JULY, 1953

Radio-Television SERVICE DEALER

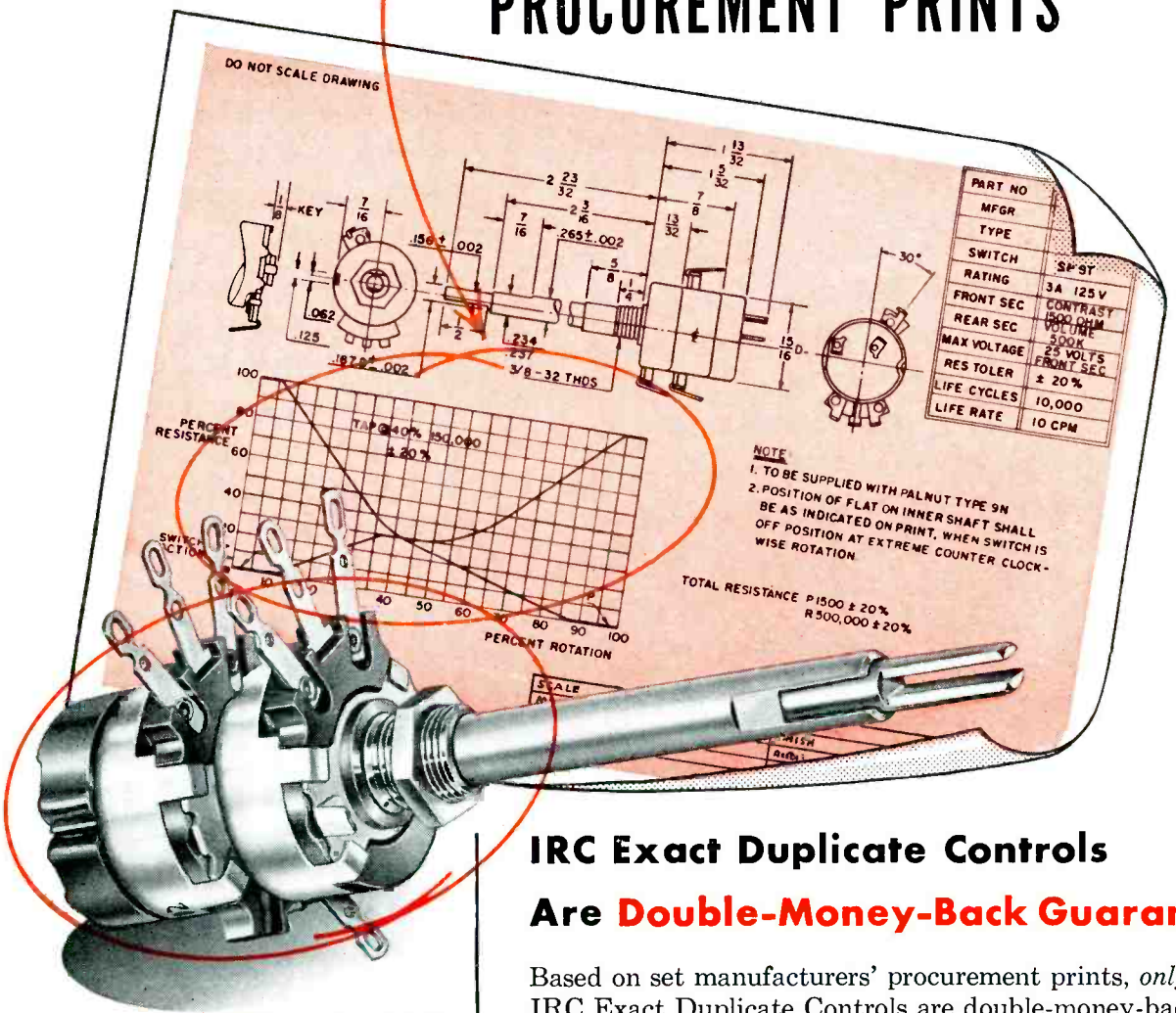
The Professional Radio-TVman's Magazine

IN THIS ISSUE:

AM-FM-TV-SOUND

ASSURED ELECTRICAL ACCURACY

BASED ON MANUFACTURERS' PROCUREMENT PRINTS



ONLY IRC GUARANTEES ACCURATE ELECTRICAL OPERATION AND SATISFACTORY MECHANICAL FIT OR DOUBLE-YOUR-MONEY-BACK

Electrical specifications of this typical manufacturer's procurement print are exactly duplicated by IRC's QJ-412 control (shown). CONCENTRIKIT assembly includes P1-206 and R1-223 shafts with B17-109 and B13-133X Base Elements and 76-1 Switch.

IRC

Wherever the Circuit Says ~~~

IRC Exact Duplicate Controls Are Double-Money-Back Guaranteed

Based on set manufacturers' procurement prints, *only* IRC Exact Duplicate Controls are double-money-back guaranteed for accurate electrical operation. This firm guarantee applies to both IRC factory-assembled Exact Duplicates *and* universal CONCENTRIKIT equivalents.

Set manufacturers' electrical specifications are closely followed.

Resistance values are carefully selected to match.

Tapers are watched carefully; IRC doesn't arbitrarily substitute tapers to obtain wide coverage.

For exact duplicate controls of guaranteed accuracy, specify IRC. Most Service Technicians do.

INTERNATIONAL RESISTANCE CO.

404 N. Broad Street, Philadelphia 8, Pa.

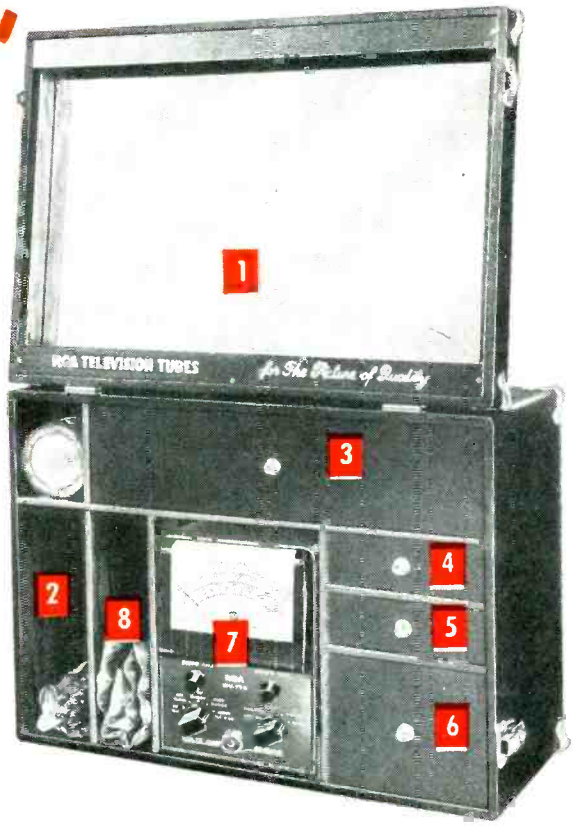
In Canada: International Resistance Co., Ltd., Toronto, Licensee

You wanted it... here it is—

THE RCA "SERVI-CHEST"

the truly portable "workshop" you'll be proud to take into the home

YOURS FOR JUST 30 RCA SILVER TOKENS!



Look at these features!

1. GIANT SERVICE MIRROR—Top-quality glass. 11" x 16" working surface. Removable hinges for flexibility of use. Wedges provided for adjustment of mirror angle.
2. SOLDERING GUN COMPARTMENT—Will accommodate all popular makes of soldering guns or irons.
3. UTILITY DRAWER—Roomy enough for tools, flashlight, large capacitors, high-voltage probes, etc.
4. RESISTOR DRAWER—Will hold large assortment of popular resistor sizes.
5. CAPACITOR DRAWER—Plenty of space for working supply of radio and TV types.
6. SPARE PARTS DRAWER—Suitable for small components and tools.
7. VOLTMETER COMPARTMENT—Designed to accommodate the popular RCA "Volt-Ohmyst"®. Instrument can be operated without removal from compartment.
8. UTILITY COMPARTMENT—Suitable for socket wrench kit, drop cloth, carrying strap, etc.

DELUXE CONSTRUCTION
Measures 13¼" high, 9" deep, 18¼" wide.

PLUS THIS BIG BONUS

With every RCA "SERVI-CHEST" you earn, you get these seven RCA Technical Publications.

1. *"Service Parts Directory for RCA Victor Radios."*
2. *"This Business of Radio and TV Servicing."*
3. *"RCA Receiving Tubes"* booklet.
4. *"RCA TV Replacement Guide."*
5. *"TV Servicing Supplement."*
6. *"RCA Kinescopes"* booklet.
7. *"TV Servicing."*

How to get your RCA "SERVI-CHEST"

IT TOOK SIX MONTHS TESTING in the field to develop just the right kind of carry-all case for you . . . the RCA "SERVI-CHEST." It's the "little black bag" that identifies you as a "professional" Radio and Television Service Technician. The "SERVI-CHEST" is just what you asked for . . . and you can get yours *without cost.*

During the next three months, you will receive one RCA Silver Token from your *RCA Tube Distributor* for each RCA Kinescope or for each 25 RCA Receiving Tubes you purchase. When you have collected 30 Silver Tokens, present them to your *RCA Tube Distributor* and receive, *without cost,* the complete RCA "SERVI-CHEST." Start earning yours today.

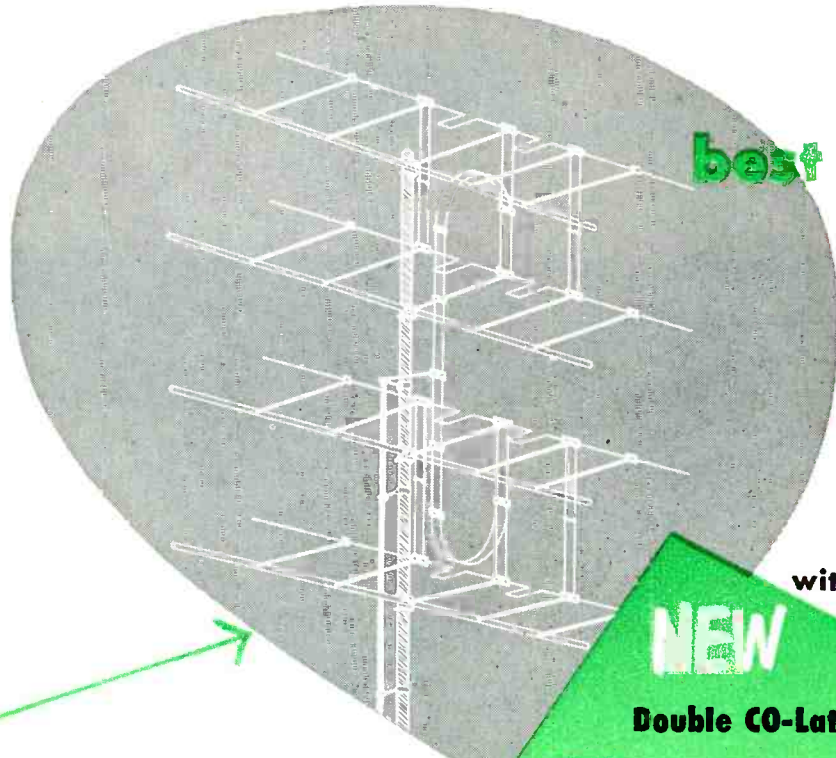
Now you can earn an RCA Drop Cloth and Carrying Strap

For only 3 Silver Tokens each, you can earn these two valuable servicing aids. See your RCA Tube Distributor.

Now available from your *RCA Tube Distributor* . . . The famous RCA "TREASURE CHEST" a perfect companion piece to the RCA "SERVI-CHEST"

See your RCA Tube Distributor today for full details

RADIO CORPORATION of AMERICA
ELECTRON TUBES **HARRISON, N. J.**



best possible

Fringe area installation

with the remarkable

NEW

Double CO-Lateral

FINCO 400-A

ALL Channel UHF and VHF Antenna

for excellent reception 120 to 150 Miles from stations

32 Driven Elements

Here is one truly great antenna for the fringe area market — an antenna that can give YOUR installations recognition in the community. The new 400-A was tested all over the country under all types of conditions. *Reception was the finest* — we can prove this! The traditionally superb Finco engineering is evident in the performance and symmetrical design. One antenna — one transmission line. All-aluminum construction — rugged, lightweight, completely pre-assembled. Total weight only 8 lbs.

Fringe area TV buyers demand Quality installations . . . FINCO is Quality!

Fringe area buyers more and more ask for the FINCO by name. Let them know you handle the best—advertise the low cost way with Finco co-op ad mats—tie-in with LIFE—watch your sales soar! Get the complete story from your jobber or write direct.

TO PUT THE ***FINCO*** NAME BEFORE YOUR CUSTOMERS WE ARE ADVERTISING IN . . . LIFE

RADIO

TELEVISION

LOCAL NEWSPAPERS

FARM MAGAZINES

Tie-In With This Program

The Finney Co.
Dept. S-15
4612 St. Clair Ave.
Cleveland 3, Ohio

RUSH

- ☐ information on the new 400-A and UHF Conversion Kit No. 12
- ☐ FREE LIFE merchandising display material.
- ☐ Co-op newspaper ad mat brochure.

NAME .....

COMPANY NAME .....

ADDRESS .....

CITY ..... ZONE..... STATE .....

the FINNEY COMPANY

Dept. SD-17 • 4612 St. Clair Ave. • Cleveland 3, Ohio

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MEMBER AUDIT BUREAU OF CIRCULATIONS

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EDITORIAL

by S. R. COWAN

New Servicemen's Magazines

Recently I've heard that two or three different firms are about to launch new magazines for TV servicemen—or, as in one case, a former retailing magazine is about to switch over to become the "saviour" of technicians. These "new" magazines, according to their publishers' claims to advertising prospects, will be so "unique and wonderful" that every serviceman will surely become a subscriber. The fact that there are already eight magazines claiming to be servicemen's salvation—and that most servicemen are already paying upwards of $30 a year for subscriptions to magazines that they haven't time to read thoroughly seems to be overlooked by our prospective contemporaries.

Because I have been associated with the only two technical magazines that have genuinely catered solely to radio-TV servicemen for over 24 years ("Service" from 1930 to 1940 and "Service-Dealer" since 1940), I am intrigued by the claims of other publishers who suddenly find it so advantageous and necessary for them to come to the aid of the service profession; especially the one that has been so retailer-conscious for many years, when that's where the publishing gravy was; and while servicemen were struggling to stay alive because of the unfair tactics used by retailers who used technicians as fall guys.

As for new ideas or publishing techniques that will surely benefit the serviceman and service profession, I candidly admit that I've searched for them for a quarter of a century, and in all that time have only discovered two or three that have merit, are practical, and sound. For example, "Radio-TV Service Dealer" originated such regular departments as "Shop Notes"—"Circuit Court" and "Video Speed Servicing Systems." Each has proven its worth as thousands of unsolicited testimonials attest.

It is known to the service field that if any serviceman ever advances a new and practical publishing idea that can be used by us to improve the serviceman's lot, he will receive a handsome reward. Yet servicemen themselves, facing their daily problems and being closer to the nub of things than any "Johnny-come-lately" seldom offer us suggestions. The reason is simple: being close to the nub of things ourselves we usually beat our readers to the punch and do the jobs they want us to do as an automatic function.

Perhaps we don't dish out fancy charts and tabulated data sheets in four colors—but for *genuine* application, the text we run is authentic, accurate and timely . . . and that's something only a magazine published by servicemen for servicemen can do.

Nevertheless, competition stimulates any aggressive businessman. We'll meet the challenge. We'll try even harder than ever before to maintain "Service-Dealer's" acknowledged leadership as the "Professional Radio-TV man's magazine."

How to make PICTURE-TUBE SUBSTITUTIONS EASILY

New CBS-Hytron Substitution Chart for Television Picture Tubes helps you pick logical substitutions easily, quickly. It's a cinch to use this complete, up-to-date Chart. An Index of types leads you to proper Substitution Group listing all readily interchangeable types. You pick an available type . . . with the least number of necessary service adjustments. That's it. No other references required. You save time . . . money. You need this indispensable CBS-Hytron TV Substitution Chart. Get it from your CBS-Hytron distributor. Or write direct today.

WHAT'S IN IT

1. *General Introduction* outlines scope and purpose.
2. *Introductory Notes* give details on tabulation.
3. *Typical Substitution* shows how to use Chart.
4. *Index* indicates Substitution Group for each type.
5. *Substitution Groups* narrow choice to logical substitutions.
6. *Basing and Outline Drawings* give basing and dimensional data.

FEATURES

- All necessary data given for all electromagnetically deflected types, regardless of make.
- Directly interchangeable types indicated.
- Other popular substitutes and required service changes high-lighted and explained.
- Substitution, not conversion, emphasized.

GOT THESE HELPFUL GUIDES?

All are complete. Include all types, regardless of make. Give all pertinent data. Are free. Get yours today.

Miniature Guide includes 250 types, 111 basing diagrams. Indicates similar larger prototypes.

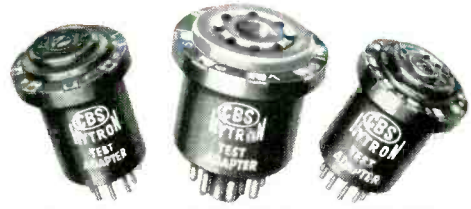
Crystal Diode Guide describes 92 types. Includes 7 dimensional diagrams. Indicates typical application for each type.

TV Picture-Tube Guide lists 164 types, 19 basing diagrams for all magnetically deflected picture tubes.

New . . . Free DECAL

Not just an identification. But a colorful decal that sells for you! *Sells* your magic ability to recapture new-set sparkle. Let this decal pull customers to you. Get it today from your CBS-Hytron distributor.

NOW 3 CBS-HYTRON TEST ADAPTERS



7-Pin Min., $1.45 Net

8-Pin Octal, $2.25 Net

9-Pin Min., $1.75 Net

BY POPULAR DEMAND. You can now buy CBS-Hytron Test Adapters in all three popular sizes: 7-pin miniature, 8-pin octal, 9-pin miniature.

You can now test *all* sockets dynamically . . . "topside." Without wrestling with heavy chassis. Without disturbing wiring or parts. Just plug tubes into Test Adapters and Adapters into sockets. Presto, socket connections are topside . . . ready for your test prod. You check voltage, resistance, gain, intermittents, oscillation. Trace signals, etc. All the e-a-s-y topside way. Order *all three* Test Adapters from your CBS-Hytron distributor today.

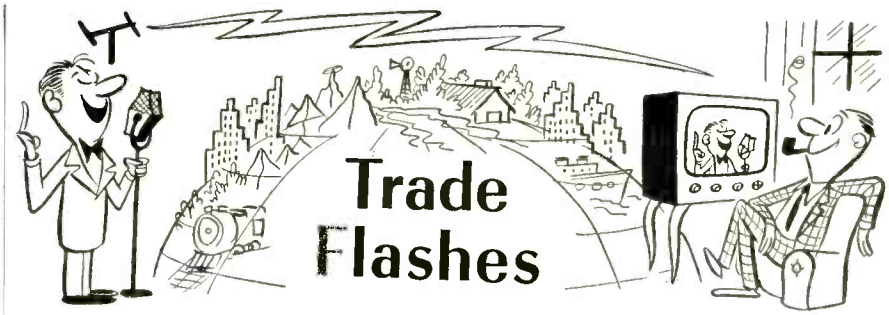
CBS HYTRON

Manufacturers of Receiving Tubes Since 1921

CBS-HYTRON Main Office: Danvers, Massachusetts

A Division of Columbia Broadcasting System, Inc.

RECEIVING . . . TRANSMITTING . . . SPECIAL-PURPOSE AND TV PICTURE TUBES • GERMANIUM DIODES AND TRANSISTORS



Trade Flashes

Du Mont Training Program Underway

An accelerated serviceman's training program in new television areas, plus a follow-up in older markets, to increase technical proficiency, is currently underway by the Teleset Service Department of Allen B. DuMont Laboratories, Inc. Du Mont service clinics are being held in more than 40 new areas including Columbia, S. C., Bethlehem, Pa., Montgomery, Ala., Fort Lauderdale, Fla., as well as several other cities recently gone on the air or expected to begin transmission shortly. The serviceman is regarded as the important link between the manufacturing and selling elements of the industry, and the consumer, himself. Strong emphasis is placed on the importance of good business practices on the part of servicemen in the television field today.

Du Mont's regional service manager organizes the service clinic operation, in cooperation with the local distributor. Bench test equipment is set up and a definite class schedule publicized in the local consumer, trade press, and in local trade association circles. Classes, held evenings, are purposely limited to size, to insure individual attention. Strong emphasis is placed on practical trouble shooting and the proper use of bench test apparatus. While portions of the course are devoted to actual work methods of fixing troubles, the main objectives are always to show the serviceman how to find the trouble, why it exists and then explain to him how to alleviate it.

Servi-Chest Offered Dealers In RCA Radio-TV Tube Promotion

A compact carrying case designed to accommodate parts, tools, and test equipment required by TV technicians on house calls was announced by the Tube Department of RCA Victor Division, Radio Corporation of America.

Called the RCA "Servi-Chest," the kit is offered to radio and TV service dealers under a three-month sales promotion program sponsored by the RCA Tube Department in connection with RCA receiving tubes and kinescopes. Under the program, dealers can receive "Servi-Chests" from their RCA tube distributors with the purchase of 750 RCA receiving tubes or 30 RCA television picture tubes between June 1 and August 31.

The "Servi-Chest measures 13½ inches high 9 inches deep, and 18¼ inches wide and complements the RCA "Treasure Chest" for tubes. It is constructed with a sturdy wood frame, strengthened in each corner with metal braces, and covered with rugged leatherette. Included is a giant service mirror which features a working surface measuring 11 by 16 inches. Internal construction includes separate compartments for soldering gun, vacuum tube voltmeter and servicing tools; three separate drawers for storing resistors, condensers, and spare parts; and a large utility drawer for probes, flash-light, larger tools and parts.

To facilitate record-keeping, each service dealer will receive from his RCA tube distributor a silver token with each purchase of 25 RCA receiving tubes or one RCA kinescope. Each token will bear the identification number of the distributor, who will exchange a "Servi-Chest" for 30 tokens bearing his number when presented by dealers.

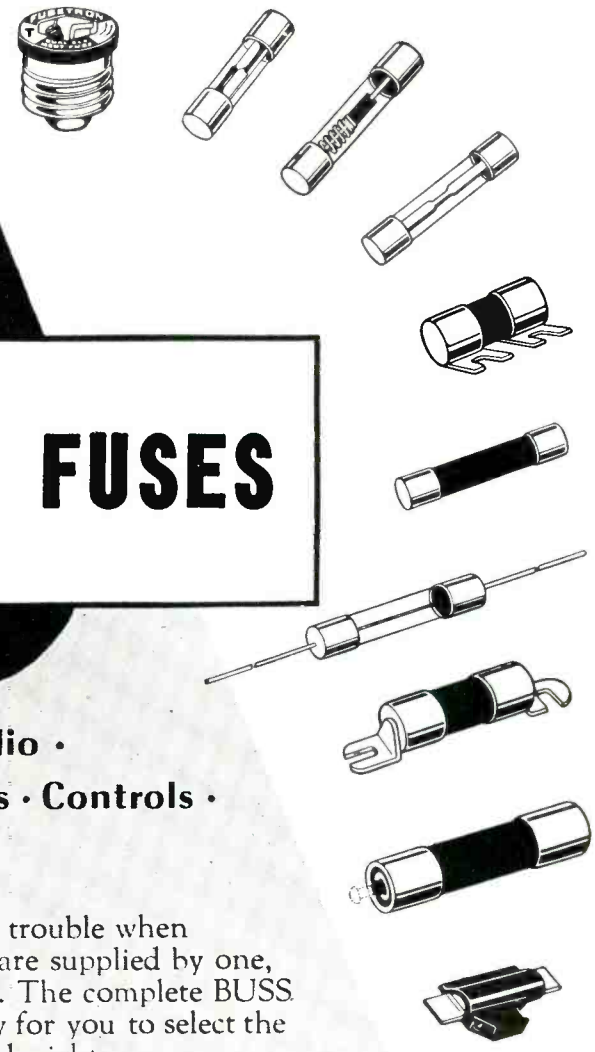
$10,000 In Cash Prizes Offered By Raytheon Contest

Raytheon Manufacturing Co., Receiving Tube Division, Newton, Mass., announced a $10,000 Transistor Application Contest to be handled exclusively through Raytheon Special Purpose Tube Distributors. The contest opened June 1, 1953 and runs for three months with the closing date set at midnight August 31, 1953. Raytheon, to encourage development and experimentation in the field of Transistor application, is sponsoring this contest primarily directed toward the experimenter, engineer and "gadgeteer." The contest offers a first prize of $5,000, second prize of $2,000, third prize of

[Continued on page 10]

YOU'LL FIND THE RIGHT FUSE, FASTER in the Complete Line of Electronically Tested

.....BUSS FUSES



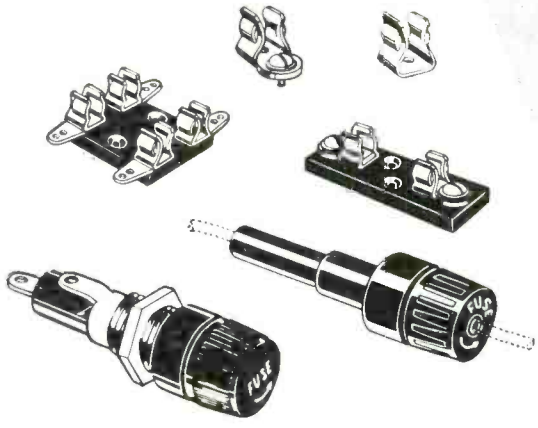
for Television · Radio · Radar · Instruments · Controls · Avionics . . . .

You'll save time and trouble when all your fuse needs are supplied by one, dependable source. The complete BUSS line makes it easy for you to select the fuse to do the job right.

The makers of BUSS fuses insist on perfection. Every fuse is electronically tested in a sensitive device that rejects any fuse not properly calibrated, properly constructed and right in all physical dimensions.

Take advantage of the profit-saving efficiency that you can gain by standardizing on the complete line of BUSS fuses.

Plus
A COMPLETE LINE OF FUSE CLIPS, BLOCKS AND HOLDERS



IT'S GOOD BUSINESS to stock and use BUSS fuses. Your customers **know** the name BUSS . . . famous for protection in homes, on farms and in industry for 39 years. When you use BUSS, they know you've used the finest fuses available.

BUSSMANN Mfg. CO., Division of McGraw Electric Co.
University at Jefferson, St. Louis 7, Missouri

MAIL THIS COUPON *TODAY*...

BUSSMANN Mfg. Co. (Division of McGraw Electric Co.) SD-753
University at Jefferson, St. Louis 7, Mo.

Please send me bulletin SFB containing facts on BUSS small dimension fuses and fuse holders.

*Name*_____

*Title*_____

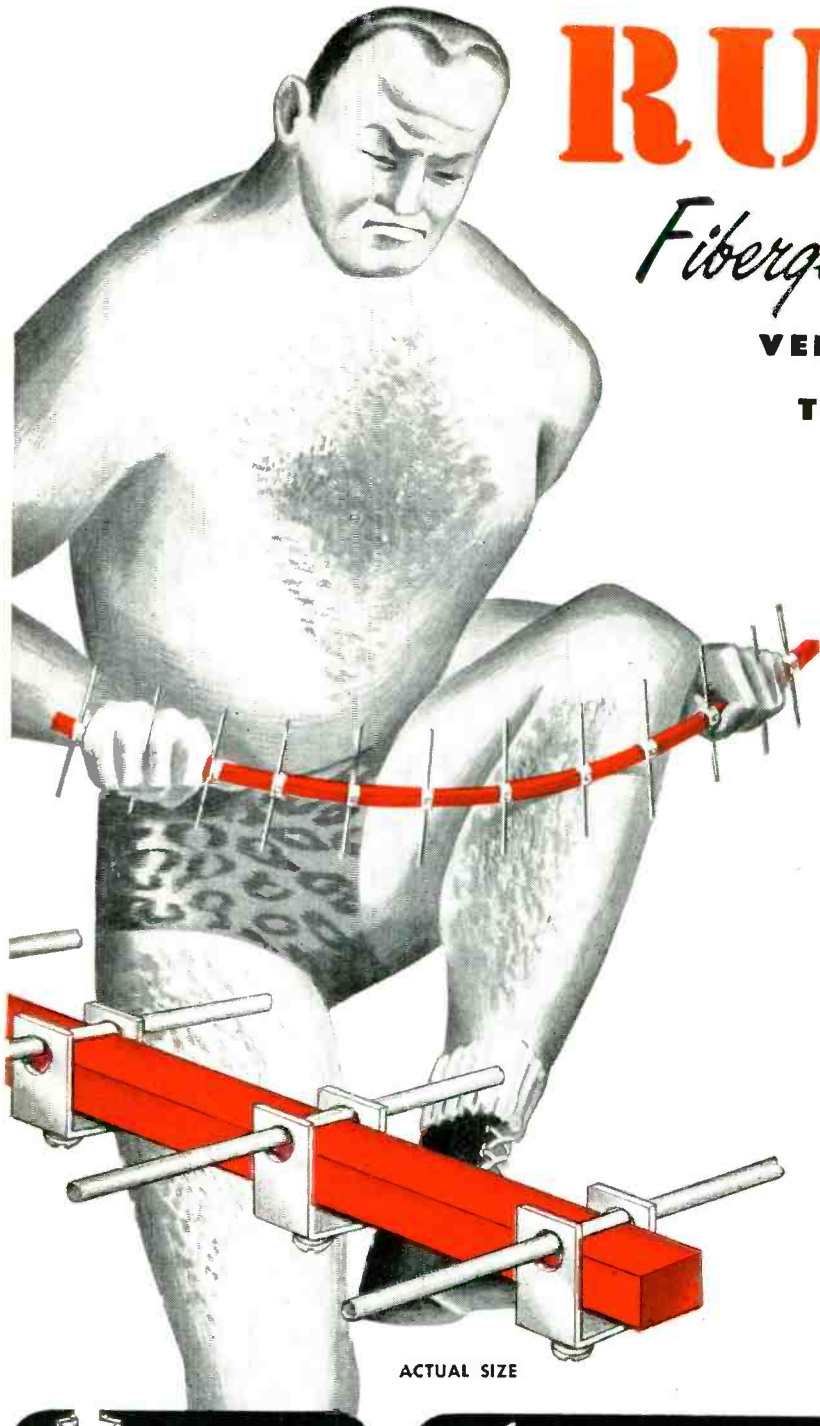
*Company*_____

*Address*_____

*City & Zone*_____ *State*_____ 753

RUGGED

Fiberglas HELPS MAKE VEE-D-X UHF ANTENNAS THE WORLD'S STRONGEST



ACTUAL SIZE

The sensationally strong Fiberglas boom used in the construction of VEE-D-X UHF antennas has the highest strength ratio to weight of any material known, and its bright red color makes it easy to identify as a genuine VEE-D-X antenna.

TV SERVICE MEN *EVERYWHERE* VOTE VEE-D-X UHF ANTENNAS *FIRST* FOR CONSTRUCTION — PERFORMANCE — EASE OF INSTALLATION.

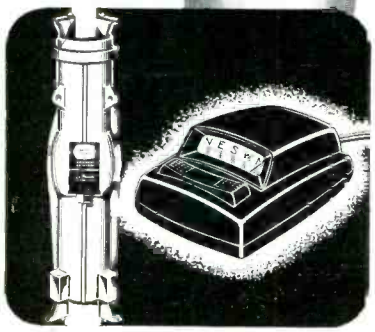
Besides the rugged Fiberglas boom, VEE-D-X UHF antennas are designed with strong, yet light weight solid aluminum elements (to prevent ice loading) and (a VEE-D-X exclusive) Flex-Clamp on the Bow-Tie and Corner Reflector, for positive vise-like grip and ease of installation.

And every VEE-D-X UHF antenna is engineered for powerful performance in all areas! No wonder TV service men are saying, "These VEE-D-X UHF antennas are Power-FULL in both performance and construction."

VEE-D-X

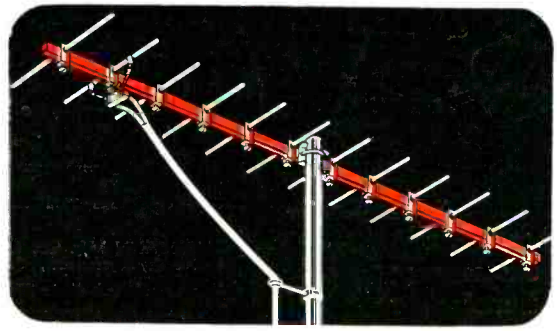
THE WORLD'S FINEST UHF ANTENNAS

La Pointe **ELECTRONICS INC.**
ROCKVILLE, CONNECTICUT



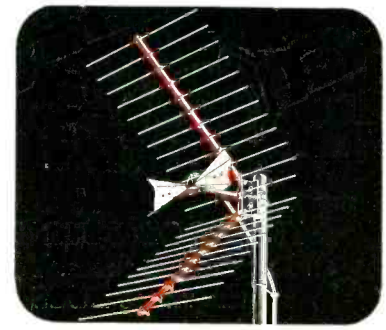
ROTATOR

Finest in design, construction and performance. Produced in collaboration with three world famous manufacturers. Designed to perform with pin-point accuracy. Beautifully styled control console operates with convenient downward pressure. Choice of two colors.



LONG LONG JOHN

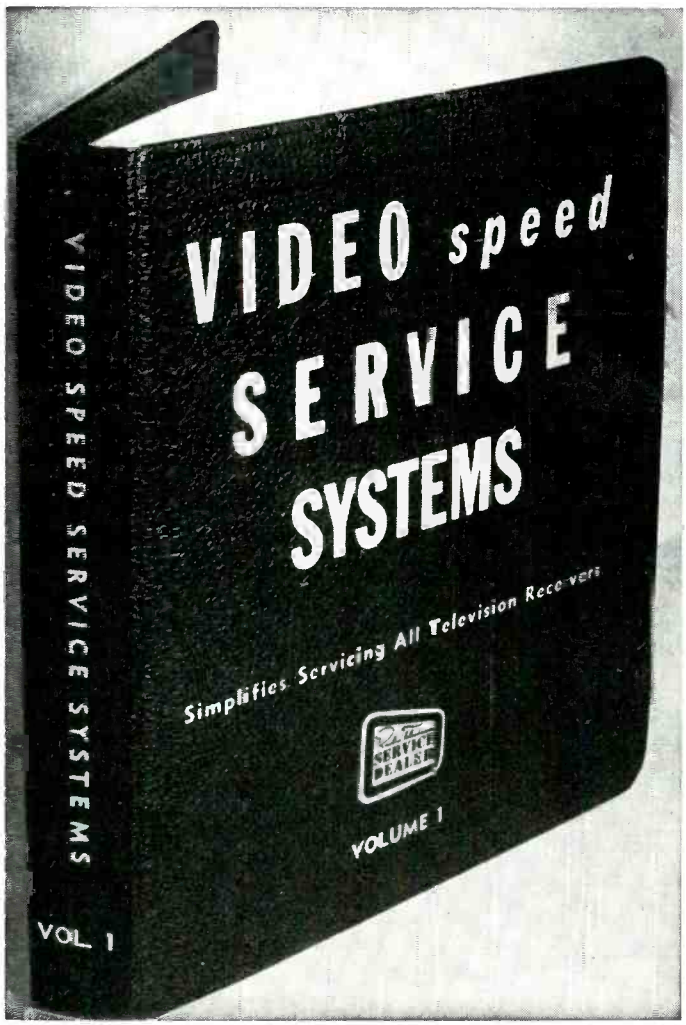
This 12-element yagi is engineered for grand slam power in fringe areas. It is the highest gain single channel antenna ever developed. Rugged Fiberglas boom construction. Strong, light in weight and factory pre-assembled construction for ease of installation. Model LLJ-U.



CORNER REFLECTOR

This is the *power-full* all-channel VEE-D-X antenna that minimizes probing. Also the answer for UHF fringe and areas where noise or reflection problems exist. Rugged Fiberglas boom construction. Ready for installation in less than 30 seconds. Model COR-U.

Order Yours Now!



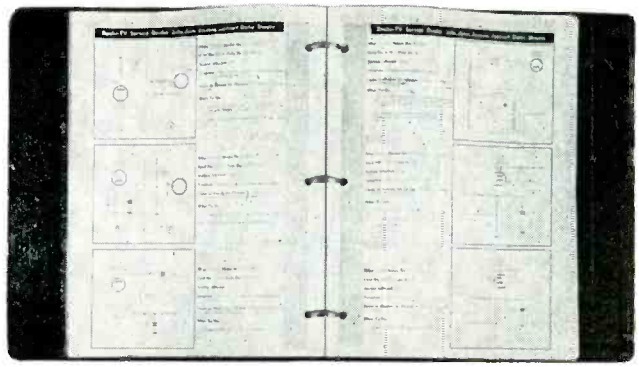
VIDEO speed SERVICING SYSTEMS

Contains over 600 Service Items representing over 1000 of the most-serviced Television models now in use. Over 25 different manufacturers' lines are covered.

$4.95 (post paid)

Distributors—order your supply now!

Service Dealers—get your copy of VSSS from your Distributor. If he can't supply you, order direct by mail from us.



The expansion type ring binder (of finest quality) is 9 x 12 inches, holds all 224 pages of VSSS Vol. 1, and has room for another year's supply of VSSS Data Sheets. Opens flat for bench use. TVset models and chassis are cross indexed for speedy reference.

Video Speed Servicing Systems IS GUARANTEED To Simplify Servicing All TVsets. 24 (or more) new Data Items are published in every issue of "Radio-Television Service Dealer" as a regular monthly feature.

TEAR OFF AND MAIL NOW

RADIO-TELEVISION SERVICE DEALER
67 West 44th Street, New York 36, N. Y.

Please send me post-paid VIDEO SPEED SERVICING SYSTEMS Volume 1. Enclosed herewith is

my ☐check ☐ money order for $_____ for _____ copies at $4.95 each.

Name .....

Address .....

City ..... Zone ..... State .....

TRADE FLASHES

[from page 6]

$1,000, fourth and fifth prizes of $500 and $300 respectively and sixth to seventeenth prizes of $100 each. A $100 prize will be given to the Distributor Salesmen selling the winner of the first to the fifth inclusive prizes.

Briefly, requirements are that a contestant must obtain a Raytheon CK722 from his Raython tube distributor, device and build a piece of electronic equipment which employs one or more Raytheon CK722 transistors, and mail a photograph of the unit, a completed official entry blank, and a 500 word minimum, 1,000 work maximum constructional article on the equipment to Raytheon. The seventeen cash prizes will be awarded to the seventeen contestants who build and submit the most ingenious, useful and original applications of the Raytheon CK-722 Function Transistor.

G.E. Conducts Business Survey For Service Dealer

Any radio-TV service dealer who would like to know how his own operation compares with thousands of others will have his answers from the General Electric Tube Department this summer. The department has mailed 40,000 copies of a "How's Your Business?" questionnaire to service dealers in every major television area in the country. Returns will be compiled to make an "average service dealer." According to John T. Thompson, Manager, G-E Replacement Tube Sales, the survey is part of the widespread public relations program which the company is sponsoring in the interests of the TV service industry.

Typical survey questions ask the service dealers how his business is divided on a percentage basis—for home and portable radios, auto radios, TV sets, and other electronic equipment—how many service technicians he employs, how many jobs each handles per week, and how many hours technicians spend on each job. The survey also asks if radio business increased or decreased last year, and gives the service dealer space to list "major problem(s) you believe your business will face in the next few years." The G-E Tube Department conducted an initial service dealer survey in 1951 and followed it with another last year. The 1953 survey is designed to bring past findings up to date.

RTMA Report Shows Increase In Radio-TV Set Production

Television and radio set production during the first four months of this year increased by 70 per cent and 38 per cent, respectively, from the same period last year, the Radio-Television Manufacturers Association reported.

Total television production through April of this year was estimated at 2,827,821 units by the Association compared with 1,647,708 in the like 1952 period. The radio output increased from a revised total of 3,625,863 sets in 1952 to 4,993,720 in the January-April period this year. Gains were made in all four radio classifications —home sets, clock radios, portables and auto sets. April television output was estimated at 567,878 units compared with 322,878 for April 1952. The number of radios manufactured increased from 957,666 units last year to 1,158,936 sets in April this year, RTMA reported. Radios with FM circuits manufactured during April totaled 40,178 units. An additional 2,721 television receivers containing FM facilities also were produced.

RCA Victor to Enter Hi-Fidelity Phonograph Field

The RCA Victor Division of the Radio Corporation of America has announced the development of a new high-fidelity system of record reproduction, permitting the introduction for the first time of high-fidelity instruments in the company's regular phonograph line. Joseph B. Elliott, Vice President in charge of Consumer Products, said RCA Victor's entry into the high-fidelity phonograph field will now en-

able the general public to enjoy extended tonal range and distortion-free record reproduction on home instruments engineered and manufactured by the company which has gained world-wide recognition for its contributions in the field of sound recording and reproduction.

RTMA Service Committee Cites Aid to Technicians and Public

Citing a list of accomplishments relating to means of improving service to the owners of radio-television products, the RTMA Service Committee reported that its efforts were concentrated during the past year on programs aimed at increasing the technical proficiency of technicians. The Service Committee annual report noted that a pilot course at the New York Trade School has been launched to develop training material for the use of the nation's trade and vocational schools to upgrade TV technicians. Through voluntary contributions of the entire membership of RTMA, funds and equipments were acquired to defray the expenses of a projected two year program.

I.D.E.A. Introduces New Regency Remote Control For TV

An inexpensive and highly efficient remote control for television that operates on a single connecting cable and can be installed in less than 15 minutes was introduced at the Electronic Parts Show by the Industrial Development Engineering Associates (I.D.E.A) of Indianapolis. The company also manufactures Regency *vhf* boosters and *uhf* converters for television.

According to Edward C. Tudor, president, interest in the new Regency remote control has been extraordinary. The Chicago industrial designing firm of Painter Teague & Petertil, who designed the smart Regency booster and converter, will stylize the cabinet for the remote control. "With this new Regency item, the only connection necessary with the TV set is a single conductor cable," Mr. Tudor explained. He said that the installation of the remote unit to the TV set entails the soldering of three simple connections. "It's an operation that can be performed by an experienced service man in fifteen minutes," he added. Mr. Tudor said that the Regency remote control is constructed to work with any existing TVset and that nothing in the set is disturbed when the installation is made. The Regency remote control performs four major functions, he said. It selects stations, adjusts fine tuning, and controls contrast and volume. All of these important operations, Mr. Tudor pointed out, are done through the single wire connecting the TV set with the Regency unit.

Percy L. Schoenen Dies—Headed Olympic Radio & TV

Funeral services for Percy L. Schoenen, 61, former president of Olympic Radio & Television, Inc., Long Island City, was held recently. A prominent figure in radio and television manufacturing circles, Mr. Schoenen had been associated with Olympic since its founding in 1935. He joined the firm as a vice-president, became executive vice-president in 1946 and president in 1952. He retired from the latter office in April of this year.

Mr. Schoenen had served as a member of the Radio and Radar Committee of the Civilian Industry Advisory Division of the War Production Board during World War II. He was also an active member of the Radio and Television Manufacturers' Association.

A native of Chicago, Mr. Schoenen is survived by his widow, Anna, and a brother, Archibald.

Western Electronic Show

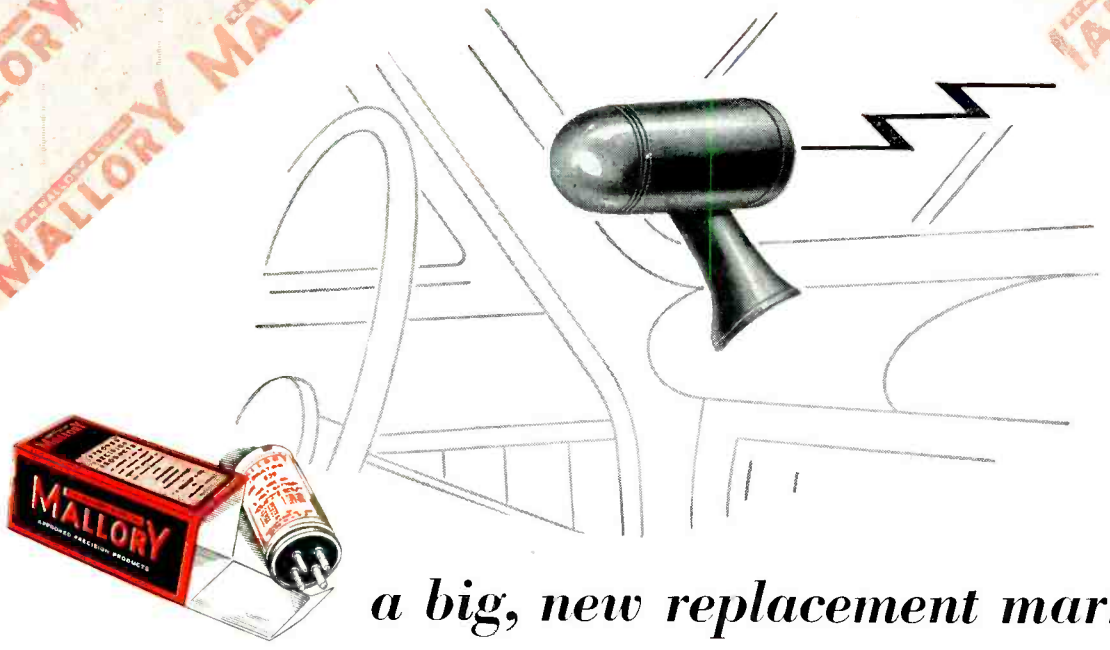
August 19th, opens the ninth annual Western Electronic (Trade) Show at Civic Auditorium, San Francisco, for a three-day run. The top 80% of electronic manufacturers will occupy 327 booth to display products used in broadcasting, communication, telemetry, air and marine navigational aids, industrial production and controls, instrumentation, computors, professional electronic research and education, nucleonic and geophysical detection and research, servicing and installation accessories. No home-use receivers will be displayed; and the general public will not be admitted. Trade and engineering attendance is expected to reach 14,000.

These combined (Wescon) annual events alternate annually between Los Angeles and San Francisco, and now rank second in size and importance among National electronic trade shows and engineering gatherings.

GE Opens New Tube Warehouse

Increased electronic tube service to the midwest was spotlighted June 11, as the General Electric Company formally opened its new tube warehouse—largest in the world—at 3800 N. Milwaukee Ave.

The $875,000 structure has almost 100,000 square feet of floor space. It



a big, new replacement market for Mallory Vibrators... ELECTRONIC HEADLIGHT DIMMERS

THE MARKET Already, over a hundred thousand new automobiles are equipped with automatic, electronic headlight dimmers. By the end of the year this figure will be multiplied several times . . . and the first of them are beginning to need service.

THE OPPORTUNITY This can be big business for you . . . business that may grow even larger than automobile radio service. But, if you are to get full benefit of this new market, automotive shops must be told that these are *electronic devices . . . devices that should be serviced by qualified radio service men.* Explain it, now, to every car dealer and shop for which you do service work.

THE PRECISION PARTS Automatic headlight dimmers depend on a vibrator power supply unit. When it is time for vibrator replacement, you can be sure the job is right if you use Mallory. As in the case of automobile radios, Mallory worked closely with the manufacturer and played an important part in this new development by supplying the first original equipment vibrators. With just three Mallory Vibrators you can service any unit now on the market.

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also serves as headquarters for the company's central regional sales organization for electronic tubes.

Farm Market Forecast As Major TV Sales Area

The nation's farm market with an annual gross income of over forty billion dollars can become a major factor in the sales of television receivers, Irving Rosenberg, director of operations, receiver and cathode-ray tube divisions, Allen B. Du Mont Laboratories, Inc., said. Speaking before an industry group at East Paterson, New Jersey, the Du Mont executive noted that until the "freeze" on new station construction was lifted last year, large-scale television coverage was not available in farm areas. Now, he added, almost one-third of this country's 5,000,000 farms are within reception range of a TV station.

Antenna Manufacturers Elect New Officers

Election of new officers of the Antenna Manufacturers Association has been announced by David Laine, Secretary for the organization.

President of the group is Martin Bettan, Director of Sales and Engineering for RMS (Radio Merchandise Sales, Inc.), who is also a widely known lecturer and antenna authority. Ben Snyder, of Snyder Manufacturing Company, was made Vice-President, and Edward Finkel, J.F.D., will serve as Secretary-Treasurer of the association, of the industry's leading antenna manu- which is comprised of a large number seven million television receivers in facturers.

Nearly 2.5 Million TV Sets Shipped to Dealers in Four Months

During the first four months of this year nearly 2.5 million television receivers were shipped to dealers throughout the country, the Radio-Television Manufacturers Association reported. For the January-April period, RTMA estimated that 2,452,508 TVsets went to dealers compared with 1,564,516 sets shipped in the same 1952 period. For the month of April, the Association reported 392,492 TVsets went to dealers compared with 287,004 units shipped in April 1952.

LaPointe Appoints Sales Manager

Webster E. Barth has been appointed General Sales Manager for LaPointe Electronics Inc., it was announced by Jerome E. Respess, Vee-D-X president. In his new post Mr. Barth will coordinate the sales efforts for all the company's divisions including Vee-D-X television antennas and accessories, Press Wireless electronic devices and equipment, and the newly created Fiberglas operation. Mr. Barth was formerly Sales Manager for New England for the Reynolds Metals Company, and he had seventeen years of sales experience.

CBS-Columbia Appoints Director.

The Board of Directors of CBS-Columbia Inc., television and radio receiver manufacturing subsidiary of the Columbia Broadcasting System, announced the election of Louis Hausman, CBS-Columbia Vice President, as a Director of CBS-Columbia Inc. Mr. Hausman was formerly Administrative Vice President of CBS Radio. He has been associated with the Columbia Broadcasting System for more than 13 years.

Sylvania Plans New TV Plant

Sylvania Electric Products, Inc., announced plans for a new 416,000-square-foot television set manufacturing plant to be built in Batavia, N. Y.

H. Ward Zimmer, Sylvania President, said the new plant will be built in anticipation of greatly increased production and sales of Sylvania television sets.

[*Continued on page 43*]

UNBEATABLE quality is built into every Sylvania product. Even beyond that, Sylvania quality goes back to its essential metals, chemicals, and materials.

Sylvania quality is fundamental

Sylvania grinds and formulates its own phosphors, and applies them by improved methods which assure maximum uniformity and fine picture-tube performance. Sylvania draws its own high-quality tungsten filaments and winds and tests its own coils.

Naturally, this far-reaching quality control results in an enviable nation-wide reputation. Today 7 of the top 10 television set makers use Sylvania Picture Tubes and Receiving Tubes. Naturally, too, Sylvania quality pays off in fewer call-backs, more satisfied customers . . . and *more profits for you.*

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the most sensitive fringe area antenna ever developed for UHF!

- Two dipoles—actually two antennas in one.
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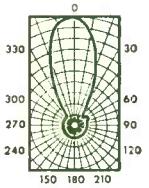
- Eliminates UHF's TWIN TERRORS. Features vibration-proof construction; and "free-space" terminals.

model no. 406

up to 16 DB gain!

gain above tuned reference dipole

horizontal polar pattern (relative voltage)



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CHANNEL MASTER'S 10-ELEMENT DELTA-WELD YAGI

practically no assembly necessary

custom-designed for your specific area!

- Elements permanently WELDED IN POSITION on crossarm.
- Custom construction — designed for almost any UHF area.
- Delta-matched dipole for excellent impedance match.
- Brilliant performance. Average gain: over 11 DB, single bay; over 14 DB, stacked. Even higher on some models.
- Eliminates UHF's TWIN TERRORS.

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No. 6 **SYMPOSIUM** SERIES

UHF ANTENNAS

PART 2

by RUDOLF F. GRAF

We have extended this section to include three parts. This second installment discusses the following types of UHF antennas: corner reflector, helical, dipoles with screen reflectors, circular, clover leaf, and conical.

WITH the rapid expansion of *uhf* stations all over the country, it is important that the progressive servicemen be acquainted with the various new antennas that have recently appeared on the market, as well as the numerous and unique problems that arise when making a *uhf* installation. One of the nicest things about *uhf* antennas is the fact that they are substantially smaller and considerably lighter than their *vhf* brothers. There are a number of suitable antennas on the market and their choice depends entirely on the requirements of any one particular locale.

In the first part of this symposium we have discussed the following popular types of *uhf* antennas:

1. Bowtie or Fan Dipole.
2. V-type antennas
   (a) Four element horizontal end-fire V
   (b) Vertically stacked V
   (c) Trombone antenna
3. Rhombic antenna.
4. Yagi antenna.

In the second part of the symposium, we cover a number of other types of commercially available *uhf* antennas. At the end of the series we shall devote a little space to the problems encountered when making *uhf* antenna installations.

Corner Reflector

This is one of the more elaborate types of *uhf* antennas and is sometimes also referred to as a sheet reflector type of antenna. There are now available two types of corner reflectors, which are distinctly different in their mechanical construction. One type uses horizontal rods and the other uses a wire screen. Even though the ideal reflector would be a solid metal sheet, either of the aforementioned types of construction is quite satisfactory electrically, and is much to be preferred from a mechanical point of view, since weight, wind resistance, and ice loading are considerably reduced. See *Fig. 9*.

Whether the reflector is constructed with rods or is of a wire form, the open spaces should be about one tenth of a wavelength or less at the highest operating frequency. That being the case, the reflector functions the same, from an electrical point of view, as if it were one solid sheet of metal. Thus, any signal entering from the front of the array will be reflected toward the antenna proper as illustrated in *Fig. 9*. The included angle between the two halves of the reflector is usually 90 degrees. The antenna or driven element is placed in the center of this assembly at about 8½ inches from the vertex. This distance is found to be optimum for best reception over the entire *uhf* band.

The driven element is the familiar broad-band dipole that we have used on the Bowtie, with some slight modifications. The dimensions are given in *Fig. 9a*. The two halves of the driven element are cut from thin aluminum and have an included angle of 40 degrees. *(Fig. 9b)* In order to reduce the capacitance to the reflector, they are bent up at 90 degrees across their axis *(Fig. 9c)*. The overall length of the driven element should be 14¼ inches for best performance over the entire *uhf* band.

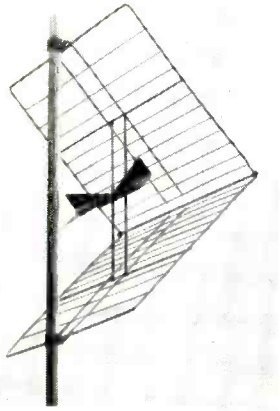
The width and length of the reflector screen is not too critical. It must, however, extend over the driven element in all directions. It has been found through exhaustive tests that the optimum size for the reflector is a rod length of 20 inches and a width of 25 inches. An increase in the reflector beyond this size is not warranted since the performance is bettered only slightly, but the weight of the whole assembly begins to be a problem.

While we are on the subject of weight, let us see how this antenna is rigidly held in place. This is the heaviest of all the *uhf* antennas and since we all know that vibration of the antenna causes picture flutter and is a

serious problem at these frequencies, a rigid method of support must be employed.

When the reflector is made up of a number of horizontal tubes as shown in *Fig. 9* the whole assembly is usually held at the vertex of the reflector screen. The driven element is held in the center of the corner with an insulator which extends forward into the corner reflector.

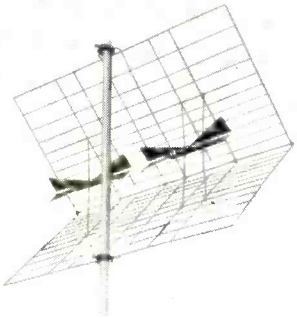
The horizontal elements are either ¼" or up to ⅜" tubes or solid rods. They are held in place either by an



Courtesy Channel Master

Fig. 10—This antenna is supported by mast attached to ends of screen.

aluminum channel or by a wood or Fiberglas support. It is of no particular importance, insofar as the performance of the antenna is concerned, whether, the reflector elements are electrically connected or not. Thus the



Courtesy Channel Master

Fig. 11—Twin corner reflector uses two driven elements.

supports may be metallic or non-metallic.

Since there actually is only one point of support (the vertex of the corner array) for the whole assembly, there is a slight tendency for the whole reflector to be subject to vibration in severe weather.

There is another method of support shown in *Fig. 10,* which, in the opinion of the author, is much to be preferred insofar as the rigidity of the

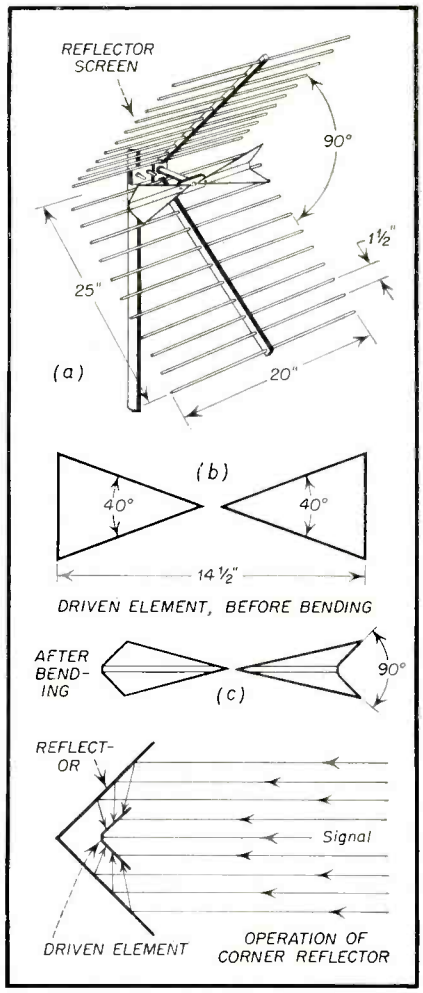


Fig. 9—Corner reflector antenna construction and operation:
(a) antenna dimensions.
(b) driven element before bending.
(c) driven element after bending.
(bottom) operation of the corner reflector *uhf* antenna.

whole assembly is concerned. This construction is now used by *Camburn Inc.* of Woodside, N.Y. in their Model 660 and by *Channel Master* in their Model 405. The reflector is held at the two extreme ends of the wire screen with two complete U-bolts assemblies. The driven element is riveted to an insu-

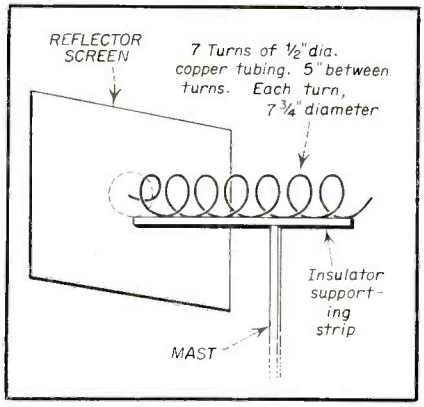
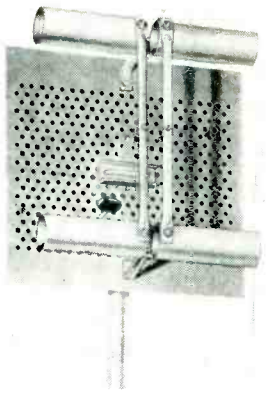


Fig. 12—Dimensions and construction of helical type of *uhf* antenna. Note method of support.

lator which in turn is riveted to two supports that hook into the wire screen at four indicated points. Thus, when the screen is opened, the driven element is held rigid and the angle of the reflector is automatically set. The fact that the mast is in front of the antenna does not seem to affect the reception of the signal at all.

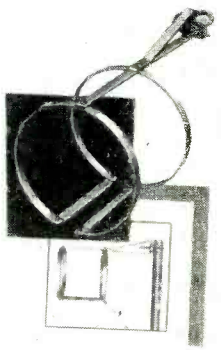
This is one of the truly uni-directional antennas. There is an almost complete absence of unwanted rear and side lobes (both in the vertical and in the horizontal direction) which



Courtesy Radiart

Fig. 13—UHF antenna using dipoles and reflector.

will solve many problems of reflections. Due to its very high gain, it is an excellent fringe area antenna as well as proving extremely useful in difficult urban installations.



Courtesy Rytel

Fig. 14—Circular *uhf* antenna needs no insulators.

Figure 11 illustrates a new type of corner reflector that has appeared on the market. It is called a Twin corner reflector and consists of two corner driven elements stacked side by side. The gain is considerably higher than that of a single antenna and the forward reception angle is narrowed considerably.

Helical Antenna

This antenna *(Fig. 12)* has been tested for *uhf* reception and has been

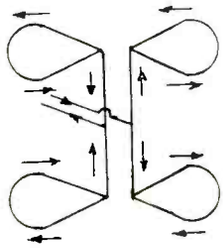


Fig. 15b—Current path in 2-bay stacked clover leaf antenna.

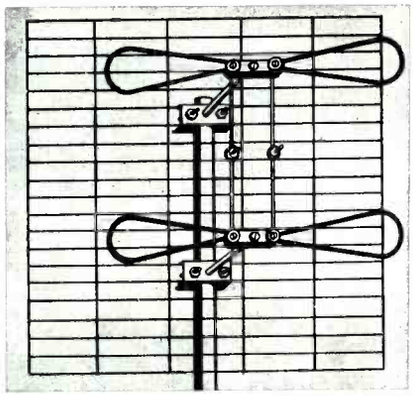
found to perform quite satisfactorily. It has however, not been made commercially available due to its high manufacturing cost. The antenna has a gain which is comparable to that of a Bowtie with reflector and has good directivity. The helical antenna is receptive to all signals no matter what their polarization may be. This is sometimes an advantage. Even though a television signal is sent out with horizontal polarization, it may change its polarization because of multiple reflection and other causes. A helical antenna suitable for *uhf* reception might have seven turns of ½ inch copper tubing. The turns would be 7¾ inches in diameter and would be five inches apart. The whole antenna is connected to the transmission line at one end of the coil at the point where it enters the reflector screen.

Dipoles With Screen Reflector

This antenna is illustrated in *Fig. 13*. It has been marketed by several manufacturers and has recently also been introduced as an indoor *uhf* antenna. Essentially it is the old familiar "Lazy H", designed to cover the entire *uhf* band. This broad band coverage (2 to 1 frequency ratio) has been accomplished by using large diameter elements properly spaced. This antenna has essentially uniform gain and may be stacked if required. The reflector screen is usually square and measures 12 inches on each side. Commercially available antennas have used perforated metal for the reflector. Nevertheless, any other reflector would also be satisfactory providing it is constructed as outlined above in the discussion captioned, Corner Reflector. The dipoles are mounted about 4½ inches in front of the reflector. The maximum gain attainable for a single bay is about 9 *db*.

Circular Antenna

One of the manufacturers on the West Coast has recently introduced a fairly small and simple circular folded dipole antenna which is trade-marked "Double-O". The antenna is said to have great directivity in the horizontal plane with minimum pickup in a vertical direction. The antenna is illustrated in *Fig. 14*. As we can see it consists essentially of two rings. These rings are connected together in such a manner that their signals are fed 90 degrees out of phase to provide an additional gain of 3.8 *db*. Since each ring has a gain of 1 *db* over a single dipole, the overall forward gain of this antenna is 1 plus 1 plus 3.8 or 5.8 *db*. There are no insulators of any kind used on the "Double-O" antenna since it is supported at a current node. The signal is fed to the receiver from the circle closest to the mast. In actual performance, this antenna was not quite as effective as the Bowtie with reflector or the stacked dipoles with reflector described above. Nevertheless, it is a good antenna for areas of strong to medium signal strength.



Courtesy Fretco

Fig. 15a—Stacked clover leaf type of uhf antenna.

Clover Leaf Antenna

This type of antenna is now being marketed under the trade names of "Clover-V-Beam" and "Mi-Tee-Ray". It is shown in *Fig. 15a*. The antenna is a stacked broad band *uhf* array covering Channels 14 to 83. The reflector makes the antenna essentially uni-directional and, depending upon the location, may or may not be employed. The antenna is marketed with straight reflectors, but the cloverleaf antenna elements are sometimes tilted forward. The cloverleaf shape provides an essentially uniform response over the entire *uhf* band without any sporadic peaks. *Fig. 15 b* and *c* shows the current flow in a double stacked and four stacked clover leaf array.

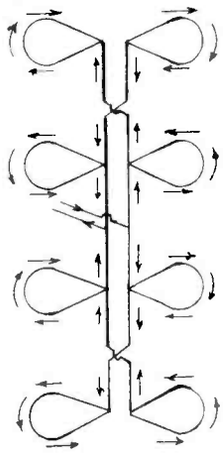


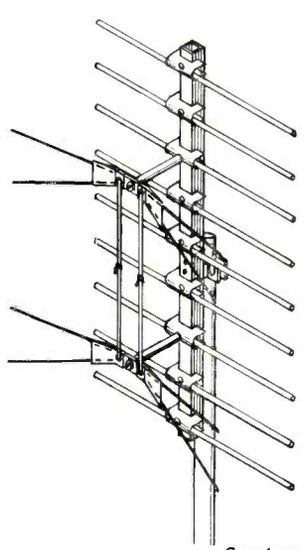
Fig. 15c—Current path in 4-bay stacked clover leaf antenna.

Conical Antennas

The antennas which are grouped under this heading are actually made up of a section of a cone. On order to reduce wind resistance and yet retain some of the desirable characteristics of a conical antenna only a small section (2 extremes) of an actual cone are used. The principal advantage of this type of antenna lies in the characteristically broad frequency coverage of a conical and the comparatively high gain which can be realized. A representative antenna built along the conical principle and manufactured by Telrex is illustrated in *Fig. 16*. The elements are arranged in the shape of a forward tilted "X", and may be stacked two or four high and be used with or without a reflector. The antennas are stacked and interconnected in essentially the same manner as the Cloverleaf antenna described previously. Each of the conical antennas measure 14 to 16 inches from end to end. and a four-bay stacked array is less than 2½ feet high. The center to center spacing of the elements is 12½ inches. The reflector rods are made of ⅜" tubing and must have a minimum center to center spacing of two inches.

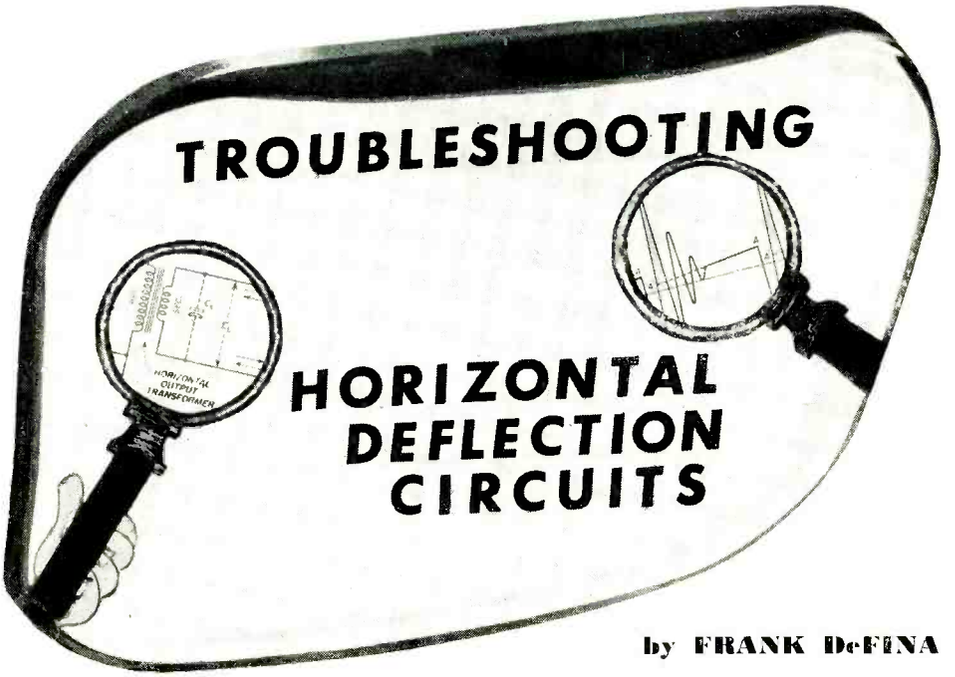
The gain of this antenna will vary from 7 to 11 *db* over the *uhf* band.

[*Continued on page 43*]



Courtesy Telrex

Fig. 16—Application of stacked conical uhf antenna. This antenna has broad frequency coverage.



by FRANK DeFINA

This article concerns itself with the procedures used for isolating and correcting defects in TV receiver horizontal deflection circuits and is a sequal to the theoretical article "Horizontal Deflection Circuit Theory," which appeared in the September, 1952 issue of RTSD

HORIZONTAL deflection circuits can be divided into two groups with reference to boost voltage distribution. These are:

1. Where the horizontal oscillator plate supply voltage is supplied by the receiver's low voltage *d-c* power supply.
2. Where the horizontal oscillator (and other circuits) is supplied B (++) voltage from the boost voltage circuit.

Receivers of the first class utilize their boost voltage to supply voltage to the plate circuit of the horizontal amplifier tube, to the first anode of the picture tube, and sometimes to some of the vertical deflection circuits. Their horizontal oscillator circuits do not receive boost voltage.

Troubles in this class of receiver are usually more readily found and remedied than in the second class of receivers. In the second class of receivers those trouble that affect the boost voltage, causing it to be lower than normal, also affect the operation of the horizontal oscillator. Trouble in the horizontal deflection coils, in the horizontal output transformer, etc., lowers the boost voltage and causing improper operation of the horizontal oscillator. Then again, low boost voltage may be due to faults in the horizontal oscillator itself, which may result in insufficient drive to the grid of the horizontal output amplifier tube thus producing low boost voltage.

An example of a receiver of the first class is the Dumont's model 17T350, the horizontal circuit of which is shown in *Fig. 1*.

Examination of this figure reveals that the plate supply voltage to the horizontal oscillator tube V219 and the screen grid of the horizontal deflection amplifier tube V220 is taken from the 300V low-voltage *dc* power supply of the receiver. The boost voltage supplies the vertical deflection circuits, the plate circuit of V220, and the CRT first anode (pin #10).

If the defective receiver exhibits more than sufficient height yet the raster seems dim, a competent serviceman can quickly diagnose the trouble as being probably one or more of the following: (a) low cathode emission in the picture tube, (b) brightness control circuit trouble, (c) ion trap misalignment, (d) ion trap defective, (e) weak HV rectifier tube, (f) a defect in the horizontal output transformer winding between point 9 and the HV rectifier tube plate, (g) some trouble beyond or at pins #2 and #7 of the HV rectifier tube socket. A quick check of the boost voltage would probably show it to be normal. The previously mentioned troubles can also result in no raster. Other common raster troubles may show up as a raster of insufficient width, or of simultaneous reduction in height and width.

It is not the purpose of this article to go into complete detail on all possible troubles that can occur, but rather to outline methods of trouble-shooting which can quickly isolate the sections of the receiver where trouble exists.

Analysis

The most rapid means of analysis available to the repairman in the case of no raster in this first class of receivers is to measure the grid bias at the control grid (pin #5) of the 6BQ6-GT or to apply a scope to this point and determine whether the bias or the peak-to-peak sawtooth voltage come up to the manufacturer's recommended values. Of course, before doing this, it has been assumed that the serviceman has checked the horizontal tubes and has ascertained that there is no high voltage at the picture tube.

If the grid bias is considerably less than −16 volts and the peak-to-peak sawtooth voltage is considerably less than 54 volts at pin #5 of the 6BQ6-GT, and if the plate supply voltage of V219 is nearly normal, trouble-shooting should be confined to the circuits *ahead* of pin #5 of the 6BQ6-GT. Should these voltages at pin #5 be normal, trouble-shooting should be confined to the component parts connected to the circuit *after* pin #5.

To prevent gassing of the 6BQ6-GT

its screen grid voltage as well as its plate voltage should be removed. The tube should remain in its socket while a scope is connected between its control grid and ground during the trouble-shooting procedure. Removal of plate and screen voltages from V220 disables the pix-tube high voltage for safety reasons, and of course, renders inoperative the component parts connected *after* the plate of the 6BQ6-GT. In this receiver removal of the plate voltage is easily accomplished by lifting the plate clip connector; and removal of the fuse F201 lifts the screen voltage.

The horizontal oscillator circuit is then investigated for trouble from the *afc* test point up to the control grid of the horizontal deflection amplifier tube. It must be remembered that the horizontal oscillator tube plate supply voltage should be normal. If this is not so, trouble may exist in the receiver's low voltage *dc* power supply.

To summarize then, a quick check for trouble in the first class of receivers is to investigate the grid bias or grid drive at the control grid of the horizontal deflection amplifier tube to see whether trouble lies in the circuits connected ahead of or beyond the control grid of this tube.

This quick check is also valuable in the case of the second class of receivers which may have troubles that stem from the oscillator, boost, deflection, or high-voltage circuits. All too often faults in the horizontal oscillator circuits produce insufficient grid drive to the horizontal amplifier output tube, which in turn produces low sweep deflection currents, low high voltage and low boost voltage. Then again, it may be that faults in components connected beyond the horizontal output amplifier tube are producing low sweep deflection currents, low high-voltage and low boost voltage. If the boost voltage is low the horizontal oscillator in turn will not function properly, if at all. The question then arises, which section is at fault: the horizontal oscillator section, or that section of the receiver on the horizontal output transformer side of the horizontal output amplifier tube.

Auxiliary Supply

A method utilized by the author when the second class of receivers were first introduced on the market makes use of a variable d-c power supply which is connected in series with the low voltage power supply. The purpose of this arrangement when properly connected is to provide the correct boost voltage so that trouble-shooting can be carried on under conditions simulating original plate voltages. Illustration of the method is best shown by its application to the circuit of *Fig. 2*, which is that of Admiral Model 21F1 series.

There are many types of variable voltage d-c power supplies, and the choice of a supply is left to the reader.[2] The author has used two types, one of which produces d-c voltages variable from 70 volts of 250 volts at a current rating of approximately 50 *ma*. This low voltage power supply is valuable when connected in series with the receiver low voltage power supply only when the boost voltage is to be applied to the receiver's horizontal oscillator circuit to determine whether it is operative or not. It cannot be applied directly to other circuits because of the heavier current drain that would be involved.

Another type of variable voltage D.C. power supply is one capable of being varied from 60 volts to 300 volts at a current drain of approximately 200 *ma*, and can be directly substituted for the boost supply not only to the horizontal oscillator circuits but also to the plate circuit of the horizontal deflection amplifier output tube where the tube plate current may be rather high. This supply is bulky and expensive to construct. The lower wattage variable d-c power supply suffices for most work, and was used in the trouble-shooting procedure that is about to be described.

The variable voltage d-c power supply is wired so that neither its B(+) or its B(−) terminals are grounded. That means that the power supply parts can be mounted on a wooden breadboard if desired. *Fig 2* shows that the boosted voltage of 400 volts should be applied to V401A, V402, V406 and

[Continued on page 36]

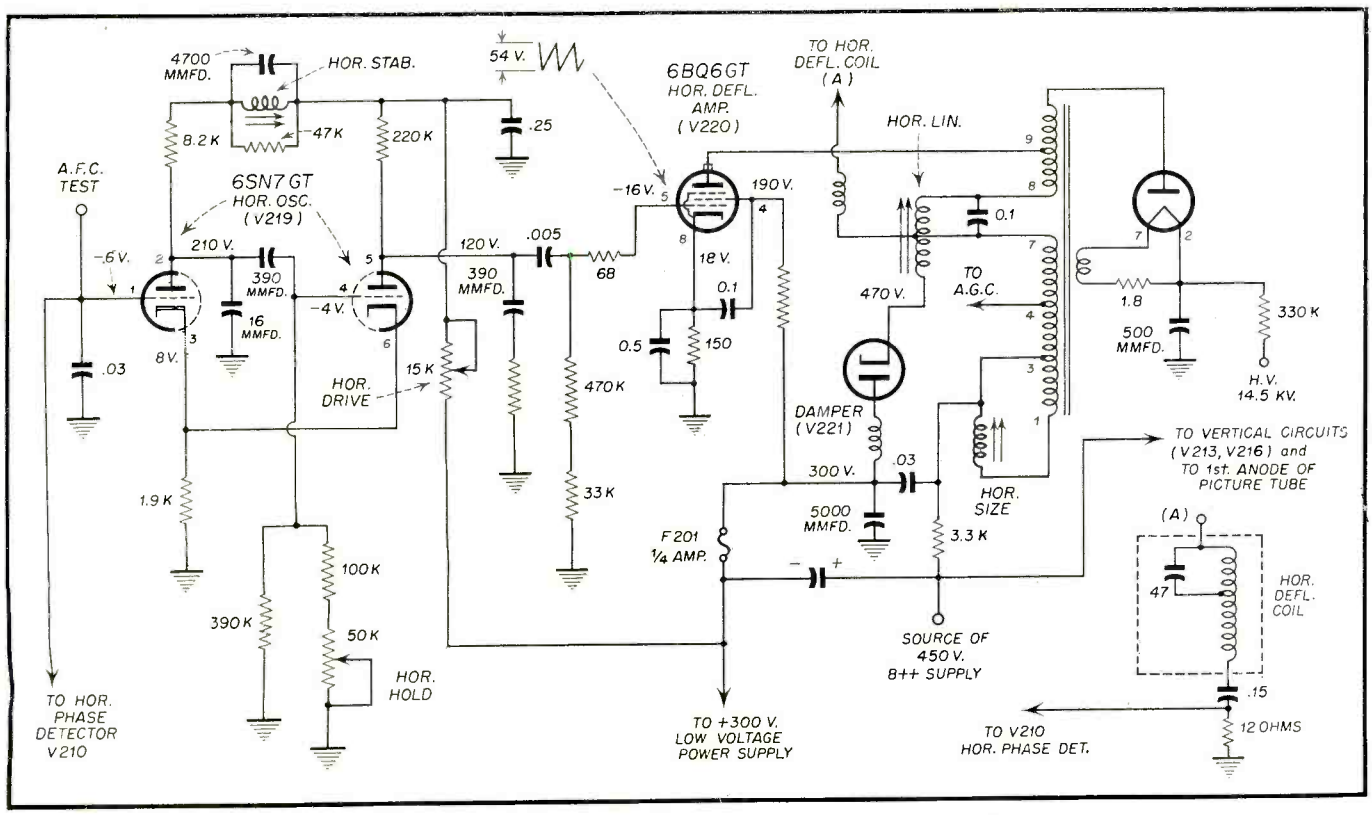
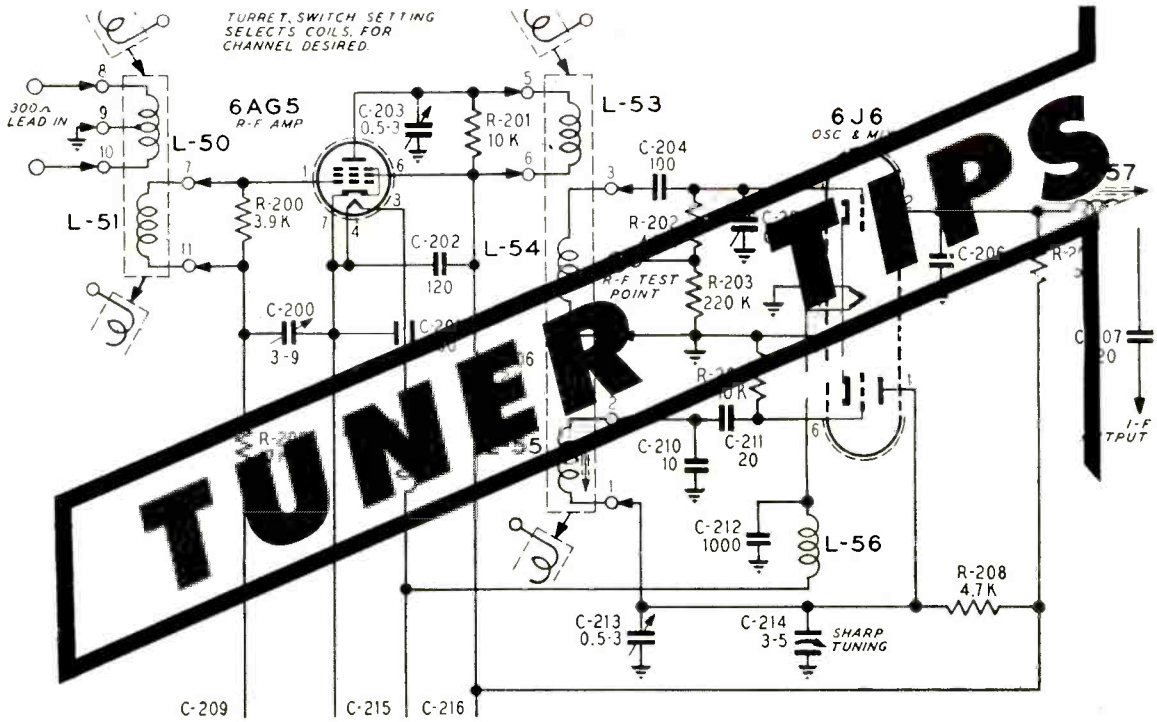


Fig. 1—Horizontal deflection circuits of some models of Dumont TV receivers.



TUNER TIPS

by AL KINCKINER

A digest of common TV troubles and repairs found in the more popular tuners as reported by a practicing TV technician.

THAT section of a television set that picks up the sound and picture signals from the antenna, amplifies them slightly, heterodynes them to more readily amplified frequencies, though sometimes called the front end, is more properly called the tuner. Call it what you may, and some really do, it can be, and often is, a source of varied and disagreeable troubles.

Noise is the commonest trouble and probably the easiest to repair. Generally, cleaning the contacts and wipers with a dry cloth, and applying contact cleaner in the case of wafer type contacts is the cure to tuners that have suddenly become noisy.

Fading and/or drift is usually handled the same as a noisy tuner. If this does not eliminate the trouble, a probing of all components in the tuner will turn up internal shorts or opens. If fade or drift is slow, then the application of a soldering iron near the resonant elements will show up component changes thermally. Sometimes blowing through a straw on a defective resonant circuit capacitor will induce enough drift to show up the fault.

Insensitivity, if alignment has not been disturbed, can be traced to open coupling or bypass condensers. Poor selectivity, as in insensitivity can be traced to changes in values of coil loading resistors, or the shifting of tertiary windings on coil forms.

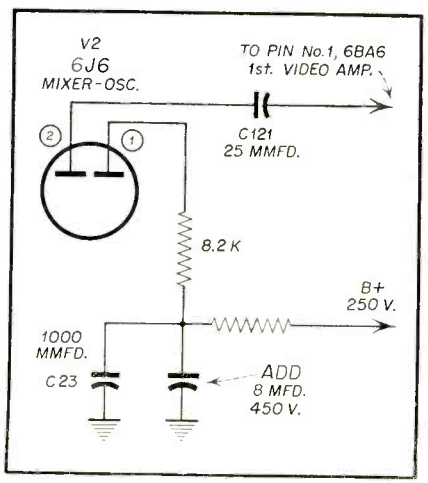


Fig. 1—Partial schematic of Motorola Tuners TT1 to TT6 — eliminating carrier modulation.

Poor channel centering (sound comes in at extreme end of fine tuning range) may be caused by aging of the tank circuit capacitor in the oscillator or tubes. Present tube production runs are generally of lower internal capacity and the oscillator tank condenser may need to be increased in value when replaced with new tubes. Following are some specific tuner faults.

Motorola Tuners TT1 to TT6

All Motorola sets using tuner types TT1 to TT6: Carrier modulation present on high channel stations—add 10 μf-450V condenser from B+ end of 8200 ohm resistor feeding pin #1-6J6 to ground. (See *Fig. 1*)

RCA Tuner KRK2A

RCA tuner type KRK2A (the common three 6J6) tuner used in early RCA, Admiral, Emerson, Fada and other makes: Fading occurring on Channel 6—Poor soldering of bus connecting rotors of each two wafer sections, generally in the converter section. The 270 μμf condenser from pin

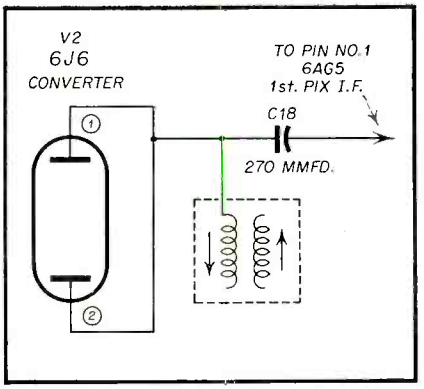


Fig. 2—Partial schematic of RCA tuner type KRK2A — eliminating fading.

#1 of converter 6J6 to video *if* grid caused many different troubles such as fading, overloading of pix; sound remains OK. *(Fig. 2)*

Motorola 50, 51, 52 Tuners

Motorola 50, 51, 52 tuners Fading, drift and generally noisy—If trouble persists after using a good grade contact cleaner, flux and solder the rivets holding the stationary plate of fine tuner, also lubriplate the wire spring grounding the station selector shaft. *(Figs. 3a* and *3b)*

Philco Turret Tuners

In Philco turret tuners the contact springs have a tendency to break. The Micalex contact plates are available from Philco, part #15-9519 for *rf* unit and part #15-9520 for oscillator unit. The contact plates can be replaced without dissembling on a large scale as follows:

1—Clip soldered connections as near to plate as possible.

2—With tiny caping chisel, remove rolled over ends of four rivets holding the plate.

3—Insert new plate in place and push rivets through the head end of the rivet on contact plate side.

4—Put small amount of flux on rivets and frame nearby and with pressure on head of rivets solder them to frame, making sure solder runs on tuner frame and rivets.

Westinghouse V9886 Tuners

If with Westinghouse V-9886 tuners fine tuner cannot be adjusted after changing 6J6 oscillator, adding an 8 $\mu\mu$f N750 ceramic capacitor from 6J6 pin #1 will center fine tuner. *(Fig. 4)*

Dumont Imputuners

Dumont Inductuner in pre-1952 sets: Drift or fading occurs with slight pressure on tuning shaft. With cover removed pressing on the coil barrel with insulated rod at each of the three sections will indicate which section is causing trouble. Since you can't move the coil barrel nearer to the contact plate, the solution lies in moving the contact plate nearer to the coil barrel. To do this release the screws in contact plate, gently lift up plate and insert a fiber shim about .010 of an inch thick under the plate, tighten plate holding screws, and try the set. Chances are you will feel that you have made an almost impossible repair. *(Fig. 5)*

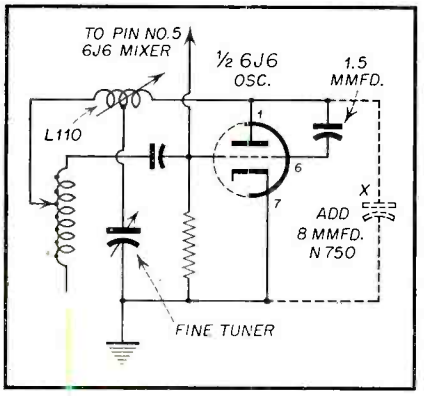


Fig. 4—Partial schematic of Westinghouse V9886. Add 8 $\mu\mu$f N750 ceramic capacitor.

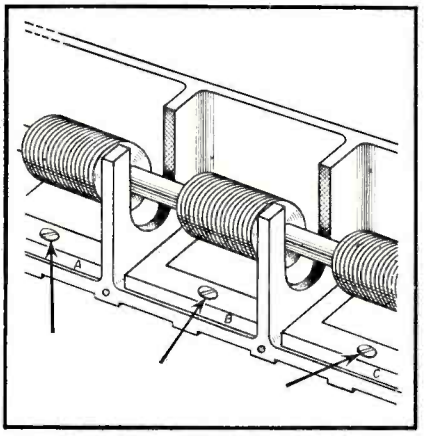


Fig. 5—Partial drawing of Dumont Inductuner in a pre-1952 sets—eliminating drift or fading.

Standard Tuners in Philco

When Philco sets using Standard Coil tuners become noisy, check all bonding straps for breaks or poor soldering. If banding straps are broken, replace with ¼ inch tinner braid, soldering braid from tuner frame to floating frame to set chassis.

RCA KRK7 Tuners

If RCA KRK7 Tuners are noisy, check for floating core or trimmer shafts protruding through top of tuner (listed as *C6, C10* and *C11,* on tuner drawing). Weave a piece of spring wire around these shafts as shown in *Fig. 6.*

Sylvania Continuous Tuners

Sylvania continuous tuners become noisy and cutout on Channels 2, 3, 4 or 7 and 8 only, other channels giving no trouble, rear three stator plates of tuning condenser have shifter. The stator sections are positioned by the heavy buswires connected to them, re-center the stators by slightly bending the bus wires.

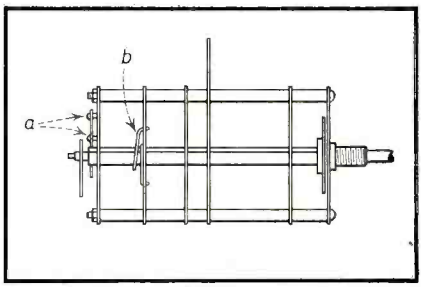


Fig. 3—Partial drawing of Motorola 50, 51, 52 tuners—eliminating fading drift and general noise. Points a and b indicate points of lubrication. Flux and solder rivets for best results.

Standard Tuners

Standard Tuners drift or are not able to get high channel stations if there is poor soldering to metal in ceramic disc at front of tuner. These tuners operate better if no lube is used on contacts, just polish the contacts to a high silver luster. Try using a rubber eraser, it works wonders.

Zenith Tuners

On Zenith tuners use contact cleaner on switch contacts if noisy. If set is weak, snowy or give frying noise, trouble is probably in the combination stacked silver mica condenser. Leakage between individual silvered mica sheets occurs. Replace this with separate high quality ceramics.

Conclusion

The troubles and tuners covered are mostly in the older sets, the newer set tuners being somewhat better mechanically and electrically as yet have not aged enough to point out their weaknesses. Generally they are a little roomier and with some exceptions easier to work on.

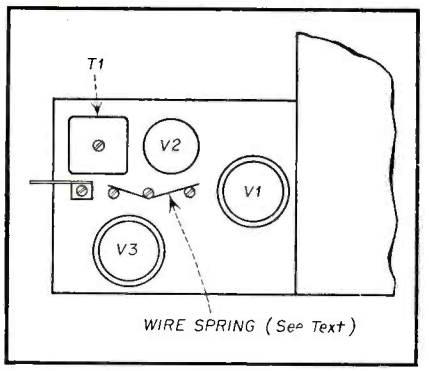


Fig. 6—Partial layout of RCA KRK7 tuner eliminating noise. Spring wire is shown woven around shafts.

Fig. 6—Hewlett-Packard Generator.

UHF TEST EQUIPMENT

by **ALLAN LYTEL**

UHF reception is spreading across the country as one section after another gets new stations. With the use of converters and match-box units comes the problem of servicing and test equipment. It is possible to use *vhf* gear on the new band by use of the harmonics contained in the output of the signal generator. This is not a new wrinkle, for some of the present signal generators now on the market use harmonics of the oscillator for the higher frequencies on the dial.

Suppose that you have a signal generator that has fundamental operation up to 200 *mc*. Then 600 *mc* will be the 3rd harmonic and 800 *mc* will be the 4th harmonic of the original 200 *mc* signal. But it must be remembered that the higher the harmonic the greater is the sweep-width. As an example, a four *mc* sweep at the fundamental becomes an eight *mc* sweep at the second harmonic and a twelve *mc* sweep at the third harmonic. This makes it rather inconvenient to use the original dial calibrations for sweep-width. As the harmonics become higher, they of course have a smaller amplitude. In general, the lowest harmonic that will do the job is the best one to be used.

This is in no sense a recommendation that *vhf* test equipment be used for the *uhf* band: it is only a suggestion of a method that has worked in areas without enough *uhf* at present to justify the purchase of new test equipment.

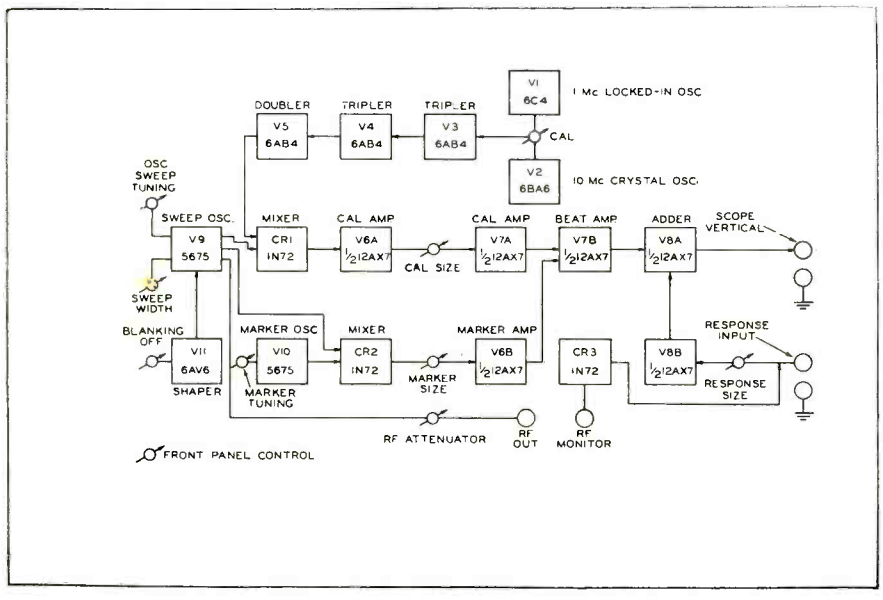


Fig. 1—Block diagram of a variable marked oscillator.

The RCA Sweep-Marker Generator WR 40-A

This unit, primarily a laboratory sweep oscillator with built-in markers is shown in block diagram in *Fig. 1*. It features a continuously variable frequency from 470 *mc* to 890 *mc* with a maximum sweep width of 45 *mc* and an accuracy of plus or minus 3%. The variable marker oscillator can also tune over the entire range as above. A 10 *mc* crystal oscillator is used, together with a locked-in 1 *mc* oscillator to supply calibration points of all harmonics within the entire band. An important feature is the addition of the markers signals after the response curve has passed through the entire tuner or circuit under investigation.

The master oscillator is a type 5675 Pencil Type Triode. *Figure 3* is a photograph of a different type of pencil triode, and *Fig. 4* illustrates the construction of a pencil triode with its associated coaxial tuner. Triodes operating in this band must meet certain requirements: the inter-electrode capacity must be small, the lead inductance must be reduced to a low value, and the transit time (the time required for an electron to go from cathode to plate) must be as low as possible. Pencil-type tubes, which get their name from their unusual construction, have been designed to meet all of these requirements.

The center portion of the tube as shown, is of glass, meeting with two cylinders of metal, one at the top for the plate and the second at the bottom as the cathode support. In this way, this tube becomes suitable to use in a coaxial tuned circuit where the cylinders become a part of the coaxial cir-

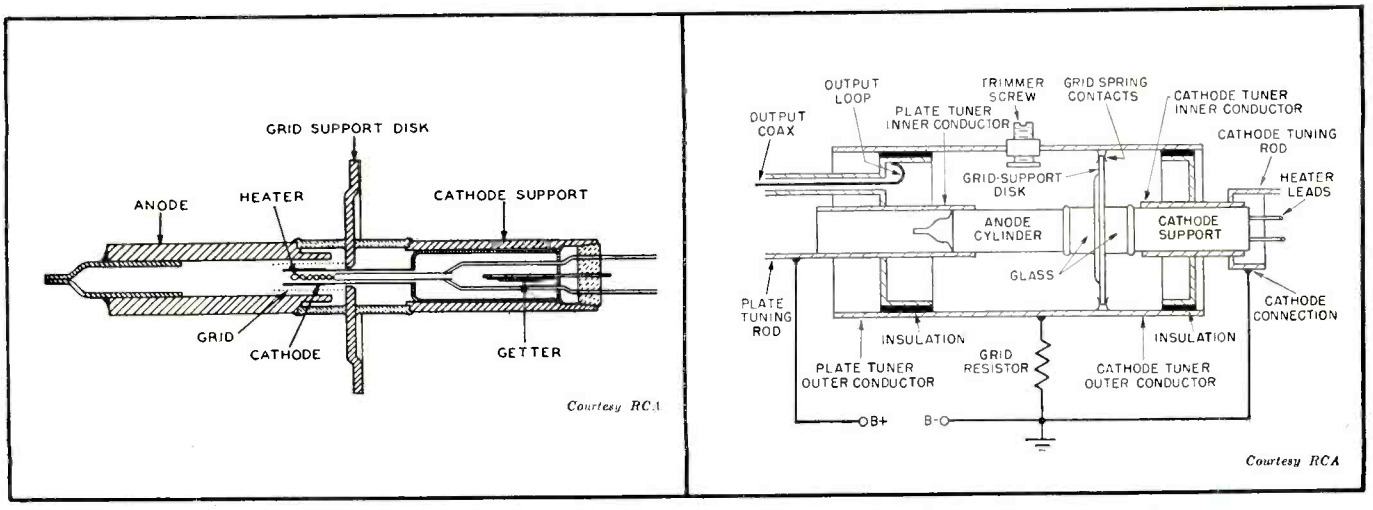


Fig. 4—Construction of a pencil triode (left) with its associated coaxial tuner (right).

cuit. Connections are made directly to the plate tube; two wires coming from the bottom for the heater leads.

The tube is about two inches long and the cylinders at top and bottom are about one-quarter of an inch in diameter. The grid structure is mounted on a grid support disk between two sections of glass. A feature of this design is small drift as the tube heats up. There is a longitudinal change in the anode and cathode cylinders but the spacing between the elements changes only a small amount, thus contributing to the stability of tube operation.

The illustration of the tube in use shows how the actual tube structure becomes a part of the tuned circuit. The anode or plate cylinder becomes a part of the inner conductor for the coaxial line. Note that there is an insulated sleeve between the plate inner conductor and the outer cylinder of the coaxial line which is at ground potential. This circuit is actually two coaxial tuned circuits placed back-to-back so that they have a common outer conductor.

In the sweep generator, the coaxial oscillator is frequency modulated by a vibrating device that varies the inductance of the cylinder to provide linear frequency deviation up to 45 *mc*. A blanking voltage is included to provide a zero base line on the associated oscilloscope. The blanking voltage has a push-button on the instrument so that it may be removed to allow accurate adjustment of the Phasing Control.

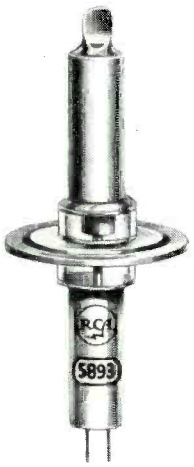


Fig. 3—Type 5675 Pencil Type Triode master oscillator.

Operation of this Sweep Generator (referring to both the block diagram and the typical connections) has the *rf* from the unit to the tuner and the de-modulated output from the tuner back to the sweep generator at the Response Input terminals rather than back to the vertical plates of the scope. Here the marker pips are added to the signal and this combination is then fed to the vertical input of the scope. Sweep for the scope is supplied by the generator at the Sweep terminals. This method, as above, allows the markers to appear unchanged by the circuit under investigation so that the markers are clear and their size or amplitude may be changed at will.

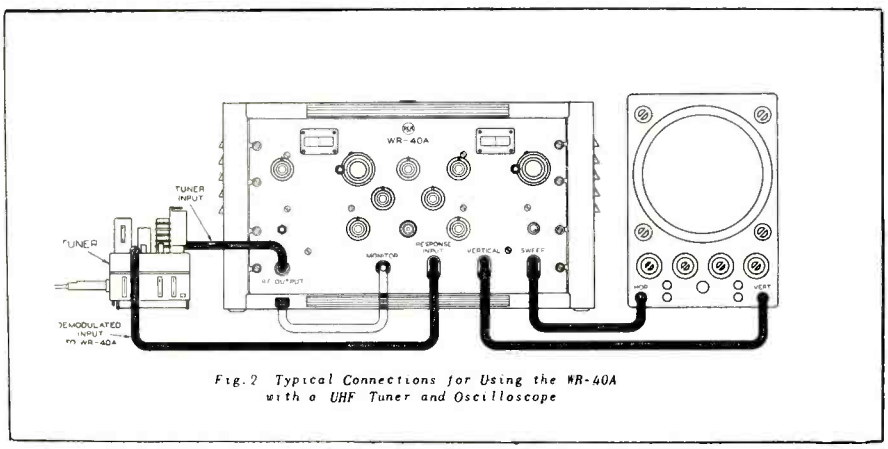


Fig. 2 Typical Connections for Using the WR-40A with a UHF Tuner and Oscilloscope

Hewlett Packard Model 614-A

An interesting feature of *uhf* is that the test equipment used has a great deal of the circuitry and design problems that arise in *uhf* receiving gear. An example here is this unit, covering the range from 800 *mc* to 2100 *mc*. Although it is not primarily designed for TV servicing work, it does cover a portion of the *uhf* TV band.

This unit provides signals at a maximum power level of 1 milliwatt over the entire frequency range. Output is read from a directly calibrated dial and selected by means of a single control. *Figure 5* is an outline drawing of the front panel showing the controls and adjustments while *Fig. 6* is a photograph of this unit.

The directly calibrated output attenuator allows the output voltage adjustment over a range from 200 millivolts to .10 microvolts. This signal generator can provide continuous wave output, pulse output, or an FM or sweeping signal output.

Pulse output, since it is not directly applicable to the greatest use of the instrument in television servicing (although it has specialized television uses) will be covered only briefly. In this

[*Continued on page 46*]

VIDEO SPEED SERVICING SYSTEMS

10th INSTALLMENT

INDEX FOR MAY, JUNE and JULY ISSUES

Mfr.	*Chassis No.*	*Section Affected*	*Month*	*Page*	*Card No.*
Arvin	TE 337	Sync	June	39	AR-337-1
Arvin	TE 337	Sync	June	39	AR-337-2
Arvin	TE 337	Sync	June	39	AR-337-3
Arvin	TE 337	Pix	June	40	AR-337-4
Arvin	TE 337	Pix	June	40	AR-337-5
Arvin	TE 337	Pix	June	40	AR-337-6
Belmont Raytheon	20AY21	Pix	July	27	BE-Y21-1
Belmont Raytheon	20AY21	Pix	July	27	BE-Y21-2
Belmont Raytheon	20AY21	Pix	July	27	BE-Y21-3
Belmont Raytheon	20AY21	Pix	July	28	BE-Y21-4
Belmont Raytheon	20AY21	Sync	July	28	BE-Y21-5
Belmont Raytheon	20AY21	Raster	July	28	BE-Y21-6
Crosley	265	Sync	May	45	CR265-7
Crosley	265	Pix	May	45	CR265-8
Crosley	265	Pix	May	45	CR265-9
Crosley	265	Sound	May	46	CR265-10
Crosley	265	Pix	May	46	CR265-11
Crosley	265	Pix	May	46	CR265-12
DuMont	RA117	Pix	July	29	DM-117-1
DuMont	RA117	Pix	July	29	DM-117-2
DuMont	RA117	Raster	July	29	DM-117-3
DuMont	RA117	Pix	July	30	DM-117-4
DuMont	RA117	Sync	July	30	DM-117-5
DuMont	RA117	Sync	July	30	DM-117-6
Emerson	120144	Pix	July	31	EM-144-1
Emerson	120144	Pix	July	31	EM-144-2
Emerson	120144	Sync	July	31	EM-144-3
Emerson	120144	Sync	July	32	EM-144-4
Emerson	120144	Pix	July	32	EM-144-5
Emerson	120144	Sync	July	32	EM-144-6
Motorola	TS 292	Pix	June	41	MO292-1
Motorola	TS 292	Pix	June	41	MO292-2
Motorola	TS 292	Pix	June	41	MO292-3
Motorola	TS 292	Pix	June	42	MO292-4
Motorola	TS 292	Pix	June	42	MO292-5
Motorola	TS 292	Pix	June	42	MO292-6
Silvertone	51-478.339	Raster	May	47	SI478-1
Silvertone	51-478.339	Pix	May	47	SI478-2
Silvertone	51-478.339	Sync	May	47	SI478-3
Silvertone	51-478.339	Sync	May	48	SI478-4
Silvertone	51-478.339	Sync	May	48	SI478-5
Silvertone	51-478.339	Raster	May	48	SI478-6
Stewart-Warner	9300	Pix	June	43	SW9300-1
Stewart-Warner	9300	Pix	June	43	SW9300-2
Stewart-Warner	9300	Pix	June	43	SW9300-3
Stewart-Warner	9300	Pix	June	44	SW9300-4
Stewart-Warner	9300	Sound	June	44	SW9300-5
Stewart-Warner	9300	Sound	June	44	SW9300-6
Stromberg-Carlson	317 Series	Pix	May	49	SC317-1
Stromberg-Carlson	317 Series	Pix	May	49	SC317-2
Stromberg-Carlson	317 Series	Sync	May	49	SC317-3
Stromberg-Carlson	317 Series	Pix	May	50	SC317-4
Stromberg-Carlson	317 Series	Raster	May	50	SC317-5
Stromberg-Carlson	317 Series	Pix	May	50	SC317-6
Sylvania	1-139	Pix	May	51	SY139-13
Sylvania	1-139	Pix	May	51	SY139-14
Sylvania	1-139	Pix	May	51	SY139-15
Sylvania	1-139	Pix	May	52	SY139-16
Sylvania	1-139	Pix	May	52	SY139-17
Sylvania	1-139	Pix	May	52	SY139-18
Transvision	"A" Series	Raster	July	33	TA-A-1
Transvision	"A" Series	Raster	July	33	TA-A-2
Transvision	"A" Series	Sync	July	33	TA-A-3
Transvision	"A" Series	Pix	July	34	TA-A-4
Transvision	"A" Series	Pix	July	34	TA-A-5
Transvision	"A" Series	Pix	July	34	TA-A-6
Truetone	2D1235B	Raster	June	45	TU1235-1
Truetone	2D1235B	Pix	June	45	TU1235-2
Truetone	2D1235B	Pix	June	45	TU1235-3
Truetone	2D1235B	Pix	June	46	TU1235-4
Truetone	2D1235B	Pix	June	46	TU1235-5
Truetone	2D1235B	Pix	June	46	TU1235-6

Radio Receiver

OSCILLATOR TROUBLES

by Harry Mileaf

In the present high pressure of TV repairs we must not lose sight of radio receivers. This article discusses common causes of radio receiver oscillator failure.

PROBABLY the biggest source of difficulty in standard broadcast radio repair is the local oscillator section of the receiver. In many cases where the radio receiver is inoperative due to the failure of the local oscillator, the cause for the oscillator section not operating or quitting intermittently is usually not readily apparent. Many times when standard service procedures are applied to the various circuit components they appear to be in proper operating condition, yet the circuit does not oscillate. Under these conditions the cause of the trouble is most likely in other associated circuits. This situation can be readily understood if we realize one point of information. That is, in the manufacturers' quest for economical production, they have sliced their tolerance of safety factor very thin. The present day oscillator coils have become slowly but surely, remarkably smaller and smaller. Due to this, the percentage of regenerative feedback that is required to maintain oscillation is fairly critical. The present day local oscillator that is used in broadcast receivers, and especially those used in 3-way *ac/dc* portables, have become sections of critical operation. In quite a large percentage of the suspected oscillator troubles, the real cause of the oscillator cutting out may be found in related circuits that appear almost normal. To understand how these other related circuits can affect the oscillator we should first review the factors that determine the stability of oscillations.

In *Fig. 1*, we have a simple Armstrong type of oscillator that is being employed in many of the present day sets. It uses a 1R5 pentagrid converter.

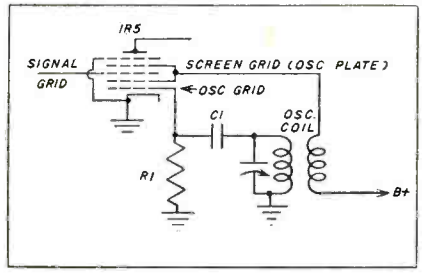


Fig. 1—Typical ac/dc oscillator circuit using a 1R5 tube.

Cathode, the first grid, and the screen grid elements of the 1R5 perform the duties of the cathode, grid, and plate respectively of the simple triode oscillator. The method of regenerative feedback used to maintain oscillations is as we can see, the oscillator coil that inductively couples the signal from the primary in the oscillator plate (screen grid), to the secondary in the oscillator grid. What determines the frequency and constancy of oscillation, besides the coil and tuning condenser are, in their order of importance, the stability of the 1R5, the grid bias, and the oscillator plate potential.

C1 and *R1*, the coupling condenser and grid leak resistor, are the determining factors of grid bias. They usually form a time constant of about 5 milliseconds, which is long enough to develop the proper amount of grid bias and short enough to couple the oscillator signal without blocking. *R1* and *C1* may often change their characteristics after operating for a period of time. The biggest offender in this case is *C1* which usually opens under load. Most often, when these components are tested they invariably fool the serviceman into thinking they are satisfactory. Since

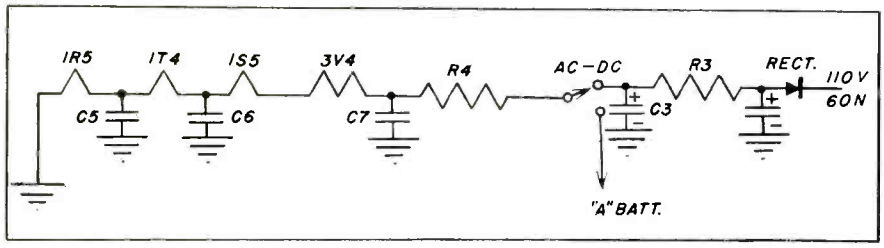


Fig. 3—Method of obtaining "A" voltage to receiver.

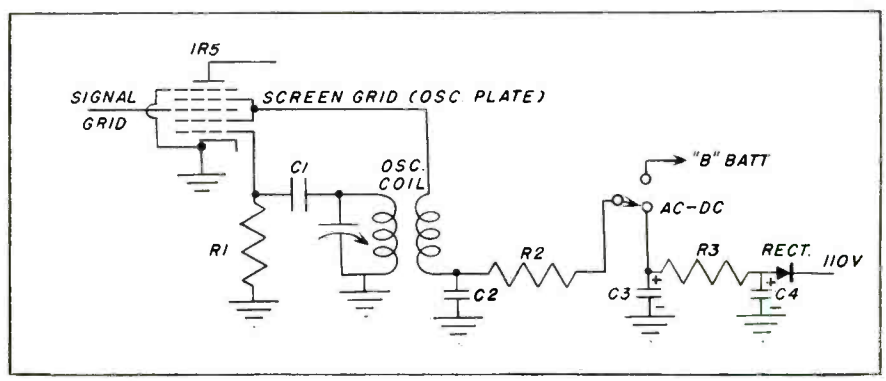


Fig. 2—Method of obtaining "B" voltage to circuit.

[Continued on page 44]

HORIZONTAL DEFLECTION CIRCUITS [from page 21]

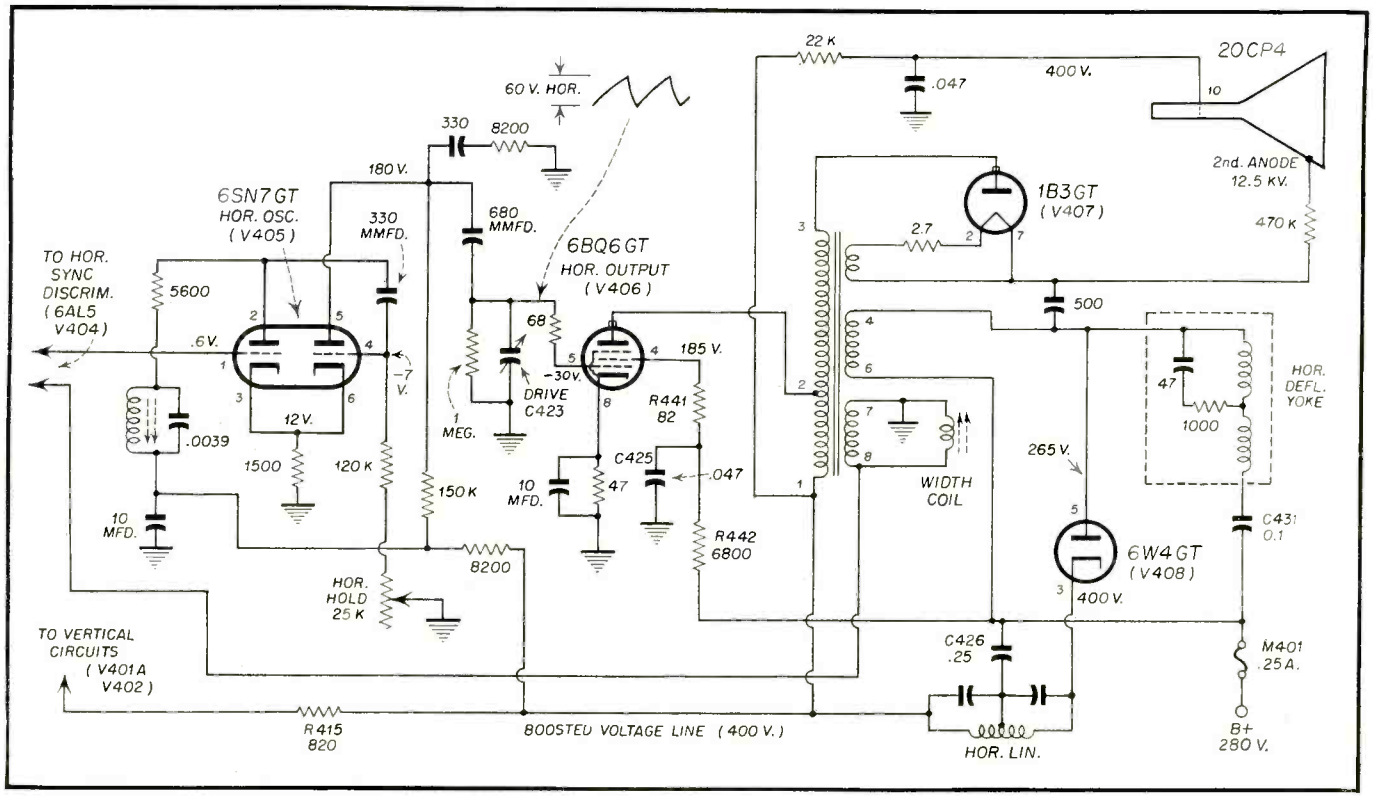


Fig. 2—Horizontal deflection circuits of some Admiral TV receivers.

to V405 which is the horizontal oscillator tube.

Typical Case

The symptoms indicated in the receiver was no raster, and satisfactory sound. The boost voltage had a value of 260 volts instead of the required 400 volts. All tubes were known to be good. A step-by-step procedure for finding the trouble was instituted as follows:

Step 1: The picture tube socket was removed from the picture tube base and the high voltage lead was disconnected from the picture tube. No high voltage was present on the high voltage lead and the boost voltage remained at 260 volts.

Step 2: The 6W4GT damper tube was removed from its socket and both the plate lead and the screen grid connection on the 6BQ6GT were lifted. One side of *R415* was also lifted so that any possibility of defects in the vertical oscillator or vertical output circuits would be eliminated. The 6BQ6GT remained in its socket.

Step 3: Pins #2 and #7 of the 1B3GT were disconnected from the horizontal output transformer secondary. The width coil was then disconnected from terminal 7 and 8 of this same transformer. Finally, the horizontal deflection coil was lifted by disconnecting one side of condenser *C431*.

Step 4: The negative ungrounded terminal of the variable voltage power supply was connected to the fuse M401 which is in the receiver B(+) line. The positive terminal of the ungrounded variable voltage power supply was then connected to pin #3 of the 6W4GT damper tube socket, with this tube still removed. This places the variable voltage power supply effectively in series with the B+ supply of the receiver. The set and variable power supply was both turned on. The voltage from fuse to ground was about 280 volts, which is normal, and the variable supply was adjusted to add 120 volts to it so that the voltage from pin #3 of the 6W4GT socket to ground was 400 volts. In effect the variable voltage power supply was connected across *C426* through one-half of the horizontal linearity coil. It could have been connected directly across *C426* with no adverse effect. By this means a boost voltage was applied to the plate circuit of the horizontal oscillator tube V405.

Step 5: A scope was connected from pin #5 (of V406) to ground and showed a peak-to-peak voltage of 70 volts available for grid drive. A high resistance voltmeter across the same points indicated -34 volts. Varying the horizontal drive condenser *C423* also varied the drive available. This indicated that the horizontal oscillator would be operative if the proper boost voltage were supplied to it. Had the peak-to-peak drive voltage been of the order of about 40 volts or less, trouble-shooting of the horizontal oscillator circuit from pin #1 of V405 to pin #5 of V406 would have been in order.

Step 6: R415 was reconnected and the boost voltage dropped very slightly due to the added vertical plate circuit loads, while the scope on pin #5 of the 6BQ6GT still showed the proper peak-to-peak voltage required for drive.

Step 7: The set was turned off and the variable voltage supply was disconnected. The plate and screen grid leads to the 6BQ6GT were reconnected and the 6W4GT was re-inserted in its socket. The set was again turned on and the boost voltage was now measured and found to be 400 volts. Had it still been low the parts under suspicion would have been the output transformer, the horizontal linearity control, *C426, R442, C425,* or *R441,* all easily checked.

Step 8: Finding the boost voltage normal at 400 volts or so the next

[Continued on page 43]

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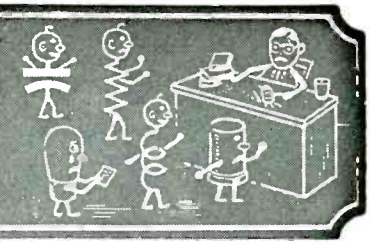
CIRCUIT COURT



Zenith "K" Series
Horizontal AFC Circuit

In the Zenith "K" chassis *(Fig. 1)* a 6AQ7GT duo-diode-triode tube is used to provide automatic frequency control of the horizontal oscillator. The duo-diode section is used as a phase detector which accepts a sawtooth waveform from the high voltage circuit and compares its phase (timing) with the incoming horizontal sync pulse sent out by the transmitter. The output from the diodes is a *dc* voltage which is applied to the control grid of the triode section. Any change in the phase between the incoming sync pulse and the sawtooth waveform will be reflected in a change in the *dc* voltage output which, in turn, will change the internal resistance of the 6AQ7GT. The cathode-plate resistance of the 6AQ7GT triode is connected in series with a 680 $\mu\mu f$ capacitor *(C56)* across the horizontal oscillator tank coil. If the internal resistance of the triode increases, the value of *C56* is, in effect, reduced and the oscillator frequency will increase. If the tube resistance is decreased, the capacitance of *C56* is effectively increased and the oscillator frequency decreases. In other words, if the *dc* voltage output from the phase detector is negative, then the bias on the control tube will be increased, resulting in a higher frequency output from the horizontal oscillator.

As shown in *Fig. 1*, the two diodes are connected "back to back," that is the cathode of the upper diode is connected to the cathode of the lower diode. The negative going sync pulses, from the sync clipper plate circuit, are applied to the common cathode connection through capacitor *C52*. Also a sawtooth of voltage obtained from the sweep output circuit (width coil) is applied to the phase detector circuit through *R61* and *C51*. In order to better understand the action taking place, the effect of the sync pulse voltage and that of the sawtooth will be diodes simultaneously.

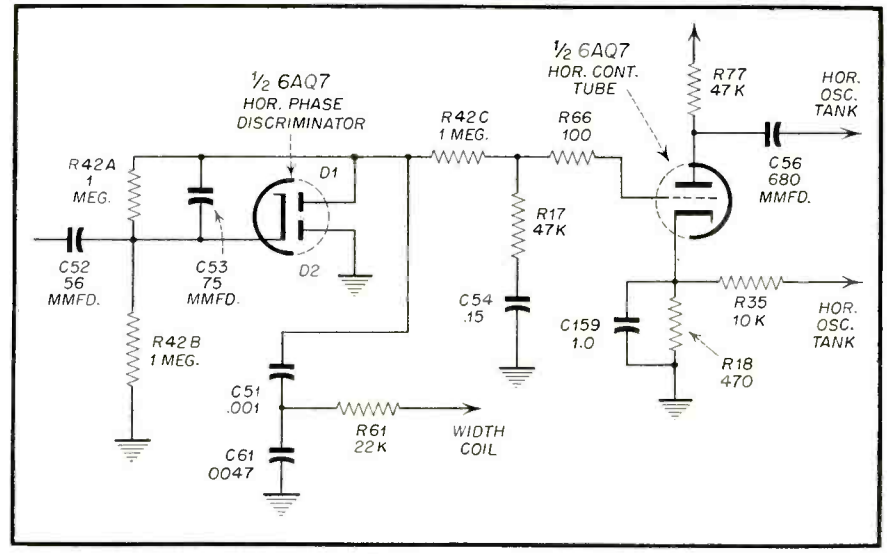


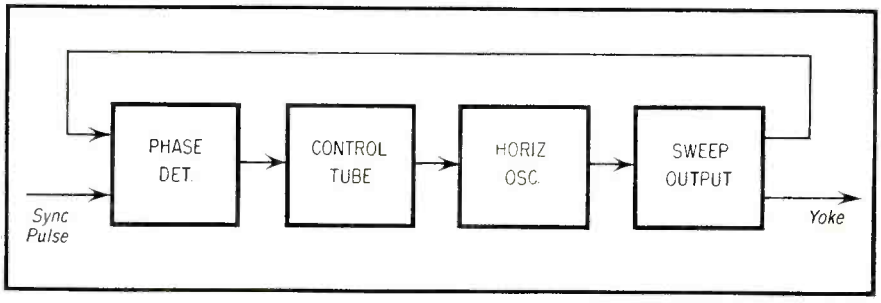
Fig. 1—Partial schematic of Zenith "K" Series horizontal afc circuit.

The 75 $\mu\mu f$ capacitor, *C53*, across the upper diode simply compensates for the shunting effects of capacitor *C52* and the clipper output impedance across the lower diode. This makes the impedance offered by the two diodes of equal value.

When the negative going sync pulses are applied to the common cathode of the two diodes, both diodes conduct simultaneously and develop approximately equal *dc* voltage across their respective load resistors. Although it may not be readily apparent, the plates of the two diodes are effectively connected in parallel as far as the sync pulses are concerned. This is because *C52* is much smaller than the combination *C51* and *C61* and as far as the sync pulses are concerned, *C51* and *C61* connect the upper diode plate to ground or effectively in parallel with the lower diode plate.

Application of the negative pulse to the cathodes of the two diodes has exactly the same effect as applying a positive pulse of equal amplitude to the plates. The diodes conduct during the sync pulse period. Since the load resistors, *R42A* and *R42B*, are of equal value (1 megohm each), then the *dc* voltage developed across each resistor will be approximately of equal amplitude. However, the polarity of the two voltages is opposite, therefore the net voltage across both resistors, from the top of *R42A* to ground, is approximately zero. Actually, the net voltage across the resistors may not be exactly equal to zero but is so close that it can be neglected. Thus, the sync pulses themselves develop equal and opposite *dc* voltages across the phase detector load resistors and the net *dc* output is essentially zero.

In order to develop a *dc* correction voltage *(afc voltage)* from the phase detector, it is necessary to feed back a voltage from the horizontal sweep output and apply it to the diode circuit in such a manner that its phase may be compared with the incoming sync pulses. This voltage, in the Zenith "K" chassis is taken from the width coil circuit and is applied to the phase detector through *R61* and *C51*. The 0.0047 μf capacitor, *C61*, integrates the width coil voltage pulses and the waveform applied to the diode circuit is a



Block diagram of horizontal afc circuit.

sawtooth in shape. This sawtooth of voltage divides across the two diodes according to the effective impedance of each diode circuit. Since the effective impedance of each diode is essentially the same, then the peak-to-peak voltage across each diode will be equal.

The conduction of the diodes so far as the sawtooth voltage is concerned, is different from that when the sync pulse only is considered. For the sync pulses, the two diodes are effectively in parallel and the pulse voltage is applied to both diodes simultaneously.

The feed back voltage is a sawtooth; the diode plates will be driven alternately positive and negative *but the two plates will not be positive or negative simultaneously*. When one diode is conducting from the sawtooth voltage the other remains non-conductive.

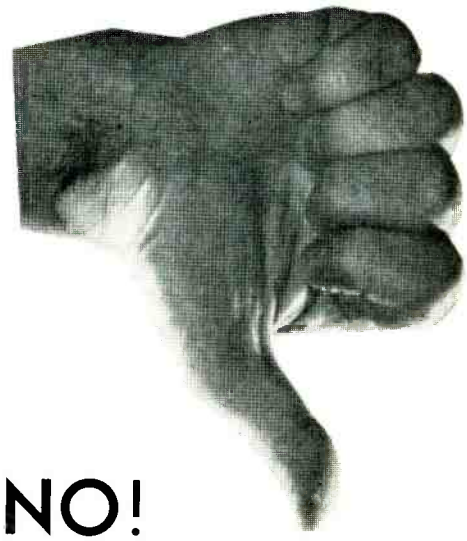
When the upper diode, conducts, a *dc* voltage is developed across resistor *R42A*. The polarity of this *dc* voltage is such that the end of *R42A* which connects to the cathodes will be positive with respect to the end which connects to the upper plate. When D2 conducts, a *dc* voltage of equal amplitude but of opposite polarity is developed across resistor *R42B*. Since these voltages are of equal amplitude but of opposite polarity, then the *average* net *dc* voltage developed in the phase detector output, due to the sawtooth voltage itself, is zero.

Neither the sync pulse nor the sawtooth voltage by themselves will produce a *dc* voltage in the phase detector output. When both sync pulses and the sawtooth voltage are applied to the phase detector simultaneously, they may produce a positive voltage, a negative voltage or zero voltage in the phase detector output, depending upon the phase relationship between them.

In order to describe the action which takes place for various phase relationships, between the sync pulse and the sawtooth, it will first be assumed that the sync pulse and sawtooth are exactly in phase. When the sawtooth and sync voltages are in phase, the sync pulse occurs at the moment the retrace portion of the sawtooth crosses its *ac* axis. The amplitude of the sawtooth voltage across each diode is half that appearing across capacitor *C61*. The sawtooth wave on the lower plate is inverted, while the sync pulse on each plate is shown as positive going. Under these conditions the amplitude of the composite voltage on each diode will be the same, since the sawtooth is passing through its *ac* axis at the moment the sync pulse appears. The sawtooth neither adds or subtracts from the sync pulse voltage, each diode will conduct equally and equal and opposite voltage drops will appear across *R42A* and *R42B*. The net *dc* voltage at the output of the phase detector will be zero and no *afc* (correction) voltage will be applied to the grid of the control tube. This is the desired condition when the sync pulses and the horizontal oscillator are exactly in phase.

If the horizontal oscillator frequency should increase, the sawtooth will lead the sync pulses in phase relationship. The retrace portion of the sawtooth wave across *C61* will cross its *ac* axis before the sync pulse appears. Therefore, at the instant the sync pulse appears, the sawtooth voltage across *C61* will be negative. At this time diode D1 will have a negative potential (from the sawtooth) on its plate and this negative potential will subtract from the positive sync pulse voltage, resulting in a combined voltage on the D1 plate *less than the pulse voltage itself*. The instantaneous polarity of the pulse and positive which will add to the positive sawtooth voltage on the D2 plate is sync pulse voltage, resulting in a combined voltage on the D2 plate *greater*

[*Continued on page 44*]



by **BETHUNE JONES**

The Status of LICENSING

Licensing of TV technicians is being brought up before city and state law-making bodies with greater frequency. To our best knowledge, the public and most technician organizations favor it, while RTMA and NEDA oppose it.

PROPOSALS for new state laws to provide special regulation of television and radio servicing have been introduced this year in the legislatures of at least four states but thus far enacted in none, a survey of reports from state capitals reveals.

A Wisconsin bill called for licensing of radio and television servicemen by a six-member state board of examiners, which would set qualifications and conduct examinations. Before taking the test an applicant would need six months' experience plus special schooling or a two-year apprenticeship. Under the bill, there would be a $25 fee for the exam and a $15 annual license fee.

The measure was sponsored by Assemblyman Eugene Lamb of Milwaukee, who asserted at a hearing on the proposal that many servicemen in Milwaukee are merely "tube testers" who charge $8 plus materials for a house call and often have to return in a few days to take the set to their shops for major and expensive repairs.

Speaking as a representative of Milwaukee television dealers however, H. L. Ashworth of that city told the Wisconsin Assembly's state affairs committee that service problems in the Milwaukee area are being solved by the industry itself. He assailed the bill as "unjustifiable government interference with private business without reasons of public health, safety or morals."

Albert Coumont of Falls Church, Va., speaking at the Wisconsin hearing as a representative of the Radio and Television Manufacturers' Association, declared that the answer was to educate the public not to try to get something for nothing and to deal with people they know are honest. "Any kind of licensing will immediately stagnate the industry," he warned.

Coumont told the Wisconsin lawmakers that television sets are being improved and now require an average of only one and one-half service calls a year compared to seven calls a year required to keep the average 1949 set in operation.

Another Wisconsin bill, recently killed by the lower branch of the State Legislature, would have required television repairmen to furnish statements of services performed and to provide a refund for the set owner if similar repair was needed on the set within five days after the job was completed.

Unsuccessfully introduced in the New York legislature was a bill which would have authorized cities to provide for licensing, bonding and regulating persons engaged in the installation and servicing of television sets. The measure had been listed as Assembly Bill No. 294, by Mangen.

Rhode Island lawmakers rejected a bill under which persons who repair and service television and radio sets and household appliances would have been licensed and bonded to guarantee performance. Sponsored by Senator Joseph Pezzullo of Johnston, the bill would have required each licensed person to furnish the general state treasurer with a $2,000 bond "for the proper discharge of the services which he may perform." The measure would have made the State Department of Business Regulation the licensing authority. The license fee would have been $2 a year.

An Illinois bill, sponsored by Senator William Lynch of Chicago, would allow cities to tax and regulate persons engaged in servicing or installing radio and television sets. To date no definite action has been taken on this measure.

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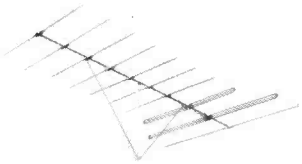
New Products

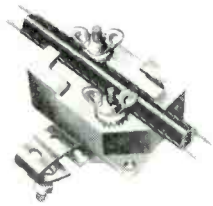
Portable RCA Tape Recorder

Pilot model of new **RCA** push-button tape recorder is demonstrated for W. W. Watts (left), vice president in charge of the RCA Engineering Products Department, by Barton Kreuzer, manager of industrial marketing division. Instrument features simple push-button operation, easy threading of tape, and high-quality performance, at a suggested list price of $189.95.



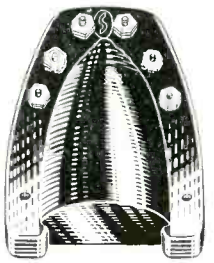
Futuramic Broad Band Yagi

Channel Master Corporation has announced a new addition to its popular series of Futuramic Broad Band Yagis. Model No. 1126, covers the entire low band, giving high gain Yagi reception across all channels from 2 through 6. The new model is a 10-element twin dipole design and has for its gain ranges, from 7 DB to 8½ DB single bay; and from 10 DB to 11 DB for the stacked array.



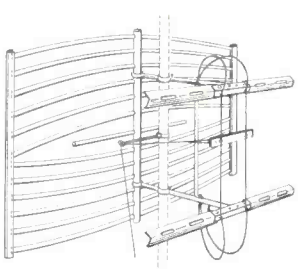
"3-IN-1" Lightning Arrester

JFD Manufacturing Company, Inc. of Brooklyn, New York, reports immediate availability of the new "3-In-1" **uhf**-vhf Lightning Arrester Nos. AT110 and AT110S. Designed to reduce lightning arrester inventory requirements, the "3-in-1" unit grounds picture-smear static and destructive lightning from either flat ribbon tubular, ovaltube, double-barrel or open-wire twin-lead.



2-Set TV Coupler

A new 2-Set Coupler that permits the use of 2 television receivers from 1 aerial installation has been placed on the market by **Snyder Manufacturing Company** of Philadelphia. Given the Model number AC-800, the Snyder Coupler is fully automatic and needs no adjustments or switches. For permanent installation, it mounts on either receiver or any convenient place between receivers, or it may be placed in the basement of the home or building.



Improved Davis Super-Vision Antenna

Davis Electronics, Burbank, California, are now shipping their new, improved product. Davis Super-Vision has been weatherized and wind-tested up to 150 miles per hour. In addition, it has been properly braced, strength-increased and thoroughly laboratory tested and field tested. Excellent for fringe area and DX receiving. High gain on all channels—2 through 13.

X-77 Insulator For UHF Antennas

One of of the newest developments to increase the over-all efficiency of **uhf** antennas has been introduced by **Walsco**.

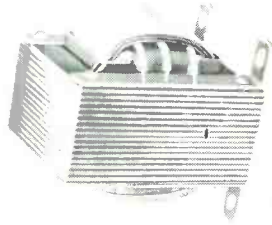
The X-77 is hollow which allows the lead-in wire to pass through the center. This feature keeps the wire completely out of the field pattern and eliminates broken wires caused by strain on the antenna terminals.

269 Volt-Ohm-Microammeter

The introduction of a 269 Volt-Ohm-Microammeter has been announced by the **Simpson Electric Company** of Chicago. The new Model 269 boasts a sensitivity of 100,000 ohms per volt. It has 33 ranges and features an easy to read large 7" dial in a small compact case. Model 269 has only two controls. One control is for setting the range desired; the other is for easy ohms adjustment.

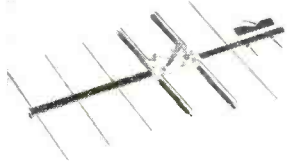
Filament Transformers For Use With Selenium Rectifier Applications

Ten new filament transformers for use with selenium rectifier applications have been introduced by the **Merit Coil and Transformer Corp.** of Chicago. These ten new Merit transformers cover the complete range of present requirements for rectifiers used in industrial, laboratory, TV and power applications.



New UHF Antennas

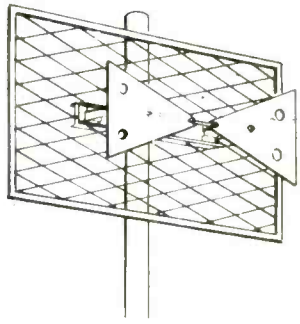
Trio introduces two basic types: **uhf** Bow Ties with reflectors and multi-channel Yagis. The model UBT-1 is a single Bow Tie (with 2' Mast); model UBT-2, two Stacks (with 3' Mast) and model UBT-4, four Stacks (with 4' Mast). The Yagi antennas include model 6-UBY-14-26, model 6-UBY-27, model 6-UBY-43-60, and model 6-UBY-61-83.



Bow Tie Released on New Antenna Formula

A **uhf** Bow Tie and Reflector based on a completely new antenna formula has been developed by VEE-D-X, it was announced by **LaPointe Electronics Inc.** This new formula, eliminates insulators and permits all metal construction thus providing higher gain and flatter response across the entire **uhf** band.

Known as VEE-D-X model BT-U, this **uhf** antenna includes other important features.



TRADE FLASHES

[*from page 14*]

The establishment of the new plant will provide substantially increased facilities for all activities of Sylvania's Radio and Television Division. John K. McDonough, General Manager of the division, said division headquarters will remain in Buffalo, N. Y. Batavia will be the 33rd community in ten states in which Sylvania has at least one manufacturing plant, and the new facility there will be the largest Sylvania plant under one roof. It will bring the company's total square footage in manufacturing plants to approximately 4,650,000.

RTMA President Reports Deliveries Of Military Electronics of $5.5 Billion

More than $5.5 billion worth of electronic products for the armed forces have been delivered since the start of the Korean War, President A. D. Plamondon, Jr., of the Radio-Television Manufacturers Association declared.

UHF ANTENNAS

[*from page 19*]

The higher gain is realized at the upper end. Other, larger antennas based on the conical principle are marketed by RMS and Ward and are designed to cover the *vhf* as well as the *uhf* spectrum.

HORIZONTAL DEFLECTION

[*from page 36*]

check was to observe the intensity of the spark drawn by a screwdriver when applied to the 6BQ6GT tube plate cap and at the 1B3GT tube plate cap lead. Fat, juicy arcs were obtained at these points. Then pins #2 and #7 of the 1B3GT were reconnected to the output transformer filament winding. The set was again turned on and the high-voltage was measured at 13KV. The high voltage lead was then connected to the pix tube second anode and the pix tube socket was slipped on to the pix tube base. Lo and behold! A bright white horizontal line appeared across the screen of the pix tube after the ion trap and the brightness control were properly adjusted. What should have appeared was a bright *vertical* line inasmuch as the horizontal deflection coil was disconnected by virtue of lifting one end of C431. It was then suspected that someone had reversed coils and used the vertical deflection coil in the horizontal circuit and vice versa. Upon connecting what was presumed to be the horizontal deflection coil by reconnecting *C431* back again, the raster disappeared and the boost voltage dropped to 260 volts as had occurred in Step 1. The large mismatch due to the use of the vertical deflection coil for the horizontal deflection coil had resulted in trouble with the receiver. Properly reconnecting the coils restored the set to normal operation.

As a concluding note, if the vertical deflection coil had been in its proper connection, and the horizontal deflection coil was still disconnected by virtue of the lifting of *C431*, a bright white *vertical* line would have been seen on the picture tube screen. If then reconnecting *C431* resulted in low boost voltage and disappearance of both the raster and the high voltage it is obvious that either the horizontal deflection coil and/or *C431* would have been found to be defective.

Footnotes And References

(1) An error appears in Fig. 8 on Page 55 of the article. H BLANKING TIME should be (approx. 10us).

(2) Creviston, W.: "Improved Variable Power

Supply," Radio & Television News, April 1953.
Houle, J.: "Wide Range Voltage Regulators," Electronics, August 1951.
Walker, A.H.B.: "Variable H.T. Power Pack," Wireless World, Sept. 1952.

CIRCUIT COURT

[*from page 39*]

than the pulse voltage by itself. Since the combined voltage on D2 is greater than the combined voltage on D1, D2 will conduct more heavily and a greater voltage drop will appear across *R42B*. The net *dc* output is equal to the algebraic sum of the *R42A-R42B* voltage drops and, in this case, the net *dc* output voltage will be positive with respect to ground. As mentioned previously, a positive correction voltage applied to the control tube grid will cause its plate resistance to decrease and effectively increase the capacitance of *C56* lowering the frequency of horizontal oscillator and sweep.

If the horizontal oscillator frequency should decrease, the sawtooth wave will lag the sync pulse in phase and the sync pulse will appear before the retrace portion crosses its *ac* axis. The action which takes place is similar to that described above except that the instantaneous polarities of the sawtooth are reversed. The combined voltage on D2 is now less than the positive sync pulse voltage by itself while the combined voltage of D1 is greater. D1, therefore, conducts more heavily, the greater voltage drop appears across *R42A* and the net *dc* output will be negative. The negative correction voltage applied to the control tube grid causes its plate resistance to increase, effectively decreasing the capacitance of *C56* which, in turn, increases the frequency of the horizontal oscillator and sweep.

In order to prevent the sawtooth voltage and random noise pulses from directly affecting the bias on the control tube grid, the phase detector output voltage is passed through a filter before being applied to the grid. *R42C* and *C51* form a low-pass filter, which has a relatively long time constant, so that rapid voltage changes from the sawtooth or from random noise pulses will have no effect on the control tube bias. The time constant is still sufficiently short, however, to pass the relatively slow changes in correction voltage developed by a phase difference between the sync pulses and the sawtooth.

Capacitor *C54* and resistor *R17* form an "anti-hunt" network to reduce normal overswing (hunting back and forth across the zero *dc* voltage point) which exists when a correcting voltage is applied to a control circuit.

OSCILLATOR TROUBLES

[*from page 35*]

the coupling condenser and grid resistor are fairly cheap items and easily accessible, it is recommended that they be changed together if there is the slightest doubt as to their condition.

Probably the trickiest constant in the local oscillator section is the B+ supply to the oscillator plate *(Fig. 2)*. The oscillator in this circuit is designed to operate with about 55 volts on the oscillator plate. The oscillator will usually cut out at about 45 volts. Under this condition an *if* signal can be fed through from the grid of the converter, but not an *rf* signal. This lack of oscillation occurs when the B+ drops, and can be verified by trying the set on battery operation with a new battery. If the set operates, the power supply on *ac/dc* operation is defective. Under these conditions, the serviceman may assume, after sending through an *if* signal, that the B+ supply is normal.

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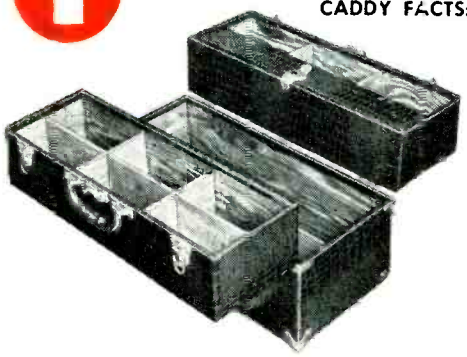

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Actually the supply has dropped low enough to cut out the oscillator but not enough to hinder *if* amplification. We must remember that the oscillator section is much more critical than the amplifier section.

Probably the first check that should be made is the oscillator plate supply. *R2* and *R3* often have a tendency to increase in value and so lower the B+ potential to this circuit. At times this condition only affects the *dc* operation because of the higher potentials developed on *ac* operation (the power supply charges up to the peak of the *ac* voltage which is usually in the order of 150 volts). *C2*, the oscillator decoupling condenser will bring about the same results if it develops a high resistance leakage. *C3*, the input filter condenser usually opens. As a result of this, the B+ potential will drop to 70% of its normal value. In most cases this will cut out the oscillator if the rectifier is not operating at peak efficiency. This trouble is most often accompanied by a noticeable hum. If the selenium rectifier develops a higher internal resistance than normal it will drop a portion of the voltage and tend to inhibit oscillation. The selenium rectifier can be easily shunted for testing purposes.

Another troublesome occurrence that affects the local oscillator is the filament supply line on *ac/dc* operation. See *Fig. 3*. The 1R5 filament takes 1 volt to operate efficiently. The filaments of the four tubes in series with *R4*, the filament dropping resistor, form a network that applies the proper amount of filament voltage to the vacuum tubes. The filament dropping resistor, *R4*, is very critical and should be precise. If its value is too low the tube filaments will blow. If *R4* increases in value the filament voltage applied to the tubes will be below the proper rating and the tubes will operate below efficiency. This usually causes the oscillator section of the 1R5 converter to stop operating. The value of *R4* often increases and causes this trouble. The filament filter condensers, *C5*, *C6* and *C7*, have also been contributing factors to a defective filament supply. Besides shorting out and causing complete failure of the receiver, they sometimes develop a high resistance leakage that upsets the balance of the filament dropping supply, lowering the efficiency of the 1R5.

How many times did you change the 1R5 every other week on a radio of this type thinking the tubes were no good? Any one of the previous troubles can cause a condition of this sort.

UHF TEST EQUIPMENT

[*from page 25*]

use, the instrument produces signal pulses of a width between 1 and 10 microseconds, at pulse repetition rates from 40 to 4000 pulses per second. The pulse rate and width can both be selected from directly calibrated controls on the front of the panel shown as 16 and 18 on *Fig. 5*; pulse delay is marked 17 on *Fig. 5*. External synchronization can be used for the pulse generating circuit and the Delay Control adjusts the pulse occurrence after the leading edge of the sync pulse. In addition, trigger voltages are available to provide trigger signals for external equipment.

The oscillator controls are also shown. Number 5 is the main tuning dial directly calibrated in megacycles from 800 to 2100; this control is labeled Signal Frequency. The control knob, No. 6, is calibrated from 0 to 100 over its outer edge which allows interpolation of frequency reading.

The oscillator modulation selector is control No. 7; this permits the oscillator to operate in a number of ways. The oscillator may operate in the Frequency Modulated Position; the Continuous Wave Position or in three different Pulse Modulated positions. Before this control is set in any particular position, it should be set to the Off position and the meter, No. 9, is set to the zero

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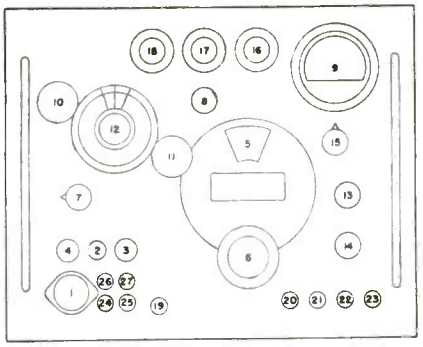

Fig. 5—Outline drawing of front panel of Model 614A with controls, etc., numbered.

power level by means of control No. 8, the Zero Set. When this is done, the power measuring bridge is balanced for zero radio frequency output.

With the oscillator modulation selector in the CW position, control No. 10, the Power Set control is then adjusted so that the power level meter reads exactly at the half scale or zero db reference point. This allows calibration of the power output from the oscillator. The output power level may be set with control No. 11, the Output Attenuator which controls the directly calibrated dial number 12. This reads in decibels from 0 to minus 127 decibels below 1 milliwatt, and in voltage from 0.224 volts to 0.1 microvolt. Both of these calibrations assume the signal generator is working into a 50 ohm resistive load.

Sweeping of the main oscillator is obtained by means of controls No. 13 and No. 14 which are FM Phase and FM Amplitude. The Phase Control is used to change the phase of the *ac* voltage applied to the repeller plate of the reflex Klystron over 180 degrees. This is necessary as in sweep alignment so that the two presentations on the oscilloscope face may be phased or made to coincide. The FM Amplitude control affects naturally, the amount of the frequency swing of the signal output. The maximum range is about one-half of one per cent of the carrier frequency. For example at 800 megacycles, the signal output is swept approximately 4 megacycles. At the high frequency end or at 2100 megacycles, the sweep width is about 10 megacycles. Neither the Phase nor the Amplitude controls are calibrated.

In addition to its use, as a single frequency signal generator and an FM or sweeping oscillator, this unit also is capable of utilizing external modulation and external synchronization for the modulator system. Pulse operation in a number of versatile applications is also designed in the unit and output synchronization signals are provided to allow connection to other test units.

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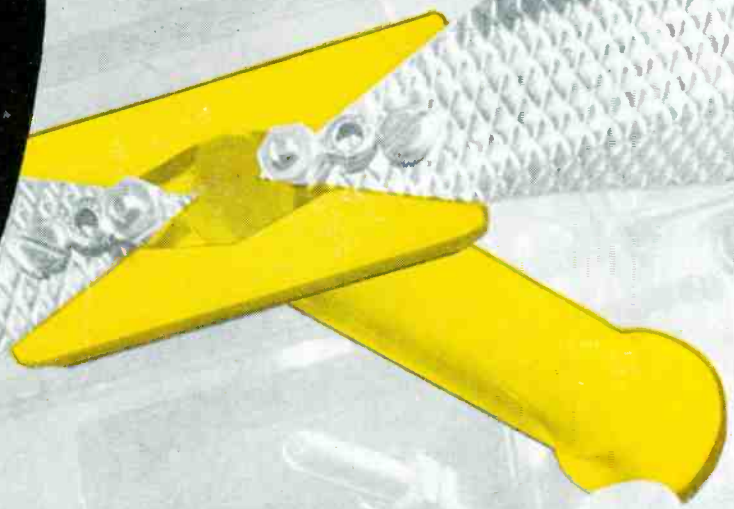

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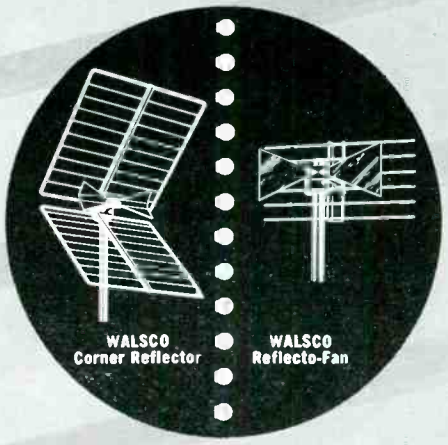

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