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OCTOBER, 1948

AM-FM-TV-SOUND

The Professional Radioman's Magazine
Have You Met the Little Fellow with the BIG Advantages?

The All New Mallory Midgetrol

Offers These BIG Advantages...

**BIGGER MARKET**

The small size of the Mallory Midgetrol lets you service portables, auto radios and small AC-DC receivers which require 15/16" controls.

**SIMPLER INSTALLATION**

The unique shaft design of the Mallory Midgetrol saves installation time with all types of knobs.

**SIMPLER STOCKING**

Electrical characteristics let you use the Mallory Midgetrol to replace 11/8" as well as 15/16" controls. Stocks are further reduced because no special shafts are needed.

The Mallory Midgetrol is unusually quiet, both mechanically and electrically—and tests prove it stays quiet. In addition, the Mallory Midgetrol has nine all new features.

- NEW SIZE
- NEW DESIGN
- NEW SHAFT
- NEW EXTENSION
- NEW SWITCH
- NEW ELEMENT
- NEW CONTACT
- NEW TERMINAL
- NEW TWO-POINT SUSPENSION

It's the NEW Standard in Carbon Controls. See your Mallory distributor.

P. R. MALLORY & CO., Inc.
CAPACITORS... CONTROLS... VIBRATORS...
SWITCHES... RESISTORS... RECTIFIERS...
VIBRAPACK® POWER SUPPLIES... FILTERS

APPROVED PRECISION PRODUCTS
P. R, MALLORY & CO., Inc., INDIANAPOLIS 6, INDIANA
**CROSLEY Twice Tested**

★ RADIO PARTS

for general replacement

**IMMEDIATE DELIVERY!**

from your nearest CROSLEY Distributor, listed below

- **Albany, New York** ...... Roskin Bros.
- **Amarillo, Texas**
- **Atlanta, Georgia** .. Georgia Appliance
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- **Buffalo, N. Y.** ..... Western Mds. Distrs.
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- **Carrier Mills, Ill.** ..... O'Keefe Distributing
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- **Cleveland, Ohio** ..... Frankelite Company
- **Columbus, Ohio** Miami Valley Dist. Co.
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- **Dayton, Ohio** ..... Miami Valley Dist.
- **Denver, Colo.** ..... Graybar Electric Co., Inc.
- **Des Moines, Iowa** ..... E. Sorenson Co.
- **Detroit, Mich.** ..... Peninsular Dist. Co.
- **El Paso, Texas** ..... Vaughan Appliance
- **Fargo, N. D.** ..... Meyers-Taube Co.
- **Fort Smith, Ark.** ..... Dutton-Lainson
- **Huntington, W. Va.** ..... Lehigh Valley Dist.
- **Houston, Texas** ..... United Appliance Co.
- **Grand Rapids, Mich.**
- **Great Falls, Mont.** ..... Ft. Gail Paper Co.
- **Harlan, Ky.** ..... Kentucky Mine Supply
- **Harrisburg, Pa.** ..... Jules Alexandre, Inc.
- **Hastings, Nebraska** ..... Dutton-Lainson
- **Hazleton, Pa.** ..... Elkhorn Valley Dist.
- **Reader's Wholesale Distributors**
  - **Huntington, W. Va.** Huntington Wh'le Furn.
  - **Indianapolis, Ind.** ..... Capital Paper Co.
  - **Jackson, Miss.** ..... Southern Wholesalers
  - **Jacksonville, Fla.** ..... Graybar Elec. Co., Inc.
  - **Kansas City, Mo.** ..... Superior Distri. Co.
  - **Little Rock, Ark.** ..... Wright Service Co.
  - **Los Angeles, Calif.** ..... J. N. Ceazan Co.
  - **Louisville, Ky.** ..... Cooper-Louisville
  - **Manitowoc, Wis.** ..... J. J. Stangel & Hve.
  - **Memphis, Tenn.** ..... National Rose Co.
  - **Miami, Fla.** ..... Graybar Electric Co., Inc.
  - **Milwaukee, Wis.** ..... Greusel Distri. Co.
  - **Nashville, Tenn.** ..... Nashville Chair Co.
  - **Newark, N. J.** ..... Apollo Service, Inc.
  - **New Haven, Conn., H. M. Tower Corp.
  - **New Orleans, La.**
  - **Woodward, Wight & Co.
  - **New York, N. Y.** ..... CROSLEY Distr. Corp.
  - **Omaha, Neb.** Electric Fixture & Supply
  - **Orlando, Fla.** ..... Graybar Elec. Co., Inc.
  - **Peoria, Illinois** ..... Johnston-Moody Co.
  - **Philadelphia, Pa.** ..... Judson C. Burns, Inc.
  - **Phoenix, Arizona** Appliance Distributors
  - **Pittsburgh, Pa.** Pittsburgh Products Co.
  - **Portland, Maine** Graybar Elec. Co., Inc.
  - **Portland, Ore.** Fields Sales Company
  - **Providence, R. I.** Graybar Elec. Co., Inc.
  - **Quincy, Illinois** ..... Tenk Hardware Co.
  - **Reno, Nev.** ..... Heat & Air Cond. Supply
  - **Richmond, Virginia** ..... Louis O. Bowman
  - **Roanoke, Va.** ..... Richardson-Wayland
  - **Rochester, N. Y.** ..... O'Donnell-Dunigan
  - **Saginaw, Mich.** ..... J. Geo. Fischer & Sons
  - **Salt Lake City, Utah** Western Supply Co.
  - **San Antonio, Texas** Alamo Distributing
  - **San Francisco, Calif.** ..... California Electric
  - **Savannah, Georgia** ..... Frank Corp.
  - **Seattle Wash.** ..... Commercial Appliance
  - **Shreveport, La.** ..... Electric Supply Co.
  - **Sioux Falls, S. D.** ..... Power City Radio
  - **South Bend, Ind.** ..... The Ridge Company
  - **Spokane, Wash.** ..... Standard Sales Co.
  - **Springfield, Ill.** ..... Central III. Wholesalers
  - **Springfield, Mass.** ..... Tarbell-Watters
  - **Springfield, Mo.** ..... Rogers & Baldwin
  - **Sterling, Illinois** ..... Hardware Products
  - **St. Louis, Missouri** ..... ARA Distributing
  - **St. Paul, Minn.** ..... Motor Power Eqpt. Co.
  - **Syracuse, N. Y.** ..... O'Donnell Distributors
  - **Tampa, Fla.** ..... Graybar Elec. Co., Inc.
  - **Toledo, Ohio**
  - **Walding-Kinnan & Marvin Co.
  - **Tulsa, Oklahoma** Tom P. McDermott, Inc.
  - **Tucson, Arizona** Appliance Distributors
  - **Atlanta, Georgia** Appliance Distributors
  - **Atlanta, Georgia** Appliance Distributors
  - **Cincinnati, Ohio** Appliance Distributors
  - **Cleveland, Ohio** Appliance Distributors
  - **Columbus, Ohio** Appliance Distributors
  - **Dayton, Ohio** Appliance Distributors
  - **Denver, Colorado** Appliance Distributors
  - **El Paso, Texas** Appliance Distributors
  - **Fort Worth, Texas** Appliance Distributors
  - **Houston, Texas** Appliance Distributors
  - **Kansas City, Missouri** Appliance Distributors
  - **Little Rock, Arkansas** Appliance Distributors
  - **Los Angeles, California** Appliance Distributors
  - **Louisville, Kentucky** Appliance Distributors
  - **Manitowoc, Wisconsin** Appliance Distributors
  - **Memphis, Tennessee** Appliance Distributors
  - **Miami, Florida** Appliance Distributors

**CROSLEY TELEFLEX**

packaged FM & TV antennas

**TELEFLEX** has all the electrical advantages claimed for other antennas. Plus exclusive features that save installation time, labor and cost! Comes factory assembled in one carton, ready to install on location in less than three minutes! All external connections factory made to eliminate trouble from water, ice or short. Reflector spacer rods adjustable without cutting. Dipole elements adjustable to full FM and TV range without cutting. Teleflex straight dipole-type antenna, with 60 feet of 75 ohm transmission line, only $6.90 from your Crosley Distributor. $5.40 less transmission line.

**CROSLEY**

Division—AEGO Manufacturing Corporation

Cincinnati 25, Ohio

RADIO SERVICE DEALER • OCTOBER, 1948
EDITORIAL

by S. R. COWAN

A Sound TV Plan

One of the industry's oldest set manufacturing firms is just now starting production. When the sales manager was asked, "What is your policy to be in regard to service installation?" he replied, "Wide open!" He then explained that the firm's distributors will be given carte blanche in each territory they serve as to who will do the installing and servicing for that area.

Where the distributor finds a dealer equipped with a proper service department and trained staff, that dealer will be allowed to sell, install and service all TV sets he sells of that brand. Where dealers who have their own service work the distributor will arrange to have competent service organizations or servicemen do it for them. In all cases, the retailer will be required to allow the TV set buyer to choose for himself what organization he wants to have do the installing and servicing.

In our opinion, here is a TV set maker with a realistic and practical policy—one that serves the best interests of all parties concerned. If an radio technician or Service Dealer is so lax as to fail to really get all the "know how" possible on TV, and to qualify himself for all types of TV work, he will have no one but himself to blame if he fails to survive in the competitive days ahead.

Radio Service Course Graduates

In our travels we have noticed recently that Radio Training Schools in many parts of the country are now reaching the final stages of their training programs. Consequently, now day after day, week after week—vast numbers of newly made radio technicians are coming into the radio servicing field. Most are doing it in a serious way—with every intention of making this their life business—not at all like the droves of ex-G.I.'s who (with little or no experience) popped into radio servicing in the last months immediately after getting their discharge papers, and then popped out of the same again because they didn't have what this profession requires to wit: real technical ability, the sincere desire to be radio servicemen, and proper financing.

All old timers in this business now face much greater competition than ever before. It's going to be tough competition, so recognize impending events and don't say we didn't warn you.

Tube Shortage-Outlook

In many parts of the country "hot number" tubes are scarcer than ever while "slow movers" are available in unlimited quantities. The condition is steadily getting worse. Perhaps tube manufacturers aren't aware of condition in the replacement field, and if such is the case, we hope this squib acquaints them with the facts.

However, just as a caution, may we suggest that every Radio Service Dealer and Service Director should write at once to his tube supplier and state in a business-like manner, (but briefly), just how unbalanced his tube inventory is. Ask the jobber to contact the tube makers' representatives and in turn have them

(Continued on page 65)
"Nobody can tell me about Ken-Rad tubes—I've been using them for 14 years!

"When you've used them as long as I have, you know you can depend on them.

"I don't know any tube that stands up better than Ken-Rad tubes. They're quality through and through.

"Customers like them. This means repeat business—better business.

"Ken-Rad tubes do the trick, all right!"

JAMES E. CAMPBELL, Foreman, Quality Control Section, who oversees the quality sampling inspection (below) before tubes are accepted into warehouse. Ken-Rad tubes are constantly being tested to assure dependable performance, long life.

W. B. STYLES of Styles & Appleton, Oakland, California, one of thousands of reliable servicemen who depend on Ken-Rad tubes to build repeat business.

"They have to stand up—through test after test.

"This comprehensive testing results in dependable tubes that satisfy your customers, increase your business.

"Ken-Rad tubes are factory-tested for noise, microphonics, static, life, shorts, appearance, gas, air and hum.

"No wonder they're tops in quality, stamina and endurance. No wonder they're customer-pleasers, profit-makers."

KEN-RAD TUBES MUST STAND UP!

KEN-RAD Radio Tubes
PRODUCT OF GENERAL ELECTRIC COMPANY
Schenectady 5, New York

The Serviceman's Tube

RADIO SERVICE DEALER + OCTOBER, 1948
INTERCOMMUNICATION AND SOUND SYSTEM CABLES

Every Type for Every Service

Sold Exclusively Through Recognized Wholesale Distributors

Belden Radio WIRE
TV and HYTRON go together!

GOING...GOING...GONE!

Last prizes in your Hytron serviceman's contest going — going — gone. Grand prize winner soon to be announced. Contest over. BUT the results are just beginning. We are now up to our necks in "hot" ideas. Two swell new shop tools are already scheduled for production. Many more coming. Don't miss a single one. And thanks a million for your cooperation in the contest. We are doing our darndest to make your efforts pay off for you.

TV and tubes go together. A heck of a lot of tubes. Lots of kinds of tubes. Miniature, GT, G, metal, and lock-in. In TV you find all varieties of receiving tubes.

To replace them, you need dependable tubes and a wide range of types. Dependable — because the complex TV tube chain is no stronger than its weakest link. A wide choice of types — to match the ingenuity of TV set designers.

Hytron gives you both. All kinds of tubes — and the same dependable Hytron tubes which keep company with the best of TV set makers. Service your TV sets with Hytron tubes; you'll find that TV and Hytron go well together.

SPECIALISTS IN RADIO RECEIVING TUBES SINCE 1921

HYTRON
RADIO AND ELECTRONICS CORP.
MAIN OFFICE: SALEM, MASSACHUSETTS

RADIO SERVICE DEALER * OCTOBER, 1948
CONIPIATELI
"GREATEST ADVANCE"

A COMPLETELY NEW VOLT-OHM-MIL-AMMETER that does more ...
...has proved components ... and will give a lifetime of satisfaction.

1 Beautiful Stream-lined Instrument.
2 Large 5½" Meter
   In Special Molded Case Under Panel.
3 Resistance Scale Markings From .2
   Ohm To 100 Megohms ... Zero Ohms Control Flush With Panel.
4 Only one Switch ...
   Has Extra Large Knob 2½"
   Long ... Easy To Turn ... Flush With Panel Surface.

Precision first...to Last

TRIPLETT ELECTRICAL INSTRUMENT CO.
In Canada: Triplett Instruments of Canada, Georgetown, Ontario.
IMPROVEMENTS

MODEL 630
$37.50
U.S.A. Dealer Net
Leather Carrying Case $5.75
ADAPTER PROD FOR TV
HIGH VOLTAGE TESTS EXTRA

New Molded Selector Switch
Contacts Are Fully Enclosed.

Unit Construction... Resistors, Shunts, Rectifiers, Batteries All Are Housed In A Molded Base Built Right Over The Switch... Provides Direct Connections Without Cabling... No Chance For Shorts.

All Resistors Are Precision Film Or Wire Wound Types... For Permanent Accuracy.

Batteries Easily Replaced... New Double Suspended Contacts.

TECH DATA
D.C. VOLTS: 0-3-12-60-300-1200-6000, at 20,000 Ohms/Volt
A.C. VOLTS: 0-3-12-60-300-1200-6000, at 5,000 Ohms/Volt
D.C. MICROAMPERES: 0-60, at 50 Millivolts
D.C. MILLIAMPERES: 0-1.2-12-120, at 250 Millivolts
D.C. AMPERES: 0-12, at 250 Millivolts
OHMS: 0-1000-10,000; 4.4 Ohms on center scale on 1000 scale; 44 Ohms center scale on 10,000 range.
MEGOHMS: 0-100 (4400-440,000 at center scale)
DECIBELS: -30 to +1, +16, +30, +44, +56, +70
OUTPUT: Condenser in series with A.C. Volt ranges
Married Bliss and TV, Programs

ANYONE who has been married for any length of time knows that tact and patience are requisite to a happy home. Now you can add to the obstacles of connubial bliss that new gimmick called television. Believe it or not, TV programs are alienating husbands and wives. Take the tired hubby who winds up a tough day at the office and wends his weary way home looking forward to a pleasant meal to be followed by a few hours of relaxation viewing a fight, ball game or wrestling match on his videoset. Instead, he finds his wife and kiddies have decided that they want to watch a movie or newscast scheduled for the same period. An argument ensues . . . and as usual, there can’t be a winner when husbands and wives quarrel. Solution: two videosets per home.

Suit Against TV Maker

One of the biggest TV makers is faced with a law-suit by a group of radio servicemen who contend that this set-maker is depriving them of their right to a livelihood by violating several laws, such as the Clayton, Sherman and Robinson-Platman Acts. Plaintiffs will claim that the set-maker forces a buyer of his brand videoset to contract for its installation and maintenance through a servicing firm who was selected for the job by the set maker. If upheld the claim might show violation of the antitrust law. However, it takes time, often years, before such suits are adjudicated, so what the final outcome will be is a moot question.

We don’t believe any video set maker wilfully desires to monopolize the servicing end as well as the sales angle of this business. Rather, the prime purpose of having “factory-trained” TV service outlets at the inception of TV was to protect both the manufacturer’s investment as well as the public welfare by keeping unqualified technicians out of something about which they knew but little if anything. Of course that was nearly two years ago, and times change. Now, we feel the TV problem can be quickly solved by ending all exclusive factory service tie-ups (eliminating the threat of a suit, incidently) and by allowing TV to become a free-enterprise proposition.

And, regarding TV service techniques, we know many technicians who never had the privilege of a “factory-training course” yet are by far more qualified to install and repair TV sets than their supposedly more eligible colleagues.

New York “Town Meeting”

New York’s technicians have been afforded an opportunity to attend a series of technical lectures, sessions of which are called “Town Meeting of Radio Technicians,” sponsored by the RMA and other industry groups, when the clinics were held at the Astor Hotel in New York City on September 27, 28 and 29. All technicians in the New York area were eligible for admission free, and were urged to attend. For further details of this program the reader is referred to page 46.

Broadcasting Gets “New Look”

For years the radio listening public considered radio a mighty handy gadget to have around because it covered the news almost as fast as it took place. For example, we recall hearing a broadcast of a two-hour old transcribed plea from an embattled group commander, (tied up in the Belgium Bulge fiasco), for reinforcements. And, subsequently we even saw that type of action taking place as recorded by the newswired cameramen. But, now the U. S. Navy comes up with an even more startling and significant plan; for by using telecasts it can actually show dynamic action as it takes place. Can you imagine watching a war being fought while you sit in an easy chair, or attend a movie theatre? Well, it’s not such a fantastic idea! Let’s hope it never happens, but just consider the potentialities of TV once the space-limitations factor is licked, and it will only take time to accomplish this elementary problem. Networks are coming along fast.

The Slump

As reported here last month, the drop-off in radio and appliance sales during the summer months was exceptionally noticeable as compared to the slump in sales of other types of consumer durable goods. Now that one can study the RMA report of receiver production for the month of July it gives one the chills because the figures are so bad. Television production alone affords some consolation.

Recognizing that July has always been an off-production month, this year’s figures show an abnormal slough. For example, while over 1,400,000 AM receivers were produced in March 1948, only 552,000 were made in July. In comparison, while 52,000 TV sets were made in March, July production was 56,000 units. June was the peak TV month with production topping 64,000 units.

Analyzed another way, one can logically state that only TV is able to hold its own against seasonal production slow-downs and buyers’ resistance. Everywhere throughout the country holders of permits for TV stations are fighting to get on the air as quickly as possible. There’s gold in them thar hills, and make no mistake about it!
MADE TO SELL YOU
AND YOUR SERVICE

3 NEW
SYLVANIA AIDS!

Here's the new Sylvania Service Kit now available to service dealers—a prestige-building and practical addition to your service business!

Made of laminated plywood covered with brown plastic fabric with the appearance of fine leather, this kit has a tube capacity of over 75 tubes. The interior measures only 18"x 11 1/4" x 5 1/2". The tool section in the lid is designed to hold the most commonly used tools for on-call service. Ask your Sylvania Distributor for this wonderful new, low-priced Service Kit. Get that added professional touch that means so much.

only $995

And here's the new Sylvania illuminated shadow box sign that's ready for hanging in your window, on your wall, or on any strategic flat surface in your windows.

The big, bright red letters "Radio Service" tell your message in no uncertain terms to every passerby. The sign's face is glass; the background translucent yellow. The red letters are outlined in black, while the bottom half of the sign is black with yellow lettering. The brown metal case is chrome trimmed. Size: 18 1/4" long, 8 1/4" high, 3 3/4" deep. Seven-foot cord provided.

At Sylvania Distributors everywhere! Sylvania Electric Products Inc., Advertising Department, Emporium, Pa.
New York Town Meeting

A nation-wide attempt to re-educate an entire industry was launched Monday, Sept. 27, at the Town Meeting of Radio Technicians in the Astor Hotel.

The Town Meeting was in session for three nights and one afternoon, and was the first of five to be held in the next eight months which will spearhead a drive by the entire radio manufacturing and distributing industry to convert the radio service industry to the demands of television installation and maintenance.

Ehle, chairman of the Town Meeting sub-committee of the Radio Parts Industry Coordinating Committee, was the driving force behind the proceedings.

The Coordinating Committee is composed of the Electronic Parts and Equipment Manufacturers, the Radio Manufacturers Association, the Sales Managers Club (East), and the West Coast Electronic Manufacturers Association.

"The radio manufacturing industry feels that it has an obligation to the 30,000 or 40,000 radio repairmen who have devoted years of their lives to servicing the AM sets we made. As a consequence, we are undertaking a national educational program, at no cost whatsoever to the radio technician, to present him with two types of information:

"First, the most advanced information on television, based on actual servicing experience, which the top-flight technical brains of the country can prepare to enable him the better to serve television set owners;

"Second, the most practical, down-to-earth information on management and merchandising of his own business to enable him to become a stable and expanding businessman. This is necessary if he is to grow and advance with the growth and advance of television."

The New York Town Meeting will be followed by similar sessions in Boston, Atlanta, Los Angeles, and Chicago. They are patterned after an experimental meeting held quietly in Philadelphia last January which, studies showed, stimulated manufacturers, distributors, and technicians in that area to an intensive study of the subject providing the follow-through necessary to make the Town Meetings effective.

Following was the program:

7 P.M. Stember 27: First Session, Lewis Winner, Moderator

Presiding: Harry A. Ehle, Chairman, Town Meetings of Radio Technicians, Radio Parts Industry Coordinating Committee.

"Why a Town Meeting?" Max Balcom, President, Radio Manufacturers Association.

"Antenna Installation:" Ira Kamen, Television Antenna Dept., Commercial Radio Sound Corp.

"How and When to Collect Your Bills:" John Nuffort, Creditman, American Cyanamid Company.

"TV Installation in the Home"—A Symposium

1. Instructing the Customer in Set Operation: Marvin Kaplan, Video Television, Inc.

7 P.M. September 28: Second Session


"Television Servicing in the Home With Existing Test Equipment": Eugene Ecklund, Bergen-Passaic Electronics, Inc.

"Case History of a Successful TV Service Shop": Harold Suss, Assistant Comptroller, Bloomingdale Bros., Inc.

2 P.M. September 29: Third Session

O. H. Caldwell, Moderator

"Television Service in the Shop": Carl Quirk, Allen B. DuMont Laboratories, Inc.

"How to Get Along With Your Banker": William J. Boyle, Assistant to the Vice President, Franklin Square National Bank, Franklin Square, L. I.

"RF and IF Systems and FM Conversion Systems": Murray Goldstein, Emerson Radio & Phonograph Corp.

"Advertising and Public Relations": Austin C. Lescaboura, Austin C. Lescaboura and staff.

7 P.M. September 29: Fourth Session


"The Technician as the Public Sees Him": A National Survey—George H. Dennison, Association of Better Business Bureaus, Inc.

"Sweep Generators": John F. Rider, John F. Rider, Inc.

"Radio Service Industry Faces Television": W. L. Parkinson, General Electric Co.


Second Hytron Winner Gets Prize

The second award (for entries made during June) was won by Gerard P. Diaz, radio serviceman of 12 W. 7th St., Parkville, Mo. The winner met William T. McGary, Hytron field representative, and Merle Applebee at the latter's store, Burstein-Applebee Co., Hytron jobbers, and carried away with him the double prize for June entries—a Radio City Products Model 665-A "Billionaire" and a Model 705-A Signal Generator.

The Hytron contest is not over yet. Servicemen with ideas for simple, handy, inexpensive tools still have a good chance to win one of these high-grade test kits. Hytron jobbers have the information and the entry blanks.
The NEW General Electric Variable Reluctance Cartridge for Long Playing Records

- Specifically designed for the new long playing records...high compliance...low mass stylus assembly
- Equipped with 1 mil tip radius sapphire stylus
- Can be used with standard G-E preamplifiers

Place your order today!

General Electric Company, Electronics Park, Syracuse, New York
Model 266 Vacuum Tube Voltmeter for TV, FM, AM

Ranges:
- Volts: (A.C. and D.C.) 0-1, 5, 10, 50, 500, 1000, 5000
- Milliamperes: (D.C.) 0-1, 5, 10, 50, 100, 250, 500
- Ohms: 0-10, 100, 1000, 10,000
- Megohms: (10 ohms center), (100 ohms center), (1000 ohms center), (10,000 ohms center), (1 megohm center)
- Megohms: (10 megohms center)

Size: 8½" x 9½" x 8". Dealer's Net Price complete with Operator's Manual $94.50

Ask your jobber or send for literature.

SIMPSON ELECTRIC COMPANY
5200-5218 W. Kinzie St., Chicago 44, Ill.

INSTRUMENTS THAT STAY ACCURATE

The Simpson Model 330 tests tubes in terms of PERCENTAGE of rated DYNAMIC MUTUAL CONDUCTANCE, a direct indication of tube performance with reference to the manufacturer's STANDARD MICROMHO rating. Shows tubes as good, fair, weak or definitely bad. When you have finished a tube test ONE BUTTON returns all switches to the normal position ready for the next test.

Size: 13½" x 9½" x 6½".
Dealer's Net Price, complete with Operator's Manual $132.50

Model 415-A Signal Generator for FM and AM. Incorporates built-in sweep circuit for modern FM servicing, frequency modulated signal with a sweep of 1 megacycle, more than adequate for all FM alignment. Internally modulated at either 60 cycles or 400 cycles or modulated from an external source. A 120 cycle saw-tooth voltage is available at scope synchronization or as actual scope sweep. AM bands cover complete frequency range from 75 KC to 130 MC.

For 105-130 volts, 50-60 cycle
Size: 5½" x 11¾" x 15⅝"
Dealer's Net Price, complete with Operator's Manual $145.00

Model 330 RCP Mutual Conductance Tube Tester for TV, FM, AM for TV, FM, and AM servicing

— your 3 finest basic testers

On Model 266 Vacuum Tube Voltmeter, note these distinguishing Simpson features: the 1 volt range for full scale deflection, necessary in low R.F. voltage measurements; the zero center switch provided for discriminator circuit alignment, a feature which embraces all D.C. voltage ranges. D.C. volt input resistance ranges from 50 megohms to 200 megohms; A.C. volt input impedance at 60 cycles is 40 megohms. The low input capacitance of the probe (approximately 4 micro-microfarads) assures the accuracy essential for the high frequencies encountered in servicing FM and television receivers.

Model 330 RCP Mutual Conductance Tube Tester for TV, FM, AM

Size: 8½" x 9½" x 8". Dealer's Net Price complete with Operator's Manual $94.50

Model 415-A Signal Generator for FM and AM

Size: 5½" x 11¾" x 15⅝"
Dealer's Net Price, complete with Operator's Manual $145.00

RADIO SERVICE DEALER • OCTOBER, 1948
PROJECTION TELEVISION

by ALLAN LYTEL

North American Philips Protelgram System

Projection television is of increasing importance to all TV servicemen as the public is becoming more aware of the advantages of the larger screen this allows. Surveys show that the greatest single unfavorable factor in the present day television receiver is the size of the screen. Most laymen agree that the 10 inch represents the smallest possible size for home use. The 7 inch size proves to be inadequate for anything but the smallest audience.

There are two approaches that may be used to overcome this defect of a small screen, the larger tube or the projection system. Both of these mean an increase in the cost of the receiver and the projection system seems to hold the promise of the goal of all manufacturers; an inexpensive receiver with a large viewing screen.

Allen B. Du Mont Laboratories have pioneered in the production and use of the large direct-view screen. Their Studio Model, the Clifton, uses the 12JP4, a 12 inch tube with magnetic deflection and focusing. This tube, illustrated in Fig. 1, provides a picture size of 7¾ in. by 10¾. The actual diameter of the tube is 12 in. at the widest point and the length is 17¾ in. The largest direct-viewing screen is used on the Du Mont Salon Models, the Westminster and the Hampshire. This screen has its greatest diameter of 20 in., a length of 23¾ in. and provides a picture area of 12¾ by 17¾ in. This tube has 222 sq. in. of picture area and is provided with a motor-driven tilt mechanism which is used to bring the tube into viewing position from the normal closed rest position. The tube is illustrated in Fig. 2, and it is the 20BP4 type.

Direct view has the advantage of a more simple mechanical system in the radio cabinet but the disadvantage is the room that is needed for these large tubes as may be seen from the over-all length of this 20 in. tube. Projection television has been developed to the point where the space required is not much more than is required for the 20 in. tube. One immediate advantage that is noticed of the direct view system is the clear picture that is presented from any viewing angle from the front. This is not always the case with the projection systems.

North American Philips Protelgram Projection System

The most startling development in projection television is this compact system developed and produced by North American Philips. This unit has the name "Protelgram" and the Model number 100 which may be seen in Fig. 3. A projection picture of 12 in. by 16 in. is offered through the use of this package which is composed of three small units; a special CRT, 3NP4, a metal projection box with the deflection and focusing coils, and a high voltage power supply. As in Fig. 8, the viewing screen and the cabinet mirror are not a part of the package unit and may be placed in any of several positions to make a complete unit for projection and viewing.

This unit is designed to be used with the same chassis as is normal for the 10BP4 which is in common use. Beginning with a conventional TV chassis using a 10 in. tube as above (10BP4) the use of the Protelgram system does away with, or supplies all of the following parts: 1) Focus coil, 2) deflection coil, 3) ion trap and its circuit and DC supply, 4) 10BP4 tube, socket, wires, including the 5) high voltage cable, 6) the high voltage supply, usually 9 Kv, with all components of this high voltage supply, and, 7) CRT mounting and safety glass.

This unit does need a power source, which is taken from the conventional chassis and uses 50 mils at 350 volts d.c. and 1.2 amps at 6.3 volts a.c.

The great advantage of this system is apparent at once, for it allows a smaller cabinet with a very large picture and at the same time a rather simple mechanical system as compared with other projection systems. A 2¾ in. CRT is used with a very small spot and fine grain phosphor which allows a resolution of 450 lines with a contrast ratio of 30:1 with very bright high lights of 45 foot-lamberts. The picture...
Fig. 3—Suggested use of Protelgram Projection System.
(Courtesy North American Philips)

Fig. 4—Units of Philips Projection System.
(Courtesy North American Philips)
completely assembled. The unit is removed from the case in Fig. 7. Completely enclosed, this high voltage unit is only 8½ in. high, 4½ in. wide, 7 in. long, and weighs 5 lbs. Because of the special shielding there is no r-f radiation from the unit. On this chassis are a 6SR7 (a duplex diode triode), and a 6BG6G together with the circuit components and transformer.

A special sealed transformer assembly is used which contains three special rectifiers, the transformer and the high voltage condensers. This unit is impregnated and sealed under a vacuum. The unit is illustrated in Fig. 8 with the sealed cover removed. Fig. 9 is the schematic of this circuit showing the EY51 high voltage rectifiers.

This circuit provides a stable source of high voltage as the triode section of the 6SR7 acts as a 1 kc sawtooth oscillator driving the 6BG6G which is biased almost to cut-off. This 1 kc then appears as plate current pulses, which go through a part of the transformer primary. Since the transformer primary is tuned to 25 kc, there are damped oscillations produced. These are about 8½ kv and are applied to the three rectifiers in series to make a total of 25 kv. The filament supply for the diodes comes from the 25 kc oscillator as shown.

Negative feedback is used from the 25 kc oscillations to the diode rectifier of the 6SR7 and then to the control grid of the 6BG6G to control the current through the transformer and improve the regulation.

There are three inputs to this power supply from the TV chassis: 1) Ground, 2) filament supply; 6.3 volts a.c. (one side is grounded), 3) plate supply; 350 volts d.c., 50 mils drain, with a 150 microamperes high voltage drain.

The output of this high voltage supply (Continued on Page 55)
An excellent explanation and application in chart form of DBM, the unit of power or voltage ratio is given in the July issue of RCA Tube Tips. It is reprinted below with RCA permission.

Sound men who are consistently concerned with DBM* measurements may use the RCA 195-A VoltOhmyst electronic meter because it is provided with a direct-reading DB scale. The DB scale of the 195-A reads directly in DBM when the diode probe is placed across a 600-ohm resistive load, and the range switch is set at 5 volts.

When it is desired to make DBM measurements with the latter instruments, the accompanying chart can be used to find DBM values corresponding to a-c voltage values read across a 600-ohm resistive load. Because DBM are defined with respect to a 600-ohm load, power levels correspond to voltage values. Therefore, DBM can also be measured in terms of RMS a-c voltage across a 600-ohm resistive load. For example, 0.775 volt indicates 0 DBM or 1 milliwatt; 7.75 volts indicates 20 DBM; 77.5 volts indicates 40 DBM, etc. While measurements must all be made with a sine waveform to avoid waveform error, any frequency can be used which is within the range of the VoltOhmyst VTVM.

The accompanying DBM chart provides rapid conversion of RMS a-c voltages to corresponding DBM values. Associated power levels can also be read along the top of the chart. The chart is applicable to resistive loads other than 600 ohms when a suitable factor is added algebraically to the DBM values appearing along the axis of ordinates, as explained in the chart footnote.

*DBM values are defined as the number of decibels above or below a reference level of 1 milliwatt in 600 ohms at 1000 cycles. Accordingly, 0 DBM indicates a power level of 1 milliwatt; 10 DBM, 10 milliwatts; 20 DBM, 100 milliwatts, etc.

Note: For a-c volts (RMS) measured across a 500-ohm resistive load, add 0.792 DBM algebraically to values read from chart. For a-c volts (RMS) measured across other resistive loads, use formula: \[ \Delta \text{DBM} = 10 \log \frac{600}{R} \] where R is the load in ohms, and \( \Delta \text{DBM} \) is the corresponding increment to be added algebraically to the DBM value read from the chart. (If \( R > 600 \), \( \Delta \text{DBM} \) is negative.)
DISTRIBUTED CAPACITANCE

by RUFUS TURNER

An important characteristic of coils used in the new higher-frequency receivers. This article tells in plain language what it is and how to measure it.

The distributed capacitance of a coil depends upon the diameter of the wire with which the coil is wound, number of turns, separation between turns, thickness of insulation on wire, type of insulating material on wire, diameter of coil, length of coil leads, and to some extent upon the end-to-end length of the coil. There is no simple way to calculate the distributed capacitance of a coil.

In manufactured and home-made coils, distributed capacitance is reduced to a low value by spacing turns, using bare wire (in spaced-turns coils), and by employing "non-parallel" winding such as is found in universal, lattice-wound, honeycomb, spiderweb, and jumble-wound coils. In coil installation, short connecting leads materially reduce the undesired shunting capacitance.

A coil with low distributed capacitance is a good coil. A coil with high distributed capacitance is inefficient, since the undesired shunting capacitance tends to conduct r-f currents around the coil when these currents should flow through the coil in order to properly do their work.

Because of distributed capacitance, a coil apparently has a higher value of inductance than the true inductance. This confusing larger value is known as the equivalent inductance and may be several times higher than the true inductance of a coil. In practice, the difference between true inductance and equivalent inductance often necessitates peeling off turns after a coil has been wound, according to specifications, to have a desired inductance rating.

Measurement of Distributed Capacitance

We have stated already that there is no simple formula for computing distributed capacitance from the dimensions of a coil. However, distributed capacitance can be measured by the serviceman. Electronic laboratories employ the Q-meter for this purpose. But since that instrument ordinarily is not found in radio service shops, we will explain a simpler method.

The apparatus required are (1) a radio-frequency test oscillator or signal generator, (2) a variable capacitor with dial reading direct in micromicrofarads (or provided with a calibration curve), and (3) an a-c vacuum-tube voltmeter. The circuit is given in Fig. 1.

The following test procedure is recommended: (1) Keep the coil under test as much in the clear as possible. That is, well away from other objects. However, keep coil leads as short as practicable.

Employ the loosest possible coupling between the 1-turn link and the coil under test. Adjust the separation between the link and the coil for the widest value which will still give a readable deflection on the meter.

(Continued on Page 53)
THE TV picture tube is essentially a vacuum tube in which the plate, or receiver of electrons is replaced by a translucent glass face covered internally with a fluorescent material, called a “phosphor.” Electrons are emitted from a cathode, and eventually find their way to this fluorescent surface causing it to glow.

Characteristics of Phosphors

There are many materials which can be classified as phosphors. These exhibit different characteristics when subjected to the bombardment of electrons from a heated cathode. These characteristics which are symbolized: P1, P2, etc., pertain to the color with which the phosphor fluoresces, and the persistency of light after fluorescence. Some substances lose their glow almost immediately after the electron bombardment is removed, while others continue to glow for an appreciable time after. The table in Fig. 1 lists a number of popularly employed symbols and their characteristics.

Frame frequency in TV is 30 cycles per sec. This requires that each frame be completely obliterated in time for the succeeding frame. This imposes a requirement of a phosphor of high and instantaneous brightness. Other requirements are stability and a minimum of eye fatigue. The most suitable type of phosphor at present for TV is the P4 type.

The Electron Gun

The operation of the electron gun in a cathode ray tube can be divided into two main tasks: 1) beam forming and control, and 2) beam deflection. These functions are shown, relative to each other, in block diagram form in Fig. 2. In the electron gun the beam is first developed in a heated cathode, after which it is modulated by an incoming signal, after which it is both focused and accelerated so that it reaches the viewing screen in a fine stream of high velocity electrons. In addition to these operations, the beam must be deflected across the screen, horizontally and vertically. This is done by the incoming synch pulse sweeps acting through the horizontal and vertical deflecting coils or plates.

There are many types of electron gun structures. However, by an analysis of its basic principles we can arrive at a clear understanding of even the most complicated types. Essentially, the electron gun is designed to perform the following: 1) accelerate the electron, 2) narrow the beam down to a fine stream so that by the time it reaches the viewing screen it is an intense pin point of high velocity electrons.

Electron Acceleration

Electron acceleration results from a difference of electric potential between two electrodes. This potential can be set up electrostatically or electromagnetically.

Electrostatically, the presence of a voltage difference between two plates (see Fig. 3a) sets up electrostatic lines of force between these plates. At right angles to these lines of force is the potential field which is a maximum at the positive plate and decreases to a minimum at the negative plate. A free electron starting out at the negative plate is gradually accelerated to the positive plate by this field in much the same manner that an object dropped from a high structure is accelerated towards the earth by the force of gravity.

Electron acceleration can also be effected by electromagnetic or magnetic means as shown in Fig. 3b. In this case the free electron is deflected at right angles to the magnetic lines of force, its direction of motion being dependent on the direction of the magnetic field and on the original direction of motion of the electron. This comes about as a result of the fact that an electron in motion like a conductor carrying current, sets up a circular magnetic field around it. This magnetic field reacts with the magnetic field set up by coils, or the magnet, producing a force on the electron similar to the force exerted on the armature of a motor. See Fig. 4. Little or no use is made in television of magnetic means for electron acceleration however, considerable applications will be found of magnetic components in focusing, deflection, and ion traps.

First of a series of two articles on picture tubes and associated control circuits. In this article the fundamentals of electrostatic and electrodynamic cathode ray tubes are discussed, particularly with reference to the electron gun structure and its function.  

**Table 1**

<table>
<thead>
<tr>
<th>P1</th>
<th>P2</th>
<th>P4</th>
<th>P5</th>
<th>P6</th>
<th>P7</th>
</tr>
</thead>
<tbody>
<tr>
<td>Green Trace</td>
<td>Medium Persistence</td>
<td>General Oscillographic</td>
<td>Short Persistence</td>
<td>Photographic Recording</td>
<td>Blue-Yellow Trace—Very Long Persistence</td>
</tr>
</tbody>
</table>

Fig. 1—Screen fluorescence characteristics and applications.

Fig. 2—Block diagram of basic sections of TV picture tube.
These will be discussed shortly.

Cylinders are used almost exclusively in cathode ray tube guns for electron acceleration. The electrostatic and potential field distribution of two concentric cylinders is shown in Fig. 5. An electron entering cylinder A will be accelerated toward cylinder B by virtue of the potential field between them.

As stated previously, electron acceleration is accomplished primarily by electrostatic means. Naturally, where magnetic devices are employed for the reasons outlined above some acceleration will take place; but these are incidental rather than primary functions.

**Grid Control**

Prior to deflection, three types of control are usually present in the electron gun. These are: 1) grid control, 2) focusing, and 3) ion control. Just as in a vacuum tube the cathode ray tube contains a control grid which determines the intensity of cathode current or "beam current," as it is more commonly called. This control grid is always negative in polarity with respect to the cathode. The shape of this grid, however, differs from that of the one in the vacuum tube insofar as it is in the form of a hollow cylinder entirely open at one end and wholly enclosed at the other end, except for a tiny whole in the center of this enclosure for the purpose of concentrating the beam into a thin stream. Fig. 6 illustrates the cathode and grid structure in a typical CRT.

**Focusing**

In the process of accelerating the electron beam from the cathode to the phosphor screen an essential requirement is that the beam reaching the screen be a sharp and well-defined pin point. Since the cathode itself is not a point, but a surface of appreciable area, electrons leaving it emerge at all angles from it, making it necessary to compress the beam so that these electrons converge at a single point on the screen.

This process is analogous to the focusing that takes place in an ordinary light lens. For this reason the complete study of this means of electron control is called "electron optics," and the device analogous to the light lens is called and "electron lens."

**Electrostatic Focusing**

Focusing may be accomplished electrostatically or electromagnetically. A single electrostatic electron lens is formed by two concentric cylinders, or, when a cathode surface and cylindrical metal tube are mounted so that the axis of the cylinder lies in the same straight line with a line running perpendicularly through the center of the cathode surface. In both cases the second electrode must be at some positive potential with respect to the first. See Fig. 7a.

Because of the electrostatic field characteristic of concentric electrodes (see Fig. 5) the beam will be compressed in all directions towards the axis. As a result, the electrons emitted from the cathode are constrained to follow the paths shown in Fig. 7a; all the electrons passing through a point located at some distance from the cathode, called the "crossover point." From there on the electrons diverge as they proceed onward.

In addition to its focusing action, the anode cylinder, called "the first anode," enables saturation of emission...
An example of a cathode-ray tube with electrostatic focusing and deflection.

from the cathode to take place as well as reducing the space charge around it.

Notice that an image of the cathode surface itself is produced in the plane indicated by the lines A-A'. Cathode images of this sort may actually be observed on the viewing screen when the 2nd anode is not operative, thereby permitting of a single lens system of the type shown in the figure.

**Magnetic Focusing**

Magnetic focusing may be obtained by using a coil wound around the neck of the tube so that a magnetic field parallel to the axis is obtained. See Fig. 7b. In this case the electrons are whirled along the axis of the magnetic field in corkscrew fashion, causing the beam to be compressed and rotated at the same time. The image formed in a magnetic system is somewhat rotated in a plane perpendicular to the axis because of this action. However, the important point is, that when the focus coil is properly adjusted, all electrons leaving the cathode meet in a single point at the face of the tube.

Double Lens Systems

All electrostatic electron guns employed in TV tubes use a double electron lens arrangement of the type illustrated in Fig. 8. Note that the first lens is considered as being located between the cathode and the first or focusing anode, and the second lens between the first and second or accelerating anode. The electrostatic field formed by the first and second anodes forces the beam to converge so that it eventually reaches the viewing screen at a single point. The second anode is operated at a high potential relative to the cathode and the first anode in order to obtain the required acceleration of the beam.

The electron gun and lens system of a magnetically focused tube is shown in Fig. 9. In this device, the focus coil is located back of the accelerating anode resulting in the beam path shown. In this case the first lens system is located between the cathode and the accelerating anode, and the second between the accelerating electrode and the focus coil. As in its electrostatic prototype, the electromagnetic accelerating anode is operated at a very high potential in order to step up the speed of the electron beam.

In both electrostatic and electromagnetic gun structures the accelerating anode extends past the gun itself into the flared section of the tube in the form of an internal coating. This lining consists of some black conducting material such as Aquadag. Extending almost into the phosphor itself, this anode, in addition to its accelerating action, serves to collect the secondary electrons emitted from the viewing screen after bombardment by the beam. The lining is made black in order to prevent reflections from the viewing screen.

**Electron Gun Refinements**

In electrostatically focused picture tubes improved beam current stability with changes in focus anode potentials can be obtained by inserting a second grid between the control grid and the focus anode. See Fig. 10a. This grid is operated at 2nd anode potential. Most modern tubes employ this device. In effect, the beam of the tube can be sharply focused (focus control adjustment) on the viewing screen and remains sharp even though the beam current (intensity control adjustment) may be varied considerably. In addition, this feature results in a lower focus current, permitting the use of a smaller filter capacitor.

An analogous effect can be obtained in magnetically focused tubes by inserting a screen grid sometimes called an “accelerator grid,” between...
Ion Traps

Ions are charged particles of matter (positive and negative) which are present in the tube due to gas, impurities, and "boiling off" of the cathode material itself. Their weights depend on the atomic weights of the elements that are ionized. Negatively charged ions enter the emitted electron stream, and are subject to the same accelerating force of the high voltage anode as the electrons. Under the influence of an electrostatic field these ions exhibit characteristics of attraction and deflection similar to those of electrons. For this reason their bombardment of the viewing screens in electrostatically deflected tubes is spread over the entire surface of the phosphor, and their effect is negligible. On the other hand, they are not influenced by magnetic fields, so that in magnetically deflected tubes they concentrate at the center of the viewing screen, causing a brown spot to appear after a short period of initial operation.

There are a number of methods currently employed for the elimination of this ion bombardment depending on the electron gun construction of the tube. These are as follows: 1) angle cut method, 2) bent gun method, 3) aluminized screen method. These will now be explained.

Angle Cut Ion Trap

In this method the cut spacing between the accelerating grid and the high voltage anode is at an angle of about 15° as shown in Fig. 11. Emerging from the accelerating grid the ions and electrons are bent away from the axis of the cylinder because of the altered electrostatic field produced by the angular manner in which the electrodes are separated. Two electromagnets are mounted on the neck of the tube, the heavier one nearer the base. The magnetic field set up by these coils deflect the electrons leaving the accelerating grid upward again to follow the original direction of the gun axis before they have a chance to fall into the high voltage anode. The ions, on the other hand, are not affected by the magnetic field set up by the ion trap coils, and fall into the high voltage anode where they are absorbed.

Magnetic ion traps or "beam benders" as they are often called, may also be used for this purpose. Fig. 12 shows two traps of this type. In fact it is not even necessary to use two magnets, as proven by the recent appearance on the market of an ion trap incorporating a single permanent magnet. Fig. 13 illustrates a typical ion trap installation of the permanent magnet type. Notice the location of the focus coil. The tube used is a 10BP4.

Bent Gun Ion Trap

In this type of gun structure the cylindrical portion of the gun is actually bent at the separation plane between the accelerating grid and the high voltage anode. However, the effect is

(Continued on page 52)
HIGH VOLTAGE PROBES

by L. S. RICH

High Voltage Hazards

For a long time it has been the practice of TV receiver manufacturers to advise against the direct measurement of high-voltage circuits in TV receivers with the power "ON." This policy was directed primarily from a safety point of view, even though direct voltage measurements lend itself to faster trouble shooting. However, line-frequency high-voltage power supplies are dangerous because the power available in the line is sufficient to cause electrocution, direct voltage measurement with the power "ON" should not be made.

With the advent of r-f, flyback, and pulse operated power supplies the danger of fatal shock has been considerably reduced due to the limited power available in these supplies. Along with this development comes the introduction of commercial high-voltage test probes designed to permit actual measurement of these high voltage circuits with the set turned on. It cannot be stressed too strongly that these probes are designed for use only in r-f, flyback, and pulse operated high-voltage power supplies, and NOT in line-frequency, transformer operated high voltage supplies.

Even with the higher frequency types of high-voltage power supplies the possibility of a dangerous shock is present. This is due to the fact that some individuals, due to certain physical defects, such as heart conditions, etc., may not subject themselves to even the low-current shock potentialities present in the higher frequency types of power supplies. Then again, even perfectly healthy individuals can receive a dangerous shock with these power supplies under certain conditions: such as, when the operator is considerably perspired.

But radiomen are just going to keep on testing high-voltage circuits under all sorts of conditions, and we might just as well make this operation as safe as possible by safety education, and by advocating shock-proof test equipment, especially designed for this purpose. This policy is pursued in other fields where elements of danger, of necessity, enter into the routine of a day's work.

What to Look for in a Probe

The first question that should arise in one's mind when giving this subject consideration is: "What should I look for in a well-designed high-voltage test probe?" Here are some points that might be worth consideration:

1) Universality:—Does the probe contain facilities for use with the volt-ohm-milliammeter already owned by the operator? Some meters have 5,000 volt scales, others—6,000 volt scales, etc. A test probe when attached to these instruments must be able to extend the range of the voltmeter to 30,000 volts, which value is customarily employed in most probes. This means that different multipliers, or cartridges, must be made available by the manufacturer for a wide variation of instrument meter sensitivities and scales.

It is a simple matter for the radioman to calculate what value of cartridge resistance is required for his instrument by using the formula: \[ R_{\text{new}} = \frac{R_{\text{old}} \times N}{N-1} \]; where \( N \) is the multiplying factor, that is, the new voltage range divided by the old voltage range.

For example let us calculate the resistance of the cartridge required for a 5,000 volt instrument, the meter sensitivity of which is 20,000 ohms per volt. In this case \( N \) equals 30,000/5,000, or 6. Substituting in the formula, \( R_{\text{new}} = 5,000 \times 20,000 \times (6-1) = 500 \) megohms.

2) Sturdiness:—Are the materials that make up the probe durable under ordinary conditions of use? Is the construction such that the probe will "stand up" under all sorts of handling? Are the electrical characteristics suitable for the high voltages to which the probe is subjected?

Let us examine the construction of a typical probe (see Fig. 1) and see how these requirements are met with in this probe. Notice the heavy construction of the different parts used in the probe and the quality of the materials themselves. It is vitally important that the rubber-covered flexible cable should be strong enough to withstand constant bending without damage. Notice the ribbed construction of the high-tension leakage barrier. This provides for a greater path between the fingers which grasp the probe and the high-voltage test tip. The probe head is polystyrene which has a dielectric strength of 25,000 volts per millimeter.

3) Safety:—In addition to the high quality materials and long leakage paths, what measures are employed to insure the operator against unusual breakdowns in the probe itself?

Notice that the cable and probe is completely shielded so that in case of a

(Continued on page 58)
Many years ago, in the crystal set era, a man by the name of Dr. Lee De Forest invented a gadget of glass and metal which he called an Audion bulb. He was destined to become the Father of Radio. In the years following, we all know how many sons he became father of.

This paper is directed to another branch of his offspring, his stepsons—the Radio Servicemen.

Back in the old days, which some of us remember, many an ardent set-builder toiled with bated breath over an assembly of vario-couplers, vario-meters, rheostats and precious dry-cell tubes, impatient for the magic moment when the contraption would utter a few faint sounds drawn from the charged atmosphere. And in that crucial instant when the switch was thrown and the thing failed to work, was born the world's first Radio Serviceman.

In the years immediately following that history-making invention, Radio developed by leaps and bounds. Every man and boy who could wield a soldering iron and screwdriver, and even some who couldn't, tried his hand at making a receiver. Heaven bless some of the gizmos which paraded under the name of Radio. But many of them worked well, according to the standards of the times, and some of the early set-builders became very proficient in the art, even undertaking to construct sets for others, at a profit. They had learned a trade by application rather than by theory, by cut-and-try, rather than by classroom. The book learning might follow later, but seldom did.

For quite a few years, the building of radio receivers became a popular hobby, in the class with photography, woodcraft and others. Obviously, the servicing of these homemade receivers became the special duty, or, on the contrary, the pleasure of those who built them.

In this article Mr. Silverberg outlines the evolution of the radioman from an "amateur tinkerer" to a highly skilled technician and professional businessman. In this category it is imperative that the radioman join a representative association that will dignify the profession and protect his interests.

With the advent of factory-built sets, professional service shops began to crop up. These establishments were operated, for the most part, by men who had become intrigued by the art and had determined to make a career of Radio. Occasionally a service shop would display a sign stating that its owner was formerly connected with such and such a radio manufacturing company. This form of self praise was of doubtful value, since it spoke only for his knowledge of that particular make. Most shops were content to rest on their laurels as a radio expert on all makes. Special, and sometimes secret diagnostic methods became the subject of shop chit-chat, and each shopkeeper became a little genius in his own circle. Every other radio man was the world's worst crook and thief.

Community spirit which included a secret diagnostic methods became the subject of shop chit-chat, and each shopkeeper became a little genius in his own circle. Every other radio man was the world's worst crook and thief. Community spirit which included a competitor was out of the question.

During these formative years, there was being born, in the minds of the public, a very definite idea concerning radio servicemen. That idea was based on the knowledge of the way in which most radio service shops became established, namely, by advancement from an amateur status. The average layman considered the serviceman as a necessary evil, and felt he was challenging his authority when he was forced to call in the neighborhood radioman.

Those of us in the Radio Service profession today realize how far removed we are from those early pioneers. The rapid advancement of the art has brought us new circuits, new designs, even new principles. If we have not kept abreast of these developments, then they have left us far behind.

It is not for lack of available training that this might have happened to some of us. It is, rather, because of mental laziness, or the lone-wolf instinct, that too many modern radio servicemen are still to be considered in the class of tinkerers.

In recent years, a new kind of serviceman has entered the field to give competition to the oldtimers who are satisfied with their three meals a day. This newcomer is the professional business man, who has adopted business as his career and radio as the particular category through which he enters the field. This newcomer has taken a course in Radio and Electronics and has hung up his shingle with definite ideas of the value of time and material. He has gone into business for the sole purpose of becoming successful in his chosen profession, and he has no illusions about tradition or public service.

The romance of the art is completely lacking from his makeup, because it never existed in the first place. He is not too concerned with his lack of knowledge of old type receivers because he can always try to sell a new set, or at worst, beg off because of lack of obsolete parts. But he makes it his business to keep abreast of the times with new methods, improved test equipment and
an outlook directed toward the future. This attitude toward business, in itself, is not to be condemned, for, after all, radio servicemen are business men, or should be, and their business is their path to success. The poor businesman in any trade is not destined to remain long.

Unfortunately, there are some who measure their success wholly in terms of dollars, rather than in units of improved public relations. Sometimes a thin line separates unethical practice from profitable practice. Each of us has, at one time or another, been confronted with a situation where a decision must be made between maintaining a profit and maintaining a customer. The short-sighted individual insists that every transaction be a profitable one, even if it involves misrepresentation or fraud.

We are all aware of the fact that some complaints against radio servicemen are justified. While we may condemn such acts, and the adverse publicity connected with them, we are, individually, helpless to avoid threat to the integrity of our profession. This is no age for lone wolves and rugged individualists. There is a growing tendency among independent radio servicemen throughout the country to organize into associated groups, to combat the acts of the unscrupulous few who jeopardize our good standing in the community. It is here that the lone wolf realizes his impotency as compared to the concerted effort of an organized association working in his behalf.

In connection with this situation, there have been many recent proposals to license all radio servicemen, as a means of eradicating abuse of public confidence. While no one questions the sincerity of those who propose such legislation, various associations and trade groups have pointed out emphatically that licensing would not accomplish this end. It has been well demonstrated that licensing, since it is based on technical qualifications, cannot regulate or correct matters of business relations ethics. It has been shown that even the unethical shopowner cannot be denied a license if he is able to qualify on technical grounds.

To deal with this situation, most Radio Servicemen's organizations have adopted an educational program directed to the public, as well as to the trade. The public is being asked not to encourage so-called "free deals" and "something-for-nothing" offers, because these tend to undermine the honesty of the industry. They are being made acquainted with the problems encountered in servicing of complicated electronic devices, and with the enormous amount of study and training necessary for the maintenance of a successful radio service business. In addition, they are being briefed to expect to pay reasonable prices for time and material rendered.

The serviceman, for his part, is being urged to cooperate with his association in weeding out the element of dishonesty which threatens his well-being. He is being taught that it is unprofitable to be unethical.

Many means are available to associations in attacking this problem. The method most commonly practised is the identification of ethical member shops with prominent emblems in shop windows. Supplementing this is the radio and newspaper publicity urging the public to look for and patronize shops displaying the association emblem. On the other hand, members are made to realize that, in their dealings with the public, their association will back them up, but will not cover them up.

Most radio service organizations maintain a service committee, which acts quickly and impressively when presented with legitimate charges of fraud or unethical practices, against radio servicemen. The operation of this committee is direct and straightforward. If, upon investigation by the technical staff, the charges are substantiated, this is determined by an actual examination of the radio or television receiver in question, the offender is given an opportunity to rectify the complaint, to the satisfaction of the association and the complainant. If he fails or refuses to do so, he is warned that the complainant will be advised to sue in small claims or magistrate's court, at which time the technical staff of the association will act as witnesses for the complainant. While this action is taken whether the offender be a member or nonmember, should such a case be decided against a member, he is automatically expelled from the association, and the membership is so advised.

In cities where such organizations operate, there has been a decided improvement in customer relations and shopowner prestige. Probably the most important phase of association activity, from a standpoint of benefit to the industry, is the technical education and training program. This department functions much the same as a post-graduate school for physicians. It offers to members free, complete courses in the subjects of radio, television, and electronics, knowledge of which is rapidly becoming essential to a successful service business. These courses take the form of lectures, demonstrations, and question periods, but are supplemented with personal instruction, where necessary. Lectures are prepared in cooperation with recognized authorities on the subject. In many instances, lectures are loaned by leading manufacturers. These courses usually are spread over a period of time sufficient to insure proper and complete absorption of the subject matter by all members. Frequent review periods guard against members missing anything of importance. Mimeographed transcriptions of the lectures are provided for future study.

Such an educational program is of the utmost value to radio servicemen, as well as to the industry itself, for only by this means can a serious future bottleneck of service facilities be prevented. The extremely rapid growth of television sales has out-distanced the ability of service and maintenance organizations to keep up with the demand. It is imperative that the industry at large be trained at the earliest moment to share the work. Town Meeting has started something which every association throughout the country must follow. Every radio serviceman who dares to look into his future cannot fail to see himself as part of this enormous industry, or as a weak unprogressive bystander, choking in the dust raised by his competitor in passing.

Another important function of the radio service association is the maintenance of an employment bureau. While this department acts as a clearing house for employer and employee alike, it takes on none of the duties of a trade union. Nevertheless, it serves to channel expert or specialized help to where it is needed.

Many associations maintain a customer allocation service. This department receives inquiries for service from the public and allocates such inquiries to the nearest shop member. An increasing number of these calls come in daily, testifying to the growing confidence of the public in such organizations.

Another service offered by the association is the maintenance of a legal department for use of members. Free legal advice is available at the ring of a phone. Reduced legal fees are charged when court proceedings become necessary.

The association's library is available at all times for the use of members. Here are accumulated approved books, manuals, handbooks and magazines, some of which would prove too costly for individual ownership.

Some organizations have made available to members group insurance and hospitalization at rates far below that of individuals.

New services are being added constantly to confirm a growing realization that membership in radio service associations has become a "must" to independent radio servicemen.
Doubbling the size of their display floor by taking over the adjoining store has enabled Smith & Applegate, Peoria, Ill. radio and appliance dealers to entirely revamp the display arrangements in their store to better serve their large clientele of customers and to make their extensive promotional program more effective.

The store is located on Main street, fourteen blocks from downtown, and was established about two years ago by Dave Smith and Walt Applegate. When Tom Stull, a young man who had formerly worked for Mr. Smith in a leading shoe store returned from army service, he was employed on the floor and as an outside salesman. In keeping with the policy of the firm to give top positions to its own employees, all of whom must start on the floor, Mr. Stull has become a member of the firm as vice-president and sales manager, a position earned in about a year's time.

The additional space secured now makes their display floor one of the largest of any similar business in the city and will enable them to increase their volume, already one of the largest in the city.

Attractive floor displays is one of the major promotional factors used. In making the necessary changes in arrangement, the record department, which occupies about 40% of the floor, was moved to the rear of the store. Two new listening booths were added so that nine persons can now listen to records at the same time. Four of these can use the booths while five are accommodated at a record bar, an attractive feature of the department.

The record bar appeals particularly to "pop" fans among the younger generation and is widely frequented by high school and university students. The bar is nine feet long. The top is covered with tile linoleum and the front and sides are upholstered in red leatherette. Five turntables below the top, each equipped with earphones, make it possible for five persons to listen to records at the same time. Four of these can use the booths while five are accommodated at a record bar, an attractive feature of the department.

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Through the center of the record department are 6 table top fixtures given over to display of single records. Uniform display racks with compartments for storing stock of albums. More than 1000 albums are carried in stock at all times.

Still another display table shows blank record albums and record cabinets.

The remainder of the floor is about evenly divided between radio and appliance displays. Radios are on the right-hand side and appliances on the left-hand side of the store.

An attractive and convenient fixture for the display of table models of radios and record players affords room for 37 units on its two decks. Adjoining this fixture are 7 individual movable platforms, on each of which is displayed a
cabinet style radio or console. Through the center of the room are shown 18 more models of the larger units. Every model of radio, both cabinet and table style, is hooked up for demonstration playing. The lines carried include Westinghouse, Philco, Zenith, RCA-Victor and General Electric.

In the major appliances, the lines include Philco and Westinghouse refrigerators, Conlon and Bendix ironers, Philco and Whiting freezers, Conlon and Apex washers, Westinghouse, Grand, Universal and SGA Acorn ranges, Westinghouse and Bendix automatic washers, and Marion, Westinghouse, Permaglass and Universal water heaters. Refrigerators, freezers, water heaters, ironers and automatic washers are displayed against the wall. The latter are hooked up for demonstrations, which plays a great part in the promotional program for these items. Ranges and conventional washers are displayed in the center of the floor, mounted on individual movable platforms. These items are placed back to back with panels between them; thus making a double display.

Back of the range and washer display is a streamlined two-deck fixture for the display of small appliances. The displays are not confined to the floor. The two large windows are utilized to the fullest extent for displays. These are changed weekly so they do not become monotonous. At the present time, radios occupy one window and albums and record players the other.

An attempt is made to always have something especially attractive in the windows. A practice is made of tying in promotions with bands, soloists and recording artists who visit the city. One of the most effective of these was recently when Eddie Howard appeared in the city and more than 2000 records of his recording were sold by means of a tie-in of window display and newspaper ads.

Recently a jockey show was started over station WJMJ from 7:00 to 7:30 A. M. six days a week and an additional half hour on Saturday afternoons. This has been very effective and is becoming increasingly so because of a 30-day contest now running to secure a name for the program. A $250 console is offered to the person adjudged the winner by three prominent persons selected by the radio station. The console offered is being shown in the window with complete explanatory posters and is attracting much attention.

With the addition of more space, allowing bigger and better displays, newspaper advertising has increased about 30%. An increase of 30% in business is thereby anticipated. Small ads, each containing the picture of Dave, Walt, Tom, or Kitty Doubet (saleslady), appear daily in the two city papers. These ads follow the old "Confucius Say," type of ads prevalent several years ago. In each ad the person pictured "says" something in terse, well-chosen words, such as, "Tom says: 'If you can afford a washer, you can afford one that does all the work. We have Bendix and Westinghouse fully automatic washers. Your hands never touch the water—no washing in cold weather. Come in and see for yourself.' "

These little ads, appearing every day, lead up to a particular promotion each week of one of the items stressed in them. Then, these items are promoted by dramatized display ads, by radio and by window display. This type of advertising has been very effective—so effective that it has attracted national attention. Of 101 advertising ideas submitted to a national committee, this idea was chosen as second best. It has accomplished results that major companies said couldn't be done.

Direct mail is another form of promotion that has been effective. Each month, the list of new records is mailed to a list of from 1500 to 2500 record fans. With these are also mailed literature of major appliances. Direct mail brings in a considerable number of customers from outside the city.

Although some merchandise is still available only in limited quantities, there is still enough on the market to warrant Smith & Applegate using the personal solicitation method of securing business. While many prospects are secured from contacts on the floor, the firm feels that the time has come when business must be promoted rather than to depend on callers at the store. They have a plan that is working out admirably. They employ several women who makes a house-to-house canvass of householders. She does not attempt to sell anything—only to secure prospects. In other words, she is making a house-to-house survey of what appliances and radios householders already have and what they need. Her work is so effective that she secures enough prospects to keep four salesmen busy following up these leads. This program brings in many sales.

The company maintains a complete service department with 2 men employed. While their main endeavor is installing and servicing their own sales, they do a general service business for others. Because of doing this service for both the firm and others, they get into homes and find out what appliances are lacking and what need replacing. These prospects are turned in and given to the outside salesmen.

"We do not consider a sale made when an appliance leaves our warehouse for installation in the home—or even after it is installed," says Mr. Smith. "To us a sale is not consummated until the appliance has proved satisfactory after a considerable period of time. That is why we maintain a service department of high excellence. We could not do without such a department as it does much to make a sale satisfactory to the customer. We are just as much interested in keeping our sales service as we are in making the sales. The service department enables us to make our intensive promotional program effective."

An effective method of displaying the complete line of radios for sale.
How much do you know about TV? Listed below are a number of questions, each of which has but one correct answer. The accuracy of your answers, and the relative speed with which you can complete this quiz, is a measure of your theoretical knowledge and practical experience.

**QUESTIONS 1 to 6**

1. **Symptom:** Tubes light; no sound; no raster.
   **Cause:** CRT; Front End; Low voltage "B" supply; sound i-f amplifier; High voltage "B" supply.

2. **Symptom:** Raster O.K.; no sound; no picture.
   **Cause:** R-F amplifier; Low voltage "B" supply; Video amplifier; Synch separator; Video i-f amplifier.

3. **Symptom:** Picture O.K.; no sound on all stations.
   **Cause:** R-F amplifier; Video i-f amplifier; Video amplifier; Synch separator; High voltage power supply.

4. **Symptom:** Picture O.K.; no sound on one station.
   **Cause:** R-F oscillator; Video amplifier; Sound i-f amplifier; Video i-f amplifier; sound detector.

5. **Symptom:** Sound O.K.; raster O.K.; no picture.
   **Cause:** R-F. oscillator; Video amplifier; Sound i-f amplifier; Video i-f amplifier; Antenna, Sound i-f amplifier.

6. **Symptom:** Sound O.K.; picture O.K.; sound on picture.
   **Cause:** Front end; Trap adjustment; Video amplifier; Synch separator; CRT.

**QUESTIONS 7 to 12**

7. **Symptom:** Sound O.K.; picture O.K.; brightness low.
   **Cause:** Front end; Video i-f amplifier; Video amplifier; Synch separator; High voltage power supply.

8. **Symptom:** Sound O.K.; no raster.
   **Cause:** Front end; Video i-f amplifier; Video amplifier; Synch separator; CRT.

9. **Symptom:** Sound O.K.; poor picture definition (high frequency).
   **Cause:** Video i-f amplifier; Synch separator; Horizontal output; Vertical output; CRT.

10. **Symptom:** Sound O.K.; picture smeared.
    **Cause:** Front end; Video amplifier; Synch separator; H.V. power supply; CRT.

11. **Symptom:** Sound O.K.; picture tears out of synch horizontally and vertically.
    **Cause:** Video i-f amplifier; High voltage power supply; CRT; Damper; Sound i-f amplifier.

12. **Symptom:** Sound O.K.; no vertical deflection.
    **Cause:** Synch separator; Video i-f amplifier; Vertical oscillator; CRT.

**QUESTIONS 13 to 20**

13. **Symptom:** Sound O.K.; no horizontal deflection.
    **Cause:** Synch separator; Video i-f amplifier; Horizontal oscillator; Vertical oscillator.

14. **Symptom:** Picture and sound don’t track on all stations.
    **Cause:** Video i-f amplifier; Sound i-f amplifier; R-F oscillator; Sound traps.

15. **Symptom:** Sound O.K.; picture contrast reversals occurring frequently.
    **Cause:** Video i-f amplifier; Front end; Synch separator; D-C restorer; High voltage power supply.

16. **Symptom:** Sound O.K.; picture O.K. on low frequency channel stations—poor on high frequency channel stations.
    **Cause:** Video i-f amplifier; Video amplifier; Low voltage power supply; Antenna, Synch separator.

17. **Symptom:** Picture O.K.; sound weak.
    **Cause:** Antenna; R-F amplifier; Sound detector; Video detector; Video amplifier.

18. **Symptom:** Picture O.K.; sound distorted.
    **Cause:** Antenna; R-F amplifier; Sound detector; Video detector; Video amplifier.

19. **Symptom:** Sound O.K.; picture tears horizontally and vertically.
    **Cause:** Vertical oscillator; Horizontal oscillator; High voltage power supply; Synch separator; CRT.

20. **Symptom:** Sound O.K.; low horizontal amplitude.
    **Cause:** Video amplifier; Synch separator; CRT; Video detector.

(Answers will be found on page 52)
Circuit Court

Temple G-521

Many of the current offerings in the receiver field are making use of the recently-developed dry-disc rectifier. While simplicity is achieved, most sets have sacrificed the advantage of a pilot light. Practically all portables of the battery a-c type also are minus this desirable feature. One instrument which falls into both of the classes mentioned, but which has pilot lights, is the Temple model G-521.

This two-band battery or line-operated set contains five tubes and a disc rectifier. No pilot light provision exists while the set is operating on battery power, but with the application of line power the lights come into use.

A partial schematic is shown, covering that portion of the circuit which develops the voltages needed to substitute for the 90 volt B battery and 9 volt A battery. Beginning at the line plug we find a by-pass capacitor ahead of the rectifier. Protection to the rectifier, and first filter condenser, is provided by the 15-ohm resistor. This is followed by a 330-ohm resistor, across which are two 2 volt, 60 ma pilot lamps in series. The drop across the resistor is adequate to operate the lamps. Next in the circuit are found two branches, one for the A circuit and another for the B voltage, each with its filter resistor and capacitor.

Setchell-Carlson 437

This instrument, a seven tube broadcast band receiver, is unusual in that it is designed to operate directly from a 32 volt source. Power of this sort is widely available in some rural areas and aboard small craft.

Most sets intended for service on 32 volt power have made use of some sort of power conversion equipment. This example, by contrast, employs no source of power other than the source itself.

A block diagram is shown indicating the tube complement and function. Note that such valuable features as a tuned RF stage and push-pull audio output are incorporated.

Of most interest is the disposition of the positive 32 volt potential in the set. A partial schematic illustrates the fact that the tube heaters are so connected in a series-parallel network that they all receive normal potential, and also provide for pilot light illumination across the 50-ohm resistor shown. All plate and screen potentials are drawn directly from the positive side of the source.

Dewald B-612

A new adaptation of an old idea appears in this FM tuner. It consists of an a-c/d-c circuit providing for reception of AM radio and permit reception of FM stations in sets not having the feature included.

Ahead of the AM oscillator the tuner is conventional, using a 12AT7, dual triode, as oscillator and mixer; a 12BA6 IF stage at 10.7 mc; another 12BA6 as limiter; and a 12A5 discriminator.

Each of the FM signals, their conversion to audio and subsequent modulation of an AM oscillator. The output of this oscillator, which covers the range of 550 to 750 kc., is intended to be picked up on any

Arbitrary circuit for the converter tube is used with the oscillator functioning in the usual manner with the cathode tapped up on the grid coil. Self bias is developed across the cathode resistor of 330 ohms.

The audio from the discriminator is fed to the usual signal grid and appropriate voltages to the other elements. The plate load consists of a 22K ohm resistor. Output is coupled to the external circuit via a 220 μF capacitor. This output will be at a frequency determined by the constants in the oscillator tank circuit, of which the capacitor is adjustable, and will be modulated in accordance with the discriminator output.

An obvious advantage of the instrument over most tuners is that no special connection to the AM receiver is needed.

Partial schematic, Temple model G-521.

Diagram of Block diagram, Setchell-Carlson model 437.

Radio Service Dealer © October, 1948

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Many such sets did not include a jack or other means of readily applying an external audio signal. The purchaser can set the tuner up without professional aid and the device can be easily moved from set to set as desired.

**Stewart Warner A61CR**

An unusual method of providing inverse feedback is found in the audio portion of this receiver, an a-c set using five tubes plus rectifier. The audio stages, consisting of a 6SJ7 and a 6V6 tube in cascade, follow a 6SF7 combined i.f. and detector. The partial schematic illustrates details under discussion.

Of interest is the additional filtering given the plate supply to the 6SJ7. The 220k-ohm resistor followed by a .1 µf capacitor provide very effective hum elimination. It will be seen that fixed bias is supplied to the 6V6 output stage.

The feedback is provided by connecting the capacitor which would ordinarily by-pass the 6SJ7 screen to ground, to the high side of the voice coil. Audio voltage appearing at the voice coil will thus show up on the screen, and being 180 degrees out of phase with the plate excursions of the tube, will have much the same sort of effect as the more usual scheme of feed-back to the plate.

The advantages generally sought for, and realized, in this type of circuit are hum reduction and less distortion than would normally occur in the system, particularly at high signal levels.

**Admiral 4B1**

Two details of interest appear in this instrument ahead of the 6SB7Y convertor stage. The set covers both AM and FM broadcast bands and employs eight tubes plus rectifier. Tuning is by a combination of condenser and slug tuning.

Reference to the partial schematic will disclose that two i-f stages are used on the FM band, but only one on AM. This is an obvious solution to the problem of obtaining adequate gain at the high signal frequency involved at the FM band.

The first FM stage makes use of a 6BA6 pentode tube in an unconventional circuit. Grounded-grid r-f stages are becoming common but generally use triode tubes. In this case the plate and screen of the 6BA6 are tied together to form the plate of an effective triode. The signal is applied to the cathode, which is isolated from ground by an RF choke and a bias resistor. The grid is tied directly to ground, and the plate-screen combination is loaded by a slug-tuned transformer. A 10-ohm resistor in the plate lead provides stability.

The tuned circuit in the plate of the FM stage is coupled to the grid of the second 6BA6 r-f stage, via the range switch. AVC is applied to this stage. The tube is connected in a normal pentode circuit with another slug-tuned transformer coupling to the signal grid of the 6SB7Y convertor. The oscillator tuning for the FM band, not shown, also is slug-tuned.

In the AM position a different set of components come into use. The loop is tuned by one section of the condenser gang, with a low frequency padding coil in series, and connects to the grid of the second 6BA6 r-f tube. The plate circuit of this stage has a slug-tuned coil paralleled by a .005 µF mica capacitor as its load. The primary of the FM transformer, with its few turns has no effect on the AM signal. The grid of the converter tube is switched to the high side of the broadcast coil by the range switch. Oscillator tuning is by another section of the gang condenser. The result is adequate gain on both bands and a minimum of switching in signal frequency circuits.

**Admiral 4D1**

One of the war-developed techniques which will no doubt be appearing in commercial equipment with increasing regularity is the use of printed circuits. Several variations have come to light, one of the simpler of which is shown in the partial schematic of this set. An accompanying print illustrates the actual component, called a Bulplate.

The instrument is a personal-type battery operated portable with four tubes. The printed assembly contains material which replaces five capacitors. They are identified by letters in the diagram. Their value and function are as follows:

- a. 150 µF L.F. bypass.
- b. .002 µf audio coupling to pentode grid.
- c. .006 µf a-f screen bypass.
- d. 100 µf tone correction.
- e. .005 µf audio coupling to output tube grid.

Inspection of the circuit will disclose that only b is in no way connected with at least one of the other capacitors. This makes it possible to use a minimum...
Our customers like

Controls: With CRL's improved Adashft Radiohms you can carry a small stock of controls, yet be ready to handle almost any kind of control replacement problem. No wiggle, no wobble, no slip. Just insert shaft pilot in control stub shaft, and slip "C" washer into place. Available in all sizes for all model "M" volume control applications. Six types of shafts.

Switches: Centralab offers you a complete line of Tone, Rotary Selector, Lever Action and Medium Duty Power Switches, which features a wide variety in both laminated phenolic and steatite insulation. Available with shorting or non-shorting contacts. See your Centralab Distributor for further information, or write direct for new Catalog 26.
Centralab performance!
— says Earl Chandler, Milwaukee, Wisconsin

Customer attitude toward the service you give is often based on the performance of the replacement parts you use. That’s why thousands of successful service repairmen everywhere — men like Earl Chandler — stock a complete line of Centralab service components. These men know from experience how much CRL parts help them build customer goodwill. Compare quality . . . compare performance . . . compare price, and you’ll see for yourself how quickly CRL parts can help you build up your service business. Get all the facts. Call or write your Centralab Distributor!

"Sullivan’s Radio Shop, Milwaukee, Wisconsin, combines careful workmanship with Centralab quality parts to make sure that our customers are satisfied," says Earl Chandler, serviceman. Such a policy means more business . . . greater profits!

“Hi-Kaps”: CRL line of ceramic By-pass and Coupling Capacitors gives you ceramic dependability and permanence at a new low price! Packaged in a convenient envelope of five, Hi-Kaps are clean, easy to stock and handle. Wide range from .000050 to .010000 mfd. Rating — 600 WVDC, 7000 V. flash tested. Ask your Centralab Distributor for all the facts.

“Hi-Vo-Kaps”: Just out! Centralab’s new high voltage capacitors for television and high voltage applications. Made of Ceramic-X, Hi-Vo-Kaps combine high voltage and small size to give you convenient, dependable performance. 10,000 WVDC, 20,000 VDC. Capacity — 500 m mf. See your CRL Distributor, or write direct.
Admiral TV-12—6B6G (V407) Circuit Fuse

The following service notes come to us from the Admiral Service Department.

Damage to circuit components (such as horizontal output transformer T402) may result from failure of the 6B6G horizontal output tube (V407). A minor circuit change is necessary in order to provide adequate fuse protection. The modified circuit results in improved horizontal centering as well as fuse protection. Present production now incorporates this circuit modification. Fuse kit may be obtained from Admiral direct.

The above circuit modification should always be made when major repairs are made on a television receiver chassis which does not already have a fused circuit.

Line drawings showing the bottom of the television receiver chassis before and after modification are shown in Figs. 1 and 2, respectively. Fig. 3 shows the fuse holder mounting details. The modified section of the receiver circuit is shown in Fig. 4.

The circuit modifications are made as follows:

1. Remove C426 and R436.
2. Clip out jumper wire between terminals 1 and 2 on tie-strip “A.”
3. Remove lead from R432 from terminal 3 of tie-strip “B” and reconnect to terminal 2 of tie-strip “A.”
4. Disconnect red wire from terminal 1 of tie-strip “A” and reconnect to terminal 3 of tie-strip “B.”
5. Disconnect deflection yoke lead (yellow) from terminal 5 and reconnect to terminal 1 of tie-strip “A.” Do not disconnect yellow lead from focus coil (this lead must remain connected to terminal 5).
6. Insulate one lead of a 0.5 mfd. condenser (64B6-27) with a 1-3/4” length of spaghetti tubing (96A2-5). Solder condenser mounting strap to chassis next to terminal 3.
7. Connect a 7” length of wire (05B10-20-20-92, white with red tracer) to terminal 1 of tie-strip “C.” Insert free end through nearest hole at rear of chassis (for connection to fuse holder in 9KV rectifier compartment).
8. Use a No. 36 drill bit to drill a hole 1-3/4” from rear of chassis and 2-3/4” from left side of chassis. Since there is not too much room to work in the 9KV rectifier compartment, it is convenient to dismount R435 and remove V409 from its socket while drilling the hole as described above. This hole permits mounting the fuse holder with a No. 6 self-tapping screw (1A51-6-2).
9. Cut lead (white with yellow tracer) 2-3/4” from terminal No. 5 on horizontal output transformer T402. Skin back the two ends 3/4” and tin. Solder both wires to the fuse holder terminal nearest rear of chassis.
10. Connect white wire with red tracer (see step 7) to other terminal of fuse holder.
11. Press 0.25A fuse (84A4-2) into the fuse holder clips. Check lead dress to avoid possible shorts before placing receiver chassis in operation.

Figure 4

Circuit changes required to install protective fuse in Admiral model TV-12 receiver.

(Continued on page 50)
"...of course we have all 17 RIDER MANUALS."

"...and attribute a good bit of our success in producing a quantity of work in a minimum of time to their always dependable, complete, factory information. We will have Volume XVIII as soon as it is published."

VOLUME 1

RIDER PA MANUAL

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Covers 145 Manufacturers' Amplifiers, from 1938 to Date

Bigger and better than even we had anticipated, the scope and thoroughness of the first industry-wide PA service manual makes it an essential piece of equipment for any shop doing PA work. It covers public address systems, outdoor announcing, musical instruments and phonographs, theatre and church hearing aids, electronic megaphones, intercommunications systems, theatre and home motion pictures, school, hotel and hospital sound systems, mobile and portable sound systems.

Separate "HOW IT WORKS" book explains the theory of various designs employed in different types of amplifier systems, the servicing of PA systems, using the sine wave and square wave means of checking, methods of rapidly locating faults. Everything you need.

2000 Pages in this new RIDER FIRST plus separate "HOW IT WORKS" and INDEX . . . . . . . . . . $18.00
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RIDER MANUALS
MEAN SUCCESSFUL SERVICING

RADIO SERVICE DEALER * OCTOBER, 1948
G. E. Announces New Cartridge

A new variable reluctance cartridge, designed especially for the new long-playing records, has been announced by the Receiver Division of General Electric's Electronics Department at Electronics Park, Syracuse, N. Y.

The new cartridge, which features a low mass stylus assembly and high compliance for more faithful tracking is one-third smaller than previous models. Its shape makes it more universally adaptable to various tone arms. It also affords greater clearance for record changers. The stylus of the new cartridge is a sapphire, measuring one mil in diameter as required by the new microgroove recordings.

Screwdriver Has Reversible Blade

Called the vaco duplex reversible, a new screwdriver is announced by Vaco Products Company, 317 E. Ontario Street, Chicago 11, Illinois, which accommodates both the Phillips and the regular screw by merely reversing the blade.

An oil-tempered, chrome vanadium steel blade is used which is easily and quickly inserted or removed. It will not come apart in normal use. A positive spring action clutch in the center of the shaft provides fool-proof chucking. An Amberyl handle is provided for safety having fluted edges chambered for comfort, and bearing the Underwriters' Laboratories re-examination service mark.

New High Q Chokes

Two compact High Q Chokes are now being marketed by Chicago Transformer, 3501 W. Addison Blvd., Chicago, Illinois, a Division of the Essex Wire Corporation.

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An oil-tempered, chrome vanadium steel blade is used which is easily and quickly inserted or removed. It will not come apart in normal use. A positive spring action clutch in the center of the shaft provides fool-proof chucking. An Amberyl handle is provided for safety having fluted edges chambered for comfort, and bearing the Underwriters' Laboratories re-examination service mark. It is shock and break resistant and is impervious to most alkalies and acids. Available in two sizes — No. 1 Phillips point and 3/16" regular, and No. 2 Phillips point and 1/4" regular.

New Isolation Transformer

The Cal-Perry Corporation of East Orange, New Jersey announces the availability of its new, improved, patented soldering iron tip for use with electric soldering guns.

The unit is a chromium-plated copper electrode with only the surface of the tip exposed to prevent heat loss. Heating time is only 9 seconds. The electrode is guaranteed for six months.

The tip is available through dealers and jobbers. Write to the Cal-Perry Corporation, 62 Franklin Street, East Orange, New Jersey and the nearest dealer will be furnished. New "Precision" HV TV Test Probes


New Soldering Iron Tip

The Cal-Perry Corporation of East Orange, New Jersey announces the availability of its new, improved, patented soldering iron tip for use with electric soldering guns.

The unit is a chromium-plated copper electrode with only the surface of the tip exposed to prevent heat loss. Heating time is only 9 seconds. The electrode is guaranteed for six months.

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New "Precision" HV TV Test Probes


The new Series TV Test Probes afford direct measurement facilities up to 30,000 volts D.C., with complete safety to the operator, with utmost simplicity, speed and accuracy. These probes provide direct kilovoltmeter facilities with present high sensitivity test sets and vacuum tube voltmeters. They can be used with most popular high sensitivity test sets due to the availability of stock value and special value multiplier cartridges.

Safety is provided via extended high dielectric anti-leakage paths; a multi-channeled guard barrier; full handle length internal arc-back shield directly grounded; external arc-back barrier directly grounded; a fully shielded instrument connecting cable further safeguards the user; all critical high potential and ground connections within the probe are positively accomplished via high compression contact springs; the probe head is made of custom molded polystyrene; the handle and barrier of custom molded bakelite; the internal components are made of lucite.

Two New Powrarm Units

The Wilton Tool Manufacturing Company of 936 Wrightwood Ave., Chicago 14, Ill., is now producing two improved Powrarm units. one.

(Continued on Page 36)
SAFE..SIMPLE
HIGH VOLTAGE TV Tests to 30,000 VOLTS
WITH THE NEW
PRECISION SERIES TV
Super High Voltage Safety Test Probes

NOW...the TV high voltage test problem solved with safety and operational confidence. A super high voltage test probe, "Application Engineered" for the job...tested on the job...approved for the job. Custom designed for YOUR safety FIRST, and providing the accuracy, dependability and reliability you expect from products bearing the "Precision" name.

★ Convenient (Tool-less) means for rapid removal and interchange of the special cartridge style high voltage tubular multiplier permits a single TV probe to be employed with more than one, high sensitivity, multi-range test set, via purchase of the appropriate cartridge.

Series TV High Voltage Test Probes are now on display at all leading radio parts distributors and are available as follows:

<table>
<thead>
<tr>
<th>Series</th>
<th>Description</th>
<th>Accessories</th>
<th>Net Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>TVP</td>
<td>High Voltage Test Probe with cartridge</td>
<td>TVP-2000-M</td>
<td>$12.35</td>
</tr>
<tr>
<td>EV-1</td>
<td>Model TVP w/cartridge for Precision Series EV-10 TVM</td>
<td>TVP-2000-M</td>
<td>$15.45</td>
</tr>
<tr>
<td>EV-2</td>
<td>Model TVP w/cartridge for Precision (or any) 20,000 ohms per volt test sets having a built-in 6000 volt AC range.</td>
<td>TVP-2000-M</td>
<td>$15.45</td>
</tr>
</tbody>
</table>

Stock value and special value multiplier cartridges are available to match most popular high sensitivity test sets.

Series TV High Voltage Test Probes provide direct kilovoltmeter facilities with your present high sensitivity test set, and vacuum tube voltmeter such as the "Precision" instruments illustrated below.

See them on display at all leading radio equipment distributors along with the complete Precision line of modern electronic test instruments for all phases of AM-FM-TV service and maintenance.

Model 85
Laboratory Type 20,000 ohms per volt AC-DC test set. Full rotary range and function selection, 36 self-contained ranges to 6000 volts, 65 meg-ohms, 10 amperes, + 10 DB, 4½" Full Vision meter.
Net Price $38.75

Model 85-1
20,000 ohms per volt Multi-Meter. High speed, Wide Range, push button operated. AC-DC ranges to 6000 volts, 600 meg-ohms, 10 amperes, + 10 DB, 4½" Full Vision meter.
Net Price $54.30

Model EV-10
MCP Multi-range, high sensitivity, zero-centered VTM plus complete AC-DC V-O-M facilities to 2000 volts, 2000 meg-ohms, 10 amperes, + 10 DB, 4½" Full Vision meter.
Net Price $59.95

Model 10-54-P
Combination Electronamic Tube Tester, and 20,000 ohms per volt AC-DC V-O-M. Self-contained rotary selector panel, 2000 volts, 2000 meg-ohms, 10 amperes, + 10 DB, 4½" Full Vision meter.
Net Price $134.40

PRECISION APPARATUS COMPANY, INC.
92-27 Horace Harding Boulevard Elmhurst 8, New York
Export Division: 458 Broadway, New York, U.S.A. Cables: Morhanex

RADIO SERVICE DEALER * OCTOBER, 1948 35
NEW PRODUCTS
(from page 34).

mechanically operated for light work, and the other hydraulically operated for heavy duty work. Both Powrarms position work at any desired angle on a 360° horizontal or axial plane, or on a 180° vertical plane, and hold the work firm under great pressures. The tools combine the ball-and-socket joint principle with a simple, positive locking device that requires only slight pressure on a lever or hydraulic system to lock the work in any desired position. Work up to 150 pounds in weight can be held at any angle. Both powrarm models are easily bolted to a work bench, or a special clamp is also available to attach Powrarm to any convenient location in field or shop.

Racon Introduces “Cellular Grand”
A new high fidelity audio reproducer has just been released to the trade by the Racon Electric Co., Inc., New York, under the name of “Cellular Grand.” It is equipped with a new type of cellular horn having a sound distribution angle of 120 horizontal and 60 vertical. Also has new type of resistive capacitive filter network. The frequency range is 50 to 12,000 cps. The unit measures 11 x 11 x 15 and is housed in an attractive art finish cabinet that may be used outside or inside of a console. For complete details address Racon Electric Co., Inc., 52 E. 19th St., New York.

Needles For Microgroove Records
Electrovox Company, Inc., of 66 Franklin St., East Orange, N. J., announces production of a special microgroove needle for playing the new microgroove records.

A comparison (greatly magnified) is shown of a conventional needle point and microgroove needle point resting in their respective grooves. A conventional needle tip simply will not fit a microgroove. Since there are up to three times as many grooves per inch on a microgroove disc than on a conventional record, the needle tip must be reduced proportionately.

On the other hand, the smaller needle tip must also be rounded so as not to cut into the bottom of the soft vinylite grooves.

Needles are available in two materials, sapphire and a special osmium alloy. The new microgroove will carry WALCO trade name and be sold through normal retail phonograph record outlets.

400 and 500 Ma Stacks
Two new stacks with current ratings of 400 ma and 500 ma, have been developed by Federal Telephone and Radio Corporation, East Newark, N. J., manufacturing associate of International Telephone and Telegraph Corporation. These rectifiers are designated RS 400 and RS 500.

In television receivers the use of the circuit, such as utilized in virtually all radio sets, for obtaining all the re- quire d-d-c power. In the radio set, removal of filament hum can easily be accomplished by rectifying and filtering the filament supply. Another wide application for these rectifiers exists in areas where recent conversion from d-c to a-c primary power has made obsolete or impractical many d-c appliances formerly in use.

New Metal 16 Inch TV Tube
Manufacture of a 16 inch direct-view television receiving tube made of metal was announced by the Tel-O-Tube Corporation of America.

The major portion of the outer shell or “envelope” of the new tube consists of a cone of spun chrome-steel alloy. Only the image screen and the neck or stem which houses the cathode-ray gun assembly are made of glass. These are fused to the metal cone, which has the same coefficient or expansion as the glass. Features of the metal tube include light weight—about one-sixth that of an all-glass tube of the same size, shielding for the removal of ambient light, safety—the tube will not shatter if broken, and a large scanning surface. The Tel-O-Tube gives nearly 150 square inches of clear image area. For further clarity, Tel-O-Tube utilizes drawn glass, polished on both sides.

New Window TV Antenna
The Gyro-Tenna is designed for maximum maneuverability to pick up every signal from every point of the compass regardless of its direction. When it is installed, the Gyro-Tenna
Smooth Power...

FOR EVERY TYPE OF RECORDING UNIT

There's plenty of long-lasting Smooth Power in this compact General Industries recording motor. Originally developed for and widely used with marked success in disc recorders, it has been redesigned to meet the increased power requirements of tape and wire recorders. Here, indeed, is the one motor that meets all recorder requirements.

Like its companion motors in the famous Smooth Power line, this motor features a dynamically balanced rotor, with precision accuracy assured by the latest type of electronic testing equipment. Other features include special locating and locking means for both top and bottom covers... self-aligning, oil-impregnated sleeve and end thrust bearings... dual aluminum cooling fans and scientific air intakes for maximum cooling effectiveness.

For additional information and performance data, write today to:

The GENERAL INDUSTRIES Co.
DEPT. K  •  ELYRIA, OHIO
NEW Television Kits, and Equipment

Important Advances in TV Reception and Servicing!

MODEL 10 BL TV/FM KIT
FLASH! New BIG VALUE KIT: Model 10A, 10" Electromagnetic Kit, 52 sq. in. picture, with amazing new continuous tuning on all 12 channels, (less cabinet) NET $19.50

MODEL FSM-1, TV/FM KIT gives 115 sq. in. picture; complete FM Radio receives all channels; streamlined cabinet...

Model 10CL...

Model 10F-... (in model 10BL) gives 120 sq. in. picture with all angle lens mounted on 10BP4 tube; Complete with cabinet and all-angle lens

MODEL 7CL, TV Kit gives 60 sq. in. picture; console cabinet with Roto-Table; streamlined design. Receives all 12 channels; continuous tuning NET $29.50

MODEL 7BL, same as 7CL except that it is a table model...

NET $39.00

All Prices Subject to Change Without Notice.

8572 Santa Monica Blvd., Hollywood 46

In Calif.: Transvision of California Dept. RSD

New Rochelle, N. Y.

Now ready for delivery at Capitol Radio Corporation, 100 Metropolitan Ave., Brooklyn, N. Y., is a high-powered, high-fidelity 13 tube AM-FM chassis.

New AM-FM Chassis

In a BIG WAY with the TRANSVISION DEALER PLAN

Write for details now!

RADIO SERVICE DEALER • OCTOBER, 1948
AM-FM TUNER AND AMPLIFIER

If you appreciate quality—you'll want MEISSNER. The Meissner Model 9-1093 AM-FM Tuner and Amplifier has a frequency range of 535 to 1620 KC (AM Band) and 88 to 108 MC (FM Band). It has a power output of 18 watts at less than 2% harmonic distortion, and a hum level, 65 db below full output. It's delivered complete with tubes, two antennas and all hardware required to mount the chassis units in the cabinet. The antennas consist of a low impedance 12" x 16", noise reducing loop for AM broadcast and an indoor type folded dipole, 300 ohm, for FM broadcast. Insist on the finest, insist on MEISSNER, it's your finest for more listening pleasure.

FM RECEPTOR

Now, the incomparable beauty of FM reception is available to all with the Meissner model 8C FM Receptor. Here is the full scale fidelity of FM reception, unbelievably free from static, interference or fading. The new FM band is 88 to 108 MC; power supply is 105 to 125 volts, 50 or 60 cycles AC; consumption is 35 watts. Audio Fidelity, flat within plus or minus 2 db, from 50 to 15,000 CPS. For the best FM reception, remember MEISSNER, it's the finest.
Build Business 3 ways
FROM NEW AND OLD CUSTOMERS

with Exclusive NEW SERIES 12 TORQUE DRIVE CRYSTAL PICKUP CARTRIDGE

NEW IDEA WINS CUSTOMERS
CREATES MORE BUSINESS
1. With only 3 basic types you can make normal replacements of over 150 standard models
2. You offer all record fans a new aid in obtaining finer reproduction and preserving records.
3. You help record lovers get more plays out of old worn records.

Everyone likes the way the new TORQUE DRIVE improves performance... hushes surface noise and needle talk... reduces record wear, increases record life, gives more needle plays. Comes in low, medium and high voltage, with replaceable Osmium-tip or Sapphire-tip long-life whisker needle. Available individually or in kits.

Series 12 with Osmium-tip needle... List price $7.50
Series 12 with Sapphire-tip needle... List price $8.50

New Model L-14 for MICROGROOVE
New Microgroove Crystal Cartridge also available now—at same price. E-V Model L-14 has smooth, peak-free reproduction, 12,000 c.p.s. No filter necessary.

New Model 20 MAGNETIC CARTRIDGE

Television Components
G.E. announces a new line of television components, for use with 10-inch picture tubes requiring 50 degree magnetic deflection at an accelerating voltage of 9000 volts. The components consist of a horizontal output transformer, horizontal size control, horizontal linearity control, deflection yoke, focus control, centering device, mounting bracket and ion trap.

These components include a permanent magnet centering device, a focus coil which is a combination permanent and electro magnet, and a horizontal transformer, polyethylene molded and hermetically sealed. The new ion trap may be slipped on to the tube without removal of the socket.

Over-all length of the deflection yoke, centering device and focus coil assembly is 4-3/16 inches. Maximum diameter of the assembly is 3-1/4 inches. Wherever possible, permanent magnets supply the d-c magnetic fields in the components, eliminating much of the wiring and space consideration normally given to these parts.
Thousands of Radio Service Technicians are right! They’ve found the way to quicker, easier, more profitable servicing. Join these thousands of successful money-making Servicemen who have switched to PHOTOFACT Service Data. Learn for yourself how this accurate, easy-to-use, practical data saves you time, makes your work easier, helps you earn more. PHOTOFACT gives you 100% useful service data—every photograph, every diagram, every bit of information helps you do a complete job. You owe it to yourself to switch to PHOTOFACT. There’ll be a big difference in the time you save and the bigger profits you’ll earn every single working day.

**PHOTOFACT VOLUMES**

The Preferred Service Data

Bring your file of post-war receiver Service Data right up to July, 1948! Here’s the most accurate and complete radio data ever compiled—preferred and used daily by thousands of Radio Service Technicians. Includes: Exclusive Standard Notation Schematics; photo views keyed to parts lists and alignment data; complete parts listings and proper replacements; alignment, stage gain, circuit voltage and resistance analysis; coil resistances; record changer service data, etc. Order Volume 4 (1947) today—keep your Photofact library up-to-date—it’s the only Radio Service Data that meets your actual needs!

- Vol. 1. Covers all post-war models up to Jan. 1, 1947
- Vol. 2. Covers models from Jan. 1, 1947 to July 1, 1947
- Vol. 3. Covers models from July 1, 1947 to Jan. 1, 1948
- Vol. 4. Covers models from Jan. 1, 1948 to July 1, 1948

The Amazing

Radio Industry RED BOOK

Replacement Parts Buyer’s Guide

NOW—stop wasteful hunting through dozens of incomplete parts manuals. The RED BOOK tells you what you need to know about replacement parts for approximately 17,000 sets made from 1938 to 1948. Includes complete, accurate listings of all 9 major replacement components—not just one. Lists correct replacement parts made by 17 leading manufacturers—not just one. Covers original parts numbers, proper replacement numbers and valuable installation notes on: Capacitors, Transformers, Controls, IF Coils (including Peak Frequencies), Speakers, Vibrators, Phonocartridges, Pairs—Tube and Dial Light data for each receiver, and Battery replacement data. Get all the right answers in the RED BOOK. 440 pages. $3.95

FREE Cumulative Index

Send for the FREE Cumulative Index to PHOTOFACT Folders covering all post-war receivers up to the present. You’ll want this valuable reference guide to the Radio Service Data preferred and used by thousands. Helps you find the Folders you want quickly. Get this Index at your Jobber or write for it today.

**BOOST YOUR EARNING POWER!**

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<th>Price</th>
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<tbody>
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<td>Replacement Parts Buyer’s Guide</td>
<td>$3.95</td>
</tr>
<tr>
<td>PHOTOFACT Volumes in Deluxe Binder</td>
<td>$49.50</td>
</tr>
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<td>Dial Cord Stringing Guide</td>
<td>$2.00</td>
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<tr>
<td>Tube Placement Guide</td>
<td>$1.25</td>
</tr>
<tr>
<td>Automatic Record Changer Manual</td>
<td>$4.95</td>
</tr>
<tr>
<td>Receiver Tube Placement Guide</td>
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City: __________________ State: _______

My (check) (money order) for $________ enclosed. 

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**Vol 1.** $3.95, **Vol 2.** $3.95, **Vol 3.** $3.95, **Vol 4.** $3.95

Send the RED BOOK. $3.95 per copy.

Send FREE Photofact Cumulative Index.
A horn or speaker of conventional type may resemble a Racon horn or speaker in outward appearance. But close examination of a Racon unit reveals internal differences—refinement of design, better mechanical construction, sturdier materials and other special features that represent ADVANCED ENGINEERING. It is these exclusive features that give you superior performance in any Racon unit. Higher efficiency over wider ranges. Freedom from distortion. Uninterrupted service. The long life that protects your investment.

1—Racon RE-ENTRANT TRUMPET RE-35. Designed to deliver highly concentrated sound over long distances. Air column 3½'. Inside tone arm aluminum castings; bell, heavy aluminum spinnings; center reflecting section, RACON PATENTED ACOUSTIC MATERIAL to prevent resonant effects. Ruggedly built. Length 16'; bell diam. 18'. Swivel ratchet or U bracket mounting.

2—Racon RE-ENTRANT RADIAL TRUMPET SR-35R. Has all of the construction features of RE-35 such as non-vibratory center section, heavy aluminum castings, etc. All reflecting surfaces of RACON PATENTED ACOUSTIC MATERIAL to prevent resonant effects prevalent in all large reflecting surfaces. Delivers sound with even intensity over a 360° circumference. Length 16'/2; width 17'/4. Type SR-60R length 34'/2; width 36'/2.

3—PERMANENT MAGNET HORN UNITS. Highly popular in all types of service. Many improvements. Two groups with Alnico V Magnets and Alnico Blue Dot Magnets. Steel parts plated to prevent corrosion. Also fitted with corrosion proof metal or plastic diaphragms. Voice coil impedance on all units: 15 ohms, except dwarf size—which is 8 ohms. Special ohmages on request.

NOW FURNISHED WITH WATERPROOF CASING

All units may now be had with heavy spun aluminum cases, forming a hermetically sealed, watertight housing for outdoor use, at slight extra cost.

Write for Catalog of complete Racon Line

Racon Electric Co., Inc.
52 E. 19th Street
New York, N.Y.

TRADE FLASHES

(Continued from page 10)

covering the products of 147 manufacturers and the years of equipment production embraced by the manual is from 1938 to date—a span of 10 years. The manual is loose-leaf and bound in the sturdy blue Rider binders. Accompanying the manual is the "How It Works" book describing the theory. The index is complete with references to the contents of each page in the manual.

Westinghouse Stratovision

Westinghouse Radio Stations, Inc., a subsidiary of the Westinghouse Electric Corporation, has filed a petition with the F.C.C. which, if approved, would grant authorization for the first commercial Stratovision station to bring television broadcasting to "about 6,000,-000 people who under present allocations will not receive protected service," even when proposed ground stations are in operation. The petition requests the allocation of Channel 8 for an airborne television station to operate about a point 30 miles west of Pittsburgh and to provide service in an area with a radius of approximately 200 miles, an area 35 times that normally covered by ground television stations.

TV Set Shipments Rise

Television receiver shipments by RMA member-companies were 50 per cent greater during the second quarter of 1948 than in the first quarter and brought total postwar shipments as of June 30 to more than 425,000, the Radio Manufacturers Association reported today.

July Radio Tube Sales Drop

Radio receiving tube sales dropped to 9,637,244 in July due to vacation plant shutdowns in the radio industry and other seasonal and market conditions, the Radio Manufacturers Association reported today. June sales were 15,114,272. July sales brought the year's total reported by RMA member-companies to 109,643,207. July sales were classified as follows: 6,466,320 for new sets, 2,824,013 for replacements, 308,620 for export, and 38,291 for government agencies.

RMA Service Committee Named

Improved servicing of radio and television receivers with resulting benefits to the buying public is the broad objective of an expanded RMA Service Committee named.

(Continued on page 45)
THE IDEAL INSTRUMENT FOR CHECKING AUDIO

AUDIO GENERATOR KIT
HEATHKIT SINE AND SQUARE WAVE

- Circuit blueprints and instructions. R.C. type calibrated dial, beautiful 2 color panel, 1% low distortion, less than 1%, large square wave over same range. Extremely stable. Supplies excellent sine wave 20 cycles to 20,000 cycles and in addition supplies 400 cycle audio available for 30% modulation or audio testing. Use 6SN7 as RF oscillator and audio amplifier. Complete kit has every part necessary and detailed blueprints and instructions enable the builder to assemble it in a few hours. Large easy to read calibration. Convenient size 9" x 6" x 4 3/4". Wt. 4 1/2 lbs.

$24.50
NOTHING ELSE TO BUY

SIGNAL GENERATOR KIT
HEATHKIT SINE AND SQUARE WAVE AUDIO GENERATOR KIT

The ideal instrument for checking audio amplifiers, television response, distortion, etc. Supplies excellent sine wave 20 cycles to 20,000 cycles and in addition supplies square wave over same range. Extremely low distortion, less than 1%, large calibrated dial, beautiful 2 color panel, 1% precision calibrating resistors, 110 V 60 cycle power transformer, 5 tubes, detailed blueprints and instructions. R.C. type circuit with excellent stability. Shipping weight 15 pounds.

$34.50
NOTHING ELSE TO BUY

SIGNAL TRACER KIT
HEATHKIT SIGNAL TRACER KIT

- Transformer power supply, 1% glass enclosed diode rectifier. Ceramic selector switches, 10 megohm input resistance, linear AC and DC scale, electronic AC reading RMS. Circuit uses 6SN7 in balanced bridge circuit with 6H6 as AC rectifier and 43 6 as transformer power supply rectifier. Included is means of calibrating without standards. Average assembly time less than four pleasant hours and you have the most useful test instrument you will ever own. Ranges 0-.1, .1 to 1, 1 to 10, 10 to 100, 100 to 1000, 1000 to 10,000, 10,000 to 100,000, 100,000 to 1,000,000, 1,000,000 to 10,000,000. Complete with detailed instructions. Add postage for 8 lbs.

$245.00
NOTHING ELSE TO BUY

NEW 1948 HEATHKIT 5 INCH OSCILLOSCOPE KIT
NEW IMPROVED MODEL OF THE FAMOUS HEATHKIT OSCILLOSCOPE. BUILDING AN OSCILLOSCOPE IS THE REAL TRAINING FOR TELEVISION AND NEWER SERVICING TECHNIQUES AND YOU SAVE TWO-THIRDS THE COST. ALL THE FEATURES AND QUALITY OF INSTRUMENTS SELLING FOR $100.00 OR MORE. SUPPLIED COMPLETE WITH CABINET, TWO COLOR PANEL, 5BP1 TUBE, 2 5Y3 TUBES, 2 6SJ7 TUBES AND 884 SLEEVE GENERATOR TUBE. POWER TRANSFORMER SUPPLIES 1000V NEGATIVE AND 350 VOLT POSITIVE. SLEEVES GENERATOR 15 CYCLES TO 30 M CYCLES. HAS VERTICAL AND HORIZONTAL AMPLIFIERS, OIL FILLED FILTER CONDENSERS FOR LONG LIFE. COMPLETE BLUEPRINTS AND INSTRUCTIONS INCLUDED.

$39.50
NOTHING ELSE TO BUY
Sure, America's going ahead... if we all pull together!

Let's compare yesterday with today... that will give us an idea of what tomorrow can be!

**Machine Power:** Since 1910 we have increased our supply of machine power 4½ times.

**Production:** Since 1910 we have more than doubled the output each of us produces for every hour we work.

**Income:** Since 1910 we have increased our annual income from less than $2400 per household to about $4000 (in dollars of the same purchasing power.)

**Work Hours:** Yet, since 1910 we have cut 18 hours from our average workweek—equivalent to two present average workdays.

**HOW have we succeeded in achieving all this? Through the American kind of teamwork!** And what is teamwork?

American teamwork is management that pays reasonable wages and takes fair profits—that provides the best machines, tools, materials and working conditions it possibly can—that seeks new methods, new markets, new ideas; that bargains freely and fairly with its employees.

Our teamwork is labor that produces as efficiently and as much as it can—that realizes its standard of living ultimately depends upon how much America produces—that expects better wages as it helps increase that production.

Teamwork is simply working together to turn out more goods in fewer man-hours—making things at lower costs and paying higher wages to the people who make them and selling them at lower prices to the people who use them.

What we've already accomplished is just a foretaste of what we can do. It's just a start toward a goal we are all striving to reach: better housing, clothing, food, health, education, with ever greater opportunities for individual development.

Sure, our American System has its faults. We all know that. We still have sharp ups and downs in prices and jobs. We'll have to change that—and we will!

It will continue to take teamwork, but if we work together, there's no limit on what we can all share together of even greater things.

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11 West 42nd Street, New York 18, N.Y.
Please send me your free booklet, "The Miracle of America," which explains clearly and simply, how a still better living can be had for all, if we all work together.

Name

Address

Occupation
Committee named today by RMA President Max F. Baleon. Several industry projects, including the RMA plan adopted last year to encourage set owners to call for qualified and franchised servicemen, are under the direction of this committee which also maintains liaison with servicemen's organizations and opposes proposed municipal licensing of servicemen. A. T. Alexander, of Motorola Inc., Chicago, is the newly appointed chairman of the expanded Service Committee; Former Chairman W. L. Parkinson of General Electric Company, Syracuse, has agreed to be Vice Chairman and continue active in the committee's various projects.

**Air King Announces Price Increase**

David H. Cogan, President, Air King Products Co., Inc., Brooklyn, N. Y., manufacturers of radios, combinations, wire recorders and television receivers announced today the Air King line of radios and wire recorders will be subject to a price increase from 5% to 15%. The advanced prices, it was decided to withhold this general price increase until October 1, 1948. Mr. Cogan also stated that there was no contemplated price increase of the Air King line of television "Spotlite-Brite" receivers.

**Vee-D-X Expands Line**

A new "single-source" plan to facilitate the purchasing by the serviceman of the necessary accessories required in the installation of FM and TV antennas has been instituted by the LaPointe-Plasmocord Corp., Unionville, Conn., manufacturers of the VEE-D-X antenna systems. The company will offer these accessories to all jobbers in the radio and electronic field.

**National Electronics Conference**

Final plans have now been completed for the 1948 National Electronics Conference which will be held at the Edgewater Beach Hotel, Chicago, on November 4, 5, and 6.

A comprehensive technical program has been arranged, with all major fields of interest being covered. These include new materials, sound measurement and recording, servo-mechanisms, communications, electronic instrumentation, new tube developments, microwaves, computers, industrial applications, television, management of research, electronic circuits, magnetic amplifiers and antennas.

**New Sylvania TV Tube Plant**

Current expansion of television viewing tube production by Sylvania Electric Products Inc. will include a new plant at Ottawa, Ohio, according to J. C. Fairley, general manager, Radio Division. He said that operation of the new plant will begin within a few weeks and that it will double Sylvania's present rate of tube output for the increasing demand of television set makers.

**First Monthly Microgroove Release**

The first monthly release of Columbia's LP Microgroove records, including the complete Metropolitan Opera version of Puccini's "La Boheme" on two 12-inch LP discs, has been announced by Edwarde Wallerstein, Chairman of the Board of the company.

The new release, which augments Columbia's initial catalog of 101 LPs, consists of 14 records (six 12-inch and eight 10-inch discs). They will be issued in September.

**Starrett Uses 16 Inch Metal Tubes**

Simultaneous with the announcement by Tel-O-Tube Corporation of America

**NOW! YOU CAN GET IMMEDIATE DELIVERY ON 1/2- AND 1/4-TON PANEL TRUCKS!**

Sign up today and drive one away. Take delivery on a new Thames Panel Truck... not next month, not next week, but NOW! The Thames is the largest selling light duty truck in England. It is a Ford product made in England.

AMPLE LOAD SPACE... With a capacity of 120 cubic feet for the 1/2-ton Truck and 65 cubic feet for the 1/4-ton, there is ample load space for light deliveries.

EASY HANDLING... A 90-inch wheelbase makes the Thames an exceedingly easy truck to handle, easy to park. Turning circle of the 1/2-ton is 36 ft., 1/4-ton, 34 ft. 9 in.

POWER WITH ECONOMY... One-third the displacement of the average 1/2-ton engine, the 4-cylinder Thames consumes much less gas. Curb weight of 2160 lbs. on the 1/2-ton, 1550 lbs. on the 1/4-ton also helps gas mileage. The engine is especially suitable for non-premium fuels.

AMPLE POWER... The sturdy precision built engine is more than adequate to meet load requirements.

BIG ADVERTISING VALUE... The unique appearance of Thames Trucks builds prestige for your business.

NATIONWIDE SERVICE... Selected Ford Dealers carry a complete supply of parts and Ford Dealers everywhere will service Thames Trucks.

FORD MOTOR COMPANY
2779 Schoenier Road, Dearborn, Michigan

Please send me more information about Thames Panel Trucks.

Name

Address

City State

Trade Flash (Continued from Page 48)
DE LUXE COMBINATION
Tube Tester  RCP Model 8573
Set Tester
Signal Generator
$99.95
at this record-smashing price only

THE FIRST AND ONLY ONE OF ITS KIND!

Every square inch solid-packed with value! Look what you get in this phenomenally low-priced tester: (1) A complete tube tester with over 800 listings in its famous Rollindex roll chart, (2) A battery tester, (3) A capacitor tester, (4) An AM-FM signal generator, (5) An audio oscillator; and a dozen additional features.

Readable scale divisions on the ohm meter start at 0.05 ohm to 25 megohms
DC Volts: 0, 2.5, 10, 50, 250, 1000, 5000
AC Volts: 0, 10, 50, 250, 1000, 5000
DC Milliamps: 0, .5, 2.5, 10, 50, 250, 1000
DC Amps: 0, 10
Output Voltmeter: 0, 10, 50, 250, 1000, 5000
Complete with tubes, batteries and test leads, output leads, etc., housed in natural finish oak case; hammertone gray panel. See this outstanding buy at your jobber today—or write for full details.

RCP INSTRUMENTS—BEST FOR EVERY TEST

Announcing—

"TELEVISION INTERFERENCE—Its Causes and Cures"

A new Handbook by Radio Magazines, Inc., covering in detail the important facts of TVI. The TVI Handbook is edited to fill the pressing requirements of amateurs and other technicians confronted with the problems of TV interference, or otherwise unsatisfactory television reception. Included in its thorough treatment of causes and cures are a comprehensive set of TV screen photos depicting all types of reception, many case histories, preventative design data, and other equally pertinent facts. It is a vital publication for radio men wherever TV is on, or about to go on the air.

Price 50c postpaid, or order from your local jobber.

Enclosed find $ . . . . . . . for . . . . . copies of the TVI Handbook
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Price 50c postpaid, or order from your local jobber.

ARSNY Launches TV Training Program

The Associated Radio Servicemen of New York, through its president, Max Liebowitz, and Program Director, Samuel L. Marshall recently announced the launching of an ambitious training program for its members, covering the Fall and Winter-Spring seasons, 1948-1949. Twelve lectures have been arranged covering every phase of TV, theoretically and practically, and participated in by foremost authorities on the subjects.

The following schedule, listing the date, topic, and participating company, indicates the breadth and scope of the program:
Nov. 3, 1948—Front Ends & I. F. Systems—Delehanty Institute
Nov. 17, 1948—Video Amplifiers—Howard W. Sams & Co., Inc.
Feb. 2, 1949—Alignment & Test Equipment—Bendix Radio
Mar. 16, 1949—Alignment & Test
Form A Group, Servicemen—

Subscribe to "RSD"—

SAVE Up to 50%

★ The more in a group the bigger the savings. 6 men in a group save $1.00 each, 4 men groups save $.75 per man. Present "RSD" subscribers may participate in or form a group with co-workers, or even competitors. Still active subscriptions are automatically extended 1 year. Start a Group today! The timely and exclusive technical data appearing in future issues of "RSD" will make this the best investment you ever made. The special Group Rate offer may be withdrawn at any time—so hurry.

Use This Coupon For Convenience

(The coupon below can be used for from 1 to 6 subscription orders. Use it today!)

RADIO SERVICE-DEALER MAGAZINE
342 Madison Ave., New York 17, N. Y.

Please enter 1 year subscription orders for the names given below. Our remittance is enclosed.

NOTE: If you do not wish to tear this order blank out, just print or type the information on a single sheet of paper, following the style given. Each subscriber's occupation must be clearly described.

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State whether a New Subscriber ☐ or Renewal Order ☐
Equipment—Kay Electric Company
April 6, 1949—Servicing & Test Equipment—Radio Service Dealer Magazine
May 4, 1949—Servicing & Test Equipment—United States Television Mfg. Corp.

New Microgroove Pickup

A new lightweight "Featheride" tone arm and two new crystal cartridges for reproduction of LP microgroove records are announced by Webster Electric Company of Racine, Wisconsin.

The new tone arm, of stamped aluminum construction, is correctly balanced to maintain precise 7-gram tracking pressure for LP requirements.

Model F12 Crystal Cartridge is for exclusive playing of LP records, playing at 33 1/3 RPM. The Model F11 is a double needle, combination cartridge that plays either microgroove or standard records with equal facility.

Large Screen Video Demonstrated

Projecting its large television picture, 520 square inches in size, Television Assembly Company debuted its new custom-built P-520 projection receiver for home use at the St. Moritz Hotel Terrace Club here recently.

The receiver uses a Bausch and Lomb Refractive System employing an F 1.9 lens and an RCA 5TP4 tube (a five inch tube), and the Du Mont Inputuner. Only an 18 inch depth is required for installation.

JFD Helps TV-FM Antenna Installers

The JFD Manufacturing Co., Inc., 4110 Fort Hamilton Parkway Brooklyn, New York, as part of its service to television installation technicians, announces the formation of the JFD TV-FM Antenna Installation Department.

The department will offer free advice to all servicemen in the analysis and solution of their TV-FM antenna installation and reception problems.

Stromberg-Carlson Sales Kit

Shipments of a special radio sales kit for Fall merchandising will shortly be made by Stromberg-Carlson to its authorized dealers throughout the country.

The kit contains three dealer sales manuals showing Stromberg-Carlson's Fall line of radio and television receivers, direct mail stuffers for radio and television, attractive model identification cards, a complete advertising mat service book, 4-color full line folders for customer handouts, and a unique Christmas window display to be mailed later in the season.

New PA Kit

A special kit, consisting of an automatic record changer and an amplifier and speaker is now being offered for use in hotels, restaurants, factories and other places where people gather, by the Webster-Chicago Corporation.

The kit consists of Webster-Chicago's new "Matinee" automatic record changer, which is especially designed for reproducing the 33 1/3 RPM records, and the corporation's "Fairway" amplifier and speaker. The record changer in the kit records with a seven gram pickup and one mil radius tip, while the amplifier and speaker is an 8-watt...
output model with separate volume and tone controls. It will play up to four hours in one loading.

**Master TV Antenna Contract**

The contract for providing television outlets in all 3008 apartments of the new Fresh Meadows Rental Housing Development, Flushing, Queens, has been let to Amy, Aceves & King, Inc., 11 West 42nd Street, New York City. This installation will provide television, AM and FM outlets for all departments in the 2 thirteen-story, 68 three-story and 70 two-story buildings in the new housing project of the New York Life Insurance Company.

**Racine RMA Transformer**

Chairman

Mr. L. S. Racine, sales manager of Chicago Transformer Division, Essex Wire Corporation, has recently been appointed chairman of the Transformer Section, RMA Parts Division, for the current year, 1948-1949.

**Oak Ridge Appointments**

Marvin Kaplan, Director of Oak Ridge Antennas announced new executive appointments which are as follows: Mr. Maury Jungman, New York Area Sales Manager; Mr. Burt U. Levy, Eastern Sales Manager; Mr. Howard S. Levy, National Sales Manager; and, Mr. Leon G. Friedman, Production Manager.

**Rep. & Distributor Appointments**

A. J. "Art" Nelson, of Denver, Colorado, was appointed Manufacturer's Representative for Air King Products Co., Inc., Brooklyn, N. Y. Mr. Nelson will cover the states of New Mexico, Colorado, Wyoming, Montana, Idaho, Utah and the trading area of El Paso, Texas.

**G. E. Appoints**

E. H. Fritschel has been named Manager of Sales and A. C. Gable has been appointed Division Engineer, of the G. E. Tube Division.

**Markwell Resigns**

Ernest A. Marx, general manager, Television Receiver Division, Allen B.
Du Mont Laboratories, Inc., announced today that Norman M. Markwell had resigned as advertising and sales promotion manager, as of September 1, because of illness.

Stewart-Warner Elevates Minteer

Elevation of James L. Minteer to the post of secretary of Stewart-Warner Corporation has been announced by

James D. Knowlson, president and board chairman.

John D. Reid Honored

John D. Reid, manager of research of the Crosley Division, Avco Manu-

facturing Corporation, has been awarded the President’s Certificate of Merit for outstanding work on the proximity fuze during the war.

LaPOINTE PLASCOMOLD CORP.
UNIONVILLE, CONN.

VEE-D-X
Adds more vision to television

SHOP NOTES
(from page 38)

G. E. TV Receivers Models 901 and 910. Low Frequency Rumble on FM

G. E. offers this remedy for curing the above condition. Remove the receiver chassis from cabinet. View the squelch switch, S4, with the receiver chassis upside down and with the operating controls toward observer. The lower right-hand terminal on squelch switch has connected to it a green wire, the other end of which connects to the junction of a 1.0 megohm resistor, R111, and a 1500 µµF ceramic capacitor, C105. Between this switch terminal and the nearest ground tab on an adjacent electrolytic capacitor, solder a 0.25 µF 400V paper capacitor.

R.C.A. 54B1, 54B2, 54B3—Oscillation

Oscillation on advanced position of the volume control may be caused by feed-back between speaker voice coil leads and leads to the volume control. Keep the voice coil leads away from the volume control leads.

R.C.A. QB55X (RC-563K)

A capacitor (.05 mfd, C30) has been added between terminal No. 6 of S2 rear and chassis. The bus wire which connected terminal No. 6 of S2 to chassis is omitted. This prevents momentary grounding of +B when the range switch is turned.

R.C.A. Vibrator Radios—Mechanical Hum

The vibrator power supply is usually mounted on rubber bushings and secured to the radio chassis with screws and metal spacers which fit inside the rubber bushing. If the power supply should be removed from the radio chassis, when reassembling, be sure to replace the metal spacers to prevent the rubber bushings from being compressed when tightening the mounting screws. If the rubber bushings are compressed, it will cause additional mechanical hum.

Webster Wire Recorder Oscillator Circuit Test

To determine whether or not the oscillator circuit of the wire recorder is operating properly Webster service notes suggests the following:

1. Remove the four screws holding the mechanism cover and remove the cover.
2. Remove the 6.3 volt pilot light.
3. Remove the screw from the top of the recording head, and remove the head from its socket by carefully
pulling straight up, just as you would remove a tube.
4. Insert the screw in terminal No. 3 of the recording head to act as a contact.
5. Touch one contact of the bulb to the screw and ground the other contact.

The recorder should be turned "on," the "record-listen" switch should be at "record," and the "run-rewind" control lever at "run." Since the oscillator should deliver from 5 to 6 volts of R.F. at 1 ampere, the bulb should light brightly if the oscillator is operating properly.

CAUTION: Be certain to recheck the "level wind" after the recording head has been replaced. If the head has not been seated at its original height, the level wind will be off and wire may spill expecially with an one-hour spool of wire.

Noisy House Wiring

Instead of taking off plates of wall receptacles, canopies, and sockets to find faulty house wiring connections, use an electric heater that draws about 6 amperes.

Connect it to each outlet, with an a-c volt-meter plugged across the line, watching any fluctuation on the meter. In this way many joints will be found that should have been soldered, but were not, joints of this type corrode very quickly, thus causing all sorts of noise in the line. This method will show up cold soldered joints, so if in doubt on any joint, make sure by placing your hot soldering iron under the joint till the solder flows freely around the wires, thus assuring a perfect bonded joint, free of any noise.

Locating Ignition Noise

By connecting an r-f coil across a set of headphones and using same as an exploring coil, it is a simple matter to locate ignition noises, etc., in car installations. By holding the coil close to the various wires under the dash, the ones causing the trouble can soon be located, and the annoyance eliminated by the use of a filter.

Last two shop notes submitted by Albert Loisich, Darby, Pa.

INTERNATIONAL RESISTANCE CO.

(Continued from Page 29)

number of leads by having common terminals where internal circuits exist. As a result, the five items are connected in the circuit by only 7 leads.

As indicated in the manufacturer's service notes, in case of failure of one capacitor it will not be necessary to replace the entire Bulplate. The limiting factor will be space to mount conventional components.

No matter how much you know about soldering, there's always a trick that will make it easier. This little 20-page pocket guide is crammed full of such time-and-trouble savers.

Without wasting words, it covers the whole soldering operation—points out DO's and DON'T's—refreshes your memory on difficult points—suggests methods that help you work faster. Yet there's no hard studying, no tough technical talk. Every word is plain everyday English and every point is made clear by easy-to-understand illustrations.

Get this handy Soldering Guide today, and keep it on your bench for ready reference. It's a real handbook of professional soldering—not a catalog. Just mail the coupon with 10c cash or stamps and we'll send your copy at once.
**TV PICTURE TUBES**
(from page 21)

similar to that produced in the angle cut gun. In this case also, a pair of electromagnets are mounted on the neck of the tube, except that now one coil is mounted on top and the other on bottom. A typical bent gun tube is the 10AP4.

**Aluminized Screens**

By depositing a molecularly thin layer of aluminum after the phosphor has been applied to the inside of the tube, two effects are observed. First, the fast moving electrons penetrate this layer and reach the phosphor with no apparent loss in velocity, whereas the heavy ions cannot penetrate through and are absorbed by the nearby high voltage anode layer. In this manner no ion spot danger is present and no ion traps are necessary. The second effect is one of greater optical efficiency by virtue of the fact that the reflections present in an ordinary tube due to the presence of reflecting glass in the supporting wall of the tube do not exist in the aluminized tube because the light formed on the phosphor cannot penetrate back through the aluminized layer. As a result the light previously lost off the rear area of the screen is now reflected back to the viewer. The 10FP4 is a typical tube of this type.

To be continued.

**TECHNICAL QUIZ No. 8**

ANSWERS

Do NOT read or study these answers until you have finished marking down your answers to the "Quiz" given on page 27 of this issue. When that is done, compare your answers to these correct ones.

1. Low voltage "B" supply
2. R-F amplifier
3. Sound i-f amplifier
4. R-F oscillator
5. Video i-f amplifier
6. Trap adjustment
7. High voltage power supply
8. CRT
9. Video i-f amplifier
10. Video amplifier
11. Video i-f amplifier
12. Vertical oscillator
13. Horizontal oscillator
14. R-F oscillator
15. D-C restorer
16. Antenna
17. Sound and video i-f amplifier
18. Sound detector
19. Synchron separator
20. Synchron amplifier

**HIGH VOLTAGE PROBES**
(from page 22)

breakdown in the insulation between the high-voltage conductors and connectors, the high voltage is short-circuited to ground without reaching the operator. Notice also item 5 which refers to the nameplate and leakage guard. This dual purpose identification plate and "Safety Guard-Ring," which is grounded by means of a concealed contact spring, serves as a final and positive ground return for any unusual leakage potentials which might develop along the Lead and Barrier due to...
Operational negligence or excessive moisture. Such voltages are thereby returned to ground before reaching the operator's hand.

4) Flexibility:—Are the components quickly and easily replaceable in case of damage or for other reasons?

While most of the components are of the molded type the construction is such as to permit of easy disassembly of the probe.

Operating Precautions

When operating high voltage probes it is well to observe the following safety precautions:

The high potentials produced by the power supplies of modern TV receivers, while of low current capacity, can nevertheless be dangerous if sufficient care is not exercised. The following precautions should therefore be rigidly observed:

1. Hands, shoes, bench and floor must be DRY.

2. Always keep the probe free of all accumulated dirt and/or moisture.

3. Fingers must NOT extend over or beyond the safety limits of the TV probe.

4. Alligator Grounding clip MUST be properly clipped to negative side of the high voltage power supply (usually chassis) BEFORE voltage measurements are attempted.

5. Become fully acquainted with the location of all high potential points within the device under test!

6. When testing, extreme care must be observed in order to prevent accidental contact of the hand with exposed high potential points on the chassis of the TV receiver.

7. Read and adhere to the published alignment and test procedures for the particular receiver to be repaired or tested.

8. Occasionally check continuity of grounding connections within the probe by use of an ohmmeter.

DISTRIBUTED CAP.

(from page 17)

and capacitor at some point near the high-capacitance limit of the tuning capacitor. The actual frequency is not too important, since the distributed capacitance does not change with frequency, and a measurement made at a lower frequency will be adequate for coils to be used at ultra-high frequencies. Adjust the tuning capacitor for peak deflection of the meter. Read the capacitance setting at this point. Call this value C'.

(4) Without changing the oscillator frequency, reset the tuning capacitor.

Astatic FL-33 PICKUP

FOR COLUMBIA MICROGROOVE RECORDS

Here is no mere version of what a pickup for use with Columbia Microgroove Records should be—but the actual playing arm designed to meet the precise requirements of Columbia's new recordings. This new Astatic Pickup is manufactured to meet the specifications by Columbia, to insure maximum quality performance of the Columbia LP Microgroove Record. Available, then, in the Astatic FL-33 Pickup and LP-33 Crystal Replacement Cartridge, is the ultimate in Microgroove companion equipment... alone capable of getting the most out of LP Records.

FL FILTER: For best performance with high quality speakers. Controls high frequency response.

FEATURES OF ASTATIC'S FL-33 PICKUP

1. Five-Gram Needle Pressure.
2. Permanent Sapphire Needle with .001" Tip Radius.
3. Approximately One-Half Volt Output.
4. Frequency Range 30 to 10,000 c.p.s.
5. Novel Design at Base Eliminates Tone Arm Resonances and Assures Perfect Tracking.
6. LP-33 Cartridge for Microgroove instantly replaceable in FL Arm with LP-78 Cartridge having .001" radius needle for playing 78 RPM Records. Both simple slip into position, no tools needed.

NO CHANGING OF NEEDLE PRESSURE

This ATTRACTIVE ALL-STEEL STORAGE DISPLAY CABINET FREE

with purchase of 12 most popular types HALLDORSON vacuum-sealed TRANSFORMERS.

Assortment includes input, output and power transformers as follows (see Halldorson catalogue):

<table>
<thead>
<tr>
<th>TRANSFORMER TYPE</th>
<th>VOLTAGE</th>
<th>NOTES</th>
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<td>1-D4-600</td>
<td>1-T-341</td>
<td>1-85-853</td>
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<td>1-D4-604</td>
<td>1-85-816</td>
<td>1-85-66</td>
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<tr>
<td>1-K4-800</td>
<td>1-A4-777</td>
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<td>1-D4-602</td>
<td>1-A4-775</td>
<td>1-5-40</td>
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Dealer Net $24.90

Just the thing for your service bench or can be mounted on the wall... an all-steel storage-display cabinet that holds 12 most frequently used Halldorson vacuum-sealed transformers as per list above... You pay only for the transformers... the cabinet is included in the deal at no extra cost to you... saves trips to distributor's counter... makes stock keeping easy... Good for limited time only. Act now...

SEE YOUR RADIO PARTS DISTRIBUTOR OR WRITE
The HALLDORSON COMPANY 4600 Ravenswood Ave. Chicago, Ill.

Halldorson
Vacuum Sealed Transformers
to resonate the coil at twice the oscillator frequency (2nd harmonic). When peak deflection of the meter is obtained, read the capacitance setting at this point. Call this value $C_1$.

(5) If the coil under test had no distributed capacitance at all, $C_2$ would be exactly $\frac{1}{2} C_1$. But $C_2$ will be found to be less than $\frac{1}{2} C_1$, indicating the presence of a certain amount of distributed capacitance. The value of the distributed capacitance ($C_d$) may be calculated from the $C_1$ and $C_2$ values by means of the following formula:

$$C_d = \frac{(C_1 - 4C_2)}{3}$$

When making this distributed capacitance test, the operator must take care to keep all leads rigid and short, in order that all stray capacitances across the coil under test will be held constant.

**Alternative Methods of Test**

If an a-c vacuum-tube voltmeter is not available; a crystal diode and d-c microammeter may be employed in its place, as a crystal galvanometer, as shown in Fig. 2. The required sensitivity of the microammeter will depend upon the voltage output of the test oscillator. For example; a 0-100-microampere instrument will be necessary with most service test oscillators, while as large a meter as 0-1 milliampere is usable if the oscillator has a 1-volt output jack.

If a dial-calibrated variable capacitor is not available, the following alternative test method may be employed: Use a good single-gang variable capacitor (350 or 500 $\mu F$) mounted solidly behind a panel and provided with two binding post terminals. Tune the coil-capacitor test circuit as described previously; but after each adjustment, carefully remove the tuning capacitor from the circuit without disturbing its dial setting (also, do not disturb the position of the coil leads) and measure the capacitance setting of the tuning capacitor with a dependable bridge or capacitor checker to obtain the $C_1$ and $C_2$ values for use in the formula.

**Practical Pointers**

The coils used in many higher-frequency receivers are small and simple.
**THE MOST DESIRABLE ANTENNA MOUNT EVER MADE!**

Pat. Pending

Chimney Mount Antenna Base

- for TELEVISION
- FM • AMATEURS

List Price: $7.50
Cost to Retailer: $4.50

Installed in 10 minutes • Permits Use of Several Mounts on One Chimney

Chimney Mount is by far the fastest selling product of its type in the radio and television fields. It can be installed in ten minutes without the use of special tools or drilling of holes. Several mounts can be strapped to one chimney—to pole, 2 x 4, side of house or to any rectangular roof extension. Fastens aerial to highest point with galvanized steel bands having a combined tensile strength of more than 3,000 lbs. Made of corrosion-resistant aircraft-type aluminum alloy. Weight: 3 lbs.

**DISTRIBUTED CAP.**

(from page 54)

As a result, it very often will be economical for the service dealer to wind replacement coils. In all such instances, the operator must work for low distributed capacitance. He especially must reduce all distributed capacitance values to such a figure that self-resonant effects will not be encountered in or near the operating band of the circuit into which the coil is installed.

Good practical rules are to keep the coil size as small as practicable (consistent with the desired inductance), to use spaced turns rather than close winding, to use bare wire and self-supported air-wound coils whenever possible, to keep coil leads as short as practicable, and to mount the coil as far away from the chassis and other surrounding objects as short leads will permit.

**PROJECTION**

(from page 15)

is 23½ kv with no load and 24 kv with 125 microamperes drain.

Fig. 10 illustrates the complete unit with the high voltage supply mounted near the projection box. Notice the high voltage cable, the adjustment screws allowing accurate adjustment of the CRT without danger, the socket for the CRT and the correction lens at the top.

This complete unit represents the best in compact projection television allowing the greatest flexibility of receiver design and cabinet layout. The serviceman will have only the minor adjustment of the screws as shown for service, when needed, will be only the replacement of a sub-assembly. Without a doubt this unit also points the way to adaption of conventional receivers to projection television. There only remains the minor changes of the chassis and the mounting of the screen and mirror if needed.

**EDITOIAL**

(from page 2)

bring pressure to bear so that a bad situation can be corrected.

**Receiver Maker Failures**

AM set sales have been way below normal for a long time and now the squeeze is on makers of same, especially the “loft manufacturers” and makers of not-to-well-known-brands. Many of the “weak-sister” manufacturers are in precarious financial straits. It’s a wise policy to stick to nationally advertised brands if you are going to invest in any appreciable amount in AM receivers. In any event, keep inventories comfortably low.
Easier Antenna Installations

Star Expansion Bolts make it easy to fasten TV equipment to brick, stone, concrete or any other type of masonry. Help you to position antenna masts, cables and lines in the best possible manner — assure greater satisfaction — reduce service calls. There’s a Star fastening for every masonry job. See your jobber or write for details.

Visit Our Display Booth, I. R. E. Show, March 7-10, ’49

EXPANSION BOLT CO. INC.
147 Cedar Street, New York 6, N. Y.

Vital Aids IN SERVICING MINIATURE TUBE RADIOS AND EQUIPMENT

Star Miniature Socket Wiring Plugs for accurate alignment of miniature socket contacts during wiring. Precision cast of stainless steel — pins of stainless steel. (6 pin; #6-10 1/2 pin).

Star Miniature Tube Pin Straighteners (with stainless steel insert) to obtain a perfect fit when the tube is placed in the equipment. (7 pin; #6-10 1/2 pin).

Scientifically designed — Precision made. Immediate delivery in any quantities. Visit our Display Booth, I. R. E. Show, March 7-10, 1949

EXPANSION PRODUCTS CO., INC.
147 Cedar Street, New York 6, N. Y.
AIR KING SETS THE STAGE FOR
an All-Star Performance

With all the magnificence and excitement of a Broadway premiere, powerful spotlights converge on stage and the curtain unfolds on a stellar performance! Lucky first-nighters, with seats down front, watch in breathtaking silence...It's a hit! A great performance! AIR KING "Spotlite Brite" Television makes every show a thrill to watch. The large ultra-bright picture brings every viewer down front...ringside...at the 50-yard line! Impartial field tests have proved AIR KING "Spotlite Brite" Television always gives an All-Star Performance; the video industry's greatest "hit!"

See AIR KING "Spotlite Brite" Television in actual operation at your AIR KING franchised distributor today!

AIR KING PRODUCTS CO., INC., 170 53rd STREET, BROOKLYN 32, N.Y.
Export Address: Air King International, 75 West St., New York 6, N.Y.

AIR KING RADIO
Division of HYTRON RADIO & ELECTRONICS CORP.
The Royalty of Radio Since 1920
Get the lead... Hold the lead...
with RCA's new line of sales aids

- Lead the field in sales and service with these new, compelling RCA sales aids! They'll give you the powerful point-of-sale support you need to help bring more business your way... because they associate your business with the greatest name in radio and television.

See the complete line of RCA sales and business aids... and learn how they can be used to promote business for you. The new booklet, "RCA Schematic for Bigger Profits and Better Service," presents the whole story. Get your copy today from your RCA Distributor.

SEE YOUR RCA TUBE DISTRIBUTOR TODAY FOR FULL DETAILS

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA
HARRISON, N. J.