

FREQUENCY MODULATION

MODEL 42-395, code 121

SPECIFICATIONS

MODEL 42-395, CODE 121

Model 42-395, Code 121, is a nine (9) tube A. C. operated super-heterodyne 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 ten (10) electric push buttons which automatically tune six stations in the standard broadcast band and selects the standard, shortwave and frequency modulation bands; Philco built-in Super Aerial System for standard and shortwave reception; the Philco F M Dipole Aerial for frequency modulation reception; three tuning bands; two intermediate frequency stages; two tone controls (Treble and Bass); push-pull pentode audio output stage driven by a phase inverter audio amplifier stage; Philco Loktal tubes and a fourteen (14) inch electro-dynamic speaker.

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

This model can also be operated on 115 volt, 25 cycle or 220 volts, 60 cycle A. C. current. To do this it is necessary to change the power transformers as indicated in the replacement parts list.

Power Consumption:

Intermediate Frequency: Standard and shortwave bands 455 KC; Frequency Modulation 4.3 MC.

Tuning Band Frequencies: 540 to 1720 KC; 9 to 15.5 MC; 42 to 50 MC (FM).

Audio Output: 4 watts.

Philco Tubes Used: XXL, oscillator; XXL, converter; two 7V7, I. F. amplifiers; XXFM, second detector, first audio; 7A4, audio phase inverter; two 7B5 audio output, and a 7Z4, rectifier.

Cabinet Dimensions: Height Width Depth

EXTERNAL AERIAL CONNECTIONS

The built-in aerial system is designed to operate without an outside aerial or 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, shortwave, 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 FM 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 FM 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 FM band regardless of the position of the switch.

3—For Additional Sensitivity on Standard Broadcast and Shortwave only in Areas where FM 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 FM Philco Outdoor Dipole Aerial, it is very important that the aerial compensating condensers of the standard and shortwave band are repadded.

ELECTRIC PUSH-BUTTON TUNING ADJUSTMENTS

The electric push-button tuning mechanism consists of ten (10) push-buttons. Six of the push-buttons are used for selecting standard broadcast stations, one for the power control (ON-OFF) and three (3) for selecting the standard, shortwave and FM tuning bands.

Viewing the front of the cabinet from left to right the first push-button is the power control (ON-OFF); the next six (6) push-buttons for standard broadcast stations, and the eighth, ninth and tenth for selecting the standard, shortwave and FM tuning bands, respectively.

When setting up stations on the push-buttons the lowest frequency station is set up for reception on the second push-button from the left and the remaining stations according to increasing frequency in the next five push-buttons. The push-buttons are adjusted by the padders located on the rear of the chassis. The frequency range covered by each push-button and the procedure for adjusting is listed in the adjacent tabulation. 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. The procedure for setting up these models is included in the instructions supplied with each model.

| 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 |
| 6 | { Ant. } { Osc. } | 7 | 900 to 1600 KC |
| | | 8 | Standard Band |
| | | 9 | Shortwave Band |
| | | 10 | FM Band |

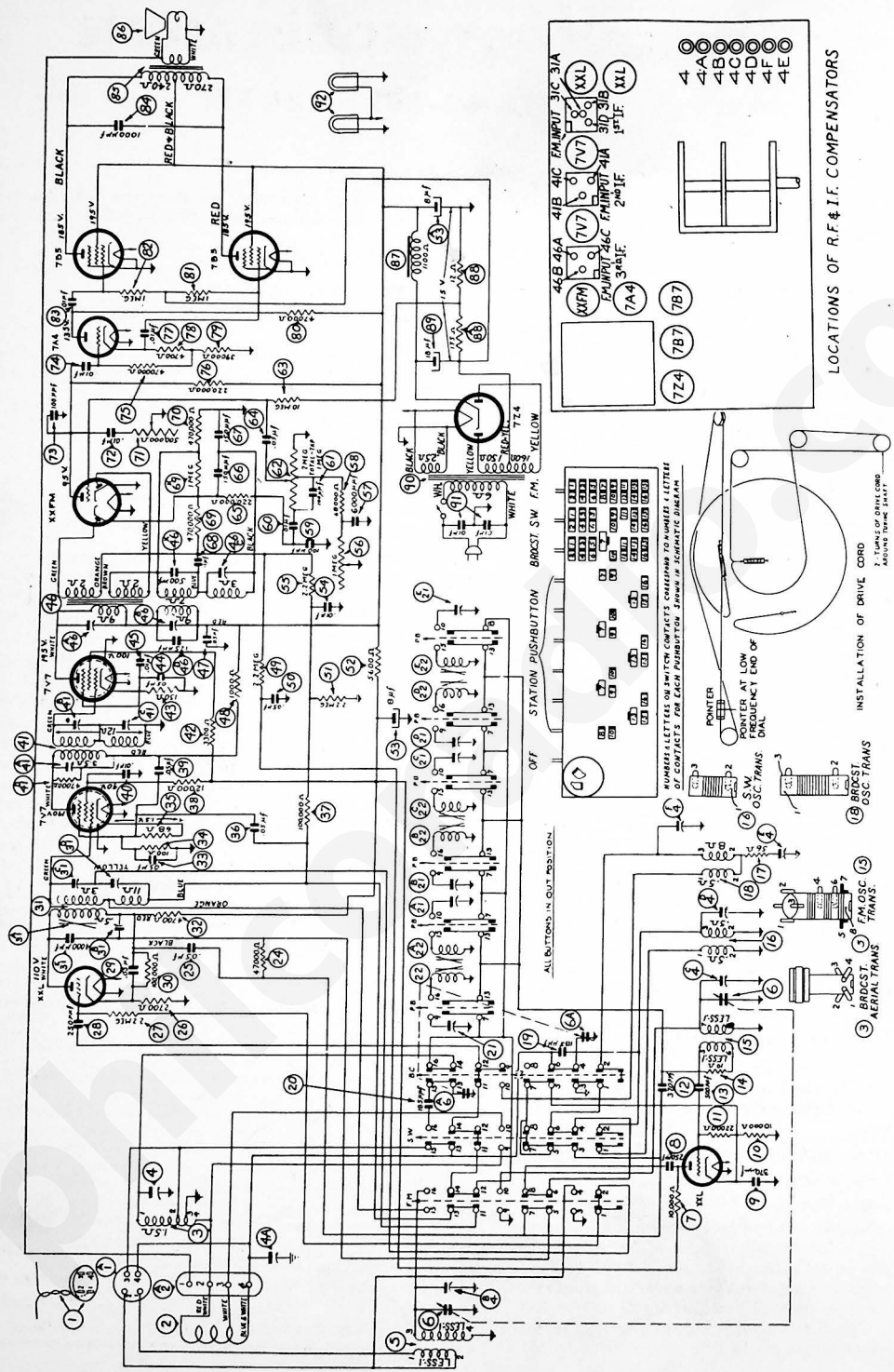
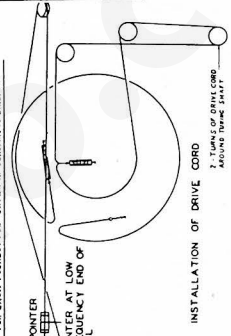
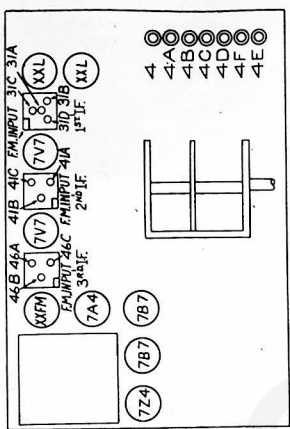


Fig. 1—Schematic Diagrams—Model 42-395, Code 121
 The D. C. voltages indicated at the tube elements in the above diagram were measured with a 1000 ohms per
 voltmeter. Philco Model 027. Line voltage 115 volts A. C. No signal being received—range switch broadcast.

LOCATIONS OF R.F. & I.F. COMPENSATORS



REPLACEMENT PARTS—Model 42-395, Code 121

| Schem. No. | Description | Part No. | Schem. No. | Description | Part No. | Schem. No. | Description | Part No. |
|------------|--|-----------|------------|---|-----------|------------|---|------------|
| 1A. | F. M. Dipole Aerial (Mounted in Cabinet) | 76-1394 | 22A. | Push-Button Oscillator Transformer (900 to 1600 KC) | 32-3779 | 51. | Resistor (2.2 megohms) | 33-522339 |
| 1. | Socket F. M. Dipole Aerial | 27-6181 | 22B. | Push-Button Oscillator Transformer (650 to 1500 KC) | 32-3779 | 52. | Resistor (5600 ohms) | 33-256339 |
| 2. | Loop Aerial (Broadcast and Shortwave) | 76-1395 | 22C. | Push-Button Oscillator Transformer (650 to 1300 KC) | 32-3780 | 53. | Electrolytic Condenser (8 mfd, 475 volts) | 30-2528 |
| | Mtg. Screw | W-288FA11 | 22D. | Push-Button Oscillator Transformer (600 to 1200 KC) | 32-3780 | 53A. | Electrolytic Condenser (8 mfd, 475 volts) Part of 53 | |
| | Mtg. Sleeve | 56-1345 | | | | | Mtg. Clamp | 56-1466 |
| | Mtg. Sleeve | 28-3806 | | | | | Condenser (.01 mfd, 400 volts) | 33-4239 |
| | Spring Washer | 26-4186 | | | | | Base Tone Control | 33-5479 |
| | Mtg. Washer | W-425FA3 | | | | | Condenser (.006 mfd, 400 D. C.) | 30-4591 |
| | Mtg. Washer | W-648FA3 | 22E. | Push-Button Oscillator Transformer (540 to 1000 KC) | 32-3780 | 57. | Resistor (86000 ohms) | 33-968339 |
| 2A. | Terminal Panel (Loop Aerial) | 32-9870 | | | | 58. | Mica Condenser (100 mfmfd) | 60-110157 |
| | Mtg. Rivet | W-207 | | | | 59. | Mica Condenser (100 mfmfd) | 30-4572 |
| 3. | Broadcast Aerial Transformer | 32-3790 | | | | 60. | Mica Condenser (100 mfmfd) | 60-110157 |
| | Mtg. Clip | 28-5002 | 23. | Push-Button Switch | 42-1703 | 61. | Volume Control | 33-5478 |
| 4A. | Compensator (Broadcast Aerial) | 31-6443 | | | | 62. | Resistor (10 megohms) | 33-10339 |
| | Compensator (Short Wave Aerial) Part of 4 | | | | | 63. | Resistor (22000 ohms) | 30-4519 |
| 4B. | Compensator (F. M. Aerial) Part of 4 | | 24. | Resistor (47000 ohms) | 33-347339 | 64. | Condenser (.05 mfd, 200 volts) | 33-422339 |
| 4C. | Compensator (F. M. Oscillator) Part of 4 | | 25. | Condenser (.05 mfd, 400 volts) | 30-4518 | 65. | Condenser (150 mfmfd) | 60-115137 |
| 4D. | Compensator (S. W. Oscillator) Part of 4 | | 26. | Resistor (2700 ohms) | 33-227339 | 66. | Mica Condenser (150 mfmfd) | 60-115137 |
| 4E. | Compensator (Brdest., Oscillator 580 KC) Part of 4 | | 27. | Resistor (2.2 megohms) | 33-522339 | 67. | Condenser (.1 mfd, 200 volts) | 30-4586 |
| 4F. | Compensator (Brdest. Oscillator 1500 KC) Part of 4 | | 28. | Mica Condenser (250 mfmfd) | 60-125257 | 68. | Resistor (47000 ohms) | 33-447339 |
| 5. | F. M. Aerial Transformer (Part of 15) | | 29. | Condenser (.05 mfd, 400 volts) | 30-4518 | 69X. | Resistor (1 megohm) | 33-10339 |
| | Mtg. Clip | 28-5002 | 30. | Resistor (100000 ohms) | 33-10339 | 70. | Resistor (47000 ohms) | 33-447339 |
| 6. | Tuning Condenser (F. M. Section) | 31-2592 | 31. | First I. F. Transformer | 32-3828 | 71. | Treble Tone Control | 33-5480 |
| 6A. | Tuning Condenser (Brdest., S. W. Section) Part of 6 | | 31A. | Primary Compensator (iron core) Part of 31 | W-2157 | 72. | Condenser (.01 mfd, 400 volts) | 30-4572 |
| | Drive Drum | 76-1293 | 31B. | Primary Compensator (4.3 KC) Part of 31 | | 73. | Mica Condenser (100 mfmfd) | 60-110157 |
| | Drive Cord (Pointer) | 31-2576 | 31C. | Secondary Compensator (455 KC) Part of 31 | | 74. | Condenser (.01 mfd, 400 volts) | 33-447339 |
| | Spring | 28-8953 | 31D. | Secondary Compensator (4.3 KC) Part of 31 | | 75. | Resistor (22000 ohms) | 33-422339 |
| | Drive Cord (Tuning Cond.) | 31-2603 | 31E. | Condenser (4000 mfmfd) Part of 31 | | 76. | Condenser (.01 mfd, 400 volts) | 30-4572 |
| | Shaft | 26-8751 | 32. | Resistor (4700 ohms) | 33-247339 | 77. | Condenser (.01 mfd, 400 volts) | 30-4572 |
| | "C" Washer | 56-6164 | 33. | Condenser (.05 mfd, 200 volts) | 30-4519 | 78. | Resistor (4700 ohms) | 33-247339 |
| | Mtg. Grommet | 27-4596 | 34. | Resistor (100 ohms) | 33-110339 | 79. | Resistor (2000 ohms) | 33-23339 |
| | Mtg. Sleeve | 56-1505 | 35. | Resistor (68 ohms) | 33-063339 | 80. | Resistor (47000 ohms) | 33-347339 |
| | Mtg. Screw | W-1351FA3 | 36. | Condenser (.05 mfd, 200 volts) | 30-4519 | 81. | Resistor (1 megohm) | 33-10339 |
| | Pointer (Dial) | 56-2311 | 37. | Resistor (100000 ohms) | 33-410339 | 82. | Resistor (1 megohm) | 33-10339 |
| 7. | Resistor (10000 ohms) | 33-310339 | 38. | Resistor (12000 ohms) | 33-312339 | 83. | Condenser (.006 mfd, 1000 volts) | 30-44317 |
| 8. | Mica Condenser (250 mfmfd) | 60-125257 | 39. | Condenser (.05 mfd, 400 volts) | 30-4518 | 84. | Condenser (.01 mfd, 1000 volts) | 30-4572 |
| 9. | Mica Condenser (370 mfmfd) | 30-1110 | 40. | Condenser (.01 mfd, 400 volts) | 30-4572 | 85. | Output Transformer | 32-8191 |
| 10. | Resistor (10000 ohms) | 33-310339 | 41. | Second I. F. Transformer | 32-3836 | 86. | Speaker | 36-1530 |
| 11. | Resistor (22000 ohms) | 33-322339 | | | | | Cone Assembly (for Speaker 36-1530) | 36-4181 |
| 12. | Mica Condenser (370 mfmfd) | 30-1110 | 41A. | Primary Compensator (4.3 KC) Part of 41 | | | Cable (Speaker) | 41-5610 |
| 13. | Mica Condenser (500 mfmfd) | 60-150257 | 41B. | Secondary Compensator (4.3 KC) Part of 41 | | | Mtg. Washer | 27-6181 |
| 14. | Resistor (10 ohms) | 33-010339 | 41C. | Secondary Compensator (455 KC) Part of 41 | | | Mtg. Nut | W-124FA3 |
| 15. | F. M. Oscillator Transformer | 32-3792 | 41D. | Resistor (47000 ohms) Part of 31 | 33-347339 | 87. | Field Coil (Replace Speaker 36-1530) | 33-3416 |
| | Mtg. Clip | 28-5002 | 42. | Resistor (3300 ohms) | 33-233339 | 88A. | Bias Resistor (12 ohms) | 33-3416 |
| 16. | S. W. Oscillator Transformer | 32-3793 | 43. | Resistor (150 ohms) | 33-113339 | 89. | Electrolytic Condenser (18 mfd, 475 volts) Part of 88 | 30-2517 |
| | Mtg. Clip | 28-5002 | 44. | Condenser (.05 mfd, 400 volts) | 30-4518 | | Mtg. Clip | 30-2517 |
| 17. | Resistor (56 ohms) | 33-056334 | 45. | Condenser (.01 mfd, 400 volts) | 30-4572 | 90. | Power Transformer (115 volts, 60 cycles) | 32-8192 |
| 18. | Broadcast Oscillator Transformer | 32-3791 | 46. | Third I. F. Transformer | 32-3829 | | Power Transformer (115 volts, 25 cycles) | 32-8209 |
| 19. | Mica Condenser (185 mfmfd) | 20-018511 | 46A. | Mtg. Nut | W-2157 | 91. | Power Line Filter Condenser (.01-.01 mfd) | 39201DGC |
| 20. | Mica Condenser (185 mfmfd) | 20-018511 | 46B. | Primary Compensator (4.3 KC) Part of 46 | | 92. | Dial Lamp | 34-2141 |
| 21. | Push Button Station Padder (900 to 1600 KC) | 31-6449 | 46C. | Primary Compensator (455 KC) Part of 46 | | | Socket Assembly | 76-1295 |
| 21A. | Push-Button Station Padder (900 to 1600 KC) Part of 21 | | 46D. | Mica Condenser (125 mfmfd) Part of 46 | | | Miscellaneous Parts—Model 42-395 | |
| 21B. | Push-Button Station Padder (850 to 1500 KC) Part of 21 | | 46X. | Condenser (500 mfmfd) | 60-150227 | | Bezel | 54-4128 |
| 21C. | Push-Button Station Padder (650 to 1300 KC) Part of 21 | | 47. | Condenser (.05 mfd, 400 volts) | 33-210339 | | Screw | W-2073FB26 |
| 21D. | Push-Button Station Padder (600 to 1200 KC) Part of 21 | | 48. | Resistor (1000 ohms) | 33-522339 | | Cable (Power) | L-3199 |
| 21E. | Push-Button Station Padder (540 to 1000 KC) Part of 21 | | 49. | Resistor (2.2 megohm) | 30-4519 | | Cabinet | 10887A |
| 22. | Push-Button Oscillator Transformer (900 to 1600 KC) | 32-3779 | 50. | Condenser (.05 mfd, 200 volts) | 30-4519 | | Dial Scale | 27-5789 |

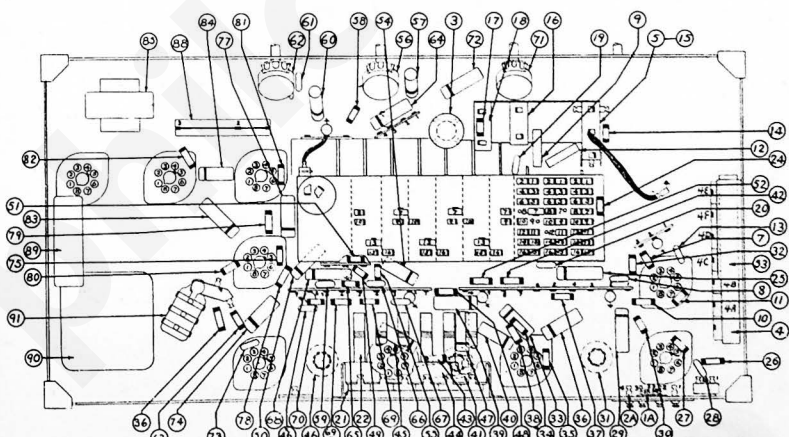


Fig. 2—Locations of Parts—Under Chassis Model 42-395

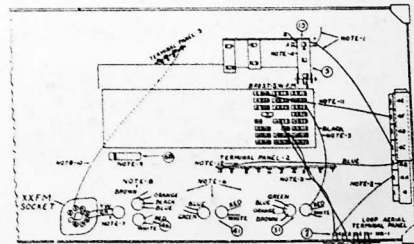


Fig. 3—Critical Wiring Locations—F. M. Aligning Model 42-395

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 | | Adjust Compensators In Order | Special Instructions |
|---------------------|--|----------------------------------|--------------|-----------------------------------|------------------------------|-------------------------------|
| | Output Connections | Dial Setting | Dial Setting | Control Settings | | |
| 1 | High side to No. 4 terminal loop panel | 455 KC | 580 KC | Vol. max. push-button Bdcst. "IN" | 46B, 41C, 31C, 31A | |
| 2 | Use loop on generator | 1500 KC | 1500 KC | " | 4F, 4 | Note A |
| 3 | Use loop on generator | 580 KC | 580 KC | " | 4E | 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" | 4D, 4A | Note C |

FREQUENCY MODULATION ALIGNING PROCEDURE

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

NOTE CRITICAL WIRING LOCATIONS

1. Wire from F. M. oscillator transformer (15) to compensator 4C must be short, also the blue wire from F. M. oscillator transformer (15) to the tuning condenser should be short and away from chassis.
2. Wire from compensator (4A) to the lug No. 4 of the loop aerial terminal panel 2A must be short.
3. Wires from lugs 3 and 4 of the loop aerial terminal panel (2A) to the short-wave push button lugs 10 and 13 of the push button switch must have one complete twist only.
4. All wires from the lugs of the F. M. oscillator transformer (15) should be dressed away from the push button switch and the wires of the F. M. aerial transformer (5) which is part of the F. M. oscillator transformer (15).
5. The black wire from the first I. F. transformer (31) to lug 5 of the F. M. push button must be dressed along the chassis and away from the orange and yellow lead of the I. F. transformer.

6. Wires from the 1st, 2nd and 3rd I. F. transformers must come through the holes as indicated in Fig. 3.
7. The yellow and green leads from the third I. F. transformer (46) to contact 5 and 6 of the XXFM socket must be dressed away from the chassis and other wiring.
8. The white, brown, black and orange wires from the third I. F. transformer (46) must be dressed away from chassis base.
9. Condenser (68) must be away from chassis base.
10. Wire from contact 3 of the XXFM socket must be dressed away from the leads of the 3rd I. F. transformer (46) and the test socket lead.
11. Wire from compensator 4F to lug 2 of the broadcast push button must be dressed away from the chassis base.
12. The blue wire from electrolytic condenser (53) to lug 10 of terminal panel No. 2 must be dressed close along chassis base under condenser (25) and close to terminal panel.

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. F. M. push-button "IN" | 46C (Note D) 46A (Note E) | |
| 2 | 1st I. F., F. M. input connection | 4.3 MC | 580 KC | F. M. push-button "IN" | 41A, 41B (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" | 31B, 31D (Note F) | |
| 4 | Use test loop on generator; place near dipole aerial | 48.5 MC | 85 (Note G) | F. M. push-button "IN" | 4C (Note G) 4B (Note H) | Roll tuning condenser when adjusting 4B. See Note B |
| 5 | | 48.5 MC | 85 | F. M. push-button "IN" | 4C 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 (4D) to the second signal peak from the closed position (maximum capacity).

The aerial compensator (4A) 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 (46C) 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 (46A) 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 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 (46C)

until zero reading is obtained on the meter. After this adjustment is made padder No. 46A should be reset for equal peaks as given above.

NOTE F.—Adjust padders 41A, 41B, 31B, and 31D 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 85 on the F. M. scale. Adjust padder (4C) to the point where minimum signal indication is observed on the output meter.

NOTE H.—In order to adjust padder (4B) the signal generator should be set to either the signal peak approximately 125 KC below 48.5 MC (48.375 MC), or 125 KC above 48.5 MC (48.625 MC). Adjust padder (4B) to maximum output reading on either of these peak signals. As padder 4B is being adjusted roll the tuning condenser as given in Note B.