MODEL E-50

Five-Tube, Two-Band, A-C Superheterodyne Receiver

Electrical Specifications

FREQUENCY RANGES
"Standard broadcast" (A) .....540-1,800 kc.
"Short wave" (B) .....1,800-6,500 kc.

ALIGNMENT FREQUENCIES
"Standard broadcast" (A) ..... 600 kc. (osc.), 1,500 kc. (osc., ant.)
"Short Wave" (B) ..... None Required

Intermediate Frequency ..... 460 kc.

RADIOTRON COMPLEMENT
(1) TYPE 6A7 ..... First Det.-Oscillator
(2) TYPE 6D6 ..... Intermediate Amplifier
(3) Type 75 Second Det., A-F Amp. and A.V.C.
(4) Type 41 .....Audio Power Amplifier
(5) Type 80 ..... Full-Wave Rectifier

Pilot Lamp (1) ..... Mazda No. 46, 6.3 volts, 0.25 amperes

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 RATING
Undistorted ..... 2.0 watts
Maximum ..... 4.5 watts

LOUDSPEAKER
Type ..... Electrodynamic
Voice Coil Impedance .... 5 ohms at 400 cycles

Mechanical Specifications

Height ..... 14 inches
Width ..... 9 19/32 inches
Depth ..... 6 13/16 inches
Weight (Net) ..... 17 pounds
Weight (Shipping) ..... 20 pounds
Chassis Base Dimensions ..... 10 inches x 5½ inches x 2 inches
Over-all Chassis Height ..... 7½ inches
Operating Controls ..... (1) Power Switch-Tone, (2) Tuning, (3) Volume, (4) Range Selector
Tuning Drive Ratio ..... 6 to 1

General Features

This model contains a five-tube chassis mounted in a table-type cabinet. The superheterodyne type of circuit is used, with such features of design as: Automatic volume control, diode detection, magnetite core adjusted i-f transformers, aural compensated volume control, continuously variable tone control, resistance coupled audio system and an electrodynamic loudspeaker. Tuning range is continuous through the "Standard broadcast," and "Short wave" bands (including 49 meters). The short wave portion of this extensive range also includes channels assigned for police, amateur and aviation communication. Trimmer adjustments are located at accessible points. Their number is reduced to the least that is consistent with efficient operation.

Circuit Arrangement

The conventional superheterodyne type of circuit, consisting of a combined first-detector-oscillator stage, a single i-f stage, a diode-detector automatic-volume control stage, an audio voltage amplifier stage, an audio power output stage, and a full-wave rectifier power supply stage is used.

The antenna coil system consists of two series-connected primary and two series-connec-

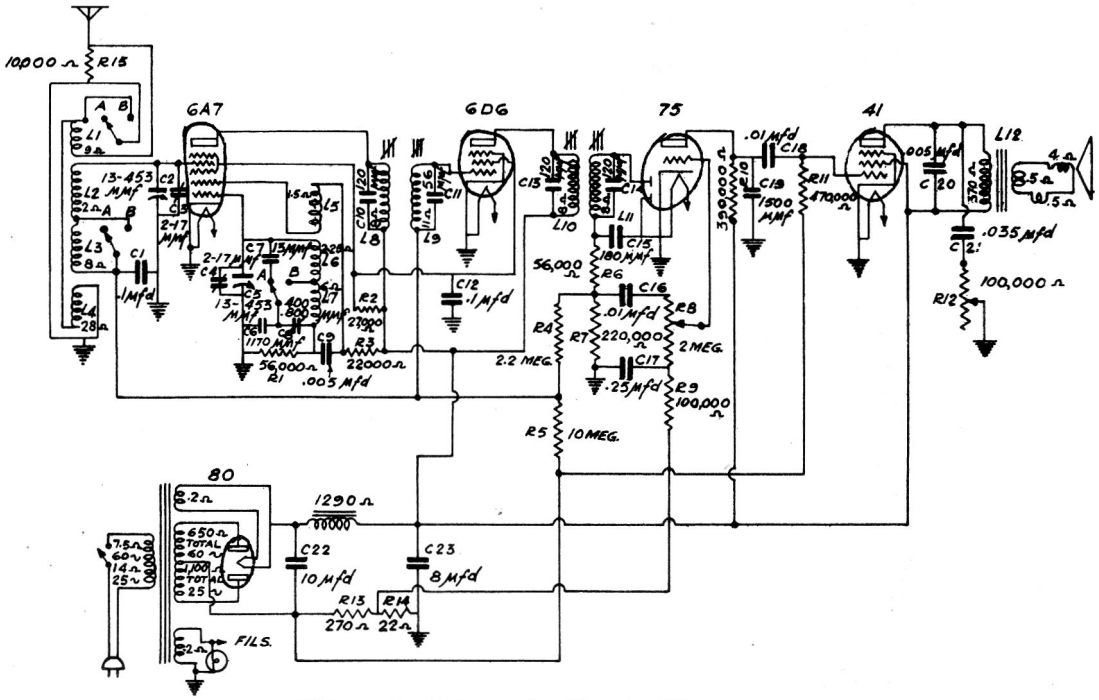


Figure 1—Schematic Circuit Diagram

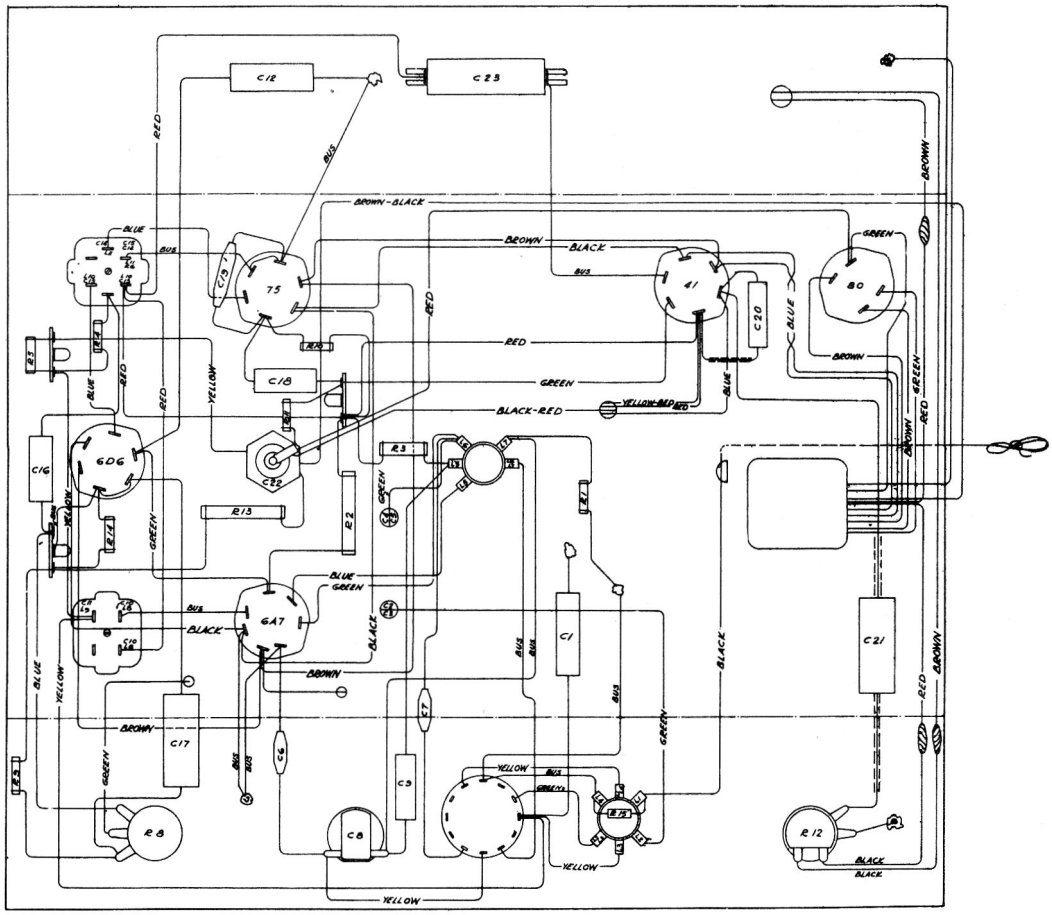


Figure 2—Chassis Wiring Diagram

ted secondary windings to provide the two ranges of tuning. The oscillator coil is similarly wound on a single form. A multipole range selector switch is used to connect the various sections of these coil systems.

The first detector and oscillator functions are accomplished in a single tube, a Type 6A7. The input of this tube is coupled to the antenna through a tuned transformer. The two-section gang condensor, which tunes the antenna transformer secondary and the heterodyne oscillator coil, has adjustable trimmers for obtaining exact alignment.

The intermediate frequency stage is coupled to the Type 6A7 and to the Type 75 by means of tuned transformers. These transformers resonate with fixed capacitors and are adjusted by molded magnetite cores to tune to 460 kc.

The modulated signal as obtained from the output of the i-f system is detected by one of the diodes of the Type 75 tube. Audio frequency secured by this process is passed on to the control grid of this same tube for amplification before final reproduction. The d.c. voltage, which results from detection of the signal, is used for automatic volume control. This voltage, which develops across resistor R7, is applied as automatic control grid bias to the first detector and i. f. tubes through a suitable resistance filter.

Manual volume control is affected by means of an acoustically tapered potentiometer connected as a variable coupling element between the output of the second detector and the first audio control grid. After amplification by the Type 75, the audio signal is transmitted by resistance-capacitance coupling to the input of the Type 41 power output stage, which, in turn, is transformer-coupled to the dynamic speaker. High-frequency tone control is provided by means of the capacitor C-21 and the variable resistor R-12 shunting the plate circuit.

The power supply system consists of a Type 80 rectifier tube which is supplied from an efficiently designed power transformer and which works into a suitable filter. The various potentials required for the plate, screen, control grid, and cathode circuits are obtained from the output of the filter. The electro-dynamic loudspeaker field coil is used as a filter reactor.

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

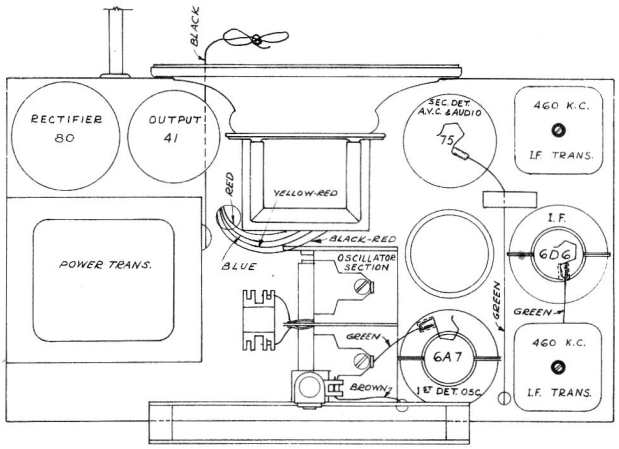


Figure 3—Radiotron, Coil and Trimmer Locations

symbols signifying these parts on the diagrams. Identification titles, such as R3, L2, C1, etc., are provided for reference between the illustrations and the Replacement Parts List. The coils, reactors, and transformer windings are rated in terms of their d.c. resistances only. Ratings of less than one ohm are generally omitted.

Alignment Procedure

There are three alignment trimmers provided in the antenna transformer and oscillator coil tuned circuits. The i.f. transformer adjustments are made by means of screws attached to molded magnetite cores. All of these circuits have been accurately adjusted during manufacture and should remain properly aligned unless affected by abnormal conditions or altered during servicing. Loss of sensitivity, improper tone quality, and poor selectivity are the usual indications of improper alignment.

The correct performance of this receiver can only be obtained when the aligning has been done with adequate and reliable apparatus. The manufacturer of this receiver has available, for sale through its distributors and dealers, a complete assortment of such service equipment as may be needed for the alignment operation.

A test oscillator, such as the GE Stock No. 9595, is required as a source of the specified alignment frequencies. Visual indication of receiver output during the adjustment is necessary and should be acomplished by the use of an indicator such as the GE Stock No. 4317 Neon Output Indicator.

The procedure outlined below should be followed in adjusting the various trimmer capacitors and molded cores:

I-F Core Adjustments

The four adjustment screws (attached to molded magnetite cores) of the two i.f. transformers (one on top and one on bottom of each i.f. transformer) are located as shown by figure 3. Each circuit must be aligned to a basic frequency of 460 kc. To do this, attach the output indicator across the loudspeaker voice coil or across the output transformer primary.

Connect the output of the test oscillator to the control grid of the Type 6A7 through a .05 mfd. capacitor. Connect the test oscillator ground terminal to the ground terminal of the receiver chassis. Range selector should be in "Short wave" position. Tune the oscillator to 460 kc. Advance the receiver volume control to its full-on position and adjust the receiver tuning control to a point, within its range, where no interference is encountered either from local broadcast stations or from the heterodyne oscillator. Increase the output of the test oscillator until a slight indication is present on the output indicator. Adjust the two magnetite core screws of the second i.f. transformer to produce maximum (peak) indicated receiver output. Then, adjust the two magnetite core screws of the first i.f. trans-

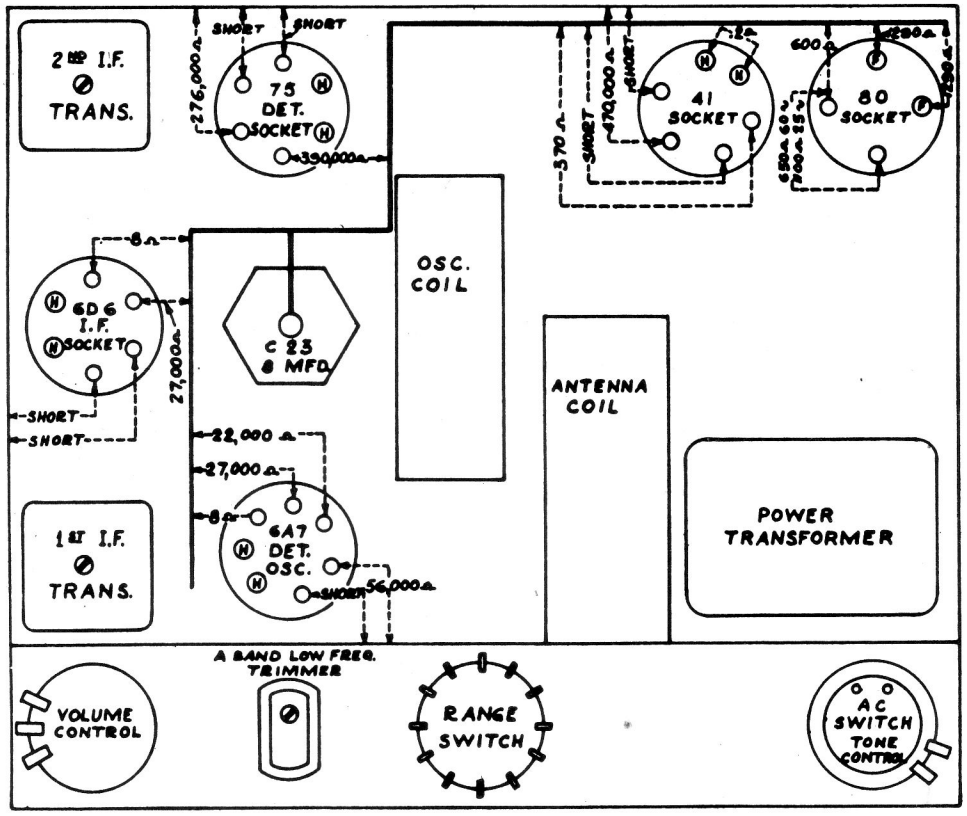


Figure 4— Resistance Diagram
Power supply disconnected—Radiotrons in sockets—Tuning condenser in full mesh—Volume control maximum

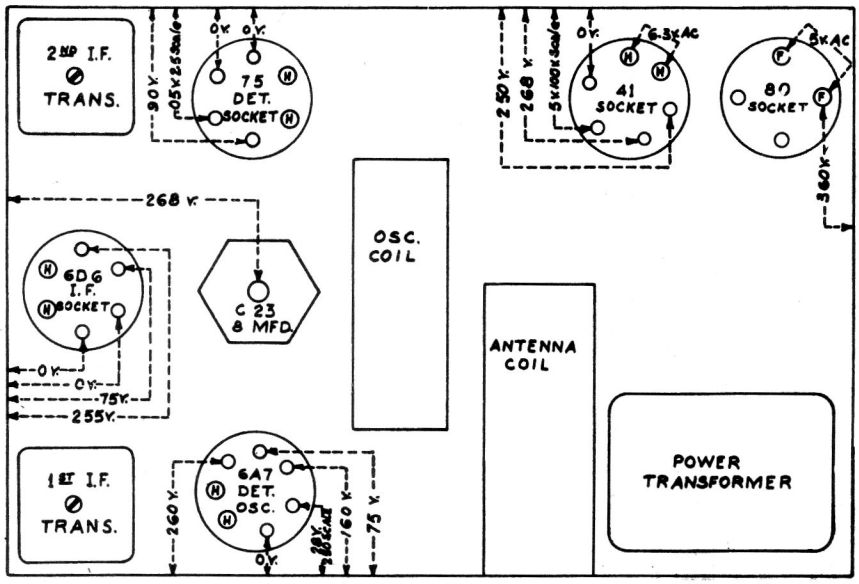
Resistance Measurement

The resistance values shown between Radiotron socket contacts, grid caps, resistors, terminals, and receiver chassis ground, on figure 4, have been carefully selected so as to facilitate a rapid continuity check of the circuits. The use of this diagram in conjunction with the Schematic Circuit Diagram, figure 1, and Chassis Wiring Diagram, figure 2, will permit the location of certain troubles which might otherwise be difficult to ascertain. Each value as specified should hold within $\pm 20\%$. Variations in excess of this limit will usually be indicative of trouble in circuit under test. Resistance values were measured with the Radiotrons in sockets; tuning condenser in full mesh, and volume control set at maximum except where otherwise noted. In all cases of measuring the resistance between points of the circuit and ground, it will be necessary to connect the negative terminal of the resistance meter to chassis-ground. If the polarity of the resistance meter is not known, it may be readily ascertained by connecting a d-c voltmeter of indicated polarity across the terminals of the device.

former for maximum (peak) receiver output as shown by the indicating device. During these adjustments, regulate the test oscillator output so that the indication is always as low as possible. By doing this, broadness of tuning due to a.v.c. action will be avoided. It is advisable to repeat the adjustment of all i.f. magnetite core screws to assure that the interaction between them has not disturbed the original adjustment.

R-F Trimmer Ajustments

Calibrate the tuning dial by setting the pointer to a horizontal position with the two-gang tuning condenser in full mesh. The output indicator should be left connected to the system. Attach the output of the test oscillator to the receiver "Antenna" terminal through a 200 mmfd. (important) capacitor. Adjust the test oscillator to 1,500 kc. and set the receiver tuning control to a dial reading of 1,500 kc. Leave the volume control of the receiver at its maximum position. Make sure that the range selector is at its broadcast position. Regulate the output of the test oscillator until a slight indication is perceptible at the receiver output. Then adjust the two trimmers, C4 and C3, of the oscillator and antenna transformer coils (mounted on the variable condenser) so that each produces maximum (peak) receiver output. After this maximum has been accurately obtained, shift the test oscillator to 600 kc. Tune the receiver to pick up this signal, disregarding the dial reading at which it is best received. Then, adjust the receiver oscillator series trimmer, C8, simultaneously rocking the tuning control backward and forward through the signal until maximum receiver output results from these combined operations. The adjustment at 1,500 kc. should then be repeated to correct for any change which may have been caused by the oscillator series trimmer adjustment.



Voltage Diagram
All Readings on 1000 Ohms per Volt, 500 V. Scale except as specified above.

Figure 5—Radiotron Socket Voltages

Measured at 115 volts, 60-cycle supply—Tuned to approximately 1,000 kc. ("Standard broadcast")—No signal being received—Volume control minimum

Radiotron Socket Voltages

The voltage values indicated from the Radiotron socket contacts, grid caps, resistors, and terminals to receiver chassis ground on figure 5 will assist in locating cause for faulty operation. Each value as specified should hold within ±20% when the receiver is normally operative at its rated line voltage. Variations in excess of this limit will usually be indicative of trouble in the basic circuits. These voltages were measured with receiver tuned to approximately 1,000 kc., no signal being received and volume control set at minimum. To duplicate the conditions under which the voltages were measured requires a 1,000 ohm-per-volt d-c meter, having ranges of 10, 50, 250, and 500 volts. Use the nearest range above the voltage to be measured. A-C voltages were measured with a corresponding a-c meter.

REPLACEMENT PARTS E-50

STOCK No.	DESCRIPTION
	RECEIVER ASSEMBLIES
12118	Cap-Grid contact cap-Package of 5...
11465	Capacitor-Adjustable capacitor (C8).
12659	Capacitor-13 Mmfd.(C7).....
12629	Capacitor-56 Mmfd.(C11).....
12404	Capacitor-120 Mmfd.(C10,C13,C14)....
12406	Capacitor-180 Mmfd.(C15).....
S-1678	Capacitor-1170 Mfd.(C6).....
13762	Capacitor-1500 Mmfd.(C19).....
4868	Capacitor-.005 Mfd. (C9,C20).....
4883	Capacitor-.01 Mfd. (C16,C18).....
4791	Capacitor-.1 Mfd. (C1,C12).....
S-1592	Capacitor-.25 Mfd.(C17).....
12670	Capacitor-.035 Mfd.(C21).....
S-1679	Capacitor-8 Mfd. (C23).....
11203	Capacitor-10 Mfd.(C22).....
12495	Coil-Antenna coil(L1,L2,L3,L4).....
12496	Coil-Oscillator coil (L5,L6,L7).....
S-1680	Condenser-2-gang variable tuning condenser (C2,C3,C4,C5).....
12006	Core-Adjustable core and stud for Stock Nos.12653 and 12801.....
S-1689	Dial-Station selector dial.....
S-1682	Drive-Vernier drive for variable condenser.....
S-1683	Indicator-Station selector indicator pointer.....
5226	Lamp-Dial lamp-6.3 volts-Package of 2.....
S-1684	Resistor-22 ohm-insulated, ¼ watt (R14).....
13675	Resistor-270 ohm-carbon type, 1 watt (R13).....
13302	Resistor-10,000 ohms-carbon type, 1/10 watt (R15).....
8070	Resistor-22,000 ohms-carbon type, 1/2 watt (R3).....
12011	Resistor-27,000 ohms-carbon type, 1 watt (R2).....
11282	Resistor-56,000 ohms-carbon type, 1/10 watt (R6).....
5029	Resistor-56,000 ohms-carbon type, 1/4 watt (R1).....
5145	Resistor-100,000 ohms-carbon type, 1/4 watt (R9).....
11398	Resistor-220,000 ohms-carbon type, 1/10 watt (R7).....
S-1685	Resistor-390,000 ohms-insulated, 1/4 watt (R10).....
S-1690	Resistor-470,000 ohms-insulated, 1/4 watt (R11).....
S-1536	Resistor-2.2 meg.carbon type, 1/4 watt (R4).....
13601	Resistor-10 meg.-insulated, 1/4 watt (R5).....
12607	Shield-First I.F. transformer shield top.....
12008	Shield-I.F. transformer shield.....
12581	Shield-Second I.F. transformer shield top.....
12218	Shield-6A7 radiotron shield complete
11265	Shield-6D6 radiotron shield complete
4794	Socket-4-contact 80 radiotron socket
4786	Socket-6-contact 6D6,41 or 75 radiotron socket.....
4787	Socket-7-contact 6A7 Radiotron socket.....
S-1686	Socket-Dial lamp socket.....
12007	Spring-Retaining spring for Stock Nos.12006 and 12664-Package of 10.
12647	Switch-Range switch.....
S-1687	Switch-Tone control and power switch (R12).....
12801	Transformer-First I.F. transformer complete (L8,L9,C10,C11).....
12653	Transformer-Second I.F. transformer complete (L10,L11,C13,C14,C15,R6).
S-1665	Transformer-Power Transformer, 105-125 volts, 50-60 cycles.....
S-1666	Transformer-Power Transformer, 105-125 volts, 25-60 cycles.....
S-1688	Volume control (R8).....
	REPRODUCER ASSEMBLIES
S-1677	Cone-Reproducer cone.....
S-1676	Transformer-Output transformer (L12)
S-1675	Reproducer-Complete.....
	MISCELLANEOUS ASSEMBLIES
S-1664	Indoor Antenna.....
12700	Knobs-Station selector knobs.....
11347	Knobs-Volume control, tone control and range switch knobs-Package of 2.....
11349	Spring-Retaining spring for knobs, Stock Nos.11347 and 12700-Package of 5.....