

FREQUENCY MODULATION

Model 42-350, Code 121

SPECIFICATIONS

CIRCUIT DESCRIPTION: Model 42-350, Code 121, is a seven (7) tube superheterodyne radio 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 six electric push-buttons for automatically tuning five stations in the standard broadcasting band, Philco built-in low impedance loop aerial for reception of standard and short-wave broadcast stations; separate Automatic Built-In F. M. Aerial for reception of Frequency Modulation stations; three tuning ranges; two intermediate frequency stages; tone control; illuminated band indicator; audio boss frequency compensation in the volume control circuit, and a pentode audio output.

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: 50 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: 1.5 watts.

PHILCO TUBES USED: XXL, oscillator; XXL, converter; 7V7, 1st I. F.; 7V7, 2nd I. F.; XXFM, 2nd detector-1st audio; 7B5, audio output, and a 7Y4 rectifier.

CABINET DIMENSIONS: Height, 11 inches; width, 18½ inches; depth, 10½ inches.

ELECTRIC PUSH-BUTTON TUNING ADJUSTMENTS

The electric push-button tuning mechanism consists of six (6) push-buttons. Five of the push-buttons are used for selecting standard broadcast stations, and one for the power control (ON-OFF).

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.

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

Padders (right to left from rear)	Circuit	Buttons (left to right from front)	Frequency Range
1	Ant.	1	ON-OFF
2	Osc.	2	540 to 980 KC
3	Ant.	3	540 to 980 KC
4	Osc.	4	710 to 1185 KC
5	Ant.	5	850 to 1600 KC
6	Osc.	6	1185 to 1720 KC

EXTERNAL AERIAL CONNECTIONS

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

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 standard, short-wave, or FM bands.

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 in Areas where F. M. reception is not available.

Philco Safety Aerial, Part No. 40-6370.

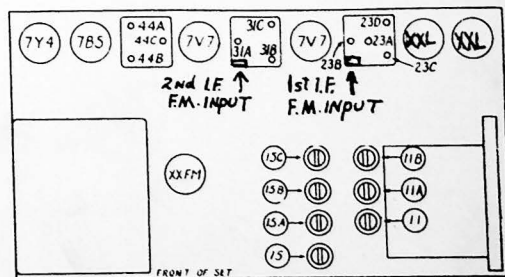
Philco Aerial Coupler, Part No. 45-1361.

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

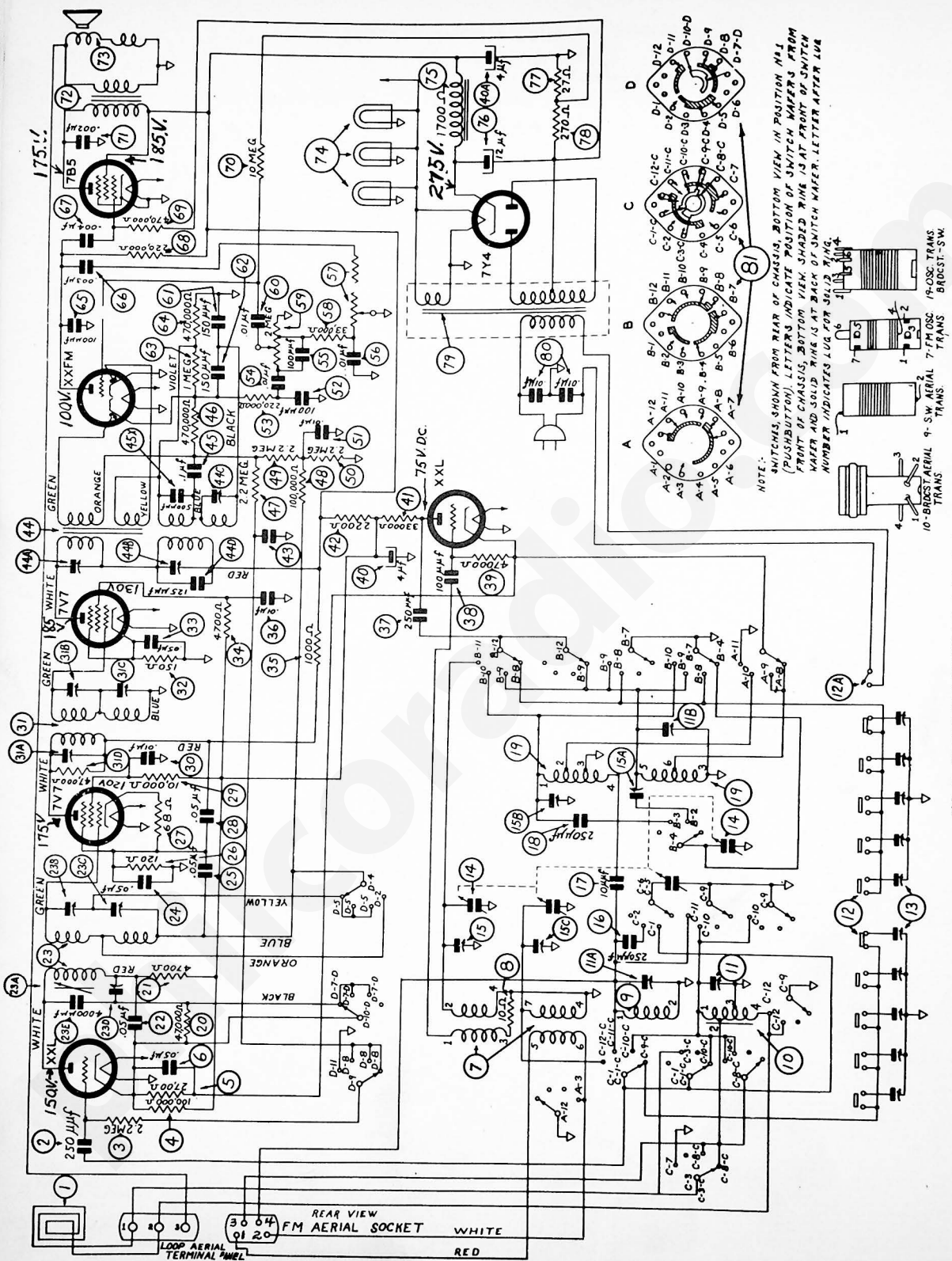
*Accessories for this aerial are the Philco Aerial Mast Kit, the Philco Reflector Kit and Philco High Efficiency Transmission Line. See Service Bulletin No. 396 on Dipole Aerials.

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 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.



TOP OF VIEW OF CHASSIS
FIG. 1—LOCATIONS OF R. F. AND I. F. COMPENSATORS



NOTE:
 SWITCHES SHOWN FROM REAR OF CHASSIS, BOTTOM VIEW IN POSITION #1 (PUSH-BUTTON). LETTERS INDICATE POSITION OF SWITCH MARKERS FROM FRONT OF CHASSIS, BOTTOM VIEW. SHADED RING IS AT FRONT OF SWITCH WAFER AND SOLID RING IS AT BACK OF SWITCH WAFER. LETTER AFTER SW NUMBER INDICATES LOG FOR SWITCH.

FIG. 2.—SCHEMATIC DIAGRAM 42-350, Code 121

The D. C. voltages indicated at the tube elements in the above diagram were red with a 1000 ohms per voltmeter, Philco Model 027. Line voltage 117 volts A. C. No signal being broadcast.

ALIGNING R. F. AND I. F. COMPENSATORS

EQUIPMENT REQUIRED

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

CONNECTING ALIGNING INSTRUMENTS

AUDIO OUTPUT METER: Terminal No. 2 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 in Fig. 1. 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		Adjust Compensators in Order	Special Instructions
	Output Connections	Dial Setting	Dial Setting	Control Settings			
1	High side to No. 1 terminal loop panel	455 KC	580 KC	Vol. max. Band Switch "Brdest."		44B, 31C, 23A, 23B	
2	Use loop on generator	1500 KC	1500 KC	"	"	15A, 11B	Note A
3	Use loop on generator	580 KC	580 KC	"	"	11	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	Band Switch "S.W."		15B, 11A	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 this set are critical for location and position. See Figs. 4 and 5, Page 4, for locations of wires and parts.

- Dipole aerial leads from socket to be twisted and dressed over wave switch directly to F. M. aerial-oscillator transformer No. 7.
- Ground braid from gang to chassis to be wired and soldered on top side of subbase in such a manner so that there is a floating band between ground and the condenser.
- Short wave aerial transformer (No. 9) to be wired directly between terminal panel 4 and band switch contact C-11-C so that there is a minimum of slack in the wires.
- Wire from broadcast aerial transformer (No. 10) to ground to be dressed under short wave aerial transformer (No. 9).
- Wire from band switch contact B-11 to compensator 15 to be direct and away from switch and other wires.
- Red and white wires from 1st I. F. transformer to be dressed on base and not twisted with other wires from same coil. Green wire to be free of other wires and direct to contact 6 of the 7V7, 1st I. F. tube.
- Wires from 3rd I. F. transformer (44) to be brought out proper holes and not twisted together inside of can.
- Green and yellow wires of 3rd I. F. transformer 44 to run from hole in subbase between terminal panel 5, contacts 2 and 3 and direct to contacts of the XXFM tube 5 and 6. Orange, blue, black and brown leads to be free of other wires and dressed off base.

- Condenser (45) to be dressed off base.
- A.C. switch leads to be twisted.
- Wire from prong 5 of the 7Y4 tube to lug 3 of the loop aerial terminal panel to be dressed between Electrolytic Condenser 76 and Mounting Strap and to rear of chassis across bottom contacts of F. M. socket.
- White, red and black wires of 1st I. F. transformer to be dressed with excess out of coil shield, and towards rear of chassis, and close to base. Black lead to be dressed around and under all leads going to XXL converter tube socket. Orange, yellow, green and blue leads to be dressed with excess out of coil shield and away from the white, red and black leads.
- Wire from band switch contact C-12-C to compensator 15-C to be dressed free of other wires.
- Dress wire from band switch contact B-12 to wiring panel 4, lug 4 with excess toward front of set, under shortwave aerial transformer (9), keeping wire between the terminal panel 4 and wires coming through subbase which connect to F. M. aerial-oscillator transformer (7) and band switch.
- Keep wires from terminal panel No. 5 contact No. 5 to band switch contact D8 and terminal panel No. 6 to terminal panel No. 4 between padder strip and mounting stud of 1st I. F. transformer so that they are kept clear of leads from the 1st I. F. transformer.

F. M. BAND ALIGNING PROCEDURE

Operations in Order	SIGNAL GENERATOR			RECEIVER		Adjust Compensators in Order	Special Instructions
	Output Connections	Dial Setting	Dial Setting	Control Settings			
1	2nd I. F., F. M. input connection	4.3 MC	580 KC	Vol. max. Band Switch "F.M."		44C (Note D) 44A (Note E)	
2	1st I. F., F. M. input connection	4.3 MC	580 KC	Band Switch "F.M."		31A, 31B (Note F)	
3	High side to No. 1 contact, F. M. socket. Ground to No. 2 contact	4.3 MC	580 KC	Band Switch "F.M."		23D, 23C (Note H)	
4	Use test loop on generator; place near dipole aerial	48.5 MC	85 (Note G)	Band Switch "F.M."		15 (Note G) 15C (Note H)	Roll tuning condenser when adjusting 15C. See Note B.
5	"	48.5 MC	85	Band Switch "F.M."		15 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 (15B) to the second signal peak from the closed position (maximum capacity).

The aerial compensator (11A) 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 (44C) 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 (44A) must be adjusted in the direction necessary to make both peaks equal. This is done by slightly turning padder and then equalizing. This is done by slightly turning padder and then turning signal generator above and below 4.3 to observe peaks. After equal peak 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 (44C) until zero reading is obtained on the meter. After this adjustment is made padder No. 44A should be reset for equal peaks as given above.

NOTE F.—Adjust padders 31A, 31B, 23C, and 23D 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, 43.5 is 85. Set the tuning dial pointer to 90 on the F. M. scale. Adjust padder (15) to the point where minimum signal indication is observed on the output meter.

NOTE H.—In order to adjust padder (15C) the signal generator should be set to either the signal peak approximately 135 KC below 49 MC (48.875 MC), or 135 KC above 49 MC (49.125 MC). Adjust padder (15C) to maximum output reading on either of these peak signals. As padder 15C is being adjusted roll the tuning condenser as given in Note B.

REPLACEMENT PARTS—Model L42-350, Code 121

Schem. No.	Description	Part No.	Schem. No.	Description	Part No.	Schem. No.	Description	Part No.
1.	Loop Aerial	76-1383	42.	Resistor (2200 ohms)	33-222339			27-7467
1a.	Mtg. Screw	W-2071	43.	Condenser (1.0 mfd., 200 volts)	30-4519			W-1213
	F.M. Loop Aerial	26-1303	44.	Jrd. I.F. Transformer	32-3796			31-2064
	Socket	27-6181	44a.	Mtg. Nut	W-1949	74.	Dial and Indicator Lamps	
2.	Mica Condenser (250 mmfd.)	60-122527	44b.	Primary Compensator (4.3 M.C.)		75.	Field Coil (Replace Speaker 36-1514)	
3.	Resistor (100,000 ohms)	33-410339	44c.	Part of 44		76.	Electrolytic Condenser (12 mfd., 400 volts)	30-2409
4.	Resistor (2700 ohms)	33-227339	44d.	Primary Compensator (455 K.C.)			Mtg. Clip	56-1486
5.	Condenser (.05 mfd., 200 volts)	30-4519		Part of 44		77.	Resistor (27 ohms)	33-027336
7.	F.M. Oscillator Transformer	32-3797	45.	Condenser (1.1 mfd.)	30-4586	78.	Resistor (270 ohms)	33-12744
8.	Mtg. Clip	28-5002	45a.	Mica Condenser (100 mmfd.)	60-110257		Power Transformer (115 volts, 60 cycle)	32-8183
9.	Resistor (10 ohms)	33-010336	46.	Resistor (2.2 megohms)	33-522344		Mtg. Screw	56-2285
10.	Short Wave Aerial Transformer	32-3763	47.	Resistor (100,000 ohms)	33-410339		Shield	56-2286
11.	Mtg. Clip	28-5002	48.	Resistor (2.2 megohms)	33-522339		Power Transformer (115 volts, 25 cycles)	32-8210
11a.	Compensator (Brdst. Band, 500 K.C.)	31-6426	49.	Resistor (2.2 megohms)	33-522339		Shield	56-1547
11b.	Compensator (S.W. Aerial, 15 M.C.)		50.	Resistor (2.2 megohms)	33-522339		Shield Base	56-1548
	Part of 11		51.	Condenser (.01 mfd., 400 volts)	30-4572		Power Transformer (115/230 volts, 60 cycle)	32-9211
12.	Push-button Switch & A.C. Switch	42-1695	52.	Mica Condenser (100 mmfd.)	60-110257	8d.	Condenser (.01-.01 mfd.)	3903-00G
12a.	A.C. Switch (Part of 12)		53.	Resistor (220,000 ohms)	33-422339	8i.	Band Switch	42-1696
	Mtg. Sleeve	28-5665	54.	Condenser (.01 mfd., 400 volts)	30-4572		Mtg. Nut	W-2157
	Mtg. Screw	W-523	55.	Mica Condenser (100 mmfd.)	60-110257		MISCELLANEOUS PARTS	
13.	Push-button Padder Strip	W-1974	56.	Condenser (.01 mfd., 400 volts)	30-4572		Arm and Link (Band Indicator)	76-1353
	Mtg. Screw	W-1974	57.	Mtg. Nut	W-2157		Cable (Power)	L-3199
14.	Tuning Condenser	31-2595	58.	Resistor (33,000 ohms)	33-331314		Cabinet	10-6524
	Drive Cord (Tuning Cond.)	21-2546	59.	Volume Control	33-5470		Dial Scale	27-5736
	Spring	28-8751	60.	Mtg. Nut	W-2157		Dial Pointer	56-1856
	Drive Cord (Pointer)	31-2594	61.	Condenser (.01 mfd., 400 volts)	30-4572		Escutcheon (Push Buttons)	W-2071
	Spring	28-9953	62.	Mica Condenser (150 mmfd.)	60-115327		Knob Assembly (Vol. Tone, Band)	54-1102
	Mtg. Rubber	27-4596	63.	Mica Condenser (100 mmfd.)	60-115327		Knob Assembly (Push Buttons)	54-1126
	Mtg. Sleeve	28-3896	64.	Resistor (1 megohm)	33-510339		Mtg. Screw (Chassis)	W-763
	Mtg. Washer	W-151	65.	Resistor (470,000 ohms)	33-447339		Mtg. Washer (Chassis)	W-425
	Mtg. Screw	W-2002	66.	Mica Condenser (100 mmfd.)	60-110257		Socket Assembly (Indicator Lamps)	76-1074
	Tuning Shaft	56-6156	67.	Mica Condenser (1000 volts)	30-4469		Socket Assembly (Dial Lamps)	76-1287
	Tuning Drive Drum	38-9943	68.	Condenser (.004 mfd., 400 volts)	30-4623		Socket (Single Prong)	27-6180
15.	Compensator (F.M. Osc., 48.5 M.C.)	31-6444	69.	Resistor (220,000 ohms)	33-422339		Socket (4 Prong F.M. Aerial)	27-6181
15a.	Compensator (Brdst. Osc., 1500 K.C.)		70.	Resistor (10 megohms)	33-473339		Socket (Tubes)	W-239
	Part of 15		71.	Resistor (10 megohms)	33-610339		Tab Kit	10-6560
15b.	Compensator (S.W. Osc., 15 M.C.)		72.	Condenser (.002 mfd., 600 volts)	30-4622		Tab (Television)	27-5778
	Part of 15		73.	Output Transformer	32-8172		Terminal Panel (Loop)	38-9942
15c.	Compensator (F.M. Aerial, 48.5 M.C.)			Speaker	36-1534		Wiring Panel (4 Iuvs)	38-9907
	Part of 15			Cone Assembly (for Speaker 36-1514)	36-4206		Wiring Panel (5 Iuvs)	38-9579
16.	Silver Mica Condenser (250 mmfd.)	20-025011		Cable	41-3613		Mtg. Rivets	W-239
17.	Mica Condenser (10 mmfd.)	60-010337						
18.	Mica Condenser (250 mmfd.)	20-025011						
19.	Oscillator Transformer (Brdst., S.W.)	32-3798						
20.	Mtg. Clip	28-5003						
21.	Resistor (47,000 ohms)	33-347339						
22.	Resistor (4700 ohms)	33-247339						
23.	Condenser (.05 mfd., 400 volts)	30-4518						
23a.	1st I.F. Transformer	32-3784						
	Mtg. Nut	W-1949						
23b.	Primary Compensator (455 K.C.)							
	Part of 23							
23c.	Secondary Compensator (4.3 M.C.)							
	Part of 23							
23d.	Primary Compensator (4.3 M.C.)							
	Part of 23							
23e.	Mica Condenser (4000 mmfd.)	60-240214						
	(Part of 23)							
24.	Condenser (.05 mfd., 200 volts)	30-4519						
25.	Condenser (.05 mfd., 200 volts)	30-4519						
26.	Resistor (120 ohms)	33-112336						
27.	Resistor (68 ohms)	33-068336						
28.	Condenser (.05 mfd., 400 volts)	30-4518						
29.	Resistor (10,000 ohms)	33-310339						
30.	Condenser (.01 mfd., 400 volts)	30-4572						
31.	2nd I.F. Transformer	32-3788						
	Mtg. Nut	W-1949						
31a.	Primary Compensator (4.3 M.C.)							
	Part of 31							
31b.	Secondary Compensator (4.3 M.C.)							
	Part of 31							
31c.	Secondary Compensator (455 K.C.)							
	Part of 31							
31d.	Resistor (47,000 ohms) (Part of 31)	33-347339						
32.	Resistor (150 ohms)	33-115336						
33.	Condenser (.05 mfd., 200 volts)	30-4519						
34.	Resistor (4700 ohms)	33-247336						
35.	Resistor (1000 ohms)	33-210339						
36.	Condenser (.01 mfd., 400 volts)	30-4572						
37.	Mica Condenser (250 mmfd.)	60-122527						
38.	Mica Condenser (100 mmfd.)	60-110257						
39.	Resistor (47,000 ohms)	33-347339						
40a.	Electrolytic Condenser (4.4 mfd., 400 volts)	30-2477						
40b.	Electrolytic Condenser (4 mfd., 400 volts) (Part of 40)							
	Mtg. Clip	56-1466						
41.	Resistor (33,000 ohms)	33-333339						

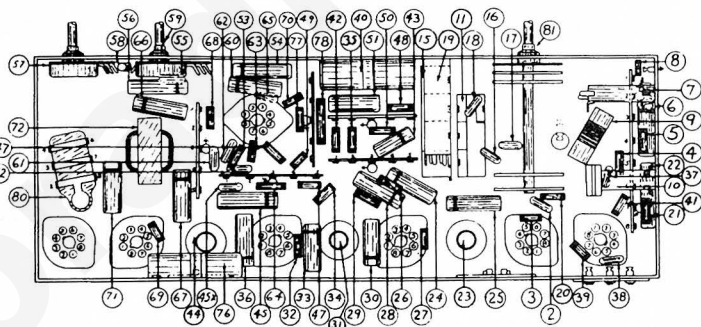


FIG. 4—LOCATIONS OF PARTS—UNDER CHASSIS

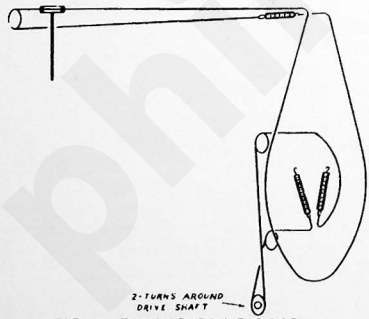


FIG. 3—TUNING DRIVE CORD ARRANGEMENT

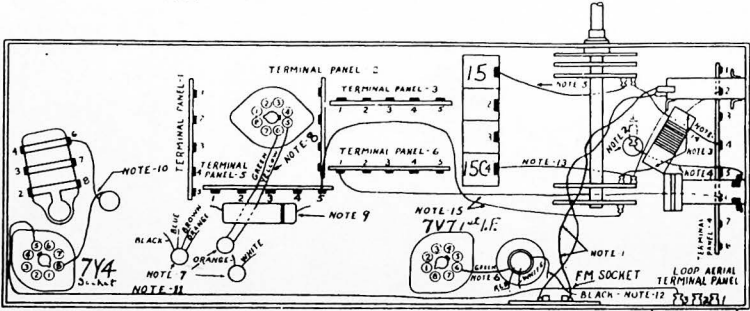


FIG. 5—CRITICAL WIRING AND PART LOCATIONS—UNDER CHASSIS
(See Notes 1 to 15, Page 2)