WARE MANUFACTURING CORP.

Model T

Model 4 Tube "Music Master"

Model 7 Tube "Music Master"

V = Volume Control  N = Neutrodon
TC = Tuning Condensers  F = Filter Unit
LC = Loosser Coil  L = Leath

www.americanradiohistory.com
Un-off switch is located on volume control shaft. Coils L1 and L5 are inductively coupled to L2.
WARE PAGE 25

WARE MANUFACTURING CORP.

MODEL S-1
MODEL SBF

TYPE S-1 SUPERHETERODYNE

PEAK FREQUENCY - 178 KC

1.5
2500 FIELD

100 M

250 M

RF (24)

D1 (24)

IF (24)

D2 (24)

AF ('27)

Model SBF same as SBF except binding post A-2 & antenna condenser are omitted.

CAUTION: Set should not be turned on unless loud speaker is connected & all tubes are in sockets.

TYPE S.B.F. SUPERHETERODYNE
WELLS - GARDNER & CO.

MODEL 062 Series
Schematic
Voltage

IF PEAK 262 K.C.

Table 1
Plate to Screen to Grid to Plate
Cathode Cathode Cathode Cathode
1st Det 2.1 90 90 90 90
1st Det 2.1 226 230 226 226
1st Det 2.1 226 226 226 226
1st Det 2.1 226 226 226 226
2nd Det 4.7 170 170 170 170
2nd Det 4.7 225 225 225 225
2nd Det 620 225 225 225 225
** When read with cord and plug, ground the control grid.

** High resistance interferes with correct tuning.
WILLARD STORAGE BATTERY CO.

MODEL B Unit 3095
MODEL B Unit 3310, 4310
MODEL B Unit 4095

Standard "B" Power Unit, Part No. 3095, 50-60 Cycle

Super "B" Power Units, Part Nos. 3310 and 4310
25-40 and 50-60 Cycle

Standard "B" Power Unit, Part No. 4095, 50-60 Cycle
WILLARD STORAGE BATTERY CO.

MODEL AB 6301
MODEL AB 3301
G.E. Charger
MODEL AB 3301
Westinghouse

Combination “A-B” Power Unit,
Part No. 6301, 4 Volt, 50-60 Cycle

Combination “A-B” Power Unit, Part No. 3301
(General Electric Charger), 6 Volt, 50-60 Cycle

Combination “A-B” Power Unit, Part No. 3301
(Westinghouse Charger), 6 Volt, 50-60 Cycle
A Z-24 automatic volume control tube keeps the volume of the incoming signal constant by varying the grid bias voltage on the 1st R. F., 1st detector, and I. F. stages, in relation to the change of R. F. energy amplified before the 2nd detector. The three grid returns mentioned are coupled to the plate of the automatic volume control tube through three limiting resistors, while the 2nd detector grid couples to the volume control tube grid through a small fixed condenser. Any variation in signal strength on the 2nd detector grid is transferred to the automatic volume control tube which, proportionately varies the voltage drop across the volume control tube plate resistor which changes the bias of the three tubes mentioned.

The local distance switch simply shunts a resistor from plate to cathode of the automatic volume control tube when in the local position, thereby placing a constant bias on the three R. F. stages.
REVISED CIRCUIT - SCHEMATIC DIAGRAM # 2

MODEL 91 (2014) FOR SERIAL NUMBERS AFTER 375,354
MODEL 92 (2014) FOR SERIAL NUMBERS AFTER 301,394
In all receivers, bearing serial numbers 373,334 on model 91 and 301,394 on model 92, or higher, the manual control has been removed from the A.V.C. cathode and placed in the grid circuit of the first A.F. stage. A tapped resistor takes the place of the original control. By use of this new system, the automatic volume control operates independently and at full efficiency, manual volume being controlled by varying the audio output.

Since the A.V.C. or R.F. circuit remains constant, the tuning meter will show maximum swing on the station at any manual control setting. Originally the meter action decreased as the volume was lowered.

The parts list shown previously, except for the substitutions given below, should be used when ordering replacement components.

**PARTS CHANGE.**

1 Audio volume control, part # 63-212 List $1.65
1 Center tapped resistor, part # 63-210 List $0.50
Deduct the 63-171 volume control.

---

All ten-tube Zenith Superheterodynes after the above serial numbers will incorporate a variable Sensitivity Control in place of the original Local-Distance switch. The diagram (*) indicates its position as being connected into the I.F. cathode. In addition to the control unit the first detector coil has been replaced by one having slightly different construction to provide equal sensitivity over the entire tuning range. It is not advisable to make this change in receivers subsequent to the above numbers, for the reason that each complete set of chassis coils must be inductively matched, otherwise the efficiency of the receiver will be seriously affected.

The following alteration makes the parts list directly applicable to the improved models:

**DEDUCT**

1 Local-Distance switch, part # 85-31
1 First detector coil, " # S-997
1 Eight megohm resistor " # 63-224
1 250,00 ohm resistor " # 63,135

**ADD**

1 Sensitivity Control, part # 63-228
1 Det. coil assembly " # S-2104
1 Bypass condenser, " # 22-115
1 50,000 ohm resistor, " # 63-135
Balancing Chassis

Every Zenith Superheterodyne Receiver is carefully balanced on laboratory equipment before leaving the factory and should not require further attention in this respect. However, in the event that some part of the R. F. circuit has been changed, or the adjustments shifted by mishandling, the chassis may be rebalanced as follows:

If an oscillator is available more accurate results will be obtained. It should be accurately calibrated from 1750 to 550 kilocycles and should also have provision for generating a 175 kilocycle signal. In cases where an oscillator is not available a fairly good result may be had by listening to stations which operate as nearly as possible to the extreme ends of the dial. Although an output meter will give more accurate results, satisfactory adjustments can be made simply by listening to the speaker.

The chassis should be removed from the cabinet so that all adjustments are easily accessible. Next place the test oscillator in operation and connect it directly to the antenna and ground posts of the receiver. It should then be set to 1500 kilocycles and the receiver tuned to the same reading on the dial. If the oscillator is not accurate the stations will not be received on their proper calibration. If a station is used for this purpose, the dial pointer should first be set to the exact frequency of the station being received. Beginning with the variable condenser tuning section at the extreme left, which tunes the oscillator circuit, the trimmer should be regulated for maximum output of the receiver, while rocking the tuning condenser back and forth over the range. The trimmer, or vernier adjustment, is made by adjusting the antenna compensator knob as explained in the instruction card. The third, or 1st R. F., trimmer, is trimmed in the same manner as the oscillator. When the volume reaches a very high level, so that it is difficult to determine slight changes, it should be reduced by means of the volume control knob so as to be barely audible. The fourth, or 1st detector section, is next in order and its trimmer should also be adjusted for resonance.

After the vernier adjustments have been completed the test oscillator should be set at 550 kilocycles and the dial of the receiver tuned until the oscillator signal is tuned in. Now the oscillator padding condenser (see fig. 3) should be carefully adjusted with a screw driver for maximum output of the receiver, while rocking the tuning condenser back and forth over the signal. This padding adjustment brings the OSCILLATOR circuit of the receiver in resonance with the remaining tuned circuits and, thereby, enables it to track accurately over the entire scale. The receiver will now operate at full efficiency and all stations will be received at their proper calibration. If this is not found to be entirely so, the entire balancing operation should be repeated.

The intermediate transformers used in the ten tube Superheterodyne have been accurately peaked at 175 kilocycles on a temperature controlled crystal oscillator before leaving the factory. It is not recommended that their adjustments be tampered with unless an oscillator is available which is very accurately calibrated at 175 kilocycles, or unless the serviceman is absolutely certain the troubles lie in their adjustment. However, if it is necessary to check the adjustments, the 175 K. C. test oscillator may be connected to the grid terminal of the 1st detector through a 00025 fixed condenser. The ground lead of the test oscillator is connected to the ground post of the receiver. The oscillator tube must be removed from the chassis while this operation is being performed. Four adjusting screws are provided under the chassis directly beneath the intermediate transformers, which tune the plate circuit of the 1st detector, grid and plate circuits of the 1st detector, and grid circuit of the second detector. (See wiring diagram.) Beginning with the 2nd detector grid vernier, each adjusting screw should, in turn, be set for maximum signal output from the speaker or output meter. For best results the verniers should be gone over twice in the same rotation always keeping the output from the test oscillator at the weakest possible strength in order to determine slight variations in volume.
CONDENSERS

22-82 .001 Mfd. .................................................. (2nd Det. Plate) ........................................ $ .30
22-110 .1 Mfd ..................................................... (R.F.) .................................................... .50
22-111 .03 Mfd ...................................................... (A.V.C. Plate) ....................................... .30
22-112 .1 Mfd ...................................................... (2 Used. See Footnote) ............................ .15
22-113 .5 Mfd ...................................................... (3 Used. See Footnote) ............................ .30
22-115 .1 Mfd ...................................................... (3 Used. See Footnote) ............................ .10
22-119 6. Mfd ....................................................... (High Voltage Electrolytic) ...................... 1.50
22-122 Four Gang Variable ................................... ....................................................... 7.00
22-125 .8 Mfd ...................................................... (Low Voltage Electrolytic) .......................... 1.50
22-126 .006 Mfd .................................................... (Tone Control) ....................................... .55
22-127 .000025 Mfd ................................................. (A.V.C. Coupling) ................................... .35
22-129 Oscillator, Padding .................................... ....................................................... .75

RESISTORS

63-111 2M Ohm 1 Watt ........................................ (1st A.F. Cathode) .................................... $ .10
63-121 100M Ohm 1 Watt ...................................... (2nd Det. Plate) .................................... .30
63-131 400 Ohm 1/2 Watt .................................... (A.V.C. Voltage Divider) ......................... .30
63-135 25M Ohm 1/2 Watt .................................... (2nd Detector Cathode) ......................... .30
63-136 2500 Ohm 1/2 Watt .................................. (1st A.F. Grid) ........................................ .30
63-140 1 Meg Ohm 1/2 Watt ................................ (Oscillator Grid) ..................................... .30
63-144 3 Meg Ohm 1/2 Watt ................................ (A.V.C. Grid) ........................................ .30
63-146 2M Ohm 1/2 Watt .................................... (1st A.F. Cathode) ................................ .30
63-166 1400 Ohm 1/4 Watt ................................ (3 Used. See Footnote) ............................ .30
63-167 8M Ohm 1 Watt ........................................ (A.V.C. Divider) .................................. .30
63-168 3600 Ohm 2 Watt .................................. (Plate Voltage Divider) ....................... .50
63-169 400M Ohm 1/2 Watt ................................ (A.V.C. Plate) ........................................ .30
63-170 2800 Ohm 2 Watt .................................. (Plate Voltage Divider) ....................... .50
63-171 Manual Volume Control and Switch Assembly ............................................ 1.65
63-172 Tone Control ........................................... ....................................................... .10
63-173 750 Ohm Metal Mounting .................................. (Power Tube Bias) ...................... .40
63-180 1M Ohm 1/2 Watt .................................. (1st Detector Cathode) ......................... .10
63-188 41/2 Meg. Ohm 1/2 Watt ................................ (A.V.C. Plate) ................................... .10

Note: All resistors employed in this receiver are marked in accordance with R.M.A. standards. Color code charts may be obtained by writing direct to the Erie Resistor Corp., Erie, Pa.

S-912 Intermediate Transformer Complete (2 Used) (Specify with or without grid lead) .......... $2.50
S-916 Antenna and 1st R.F. Coils .................................................. .75
S-997 1st Detector Complete .................................................. 1.25
S-999 Oscillator Coil Complete .................................................. 1.25

Note: 22-112 Filter Choke By-pass and 1st Audio Coupling Condensers
22-113 1st R.F., 1st Det. and I.F. Screen, 2nd Det. and A.F. Cathode
22-115 2nd Det. and I.F. Grid Return, 1st Det. Cathode
PARTS LIST AND DATA

22-74.......... 0.1 Mfd.
22-77.......... Dual 0.1 Mfd.
22-81.......... .01 Mfd. (T.C.)
22-82.......... .001 Mfd.
22-83.......... .03 Mfd.
63-108..........50000 Ohms-green
63-110.......... 400 Ohms-yellow
63-111.......... 2000 Ohms-black
63-113..........250000 Ohms-white
63-127.......... 1 Meg.-brown
63-128..........50000 Ohms (V.C.)
63-130..........800 Ohms-bl-yel.

POWER UNITS
MODELS 10, 11, 12
22-71.......... 1.0 Mfd.
22-72.......... 8.0 Mfd. (Elect)
63-114..........10 Ohm (C.T.)
63-124..........10450 Ohm V. Div.
95-85 Power Transformer
95-84 Power Transformer for models 102, 112, 122, 25 cycle sets.

CIRCUIT DIAGRAM
SUPER ZENITH RECEIVER
MODELS 10, 11, 12 and 102, 112, 122

VOLTAGE READINGS AT SOCKETS USING WESTON 547 ANALYZER

<table>
<thead>
<tr>
<th>TYPE</th>
<th>POSITION</th>
<th>FIL VOLS</th>
<th>PLATE VOLS</th>
<th>GRID VOLS</th>
<th>SCREEN VOLS</th>
<th>NORMAL PLATE M.A.</th>
<th>GRID TEST M.A.</th>
</tr>
</thead>
<tbody>
<tr>
<td>224</td>
<td>1st R.F.</td>
<td>2.3</td>
<td>185</td>
<td>3.25</td>
<td>90</td>
<td>4</td>
<td>7</td>
</tr>
<tr>
<td>224</td>
<td>2nd R.F.</td>
<td>2.3</td>
<td>185</td>
<td>3.4</td>
<td>90</td>
<td>4</td>
<td>7.5</td>
</tr>
<tr>
<td>224</td>
<td>3rd R.F.</td>
<td>2.3</td>
<td>185</td>
<td>3.3</td>
<td>90</td>
<td>4</td>
<td>7.5</td>
</tr>
<tr>
<td>245</td>
<td>Det.</td>
<td>2.3</td>
<td>90</td>
<td>3</td>
<td>30</td>
<td>.25</td>
<td>.75</td>
</tr>
<tr>
<td>227</td>
<td>1st A.F.</td>
<td>2.3</td>
<td>170</td>
<td>12</td>
<td>—</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>245</td>
<td>P.P.</td>
<td>2.3</td>
<td>245</td>
<td>50</td>
<td>—</td>
<td>28</td>
<td>37</td>
</tr>
<tr>
<td>245</td>
<td>P.P.</td>
<td>2.3</td>
<td>245</td>
<td>50</td>
<td>—</td>
<td>28</td>
<td>37</td>
</tr>
</tbody>
</table>
A new development in the form of capacity coupling is used between the R. F. stages. Close examination will reveal the fact that it comprises a single band of bus-bar wire. This band is connected from the plate terminal of the preceding R. F. stage and coupled to the grid coil of the following R. F. stage. The position of this band is permanently adjusted at the factory and should never be altered or tampered with unless the available line voltage is extremely low.

The distance from the coupling band to the grid or top end of the R. F. coil entirely governs the stage coupling and efficiency of the set. If this band is too close to the grid end, excessive coupling will result, causing a decided lack of selectivity. If the band is placed too low, the result will be a lack of sensitivity. Midway between the coil winding is the exact and most efficient operating position. If it is found necessary to reset this band, insulating cement or other fastening substance should be applied to hold it in position, since loose vibration would cause frequency flutter.

The R. F. plate chokes are concealed beneath the R. F. coil base between the base and sub-panel. These chokes have an inductance of 6.75 M. H. and can be distinguished from the detector plate choke by the fact that they have 150 less turns. If an occasion arises which necessitates removing an R. F. choke, the serviceman should make certain that the 1⁄4 inch spacing is maintained between the choke and the R. F. coil base. To neglect this important adjustment may cause erratic operation of the receiver.

Occasionally, and especially if the receiver has remained idle for a long length of time, it may have a tendency to oscillate. This is always due to poor contact between the wipers and rotor bearings of the variable condenser gang. It may be overcome by cleaning both parts with fine sandpaper or by revolving the dial several times to remove oxidization at that point.

BALANCING

When resonating the variable condenser system for most efficient receiver performance, it will be noticed that an entirely new and fool-proof system of locking the verniers has been employed. The large locking nut may be loosened with a No. 6 Spintite wrench and the vernier screw turned with a small pointed screwdriver.

Proper method of balancing is accomplished by setting the antenna input control first on the No. 1 position. A station of low wavelength should be tuned to resonance on the dial. Adjust each trimmer condenser to exact resonance or so that it is set to peak volume. After this has been done, the input control should be set to the No. 2 position and the antenna section trimmer readjusted.

Upon completion, make certain that the wavelength of the station chosen corresponds to the proper wavelength reading on the drum dial.
ZENITH RADIO CORP.

Resistors
- 63-135 25M ohm
- 63-139 500M ohm
- 63-140 1meg
- 63-160 100M ohm
- 63-181 Volume Control and Switch
- 63-195 12M ohm
- 63-196 6M ohm
- 63-197 17M ohm
- 63-198 30M ohm
- 63-199 150M ohm
- 63-200 Tone Control

Parts List
- Resistors
- Capacitors
- Transformers
- Diodes
- Transistors
- Connectors
- Switches

MODEL BH (2021)
Schematic
Parts List

(See Footnote) (Pentode Bias)
(See Footnote) (Oscillator Grid)
(Voltage Divider)
(Voltage Divider)
(R.F. & I.F. Screen)
(1st Detector Screen)
(R.F. & I.F. Cathode)

Fixed Capacitors
- 22-112 .002 mf
- 22-113 .01 mf
- 22-114 .1 mf
- 22-115 1 mf
- 22-116 4.7 mf
- 22-117 4.7 mf
- 22-118 4.7 mf
- 22-119 4.7 mf
- 22-120 4.7 mf

Pre-Selector Coil 0.5 henry
1st Detector Plate Choke
2nd Detector Plate Choke
R.F. & I.F. Transformer
R.F. & I.F. Filter
Oscillator Coil
Intermediate Transformer
1st Detector Screen
Radio Transformer
Oscillator Grid Lead

www.americanradiohistory.com
MODEL 103
Chassis 2017
Above Serial # 450,451
Schematic

SERIAL NUMBERS AFTER 450,451 ONLY.

MODEL 103 (2017)

PEAK FREQUENCY
176 RC
### MISCELLANEOUS

<table>
<thead>
<tr>
<th>Part</th>
<th>Description</th>
<th>Price</th>
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<tbody>
<tr>
<td>19-24</td>
<td>Grid Clip</td>
<td>.02</td>
</tr>
<tr>
<td>14-4</td>
<td>Phone Jack Base Assembly</td>
<td>.30</td>
</tr>
<tr>
<td>46-10</td>
<td>Tuning Knob</td>
<td>.15</td>
</tr>
<tr>
<td>46-55</td>
<td>Control Knob (3 used)</td>
<td>.20</td>
</tr>
<tr>
<td>19-38</td>
<td>Dynamic Speaker</td>
<td>25.00</td>
</tr>
<tr>
<td>52-25</td>
<td>Speaker Multicord</td>
<td>.15</td>
</tr>
<tr>
<td>57-308</td>
<td>Dial Escutcheon Plate</td>
<td>.80</td>
</tr>
<tr>
<td>57-309</td>
<td>Meter Escutcheon Plate</td>
<td>.85</td>
</tr>
<tr>
<td>73-5</td>
<td>Small Set for Auto Coupling</td>
<td>.01</td>
</tr>
<tr>
<td>78-36</td>
<td>Z-17 Socket</td>
<td>.20</td>
</tr>
<tr>
<td>78-37</td>
<td>Z-27 Socket</td>
<td>.20</td>
</tr>
<tr>
<td>78-38</td>
<td>Z-40 Socket</td>
<td>.20</td>
</tr>
<tr>
<td>78-40</td>
<td>Z-66 Socket</td>
<td>.20</td>
</tr>
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<td>78-41</td>
<td>Z-46 Socket</td>
<td>.20</td>
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<td>78-42</td>
<td>Amperite Socket</td>
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<td>83-302</td>
<td>Speaker Multicord Terminal Strip</td>
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<tr>
<td>85-24</td>
<td>Phone Switch</td>
<td>.75</td>
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<td>85-32</td>
<td>Local Distance-and Mate Switch</td>
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<td>93-147</td>
<td>Electrolytic Condenser Insulating Washer</td>
<td>.03</td>
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<tr>
<td>93-102</td>
<td>110 volt 60 cycle Power Transformer</td>
<td>8.00</td>
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<td>93-116</td>
<td>110 volt 25 cycle Power Transformer</td>
<td>13.50</td>
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<tr>
<td>114-6</td>
<td>Large Set for Auto Coupling</td>
<td>.05</td>
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<tr>
<td>136-2</td>
<td>2 amp Fuse</td>
<td>1.10</td>
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<tr>
<td>141-11</td>
<td>Auto Coupling Collar</td>
<td>.85</td>
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<tr>
<td>184-37</td>
<td>Auto Control Shaft Assembly</td>
<td>.75</td>
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<tr>
<td>184-176</td>
<td>Power Choke</td>
<td>4.00</td>
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<tr>
<td>184-177</td>
<td>Audio Transformer (Five Lead)</td>
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<tr>
<td>184-178</td>
<td>Audio Transformer (Six Lead)</td>
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### COILS

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<tbody>
<tr>
<td>20-8</td>
<td>2nd R. F. Plate Choke</td>
<td>.50</td>
</tr>
<tr>
<td>20-12</td>
<td>Antenna Choke</td>
<td>.50</td>
</tr>
<tr>
<td>8-109</td>
<td>2nd Detector Plate Choke and Bracket</td>
<td>.50</td>
</tr>
<tr>
<td>1068</td>
<td>Pre-Selector</td>
<td>2.00</td>
</tr>
<tr>
<td>1073</td>
<td>1st R. F.</td>
<td>.90</td>
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<tr>
<td>1065</td>
<td>1st Detector</td>
<td>1.20</td>
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<tr>
<td>1066</td>
<td>J. F. Transformer (Specify with or without Grid Lead)</td>
<td>2.85</td>
</tr>
<tr>
<td>1067</td>
<td>Oscillator</td>
<td>1.65</td>
</tr>
<tr>
<td>1068</td>
<td>2nd R. F. Tuned Transformer</td>
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</tr>
<tr>
<td>1072</td>
<td>Coupling Coll</td>
<td>.90</td>
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### RESISTORS

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</tr>
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<tbody>
<tr>
<td>8-135</td>
<td>25M Ohm (1st, 2nd Detector Cathode)</td>
<td>.50</td>
</tr>
<tr>
<td>140</td>
<td>1 Meg Ohm (Detector Grid)</td>
<td>.80</td>
</tr>
<tr>
<td>1346</td>
<td>2M Ohm (2nd Detector)</td>
<td>.80</td>
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<tr>
<td>1400</td>
<td>Ohm (J. F. and L. F. Grid Return)</td>
<td>.80</td>
</tr>
<tr>
<td>166</td>
<td>400M Ohm (A. V. C. Plate)</td>
<td>.80</td>
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<tr>
<td>1653</td>
<td>1600 Ohm (A. V. C. Dividers, Metal Mtg.)</td>
<td>.75</td>
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<tr>
<td>183</td>
<td>4M Ohm (Voltage Divider, see footnotes)</td>
<td>.65</td>
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<tr>
<td>184</td>
<td>750 Ohm (Power Bias)</td>
<td>.80</td>
</tr>
<tr>
<td>196</td>
<td>5M Ohm (2nd Detector Grid)</td>
<td>.80</td>
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<tr>
<td>192</td>
<td>Volume Control and Switch Assembly</td>
<td>1.75</td>
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<tr>
<td>193</td>
<td>Tone Control</td>
<td>1.00</td>
</tr>
<tr>
<td>144</td>
<td>3 Meg Ohm (A. V. C. Grid)</td>
<td>.50</td>
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### DIAL ASSEMBLY

<table>
<thead>
<tr>
<th>Part</th>
<th>Description</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>1003</td>
<td>Dial Light Socket and Clip (less lamp)</td>
<td>.90</td>
</tr>
<tr>
<td>1009</td>
<td>Tuning Shaft and Bracket Assembly</td>
<td>1.50</td>
</tr>
<tr>
<td>1010</td>
<td>Drum Gear and Cam</td>
<td>.85</td>
</tr>
<tr>
<td>1106</td>
<td>Dial Pointer and Reflective Plate</td>
<td>1.50</td>
</tr>
<tr>
<td>1120</td>
<td>Dial Strip and Bracket</td>
<td>.85</td>
</tr>
<tr>
<td>1121</td>
<td>Dial Pointers and Reflectors</td>
<td>.20</td>
</tr>
<tr>
<td>1151</td>
<td>Dial Light Clip</td>
<td>.35</td>
</tr>
<tr>
<td>1161</td>
<td>Dial Elevator Shaft</td>
<td>.10</td>
</tr>
<tr>
<td>1172</td>
<td>Dial Pointers and Reflectors</td>
<td>.08</td>
</tr>
<tr>
<td>1119</td>
<td>Roller Bearings</td>
<td>.08</td>
</tr>
<tr>
<td>110</td>
<td>3/4 volt Meter Lamp</td>
<td>.08</td>
</tr>
<tr>
<td>120</td>
<td>2/4 volt Meter Lamp</td>
<td>.20</td>
</tr>
<tr>
<td>120</td>
<td>2/4 volt Meter Lamp</td>
<td>.60</td>
</tr>
<tr>
<td>122</td>
<td>Taping Meter and Cord</td>
<td>2.35</td>
</tr>
<tr>
<td>118</td>
<td>Dial Elevator Arm</td>
<td>.35</td>
</tr>
</tbody>
</table>

22-50 1st Detector Cathode and A. V. C. Plate.
22-107 2nd Detector Cathode, 1st A. F. Bias, L. F. Plate and Voltage Divider.

### IMPORTANT: GIVE SERIAL NUMBER OF RECEIVER ON ALL PARTS ORDERS.

All prices are subject to regular discount and change without notice.
MODEL 103
Chassis 2017
Above Serial # 451,260
Schematic

ZENITH RADIO CORP.

MODEL 103 (2017) SERIAL NUMBERS AFTER 451,260
**Socket Voltages**

<table>
<thead>
<tr>
<th>Type</th>
<th>Position</th>
<th>Fil.</th>
<th>Plate</th>
<th>Control Grid</th>
<th>Cathode</th>
<th>Plate M. A.</th>
<th>S. G.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Z-51</td>
<td>1st. R. F.</td>
<td>2.2</td>
<td>185</td>
<td>9.</td>
<td>0.</td>
<td>2.5</td>
<td>80</td>
</tr>
<tr>
<td>Z-51</td>
<td>2nd. R. F.</td>
<td>2.2</td>
<td>200</td>
<td>3.9</td>
<td>0.</td>
<td>3.</td>
<td>84</td>
</tr>
<tr>
<td>Z-24</td>
<td>1st Det.</td>
<td>2.2</td>
<td>185</td>
<td>0.</td>
<td>+7.</td>
<td>.25</td>
<td>70</td>
</tr>
<tr>
<td>Z-27</td>
<td>Osc.</td>
<td>2.2</td>
<td>80</td>
<td>0.</td>
<td>0.</td>
<td>7.</td>
<td>0</td>
</tr>
<tr>
<td>Z-51</td>
<td>I. F.</td>
<td>2.2</td>
<td>185</td>
<td>4.</td>
<td>0.</td>
<td>3.</td>
<td>90</td>
</tr>
<tr>
<td>Z-51</td>
<td>I. F.</td>
<td>2.2</td>
<td>185</td>
<td>4.</td>
<td>0.</td>
<td>2.</td>
<td>90</td>
</tr>
<tr>
<td>Z-27</td>
<td>2nd. Det.</td>
<td>2.2</td>
<td>185</td>
<td>0.</td>
<td>+17.5</td>
<td>.5</td>
<td>0</td>
</tr>
<tr>
<td>Z-27</td>
<td>1st. P. P.</td>
<td>2.2</td>
<td>165</td>
<td>0.</td>
<td>+12.5</td>
<td>3.</td>
<td>0</td>
</tr>
<tr>
<td>Z-27</td>
<td>1st. P. P.</td>
<td>2.2</td>
<td>165</td>
<td>0.</td>
<td>+12.5</td>
<td>3.</td>
<td>0</td>
</tr>
<tr>
<td>Z-45</td>
<td>2nd. P. P.</td>
<td>2.3</td>
<td>240</td>
<td>-48.</td>
<td>0.</td>
<td>36.</td>
<td>0</td>
</tr>
<tr>
<td>Z-45</td>
<td>2nd. P. P.</td>
<td>2.3</td>
<td>240</td>
<td>-48.</td>
<td>0.</td>
<td>36.</td>
<td>0</td>
</tr>
<tr>
<td>Z-24</td>
<td>A. V. C.</td>
<td>2.3</td>
<td>30</td>
<td>4.</td>
<td>0.</td>
<td>0.</td>
<td>45</td>
</tr>
<tr>
<td>Z-80</td>
<td>Rect.</td>
<td>5</td>
<td>350</td>
<td>0.</td>
<td>0.</td>
<td>70.</td>
<td>0</td>
</tr>
</tbody>
</table>

Voltage readings taken with a Weston model 566 type 3 tester. Manual volume control in maximum position and antenna and ground disconnected. Line voltage 112.

**Tube Layout** - Showing Position and Circuit Function of each.
Resistors

63-121 100M ohm 1 Watt (2nd Detector Plate)
63-135 25M " 4 4 (2nd Detector Cathode)
63-137 250M " 4 4 (Oscillator & Power Grid)
63-140 1 meg" 4 4 (A.V.C. Screen)
63-160 100M " 4 4 (A.V.C. Plate)
63-169 400M " 4 4 (A.V.C. Grid)
63-239 24M ohm 1 Watt (Oscillator Plate)
63-244 500 " 4 4 (1st Detector Cathode)
63-251 Voltage Divider (six tap)
63-252 Voltage Divider (five tap)

Coils and Chokes

20-30 Antenna Coil
20-31 Oscillator Coil
20-35 Detector Coil
95-133 1st & 2nd I.F. Transformer

Condensers

22-112 .1 mfd 300 volt(2nd Detector Screen & Power Grid)
22-113 .5 " .......(R.F.1st Detector & I.F.Grid Return)
22-117 .5 " 200 volt(Four used, see below)
22-137 .05 " 400 volt(Oscillator Plate)
22-147 .005 600 volt(2nd Detector Plate & A.V.C.Screen)
22-170 .1 mfd 400 volt(R.F. & 1st Detector Plate,2nd Detector Plate)
22-171 .05 " 600 volt(Tone Control)
22-172 2. " 450 volt(Filter)
22-173 8. " 500 volt(Filter)

Socket Voltages

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Z-58</td>
<td>R.F.</td>
<td>2.4</td>
<td>190</td>
<td>0</td>
<td>95</td>
<td>0</td>
<td>7,</td>
</tr>
<tr>
<td>Z-58</td>
<td>1st Det.</td>
<td>2.4</td>
<td>190</td>
<td>2.3</td>
<td>95</td>
<td>2.3</td>
<td>4,</td>
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<tr>
<td>Z-56</td>
<td>Osc.</td>
<td>2.4</td>
<td>100</td>
<td>0</td>
<td>-</td>
<td>-</td>
<td>4,</td>
</tr>
<tr>
<td>Z-58</td>
<td>I.F.</td>
<td>2.4</td>
<td>190</td>
<td>0</td>
<td>90</td>
<td>0</td>
<td>2,</td>
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<tr>
<td>Z-57</td>
<td>2nd Det.</td>
<td>2.4</td>
<td>90</td>
<td>-60</td>
<td>70</td>
<td>-60</td>
<td>.2</td>
</tr>
<tr>
<td>Z-57</td>
<td>A.V.C.</td>
<td>2.4</td>
<td>-10</td>
<td>-65</td>
<td>-2</td>
<td>-65</td>
<td>0,</td>
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<tr>
<td>Z-59</td>
<td>Power</td>
<td>2.4</td>
<td>175</td>
<td>-70</td>
<td>165</td>
<td>-70</td>
<td>25,</td>
</tr>
<tr>
<td>Z-80</td>
<td>Rect.</td>
<td>5.</td>
<td>*350</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>*36</td>
</tr>
</tbody>
</table>

Line 115 Volts

All readings, with exception of heaters, taken from socket connections to ground. Use 1,000 ohm per volt D. C. meter.

All Controls Maximum

BALANCE I.F. frequency at 175 K.C. Condenser gang at 1500 K.C. and oscillator padder at 600 K.C.