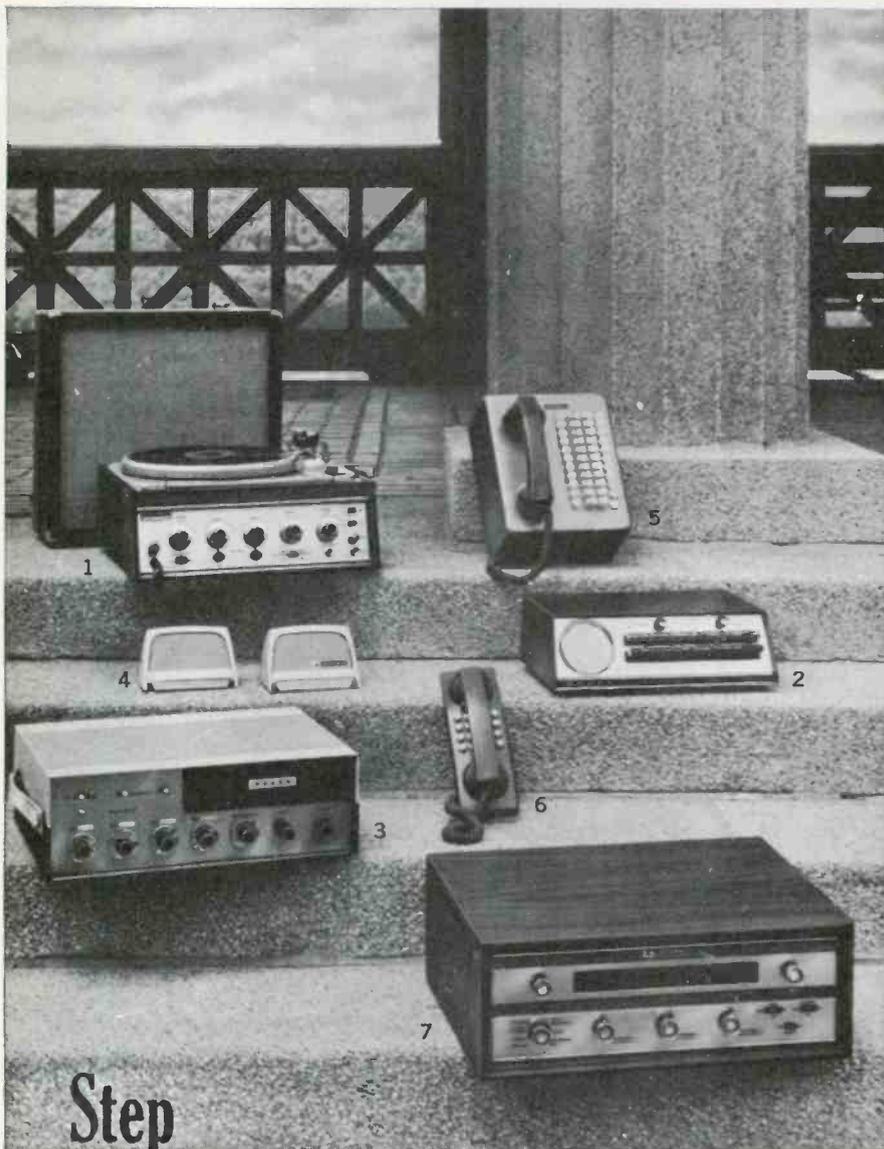
Both models can be supplied with a 100 kc to 1mc frequency range. Bandwidth at —6 is 1 to 20% of center frequency and impedance for transistor circuits is 10k ohms input and 1k ohm output. For vacuum tube circuits input impedance is 25k ohms. Output impedance for this type is 200k ohms. Other impedance values available on request.

Fabricated from a modified zirconite compound, the unit is said to possess permanently tuned design characteristics unaffected by age. Structure of the ceramic i-f is also said to be capable of withstanding repeated 100-g shocks. ■

CERAMIC I-F TRANSFORMERS

	TRANSISTOR CIRCUITRY (TYPE A10019C)	VAC. TUBE CIRCUITRY (TYPE A25H4C)
Input Impedance	10K	25K
Output Impedance	1K	200K
Center Frequency	455 ± 1 kc	455 ± 1 kc
Power Loss (at rated frequency)	1 db	—
Voltage Loss (at rated frequency)	—	1 db
Working Voltage	500 dc between any 2 terminals	500 dc between any 2 terminals
	10V RMS ac at resonance	10V RMS ac at resonance
Bandwidth at:		
—3 db	6 kc	2 kc
—6 db	9 kc	4 kc
—10 db	17 kc	8 kc
—20 db	50 kc	24 kc
—30 db	130 kc	70 kc
—40 db	—	160 kc

* Temperature stability 0.02% R.T. to 80 C.
No spurious responses within an octave.



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For thirty years . . . leadership in sound. BOGEN-PRESTO, world's leading designer/producer of quality Sound Products, offers you the most exciting, most complete line in the industry. From ultra-modern office communications systems to high fidelity for the home—from P.A. and Mobile Sound systems to School Consoles—whenever precision, dependability and performance are required...step up with BOGEN.

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1 VP20 Portable Transcription Player—designed to fill almost every need in the commercial and educational areas.

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3 MX60 Public Address Amplifier—sound flexibility to meet every need, every condition.

4 Bogen Twin-Com—Battery or AC powered. Perfect for home, small office, restaurant. 2 station master and remote intercom system.

5 Attend-A-Phone—service phone system between a central desk and all remote points. Applicable for office, bowling alleys, hospitals, schools, motels and many more.

6 TSD Bogen-Phones—10 and 20 station phones for inter-office communication. Require no central switchboard... multi and private conversations.

7 RP200 Fun-Couple Stereo Receiver—combining quality and style with built-in Multiplex... typical of the all-new line of BOGEN receivers, amplifiers and tuners.

Write for complete literature on the entire BOGEN Sound Line.

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For more details, circle 69 on page 60

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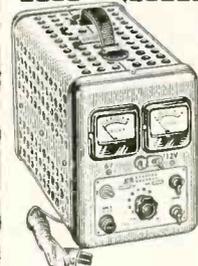
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A.C. Household Electricity Anywhere . . . in your own car, boat or plane Operates Standard A.C. Record Players Dictating Machines Small Radios Electric Shavers Heating Pads, etc. In your own car or boat!

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6-RMF (66 volts) 60 to 80 watts. Shipping weight 12 lbs. DEALER NET PRICE \$33.00
12T-RME (12 volts) 90 to 125 watts. Shipping weight 12 lbs. DEALER NET PRICE \$33.00
*Additional Models Available



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MAY ALSO BE USED AS A BATTERY CHARGER
MODEL 610C-ELIF . . . 6 volts at 10 amps. or 12 volts at 6 amps. Shipping weight 22 lbs. DEALER NET PRICE \$49.95
MODEL 620C-ELIT . . . 6 volts at 20 amps. or 12 volts at 10 amps. Shipping weight 33 lbs. DEALER NET PRICE \$66.95

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By every test ATR Auto-Radio Vibrators are best! . . . and feature Ceramic Stack Spacers, Instant Starting, Large Oversized Tungsten Contacts, Perforated Reed, plus Highest Precision Construction and Workmanship and Quiet Operation!

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Ask your distributor for ATR's Low Priced type 1400, 6 volt 4-prong Vibrator, and 1843, 12 volt 3-prong, or 1840, 12 volt 4-prong Vibrator. THE WORLD'S FINEST!

There is a trim plate kit for YOUR CAR!

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CUSTOMIZED KARADIO

Vibrator-Operated with Tone Control

ATR KARADIO . . . is ideal for small import cars or compact American cars! Unit

is completely self-contained—extremely compact! Powerful 8-tube performance provides remarkable freedom from engine, static, and road noises. The ATR Customized Karadio comes complete with speaker and ready to install. Can be mounted in-dash or under-dash—wherever space permits! No polarity problem. Neutral Gray-Tan, baked enamel finish. Overall size, 7" deep, 4" high, and 6½" wide. Shipping weight, radio set, 7 lbs. Model K-1279—12 for 12V Dealer Net Price \$33.57 Model K-1279—6 for 6V Dealer Net Price \$33.57

Airplane Style Overhead Mounting under Cab Roof

NO PRINTED CIRCUITRY

ATR TRUCK KARADIO

Excellent Tone, Volume, and Sensitivity!

Compact, yet powerful. Fits all trucks, station wagons,

most cars and boats. Just drill a ¾ inch hole in roof and suspend the one piece unit (aerial, chassis and speaker) in minutes. Watertight mounting assembly holds antenna upright. Yoke-type bracket lets you tilt radio to any angle.

Extra-sensitive radio has 6 tubes (2 double-purpose), over-size Alnico 5 PM speaker for full, rich tone. Big, easy-to-read illuminated dial. Fingertip tuning control. Volume and tone controls. 33-in. stainless steel antenna. Neutral gray-tan enameled metal cabinet, 7 x 6½ x 4 in. high over-all. Shipping weight 10½ lbs. Model TR-1279—12A for 12V Dealer Net Price \$41.96 Model TR-1279—6A for 6V Dealer Net Price \$41.96

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ST. PAUL 1, MINNESOTA—U.S.A.

Castle TV Tuner Service—opens a new modern TV tuner service plant at Cliffside Park, N. J.

Vocaline Co. — DONALD W. PENFIELD appointed marketing manager.

JFD Electronics—licenses LE CONDENSATEUR CERAMIGQUE (LCC), capacitor manufacturer, Paris, France, for the manufacture and sale of JFD trimmer capacitor, fixed and variable inductor lines for the 6 countries of the European Common Market. Also, JFD is building an antenna manufacturing plant on a 10-acre site in Oxford, N. C., to be named JFD-SOUTHERN, INC.

Michigan Magnetics—appointments: BERNIE L. KILLINGER, assistant sales manager; JOHN WILLIGMAN, Chicago sales engineer. Promoted to general sales manager is WILLIAM R. SPACKMAN.

Miniature Instruments—enlarges its plant, nine months after moving to its new quarters, to accommodate newly acquired subsidiary, PEPTONE ELECTRONICS, car radio manufacturer.

Olympic Radio & Television Sales Corp. — DAVID A. NEGREY appointed western regional sales manager with headquarters in Arvada, Colo. Harry W. GREEN named vice president and general manager of OLYMPIC OF SOUTHERN CALIF. Inc. Los Angeles.

Progress Webster Corp.—OLIVER L. ANGEVINE, JR., appointed chief engineer.

Sony Corp. of America—has opened a central regional office at 4950 W. Belmont Ave., Chicago.

Jerrold Electronics—general manager appointments: ROBERT H. BEISSWENGER, for JERROLD-PHILADELPHIA; and DONALD SPANIER, for HARMAN-KARDON, Plainview, L. I., N. Y. DANIEL AARON was named assistant general manager of JERROLD-PHILADELPHIA. Also announced is the acquisition by JERROLD of TECHNICAL APPLIANCE CORP., Sherburne, N. Y.



Beisswenger



Spanier



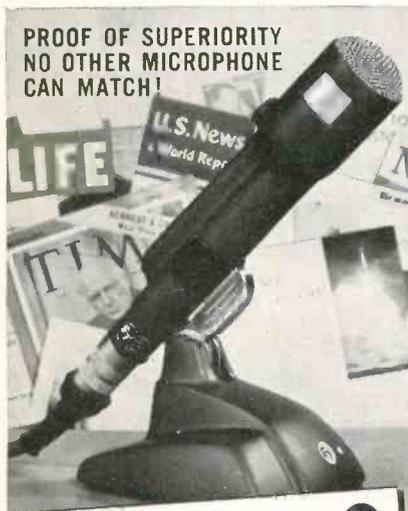
Fisher



Hunt

Zenith Sales Corp.—CLIFFORD J. HUNT appointed vice president, charge of operations, a new post. WALTER C. FISHER, named vice president and manager of distribution. PHILIP J. WOOD, appointed field sales manager. Newly appointed market development managers are: WILLIAM R. CAMPBELL, for radio products; WILLIAM G. FRICK, for TV products; and J. B. ANGER, for phonos and hi-fi products.

Raytheon Distributor Products Div.—district manager appointments: RICHARD H. BALE and FRANK R. SESTANO-



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ElectroVoice

ELECTRO-VOICE, INC.
Commercial Products
Div., Dept. 1111T
Buchanan, Michigan

For more details, circle 72 on page 60

For more details, circle 67 on page 60

VICH, Hawthorne, Calif., JOHN L. SIBBER, Denver, Colo., J. DERYL CASER, Chicago, Ill., and GEORGE F. WEILER, Cleveland, Ohio. JOHN H. HAUSER has been named distribution consultant, Westwood, Mass.

Sylvania—MERLE W. KREMER named vice president of the Electronic Tube Division, charge of operations and continues as vice president and general manager of the firm's Parts Division. GORDON L. FULLERTON appointed vice president of picture tube operations.

Westinghouse—MELVIN GOETZ named director, product and systems planning for the consumer products group.

REPS AND DISTRIBUTORS

Antenna Specialists Co.—names NEAL BEAR CORP. as rep for Ohio, western Pennsylvania and West Virginia areas.

Bogen-Presto Div. Siegler Corp. — rep appointments: WAYNE BEITEL CO., Detroit, Mich.; and ISLAND WHOLESALE SALES CO., Honolulu, Hawaii.

Delta Semiconductors, Inc.—appoints FEDERATED PURCHASER, INC. as distributor for New York and northern New Jersey.

Krylon, Inc.—announces this year's sales achievement awards went to rep firms: TODD, BLUNT & WILLIAMS, INC., Narbeth, Pa., and HIRSIG-FRAZIER CO., Dallas, Tex.

Micon Electronics, Inc., wholly owned subsidiary of METALCRAFT, INC.—names SOUTHERN SALES CO., Angola, Ind., as their rep for Indiana-Kentucky territory.

Electronic Headquarters—Austin, Tex., distributing firm has merged with SERVICE ELECTRONIC SUPPLY, also of Austin.

Sylvania Home Electronics Corp., marketing subsidiary of SYLVANIA ELECTRIC PRODUCTS, INC. — appoints franchised distributors for TV sets, radios and stereo hi-fi phonos: LINCOLN SALES CORP., Baltimore, for 10 Maryland and eight West Virginia counties; GRAYBAR ELECTRIC CO., Philadelphia, for Allentown, and Reading, Pa., and Wilmington, Del., territories; and FRANK EPTING CO., Charlotte, N. C., for 51 North Carolina, 15 South Carolina counties.

University Loudspeakers, Inc. — rep appointments: ANDERSON SALES CO., Boston, Mass., for all products — high fidelity, public address and modular microphones; and BUTCHART-RATHSBURG & Assoc., Detroit, Mich., for component speakers.

Utah Electronics Corp.—names DALE G. WEBER CO., Portland, Ore., as rep in the states of Washington, Oregon and Alaska.

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NOW, for the first time, a home study course devoted exclusively to 2-way FM radio servicing.

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The Motorola Training Institute course covers everything in 2-way radio from basic principles to system analysis and troubleshooting the latest transistorized equipment.

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HERE'S WHAT STUDENTS SAY ABOUT THE MOTOROLA TRAINING INSTITUTE COURSE

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NEW TECHNICIANS: Learn in just a few months what could take years. Course prepared by experienced faculty and highly skilled technicians. Easy-to-grasp lessons—reference library—individualized instruction.



TV-RADIO SERVICE MANAGERS: Here's a great growth opportunity for you and your technicians. The Motorola Training Institute home study course teaches your technicians the right way to do 2-way radio servicing and enables you to expand your range of services.



EXPERIENCED TECHNICIANS: Learn advanced servicing techniques and technological improvements. Get new information and know how on all the new transistorized equipment. An excellent "brush-up" course.

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For more details, circle 73 on page 60



CITIZEN BAND CLASS "D" CRYSTALS

All 22 Frequencies in Stock
3rd overtone .005% tolerance—to meet all FCC requirements. Hermetic ally sealed HC6/U holders. 1/2" pin spacing—.005 pins. (.093 pins available, add 15c per crystal.)

\$2.95 EACH

The following Class "D" Citizen Band frequencies in stock (frequencies listed in megacycles): 26.965, 26.975, 26.985, 27.005, 27.015, 27.025, 27.035, 27.055, 27.065, 27.075, 27.085, 27.105, 27.115, 27.125, 27.135, 27.155, 27.165, 27.175, 27.185, 27.205, 27.215, 27.225.

Matched crystal sets for all CB units . . . \$5.90 per set. Specify make and model numbers.

RADIO CONTROL CRYSTALS IN HC6/U HOLDERS

Specify frequency. 1/2" pin spacing. . . pin diameter .05 (.093 pin diameter, add 15c)

.....\$2.95 ea.

FUNDAMENTAL FREQ. SEALED CRYSTALS

- in HC6/U holders
- From 1400 KC to 2000 KC .005% Tolerance\$4.95 ea.
- From 2000 KC to 10,000 KC any frequency .005% Tolerance\$3.50 ea.
- SEALED OVERTONE CRYSTALS**
- Supplied in metal HC6/U holders
- Pin spacing .486, diameter .050
- 15 to 30 MC .005 Tolerance\$3.85 ea.
- 30 to 45 MC .005 Tolerance\$4.10 ea.
- 45 to 60 MC .005 Tolerance\$4.50 ea.

QUARTZ CRYSTALS FOR EVERY SERVICE

All crystals made from Grad "A" imported quartz—ground and etched to exact frequencies. Unconditionally guaranteed! Supplied in:

- FT-243 holders MC-7 holders
- Pin Spacing Pin Spacing
- 1/2" Pin Diam. 3/4" Pin diameter .125
- Cria/ar Holders FT-171 holders
- Pin Spacing 1/2" Pin Spacing
- Pin Diameter 3/4" Banana pins



MADE TO ORDER CRYSTALS

- 1001 KC to 2600 KC: .005% tolerance\$4.50 ea.
- 2601 KC to 9000 KC: .005% tolerance\$2.50 ea.
- 9001 KC to 11,000 KC: .005% tolerance\$3.00 ea.

Specify holder wanted

Amateur, Novice, Technician Band Crystals
.01% Tolerance . . . \$1.50 ea.—80 meters (3701-3749 KC), 40 meters (7152-7198 KC), 15 meters (7034-7082 KC), 6 meters (8335-8650 KC) within 1 KC
FT-241 Lattice Crystals in all frequencies from 370 KC to 540 KC (all except 455 KC and 500 KC) 50c ea.
Pin spacing 1/2" Pin diameter .093
Matched pairs ± 15 cycles \$2.50 per pair
200 KC Crystals, \$2.00 ea.; 435 KC Crystals, \$1.25 ea.; 500 KC Crystals, \$1.25 ea.; 100 KC Frequency Standard Crystals in HC6/U holders \$4.50 ea.; Socket for FT-243 crystal 15c ea.; Dual socket for FT-243 crystals, 15c ea.; Sockets for MC-7 and FT-171 crystals 25c ea.; Ceramic socket for HC6/U crystals 20c ea.
Write for new free catalog #961 complete with oscillator circuits

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See big red display . . . if he doesn't stock them, send us his name and order from our Florida plant.

Now! Engineering samples and small quantities for prototypes now made either at Chicago or at Ft. Myers Plant. 24 Hour Service.
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Dept. T-111, 1000 CRYSTAL DRIVE, FORT MYERS, FLORIDA
For extra fast service, Phone WE 6-2100

ATTACH THIS COUPON TO YOUR ORDER FOR SHIPMENT VIA 1ST CLASS MAIL AT NO EXTRA COST

TERMS: All items subject to prior sale and change of price without notice. All crystal orders must be accompanied by check, cash or M.O. with PAYMENT IN FULL.
Dept. T-111

For more details, circle 74 on page 60

ASSOCIATION NEWS

Florida

TESA, Miami, has indicated that a proposed licensing law for Dade County was squashed by a vote of 10 to 1. The County Commission stated that the law "might become an open door for the complete control of the industry by the wishes and desires of the few." No official comment from TESA-Miami, who supported the bill, has been received at this writing.

Illinois

NATESA, Chicago, reports that the Americana Hotel, Miami, will be the scene of its 1962 Spring directors meeting to be held April 28 and 29. TESA-Miami will be the host, and A. Edward Stevens, convention chairman.

Parts Distributors Also Complain

A NATESA reporter-at-large reveals findings obtained after visiting parts distributors and service technicians in principal cities of 48 states during the last year and a half. According to the information, the service technician is continually complaining about his parts distributor in almost every area. "But," the reporter said, "I would like to comment on the parts distributors' complaints for a change."

The substance of the reporter's findings was that many distributors are concerned about service technicians buying from anyone who offers his parts at savings. The distributors say that many technicians spread their purchases over six or seven houses, being loyal to none. Many technicians are also purchasing their supplies from catalog houses and others in the business. In addition, the report continued, the average service technician will play one parts distributor against the other, trying to get an extra few cents off on purchases.

Those Behind The Throne

From another NATESA source comes a story about a few enterprising Chicago radio-TV technicians who are directing their major advertising efforts to the housewife. They reason that she is the chief executive and exchequer behind the front-office-mint when it comes to radio-TV repairs, and she often decides, for example, if stereo comes into the home or remains outside.

One technician uses a newspaper ad offering used table-top sets for kitchen purposes—with "bonuses" of glassware, handy utensils, etc. He also runs a weekly recipe contest and pays \$2 for the best and \$1 for runner-up recipes. Every two weeks the recipes appear with an ad on sales and service for other housewives to use.

Another technician has a little different approach, but it all adds up to the same good-will and "image building." He leaves a free gift—a dishcloth, table spread, pot-holder or apron—with the housewife on every service call. He

AN

IMPORTANT

MESSAGE

TO

TV

TECHNICIANS!



If you are a TV Technician located within a fifty mile radius of New York City, excluding Brooklyn & Long Island, you have an opportunity to combine the exciting field of merchandising with servicing as a store owner or manager with one of America's leading electronic chains. Investigate the advantages of a PARTS UNLIMITED franchise and earn more by taking advantage of centralized buying, advertising, top-notch management advice in merchandising & store management. Write today for further information.

PARTS UNLIMITED, INC.

1 State Street • Bloomfield, N. J.

For more details, circle 75 on page 60

free send for the 444-page
1962 **ALLIED**
ELECTRONICS CATALOG

WORLD'S BIGGEST SAVES YOU MOST

send for it

Get the one complete catalog with everything in electronics at money-saving prices for Service Technicians and Engineers:

- World's largest selection of Electronic Parts, Tubes, Transistors • Test Instruments, Meters • TV Tubes, Antennas, Accessories • Knight-Kits®—Best in Build-Your-Own • Everything in Stereo Hi-Fi Systems and Components • P. A. Systems • Tools • Books • Everything for Service Work.

NO MONEY DOWN • Easiest Terms

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ALLIED RADIO, Dept. 222-L1
100 N. Western Ave., Chicago 80, Ill.
 Send FREE 1962 ALLIED Catalog

Name _____
PLEASE PRINT
Address _____
City _____ Zone _____ State _____

For more details, circle 76 on page 60

runs a "Housewives Cold-Cash" contest each month with \$5, \$2.50 and \$1.50 paid for the best three letters received on the subject "Why . . . Is My Favorite TV Repairman." Still another housewife-minded technician offers free potted plants for service transactions amounting to \$10 or more.

Indiana

IESA, Indianapolis, confirms reports that Admiral TV sets distributed in the central area will be sold with a one year service guarantee when sets are brought in by owners. According to a notice issued by Capitol Appliance Distributors, \$4 will be paid for each instance of circuit work. Anyone repairing one of these sets will only be paid the aforementioned repair price. The report says the customer stands to gain nothing since it is doubtful that anyone will provide quality workmanship at these sub-standard repair rates which are approximately one-third of the normal charge.

IESA also announced that the U.S. Bureau of Apprenticeship Training has advised that Selective Service deferments, similar to those available to college students, are available to apprentices until their training is completed—if the apprenticeship plan is approved by the Indiana Director of Selective Service.

Missouri

TEAM, St. Louis, says that harm done to the TV service industry's public relations increases when a license bill is introduced. Further suggests that the licensing idea has divided the industry, resulting in manufacturers setting up their own service facilities to insure public acceptance of their products.

Ohio

TESA, Cincinnati, reports that state license bill No. 253 has been "buried" in the Commerce and Transportation Committee by a 9 to 2 vote. A motion was passed to table the bill indefinitely.

Texas

TEA, Fort Worth, has approved, and is placing in effect, a life insurance program with blanket coverage for its members. The plan provides for extending the insurance to all employees of affiliated firms. Association president Marvin Tappe said the insurance program is one major step forward in TEA's efforts to give better service to its members. He praised members of the special committee who worked out the insurance plan.

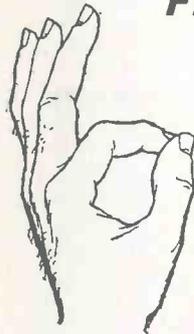
Washington

WSEC, Yakima, reports the following officers have been elected: Chairman, Dick Brinkerhoff; vice chairman, Dick Jones; secretary-treasurer, Ansel Heckman.

TSA, Seattle, reports that the King County Association and the City of Seattle acted as hosts for the fall meeting of WSEC, on October 1.

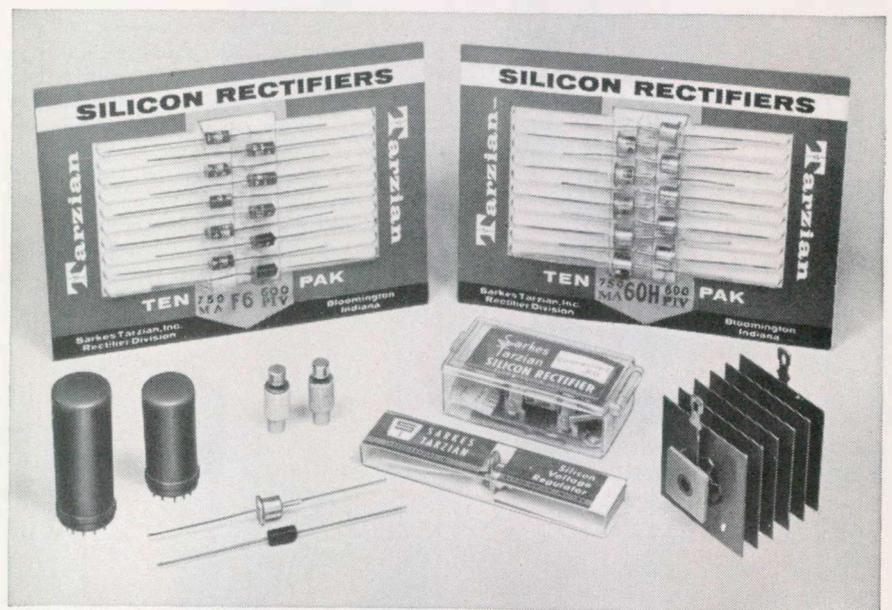
Sarkes Tarzian

SILICON RECTIFIERS THAT MEAN FEWER CALL-BACKS FOR YOU



If you prefer them, you have lots of company!

Returns have just been tabulated from a mailing by Brand Name Survey, an independent research organization, to 23,000 service technicians in 36 states—all major market areas in the United States. More technicians like yourself prefer Sarkes Tarzian rectifiers than the next two most popular makes combined!



▲ Tarzian 400 and 600 volt F and H series units are available in handy Ten Packs or Doubler Replacement Kits, and in bulk; M150 and M500 units in Conversion Kits and in bulk. Nine standard tube replacement rectifiers replace over 95% of all popular vacuum tube rectifiers; S5347 replaces 6BW4 or 12BW4 in Citizen's Band radios. Four "condensed stack" selenium rectifiers, more efficient and SMALLER than before, now cover your 50 to 500 ma requirements.

Tarzian silicon rectifiers are available in the shapes, sizes, and specifications you need to do your work right—and quickly. They are available from distributors everywhere. And they combine the low price and high quality that is a Tarzian trademark.

Ask your distributor for a copy of the new Tarzian "Distributor Line" catalog, and make the performance of these preferred devices part of your good service.



SARKES TARZIAN, INC.

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

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those who
Serve Best
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There's never any doubt with QUIETROLE... it always says "Sh, Sh" to noisy controls and switches on TV, radio and electronics instruments. Now, Quietrole is even easier to use... has FREE EXTENDER TUBE that hits those hard to reach places right on the button. It's Quality Quietrole that makes those once pesty repairs easier than ever. See how Quietrole can ease the jangled nerves of even your hardest to please customers. Quietrole, helps the serviceman serve better than ever.

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(with FREE Extender Tube)

2, 4, 8 oz. Bottles
(with dropper)

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For more details, circle 78 on page 60

NEW BOOKS

RAPID AUTO RADIO REPAIR. By G. Warren Heath. Published by Howard W. Sams & Co., Inc. 160 pages, soft cover. \$2.94.

A sectionalized book with the first three chapters covering auto radio receiver design and circuit theory. The remaining three chapters discuss common symptoms, possible causes and suggested service procedures, which are listed from A to Z according to symptoms. The servicing guide includes hybrid, all-transistor and FM auto radios. Automatic search type tuners are included as well as ignition system interference problems.

1960-1961 TV CIRCUIT HANDBOOK. By Samuel L. Marshall. Published by Howard W. Sams & Co., Inc., 136 pages, soft cover. \$3.95.

This handbook divides the TV receiver into thirteen circuit sections (one section covers color TV). Late circuit innovations and their operation are described. Using schematics, block diagrams and drawings, the 13 section text analyzes the functions of 1960-61 TV circuitry. Troubleshooting charts include symptoms and likely component failures. The book may prove helpful in understanding operation and troubleshooting modern TV receivers.

TELEVISION RECEIVER SERVICING. TIME BASE CIRCUITS. By E. A. W. Spreadbury, Published by Iliffe Books Ltd., London, S.E.1, England. 366 pages, hard cover. \$3.70.

This is a revised second edition of the first volume of a two-volume work previously written by this British author. Although addressed specifically to British service engineers (a term equivalent to U. S. radio-TV technicians), it is interesting for two reasons: First, it is a well written book containing a wealth of practical information; second, the contrasting British terms used to describe circuitry and components. It should be recalled, too, that the British horizontal scan (line-time-base) frequency is 10,125 cps, or 405 lines, instead of 15,750 cps and 525 lines respectively. Vertical (picture or frame time base frequency) is 50 cps (interlaced) instead of 60 cps. Sound and picture are separated 3.5 mc instead of 4.5 mc. And, of course, our "tube" has always been a "valve" in Britain since Fleming's day.

The first two chapters deal with the no raster (blank screen) symptom, its causes and cures. HV (EHT—Extreme High Tension—) systems, B+ (HT) and damper boost (HT boost), horizontal sweep oscillators (line-time-base circuits) and troubleshooting techniques. Other chapters review basic composite video, sync separation, sync separator circuitry and troubleshooting with the scope. Following chapters portray more

POWER TRANSISTORS

FOR GENERAL REPLACEMENT PURPOSES IN AUTO RADIOS, POWER AMPLIFIERS, FARM RADIOS, MARINE RADIOS, ETC.

Individually packaged in a plastic see-thru box with instructions and cross-reference information.



4 TYPES OF POWER TRANSISTORS THAT WILL REPLACE A LARGE MAJORITY OF TRANSISTORS IN USE TODAY



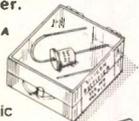
V176 LOW WATTAGE TYPE
V155 MEDIUM WATTAGE
V40 HIGH WATTAGE TYPE
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FOR GENERAL REPLACEMENT PURPOSES

For use in radios, television sets, amplifiers or any electronic equipment presently using a tube, selenium or silicon rectifier.

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750 MA 400 P.I.V.
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For use in all TV sets and electronic equipment where an RMS voltage of 280 volts or less is applied.



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365 BABYLON TPKE. — ROOSEVELT, N. Y.

For more details, circle 79 on page 60

NEW! NOW!

MOSLEY Hi-Fi Accessories

Cash in on Hi-Fi and Stereo accessory sales with Mosley audio accessories. Long identified as the producer of premium quality television antenna accessories, Mosley now offers a full line of speaker switches, attenuator plates and speaker wall outlets.

A ready-made and profitable market for you through Mosley advertising in leading high fidelity and electronic enthusiast magazines.

Ask your Mosley Distributor for full details or write

Mosley Electronics, Inc.

4610 N. Lindbergh Blvd.

• Bridgeton, Missouri

For more details, circle 80 on page 60

ELECTRONIC TECHNICIAN

thoroughly vertical sync (frame pulse), horizontal sync (line pulse), interlace, vertical and horizontal oscillator circuits (time-base-circuits). Operation and troubleshooting of damper (HT boost) circuits are covered in another chapter. Final chapters explore picture shift (focus and centering), CRT circuits, and various British fly-wheel synchronizing circuits such as "synchrophase," "Ferguson," "Pye" and "Philips." Test and troubleshooting instruments discussed.

STATEMENT REQUIRED BY THE ACT OF AUGUST 24, 1912, AS AMENDED BY THE ACTS OF MARCH 3, 1933, JULY 2, 1946 AND JUNE 11, 1960 (74 STAT. 208) SHOWING THE OWNERSHIP, MANAGEMENT, AND CIRCULATION

Of ELECTRONIC TECHNICIAN published monthly at Duluth, Minnesota for October 1, 1961.

1. The names and addresses of the publisher, editor, managing editor, and business managers are: Publisher, Howard A. Reed, 480 Lexington Avenue, New York 17, N.Y.; Editor, Albert J. Forman, 480 Lexington Avenue, New York 17, N.Y.; Managing Editor, Arthur P. Salsberg, 480 Lexington Avenue, New York 17, N.Y.; Business Manager, E. A. Kuefner, 1 East First Street, Duluth 2, Minn.

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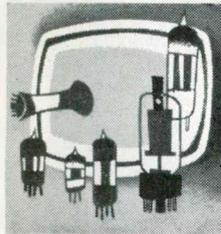
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5. The average number of copies of each issue of this publication sold or distributed, through the mails or otherwise, to paid subscribers during the 12 months preceding the date shown above was: (This information is required by the act of June 11, 1960 to be included in all statements regardless of frequency of issue.) 82,000. (Signature) Robert L. Edgell
Vice President

Sworn to and subscribed before me this 27th day of September, 1961. (SEAL)

(Signature) Empi S. Fisher
Notary Public
St. Louis County,
Minn.

(My commission expires Jan. 31, 1963.)



The "Big Picture"

...informative shop talk from
Sylvania Field Service Headquarters



A fast,
easy way
to build
a good
service
reputation

TV service customers are tough customers . . . especially on "tough dog" service bills. There's no such animal in the new Sylvania TV . . . it's designed for fast and easy service, the kind that keeps customers happy and your reputation high.

The new GT-555 chassis is the cleanest yet . . . horizontal and modular for fast and easy access to all components. The exclusive Flexi-core transformer that powers it is 100% interleaved and welded (rather than bolted) to reduce magnetic interference and eliminate lamination buzz. It's smaller and lighter, too . . . and provides easier-testing parallel circuits.

Pulling and remounting whole assemblies takes just seconds. All major components have easy-to-pull plugs, and new bracket mounting eliminates those tough-to-get-at screws.

Fast and easy service is built into the new chassis board, too. Its easy-to-follow road map color-codes circuits 5 ways . . . even designates parts and tube pin numbers. No wiring errors or cracking problems, either . . . automatic production assures "lab model" uniformity, and tough copper-bonding withstands flexing, vibration and shock.

The GT-555 has many more quality features you'll appreciate. It's a cold chassis . . . completely insulated from ground and AC line. The cage door on the Mylar-insulated high voltage transformer is hinged (with safety lock) for easy access. All capacitors are plastic encapsulated.

It's a honey, with a fast-growing reputation for fine performance and reliability—the kind of reputation that's easy to recommend.

SERVICE TIP OF THE MONTH

Check stubborn cases of sync buzz in TV audio as follows: (1) align all tuned sound circuits according to manufacturer's service literature; (2) check lead dress on video leads, which may be close to sound section and injecting buzz; (3) ground the volume control case (through capacitor on series filament "hot chassis" sets).

Sylvania Home Electronics Corp., Batavia, New York

SYLVANIA

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RAD-TEL Tube Values Defy Comparison!

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—	1AX2	.62	—	2EN5	.45	—	3V4	.58	—	5BE8	.83	—	6AB4	.46
—	1B3	.79	—	3A3	.76	—	4AU6	.54	—	5BK7	.82	—	6AC5	1.05
—	1DN5	.55	—	3A4	.60	—	4BA6	.51	—	5BQ7	.97	—	6AC7	.96
—	1G3	.79	—	3AF4	1.02	—	4BC5	.58	—	5BR8	.79	—	6AF3	.73
—	1H5	.54	—	3AL5	.42	—	4BC8	.96	—	5BT8	.83	—	6AF4	.97
—	1J3	.79	—	3AUG	.51	—	4BN6	.75	—	5CG8	.76	—	6AG5	.68
—	1K3	.79	—	3AV6	.41	—	4BQ7	1.01	—	5CL8	.76	—	6AH4	.81
—	1L4	.68	—	3BA6	.51	—	4BS8	.98	—	5CM8	.90	—	6AH6	.99
—	1LC5	.59	—	3BC5	.54	—	4BU8	.71	—	5CQ8	.84	—	6AK5	.95
—	1LD5	.69	—	3BE6	.52	—	4BZ6	.58	—	5CZ5	.72	—	6AL5	.47
—	1LG5	.69	—	3BN6	.76	—	4BZ7	.96	—	5EA8	.80	—	6AL7	1.43
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—	1R5	.62	—	3BY6	.55	—	4DE6	.62	—	5J6	.68	—	6AM8	.78
—	1S2A	.76	—	3BZ6	.55	—	4DK6	.60	—	5T4	.79	—	6AQ5	.53
—	1S4	.59	—	3CB6	.54	—	4DT6	.55	—	5T8	.81	—	6AR5	.55
—	1S5	.51	—	3CF6	.60	—	4EW6	.58	—	5U4	.60	—	6AS5	.60
—	1T4	.58	—	3CS6	.52	—	5AM8	.79	—	5U8	.81	—	6AS6	.80
—	1U4	.57	—	3DG4	.85	—	5AN8	.86	—	5V3	.90	—	6AT6	.43
—	1U5	.50	—	3DK6	.60	—	5AQ5	.52	—	5V6	.56	—	6AT8	.79
—	1V2	.50	—	3DT6	.50	—	5AS8	.86	—	5X8	.78	—	6AU4	.82
—	1X2B	.82	—	3Q4	.63	—	5AT8	.80	—	5Y3	.46	—	6AU6	.52

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—	6AU8	.87	—	6J7	.62	—	12DB5	.69
—	6AV6	.41	—	6K6	.63	—	12DE8	.75
—	6AW8	.90	—	6L6	1.06	—	12DL8	.85
—	6AX4	.66	—	6N7	.98	—	12DM7	.67
—	6AX5	.74	—	6S4	.51	—	12DQ6	1.04
—	6AX7	.64	—	6S8	.76	—	12DS7	.79
—	6AX8	.92	—	6SA7GT	.76	—	12DT5	.76
—	6BA6	.50	—	6SG7GT	.41	—	12DT7	.79
—	6BA7	.84	—	6SH7GT	.49	—	12DT8	.79
—	6BA8	.88	—	6SJ7	.88	—	12DW8	.89
—	6BC5	.61	—	6SK7GT	.74	—	12DZ6	.56
—	6BC7	.94	—	6SL7GT	.80	—	12EG6	.54
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—	6BD5	1.25	—	6SQ7	.73	—	12EL6	.50
—	6BD6	.57	—	6T4	.99	—	12EM6	.79
—	6BE6	.55	—	6T8	.85	—	12EN6	.78

—	6BF5	.90	—	6U8	.83	—	12EZ6	.53
—	6BF6	.44	—	6V6GT	.54	—	12F8	.66
—	6BG6	1.66	—	6V8	.86	—	12FA6	.79
—	6BH6	.65	—	6W4	.60	—	12FM6	.43
—	6BH8	.87	—	6W6	.71	—	12FR8	.91
—	6BJ6	.62	—	6X4	.39	—	12FX8	.85
—	6BJ7	.79	—	6X5GT	.53	—	12GC6	1.06
—	6BK7	.85	—	6X8	.80	—	12J8	.84
—	6BL7	1.00	—	6Y6G	.65	—	12K5	.65
—	6BN4	.57	—	7A8	.68	—	12L6	.58
—	6BN6	.74	—	7AU7	.61	—	12S8	.62
—	6BQ5	.65	—	7B6	.69	—	12SA7	.92
—	6BQ6	1.05	—	7EY6	.73	—	12SF5	.50
—	6BQ7	1.00	—	7F8	.90	—	12SF7	.69
—	6BR8	.78	—	7Y4	.69	—	12SH7	.49
—	6BS8	.90	—	8AU8	.83	—	12SJ7	.67
—	6BU8	.70	—	8AW8	.93	—	12SK7	.74

—	6BX7	1.02	—	8BH8	.90	—	12SL7	.80
—	6BY5	1.15	—	8BN8	.75	—	12SN7	.67
—	6BY6	.54	—	8BQ5	.60	—	12SQ7	.78
—	6BY8	.66	—	8CG7	.62	—	12U7	.62
—	6DZ6	.55	—	8CM7	.68	—	12V6	.53
—	6E27	1.01	—	8CN7	.97	—	12W6	.69
—	6E28	1.09	—	8CS7	.74	—	12X4	.38
—	6C4	.43	—	8CX8	.93	—	17AX4	.67
—	6C8	.90	—	8EB8	.94	—	17BQ6	1.09
—	6CB6	.55	—	8SN7	.66	—	17D4	.69
—	6CD6	1.42	—	9CL8	.79	—	17DQ6	1.06
—	6CE5	.57	—	11CY7	.75	—	17L6	.58
—	6CF6	.64	—	12A4	.60	—	17W6	.70
—	6CG7	.61	—	12AB5	.55	—	18FW6	.49
—	6CG8	.77	—	12AC6	.49	—	18FX6	.53
—	6CK4	.70	—	12AD6	.57	—	18FY6	.50
—	6CL8	.79	—	12AE6	.43	—	19AU4	.83

—	6CM6	.64	—	12AE7	.94	—	19BG6	1.39
—	6CM7	.66	—	12AF3	.73	—	19T8	.80
—	6CM8	.90	—	12AF6	.49	—	19V8	.79
—	6CN7	.65	—	12AJ6	.46	—	21EX6	1.49
—	6CQ8	.84	—	12AL5	.45	—	25AV5	.83
—	6CR6	.51	—	12AL8	.95	—	25AX4	.70
—	6CS6	.57	—	12AQ5	.60	—	25BK5	.91
—	6CS7	.69	—	12AT6	.43	—	25BQ6	1.11
—	6CU5	.58	—	12AT7	.76	—	25C5	.53
—	6CV6	1.08	—	12AU6	.51	—	25CA5	.59
—	6CY5	.70	—	12AU7	.60	—	25CD6	1.44
—	6CY7	.71	—	12AV6	.41	—	25CU6	1.11
—	6DA4	.68	—	12AV7	.75	—	25DN6	1.42
—	6DB5	.69	—	12AX4	.67	—	25EH5	.55
—	6DB6	.51	—	12AX7	.63	—	25L6	.57
—	6DE6	.58	—	12AY7	1.44	—	25W4	.68
—	6DG6	.59	—	12AZ7	.86	—	25Z6	.66
—	6DK6	.59	—	12B4	.63	—	32EY5	.55

—	6DN6	1.55	—	12BA6	.50	—	32L7	.90
—	6DQ6	1.10	—	12BA7	.84	—	35B5	.60
—	6DT6	.53	—	12BD6	.50	—	35C5	.51
—	6DT8	.79	—	12BE6	.53	—	35L6	.57
—	6EA8	.79	—	12BF6	.44	—	35W4	.42
—	6E5	.72	—	12BH7	.77	—	35Z5	.60
—	6EB8	.94	—	12BK5	1.00	—	36AM3	.36
—	6EM5	.76	—	12BL6	.56	—	50B5	.60
—	6EM7	.82	—	12BQ6	1.06	—	50C5	.53
—	6EU8	.79	—	12BY7	.77	—	50EH5	.55
—	6EW6	.57	—	12BZ7	.75	—	50L6	.61
—	6EY6	.75	—	12C5	.56	—	57G3	1.00
—	6F5GT	.39	—	12CN5	.56	—	70L7	.97
—	6F6	.69	—	12CR6	.54	—	70Z5	.69
—	6GK6	.79	—	12CU5	.58	—	84/6Z4	.46
—	6GN8	.94	—	12CU6	1.06	—	807	.70
—	6H6	.58	—	12CX6	.54	—	117Z3	.61
—	6J5GT	.51	—			—		

• NOT AFFILIATED WITH ANY OTHER MAIL ORDER TUBE COMPANY •



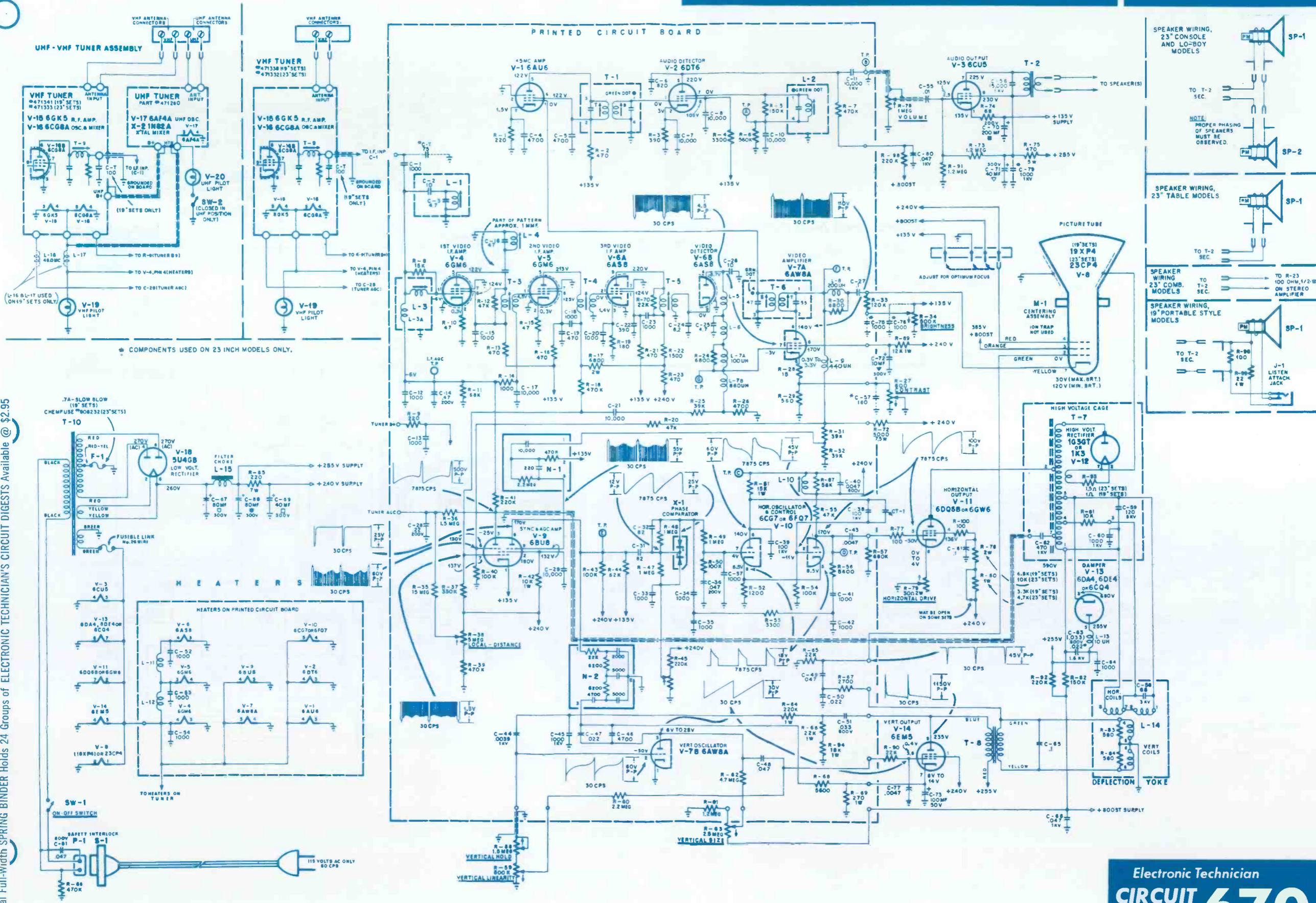
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For more details, circle 81 on page 60



* COMPONENTS USED ON 23 INCH MODELS ONLY.

SPEAKER WIRING, 23" CONSOLE AND LO-BOY MODELS

NOTE: PROPER PHASING OF SPEAKERS MUST BE OBSERVED.

SPEAKER WIRING, 23" TABLE MODELS

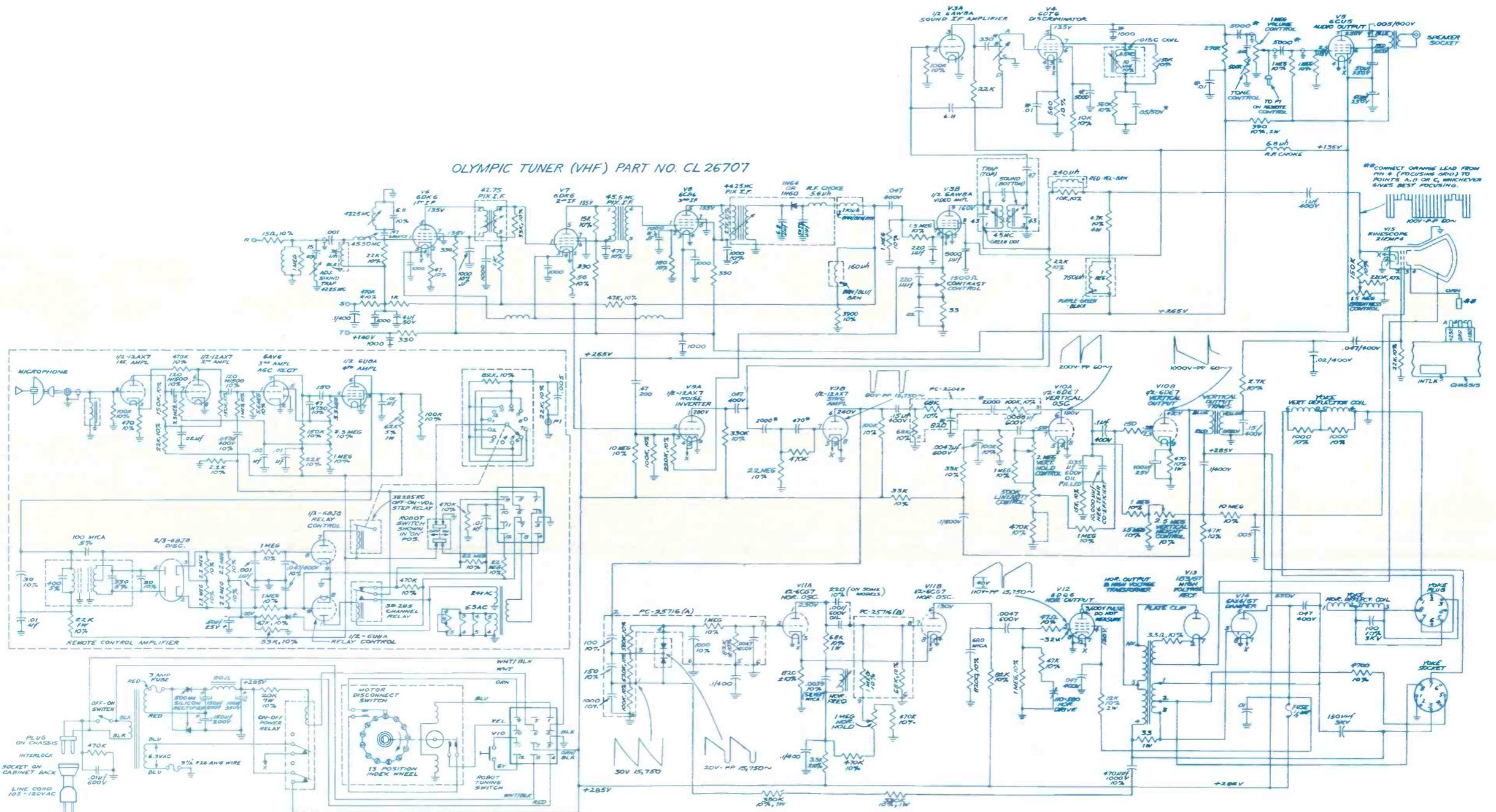
SPEAKER WIRING, 23" COMB. MODELS

SPEAKER WIRING, 19" PORTABLE STYLE MODELS

J-1 LISTEN ATTACH JACK

Special Full-Width SPRING BINDER Holds 24 Groups of ELECTRONIC TECHNICIAN'S CIRCUIT DIGESTS Available @ \$2.95

OLYMPIC TUNER (VHF) PART NO. CL 26707

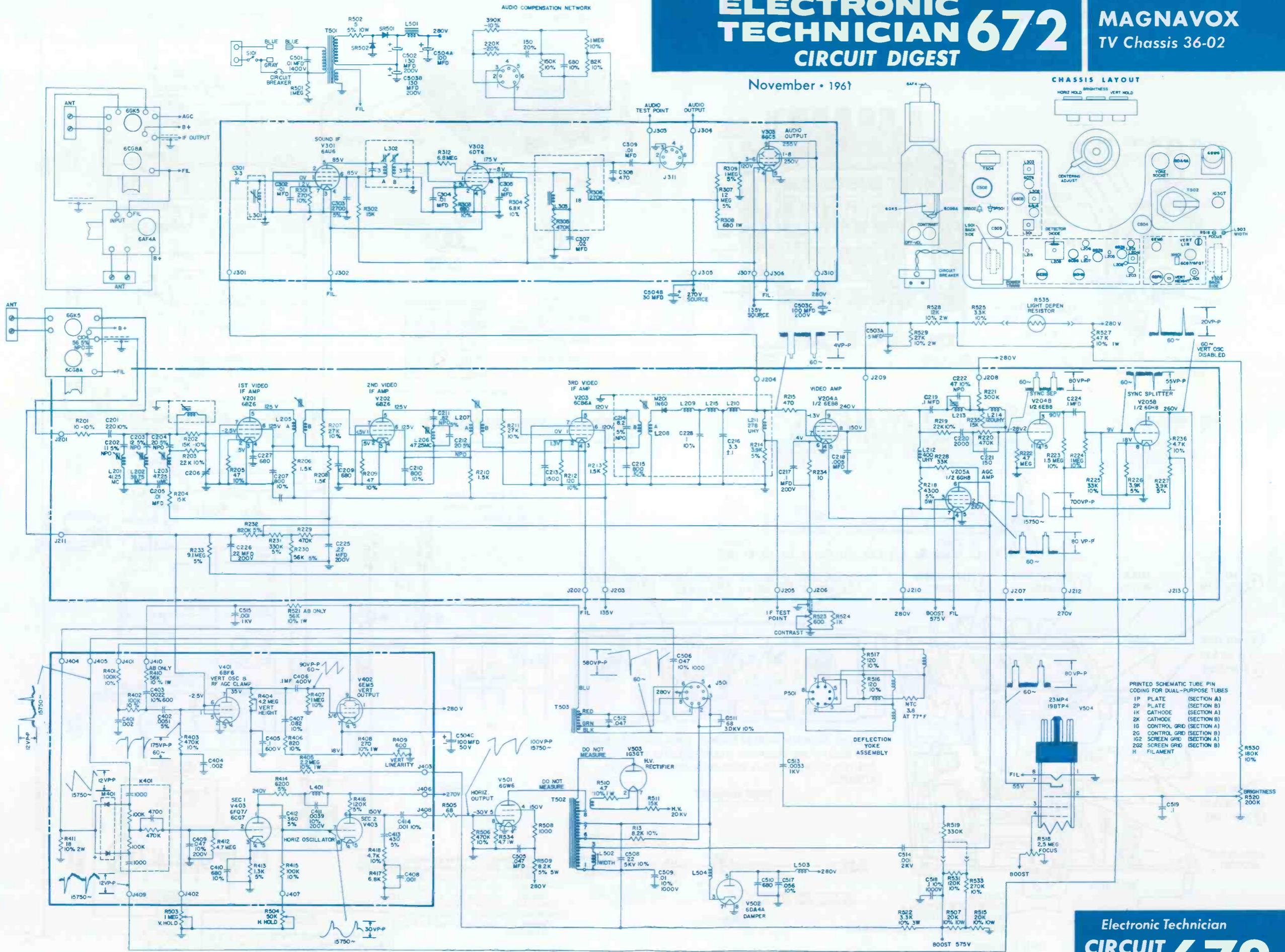


ELECTRONIC TECHNICIAN 672

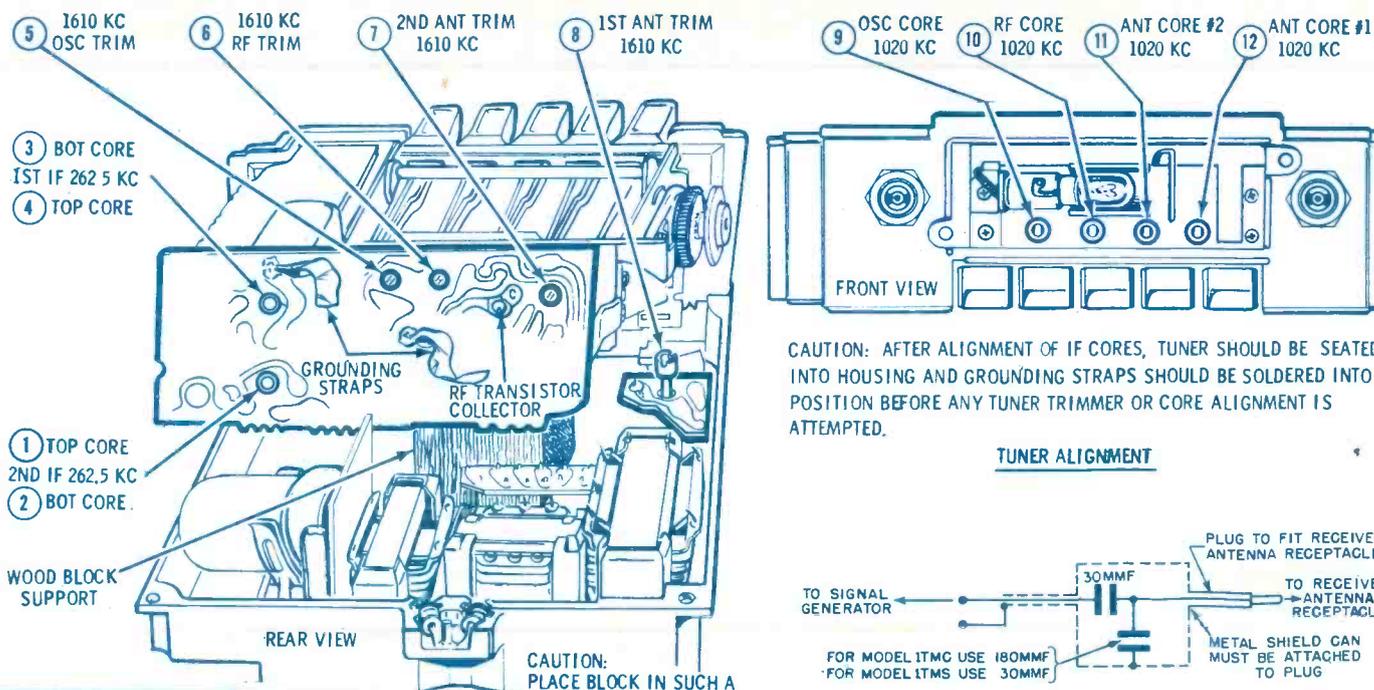
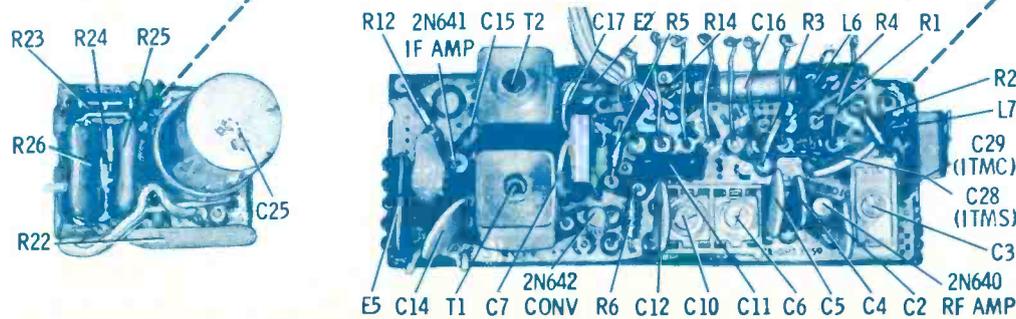
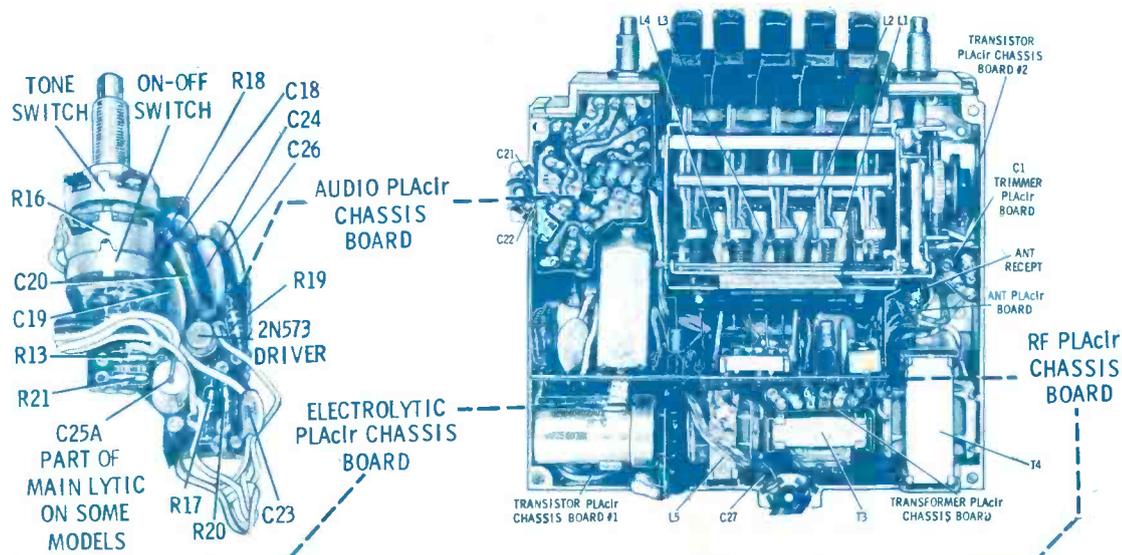
CIRCUIT DIGEST

MAGNAVOX
TV Chassis 36-02

November • 1961

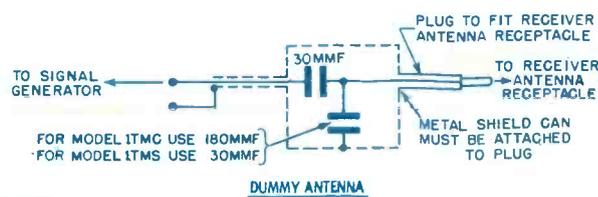


November • 1961



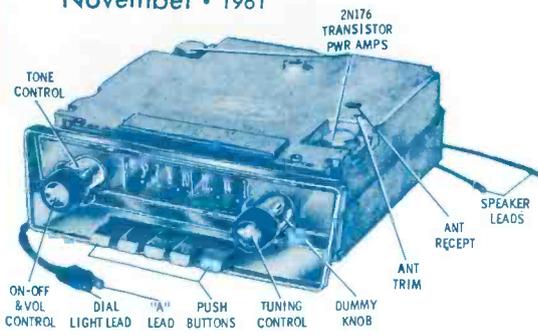
CAUTION: AFTER ALIGNMENT OF IF CORES, TUNER SHOULD BE SEATED INTO HOUSING AND GROUNDING STRAPS SHOULD BE SOLDERED INTO POSITION BEFORE ANY TUNER TRIMMER OR CORE ALIGNMENT IS ATTEMPTED.

TUNER ALIGNMENT



CAUTION: PLACE BLOCK IN SUCH A MANNER THAT POINTER OR ANY OTHER PARTS ARE NOT DAMAGED.

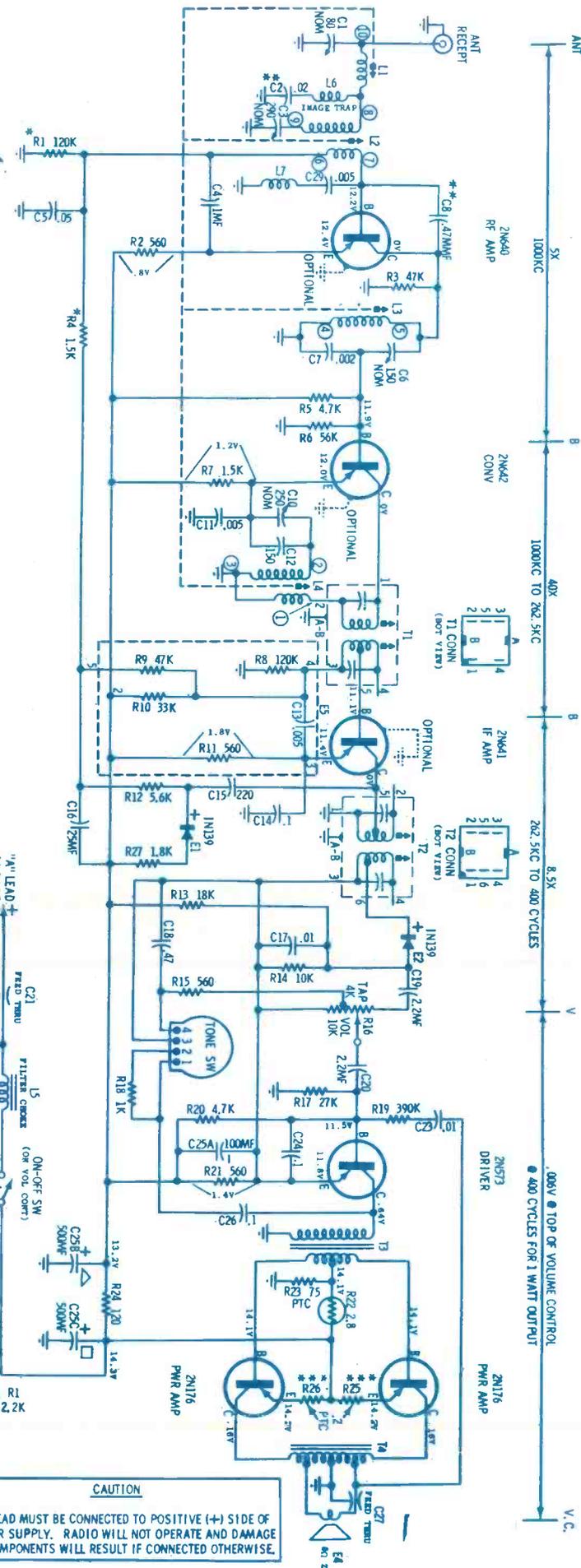
RF-IF ALIGNMENT



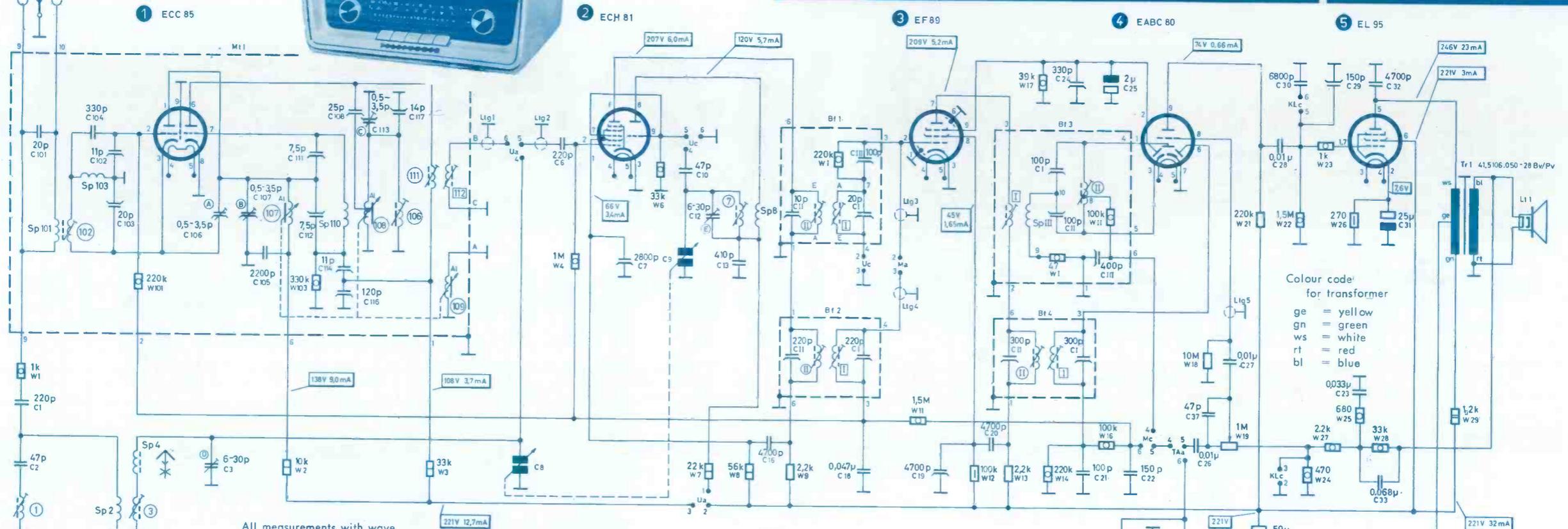
ROTATION WITH REFERENCE TO FRONT VIEW

TRANSISTOR & DIODE COMPLEMENT

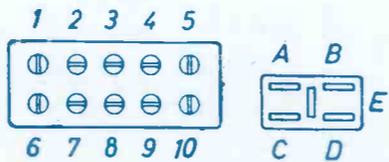
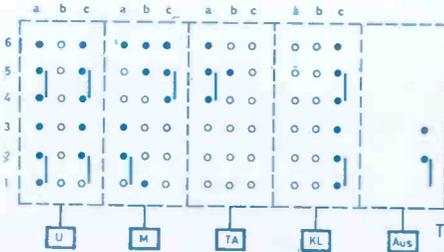
TYPE	FUNCTION
2N640	RF Amp
2N642	Converter
2N641	IF Amp
2N573	Driver
2N176	Push-pull Power Amp
2N176	Push-pull Power Amp
1N139	Detector Diode
1N139	AVC Diode



- Filter coil on top
- Filter coil on bottom

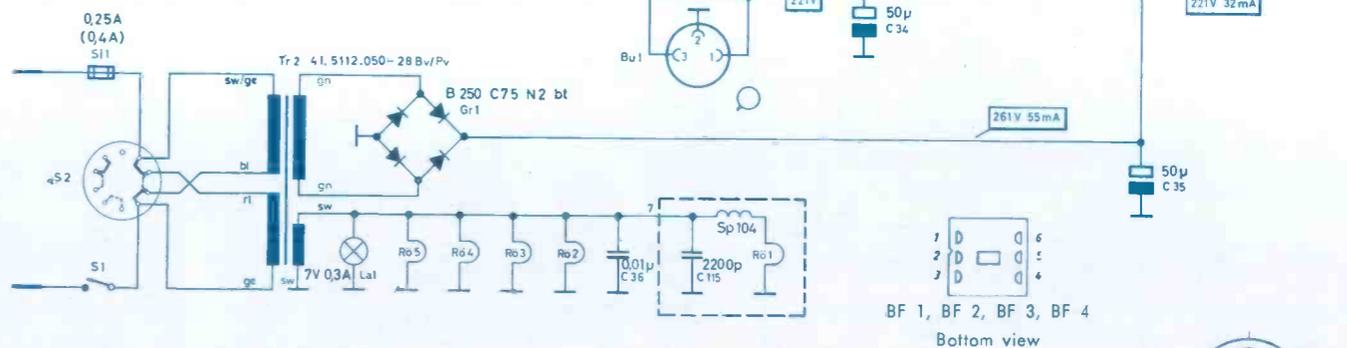


All measurements with wave switch in position FM

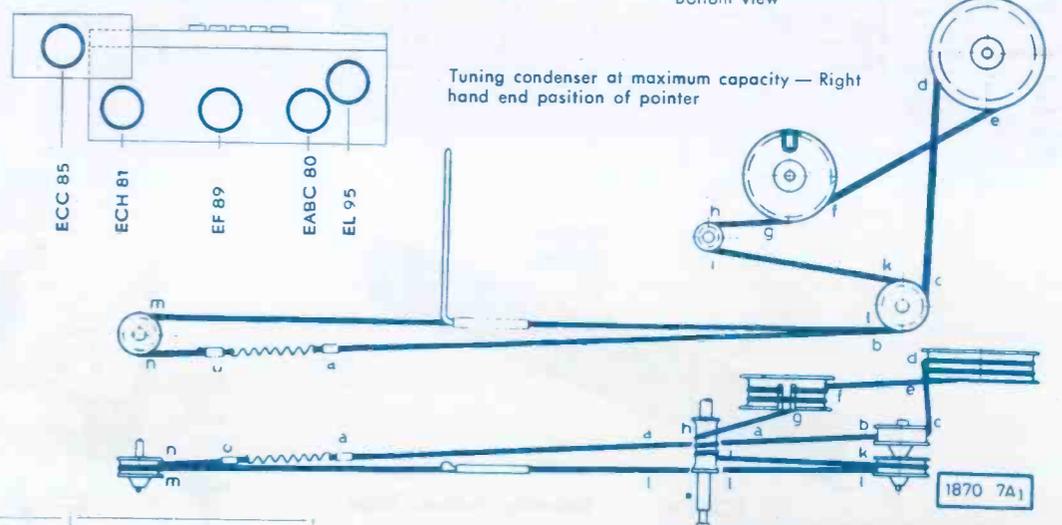


Terminal plates of the VHF input and mixer unit

The contact bridges are shown in unoperated position. When pressing a button, the corresponding slider with its contact bridges will move in the direction of the arrow.



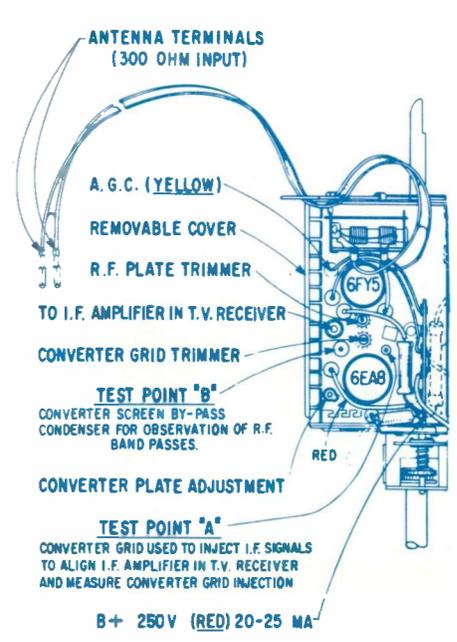
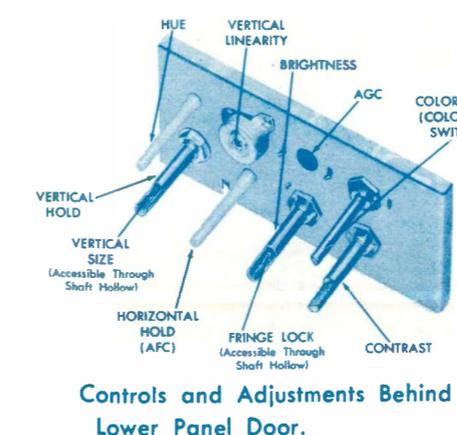
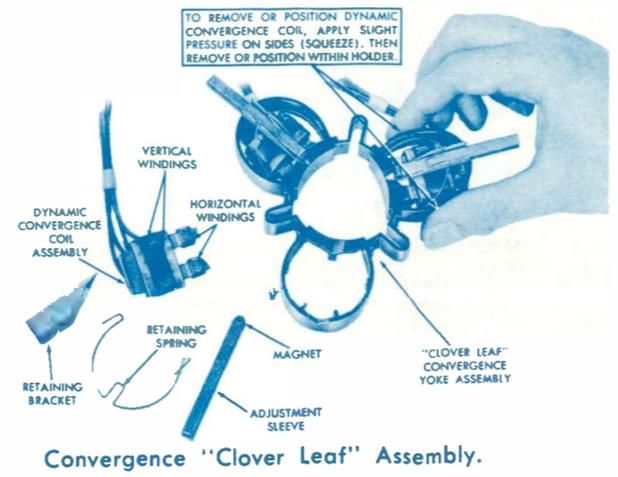
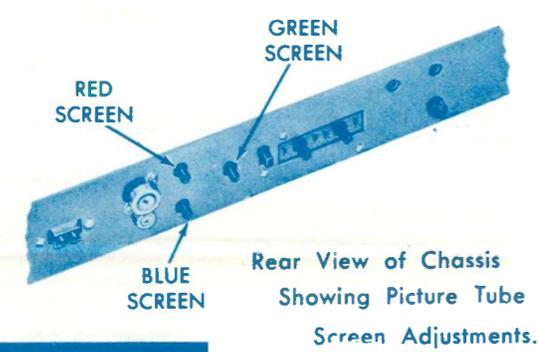
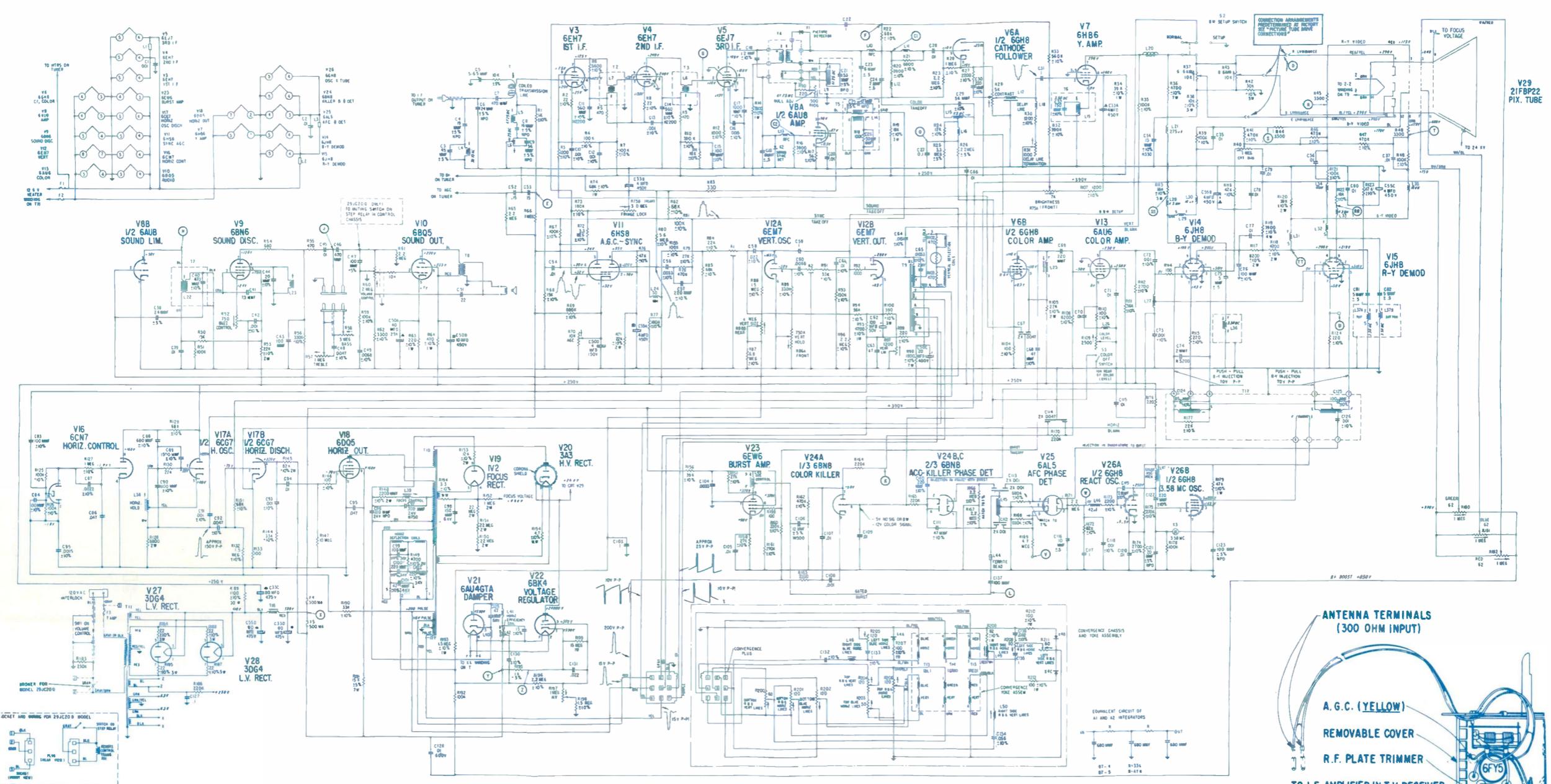
BF 1, BF 2, BF 3, BF 4
Bottom view



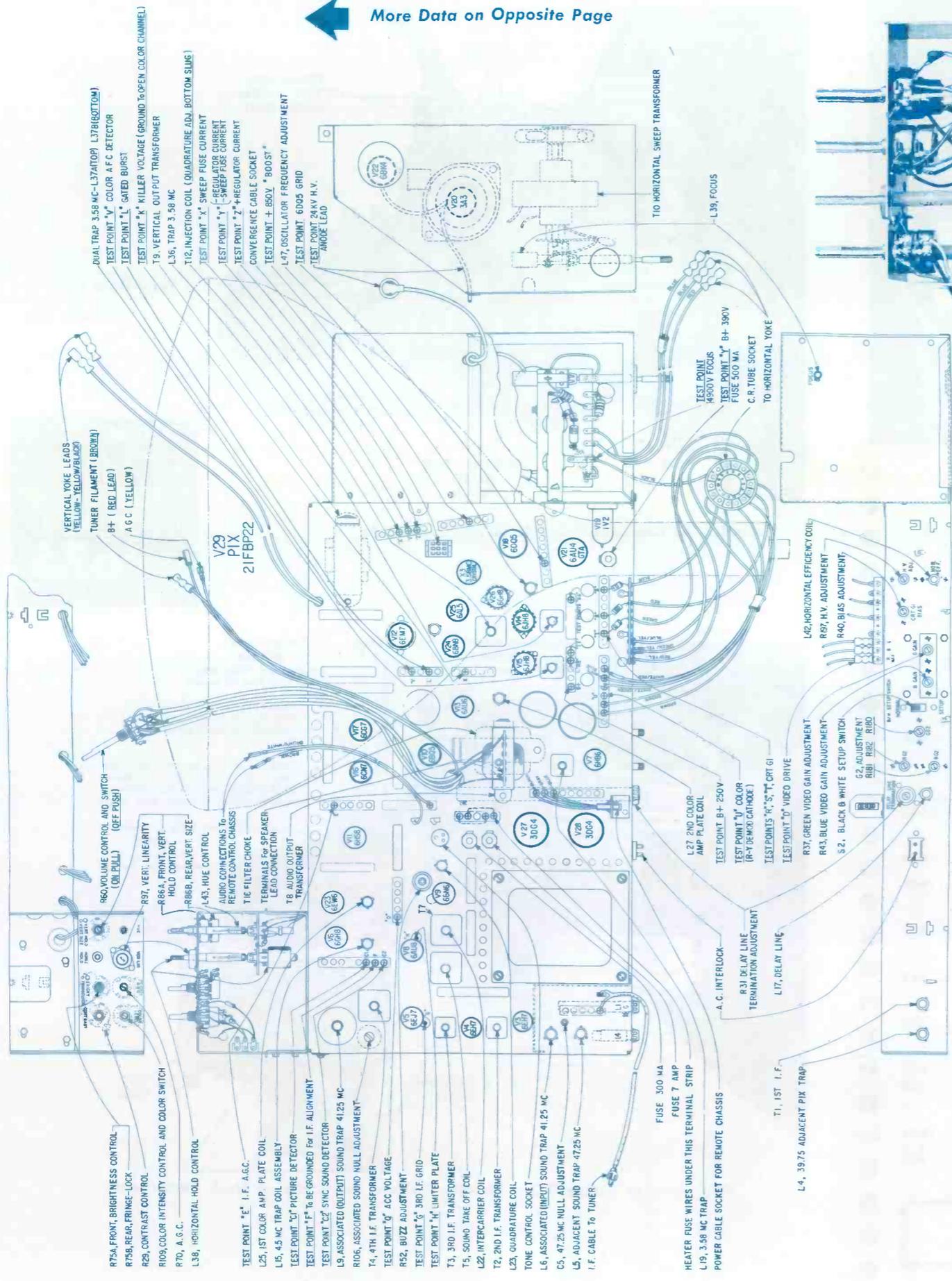
Tuning condenser at maximum capacity — Right hand end position of pointer

F. M.	88 — 108 Mc
A. M.	515 — 1610 kc
A M = 460 kc F M = 10,7 Mc	

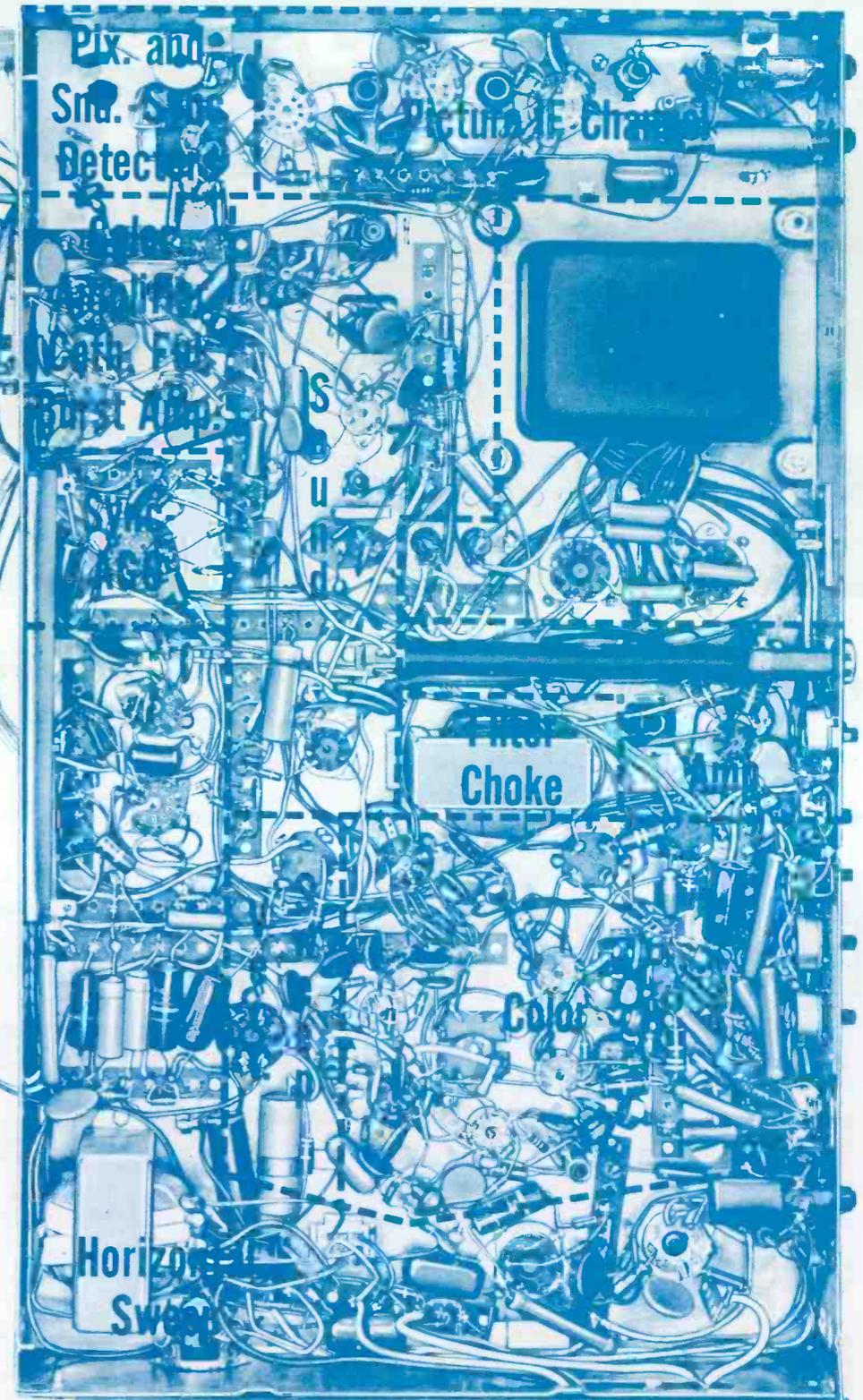
1870 6A



← More Data on Opposite Page



Tube and Test Point Location, 29JC20 Chassis.



Bottom View of 29JC20 Chassis, Identifying Areas of the Receiver.

More Data on Reverse Side

ZENITH
TV Color Chassis
29JC20

Electronic Technician
CIRCUIT DIGEST
675

ELECTRONIC TECHNICIAN

CIRCUIT DIGESTS

In This Issue (No. 111)

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MAGNAVOX TV Chassis 36-02	672
MOTOROLA Auto Radio 1961 Continental Model 1TMC	673

OLYMPIC TV Chassis JWR	671
TELEFUNKEN AM-FM-SW Radio Caprice 5051W	674
ZENITH TV Color Chassis 29JC20	675



INTERIM INDEX "CIRCUIT DIGESTS" - MAY-OCT. 1961

This Cumulative Index covers Circuit Digests May 1961 thru October 1961.

September 1952 thru April 1961 complete Cumulative Index printed in May 1961 Circuit Digest.

Circuit Digest Schematic No.

ADMIRAL TV Chassis 16A9 & 16A9U TV Chassis 20A7, 20A7B, 20A7C, 20A7D, 20B7, 20C7	657 644
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DELCO Auto Radio 1961 Buick Model 980134 Auto Radio 1961 Chevrolet Model 988414	652 650
--	--------------------------

DELMONICO TV Portable Model PTV-19	649
--	------------

DUMONT TV Chassis 120600-A, 120601-A	663
--	------------

EMERSON TV Chassis 120530C, 120549C, 550D, 551C, 120552E, 553F, 554E, 120555E, 556F, 557E	648
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GAMBLE-SKOGMO TV Models 9590A, 9591A, 9592A TV Chassis TV2-9620A	643 665
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GENERAL ELECTRIC TV Chassis MW: Models M604, M605, M610, M611, R610, M614, M615	659
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LAFAYETTE RADIO Citizens Band Radio Model HE-20A	666
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MONTGOMERY WARD TV Models W9-5220A, W9-5226A, W9-5230A, W9-5320A, W9-5326A, W9-5330A	653
---	------------

MOTOROLA TV Chassis 436 Series: Models 19T5, 7, 8, 11, 12, 13, & 14 Series Auto Radio 1961 Rambler American Model 13MAM	656 661
--	--------------------------

MONTH IN WHICH CIRCUIT DIGEST APPEARED

Circuit Digest No.	
634-636	May 1961
637-643	June 1961
644-650	July 1961
651-656	Aug. 1961
657-662	Sept. 1961
663-669	Oct. 1961

Circuit Digest Schematic No.

Auto Radio 1961 Ford & Falcon Model 14MF	647
Auto Radio 1961 Plymouth Model MoPar 109	664

PEARCE-SIMPSON Citizens Band Radio Model CBD-5	638
--	------------

PHILCO TV Chassis 11N56 TV Chassis 12N50 Series	636 662
--	--------------------------

RCA TV Chassis KCS 136 Series TV Chassis KCS 137 & KCS 138 Citizens Band Radio Model MARK VII "Radio Phone"	669 653 645
--	--

RAYTHEON CO. Citizens Band Radio "Raytel" Model TWR-1	640
--	------------

REGENCY Citizens Band Radio Model CB-27 & CBM-27	658
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SETCHELL-CARLSON TV Chassis, Model 159	639
--	------------

SONY Transistor TV Model 8-301	667
--	------------

STERLING AM/FM/SW Radio, Phono: Chassis 1/633 US-Stereo: Models Tannhauser US, Isabella US, Arabella US	641
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SYLVANIA TV Chassis 552-1, -2, -9 Transistor Radio: Chassis 682-1, -2, -3; Model 4P19 Series	646 668
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TELEFUNKEN AM-FM-SW Radio Model Jubilate 5061W	654
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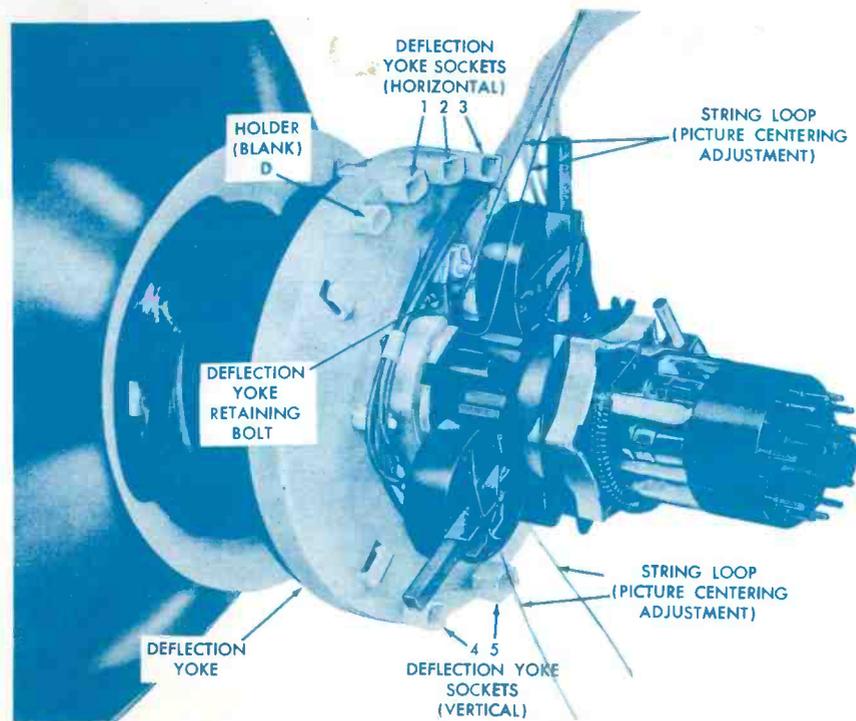
TRAVLER TV Chassis 1051-90: Model 23SP6095	642
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TRUETONE TV Model 2D3246	637
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WESTINGHOUSE TV Chassis V-2411-1, V-2411-3 TV Chassis V2414-1, V2414-2	634 660
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ZENITH TV Chassis 17G28 & 17G28Q Transistor Portable Radio: Model Royal 150: Chassis 6GT42Z2	651 635
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All Units are TV Receivers
Unless Otherwise Noted

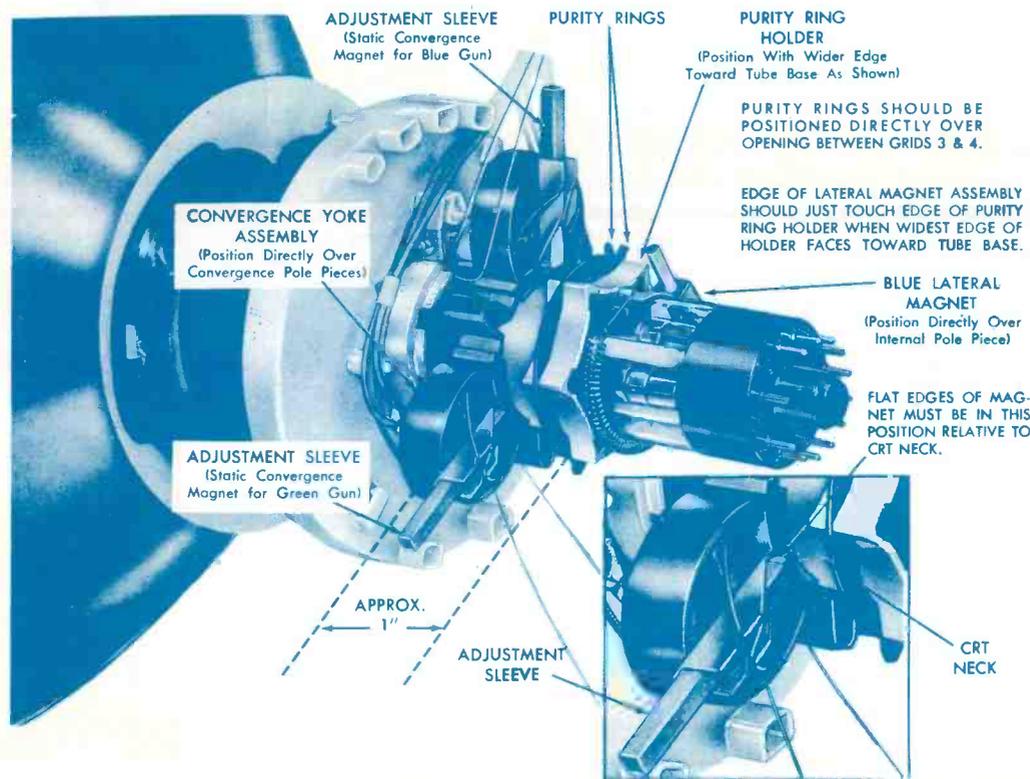


Location of Components on Neck of Picture Tube.

More Data on
Reverse Side

ZENITH
TV Color Chassis
29JC20

Electronic Technician
CIRCUIT DIGEST
675

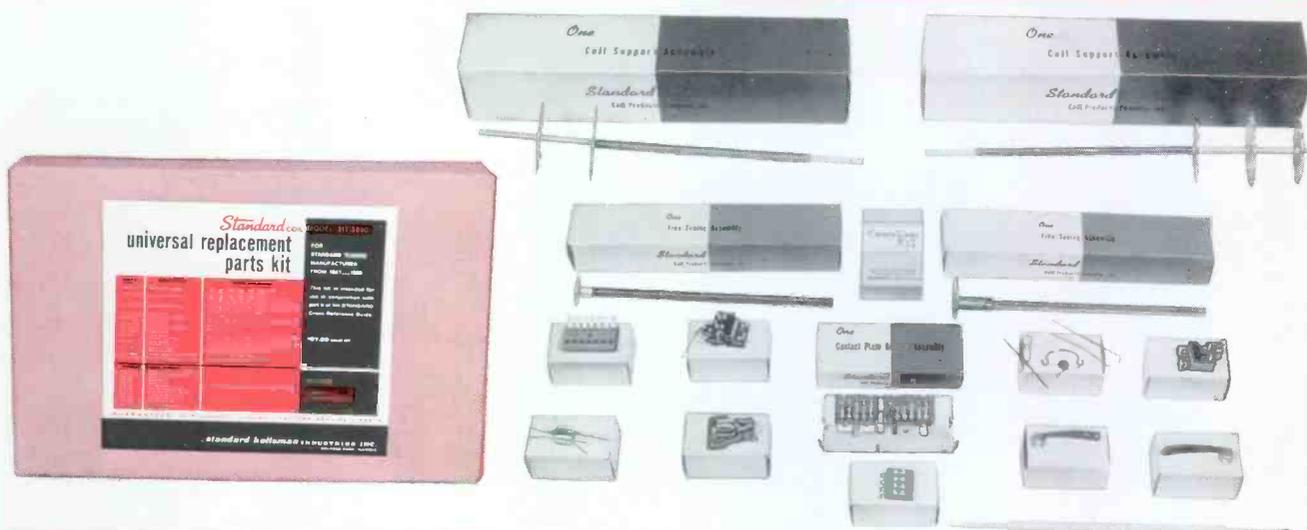


Rear View of Picture Tube, Showing Correct Positioning of Neck Components.

Universal Replacement Parts Kit

MODEL 31T 3890

Popular Standard Coil field replacement parts used extensively by servicemen for STANDARD tuners manufactured from 1947-1956.



MODEL 31T 3890

A kit of mechanical and electrical parts for shop and field use to be used in conjunction with Section II of the STANDARD Cross Reference Guide. These parts make up 90% of the replacement parts most commonly used in field service.

INCLUDED

FREE

- Special IF alignment tool for late model STANDARD TV and FM tuners.
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For more details, circle 82 on page 60



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To Increase Your Business and Build Customer Confidence

Before any RCA Silverama Picture Tube goes into its carton for shipment to your distributor, it has been through one of the most exhaustive series of quality tests in the picture-tube industry.

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manufacture, assure you that RCA Silverama is the finest replacement TV-picture tube modern science and technology can produce.

But most important to your business: this superior tube is priced to compete with other name brand picture tubes. Thus for no extra cost you can provide the business-building extras of assured quality performance, fewer complaints, callbacks and in-warranty failures—plus the brand-name your customers want and trust, RCA Silverama. See your authorized RCA Tube distributor today!



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RCA ELECTRON TUBE DIVISION, HARRISON, N. J.

27F-54—RCA Tube Division
Prepared by Al Paul Lefton Co., Inc.



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