



NATIONAL RADIO INSTITUTE

 *Washington D. C.* 

Radio-Trician Service Manual

(TRADE MARK REGISTERED U. S. PATENT OFFICE)

Compiled solely for  Students & Graduates

ON

THE MAJESTIC ELECTRIC RADIO RECEIVERS

(Series 60-70 and 80-90 and 180)

This Service Manual is prepared for Radio-Tricians who may be called upon to service and install these radio receiving sets. Therefore, it is advisable to study this Service Manual carefully so as to be able to quickly analyze and correct any trouble in these sets.

Circuit Description.

The Majestic receiver is a 7-tube TRF, completely shielded set, with all metal chassis and separate power supply unit, so designed as to fit into several types of console cabinets of different prices. The receiver consists of 3 stages of TRF controlled by a 4-gang condenser, the 3 RF tubes which are of the type 226 AC are contained in cylindrical cans. The detector is the usual type 227 AC tube and the AF amplifier consists of a type 226 first stage, and a push-pull second stage using type 171 tubes. The output of the set is fed into an electro-dynamic cone speaker, the field of which is excited by 90 volts DC obtained from the rectifier system in the power plant. The power plant consists of a type 280 full-wave rectifier, supplying 220 volts DC for the "B" and "C" potentials, as well as the field of the loud speaker, and the usual 1½, 2½ and 5-volt windings on the power transformer supply, the filaments of the tubes and the pilot lamp on the drum dial.

The voltage divider resistances are indicated on the schematic wiring diagram, Fig. 1, as are the values of the filter condensers, and the various C biasing resistances in the set itself. "C" bias is obtained by means of the voltage drop across these resistances, which are placed in the —B supply lead. While the electrical center of the filament circuits for the 3 RF tubes is obtained by means of a center tapped 20-ohm resistance, of a fixed type, a small amount of residual hum in the receiver is balanced out at the time of installation by means of a 20-ohm potentiometer across the filament of the 1st audio tube, this resistance being placed on the back of the chassis so as to be accessible from the rear of the cabinet.

be quite accurately determined.) Nos. 1 to 6, inclusive, signify the continuity of the RF circuits, and Nos. 9 and 10 the 1st audio.

12. That the filament circuits of the two power tubes, and the heater circuit of the detector is not grounded.

It should be noted that the above tests are not of the sockets, resistors, etc., but that the respective circuits are continuous from the end of the cable to the socket prongs, and through the associated apparatus.

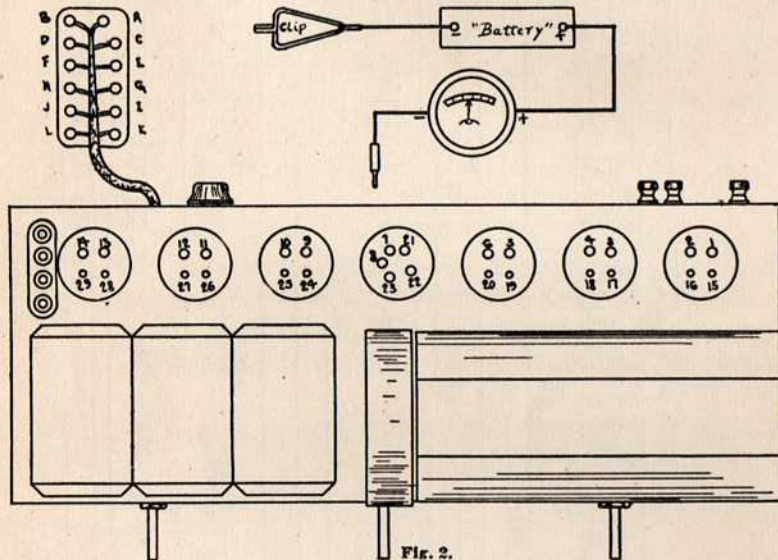


Fig. 2.

Continuity Tests—See Fig. 2.

1.	Socket terminals 1, 2, 3, 4, 5, 6	Continuous	E&F
2.	" " 7 and 8	"	G&H
3.	" " 9 and 10	"	I&J
4.	" " 11, 12, 13, 14	"	K&L
5.	" " 15, 17, 19, 24, 26, 28	"	Ground
6.	" " 22 (through grid leak)	"	*Ground
7.	" " 16, 18, 20, 25	"	C
8.	" " 7, 8, 21	"	B
9.	" " 27, 29	"	D
10.	" " 23	"	*Ground
11.	" " 1, 2, 3, 4, 5, 6, 9, 10	"	*Ground
12.	" " 7, 8, 11, 12, 13, 14	Open	*Ground

Note:—The power pack should be disconnected while making the above readings.

*The ground connection in these cases may be the frame of the receiver, the ground terminal post, or lug A (B—) of the cable terminal plate.

BALANCING AND ALIGNING

Models 60 and 70

Rebalancing. Rebalancing on a broadcast program is possible, but it is recommended that the Radio-Trician who wishes to equip himself with better facilities construct an oscillator or radio wave generator and a resonant indicator, to indicate the correct tuning adjustment.

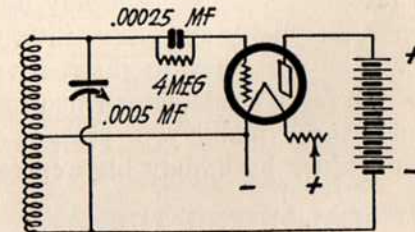


Fig. 3.

Tools. The tools necessary in addition to a set of tested tubes, will be a balancing tube (dummy tube) and an insulated wrench which may be procured from the factory. (With due care a No. 4 Spintite wrench may be used.)

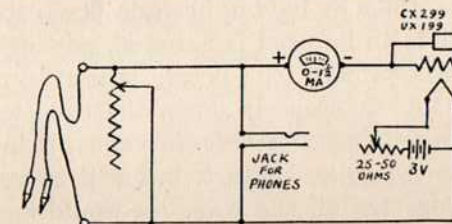


Fig. 4.

Oscillator. Fig. 3 shows details of a simple modulated oscillator which may be conveniently mounted on the conventional bread-board or may be built on a panel and fitted to a cabinet to fit the space of the constructor. The size of the coil and variable condenser should be such that the entire broadcast wave length band will be covered by the oscillator. If a .0005 mfd. condenser is used, then the coil should consist of 50 turns of No. 22 DCC wire wound on a 3" form and tapped in the center.

Resonant Indicator. Fig. 4 shows details of a simple device to insure accurate tuning and to replace the less certain method of depending upon the apparent intensity of sound in the earphones or loud speaker. This indicator employs a low

range D. C. milliammeter to measure the rectified current. The filament rheostat is useful to adjust the meter deflections with a given input strength.

Similar to the oscillator, the construction of the resonance detector may be of the bread-board or panel type. It would prove very convenient to equip the input with a single pair of conductor telephone cords with tip lugs on the end that may be inserted into the jack on the receiver.

This type of resonant detector is highly desirable because of its quick response, simplicity and portability.

Caution. It will be necessary to shunt a variable resistor across the input of the resonant detector when testing a receiver that does not employ the dynamic type of loud speaker to protect the meter from injury by unduly high current.

BALANCING TUBE

A balancing tube may be made by selecting a UX-226 or CX-326 tube, which is entirely normal according to all tests available. Compare this tube with several other tubes while the filaments are heated and make sure that the elements of the tube are correctly spaced (this is important) and are not bent to one side or the other by having been dropped, etc.

When the tube to be used is selected, cut off about half of one of the filament prongs (the larger prong) and resolder the wire inside. If this is properly done, the tube will serve as a balancing tube when inserted only far enough into the socket to allow 3 prongs to make contact, but will serve as a normal amplifier when inserted all the way. It would be well to mark this tube with a lap or two of friction tape about the upper part of the glass, or with a gummed label of some sort. Great care must be taken to protect this tube from undue shocks from dropping, etc., as it will be a satisfactory standard only as long as the elements inside remain in their proper relation.

BALANCING WRENCH

It will be convenient to use a special insulated balancing wrench that employs metal (if metal is used) only at the tip to avoid an error in adjusting the balancing or aligning condensers, due to "body capacity" of the hand and the wrench itself. (A common wrench that will fit a cap screw with a one-quarter hexagon head will serve if the Radio-Trician will remove the wrench from the screw head before judging the adjustment.)

Procedure in Balancing. 1. Place the receiver on some suitable bench or table where the adjusting points will be accessible, and connect up speaker and power pack and insert tubes.

2. If resonant indicator is used insert leads from resonant indicator into black jacks on the receiver and insert the red wires from the speaker into the red jacks on the receiver. If the resonant indicator is not used, merely substitute a pair of ear-phones and insert the cord tips into the black jacks on receiver.

3. Connect the ground wire to the ground post and a few feet of wire (six feet should be enough) to the antenna post.

4. Set the tuning dial on about 210 meters wave length (about 5 or 10 points on the percentage scale) and tune the oscillator dial until a note or tone is heard in the receiver.

5. Remove the oscillator away from the receiver until the intensity of the note is about equal to normal reception and until the receiver tunes sharply.

6. Some experimenting may be necessary to find the proper distance to remove the oscillator and the proper adjustment of the resonant indicator rheostat. It is generally convenient to have about a two-thirds scale deflection of the meter, as this insures sensitiveness and sharp response.

7. Then proceed to tune set to resonance with oscillator accepting the maximum deflection of the milliammeter as an indication. The volume control on the set may be used to assist in varying the output intensity and range of deflection of the meter.

8. When properly tuned place the balancing tube in the 3rd RF socket position (3rd from antenna post) only far enough to allow 3 contacts to make connection so as not to heat the filament.

9. This stage may now be balanced by adjusting the balancing condenser at the left of this tube until the note in the ear-phones is reduced to a minimum, using the balancing wrench.

10. Now repeat this operation by inserting the balancing tube in the 2nd RF socket position (2nd from right to left) first checking the tuning of the dial to see that it is still at maximum.

11. Now repeat the same operation placing the balancing tube in the 1st RF socket position (extreme right) this time checking the tuning of both the main dial and the antenna trimmer.

12. This constitutes the balancing operation, but may be repeated as a whole one or more times until the Radio-Trician is confident that the adjustments are accurate.

SCHEMATIC DIAGRAM FOR MODEL 180 MAJESTIC RECEIVER

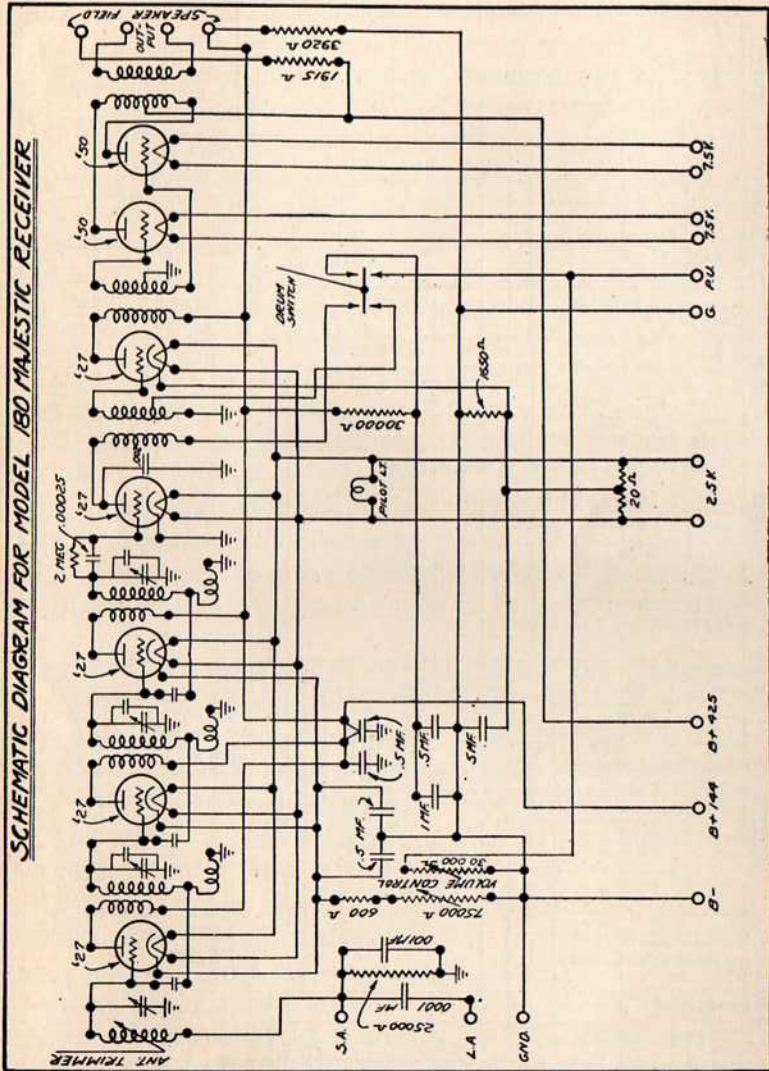


Fig. 6.—Schematic circuit diagram of Majestic Receiver, Model 180.

SCHEMATIC DIAGRAM OF 8P6 & 8P3 POWER UNITS

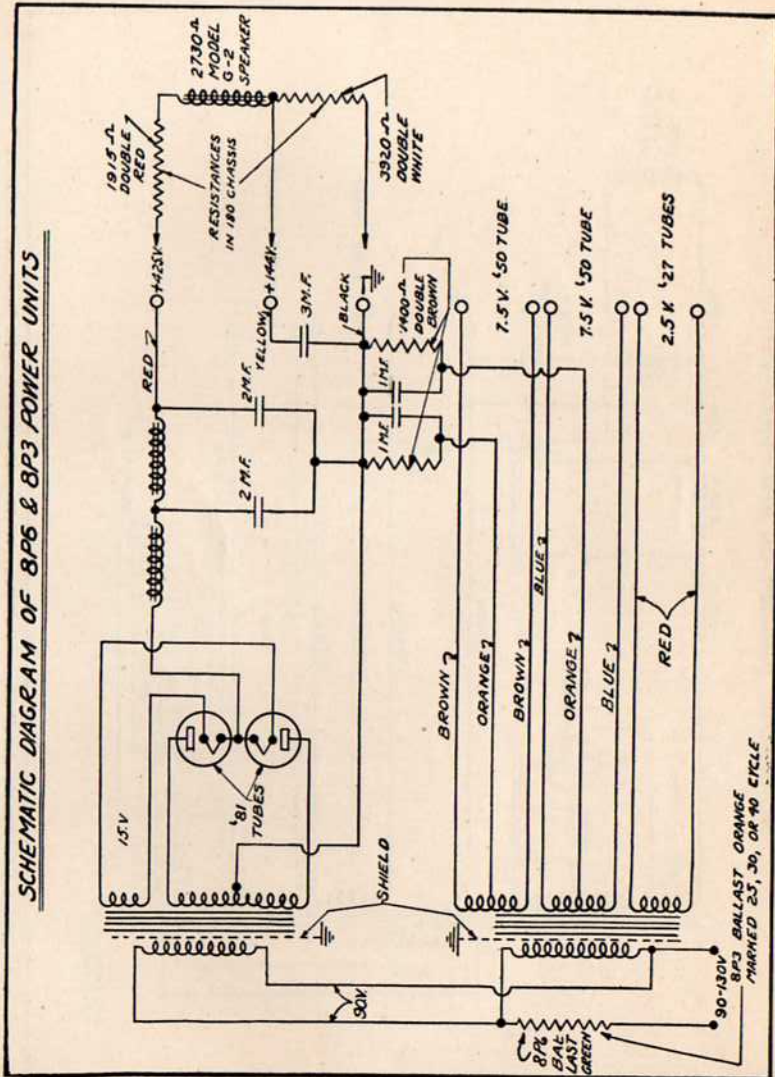


Fig. 7.—Schematic circuit diagram of Power Unit used with Majestic Receiver, Model 180.

