
Models 40S, 41S, 42S and 82S consist of three stages of Radio frequency amplification using —24 type tubes, a detector stage using a —27 type tube, a stage of audio frequency amplification using a —27 type tube and a push-pull amplifier using —45 type tubes. Figure 1 shows a schematic diagram of this set as it was first built for use with type J Dynacoil speaker. Two different types of antenna connections have been used on this receiver as shown in the diagram. The coil shown in the “new antenna connection” is connected directly to the grid of the first 224 tube and acts as an auto transformer, the other end of the coil being connected to the ground connection.

In order to use these receivers with the type M speaker, it was necessary to change the resistance values and the circuit arrangement slightly. The modifications made in adapting the chassis to the M type speaker are described in the following paragraphs.

Plate Supply Systems in Receivers Using M Type Speakers

As in receivers using the J speaker, the negative or low-potential plate supply lead (connected to the middle tap of the secondary supplying the rectifier plates) is grounded to the chassis, and the high-potential lead (from the middle tap of the secondary supplying the rectifier filament) is connected through a choke coil to a speaker terminal on the chassis. From this speaker terminal the circuit continues through the speaker leads to the speaker itself. At this point, instead of all of the plate current flowing through the speaker field, a part branches off and goes directly to the middle tap of the output transformer primary (built into the speaker) and thence to the output tubes. The plate current for the radio-frequency, detector, and first audio stages flows through the speaker field and back to a terminal on the receiver.

It is necessary that the plate supply circuit branch within the M type speaker in this way, because the field coil of this speaker requires but 45 milliamperes (considerably less than the entire plate current drawn by all of the tubes) instead of 86 milliamperes, as required by the field of the J speaker.

The combined plate current used by the radio frequency, detector, and first audio-frequency tubes is less than 46 milliamperes, however. This makes it necessary to shunt part of the speaker field current around the plate circuits of these tubes, direct to the chassis. For this purpose a 5500-ohm resistance in the receiver (or two 11,000-ohm resistances in parallel) is connected from the plate supply circuit to ground (chassis).

As the plate supply circuit enters the receiver from the speaker field it is divided into two branches, one of which goes direct to the detector and first audio plates, the other going through a 440-ohm resistance to the radio-frequency plates and the 6500-ohm shunt resistance.
A further resistance of 150,000 ohms is inserted in the detector plate circuit. These various resistances reduce the voltages to the proper values for the tubes in question.

The screen elements of the screen grid tubes are kept at appropriate positive potentials through a 20,000-ohm resistance connected to the positive plate supply.

**Chart of Changes in Models 40S, 41S, 42S and 82S**

<table>
<thead>
<tr>
<th>BEFORE CHANGE</th>
<th>AFTER CHANGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Volume control consists of two resistors, one varying R.F. grid bias and screen grid potential, the other grounding antenna end of 1st R.F. transformer primary (other end of primary grounded).</td>
<td>1a. Same, except lower end of 1st R.F. transformer primary connected to free end of volume control instead of to ground, so that resistor is shunted across primary and only connection to ground is through volume control.</td>
</tr>
<tr>
<td>2. Same as 1a.</td>
<td>2a. Antenna circuit resistor omitted from volume control. Range control added.</td>
</tr>
<tr>
<td>3. “On-off” switch of rotary type, operated by turning switch knob clockwise.</td>
<td>3a. “On-off” switch of toggle type, operated by pulling out or pushing in switch knob. Changed so that range control added to chassis, could be operated by rotating switch knob.</td>
</tr>
<tr>
<td>4. A group of resistances shown on the diagram in connection with the volume control bias resistor, having various values of resistance.</td>
<td>4a. The values of these resistances have been changed from time to time to improve the control of volume.</td>
</tr>
<tr>
<td>5. Fuse on bottom of chassis reached through hole in bottom of plate.</td>
<td>5a. Cover added over bottom plate hole.</td>
</tr>
<tr>
<td>6. No pick-up terminal.</td>
<td>6a. Pick-up terminal added.</td>
</tr>
<tr>
<td>7. Pick-up terminal connected direct to detector grid circuit.</td>
<td>7a. Choke and 0.001 condenser added in pick-up lead.</td>
</tr>
<tr>
<td>8. Output bias resistance 850 ohms.</td>
<td>8a. Changed to 700 ohms.</td>
</tr>
<tr>
<td>9. Fuse 1 ampere cartridge type.</td>
<td>9a. Changed to 2 ampere because larger current is drawn when receiver is first put into operation until Mershon condenser builds up.</td>
</tr>
<tr>
<td>10. Plate voltage resistances and connections suitable for J speaker.</td>
<td>10a. Changed to accommodate M type speaker and described in accompanying text.</td>
</tr>
<tr>
<td>11. Resistance of 5500 or 6000 ohms shunted from 440-ohm resistance in positive plate supply to ground in chassis for M speaker.</td>
<td>11a. Replaced by two 11,000-ohm resistance in parallel. Later changed back to single 5500-ohm resistance.</td>
</tr>
<tr>
<td>12. Grounded condenser 0.00025 mfd. connected to line on line side of fuse.</td>
<td>12a. Changed so as to connect to line on receiver side of fuse in order to protect against shorts in condenser.</td>
</tr>
</tbody>
</table>

“Red” lead represents positive plate circuit entering speaker from power supply system in receiver. “Black” lead represents plate current for R.F. detector.
ages is the same as in receivers using the J type speaker, except that the values of resistances have been changed, as follows:

1. Output bias resistance from 850 to 700 ohms.

2. Detector bias resistance from 60,000 to 55,000 ohms.

3. Bleeder current resistances from 100,000 to 55,000 ohms.

Volume Control Changes

Three types of volume control have been used at various times on these chassis since their first introduction.

In the first type two resistances, varied simultaneously, were used. One of these controlled the energy transferred from the antenna circuit to the grid circuit of the first tube, while the other controlled the bias potential and screen element potential of the screen grid tubes.

The second type of control was exactly the same as the first except that the primary of the first R.F. transformer was connected to the free end of the volume control resistance instead of to ground.

The third type of volume control was introduced coincident with the addition of the range control on this receiver. The variable resistor in the antenna circuit was omitted. The arrangement for controlling bias and screen grid voltages points of the range control switch are connected to the taps on this coil, and a third point provides pick-up through capacity coupling to the other two. The arm of
the range control switch is connected to the antenna terminal.

**Model 41A and 42**

Model 41A is a 7-tube Neutodyne Receiver using four —26, one —27 and two —71A type tubes and is built for operation with type H Dynacoll speaker Model 242. A circuit diagram of this receiver is shown in Figure 2.

Model 42 receiver is the same chassis as used in Model 41A, mounted in a console cabinet with built-in type H Dynacoll speaker Model 245. These two receivers are very similar to that of the Crosley Showbox Model 706 Receiver. It differs mainly in that the output choke is omitted and different sizes of resistances and fixed condensers are used.

**Models 30S, 31S, 32S, and 34S**

These receivers use the same 7-tube chassis and differ only in the type of cabinet used. The circuit used in these receivers consists of two stages of tuned Radio frequency amplification utilizing 2 —24 type tubes, the detector and the first audio stage utilizing —27 heater type tubes and a push-pull output audio stage using two —45 type tubes. All coupling is by means of transformers except that of the detector to the first audio stage.

Resistance coupling is used between these two stages. This series is very similar to the 40S series, having only two stages of Radio frequency amplifica-
tion in place of three stages used in the 40S series. A wiring diagram of the 30S series is shown in Figure 3.

**Models 60S, 61S, 62S, and 63S**

These receivers all use the same chassis mounted in different types of cabinets and are designed primarily for operation from 110-volt D.C., although they may be operated on 220-volt D.C. supply as described below. This receiver is to be operated with Dynacoil speaker type L. The following tubes are required: Four — 22, two — 12A, and two — 71A type tubes.

Before connecting this receiver be sure that the electric line supplies 110 or 220 volts direct current—not alternating current.

Since direct current is used, the receiver must be connected to the line with proper polarity. To test the polarity, proceed as follows: Make all connections with the exception of that to the light socket or receptacle, and insert the tubes in the proper sockets. Screw a lamp bulb into the fuse socket on the supply cable. For 110-volt lines, use a 110-volt, 40 or 60 watt lamp bulb; and for 220-volt lines, use a 220 volt, 40-watt bulb. Turn on the switch on the receiver. Connect the supply cord to a light socket or baseboard receptacle, and note the brilliance of the lamp bulb. Remove the plug and reinsert it with its prongs reversed, again noting the brilliance of the bulb. The proper connection is that in which the bulb is less brilliant. Never operate the receiver with the plug inserted in the other position.

After the polarity has been determined, the lamp bulb used for testing must be replaced as follows: If the receiver has been connected to a 110-volt line, replace the bulb with the plug fuse supplied with the receiver. If it has been connected to a 220-volt line, replace the bulb with a 40-watt, 110-volt lamp bulb. This is the only difference in installation and operation for 110 and 220 volts.

Never operate the receiver without a 6-volt Mazda, miniature base bulb No. 40 burning in the dial light socket.

The wiring diagram of this receiver is shown in Figure 4.

**Models 20, 21 and 22**

These receivers differ only in the type of cabinet. They all use a 6-tube, screen grid, battery type chassis. Tubes used are three — 22, two — 01A or — 12A, and one — 71A type tubes. The filament supply requires a 6-volt storage battery while the "B" supply uses four 45-volt "B" batteries. The "C" supply requires two 22/2-volt and one 42/2-volt batteries.

A wiring diagram is shown in Figure 5.

**Improved Changes in Chassis**

The original chassis were built for use with Type E Dynacoil. When the Type C Dynacoil (with separately excited field coils) was introduced, two terminals (Red and Black) were added to the chassis for supplying the field of the "C" type speaker with current direct from the storage battery, or "A" supply.

For a short time the yellow and black filament terminals were connected to the points shown by the dotted lines marked "2Y" and "2B" on the diagram.

In recent chassis the 3-megohm resistor W5408 in the detector grid circuit is replaced by an A-2 radio-frequency choke. The 0.85-ohm resistor is moved to the negative filament lead, and the detector grid return is connected to the negative side of the 0.85-ohm resistor. See the changes marked "3" on the circuit diagram.