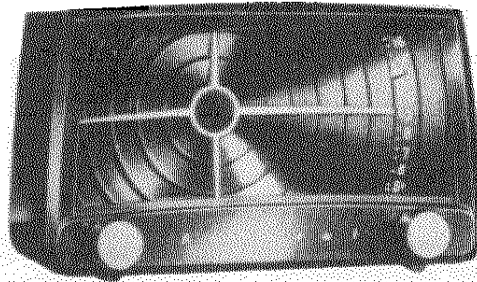


MODELS 5S21A  
5S22AN, 5S23AN  
Ch. 5C3



Models 5S21AN Ebony, 5S22AN Mahogany  
and 5S23AN Ivory

### GENERAL

This receiver employs the very latest in radio circuitry and printed circuit wiring technique. The printed circuit wiring used in this receiver replaces the hookup wire type of circuit wiring used in earlier receivers. See figures 1 and 2. The printed circuit wiring is permanently adhered to the underside of the plastic chassis base by a photo engraving process. This new method of wiring has produced greater uniformity of chassis wiring, fewer wiring troubles and simplifies circuit tracing and trouble shooting. All circuit components are of standard size and design. For servicing convenience, all parts are mounted on the top side of the chassis; see figure 3. Audio circuit components are contained in a printed circuit couplate.

Trouble shooting and parts replacement will in general be the same as for receivers wired with hookup wire. However, when servicing, it is important to read the service information given in this manual with respect to servicing technique printed circuit receivers. A top view of the chassis is shown in figure 3. A bottom view of early and later production chassis is shown in figures 1 and 2. The early and later production chassis have some minor differences in the routing of the printed circuit wiring but however, are the same electrically.

### REPLACEMENT OF COMPONENTS

All components used in this receiver are of standard size and design. For servicing convenience, all components are mounted on the top side of the chassis, see figure 3.

To avoid damage to printed circuits by application of excessive heat when replacing components, use a soldering iron (60 watts or less) with a small tip. Do not use a soldering gun.

To remove a defective component, apply the tip of the soldering iron to the connection point at the underside of the chassis. Keep soldering iron on connection just long enough to melt the solder, then quickly tap the chassis against the service bench to shake the solder away from the connection. After the solder is removed, untwist or separate connections. A pick will be helpful for untwisting or separating connections. After disconnecting connecting wires or lugs, carefully remove components from the top side of the chassis.

Before installing replacement components, clean the solder from the connection point, so that the leads or lugs can be pushed through the holes in the chassis panel. To avoid running solder into adjacent leads of the printed circuit, use as little solder as possible.

For quick replacement, resistors and condensers may be replaced by clipping out the defective part and soldering the new part to the connecting leads remaining from the original part.

An open or damaged section of printed circuit wiring can be replaced by soldering a jumper of ordinary hookup wire across the connection points. To avoid need for complete tube socket replacement, defective tube socket pin clips may be replaced individually. Tube socket pin clips are available under part number 87A35-2.

Note: The tubular shield (center connection) at the bottom of each tube socket must be securely soldered to the printed circuit wiring, otherwise hum or oscillation will result.

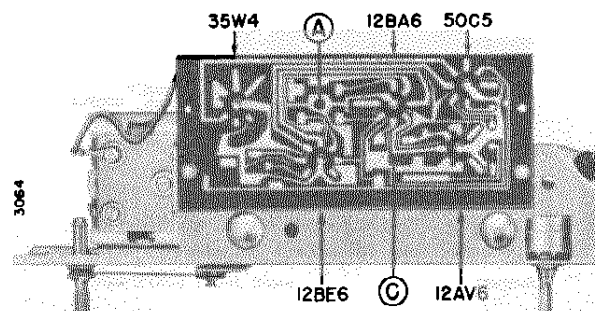


Figure 1. Bottom View of (Early Production) Chassis.

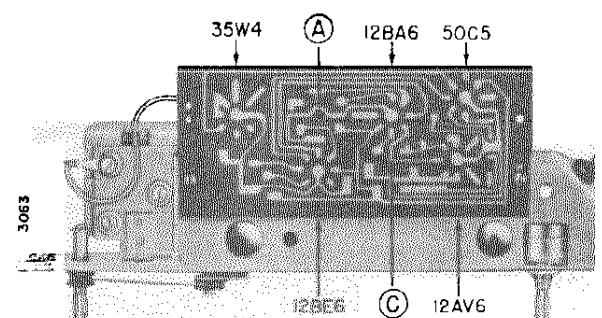


Figure 2. Bottom View of (Later Production) Chassis.

### ALIGNMENT PROCEDURE

- Connect output meter across speaker voice coil.
- Turn receiver volume control full on.
- Use an isolation transformer if available, otherwise connect a .1 mfd. condenser in series with low side of signal generator and connect to chassis.  
Caution: Do not connect a ground wire directly to chassis.
- Use lowest output setting of signal generator capable of producing adequate output meter indication and then proceed as outlined in chart below.
- Use a NON-METALLIC alignment tool for IF transformers.
- 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	250 mmfd. condenser	Antenna stator of tuning condenser	455 KC	Gang fully open	2nd IF 1st IF	*A, B *C, D	Maximum Output
2	250 mmfd. condenser	Antenna stator of tuning condenser	1620 KC	Gang fully open	Oscillator (on gang)	E	Maximum Output
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 (on gang)	F	Maximum Output
4	Set dial pointer slide as shown in Pointer Setting and Dial Cord Stringing Diagram below. Also see instructions below on "Removing Or Installing Chassis In Cabinet" and on "Setting Pointer Slide."						

\*Adjustments A and C made from the underside of the chassis. To avoid splitting the slotted head of powdered iron core tuning slugs in IF transformers, use an alignment tool with a blade 1/8" wide.

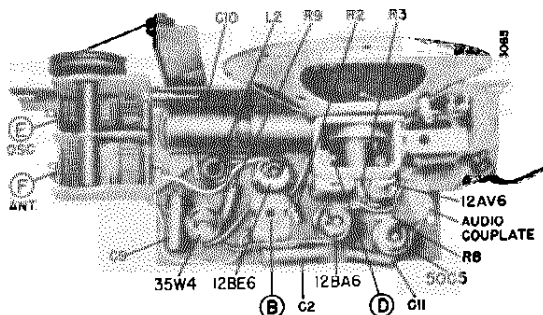
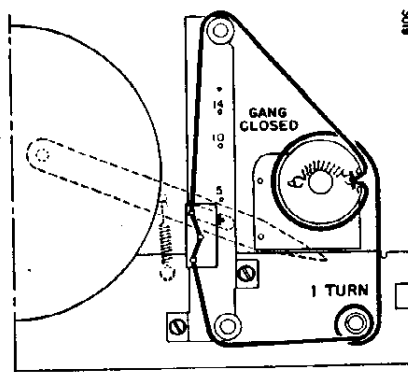


Figure 3. Top View of Chassis. Location of Components and Alignment Adjustments Shown. Adjustments A and C made from underside. See figures 1 and 2.

#### REMOVING OR INSTALLING CHASSIS IN CABINET

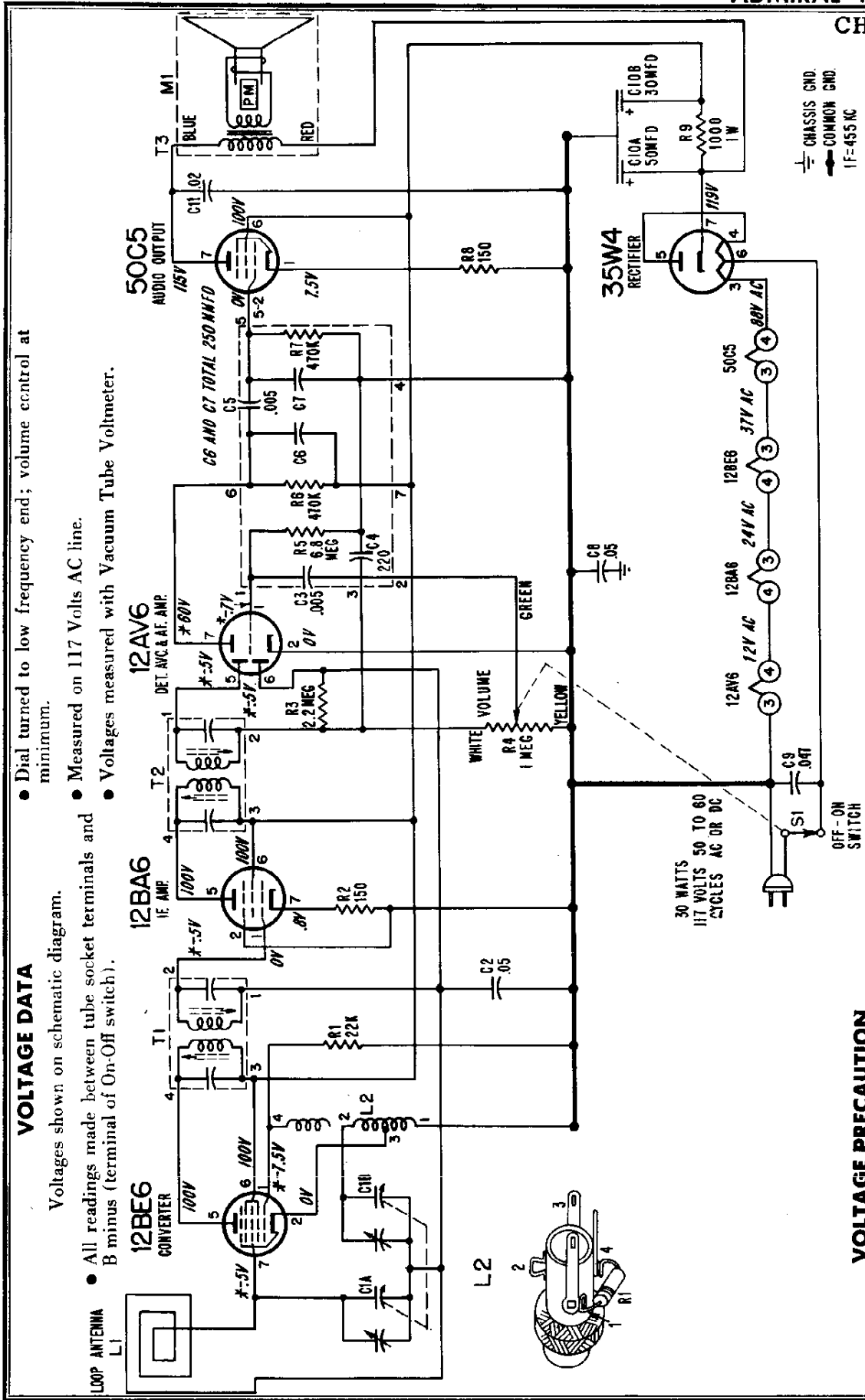
Fully close the gang condenser before removing or installing the chassis in the cabinet. When installing, carefully slide the chassis in the cabinet, so that the tab on the pointer slide fits into the elongated hole at the center of the dial pointer. See the "Pointer Setting and Dial Stringing" diagram at the right. Parts which are shown in dotted lines are not assembled to the chassis. These parts are mounted on the inside of the cabinet.

#### POINTER SETTING AND DIAL CORD STRINGING



#### SETTING POINTER SLIDE

With the gang condenser fully closed, line up the center of the pointer slide with the bottom hole in the pointer slide bracket as shown in the figure above.



- VOLTAGE DATA**  
 Voltages shown on schematic diagram.
- Dial turned to low frequency end; volume control at minimum.
  - Measured on 117 Volts AC line.
  - Voltages measured with Vacuum Tube Voltmeter.

- All readings made between tube socket terminals and B minus (terminal of On-Off switch).

CHASSIS GND.  
 COMMON GND.  
 IF=455 KC

**VOLTAGE PRECAUTION**

The chassis of this receiver is connected directly to one side of the power line. To avoid possibility of damage to test equipment or to printed circuit wiring, do not place the chassis directly on a metal service bench, tools or other metal objects.

When taking voltage readings or making resistance measurements, use test leads with needle point prods to avoid possibility of short circuit between sections of the printed circuit wiring.

**SPECIFICATIONS**

**Circuit:** Superheterodyne using 5 miniature tubes. See additional circuit information on front page.

**Frequency Range:** Standard broadcast band, 535 to 1620 KC.

**Intermediate Frequency:** 455 KC.

**Power Supply:** Power line of 117 volts, 50 to 60 cycles AC or DC.

**Power Consumption:** 30 watts.

**Antenna:** Built-in loop antenna.

**Speaker:** 5" PM, with Alnico V magnet. Voice coil impedance, 3.2 ohms.

**COILS, TRANSFORMERS, ETC.**

L1	Antenna, Loop.....	69C	159
	(mounted on cardboard back)		
L2	Coil, Oscillator.....	69A	158-1
	(includes R1)		
T1	Transformer, 1st IF.....	72B	28-63
T2	Transformer, 2nd IF.....	72B	28-63
T3	Transformer, Output.....	98A	4
M1	Speaker (5" PM) and Output Transformer.....	78B	26-3
S1	Switch, On-Off.....	Part of R4	
	Couplate.....	63B	6-7
	(Includes R5, R6, R7, C3, C4, C5, C6, C7)		

**RESISTORS**

Symbol	Description	Part No.
R1	22,000 ohms, 1/2 watt.....	60B 8-223
R2	150 ohms, 1/2 watt.....	60B 8-151
R3	2.2 megohms, 1/2 watt.....	60B 8-225
R4	1 megohm, Volume control.....	75B 1-52
	(includes switch S1)	
§R5	6.8 megohms, 1/2 watt	
§R6	470,000 ohms, 1/2 watt	
§R7	470,000 ohms, 1/2 watt	
R8	150 ohms, 1/2 watt.....	60B 8-151
R9	1,000 ohms, 1 watt.....	60B 28-2

**CONDENSERS**

C1A	420 mmfd, max, Ant. }	} gang.....	68B 48
C1B	108 mmfd, max, Osc. }		
	(Dial drum spot welded to gang.)		
C2	.05 mfd, 400 volts, paper.....	64B	1-7
§C3	.005 mfd, 450 volts		
§C4	220 mmfd, 450 volts		
§C5	.005 mfd, 450 volts		
§C6	{ See note on		
§C7	{ schematic.		
C8	.05 mfd, 400 volts, paper.....	64B	1-7
C9	.047 mfd, 400 volts, paper.....	65A	13-5
C10A	50 mfd, 150 volts }	} elect. ....	67A 10
C10B	30 mfd, 150 volts }		
C11	.02 mfd, 400 volts, paper.....	64B	8-11

**MISCELLANEOUS PARTS**

Bracket, Pointer Slide (incl. pulleys).....	A3730
Cabinet, Plastic	
Ebony.....	34D 26-12
Mahogany.....	34D 26-13
Ivory.....	34D 26-14
Carton and Fillers.....	44B 236
Dial Background.....	22A 30
Dial Cord (27" length needed).....	50A 1-3
Grommet (for mtg. gang).....	12A 1-19
Grommet (for mtg. tuning shaft).....	12A 1-21
Knob, Tuning	
Ebony.....	33A 81-1
Mahogany.....	33A 81-3
Ivory.....	33A 81-2
Pointer, Dial.....	25A 52
Shaft, Tuning.....	28A 26-6
Slide, Pointer.....	15A 800
Snap Button	
for mtg. pointer to cabinet.....	13A 1-2-59
for mtg. dial background.....	13A 1-3-59
Socket, Tube.....	87A 35-1
Spacer, Metal "T" (for mtg. gang).....	29A 2-1-24
Spacer, Tuning Shaft.....	29A 2-7-24
Speed Nut (for tuning shaft spacer).....	2B 10-19-27
Spring, Dial Cord Tension.....	19C 1-2
Spring, Pointer Tension.....	19C 1-20
Washer, "C" (for tuning shaft).....	4A 4-6-0
Washer, Spring (for tuning shaft).....	4A 6-3-0
Washer, Spring (for pointer).....	4A 6-5

§Part of couplate, part number 63B6-7. Numbers 1, 2, 3, 4 on schematic correspond to lead numbers printed on face of couplate 63B6-7.