



SERVICE MANUAL

MODEL "ROYAL 500E" TRANSISTOR PORTABLE RADIO

CHASSIS 8CT40 & 8CT40Z2

GENERAL

These transistor portable chassis are conventional superheterodyne receivers. They use an untuned R.F. stage with an individual mixer and oscillator to produce the 455 Kc intermediate frequency. Chassis 8CT40 and 8CT40Z2 are virtually identical except for different transistors and a few other parts. The parts marked by asterisks on the chassis wiring and component drawing apply only to chassis 8CT40Z2. The first and second intermediate frequency amplifiers are conventional. A (103-19) is used as the diode detector and AVC voltage source. This is then followed by a driver stage and a class "B" push-pull output stage. As you can see from the chart, the chassis use a pair of matched transistors in the final output stage and therefore should one transistor fail, both transistors must be replaced simultaneously as chances are they will not perform properly unless so matched.

Power Supply..... Four Zenith type Z-8 or Z-9 1 1/2 volt batteries or four 1 1/2 volt penlite batteries
Frequency Range 540 to 1600 KC
Intermediate Frequency 455 KC
Sensitivity..... Approximately 70 microvolts/meter for 50 milliwatts output
Power Output Undistorted 100 milliwatts
Power Output Maximum 180 milliwatts
Speaker 2 3/4 inch P.M.
Alnico V Voice Coil Impedance 15 ohms at 1000 cycles
Accessory Earphone B39-24 Impedance 15 ohms at 1000 cycles

PRINTED CIRCUIT SERVICING

Servicing printed circuit sets is, in general, much the same as servicing ordinary receivers. However, certain tools and techniques are well suited for this type of work. The following items are especially useful:

1. Good pair of long-nose pliers.
2. Sharp wire cutters.
3. Small stiff glue brush (for solder removal).
4. Pencil type soldering iron with a small tip (25 watts or less).

WARNING: Excessive heat may damage the printed circuit during component replacement if a soldering pencil, iron or gun of higher wattage rating is used.

5. Tin leads on component before soldering.
6. Use only solder with a 63% tin 37% lead mixture which has an extremely low melting point.
6. Metal pick (soldering aid).

COMPONENT REPLACEMENT

Resistors and capacitors should be replaced by clipping out the defective part and neatly soldering in the new part. If a unit, such as the oscillator coil or I.F. transformer, is to be removed heat the mounting lugs with a pencil type soldering iron and move them away from the soldered connection with a long-nose pliers or metal pick. Continue heating the lugs and brush away the molten solder with a small stiff glue brush. Remove the defective unit by lifting it off the chassis. Before inserting the new unit, be certain that the lug holes are open and free from solder. Forcing a lug against a solder filled lug hole may break the bond between the chassis base and the printed wiring. It is, therefore, necessary to exercise care when replacing units.

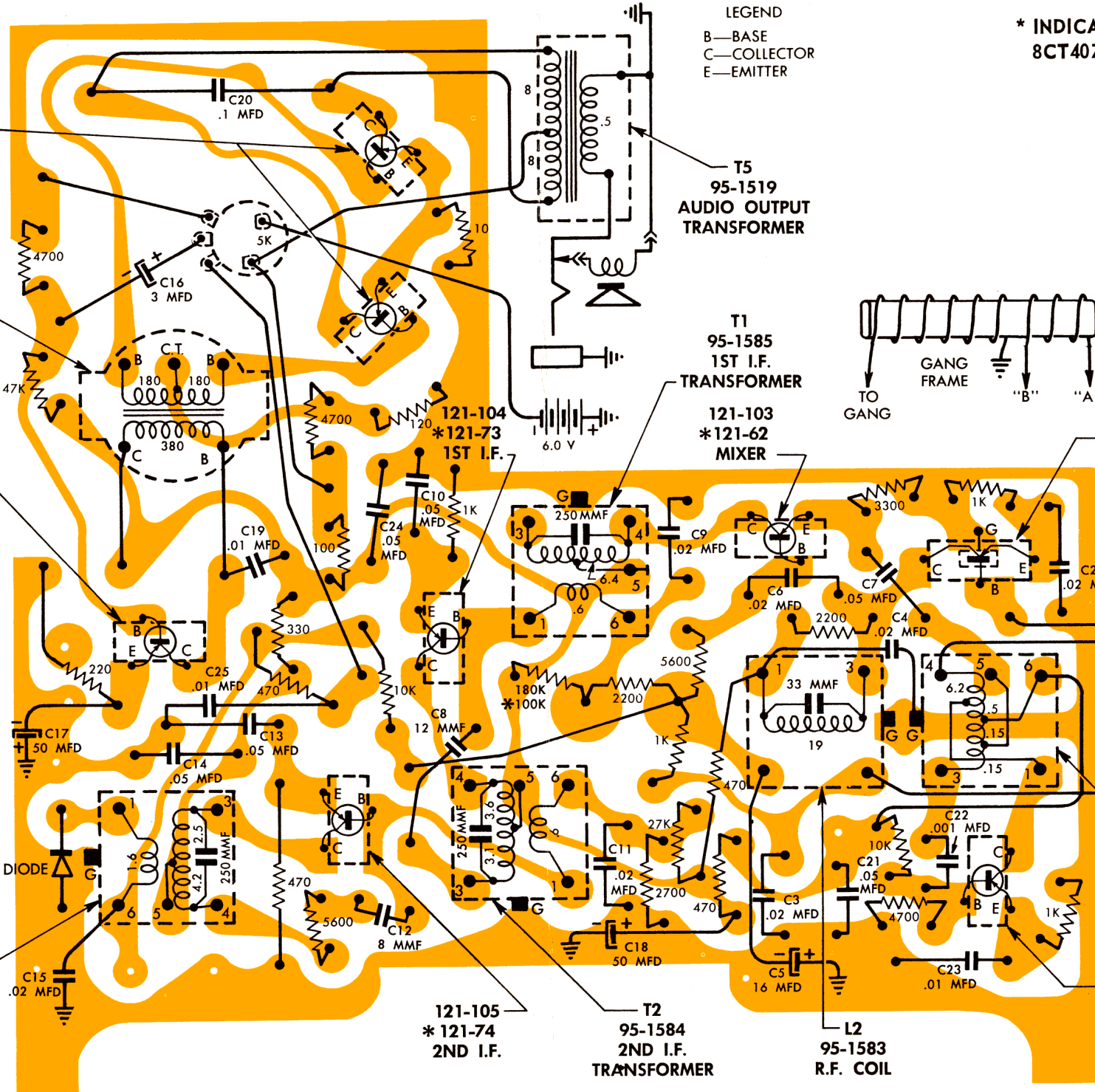
An open or damaged section of printed circuit wiring can be replaced by soldering a short jumper wire across the points to be connected.

121-107
*121-61
OUTPUT
MATCHED PAIR

T4
95-1518
DRIVER
TRANSFORMER

121-106
*121-64
DRIVER

T3
95-1586
3RD I.F.
TRANSFORMER



LEGEND
B—BASE
C—COLLECTOR
E—EMITTER

* INDICATES PARTS USED ON
8CT40Z2 CHASSIS ONLY.

T5
95-1519
AUDIO OUTPUT
TRANSFORMER

T1
95-1585
1ST I.F.
TRANSFORMER

121-103
*121-62
MIXER

121-101
*121-78
R.F.

LOOP "B"
GANG
OSC.

LOOP "A"

T6
95-1589
OSCILLATOR
TRANSFORMER

121-102
*121-65
OSC.

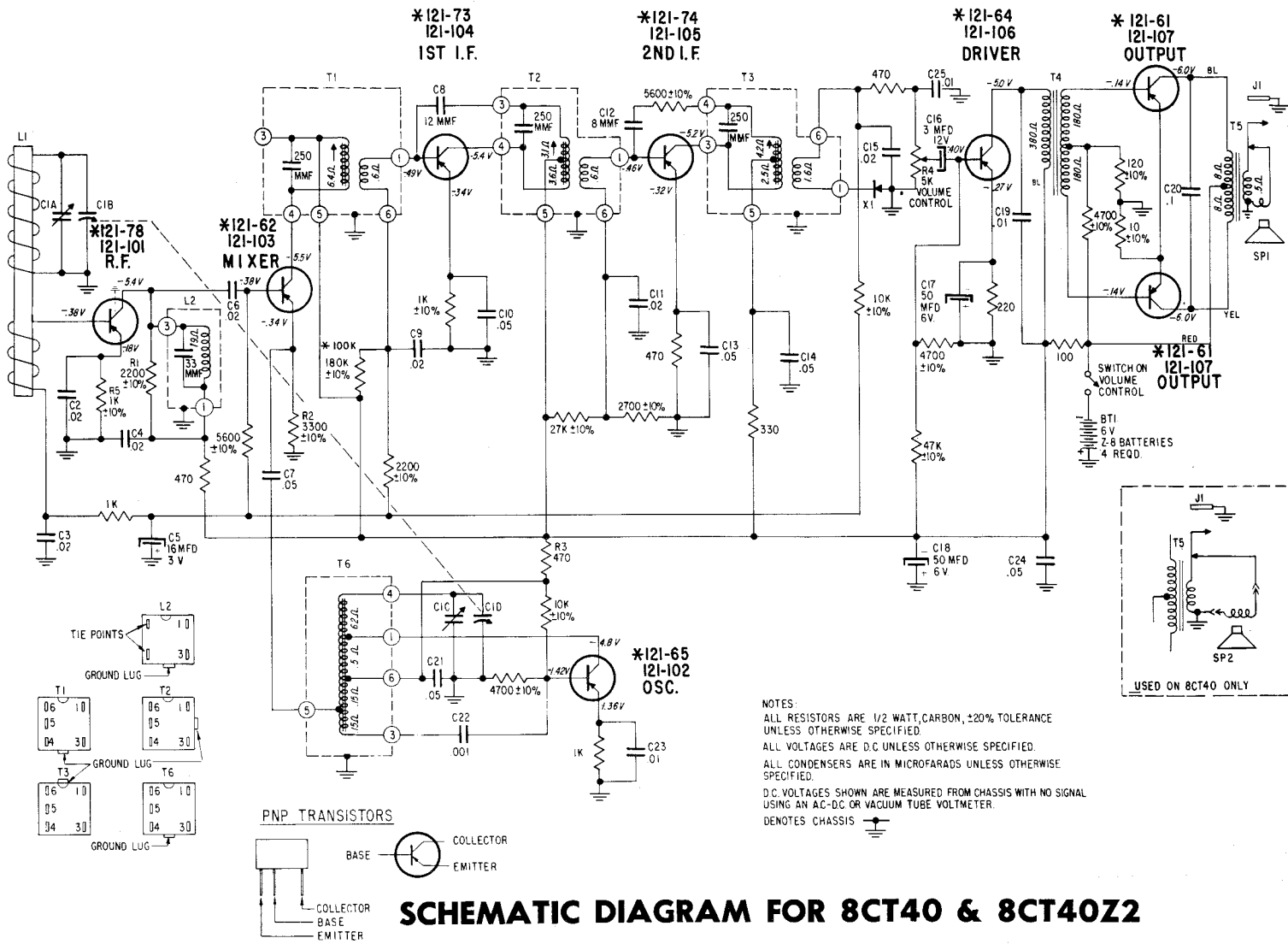
121-105
*121-74
2ND I.F.

T2
95-1584
2ND I.F.
TRANSFORMER

L2
95-1583
R.F. COIL

CHASSIS, WIRING AND COMPONENTS

VIEWED FROM WIRING SIDE

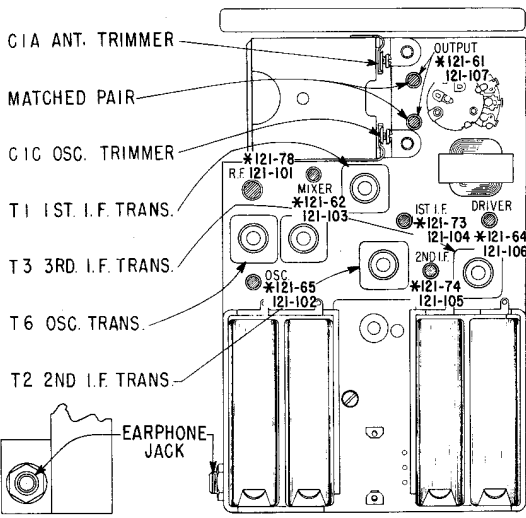


ALIGNMENT PROCEDURE

Operation	Input Signal Frequency	Connect Inner Conductor From Oscillator To	Connect Outer Shield Conductor From Oscillator To	Set Dial At	Trimmers	Purpose	
1	455 KC	ONE TURN LOOSELY COUPLED TO WAVEMAGNET	Chassis	600 KC	Adj. T1, T2 T3 for maximum output.	For I.F. Alignment	
2	1620 KC		—	Gang wide open	C1C	Set oscillator to dial scale.	
3	600 KC		—	Near 600 KC	Adjust slug in T6	Adjust T6 for maximum output while rocking gang. Tune T6 for maximum output regardless of dial accuracy.	
4	REPEAT STEPS 2 & 3		—	—	—	—	—
5	1260 KC		—	—	1260 KC	C1A	Align loop ant.

CHASSIS INFORMATION CHART

Chassis	Chassis Color Dot	Transistor Layout Label Color	Part No.	R.F.	Mixer	Osc.	1st I.F.	2nd I.F.	Crystal Diode Detector	Driver	Output-Output	Supplier
8CT40	Black	Black 102-6283	Zenith E.I.A. Type	121-101 2N544 PNP	121-103 2N411 PNP	121-102 2N409 PNP	121-104 2N409 PNP	121-105 2N409 PNP	103-19 1N87G	121-106 2N407 PNP	121-107 Matched Pair PNP	Sylvania
*8CT40Z2	Red	Red 102-5729	Zenith E.I.A. Type	121-78 2N544 PNP	121-62 2N411 PNP	121-65 2N409 PNP	121-73 2N409 PNP	121-74 2N409 PNP	103-19 1N87G	121-64 2N407 PNP	121-61 Matched Pair PNP	R.C.A.



TRANSISTOR & TRIMMER LAYOUT

CHASSIS PARTS
Chassis 8CT40 &
8CT40Z2

CABINET PARTS
Models Royal 500E, R, W & Y

PART NO.	DIA. NO.	DESCRIPTION	PRICE	PART NO.	DIA. NO.	DESCRIPTION	PRICE
				Z-8		1 1/2 volt battery (use 4)	
				or			
				Z-9		Mercury cell (use 4)	
12-2364		Variable capacitor mtg. brkt.	.10	14-2763		Plastic cabinet - front - R500YE	3.00
22-2726		50 mfd. electrolytic - 6V (2 used)	1.50	14-2764		Plastic cabinet - front - R500RE	3.00
22-2728		.05 mfd. ceramic disc - 25V	.60	14-2765		Plastic cabinet - front - R500WE	3.00
or				14-2784		Plastic cabinet - rear - R500YE	3.00
22-3034		.05 mfd. ceramic disc - 25V	.45	14-2785		Plastic cabinet - rear - R500RE	3.00
22-2729		.001 mfd. ceramic disc - 25V	.25	14-2786		Plastic cabinet - rear - R500WE	3.00
22-2871		16 mfd. electrolytic - 3V	1.50	16-1628		Packing carton	
22-2884		3 mfd. electrolytic - 12V	1.50	24-885		Battery cover - R500YE	.60
22-2885		.02 mfd. ceramic disc - 25V (3 used)	.25	24-886		Battery cover - R500RE	.60
22-2998		.01 mfd. mylar - 50V	.35	24-986		Battery cover - R500WE	
22-3010		.01 mfd. ceramic disc - 25V (3 used)	.45	36-208		Cabinet handle	1.00
22-3033		.02 mfd. ceramic disc - 25V (4 used)	.30	49-892		2 3/4" PM speaker	6.00
22-3034		.05 mfd. ceramic disc - 25V (2 used)	.45	57-2781		Emblem plate	.50
22-3156		8 mmfd. ceramic disc - 500V	.25	57-2782		Escutcheon - R500YE	3.75
22-3157		12 mmfd. ceramic disc - 500V	.25	57-2825		Escutcheon - R500RE	3.75
22-3165		.05 mfd. ceramic disc - 25V (3 used)	.35	57-2826		Escutcheon - R500WE	3.75
22-3209		2 section variable capacitor	4.25	71-130		6-32 x 5/16 Phils. flat hd. mach. screw (used on 14-2784, 5 & 6)	.03
44-34		Miniature jack	.90	80-1323		Clamp spring (2 used on 49-892)	.10
54-74		2-56 x 3/16 hex. nut (1 used on ea. 112-1048)	.03	80-1325		Knob ret. spring (pt. of S-47780)	.05
54-417		1/4 - 32 x 3/8 hex. nut (1 used on ea. 44-34 & 63-3693)	.10	86-326		Connector terminal (2 used)	.03
63-1701		10 ohm 1/2W ins. 10%	.17	97-525		Chassis mtg. stud	.40
63-1744		100 ohm 1/2W ins. 20%	.17	102-2286		Gold label	.15
63-1747		120 ohm 1/2W ins. 10%	.17	112-773		6-20 x 3/8 Phils. pan hd. self-tap screw (2 used on chassis)	.03
63-1758		220 ohm 1/2W ins. 20%	.17	112-1126		6-32 x 1/4 mach. screw (mts. cover)	.20
63-1765		330 ohm 1/2W ins. 20%	.17	112-1247		4-24 x 7/32 Phils. pan hd. self-tap screw (1 used on ea. 80-1323)	.03
63-1785		1000 ohm 1/2W ins. 10%	.17	114-49		6-32 x 5/8 x 1/4 hex. hd. mach. screw (used on 97-525)	.03
63-1786		1000 ohm 1/2W ins. 20% (2 used)	.17	114-700		4-40 x 7/32 x 3/16 hex. hd. self-tap screw (3 used on escutcheon)	.05
63-1799		2200 ohm 1/2W ins. 10%	.17	138-279		Cabinet grille	.90
63-1803		2700 ohm 1/2W ins. 10%	.17	188-204		Knob clamping ring (pt. of S-47440)	.03
63-1813		4700 ohm 1/2W ins. 10% (3 used)	.17	188-209		Knob clamping ring (pt. of S-46811)	.03
63-1817		5600 ohm 1/2W ins. 10% (2 used)	.17	188-243		Trim ring	
63-1827		10 K ohm 1/2W ins. 10% (2 used)	.17	197-47		Suction cup	
63-1845		27 K ohm 1/2W ins. 10%	.17	202-1518		Instruction book	.15
63-1855		47 K ohm 1/2W ins. 10%	.17	S-46811		Dial scale & bushing assem.	.75
63-3693		Volume control & sw.	2.05	S-47440		Vol. control knob	
63-4172		470 ohm 1/4W ins. 20%	.17	S-47780		Tuning control knob	
63-4185		1000 ohm 1/4W ins. 10%	.17			CHASSIS PARTS	
63-4199		2200 ohm 1/4W ins. 10%	.17			Chassis 8CT40 ONLY	
63-4206		3300 ohm 1/4W ins. 10%	.17				
78-1067		3 contact socket (7 used)	.30	63-1772		470 ohm 1/2W ins. 20% (3 used)	.17
78-1103		4 contact socket	.50	63-1870		100 K ohm 1/2W ins. 20%	.17
80-1075		Battery contact spring (2 pt. of S-47430)	.15	63-1880		180 K ohm 1/2W ins. 10%	.17
80-1091		Drive cord tension spring	.08	121-101		Transistor (R.F.)	3.75
80-1247		Battery contact spring (2 used)	.10	121-102		Transistor (OSC)	2.50
80-1317		Dual contact spring (pt. of S-47430)	.25	121-103		Transistor (mixer)	2.65
83-3025		Cushion strip	.03	121-104		Transistor (1st I.F.)	2.50
83-3178		Polyethylene strip (battery pull out)	.05	121-105		Transistor (2nd I.F.)	2.50
86-302		Insertion terminal (2 used)	.03	121-106		Transistor (driver)	1.75
86-327		Connector terminal (2 used)		121-107		Transistor - output (2 used)	2.15
93-1270		.095 I.D. x 1/4 O.D. x 1/2 Thk. bakelite washer (1 used on ea. 112-1048)	.03			CHASSIS PARTS	
95-1518		Driver transformer	5.00			Chassis 8CT40Z2 ONLY	
95-1519		Audio output transformer	3.50				
95-1583		R.F. transformer	3.50				
95-1584		2nd I.F. transformer	3.50				
95-1585		1st I.F. transformer	3.50				
95-1586		3rd I.F. transformer	3.50				
95-1589		Oscillator transformer	3.00				
103-19		Crystal diode	.75				
112-1048		2-56 x 1/4 binding hd. mach. screw (2 join S-47430 & 80-1247)	.03				
113-6		4-40 x 3/16 rd. hd. mach. screw - lockwasher (used on S-46794)	.03				
113-69		4-40 x 5/32 hex. hd. mach. screw - lockwasher att. (2 used on 22-3209)	.03				
S-46794		Antenna	1.75				
S-47430		Housing & spring assem.	1.75				

Prices shown are suggested U.S.A. retail prices which include U.S.A. Federal Manufacturers' Excise Tax where applicable and are subject to change without notice.

ZENITH RADIO CORP. 6001 Dickens Ave. Chicago 39, Ill.