



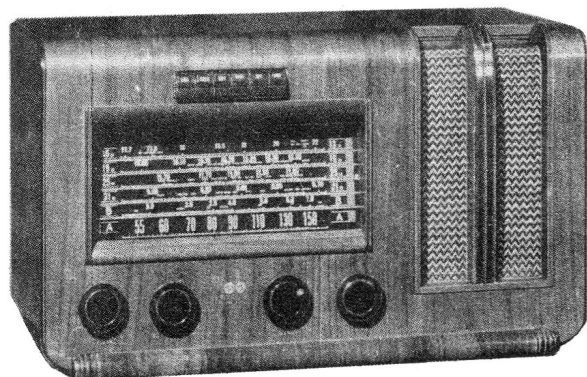
# RCA Victor

## MODELS A22 & A31

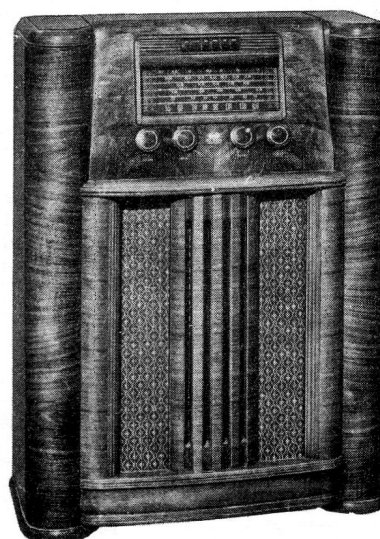
### Seven-Tube, Six-Band, A-C, Superheterodyne Receivers

## TECHNICAL INFORMATION AND SERVICE DATA

SERVICE DIVISION • RCA VICTOR COMPANY LIMITED • MONTREAL



Model A22



Model A31

## Electrical Specifications

### FREQUENCY RANGES

|                        |               |      |
|------------------------|---------------|------|
| Standard Broadcast (A) | 540-1,550     | k.c. |
| Short Wave (B)         | 2,300-7,500   | k.c. |
| 31 M                   | 9,450-9,700   | k.c. |
| 25 M                   | 11,680-11,920 | k.c. |
| 19 M                   | 15,030-15,380 | k.c. |
| 16-13 M                | 17,700-22,000 | k.c. |

Intermediate Frequency ..... 455 k.c.

### RADIOTRON COMPLEMENT

- (1) Type-6SK7 ..... R-F Amplifier
- (2) Type-6SA7 ..... First Detector-Oscillator
- (3) Type-6SK7 ..... Intermediate Amplifier
- (4) Type-6SQ7 ..... 2nd. Det., A. V. C. & A. F.

Pilot Lamps (2) ..... Mazda No. 51, 7.5 volts, 0.2 amp.

### POWER SUPPLY RATINGS

|          |                                       |
|----------|---------------------------------------|
| Rating A | 105-125 volts, 50-60 cycles, 80 watts |
| Rating B | 105-125 volts, 25-60 cycles, 80 watts |

### POWER OUTPUT

|             |           |
|-------------|-----------|
| Undistorted | 3 watts   |
| Maximum     | 4.5 watts |

### R. F. ALIGNMENT FREQUENCIES

|                        |        |                                           |
|------------------------|--------|-------------------------------------------|
| "B" (49 Meters)        | 6,100  | k.c. (osc.)                               |
| 31 M (31 Meters)       | 9,550  | k.c. (osc., det., ant.)                   |
| 25 M (25 Meters)       | 11,800 | k.c. (osc.)                               |
| 19 M (19 Meters)       | 15,200 | k.c. (osc.)                               |
| Standard Broadcast (A) | 600    | k.c. (osc.), 1400 k.c. (osc., det., ant.) |

- (5) Type-6F6G ..... Power Output
- (6) Type-5Y4G ..... Full Wave Rectifier
- (7) Type-6U5 ..... Tuning Tube

### LOUDSPEAKER (CRL-520-1) (A31 only)

|                  |                        |
|------------------|------------------------|
| Type             | 12 inch Electrodynamic |
| Impedance (V.C.) | 3 ohms at 400 cycles   |

### LOUDSPEAKER (CRL-517-1) (A22 only)

|                  |                        |
|------------------|------------------------|
| Type             | 12 inch Electrodynamic |
| Impedance (V.C.) | 3 ohms at 400 cycles   |

## Electrical and Mechanical Specifications (continued)

| CABINET DIMENSIONS  |                  | A22    | A31                     |
|---------------------|------------------|--------|-------------------------|
| Width .....         | 22               | inches | 28 $\frac{3}{4}$ inches |
| Depth .....         | 10 $\frac{3}{4}$ | inches | 13 $\frac{1}{2}$ inches |
| Height .....        | 13               | inches | 39 $\frac{1}{4}$ inches |
| <b>POWER OUTPUT</b> |                  |        |                         |
| Undistorted .....   |                  |        | 3 watts                 |
| Maximum .....       |                  |        | 4.5 watts               |

### PUSH BUTTON TUNING RANGE

|                    |                |
|--------------------|----------------|
| Button No. 1 ..... | Phonograph     |
| Button No. 2 ..... | 540—1,000 k.c. |
| Button No. 3 ..... | 540—1,000 k.c. |
| Button No. 4 ..... | 620—1,200 k.c. |
| Button No. 5 ..... | 750—1,400 k.c. |
| Button No. 6 ..... | 900—1,570 k.c. |

## General Description

These receivers employ a seven-tube, six band super-heterodyne circuit, the arrangement of which is shown in the Schematic Circuit Diagram. Features of design include:—Loop antenna as the first tuned circuit; high gain R.F. stage; stabilized oscillator circuit resulting in less frequency drift; magnetite core I.F. transformers; magnetite core oscillator coils on all bands; automatic volume control; A.C. outlet on chassis back

apron; Tuning indicator tube for fine, accurate tuning on all bands; variable tone control circuit; push button tuning of five Standard Broadcast stations by means of pre-set oscillator coils; dust proof electrodynamic loudspeaker; temperature stabilized capacitors in the oscillator circuits; and a large, edge lighted dial individually calibrated for each band.

## Circuit Arrangement

The circuit consists of an R.F. amplifier stage incorporating the Loop Antenna as the first tuned circuit; first detector (oscillator) stage; I.F. amplifier stage; second detector, A.V.C. and first Audio stage and a single pentode output operating in Class A-B; tuning indicator; and a well regulated power supply.

The Loop Antenna used as the first tuned stage is in the circuit on all bands; temperature compensated capacitors are used in the oscillator circuits to reduce oscillator drift.

Spread band tuning is accomplished electrically by shunting the oscillator section of the variable capacitor with relatively large temperature—stabilized fixed cap-

acitors for tuning the oscillator coils on the 16-13M, 19M, 25M, 31M bands. Antenna and detector coils are designed to be sufficiently broad-tuned to require no variable tuning over the narrow frequency range of the spread bands.

The intermediate frequency amplifier consists of a Type 6SK7 tube in a single stage transformer-coupled circuit. The windings of all I.F. Transformers are resonated by fixed capacitors and are adjusted by moulded magnetite cores to tune to 455K.C.

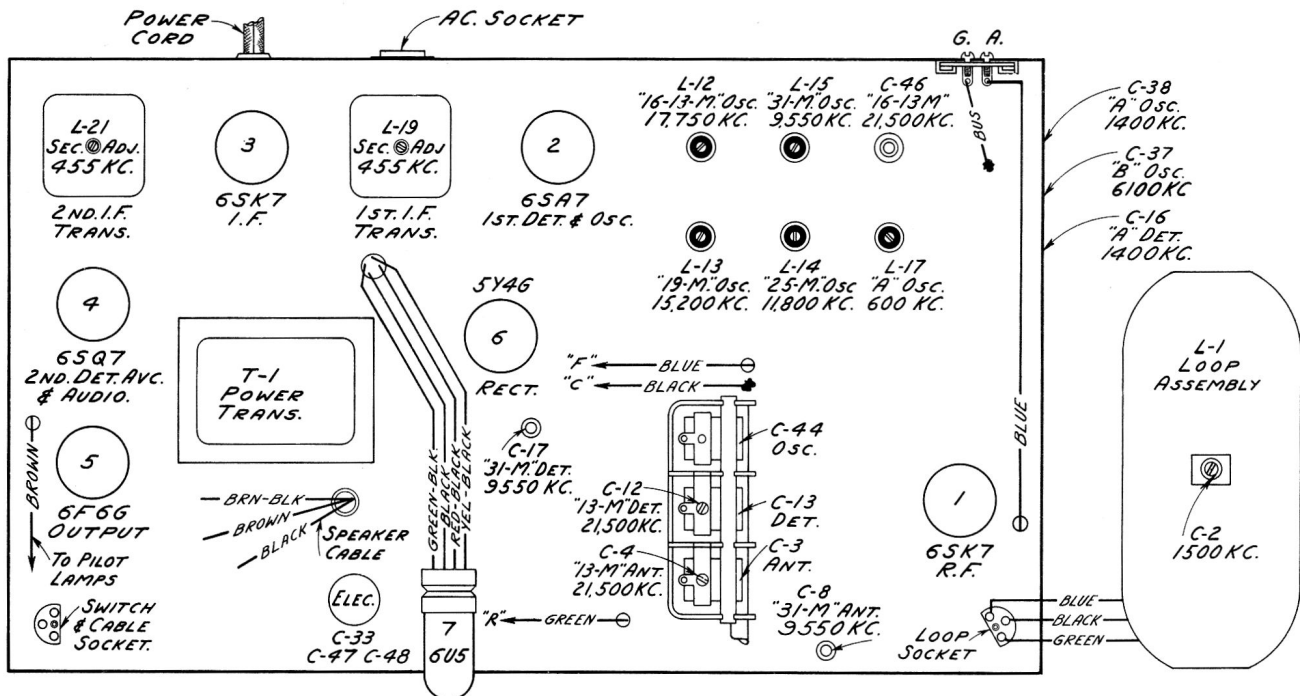


Fig. 1—Chassis Layout and Alignment Adjustments

# Alignment Procedure

**Cathode-Ray Alignment** is the preferable method. Connections for the oscillograph are shown on the schematic diagram.

**Output Meter Alignment.**—If this method is used, connect the meter across the voice coil, and turn the receiver volume control to maximum.

**Test-Oscillator.**—For all alignment operations, connect the low side of the test-oscillator to the receiver chassis, and keep the output as low as possible to avoid a-v-c action.

**Calibration Scale on Indicator-Drive-Cord-Drum.**—The tuning dial is fastened in the cabinet and cannot be used for reference during alignment; therefore, a calibration scale is attached to the tuning drum. The setting of the gang condenser is read on this scale, which is calibrated in degrees. The correct setting of the gang

in degrees, for each alignment frequency, is given in the alignment table.

As the first step in r-f alignment, check the position of the drum. The O° mark on the drum scale must be vertical and directly above the center of the shaft of the tuning drum when the plates are fully meshed. The drum is held to the shaft by means of two set-screws, which must be tightened securely when the drum is in the correct position.

**Pointer for Calibration Scale.**—Improvise a pointer for the calibration scale by fastening a piece of wire to the chassis, and bend the wire so that it points to the O° mark on the calibration scale when the plates are fully meshed.

| Order of Alignment | Test Oscillator          |               |                   | Range Selector | Receiver Dial Setting   | Circuit to Adjust  | Adjustment Symbols |
|--------------------|--------------------------|---------------|-------------------|----------------|-------------------------|--------------------|--------------------|
|                    | Connection to Receiver   | Dummy Antenna | Frequency Setting |                |                         |                    |                    |
| 1                  | 6SK7<br>2nd I.F.<br>Grid | .1            | 455 kc            | "A"            | No Signal<br>550-750 kc | 2nd I.F.<br>Trans. | L20 & L21          |
| 2                  | 6SA7<br>Det. Grid        | .1            | 455 kc            | "A"            | No Signal<br>550-750 kc | 1st I.F.<br>Trans. | L18 & L19          |
| 3                  | Ant. terminal            | 300 Ohms      | 21,500 kc         | "16-13 M"      | 21.5 mc (162°)          | "16-13 M" Osc.     | L46                |
| 4                  | Ant. terminal            | 300 Ohms      | 17,750 kc         | "16-13 M"      | 17.75 mc (17°)          | "16-13 M" Osc.     | L12                |
| 5                  | Ant. terminal            | 300 Ohms      | 21,500 kc         | "16-13 M"      | 21.5 mc (162°)          | "16-13 M" Det.     | C12                |
| 6                  | Ant. terminal            | 300 Ohms      | 21,500 kc         | "16-13 M"      | 21.5 mc (162°)          | "16-13 M" Ant.     | C4                 |
| 7                  | Ant. terminal            | 300 Ohms      | 15,200 kc         | "19 M"         | 15.8 mc (94°)           | "19 M" Osc.        | L13                |
| 8                  | Ant. terminal            | 300 Ohms      | 11,800 kc         | "25 M"         | 11.8 mc (99°)           | "25 M" Osc.        | L14                |
| 9                  | Ant. terminal            | 300 Ohms      | 9,550 kc          | "31 M"         | 9.55 mc (73°)           | "31 M" Osc.        | L15                |
| 10                 | Ant. terminal            | 300 Ohms      | 9,550 kc          | "31 M"         | 9.55 mc (73°)           | "31 M" Det.        | C17                |
| 11                 | Ant. terminal            | 300 Ohms      | 9,550 kc          | "31 M"         | 9.55 mc (73°)           | "31 M" Ant.        | C8                 |
| 12                 | Ant. terminal            | 300 Ohms      | 6,100 kc          | "B"            | 6.1 mc (149°)           | "B" Osc.           | C37                |
| 13                 | Ant. terminal            | 300 Ohms      | 1,400 kc          | "A"            | 1,400 kc (155°)         | "A" H.F. Osc.      | C38                |
| 14                 | Ant. terminal            | 300 Ohms      | 600 kc            | "A"            | 600 kc (33°)            | "A" LF Osc.        | L17                |
| 15                 | Ant. terminal            | 300 Ohms      | 1,400 kc          | "A"            | 1,400 kc (155°)         | "A" Det.           | C16                |
| 16                 | Radiation Loop           | 300 Ohms      | 1,500 kc          | "A"            | 1,500 kc (163°)         | Loop               | C2*                |

**NOTE:**—Align the I.F. circuits by means of the oscillograph, for a symmetrical curve. Peak R.F. stages of all bands. \* Radiation loop comprising two turns of wire 18 inches in diameter should be placed four feet from receiver loop before aligning "C2".

**Spread-Band Alignment.**—The most satisfactory method of aligning or checking the spread-band ranges is on actual reception of short-wave stations of known frequency, by adjusting the magnetite-core oscillator coil for each band so that these stations come in at the correct points on the dial.

In exceptional cases, when the set is being serviced in a location where the noise level is high enough to prevent reception of short-wave stations, a test-oscillator may be used for alignment, but an extremely high degree of accuracy is required in the frequency settings of the test-oscillator, as a slight error will produce considerable inaccuracy on the spread-band dials. The frequency settings of the test-oscillator may be checked by one or both of the following methods:

1. Determine the exact dial settings of the test-oscillator (for frequencies at or close to the specified alignment frequencies) by zero-beating the test-oscillator against short-wave stations of known frequency.
2. Use harmonics of the standard-broadcast range of a test-oscillator, first checking the frequency settings on this range by means of a crystal calibrator (RCA Stock No. 9572), or by zero-beating against standard broadcast stations.

**When a test oscillator is employed for spread-band alignment, a final check should be made on actual reception of short-wave**

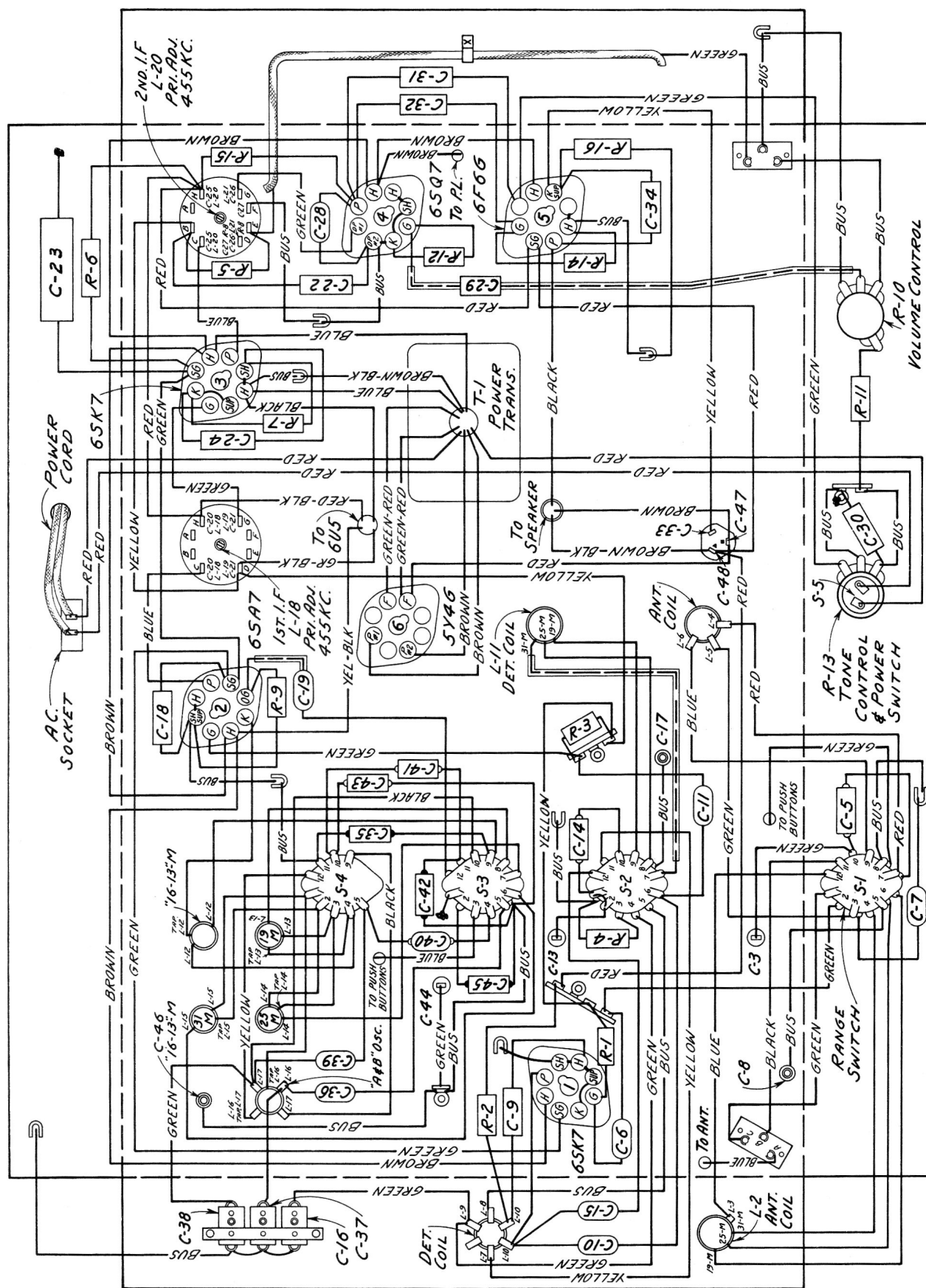
**stations of known frequency, and the magnetite-core oscillator coil for each band should be re-adjusted so that the stations come in at the correct points on the dial.**

**NOTE:**—Whenever possible spread band adjustments should be made with the chassis fastened in the cabinet and the pointer accurately aligned to the dial.

**Spread-band Adjustments.**— Alignment of the spread bands requires special procedure since test oscillators used alone are not ordinarily sufficiently accurate for this purpose. The RCA Stock No. 9572 Crystal Calibrator affords a convenient and accurate alignment standard. Wrap a few turns of wire around the crystal calibrator and connect one free end to the antenna terminal of the receiver. Using the crystal calibrator to obtain the necessary accuracy, follow the tabulated alignment procedure for the "31M.", "25M.", and "19M." bands.

For the "B" band, snap crystal calibrator "Hi-Lo" switch to "Hi", turn the range selector to "B" band, and set receiver dial pointer to 6.0 mc. Adjust oscillator padder C37 for minimum "Tuning Tube" opening. Use the peak indicated by the alignment table. Snap "Hi-Lo" switch to "Lo" and locate 6,100 kc (the first 100 kc harmonic above 6,000 kc) by slightly readjusting C37 with the dial pointer set at 6.1 mc. This method insures selection of correct crystal-calibrator harmonic.





**Figure 3—Chassis Wiring Diagram**



## RADIOTRON SOCKET VOLTAGES

| Type           | Plate                                | Screen Grid | Control Grid | Cathode | Heater |
|----------------|--------------------------------------|-------------|--------------|---------|--------|
| 6SK7 R.F.      | 210                                  | 82V         | ....         | ....    | 6.3V   |
| 6SA7 Conv.     | 220                                  | 82V         | ....         | ....    | 6.3V   |
| 6SK7 I.F.      | 220                                  | 82V         | -.2V         | ....    | 6.3V   |
| 6SQ7 Audio     | 195                                  | ....        | ....         |         | 6.3V   |
| 6F6G Output    | 205V                                 | 220V        | ....         | 13V     | 6.3V   |
| 5Y4G Rectifier | D.C. output measured across C48 340V |             |              |         | 5.0V   |

Note:—All the above values hold within plus or minus 20% when measured with a 1,000 ohm-per-volt meter, on a line voltage of 115 volts. All voltages are measured to chassis.

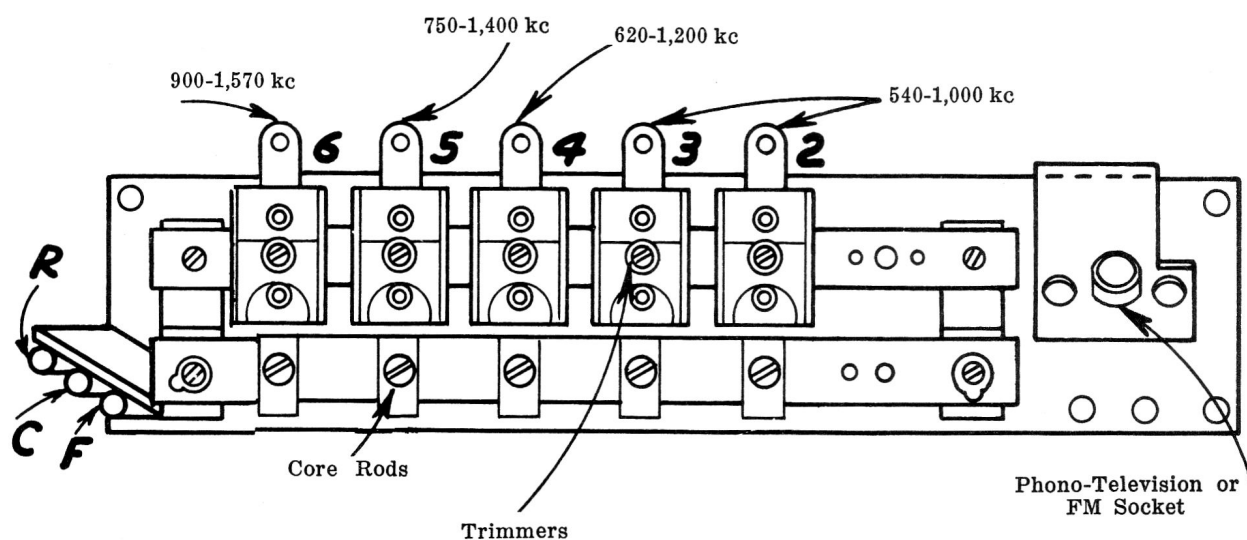


Fig. 4

## Push Button Adjustment

The push buttons may be adjusted for any five stations on the "A" band. The preferable arrangement is to adjust for stations in order of frequency.

Proceed as follows:—

- (1) Turn "Range selector" to "A" position and manually tune in the first station, say 560 k.c.
- (2) Turn "Range selector" to "P.B." position, press button No. 2 located second from left on front panel.

- (3) Referring to Figure 4, adjust core and trimmer No. 2 for a peak at 560 k.c.

- (4) Proceed to adjust the other four stations in order of frequency, as outlined above.

When a station is inaudible due to reception conditions a test oscillator should be substituted for the station signal.

# REPLACEMENT PARTS

Insist on genuine factory tested parts, which are readily identified and may be purchased from authorized dealers.

| STOCK NO.                  | DESCRIPTION                                                                                  | STOCK NO.                                                      | DESCRIPTION                                                    | LIST PRICE |
|----------------------------|----------------------------------------------------------------------------------------------|----------------------------------------------------------------|----------------------------------------------------------------|------------|
| <b>RECEIVER ASSEMBLIES</b> |                                                                                              |                                                                |                                                                |            |
| S-2876                     | Board-Ant.Ground Terminal Board....                                                          | 12486                                                          | Resistor-560,000 ohm, 1/4 watt (R8).....                       |            |
| 12714                      | Capacitor-Adjustable Trimmer 2-12 mmf. (C8,C17,C46).....                                     | 12013                                                          | Resistor-1.0 megohms, 1/10 watt (R17).....                     |            |
| 31400                      | Capacitor-Trimmed Condenser two 2-10 mmfd, one 3-30 mmfd. (C16,C37,C38).....                 | 12679                                                          | Resistor-2.2 megohms-1/4 watt (R1,R5).....                     |            |
| 12814                      | Capacitor-5.6 mfd. (C10).....                                                                | 30992                                                          | Resistor-10. megohms-1/4 watt (R12).....                       |            |
| 12896                      | Capacitor-15 mmfd. (C7).....                                                                 | S-2887                                                         | Shaft-Station selector drive shaft (Model A25 only).....       |            |
| 36012                      | Capacitor-15 mmfd. (Temp.Comp.) (C35)                                                        | S-2888                                                         | Shaft-Station selector drive shaft (Model A38 only).....       |            |
| S-3008                     | Capacitor-47 mmfd. (Close Tol.) (C5,C14).....                                                | S-2824                                                         | Socket-A.C. Socket.....                                        |            |
| 35644                      | Capacitor-47 mmfd. (Temp.Comp.) (C45)                                                        | 31364                                                          | Socket-Dial Lamp Socket.....                                   |            |
| 12723                      | Capacitor-56 mmfd. (C19).....                                                                | 36422                                                          | Socket-Loop Antenna & Push Button Switch Cable Socket.....     |            |
| S-2997                     | Capacitor-62 mmfd. (Temp.Comp.) (C42)                                                        | 5119                                                           | Socket-Speaker Cable female connector.....                     |            |
| 13057                      | Capacitor-68 mmfd. (On Loop) (C1).....                                                       | 31251                                                          | Socket-Tube socket.....                                        |            |
| 12724                      | Capacitor-120 mmfd. (C28).....                                                               | 13638                                                          | Spring-Drive cord tension spring (Pkg.2).....                  |            |
| S-3100                     | Capacitor-120 mmfd. (Close Tol.) (C43)                                                       | S-2889                                                         | Switch-Range switch (S1,S2,S3,S4) (Model A25 only).....        |            |
| 12694                      | Capacitor-220 mmfd. (C15).....                                                               | S-2890                                                         | Switch-Range switch (S1,S2,S3,S4) (Model A38 only).....        |            |
| S-2895                     | Capacitor-220 mmfd. (Close Tol.) (C41)                                                       | S-2891                                                         | Tone Control and Power Switch (R13,S5) (Model A25 only).....   |            |
| 12952                      | Capacitor-330 mmfd. (C6).....                                                                | S-2892                                                         | Tone Control and Power Switch (R13,S5) (Model A38 only).....   |            |
| 12537                      | Capacitor-560 mmfd. (C11).....                                                               | S-2899                                                         | Transformer-1st I.F. Transformer (L18,L19,C20,C21).....        |            |
| S-2988                     | Capacitor-680 mmfd. (Close Tol.) (C40)                                                       | S-2900                                                         | Transformer-2nd I.F. Transformer (L20,L21,C25,C26,C27,R8)..... |            |
| 11622                      | Capacitor-2400 mmfd. (C36).....                                                              | S-2903                                                         | Transformer-Power-110 volt 25/60 cycle (T1).....               |            |
| 13895                      | Capacitor-5600 mmfd. (C39).....                                                              | S-2904                                                         | Transformer-Power-110 volt 50/60 cycle (T1).....               |            |
| 5107                       | Capacitor-.0025 mfd. (C29).....                                                              | S-2905                                                         | Volume Control (R10) (Model A25 only).....                     |            |
| 4838                       | Capacitor-.005 mfd. (C31,C34).....                                                           | S-2906                                                         | Volume Control (R10) (Model A38 only).....                     |            |
| 4937                       | Capacitor-.01 mfd. (C9,C32).....                                                             |                                                                |                                                                |            |
| 32787                      | Capacitor-.05 mfd. (C22,C30).....                                                            | <b>SPEAKER ASSEMBLIES (CRL-517-1) 6" E M (Model A22 only)</b>  |                                                                |            |
| 4839                       | Capacitor-.1 mfd. (C18,C24).....                                                             | 32907                                                          | Cap-Dust cap for cone centre (Pkg.5).....                      |            |
| S-2894                     | Capacitor-Electrolytic 10 mfd. (C23)                                                         | 33077                                                          | Coil-Field coil (L24).....                                     |            |
| S-2925                     | Capacitor-Electrolytic comprising two sections 10 mfd, one section 20 mfd (C33,C47,C48)..... | 35441                                                          | Cone-Speaker cone and voice coil (L22).....                    |            |
| S-2877                     | Coil-Antenna coil "B-16-13" bands (L4,L5,L6).....                                            | 5118                                                           | Plug-3 contact male plug.....                                  |            |
| S-2878                     | Coil-Ant.Coil "31-25-19" bands (L2,L3).....                                                  | S-2875                                                         | Speaker complete.....                                          |            |
| S-2879                     | Coil-R.F.Coil "A-B-16-13" bands (L7,L8,L9,L10).....                                          | 32905                                                          | Transformer-Output (T2).....                                   |            |
| S-2880                     | Coil-R.F. Coil "31-25-19" bands (L11).....                                                   |                                                                |                                                                |            |
| S-2884                     | Coil-Oscillator 16-13 M Band (L12).....                                                      | <b>SPEAKER ASSEMBLIES (CRL-520-1) 12" E M (Model A31 only)</b> |                                                                |            |
| S-2881                     | Coil-Oscillator 19 M Band (L13).....                                                         | 31825                                                          | Cap-Dust Cap for cone centre (Pkg.5).....                      |            |
| S-2882                     | Coil-Oscillator 25 M Band (L14).....                                                         | 12012                                                          | Coil-Field Coil (L24).....                                     |            |
| S-2883                     | Coil-Oscillator 31 M Band (L15).....                                                         | 31275                                                          | Cone-Speaker cone and voice coil (L22).....                    |            |
| S-2885                     | Coil-Oscillator "A" and "B" band (L16,L17).....                                              | 5118                                                           | Plug-3 contact male plug connector                             |            |
| S-2898                     | Condenser-3 gang variable tuning Condenser (C3,C4,C12,C13,C44)....                           | S-2893                                                         | Speaker complete.....                                          |            |
| S-2897                     | Cord-Indicator pointer drive cord (53 1/2 long).....                                         | S-2855                                                         | Transformer-Output (T2).....                                   |            |
| 31273                      | Drum-Drive Cord Drum Assembly.....                                                           |                                                                |                                                                |            |
| S-2886                     | Indicator-Station Selector Indicator Pointer.....                                            |                                                                |                                                                |            |
| 11765                      | Lamp-Dial lamp Mazda #51.....                                                                |                                                                |                                                                |            |
| 31280                      | Pulley-Drive cord pulley.....                                                                |                                                                |                                                                |            |
| 14887                      | Retainer-Drive cord pulley retainer (Pkg.10).....                                            |                                                                |                                                                |            |
| 30929                      | Resistor-270 ohms, 1/2 watt (R7)...                                                          |                                                                |                                                                |            |
| 31388                      | Resistor-390 ohms, 1 watt (R16)....                                                          |                                                                |                                                                |            |
| 14720                      | Resistor-1000 ohms, 1/4 watt (R2)...                                                         |                                                                |                                                                |            |
| 30146                      | Resistor-4700 ohms, 1/4 watt (R4)...                                                         |                                                                |                                                                |            |
| 14559                      | Resistor-10,000 ohm, 1/4 watt (R11)                                                          |                                                                |                                                                |            |
| S-2587                     | Resistor-10,000 ohm, 4 watt (R6)...                                                          |                                                                |                                                                |            |
| 12454                      | Resistor-33,000 ohm, 1/4 watt (R9).                                                          |                                                                |                                                                |            |
| 14659                      | Resistor-470,000 ohm, 1/4 watt (R14,R15).....                                                |                                                                |                                                                |            |

# REPLACEMENT PARTS

| STOCK NO.                          | DESCRIPTION                                                 | STOCK NO.                       | DESCRIPTION                                               |
|------------------------------------|-------------------------------------------------------------|---------------------------------|-----------------------------------------------------------|
| <b>PUSH BUTTON SWITCH ASSEMBLY</b> |                                                             | <b>MISCELLANEOUS ASSEMBLIES</b> |                                                           |
| S-3241                             | Cable-Shielded phono cable less plug.....                   | 35883                           | Button-Station selector push button.....                  |
| S-2908                             | Capacitor-Trimmer capacitor bank (C49,C50,C51,C52,C53)..... | S-2913                          | Dial-Station selector dial scale                          |
| 35803                              | Coil-Oscillator coil (L25,L26,L27,L28,L29).....             | 34489                           | Knob-Volume,tone or tuning control knob.....              |
| 35871                              | Core-Oscillator coil core.....                              | S-3316                          | Knob-Range Switch Knob (Outer section only).....          |
| 32641                              | Plug-Three prong male plug for Phono cable.....             | S-2914                          | Knob-Range switch knob (Inner section only).....          |
| 31347                              | Socket-Phono input socket.....                              | S-2915                          | Loop-Antenna loop assembly (L1,C1,C2)(Model A25 only).... |
| S-2911                             | Switch-Push Button switch assembly (S6 to S16 inc.).....    | S-2916                          | Loop-Antenna loop assembly (L1,C1,C2)(Model A38 only).... |
|                                    |                                                             | 36149                           | Marker-Push button call letter markers (1 set).....       |
|                                    |                                                             | 34053                           | Spring-Push button retaining spring (Pkg.5).....          |
|                                    |                                                             | 14270                           | Spring-Knob retaining spring (Pkg.2).....                 |
|                                    |                                                             | S-2542                          | Tool-Push button tuning set up tool.....                  |

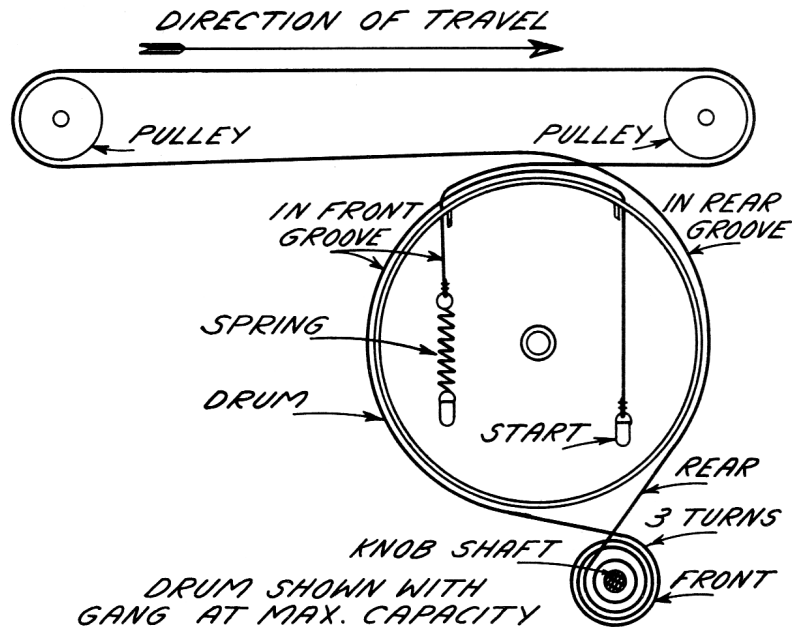


Fig. 5—Dial Drive Cord.