

TECHNICIAN

& Circuit Digests

**TEST
EQUIPMENT
CONTEST
WINNERS**

See page 23

February • 1956

Caldwell-Clements, Inc.

20 7 WATT RESISTORS

SELECTED POPULAR VALUES



RESIST-O-CARD

\$6.60
NET

NEW TYPE PW-7 WIRE WOUND POWER RESISTORS • FULL 7 WATT RATING



TRY

these modern power resistors

Servicemen everywhere are finding IRC's unique approach to wire wound power resistors is ideal for today's service requirements. Try them yourself, and benefit by these exclusive IRC features:

- **COMPACT, RECTANGULAR DESIGN** for easier assembly in tight circuits
- **AXIAL LEADS** for easier, faster soldering
- **CLEAR, PERMANENT MARKINGS** for full identification
- **CONSERVATIVE RATINGS** permit continuous operation at full power
- **FAMOUS IRC ELEMENT** sealed in ceramic case for complete insulation and protection
- **2 SIZES**—PW-7, full seven watts and PW-10, full 10 watts
- **FULL COVERAGE OF RESISTANCE VALUES** for today's service needs

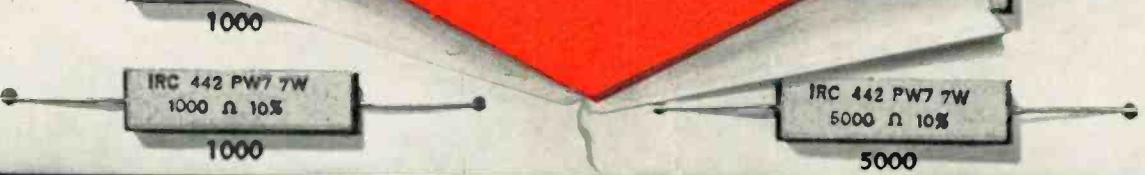
BUY

handy Resist-O-Card assortments

Your IRC Distributor has these new power resistors in 2 convenient assortments of popular values. The values are printed on each card . . . you always know what you have, and you always have what you need.

RESIST-O-CARD #19-A, 7 Watt assortment of 20 popular values—\$6.60 net

RESIST-O-CARD #20-A, 10 Watt assortment of 20 popular values—\$7.20 net



INTERNATIONAL RESISTANCE CO.

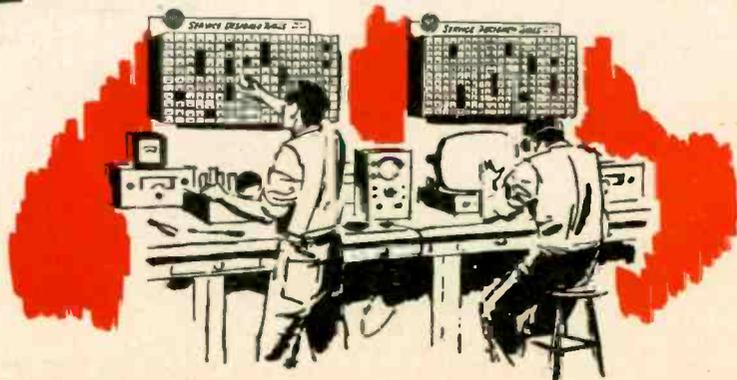
Philadelphia, Penna.

FOR 10 WATT POWER RESISTOR REQUIREMENTS SPECIFY IRC ASSORTMENT #20-A. ASSORTMENT #20-A INCLUDES 20 PW-10 RESISTORS IN SELECTED VALUES—\$7.20 NET.

GREATEST TIME-SAVER FOR



SERVICE-DESIGNED TUBES



SAVES WORK-BENCH TIME

TV-RADIO SERVICE EVER OFFERED!

NEW!



SEE-LECT-A-TUBE

Best for
any set!



- Speeds up your counter tube sales.
- Makes tube selection easy, quick, sure.
- Visual inventory control helps you rotate your tube stock properly.
- Increases work-bench efficiency.
- Protects tubes against breakage losses.
- Saves valuable space . . . 250 tubes of all carton sizes occupy a dimension only 38" by 20½" by 6¼".

General Electric TV-radio technicians pooled their experience to help design this new SEE-LECT-A-TUBE for your TV-radio service business.

Complete flexibility in meeting your tube requirements! Rugged blue steel dispensing units, mounted side-by-side, each hold a vertical row of tubes. The types can vary with your individual needs. Six carton sizes are provided for—from miniatures to large glass types. The number of dispensers allotted to each size is scientifically based on average tube usage, but dispensers can be arranged so that they will match your special requirements.

Friction flanges hold tubes in place! When a tube is removed from a dispenser, those above it can't slide down. The tube alignment remains intact. Open spaces, therefore, indicate tubes that need to be re-ordered . . . or, as a further check, you can put back the

empty cartons in reverse position, with bottom ends forward. Thus—besides gripping the cartons for safety—the friction flange in each SEE-LECT-A-TUBE dispenser helps you determine how many tubes of any given type you have in stock.

Wall-bracket included! A bracket comes with each SEE-LECT-A-TUBE which will fasten easily to any wall, giving solid support to dispensers and tubes. The SEE-LECT-A-TUBE is shipped pre-assembled . . . just unbox the complete unit and hang it on the wall bracket.

See your G-E tube distributor for details! Right now your General Electric distributor is waiting to tell you all about the new SEE-LECT-A-TUBE, and how you can obtain one promptly. Contact him today! Don't miss this chance to modernize your tube inventory for bigger sales, improved shop efficiency! *Tube Department, General Electric Company, Schenectady 5, New York.*



SPEEDS UP TUBE SALES

Progress Is Our Most Important Product

GENERAL ELECTRIC



you can't match **TRIPLET** model 630 VOM

for **SPEED
ACCURACY
DURABILITY
CONVENIENCE!**

heavy molded case
—1/4" thick for high impact.
Fully insulated.

sure grip battery contacts

Balanced double-spring tension grip assures permanent contact.

"this wide-range model

tests AC-DC Volts (DC at 20,000 O/V); DC Microamperes, Milliampere, and Amperes; Ohms (to 100 Megohms); Decibel and Output. Its easy-to-read scales are the longest in this type tester."



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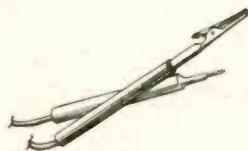


streamlined design

No protruding knobs on switch or ohms control—both are flush with the panel.

king size recessed knob

—Only one switch; (fully enclosed) selects both circuit and range. Just turn the switch and make your reading.



for quick positive connections

—Banana jacks and plugs on test leads are best. Alligator clips are provided to slip on test prods for extra convenience.

for most efficient meter use

—With every Model 630 you receive complete, simplified instructions on how to use and maintain most efficiently.



for convenience in reading

—Available as an extra (only 50c), this special stand tilts meter at best angle for easy reading

no slip feature

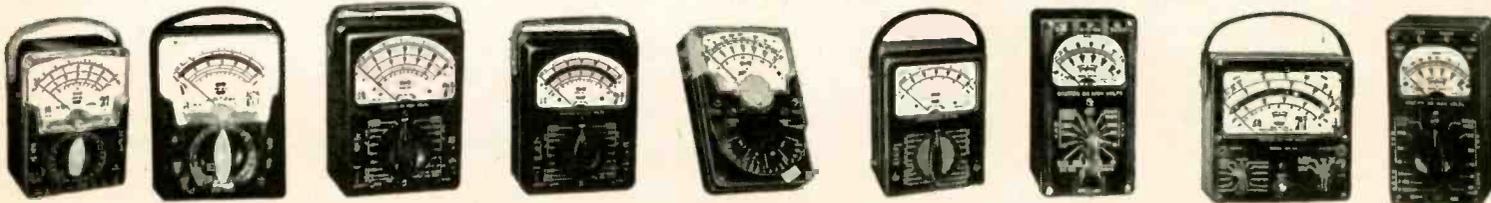
Four rubber feet furnished as standard equipment fit in back of the case to prevent slipping on smooth surfaces.

advanced engineering

—Molded mounting for resistors and shunts allow direct connections without cabling. No chance for shorts. Longer life and easy-to-replace resistors in their marked positions.

MODEL 630 | \$39.50

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Bluffton, Ohio



THE MIGHTY NINE VOM LINE

631
Combination
V-O-M—VTVM

630-NA
For Best Testing
Around The Lab,
Production Line—
or Bench

630
The Popular
All-Purpose
V-O-M

630-A
A Good Lab and
Production Line
V-O-M

310
The Smallest
Complete V-O-M
With Switch

630-T
For Telephone
Service

666-HH
Medium Size
For
Field Testing

625-NA
The First V-O-M
With 10,000
Ohms/Volt AC

666-R
Medium Size
With
630 Features

FIRST TO BREAK THE TV RECEPTION BARRIER...

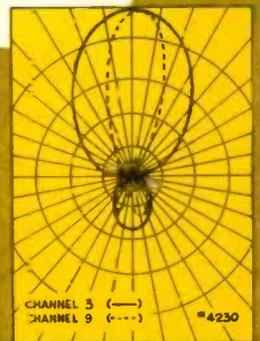
**MOST POWERFUL SUPER FRINGE
ANTENNA IN THE WORLD**

NEW WALSCO WIZARD

with exclusive **PHASE REVERSER**

Distance is no barrier to the amazing new WALSCO WIZARD. Exclusive "Phase Reverser" delivers the sharpest, crystal-clear picture ever seen in the most difficult reception areas. No other antenna like it.

New WIZARD offers highest gain and sharpest directivity possible on all VHF channels. Installation in a jiffy... without complicated harnesses, phasing stubs, or extra dipoles. Guaranteed for 3 years!



WALSCO WIZARD Imperial equals reception of 10 element yagis on low channels, and equals a three stack 10 element (30 elements) yagi on channels 7 to 13.

Actual comparison of fringe antenna performance

Channels	Gain (db) Single Bay						
	2	4	6	7	9	11	13
WalSCO Wizard Imperial	5.1	6.9	8.2	11.9	11.6	10.8	12.6
Antenna "A" With 3 Phase Reversing Dipoles	6.3	6.6	8.1	10.5	10.2	10.6	12.4
Antenna "B" - Yag Type with Phasing Loops	5.1	5.5	6.8	7.5	9.6	8.8	11.2
Antenna "C" - Yag Type with Loading Coils	5.9	6.9	8.6	9.1	8.6	9.6	7.8



ELECTRONICS CORPORATION
A SUBSIDIARY OF Tele-Graph CORPORATION

3602 Crenshaw Blvd.,
Los Angeles 16, California

Model
Wizardette #4210
Wizard #4220
Wizard Imperial #4230

Price
\$14.30 list
19.50 list
34.90 list



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- CHEMICALS
- ALIGNMENT TOOLS



Everything you need for successful radio-television servicing is available in the big G-C line . . . at leading parts distributors everywhere.

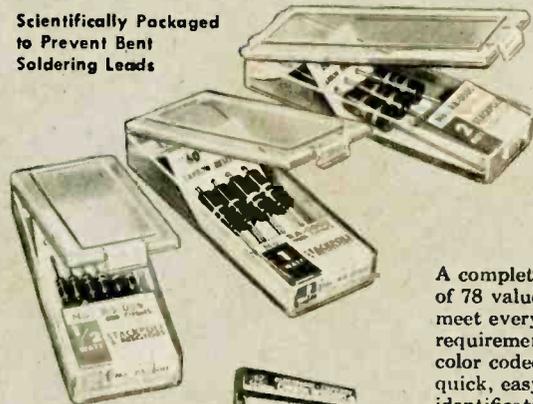
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G-C ELECTRONICS MFG. CO.

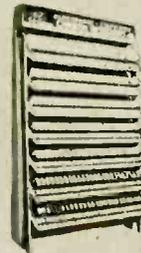
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Scientifically Packaged to Prevent Bent Soldering Leads



A complete line of 78 values to meet every requirement . . . color coded for quick, easy identification.

60 LINE CARBON RESISTORS
ALL ONE PRICE . . . ONE STANDARD PACKAGE
LIST \$1.00 per BOX
DEALER NET **60c** PER BOX



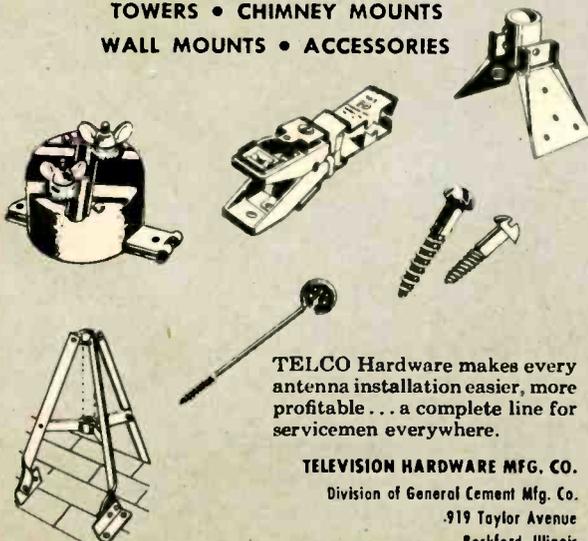
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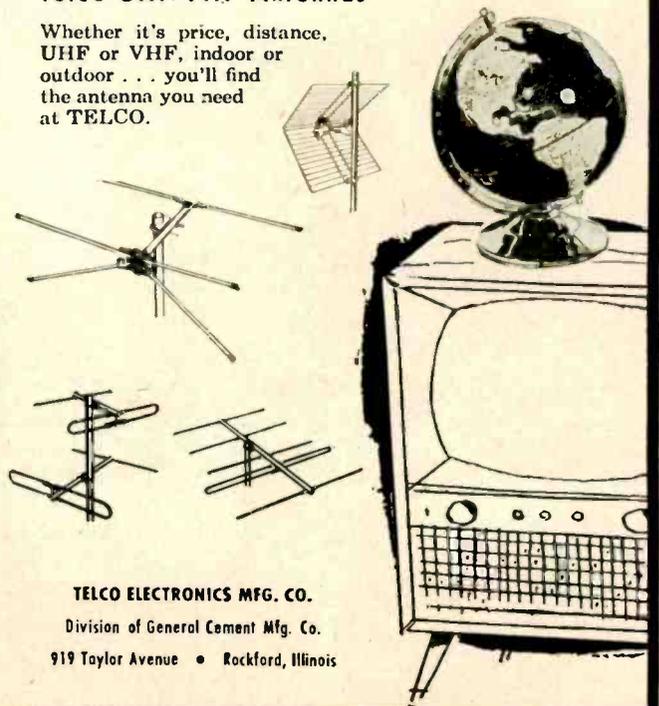
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Telco UHF-VHF Antennas

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pre-selling
advanced-engineered
CBS SILVER VISION
.....
aluminized picture tubes
for you!**

Garry
Moore
famous CBS
Television Star



Garry Moore is selling Silver Vision tubes to your women customers regularly over the CBS Television Network. And, starting in March, he begins to pre-sell them also in a new series of full-page ads in Good Housekeeping Magazine.

He is not telling the ladies about the advanced-engineering of Silver Vision's aluminized screen . . . silver activated phosphors . . . and small-spot gun. You appreciate these things, but women don't. Garry is stressing Silver Vision's clearer, sharper, brighter pictures. And he is repeating these facts: "There are no better tubes made than CBS tubes . . . and CBS tubes have the Good Housekeeping Guaranty Seal."

Take advantage of the customer confidence CBS-Hytron is constantly building for you. You'll find the sale is ready-made when you recommend an advanced-engineered Silver Vision picture tube.

Garry Moore is selling you and your expert service



CBS-HYTRON, Danvers, Massachusetts
A DIVISION OF COLUMBIA BROADCASTING SYSTEM, INC.

... Another
MALLORY
service engineered
products

Mallory Selenium Rectifiers

make every
replacement sure

Made by Mallory-developed techniques unique in the industry, this new line of selenium rectifiers gives you an unequalled combination of performance and dependability.

SERVICE LIFE IS LONG—far exceeds original equipment specifications.

EFFICIENCY IS HIGH due to low forward voltage drop. Efficiency stays high throughout service life.

COUNT ON EVERY STACK for the same high quality. The new rectifiers are manufactured to standards of uniformity never before possible.

RATINGS ARE CONSERVATIVE—no need to use over-size stacks to "play safe". Order your stock today from your Mallory distributor.

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- Mercury Batteries

LETTERS To the Editor

Colorblind Dilemma

Editor, TECHNICIAN:

Am I in a dilemma! It isn't too far off until color TV takes a firm foothold—then where shall I be? I am colorblind. Although I can see primaries red and green, I am told I do this through brightness discrimination. When it comes to shades or primary colors side by side, as exhibited by a rainbow generator, I am lost. Plain and simple, will I be able to service color TV in a customer's home or on the bench? They say when there is a will there is a way. I have the will, but what is the way?

JERRY FIELDS

West Orange, N.J.

• Unfortunately, there is no simple solution if you must look at the picture. However, troubles that can be located by voltage measurements or scope tracings permit at least partial color TV servicing. Considering that there are well over 8000 colorblind techs, some enterprising manufacturer should get to work on the problem, perhaps coming up with some kind of simplified colorimeter and rainbow generator.—Ed.

Contest Winners

Editor, TECHNICIAN:

My best thanks for the nice prize, which your paper helped me win. I owe part of my knowledge to the splendid information in your magazine. I wish you the leadership you deserve.

J. WIESEMANN

Philadelphia, Pa.

Editor, TECHNICIAN:

There were in the country many who were looking for good news from the East. And the man Nicholas, not weighing his merit against that of others he did not know, went about his daily labors, steadfast in the hope that some good might be found in that which he had done. Now it came to pass on the eve of the day that men call Christmas Eve that he returned to his own house wearied with the work of the day. His wife came running with haste to greet him. Then was he amazed, for this was not her wont. He looked and saw she held a piece of paper. Lo, it was from one in a distant city.

And the man Nicholas read the message swiftly and lifted up his eyes unto his wife and cried out, "Oh, boy! Oh, boy!" And he spake again in the common tongue of those times, "I see the name Hickok. It is the top. Oh, boy!" Now it came to pass on the day called Christmas Eve, when evening was nearly come, that the man Nicholas heard footsteps at the entrance and glad voices. He hurried thither and saw a

large box. Again his wife spake, "This is what you have been waiting for." When at last the object stood revealed he was able only to utter, "Oh, boy!"

Now when Christmas was fully come, the man Nicholas gathered together his family. And while they all rejoiced, the man Nicholas gave thanks in his heart for all that had come to pass.

NICHOLAS B. COOK.

Paterson, N.J.

• "Blessed is he who expects nothing, for he shall never be disappointed."
Alexander Pope—Ed.

Editor, TECHNICIAN:

I was overjoyed to hear that I had won one of the prizes in the Test Equipment Contest. The Raytronic CB-77N is an instrument the type of which I had decided to have eventually in my recently established shop. I have a great interest in comparing the features of all brands of test equipment. I am very glad manufacturers are supplying us with instruments to make our servicing easier and faster.

ANGELO ALDANA

Chicago, Ill.

• See complete list of winners on page 23.—Ed.

Tough Dog Bites Us

Editor, TECHNICIAN:

In the Tough Dog Corner of December 1955 (page 20), "Vert. Fault Darkens Pix" raises some questions. The leaky condenser causes a positive increase in the grid voltage of the vertical oscillator, which causes the tube to draw increased current. This causes a drop in plate voltage. The plate is connected to the screen grid of the crt, causing a dark raster.

BERT ZAMANIAN

Watertown, Mass.

Editor, TECHNICIAN:

The correction measures are okay. The only exception is in the description of the circuit and the effect of the leaking 0.01 condenser. Half of the 12SN7 in the vertical circuit acts as a blanking tube, and has no function in the oscillator. The condenser is part of a network to shape the vertical pulse from the output tube. When this condenser has high leakage, it causes the plate to draw current heavily and lowers the voltage to pin 10 (G2) of the pix tube, in turn causing the brightness to be lowered.

JOSEPH W. JONES

Dallas, Tex.

• Pardon our slip. In terms of the partial schematic sent in by Tough Dog contributor Ward (reproduced on p. 20, December 1955), his item was justified with no need for further investigation. Inspection of the full schematic indeed shows that the half of the 12SN7 referred to is a blanking triode rather than part of the oscillator, as Mr. Jones points out, and that darkening of the pix occurs as described in both letters.—Ed.



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Exact Duplicates as you prefer them

Want them ready to use?

Mallory can give you completely assembled dual controls in all the styles and characteristics to fit the most popular TV and auto radio sets.

Want to assemble your own?

A small stock of Mallory factory-assembled sections, switches and shaft tips lets you make thousands of combinations to match each job. It takes you only a few minutes to complete the control you need, and you save all the time of shopping for the right combination.

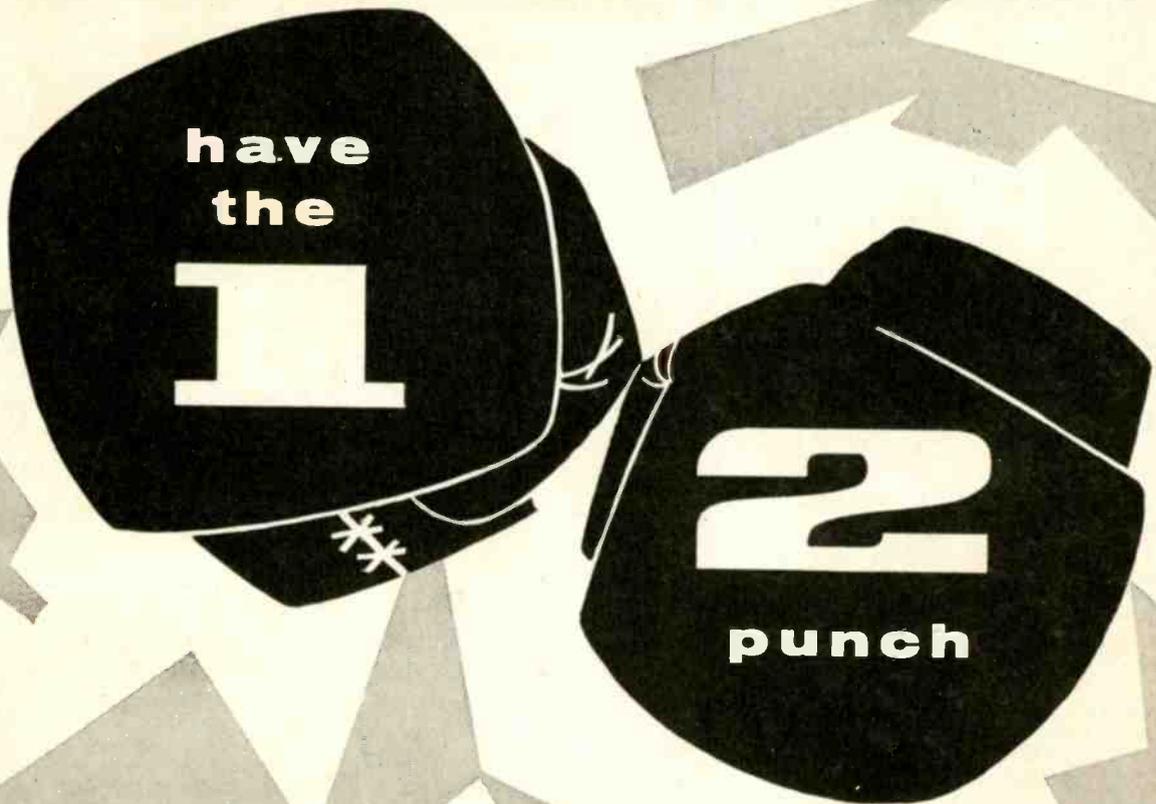
**You're right either way —
with Mallory.** Mallory Dual Controls assure you of duplicating the exact characteristics you require . . . with noise-free, long-lasting, stable controls that assure customer satisfaction. Your Mallory distributor carries a full stock of both types. See him today!

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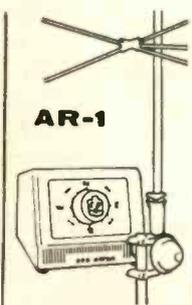
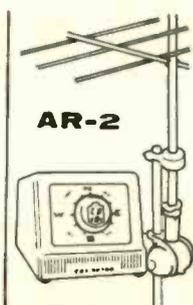
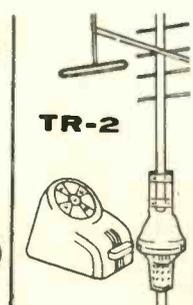
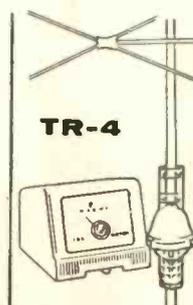
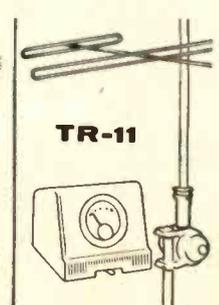


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to millions of viewers through an extensive coverage of audiences in every important TV market. Capture this pre-sold market by featuring these nationally advertised CDR ROTORS.

 <p>AR-22</p>	 <p>AR-1</p>	 <p>AR-2</p>	 <p>TR-2</p>	 <p>TR-4</p>	 <p>TR-12</p>	 <p>TR-11</p>
<p>Completely AUTO-MATIC version of the TR-2 with all the powerful features that made it famous.</p>	<p>Completely AUTO-MATIC rotor, powerful and dependable. Modern design cabinet. 4 wire cable.</p>	<p>Completely AUTO-MATIC rotor with thrust bearing. Handsome cabinet. 4 wire cable.</p>	<p>Heavy-duty rotor with plastic cabinet, "compass control" illuminated perfect pattern dial, 8 wire cable.</p>	<p>Heavy-duty rotor, modern cabinet with METER control dial, 4 wire cable.</p>	<p>Combination value complete rotor with thrust bearing. Modern cabinet with meter control dial, uses 4 wire cable.</p>	<p>Ideal budget all-purpose rotor, new modern cabinet featuring meter control dial, 4 wire cable.</p>



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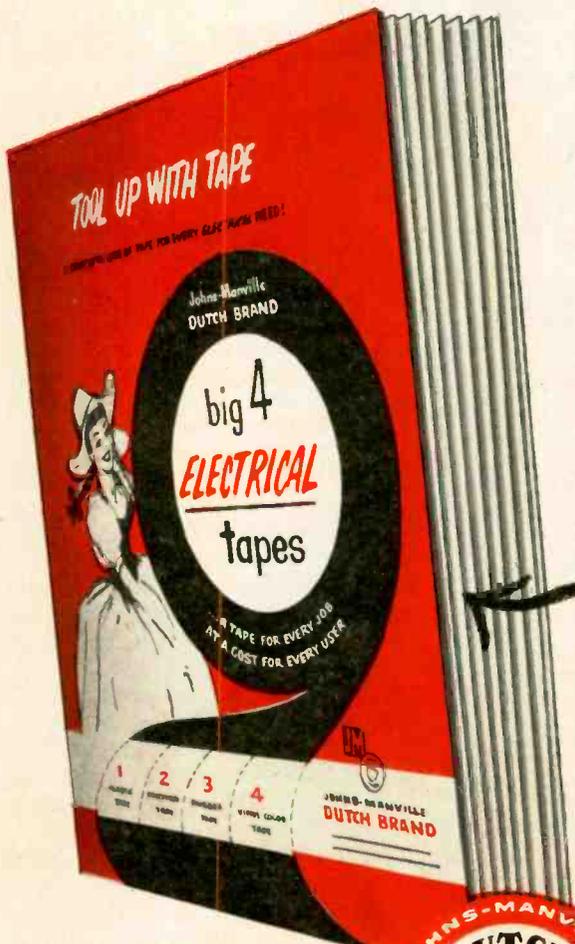


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See how the **Big Four** in electrical insulation

MAKES ANY JOB EASIER, FASTER, BETTER



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SEND FOR THIS NEW FACT-PACKED

***Big Four* BOOKLET NOW!**

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

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



Johns-Manville
DUTCH BRAND
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7800 WOODLAWN AVENUE • CHICAGO 19, ILL.

MAKE MORE MONEY on every service call



NET \$109⁹⁵

B&K

DYNA-QUIK MODEL 500

DYNAMIC MUTUAL CONDUCTANCE TUBE TESTER

Tests over 95%

OF ALL POPULAR TV TUBES*—IN SECONDS

You can cut servicing time—eliminate repeat calls—make more on-the-spot tube sales—give a better service guarantee—make new profits in minutes with DYNA-QUIK. This top quality, low cost, portable dynamic mutual conductance tube tester enables any serviceman to locate weak and inoperative tubes quickly and easily with laboratory accuracy right in the home.

DYNA-QUIK creates greater customer confidence because your customer sees for himself the true tube condition on "Good-Bad" scale. In just a few minutes you can check all the tubes in a TV set for shorts, grid emission, gas content, leakage, dynamic mutual conductance and life expectancy under the dynamic heavily loaded conditions that are the actual operating conditions of the set. Used in the shop or in the home—DYNA-QUIK will make money for you every day!

- Fast—a complete tube test in as little as 12 seconds.
- Easy—one switch tests everything. No roll chart—no multiple switching.
- Accurate—large 4½" plastic meter has two scales calibrated 0-6,000 and 0-18,000 micromhos.
- Always up to date—test procedure instructions for new tubes supplied by factory at regular intervals.
- Automatic line compensation—special bridge continuously monitors line voltage.
- 7-pin and 9-pin straighteners mounted on panel.
- Portable—luggage style carrying case with removable slip-hinged cover.
- Lightweight—15¼ x 14¼ x 5½ in. Weighs only 12 lbs.

*Including new 600 mil series tubes.

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Telephone-Line TV

In a demonstration jointly staged by the Bell Telephone Co. of Penna. and Dage TV Div. of Thompson Products, Inc., photographs, printed material and signatures were transmitted over 10 miles of ordinary telephone lines in an industrial TV system.

The new system, called Data-Vision, is to be used experimentally by the Philadelphia National Bank. Among many potential applications in business and industry where there is a need to view visual information from a distance, Data-Vision will make possible almost instantaneous signature verification for branch banking.

A slow-scan transmitter is employed, which takes from 2 to 4 seconds to complete a frame. The viewing tube in the monitor uses a long-persistence phosphor to hold this slowly transmitted image. With this frequency of scan, only an 8000-cps bandwidth is needed for transmission, as contrasted to the 4-mc bandwidth needed for fast-scan TV. This relatively narrow bandwidth makes the use of telephone lines practical. While the system is adequate for transmitting stationary objects, it is not intended for use in recording motion.

Joint Reception Project

Three manufacturers have joined hands to create a product for making 8 TV channels available to set owners in the Arkansas-Louisiana-Texas area. Called the Finco Ark-La-Tex Geomatic Unit, it consists of tower, rotator, and antenna, custom-designed to bring in Channels 6 (Texarkana), 7 (Tyler), 5 (Alexandria), 8 (Monroe), 9 (Lufkin), 10 (Eldorado), 12 (Shreveport), and the new Channel 3 in Shreveport.

The self-supporting tower, for installation on the ground, is manufactured by Spaulding Products Co.; Crown Controls Co., Inc., provides the rotator; and the antenna is made by the Finney Co.

While the 8 channels in the area are widely separated and in different directions, it is claimed that the Ark-La-Tex can provide a variety and quality of TV viewing in this part of the country that rivals the situation in such highly developed metropolitan TV centers as New York City and Los Angeles. It is felt that the field-tested unit will serve future reception requirements in the area, as well as present ones.

STERLING JUBILEE

1931 1956

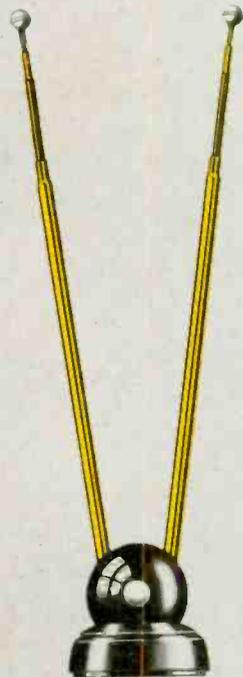
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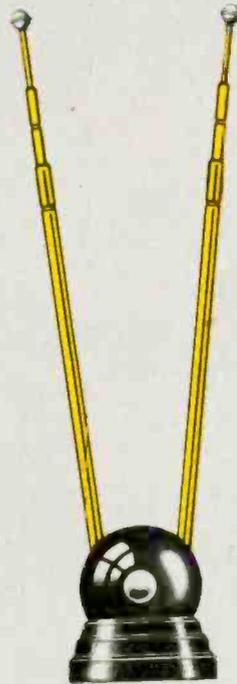
*antenn-gineered for quality
priced for all markets
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PT-S



3-D



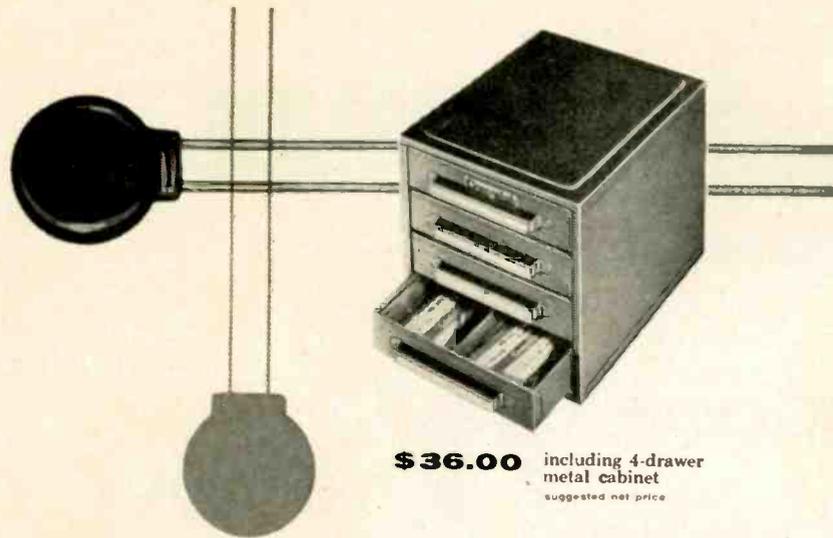
PT-X



5-D



SNYDER Manufacturing Company PHILADELPHIA 40, U.S.A.



\$36.00 including 4-drawer metal cabinet
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Time-saving workbench kit of 200 new Centralab Molded Disc Capacitors

Centralab Metal Kit MDK-200 provides comprehensive assortment of 31 most generally used values

You don't have to delay a job until you get the right ceramic disc capacitor — because you *always* have the right one handy in this MDK-200 selection of 31 popular types.

It's easy to find just what you're looking for. All capacitors are packed five to a polyethylene envelope — with values, part numbers, and ratings clearly shown.

This gives you another good reason to use Centralab Molded Discs on all bypass, coupling, and general applications. You save time and money — your customer gets premium performance.

Call your Centralab distributor and have him deliver a Centralab MDK-200 Kit today. And send coupon for Centralab Catalog No. 29.

Only Centralab Type MD Molded Discs provide all these and other advantages

Lead strength greater than the breaking strength of the wire itself.

The only truly insulated ceramic capacitor — 2500 V.D.C. breakdown to ground.

Electrical properties constant to 3,000 megacycles.

Insulation resistance of molding, 300,000 megohms.

Fungus-proof. Unaffected by ozone, salt water, or solvent at room temperature. Will not become brittle at -55° C.

Moisture absorption, .005% or less.

Centralab

A DIVISION OF GLOBE-UNION Inc.
902B E. Keefe Ave., Milwaukee 1, Wisconsin

Send me Centralab Catalog No. 29.

Name _____

Company _____

Address _____

City _____

Zone _____

State _____

D-555

Editor's Memo

How tough should you be in collecting money due you?

There are several schools of thought for this question. First, there's one tech who hardly presses his collections. People love him, but he's hardly able to pay the rent. Another tech is so tough that he refuses to bring the set back in the customer's house (thereby retaining his lien) before getting paid if he suspects Mr. Set Owner is a chiseler type. Very risky public relations for any local shop.

Personally, I think both extremes are best avoided. A healthy approach should indicate you trust the customer and are patient—up to a point. Collecting on the spot is the best bet. A friendly explanation of your immediate financial obligations, after the set is back in working condition, will often turn the trick. When immediate collection is not possible, a series of reminder letters that are friendly, even slightly humorous, and increasing in firmness, can bring in payment without going to court.

There's a funny story with a moral about being tough in making people pay up. It shouldn't be taken too seriously, although many truths are said in jest. I don't know who originated this tale, but it first reached my ears through the industry's inveterate story teller, Aerovox vp Charlie Golenpaul.

It seems there was a parts distributor, whom we'll call Joe Jobber, who was always going broke (probably because techs didn't patronize his wholesale to public establishment). After his fifth disaster, he went to his lawyer.

"Joe," said the lawyer, "you can't go bankrupt again. Too many people have been stuck too many times because of you. You'd be a marked man. What you have to do is play dead. Then you can go to another town under an assumed name and start all over again."

Joe was agreeable to the suggestion. So they decked him out in a fine mahogany coffin, complete with carved silver handles and plush lining, and laid him out for people to pay their last respects.

The first person passing by the coffin looked at Joe and cursed, "You dirty dog, because I trusted you I lost \$10,000." Joe didn't move a muscle.

The second person spat on him and shouted, "You rat, because I had faith in you I lost \$15,000, and my business is on the verge of collapse." Joe didn't flinch.

The third person cursed Joe worse than the others, screaming how he'd lost his business and his wife had left him because of Joe. In burning fury he whipped out a big knife, growling, "Maybe I can't get my \$20,000 and my wife back. But I'll get some satisfaction. I'm going to cut your heart out."

As the knife was about to be plunged into his prostrate body, Joe squinted through one half-opened eye and whispered, "You'll pay!"

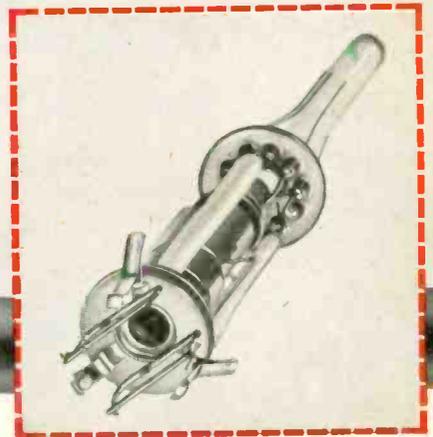
Al Forman



← "Silver Screen 85's" new barium "picture-guard" process deposits a lining of barium over the tube's inside walls. Increased "getter" action keeps the vacuum pure, protecting the screen and electron gun from contamination. The result: Silver Screen 85 gives a brighter picture for a longer time.

"Silver Screen 85's" new high-energy electron gun delivers 10% more light-producing electron energy to the screen. Brightness is increased an equal amount. Precision-focus keeps the picture in perfect sharpness. ↓

 SYLVANIA
SILVER SCREEN 85



"Silver Screen 85" steals the show again

...with new "picture guard" and
new high-energy electron gun

Sylvania's "Silver Screen 85" is now improved four ways to give brighter pictures for a longer time. New "Picture Guard" and high-energy electron gun headline these improvements. In addition, refinements have been made in the silver activated screen and super-aluminized reflector to make television's brightest picture tube even brighter. And to make this *your* biggest year with "Silver Screen 85" Sylvania will be telling more consumers than ever about the improved "Silver Screen 85."

In addition to "Beat the Clock" Sylvania will use Sunday Supplements to promote the "Silver Screen 85" in your own locality. Full schedules will be run in *This Week* and *American Weekly*, plus a score of independent Sunday Supplements.

A better tube, better promotion, with more tie-in material made available for your use. That means this can be your biggest picture tube year if you make it a "Silver Screen 85" year.



SYLVANIA[®]

SYLVANIA ELECTRIC PRODUCTS INC.
1740 Broadway, New York 19, N. Y.
In Canada: Sylvania Electric (Canada) Ltd.
University Tower Bldg., Montreal

LIGHTING • RADIO • ELECTRONICS • TELEVISION • ATOMIC ENERGY



WR-36A
Dot-Bar
Generator
User Price*...
\$147.50



WR-61A
Color-Bar
Generator
User Price*...
\$247.50

Stable!
Accurate!
Portable!
Easy-to-use!

RCA TEST INSTRUMENTS FOR COLOR TV



WO-91A 5" Scope for
Black-and-White Color
User Price*...\$329.50

Your shop's one of the best equipped for trouble-shooting and servicing both black-and-white and color TV when it's equipped with RCA Test Instruments...add these three RCA units to your black-and-white setup and you are ready to service all makes of color TV sets.

WR-61A Color-Bar Generator generates signals for producing 10 different color bars simultaneously—including bars corresponding to the R-Y, B-Y, G-Y, I, and Q signals for checking and adjusting phasing and matrixing in all makes of color sets. *Crystal-controlled oscillators insure accuracy and stability.* Luminance signals at bar edges facilitate checking color "fit" or registration. Adjustable sub-carrier amplitude permits checking color-sync action. The WR-61A is accepted as the standard for color-phasing accuracy in many TV stations and network operations.

WR-36A Dot-Bar Generator provides a pattern of small-size dots, horizontal and vertical bars and fine-line cross-hatch patterns for precise adjustment of convergence and linearity. RF output available on channels 2-6. High-impedance video output circuit with the new WG-305A Video Test Adapter (included) contributes to sharp, steady patterns. Choice of internal 60-cps vertical sync or external sync. The crosshatch pattern and the number of vertical and horizontal dots and bars is adjustable. Weighs only 13 lbs.

WO-91A 5" Oscilloscope incorporates features usually found only in much more expensive instruments. It has all the 'scope functions you need to do both black-and-white and color TV service work...speedily and with top-grade results! Some of the outstanding features are: front-panel switching of "V"-amplifier bandwidth; response flat to 4.5 Mc in wide-band position; voltage-calibrated frequency-compensated "V" amplifier step-attenuator. Simultaneous waveshape display and voltage measurement on direct-reading graph scales enable you to read peak-to-peak voltages directly. Sturdy single-unit probe with built-in switch permits instant selection of direct/or low capacitance operation.
*(optional)

SEE YOUR RCA DISTRIBUTOR
FOR DETAILS ON THESE
OUTSTANDING
RCA TEST INSTRUMENTS
FOR COLOR TV!



TEST EQUIPMENT
RADIO CORPORATION OF AMERICA
HARRISON, N. J.

How to make an easy, extra \$1000 profit this year

One car in four lacks a car radio.

So, just about every fourth man who comes in your place is a car radio prospect. He's waiting for someone to show him the new car radios; and to talk price and installation with him.

This explains why so many dealers are cashing in on car radios this year. Sales are 30% ahead of last year's ... and still increasing.

One car radio manufacturer is better known than any other. That company is Motorola, the world's largest manufacturer of radios.

And now—for 1956—Motorola has produced a completely new car radio line including Transistor-Powered models. These new sets play where others fail—under bridges, among tall buildings, next to roadside power lines, wherever there's a signal. They sell for

as little as \$39.95 (plus installation charge).

No installations to handle unless you're equipped to capture this extra profit. In most cities, Motorola's Installation Depot can do them for you. Or, you can do them yourself in as little as 20 minutes.

Sell just one Motorola Car Radio a week to get your extra \$1,000 this year.

Why miss out on this easy, plus-profit business any longer? Cut out the coupon below. Send it to us. You'll get all the facts promptly. No obligation.



MOTOROLA

World's Largest Exclusive Electronics Manufacturer

Motorola, Inc., Dept. T-2
4545 W. Augusta Blvd.
Chicago 51, Ill.

Attn: Car Radio Department

Please give me all facts about the profitable
Motorola Car Radio business. Thank you.

Name _____

Address _____

City _____ Zone _____ State _____



WHY should a set owner call you instead of Joe's for TV-Radio service?

Honestly, now, what special inducement do you have that will cause customers to select you for service instead of your competitor? Men? Shop? Trucks? Test Equipment? In most cases the answer is simple — *not a single thing!*

The exceptions are service dealers who are among the select group of RAYTHEON BONDED ELECTRONIC TECHNICIANS.

Raytheon Bonded Dealers can offer the public TV-Radio service that is bonded by Raytheon through one of America's largest insurance companies. This creates customer confidence, sways potential customers, helps get more business and make more money. Yet, this tremendous selling advantage costs Bonded Dealers *not one penny.*

Why not ask your Sponsoring Raytheon Tube Distributor if you can qualify as a Raytheon Bonded Electronic Technician? If you can, we'll be happy to pay for *your* bonding.



RAYTHEON

Excellence in Electronics

RAYTHEON MANUFACTURING COMPANY

Receiving and Cathode Ray Tube Operations
Newton, Mass., Chicago, Ill., Atlanta, Ga., Los Angeles, Calif.

RAYTHEON MAKES ALL THESE,

RECEIVING AND PICTURE TUBES • RELIABLE SUBMINIATURE AND MINIATURE TUBES • SEMICONDUCTOR DIODES, POWER RECTIFIERS AND TRANSISTORS • NUCLEONIC TUBES • MICROWAVE TUBES

TECHNICIAN & Circuit Digests

CALDWELL-CLEMENTS, JNC., 480 LEXINGTON AVENUE, NEW YORK 17, N. Y.

"Unity" Without Harmony

On October 9, 1955 in Indianapolis, an event took place that may yet be a turning point in the history of the service industry. On that day, representatives of many local and state service associations throughout the nation voted unanimously in favor of consolidating all groups within the National Alliance of Television & Electronic Service Associations. It seemed that the long-awaited development of a single strong industry voice had been achieved.

Since then, there have been rumblings of discontent over the course of that meeting, from those who were present as well as those who were not.

The abrupt disappearance of all disagreement, is neither expected nor desirable. Real unity must depend on continuing the process of self-appraisal and mutual criticism, rather than throttling it. However, we are seriously disturbed over the nature of that disagreement.

There are certainly many areas in which key questions have yet to be ironed out. In the matter of national control, it must still be decided how much power there will be at the top and how much autonomy will remain with local groups. Will unity be from the top down, or will control originate at the bottom? Tied in with this is the manner in which authority will be delegated at the national level. Will there be one-man control, or administration by a group of men? How long will the man

or men be permitted to remain in office? Who will be permitted to join? Any qualified technicians, or shop owners only? These are only some of the issues hanging in the balance.

What disturbs us is the *absence* of these issues in arguments presently being advanced. Disagreement has deteriorated into a struggle in which personalities rather than issues are paramount. Charges of self-seeking, personal politicking, and behind-the-scenes manipulation for control fill the air, whether in innuendo form or by direct statement. Smear tactics are in evidence.

Perhaps we should take heart from the fact that dirty fighting has often characterized government politics. However, the fact that we have been able to indulge in this costly luxury is the result of the long-term stability and strength of our government. No such present strength is evident in the service industry. In fact, the need for unity is reluctantly imposed on us as a matter of sheer survival. Even the AF of L and CIO, with their bitter jurisdictional disputes, were able to find the common meeting ground of unity.

How about it, fellows? Shall we stick to the issues? When these are well on their way to being straightened out and we have begun to see the fruits of working together, there will be plenty of time for the game of name calling.

Man Bites Distributor

A technician-dealer we know had been doing a fair sideline business in Hi-Fi installations. Often embarrassed by the fact that his customers could buy the speakers he was selling at the same price he was paying—and considerably less than he was charging—he got in touch with the speaker manufacturer to discuss the situation. At the latter's quiet suggestion, the technician is now buying speakers direct from the source, at jobber's price, and profitably selling them, without customer gripes, at "audiophile net"—the effective list price.

A little investigation indicates that several manufacturers accept or encourage such business.

Having cried out against middlemen who compete with their own best customers, we could easily

say, "It serves them right," and endorse the arrangement. However, we are too conscious of the importance of the wholesaler's *proper* role in the complex business of diversified distribution to do any gloating. This development confuses the long-term task of building a coherent system of distribution.

We direct an appeal to distributors, even those who have done such a fine job in getting Hi-Fi across to the public, to make every effort to stay in the middleman position, rather than override the dealer's function. We also urge technician-dealers to build their audio business if they ever expect to exercise their proper role of being the sole sales outlets to the public.

Tuning In the

ROLL-CHART OBSOLESCENCE in tube testers can become a thing of the past if a plan instituted by Precision Apparatus Co. meets with widespread acceptance. For \$2 (annual fee) plus the model and serial numbers of your Precision tube checker, this manufacturer will automatically mail you new roll charts (at least two) during the year plus supplementary test data to keep your instrument up to date with the many new tube types or revise specs for old types. This automatic subscription plan will relieve you of the burden of tube data correspondence or write-in listings, keep you up with the latest types in the fastest possible way, and prevent your checker from having to be replaced from time to time. If you're interested, write to the mfr's Tube Test Data Dept. Address is 70-31 84th St., Glendale 27, L. I., N. Y.

TV RELAY STATIONS linking America with Europe are possible right now, reports Dr. A. B. Du Mont, as a result of new techniques. Reference was to the use of the "scatter" principle for transmission over long distances. A practical route can be developed, he states, for the establishment of "forward scatter" UHF receivers and transmitters, with the number of links possibly being cut down through the use of VHF. Dr. Du Mont also suggests the possibility of a hemispheric network, linking North and South America. He points to a start that has been made with an experimental relay between Florida and Cuba.

CONTINUING SELENIUM SHORTAGE has more manufacturers paying for used selenium rectifiers returned for salvage. Most recent manufacturer to make the salvage offer is Federal Tel. & Radio Co. Growing use of these rectifiers is only partly responsible for the shortage. Selenium is a by-product of copper smelting. Work stoppages in copper mining during the past year have aggravated the short supply.

PIX TUBES WILL BE REPLACED in 6 million TV sets during 1956, according to J. M. Lang, gen. mgr. of the GE Tube Dept. The bill for these replacement jobs will come to \$300 million. Also turned up in the GE run-down of figures is the estimate that the average life of a picture tube is about 4 years. . . . Concerning smaller vacuum tubes, it is estimated that over 150 million will be replaced during the year in radio and TV sets. . . .

LOOK, MA, NO HANDS. A machine capable of packaging 96,000 tubes in an 8-hour day has been installed at the Westinghouse Elmira plant. A human operator can only package 3,000 tubes in the same period. This latest example of automation opens the cartons, inserts tubes, closes both ends, and prints the tube type on the outside of the box.



"But it would be a lot easier to work on if I took it into the shop."

THAT TECHNICIAN'S DUMB GIRL FRIEND just can't figure out some things—like why she still gets long-winded commercials on her set even though she had that gassy audio tube replaced—or what's so pretty about those two conicals on her roof, even if they're really stacked—or how in the world they get canned milk out of a condenser. Anyhow, she knows fixing TV sets must be a cinch. After all, the toughest part is finding out what's wrong—and isn't that why receivers have built-in detectors?

FEBRUARY 1956 NETWORK COLOR TV SCHEDULE

MONDAYS through FRIDAYS February 1-3, 6-10, 13-17, 20-24, 27-29 5:30—6:00 PM (EST)	NBC	"Howdy Doody"	(Live)
MONDAYS through FRIDAYS February 6-10, 13-17, 20-24, 27-29 3:00—4:00 PM (EST)	NBC	"Matinee Theatre"	(Live)
MONDAY, February 6 9:30—10:30 PM (EST)	NBC	"Robert Montgomery"	(Live)
10:00—11:00 PM (EST)	CBS	"Studio One"	(Live)
FRIDAY, February 10 9:30—10:00 PM (EST)	NBC	"Star Stage"	(Live)
SUNDAYS, February 12, 19 3:30—4:00 PM (EST)	NBC	"Zoo Parade"	(Live)
TUESDAY, February 14 9:30—10:30 PM (EST)	NBC	"Playwright 56"	(Live)
THURSDAY, February 16 8:30—9:30 PM (EST)	CBS	"Shower of Stars"	(Live)
TUESDAY, February 21 8:00—9:00 PM (EST)	NBC	"Milton Berle"	(Live)
SUNDAY, February 26 7:30—9:00 PM (EST)	NBC	"Sunday Spectacular"	(Live)

Picture



SHIPBOARD TV on the USS Boston marks the first time a guided missile cruiser has been so equipped. The master amplified system, which will bring TV to the crew whenever the vessel is in port, was engineered by Jerrold Electronics Corp. The system can pick up all VHF channels and some UHF stations, including telecasts in foreign ports where the system is compatible with ours. The cruiser, which fires anti-aircraft guided missiles for fleet air defense, will take down its receiving antenna while out at sea . . . Jerrold is also installing a closed-circuit link from Idaho State College, Pocatello, Idaho, to all 11 public schools in the nearby community. One teacher at the college can instruct 300 students in the schools through the link.

INEXPENSIVE PHONO RECORDS, produced on plastic-coated paper, are being pushed by Columbia Records for commercial and public-service users as "Auravision." The name derives from the fact that text, including color illustrations, may be printed over the playing surface of the disc. The records, which can be played many times before showing deterioration, can be made in any size or speed. Sample copy, printed as part of a brochure promoting Auravision, is a 7-in. 78-rpm disc.

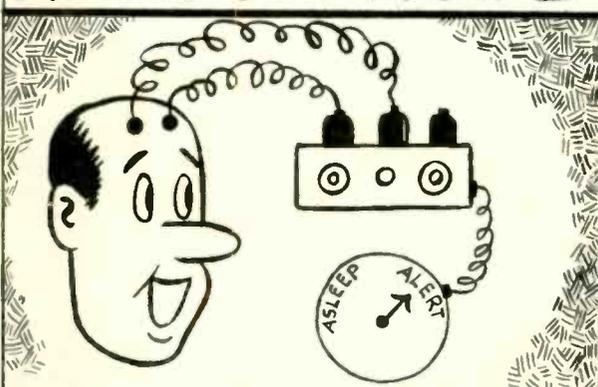
ON LAND, IN AIR. The growing use of tape-recorded background music on planes is spreading to other means of travel. Two railroads, the Atlantic Coast Line and the Atchison, Topeka and Santa Fe, are equipping passenger cars with Presto tape recorders to provide their paying customers with some "travelling music."

CALENDAR OF COMING EVENTS

- Feb. 8-11: 1956 Los Angeles High Fidelity Music Show, Hotel Alexandria, Los Angeles, Calif.
- Feb. 16-17: 1956 Transistor Circuits Conference, IRE-AIEE, University of Pennsylvania, Philadelphia, Pa.
- Mar. 2-4: Third High Fidelity Music Show, Harrington Hotel, Washington, D. C.
- Mar. 5-10: National Television Servicemen's Week.
- Mar. 12-16: National Electrical Manufacturers Assoc., Edgewater Beach Hotel, Chicago, Ill.
- Mar. 19-22: 1956 IRE National Convention and Radio Engineering Show, Waldorf-Astoria and Kingsbridge Armory, New York, N. Y.
- Apr. 13-14: Tenth Annual Spring Television Conference, Engineering Society of Cincinnati Bldg., 1349 E. McMillan St., Cincinnati, Ohio.
- Apr. 15-19: The 34th annual convention of the National Association of Radio & Television Broadcasters, Conrad Hilton Hotel, Chicago, Ill.
- May 21-24: 1956 Electronic Parts Distributors Show, Conrad Hilton Hotel, Chicago, Ill.
- June 27-30: Jobber-Rep-Mfrs. Conference, Breezy Point Lodge, Brainerd, Minn.
- July 22-25: 1956 National Audio-Visual Convention and Trade Show, Hotel Sherman, Chicago, Ill.

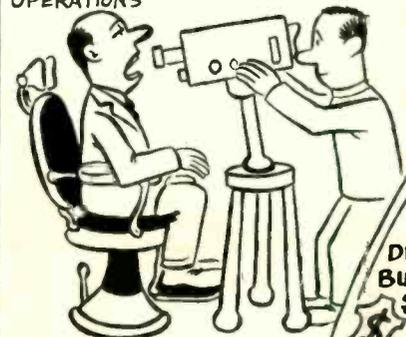
CUSTOMER'S COMPLAINT to a technician was, "You overcharged me for those two tubes you replaced last week, according to a friend of mine. What are you going to do about it?" Our friend didn't know himself what to do about it. He hadn't made out a bill. He hadn't shown the customer a list of tube prices. He hadn't kept a record of the tubes sold and the prices charged. He was a specialist in the electronic age still doing business with stone-age methods.

RANDOM NOISE



ELECTRODES ON A PERSON'S FOREHEAD PICK UP VOLTAGES WHICH SHOW HOW ALERT HE IS, REPORTS TUFTS U. BERKSHIRE LABS. IS MAKING TRANSISTORIZED INSTRUMENT FOR THIS PURPOSE

CLOSED CIRCUIT TV MADE BY DAGE ENABLES DENTAL STUDENTS AT LOYOLA TO GET EYE-TOOTH VIEW OF DENTAL OPERATIONS



RCA'S VIDEO TAPE RECORDER CAN RECORD 20 KC PER INCH - OR AN ENTIRE TV PICTURE AS LOW AS 20 FT./SEC.

TOM HIGGINS JR.

BY 1965 ELECTRONIC DISTRIBUTION SERVICE BUSINESS WILL REACH \$5,178,000,000 PREDICTS PENNSYLVANIA HEAD DON MITCHELL. INCLUDED ARE \$2,104,000,000 FOR COMPONENTS, \$1,389,000,000 DISTRIB REVENUE, AND \$1,685,000,000 SERVICE BUSINESS

Technician Test Equipment



TECHNICIAN's Test Equipment Contest has been a huge success!

Hundreds of entries were received from 45 states, District of Columbia, Hawaii and Canada. Selecting the winners was no easy task . . . there were so many good ideas. After much deliberation the top 106 winners listed here, with the \$2400 worth of prizes they are receiving, were chosen. Congratulations on a job well done.

This contest points up some salient facts of interest to technicians and manufacturers alike. Techs are strongly instrument-conscious. They are constantly seeking improved test gear which will make TV-electronic servicing faster and more effective. Based on their practical experience, techs have plenty of firm ideas and worthwhile suggestions on which features should be incorporated in test equipment. Contest findings based on data contained in entries are being made available to manufacturers so that the kind of instruments techs want will be placed on the market.

Here is a summary of some of our statistical findings, which were based on an analysis of the first 440 entries received:

IMPORTANCE OF INSTRUMENT TYPES TO TECHNICIANS:

(Presented in order of importance.)

1. Tube tester
2. VTVM
3. CRT tester
4. VOM
5. Scope
6. Capacitor tester
7. Filament continuity tester
8. CRT rejuvenator
9. RF & audio signal generators
10. Yoke-flyback tester
11. Bar-dot color generator
12. Field strength meter
13. Crosshatch-pattern generator
14. Sweep-marker generator
15. High voltage test probe
16. RC & circuit analyzer
17. Signal tracer
18. Grid circuit tester
19. Test socket adapter
20. Deflection-sync source & test
21. Wattmeter
22. RC substitution box
23. Selenium rectifier tester

24. Substitute speaker
 25. Power supply
- (Other instruments noted by under 2% of entrants.)

SPECIAL FEATURES DESIRED BY TECHNICIANS

1. AC power receptacle in instrument
2. Instrument mounted in caddy
3. Tool compartment in case
4. Lighted meter dial
5. Transistorized instruments
6. Battery operated meters
7. Zero center dial scales
8. Retractable cords & leads

FACTORS AFFECTING TECHNICIAN BRAND PREFERENCE

(Figures show number of first place votes.)

Performance range & accuracy	237
Manufacturer's reputation	103
Cost	37
Ruggedness	16
Appearance	10
Latest model	9
Availability of modification kits	4
Availability of instrument manuals	2
Availability of instrument at jobber	1
Locality of manufacturer	1

AVERAGE VALUE OF TEST EQUIPMENT PER SHOP

\$1239.00

SALES POTENTIAL BY PRICE RANGE

(% of technicians willing, but not necessarily planning, to buy instrument up to maximum \$ shown. % in each range does not include technicians in other price ranges. Total of all ranges, 100%.)

Tube tester	
to \$99	31.0%
\$100-\$199	52.0%
\$200-\$800	17.0%
VOM	
to \$39	42.2%
\$40-\$59	44.0%
\$60-\$150	13.8%
Capacitor tester	
to \$39	35.9%
\$40-\$79	47.9%
\$80-\$190	16.2%
VTVM	
to \$69	46.6%
\$70-\$99	32.7%
\$100-\$220	20.7%

(Continued on page 62)

Contest Winners

TEST EQUIPMENT PRIZES AWARDED

Prize No.	Instrument
1 st	HICKOK Model 650C Signal Tracer
2 nd	WESTON Model 983 5" Oscilloscope
3 rd	HYCON Model 617 3" Oscilloscope
4 th	TELETTEST FT100 Flyback Tester, RT203 Rejuvenator, CT355 Capacitester
5 th	SUPREME Model-655 5" Oscilloscope
6 th	CLOUGH-BRENGLE Model 411 Audio Oscillator
7 th	JACKSON Model 49 Tube Tester & Accessories
8 th	AUTHORIZED Model 204 Intermittent Analyzer
9 th	TELEVISION ENGINEERS Model V1000A Tube Checker
10 th	RADION Model FSM500 Field Strength Meter
11 th	RAYTRONIC Model CD-77N "Beamer"
12 th	ELECTRONIC TEST INSTR. "Vitameter"
13 th	SECO FB-4 Flyback and GCT5 Tube Testers
14 th	SHASTA Model 201 VTVM
15 th	RADIO CITY Models 480 & 453 Multitesters
16 th	SIMPSON Model 355 "Midgetester"
17 th	VIDAIRE Model FT-100 Wave Trap Meter
18 th	HEATH Model V-7 VTVM Kit
19 th	CENTURY Model 201 Condenser-Resistor Analyzer
20 th	RADIO KITS Model M-3C Multitester Kit
21 st	TELEMATIC Model WT606 TVI Analyzer
22 nd	POMONA Socket Kits & Meter Switch
23 rd	SUPERIOR Model 770A VOM
24 th	ELECTRONIC MEASUREMENTS Model 102 Multitester
25 th	BERKSHIRE Model 18 "Labprobe"
26 th	ALCO Model R20 Resistor Substitution Box
27-31 st	SUPEREX CRT Adapter
32-56 th	GENERAL ELECTRIC Series Heater Checkers
57-81 st	RCA "Multicards"
82-106 th	CBS-HYTRON Four-Way Tools

THE WINNERS

- Nicholas B. Cook, Paterson, N. J.
- Charles Garrett, New London, Conn.
- Maxime G. Kaufman, Wash., D. C.
- Wayne E. Lemons, Buffalo, Missouri
- John Sternklar, Clifton, N. J.
- Dacil E. Oldaker, Fairborn, Ohio
- Leon M. Langley, New Orleans, La.
- Nelson Radio & TV, Freeport, Ill.
- Jules Elkish, Philadelphia 7, Pa.
- H. H. Gottlieb, L.I. City, N. Y.
- Angelo Aldana, Chicago, Ill.
- F. M. Dickinson, Stony Point, N. Y.
- Fritz C. Hoffman, Kewaunee, Wisc.
- Raymond Ford, Rochester, N. Y.
- Donald M. Diers, Milwaukee, Wisc.
- Bernard Ginsberg, Jamaica, N. Y.
- Lester H. Wright, Zion, Ill.
- Floyd Stahl, Dayton, Ohio
- L. A. Shaffer, Stone Harbor, N. J.
- Norman Platner, Jackson Hts., N. Y.
- M. G. Goldberg, St. Paul, Minn.
- W. M. Parsons, Stockton, Calif.
- Otto R. Mikell, Montclair, N. J.
- J. Wisemann, Philadelphia, Penna.
- Tony G. Braun, St. Louis, Mo.
- A. W. Howorth, Sioux Falls, S. D.
- John Dezzani, Lynwood, Calif.
- Barry D'lott, Brighton, Mass.
- T. E. Show, Astoria, N. Y.
- John B. Ohnstad, Moorhead, Minn.
- M. C. Erland, White Plains, N. Y.
- E. E. Roberts, Chattanooga, Tenn.
- Howard Goll, Chicago, Ill.
- Paul Katz, Bayonne, N. J.
- Irv Sockel, Cleveland Hts., Ohio
- H. M. Layden, New York, N. Y.
- Peter V. Mack, Passaic, N. J.
- Hugo Goldberger, Baltimore, Md.
- Bud Electronics, Union City, N. J.
- Dimas Ramirez, New York, N. Y.
- G. F. St. Germaine, Bridgeport, Conn.
- Russell Scarpelli, Gulfport, Miss.
- H. W. Attebery, Phoenix, Arizona
- J. Besmertnik, Brooklyn, N. Y.
- William Kelvin, Albertson, N. Y.
- S. Vanderlaan, Albion, N. Y.
- Willard J. Beale, Greenbelt, Md.
- George Peroni, Miami, Fla.
- Charles Myus, Lapeer, Mich.
- L. E. Klingberg Jr., Los Angeles
- R. L. Pearson, Holdrege, Nebr.
- Tom Daniel, Chase, Kansas
- Fred J. Wonsor, Bath, Maine
- A. A. Hansen, St. Clair Shrs., Mich.
- Donald D. Helm, Phoenix, Arizona
- Robert Kuckuk, Mellen, Wisc.
- R. B. Graf, Statesville, N. C.
- E. J. Harrison, Louisville, Ky.
- Emmet Morris, Gorham, Kansas
- M. W. Byfield, Seattle, Wash.
- Leo Weiser, Niles, Mich.
- Wm. H. Ward, White Hall, Ill.
- Gordon R. Linscott, Sharon, Tenn.
- Edwin O. Reid, Palatka, Fla.
- Duke's Radio & TV, Glassport, Pa.
- Ed Gorecki, Grand Rapids, Mich.
- E. T. Hansen, Salt Lake City, Utah
- Eugene A. Dorriere, St. Louis, Mo.
- C. L. Otto, Colorado Spgs., Colo.
- M. L. Stahl, Jr., Boca Raton, Fla.
- J. N. Picardi, McKeesport, Pa.
- Arthur E. Rhine, New York, N. Y.
- R. E. Cauble, Whittier, Calif.
- R. W. Poling, Ft. Lauderdale, Fla.
- Mendel Maskewitz, Oak Ridge, Tenn.
- J. A. Tromp, Fairport Harbor, Ohio
- Young Kim, Dinuba, Calif.
- R. O. Goettmann, Pittsburgh, Pa.
- Bubica TV Service, Garfield, N. J.
- Robert E. Cox, Seattle, Wash.
- Kenneth G. Harf, Flushing, N. Y.
- J. W. Bernthal, Lemay, Mo.
- A. J. Kalas, Downey, Calif.
- J. L. Mancini, Winthrop, Mass.
- Thomas C. Rumney, Toronto, Ontario
- Bernard B. Daien, Suffern, N. Y.
- Norman Maxwell, Clore, Mich.
- Claude L. Ealy, Belle Plaine, Iowa
- J. S. Credidio, Philadelphia, Pa.
- James D. Strauss Jr., York, Pa.
- Fred Garing, Gallup, N. M.
- C. T. Martowicz, New York, N. Y.
- R. J. Ambrose, Providence, R. I.
- Lynch Radio-TV, Schenectady, N. Y.
- Donald Katz, New York, N. Y.
- Ben Phipps, Dos Palos, Calif.
- Ralph Clark, Indian Rocks Bch., Fla.
- Robert L. Weil, Albany, N. Y.
- B. H. Hurdelbrink, Lansford, N. D.
- A. A. Bowen, Burlington, N. J.
- E. Walker, Ville St. Mrtn., Que.
- W. E. Warner, Charleston, W. Va.
- Roland H. Curry, Savanna, Ill.
- J. J. Foley, Queens Village, N. Y.
- Bill Morrow, Seymour, Iowa
- E. A. Radmon, Ellinwood, Kans.

Field Testing Methods for

Standard Yoke Circuits: Streamlined Checking Techniques for

JAMES A. McROBERTS

• "Is it the yoke, the transformer, or something else?" Before attempting to settle this frequently arising question, some review of yokes and their associated circuitry is in order.

Deflection is accomplished by electromagnetic action in the yoke coil pairs. The deflecting force is determined by two factors, the current flowing in the particular pair of coils and the number of turns in the coil winding. The deflecting force required in a particular case

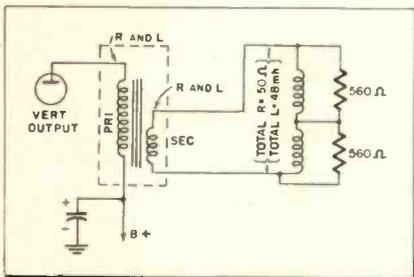


Fig. 1—Vertical output section using transformer with separate primary and secondary.

may vary, depending on picture tube size and other factors, but the ampere-turns ratio is fairly constant. As a result, the voltage developed across any yoke is relatively predictable. A range of 2 to 1 might be expected from the largest cathode-ray tube to the smallest.

The vertical windings of the yoke generally have an inductance of 50

millihenries. Wound for this inductance, resistance of the vertical coil will be about 50 to 60 ohms. Exceptionally, low-inductance yokes will be encountered, like those rated at 3.5 mh inductance and 3.5 ohms resistance. However, the voltage developed across such a yoke is approximately the same as that developed across the higher-impedance windings, since yoke current goes up correspondingly as the impedance goes down.

The yoke is ordinarily driven by a matching transformer. The reflected load of the vertical yoke coils adds to the primary impedance of the transformer so that about 5 henries is presented as the load on the vertical output tube. This is very constant whether the drive is through a separate-winding transformer (Fig. 1) or an autotransformer (Fig. 2). The voltage across the primary is approximately 1200-1400, peak-to-peak, during retrace. The P-P current is about 16-20 ma, with 11-13 average, for the primary. Secondary current is about 165 ma, P-P and about 100 ma average.

The horizontal coils are driven through a matching transformer or a direct drive arrangement that does the same thing. Figs. 3 and 4 show these drives respectively. The inductance of the series coil pair varies from 8.3 to 30 mh, with resistance ranging from 13.5 to 45 ohms. The primary of the flyback has 4500 to

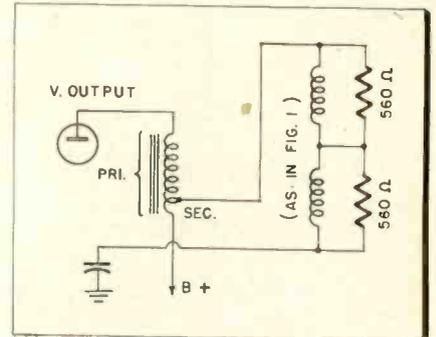


Fig. 2—Autotransformer matches vertical coils of deflection yoke to plate of output tube.

6000 volts P-P during retrace, and the flyback voltage across the deflection coil pair is roughly 1250 volts, P-P. Some variation is noted with picture tube size, values increasing with increased size. Roughly 500-600 ma peak current flows through the deflection coils, plus any dc present. The reaction scanning, though, develops an oscillatory voltage that is rectified by the damper and is added in series with the B-plus as the B-plus boost. The amount so added is directly proportional to the peak deflection current.

Tests, Vertical

A. The ohmmeter will disclose any radical departure from the correct value of yoke resistance.

B. The primary retrace voltage can be metered with reasonable accuracy

Fig. 3—Separate winding transformer driving the horizontal coils.

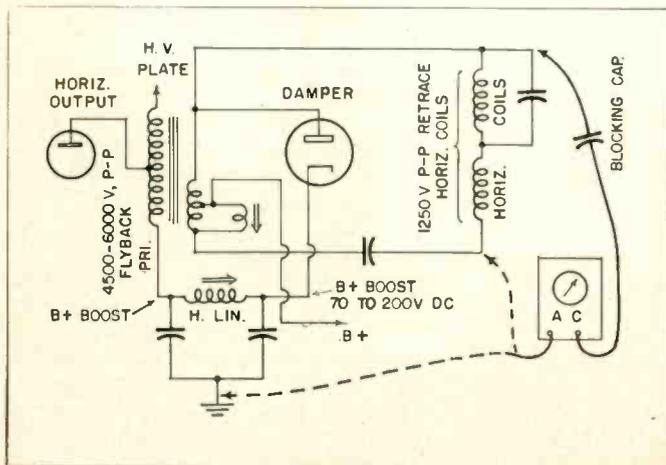
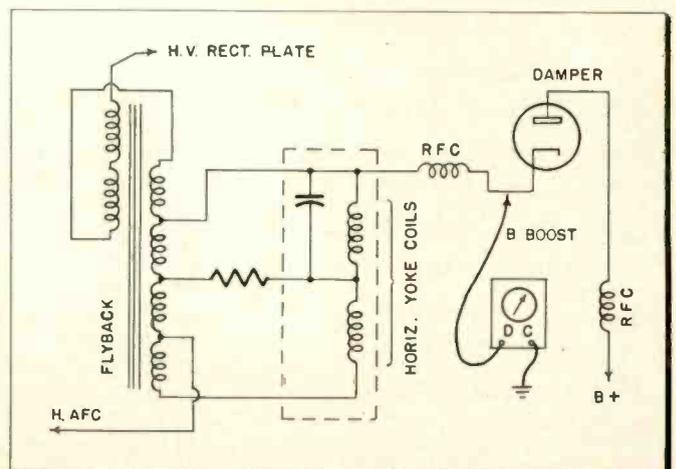


Fig. 4—Direct-drive (autotransformer) horiz. deflection system.



Deflection Yoke Problems

Speedy Service in the Customer's Home As Well As in the Shop

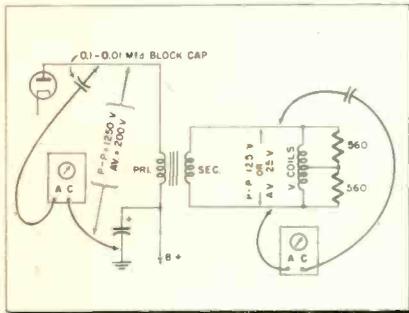


Fig. 5—Using ac meter to estimate peak-to-peak deflection voltage in yoke or xformer.

by an ac voltmeter, such as the ordinary v-o-m or vtvm. Fig. 5 shows this test with a series blocking capacitor. The meter will read about one fifth of the P-P voltage, or approximately 250 v. The voltage across the coils of the yoke is about 125 v (P-P) with a meter reading of about 25 volts. The technician should make a check on a good set with the circuit of Fig. 5 contrasting with known values such as obtained from an oscilloscope. An abnormal yoke seriously upsets these values.

C. A #47 pilot light is rated at 150 ma for full brilliancy. Hence the 100-ma average current will cause it to light up a fairly bright red; dc may be present and this test would fail in such a case. See Fig. 6.

D. A jumper and blocking capacitor may be used to transfer the vertical pulses to the volume control's "hot" terminal. Hearing the pulses in the audio will prove their presence. See Fig. 7.

Horizontal Tests

A. The presence of a deflection current is almost definitely established by the presence of the indicated boosted B-plus voltage. Some boost may be developed in some circuits by a width coil alone, but this value will be very low. The width coil can be disconnected temporarily if such action is suspected. The B boost should be close to rated value. This varies from about 70 to 200 volts or so with modern sets.

B. The presence of dead shorts or serious departures from normal resistance readings is readily detected by the ohmmeter.

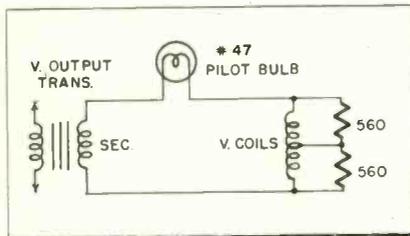


Fig. 6—Pilot bulb used to test yoke current.

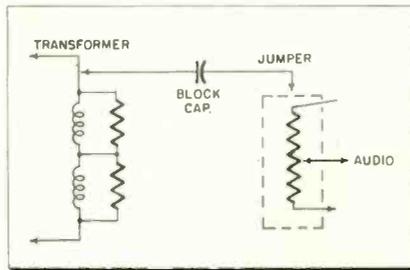


Fig. 7—Deflection pulses can be checked by coupling them to the receiver's audio section.

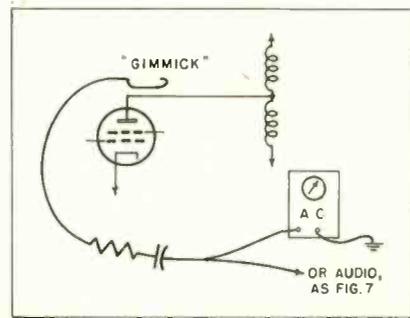


Fig. 8—Loosely coupled "gimmick" may be used to check for presence of horizontal pulses.

C. The procedure suggested in Fig. 5 can be applied to the horizontal coils with about the same reading as across the vertical primary, i.e., in the vicinity of 250 volts on the meter for the 1200 volts P-P. Disconnection of the yoke is not easy for the horizontal coils, but a radical departure from the above value is suspicious.

D. The average coil current for most yokes is about 300 ma. A #44 pilot bulb will burn overly bright with such a current since its rated value is 250 ma. This test can be performed if a blocking capacitor is in series with the deflection coils, as dc might otherwise be present.

E. The horizontal pulse may be heard (rotation of the horizontal hold may be required to shift the

oscillator frequency to the audible range) by an arrangement like that of Fig. 7 applied to the coils. A series capacitor and a series resistor of at least 10k (or several times this value) is required as a safety precaution. Cf. Fig. 8.

F. Fig. 8 shows a gimmick of heavily insulated wire coupling the horizontal pulses in the plate of the horizontal output to the jumper, with series resistor and blocking capacitor, which in turn feeds these pulses to the hot side of the volume control so that they may be heard.

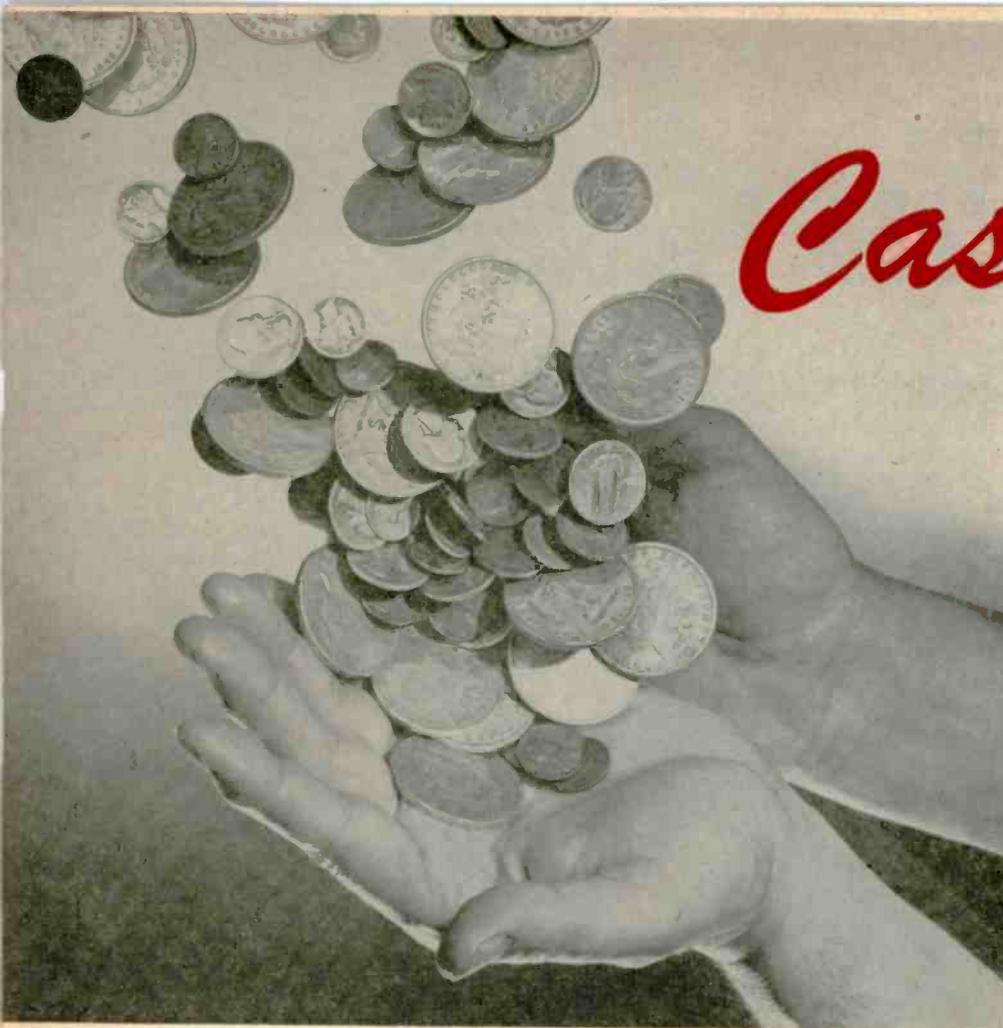
The high pulse voltages encountered in these tests make safety precautions necessary. The connections should be made with the set off, and should not be held by the operator. The voltmeter should be insulated from any ground when so used. The same is true of the pilot light and the audio jumper. The series resistor should be large enough to drop the peak voltage to the value of the capacitor's reactance at the frequency employed in the audio tests; since ample signal is available, this resistor's value is not too critical. Even 250k is quite satisfactory. •

Who Will Service Pay TV?

In a report to the FCC on subscription TV, Jerrold Electronics Corp. raises interesting questions on TV service where decoders are involved.

With several connections made between decoder and receiver, they tend to operate as a single instrument. Is service on one without involving the other possible? To what extent will the independent service technician be permitted to work on them? Who will own the decoding device? Who will install it? Who will service it?

If set and decoder are to be maintained by separate organizations, instances of disputed authority may arise. To overcome this, there is the possibility that pay-TV operators may offer comprehensive service on an entire installation, including the receiver, thus competing with independent service.



Cash In On

JAMES E. WEDDLE

• Aside from unreasonable customers and the vagaries of some manufacturers, the professional technician's greatest headache is probably the "repairs" effected (or committed) by the handful of incompetents who occupy the outer fringes of our field. No technician has been initiated until he has encountered one of these butchered chassis, out of which fragments of solder and broken coil slugs drop from a rat's nest of wires and cut component leads.

Although many technicians look upon these receivers as something to be avoided—some refuse to work on them—these sets can be turned into both immediate and long-range profit. Nothing enhances a reputation more effectively than restoring a butchered set to satisfactory condition.

This may sound like a large order; and sometimes it is. On the other hand, once a few of these dogs have been tackled, it is surprising how many turn out to be relatively simple jobs. It is important to keep in mind that the work of the incompetent must be corrected *before* any attempt is made to isolate the original trouble. Fortunately, the butcher simplifies this by leaving

evidence to mark the areas of his operations. In addition, his work falls into a pattern which serves as a guide as to what to look for. For example, a bolt in the fuse clip indicates that the original trouble caused the blowing of fuses, and also tips us off to look for components overheated or burned out due to the infusible bolt. Depending on the length of time the receiver was in the butcher's hands and the nature of the original trouble, a thorough visual inspection may be expected to reveal the following indications of dirty work:

Marks of the Butcher

Missing tubes; missing parts; wires and leads cut loose and not reconnected, or reconnected to incorrect points; wrong tubes, or tubes in wrong sockets; components of incorrect value installed; "bargain" parts installed; cold solder joints; solder drippings which cause short circuits (hot solder dropped on i-f coil and horizontal output transformer windings is a common source of trouble); misalignment (with broken coil slugs); resistors and capacitors damaged by too much soldering iron heat; tampering in tuner circuits; damage to horizontal output transformer windings due to the

excessive drawing of arcs with a screwdriver.

As a rule, it is best to start restoration by checking tubes for correct placement and type. Once this has been taken care of, the underside of the chassis should be inspected for the most obvious signs of tinkering such as cut wires and leads, coil and transformer damage, etc. The tuner should be given an especially close examination, as extensive damage here may necessitate the replacement of the entire unit.

In the case of a turret tuner, the entire drum should be removed for inspection of the wiring, with each segment of the drum being removed and its coils inspected. A small, off-set inspection mirror is useful in tuner inspection, as well as in locating solder drippings on coil and transformer windings.

Once this general inspection has been completed, the chassis should be examined for bright, new soldered connections. These are easy to spot by their lumpiness, as well as their brightness. All leads to such connections, along with any disconnected leads, should be traced, with the aid of an accurate circuit diagram, for proper termination. Any

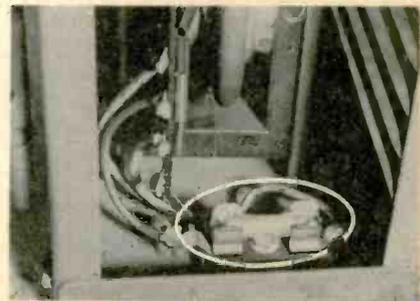


Fig. 1—Metal foil wrap used to defeat fuse resulted in fire damage to the receiver.

missing parts, bargain parts, and cold solder joints will become obvious in the course of this work, as will parts of incorrect value.

It helps to know that there is method of a sort in the butcher's madness. Usually, when he changes the value of a resistor, he changes to a lower value, probably on the theory that such expedient will increase plate and screen voltages.

The Butcher's Work

Manhandled Sets Can Pay Off in Profits and Good Will

This sort of "improvement" is usually found where the original trouble was insufficient width and/or height, and sometimes in cases of insufficient contrast. Another common trick is the entire removal of such components as chokes, peaking coils, resistors, etc., in the path of video signals. These are replaced by lengths of wire or bridges of solder.

Realignment should not be attempted until everything else necessary has been done to restore the chassis. Even after all circuit corrections indicated by visual inspection have been made, it is a good idea to check tuner and i-f voltages before proceeding. Often, the butcher will switch leads or bridge voltage-divider resistors in order to

increase tuner and i-f tube voltages, and a voltage check will reveal this condition in case it escaped visual detection.

The foregoing measures having been completed, the set may be turned on and analyzed in more or less conventional fashion. That is, any undetected butchering will show up as operating defects, and may be

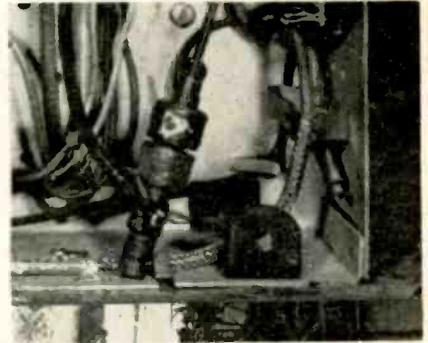


Fig. 6—Dripped solder damaged h. osc. coil.

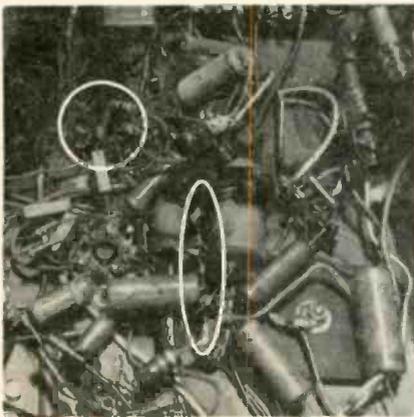


Fig. 2—Inadequate repair of fire damage: Charred tube socket not replaced (resistance reading possible from any pin to ground); damaged terminal strip not replaced; ends of burned-out resistors left hanging in set; charred resistors, capacitors not replaced.

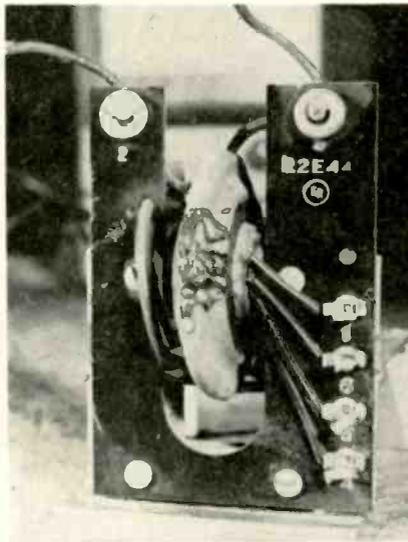


Fig. 5—Flyback xformer damaged by arcing.

traced by voltage and resistance analysis and use of the scope.

Needless to say, the circuit diagram and alignment data are essential. Photographs of the chassis, if available, save much time in locating and identifying missing components. This visual inspection and

correction, while in its nature tedious, does not consume as much time as one might imagine if approached methodically.

In these cases, the customer is always more delicate than the receiver, and must be handled accordingly. Usually, he is not in a pleasant frame of mind when he calls on you; for obvious reasons, he is skeptical. Also, he may be the type who is disagreeable even when he hasn't been victimized; there is a good possibility that he engaged the incompetent in the first place because he was unwilling to pay a standard charge. Then again, perhaps he did the damage himself.

Be that as it may, there is no other situation in which the professional manner more effectively proves its value. The job should be received as a doctor receives a patient: *per se*, as a part of the day's work. As always, it is excellent policy to listen

(Continued on page 60)

Fig. 3—Typical alterations in vertical oscillator-output stages.

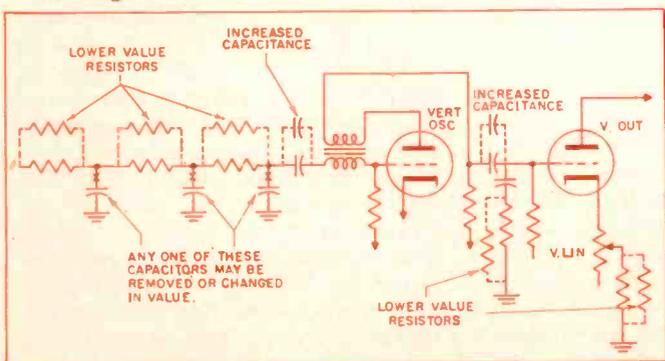
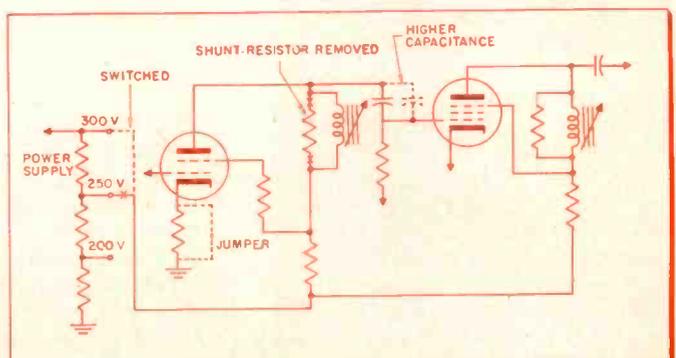


Fig. 4—Typical alterations in the intermediate-frequency stages.



Tell-Tale



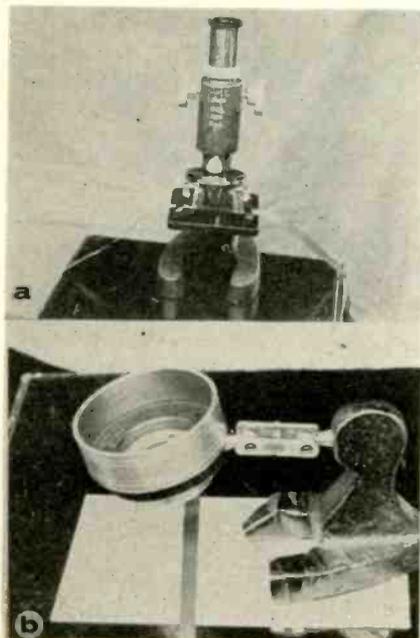
Marks

A. R. CLAWSON

• Just as bullets and cartridge cases are definitely and characteristically marked by the guns in which they are used, so is a magnetic tape marked by the transport mechanism of the machine through which it passes. Visual examination of the tape will furnish valuable clues as to what some faults are, and give an idea of where to look for those troubles.

Of interest in this connection, is the method of identifying a tape with a particular machine; such work is performed under a microscope, as shown in Fig. 1A. The power of the scope is reduced from

Fig. 1A—Microscope used to examine tape in labs. B—Magnifier set-up for service tech.



normal however. Comparison of a questioned tape with a fresh test tape establishes the identity of tape and machine on which used.

Fortunately, practical service work does not require such an elaborate set-up. Many flaws may be noted by direct inspection of the used tape or, preferably, several feet of new tape with the unaided eye. Magnification at low power—about 5× (or five times)—is a great help, and is also

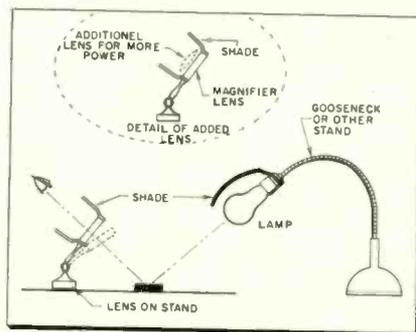


Fig. 2—Layout of light source, tape, the magnifier and the eye during inspection procedure.

useful for examination of fine wire leads and other shop applications. A fixed stand—adjustable, of course, for focus—frees the hand from holding the tape or object and enables many feet of tape to be examined rapidly. Furthermore, the angle of the light is important; a fixed light and a fixed stand permit easier work.

Fig. 1B shows such a magnifier for examining tape. Fig. 2 shows diagrammatically the arrangement of tape (greatly exaggerated), magnifier, eye, and the light source. The light should be so positioned that it strikes the tape at a glancing angle, particularly for looking at scuff marks caused by flats, which will be discussed later. The light

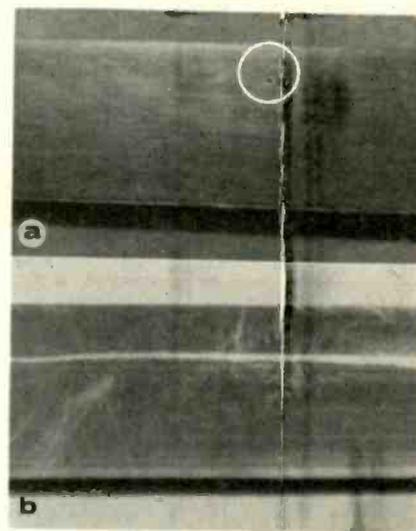


Fig. 3A—Tape in good condition, though used (embedded particles in circle). B—Scratch produced by a projection on the erase head.

should be shaded from the worker's eye so that he can look at the tape without being partially blinded.

A shade on the lens of the magnifier is a help in reducing unwanted reflections from other lights and objects—a camera sunshade is used in the photo of Fig. 2; paper may be wrapped around the magnifier as a substitute. Other types of magnifiers can be employed, such as a watchmaker's loupe (about 5 to 6×) or a folding pocket magnifier. If the magnifier has a single lens such as the one of Figs. 1B and 2, another lens may be placed over or under it to increase the power, such as the insert of Fig. 2 illustrates.

We now turn our attention to the markings, how caused and the faults so indicated; in the photographs, a shadow is produced by the tape edge which should be disregarded by the reader.

Even a new recorder, or one in good condition, will produce some marks on a new tape. The technician must decide when marking indicates trouble and when it is normal. Fig. 4 is a photograph of a

Before You Dismantle the Transport Mechanism, Look for These "Fingerprints." They May Point Out the Trouble

Reveal Tape Recorder Flaws

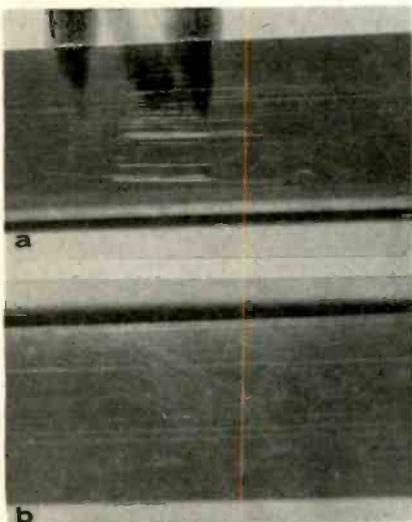


Fig. 4A—Starting with worn head produces short scratches. B—Incipient trouble from worn guide; wear on edge is due to dirt.

fairly well-worn tape from a machine in good condition. A number of scratches are plainly visible on the oxide surface, but none are deep enough to indicate unusual wear or faults in the instrument. The scratches are due to minute projections on the heads and guides plus the accumulation of oxide coating particles which have worn off and rub against the tape. When such particles collect at specific points in the transport mechanism (such as the bottom of a guide) they will wear the tape surface rapidly: note the darkened lower edge of the tape near the shadow in Fig. 3A. Particles collecting on the capstan later may be imbedded in the tape, to produce a speck surrounded by a white ring. Two such spots with rings are evident in Fig. 3A. Many such spots on a tape indicate the need for a thorough cleaning job on the machine.

Fig. 3B illustrates a section of tape with a wide scratch due to a projection on an erase head on a dual-track machine. Such scratching is clearly excessive, since the entire oxide surface has been dug out by

the burr or point as the tape has been pulled past it. A reversal of a new test tape revealed two scratches, but this reversal is an unimportant thing.

The tape of Fig. 3B also shows excessive wear at the bottom due to a collection of oxide and dust, etc., at the bottom of the guides. So long as the wearing away does not invade the area of the sound track, the tape is usable, although the need for a cleaning is very plain.

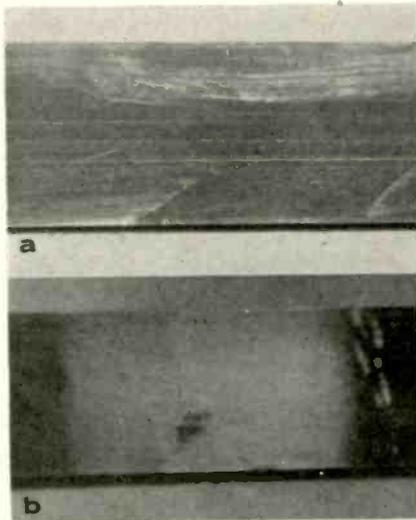


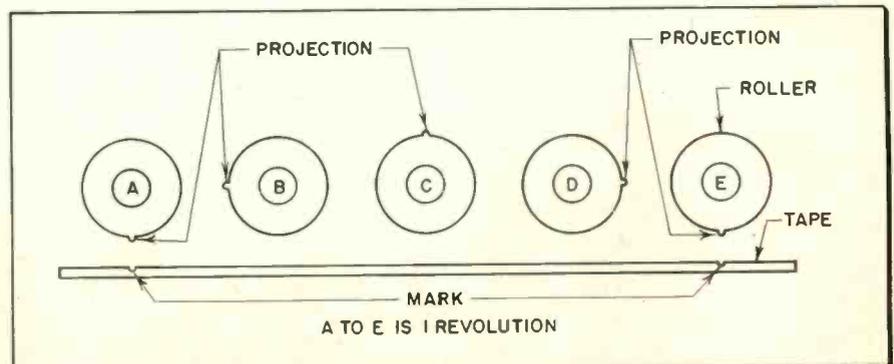
Fig. 5A—Starting with a flat on a pressure roller produces scuff on tape backing. B—"Chatter" (inadequate pressure-pad contact).

It is further evident that this tape has not been reversed on the dual-track machine so that the lengthwise scratches on the bottom half are due to other things than the recorder and erase heads, which were fixed for upper-track recording in this case. The collection of particles at the bottom causes the waviness in the scratch due to jiggling of the tape vertically.

From the foregoing discussion, the reader will have gathered that a lengthwise marking, scratch, or impression is caused by pulling the tape past some fixed object in its transport. A projection will leave an indentation and, if appreciable, will leave a scratch. A depression will leave an unaltered tape surface after several runs (unaltered by comparison with the remainder of the tape). When the tape is damaged after two or three runs through the machine, then the trouble is sufficient to warrant a search for its cause. The position of the markings with respect to the edge of the tape furnishes a clue as to what part of a contacting surface can cause the mark.

The back of the tape may be marked by projections or depressions similarly; however, unless they are very severe, there is little cause for search: the plastic back will take quite a beating. Pressure pads on (Continued on page 51)

Fig. 6—A projection on a roller or other rotating member repeats its marking on the tape.



Localizing Troubles

Line-Caused Symptoms. Motorboating and Whine.

SOL HELLER

• For faster troubleshooting of TV tuner troubles, the service technician should be familiar with the variety of symptoms these defects can produce. It is also important, from the standpoint of saving time, to know what preliminary observations and tests should be made before deciding that the trouble present actually lies in the tuner.

Before any other tests are made, the possibility of station trouble should of course be eliminated. (It is assumed that receiver controls are correctly set.) Absent picture and sound, noise streaks in the picture or sync troubles—at one channel setting—may be due to transmitter trouble, as well as to front-end defects. Check reception at the same channel setting on another receiver, if you can; or get a full enough report from the customer to rule this possibility out.

When the complaint is intermittent pix and sound reception on one or more channels, the possibility of reduced line voltage causing the symptoms should not be overlooked. The r-f oscillator may stop operating on some channel settings when the line voltage is substantially reduced, particularly when its transconductance has dropped, due to aging. The presence of a rectifier with reduced emission, or some

other B supply circuit fault tending to reduce supply voltages, will promote the development of such a condition, infrequent though it is.

If somewhat reduced picture size, brightness and contrast are noted (on operating channels) when pix and sound disappear at one or more station settings, a line voltage check is in order. If it is convenient to make such a test at the customer's home when the intermittent is in its active phase, the customer may be asked to report on the size, brightness and contrast changes referred to; this report can then be used as a guide. Best of all, if a variable-voltage set-up is available, the set's operation can be checked at various levels of reduced line voltage, either in the shop or in the customer's home. The dramatic restoration of normal set performance by use of a constant-voltage transformer in the customer's home, incidentally, will help "sell" the set owner on the need for such a unit. It is, of course, assumed that no remediable set fault is present, and a low line voltage frequently exists at the customer's location.

When both video and sound are absent on all channels, and the raster is normal, the source of the defect may lie in any stage common to both the video and sound signals. In the case of intercarrier receivers, such stages ordinarily include the front end, video i-f, video detector

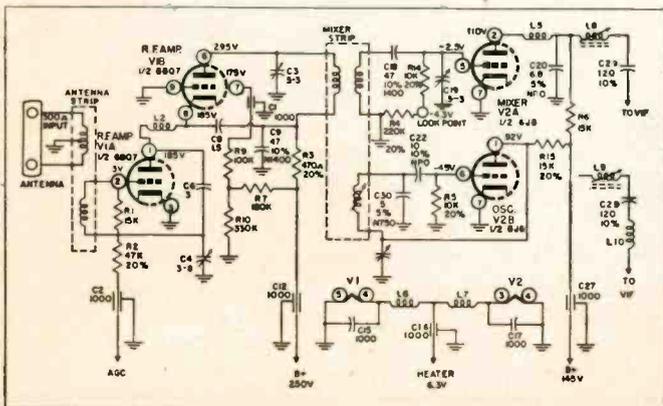
and video amplifier. If a marked noise pattern (random black and white dots and flashes) is seen on the crt, with the contrast setting at maximum, trouble in the antenna system, or in the antenna input circuit, is probable. Try an indoor antenna, and note results. Next, substitute front-end tubes. Also check the antenna input circuit, visually as well as with an ohmmeter, if necessary.

Test Signal Injection

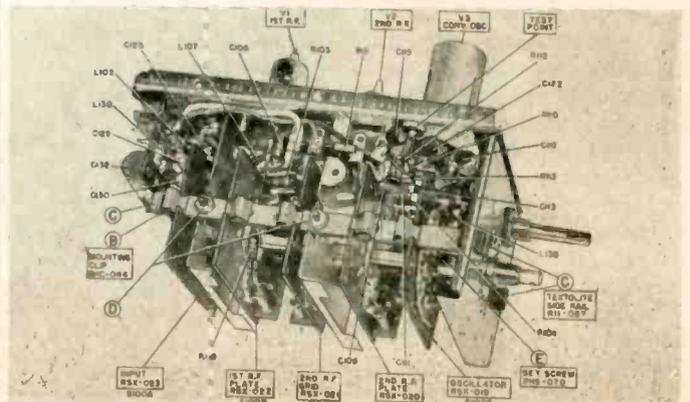
If noise is not visible on the crt, and replacement of tubes in stages common to the video and sound has not restored reception to normal, inject a 400-cycle modulated video i-f signal between the 1st video i-f grid and ground. If horizontal bars are now seen on the crt, switch the generator leads to the antenna terminals, leaving the modulation on, and set the generator to the frequency of the receiver's channel setting. If horizontal bars do not become visible at this time when the fine tuning control is manipulated, trouble in the front end is definitely indicated.

Now apply a 400-cycle modulated signal of the receiver's video i-f between mixer grid and ground. In some sets, the presence of an accessible test point at the tuner will facilitate this test. If horizontal bars are seen on the crt screen, trouble in the tuner at some point ahead of the mixer is probable.

Schematic of a representative cascode-type turret tuner. With V1A and V1B in series, a defect in one of these triodes can upset readings in the other.



Typical GE tuner, used in 20T2 models. Close quarters often make it desirable to take voltage measurements from the top of the chassis. (Courtesy GE)



in the TV Front End

Microphonics. Snow and Noise. Tuner-Caused Sync Defects

If similar bars were *not* seen when the signal leads were applied to the antenna terminals, and the generator frequency made the same as the receiver's channel setting, measure the grid-to-ground voltage of the oscillator with a vtvm. The presence of several volts negative to ground indicates that the oscillator is working. Trouble in the r-f amplifier or the antenna input circuit should now be looked for.

When a weak, "washed-out" picture contains excessive snow, reduced gain in the r-f amplifier is indicated (it is assumed that the antenna installation has been eliminated as a possible source of the trouble); when a weak picture has no snow associated with it, trouble in a video i-f stage or succeeding section is probably present. Bear in mind that improper age operation may bias the r-f amplifier to a point where weak pix and snow result.

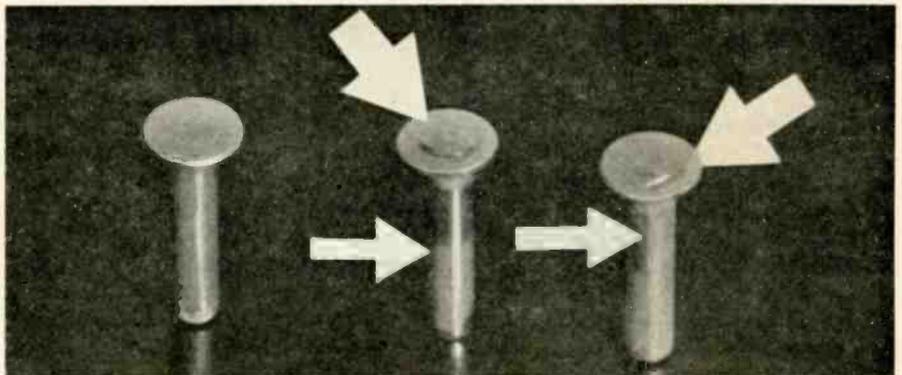
Antenna Fault Possible

When the technician is uncertain whether the antenna system, the set-owner's location or tube noise in the receiver itself is causing excessive snow in the picture, he can make the following check:

Advance the contrast setting to maximum and short the antenna terminals. Now connect a vtvm across the video detector load. Switch the station selector to an unassigned channel and measure the noise voltage present. A reading in excess of .6 v, app.—polarity of voltage depends on polarity of video detector output signal—indicates that excessive tube noise is present. Video detector and video i-f amplifier tubes can be responsible for the trouble, as well as the r-f oscillator and r-f amplifier.

Disable the high-voltage section if an excessive noise reading is obtained and make a second check, to rule out the possibility of noise and snow introduction via corona or arcing in this section.

Defective condensers in the antenna input circuit are likely sources of excessive snow, and should be checked.



Fine-tuning plungers used in some Philco tuners. The one at left is normal. Wear spots in the others (see arrows) may lead to oscillator detuning. (Courtesy Philco)

When a motorboating type of noise is heard during the first few seconds after the receiver is turned on, a defective oscillator (generally the oscillator section of a mixer-oscillator tube) is indicated. Try another tube even though the original one tests good in a tube tester. A high-pitched whine when the set first begins to operate also points to a defective r-f oscillator. Replace it, to check.

Tuners are a frequent cause of audible as well as visual microphonics. The condition will generally cause sound bars to be seen in the picture; a ringing sound will often be audible in the sound, particularly when the volume control setting is advanced, or the chassis or cabinet is tapped.

The oscillator tube (or tube section) is the likeliest source of such a defect. Replace it to check. Choose one that will not only be least microphonic, but will introduce a minimum amount of detuning. You can check for this by noting how far the fine tuning control must be moved from its mid-setting, to tune in good picture and sound, in the case of each oscillator tube substitution. Do this on a high channel. Sometimes a slight oscillator realignment is unavoidable when the tube is replaced.

Other sources of tuner microphonics include: Improper seating of the oscillator-mixer tube in its socket; loose oscillator-mixer socket pins (tighten to correct); screws

mounting tuner to chassis are too tight; and oscillator trimmers, loose wires or other components are vibrating. In some tuners, rivets which fasten the stator of the fine tuning condenser to its mounting on the chassis may have become loose. Screws fastening the tuner sub-chassis to the main chassis may be loose, permitting the sub-chassis to vibrate excessively. One or more loose solder connections may be present. A very dry tuner shaft may also cause microphonics.

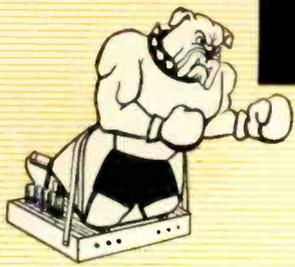
In many instances, a front-end caused sync defect will be located only after considerable time has been wasted in troubleshooting other stages. In one case, where a continuous roll was present on two channels only, the serviceman checked the vertical circuit for quite some time, before he finally got around to the front-end. A defective 6J6 was the cause.

Tube May Be Gassy

A gassy r-f amplifier can cause grid current flow in this tube, possibly producing sync compression that may affect some channels more than others, impairing either vertical or horizontal synchronization, or both.

Heater-to-cathode leakage in the r-f amplifier or mixer-oscillator may produce horizontal pulling. The tell-tale signs of such leakage—hum bars in the picture—may be absent or

(Continued on page 49)



"Tough Dog"



Corner

Difficult Service Jobs Described by Readers

Pix Behind Bars

Every service technician is probably familiar with the effect a 60-cps or 120-cps signal has when it modulates the picture. Imagine our surprise, however, when we found 20 black and 20 white horizontal bars on the screen along with a stable picture, indicating a frequency of about 1200 cps. To help things along, the trouble was intermittent, appearing only two or three times a day for periods of about 5 to 10 minutes.

Tube substitutions gave no improvement. When the symptom was present, a 1200-cps signal was found in the detector output, consequently also in the video amplifier. This signal was of maximum intensity at the plate of the keyed agc amplifier (shown as part A of the accompanying illustration). Also, it was quite sinusoidal.

With the agc circuit under suspicion, we used a scope in this stage the next time the trouble showed up, and found a very sinusoidal 1200-cps waveform at the agc feed point to the i-f system (junction of the 33-k resistor, 220-k resistor, and 4-mfd capacitor). Investigation of these components showed that the oscillation could be started by tapping the condenser. By disconnecting one end of the condenser, it was found that the 1200-cps oscillation

was present whenever the condenser was out of the circuit, but could be suppressed by reconnecting the capacitor. Replacement of the condenser, apparently intermittent, cleared up the trouble.

How did the oscillation occur? Consider part B of the illustration. This is a ladder-type R-C oscillator that can be made to operate at fairly low audio frequencies. It depends upon a 180-degree phase shift, through the components of the R-C network, from the plate to the control grid. Consider that the plate of the agc tube (part A) is coupled back to its own grid through the components shown, along with the i-f amplifiers, the video detector, and the video amplifier, to complete the path. Components in the agc network, plus components of the other stages in the path, apparently furnished the required 180-degree phase shift at 1200 cps to sustain the oscillation, except when these oscillations were filtered out by a condenser in good order.—Ray Carney, Aurora, Colorado.

Slugging It Out

On a call involving loss of horizontal sync, the set was turned on and allowed to warm up. The oscillator was obviously way off frequency and the hold control did not

have enough range to bring it in. The owner's report was as follows: The set sometimes came on normally, but would run for 10 or 20 minutes after warmup at other times before the picture would lock in. Sometimes it would work without trouble for days. When it went off frequency, it might return a while later or be out for days.

With the horizontal frequency slug on the back panel, I brought the set back to sync. It held over its full range, and through channel switching. Sure enough, another call came the next day reporting that the set was out again. It was picked up and put on the bench, where it played for a full day before it went out again.

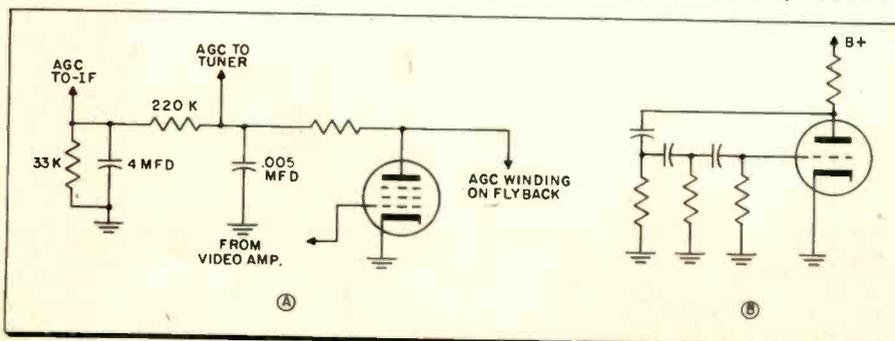
Resistance and voltage values in the circuit were well within tolerance in the oscillator and discharge circuit. New tubes were tried without success. Coupling and bypass capacitors, which checked okay, were changed anyhow. The horizontal blocking oscillator transformer was examined, but there was no evidence of shorted turns, scratched varnish or overheating. I had about decided to install a new transformer when I felt a slight thump inside the can.

The cap was removed from one end of the fiber coil-form tubing and the slug was pulled out. The slug had a tiny piece broken off one end! Now it was a simple matter to obtain a slug of the same size from an old discriminator transformer and replace it in the core of the oscillator transformer. The set was returned to the customer after readjustment with the trouble removed.

Apparently the broken piece of the powdered iron slug had been shifting from place to place in the transformer (which was mounted with the slugs horizontal). The symptom was apparently induced by vibrations of the speaker or move-

(Continued on page 52)

Path from agc plate to its grid through other stages may set up oscillator simplified at B.



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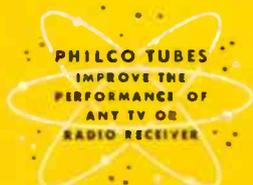
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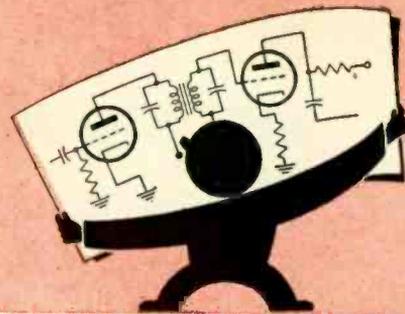
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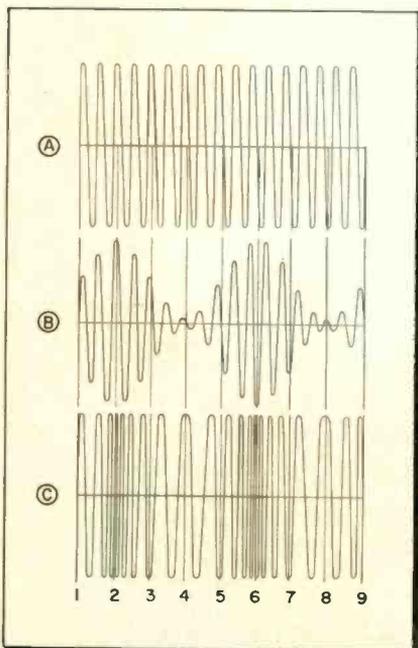
No. 6: How Audio Is Recovered from an FM Signal

SIDNEY C. SILVER, MANAGING EDITOR

There is more than one way of explaining how audio modulation is recovered from an FM signal. The most frequently employed method involves the use of vectors. While this explanation has its virtues, it also has the disadvantage of not visualizing what is taking place. As a result, the explanation tends to elude the memory. Many a technician of good background has been heard to say of it, "Let's see; I once had this business all doped out. When I try to go through it step-by-step now, I get lost."

A simpler way of looking at the process—a way that accounts for the large majority of FM detectors in use today—involves the straightforward recognition that the FM signal can first be converted into a corresponding AM wave. After this is done, more or less conventional AM diode detectors can be used to recover audio from the carrier. Looking at it this way, we can form

Fig. 1 A—Unmodulated carrier. B—Same carrier amplitude-modulated with sine wave. C—Carrier frequency-modulated with sine wave.



an easily retained mental "picture" of what happens.

For a better understanding, let us review the differences between the frequency-modulated and amplitude-modulated carrier. Part A of Fig. 1 shows several cycles of an unmodulated carrier. When it is amplitude-modulated with an audio signal—a sine wave is used for simplicity—carrier strength is made to vary in step with the audio signal. The effect on the carrier is shown in part B, with the tips of each cycle of the carrier (the envelope) following the shape of the audio sine wave. Carrier frequency is unchanged.

When we frequency-modulate this same carrier, the waveform at C results. Carrier frequency, rather than amplitude, is varied in step with the strength of the audio signal. At times 1, 3, 5, 7, and 9, when the sine wave is at its zero or neutral value, waveform C has the same frequency as unmodulated carrier A. At times 2 and 6, when the sine wave reaches maximum amplitude, carrier C is made to increase in frequency above its normal value by the greatest amount. At instants 4 and 8, when the sine wave reaches its minimum value, carrier C is made to decrease in frequency below normal value by the greatest amount.

The most elementary way of recovering the FM signal is to use so-called slope detection. The method has more than historical significance: it is still used, with some trimmings, in conventional FM detectors. For the purpose of the best explanation, however, the term can be quite misleading. We would be better off speaking of slope conversion. What happens is this:

Let us assume that we have a conventional all-band AM receiver, with a familiar-looking i-f response like that shown in Fig. 2. We are able to adjust the set to tune through the FM broadcast band. To recover FM signals, we could set the receiver so that the center frequency of the desired FM carrier occurs on the curve at the point identified as F_0 , rather than at the center of the curve. This can be done by shifting

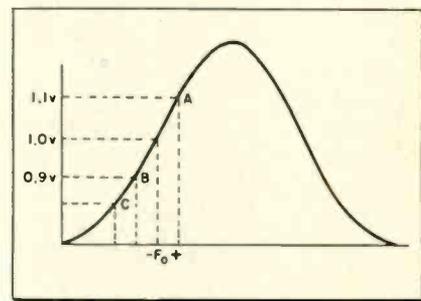


Fig. 2—How detuned receiver responds to FM.

the alignment frequency of the i-f stages, or by slightly detuning the r-f portion of the set.

With the receiver thus detuned, let us assume that amplitude of the unmodulated carrier coming out of the i-f system is 1 volt, as shown. Now, what happens when modulation swings the carrier to a higher frequency, as at point A? Since the detuned set responds better at the raised frequency, carrier amplitude goes to, say, 1.1 volt. Correspondingly, when modulation swings the carrier below its normal frequency, to point B, the i-f response drops amplitude to only 0.9 volt. As it leaves the i-f system, the intermediate carrier has now been varied in amplitude, while it still retains its frequency-modulated nature. It combines the characteristics of Parts B and C of Fig. 1, with the new amplitude variations corresponding to the old frequency variations.

From this point on, we can ignore the frequency deviations and treat our signal just as though it were a simple AM wave. In our detuned receiver, that is just what is done. A straightforward diode detector, followed by an r-f filter, recovers the desired audio. This is fine, as far as it goes—but we must still face the fact that, in practice, slope conversion and detection just isn't used anymore, at least not in the simple way described here.

What's wrong with the slope method? Does it have its variations and counterparts in modern FM and TV receivers? These are some of the points to be discussed in the next installment.



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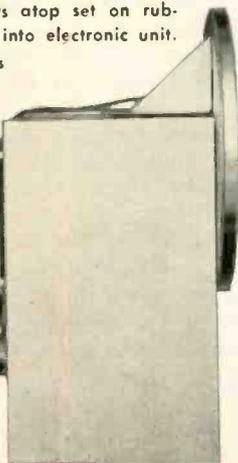
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Shop Hints to Speed Servicing

Tips for Home and Bench Service Contributed by Readers

Solder Gun Mount

The accompanying sketch shows a soldering gun connected to a wire loop, by means of which the gun can be hung within reach but out of the way under or over the work bench, or elsewhere in some convenient place near it. The wire hook is made of no. 14 or some other comparable heavy wire, fashioned into the form of a loop with two small loops, one at each end. Most soldering guns have a long bolt that goes through the plastic case as shown, holding the case together. The two loops are fastened to the gun at either end of this bolt. Since one accidental fall from the work bench may be enough to break the entire gun case, this means of keeping the gun out of harm will be useful in preventing such accidents.—Hyman Herman, Flushing, N. Y.

Soldering to Lugs

We all have trouble, at one time or another, in trying to solder a new wire to the hole in a soldering lug, or in trying to replace wires or leads in such a soldering lug, where there are already several wires using the same terminal point. This difficulty can be overcome by the use of an ice-pick. The pick is shoved through the hole in the lug or terminal while the heat of the soldering iron is be-

ing applied, and it is kept in position as the tie point is permitted to cool. After the terminal has cooled, the pick is withdrawn. This leaves a convenient round hole of good size, large enough to feed a couple more wires through.—George E. Mancini, Methuen, Massachusetts.

Improving TV Sound

Most standard TV and radio receivers use a single-ended audio output stage. Ordinarily, the cathode resistor is bypassed with an electrolytic condenser, which raises audio output somewhat, since it prevents some degeneration of the output by cathode signal. In such cases, removal of the condenser improves sound quality. This results from negative feedback (degeneration) at the cathode. The drop in sound output is usually not enough to prevent the user from obtaining as much volume as he desires.

Once the condenser is removed, the cathode becomes a good take-off point if it is desired to feed sound from the receiver to a separate amplifier or audio system, a tape recorder, or some other equipment, since it provides several advantages. Among these advantages, aside from good audio quality, are the facts that audio amplitude is appreciable, that

this take-off point is at the desired low impedance (the cathode resistor is seldom over 1000 ohms), that the take-off is of the cathode follower type, that one end of the circuit is already grounded, and that coupling condensers of a low voltage rating may be used.

A word of caution: some TV receivers use a stacked B-plus supply. In these, the technique described is not possible, if the audio output tube is part of a voltage divider. In the latter case, there is about 150 volts on the cathode of the output tube, which is used as the low B-plus supply for other stages in the receiver, such as the i-f tubes. Removal of an electrolytic condenser will disturb voltage regulation to the other tubes.—C. W. Martel, Newton, Massachusetts.

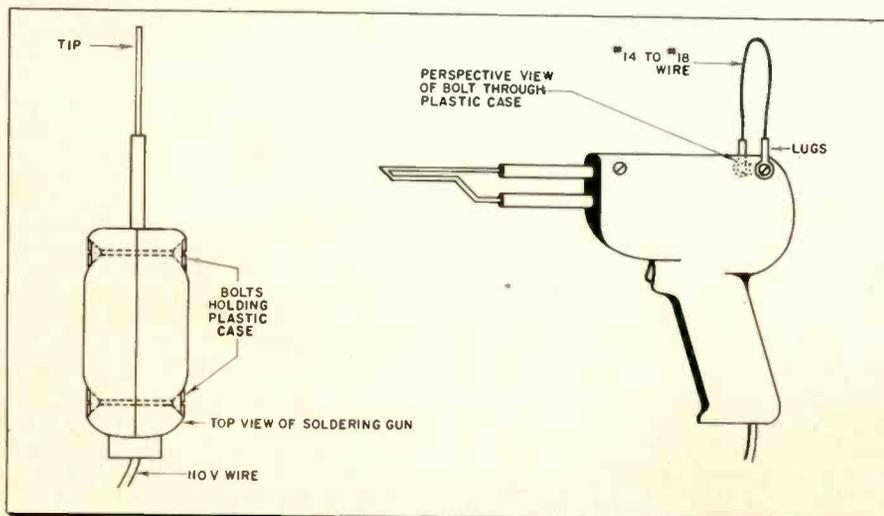
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When the customer hasn't been around in quite a while, we send a "statement" in a standard window envelope, giving it the appearance of a bill at first glance. Since he hasn't been in the store recently, the customer is angry when he first opens the envelope. Then he finds our note typed across it: "Of course you don't owe us any dollars—we'd simply like to have you visit us again."

The next reaction is one of relief and amusement. The result is usually a phone call or visit, which gives us the chance to re-establish him as a customer. By uncovering grievances, we also get a chance to check on our service.—Stanley Clark, E. Bradenton, Florida.

Details for adding wire hook, used to hang soldering gun out of harm's way, to gun case.



SHOP HINTS WANTED

TECHNICIAN will pay \$5 for acceptable shop hints. Unacceptable items will be returned. Use drawings to illustrate your explanations wherever necessary. A rough sketch will do as long as it can be followed. Send your hints to "Shop Hints" Editor, TECHNICIAN, Caldwell-Clements, Inc., 480 Lexington Ave., N. Y. 17, N. Y.

New Products For Technicians

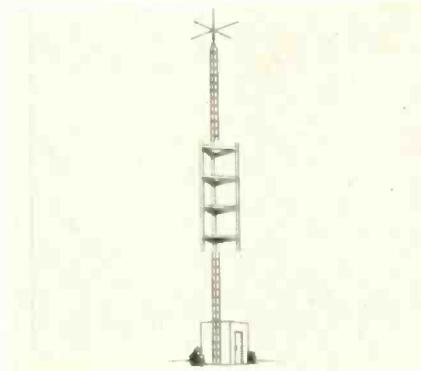
BT TWO-SET COUPLER →

Impedance matched coupler, Model TV-42, is \$2.95. The coupler is flat from 0-900 mc and features 300 ohm screw terminals for all connections. Resistive isolation averages better than 12 db between TV sets. The unit may also be used in reverse to mix two antennas or amplifiers into one line. Case measures 3½" x 1¾" x 1". Mounting of the compact unit is accomplished with two wood screws. Units are packed 12 to a carton. Blonder Tongue Labs., 526-536 North Ave., Westfield, N. J.—TECHNICIAN (Ask for No. 2-2)



Rohn TOWER →

A substantial heavy-duty radio communication tower, the No. 40, is self-supporting to 66'; or up to 200'-300' when guyed. Available in hot-dipped galvanized finish, this big tower features an 18" equilateral design with steel cross-bracing and is electrically welded throughout. Company reports 66' tower can be installed by two men in two hours. Shipping weight, 60 lbs. per 10' section. Further information is available from the manufacturer. Rohn Mfg., 116 Limestone, Bellevue, Peoria, Ill.—TECHNICIAN (Ask for No. 2-3)



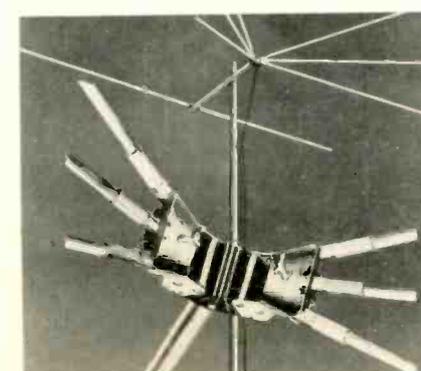
JFD CAPACITORS →

New series of Subminiature piston capacitors, models VC9G and the VC10G, feature glass dielectrics and invar silver-plated rotors. VC10G is ⅜" long, VC9G ⅝" long. Temperature range is 55°C to +125°C, dielectric strength greater than 1000 v, dc. Capacitance range of VC10G, is 1 to 4.5 µf, and the unit weighs 2 grams. Model VC9G range is 0.5 to 8.5 µf and weighs 3 grams. Each has a 2-56 internal screw thread. Electronics Div., JFD Mfg. Co., 6101 16th Ave., Brooklyn, N. Y.—TECHNICIAN (Ask for No. 2-7)



Channel Master ANTENNA →

New, mechanically superior version of Super Fan antenna, features a redesigned fan head. All elements on the new antenna snap out and lock into place automatically. No hardware, tools, or tightening are necessary. All elements are reinforced with ½" diameter external aluminum sleeves, 3½" long. Series 313A, of seamless tubing, list at: single bay, \$10.42; 2-bay, \$22.22; 4-bay, \$48.19. Series 713A, butted tubing, list at: single bay, \$8.19; 2-bay, \$17.08. Channel Master Corp., Ellenville, N. Y.—TECHNICIAN (Ask for No. 2-1)



Esico SOLDERING GUN TIPS

A merchandising counter display for the "Luger" soldering gun and the new serviceman's kit of six tips has been made available. This sales-promoting wire rack is finished in flat black and takes a minimum of counter space. Included in the assortment are tips for broad, narrow, short, long, angled, V and straight. It contains easily changed tips for soldering connections to small prongs, for thin, channel-type lug connections, and the smallest tip available, one-sixteenth of an inch thin. Electric Soldering Iron Co., Deep River, Conn.—TECHNICIAN (Ask for No. 2-8)

Columbia TV LINE

"Permaline" new television transmission line is guaranteed up to 25 years to resist salt spray and salt air, fumes from chemical plants and oil refineries, severe low temperatures, sunlight and ultra-violet light. It is now available on individual display cards. Columbia Wire & Supply Co., 2850 Irving Park Road, Chicago 18, Ill.—TECHNICIAN (Ask for No. 2-4)

Klein KNIFE, PLIERS

The Xela skinning knife, Cat. No. 1550-5, has a blade of quality cutlery steel. The handle is hard wood with a ring for attaching to snap. Size ¾-in. New needle-nose pliers for reaching into confined space has 2 stripping holes in the cutting blade for skinning 19 and 22 gauge synthetic coated wire. Cat. No. 203-6-H2. Mathias Klein & Sons, 7200 McCormick Rd., Chicago 45, Ill.—TECHNICIAN (Ask for No. 2-31)

Ronette CARTRIDGES

Series of new high-output-voltage pick-up cartridges replaces current line of high-output cartridges designated with the suffix US, T, VS, V or V-Max. In the turnover series the new cartridges will be known as TO-22; in the single-stylus series they will be known as RA-395. They are direct replacements for previous models. Ronette Acoustical Corp., 135 Front St., New York 3, N. Y.—TECHNICIAN (Ask for No. 2-5)

VM BINAURAL TAPE KIT

New "Stere-o-matic Binaural Conversion Kit" adapts company's tape recorders to play pre-recorded staggered-heads binaural tapes. Kit consists of amplifier to be used with 12AX7 tube, recording and playback head with bracket, humbucking coil, head and output cable and mounting accessories. Kit retails at \$16.95, installation fee is \$10. V-M Corp., Benton Harbor, Mich.—TECHNICIAN (Ask for No. 2-6)

For more technical information on new products, use inquiry coupon on page 40

New Test Equipment

CG TRANSISTOR CHECKER

Fast comparative check on PNP and NPN transistors for radio service is provided by a portable transistor tester, Model TR-2. The unit features 4-in. meter with two ranges that read Alpha, Beta, and Ico directly. Available in a-c or d-c versions. Emitter current is adjustable from 1 to 10 ma, while a switch provides collector voltage of 1.5 to 6 volts. A calibration control compensates for wide temperature variations. CG Electronics Corp. 212 Durham Ave., Metuchen, N. J.—TECHNICIAN (Ask for No. 2-17)



Superior TUBE CHECKER

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Radiart CONVERTERS

With some 45 models available, the Vipower line of vibrator-powered converters covers a range of power outputs from the 2-watt Shaver Pak to a 350-watt super heavy-duty model. Four of the dc-to-ac units, Mobilpaks, are especially for mobile use, including dual-purpose models to operate from a 6 or 12 volt battery. Six models provide sine-wave regulated power for Hi-Fi equipment. Two battery eliminators are suited for auto radio service. Radiart Corp., 3455 Vega Ave., Cleveland, Ohio—TECHNICIAN (Ask for No. 2-18)



DuMont 2-BEAM SCOPE

A general-purpose dual-beam oscillograph, Type 333, has accurate calibration facilities, high sensitivity and high gain, permits measurements of two signals simultaneously, and facilitates accurate comparison of related signals. It employs a Type 5ARP crt, with stringent tolerances. Technical Products Div., Allen B. DuMont Labs. Inc., 760 Bloomfield Ave., Clifton, N. J.—TECHNICIAN (Ask for No. 2-22)

H-P POWER SUPPLY

A new multi-purpose power supply, Model 711A, offers a voltage range of 0 to 500 volts and no-load to full-load regulation of better than $\pm 0.25\%$ or 0.5 volts. Ripple is less than 1 mv. Separate current and voltage meters, with push-button range switching, and overload protection are additional features. Priced at \$225.00 f.o.b. Hewlett-Packard Co., Dept. P., 395 Page Mill Rd., Palo Alto, Calif.—TECHNICIAN (Ask for No. 2-21)

Beckman METER

Use of meter movement for just the top 5 to 10% of the range permits this portable single-range expanded-scale voltmeter to obtain high accuracy. Only the range of interest is expanded full scale. Guaranteed accuracy is $\pm 0.5\%$ of input voltage. The instrument offers overvoltage protection, wide frequency range (50 to 5000 cps) and voltage expansions of ± 5 , ± 10 , or $\pm 15v$ at 115v. Designed for ruggedness and reading ease. Shasta Div., Beckman Instruments, Inc., P. O. Box 296, Station A, Richmond, Calif.—TECHNICIAN (Ask for No. 2-20)

Phaotron METERS

Self-contained, ready-to-use, precision portable instruments are available in 38 standard ranges with rated accuracy of either 0.5% or 1% of full scale deflection. Overload network provides protection. Instruments provide up to 6 ranges. Switch protects the meter movement when set in transit position. Instruments come complete with carrying case, calibration chart, probes, and feature metal cases, double magnetic shielding, mirrored scales. Phaotron Instr. & Electronic Co., 151 Pasadena Ave., So. Pasadena, Calif.—TECHNICIAN (Ask for No. 2-19)

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News of the Industry

A national sales meeting of its representatives from every part of the country was held Dec. 2, in Chicago, by **B & K MANUFACTURING CO.**

Maj. Gen. **GEORGE I. BACK, U.S.A., (Ret.)**, former Chief Signal Officer of the Army, has been appointed Assistant to the President, **INTERNATIONAL RESISTANCE CO., PHILADELPHIA.**

RAYTHEON MANUFACTURING CO. has created a new "special tube div." under its Receiving and Cathode Ray Tube Operations, with **R. L. MCCORMACK** as manager. Other recent appointments include **NILES P. GOWELL** as chief engineer, and **JOHN M. PALMER** as manager of manufacturing, both receiving tube div. **MYLES M. WALKER** will fill the newly created position of new market development manager of the company's commercial equipment div.

Representatives of the **JFD MANUFACTURING CO.** met recently in a technical session with executives and staff members of the **NIDESCO DISTRIBUTORS** of Jersey City. Local reception problems, color reception, and antenna marketing were discussed.

ABE KOSAKOWSKY has been appointed sales service engineer in the jobber div. of **PYRAMID ELECTRIC CO.**

JOHN W. CRAIG has been elected vice president of **WESTINGHOUSE ELECTRIC CO.**, and manager of the company's electric appliance div. **WALLACE F. BAKER** has been appointed assistant general sales manager, electronic tube div.

A 25% increase over last year's contribution to the Employee's Profit Sharing Retirement Fund was announced by **CHANNEL MASTER CORP.**

WILLIAM C. OTTO has been named Industrial Sales Manager, Indianapolis Div., **CORNELL-DUBILIER ELECTRIC CORP.**

Rear Adm. **STANLEY F. PATTEN (Ret.)** has been elected treasurer of **ALLEN B. DU MONT LABORATORIES**, in addition to his duties as vice president and director.

JOHN M. MALONE has been named manager of initial equipment, tube sales to electronics manufacturers, by **TUNG-SOL ELECTRIC INC.**

Examples of "TACO" antennas, manufactured by **TECHNICAL APPLIANCE CORP.**, were exhibited recently to employees of the Rome Div. of **REVERE COPPER AND BRASS INC.**

(Continued on page 44)

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PICTURE TUBES

TUNG-SOL ELECTRIC INC., Newark 4, N. J. Sales Offices: Atlanta, Columbus, Culver City, Dallas, Denver, Detroit, Melrose Park (Ill.), Newark, Seattle.

Association News

TSA Michigan Reports on Licensing & Training

Television Service Assoc. of Michigan notes that after considerable effort, it has evolved a draft for a proposed licensing bill. A public hearing of the Detroit Common Council is scheduled for early this year.

TSA has inaugurated a free technical training program open to all practicing techs, regardless of group affiliation. Topics for the first five monthly seminars include: Jan., instruments; Feb., instrument applications; Mar., B&W TV circuitry; Apr., management; May, color TV. Interested techs are advised to write to TSA at 8242 Woodward, Detroit 2, Mich.

Okla. Ass'n. Chartered

The Television Service Association of Oklahoma has been chartered under that state's laws as of Dec. 24, 1955. Entrance fee is \$50, and yearly dues \$100.

Guild Comments on List Prices

Writing in a recent issue of the "Guild News" (Radio-TV Guild, Long Island), Murray Barlowe points out: "Our economy has gone from a sellers market to a buyers market . . . Let's face it, DISCOUNT is no longer a dirty word . . . As a matter of fact, in the consumers book, the merchant who charges LIST PRICE is considered UNETHICAL . . . So here we are . . . fighting desperately to maintain a fictitious manufacturer's list price . . . While we madly cut prices on appliances and television sets in our shops, we religiously maintain the list prices on tubes! . . . The bulk of our income is from 'services rendered' . . . Learn to price your work fairly and you need never worry about the sales of parts."

TESA St. Paul Elects Officers

New officers of Television Electronic Service Assoc. of St. Paul for 1956 are: Harry Winkler, pres.; Robert Tohweder, vp; James Dorfman, treas.; Joe Driscoll, secy.

Catalogs & Bulletins

YOKES & FLYBACKS: Replacement guides for yokes and flybacks used in CBS and Emerson TV sets. Todd-Tran Corp., 156 Gramatan Ave., Mt. Vernon, N.Y. (Ask for B2-1)

BOOKS: Fall-winter 1955-56 catalog describes all of publisher's books on electronics, TV, radio and hi-fi. John F. Rider Publisher, Inc., 480 Canal St., New York 13, N.Y. (Ask for B2-2)

SEMICONDUCTORS: Eight-page brochure ECG-95 contains rating data on NPN and PNP transistors, and germanium rectifiers including bias and power stack types. Semiconductor Products Section, General Electric Co., Electronics Park, Syracuse, N.Y. (Ask for B2-3)

INSTRUMENTS: 12-page 1956 catalog describes 54 test instrument models available in both kit and factory wired form. Eico, 84 Withers St., Brooklyn 11, N.Y. (Ask for B2-4)

POWER CONVERTERS: 28-page catalog 410 describes line of "Powercon" vibrator converters, battery eliminators and radio-TV power supplies. Cornell-Dubilier Electric Corp., 2900 Columbia Ave., Indianapolis, Ind. (Ask for B2-5)

TV SETS: 48-page pocket-size "Tele-Sell" product guide aids retail salesmen in selling firm's line of TV sets. Westinghouse Electric Corp., TV-Radio Div., Metuchen, N.J. (Ask for B2-6)

CAPACITORS: "Auto Radio Replacement Capacitor Manual" K-300 lists data for every auto radio made from 1946 through 1955. "Twist-Lok" electrolytics are described and cross-referenced. Sprague Products Co., 65 Marshall St., North Adams, Mass. (Ask for B2-7)

TEST EQUIPMENT: Catalog 23 illustrates and details entire line of test instruments for servicing and allied use. Precision Apparatus Co., Inc., 70-31 84th St., Glendale 27, L.I., N.Y. (Ask for B2-8)

COMMUNITY TV: Explanation of physical setup and profitable operation of community TV presented in 16-page booklet. Entron Inc., P.O. Box 287, 4902 Lawrence St., Bladensburg, Md. (Ask for B2-9)

POWER SUPPLIES: Catalog PR 156 lists specs on dc power supplies, "Tabtron" selenium rectifiers, and "Tabtran" chokes and transformers. Technical Apparatus Builders, 109 Liberty St., New York 6, N.Y. (Ask for B2-10)

LOUDSPEAKERS: "Hi-C" 15" speakers described in 4-page brochure. Racon Electric Co., 1261 Broadway, New York 1, N.Y. (Ask for B2-11)

New Books

BASIC AUDIO COURSE. By Donald Carl Hoefler. Published by Gernsback Library, Inc., 25 West Broadway, New York 7, N. Y. 223 pages. Paper cover; \$2.75. Hard cover; \$5.00.

Rather than evaluating components for the non-technical or semi-technical layman, the volume presents the raw material for understanding Hi-Fi systems, the theoretical background, for the technician who has neither the need nor the desire to become involved on the engineering level. The nature of sound and its measurement open the treatment, followed by consideration of various types of audio amplifier circuits, including power supplies. Distortion and noise, audio networks (equalizers, attenuators, filters), speakers and speaker systems, microphones and sound recording are also covered.

TELAIDES: CROSLY TV, 1952-56; WESTINGHOUSE TV, 1952-56. Prepared and published by Wallace's Telaides, Inc., 134-136 Day St., Jamaica Plain 30, Mass. 96 pages (Crosley); 104 pages (Westinghouse). Paper cover. \$2.50 (each).

In addition to schematics, volumes include notes on production changes, alignment, and service, also layout views and parts lists. Crosley volume covers chassis 359 to 477; Westinghouse book, chassis V-2200 to V-2353 and includes color models.

CRYSTAL OSCILLATORS (Review Series). Edited by Alexander Schure, Ph.D., Ed.D. Published by John F. Rider Publisher, Inc., 480 Canal St., New York 13, N. Y. 72 pages. Paper cover. \$1.25.

Oscillation principles and basic oscillators precede consideration of the piezo-electric effect and the basic quartz crystal oscillator. Also covered: crystal techniques and various types of crystal oscillators.

MOST-OFTEN-NEEDED 1956 TV SERVICING INFORMATION. Compiled by M. N. Beitman. Published by Supreme Publications, 1760 Balsam Rd., Highland Park, Ill. 192 pages. Paper cover. \$3.00.

Schematics, waveforms, normal readings and other service data on 1956 sets of 24 leading manufacturers. Most of the material is prepared from factory authorized releases.

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"Whether you're a wholesaler or a service dealer, Tung-Sol Tubes—the tubes that leading set-makers use—are your best bet for highest profits and customer good-will. You can build a reputation on Tung-Sol quality!"

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AMPHENOL TWIN LEAD INSTALLATIONS
have proved what dealers and installers have always known— with dependable AMPHENOL Twin Lead they are assured of:

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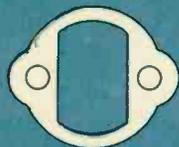
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FAIR PROFITS

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5 POPULAR AMPHENOL TWIN LEADS



14-271
AIRCORE*

300 ohm—tubular construction contains and protects field of energy—assures lowest loss under wet or dry conditions. Excellent for fringe area installations. A must for UHF and coastal regions.
*U.S. Patent 2,543,696

List per 1000 Feet

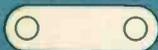
\$57.50



14-056
STANDARD

300 ohm—60 mil web thickness. Standard of quality in thousands of installations.

\$36.50



14-559
STEELCORE

300 ohm—72 mil web thickness, 7/28 copperweld conductors. Twice as tough and flexible!

\$38.50



14-100
CENTURY

300 ohm—100 mil web thickness for applications where a strong line is needed.

\$45.00



14-298
ROTATOR

Four conductor rotator cable with heavily ribbed virgin brown polyethylene dielectric.

\$50.50

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(Continued from page 41)

CLAROSTAT MFG. CO., INC., Dover, N. H., has announced the appointment of **GLENN HALL** as advertising manager.

HOFFMAN ELECTRONICS CORP. is supplying its dealers with gift certificates redeemable for color TV receivers. The gift certificate plan was deemed necessary because the company was unable to meet demand for the Hoffman Colorcasters.

JFD MANUFACTURING CO. INC., and **CHANNEL MASTER CORP.**, have settled their differences and have agreed to license each other under their respective patents. JFD also announced the appointment of **BRON KUTNY** as western regional sales manager.

SPARKS-WITHINGTON CO. has discontinued the manufacture of radio and TV sets in the U. S., effective Jan. 1, 1956.

TELREX, INC., has named **CHARLES T. GABRIELE** as advertising and public relations manager.

JOSEPH FRANK has been elected president of **ASTRON CORP.**, which also announced the appointment of **I. I. SER** as company sales manager.

CLIFFORD W. PERKINS was named as both secretary-treasurer of the **WALTER L. SCHOTT CO.**, and secretary of **WALSCO ELECTRONICS CORP.**

SNYDER MFG. CO. has completed construction of an 80,000 sq. ft. warehouse adjacent to its modern Philadelphia plant.

DAUSE L. BIBBY has been appointed executive vice president of **DAY-STROM, INC.**

FRED LIEBERMAN has been named sales manager in charge of subsidiary and branch sales operations of **JERROLD ELECTRONICS CORP.**

The new **CAPACITESTER**, introduced at the 1955 Electronic Parts Show by **TELE-TEST INSTRUMENT CORP.** is now available to electronic equipment manufacturing and service technicians for immediate delivery in unlimited quantities.

RADIO RECEPTOR CO. is expanding its production facilities, installing new equipment, and offering distributors 10¢ each for the return of used selenium rectifiers.

MARK SHEPARD, JR., has been promoted from assistant vice president to vice president in charge of the semiconductor div., **TEXAS INSTRUMENTS, INC.**

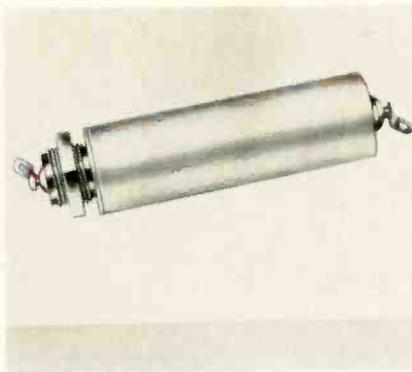
LYNN EATON, vice president of **NATIONAL CO., INC.**, has been appointed assistant to the president.

New Components

C-D PI FILTERS



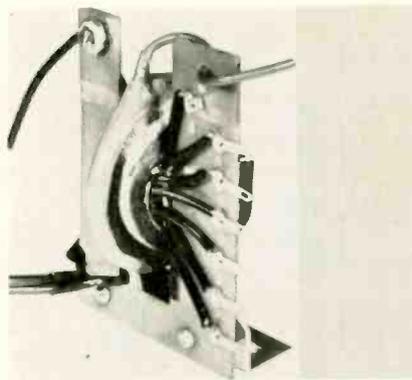
New Quietone Pi Filters in tubular cases, with handy, threaded-neck mounting, afford high insertion loss values for the suppression of radio noise. They are small and lightweight. Current ratings range from .1 to 50.0 amps. Voltages are 28, 50, 100, 300 and 500 d-c; and 115 and 125 a-c. Frequencies are 60, 400 and 1,000 cps. The flatted, threaded neck provides easy mounting to a panel or bulkhead. Cornell-Dubilier Electric Corp., South Plainfield, N. J.—TECHNICIAN (Ask for No. 2-24)



Merit FLYBACKS



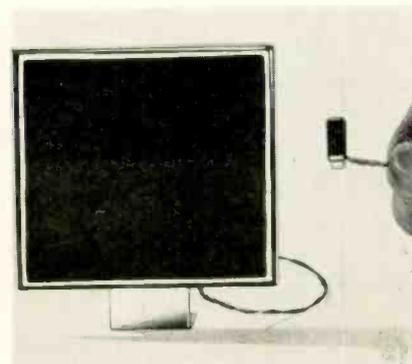
Two new flyback transformers are exact replacements. The HVO-50, (list, \$13.50) is replacement for Trav-ler part numbers TV-X-104 through and including TV-X-114, used in more than 75 Trav-ler models and chassis. The HVO-52, (list \$11.50), is replacement for Hallicrafters, Coronado, Silvertone and Truetone parts numbers 55C133, 55C-143 and 55C144, in more than 50 receiver models and chassis. Merit Coil & Transformer Corp., 4427 North Clark St., Chicago 40, Ill.—TECHNICIAN (Ask for No. 2-23)



Int'l. SUN BATTERIES



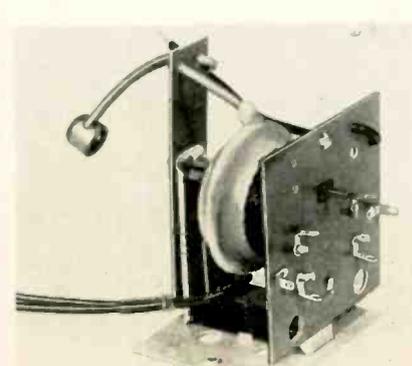
New selenium sun battery cells are available in a wide range of sizes and power ratings—from 0.14 sq. in. to 10.5 sq. in. in photosensitive area and from 0.1 to 15 mw power output in direct sunlight. A single stage transistor radio can be powered by type B2M. Also, by connecting cells in series-parallel, enough power can be generated in direct sunlight to drive a typical 5-stage transistorized radio. International Rectifier Corp., Product Info. Dept., El Segundo, Calif.—TECHNICIAN (Ask for No. 2-26)



Ram FLYBACKS



The X126 is a new composite flyback transformer which replaces flybacks 12E-23939 and 12E-24612 for Airline, Coronado, Firestone, Raytheon and Truetone, including 28 chassis and 81 models. It is an autotransformer-type. The X127 is a composite transformer which covers Westinghouse numbers V-11548, -1, -2, V-12073, V-14346, V-14627, V-15324-1, -2 and V-15650. It is for 66-70 or 90 degree systems. Ram Electronics Sales Co., So. Buckhout St., Irvington-on-Hudson, N. Y.—TECHNICIAN (Ask for No. 2-25)



Insuline SHELIVING

Non-sag auxiliary shelf to serve as either desk or work space is made of 16-ga. steel. Top section is screwed to supporting brackets, which are fixed to standard 10½ x 19-in. mounting panel. Two sizes: 3858 (16 x 22 in.) and 3859 (20 x 22 in.). Rack for heavy apparatus is made of 16-ga. steel, boasts all-welded construction plus double-thick mounting channels. Hinged, removable rear door fastens with snap locks. Knock-outs provide adaptability. No. 3868. Insuline Corp. of America, 186 Granite St., Manchester, N. H.—TECHNICIAN (Ask for No. 2-29)

Reon W-W RESISTORS

"M" series miniature (⅜ in. O.D.) and "SM" sub-miniature series (¼ in. O.D.) precision wirewound units fill need for lead mounting in printed circuitry or crowded chassis requirements. Optional pigtail construction features "R"—radial, "A"—off center axial, or "C"—central axial. Available in open bobbin style or hermetically sealed by epoxy encapsulation. Wattages from 0.1 to 2.5 watts and ohmic values up to 2.5 megohm. Reon Resistor Co., 117 Stanley, Yonkers, N. Y.—TECHNICIAN (Ask for No. 2-28)

Mucon V-S CAPACITORS

Voltage sensitive ceramic capacitors range from 300 mmf down to 100 mmf. Known as types LVSR and LVSE, capacitance of these may be decreased as much as 60% by application of dc potential up to 200 v. Type LVSR has maximum sensitivity at room temperature and type LVSE has voltage sensitivity at approximately 70° C. Applications are in the fields of tuning and frequency control, FM, etc. Mucon Corp., 9 St. Francis St., Newark 5, N. J.—TECHNICIAN (Ask for No. 2-27)

Bell HI-FI HOUSINGS

The popular 2122-C, 2199-B, and 2200-C amplifiers are now available with satin-finish gold covers added. The covers, an optional feature (with the amplifiers available with chassis deck exposed as in the past), are available so that the units may be used without installation in cabinetry. Bell Sound Systems, 555 Marion Rd., Columbus 7, Ohio—TECHNICIAN (Ask for No. 2-30)

More New Products
on pages 39, 40, 46

New Tubes & Transistors

NU H-V REGULATOR

The 6842 is a T-5½, 7-pin miniature tube designed for power supplies or amplifier circuits at plate potentials of 300 v. to 4 kv. Useful as shunt or series regulator. It can provide up to 10 ma average plate current and dissipate up to 8 watts. The low capacities, high gain, and high voltage ratings also make the 6842 well suited for TV and oscilloscope sweep circuits employing electrostatic deflection. Overall height is 2¼ in. National Union Electric Corp., Orange, N. J.—TECHNICIAN (Ask for No. 2-10)

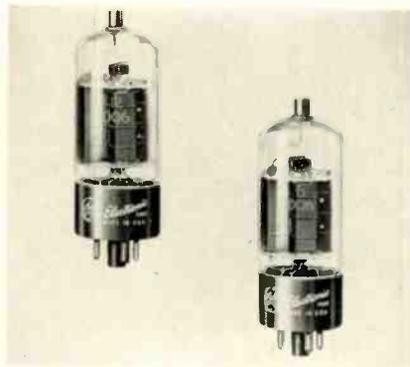


RCA TRANSISTORS

Two new transistors (types 2N139 and 2N140), intended for use in the i-f and converter stages of transistorized portable and automobile radio receivers, are germanium-alloy, P-N-P junction types. 2N139 is capable of a power gain of 30 db at 455 kc. 2N140 has characteristics to meet converter and mixer-oscillator applications in the AM broadcast band. It has a conversion power gain of 27 db at the center of this band. Tube Div., Radio Corp of America, Harrison, N. J.—TECHNICIAN (Ask for No. 2-15)

GE TUBES

Horizontal output tube 12DQ6 has 600-ma controlled heater warmup. Also available is 6-volt version 6DQ6. The 6CG7, a 9-pin twin triode miniature equivalent of the 6SN7-GTB, also has a controlled warmup filament. The 2B3-GT, is for TV sets in place of the 1B3-GT; has a filament rating of 1.75 volts; can be operated directly from the fly-back without a filament dropping resistor. New construction promises longer life. Tube Dept., General Electric, Schenectady 5, N. Y.—TECHNICIAN (Ask for No. 2-11)

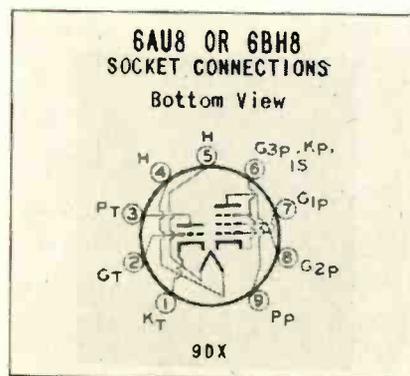


CBS-Hytron TRANSISTORS

New power transistors feature high power gain and uniformity. Four variations are available. A pair of type 2N156 can furnish 8.5 watts of audio output to the speaker with less than 85 mw of drive. Types 2N155, 2N156, 2N157, and 2N158 are high-power P-N-P junction transistors, featuring uniformity of input characteristics. In addition to audio applications, they are suited for use in servo amplifiers, power converters, and low-speed switching circuits. CBS-Hytron, Danvers, Mass.—TECHNICIAN (Ask for No. 2-14)

RCA DUAL-UNIT TUBES

Types 4BC8 and 6BC8 are medium-mu twin triodes (9-pin miniature types) for r-f use in cascode type vhf tuners. The 4BC8 has a controlled-warmup heater for use in series strings. 6AU8 and 6BH8 are dual units, each with a medium-mu triode and a sharp cutoff pentode (9-pin miniature) for diversified TV receiver applications. Both have controlled warmup heaters for series-string applications. Tube Division, Radio Corp. of America, Harrison, New Jersey.—TECHNICIAN (Ask for No. 2-32)



Raytheon TV TUBES

The 2AF4A is a heater-cathode type UHF triode of miniature construction designed for use as a local oscillator in UHF television receivers. It is the series-string counterpart for the 6AF4A. The 19AU4GT is a heater-cathode diode for use in damper service. It is designed to withstand high pulses between cathode and both heater and plate elements. It is the series-string counterpart for the 6AU4GT. Raytheon Mfg. Co., 55 Chapel St., Newton 58, Mass.—TECHNICIAN (Ask for No. 2-13)

CBS-Hytron REGULATORS

Gaseous voltage regulator tube types 6626 and 6627 replace earlier OA2 and OB2 tubes respectively. They offer longer life, improved dark starting, and elimination of voltage shifts. When the older type tubes are shielded from radiation, they become unreliable in starting. This has been overcome in the 6626 and 6627 by incorporating a small amount of radio-active nickle in the starting electrode. New combination of gases is also used. CBS-Hytron, Danvers, Mass.—TECHNICIAN (Ask for No. 2-9)



General TRANSISTOR KIT

A kit of six diffused P-N-P junction transistors for all types of radio receivers includes: 1 converter-oscillator, 2 i-f transistors, and 3 audio transistors in a lucite box. Users of the kit will find they can build almost any type radio and substitute transistors for tubes. Known as kit No. 2, suggested resale is \$17.95. General Transistor Corp., 95-18 Sutphin Blvd., Jamaica 33, N. Y.—TECHNICIAN (Ask for No. 2-12)

For more technical information on new products, use inquiry coupon on page 40

Reps & Distributors

The SAMUEL N. STRUM CO., Seattle, Wash., has been named Pacific Northwest representative for the SNYDER MFG. CO.

E. A. DICKENSON & ASSOCIATES, Milwaukee, Wisc., will represent SIMPSON ELECTRIC CO., covering the territory of the state of Wisconsin except for the portion west of Alma on a straight line north to Superior.

Sales reps of QUAM NICHOLS CO., in 12 territories showed business increases ranging up to 31% during the 11 month period ending Nov. 30, 1955.

THE N. Y. CHAPTER OF "THE REPRESENTATIVES" OF ELECTRONIC PRODUCTS MANUFACTURERS, INC., has elected the following officers for 1956. MEL LEVISON, president; LEE ROCKE, 1st vice president; KEN HUGHES, 2nd vice president; and WALLY SHULAN, secretary-treasurer.

MORRIE GREEN, president of ALMO RADIO CO., reported that almost 400 radio and TV service shops have registered for the company's "New Look" contest.

KAEMPER & BARRETT have been franchised by the DU MONT Television Receiver Div. as Northern California distributor for the company's Telesets, hi-fi units and radios.

ELECTRICAL WHOLESALERS OF FLORIDA, INC. has been established to distribute SYLVANIA'S TV sets, radios, and hi-fi phonographs in Northern Fla. INTERSTATE DISTRIBUTORS of Kansas City, Mo., will henceforth serve SYLVANIA dealers in the Springfield, Mo. territory, which consists of 19 Southern Mo. counties.

J. K. HAGEMEYER, Meridian, Miss., has been appointed distributor for the central and southern sections of the state by the TV and Broadcast Receiver Div. of BENDIX AVIATION CORP.

MUNSTON MFG. CO., Islip, N. Y., appoints four new sales reps. PERLMUTH-COLMAN & ASSOC. will cover southern Calif., southern Nev. and Ariz.; ARTHUR AKEROYD will cover New England; ADELMAN & ALDRICH will cover New York and LARABEE CO. will cover Miss., Kan., Iowa, Neb. and their St. Louis office will cover southern Ill.

DAGE TV DIV., THOMPSON PRODUCTS, INC., Michigan City, Ind., has been appointed as U. S. distributor in the industrial field of projection TV equipment by SINGER TV MANUFACTURING CO., Los Angeles, Calif.

CBS-COLUMBIA, radio and TV receiver manufacturing div. of the Columbia Broadcasting System, has franchised RADIO, TV AND APPLIANCE CO., Seattle, Wash., to distribute CBS TV and radio receivers in that area. STANDARD SUPPLY CO., Salt Lake City, Utah, will cover Utah and parts of Idaho, Nev., and Wyo.

THE L. A. CHAPTER OF "THE REPRESENTATIVES" have elected VERN RUPP, president; NORM MARSHANK, vice president; JACKSON EDWARDS, sec.-treasurer; and MAL MOBLEY, JR., executive secretary, for 1956. BILL BARRON heads the Distributor Special Sub-Committee.

SECO MANUFACTURING CO. has appointed TRINKLE SALES CO., Hatfield, Pa., as reps for Del., D.C. Md., and Southern N. J. JULES J. BRESLER, Union City, N. J., will cover Northern N. J., and Metropolitan N. Y.

TODD-TRAN, INC., has appointed MITCHELL & MORRIS, Indianapolis, Ind., as reps. The firm will cover Ind. and Ky. for the TV industry, and Ind., Ky., and Ohio for manufacturers of industrial equipment.

J. C. MERICAN CO., New York City, has been formed as reps to the electronics industry, covering the Mid-Atlantic states.

NEW

The Solution to Your Troublesome INTERMITTENT Problems!

Model SL10

SECO

MONITRON

SIGNAL TRACER AND INTERMITTENT LOCALIZER

... monitors circuits without attention

\$119.50 NEW for Television and Industrial Use

In servicing TV receivers, transmitters and similar electronic equipment where the output signal does not energize a sound producing indicator, a device is needed to actuate visible and audible alarm in case of a break in the signal path. The Seco MONITRON does just that and more!

Performs 4 basic functions:

1. Monitors circuits without attention.
2. Monitors 2 circuits at once (on same or separate chassis.)
3. Operates as a signal tracer.
4. Makes point to point gain measurements.

Another Serviceman's Timesaver joining these indispensable Seco Testers.

SECO
Model GCT-5
GRID CIRCUIT
TUBE TESTER

SECO
Model FB-4
FLYBACK CIRCUIT
AND INDUCTANCE
ANALYZER

Your Jobber has 'em or write for information.

SECO MFG. CO.

5015 Penn Avenue S.
Minneapolis, Minn.

High Fidelity Notes

Stylii; Phono needles that are only $\frac{1}{8}$ mil in diameter are being turned out by Electrovox for the 16 $\frac{3}{4}$ -rpm record player being made by CBS for Chrysler cars. Regular LP needles are 1 mil; conventional 78-rpm needle diameters are 2.5 to 3 mils. Incidentally, frequency response of the 16 $\frac{3}{4}$ rpm discs only goes up to about 8000 cps, so early use of this speed for Hi-Fi music is not expected.

"Traveling Music": Music while you fly is now available on the entire United Air Lines fleet of DC-7

Mainliners. A speaker outlet with its own volume control is located at every seat. The music, supplied by Muzak, puts the passenger in the right frame of mind for his destination. For instance, flights to Cuba will feature tapes with Latin music. Other airlines using Muzak include National, Pan American, Seaboard and Western.

Hi-Fi Fashion: Discs and phonographs are being wedded to fashions for women this year, according to *Magnetic Tape Newsletter*. Decca, in cooperation with Dukay fabrics, has evolved a "Platter Prancers" national promotion using joint adver-

tising. Dukay will offer dresses tagged with tickets resembling Decca albums and containing lists of records. Local disc jockeys will hold contests for dress designs to suit the moods of various Decca albums. RCA Victor will display its phonographs in women's apparel and accessory shops, and provide these places with discs to serve as background music for fashion shows. Columbia is tying in with a line of Italian-designed dresses and sportswear, plugging its "Holiday in Rome" album.

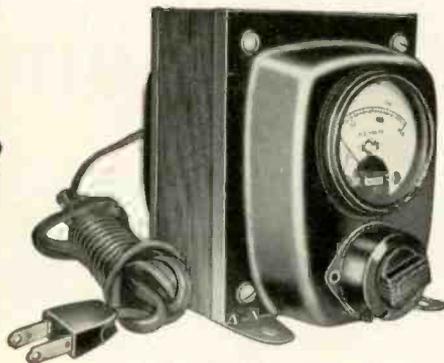
RTSA and Pay-TV

In a recent issue of its official publication, *Video Scope*, the Radio and Television Servicemen's Association of Pittsburgh, Penna., asks the service industry to take a careful look at subscription television and what it may mean to independent service. In view of the suggestion that pay TV has been described by some sources as having the characteristics of a public utility, the publication points out, service of its equipment would probably be handled by the utility. Since the decoding devices and the TV receivers become interdependent after installation, the pay-TV organization may monopolize service on the combination. The editorial concludes, "The economic future of the television technician may well be altered by the decisions rendered in Washington."

FRSAP May Join NATESA

At a recent meeting of the Federation of Radio Servicemen's Association of Penna., P.O. Box 61, Carbondale, Penna., opinions were aired concerning whether local affiliates of the statewide organization should join NATESA, for the sake of unity in a single national group. Delegates to the meeting will carry the issue to their respective chapters.

**EVERY
SERVICEMAN
NEEDS THIS
VOLTAGE
ADJUSTOR**



T-8394M MANUAL VOLTAGE ADJUSTOR

Where low voltage is affecting TV reception, the service man can detect the condition at once with a T-8394M Acme Electric Voltage Adjustor. And by a simple demonstration he can sell a Voltage Adjustor to the TV set owner. Sales are easy to make because demonstration while servicing a set quickly convinces its owner that the voltage regulation is essential to good TV reception.

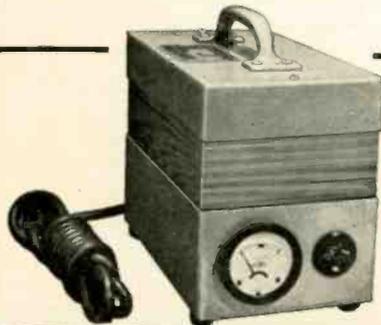
How To Use The T-8394M VOLTAGE ADJUSTOR on Service Calls

With the tap switch set at 115 volts, the meter reading will show incoming line voltage. Thus it can be instantly determined if line voltage is lower than normal required for good TV set performance.

The T-8394M Voltage Adjustor can also be used to reproduce the operating condition about which the customer complains by turning tap switch to the voltage which simulates such condition. For example, customer complains that evening program pictures flicker and shrink. When service man calls next day all operation appears normal — voltage tests out properly. But, by adjusting voltage to 97 volts the condition about which the complaint was made is reproduced. This indicates low voltage condition during evening that can be corrected with a T-8394M Voltage Adjustor.

Not A Gadget — A High Quality Unit You'll Be Proud To Use

The T-8394M Voltage Adjustor can be installed instantly, no tools needed. Just plug into most convenient outlet. Then plug television cord into secondary receptacle on Voltage Adjustor.



FOR COMPLETELY AUTOMATIC VOLTAGE CONTROL

Regardless of line voltage supply, the Automatic Voltrol corrects voltage fluctuation over a range from 95 to 130 volts. The voltmeter supplied indicates secondary voltage while unit is in operation. A built-in relay automatically disconnects circuit when set is turned off.

Acme Electric
TRANSFORMERS

ACME ELECTRIC CORPORATION
MAIN PLANT: 882 WATER STREET • CUBA, N. Y.
West Coast Engineering Laboratories:
1375 West Jefferson Boulevard • Los Angeles, California
In Canada: Acme Electric Corp. Ltd.
50 North Line Road • Toronto, Ontario



"It's clear that the atom consists of a nucleus of protons and neutrons around which the electrons rotate, but I'm still a little hazy on this principle as it applies to television."

Front End Troubles

(Continued from page 31)

not overly visible, increasing the chances of the serviceman's overlooking the real source of trouble.

In Magnavox 105, 106 and 107 chassis—as well as in other make sets using a noise inverter system—a condition known as *sync lockout* may be produced by a fault in a tuner (as well as other) tube. The condition referred to is characterized by the complete absence of horizontal and/or vertical sync. Improper operation of the noise inverter is frequently responsible for this trouble. The indirect cause may be a defective front-end tube; the defect present may, by changing the age bias, affect the noise inverter bias, introducing sync trouble.

It's a good idea, in most cases of sync trouble, to change the front-end (as well as video i-f) tubes, before going on to make further tests in the sync or sweep stages—unless, of course, unmistakable clues pointing to some other source of trouble are clearly evident.

Misalignment Woes

The presence of any of the following symptoms may be due to front-end misalignment: 1—Flutter in the picture accompanied by motorboating in the sound. 2—Lack of picture detail (focus satisfactory). 3—Wiggles in the picture background; "trailing whites" in pix (sound normal). 4—Insufficient pix contrast (sound normal). 5—Weak or no pix, weak sound. 6—Sound bars in pix. 7—Smear effect in pix. A check of the front-end response with a sweep generator and a high-gain scope will reveal whether or not misalignment of this section is causing any of these conditions.

When flashing is noted in a set using a cascode-type tuner, the r-f amplifier (6BK7, 6BQ7 or 6BZ7) may be defective. A defective mixer-oscillator (6X8, for example) may, in a few cases, also cause the same symptoms. Check to see whether flashing occurs on a blank channel, as well as on a used one. If the flashing is not noted when the station selector is set to an unused channel, a fault in a tuner tube is probably the source of the trouble. When flashing is noted at every channel setting, either a tuner tube or a defective horizontal output or damper tube may be responsible.

When a considerable amount of noise is continuously or intermittently associated with the picture in moderate or strong signal areas, the r-f amplifier (or 1st video i-f) is probably responsible.

Many tuner defects can be unearthed by visual examination. The wafer sections of band-switches are frequent sources of tuner trouble. Phenolic wafers tend to crack, introducing misalignment or other symptoms. Defective wafers should be replaced, never repaired.

Short-circuits of terminals and pigtailed are fairly common, due to

the cramped quarters present in the TV front end. Poor solder joints (sometimes visible, sometimes not) are often causes of trouble. On some RCA sets using a cascode tuner, the r-f amp. grid decoupling condenser tends to crack in warm weather, due to expansion of the metal plate to which it is attached. On Philco tuners using a plunger-type fine tuning mechanism, wear on the plunger (resulting in frequency shift of the oscillator) will be visible. In all tuners, charred resistors or overheated condensers will serve as guides to the source of trouble. •

PAYS ITS WAY every day

**TESTS and
REPAIRS
TV PICTURE
TUBES**

**Makes Customers Happy
—Creates New Profits**

Servicemen now earn new servicing dollars in minutes and build satisfied customers—with B&K Deluxe Portable CRT 400.

Spots and corrects picture tube troubles in a few minutes, right in the home, without removing tube from set! Restores emission, stops leakage, repairs inter-element shorts and open circuits. Grid cut-off reading indicates picture quality customer can expect. Life-test checks gas content and predicts remaining useful tube life. Cuts operating costs, eliminates tube transportation. Also saves money on TV set trade-in reconditioning. Profits start the very first day.

Send for Bulletin 104-T



**DELUXE CRT 400
with 4½" Plastic Meter**

Weights only 5 lbs. mounted in rugged, luggage style, carrying case covered with handsome, durable leatherette.
Size: 11 x 7½ x 5". Net \$54.95



**CATHODE
REJUVENATOR
TESTERS**



ECONOMY CRT 200

Every serviceman can cash in on picture tube repairs with this low priced quick profit maker. Performs most of the functions of the CRT 400. Has 3" meter. In leatherette carrying case.
Size: 11 x 7½ x 5". Net \$39.95
Weights 5 lbs.

**PROVEN IN
THE FIELD
EVERY DAY
BY OVER
20,000
SERVICEMEN**

Made by the Makers of the DYN-A-QUIK Tube Tester

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



Wholesome Wholesale

Distributor's Answer to Familiar Problem

• One day recently Thomas W. Bell, who operates a service business in Palmyra, New Jersey, walked into his regular wholesaler, a branch of Almo Radio Co. That wasn't his first visit, but it was the first time something like this happened to him: Mike Lash, branch manager, deposited \$1.50 on the counter and told Bell, "It's yours!"

The modest "bonus" was Almo's solution to a problem in wholesale selling. Like other far-sighted distributors, Morris Green, head of the Almo chain that includes 8 branches in the Pennsylvania-New Jersey area, has dedicated himself to a wholesale-only policy, turning away the one-shot retail customers in favor of professional service tech-

nicians. In this case, a wholesale-only sign is prominently displayed at the entrance to the establishment.

Despite its firm and specific wording, some retail customers continue to brush past the notice in quest of special consideration. Most of these are turned back, politely but firmly, by Almo personnel. Some have a legitimate story, however. They have been looking for some non-standard or otherwise unusual item. They've tried local dealers, but nobody carries it.



No arguing with this wholesale-only sign.

In the latter event, the distributor feels justified in selling the part—at list price, not at dealer net. Even so, he may still be considered as competing with his technician customers. So, to take off the curse, he gives the difference between dealer net and the list price to the very next bona fide technician who comes up to the counter.



Almo branch manager Mike Lash passes "bonus" of \$1.50 on to technician Thomas W. Bell.

The policy has paid off in invaluable good will. Among the expressions of approval from members of the servicing profession, Almo has received a letter of appreciation from the Northeast TV Service Dealers Assn.

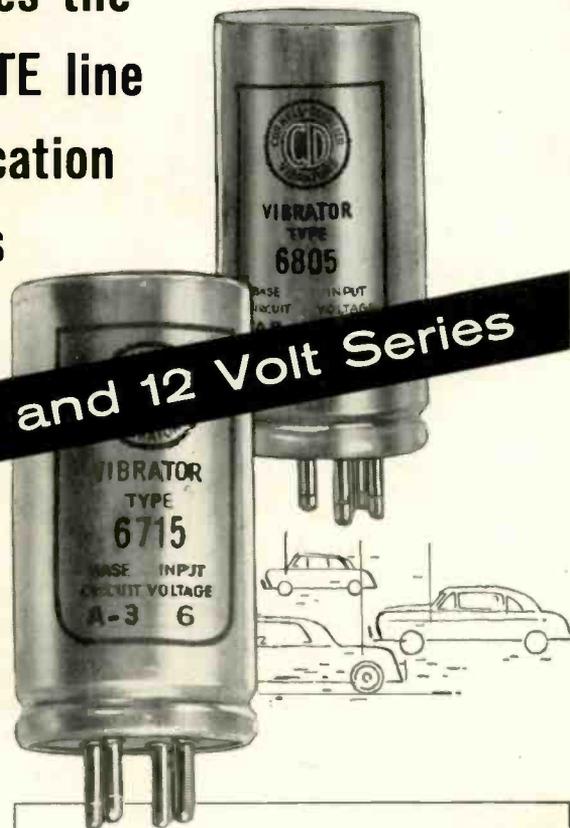
To further implement their sales policy, Almo stores display bulletin boards on which local service agencies are permitted to post their business cards. When lay customers enter for parts or service, they are referred to this "recommended listing" for agencies where they may transact their business on the retail level—where it belongs.—Prepared from information supplied by Thomas W. Bell •

C-D features the NEW COMPLETE line of Communication Vibrators

... in 6 and 12 Volt Series

that outlast them all!

Here is everything needed for complete service on communication vibrator replacements! Engineered to rigid U.S. Gov't specifications, these new C-D Vibrators outlast them all... out-perform others and give you the RIGHT vibrator for EACH application!



Ten Types Provide Complete Replacement for ORIGINAL Communication Equipment

New No.		Old No.
6 volt	6/12 volt	
5715	6715	5515
5718	6718	5518
5721	6721	★
5722	6722	★
5725	6725	★
5805	6805	5605
5820	6820	5620
5821	6821	5621
5822	6822	5622
5824	6824	★

For Specific Applications, see the NEW C-D Vibrator Guide



Cornell-Dubilier Vibrators

PLANTS IN SOUTH PLAINFIELD, N. J.; NEW BEDFORD, WORCESTER AND CAMBRIDGE, MASS.; PROVIDENCE AND HOPE VALLEY, R. I.; INDIANAPOLIS, IND.; SANFORD AND FUQUAY SPRINGS, N. C.; SUBSIDIARY: THE RADIART CORPORATION, CLEVELAND, OHIO

Tell-Tale Tape Marks

(Continued from page 29)

the recorder can have their cement (if used) work into a hard projecting point that digs into the back of the passing tape so deeply as to require correction.

Fig. 4A is a section of tape that has been started between a badly scored head and pressure pad. Note that the scratches disappear after a short travel. The case presented by this figure needs careful inspection, since such marks serve as a warning that trouble is on the way even though the tape may perform well for a short time. The next step in the development of this case would be a succession of such spots causing an audible tick as they are played.

Fig. 4B is a tape from a single track machine with incipient trouble from a worn guide. The machine was also very dirty.

Fig. 5A is illustrative of the markings caused by a pressure pad with insufficient tension against the tape, allowing it to contact the head intermittently. The pressure pad was not parallel to the head so that greater pressure was exerted at the top, producing the markings illustrated. This tape was used more with the top track on a dual-track apparatus than the bottom; hence the greater intensity of markings at the top. Similar intensity of marks would be apparent at both the top and bottom with relatively equal use. This example is illustrative of uneven contact of the tape during its journey through the machine.

Projection on Roller

Vertical marks are of considerable interest, since they are frequently made by irregularities in a rotating member. A projection on a rotating capstan will repeat itself at an interval equal to the circumference of the capstan. If a flat were to occur on a capstan, then an area of light pressure (unscuffed part of tape) would be the symptom. If the flat on a capstan or roller is so great that the tape is not moved through normally, an abraded or scuffed area is noticed, such as Fig. 5B depicts. The particular instance of Fig. 5B was a rubber pressure roller working against a capstan which had an appreciable flat on it. The tape would not readily start from a stopped position, with the resultant scuffing as shown.

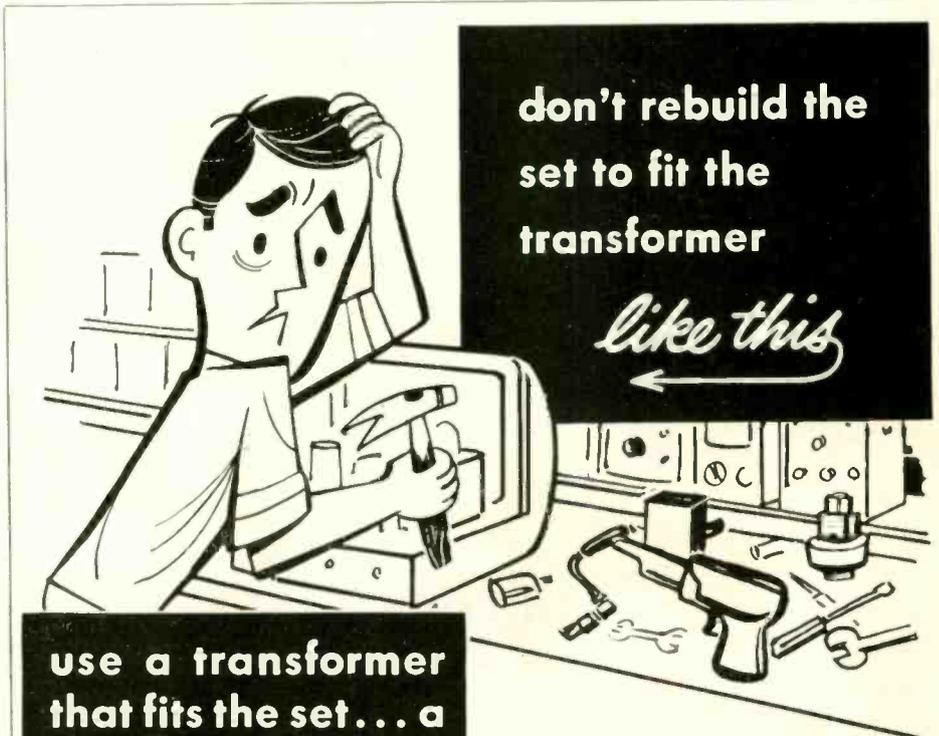
Flats are detectable even though

the tape has not been started while on a flat, since there will be a light mark against the background of the tape at repeated intervals. Fig. 6 shows how a projection repeats itself on the tape as the tape travels and as the rotating member revolves.

Creasing of the tape will result in a mark, but this need not be misleading: the mark will not repeat itself, as in the case of a flat or a projection on a rotating part. Another vertical mark that is nonrepetitive is similar to the faint vertical line preceding the scratches of Fig. 4A. It is caused by the starting of the tape in contact with a

normally adjusted pressure pad and another surface. These latter markings are usually faint and do not repeat themselves at rhythmic intervals. They are not indicative of trouble until as distinct as Fig. 4A illustrates.

The technician is urged to examine tapes that have been put through machines with known defects so that he may become familiar with the markings so produced. He should also inspect a short length of tape that has run through a machine after repair and before return to the customer. A short length of about a yard will suffice for this check. •



use a transformer
that fits the set... a
STANCOR
verified
exact replacement
TRANSFORMER

FREE STANCOR TV
Transformer Catalog and
Replacement Guide listing
replacement data on virtu-
ally all TV sets in use
today, with hundreds of
VERIFIED exact replace-
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**CHICAGO STANDARD
TRANSFORMER CORPORATION**

3513 Addison Street • Chicago 18, Illinois

test and rejuvenate your CRT's with the

TELETEST REJUVAESTER

An unbeatable combination . . . a CRT tester and rejuvenator in one small, compact, featherweight, low-cost unit. Simple to operate with one-knob control, a large, easy-to-read 4½-inch meter and a neon tube short indicator. And it weighs less than 4 pounds!

Cut operating costs by saving time and money on trade-in reconditioning and on-call CRT vitalizing. Restore normal CRT performance in 90% of cases!

TESTING

- checks cathode beam current
- locates hot and cold inter-element shorts
- checks resistance leakages as high as 5 megohms
- checks gas content and loss of brightness



Model
RT-203

1-YEAR FACTORY
SERVICE GUARANTEE

only
\$49⁹⁵

REJUVENATING

- removes contamination from cathode surface
- corrects gassy (soft) picture tubes
- restores and improves emission quality
- Cathode activity is constantly metered during the rejuvenation process, thereby preventing permanent tube damage

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See your local jobber, or write TODAY:

31-01 Linden Place, Dept. T-2, Flushing 54, N. Y.

New!

the mosley
4-Set TV Coupler

IDEAL FOR:

- HOMES
- 4-UNIT DWELLINGS
- MOTELS
- STORES

LIST PRICE
\$6.25



The new Mosley Type 904, 4-Set TV Coupler is especially designed for metropolitan television areas . . . the major multi-set market!

A bridging type resistive circuit distributes the signal equally to each output and provides effective isolation between sets to eliminate interaction. Signal transfer is excellent due to the constant impedance design.

The Mosley 4-Set Coupler will serve in a multitude of uses where it is neither necessary nor economically feasible to use amplifying distribution systems. Its low cost will appeal to your customers and the simplicity of installation means extra profits . . . for you!

AT YOUR PARTS JOBBER

MOSLEY ELECTRONICS, Inc.
8622 St. Charles Rock Rd., St. Louis 14, Missouri

Tough Dogs

(Continued from page 32)

ments within the room that successively dislodged and relocated the broken piece. Since it was not easy to shake the fragment out of the core, I suspect there were spots where it had been lodging stubbornly and keeping the oscillator off frequency.

For anyone who runs into an intermittent horizontal oscillator, particularly one with an irregular cycle of breakdown such as this, the possibility of a broken slug should be checked early. It might save a great deal of time.—L. H. Wilson, Miami Springs, Florida.

Knock for a Booster

Tube substitution in the home failed to restore high voltage to this set. The customer reported that another technician had put a "doodad" (filament booster) on the picture tube when it showed inadequate brightness about three weeks earlier, and this had restored brightness to "about normal."

In the shop, high voltage was restored when a coupling condenser, the 6BQ6 output tube and the 1B3 h-v rectifier, all defective, were replaced. However, the brightness level fluctuated, and it was impossible to adjust the receiver for sharply focused scanning lines. Investigation of the brightness circuit and adjustment of the focusing slugs on the yoke mount assembly provided no improvement. After a while, finding no circuit defects, we removed the booster. Zoom! That was it. Temporarily putting the weak 6BQ6 and weak 1B3 back into the set recreated the condition that had prompted the sale of the booster. While the set was in this condition, putting the booster back temporarily produced what a layman might consider "about normal brightness."

The tough dog here was the tech who had sold the booster, and may have been trying to soften up the customer for a pix tube sale. We hope this man wises up in the future, and makes sure he isn't using a booster to correct defects involving high voltage, brightness or the ion trap. Eventually customers are bound to find out the well-known fact that these boosters do shorten the life of crt filaments—and then the customers become tough dogs.—Clifford Goldstein, Elmhurst, N. Y.

Interference Oddities

FCC engineers, acting as interference detectives, often turn up some odd cases. Such as—

A Great Lakes coastal station needed help in locating the source of severe interference to marine communication. A 2-hr. search disclosed that sparks were jumping to a chicken-wire coop from a farmer's electric fence nearby. The owner corrected the difficulty.

Many complaints of TV interference in an upper New York State locality were being pinned on hams, diathermy equipment, etc., but a mobile FCC unit traced the source to a private residence. Here tests showed a TV booster went into heavy oscillation when it was left on after the TV set was turned off. The owner promised to turn off booster and set simultaneously in the future.

A Maryland resident complained of severe radio and TV interference from 9:15 PM to 6 AM. Tests showed her own electric blanket was the culprit!

How to Sell Color

In one of the closing months for 1955, one of Philadelphia's larger TV set dealers, Mort Farr, rang up half his dollar volume in color set sales. He states that customers shopping around for color are far more critical of picture quality than those in the market for black-and-white sets. He is also of the opinion that about 85 percent of the problem of getting good color reception depends on the antenna.

With the ability to demonstrate a good picture being of paramount importance, Farr eliminates the hazards of reception by using a master

antenna system to feed all sets on display, whether they are color or black-and-white. He feels that this system, which has helped him to sell monochrome receivers, is essential in promoting color sales.

Color Service Costs Down

An immediate reduction in the cost to consumers of a complete 1-year color TV service contract has been announced by E. C. Cahill, president of the RCA Service Co. The price, which includes installa-

tion, is down to \$99.95. This represents a cut of \$40 from the previous price.

At the same time, a comparable cut was announced on the 90-day complete coverage contract for color TV installation and service. A \$10 reduction brings the cost of the shorter-term contract down to \$39.95. Mr. Cahill pointed out that thousands of independent service technicians also are equipped to install and maintain color receivers, and stressed the importance of their role in gaining public acceptance of color TV.



... complete soldering SET
for the price of the gun alone!

ALL FOR
\$7.95
list

Weller Soldering Gun—Model 8100, a \$7.95 value

Wire-bristle Soldering Brush for cleaning connections—streamlined for getting into tight places

Famous Kester Solder—generous supply

Soldering Aid for opening old joints, holding down and twisting wires—nothing handier!

FIRST AGAIN! Yes, Weller WAS first to invent... first to patent... first to sell. And today Weller IS first in sales... first in features... first in value.

MODEL 8100 WELLER GUN

Soldering hot in 5 seconds!

Over 100 watts—ample power for normal service
• Perfect hand-balance grip • Dual spotlights light up work • Triggermatic control—instant "on-off" heat • Streamlined design for maximum reach • Long-life Wellertips.

SEE THIS BIG SOLDERING TOOL VALUE. ASK YOUR DISTRIBUTOR FOR A DEMONSTRATION... OR WRITE DIRECT FOR CATALOG BULLETIN



"What I like about him is he doesn't laugh at my diagnosis of the trouble."

Weller

ELECTRIC CORPORATION
Easton, Pennsylvania

TO SELL THE \$2.1
BILLION TV-ELECTRONIC
SERVICE MARKET . . .

tell 'em where

1956 TECHNICIAN

& Electronic Parts

Tell 52,086* PAID SUBSCRIBERS where
to buy your product **LOCALLY**

Until **TECHNICIAN** magazine published the first and only **BUYERS DIRECTORY** three years ago, manufacturers, distributors and representatives had no opportunity to tell TV-electronic service technicians where to buy replacement products, accessories or equipment in their local servicing area. Once again, the 1956 **TECHNICIAN BUYERS DIRECTORY** enables you to place your localizer listings and display advertisements in the industry's valuable (and exclusive) where-to-buy source book for service technicians and jobbers.

How to advertise with the LOCALIZER LISTINGS

Immediately under your firm name, listed free in either the Alphabetical List of Manufacturers, Distributors or Representatives, you can purchase space at the low cost of \$20 per inch to include the items of information shown in the sample listings at the left. The Localizer Index is a sales-building, cost cutting feature that speeds up contacts, reduces correspondence, phone calls, boosts inquiries, etc., for everyone who takes advantage of it.

GET EXTRA SALES PUNCH

To strengthen the tie-in between editorial and Localizer Listings, the annual **TECHNICIAN BUYERS DIRECTORY** enables manufacturers, representatives and distributors to present additional sales messages via display advertisements. The Directory is a bonus to **TECHNICIAN's** 52,000* paid subscribers which includes the largest number of paid servicemen of the audited publications in the field. The directory clears the channels that lead from you to the men who buy your products . . . and keeps your story on tap when buying is done throughout the year. Plan now to include this important May 1956 issue in your '56 sales plans.

*December 31, 1955 ABC Publisher's Statement, as filed with the Audit Bureau of Circulations, subject to audit.

FREE ALPHABETICAL LISTINGS

In the alphabetical Index of over 1700 manufacturers, listings are free to all manufacturers of TV-electronic service products.

EXECUTIVE & SALES PERSONNEL

Paid listings for manufacturers' executive and sales personnel may be followed by brand names, list of products, branch or regional offices.

REPRESENTATIVES

Alphabetical arrangement of cities in Localizer section makes it easy for buyers to find local representative. These are paid listings.

LOCALIZER LISTINGS FOR DISTRIBUTORS AND REPRESENTATIVES

EXECUTIVE & SALES PERSONNEL

Names may be listed here to quicken sales contacts.

LINES CARRIED

May be listed here to show the availability of certain brands or types of products.

AREA SERVED

May be defined in order to reach and serve more outlets in this expanding field.

Fortune Records 11629 Linwood St Detroit 6 Mich
Freed Electronics & Controls 200 Hudson New York NY
Freed Transformer 1718 Weirfield St Brooklyn 27 NY
Frequency Standards Box 504 Asbury Park NJ
Fretco Inc 406 N Craig St Pittsburgh 13 Pa

President—Joseph V Fisher
Vice Pres—Frank H Robinson
Sales Eng—Dave Hall

Products: TV antennas and accessories—open wire lead-in—ground wire—aluminum tubing—transistors—semiconductor-relays

Brand Names: Super Spectrum—Victoria—Fretaray, Spectrum—Customliner—V-2—V-4—Mi Tee Ray—Bo-Ti—Strato-Ray—Saucerline and Fretline

Representatives:

CALIF—David Ellis David Ellis Co 91 E Foothill Blvd Altadena Ryan 19108 Territory: Southern Calif—Ariz—Los Vegas, Nev

CALIF—Nickerson & Rudat 381 Brannan St San Francisco Calif Yukon 22982 Territory: San Francisco & Sacramento Calif—Honolulu—Hawaii

D C—L H Leiber International Buyer Service 217 Bond Bldg Territory: Cuba

ILL—George E Lewis G E Lewis Inc 5420 W Fullerton Ave Chicago 39 Territory: Ill—Wis—Minn

MISSOURI—Ward Paden Co Box 569 Jefferson City Mo 51023 Territory: Mo—Kan—Iowa—Neb

NEW YORK—H/V Associates 136 Liberty St NY 6 NY Worth 46193 Territory: N.J.—Md—Pa

Prentice-Hall Inc 70 5 Ave New York NY
Pres Probe Co 4034 N 6 St Milwaukee 2 Wis
Presto Recording Corp PO Box 500 Paramus NJ
Probescope Co 44-05 30 Ave Long Island City NY
Production Tool & Fixture 37 W Main Oyster Bay NY
Pyramid Electric Co 1445 Hudson Blvd N Bergen NJ

Telephone UNion 5-1776

VP-Gen Sls Mgr—Arnold R Andrews

Sls Mgr—Jabber Div—Jack K Poff

Brand Names—Cartrij-Dry; Glascoal; IMP; Matl can;

Twist-Mount; Tynee-Dry; Kool-Sel

Representatives

Atlanta—Frank C Nickerson & Co 901 Bernina Ave

NE Lamar 6878 Covers Fla (except Pensacola)

Ga-N C (jobbers only)—S C

Baltimore—R B Barnhill & Assoc 412 Woodbine Ave

Valley 5-2191 Terr Md—Pa

NEW YORK, Cont'd

Sanford Elect 157 Chambers DI 9-0550

Slate & Co 2755 Webster LU 4-0614

Stan-Burn Radio 1697 Broadway CO 5-8138

Sun Radio 122 Duane BA 7-1840

Superior Radio & TV 800 W 20 CH 7-1234

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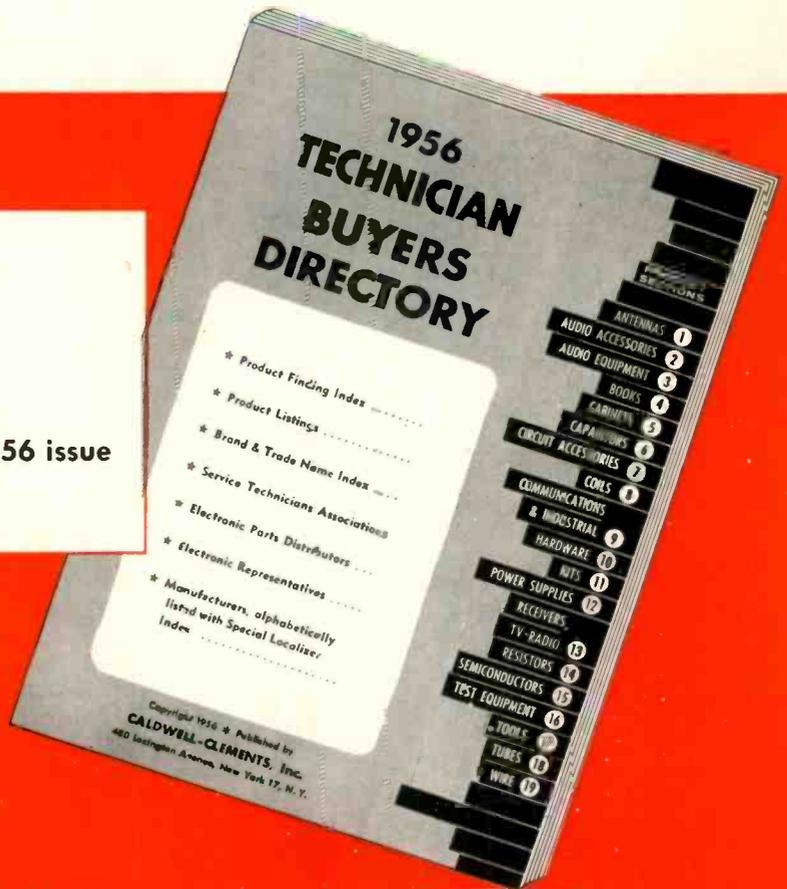
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1L9I	1.00	6B35	.85	12A35	.80
1L9J	1.00	6B36	.85	12A36	.80
1L9K	1.00	6B37	.85	12A37	.80
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• Efficient design and skilled workmanship are essentials for top performance of Hi Fi turntables, but they should be supplemented by regular maintenance. Fortunately basic maintenance is simple.

Four steps include the removal of the turntable from its shaft, lubrication of moving parts, wiping dry and replacement of the turntable. When these four simple steps are taken periodically, quality turntables will last for many years and provide continuous high quality performance. Elimination of drag on moving parts will assure freedom from rumble, wows and flutter. Wear will be reduced through the maintenance of clean, well lubricated surfaces.

Remove the turntable from its shaft and apply two or three drops of medium motor oil to the two motor bearings. See Fig. 1. The oil can be applied with a toothpick or a convenient piece of wire. The oil is drawn to the motor bearings, as needed, by means of wicks. Regular lubrication keeps the wicks in good condition so that a clean path to the motor bearings is maintained.

Make a light grease by mixing the motor oil with petroleum jelly and apply a small amount to the turntable shaft as in Fig. 2. Remove idler wheels by slipping the retaining clips off shaft ends and lubricate the shafts with a small quantity of the grease. Wash the idler wheels with warm water and soap and wipe dry before replacing them.

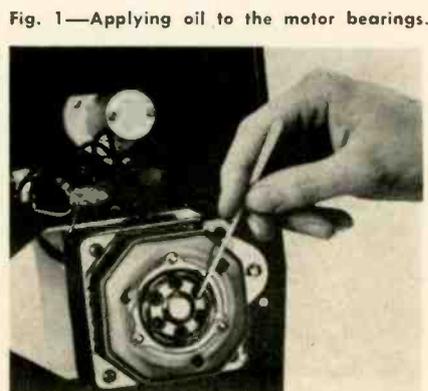


Fig. 1—Applying oil to the motor bearings.

To avoid friction and binding in the speed changing mechanism, apply a small quantity of grease to the switch-activating and shift-detent balls, as in Fig. 3. Lubricate the shaft for the mechanism with a drop or two of medium motor oil.

Before replacing the turntable panel, use a soft dry cloth to give the entire mechanism a careful dusting and wiping. All moving parts should be kept as dust-free as possible to avoid contamination of oiled surfaces with abrasive particles.

This simple procedure regularly assures top performance without wow or chatter. These defects are usually caused by abnormal wear of bearing surfaces and binding due to inadequate lubrication. They produce variable turntable speeds that greatly reduce the pleasure of Hi Fi listening.



Fig. 2—Lubrication of the turntable shaft.

The design of the Presto turntable illustrated here utilizes three idler wheels to minimize wear. They are easily replaced by simple removal of retaining clips. Since the idler wheels are interchangeable, a spare wheel may be used to replace any worn wheel during regular maintenance.

Another design feature permits removal of the turntable and turntable panel without loss of balls or bearings. In some turntables, care should be exercised to prevent displacement of balls and bearings to avoid contamination with abrasive dust. Some other types also employ complicated mechanical linkages for speed change. Each bearing surface of these links should be lubricated at regular intervals, after which the

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Top Performance

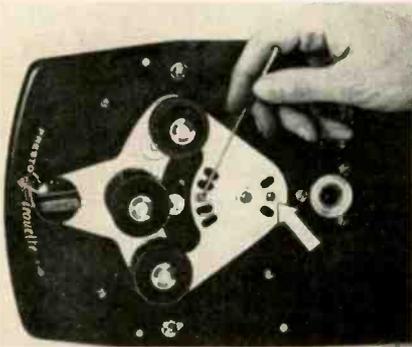


Fig. 3—Applying grease to the detent balls (indicated by the toothpick and the arrow).

entire mechanism should be wiped dry.

The importance of regular lubrication of motor bearings is sometimes overlooked when "oil-less" bearings are used in motors. These bearings are made by the compression of fine brass or bronze powders to produce a porous mass that is saturated with oil during manufacture. But, for the practical reasons outlined, it is good practice to replenish the oil supply regularly. •

Versatile Radios

Two unusual AM radios introduced by Sylvania are the Prospector, a portable with built-in geiger counter, and the Inter-Com Radio, for home use.

In addition to a geiger counter, the Prospector (\$64.95 retail) has compass, sun dial and neon tube built in. In case of atomic disaster, it can be used to measure radioactivity in the air, as well as for finding uranium. Presence of the latter element generates clicks in the speaker and causes the neon tube to flash. Hunters and sportsmen can also make use of the compass and sun dial.

The Inter-Com Radio (\$39.95 retail) includes an auxiliary unit in a cabinet of size and shape similar to the main radio. The speaker in the second unit can be used for stereophonic effect with both units in the same room, or to pipe a received program into another portion of the home. A "talk-listen" switch permits use as a 2-way intercom to sick room, nursery or between any two points in the home.

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Color Quiz

(Continued from page 36)

used if the technician is careful to remember that colors must be interpreted as being the *complements* of the primaries. To avoid confusion, the lighter areas around the black dots should be observed for the presence of the actual primaries. Some manufacturers of black-dot generators have made inexpensive conversion kits available for their earlier instruments, so that white-dot output may be obtained.

9. The hue control, located in the circuit of the 3.58-mc subcarrier oscillator, is used to adjust for reproduction of the correct colors. That is, incorrect adjustment, which will throw the oscillator out of phase or frequency, may result in green appearing when red should, or blue instead of yellow, etc. The chroma control is adjusted so that colors, though they may be correct in hue, are present in the right quantities. Overadjustment might, for example, turn normally pink tones into deep reds, whereas underadjustment might turn the deep green of a field of grass into a pale chartreuse. Ordinarily, the right amounts of color are inherent in the transmitted signal, and normal adjustment of the contrast control will also correspondingly affect chroma (color contrast) in the right proportion.

10. Though the transmitter and receiver essentially work to maintain proper color balance, aging of the receiver, nonlinearity in the antenna system, or some nonlinearity in the r-f section may deteriorate this balance. In addition, there is the matter of personal preference. Some people prefer pastel tinting, a little more subdued than occurs in a natural rendition. Others may prefer their coloring a little deeper than they find it in nature, just as many people like to overdrive contrast in monochrome TV. •

Service Technician Survey Set for February

The third annual survey of brand preferences among radio-TV technicians will be made in February 1956 by Brand Name Surveys of Chicago. Questionnaires will be mailed to more than 20,000 techs across the U.S., requesting data on their replacement component preferences. Results will be used by manufacturers to help improve their products.

Don't Overpay Your Taxes

(Continued from January Issue)

• There is a provision in the 1954 Internal Revenue Code which allows some proprietorships and partnerships to be taxed as if they were corporations. This choice should not be made lightly, as there is considerable uncertainty about the provision and the proprietorship or partnership desiring corporate tax treatment might find it better actually to incorporate.

Regulations now permit changes of fiscal year in some cases without permission of the Treasury Department. Generally it is wise to use the fiscal year which corresponds most nearly with the annual cycle of business operations, ending at the low point of receivables, inventories and loans, instead of a calendar year. This reduces the area of possible dispute over such matters as value of inventories, and has many advantages apart from tax considerations. The change should be carefully timed, though, to avoid possible adverse tax effects during the change-over period.

Under the present tax law, payments from your company to employees for treatment of sickness or injury are not taxed as income of the employees. If the company has a plan for continuing all or part of an employee's pay while he is absent for sickness or injury, limited amounts of this "sick pay" are also tax exempt.

This applies whether the payments are made by the company or by an insurance company. In the case of a sickness requiring hospitalization even for one day during the course of the illness, or in the case of any injury, the first \$100 per week of payments are tax free. In the case of sickness which does not require as much as a day's hospitalization, the exemption begins after the first week of absence.

No great formality is required concerning the "plan" but it should be explained to employees, and appropriate records kept of the amounts paid. Proposed regulations governing tax withholding in 1956 from payments to ill employees were still under discussion when this article was prepared.

If you contract for repairs and improvements to your business prop-

erty, be sure that these two types of work are billed separately. Should you lump them together, you may find that the entire cost has to be capitalized for future depreciation. By listing the cost of repairs as a separate item you are allowed to deduct it as an expense of the current year.

For example, you might have a furnace repaired and new radiators added. By separating the charges you can deduct the cost of the repairs in the current year, although the new radiators would be improvements subject to depreciation during their useful life.

Many deductions are lost through failure to keep adequate business records. Be sure that you have good records to show you what deductible expenses you have had, and to back up your deductions in case they are questioned by the Government. This applies particularly to your out-of-pocket business expenses, such as travel and entertainment of customers, and to items which are deductible on your personal income tax return.

Good records and properly qualified professional tax assistance—at tax-filing time and throughout the year—are the keys to income tax savings. •

Snyder Celebrates 25th Anniversary



Ben Snyder (r), president of Snyder Mfg. Co., and Gus Snyder, partner and technical head, examine some antennas produced by the Philadelphia firm celebrating its 25th anniversary this year. They are holding company's newest addition, the "Torque-Tenna." On Feb. 6, firm is displaying a Silver Jubilee booth at the Automobile Accessory Mfrs. show at Chicago's Navy Pier.



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Cash In On Butcher's Work

(Continued from page 27)

patiently to what the customer has to say, and by discreet questioning try to get an idea of the original symptoms.

If the customer launches into a tirade against the last fellow who worked on his receiver, it is important to remain politely but firmly non-committal—for ethical as well as business reasons. Often, a customer will think he has been the victim of an incompetent when he has not. Tell him that, naturally, you cannot make any comment on the condition of the receiver until you have checked it yourself; that you will contact him as soon as you have made an inspection and can advise him on the basis of that inspection.

Once the butchered condition of the receiver has been confirmed (or discovered), the customer should be contacted and informed, in a matter-of-fact way, of what has been found. It must be made perfectly clear that such conditions are abnormal, and must be corrected as a preliminary step to repairing the original trouble; that parts may have to be ordered, causing a delay in completing the job; that any cost estimates are tentative and cover the preliminary work only; that correcting the original trouble will be extra, at regular rates. Much of the customer's skepticism can be allayed by an honest approach. He is prepared for a large bill and time delay, because he has been told why these are necessary; he is relieved that his set is not beyond repair, and feels that it is in good hands.

This brings us to the question of whether or not it is good business or good ethics to expose the work of the incompetent. Often, customer ill-will and suspicion is engendered by refusal to explain a large bill necessitated by restoring a butchered receiver, on the grounds that such "tattling" gives the entire profession a black eye. This attitude clouds the issue, and does much more harm than good as far as public relations are concerned. It is of course unethical to cast aspersions upon the work of another professional. However, the type of workman under discussion is not a professional. He takes money under false pretenses, and undermines a legitimate profession. In short, he is a charlatan. His counterpart in the medical field

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depend on that."

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"Choice of Better Service Dealers Everywhere"



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TECHNICIAN & Circuit Digests

1st of preceding month for all ads
requiring proofs, composition,
foundry work, key changes, etc.

10th of preceding month for complete
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1st of month—Publication Date. Can-
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For easy replacement in all television receivers. 1 1/2" Tinned wired leads.



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OHMITE MANUFACTURING COMPANY
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OHMITE®

is the quack, and professional doctors do not protect the quack.

The customer is paying for the professional technician's services, and is entitled to know what is wrong with his receiver, whether it be one defective tube, or a dozen cold solder joints. Simply tell the customer the facts as you have found them. Just as he will hold you responsible for your work, it is within his province—and not the technician's—to fix responsibility for any previous work. In this way, the legitimate technician will be distinguished, justly, from the strays who try to attach themselves to the profession.

A word of warning: Circuit changes alone are not necessarily evidence of incompetence. On the contrary, intelligent circuit changes in the presence of unusual conditions are a part of the technician's craft. Also, a technician will often discover an engineering error in a receiver, and correct it long before the factory announces a production change covering the defect. Such alterations are, of course, legitimate. Incompetence exists when a man tries to perform a repair for which he is not qualified; when circuit changes have been made for the purpose of expediency, as a substitute for proper repairs; when misalignment or misadjustment has occurred; and when damage to components due to attempted repairs has taken place.

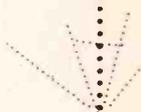
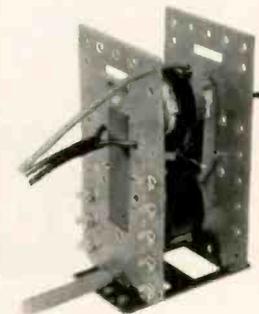
The next time a butchered chassis does cross your path, treat it with respect. More often than not, it will repay you with immediate and future profit. As for the incompetent who provided the job, he has two alternatives—to upgrade his work or eventually fold—either of which is beneficial to the profession. •



"I know he's here all the time dear, but he's not your daddy."



MERIT, first in exact and universal replacement transformers, yokes, coils—the only manufacturer of transformers, yokes and coils who has complete production facilities for all parts sold under their brand name.

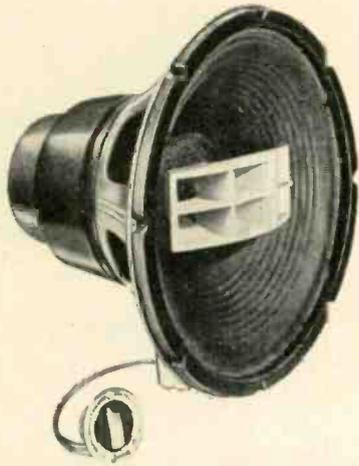


HVO-49 FOR EXACT REPLACEMENT IN AIRLINE, RAYTHEON, TRUETONE. Another in the complete MERIT line of exact and universal replacements—the only single source for all your transformer and coil requirements.

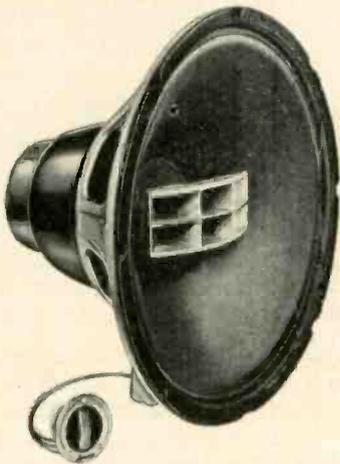
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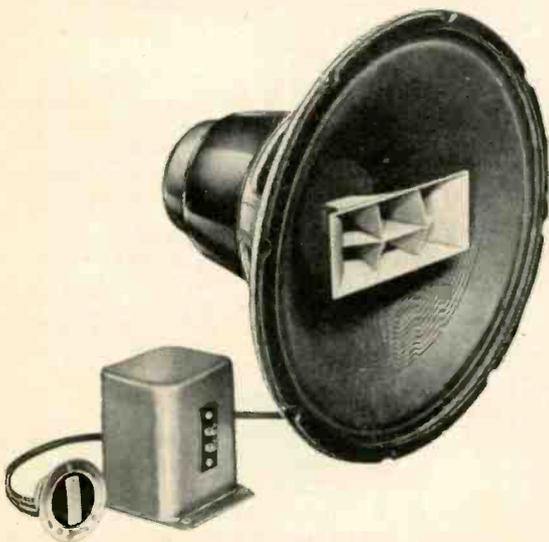




H-222



H-520



H-530

... We believe it's time to examine high fidelity loudspeaker values. For example when you are asked to spend from \$40 to \$130 for a loudspeaker you are entitled to the advantages of all of these features:

- A compression driver horn-loaded tweeter
- A multi-cell horn in the tweeter
- A high frequency balance control as an integral part of the speaker system
- A true two-way system—two separate and distinct loudspeakers with expertly coordinated performance.

H-222 Jensen 12" coaxial speaker at \$54.50 meets all these requirements.

H-520 Jensen 15" coaxial speaker at \$79.50 meets all these requirements.

H-530 Jensen 15" coaxial speaker at \$129.50 meets all these requirements.

Meeting all of these requirements correctly is of course the final test of maximum performance and value. In these Jensen authentic high fidelity coaxial loudspeakers the maximum combination of performance and value is guaranteed by the recognition accorded Jensen products for more than a quarter century as the world's quality standard.

Other Jensen coaxial speakers are priced from \$24.85; Jensen G-610 TRIAXIAL* at \$252.75 and complete systems in enclosures from \$49.50 to \$525.00. 2 and 3-way Speaker Kits from \$10.50 to \$184.50. Write for Folder HH.

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