



FREQUENCY MODULATION

Models 42-355, code 121; 42-390, code 121

SPECIFICATIONS

MODEL 42-355

Circuit Description: Models 42-355 and 42-390 are eight (8) tube superheterodyne radios designed for reception of standard, shortwave and **Frequency Modulation** broadcast stations, and the sound of a television program tuned in by special Philco Television Radios. The radio incorporates nine electric push-buttons for automatically tuning five stations in the standard broadcast band, and selects the standard, shortwave and frequency modulation tuning bands; Philco built-in low impedance loop aerials for standard, S. W. and F. M. reception; three tuning ranges; two intermediate frequency stages; two tone controls (treble and bass); audio bass frequency compensation in the volume control circuit, push-pull pentode audio output with screen phase inversion.

In general, these models are similar in design with the exception of the cabinets and loop aerials. Model 42-355 is assembled in a table model cabinet, and Model 42-390 is assembled in a console cabinet. The differences between the two models are indicated in the schematic diagram and replacement parts list.

Power Supply: 115 volts, 60 cycles A. C.

This model can also be operated on 25-cycle current. To do this it is necessary to replace the power transformer as indicated in the parts list for 25-cycle operation.

Power Consumption: 70 watts.

Intermediate Frequency: Standard Tuning, 455 KC; F. M. Channel, 4.3 MC.

Frequency Tuning Ranges: 540 to 1720 KC; 9 to 15 MC, and 42 to 50 MC (F. M.).

Audio Output: 3 watts.

Philco Tubes Used: XXL, oscillator; XXL, converter; 7V7, 1st I. F.; 7V7, 2nd I. F.; XXFM, 2nd detector-1st audio; two 41 audio output, and an 84 rectifier.

Cabinet Dimensions:	Height	Width	Depth
Model 42-355	11 $\frac{3}{8}$ "	20"	13"
Model 42-390	39 $\frac{3}{4}$ "	30"	12 $\frac{5}{8}$ "

ELECTRIC PUSH-BUTTON TUNING ADJUSTMENTS

The automatic tuning mechanism consists of nine (9) push-buttons. Five of the push-buttons are used for selecting standard broadcast stations, one for the power control (ON-OFF); and three for selecting standard tuning, shortwave and F. M. (Frequency Modulation).

Viewing the front of the cabinet from left to right the first push-button is the power control (ON-OFF), the next five push-buttons for tuning standard broadcast stations, and the seventh, eighth and ninth for selecting the tuning ranges—standard, shortwave and F. M., respectively.

When setting up stations on the push-buttons the lowest frequency station is set up in the second push-button from the left and the remaining stations according to increasing frequency in the next four push-buttons. These push-buttons are adjusted by the padders located on the rear of the chassis. The second push-button from the left can also be adjusted for reception of the sound channel of a television program received by special Philco television radios. This push-button may also be used in conjunction with a Philco Wireless Record Player.

EXTERNAL AERIAL CONNECTIONS

The built-in loop aerial system is designed to operate without an outside aerial on ground and to give exceptionally high receiving performance of stations on the standard or shortwave frequencies.

To operate the radio in steel reinforced buildings and other shielded locations where signal strength is weak, an external aerial is recommended. Three different types of aerial combinations are available, to improve reception on the various tuning ranges as follows:

1—For Additional Sensitivity on Frequency Modulation only:

*Philco Dipole Outdoor Aerial, Part No. 45-2926.

The plug at the end of the transmission line is inserted in the socket at the back of the chassis in place of the plug connected to the F. M. loop in the cabinet.

2—For Additional Sensitivity on ALL ranges:

*Philco Dipole Outdoor Aerial, Part No. 45-2926.

Philco Aerial Coupler, Part No. 45-1361.

The coupler plugs into the socket at the back of the chassis in place of the plug connected to the F. M. loop. The aerial transmission line then connects to the terminals on the coupler marked "red" and "black." The local distance switch on the coupler connects or disconnects the outdoor aerial from the standard broadcast and shortwave tuning ranges. The dipole remains connected to the F. M. band regardless of the position of the switch.

3—For Additional Sensitivity on Standard Broadcast and Shortwave Only:

Philco Safety Aerial, Part No. 40-6370.

Philco Aerial Coupler, Part No. 45-1361.

Connect the single wire lead-in of the aerial to the "black" terminal on the aerial coupler.

* Accessories for this aerial are the Philco Aerial Mast Kit, the Philco Reflector Kit and Philco High Efficiency Transmission Line. See Service Bulletin No. 396 on Dipole Aerials.

Note: When installing the F. M. Philco Outdoor Dipole Aerial, it is very important that the aerial compensating condensers of the standard and shortwave band are repadded.

The frequency ranges covered by the station tuning push-buttons and procedure for adjusting is as follows:

Padders right to left from rear	Circuit	Buttons left to right from front	Frequency Range
		1	ON-OFF
1	{ Ant. Osc. }	2	540 to 1000 KC
2	{ Ant. Osc. }	3	600 to 1200 KC
3	{ Ant. Osc. }	4	650 to 1300 KC
4	{ Ant. Osc. }	5	850 to 1500 KC
5	{ Ant. Osc. }	6	900 to 1600 KC
		7	Standard Band
		8	Shortwave Band
		9	Frequency Modulation

ALIGNING R. F. AND I. F. COMPENSATORS

The following procedure is the same for both models:

EQUIPMENT REQUIRED

1. SIGNAL GENERATOR Covering the frequency of the receiver, such as the Philco Model 070.
2. ALIGNING INDICATOR: Audio Output Meter. Philco Models 027 and 028. Circuit testers contain a sensitive output meter and are recommended.
3. TOOLS Philco Fiber Screw Driver, Part No. 45-2610.

CONNECTING ALIGNING INSTRUMENTS

Audio Output Meter: Terminal No. 1 is provided on the loop aerial panel for connecting one lead of the audio output meter to the voice coil of the speaker. The other lead of the meter is connected to the chassis. When using these connections, the lowest A. C. scale of the meter must be used. (0 to 10 volts.)

The audio output meter can also be connected between the plate of the output tube and the chassis.

Signal Generator: When adjusting the "I. F." padders, the high side of the signal generator is connected through a .1 mfd condenser to the points indicated in signal generator column "output connections" to receiver in the tabulations below.

When aligning the R. F. padders a loop is made from a few turns of wire and connected to the signal generator output terminals; the loop is then placed two or three feet from the loop in the cabinet and dipole aerial lead. Do not remove the receiving loops from the cabinet. It is necessary when adjusting the padders, that the receiver be left in the cabinet.

After connecting the aligning instruments adjust the compensators in the order shown in the tabulation below. Location of the compensators are shown on the schematic diagram. If the output meter pointer goes off scale when adjusting the compensators, reduce the strength of the signal from the generator.

STANDARD AND S. W. BANDS ALIGNING PROCEDURE

Operations in Order	SIGNAL GENERATOR			RECEIVER		Special Instructions
	Output Connections	Dial Setting	Dial Setting	Control Settings	Adjust Compensators in Order	
1	High side to No. 4 terminal loop panel	455 KC	580 KC	Vol. max. push-button Bdcst. "IN"	55A, 43C, 33B, 33A	
2	Use loop on generator	1500 KC	1500 KC	"	6E, 6	Note A
3	Use loop on generator	580 KC	580 KC	"	6F	Roll Tuning Condensers Note B
4	Use loop on generator	Readjust as given in Operation 2				
5	Use loop on generator	15 MC	15 MC	Push-button S. W. "IN"	6D, 6A	Note C

FREQUENCY MODULATION ALIGNING PROCEDURE

Note: The Frequency Modulation Circuits Must Be Adjusted With the Dipole Aerial Connected.

CRITICAL WIRING LOCATIONS

The following items on these sets are critical for location and position. See Fig. 3 for locations of wires and parts.

1. Green lead and yellow lead from third I. F. coil must be short, direct, and symmetrically spaced from sub-base. Adding capacity to the green lead will narrow the discriminator curve, while adding capacity to the yellow lead will widen the discriminator curve.
2. The XXFM grid lead must be dressed away from the discriminator coil wiring in 42-355 and 42-390 with the lug provided for that purpose. Failure to do this will result in distortion at low volume control settings.
3. The black lead of the 1st I. F. coil must be dressed along the sub-base and away from the yellow and orange leads of the same coil. Proximity of these leads may result in decreased sensitivity at certain points of the broadcast band

because of oscillator harmonics feeding through the 4.3 MC I. F. channel to build up A. V. C. voltage.

4. The blue and white and the white leads from the loop terminal panel must have one complete twist. This is necessary to maintain the proper inductance for shortwave operation, and to prevent loose S. W. antenna padding.
5. Grounding must be maintained at all original points. Any change in grounding of the R. F. wiring will cause serious mistracking of the F. M. band.
6. The brass indicator tabs must not be allowed to touch the sub-base. Any accidental connection from the push-button shafts to ground will cause misalignment of the F. M. band.
7. All I. F. coil wires must be brought out of the designated sub-base holes and kept free from wires coming out other holes. This is necessary to maintain the proper 4.3 MC I. F. curves.
8. The leads from the small gang sections are part of the F. M. tuned circuits and must be maintained to specified lengths for proper F. M. tracking.

F. M. BAND ALIGNING PROCEDURE

Operations in Order	SIGNAL GENERATOR			RECEIVER		Special Instructions
	Output Connections	Dial Setting	Dial Setting	Control Settings	Adjust Compensators in Order	
1	2nd I. F., F. M. input connection	4.3 MC	580 KC	Vol. max. F. M. push-button "IN"	55C (Note D) 55B (Note E)	
2	1st I. F., F. M. input connection	4.3 MC	580 KC	F. M. push-button "IN"	43A, 43B (Note F)	
3	High side to No. 1 contact, F. M. socket. Ground to No. 2 contact	4.3 MC	580 KC	F. M. push-button "IN"	33C, 33D (Note F)	
4	Use test loop on generator; place near dipole aerial	49 MC	90 (Note G)	F. M. push-button "IN"	6C (Note G) 6B (Note H)	Roll tuning condenser when adjusting 6B. See Note B
5	"	49 MC	90	F. M. push-button "IN"	6C oscillator	

NOTE A.—DIAL CALIBRATION: In order to adjust the receiver correctly, the dial pointer must be aligned to track properly with the tuning condenser. To adjust the dial, proceed as follows: With the tuning condenser closed (maximum capacity), set the dial pointer on the extreme left index line at the low frequency end of the broadcast scale.

NOTE B.—When adjusting the low frequency compensator of the broadcast or the aerial padders of the high frequency tuning range; the receiver tuning condenser must be adjusted (rolled) as follows: First, tune the compensator for maximum output, then vary the tuning condenser of the receiver for maximum output. Now turn the compensator slightly to the right or left and again vary the receiver tuning condenser for maximum output. This procedure of first setting the compensator and then varying the tuning condenser is continued until maximum output reading is obtained.

NOTE C.—Adjust compensator (6D) to the second signal peak from the closed position (maximum ca-

capacity). The aerial compensator (6A) must also be adjusted to maximum on the first signal peak by rolling the tuning condenser. (See Note B.)

NOTE D.—With the signal generator set to 4.3 MC, padder (55C) is adjusted to the point where minimum signal indication is observed on the output meter.

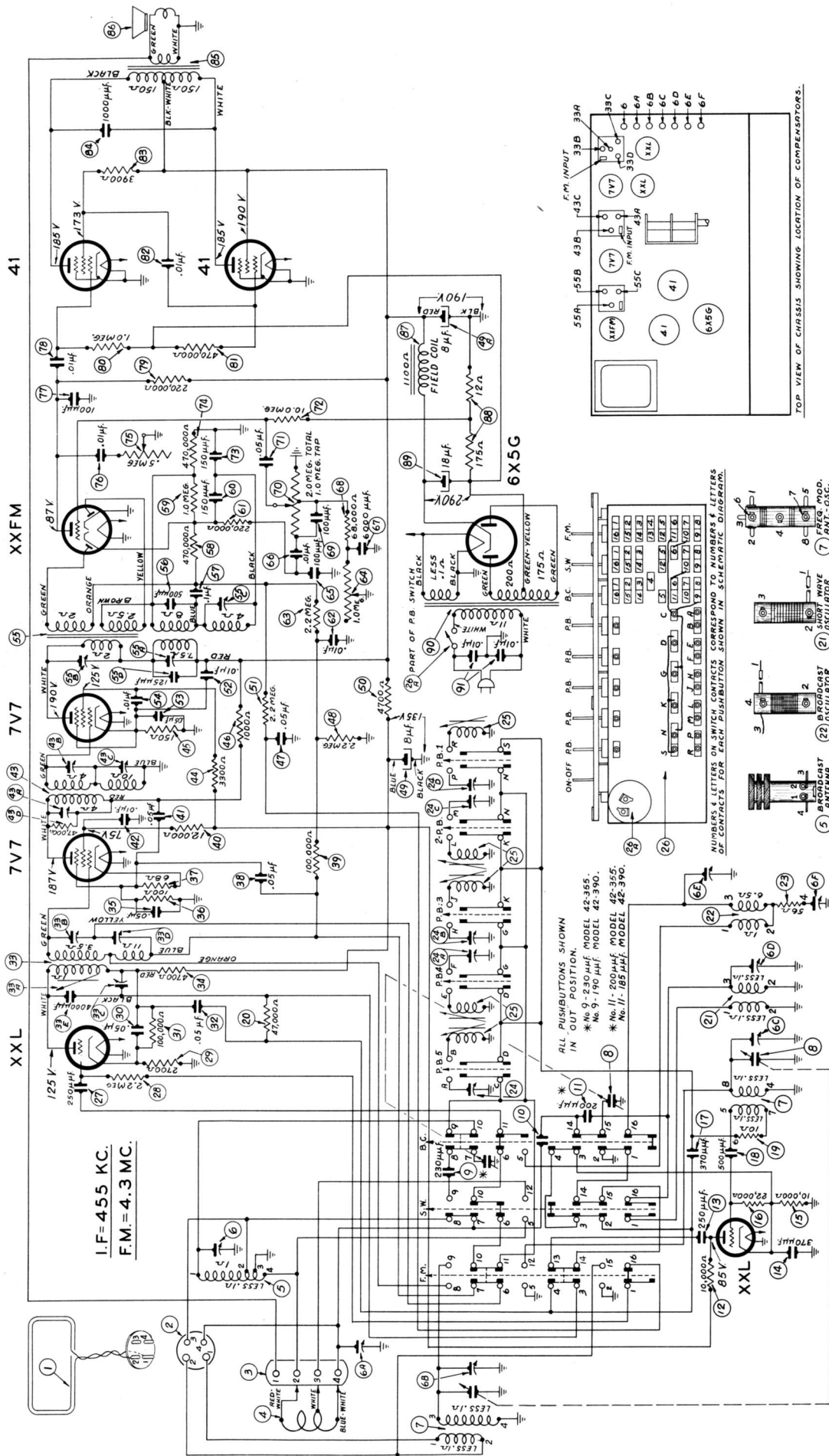
NOTE E.—Turn the signal generator first to approximately 125 KC below 4.3 MC (4.17 MC) and then 125 KC above 4.3 MC (4.42 MC). A signal peak should be observed on the output meter at approximately each of these points (4.17 and 4.42). The two peak signals should be of equal reading on the output meter and equally spaced in frequency each side of 4.3 MC. If the peaks are unequal in amplitude, padder (55B) must be adjusted in the direction necessary to make both peaks equal. This is done by slightly turning padder and then turning signal generator above and below 4.3 to observe peaks. After equal peaks readings are obtained, set the signal generator to 4.3 MC. The output meter should show zero reading at

4.3 MC. If a signal indication is observed readjust padder (55C) until zero reading is obtained on the meter. After this adjustment is made padder No. 55B should be reset for equal peaks as given above.

NOTE F.—Adjust padders 43A, 43B, 33C, and 33D for equal signal peaks and equal frequency spacing each side of 4.3 MC.

NOTE G.—The dial scale numbers are listed in tenths of megacycles less the first digit; i. e., 49 MC is 90, 48.5 is 85. Set the tuning dial pointer to 90 on the F. M. scale. Adjust padder (6C) to the point where minimum signal indication is observed on the output meter.

NOTE H.—In order to adjust padder (6B) the signal generator should be set to either the signal peak approximately 125 KC below 49 MC (48.875 MC), or 125 KC above 49 MC (49.125 MC). Adjust padder (6B) to maximum output reading on either of these peak signals. As padder 6B is being adjusted roll the tuning condenser as given in Note B.



I.F. = 455 KC.
F.M. = 4.3 MC.

ALL PUSHBUTTONS SHOWN
IN OUT POSITION.
* No. 9 - 230µH MODEL 42-355.
* No. 9 - 190µH MODEL 42-390.
* No. 11 - 200µH MODEL 42-355.
* No. 11 - 185µH MODEL 42-390.

NUMBERS 1-19 ON WHITE CAPSULES CORRESPOND TO NUMBERS 1-19 LETTERS OF CAPSULES FOR EACH PUSHBUTTON SHOWN IN SCHEMATIC DIAGRAM.

TOP VIEW OF CHASSIS SHOWING LOCATION OF COMPONENTS.

FIG. 1—SCHEMATIC DIAGRAM—Models 42-355, 42-390
The D. C. voltages indicated at the tube elements in the above diagram were measured with a 1000 ohms per voltmeter. Philco Model 027. Line voltage 117 volts A. C.
No signal being received—range switch broadcast.

REPLACEMENT PARTS—Models 42-355, 42-390

Sch. No.	Description	Part No.	Sch. No.	Description	Part No.	Sch. No.	Description	Part No.
1.	F. M. Loop Aerial (Model 42-355)	76-1384	24C.	Push-button Compensator (No. 4 Button) (Part of 24)		63.	Resistor (2.2 megohms)	33-522339
2.	F. M. Loop Aerial (Model 42-390)	76-1346	24D.	Push-button Compensator (No. 5 Button) (Part of 24)		64.	Tone Control (Bass)	33-5460
	Aerial	27-6181					Mtg. Nut	W-2157
	Mtg. Rivet	W-207	25.	Push-button Oscillator oil (No. 1 P. B.)	32-3780	65.	Mica Condenser (100 mmfd)	60-110157
3.	Terminal Panel (on Chassis, Loop Aerial)	38-9870	25A.	Push-button Oscillator Coil (No. 2 P. B.)	32-3780	66.	Condenser (.01 mfd, 400 volts)	30-4572
	Mtg. Rivet	W-207	25B.	Push-button Oscillator Coil (No. 3 P. B.)	32-3780	67.	Condenser (.006 mmfd)	30-4591
4.	Loop Aerial (Brdcst.—S. W.) (Model 42-355)	76-1306	25C.	Push-button Oscillator Coil (No. 4 P. B.)	32-3779	68.	Resistor (68,000 ohms)	33-368339
	Loop Aerial (Brdcst.—S. W.) (Model 42-390)	76-1307	25D.	Push-button Oscillator Coil (No. 5 P. B.)	32-3779	69.	Mica Condenser (100 mmfd)	60-110157
	Mtg. Sleeve	28-3806				70.	Volume Control	33-5477
	Mtg. Sleeve	56-1545					Mtg. Nut	W-2157
	Spring Washer	28-4186				71.	Condenser (.05 mfd, 200 volts)	30-4519
	Screw	W-288				72.	Resistor (10 megohms)	33-610339
	Washer	W-425				73.	Condenser (150 mmfd)	60-115137
	Washer	W-648				74.	Resistor (470,000 ohms)	33-447339
5.	Aerial Transformer (Broadcast Band) (Model 42-385)	32-3811	26.	Push-button Switch	42-1692	75.	Tone Control (Treble)	33-5461
	Aerial Transformer (Broadcast Band) (Model 42-390)	32-3790	26A.	Push-button Power Switch (Part of 26)			Mtg. Nut	W-2157
	Mtg. Clip	28-5002				76.	Condenser (.01 mfd, 400 volts)	30-4572
6.	Compensator (Broadcast Aerial)	31-6443				77.	Condenser (100 mmfd)	60-110157
6A.	Compensator (S. W. Aerial)					78.	Condenser (.01 mfd, 400 volts)	30-4572
	(Part of 6)					79.	Resistor (220,000 ohms)	33-422339
6B.	Compensator (F. M. Aerial)					80.	Resistor (1 megohm)	33-510339
	(Part of 6)					81.	Resistor (470,000 ohms)	33-447339
6C.	Compensator (F. M. Oscillator)					82.	Condenser (.01 mfd, 400 volts)	30-4572
	(Part of 6)					83.	Resistor (3900 ohms)	33-239339
6D.	Compensator (S. W. Oscillator)					84.	Condenser (.001 mfd)	30-4601
	(Part of 6)					85.	Output Transformer	32-8120
6E.	Compensator (Broadcast—Series)					86.	Speaker (Model 42-355)	36-1519
	(Part of 6)						Speaker (Model 42-390)	36-1552-4
6F.	Compensator (Broadcast—Oscillator)						Cable (Model 42-355)	41-8541
	(Part of 6)						Mtg. Washer	32-7467
7.	Aerial and Oscillator Transformer (F. M.)	32-3792					Mtg. Nut	W-124
	Mtg. Clip	28-5002					Cone Assembly (For Speaker 36-1519-2)	36-4202
8.	Tuning Condenser (two sections—Standard & F. M.)	31-2592					Cone Assembly (For Speaker 36-1519-3)	36-4166
	Drive Cord (Pointer)	31-2576					Cone Assembly (For Speaker 36-1519-4)	36-4172
	Spring (Pointer Drive)	28-8953					Cone Assembly (For Speaker 36-1552-4)	36-4212
	Drive Cord (Tuning Cond.)	31-2577					Field Coil (Replace Speaker 36-1519)	36-4212
	Spring (Drive Cord)	28-8751					Bias Resistor (12-175 ohms)	33-3416
	Drive Drum (Tuning Cond.)	76-1293					Electrolytic Condenser (18 mfd)	56-1848
	Mtg. Grommet	27-4596					Clamp	56-1848
	Mtg. Sleeve	56-1505					Power Transformer (115 volts, 60 cycle) (Model 42-355)	32-8187
	Mtg. Screw	W-2002					Power Transformer (115 volts, 60 cycle) (Model 42-390)	32-8177
	Tuning Shaft	56-6152					Shield	56-1538
	"O" Washer (Mtg. Shaft)	28-2043					Mtg. Screw	W-1974
9.	Silver Mica Condenser (230 mmfd) (Model 42-355)	30-1214					Power Line Filter Condenser (.01 mfd)	3903-ODG
	Silver Mica Condenser (190 mmfd) (Model 42-390)	20-019017					Mtg. Clip	57-1404
10.	Condenser (Wire and Lug)						Socket Assembly (Dial Lights)	76-1295
11.	Silver Mica Condenser (200 mmfd) (Model 42-355)	30-1213					Miscellaneous Parts	
	Silver Mica Condenser (185 mmfd) (Model 42-390)	20-018511					Bezels (Cabinet)	54-4099
12.	Resistor (10,000 ohms)	33-310339					Mtg. Screw	W-2071
13.	Mica Condenser (250 mmfd)	60-125257					Cabinet (Model 42-355)	10566A
14.	Silver Mica Condenser (370 mmfd)	30-1110					Cabinet (42-390)	10578A
15.	Resistor (10,000 ohms)	33-310339					Cord (Power)	L-3139
16.	Resistor (22,000 ohms)	33-322339					Dial	27-5753
17.	Silver Mica Condenser (370 mmfd)	30-1110					Background Plate	27-8903
18.	Mica Condenser (500 mmfd)	60-150157					Rubber Corner (Dial Mtg.)	54-4015
19.	Resistor (10 ohms)	33-010339					Spring (Background Plate)	28-8908
20.	Resistor (47,000 ohms)	33-347339					Mtg. Clamp (Dial)	56-1517
	Mtg. Clip	28-5002					Mtg. Screw	W-1974
21.	S. W. Oscillator Transformer (Model 42-355)	32-3812					Pointer	56-2331
	S. W. Oscillator Transformer (Model 42-390)	32-3793					Knob (Push-Buttons)	54-4111
	Mtg. Clip	28-5002					Spring (P. B. Knobs)	76-1291
22.	Broadcast Oscillator Transformer	32-3791					Knob (Tuning, Volume, Tone)	54-4105
	Mtg. Clip	28-5002					Rubber Grommet (Chassis Mtg.)	27-4571
23.	Resistor (56 ohms)	33-056339					Screw (Chassis Mtg.)	W-1345
24.	Push-button Compensator (No. 1 Button)	31-6439					Socket (41 tube)	27-6168
24A.	Push-Button Compensator (No. 2 Button) (Part of 24)						Socket (6 x 5 G)	27-6174
24B.	Push-button Compensator (No. 3 Button) (Part of 24)						Socket (Loktal Tubes)	27-6177
							Socket (Single Prong-F. M. Test)	27-6180
							Rivets (Mtg. Sockets)	W-239
							Tab Kit	40-6663
							Cover Tabs	27-5743
							Tab (Broadcast)	27-5739
							Tab (S. W.)	27-5740
							Tab (F. M.)	27-5741
							Tab (ON-OFF)	27-5742
							Tab (Television)	27-5749

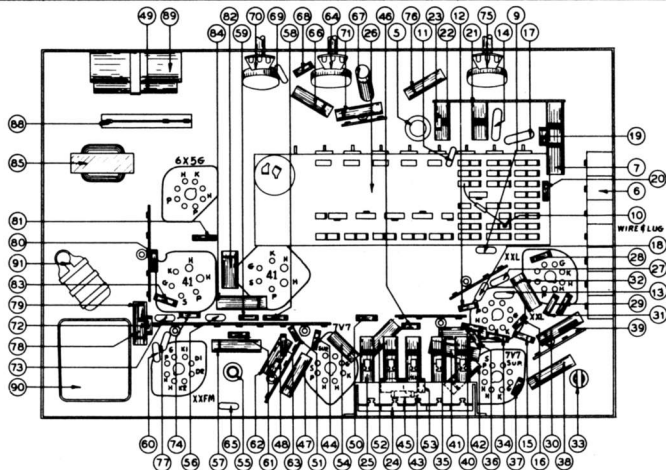


FIG. 2—PART LOCATIONS, UNDERSIDE OF CHASSIS

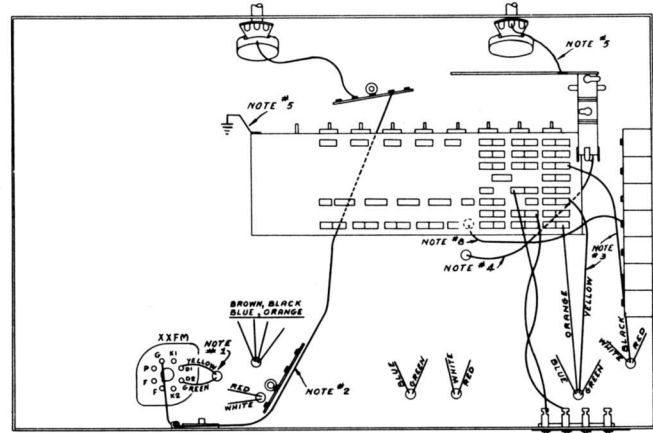


FIG. 3—CRITICAL WIRING LOCATIONS, F. M. ALIGNING

Parts and Service Division **PHILCO** Philadelphia, Pa.