

# MODEL F-87

## Eight-Tube, Three-Band, A-C Superheterodyne Receiver

### Electrical Specifications

#### FREQUENCY RANGES

"Broadcast" (A)..... 530-1,720 kc  
"Medium Wave" (B)..... 2,100-6,800 kc  
"Short Wave" (C)..... 6,800-22,000 kc  
Intermediate Frequency..... 460 kc

#### R-F ALIGNMENT FREQUENCIES

"Broadcast" (A)..... 600 kc (osc.), 1,500 kc (osc.)  
"Medium Wave" (B)..... 6,000 kc (osc.)  
"Short Wave" (C)..... 20,000 kc (osc., det., ant.)

#### RADIOTRON COMPLEMENT

(1) Type-6K7..... R-F Amplifier  
(2) Type-6J7..... Heterodyne Oscillator  
(3) Type-6L7..... First Detector  
(4) Type-6K7..... Intermediate Amplifier  
Pilot Lamps (4).....

(5) Type-6Q7..... Second Det., A-F Amp., and A.V.C.  
(6) Type-6F6..... Power Output  
(7) Type-6G5..... Tuning Tube  
(8) Type-5W4..... Full-Wave Rectifier  
Mazda No. 46, 6.3 volts, 0.25 amp.

#### POWER SUPPLY RATINGS

Rating A..... 105-125 volts, 50-60 cycles, 90 watts  
Rating B..... 105-125 volts, 25-60 cycles, 90 watts

#### POWER OUTPUT

Undistorted..... 2.5 watts  
Maximum..... 4.5 watts

#### LOUDSPEAKER

Type..... 12-inch Electrodynamic  
Impedance (v.c.)..... 2.2 ohms at 400 cycles

### Mechanical Specifications

Height ..... 40 inches  
Width ..... 26½ inches  
Depth ..... 12⅞ inches  
Weight (net)..... 55½ pounds  
Weight (shipping)..... 68 pounds  
Chassis Base Dimensions..... 14⅞ inches x 9¾ inches x 3¼ inches  
Over-all Chassis Height..... 9¾ inches  
Operating Controls..... (1) Power Switch—Tone; (2) Tuning (large inner knob), Range Selector (small outer knob, left to right "A," "B," "C"); (3) Volume  
Tuning Drive Ratio ..... 20 to 1

### General Description

This receiver employs an eight-tube, three-band superheterodyne circuit, the arrangement of which is shown by the Schematic Circuit Diagram. Features of design include an r-f amplifier stage with "cumulative-wound" antenna transformer for high signal-to-noise ratio; magnetite-core i-f transformers and low-frequency oscillator tracking; full automatic volume

control; phonograph terminal board; "Tuning Eye" tuning tube; 12-inch, dust-proof electrodynamic loudspeaker; plunger-type, air-dielectric trimming capacitors; aural-compensated audio volume control; variable, high-frequency tone control; and a new "index" dial with short-wave stations listed by name and illuminated band and tone indicators.

## Service Data

The various diagrams of this booklet contain such information as will be needed to isolate causes for defective operation if such develops. The ratings of the resistors, capacitors, coils, etc., are indicated adjacent to the symbols signifying these parts on the diagrams. Identification titles such as R1, L1, C1, etc., provide reference between the illustrations and Replacement Parts List. The coils, transformer windings, and reactors are rated in terms of d-c resistance to permit continuity checks.

**Loudspeaker.**—Centering of the loudspeaker is made in the usual manner with three narrow paper feelers after first removing the front dust cover. This may be removed by softening its cement with a light application of acetone, using care not to allow the acetone to flow into the air gap. The dust cover should be cemented back in place with ambroid upon completion of adjustment.

**Phonograph Attachment.**—A terminal board is provided for connecting a phonograph into the audio amplifying circuit. The Model R-93 Record Player should be connected as follows: Remove link between terminals 1 and 2 on terminal board. Connect green wire in Radio-Record switch cable to terminal 1, yellow to terminal 2, and shield extension to terminal 3. Tape unused red and blue leads separately. Con-

nect a 2-conductor twisted cable between the Record Player binding posts and the screw terminals on Radio-Record switch.

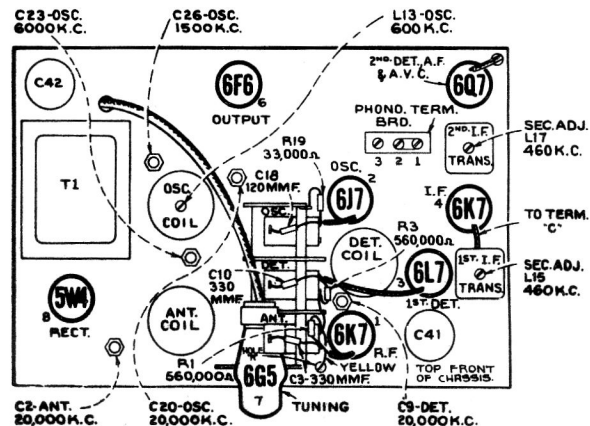


Figure 1—Radiotron, Coil, and Trimmer Locations

## Alignment Procedure

Calibrate the tuning dial by adjusting main dial pointer to the low-frequency (end) calibration mark on dial with the gang tuning-condenser plates in full-mesh position; then adjust the small (vernier) pointer to "O." These are friction adjustments.

Perform alignment in proper order, tabulated below, starting with No. 1 and following all operations across, then No. 2, etc. Adjustment locations are shown on figures 1 and 2.

Cathode-ray alignment is highly preferable; the connections to the chassis are shown on figure 4. If an output indicator is used, connect it across the loudspeaker voice-coil and advance the receiver volume control to full-volume position.

Connect the "low" output terminal of the test oscillator to

the receiver "G" (ground) terminal for all alignment operations. Regulate the output of the test oscillator so that minimum signal is applied to the receiver to obtain an observable output indication. This will avoid a-v-c action.

The term "Dummy antenna" means the device which must be connected between the "high" test-oscillator output and the point of connection to the receiver in order to obtain ideal alignment. "No signal, 550-750 kc" means that the receiver should be tuned to a point between 550 and 750 kc where no signal or interference is received from a station or local (heterodyne) oscillator.

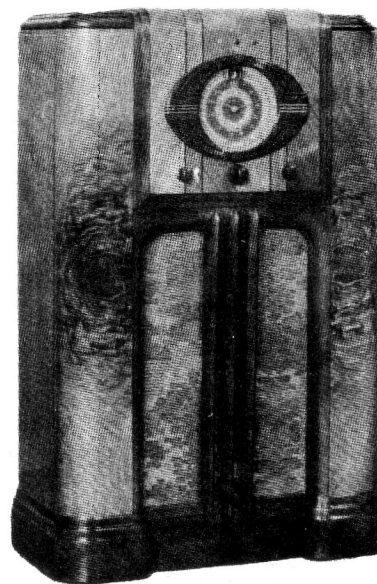
| Order of Alignment | Test Oscillator        |               |                   | Range Selector | Receiver Dial Setting | Circuit to Adjust | Adjustment Symbols | Adjust to Obtain |
|--------------------|------------------------|---------------|-------------------|----------------|-----------------------|-------------------|--------------------|------------------|
|                    | Connection to Receiver | Dummy Antenna | Frequency Setting |                |                       |                   |                    |                  |
| 1                  | 6K7 I-F Grid Cap       | .001 Mfd.     | 460 kc            | "A" Left       | No Signal 550-750 kc  | 2nd I-F Trans.    | L16 and L17        | Max. (peak)      |
| 2                  | 6L7 Det. Grid Cap      | .001 Mfd.     | 460 kc            | "A"            | No Signal 550-750 kc  | 1st I-F Trans.    | L14 and L15        | Max. (peak)      |
| 3                  | Ant. Term.             | 300 Ohms      | 20,000 kc         | "C" Right      | 20,000 kc             | "C" Osc.          | C20                | Max. (peak) *    |
| 4                  | Ant. Term.             | 300 Ohms      | 20,000 kc         | "C"            | 20,000 kc             | "C" Det.          | C9                 | Max. (peak) †    |
| 5                  | Ant. Term.             | 300 Ohms      | 20,000 kc         | "C"            | 20,000 kc             | "C" Ant.          | C2                 | Max. (peak) ‡    |
| 6                  | Ant. Term.             | 300 Ohms      | 6,000 kc          | "B" Center     | 6,000 kc              | "B" Osc.          | C23                | Max. (peak) *    |
| 7                  | Ant. Term.             | 200 Mmfd.     | 600 kc            | "A" Left       | 600 kc                | "A" L-F Osc.      | L13                | Max. (peak)      |
| 8                  | Ant. Term.             | 200 Mmfd.     | 1,500 kc          | "A"            | 1,500 kc              | "A" H-F Osc.      | C26                | Max. (peak)      |
| 9                  | Ant. Term.             | 200 Mmfd.     | 600 kc            | "A"            | 600 kc                | "A" L-F Osc.      | L13                | Max. (peak)      |
| 10                 | Ant. Term.             | 200 Mmfd.     | 1,500 kc          | "A"            | 1,500 kc              | "A" H-F Osc.      | C26                | Max. (peak)      |

\* Use minimum capacity peak if two peaks can be obtained.

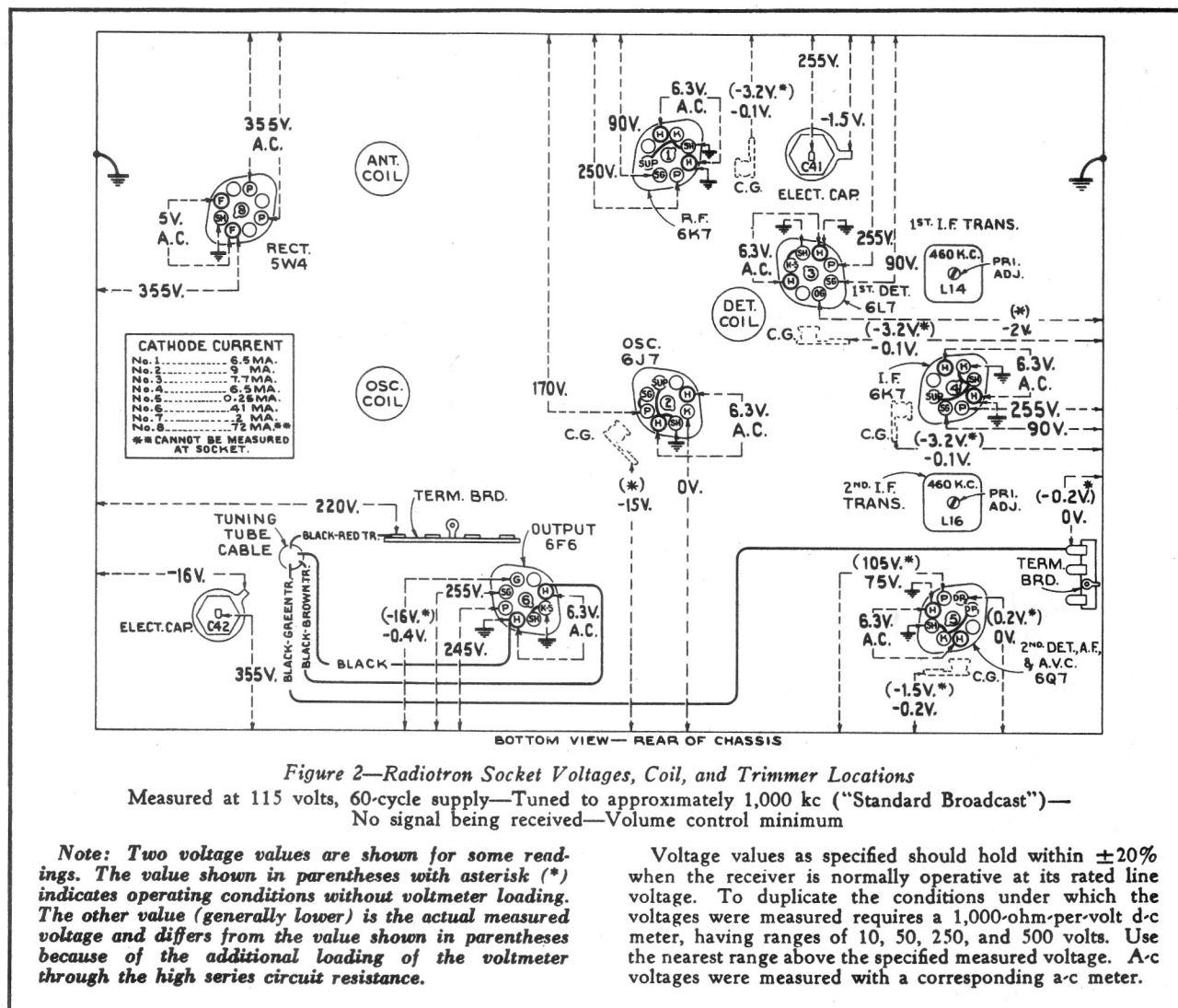
† Use maximum capacity peak if two peaks can be obtained.

‡ After this adjustment, check for image signal by shifting receiver dial to 19,080 kc.

**Precautionary Lead Dress.**—(1) Keep leads to a-c switch dressed away from antenna coil and trimmer C2. (2) Keep all filament leads twisted. (3) Keep yellow lead from term. E of 2nd i-f trans. to phono. term. board as short as possible. (4) Keep leads of C21 as short as possible. (5) Dress shielded lead from volume control to phono. term. board against side of chassis and away from 6L7 socket. (6) Yellow lead from 6J7 oscillator cathode to dummy terminal on 6L7 socket must be dressed away from chassis base and from brown filament lead. (7) All molded capacitors should be dressed so that flat side is perpendicular to chassis base. (8) Yellow lead from cathode of 6J7 socket to term. 22 of S2 must be dressed under spaghetti on 6J7 socket jumper and pulled tight away from chassis. The following bus leads should be kept as short as possible and, when necessary, replaced only with wire having same diameter as original: (9) Lead from L11-L12-L13 to ground lance; (10) Lead from term. 13 of S3 to ground lance; (11) Lead from term. 9 of S3 to L6-L7; (12) Lead from L6 to C8; (13) Lead from C9 to C8; (14) Lead from term. 5 of S1 to ground lance; (15) Lead from L1-L2 to term. 4 of S1; (16) Lead from L1 to C1; (17) Lead from term. 21 of S2 to C19.



Model F-87





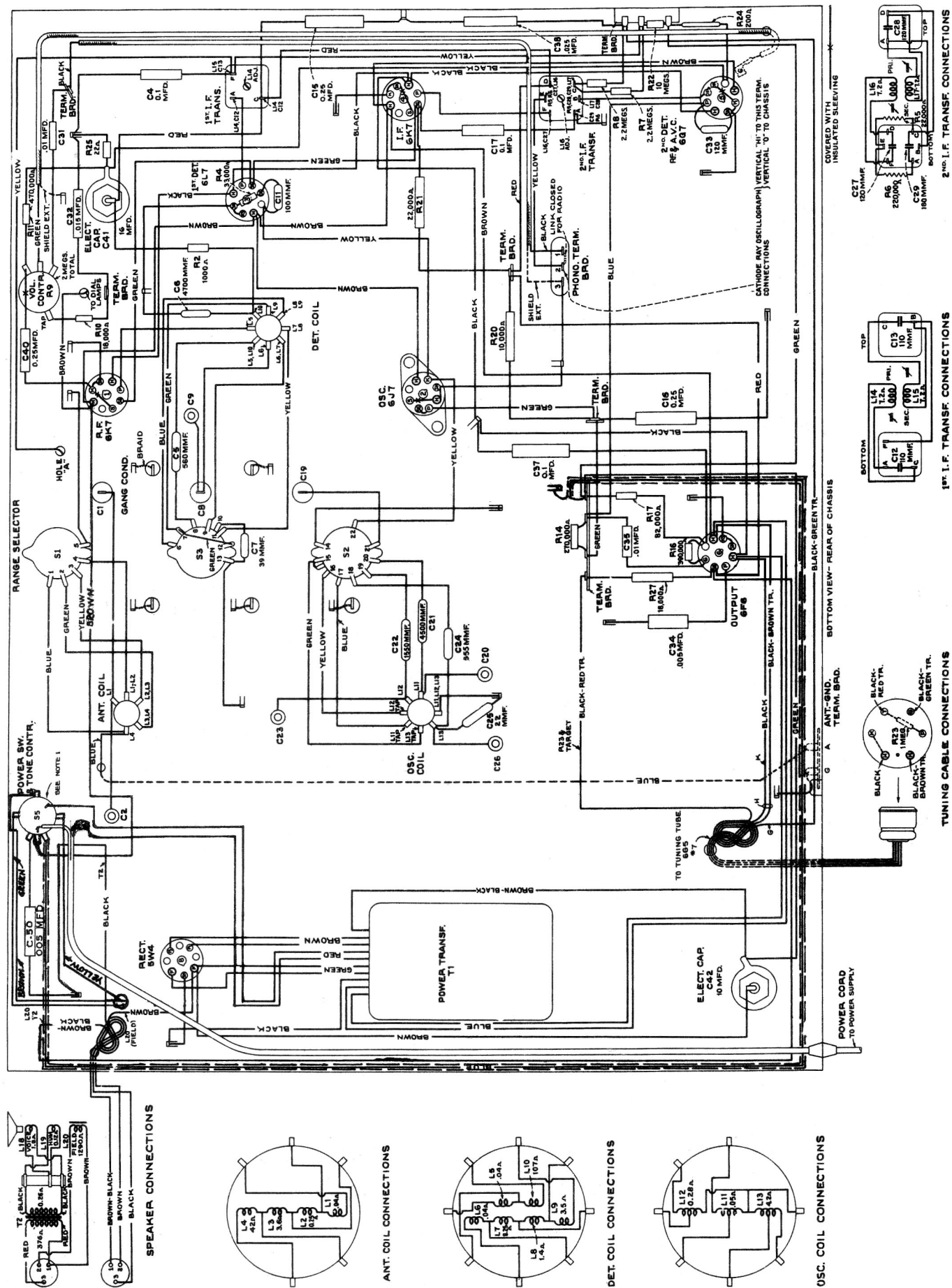


Figure 4—Chassis Wiring Diagram

# REPLACEMENT PARTS—F-87

| STOCK No.                  | DESCRIPTION                                                                                    | STOCK No.                               | DESCRIPTION                                                                                                                              |
|----------------------------|------------------------------------------------------------------------------------------------|-----------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------|
| <b>RECEIVER ASSEMBLIES</b> |                                                                                                |                                         |                                                                                                                                          |
| 12038                      | Band-Rubber band for tuning tube,Pkg.of 10                                                     | 11175                                   | Resistor-18,000 ohms-Carbon type 1/4 watt (R10).....                                                                                     |
| 14384                      | Belt-Variable condenser drive belt,Pkg. of 2.....                                              | 14078                                   | Resistor-18,000 ohms-Carbon type 1 watt (R27).....                                                                                       |
| 14517                      | Board-Antenna and ground terminal board..                                                      | 13669                                   | Resistor-22,000 ohms-Carbon type 2 watt (R21).....                                                                                       |
| 12717                      | Board-Phonograph terminal board.....                                                           | 14284                                   | Resistor-22,000 ohms-Carbon type 1/10 watt (R5).....                                                                                     |
| 14338                      | Bushing-Variable condenser mounting bushing assembly.....                                      | 13735                                   | Resistor-33,000 ohms-Carbon type 1/4 watt (R4).....                                                                                      |
| 14394                      | Cable-Tuning tube cable and socket.....                                                        | 11300                                   | Resistor-33,000 ohms-Carbon type 1/10 watt (R19).....                                                                                    |
| 12607                      | Cap-First I.F. transformer shield top....                                                      | 11365                                   | Resistor-82,000 ohms-Carbon type 1/4 watt (R17).....                                                                                     |
| 12581                      | Cap-Second I.F. transformer shield top....                                                     | 11398                                   | Resistor-220,000 ohms-Carbon type 1/10 watt (R6).....                                                                                    |
| 11350                      | Cap-Grid contact cap, Pkg. of 5.....                                                           | 11323                                   | Resistor-270,000 ohms-Carbon type 1/4 watt (R14).....                                                                                    |
| 14021                      | Capacitor-22 Mmfd. (C25).....                                                                  | 13005                                   | Resistor-390,000 ohms-Carbon type 1/10 watt (R16).....                                                                                   |
| 13545                      | Capacitor-39 Mmfd. (C7).....                                                                   | 11172                                   | Resistor-470,000 ohms-Carbon type 1/4 watt (R11).....                                                                                    |
| 12720                      | Capacitor-100 Mmfd. (C11).....                                                                 | 11397                                   | Resistor-560,000 ohms-Carbon type 1/10 watt (R1,R3).....                                                                                 |
| 14262                      | Capacitor-110 Mmfd. (C12,C13).....                                                             | 12013                                   | Resistor-1 Megohm-Carbon type 1/10 watt (R23).....                                                                                       |
| 12404                      | Capacitor-120 Mmfd. (C27,C28).....                                                             | 11626                                   | Resistor-2.2 Megohm-Carbon type 1/4 watt (R7,R8).....                                                                                    |
| 12724                      | Capacitor-120 Mmfd. (C18,C33).....                                                             | 13732                                   | Resistor-10 Megohm-Carbon type 1/4 watt (R22).....                                                                                       |
| 12406                      | Capacitor-180 Mmfd. (C29).....                                                                 | 14350                                   | Screw-#8-32x3/16 square head set screw for hub and arm on tone or band indicator cable, drum Stk.#14345,Gear Stk. #30085,Pkg. of 10..... |
| 12952                      | Capacitor-330 Mmfd. (C3,C10).....                                                              | 14374                                   | Shield-Antenna or R.F. coil shield.....                                                                                                  |
| 12727                      | Capacitor-555 Mmfd. (C24).....                                                                 | 14375                                   | Shield-Oscillator coil shield.....                                                                                                       |
| 12537                      | Capacitor-560 Mmfd. (C5).....                                                                  | 12008                                   | Shield-First or second I.F. transformer shield.....                                                                                      |
| 12729                      | Capacitor-1550 Mmfd. (C22).....                                                                | 11195                                   | Socket-5 contact 5W4 Radiotron Socket...                                                                                                 |
| 12728                      | Capacitor-4500 Mmfd. (C21).....                                                                | 11196                                   | Socket-8 contact 6F6,6K7,6J7,6L7,6Q7 Radiotron Socket.....                                                                               |
| 12897                      | Capacitor-4700 Mmfd. (C6).....                                                                 | 14114                                   | Socket-Dial lamp socket.....                                                                                                             |
| 4793                       | Capacitor-.005 Mfd. (C50).....                                                                 | 12007                                   | Spring-Retaining spring for core Stk. #12006 and Stk.#12800,Pkg. of 10.....                                                              |
| 4838                       | Capacitor-.005 Mfd. (C34).....                                                                 | 12907                                   | Spring-Tension spring for indicator drive gear Stk.#30085 Pkg. of 10.....                                                                |
| 13138                      | Capacitor-.01 Mfd. (C31,C35).....                                                              | 14342                                   | Spring-Tension spring for idler Stk. #14341,Pkg. of 10.....                                                                              |
| 11315                      | Capacitor-.015 Mfd. (C32).....                                                                 | 14515                                   | Switch-Range switch (S1,S2,S3).....                                                                                                      |
| 4870                       | Capacitor-.025 Mfd. (C38).....                                                                 | S-1794                                  | Tone control and Power Switch (S5,R50)..                                                                                                 |
| 4839                       | Capacitor-0.1 Mfd. (C4,C17,C37).....                                                           | 14376                                   | Transformer-First I.F. transformer (L14,L15,C12,C13).....                                                                                |
| 12484                      | Capacitor-0.25 Mfd. (C15).....                                                                 | 14283                                   | Transformer-Second I.F. transformer (L16,L17,C27,C28,C29,R5,R6).....                                                                     |
| 4840                       | Capacitor-0.25 Mfd. (C16,C40).....                                                             | 14511                                   | Transformer-Power transformer 105-125 volts 50-60 cycle (T1).....                                                                        |
| 11240                      | Capacitor-10 Mfd. (C42).....                                                                   | 14512                                   | Transformer-Power transformer 105-125 volts 25-60 cycle (T1).....                                                                        |
| 5212                       | Capacitor-16 Mfd. (C41).....                                                                   | 14335                                   | Volume Control (R9).....                                                                                                                 |
| 12884                      | Capacitor-Adjustable trimmer (long) (C2,C23,C26).....                                          | 14379                                   | Washer-Felt washer for indicator pointer,Pkg. of 10.....                                                                                 |
| 12714                      | Capacitor-Adjustable trimmer (medium) (C9,C20).....                                            | <b>REPRODUCER ASSEMBLIES (RL-70-E1)</b> |                                                                                                                                          |
| 14372                      | Coil-Antenna coil and shield (L1,L2,L3,L4).....                                                | 13866                                   | Cap-Dust cap for cone center-Pkg.of 5...                                                                                                 |
| 14516                      | Coil-Oscillator coil and shield (L11,L12,L13).....                                             | 14354                                   | Coil-Field coil (L20).....                                                                                                               |
| 14414                      | Coil-R.F. coil and shield (L5,L6,L7,L8,L9,L10).....                                            | 11469                                   | Coil-Hum neutralizing coil (L19).....                                                                                                    |
| 14513                      | Condenser-3 gang variable tuning condenser (C1,C8,C19).....                                    | 12667                                   | Cone-Reproducer cone and dust cap (L18).....                                                                                             |
| 5119                       | Connector-3 contact female connector for speaker cable.....                                    | 5118                                    | Connector-3 contact male plug for reproducer.....                                                                                        |
| 12006                      | Core-Adjustable core and stud for Stk. #14376 and Stk.#14283.....                              | 14395                                   | Reproducer-Reproducer complete.....                                                                                                      |
| 12800                      | Core-Adjustable core and stud for coil Stk.#14516.....                                         | 14355                                   | Transformer-Output Transformer (T2).....                                                                                                 |
| S-1792                     | Dial-Station selector dial scale complete with tuning tube escutcheon.....                     | 14357                                   | Washer-Spring washer to hold field coil, Pkg. of 5.....                                                                                  |
| 14514                      | Drive-Variable condenser vernier drive pinion gear and shaft.....                              | <b>MISCELLANEOUS ASSEMBLIES</b>         |                                                                                                                                          |
| 14345                      | Drum-Variable condenser drive belt drum complete with set screws.....                          | S-1789                                  | Escutcheon-Station selector escutcheon and crystal complete.....                                                                         |
| S-1795                     | Escutcheon-Tuning tube escutcheon.....                                                         | S-1796                                  | Tone-Indicator jewel.....                                                                                                                |
| 11982                      | Fastener-Dial scale fastener-Pkg. of 25..                                                      | S-1797                                  | Tone-Indicator jewel.....                                                                                                                |
| 30085                      | Gear-Indicator drive gear and hub assembly and indicator pointer stem and gear assembly.....   | S-1798                                  | Tone-Indicator jewel.....                                                                                                                |
| 14341                      | Idler-Station selector drive belt idler..                                                      | 11347                                   | Knob-Volume control,tone control or range switch knob-Pkg. of 2.....                                                                     |
| S-1790                     | Indicator-Station selector indicator pointer.....                                              | 12699                                   | Knob-Station selector knob.....                                                                                                          |
| S-1791                     | Indicator-Vernier indicator pointer.....                                                       | 14270                                   | Spring-Retaining spring for knob Stk. #1347,Pkg. of 5.....                                                                               |
| 5226                       | Lamp-Dial lamp, Pkg. of 2.....                                                                 | 4982                                    | Spring-Retaining spring for knob Stk. #12699,Pkg. of 10.....                                                                             |
| 14028                      | Nut-Jamb nut for adjustable trimmer capacitor Stk.#12714 and Stk.#12884, Pkg. of 10.....       |                                         |                                                                                                                                          |
| 12471                      | Plate-6J7 Radiotron socket mounting plate and rubber cushions-less socket #11196..             |                                         |                                                                                                                                          |
| 14340                      | Pulley-Station selector drive belt pulley and knob shaft.....                                  |                                         |                                                                                                                                          |
| S-1793                     | Reflector-Dial reflector and bracket complete with tuning tube bracket and band indicator..... |                                         |                                                                                                                                          |
| 14525                      | Resistor-22 ohms-Carbon type 1/4 watt(R25)                                                     |                                         |                                                                                                                                          |
| 14526                      | Resistor-200 ohms-Wire wound 2 1/2 watts (R24).....                                            |                                         |                                                                                                                                          |
| 5112                       | Resistor-1000 ohms-Carbon type 1/4 watt (R2).....                                              |                                         |                                                                                                                                          |
| 8043                       | Resistor-10,000 ohms-Carbon type 2 watt (R20).....                                             |                                         |                                                                                                                                          |