

# PHILCO *Automatic Tuning*



## SERVICE BULLETIN No. 273 for members of RADIO MANUFACTURERS SERVICE

### A PHILCO Service Plan

**I**N order to continue the Philco policy of training Radio Manufacturers Service Members, Philco issues Service Bulletins for R. M. S. members giving complete information on Philco products.

Complete details of the operating principles and construction of Philco Automatic Tuning and the ease with which it may be serviced, if it should become necessary, are covered in this bulletin.

The tremendous popularity of Philco Automatic tuning means you will be called upon to service Philco sets of this type.

The following instructions have been divided into two sections, i.e., adjustments that can be made without taking the mechanism apart, and those that require the disassembly of the mechanism.

Two views of the mechanism are shown with the parts numbered for reference. Where numbers are mentioned in the text, refer to these drawings.

**The replacement or adjustment of parts that do not require the taking apart of the Dial mechanism is as follows:**

### 1. SETTING STATIONS ON AUTOMATIC DIAL.

1. When setting the station, you must select the 6 or 8 most powerful local or those stations most regularly and easily received in the locality.

A. To adjust the Control screws for Automatic tuning of a desired station, proceed as follows:

a. Turn the set "on" and set the tuning range switch in the broadcast position. Set the magnetic tuning control to the "out" position. Set Fidelity-Selectivity control in the selective position.

b. Take off the tuning knobs and then the control handle cover by removing the three screws. Now replace the tuning knobs and turn the dial to the exact frequency of the station desired. Then insert a screw driver in the control screw directly under the tuning knobs (sometimes the control screw will fall slightly to the right or left of the center line). Now press the control screw in and turn it until a click is heard. This indicates that the screw has engaged the locking gates of the magnetic tuning switch number ③.

c. Now slightly turn the screw back and forth (this will cause dial to move) until the desired station is tuned perfectly. Then release the pressure on the control screw allowing control screw to return to its original position. It may be necessary to slightly turn the screw to the right or left in order to make it release the locking gates.

d. When screw has been set, insert the station name tab in the window.

The above procedure is followed for the setting of each station selected.

### B. Special Adjustments

1. While a certain amount of play (looseness) will be found after the control screws are set up, it should not be greater than 5 K.C. If it is more than 5 K.C., replace the screw or use one of the other screws that fits snugly in the locking gates of switch number ③.

It is also advisable to equalize the play in the control screw, so that the same amount is obtained on either side of the frequency being received.

**For example:** Suppose there is 5 K.C. play. Turn the control screw  $2\frac{1}{2}$  K.C. beyond station resonance. This places the station in the exact center of the mechanical play in the control screw. Now check the adjustment by pushing in the control handle and turning the tuning knob, the dial should move  $2\frac{1}{2}$  K.C. either side of station resonance.

**CAUTION:** If the station selected is on a channel in between a powerful and weak station, it is important that you set the control screw on the side toward the weaker adjacent channel station.

**For example:** Suppose we want a station on 1010 K.C. on the dial. Of course, this will be a powerful local or "best heard" station. At night there are stations on both sides of the station we have selected. Let us assume that the station on 1000 K.C. is strong at night and that the station on 1020 K.C. is weak at night. The control screw for the 1010 K.C. desired local station should be set to lock on the side towards the weaker station. This can be accomplished by turning the control screw one tooth towards the weaker station (1020 K.C.). (See diagram Fig. 1.) Since the mechanism locks on the side of the desired station away from the strong station in the next channel, the set will not jump away from the desired station if its signal fades. Magnetic tuning will compensate for this error in setting.

Always set the control screw away from the stronger signal on either adjacent channel.

### 2. SECURING STATION TABS

If the station tabs are loose, a tab retaining spring, part number 28-4836 should be inserted around the inside surface of the Dial cover and Station tab Escutcheon ⑭ as follows:

- Remove the control handle cover.
- Place retaining ring outside of plungers, locking the joint opposite the red tab.

**Note:** If the above spring is not available, coat the back of tab with duPont Household Cement, place tab in window of Dial cover and hold until cement dries.

### 3. CONTROL HANDLE

- Remove control handle cover.
- Remove the 2 screws ② holding the handle to the hub.
- Replace handle and reassemble using caution to have audio switch contact ⑩ aligned in control slot on side of the hub assembly ⑦.

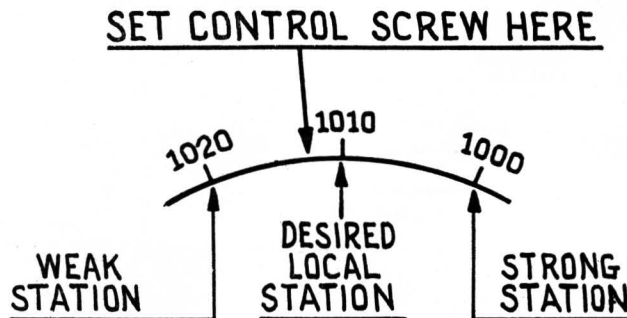


FIG. 1. Setting Control Screw to Eliminate Interference.

## 4. COUPLING ALIGNMENT

A properly aligned Dial Tuning mechanism should rotate without carrying the tuning condenser, when the (tuning condenser) coupling set screws are loosened. If the tuning condenser moves with the coupling screws loose, the coupling assembly requires a Vertical and Horizontal adjustment of the R. F. unit and Dial Tuning mechanism, as follows:

### A. Vertical Adjustment

- Loosen the tuning condenser coupling set screws.
- Loosen the rear mounting screw of the R. F. unit.
- Then raise or lower the R. F. unit until the tuning condenser shaft is centered in the coupling collar. Tighten set screws.

In some cases, where the R. F. unit Vertical Adjustment will not properly align the tuning shaft and coupling, the entire Dial tuning mechanism must be adjusted as follows:

- Loosen the four front chassis channel screws located on sides of the power and I. F. units.
- Tilt the dial mechanism towards the front or back of the receiver until the tuning condenser coupling is aligned with the tuning condenser shaft.
- With mechanism in this position, tighten screws of channel.

### B. Horizontal Adjustment

- Using a pair of pliers or wrench, slightly bend the front mounting flanges for the R. F. unit (located on the I. F. and Power unit) in whichever direction will align the coupling horizontally. Bend both flanges equally to hold original spacing.

The following procedure is for the replacement or adjustment of parts that require the taking apart of the Dial tuning mechanism:

## 1. DIAL SCALE REPLACEMENT

- Remove handle cover, then the handle hub assembly 27 by releasing retaining spring 28. The rotating section 16 of the audio switch and gasket can now be changed.
- Release mask arm from range switch coupling.
- Remove indicator and lens assembly 29.
- Lift the dial cover and station tab escutcheon 14 from the control screw housing by removing the five screws holding the assembly.
- Take dial and gaskets from unit.

Note: When replacing the dial be sure the index slot of dial is placed over metal ridge on control screw housing 7 and that gaskets are replaced.

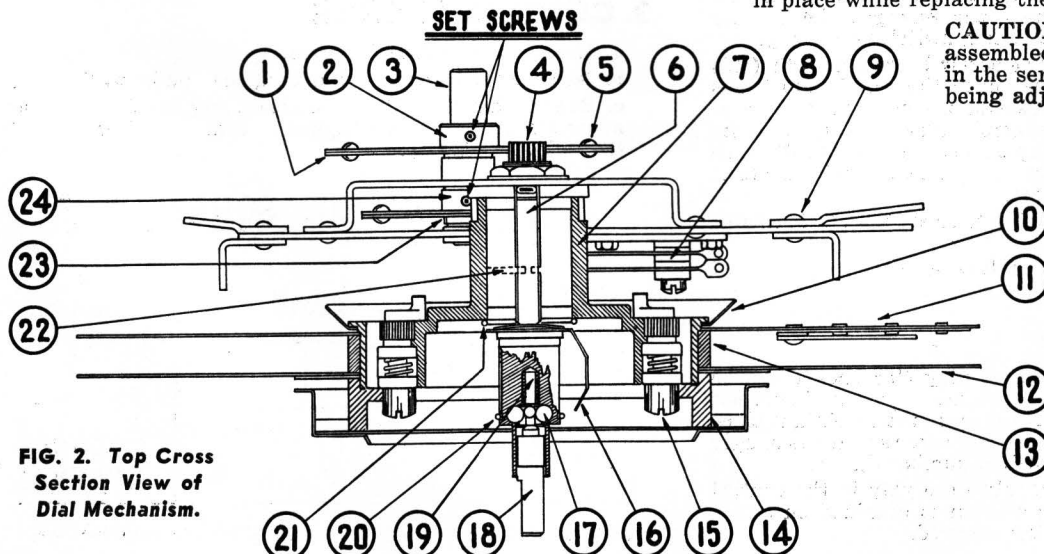


FIG. 2. Top Cross Section View of Dial Mechanism.

## 2. MASK ASSEMBLY AND REFLECTOR RING

- Remove the parts given under dial procedure above.
- Then take off spacing ring 13.
- Lift mask 11 from housing.

d. At this point the reflector ring 10 may be removed. On the ring 3 spring wings will be noted. These wings apply pressure to the mask assembly for preventing vibration.

Note: On the early dial mechanisms a spring inserted in the spacing ring 13 was used in place of these wings of the reflector for applying pressure to the mask.

- Replace the mask on reflector and assemble in the reverse order taking care that index slots are aligned.

## 3. INCREASING TENSION OF THE VERNIER DRIVE

To increase the tension of the vernier drive requires the removal of the Dial Mechanism parts as follows:

- Remove the same parts listed under a and b of the Dial Scale Replacement.

b. Take the rotating section 16 and gaskets of the audio shorting switch from the vernier shaft.

c. Expand and remove retaining spring 20 and lift the complete housing from the vernier drive.

d. Loosen the set screws in the rubber coupling of the tuning condenser.

e. Now loosen and remove lock pin 22. To do this, hold a piece of wood (small block) firmly on the side of the vernier drive housing on which the lock pin is located. Tap the end of the wooden block sharply with a hammer until pin is loosened.

Note: The Vernier shaft 18 is locked by the ball bearings shown in the drawing as 17. Spring 19 thrusts the end of shaft 18 against the three ball bearings 17 of the drive and prevents the removal of the shaft until spring 19 is compressed.

The tension of the vernier drive is secured through the strength of the thrust spring 19. Lack of tension necessitates the replacement of the spring. To replace the spring continue with the next step.

f. With pin 22 removed press the vernier shaft 18 in toward the unit. Holding the shaft 18 in this position, press pinion gear and shaft 4 towards you until the entire shaft assembly moves forward, thus releasing ball bearings. Care should be taken that ball bearings do not drop out.

g. With the vernier shaft assembly removed, the vernier shaft 18 slips easily out of the pinion shaft 4 together with the ball bearings 17. It may be necessary to tap the pinion shaft to release spring and pin 19. Replace spring and pin 19, three ball bearings, and reassemble. Apply some light grease to hold bearings in place while replacing the assembly.

**CAUTION:** After mechanism is re-assembled, recalibrate dial as given in the service bulletin of the receiver being adjusted.

Note: It is advisable to replace the entire vernier mechanism to prevent any possibility of the old and new parts not aligning properly. These parts consist of 4, 17, 18 and 19. On the early type mechanisms, the thrust parts 4 consisted of a spring, part No. 28-8416; Ball bearing, part No. 4475, and Pinion Gear and shaft, part No. 28-6481. The later type mechanisms consisted of a spring, part No. 28-8733; Thrust pin, part No. 28-6624, and Pinion Gear and Shaft, part No. 28-6565.

#### 4. BINDING IN CONTROL SCREW HOUSING

- Remove handle cover, then the handle hub assembly 27 by releasing retaining spring 20. The rotating section 16 of the audio switch and gasket can now be changed.
- Release mask arm 11 from range switch coupling.
- Remove indicator and lens assembly 20.
- Remove retaining spring 21 and pull the entire dial housing from the Vernier Drive.
- Clean the surfaces of the control screw and vernier drive housings thoroughly. Also, remove any burrs or high spots from the surfaces with a piece of fine emery cloth, particularly at end of slot for the switch lead.
- Lubricate the vernier drive surface with heavy oil or light grease.
- Reassemble in the reverse order, being careful to have the insulating gasket of Audio Switch Contact 16 in place and that the contact is centered in the handle hub 27 contact slot.

#### 5. REPLACEMENT OF AUDIO SWITCH AND ELIMINATING SHORTS

- Use the same procedure for removing parts as given under Paragraph 4-a to e. This procedure will also give access to the movable section 16 of the audio switch.
- With these parts removed, access to the stationary ring contact 6 of the audio switch and insulator — is obtained for replacement.
- When ring contact is replaced, make sure that the protecting metal shoe is in place and the insulation on the contact lead completely covers the contact up to the ring. Also, have the two gaskets and fibre collar in place to eliminate shorting to ground.
- When reassembling, make sure that audio switch lead (No. 6) is flat against the back plate 9 to prevent Housing Gear 7 from cutting insulation.

#### 6. MESHING SPLIT GEARS PROPERLY

If for any reason the split gears or control screw housing are removed, the gears must mesh properly to eliminate play or looseness. To do this proceed as follows:

##### A. Back Gear

- With set screws loose, slide split gear 2 toward the rear of the chassis to disengage pinion gear 4.
- Then push gear forward until the front half 1 of the split gear meshes with the pinion gear 4.
- With front half of gear meshed, rotate the rear half 2 of the gear one tooth, and push gear into mesh with pinion gear 4.

##### B. Inner Gear

- To mesh the inner gear properly, release the control screw housing 7. This is covered under Binding in Control Screw Housing procedure a to e. The housing, however, should not be entirely removed.
- Move the housing enough to disengage split gear 23 and 24.
- Then push housing until the teeth on the housing re-engages the front half 23 of the split gear.
- Now rotate the rear half 24 of the gear one tooth and push the housing in until it engages this section of the split gear.
- Reassemble mechanism.

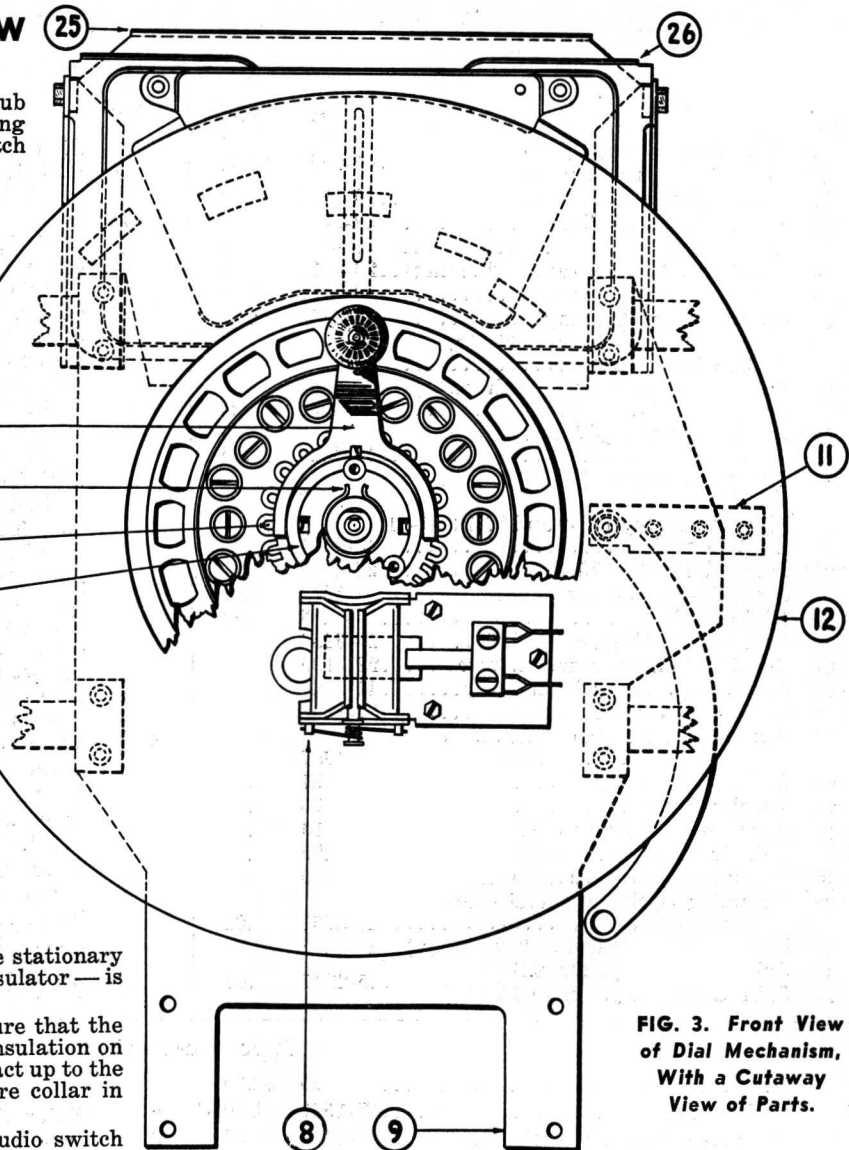


FIG. 3. Front View of Dial Mechanism, With a Cutaway View of Parts.

#### 7. REPLACING CONTROL SCREWS

##### A. Removing Screws

- Remove parts as given in a, b, c and d of Dial Scale Replacement.
- With these parts removed, insert a screw driver in the control screw slot. Now push in and turn the control screw until the lever on the end of the screw is centered in the small semi-circular slot adjacent to the control screw hole in housing 7. Release pressure on screw driver and remove the control screw.

##### B. Replacing Screws

- Insert the control screw in the screw hole.
- Now press screw in and turn it 180 degrees until the stop on the side of the screw is in a position to clear the stopping shoulder in the screw hole in dial cover 13.
- Then reassemble mechanism and set control screw for station desired as given in "Setting Stations on Automatic Dial."

#### 8. POSSIBLE CAUSES OF LOST MOTION

- Loose coupling or gear set screws — make sure all set screws are tight.
- Gears not meshed properly. See paragraph 6, "Meshing Split Gears Properly."
- Loose gates in control screw switch. Replace entire switch assembly 3.

REPLACEMENT PARTS FOR AUTOMATIC DIAL MECHANISMS

Part Nos. 31-1886, 31-1949, 31-1960, 31-1986

View No.	Description	Part No.	List Price	View No.	Description	Part No.	List Price
①	Split Gear Assembly (large) }	45-2348	\$0.60	②⑤	Pilot Lamp and Mask-Guide Ass'y....	28-4118	.25
②	Split Gear Assembly (large) }			②⑥	Dial Screen Holder Ass'y. (37-116,		
③	Shaft (Gears) .....	28-6504	.10		37-675, 37-690, 37-9, 37-10, 37-11)	31-1968	.50
*④	Pinion Gear and Shaft.....	28-6481		②⑦	Handle Hub (37-116, 37-675, 37-690,		
⑤	Spring (gears) .....	28-8380	.60		37-9, 37-10, 37-11).....	45-2344	.50
⑥	Switch Cont. Ass'y (audio shorting) ..	28-4110	.15	②⑧	Screw (handle) .....	28-6493	.02
⑦	Housing (control screws).....	28-7196	1.00	②⑨	Handle .....	45-2329	.50
⑧	Switch (magnet tuning).....	45-2330	1.20		Collar, fibre (audio switch).....	27-8389	.02
⑨	Plate (mtg. mechanism, 37-116,				Coupling (tuning condenser).....	31-1961	.80
	37-675, 37-690) .....	45-2349			Cover (handle) .....	28-4077	.25
◆⑩	Reflector Ring (early mechanism)...	28-4099	.35		Dial Mechanism (complete assembly,		
	Reflector (37-9) .....	28-4630	.25		37-116, 37-675, 37-690).....	31-1886	25.00
⑪	Mask Assembly (37-116, 37-675,				Dial Mechanism (complete assembly,		
	37-690) .....	45-2328	.75		37-10, 37-11, code 121.....	31-1949	25.00
	Mask Assembly (37-10, 37-11, code				Dial Mechanism (complete assembly,		
	121) .....	45-2367			37-9) .....	31-1960	25.00
	Mask Assembly (37-9 and 37-10, 37-11,				Dial Mechanism (complete assembly,		
	code 125) .....	45-2401			37-10, 37-11, codes 125).....	31-1986	25.00
⑫	Dial (37-116, 37-675, 37-690).....	27-5207	.80	○	Lockwasher (vernier drive).....	W-1499	1.00/C
	Dial (37-10, 37-11, code 121).....	27-5271	1.00		Insulator (No. 8 switch).....	27-8368	.01
	Dial (37-9) .....	27-5283	.90	⊙	Nut (vernier drive).....	28-6300	.08
	Dial (37-10, 37-11, codes 125).....	27-5283			Shoe (for contact No. 6).....	28-4666	
⑬	Spacing Ring (see note A below)....	28-7195	.20		Screws (magnetic tuning switch)....	W-745B	1.25/C
⑭	Station Tab Escutcheon Ass'y.....	45-2324	.40		Screws (station tab. assembly)....	W-1665	.30/C
⑮	Control Screw .....	31-1898	.15		Screws (handle cover).....	W-1669	.40/C
⑯	Switch Contact (movable, audio			+	Set Screws (gears) .....	W-1538	1.80/C
	shorting) .....	28-4097	.10		Springs (gears) .....	28-8380	.01
⑰	Ball Bearing (large) .....	28-6367	.01		Spring (spacing ring No. 13).....	28-8629	.04
⑱	Vernier Shaft .....	28-6470	.10		Stop (mounting plate) .....	28-7191	.05
△⑲	Compression Spring (early mech.)...	28-8416	.02		Vernier Drive Assembly.....	45-2342	2.40
□	Ball Bearing (early mechanism).....	4475	.01		Washer, fibre (audio switch, movable		
⑳	Retaining Spring (handle hub).....	28-8630	.02		section) .....	27-8351	.02
㉑	Retaining Spring (control screw				Washer, fibre (audio switch, fixed		
	housing) .....	28-8631	.02		section) .....	27-8361	.01
㉒	Retaining Pin (vernier drive ass'y.)..	28-6477			Washer (dial) .....	27-8398	.01
㉓	Split Gear Ass'y. (small) }	45-2347	.60		Wrench (Allen, screws).....	5973	
㉔	Split Gear Ass'y. (small) }						

Later Type Mechanism Parts

⊙	Nut .....	28-6555	\$0.03				
○	Lockwasher .....	W-1501	1.50/C	*	Pinion Gear and Shaft.....	28-6565	
+	Set Screw (Allen wrench), Gears....	W-1726	5.50/C	△	Compression Spring .....	28-8733	.01
◆	Reflector (See Note A).....	28-4609	.35	□	Thrust Pin .....	28-6624	.03

These Parts Must Be Used Together

Note A—Early type mechanisms used a spring, part No. 28-8629, inserted in spacing ring ⑬ to hold mask. This spring on later type mechanisms is replaced with springs attached to the Reflector 28-4609.

Prices Subject to Change Without Notice.



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