

PHILCO PRODUCTS LIMITED

PHILCO
TRADE MARK REG.
BALANCED UNIT
RADIO

1244 DUFFERIN STREET
TORONTO, CANADA

PHILCO
TRADE MARK REG.
AUTOMOBILE
RADIO

November 1, 1938.

TO ALL MEMBERS OF RADIO MANUFACTURERS SERVICE

SUBJECT: INSTALLING MYSTERY CONTROL RECEIVERS

AERIAL - Mystery Control sets are matched and tuned to the Philco Safety Aerial. The Safety Aerial should be installed whenever the Mystery Control receivers are permanently set up in homes. For dealer demonstrations and in your own showrooms, Mystery Control receivers should be connected to Part No.40-6112 Philco High Efficiency Aerial, with a Part No.32-2763 set transformer in the line. This will assure freedom from radio interference which might affect both the control circuits and the radio receiving circuits. It is very important that the aerial being used be connected to the receiver at the aerial post and lead away from the cabinet without any excess wire at or near the cabinet. It is important that you avoid coiling up excess aerial wire and dropping it at the back of the cabinet. Run the aerial and ground directly to the aerial and ground terminals and remove all excess wire.

GROUND - The connection of the ground on Mystery Control receivers is of great importance. The terminal panel for aerial and ground has a link which is connected to the ground post only when a ground is not used. If a ground is available, we recommend connecting it directly to the ground terminal of the receiver. When this connection is made, the link should be swung around so that it does not touch the ground post. Mystery Control chasses are being shipped with the link open and in the correct position in case a ground is connected to the ground terminal. If no ground is used, it will be advisable to connect the link as suggested above.

CONTROL FREQUENCY - Mystery Control receivers are shipped with five (5) different control frequencies, which range from 350 to 400 K.C. These are identified by code numbers appearing on the serial number ticket and on the steel sub-base. Receivers bearing Code 5 are shipped with the control frequency adjusted to 355 K.C.; Code 6 receivers have a control frequency of 367 K.C.; Code 7 receivers are adjusted to a control frequency of 375 K.C.; Code 8 receivers are adjusted to a control frequency of 383 K.C.; Code 9 receivers to 395 K.C.

ASSORTED CONTROL FREQUENCIES - We are shipping receivers with all of the above control frequencies.

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The purpose of different control frequencies is to prevent interference between two Mystery Control receivers which may be on the same showroom floor or exceptionally close together in customers' homes. When several Mystery Control receivers are to be located close together it will be necessary to use receivers with different control frequencies to avoid interference between the sets. We recommend a difference of 20 K.C. between control frequencies of sets that are in the same room. Code 5 and Code 7 receivers could be placed along side each other without any interference of the control circuits. If all the receivers in a display are of the same code, it would be necessary to change the control frequencies of the second set placed on the floor 20 K.C. from the first set. This would give a difference in control frequency of the necessary 20 K.C. and assure freedom from interference between the two circuits.

If three receivers were to be operated at the same time, it would be advisable to adjust the control frequency of the first set to 355 and of the second to 375, and of the third to 395 K.C. In homes or apartment houses, the distance between receivers will determine the difference in frequencies that is necessary. When the control frequencies are 10 K.C. apart, receivers will not interfere with each other so long as the remote control cabinet is kept a minimum of 10 feet away from the second receiver. By having the control frequencies differ by 20 K.C., the second control cabinet can be placed anywhere, even on top of the first cabinet.

CONTROL FREQUENCY SENSITIVITY CONTROL - There is a knob on the rear of the chassis which is of tremendous importance to Mystery Control operation. The normal range of Mystery Control is within a circle of the receiver with a radius of about 25 feet. It is important to remember that Mystery Control operates in a circle around the receiver cabinet. To get the most from Mystery Control it is, therefore, advisable to place the cabinet as close to the center of the "operating circle" as possible. If the receiver is located against the front wall of a home only half of the effective operating area is within the house. The remainder is outside the walls. There is a distinct advantage in operating the control frequency sensitivity control at the lowest possible setting. Extra sensitivity in the control frequency amplifier is provided so as to permit operation in the presence of inductive shields such as steel girders, metal lath construction and large bodies of metal - furnaces, boilers, stoves, refrigerators, chandeliers, or any similar metallic objects.

SETTING OF SENSITIVITY CONTROL DETERMINES EFFECT OF INTERFERENCE - The sensitivity of the control frequency amplifier is variable to fit a large range of operating conditions. Normally, sufficient precautions are taken in the amplifier and remote control circuits to greatly reduce the possibility of electrical interference. The control amplifiers are very much less subject to interference than an ordinary radio receiving system. It requires an extreme and unusual type of interference to interfere with the operation of Mystery Control. There is no possibility of interference affecting Mystery Control receivers if the sensitivity control is kept down to the first half of its total movement. This illustrates the importance of setting the sensitivity control to the minimum position possible.

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In some installations, however, owing to the presence of large metal objects around or near the receiver chassis of the Mystery Control cabinet, it will be necessary to increase the sensitivity of the control frequency amplifiers owing to the absorption of the metal surfaces. When this occurs, it will very likely be found that the same metal objects are shielding the receiver from excess static which would normally interfere with the Mystery Control circuits in a high setting of the sensitivity control. Therefore, when it is necessary to increase the setting of the sensitivity control in order to get operation of Mystery Control, you will very likely find that interference is not present and that a higher setting of the control is possible. In all installations be careful to set the sensitivity control at the lowest possible position and to locate the receiver away from metal objects which would absorb the induction field of Mystery Control.

LOCATING THE RECEIVER - In many homes the heater is located in the cellar beneath the livingroom. Wherever possible, avoid locating the cabinet directly above the heater. It should also be installed as far away as possible from radiators and should not be backed up against a wall which has a kitchen stove or refrigerator against it. By observing these precautions, you will extend the range of Mystery Control and assure satisfactory operation because it will then be possible to operate the set at normal sensitivity of the control frequency amplifiers.

ADJUSTING THE CONTROL FREQUENCY - When realigning or changing the control frequency of Mystery Control receivers, a Model 177 Philco Signal Generator is used. A wire about 15 feet long is connected to the antenna terminal of the 177 and is then wound up into a roll of wire similar to a loop. The other end of this loop is then connected to the ground terminal of the 177 Signal Generator. The loop which has been made in this manner is placed in the centre of the large secondary coil which is mounted in the cabinet between the speaker and the bottom of the cabinet. When realigning it is possible to determine the frequency to which the receiver is tuned by simply tuning back and forth between 350 and 400 K.C. with the 177. When a signal similar to that to which the control frequency amplifier is aligned is reached, the Thyatron tube in the receiver chassis will light and stay lit. When padding or when changing the control frequency simply set the Model 177 to the frequency desired (between 350 and 400 K.C.). Signal from the 177 will then be picked up by the secondary coil and fed into the control frequency amplifier. If you are shifting the frequency it may be necessary to turn the sensitivity control up towards the extreme position. As the different stages are padded it will be advisable to turn the sensitivity control gradually down towards the "near" setting.

In the control frequency amplifier there is a type 2A4G tube. This tube is fired by the operation of the control frequency amplifiers. If the iron cores of the amplifier transformer are in alignment the 2A4G tube flashes indicating resonance with the frequency fed into the amplifier. It is a characteristic of the 2A4G tube to continue firing after the peak voltage has caused it to start operation. This accounts for its staying lit during a considerable arc of the padding stick. The correct setting of the padder may be determined by reducing the amount of signal coming into the circuit so that the 2A4G tube only lights when resonance is reached.

There are three transformers in the circuit of the control frequency amplifier which must be adjusted. With the Signal Generator connected as described above, the transformers in the amplifier circuit may be adjusted using the 2A4G tube as an output meter. If you wish to pad the amplifier to 375 K.C., the 177 should be set at 375 and the transformer nearest the 2A4G tube should be adjusted first. This is accomplished by turning the adjusting screw on top of the coil shield until the 2A4G tube lights to its brightest point. In order to see a bright spot it may be necessary to reduce the sensitivity control or the output of the 177. The 2A4G tube will light when the transformer is correctly tuned to the incoming 375 K.C. signal. The second transformer (the one in the centre) is adjusted next, using the 2A4G tube as an output meter. Then the first control frequency transformer is tuned, again using the 2A4G tube to indicate resonance.

There is also an air padding condenser connected across the secondary coil mounted in the bottom of the cabinet. This condenser is covered with a round paper box. The adjusting screw is reached through an opening in the box. It is necessary to carefully adjust this padding condenser in order to accurately tune the secondary coil to the induction energy coming from the Mystery Control box. This padding is accomplished using the Model 177 as before, adjusting the padding condenser carefully so that the 2A4G tube lights. Extreme care should be used in setting the padding condenser to the point of exact resonance. This coil is extremely sharp and it may be necessary to turn down the attenuator of the oscillator as well as the sensitivity control of the control frequency amplifier several times so that the condenser is set at the exact point of resonance. This is indicated by having the 2A4G tube light and go out leaving the condenser adjusted so that the 2A4G is lit to its greatest brilliance.

Now turn off the 177, and remove the temporary coil of wire.

It is next necessary to pad the Mystery Control box. This is accomplished by dialing any of the stations and pressing the volume change lever on the control so that a continuous induction signal is sent out by the Mystery Control cabinet. Holding the lever down, bring the Mystery Control box close to the receiver so that the 2A4G tube will light. Use a padding wrench on the adjusting screw located on the bottom of the Mystery Control box and turn the condenser until the 2A4G tube lights. Turn the sensitivity control down until the 2A4G just about goes out. Now set the padding condenser on the Mystery Control box carefully, leaving it adjusted so that the 2A4G tube is lit to its greatest brilliance. The Mystery Control box is now adjusted to the same frequency as the control frequency in the receiver. This procedure is used in realigning Mystery Control receivers and when changing the control frequency of a Mystery Control set.

Model 177 is used only in adjusting the control frequency amplifier and the secondary of the induction coil in the receiver. After that part of the circuit has been set up with the Model 177, the Signal Generator should be disconnected and the Mystery Control box adjusted to the frequency already established at the control frequency amplifier.

COMPONENTS -

1. Pulser - This assembly, located in the Mystery Control box, includes all parts of the pulsing mechanism except the molded dial and the centre of the dial which is a separate piece. This unscrews by turning it in a counter-clockwise direction. To remove a pulser assembly, which is Philco Part No. 38-9704, remove the base of the Mystery Control cabinet, disconnect the wiring plug between the pulser assembly and the oscillator tube. The pulser assembly is held in the cabinet by a mounting bracket located beneath the moulded dial. First remove the centre of the dial by turning it in a counter-clockwise direction and then the dial mounting bolts. The pulser assembly mounting bolts can now be reached and should be removed. Slow dialing would make the Mystery Control circuit fail to operate and would necessitate the return of the pulser assembly. This would be indicated by incorrect operation of the relays located in the set. If the holding relay drops back before the stepping relay has climbed to the station dialed, it will be necessary to return the pulser assembly for replacement.

2. Station Selecting Switch Assembly - Philco Part No. 42-1468. This assembly is located beneath the chassis but is driven by the stepper assembly. There are three groups of contacts operated by the switch. One group switches in the oscillator coils, the second group switches in the antenna padding condensers and the third group of switches, lights the pilot lamps indicating the station dialed. Excessive friction in this switch would cause improper action of the stepper assembly. It should be adjusted so that when the relays have selected the station dialed, the contact arm is squarely on the contact. The tension of the contact arm is regulated by the setting of the hub on the switch shaft. The long wiper contacts exert a firm pressure on the contacts which may be increased or decreased by adjusting the location of the hub. The position of the contact arm is determined by the set screws which hold the driver arm onto its shaft. This is located above the chassis but beneath the stepper assembly. If the contact arms do not come to rest on the contacts it may be necessary to loosen the set screws on the switch shaft and relocate the position of the driver arm so that the contacts are made correctly. Excessive tension in the switch would act as a load on the relays and might result in chattering on one of the stations, part way up, and then failing to reach the station dialed.

3. The Stepper Assembly - Philco Part No. 38-9816. This assembly houses a holding and a stepping relay which are operated by the Thyatron tube. When the Thyatron tube lights the holding relay closes and the stepping relay pushes a ratchet as many times as the pulses sent out by the pulser in the Mystery Control box. There is a primary and a secondary ratchet. The stepper relay operates the primary ratchet which is connected to the primary switch. This switch controls the volume control motor and shorts the voice coil to ground in the station selecting positions. A muting switch which connects the plates of the output tubes together is closed during the station selecting operation. The set, of course, is playing during changes in volume but it is muted as the secondary ratchet returns to its home position, and climbs to the station dialed. This means that whenever any of the 8 stations are dialed the set is muted as the secondary ratchet switch turns the "station tuning" switch contacts.

Failure of the primary switch to return home or the secondary ratchet arm to return home, failure of the receiver to mute during dialing would indicate trouble in the stepper assembly and would make it necessary to replace it. Dialing of an incorrect station, the skipping of stations or the galloping past of stations also indicates trouble in the stepper assembly.

VOLUME CONTROL MOTOR AND ASSEMBLY - The volume control and the on-off switch are motor driven. The motor has an automatic clutch which releases and drops back as soon as the volume control is released by the stepper primary switch. This prevents "over-shooting" when changing volume and stops the gear train which drives the volume control immediately when the volume control lever is released on the Mystery Control box. There is also a clutch in the volume control itself, so that the mechanism will not jam if the volume control lever is held down after the set is shut off.

The primary switch is a single pole, double throw switch which connects the desired winding in the volume control motor to increase or decrease volume. In parallel with this switch there is a single pole, double throw switch connected to the manual volume control. This switch is mounted directly beneath the receiver dial bezel. The pilot lamp cable is close to this switch. If any of the pilot lamp wires become tangled with the switch they might cause the motor to continue running and might possibly cut through the insulation of the pilot lamp lead causing the lamp to stay lit. It is important when the chassis has been removed, to check the location of the pilot lamp wiring cable to make certain that it is entirely clear of the volume control motor switch.

SETTING UP STATIONS - The procedure for setting up stations on the Mystery Control sets is similar to the procedure followed in setting up Electric Automatic Tuning Philcos except that the eight (8) stations are dialed by the remote box instead of by pushing the buttons in the set. The recommended procedure is to tune the station in manually and then beat a signal from the Model 177 Signal Generator against the station so that it will be readily recognized. Next, turn the wave band switch to the "automatic" position and dial the first station. This must be a low frequency station. Now, using a Philco adjusting wrench, turn the oscillator transformer core for the first station until the station with the oscillator note is heard in the speaker. Next, adjust the antenna padder for maximum signal. This procedure is repeated for each of the stations being set up for Mystery Control.

Station tabs are inserted in the same manner as the earlier Philco models this season. The tabs for the Mystery Control cabinet are contained in an envelope and may be installed by bending them slightly in the middle so that the ears fall into position. There are 12 celluloid tabs to be installed over the tabs furnished for the Mystery Control cabinet. These should be installed on top of the station call tabs and in the same manner as the station tabs were installed.

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CAUTION TAG RE VOLUME CONTROL OPERATION, MODEL 39-3116RX.

On all Model 39-3116RX receivers being shipped from the factory, we are now placing a Caution Tag, which reads as follows:

"CAUTION -- DO NOT ATTEMPT TO ROTATE THE VOLUME CONTROL KNOB. PRESS UP OR DOWN AS REQUIRED. THE MOTOR WILL DO THE WORK".

This information is very important to know, in the operation of one of these receivers, as we have had a number of cases reported to us of the volume controls being broken, due to the volume control knob being rotated too far in either direction.

We suggest that you pass this information on wherever possible to owners of these receivers, explaining that the volume control is motor driven, and does not require to be rotated,

Yours very truly,

PHILCO PRODUCTS LIMITED,

C. O. Baldwin

Manager,
Parts & Service Division.

C.O.Baldwin:
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