

TECHNICAL SERVICE MANUAL  
FOR  
MODEL 800-B  
RADIO-PHONOGRAPH

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Model 800-B Radio-Phonograph

TECHNICAL DATA

Power Requirements ..... 117 volts AC  
 60 Cycles  
 Current Consumption  
 197 Watts Normal-310  
 Watts Maximum

NOTE: Power transformers can be furnished for other voltages or frequency upon request.

Number of Tubes ..... 24 including rectifier and voltage regulator

Circuit: Superheterodyne - 1 RF stage all bands.

3 Tuning Bands, 2 for AM, 1 for FM; 2 stage IF amplifier for AM with variable selectivity; 4 stage IF amplifier for FM with 2 limiter stages; continuously variable bass and treble controls; balanced phase inverter; inverse feedback; electro-static shielded antenna input circuit; beam power output circuit; peak noise limiter for use on SW band; variable sensitivity on AM.

RF Circuits ..... 1 on all bands

IF Circuits ..... 2 on AM bands with variable selectivity  
 4 on FM band with 2 limiter stages

Audio Circuits ..... 4 stages  
 2 single stages  
 Pushpull driver  
 Pushpull output

Oscillator Circuit ..... Electron coupled  
 Temperature compensated

Rectifier Circuits ..... Full wave using 2 5Y3GT tubes

Audio Power Output ..... 25 watts undistorted  
 40 watts maximum

Audio Frequency Range ..... 35 to 20,000 cycles

Overall Frequency Range - AM ..... 35 to 8,500 cycles

Overall Frequency Range - FM ..... 35 to 15,000 cycles

Tuning Range - AM ..... 540 KC to 1600 KC  
 5.9 MC to 18.2 MC

Tuning Range - FM ..... 88 to 108 MC

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Physical Specifications

Receiver chassis dimensions (panel attached):

Width	17 1/2 inches
Depth	16 1/4 inches
Height	11 1/4 inches
Weight	44 lbs.

Power Supply chassis dimensions:

Width	16 inches
Depth	10 1/2 inches
Height	7 3/4 inches
Weight	38 1/2 lbs.

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## INTRODUCTION

These instructions cover the installation, operation, and servicing of the Model 800-B Radio-Phonograph. THEY SHOULD BE STUDIED WITH GREAT CARE BEFORE THE INSTALLATION OR SERVICING OF THE EQUIPMENT IS ATTEMPTED IN ORDER THAT OPTIMUM PERFORMANCE MAY BE OBTAINED.

### Section I DESCRIPTION

#### 1.1 General

The receiver employs 24 tubes and covers the frequency range of 540-1600 KC and 5.9-18.2 MC for reception of amplitude modulated signals and 88-108 MC for reception of frequency modulated signals.

The receiver is designed for operation on a 115-120 volt, 50-60 cycle AC source. Transformers for operation on other voltages and frequencies can be supplied on request. The normal power consumption is 197 watts increasing to 310 watts momentarily while the pushbutton system is in operation.

The receiver consists of two units, interconnected by means of cables and plugs provided for this purpose. The tuning chassis contains all the RF and IF circuits used for amplitude modulation (AM) reception, the RF circuits for frequency modulation (FM) reception, and the first and second audio amplifier circuits. The power supply chassis contains the IF amplifier circuits for frequency modulation reception, the third audio amplifier circuits and the audio output circuit. It also contains all the power supply and rectifier circuits.

The receiver is provided with a motor driven pushbutton tuning system with 12 station pushbuttons provided on the front panel. Two additional pushbuttons are provided to turn the receiver ON or OFF. A receptacle is also provided at the rear of the receiver for connection of a remote control box so that the receiver may be tuned from a remote location.

#### 1.2 Frequency Range

The receiver is provided with three frequency bands. The Standard Broadcast (BC) Band covers 540 to 1600 Kilocycles. The Shortwave (SW) Band covers 5.9 to 18.2 Megacycles which includes all the important shortwave bands. The Frequency Modulation (FM) Band covers 88 to 108 Megacycles.

#### 1.3 Tube Complement

The receiver utilizes 24 tubes as follows:

Symbol	Type	Application	Symbol	Type	Application
V1	6SK7	AM-RF Amp.	V6	6H6	AM-2nd Det.
V2	6J5	AM-Osc.	V7	6E5	AM-Tuning Eye
V3	6SA7	AM-Mixer	V8	6E5	FM-Tuning Eye
V4	6SK7	AM-1st IF Amp.	V9	6J5	1st AF Amp.
V5	6SK7	AM-2nd IF Amp.	V10	6J5	2nd AF Amp.

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Symbol	Type	Application	Symbol	Type	Application
V11	6AG5	FM-RF Amp.	V18	6H6	FM Detector
V12	6C4	FM-Osc.	V19	6SL7GT	3rd AF Amp.
V13	6AG5	FM-Mixer	V20	6L6G	Audio Output
V14	6AC7	1st FM-IF Amp.	V21	6L6G	Audio Output
V15	6AC7	2nd FM-IF Amp.	V22	VR-150/OD3	Voltage Regulator
V16	6SJ7	1st FM Limiter	V23	5Y3GT	Rectifier
V17	6SJ7	2nd FM Limiter	V24	5Y3GT	Rectifier

### 1.4 Power Requirements

The Model 800-B Radio-Phonograph is designed to operate from a 110-120 volt 50-60 cycle power source. Normal power consumption at 115 volts is 197 watts increasing to 310 watts momentarily when the pushbutton system is in operation. The 46 volt transformer used to drive the pushbutton tuning system is connected across the AC line at all times and consumes 4 watts in the standby position. For operation on 220 volt 50-60 cycle power source, a stepdown transformer should be used. If the line voltage fluctuates to a value higher than 120 volts, a plug-in type ballast resistor should be used between the power source and the receiver power plug. In some locations where the line voltage varies over a wide range at different times, a tapped autoformer should be used so that the input voltage can be kept between 110-120 volts.

### 1.5 Antenna Requirements

The Model 800-B Radio-Phonograph is designed to be used with separate antennas for AM and FM bands in order to secure maximum efficiency in locations situated remotely from transmitting stations. Provision is made at the rear of the receiver through receptacle J7 in order that a loop antenna may be used for AM reception in metropolitan areas where signal levels are high enough to override any background noise level when the receiver is operated in the high-fidelity or broad position. Either the loop antenna or the outside antenna may be selected by means of the two position switch SW1 located at the rear of the receiver. For FM reception in metropolitan areas where sufficient signal strength is obtained to permit use of a built-in antenna, a folded dipole antenna may be used in conjunction with the loop antenna for AM reception. The outside antenna used for AM reception is a double doublet with a coupling transformer attached to the antenna flat top to provide maximum transfer of energy, and a low-loss twin conductor lead-in which is coupled to the receiver through a special coupling transformer which has been designed to provide maximum signal transfer from the antenna to the receiver and at the same time providing minimum noise pickup in the antenna lead-in. The outside antenna used for FM reception is a dipole antenna with a reflector. The elements of the dipoles have been designed to provide maximum signal pickup in the FM band of 88-108 megacycles, a low-loss twin conductor lead-in is used for maximum transfer of signal from the antenna to the receiver.

### 1.6 Speaker Connections

A receptacle J2 is provided in the power supply chassis for connection of the loudspeaker. Several types of speakers are furnished for use with the 800-B Radio-Phonograph, the quality of reproduction and power

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handling capabilities being the same for all types but the connections to the speaker plug are different and are described in Paragraph 2.2. Extension speakers of the PM type may be connected to the output circuit of receiver as long as the impedance match of the output transformer is maintained correctly. Paragraph 2.2 describes in more detail the necessary connections.

### 1.7 Record Player and Television Input Connections

Terminals are provided at the rear of the receiver chassis for connection of the pickup cord from the record changer to the audio circuit of the receiver. If a different pickup is used other than the one furnished with the record changer it should be a high impedance unit or a crystal cartridge. If a low impedance pickup is used it will be necessary to use a matching transformer between the pickup head and the input terminals at the receiver. The record player furnished with the Model 800-B Radio-Phonograph operates on 115 volt 60 cycle power source. If it is desired to operate from 230 volt power source or 50 cycle power source by referring to Paragraph 2.5 the necessary information can be obtained to make the changes necessary to operate the record changer properly.

Terminals are also provided at the rear of the radio receiver for connection of the audio circuit of the Model 800-B Radio-Phonograph to a television tuner so that the sound portion of the television broadcast can be reproduced by the 800-B Radio-Phonograph while the picture is reproduced by the television tuner.

## Section II INSTALLATION

### 2.1 Unpacking Equipment

When unpacking the 800-B Radio-Phonograph, make certain that all envelopes and boxes containing instructions and hardware are removed before discarding the cartons.

### 2.2 Installing Loudspeaker

The loudspeaker should be fastened to the baffle board by means of the four 1" wood screws furnished with the earlier model cabinets or by means of the carriage bolts in the later models; in either case the speaker should be fastened to the baffle surface with equal pressure on all four mounting points so as not to distort the speaker frame. Caution should be taken not to tighten too much on the mounting screws. The speakers furnished with the Model 800-B Radio-Phonograph have voice coils of 8 and 16 ohms. The coaxial speaker which has a 5 inch high frequency speaker mounted axially with the 15 inch low frequency speaker has a built in crossover network which has an input impedance of 8 ohms; the voice coil leads being connected to terminals 3 and 5 of speaker plug P4. The extended range single 15" loudspeaker has a voice coil impedance of 16 ohms and is connected to terminals 1 and 5 of speaker plug P4. If more than one speaker is to be used with the 800-B Radio-Phonograph the combined impedance of the set speaker and the extension speaker or speakers must equal 8 or 16 ohms, if not, a matching



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transformer must be used in order that the correct match may be kept with the receiver output transformer. If only one extra speaker is to be used with a voice coil impedance of 8 ohms and the set speaker is a coaxial type with an input impedance of 8 ohms then both speakers can be connected in series to terminals 1 and 5 of speaker plug P4. If the extension speaker voice coil is 8 ohms and the receiver speaker voice coil 16 ohms, a matching transformer having a primary impedance of 16 ohms and a secondary impedance of 8 ohms must be used; the 8 ohm secondary being connected to the extension speaker and the 16 ohm primary connected in parallel with the 16 ohm voice coil of the receiver speaker to terminals 3 and 5 of speaker plug P4. The above are only examples of the most common connections, however in some instances multiple speaker installations are desired where the power in some speakers is to be less than in others or "T" pad volume controls may be desired on extension speakers. Upon receipt by the Scott Radio Laboratories of the necessary information, any special problem on multiple speaker connections will be given our prompt attention.

### 2.3 Installing Power Supply

The power supply chassis should be fastened to the lower shelf of the cabinet by means of the four 1/2 inch wood screws provided. It should be fastened down in a position where the fuse receptacles and connecting cable receptacles are readily accessible. In some installations where a mechanical vibration is transferred from the pushbutton tuning transformer through the metal base of the power supply to the cabinet shelf, it may be necessary to mount the power supply on rubber washers or two rubber pads.

### 2.4 Installing Receiver Chassis

The Model 800-B Receiver chassis has been designed so that it can be rolled in or out of the front of the cabinet, with a latch spring arrangement which holds the receiver at a position where the front of the panel extrudes out approximately 2 inches for ease in tuning. By releasing the spring latches on both sides of the panel the receiver may be rolled out approximately 10 inches for inspection of the receiver or tube replacement. The receiver chassis should be installed in the cabinet using the following procedure:

1. Mount the front panel on the receiver as shown in Fig. 1 using the hardware furnished.
2. Next mount the latch springs on the sides of the receiver chassis as shown in Figure 1. The retaining screw which is used to center the latch spring in the slot on the side of the panel should be screwed in far enough to bring the latch spring flush with the outside of the panel. It may be necessary to adjust the screw on the latch spring further in to make the latch catch smoothly when the set is pulled out. However, DO NOT leave the latch adjustment screws sticking out beyond the sides of the panel as they may catch in the latch spring plate when the set is pushed into the cabinet.

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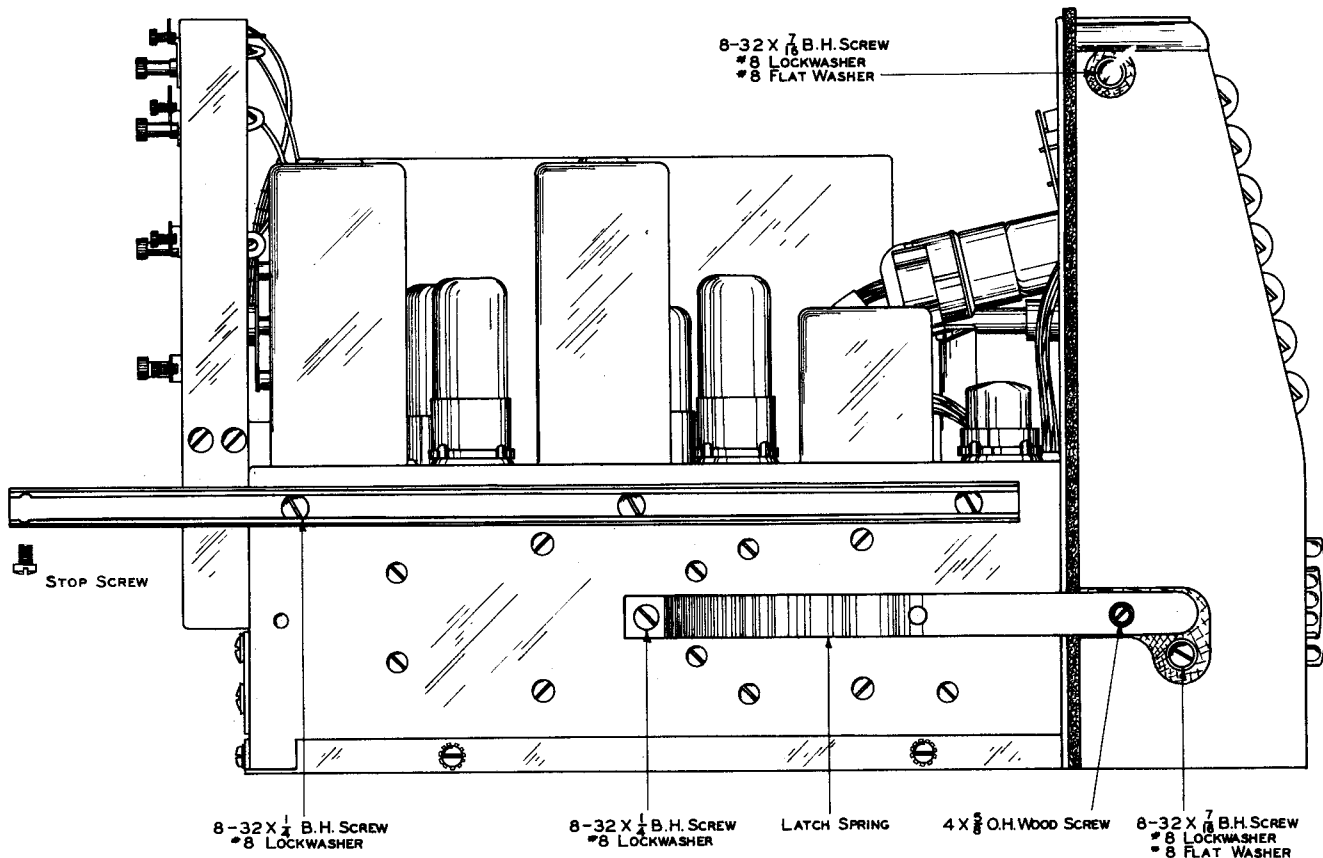


Figure 1 Slide Rail and Panel Mounting Detail

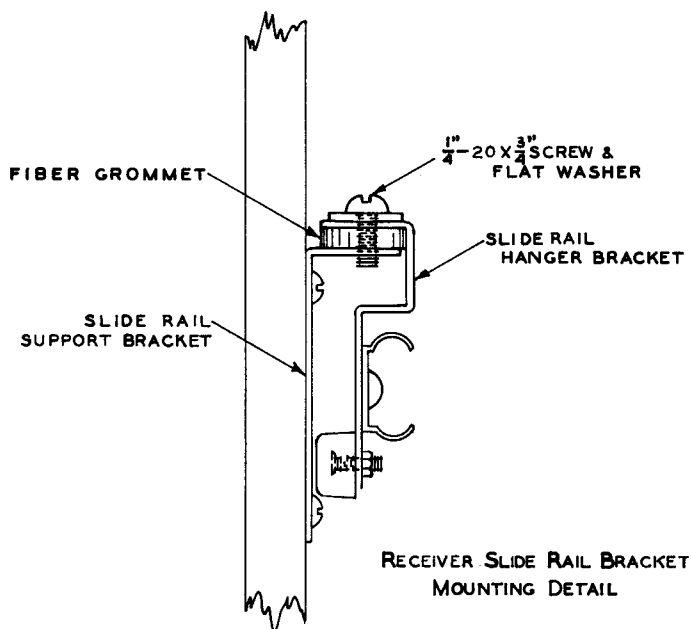


Figure 2 Slide Rail Bracket Mounting Detail

3. Mount the slide rails on the sides of the receiver chassis as shown in Figure 1 using the hardware provided for this purpose. Remove the stop screws from the ends of the rails as shown.
4. Open the door of the cabinet and slide it back inside as far as it will go.
5. Fasten the slide rail hanger brackets, which are packed with the receiver, onto the support brackets which are mounted in the cabinet, using the fiber grommets, screws and flat washers furnished with the receiver. A detail of this assembly is shown in Figure 2.

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6. Insert the rails on the receiver into the slides which are mounted in the cabinet and slide the receiver back into the cabinet. If the receiver hangs too low and touches the door when pulled out, it will be necessary to shim up the hanger brackets by adding a metal washer under each fiber grommet.
7. Insert the stop screws in the ends of the rails from the bottom side.
8. Open the cable hole clamp at the back of the cabinet and lay the cables in the slot provided. The cables may then be inserted in their respective receptacles in the power supply. DO NOT force the plugs as they are polarized and will enter the receptacle in only one position.
9. Insert the screw eye furnished, under the top at the rear of the cabinet in the center of the receiver compartment and tie the connecting cables to the screw eye leaving enough slack so that the receiver will pull all the way out without pulling the cables tight. This will allow the cables to loop when the receiver is run in and out of the cabinet.

### 2.5 Installing the Record Changer

Several types of record changers are furnished for use with the 800-B Radio-Phonograph and while the method of mounting them is very similar for all types, each one requires a different cutout and location of mounting holes in the record changer mounting board. All the record changers are designed for floating spring mounting. In mounting the record changer it is not necessary to remove the drawer although it will be more convenient to do so. The back of the compartment should be removed, then take out the slide rail stop screws, the drawer can then be withdrawn from the cabinet.

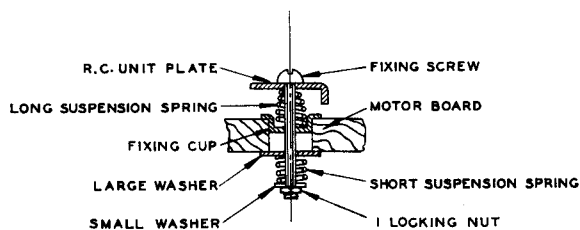
Remove the spindle and the turntable. Then mount the changer with the hardware provided following the method shown in Figures 3A, 3B and 3C.

**CAUTION:** DO NOT LIFT THE RECORD CHANGER BY THE PICKUP ARM OR THE OVER-ARM AS UNDUE STRAIN ON THESE PARTS WILL PUT THE CHANGER OUT OF WORKING ORDER.

When fastening the changer down DO NOT tighten too much on the mounting springs as the changer base will rub on the mounting board producing audio feedback when the record changer is in operation.

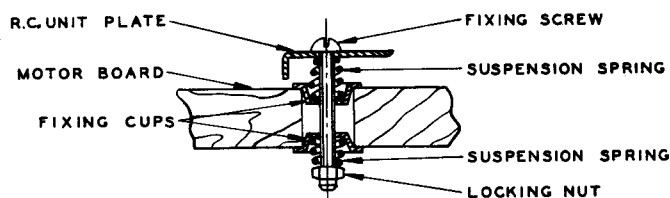
The drawer can now be reinserted in the cabinet, feeding the record changer power cord and pickup leads through separate holes in the cabinet shelf. Put the stop screws back in the slide rails and fasten the back of the cabinet on.

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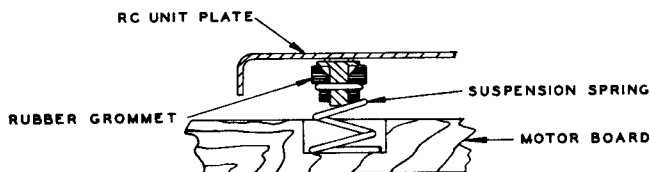
RC 60 RECORD PLAYER MOUNTING

Figure 3A



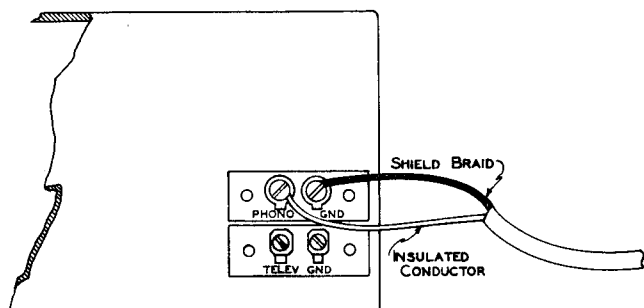
CD 40 RECORD PLAYER MOUNTING

Figure 3B



MODEL 70 RECORD CHANGER MOUNTING DETAIL

Figure 3C



RECORD PLAYER PICK-UP CONNECTIONS

Figure 4

The power cord of the record changer should be inserted in the power receptacle, which is fastened to the power supply chassis by a short cord, and the pickup cord connected to the PHONO-GND terminals at the rear of the receiver. Connect the shield braid to the GND terminal and the insulated conductor to the PHONO terminal as shown in Figure 4.

## 2.6 Power Connection

The Model 800-B Radio-Phonograph is designed for use on 110-120 volt 60 cycle power source. The receiver will operate on either 50 or 60 cycle power source but the record changer will run slow on 50 cycle source and it will be necessary to adjust the speed control on the RC60 and CD40 changers. The motor drive pulley will have to be changed on the Model 70 record changer. For operation from a 220 volt 50-60 cycle power source a stepdown transformer should be used.

Fuses are provided in the primary circuit of the power transformer (3 amp) and the pushbutton tuning system transformer (1 amp). Never replace these fuses with one of higher value as damage may be done to these transformers in case of a short circuit or heavy overload.

2.7 Antenna Connections

The Model 800-B Radio Receiver is designed to be used with either a straight antenna with single conductor lead-in or a doublet type antenna with 2 conductor lead-in. Separate connections are provided for antenna on AM and FM bands and for best reception a doublet type antenna should be used on the AM bands with a separate dipole antenna for the FM band as shown in Figure 5. For installations where only a double doublet antenna can be installed the FM antenna connection should be made as shown in Figure 6.

A double doublet antenna with pretuned matching transformer such as the SCOTT Double Doublet Antenna system will give maximum transfer of signal energy with greatest noise reduction on both broadcast and shortwave bands and a horizontal dipole with the flat top legs cut to the correct length for operation in the 88-108 megacycle band used with a two conductor lead-in with low-loss properties will give maximum results on the FM band.

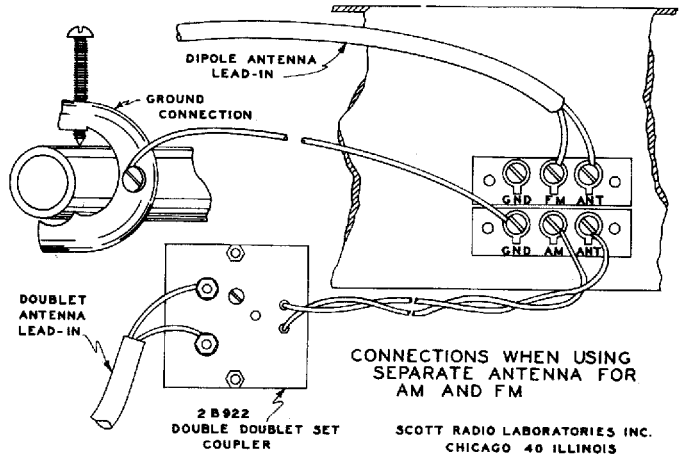
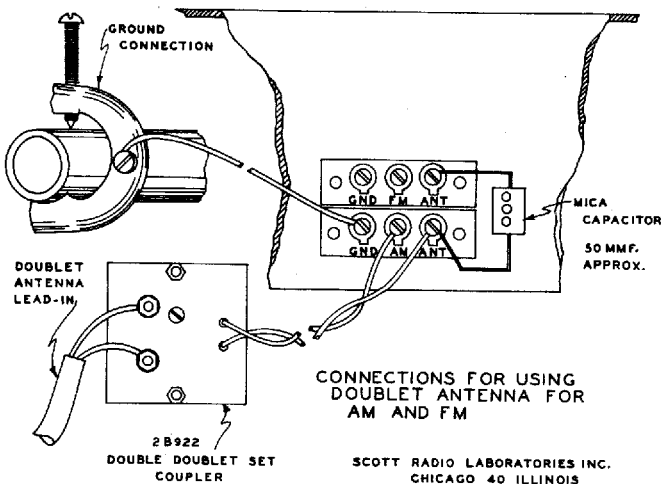


Figure 5

In installations where it is not possible to install a doublet antenna system, a single wire antenna with the flat top 60 to 75 feet long and the lead-in as short and direct as possible should be used. For FM reception a small mica capacitor of 51 MMF may be connected between the AM antenna connection and the FM antenna connection as shown in Figure 7.



A four contact receptacle is provided at the rear of the receiver chassis for using a loop antenna on the "BC" and "SW" bands in metropolitan areas where a number of powerful stations may be located. It is not recommended that a loop antenna be used for receiving distant stations. Directions for installing the loop antenna are furnished with each antenna.

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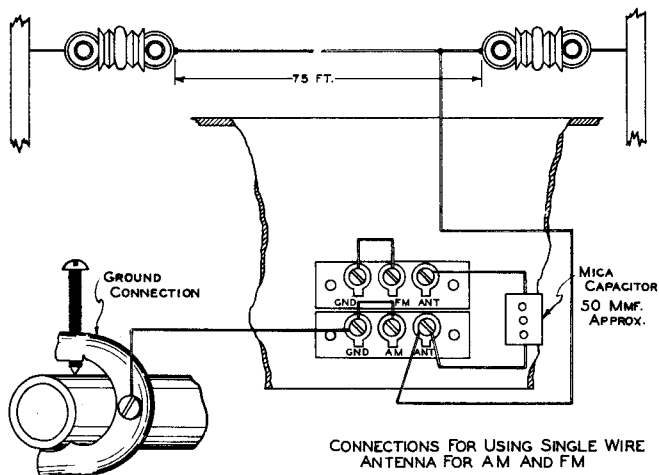


Figure 7

### Section III OPERATION OF CONTROLS

All operating positions of the controls of the Model 800-B Radio Receiver, with the exception of the Main Tuning control are marked and indicator markings on the knobs are provided so that adjustment of the controls for various operating conditions is easily accomplished.

Six variable controls plus the Main Tuning control are provided so that maximum efficiency may be obtained at any operating condition. The functions and settings of the operating controls are listed below.

#### 3.1 SELECTIVITY Control

The Selectivity control located at the left side of the panel has five positions marked S-M-B-PH-Tel. The S-M-B positions are effective only for AM (amplitude modulation) reception on the "BC" and "SW" bands. They designate the "Sharp", "Medium" and "Broad" condition of the AM-IF amplifier. The "S" position should be used at all times when manually tuning in stations as the IF amplifier is so broad in the "M" and "B" positions that a true resonant point cannot be obtained with the tuning eye. After the station has been tuned in properly in the "S" position the control may be advanced to the "M" or "B" position to obtain better fidelity. The Selectivity control must be set at the "M" or "B" position when tuning the receiver by pushbuttons.

When the Selectivity control is set at "PH" position it connects the record changer pickup into the audio circuit of the receiver and provides for record reproduction.

With the Selectivity control set at "Tel" position, the audio amplifier of the receiver is connected to the television input terminals at the rear of the receiver. These terminals are provided so that a television tuner may be connected to the 800-B Receiver and the audio amplifier of the receiver used for reproduction of television sound broadcasts, while the picture will be reproduced at the television tuner.

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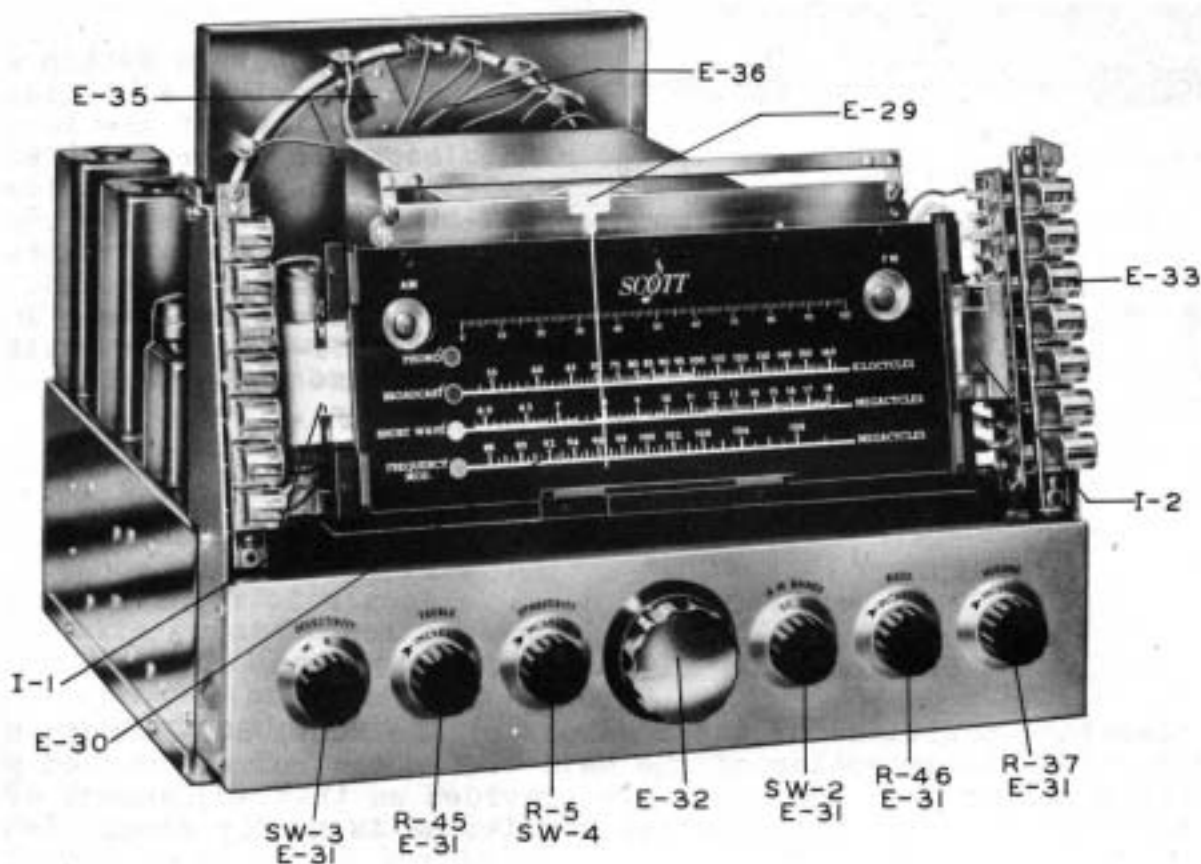


Figure 8 Front View 800-B Receiver Chassis  
Without Panel

### 3.2 TREBLE Control

The Treble control is located at the right of the Selectivity control and is provided in order that the high frequency response of the audio amplifier in the receiver may be changed to suit operating conditions and program material. Maximum high frequency response is obtained with this control set at maximum clockwise position.

### 3.3 SENSITIVITY Control

The Sensitivity control is located at the right of the Treble control. This control is effective only on the AM broadcast and shortwave bands and is provided to vary the sensitivity of the receiver. When manually tuning the receiver the control should be set to the position where the AM tuning eye shadow just closes or on weak stations to the point where maximum closure of the tuning eye is obtained. For maximum sensitivity when tuning in weak distant stations the control should be advanced to the point where the switch incorporated on this control just starts to throw. The switch mentioned above which is incorporated in the Sensitivity control is provided to switch the noise limiter circuit on and off. When the control is advanced to maximum clockwise rotation, the switch will throw on. The noise limiter circuit with which this switch is associated, is effective on noises which have definite peaks, such as automobile ignition, It will have very little effect on noise which is of constant amplitude. Although the switch may be turned on or off when the set is tuned to any frequency band, it is effective only on the AM shortwave band.

### 3.4 MAIN TUNING Control

The Main Tuning control is the large knob in the center of the panel. This control is provided for tuning the receiver to the station frequency desired.

### 3.5 AM-BAND SELECTOR Control

The AM-Band switch is located at the right of the Main Tuning control. This control is provided in order that either the broadcast or short-wave bands may be selected for AM reception. This control is effective only for AM reception.

### 3.6 BASS Control

The Bass control is located at the right of the AM-Band control. This control is provided to enable the listener to raise or lower the bass response of the receiver to suit operating conditions and program material. Maximum bass response is obtained when this control is rotated to maximum clockwise position. Turning the control counter-clockwise will reduce the bass response.

### 3.7 VOLUME Control

The Volume control is located at the right side of the panel. This control is provided to regulate the audio output or volume of the receiver. Maximum volume is obtained when this control is rotated to maximum clockwise position; zero output is obtained when the control is rotated to maximum counter-clockwise rotation. On standard 800-B Receivers this control will operate from minimum to maximum through an arc of 270 degrees. On receivers where remote volume control has been incorporated, the control will rotate seven complete revolutions from minimum to maximum since this control is driven by a motor controlled from the remote position, therefore when manually tuning the set it will be necessary to turn the control considerably more than is the case on the standard receiver.

### 3.8 Pushbutton Operation

Fourteen pushbuttons are provided on the panel of the receiver. The bottom button on the right side is provided to turn the receiver "ON" when this button is pushed in. The bottom button on the left side shuts the receiver "OFF" when pushed in. The other twelve buttons are provided for selecting stations. These twelve station selector buttons are effective only when the Selectivity control is set at "M" or "B" positions and the AM band controls set at "BC" position. A set of insert tabs listing all North American stations is included with each receiver. The sequence in which the inserts should be placed and the method of setting up the tuning system for pushbutton control is described in Section V - Adjustments.

After the pushbutton tuning system has been set up for operation as described on Page 24 when any pushbutton which has been set for an AM station is pushed the receiver will automatically switch over for reception of AM broadcast stations. When any pushbutton which has



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been set up for an FM station is pushed, the receiver will automatically switch over for reception of FM stations. When manually tuning the receiver, in order to switch from AM to FM or vice-versa, it is only necessary to push any AM or FM button momentarily and the circuits will be switched automatically.

### 3.9 Tuning Indicators

In the upper right and left hand corners of the dial scale are located two tuning indicators which are provided to enable the operator to properly tune the receiver to resonance with the station when manually tuning. The indicator in the left hand corner is marked AM and is used only when tuning in stations on the broadcast or shortwave bands. The indicator in the right hand corner is marked FM and is used only when tuning in stations on the FM band. A control, with a screwdriver adjustment slot, located on the top of the chassis directly under the FM tuning eye, is provided so that the tuning eye shadow may be made to close on the strongest FM signal for the particular location. This adjustment will then enable the listener to accurately tune the receiver to all FM stations by watching for maximum closure of the FM tuning eye.

### 3.10 Tuning Dial

The three frequency bands are individually calibrated on the edge lighted glass scale. The BC band is calibrated in kilocycles with the last zero omitted on the numeral markings because of space limitations.

The SW band is calibrated in megacycles and the important bands are marked off for ease in tuning.

The FM band is calibrated in megacycles and divided in one-half megacycle divisions for help in tuning.

A scale marked off in 100 divisions located at the top of the dial face, is provided to enable the listener to log stations which may be tuned in on any of the three frequency bands and also permits setting up the pushbutton system as described on Page 24.

At the left side of the dial face are located four colored dots which are provided to indicate which frequency band the receiver is operating on and when the receiver is adjusted for record player reproduction. Each dot is illuminated by a small lamp located at the back of the dial mechanism and are automatically turned on with the setting of the controls for changing frequency bands.