

PHILCO SERVICE SUPERVISOR



SEPTEMBER, 1953

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Shop Practices • Service Techniques • New Product News

THE NEW PHILCO 30" ELECTRIC RANGE



AT THE midyear Convention recently held in Atlantic City, Philco introduced their newest member of the electric range family. This beautiful new model shown here and known as Model E-345 is a 30" range with the giant size oven.

In this new range, Philco has produced a full large size oven 23" x 18" x 16" without sacrificing the wonderful Philco Broil-Under-Glass feature. The upper oven unit is designed with two coils. The broiling coil is centered in the unit, so that the same broil glass that we use in our 20" and 40" ranges, can be used in the broiler unit for this new 30" range. The other low wattage booster coil extends out beyond the width of the glass tracks.

A new innovation has been adopted in mounting the broil unit. On our 20" and 40" ranges the broil unit is removable, the same as the lower bake unit. In the 30" range the broil unit is attached to the oven liner by four screws. To remove the unit, it is necessary to remove the

(Continued on next page)

The New PHILCO 30" Range

(Continued from Front Cover)

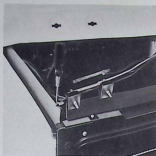


FIGURE 1

mounting screws and also disconnect the three broil supply wires from the terminal bars at the rear of the range.

The oven liner has also had some changes, not only in size but in design. The rack guide bumps have been eliminated and in place of them, the oven liner now has formed grooves or tracks which are pressed into the sides of the liner. These formed tracks are smooth with rounded edges and very easy to keep clean. The forward mounting of the oven liner has also been redesigned. The front lip of the liner now

fits into a recessed section of the front frame, which allows the door to close against an embossed section of the front frame, rather than against the lip of the oven liner as in our other models.

This new range obtains a great amount of its beauty from the chrome escutcheon and Key Largo colored glass windows mounted in the escutcheon.

The dismantled escutcheon is shown in Figure 2 with the light glasses and clock glass installed as it will be when removed from the range back splash. The escutcheon is held in place by four screws acces-

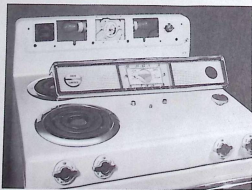


FIGURE 2

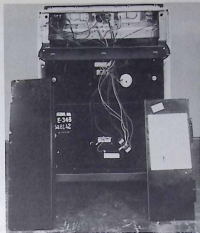


FIGURE 3

sible from the back of the range. The two bottom screws are plainly visible and the two upper ones are accessible through holes in the corner gussets of the table top back splash. The light glasses are held into the escutcheon by retainer clips and speednuts. The clock glass is also held in place by speednuts and a cast clock faceplate.

It can be seen that the table top has a new arrangement of the surface unit positions. Three of the 6-inch size units are evenly positioned across the rear of the table top, while the fourth 8-inch unit is placed at the left front corner. The oven is vented up through the right rear unit.

The table top is mounted similarly to the 20-inch models. The front flange of the table top has two tabs or projections, which fit into slots in the front frame, and the back of the top is held to the back of the range by two screws as in our other models.

To service or replace a surface unit switch, it is necessary to loosen the table top and tilt it upwards.

We have included Figure 1 to show how to work on the switches. They are connected in pairs and should be loosened accordingly, as each pair is tied together by buss bars. On this new model range, we have eliminated all screws in the switches and the connec-

tions are made by friction type snap-on terminals. Three supply wires are crimped to the ends of the three buss bars and they in turn are clipped on to the supply terminals of each pair of switches. The output lead wires to the surface units also have snap-on clips crimped to the ends of the wire leads. These too can be detached from the switch terminals by merely pulling them off with a pair of pliers or carefully prying off with a screwdriver. The switches are mounted to the table top in the same way as our 20-inch ranges, being held by a hexagon nut, to the front flange.

The thermostat, clock and signal light assemblies are accessible, when the rear back splash cover is removed. All three units are similar to our other ranges and need no special servicing instructions. When re-installing the signal light assembly, care should be taken to see that the divider shield slips in the slot in the reflector shield, which is clipped to the table top back splash.

One new feature has been added and can be seen in Figure 3, showing the back of the range with the covers off. This new part is a neutral terminal junction. This new junction block is really handy, because now all neutral wires can be attached to one centralized point, instead of placing them on various neutral terminal positions.

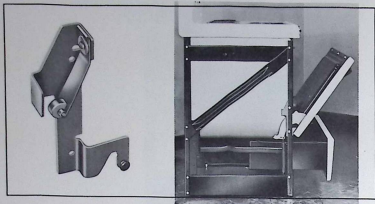


FIGURE 4

The full width heavy oven door used on this new 30" range, requires newly designed, heavy reinforced supporting brackets. (Figure 4)

This door supporting bracket is bolted to the side of the front frame by two bolts and nuts, and secured by lock washers. It can be seen that the latch springs and roller is riveted directly to the door bracket and the latch springs do not have slotted mounting holes as they do on our other models. If the latch spring needs any adjustment, it can be sprung slightly, by bending the bracket arm to which it is riveted. The bottom of each door support bracket has a slot and a pin, which allows the door to pivot freely up and down.

The door hinges on the new 30" range are not welded to the inner door panel as on our other models, but are bolted on by two heavy cap screws in each hinge. These screws are secured into a tapped holding plate, situated on the inside flange of the inner door panel. To remove the door, it is necessary to loosen these four hexagon cap screws by using a $\frac{7}{16}$ " end

wrench. After the screws are loosened the hinges slide back, so there is enough clearance to lift the door off the hinge support brackets. The door has the same type of coil springs as all our other models and these, of course, have to be unhooked first before the hinges will slide through the front panel hinge slot openings.

Figure 5, below, shows a close-up view of these door adjusting screws described in the foregoing paragraph. They are used to assemble the hinges to the door and as they are slotted, they are also used to adjust the door to the front frame.

Model E-345 has a full width storage drawer. This drawer has rollers and tracks and is mounted the same as the drawers in our 40" models.

The Electric Range Division is proud of this new model and they believe you will find it easy to service. A supplemental service bulletin is being issued to cover this model, and can be added to your 1953 Electric Range Service Manual.



FIGURE 5

The FM Method of Aligning AM Circuits

In last month's issue we covered the circuit description and part of the alignment of the new Philco high fidelity set, Model B-1756. This month we will cover the FM method of aligning the AM circuits. As previously noted, the excellent quality of this set is, to a great extent, dependent upon the correct alignment of the tuned circuits.

Prior to going through the alignment procedure, let us first consider the response of the individual i-f transformers and the over-all system. Figure 1 shows the i-f system of the radio receiver. Since an AM broadcast station is capable of transmitting audio intelligence to a maximum frequency of 5 KC, it is imperative that the receiving system be able to faithfully reproduce all audio up to and including 5 KC. The ideal i-f response curve for the proper reception of quality AM would be as shown in Figure 2(a); that is, high gain, flat top, 10 KC wide (± 5 KC from center i-f) and perpendicular sides. This, of course, is theoretical. We shall see how close we approach the ideal.

The last i-f transformer is slightly under-coupled. This has a rather sharply peaked response as indicated in figure 2(b). In the following paragraph, the reason for the peak will be shown. The second i-f transformer is over-coupled to quite an extent and exhibits a response similar to that shown in figure 2(c). The first i-f transformer is over-coupled, but not to as great an extent as the second. The response curve of this is shown in figure 2(d).

Since each of these transformers act upon the signal passing through the i-f system, the response of the system is equal to the composite of the individual transformer characteristics. Thus, the over-all i-f response is indicated by the curve of 2(e). By comparing the ideal curve of 2(a) with the overall i-f response curve of 2(e), it will be seen that the actual curve very closely approaches the ideal conditions. The sides are steep enough to provide very good adjacent signal rejection (the i-f adjacent channel attenuation, at ± 10 KC from the 455 KC center i-f, is between 75 and 95 times down). The top of the curve is sufficiently flat that at the ± 5 KC points the curve is only down 1.85 times and at the center trough, the

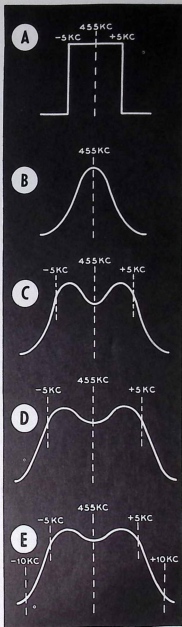


FIGURE 2

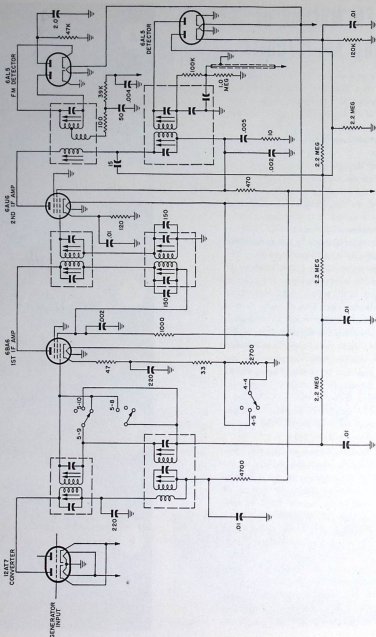


FIGURE 1 The IF System of the Radio Receiver

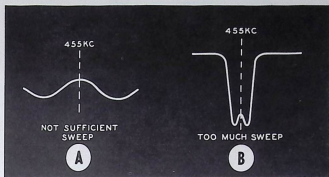


FIGURE 3

curve is only down 1.2 times. Actually, the tuning characteristics are such as to give apparently flat response between ± 5 KC, the slight dip in the center and at the curve skirts is not noticed.

With a system such as this, it is imperative that the alignment be as near perfect as possible for full realization of the sensitivity, selectivity, and frequency response that the set is capable of. It is the aim of the FM alignment method to graphically portray the response curve during alignment so that any possible errors may be avoided.

The equipment necessary and its connection to the set is as follows: a signal generator capable of producing a 455 KC signal, frequency modulated at a rate of approximately ± 10 KC, such as the Philco model 7170 and an oscilloscope such as the Philco 7020 or 7021. With the oscilloscope, one should use a phasing circuit such as is described in the 7021 user's instructions. The scope is connected between the audio test jack and chassis ground. The frequency control should be set at 60 cycles and the scope pattern synchronized. For normal alignment, the signal generator output is fed into the converter grid. For ex-

treme cases, it may be advisable to go through stage-by-stage. The settings for the Model 7170 signal generator are: sweep-deviation control to approximately 2.5 (if not sufficient sweep, only a partial curve will be presented; if too much sweep, the curve will be so compressed as to be hard to read. See figures 3(a) and (b)), band switch to "F", calibrated dial to 60 MC ± 455 KC, and attenuators for a reasonable output without overloading.

After equipment has been connected and allowed to operate for approximately fifteen minutes, load the primary of the second AM i-f transformer with a 1000 ohm resistor. Peak the secondary and primary of the third i-f transformer and the secondary of the second i-f transformer. Where making any of the adjustments in the i-f stage, keep in mind that the overall response curve must be tuned for symmetry as well as amplitude. Next, change the 1000 ohm loading resistor from the 2nd i-f primary to across the 2nd i-f secondary and tune the primary.

The loading is then moved to the 1st i-f primary (not the bifilar) and the secondary is adjusted. After placing the load across the secondary, the primary may then be peaked.

The next step is to remove the loading resistor and check the response curve for symmetry. If the curve looks like either figure 4(a) or (b), slightly re-adjust the primary of the second i-f transformer. This should give a curve similar in appearance to that of figure 4(c).

Following the alignment of the i-f stages, the FM method may be continued for the tuning of the front end stages. The signal generator is set for $60 \text{ MC} \pm$ the center frequency desired. The receiver's oscillator is set and the antenna and r-f stages are tuned for peak consistent with curve symmetry. It is interesting to note that the shape of the response curve is still quite good even with the signal fed into the antenna. It should also be noted that the adjustment of the antenna and r-f trimmers affect the band pass wave shape.

It is necessary for proper tracking that the i-f's are accurately set for a center frequency of 455 KC and that the dial calibration points are also properly made. Therefore, it is well to use a second signal generator to feed in an AM marker signal along with the FM signal so that the proper center frequencies are established. If this marker is not available, the FM should be turned off and an AM signal used to set the i-f's and oscillator to their appropriate frequency and then to make a fine adjustment for proper wave shape using the FM signal and scope. The loading resistor must be used in the i-f circuits for both methods.

Where the marker signal is available to superimpose on the response curve, it may be varied so as to show the relative sensitivities at $\pm 5 \text{ KC}$ and $\pm 10 \text{ KC}$. This will give an indication of the flatness of the curve over the operating limits and will also show whether the $\pm 10 \text{ KC}$ points are sufficiently down.

The above technique may be applied to any AM set even though the stages are not over-coupled. This will sometimes be helpful in determining such factors as band pass, adjacent channel attenuation and gain.

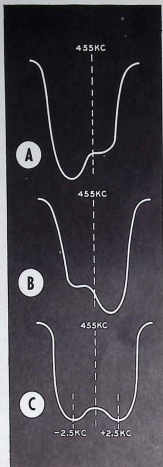


FIGURE 4

FREEZER MODEL H-183

Food Compartment Liner Replacement



Since their inception many years ago, freezers for quick freezing and long time storage of perishable foods have become increasingly popular. With the demand for more storage space, the size of the home freezer has increased to such a point that today, Philco is producing the freezer model H-183 which has a storage capacity of $18\frac{1}{2}$ cubic feet and will store approximately 650 lbs. of frozen foods. This horizontal freezer measures $29\frac{3}{4}$ inches deep, 36 inches high and $75\frac{1}{4}$ inches wide. A piece of equipment of these dimensions is quite large and cumbersome to move or transfer from a home to a service shop. For economy and practicability of service, this freezer has been engineered so that the refrigeration mechanism is divided into two easy to handle assemblies.

The high side, which comprises the suction line and heat exchanger, the motor compressor, the condenser, the capillary tube and drier. The low side of the system is the evaporator which is made up of 105 ft. of aluminum tubing wrapped completely around the food liner tank.

The two assemblies are coupled together with flare fittings inside of the rear cabinet cut-out. The replacement unit is provided with a double valve since it is supplied with the required freon and oil charge.

Through the test information provided in the Service Manual PR-2397, the malfunction of the freezer can be determined. Assuming that the test results show a refrigerant leak in the low pressure portion of the system, it will be necessary to replace the food liner and evaporator assembly. When replacing the evaporator, it will also be necessary to replace the high side assembly. The replacement unit and condenser, as previously stated, is supplied completely charged with oil and refrigerant.

To remove the evaporator and tank assembly, remove the rear outer cover plate by extracting all the screws from around its edge. Remove all the insulation from the cabinet rear cut-out.

Immediately upon removal of the insulation from the rear cut-out, a leak test should be made. Use a halide torch, check the flare fittings and the butt weld joints in the evaporator, (Fig. 1). If the leak is caused by a defective flare fitting, there is sufficient copper tubing on the end of the evaporator line to permit re-flaring so that it is not necessary to replace the evaporator and food liner. If the leak is in an inaccessible place in the evaporator tubing, it will be necessary to replace the food liner assembly. If the leak is located where a connecting union can be inserted to eliminate it, use either a standard weather-beat frost-proof short flare nut and nut and union or the special Ermeto Union Assembly.

Disconnect the evaporator and remove the complete high side assembly. The procedure for this operation is outlined in the Freezer Service Manual PR-2397. It is also outlined in the Freezer article contained in the February issue of the Service Supervisor.

With the unit removed from the cabinet, remove the cabinet lid assembly. Prior to removal, take note of the number of shims under each lid stay, and mark the horizontal position of the hinge with a pencil. This will help you to re-install the lid without danger of losing the lock setting with respect to the latch. The quantity of shims may vary to compensate for slight deviations in lid-to-cabinet alignment.

To remove the lid from the cabinet assembly, back

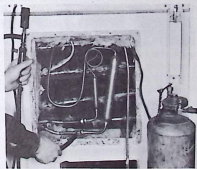


FIGURE 1

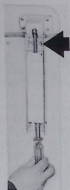


FIGURE 2

off the spring tension nut, (Fig. 2). Remove the two top mounting screws from the long leg of the lid stay, as shown by the arrow. Hold the lid stay with one hand and remove the lower mounting screw, which is hidden by the wrench shaft in this picture. Perform this operation with the lid closed. Remove the lid and lay it, top down, on a protective cloth. The next step is to remove the cabinet breaker strips, (Fig. 3).

The four cabinet breaker strips are held in position by the corner trim pieces. They, in turn, are secured to the food liner with trim mounting screws. To remove

the corner trim pieces, extract the retaining screw and pull the corner trim piece towards the center of the cabinet to clear the retaining flange from the cabinet lip.

Each breaker strip is secured to the cabinet shell by a retaining groove in the leading edge of the breaker and the curved or rear edge is secured to the food tank by a number of special breaker mounting clips. The breaker strips may be removed by pressing downward on the trim and forcing it towards the center of the cabinet.

With the breaker strips removed and the loose insulation taken off the top of the cabinet, (Fig. 3), the phenolic spacers between the liner and shell may be removed. They are secured to the food liner with two screws and to the cabinet shell with one screw.

After the ten liner braces have been taken off, the food liner is free from the cabinet. To remove the liner, lift it straight up and out of the cabinet. This operation should be done slowly to prevent tearing of the side wall insulation.

Replacement Food Liner

Unpack the replacement food liner and evaporator assembly, remove brown wrapping paper and thoroughly inspect for shipping damage or abrasions in the evaporator line. The butt welds and flare fittings should also be inspected. If the evaporator line is suspected of being weak or open, it should be pressure checked with 50 pounds of pressure of Freon-22. A halide torch, of course, will indicate any point of leakage.

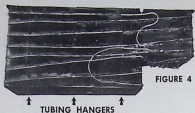


FIGURE 4

When checking the food liner and evaporator tubing, note the tubing hangers which can be seen in figure 4. To properly secure the tubing, the retaining lips are bent on the tubing ladder. The evaporator tubing is laid parallel and in contact with the food liner. A liberal amount of thermomastic compound is applied to the tubing and liner to give a good heat transfer from the food tank to the evaporator.

Liner Installation

The cabinet and insulation should be checked in preparation to installing the new food liner. Any insulation that has been disturbed or damaged should be replaced. All voids and seams between the batts of insulation should be filled.

Due to the projecting parts of the evaporator hanger ladders and the evaporator, it is necessary to use some means of holding the insulation in place when inserting the new food liner.

Figure 5 illustrates one way of inserting the tank without collapsing the insulation. Here we have used pieces of cardboard approximately ten inches wide spaced around the liners at points between the evaporator retaining ladders. When the liner is positioned, the cardboard strips may be easily extracted.

In some instances, there have been customer complaints of the front or rear breaker strip not staying in place on freezers of the first production run. This condition has been remedied in later production by the addition of three clips of the slide-on type, equally

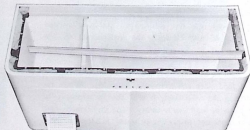


FIGURE 3

spaced on the front and rear edge of the food liner. This new clip is Part No. 8003-24. When a food liner is replaced, these clips must be transferred to the new replacement.

When replacing the cabinet breaker strip, make sure that the top (or outer edge) is positioned on the cabinet dutch bend. Press down on the curved portion of the breaker and force it towards the cabinet shell to secure the breaker lip into the retaining clip.

Lid Replacement

In replacing the lid assembly, before securing the lid stays, align the lid with the cabinet from front to rear. In most instances it will be necessary to place the same number of shims under each lid stay as were removed. Secure the stays to the cabinet by first securing the bottom stay mounting screw, (Fig. 2). Insert the two top mounting screws and adjust the lid up or down until proper gasket compression is obtained at the back of the cabinet. After the correct adjustment is made, tighten all lid stay mounting screws.

With the cabinet reassembled, the refrigeration system high side assembly should be installed in accordance with the instructions in the Service Manual PR-2397.

Upon completion of the unit installation, the complete assembly should be thoroughly leak tested with a halide torch. If there is a heavy concentration of Freon in the test area, it should be permitted to clear away before completing the leak check. Even a small leak will cause eventual replacement of the unit.

Install and check the temperature control feeler bulb on the evaporator outlet tube. Replace the insulation and rear cover plate. Do not attempt to operate unit

before this has been done. Performance check the freezer by checking the condenser to see if it is warming up. Make a temperature check in the cabinet to determine if it is pulling down properly.

Final Check

When the freezer is operating properly it should be placed in position and leveled. Leveling of the freezer should be done with a food load in it, if possible. The freezer model H-183, due to its large size, is not provided with leveling feet, so small strips of wood a few inches wide and several inches long should be placed under the front and back cabinet runners to compensate for differences in the floor.

Remember if the freezer is not level, it will affect cabinet seal and lid latching.

Before considering a freezer service call completed, check to see if the seal gasket is adjusted to prevent heat leakage into the cabinet. This may be done by using a piece of unglazed paper 1½ inches wide to gauge at various points between the seal gasket and the cabinet. With the lid closed and latched, it will be necessary to use force to remove the test strip.

On occasions it may be necessary to adjust the latch or strike assemblies. The latch mounting holes are elongated to permit horizontal adjustment of the latch so that it may be positioned to center the strike on the latch roller when the cabinet lid is closed.

The lid strike has shims under it to allow for in or out adjustments. If it becomes necessary to adjust the strike to obtain proper handle-latch tension for proper seating of the seal gasket, loosen the two strike mounting screws and move the strike in the required direction, then tighten the mounting screws firmly to hold the strike in position on the cabinet.



FIGURE 5

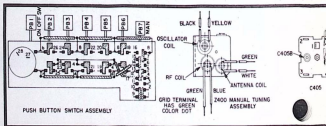
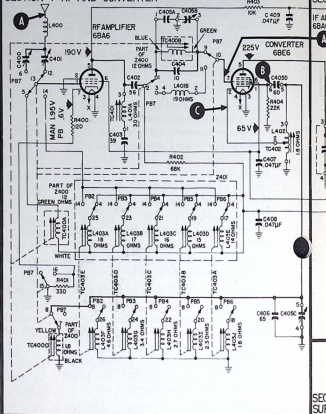
DURING a season of production minor changes are usually made to improve performance or to correct conditions which could not be foreseen at the time of design. We are printing in this month's Supervisor the revised schematic diagram of the Chrysler-Philco P-5206, D-5207, and C-5209 radios as they are now being made.

There have been few changes, but particularly, you will note condenser C-105, a .5 mfd condenser, has been added. This is used to cut down interference picked up by the "A" lead that may be created by the electrical windshield wipers in some installations.

You will note also that condenser C-103 (buffer condenser) has been changed to a .0068 mfd in value and is now Philco part No. 30-4650-91. It was found during production that a power transformer specification could be improved and a change in the buffer condenser value was made so that the overall circuitry was more efficient.

In the power supply you will note also that only three electrical connections are shown for the vibrator. Originally four connections were used, one for each prong. This was necessary originally because of the type of vibrator used, however, vibrators supplied with these sets have only three live connections and, therefore, the circuit diagram has been corrected accordingly. While there, of course, are four pins to the vibrator the fourth one is dead. Although you will note wiring to the lug of the fourth pin on the socket, this lug is merely used for a wiring support and not an electrical connection.

SECTION 4-RF AND CONVERTER



T. V. I.—Cause, Effect and Cure—Part IV

The most effective means of suppressing RF interference from transmitter origin is by the use of traps.

The traps used may vary from a simple tuned inductance to tuned series shunt inductances, either directly in the antenna leads or from one of either side of the transmission line to ground. The placement of the traps should be as close to the tuner input circuits as is practical or possible, although in cases of less intense RF interference traps hung or mounted on the antenna terminals on the back of the receiver may be satisfactory.

Figure 23 shows a very simple trap of the shorted stub type that is commonly used and the open stub type also widely used. The length of the open stub is one-quarter wave length of the interfering signal frequency and its approximate length in inches may be computed from the formula $\frac{2425}{F} = \text{length in inches}$. F is the frequency of the interfering signal in megacycles. In actual practice, it is usually cut somewhat longer and then small pieces are cut off until maximum suppression of the interfering signal is reached. 300 ohm antenna twin lead may be used for the stubs.

The shorted, half-wave stub is also cut to a longer length than that calculated from the formula

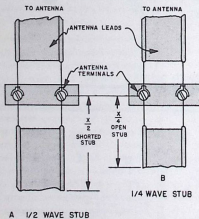


FIGURE 23

$\frac{4850}{F} = \text{Length in Inches}$. F again is the frequency in megacycles of the interfering signal. In practice the stub is shorted using a knife or a razor blade to cut through the insulation to the twin wires without cutting through the wires. Cuts are made at very short intervals until a spot is reached where maximum signal suppression occurs and the insulation is then peeled off the wire, which is cut at that point, and the two ends are soldered together.

One drawback to the use of stubs is the possibility that they may have a detrimental effect upon the other channels being received in the television area. It is suggested, when using open or shorted stub type traps, that each channel be checked to determine whether reception is affected.

Filter networks consisting of fixed tuned inductances, variable slug tuned inductances, or variable capacitive tuned inductances are very effective in suppressing strong RF interference. Both the inductances and the capacitances used in these networks should be small in value. The filters may be designed as series resonant traps from either side of the antenna lines to ground in order to present a path of low impedance to the interfering frequency thus shorting the signal to ground. Parallel tuned traps inserted

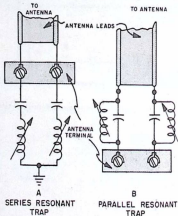


FIGURE 24

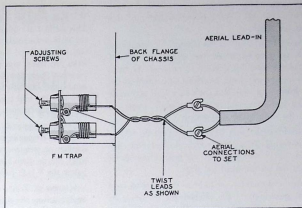


FIGURE 25

directly in the antenna transmission line may be used as well to attenuate an interfering RF frequency, since the traps when tuned to the interfering frequency, present an effectively infinite impedance to the signal, see figure 24.

It should be noted at this point that the construction of traps to attenuate interference from RF signals cannot be performed with precise accuracy due to circuit considerations in which the trap will be installed and which will have an effect upon the resonance of the trap. Trap designs therefore, is more or less on an experimental basis and various size components or arrangements of the components should be tried until that combination is reached which most effectively attenuates the undesirable signal. It is for this reason also that variable tuned traps are highly desirable in contrast to fixed traps, due to design problems with fixed traps, and the fact that the variable tuned type is far more flexible.

The Philco FM trap is an example of an adjustable or slug tuned series resonant type. The trap, which is tunable over the FM broadcast frequency range is mounted on the back of the receiver and grounded to the chassis. The leads from the trap are connected to the antenna terminals, and a path of low impedance to ground is presented to the interfering signal to which the trap is tuned by the adjustment of the tuning slugs, see figure 25.

The physical dimensions of each coil are 7 turns of the No. 18 wire, spaced $\frac{1}{2}$ inch on a $\frac{3}{8}$ inch diameter,

brass slug-tuned, bakelite or fibre coil form. In series with the coils and grounded to the mounting bracket assembly are 8 μf ceramic condensers.

It is possible that the interfering r-f signal may be of such intensity as to severely overload the receiver input stages to such an extent that the simple stub traps and commercial types previously mentioned may not effectively reduce the interfering signal to a point where it is not annoying. In such cases, more effective traps may be necessary either directly in the tuner circuits or on the input to the tuner instead of being attached to the antenna terminals on the back of the receiver. This procedure eliminates the short length of lead from the antenna terminals to the tuner input from acting as an antenna for a strong interference as is possible in some cases. A more elaborate trap might consist of several parallel resonant and series resonant types in a network, see figure 26.

Such a trap, consisting of two parallel resonant and one series resonant circuit, in both sides of the transmission line, was effectively used to suppress a strong r-f signal in the vicinity of 40 megacycles in a severe interference problem. The trap coils were approximately .5 u.h. air core-10 turns number twenty enameled wire, spaced one-half inch long and with a diameter of one-quarter inch. Powdered iron slugs, threaded to the coil turns and inserted directly into the coils, were used to tune to the interfering frequency. The condensers used both in the parallel and the series tuned circuits were 47 μf while the

coupling condensers between the parallel resonant traps were 100 μf . The attenuation factor of this trap was very high.

Pretuning the trap to the interfering frequency before installation on the receiver will be very helpful particularly where the physical location of the traps on the receiver may limit extensive adjustment of the traps. Pretuning will also determine how accurately the traps were designed or how close the traps will tune to the interfering frequency.

A grid-dip meter may be used to adjust the trap to the interfering frequency which is read from the meter scale. A strong dip in the grid current meter indicates the resonance of the trap.

An alternate method would be to feed a signal from a signal generator, at the interference frequency, to the input of the television receiver, with the traps installed in the input circuit, and an oscilloscope connected across the second detector output load. The

traps are then tuned for a minimum reading. A V.T.V.M. may be used in place of the oscilloscope. This method of tuning the traps is very accurate since the traps are actually installed in the receiver circuits and all additional capacitances, or circuit characteristics are taken into consideration. Only slight adjustments may then be necessary under actual signal conditions, and all channels should be checked to be sure that the trap is not adversely affecting reception on the other channels being received.

Traps, consequently, may be designed to attenuate a specific frequency or may be broad to attenuate a number of frequencies as in the case of a high pass filter which attenuates a wide band of frequencies below the V.H.F. television channels.

In cases of T.V.I., therefore, the problem may be analyzed from the effects on the receiver and the cause determined. From this knowledge, certain facts become evident and are a guide to the proper procedure for the serviceman to follow in effecting a cure.

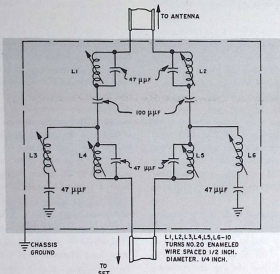


FIGURE 26

Parallel Series Trap

NEW DEVELOPMENTS in UHF Test Equipment

As is the case when any new product is introduced to the industry, new servicing procedures and equipment are needed. Such is the case with UHF. Not only was it necessary to develop new pieces of test equipment but strict attention had to be given toward utilizing test equipment that service technicians already had so as not to out-date existing equipment and make test equipment expenditures out of reason.

With this in mind, four new pieces of equipment were designed. They are:

1. Model G 8000 VHF to UHF signal generator adapter.
2. Model G 8002 automatic leveling UHF sweep generator.
3. Model A 1000 UHF variable attenuator.
4. Model T 1000 UHF matching transformer.

The unit heading this list, model G 8000, VHF to UHF signal generator adapter, is one of the most versatile pieces of test equipment ever developed, therefore, this piece of equipment will be topic for discussion in this article.

Electrically the G 8000 is similar to a Philco UHF tuner-adapter with some modifications. Figure 1, shows schematically the circuitry of this unit. It consists of an oscillator, a mixer and two RF tank circuits.

The oscillator is a modified Colpitts type of oscillator and operates at a frequency 60 megacycles below the required UHF output frequency, therefore avoiding frequency transposition which often occurs in conventional superheterodyne circuits. This stage utilizes a 6AF4 tube.

The mixer is a CPI crystal. The circuit is quite conventional and its function is, of course, to mix the local oscillator frequency with the VHF signal being fed into the input of the unit. The output of the mixer stage is a UHF signal which is coupled by mutual inductance to the RF section.

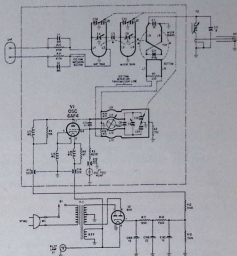


FIGURE 1 Schematic Diagram of Philco Model G 8000 VHF-To-UHF Signal Generator Adapter

No tubes are used in the RF section due to the noise factor involved. The RF system consists, however, of two tuned tank circuits.

Both the RF tank circuits and local oscillator are tuned by double variable condensers in a fashion

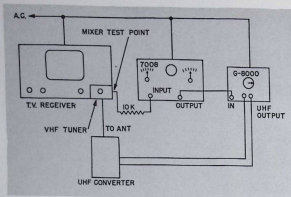


FIGURE 2
Shop Layout for
Test Equipment

similar to push-pull circuits. All the variable condensers are coupled to a common shaft, thus providing simplified tuning over the entire range which is from 470 megacycles to 890 megacycles.

The unit contains its own power supply consisting of a 6X4 full-wave rectifier and operates from a power source of 110-120 volts, 60 cycles. The G 8000 is factory calibrated to within plus or minus 3 percent when using an input of 60 megacycles at the VHF terminals.

The G 8000 may be used with any AM or FM signal generator that has an accurate output at 60 megacycles, thus increasing the utility of presently owned VHF signal generator equipment.

The connections necessary to use the G 8000 with a Philco 7008 combination sweep and marker generator are shown in figure 2. The gain or attenuation of the signal output is controlled at VHF frequencies thus adding to the simplicity of operation.

The G 8000 may also be used in reverse. That is, a UHF signal may be fed into the UHF terminals and a VHF signal of approximately 60 megacycles is available at the VHF terminals.

Due to the wide versatility of the G 8000 there are a multitude of uses for this equipment. The following are some of the many applications for this unit: It may be used to adapt a VHF signal generator to provide a UHF signal anywhere in the range between 470 megacycles and 890 megacycles. The VHF signal generator used may be either an AM or FM signal generator enabling the output of the G 8000 to be used for complete alignment or band pass checking of UHF equipment. Markers may be fed into the G 8000 when using it with a sweep generator to provide proper check points for servicing.

A VHF television signal on channel 2 or 3 can be converted to any UHF channel desired thereby permitting a service technician to service UHF tuners and converters in areas where only VHF stations exist.

This unit may also be used, as previously mentioned, in reverse so that any UHF signal from 470 to 890 megacycles can be converted down to VHF at approximately 60 megacycles. With slight detuning of the channel selector knob on the G 8000, the output at VHF can be adjusted to either channel 2 or 3. This particular feature enables this unit to serve an additional number of uses. The G 8000 can be used as a substitute UHF converter in order to check relative performances of any UHF tuner or adapter on a television receiver. The G 8000 in conjunction with any VHF field strength meter can be used for field strength measurements of UHF signals, antenna performance checks, and field strength surveys.

Two model G 8000 adapters can be used in series, back to back, thereby converting any UHF channel to any other UHF channel within the limits of the UHF band.

By using the G 8000 with a VHF signal generator, measurements can be made for standing waves.

New UHF servicing procedures and techniques are now being developed so that the servicing of UHF equipment will become as much a part of a service technicians every day procedure as is the servicing of VHF tuners. However, a good piece of test equipment is not all that is needed. A clear understanding of UHF circuits and their operation is just as necessary. Information regarding testing and servicing of UHF equipment will be forth coming in future issues of the "Supervisor."

"H" Line Electrical Systems

The electrical wiring and parts for the 1953 H-line refrigerators may be divided into three groups depending on whether the wiring is for a standard refrigerator, one having automatic defrost or the new automatic refrigerator.

The models H-732, H-733, H-736, H-932, H-936, H-935, H-1131 and H-1134 are the conventional type refrigerators and are wired in accordance with the standard wiring diagram as shown in figure 1.

The standard model refrigerator as can be seen by the wiring diagram is quite simple operationally and electrically. There is the super power system with its starting relay and overload protector, the operation of the refrigeration system is controlled by the adjustable thermostat or temperature control. The only other electrical component is the cabinet light and switch assembly which is connected directly to the A.C. supply.

THE AUTOMATIC DEFROST REFRIGERATOR

The second type is Automatic Defrost refrigerator model H-938, which employs electric heaters for quick defrosting. The wiring diagram for this refrigerator is shown in figure 2. By making a comparison to figure 1, you will note that the standard wiring has been utilized with additional components added. They are a set of defrost heaters, a heater thermostat and a

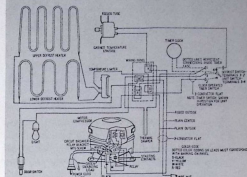


FIGURE 2

temperature limiter which are energized through a clock operated switch.

A food compartment heater has been incorporated in the rear of the refrigerator compartment to act as a thermal damper which operates in conjunction with the mechanical damper to better control cabinet temperatures. All electrical components are energized through two distribution points, the wiring panel in the rear cut out and the motor compressor terminal box.

The heater thermostat is an integral part of the timer-thermostat assembly. If any part of this assembly becomes inoperative, the complete assembly must be replaced.

THE AUTOMATIC REFRIGERATOR

The automatic refrigerators are designed to include two refrigerating elements—a conventional evaporator in the freezer compartment and a refrigerated plate located on the rear wall of the food compartment. The single-door models, H-1137 and H-1138, and the two-door model, H-1238 are of this type. The wiring diagram for the single-door models is shown in figure 4. Figure 5 shows a slight variation in the wiring of model H-1238.

By again making a comparison to the standard wiring diagram figure 1, it may be seen that basic refrig-

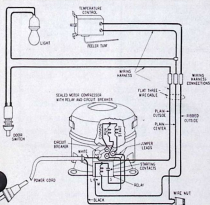


FIGURE 1

MOTOR COMPRESSOR

The electrical circuit for the motor compressor is the same for all models with the exception that the Automatic Defrost model which has the clock operated switch in series with the cabinet temperature control and motor starting relay.

This circuit is a series circuit during the normal operating cycle and a series parallel circuit during the initial starting period. During the starting period, current flows from the source (and through the clock switch in the Automatic Defrost model), then through the temperature control contacts and divides into a parallel path to flow through the relay field winding and the motor run winding, and at the same time through the relay starting contacts and the motor start winding. It then takes a common path through the overload protector back to the source.

During the normal run period of the motor compressor, the start contacts are open; therefore, the current flows through a series circuit.

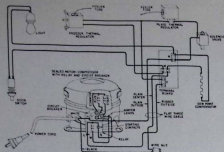


FIGURE 4

erator components are the same electrically. In addition to the basic components, figure 4 shows the plate thermal regulator and the solenoid valve which controls the flow of refrigerant through the True Zone plate in the refrigerator compartment. Since the automatic refrigerator maintains zero and sub-zero temperatures in the freezer compartment, a dew point compensator is mounted behind the center rail and dutch bend of the cabinet to retard the formation of condensate in this section of the cabinet.

The diagram in figure 4 which applies to the models H-1137 and H-1138 also applies to the model H-1238 with the exception of the wiring for the dew point compensator. Figure 5 shows the wire panel connections for the model H-1238 with the circuit modified to permit the dew point compensator to be disconnected when the refrigerator is on display. To disconnect the dew point compensator in this model, separate the leads at the wire nut located in the lamp housing. Since the leads are color coded to agree with the terminal coding on the terminal board, the correct connections for all leads is easily made. (*This is done for dealers who wish to have their boxes plugged in for lights.*)

THE MOTOR COMPRESSOR

The motor compressor which is used in the Automatic Defrost model and the Automatic Refrigerators are the same as the conventional models with the exception of increased cooling capacity for adequate refrigeration of the larger cabinets. The wiring harness for these models is terminated at a wiring panel in the rear cut-out of the refrigerator. All leads are secured to the terminal panel with spring type fasteners for ease of wiring installation.

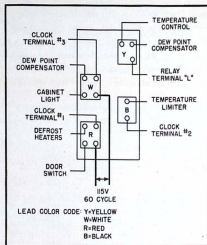


FIGURE 3

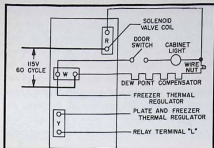


FIGURE 5

AUTOMATIC DEFOST COMPONENTS

Those components that are utilized to control and cause the refrigerator model H-938 to be automatically defrosted are easily isolated at the terminal panel.

TIMER THERMOSTAT

The timer thermostat assembly consists of an electric clock, heater switch contacts, unit switch contacts, a pressure operated thermostatic bellows, and an adjustable cam for altitude corrections.

The timer thermostat is driven by a standard clock motor which is wired into the A.C. line before any of the control devices of the refrigerator, so that immediately upon plugging the service cord into the A.C. outlet, the clock motor operates. The motor drives a gear train to rotate the timer dial shaft, and a camming gear to actuate the timer switch, which permits current to flow to the defrost heaters and at the same time opens the motor compressor circuit.

With the closing of the heater contacts, the temperature of the evaporator starts to rise. The increase in evaporator temperature causes the gas in the Thermostat feeler tube to expand which in turn exerts pressure on the bellows. When the temperature of the evaporator reaches 50 to 55° F., the bellows exerts sufficient pressure on the switch mechanism to cause it to again trip at which time the unit contacts are closed and the heater contacts are opened, thus restoring normal operation to the unit.

TIMER CLICK

To check the timer for proper operation place a piece of gummed tape on the clock face in alignment

with the indicator knob pointer. After a period of time has elapsed, the position of the pointer in reference to the index mark should be made; the difference will be the actual time that has elapsed.

To determine if the switch contacts are opening and closing properly, the refrigerator should be plugged into the A.C. outlet of a wattmeter. With the temperature control positioned to one or above and the timer knob set to any time position other than between 1 and 3, with the sealed unit operating, the wattmeter will show a reading of 175 to 275 watts. This will indicate that the unit contacts are closed. Then by rotating the timer indicator knob in a counter clockwise direction to 12 midnight, continue to rotate the knob slowly until the unit stops and the heaters are energized. This will be evident by an increase in the wattage reading, which should be between 370 and 620 watts. This increased reading indicates that the timer switch has been activated to open the unit control circuit and close the heater circuit.

TEMPERATURE LIMITER

The next component in the circuit is the temperature limiter which is a mechanical switch which operates on thermal heat transferred through the wall of the evaporator to open the defrost heater circuit when the defrost heaters have raised the temperature of the freezer compartment to a temperature between 80 degrees Fahrenheit and 95 degrees Fahrenheit.

This temperature limiter is a protective device which is a watchman in the circuit so that no damage may be brought about through failure of other components of the circuit. If the timer clock were to stop in the heater energized position, and the heater thermostat were to have its contacts fused closed, the temperature limiter would open the circuit and cut the heaters off when the temperature rises above 80 degrees Fahrenheit.

To check the temperature limiter, place a wattmeter in the A.C. supply line and rotate the timer until the high wattage indication of the defrost heater energized is seen. Disconnect the A.C. cord and open the rear cover plate, remove the single lead from the temperature limiter and then take a continuity reading across the contacts of the limiter. The normal indi-

cation with the refrigerator cool should be a closed circuit. Connect the lead, replace the insulation and temporarily secure the rear cover plate with four screws. With the wattmeter in the line, permit the refrigerator to operate through its heat period. When the wattmeter indicates cut-off of the heaters, immediately repeat the continuity check. The normal indication at this time will be a closed circuit through the temperature limiter.

If the temperature limiter is suspected of having its contacts fused together, it must be removed from the refrigerator to check it for opening and closing of the contacts. With the limiter dismounted, utilize a refrigerator test cord, replace the fuse in the common line of the test cord with a 100-watt lamp, connect the common and run test clips to the limiter binding posts. Plug the test cord into an A.C. outlet, and place the limiter against the bulb. With the temperature limiter held in vertical position against the heated bulb the lamp will be extinguished within one minute. When the limiter is moved away from the bulb and permitted to cool, the lamp will again light up. If the lamp does not go out within three minutes, replace the temperature limiter.

HEATER ELEMENT

The heater elements are the next components in the circuit. The top heater is a calrod element of 150 watts, which heats the evaporator by thermal conduction. The bottom heater is a calrod element of 350 watts, which heats the freezer compartment by radiation. These heater elements are energized as long as the clock, temperature limiter and heater thermostat maintain a closed circuit. These heaters may be checked by using the wattmeter in the line and rotating the timer clock through a defrost cycle. The normal indication is between 370 and 620 watts. If the indication is abnormally low, the rear cover plate should be removed and heater leads disconnected from the temperature limiter and heater thermostat. By utilizing a unit test cord and the wattmeter, an individual wattage check of each element can be made.

HEATER CIRCUIT

Assuming that the clock-operated timer switch in figure 2 is in the defrost position, it can be seen that the

defrost heater circuit can be simplified into a simple series parallel circuit with the three control devices in series with the parallel heater elements and the clock motor is across the line. From the source at terminal W of the wiring panel, current flows through the closed contacts of the timer switch back through terminal B through the temperature limiter contacts, then divides into a parallel path through the heater elements, coming together to follow a series path back to the power source at terminal R of the wiring panel.

DEW POINT COMPENSATOR

The dew point compensator is a heater element of the resistance wire type of approximately 12 watts. This heater element is tied into the cabinet interior in close proximity to the door seal gasket around the freezer compartment. It serves to eliminate condensate forming on the outside of the cabinet in the area of the door seal gasket. This dew point compensator is in series with the heater thermostat so that if, for any reason, the cabinet temperature is abnormally high, the heater thermostat will open the circuit.

The dew point compensator can be checked by disconnecting the lead from terminal W and Y of the terminal strip (figure 3). Connect a unit test cord to the compensator leads and plug into a wattmeter to read the amount of power being used. If no wattage is indicated, the compensator is defective and should be replaced.

AUTOMATIC REFRIGERATOR CONTROL CIRCUIT

The plate thermal regulator and the solenoid valve are the electrical components in the Automatic refrigerator that have been added to the standard electrical components which control the motor compressor and the flow of refrigerant through the True Zone plate. It may be seen in figure 4 that the plate thermal regulator and the solenoid valve are in series with the freezer thermal regulator and in parallel with the motor compressor run winding. Therefore, the refrigerator compartment True Zone plate will be refrigerated and the control circuit will be energized when the freezer thermal regulator causes the unit to operate. When the freezer regulator opens the motor compressor circuit, power is no longer supplied to the True Zone control circuit.

SERVICE MANUAL NOTES

It is suggested that you make notations in your service publications to correct them in accordance with the following information:

* * *

H-1131 SERVICE MANUAL PR-2427

In the "H" Line Service Manual the call outs in Figure 71 for the evaporator door lists the Part No. 5514-152 for the model H-1131. The part number should read 5514-153.

The part list on page 76 shows the H-1131 evaporator door as Part No. 5515-153, this part number should be 5514-153.

* * *

H-1238 SERVICE MANUAL PR-2427

The freezer thermal regulator for the model H-1238 shown as item 11 on page 25 is in error. The part number listed is 5530-113, it should be Part No. 5530-123. The parts list in the back of the manual carries the correct part number.

* * *

H-1238 SERVICE MANUAL PR-2427

Original design of the refrigerator model H-1238 called for a one piece freezer breaker frame Part No. 6171-3. Unfortunately the supply problem was such that it was necessary to use a three piece breaker frame. Top Breaker strip Part No. 6141-490, Upper Hinge-

guide Breaker Strip 6141-514, Upper Lock-Side Breaker Strip 6141-510.

The top breaker strip was improved in current production. It is now replaced with Part No. 6141-527. All accessory replacements should be ordered by this part number. The upper side breaker strip part numbers are the same.

* * *

H-1238 SERVICE MANUAL PR-2427

In the major parts identification on Page 25 and the parts list on Page 74, the top breaker molding Part No. 6146-228 and the top freezer breaker molding Part No. 6146-186 are in error. They should be Breaker molding, top—Part No. 6146-186. Breaker molding, top, freezer 6146-201.

The breaker molding for the freezer top Part No. 6146-228 was not used due to the necessity of making the breaker strip in three pieces.

* * *

REFRIGERATION HANDBOOK PR-2504

In the right hand column of Page 3, an example is given to illustrate the amount of heat in B.T.U.'s that must be removed from a pound of pork to reduce its temperature from 32° to zero. The last sentence of the third paragraph reads "To cool from 32° to 0° requires 38 x .4". It should read "To cool from 32° to 0° requires 32 x .38" as specified in the Table of Specific and Latent Heats.



This month . . .

JOHN R. LILLY, Philco Service District Representative for the Central Division, first came to know Philadelphia in 1939 while working on Sales and Service for an Appliance dealer. John joined the Philco TechRep Division in 1946 and served as a GCA operator and mechanic on Iwo Jima for one year. There followed early USA TV field group experience beginning in 1947, more TechRep experience in Tokyo and then a return to the United States in his present Philco Service post. On this page John makes a plea for better Service Technician-Service Manager understanding.

In my opinion . . .

. . . it is desirable to create a much closer relationship between members of Philco Factory-Supervised Service and the Philco Distributor Service Manager.

It is the Distributor Service Manager's job to administer and supervise high quality product service for Philco owners in his territory. Only a close and frequent contact with his Philco Factory-Supervised Service members gives him the full appreciation of their problems and technical needs . . . and this is imperative if he is to do his job well.

On the other hand, the Service Manager is in a position to furnish the service technician with a continuous stream of vital, up-to-the-minute information. The data and information thus dispensed come directly from Philco's senior engineers and factory service technicians, as soon as new Philco models are delivered into the field.

Twice this year, first at Bedford, Indiana and then at Atlantic City, your Philco Distributor Service Manager has received intensive training in the servicing of the newest Philco products. At considerable, though well justified expense to Philco, his knowledge of fundamental theories was broadened and he himself "learned-by-doing" to understand the newest and most efficient service techniques. To help him furnish you with this greater understanding and know-how, he not only has been given the training but a wealth of training aids, such as the service recordings, films and scripts for visual service demonstration.

I wish that you might get to know your Distributor Service Manager better, and that you would avail yourself of the information and the service ideas he has to offer. He is a pretty human sort of guy like the rest of us and he needs encouragement from you. For instance, he spends time and effort in preparation for his service meetings . . . his purpose in calling them is to improve the quality of the service work you render, to reduce the time you spend per job thereby making each of your hours of work more profitable. The meetings he calls deserve good attendance. Please try to be there the next time you are invited.

Your Philco Distributor Service Manager is in the business of "trouble." He is trained to recognize different kinds of trouble and to make helpful reports to Philco's engineers and production departments so that Philco's products can be constantly improved. In his job as a reporter of trouble, the Service Manager is conscious of the time element. To save time he often reports unsatisfactory performance information to the factory by phone before he makes a trip into the field for firsthand information. You can imagine how foolish he feels when the "20 TV sets" turn out to be two, and when the "serious trouble" proves to be a couple of tubes out of their sockets. Yes . . . he wants to hear about troubles—but he needs facts!

Well . . . these are my opinions. I think that if you will give your Philco Distributor Service Manager more opportunities to know you—to talk "service" with you, you will be doing him a great favor and, I believe, that this closer, friendlier relationship will be especially profitable to you in a thousand ways.

