



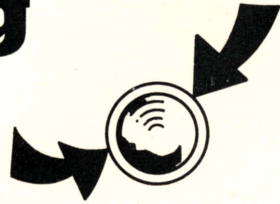
the PHILCO SERVICEMAN

VOL. 23 NO. 11 NOVEMBER, 1955

“AYR”?

(SEE PAGE 2)

Locating



Gassy Tubes

This article is the first in a series of installments designed to help the radio and television serviceman handle problems involving gassy tubes. This installment discusses the causes of gas, and how gas affects the operation of a tube.

Gassy tubes produce a variety of perplexing problems for the radio and TV serviceman. In some cases, a single gassy tube in a set will cause peculiar operational symptoms that greatly increase the difficulty of reaching an intelligent diagnosis of the trouble. In other cases, a gassy tube will be on its best behavior during the time while the set is under repair and observation, but will “act up” in the customer’s home after the set has been operating for several hours.

In order to solve difficult service problems, reduce the number of callbacks on repair jobs, and increase the list of satisfied customers, the serviceman needs to be familiar with the behavior of gassy tubes in different circuits and under various conditions.

Why Not Rely on the Tube Tester?

Some tube testers have a gas test feature incorporated in their circuitry. This test may prove successful if you happen to be testing the offending tube when it is in a troublesome mood, and if the tube operating conditions in the tester are similar to

those in the set. However, these two circumstances cannot be expected to coincide in every case. Experience has proven that it is more practicable to locate the trouble while the tube is operating in the radio or TV set. The reason for this is that a period of set operation is usually required to obtain the full story on the symptoms. Some gassy tubes are in their worst condition when the set is first turned on, while others do not show any signs of trouble until they have been in operation for a long time.

What Causes Gas in a Tube?

Before considering the effects of gas within a vacuum tube, it is helpful to understand how gas gets into the tube in the first place. In the manufacturing process, the air is pumped out of the tube by means of vacuum pumps. Then, any gases that may still remain in the tube envelope or the metals comprising the electrodes are driven out by baking the tube, usually in a radio-frequency furnace. In the case of metal-envelope tubes, the metal shell is heated with a gas flame, and the removal of gases from the electrodes is assisted by electron bombardment, which is produced by operating the tubes in “aging” racks for the required length of time. Finally, the “getter” in the tube is flashed, and this removes any residual gas. A variety of getters are used, but most of them employ a

small amount of volatile substance such as magnesium, barium, or phosphorus. The getter material combines with the gas molecules and produces solids, which are deposited on the tube envelope. The familiar silvery film which can be seen on the inside of the tube envelope is the result of getter action. Some getters employ material that is capable of absorbing gases. In many types of tubes the design of the getter is such that it continues to eliminate gases that may occur while the tube is in service.

We are now prepared to consider how gas “gets into” a tube. This knowledge will, in turn, help us to know when to suspect that a tube may be gassy. There are two common causes of gassiness: (1) as the tube is used more and more, a condition is reached in which gas is released from the electrodes faster than the getter can eliminate it; (2) minute quantities of air (which contains various gases) leak into the tube through the seals where the electrode connections are brought out. Sometimes the gas is caused by a combination of these troubles.

The release of gas from the tube electrodes occurs mainly through electron bombardment and heating. Gas is driven out of the plate and the grids in this manner. Also, when the emitter coating on the cathode

(continued on page 3)

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ARE YOU READY?

Ready for color television service. What do you know about *Colorimetry?* *Chromaticity Diagram?* *Vector Analysis?* You will know, understand, and be ready for color . . . if . . . you sign up for THE BIG PACKAGE IN ELECTRONIC SERVICE!

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Ready for home laundry service? What do you know about *Ball Point Balance?* *Speed Limiting Compensation?* *Centrifugal clutches?* THE BIG PACKAGE IN APPLIANCE SERVICE explains these, too!

BUT- What About All Year Round?

With its present product lines expanded, plus new products to be announced in 1956, Philco has created an ALL YEAR 'ROUND balance for sales. And, naturally, that means ALL YEAR 'ROUND service, too! No more slack months, seasonal spurts — but

constant, profit building service ALL YEAR 'ROUND!

If you are servicing all Philco products, or would like to, we can offer you the new, special ALL YEAR 'ROUND PFSS membership . . . combining Electronic and Appliance memberships at a saving!

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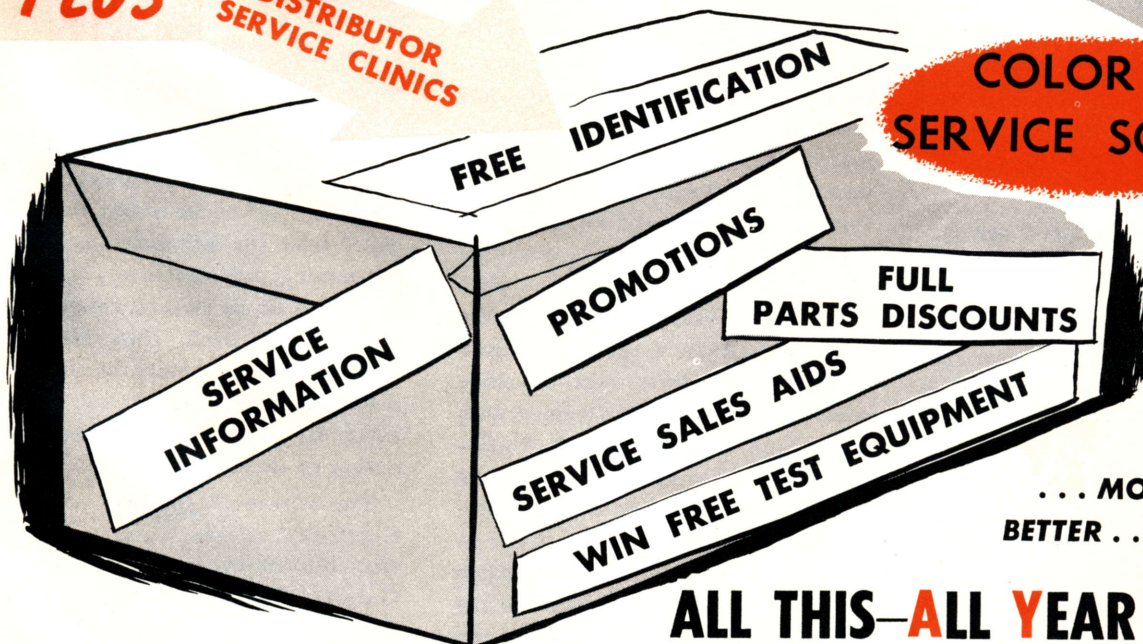
PLUS

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ALL THIS—ALL YEAR ROUND!

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OF THE BIG PACKAGE FOR '56!

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Locating Gassy Tubes

(continued from page 1)

becomes partially exhausted, gas molecules are "boiled out" of the metallic body of the cathode. Furthermore, any gas existing in the tube tends to shorten the life of the emitter material. This will be discussed later.

Leakage of air into the tube can occur at regular intervals. As the tube heats up and cools off again during normal on-and-off use, there are times when the heat of the tube is such that wire electrode connections and the glass seals do not expand or contract at the same rate; thus, minute amounts of air are admitted to the interior of the tube.

Whatever the cause of gas build-up in the tube, the trouble is increased by partial failure of the getter. As the tube is used more and more, the getter deteriorates, so that it finally becomes incapable of taking care of the gas as fast as it is produced.

What Goes On in a Gassy Tube?

When electrons from the cathode collide with gas molecules, an effect called ionization occurs—that is, positive ions are produced. These ions affect tube operation adversely in a number of ways. They are attracted to the cathode, because of the potential difference that exists. Because of the relatively large mass of the gas molecules, when they strike the cathode they strip off some of the

emitter material. This shortens the life of the tube.

Ions also neutralize some of the negative space charge, and this increases the flow of electrons from the cathode to the plate, which amounts to an increase in plate current. This alters the operating characteristics of the tube. It also increases the heat within the tube, and this can contribute toward the release of more gas from the electrodes.

Probably one of the most damaging actions of the positive ions results from the fact that these ions tend to collect on the control grid. This has the effect of making the grid bias less negative, and thus causes a marked increase in plate current. Again, the increase of heat in the tube helps to release more gas, as mentioned above. At the same time, the increased emission produces more electrons, so that more collisions occur between electrons and gas molecules, and thus the ionization becomes worse. These conditions persist over a period of time, causing faulty operation of the associated circuits, until finally the usefulness of the tube is destroyed.

It should be noted that the collection of positive ions on the control grid is particularly injurious when there is a high value of resistance in the external grid circuit, as in the case of resistance-coupled audio amplifiers and r-f or i-f amplifiers operating in a-g-c or a-v-c circuits. The

high grid circuit resistance allows the positive ions to make the control grid bias much less negative, if not actually positive. From observation of the above facts, it is easy to see why a small amount of gas ionization can be particularly detrimental to the operation of pentodes and similar high-gain tubes, whose normal control grid bias is a very small value, as compared to triodes.

It is thus obvious that a small amount of gas in a tube can change the input impedance, the gain, the control-grid bias, the plate-current, the operating point, the output impedance, and so on. Furthermore, the operation of the tube, although abnormal, will not ordinarily remain constant, but will vary gradually as the tube warms up to its task, and will then grow either better or worse, depending upon whether the gas and the ionization are decreasing or increasing. Finally, the operation will become stabilized, although during the process it may cause erratic operation of the radio or TV set. For example, a gassy horizontal oscillator tube in a TV set may cause the picture to tear or lose sync every fifteen minutes, requiring hold adjustments at regular intervals over a period of an hour or more until finally the operation is stabilized. If the TV owner is an extremely patient person, he may be content to go through this performance every evening, but it is more likely that he will call a serviceman.

(To be continued)

The next installment will deal with the symptoms caused by gassy tubes in radio and TV sets, and how to localize the trouble.

... AWARDS

Colton, California — A well-known Colton service organization receives well deserved recognition in the form of Philco's Service Achievement Award. From left to right: Bill Dinsmore, James F. Mitchell and Joe Sly (owner) Hemet Refrigeration Co.; Jack Cooper, General Manager C&C Appliance Co. (Colton Distributor); Dan Youngerman, C&C salesman; James Wheaton, TV Service Manager, Hemet; and Charles L. Ross, C&C Service Manager.



EUROPEAN TV NETWORK

Links 8 Nations

(Reprinted by permission of the Philadelphia Evening Bulletin, Philadelphia, Pa.)

London—Television is forging a cultural European unity through Eurovision—the European TV network.

The universality of the picture has helped to overcome the barriers of language, nationalism and tradition. The TV exchange between eight countries has made viewers from Scotland to Italy realize that they are united by such common interests as public events, sports, religious festivals and musical concerts.

Eurovision includes Great Britain, France, Holland, Western Germany, Belgium, Denmark, Switzerland and Italy. TV programs can be transmitted in either direction between any and all of these countries.

In Italy, Switzerland, Denmark and Belgium, TV is little more than a year old. As one might expect, TV has its greatest hold in Great Britain where four and a half million sets are in operation. France has 220,000 sets, Western Germany 150,000, Italy 130,000 and the other countries 20,000 or less. (In the U. S. there were 33 million sets in 1954.)

Eurovision grew out of the first "live" TV exchange in Europe between Britain and France in August, 1950, when the BBC produced a program called "Calais en Fete." Two years later an Anglo-French week of TV took place with 18 programs viewed simultaneously in the two countries. But it took the Coronation of June, 1953—transmitted from London to France, Belgium, Holland and Western Germany—to inaugurate a European TV network. Last year two Eurovision periods—four and a half months in all—were held when 50 programs were seen in the eight countries. On September 15, the BBC will again join the United Kingdom to the seven continental countries, but this time on a long-term basis.

This is the way a "live" TV program from London reaches viewers in the seven continental countries:

After crossing the Channel at Dover, the program divides at Lille, in one direction for the French network in Paris and in the other direction to Holland. There again it separates between the Belgian station and the Dutch network which carries the picture to Cologne for Western Germany. From Hamburg a special link has connected with Copenhagen. At the southern end of the German network the signals travel to Zurich for Switzerland and from there to Milan where they tie into the Italian network. As a result, viewers in Berlin or Belfast, perhaps sitting at home on a cold bleak day in winter, can watch a sports event being played in Rome in brilliant warm weather.

Great technical difficulties had to be surmounted in order to link 44 transmitters with 4,000 miles of circuit. On the whole the pictures have

been clear although there have been occasional failures. Lightweight radio links in tandem on very short wave lengths enables pictures to be transmitted over considerable distances without loss of quality. In 1954, 80 special relay stations were used for the eight-nation TV network.

The problem of different screening standards in the various countries—Britain with 405 horizontal lines, France with 819 lines and the others with 625 lines—was overcome by placing "standards converters" at strategic points in the Continent. Getting the signal through involves such exploits as an engineer skiing up to a 4,000-foot pass in the Alps to break off icicles from the disc transmitter.

But probably the most formidable obstacle in Eurovision was not technical but cultural, the language barrier. This has been solved by allowing



each nation to have its own commentator on the spot who talk to the viewers in their own language. The BBC soon learned that their British viewers didn't like listening to a language they don't understand. Each national commentator is briefed on the background of the event. Also each national TV organization has a picture monitor at point of telecast who controls the image for his station.

The most popular programs are outside broadcasts such as sporting events and "actualities." One of the outstanding programs of 1954 was a visit to St. Peter's in Rome ending with an address by the Pope to each country in its own language.

Also Italy telecast the famous medieval horse race, the Palio, from Siena. Such international sports competitions as the Wimbledon international lawn tennis tournament, the world cup rugby football championship from Switzerland, the Grand Prix racing from Longchamps near Paris, and the 24-hour motor race from le Maris provide the kind of activities that unite sports enthusiasts in all European countries. Royalty is of international interest and one of the most popular telecasts last year showed the Queen of the Netherlands and her daughter at a delightfully informal children's party.

Religious programs also interest viewers of different nationalities. Last Christmas the BBC telecast the service from King's College Chapel in Cambridge and on Christmas Eve midnight Mass in Notre Dame was brought to TV homes in several countries.

These programs originating in one country and being viewed by people of different nationalities and cultural backgrounds often thousands of miles away have amusing little human angles. For example, when the clock in Zurich at a football match shows the same time to a viewer in a Welsh farmhouse as he sees on his mantelpiece, the distance disappears and he feels he is there; or when a viewer in Copenhagen sees the Pope actually applauding at a concert in Rome, he has an unusual sense of intimacy, for very few people have seen the Pope applaud. When it rained at a flower festival in Montreux, many viewers in London were amazed — they thought that, unlike their country, the sun always shone in Switzerland. As viewers in Scotland at five o'clock watch the workers of Western Germany leaving their factories at the same time as their husbands, they have a sense of personal contact—that the lives of these foreigners bear a very close resemblance to their own.

Programs must be worked out well in advance—for instance August telecasts are chosen usually in May. It is interesting to note that the originating country pays the whole cost of transmission.

What of the future? Technique and programs must both be developed and improved. The BBC chief television engineer has pointed out that "much of the apparatus at present in use for transmitting the vision signals is temporary and needs to be replaced by something of higher quality, designed for regular use." During the early part of this year the number of exchanges was reduced so that improvements in the technical apparatus could be made. As the number of sets increases, the cost of better and more regular programs will be easier to support because of the extra money from license fees.

Can TV span the Atlantic and hook up the U. S. and Europe? BBC experts are convinced this will be possible in time. In fact, ingenious schemes were devised to transmit the Coronation by "live" TV to American viewers but it was estimated the cost would have been about 50 million dollars. Until this is possible, Eurovision will probably be "live" TV's greatest contribution to international understanding.

GET YOUR BACKFIELD IN MOTION!

THE NCAA (National Collegiate Athletic Association) has combined with the major television networks to offer a glittering array of college football games to your television audience during the 1955 season.

To interest the football fan in every part of the country, a wide variety of intersectional games will be televised, as well as a complete selection of post-season Bowl games. Since the popularity of college football has grown steadily to challenge major league baseball as America's number one sport, customers will be anxious to have their receivers in top viewing condition for the season.

By tying your service into such seasonal activities you can create a demand for your skills when it is

uppermost in a great many customers' minds. Service businesses, large and small, have had much success using baseball, football and other sports promotions as a theme to bring them more business at a particular time of the year. Give-aways such as football schedules, past player and college records, and local television schedules not only please the customer who receives them, but also carries your advertising message into their homes where it will be consulted *first* when the need for service occurs.

Plan your promotions for every season of the year, and plan them in advance. Just by sitting down with a calendar as a guide, in a few hours you can produce a sensible and popular program that will net you in-

creased business at the start of and during all of the many seasonal events that occur throughout the year.



How Do You R-A-T-E

As A Serviceman?

Did you ever wonder what other people think of you? The impression you make on others may determine your success in life.

Every time you meet a customer, you make an impression on her. Is this impression a good one or a bad one? Every customer who dislikes you can make your job harder.

By taking this test, you can get a pretty fair estimate of how your employer and your customers rate you. To check your true standing, answer all these questions on the basis of your past and present performance as a serviceman.

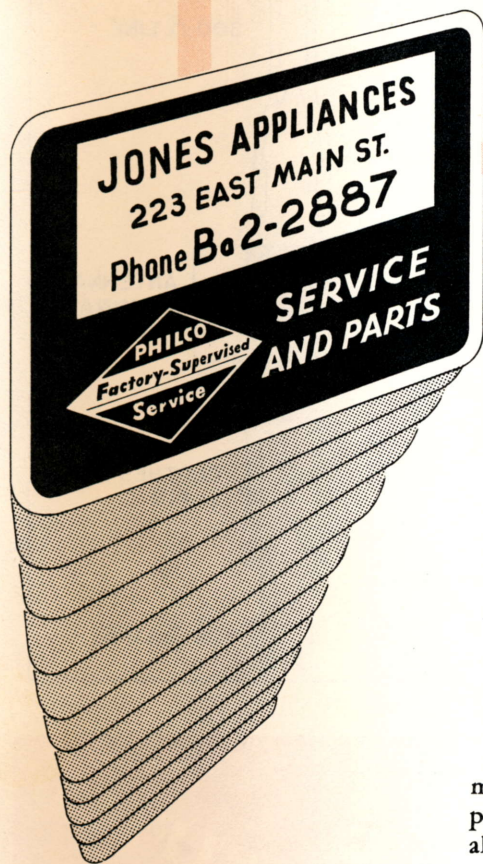
- | | Yes | No | | Yes | No |
|---|-----|----|---|-----|----|
| 1. Are you courteous when talking to the customer over the telephone or in the home? | — | — | 11. Do you consider yourself a good salesman for the products you service? | — | — |
| 2. If you are unable to meet your schedule, do you notify the customer that you will be late, or set another date? | — | — | 12. Do you follow up on customer complaints to determine if your service job was complete? | — | — |
| 3. When calling at a customer's home, do you always clean your shoes before entering, or remove your wet coat if it is raining? | — | — | 13. Do you suggest "extra services" such as checking the customer's old radio and phonograph, or checking that extra TV set? | — | — |
| 4. Do you show an interest in the customer's complaint? | — | — | 14. If a customer keeps her set in nice, clean condition, do you tell her so? | — | — |
| 5. Are you careful where you place your tools to prevent denting or marring furniture or floors? | — | — | 15. Do you explain to the customer how to get the most out of her television set by going through a demonstration of tuning properly and proper adjustment of contrast? | — | — |
| 6. Do you clean your finger prints off the cabinet after you have finished? | — | — | | | |
| 7. Do you refer to all products with interest and pride while on service calls? | — | — | | | |
| 8. Do you consider selling and service as being closely related, each one depending on the other? | — | — | | | |
| 9. Do you like your work? | — | — | | | |
| 10. Are you courteous, friendly and cheerful when making service calls? | — | — | | | |

The right answer to all of these questions is YES. If you answered YES to each question, you can rate yourself as doing a top-notch job.

If you have answered any of these questions NO, you have found a point where you can make an improvement.

Remember these questions every day and try to improve yourself.

KEEP CUSTOMERS IN TOUCH with YOU



ARE YOU NEGLECTING an all-important phase of advertising and contact that should bring your service back home . . . where it belongs?

Many servicing dealers and technicians concentrate all of their efforts into contacting customers, yet often ignore the methods by which customers can keep in contact with them.

One of your most effective devices for assuring repeat service is the sticker that should be (but often is not) affixed to every product after it has been serviced. And we know you will be interested in the new type of decal we are offering you to do this job.

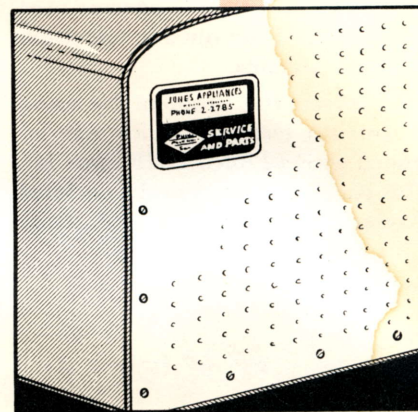
This is actually a decal nameplate (PR-2882) that provides a more per-

manent identification than has been possible to date. You can attach it to all the Philco products you service with the complete assurance that it will not fade, peel, or wash off. It measures 2 inches by 3 inches and is a water applied decal, easy to use and attractively designed in gold, blue and white.

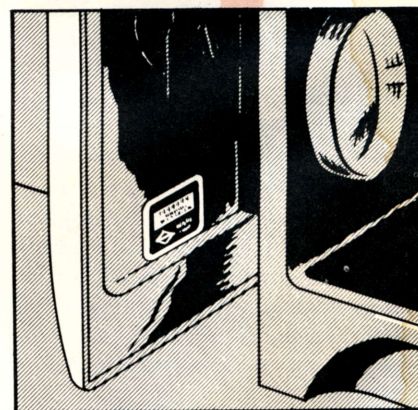
Every factor to create a lasting impression has been considered in the design of this decal nameplate. Your identification and your Philco affiliation are prominently displayed in an attractive, permanent advertisement inside your customer's home.

When the time comes for service, be sure your service message is Johnny-on-the-spot with all your customers. Bring your service back home . . . where it belongs!

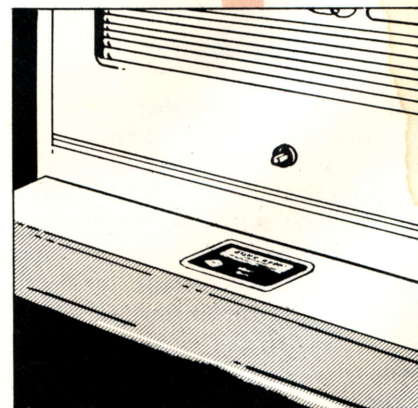
Enclosed in this month's mailing you will find a convenient form for ordering these decals from your local Philco Distributor.



Back of TV Sets



Storage Door of Ranges



Toe Plate of Refrigerators

LET THEM SEE YOUR SERVICE!

10 DOLLAR AWARD!

Tip for Antenna Lead Clip

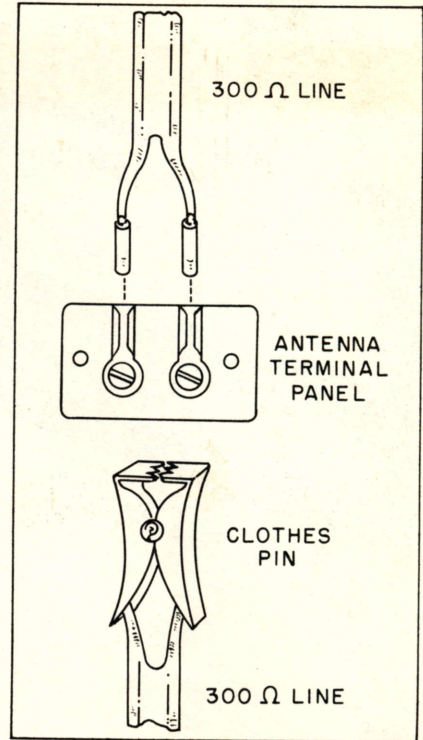
Our congratulations (and a ten-dollar check) go to Charles J. Burket, 711 East Orange St., Lancaster, Pa., for his winning entry in the November Idea Award.

"When I have a Philco television receiver on the service bench, I find that at times it seems difficult to keep the receiver antenna leads tight in the clothes pin type connector used on the end of the outside television receiving antenna.

"I solved the problem by using an antenna terminal which was included with a Philco UHF tuner kit. This panel, as shown in the enclosed diagram, has both a pair of recep-

tacles in which I insert the receiver antenna leads and also a pair of screw type terminals which readily accept the clothes pin clip. Of course, if no clip is used, just the bare ends of the antenna fit fine in the screw terminals."

NOTE: Our recent mails have not turned up near the number of award entries as in previous years. We can't believe that you have exhausted your whole "bag of tricks"—so let's have some of your time and work savers. We're paying money for every one chosen. If you have ideas on how to increase service business through advertising, sales promotion or public relations, send it along, too. Let's keep this column going!



5 DOLLAR AWARD!

Variac for Testing Portable Radios

Five dollars and a tip of the Philco hat to Joe Gray, Jay's, 5012 Alameda Road, Houston, Texas, for this following prize winning award:

"When servicing portable radios of AC/Battery types, we never fail to test AC operation in series with a 1 amp. Variac that permits control of applied voltage from 1 to max. line reading. If the oscillator won't function continuously on an applied voltage of 90 volts, then the tube used as an oscillator is poor or the circuit constants

have varied from their original values.

"This test will catch those radios used in trailer camps and others that are subjected to low line voltage. It definitely reduces call-backs, thereby serving as good advertising for our organization. Try it for size."

One comment comes along with the above suggestion—it should be understood that 90 volts is below engineering specifications. Recognized practice calls for 105 to 120 volts.

2.50 AWARD!

An Assist from the Little Woman!

It is not very often that we get an amusing entry to the Philco Idea Award, much less a winner to boot. But John C. Pyle, Simplex Radio TV Service, 1511 Alton, Denver, Colorado makes the grade with a new use for a very familiar woman's product:

"We always carry a few old 'whale bones' (mild spring steel coated with white enamel) for knob springs. Just break off what you need. Fits prac-

tically all knobs. Where do you get whale bone? Ask mama. She'll find you a few out of that old discarded corset."

Of course, there are those of you whose spouses do not require the confining support of the "two-way stretch" for an alluring figure. But, somewhere along the line you should be able to find some one in the family who uses whale bone!

CLASSIFIED
ADS

FOR SALE:

One (1) Antenna Crank Up TV Antenna Demonstration Trailer. Will also trade what-have-you? Write: Don's Radio TV Service, Box 368, Charleston, Arkansas.

FOR SALE:

Rider's TV Volumes 1, 2, 3, 4, 5, 6
Rider's Radio Volumes 10-16
Rider's Tek File 3, 5, 18, 21, 27, 30, 44, 48, 51
Price—\$50.00
Harold's Television Service, 1354 Stratford Avenue, Bridgeport, Conn.

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