

MODEL 41-788, CODES 121 AND 122

SPECIFICATIONS

Model 41-788T is a special service eleven (11) tube A. C. operated super-heterodyne radio employing eight (8) tuning bands. Three standard scales are mounted on the left of the grille. These cover the complete radio spectrum from 540 K. C. to 22 megacycles. The standard scales are tuned by a variable condenser which has tuning ratios of 80 to 1 for vernier tuning and 16 to 1 for coarse tuning. Five spread band scales on the right of the grille are designed to spread the short wave frequencies more than 20 times farther apart. This spread band tuning section of the radio is tuned by a three (3) gang permeability tuner with shunt aligning compensators for each spread band.

Each tuning band scale is printed on an individual glass section which is separately illuminated when in use. The ranges are selected by a "Band" switch.

Other features of design include Tuned R. F. stage; two I. F. stages; variable tone control; variable Bass compensation; automatic volume control; phase inverted, push-pull Pentode audio system; sensitivity control in the I. F. circuit;

balanced field electro-dynamic speaker; and permanent Phonograph connection controlled by Band switch.

The code numbers (121, 122) of this model refer to the manner in which the power supply is connected for shipment. Code 121 is shipped with the voltage change switch in the 230 volts, 60 cycle A. C. position. Code 122 is shipped with the switch in the 115 volts, 60 cycle A. C. position.

POWER SUPPLY: 115 or 230 volts A. C., 50 to 60 cycle, 90 watts.

INTERMEDIATE FREQUENCY: 455 K. C.

TUNING RANGES:

Standard Tuning—540 to 1720 K. C.; 2.3 to 7.2 M. C.; 7.2 to 22 M. C.

Spread Band Tuning—9.4 to 9.9 M. C.; 11.4 to 12.0 M. C.; 14.8 to 15.6 M. C.; 17.3 to 18.2 M. C.; 20.9 to 21.9 M. C.

TUNING DRIVE RATIO: Standard Tuning—80 to 1; 16 to 1.

AUDIO OUTPUT: 8 watts.

CABINET DIMENSIONS: 16¼" high; 24¼" wide; 11" deep.

MECHANICAL ADJUSTMENTS OF BAND SPREAD TUNING MECHANISM

1. ADJUSTMENT OF TUNING SHAFT

End play can be removed by adjusting the rear bearing No. (A) Fig. (1). Care should be taken when adjusting the screw so that shaft does not turn too tightly. In making this adjustment, the screw driver can be inserted in the chassis in line with shaft.

2. INSTALLING NEW BAND SPREAD TUNING SHAFT

a. Turn shaft (B) until carriage (C) is approximately six (6) threads from knob end of shaft. See Fig. 1.

b. Turn shaft counter-clockwise at the same time holding the rear stop washer (D) until all other washers are in contact.

c. Insert the front end of shaft through the rear of the front bearing. Install front ball bearing and then while holding the R. F. unit in a vertical position with the rear end of the radio up, drop the rear ball bearing into position and assemble the retaining screw.

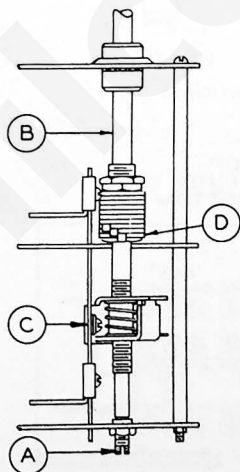


FIG. 1 — BAND SPREAD TUNING MECHANISM

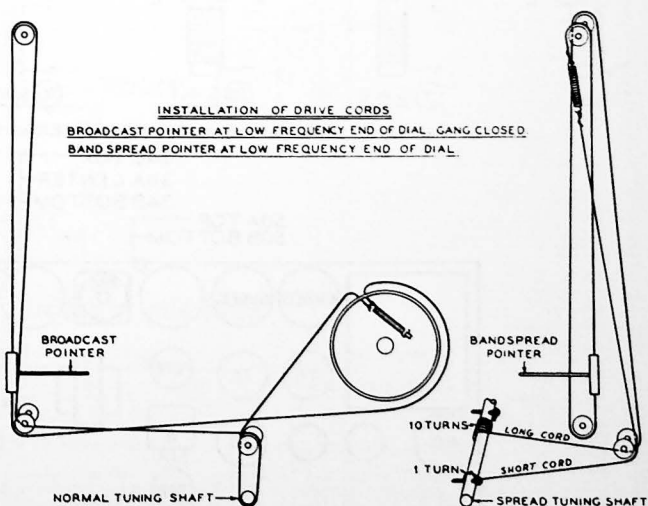


FIG. 2 — INSTALLING TUNING DRIVE CORDS

MODEL 41-788, CODES 121 AND 122 (CONTINUED)

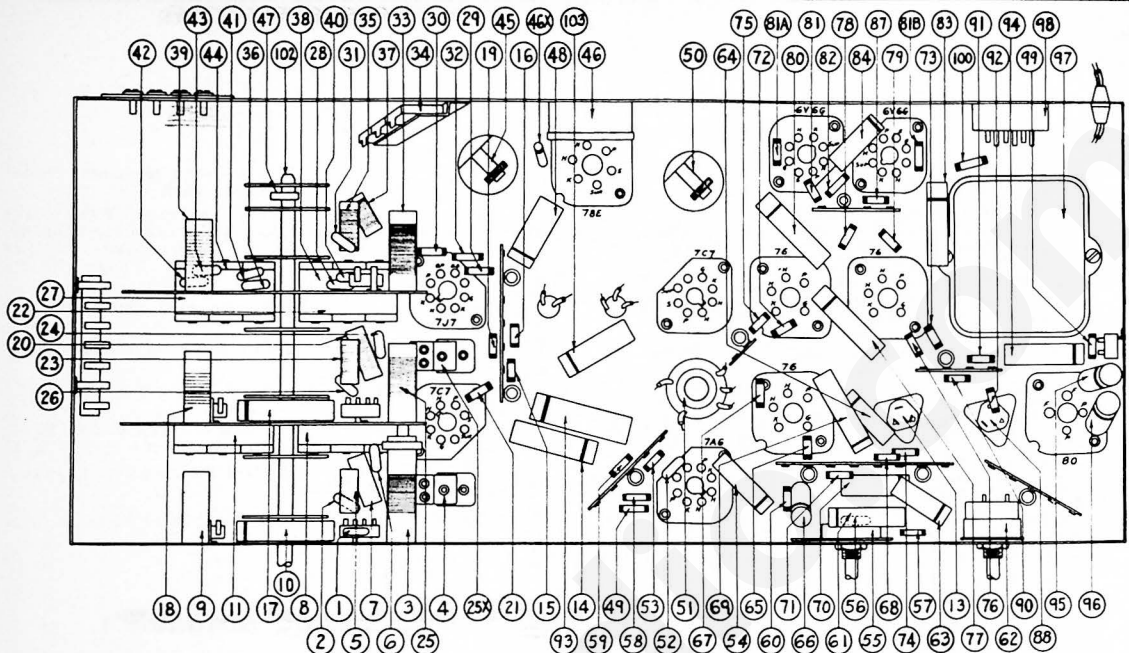


FIG. 4 — PART LOCATIONS, UNDERSIDE OF CHASSIS

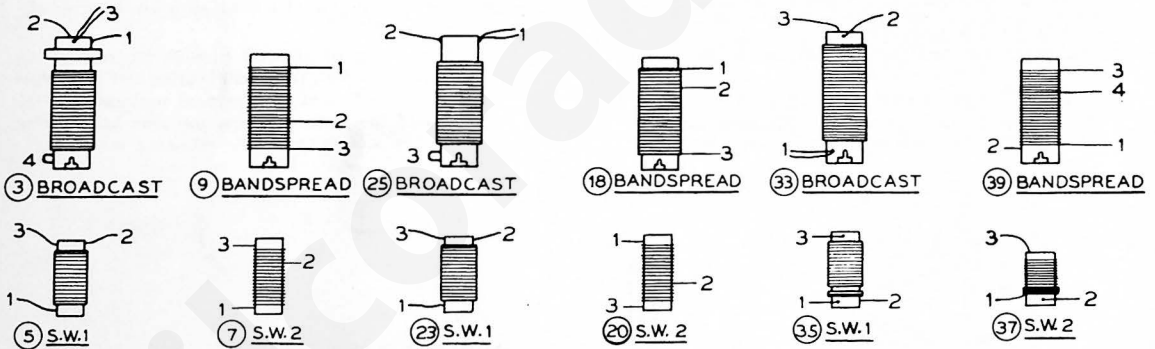


FIG. 5 — R. F. TRANSFORMER WIRING LOCATIONS

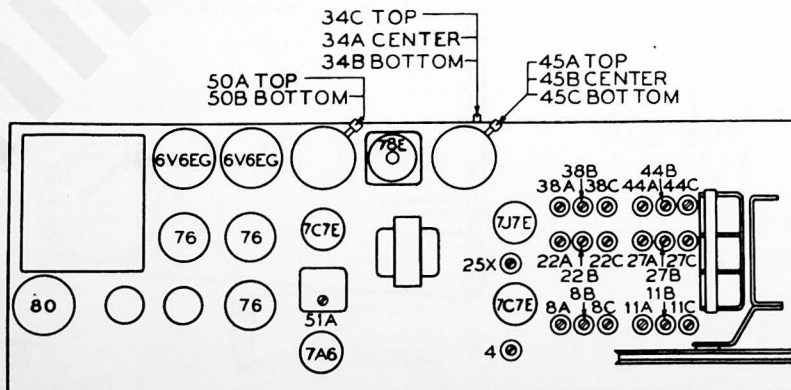
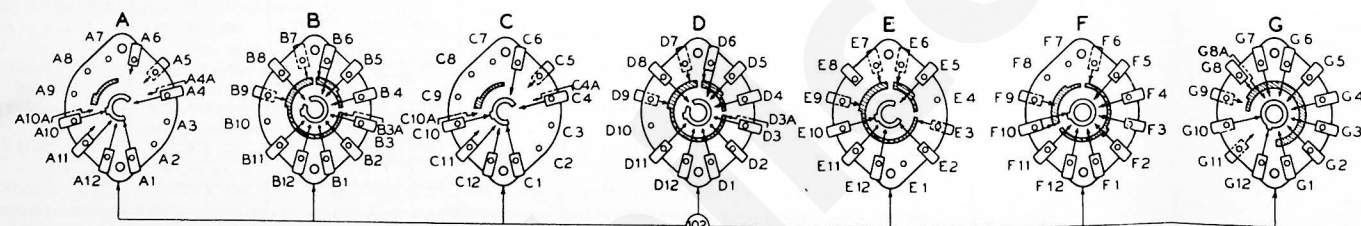
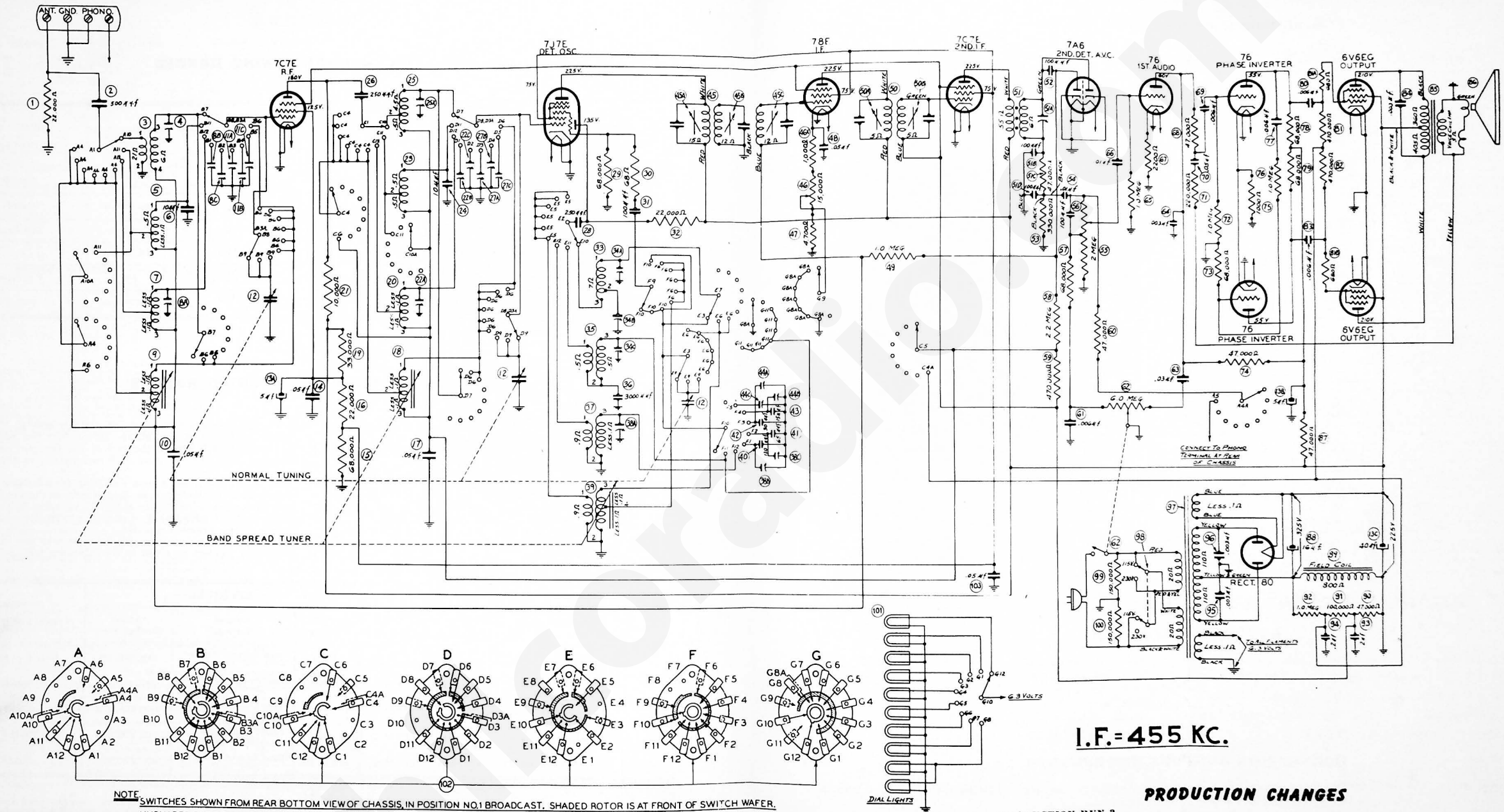


FIG. 6 — TUBE AND COMPENSATOR LOCATIONS, TOP OF CHASSIS



NOTE: SWITCHES SHOWN FROM REAR BOTTOM VIEW OF CHASSIS, IN POSITION NO. 1 BROADCAST. SHADED ROTOR IS AT FRONT OF SWITCH WAFER. UNSHADED ROTOR IS AT REAR OF SWITCH WAFER. LETTER INDICATES POSITION OF SWITCH WAFERS FROM FRONT OF CHASSIS.

PRODUCTION CHANGES

PRODUCTION RUN 2

To prevent hum from developing in the audio circuit, the following changes were made beginning with radios marked Run 2.
 Resistor (67) 2,000 ohms was removed and the cathode of the 1st audio 76 tube grounded to the chassis. The ground connection of resistor (65) was removed. Another 1 megohm resistor was connected between resistor (65) and the point in the bias circuit at resistor (90), (91) and condenser (93).
 An additional condenser .05 mfd., Part No. 30-1519 was connected to the point where resistor (65) and the new 1 megohm resistor are attached. The other end of the resistor is grounded to the chassis.

SCHEMATIC DIAGRAM MODEL 41-788

FIG. 3 — SCHEMATIC DIAGRAM, MODEL 41-788

I.F. = 455 KC.

PRODUCTION CHANGES

PRODUCTION RUN 3

Beginning with radios marked Run 3, a change was made in "C" bias circuit of the 76 Phase Inverter tubes to prevent hum. This change was made as follows:
 Remove the 1,000 ohm resistor (75) from the cathodes and ground the cathodes to the chassis. Remove the ground between resistors (72) and (73).
 These resistors are then connected to the bias circuit at the point where resistors (90), (91) and condenser (93) are attached.
 The value of condenser (93) was changed from .2 mfd. to .5 mfd. The part number of the new condenser is 30-4590.
 To prevent high frequency oscillation in the audio amplifier a 500 mmfd. condenser, Part No. 60-150257, was connected from the plate of the 76 phase inverter tube (top tube on diagram) to the ground.

CORRECTION

Oscillator transformer (39) in the parts list should be changed from Part No. 32-3456 to 32-3457.

MODEL 41-788, CODES 121 AND 122 (CONTINUED)

Replacement Parts — Model 41-788

SCHE. No.	DESCRIPTION	PART No.	SCHE. No.	DESCRIPTION	PART No.	SCHE. No.	DESCRIPTION	PART No.
1	Resistor (220,000 ohms, 1/2 watt).....	33-322339	39	Osc. Transformer (Band Spread).....	32-3457	88	Electrolytic Condenser (16 mfd.).....	30-2470
2	Mica Condenser (500 mmfd.).....	60-150257		Osc. Iron Core (With Screw).....	36-6007	89	Field Coil, Replace Speaker 36-1459.....	
3	Ant. Transformer (Broadcast).....	32-3446		Osc. Core Spacer.....	27-9664	90	Resistor (47,000 ohms, 1/2 watt).....	33-347339
4	Compensator (Antenna).....	31-6308		Osc. Iron Core (Without Screw).....	36-6098	91	Resistor (100,000 ohms, 1/2 watt).....	33-510339
5	Ant. Transformer (Short Wave 1).....	32-3448		Osc. Nut (3 48).....	W-2195	92	Resistor (1 meg., 1/2 watt).....	33-510339
6	Mica Condenser (100 mmfd.).....	60-010337	40	Mica Condenser (120 mmfd.).....	30-1175	93	Tubular Condenser (.02 mfd.).....	30-4587
7	Ant. Transformer (Short Wave 2).....	32-3446	41	Mica Condenser (.65 mmfd.).....	30-1174	94	Tubular Condenser (.2 mfd.).....	30-4587
8A	Compensator (Antenna, Short Wave 2).....	31-6356	42	Mica Condenser (30 mmfd.).....	30-1173	95	Tubular Condenser (.003 mfd.).....	30-4608
8B	Comp. (Ant., 31M Spd. Bd., Part of BA)		43	Mica Condenser (15 mmfd.).....	30-1139	96	Tubular Condenser (.003 mfd.).....	30-4608
8C	Comp. (Ant., 31M Spd. Bd., Part of BA)		44A	Compensator (Osc. Transformer 18 M. C.)	31-6358	97	Power Transformer (For 60 cycle).....	32-8031
9	Ant. Transformer (Band Spread).....	32-3455	44B	Comp. (Osc. Trans. 18 M. C., Part of 44A)		98	Power Transformer (For 25 cycle).....	42-1569
	Antenna Iron Core.....	56-8037	44C	Comp. (Osc. Trans. 21 M. C., Part of 44A)		99	Voltage Switch.....	42-1569
	Antenna Nut (3 48).....	W-2195	45	1st I. F. Transformer.....	32-3443	99	Line Resistor (150,000 ohms, 1/2 watt)	33-415339
10	Tubular Condenser (.05 mfd.).....	30-4609	46	Sensitivity Control.....	33-5401	100	Line Resistor (150,000 ohms, 1/2 watt)	33-415339
11A	Compensator (Antenna 19 M. C.).....	31-6357	46X	Resistor (1000 ohms, 1/2 watt).....	33-210339	101	Dial Lights.....	34-2064E
11B	Comp. (Antenna 16 M. C., Part of 11A)		47	Resistor (4700 ohms, 1/2 watt).....	33-247339	102	Range Switch.....	42-1572
11C	Comp. Antenna 13 M. C., Part of 11A)		48	Tubular Condenser (.05 mfd.).....	30-4519	103	Tubular Condenser (.05 mfd.).....	30-4518
12	Tuning Condenser (Normal Tuning).....	31-2466	49	Resistor (1 meg., 1/2 watt).....	33-510339			
13A	Electrolytic Condenser (5 mfd.).....	30-2470	50	2nd I. F. Transformer.....	32-3444			
13B	Electrolytic Cond. (5 mfd., Part of 13A)		51	1rd I. F. Transformer.....	32-3445			
13C	Electrolytic Cond. (40 mfd., Part of 13A)		52	Mica Condenser (100 mmfd.).....	60-110457			
14	Tubular Condenser (.05 mfd.).....	30-4518	53	Resistor (33,000 ohms, 1/2 watt).....	33-333339			
15	Resistor (68,000 ohms, 1/2 watt).....	33-368339	54	Tubular Condenser (.01 mfd.).....	30-4572			
16	Resistor (22,000 ohms, 1/2 watt).....	33-322339	55	Volume Control.....	33-5399			
17	Tubular Condenser (.05 mfd.).....	30-4609	56	Mica Condenser (100 mmfd.).....	60-110457			
18	R. F. Transformer (Band Spread).....	32-3456	57	Resistor (68,000 ohms, 1/2 watt).....	33-368339			
	R. F. Iron Core.....	56-8087	58	Resistor (2.2 meg., 1/2 watt).....	33-522339			
	R. F. Nut (3 48).....	W-2195	59	Resistor (470,000 ohms, 1/2 watt).....	33-447339			
19	Resistor (33,000 ohms, 1/2 watt).....	33-333339	60	Resistor (47,000 ohms, 1/2 watt).....	33-347339			
20	R. F. Transformer (Short Wave 2).....	32-3453	61	Tubular Condenser (.008 mfd.).....	30-4591			
21	Resistor (10,000 ohms, 1/2 watt).....	33-210339	62	Tone Control.....	33-3400			
22A	Compensator (R. F. Trans., Short Wave 2)	31-6356	63	Tubular Condenser (.03 mfd.).....	30-4517			
22B	Comp. (R. F. Trans., 31M, Part of 22A)		64	Tubular Condenser (.003 mfd.).....	30-4582			
22C	Comp. (R. F. Trans., 25M, Part of 22A)		65	Resistor (1 meg., 1/2 watt).....	33-510339			
23	R. F. Transformer (Short Wave 1).....	32-3450	66	Tubular Condenser (.01 mfd.).....	30-4572			
24	Mica Condenser (10 mmfd.).....	60-010337	67	Resistor (2200 ohms, 1/2 watt).....	33-220339			
25	R. F. Transformer (Broadcast).....	32-3447	68	Resistor (47,000 ohms, 1/2 watt).....	33-347339			
25X	Compensator (R. F. Trans., Broadcast).....	31-6308	69	Tubular Condenser (.006 mfd.).....	30-4610			
26	Mica Condenser (250 mmfd.).....	60-125457	70	Tubular Condenser (.05 mfd.).....	30-4519			
27A	Compensator (R. F. Trans., 19M).....	31-6357	71	Resistor (220,000 ohms, 1/2 watt).....	33-422339			
27B	Comp. (R. F. Trans., 16M, Part of 27A)		72	Resistor (1 meg., 1/2 watt).....	33-510339			
27C	Comp. (R. F. Trans., 13M, Part of 27A)		73	Resistor (68,000 ohms, 1/2 watt).....	33-368339			
28	Mica Condenser (250 mmfd.).....	60-125457	74	Resistor (47,000 ohms, 1/2 watt).....	33-347339			
29	Resistor (680,000 ohms, 1/2 watt).....	33-368339	75	Resistor (1000 ohms, 1/2 watt).....	33-210339			
30	Resistor (680 ohms, 1/2 watt).....	33-068334	76	Resistor (1 meg., 1/2 watt).....	33-510339			
31	Mica Condenser (100 mmfd.).....	60-110457	77	Tubular Condenser (.006 mfd.).....	30-4610			
32	Resistor (22,000 ohms).....	33-322339	78	Resistor (68,000 ohms, 1/2 watt).....	33-368339			
33	Oscillator Transformer (Broadcast).....	32-3448	79	Resistor (68,000 ohms, 1/2 watt).....	33-368339			
34A	Compensator (Broadcast, Osc. Trans.).....	31-6350	80	Tubular Condenser (.006 mfd.).....	30-4610			
34B	Comp. (Brdcast., Osc. Series, Part of 34A)		81	Resistor (470,000 ohms, 1/2 watt).....	33-447339			
34C	Comp. (S. W. 1, Osc. Series, Part of 34A)		81A	Resistor (680 ohms).....	33-168339			
35	Oscillator Transformer (Short Wave 1).....	32-3451	81B	Resistor (680 ohms).....	33-168339			
36	Mica Condenser (3000 mmfd.).....	60-230124	82	Resistor (470,000 ohms, 1/2 watt).....	33-447339			
37	Oscillator Transformer (Short Wave 2).....	32-3454	83	Tubular Condenser (.006 mfd.).....	30-4610			
38A	Compensator (Short Wave 2, Osc.).....	31-6358	84	Tubular Condenser (.003 mfd.).....	30-4582			
38B	Compensator (31M Osc., Part of 38A).....		85	Output Transformer.....	32-3443			
38C	Compensator (25M Osc., Part of 38A).....		86	Cone Assembly, Part of 36-1459-2.....	36-4106			
			87	Resistor (47,000 ohms, 1/2 watt).....	33-347339			

MISCELLANEOUS PARTS

Clip (R. F. Transformer Mounting).....	28-5002
Cable (Speaker).....	41-3535
Cabinet.....	10479A
Cabinet Back.....	27-9655
Coupling Assembly (Tuning Condenser).....	31-2291
Coupling Set Screw.....	W-2008
Cardboard Tube (Electrolytic Condenser).....	27-9506
Dial (Standard Tuning—Com. with Frame).....	76-1086
Dial (Band Spread—Com. with Frame).....	76-1087
Drive Cord (Tuning Condenser).....	31-2468
Drive Cord (Band Spread—Short Section).....	31-2469
Drive Cord Band Spread—Long Section).....	31-2470
Drum and Shaft (Tuning Condenser).....	31-2453
Knob (Tuning).....	27-4862
Knob (Tuning).....	27-4330
Knob (Volume, Wave Switch).....	27-4332
Plug (Power).....	1-1367
Pointer (Dials).....	56-1804FA33
Rubber Disc (Coupling Assembly).....	27-9164
Rubber Grommet (Chassis Corners).....	27-4566
Rubber Grommet (Tuning Cord, Mtg.).....	27-9164
Rubber Washer (Chassis Mounting).....	27-4571
Speaker.....	36-1459
Screw (Chassis Mounting).....	W-1345
Screw (Scale Mounting).....	W-1825
Screw (Cabinet Back Mounting).....	W-2076
Socket Assembly (Dial Pilot Lamps).....	76-1056
Socket (5 prong, 76 tubes).....	27-6035
Socket (6 prong, 78E tube).....	27-6036
Socket (4 prong, 80 tube).....	27-6044
Socket (Octal, 6V6EG tube).....	27-6058
Socket (Loktal, 7C7EG, 7A6).....	27-6131
Socket (Loktal, 7J7EG tube).....	27-6129
Springs (Drive Cord, Band Spread).....	28-8751
Spring (Drive Cord, Normal Tuning).....	28-8913
Tuning Shaft Assembly (Band Spread).....	76-1168
Tuning Shaft Assembly (Normal Tuning).....	31-2467
Washer (Chassis Mounting).....	28-5114

ALIGNING R. F. AND I. F. COMPENSATING CONDENSERS

EQUIPMENT REQUIRED

Signal Generator: In order to properly adjust the various R. F. and I. F. padders of this receiver, a calibrated signal generator such as Philco Model 077 A. C. operated or Model 177 battery operated is required. These signal generators cover a frequency range of 540 to 36000 K. C.

Aligning Indicating Device: A Vacuum Tube Voltmeter or Audio Output Meter, such as Philco Models 027 and 028, is required. Procedures for connecting these instruments are listed below.

Aligning Tools: Fiber handle screwdriver, Philco Part No. 45-2610 and Aligning Wrench, Part No. 7696.

CONNECTING ALIGNING INSTRUMENTS

Signal Generator: The signal generator is connected to the receiver as indicated in the tabulations below under "output connections to receiver". A Dummy Antenna is also required. This is listed under column, "Dummy Antenna, Note A".

Vacuum Tube Voltmeter: To use the vacuum tube voltmeter as an aligning indicator it should be connected to the A. V. C. circuit as follows:

1. Connect the negative (—) terminal of the voltmeter through a 2 meg. resistor to any grid return connection in the A. V. C. circuit.

2. Connect the positive (+) terminal to the chassis ground terminal.

Audio Output Meter: If this type of meter is used as an aligning indicator, it should be connected to the plate and screen terminals of one of the 6V6EG tubes. Adjust the meter to the 0 to 30 volt A. C. scale.

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

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MODEL 41-788, CODES 121 AND 122 (CONTINUED)

ADJUSTING NORMAL TUNING RANGES

Operations in Order	SIGNAL GENERATOR			RECEIVER			SPECIAL INSTRUCTIONS
	Output Connections to Receiver	Dummy Antenna Note A	Dial Setting	Dial Setting	Control Settings	Adjust Compensators	
1	Tuning Condenser Stator Lug Middle Section	.1 mfd.	455 K. C.	580 K. C.	Vol. Max. Band Selector "Brdcst"	45A, 45C, 50A, 50B, 51A	Note D
2	Antenna and Ground	200 mmfd.	1500 K. C.	1500 K. C.	Vol. Max. Band Selector "Brdcst"	34A, 25X, 4	Note B
3	Antenna and Ground	200 mmfd.	580 K. C.	580 K. C.	Vol. Max.	34B	Roll Gang
4	Antenna and Ground	200 mmfd.	1500 K. C.	1500 K. C.	Vol. Max.	34A, 25X, 4	
5	Antenna and Ground	400 ohms	6.0 M. C.	6.0 M. C.	Vol. Max. Band Selector "S.W.1"	34C	Roll Gang
6	Antenna and Ground	400 ohms	20 M. C.	20 M. C.	Vol. Max. Band Selector "S.W.2"	38A, 22A, 8A	Note C

ADJUSTING BAND SPREAD TUNING RANGES

MECHANICAL ADJUSTMENTS: Before the padders of the band spread tuning ranges are adjusted, the iron cores of the antenna, R. F. and Oscillator transformers must be mechanically set as follows:

1. Turn the band spread tuning control to the extreme clockwise position (highest frequency).

2. Adjust location of "antenna" and "R. F." iron cores so that the end of the iron core is $\frac{1}{32}$ " inside the end of the transformer. This is done by loosening the screw which holds the iron core bracket and then sliding the bracket until the correct dimension is obtained.

3. The Oscillator transformers and Iron cores are adjusted

in the same manner as given for antenna and R. F. Transformer in operation "2" above, except that the end of the iron core is $\frac{21}{32}$ " beyond the end of the transformer. (The diameter of a size "C" steel drill corresponds to this dimension).

4. When installing a new oscillator transformer or core, make sure that the iron core slides freely in the transformer. It is important to do this to eliminate backlash in the tuning mechanism. If adjustment is necessary slightly move transformer in the direction required.

After mechanically setting the transformers and iron cores, adjust the padders as given in the following tabulation:

Operations in Order	SIGNAL GENERATOR			RECEIVER			SPECIAL INSTRUCTIONS
	Output Connections to Receiver	Dummy Antenna Note A	Dial Setting	Dial Setting	Control Settings	Adjust Compensators	
1	Antenna and Ground	400 ohms	9.7 M. C.	9.7 M. C.	Band Selector Position "31M" on Dial	38B, 22B, 8B	Note E — Note F
2	Antenna and Ground	400 ohms	11.7 M. C.	11.7 M. C.	Band Selector Position "25M" on Dial	38C, 22C, 8C	Note F
3	Antenna and Ground	400 ohms	15.2 M. C.	15.2 M. C.	Band Selector Position "19M" on Dial	44A, 27A, 11A	Note F
4	Antenna and Ground	400 ohms	17.8 M. C.	17.8 M. C.	Band Selector Position "16M" on Dial	44B, 27B, 11B	Note F
5	Antenna and Ground	400 ohms	21.5 M. C.	21.5 M. C.	Band Selector Position "13M" on Dial	44C, 27C, 11C	Note F

NOTE A—The "Dummy Antenna" consists of a condenser or resistance connected in series with the signal generator output lead (high side). Use the capacity or resistance as specified in each step of the above procedure.

NOTE B—**DIAL CALIBRATION:** In order to adjust the receiver correctly the dial 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 first mark on the left edge (low frequency end) of the broadcast scale.

NOTE C—When adjusting compensator (38A) be sure to tune in the fundamental signal (20 M. C.) instead of the image signal. If the compensator is correctly adjusted, the image signal will be 910 K. C. below the fundamental signal, which will be 19.090 M. C.

NOTE D—Before adjusting padders 45A, 45C, 50A, 50B, 51A, turn padder 45B to full clockwise position (all the way out). After the padders are adjusted to maximum, then adjust padder 45B for maximum.

NOTE E—Before adjusting padders, turn the band spread tuning knob to its extreme counter-clockwise position. Set the band spread dial pointer on the first MARK on the left edge (low frequency end) of the 31 meter scale.

NOTE F—To make sure that the dial reads properly after adjusting the compensator with the signal generator as outlined above, a known station on each band near the adjusting frequency should be tuned in with the spread band tuning control. If the dial reading is incorrect, adjust the oscillator compensators on each band until the stations are heard at the correct points on the dial. After adjusting the oscillator compensators to the correct frequency of the known station, the "antenna" and "R. F." compensators should be adjusted to maximum signal.

ALTERNATIVE METHOD—Locate a known station near the center of each spread band and "Zero Beat" the signal generator with it at the time of aligning band. This makes available a signal of adjustable strength and known frequency. This method will be found to be simpler when conditions make its use possible because it is much easier to align a receiver to a strong signal.