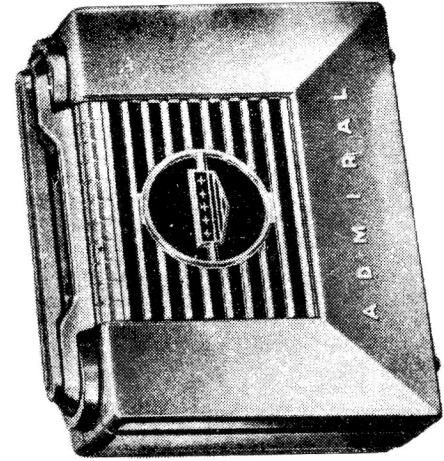


Model 4B21X Ebony, 4B22X  
Maroon, 4B24X Beige, 4B28X  
Green, 4B29X Gray

## VOLTAGE DATA

- Voltages shown on schematic diagram.
- All readings made between tube socket terminals and B minus (terminal of On-Off switch).

- Measured on 117 Volt AC line.
- Volume control minimum; dial set at low frequency end.
- Voltages measured with vacuum-tube voltmeter:



CHASSIS 4B2X

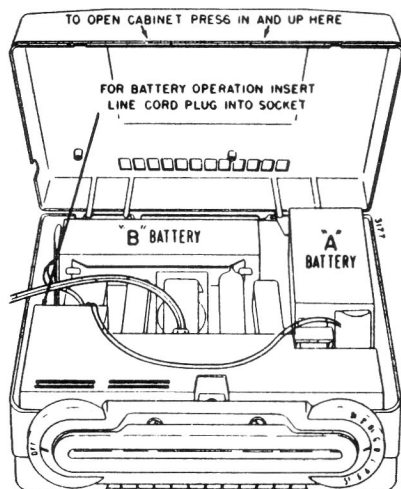
MODELS 4B21X, 4B22X, 4B24X, 4B28X, 4B29X

## ALIGNMENT PROCEDURE

- Turn receiver volume control full on (fully clockwise).
- Use an isolation transformer if available; otherwise, connect a .1 mfd. capacitor in series with low side of signal generator and connect to chassis.
- Caution: Do not connect a ground wire directly to chassis.
- Connect output meter across speaker voice coil.
- Use lowest output of signal generator required for midscale meter indication and proceed in the following sequence.
- Repeat adjustments to insure good results.

Step	Dummy Antenna in Series with Signal Generator	Connection of Signal Generator (High Side)	Signal Generator Frequency	Receiver Gang Setting	Trimmer Description	Trimmer Designation	Type of Adjustment
1	.1 mfd. capacitor	Antenna stator of tuning capacitor	455 KC	Gang fully open	2nd IF 1st IF	*A, B, *C, D	Maximum output
2	.1 mfd. capacitor	Antenna stator of tuning capacitor	1620 KC	Gang fully open	Oscillator	E	Maximum output
Set tuning pointer with tuning gang tuned to 1400 KC generator signal; see illustration below.							
3	Loop of several turns of wire, or place generator lead close to receiver loop for adequate signal pickup.	No actual connection (signal by radiation)	1400 KC	Tune in generator signal	Antenna	F	Maximum output
*Adjustments A and C made from the underside of the chassis. Use an alignment tool with a blade 3/32" wide.							

## REPLACING BATTERIES



In normal use, batteries for this set should furnish about 40 operating hours. The batteries listed below are preferred replacement types. Other equivalent types may be used, but metal-clad "leak-proof" batteries must be avoided as they will load the antenna and lower the set's sensitivity.

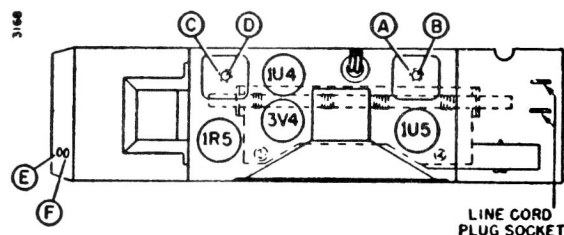
"A" Battery (7½ Volts): General 31, Eveready 717, Burgess C5, Ray-O-Vac 751C or equivalent.

"B" Battery (67½ Volts): Eveready 477, Burgess P45 or equivalent.

Normal "A" Battery Drain—50 Ma.

Normal "B" Battery Drain—8 Ma.

## TUBE AND TRIMMER LOCATION



The extremely compact design of this AC-DC-battery operated portable necessitates the removal of the chassis from the cabinet for tube replacement. The chassis removal procedure given below should be followed when other service or alignment work is necessary, also.

Disconnect the AC line cord from the wall outlet. Squeeze the handle support springs together near the escutcheon to remove the plastic handle. Remove the two escutcheon mounting screws and fibre insulating washers. Remove the "Off-Volume" and "Tuning" knobs. Now open the the cabinet (see illustration at left). Loosen the speaker mounting clips, rotate them away from the speaker, and carefully lift the chassis and batteries out of the cabinet.

An external Antenna can be connected to the white wire from the rod Antenna to reduce battery drain and aid reception when required.