General Electric Co.

Model: 233	Chassis:	Year: Pre 1951
Power:	Circuit:	IF:
Tubes:		
Bands:		

Resources
Riders Volume 21 - CHANGES 21-2
Riders Volume 20 - CHANGES 20-4
Riders Volume 18 - GE 18-29
Riders Volume 18 - GE 18-30
Riders Volume 18 - GE 18-31
Riders Volume 18 - GE 18-32
Riders Volume 18 - GE 18-33
Riders Volume 18 - GE 18-34
Riders Volume 18 - GE 18-35
Riders Volume 18 - GE 18-36

General Electric 50

This model appears on *pages 15-1 through 15-4 of Rider's Manual Volume XV*. The following items should be added to the parts list:

Symbol Part No.	*Description*
R4 RRC-013	1.0-megohm volume control
RJS-060	Tube socket, miniature tube socket for 35W4 rectifier
RJX-010	Assembly, tube socket and mounting plate assembly for 35W4 rectifier.
RHH-004	Snapfastener, for mounting cabinet-back.

General Electric 106

This model appears on *pages 15-9 through 15-10 of Rider's Manual Volume XV*. Part no. RJX-005 should be changed to read RJX-007. Delete part no. ROP-006. Add part no. UOX-001, cone, replacement speaker cone.

General Electric 115, 115W

These models appear on *page 18-13 of Rider's Manual Volume XVIII*. The following changes have been made in the parts list.

Delete catalogue numbers and parts RDK-121 and RDK-122.

Add the following:

RAG-019	Grille, for Model 115 and 115W
RDK-150	Knob and bezel, brown, for Model 115
RDK-151	Knob and bezel, white, for Model 115W.

General Electric 118, 119

These models appear on *pages 19-8 through 19-10 of Rider's Manual Volume XIX*. The following changes should be made in the parts list. RLC-001 should be changed to RLC-061, T4, coil, oscillator coil. RAY-054 should be RAV-054.

Add:

RAV-056	Cabinet, Model 119 (oak)
RDK-037	Knob, plain, fawn colored
RDK-040	Knob, with arrow, fawn colored
RHH-004	Snapfastener, holds cabinet back to cabinet on Model 118

General Electric 123, 124

These models appear on *pages 20-13 through 20-15 of Rider's Manual Volume XX*. The following changes should be noted in the replacement parts list. Item RDS-083 is a metal dial scale, tan color, with red and white figures. Later production receivers use the same type scale except for color. The later scale, cat. no. RDS-091, is gold in color, with brown and white figures.

The following catalogue numbers have been changed: URD-127 should read URD-137, R5, Resistor, 4.7 megohms, ½ w, carbon; RAU-037 should read RAU-307, Cabinet, Model 124 plastic cabinet (ivory).

General Electric 303

This model appears on *pages 15-37 through 15-39 of Rider's Manual Volume XV*. The symbol for RSW-019, switch, tone control switch, should read S4. Stock no. RMX-013 should be changed to read stock no. RMX-079.

General Electric 125

This model is identical mechanically and electrically to the late production Model 123 and 124 receivers, which appear on *pages 20-13 through 20-15 of Rider's Manual Volume XX*. Model 125 is identified by its maroon color plastic cabinet. The cabinet replacement is listed as: RAU-321, Cabinet, plastic, for Model 125.

General Electric 123, 124, 125, 135, 136, 226

Models 123, 124, and 125 appear on *pages 20-13 through 20-15 of Rider's Manual Volume XX*. Models 135 and 136 appear on *pages 20-16 through 20-18 of the same Volume*. Model 226 appears on *pages 20-27 through 20-29 of the same Volume*.

The grid resistor, URD-113, 470,000 ohms, ½ watt, carbon, has been changed in later production receivers to URD-121, 1 megohm. This change improved the audio gain.

General Electric 135, 136, 226

Models 135 and 136 appear on *pages 20-16 through 20-18 of Rider's Manual Volume XX*. Model 226 appears on *pages 20-27 through 20-29 of the same Volume*.

Late production receivers use a new type output transformer having a tapped primary. The tapped section to the B+ lead is connected in series with the power-supply filter resistor at the input filter capacitor. B+ ripple current through this winding is out of phase with ripple current to the receiver tubes, thus producing bucking voltage and reducing hum. The transformer leads are connected as follows: yellow to input filter capacitor, red to filter resistor, blue to plate of input tube, and secondary leads to speaker voice coil.

The new transformer, catalogue number RTO-078, will be carried in replacement stock in place of the original early production items RTO-063 and RTO-075 for the Models 135, 136, and 226, respectively.

General Electric 141, 143

Instability on the high end of the broadcast band might be caused by an oscillator coil whose coupling winding has changed its coupling capacitance. This defect can be corrected by replacing the coupling winding with a capacitor C15 of the value 56 $\mu\mu f$, catalogue number UCG-022. This capacitor connects the "high" side of the tuning capacitor C2 with the oscillator grid, pin 4, of the tube V1, 1R5.

Late production receivers always use capacitor C15 in conjunction with a new type of oscillator coil, RLC-101. This item replaces coil formerly catalogued RLC-089.

The hinge used in these receivers can easily be removed and replaced in the plastic cabinet or cover by the application of heat. To remove the hinge from the back cover or cabinet proper, heat the hinge at the half to be removed from the cabinet with a soldering iron. The hinge may then be pulled out of the groove of the plastic hinge recess. Since the cabinet plastic softens at a relatively low temperature, it will be unnecessary to apply the heat very long. To replace the hinge into the new unit, first start the hinge into the slotted recess in the plastic, then heat the hinge with the soldering iron and gently push the hinge into place.

General Electric 124, 135, 136

Model 124 appears on *pages 20-13 through 20-15 of Rider's Manual Volume XX*; Models 135 and 136 appear on *pages 20-16 through 20-18 of the same Volume*.

Where speakers have broken loose from cabinet mountings, or damage occurs when servicing receiver, the speaker can be remounted using screws in place of the original clips where the mounting bosses are broken. It is suggested that all four bosses be reworked to use screws for mounting, since the operation of removing the speaker may result in the breaking of additional bosses. The repair procedure is outlined as follows:

1. Cut off speaker mounting bosses and file flat to the level of the speaker baffle ring.
2. Drill hole 5/16-inch deep in each boss with #42 or 3/32-inch diameter drill.
3. Mount speaker with self-tapping screws #4 x ¼ inch long, Shakeproof Type 25, catalogue number RHS-044.

General Electric 233 Kaiser-Frazer

This model appears on *pages 18-29 through 18-36 of Rider's Manual Volume XVIII*. Noise in the form of rattle can be attributed to mechanical insecurity of parts, loose fittings, and screw fastenings, etc. Some of these are:

1. Loose tone control knobs and loose tone and volume control shafts may rattle against the cast grille. The keyway in the tone control shaft may be spread slightly to provide a tighter fit to the control knob.
2. If the shaft assembly seems loose or tends to rattle within the grille mounting hole, a ¾-inch length of #1 spaghetti (fabric or cambric tubing) may be slipped over the shaft assembly and into the bushing. This will displace the loose fitting and cushion against rattle.
3. Vibration of the screen which is set behind the case instrument panel grille causes a buzz sound when loose. The screen may be shimmed at its four corners to stabilize its mounting.

Suggestions for improving circuit and pick-up noise are as follows:

1. The former condition can be improved by antenna selection and careful peaking of the antenna trimmer to increase sensitivity and reduce noise. For metropolitan areas, a 62-inch antenna is quite adequate, while in outlying country areas the antenna length of 93 inches is recommended. Adjustment of the antenna trimmer is important and should not be overlooked. Every receiver installation should be adjusted for normal operation after the receiver has been operating approximately 15 minutes to reach normal operating temperatures, and with antenna fully extended. Tune in one of the weakest stations at approximately 1,200 kc, or near the higher-frequency end of the dial scale. Adjust trimmer for minimum noise level and maximum clarity on station used for test.
2. Noise pick-up may come from various sources, chiefly from ignition circuits of the car. The recommended noise suppressor and noise filter capacitor units should be checked. To eliminate wheel static insert about ½ ounce of powdered graphite through the valve of all four tire tubes. This will provide a ground leakage path to dampen static radiation.

General Electric 145

This model appears on *pages 19-13 through 19-16 of Rider's Volume XIX.* The B battery minus connection is made to the dummy lug 5 on the switch shown in Fig. 2.

General Electric 150

This model appears in *Rider's Manual Volume XIX on pages 19-10 through 19-12.*

If a condition of parasitic oscillation with strong signals and high volume setting, characterized by whistles and distorted output is reported on late production models in the gray cabinet the following change will correct the condition:

Change the grid return of the i-f amplifier by moving bus wire lead on #2 lug of first i-f transformer to pin #5 of the r-f amplifier (1T4), instead of pin #5 of the i-f tube. This changes the bias of the i-f amplifier from zero volts to minus 1.4 volts.

The following replacements should be made in the catalogue numbers:

Delete the following parts:

Old Cat. No.	*New Cat. No.*	*Symbol*	*Description*
URD-009	URE-009	R1	Resistor - 330 ohms, 1 w., carbon*
RCE-069	RCE-087	C2A,B,C	Capacitor - Electrolytic capacitor
RCW-3013	RCW-3015	C11	Capacitor - Electrolytic capacitor*
RHB-004	RHB-009		Monogram Button**
RLL-029	RLL-034		Loop - Antenna loop
SJS-068	RJC-016		Speaker Contact and Lead
	RAB-080		Cabinet Back - Plastic (ivory)
	RAU-041		Cabinet - Plastic (ivory)

Add the following parts:

RAB-081		Cabinet Back - Plastic (gray)
URD-045	R5	Resistor - 680 ohms, ½ w., carbon*
RHS-010		Tube shield*
UCC-625	C12	Capacitor - 0.005 μf, 600 v., paper*
UCC-635	C9	Capacitor - 0.05 μf, 600 v., paper*
RHM-052		Clip - Clip for loop antenna

*Applies to receivers with chassis number greater than 100,000.

**The new button is attached to the cabinet by means of glue.

For chassis numbers up to 55,000 the capacitors C10, 100 μμf, and C12, 0.005 μf, were not connected according to the schematic diagram. Their B- connections were made to the left side of the switch S1B, together with the capacitors C2A and C2B. This was done to prevent a howling sound when the power switch S1 is turned off.

For chassis numbers from 60,000 to 70,000 the capacitors C10 and C12 were wired according to the schematic diagram. However, the wiring of the capacitors C2A and C2B has been changed. It was found that, under certain circumstances, these capacitors added their charge to the peak of the line voltage, causing a current surge which was capable of damaging any tube. Therefore, the negative sides of the two capacitors (C2A and C2B) were connected to the right side of the switch S1B (B- line) and the positive side of C2B was connected to the terminal of the S2A switch which is connected to the B+ line of the receiver. Now the charge can leak off after the set is disconnected from the power supply. The following replacement has been made in the parts list:

Connecting pin SJS-008 for the loop antenna has been changed to RJC-001.

General Electric 160

This model appears on *pages 19-17 through 19-21 of Rider's Manual Volume XIX.* The following change in parts list should be noted:

Change catalogue number RTO-003 to read RTC-003 T5 Transformer-charging transformer.

GE 201, 202

Since there are electrically identical, these models have been added to the listing for Models 200, 203, and 205 which appears in *Rider's Volume XVIII, pages 18-19 and 18-20.*

The following items have been added to the parts list:

RAU-001 Cabinet—ivory (plastic), model 201

RAU-023 Cabinet—brown (plastic), model 202

The Beam-a-Scope cabinet back listed as RAB-003 also applies to models 201 and 202

General Electric 230, Kaiser-Frazer

This model appears on *pages 18-26 through 18-28 of Rider's Volume XVIII.* When rough manual tuning action is experienced, it is usually traced to insufficient spacing between the end of the center shaft of the turret assembly and the guide rod bracket near the tuning shaft. Production requirements call for one or more (as required) brass shim washers at this point for smooth tuning action. Where rough tuning is experienced, a thin "C" washer slipped onto the end of the center shaft of the turret in addition to the brass shim washers will relieve binding and result in smoother tuning action.

GE 230, 233

Model 230 appears in *Rider's Volume XVIII on pages 18-26 through 18-28* and Model 233 in the same Volume, *pages 18-29 through 18-36.* To the replacement parts list for these two models add RMX-120, Coil Cap Retaining Spring and Screw.

A quantity of these are used to service the antenna r-f or oscillator-converter coil and shield assemblies where the tabs have been broken. The spring is placed upon the assembly to form a bridge. Bearing upon the coil and held by the small self-tapping screw through the hole in the shield, the bridge retains the coil within its shield in lieu of tabs.

While early production receivers of Model 233 were wired as shown in the schematic, late production changes revise the power supply circuit as follows:

R24 has been deleted and the circuit for C30 is completed by connecting its free end to the secondary winding lead going to pin 5 of the rectifier, V8, so that C30 appears across the secondary of T4. Resistors R26 and R27 are connected in series with one another and across the primary winding of T4. The junction of the resistors is grounded.

To conform with these production changes, Cat. Part URE-073, R24 is deleted from the replacement parts list and item URD-023, R26 and R27, 82 ohms, ½ w., carbon resistor is added.

Cat. No. RMX-123, pushbutton locking screw is also added. This screw locks the pushbutton device for automatic station tuning and has a knurled head and threaded end.

Cat. No. RCY-028 for C1 has been changed for an improved antenna trimmer, 8-480 μμf, used in late production, listed RCY-052. This item allows knob adjustment of the antenna trimmer for which a knob is available under Cat. No. RDK-158.

General Electric 233, Kaiser-Frazer

This model appears on *pages 18-29 through 18-36 of Rider's Manual Volume XVIII.* In cases where the volume and tuning control shafts appear too short to accomodate the shaft parts and knobs, a formed lip which is bent forward in the escutcheon opening of the instrument panel will be found to obstruct receiver installation. This lip may be removed by either filing or bending it back.

In instances where the hole for the receiver mounting bracket has not been accurately located, it is possible that the receiver is positioned a bit too far toward the front of the car to allow the receiver control shafts to come through instrument panel holes to their maximum extent. If the "knock out" hole for the mounting brackets screw must be drilled, make certain it is accurately positioned.

In case of pushbutton sticking, check for and remove any burrs from the bottom of the cast grille for pushbutton openings. A binding tuning shaft will also cause the pushbottons to stick or fail to return to their normal positions. To clear shaft from binding, enlarge the tuning shaft opening using a reamer, or a rat tail file.

If the receiver is dead, check installation wiring to make certain the correct lead is connected to the ignition and instrument light switch respectively. If the receiver lead that should go to the instrument light control is connected to the ignition switch, the receiver will not operate though pilot lamps will light.

Check the loudspeaker plug connection. Though the plug pin receptacles in the speaker lead connector are arranged in such a manner to be polarized, it is often that the operator neglects to align the receptacles with respect to the male plug pins at the speaker. Forcing together of the incorrectly aligned parts is liable to cause the male pins to break through into the thin walls of the non-conducting adjacent holes of the speaker plug, resulting in open circuit wiring to the loudspeaker.

Exposure of the radio receiver to such dampness as water drain-leaks upon the receiver components and wiring, results in voltage breakdown at tube sockets (especially the 6V6 output tubes), or the shorting of capacitors and resistors. The r-f trimmer strip at the center of the receiver will also be affected, causing the radio to become weak or dead. Water leaks around the windshield, and screw head holding the set mounting bracket to the cowl should be well sealed against water draining upon the receiver. A thorough check for probable leaks and the necessary steps taken to prevent their occurrence should be taken at the time of the initial radio receiver installation.

A lower than normal battery voltage can be the cause of the radio to be weak or fail to operate. The receiver will not function properly if the battery voltage measures less than 5.8 volts.

The following changes in production wiring should be noted in the schematic diagram:

Capacitor C28 has been changed to the left side of switch, S1, at the junction of C27 and the switch connection. The ground lead of C28 is connected to chassis ground.

SPECIFICATIONS

CABINET:

Material ..... Steel
Height ..... 5¼ inches
Depth ..... 13 1/16 inches
Width ..... 9 7/8 inches

CONTROLS:

On-Off Switch and Volume
Tone
Manual Tuning
Pushbuttons for Tuning (6)

ELECTRICAL RATINGS:

Voltage ..... 6.6 volts d-c
Current ..... 8.5 amperes

FUSE:

S.F.E. (2) ..... 14 amperes

OPERATING FREQUENCIES:

Broadcast Band ..... 540–1605 kc
I-F Amplifier ..... 265 kc

SENSITIVITY:

7 microvolts for one watt output (at band ends)
6 microvolts for one watt output (at points other than band ends)

POWER OUTPUT:

(Measured at voice coil)
Undistorted ..... 7.25 watts
Maximum ..... 8.25 watts

VIBRATOR:

Nonsynchronous ..... 6 volts

LOUDSPEAKER:

Oval, PM ..... 6 x 9 inches

TUBE COMPLEMENT:

(V1) R-F Amplifier 6SK7
(V2) Oscillator-Converter 7B8
(V3) I-F Amplifier 6SK7
(V4) Detector and Audio Amplifier 6SQ7
(V5) Audio Phase Inverter 6J5
(V6) Power Output 6V6GT
(V7) Power Output 6V6GT
(V8) Rectifier 6X5GT
(I1, I2) Pilot Lamps ..... Mazda No. 55

GENERAL INFORMATION

The 1949 Kaiser-Frazer auto radio is an eight tube superheterodyne receiver employing pushbutton tuning.

OFF-ON SWITCH AND VOLUME CONTROL

The power lead of the radio is connected to the accessory post of the ignition switch and the radio cannot be turned on without the ignition key. When the key is turned to the right, the engine may be started in the usual manner and the radio can be operated. To operate the radio when the engine is not running, turn the ignition switch key to the left.

To turn the radio on, turn the Volume Control knob to the right until a click is heard. After approximately 20 seconds, the radio tubes will reach their operating temperature, permitting operation of the radio. To increase volume, rotate this control knob further to the right. To turn the radio off, rotate the volume control knob completely to the left until a click is heard, indicating the radio is turned off.

Note: In addition to the radio ON and OFF switch, the dial lights are also controlled by the Instrument Panel Control. To illuminate radio dial scale at night, the control, which also controls the brilliance of the dial lights and auto instrument panel lights to various degrees, must be advanced as desired.

MANUAL TUNING

Manual tuning is accomplished by rotating the Tuning Control knob, which drives the tuning mechanism and dial pointer through a reduction drive to the desired station frequency as indicated by the pointer on the dial scale. The dial is marked in numbers to which a zero must be added to correspond to the frequency numbers of the stations, as listed in radio program schedules. Accurate tuning of the station is necessary for optimum quality of reproduction.

PUSHBUTTON TUNING

Instantaneous tuning of any one of the six preselected stations may be accomplished by fully depressing the pushbutton for the desired station. After depressing the pushbutton, the radio will become tuned to the selected station and the pushbutton will return to its normal position upon release.

TONE CONTROL

The Tone Control knob is located directly behind the Volume Control knob. Rotating the control to the right or left will change the tone of receiver reproduction. Turning the control to the right will emphasize the treble tones, while turning it to the left will emphasize the bass tones. The treble position is useful in overcoming wind noise, etc., when driving; while the bass position brings out the full mellow tones of musical programs. With the tone control set midway, the full tonal range is obtained.

PUSHBUTTON TUNING ADJUSTMENTS

There are six pushbutton positions which are available for setting up six desired stations for instantaneous tuning. Proceed to adjust as follows:

1. Release the retaining spring beneath the bottom surface of the pearl-colored pushbutton cover by pushing it to the left with the finger tip. The cover is now free and may be removed from its shaft, exposing the knurled adjustment screw.

2. With the fingers, loosen the long screw, by a few turns of its knurled head, in the counterclockwise direction.

3. Tune in the desired station for pushbutton tuning by operating the Manual Tuning Control knob. Accurate tuning of the station is necessary for optimum quality of reproduction.

4. Depress the exposed pushbutton plunger screw fully and then release and immediately tighten screw in a clockwise direction.

5. Replace the pearl-colored pushbutton cover with the spring on the under surface of the cover, by merely slipping it over the exposed pushbutton mechanism until the spring cover lock automatically snaps in place.

The five steps above complete the procedure for adjustment of one pushbutton-controlled preselected station. Repeat the procedure for each of the remaining pushbutton positions or any one pushbutton position which may be changed to a new station setting when so desired. Any pushbutton may be set up or operated on any station without regard to frequency or sequence.

RADIO INSTALLATION

Reference is made to the Installation Details shown in Figures 1 and 2. The necessary mounting hardware for radio installation and, also, the radio control knobs and interference elimination components are found packaged in a cardboard box inside the radio shipping carton. The step-by-step procedure for installation is given as follows:

1. Install the antenna. Complete instructions are packed with each antenna kit. Dress the antenna lead-in cable up and over the auto instrument panel wires to the center of the instrument panel.

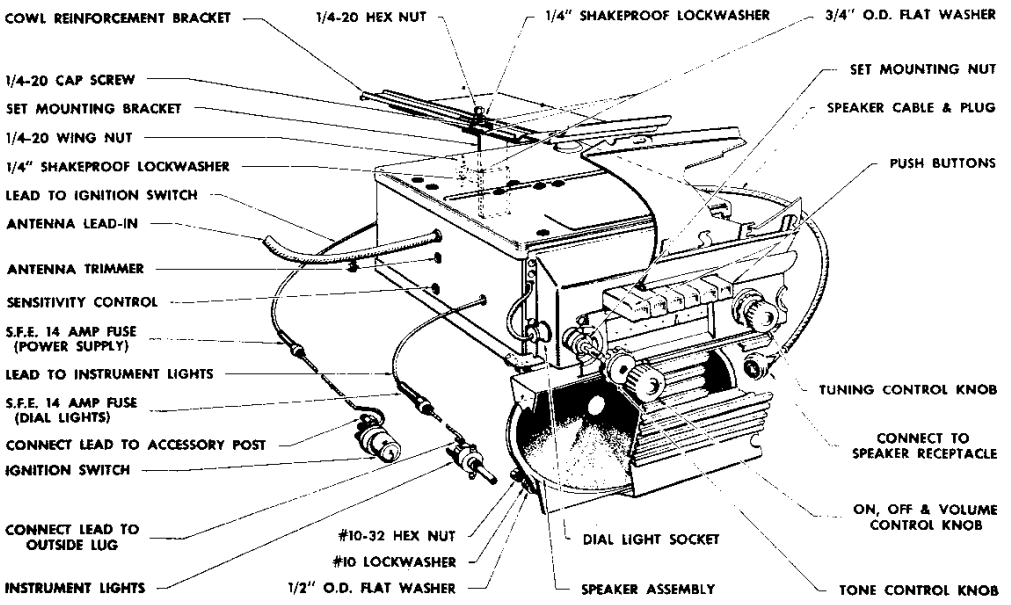


Fig. 1. Installation Details, Kaiser

2. Remove the radio opening cover plate from the auto instrument panel. The plate is held in place by speed nuts.

3. Fit the Set Mounting Bracket over the stud at the rear of the radio so that the serrated surfaces mesh, and place a ¾" O.D. flatwasher, ¼" shakeproof lockwasher, and the wing nut onto the stud and over the assembly in the order mentioned and as shown in Figures 1 and 2.

4. Lift open the auto engine compartment hood and place the Cowl Reinforcement Bracket above the cowl with its slotted opening over the hole provided for the ¼–20 Cap Screw used to fasten set mounting bracket to the automobile's cowl.

5. Carefully place radio into position from beneath and behind the auto instrument panel, so that the volume and tuning control shafts come through the panel openings provided. It may be necessary to enlist the aid of a helper in this step, since the radio must be supported while the cap screw with its first ¾" O.D. flatwasher is placed through the set mounting bracket hole, cowl, and cowl reinforcement bracket. Apply the ¾" O.D. flatwasher, ¼" shakeproof lockwasher, and ¼–20 Hex Nut. With radio and set mounting bracket in position, and the assembly pushed as far forward as set mounting bushings at control shafts will allow; tighten the hex nut.

6. With the ¼–20 wing nut (securing set mounting bracket to rear of radio) loosened a bit, raise or lower rear of radio to align the volume and tuning control shafts squarely with their respective holes in the auto instrument panel. Tighten wing nut securely.

7. Thread set mounting nuts over the volume and tuning control shafts. Using the special Spanner Wrench provided in the installation kit, tighten nuts securely.

8. Install the tone control knob on its shaft followed by the volume control knob. These knobs are the "press on" type and are merely pushed onto the shaft. Place the tuning control knob over the tuning control shaft and tighten set screw to flat of shaft.

9. Fit the radio speaker assembly over the four mounting studs with the speaker receptacle facing to the right. Place the ½" O.D. flatwasher, No. 10 lockwasher, and No. 10–32 hex nut over each stud in the order named and as shown in the illustrations. Tighten the four hex nuts securely.

10. Connect speaker cable and plug to speaker receptacle.

11. Connect antenna lead-in into its receptacle.

12. Connect the lead shown going to the ignition switch located on the auto instrument panel, to the longer accessory terminal post.

13. Connect the lead shown going to the automobile instrument light control to the load side terminal of the control.

14. Turn on the radio and allow it to operate for approximately 15 minutes to reach normal operating temperature. Tune in a weak station near 12 on the dial scale. With a small screwdriver, adjust the Antenna Trimmer until the station is heard the clearest. This setting will be optimum when adjusted for minimum noise level on station used for test. This adjustment should be made with the antenna extended to its normal operating position.

INTERFERENCE ELIMINATION

IMPORTANT: Use the utmost care in the following operations to insure freedom from motor noise. Be certain that good ground contacts are made between the interference condenser mountings and the car body. If necessary, clean away paint or dirt with emery paper. Tighten all nuts and bolts securely.

1. Remove the voltage regulator mounting screw and under this screw mount the Voltage Regulator Condenser, as shown in Figure 3. Connect the condenser lead wire under the battery terminal screw of the regulator marked "BATT."

2. Remove the high tension coil wire cable from the ignition distributor. Remove the wire cable end clip and fit cable to screw end of distributor suppressor. Screw suppressor onto cable so that screw bites into end of cable and contacts wires at its center. The distributor suppressor, in turn, is inserted into the center jack of the distributor so that the unit is now connected in series with the high tension wire lead and distributor. See Figure 4.

3. Mount the Ignition Coil Condenser under the ignition coil bracket bolt and connect its wire lead to the battery terminal of the coil as shown in Figure 4.

4. Install the Generator Condenser under the ground screw on the auto battery motor generator, as shown in Figure 5. Connect its wire lead to the generator armature post.

5. Install the two auto motor compartment hood bonding springs, one on each side of car, as shown in Figure 6.

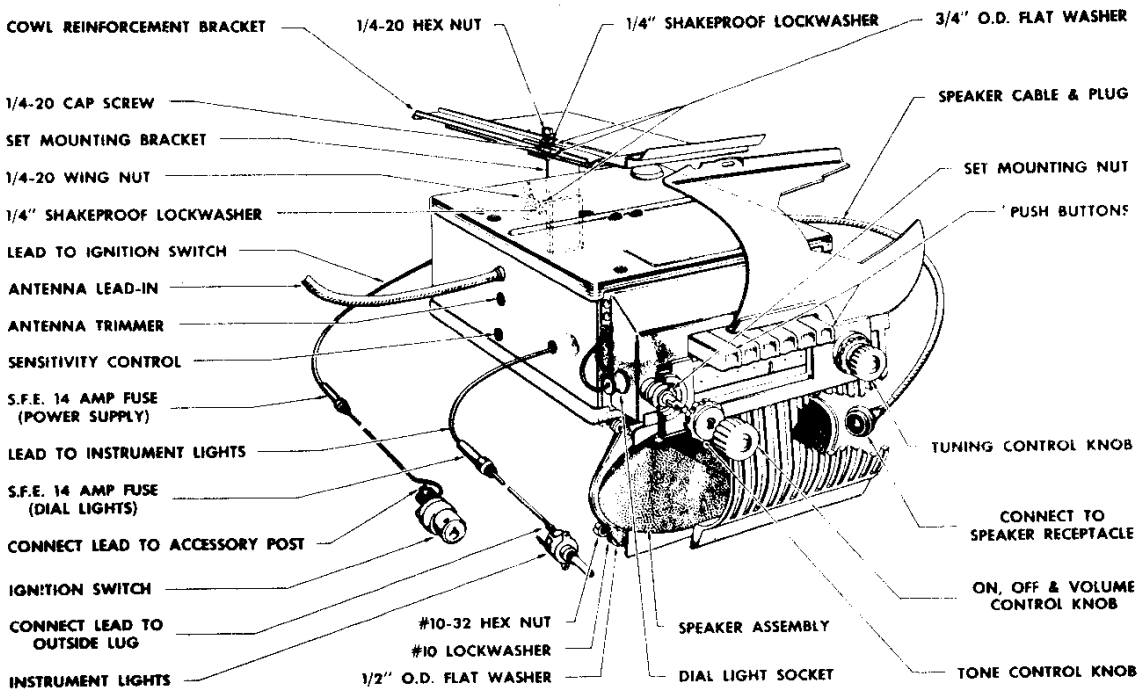


Fig. 2. Installation Details, Frazer

ELECTRICAL CIRCUIT ALIGNMENT

EQUIPMENT REQUIRED:

1. Test oscillator with audio tone modulation.
2. A-C output meter, 2½ volts full scale.
3. Insulated screwdriver.
4. .1 mf. paper capacitor.
5. Two 30 mmf. mica capacitors.
6. Jeweler's pin vise (for core adjustment).

PROCEDURE—GENERAL:

1. The alignment procedure is given in the Alignment Chart, Table I.

2. Alignment Chart, Table II, will be used *only* when a tuning core or coil has been replaced.

3. Figure 7 is the schematic circuit of a recommended dummy antenna, closely resembling actual antenna capacity, to be used in series with the signal generator leads when aligning the r-f section of the receiver.

4. Reference is made to Figures 8 and 9 for trimmer locations.

5. Connect output meter across voice coil.

6. Make all adjustments with volume control on full, tone control in clockwise (treble) position.

7. Keep signal generator output reduced as much as possible for about half-scale output meter reading.

ALIGNMENT CHART, TABLE I

Step	Connect Signal Generator to:	Signal Generator Setting	Dial Setting	Adjust for Maximum
	I-F ALIGNMENT			
1	†Grid (Pin 4) 6SK7 (V3) I-F	265 kc	*1605 kc	2nd I-F, T2, Trimmers C35 and C34
2	†Grid (Pin 6) 7B8 (V2) conv.	265 kc	*1605 kc	1st I-F, T1, Trimmer C33 and C32
3	Repeat Steps 1 and 2 for accuracy			
	R-F ALIGNMENT			
4	‡Antenna socket	1400 kc	1400 kc	Oscillator trimmer C10
5	‡Antenna socket	1400 kc	1400 kc	Converter trimmer C7, R-F trimmer C3

† Low side of signal generator to chassis, high side in series with .1 mf paper capacitor.
‡ Signal generator through dummy antenna.
* R-F cores fully withdrawn from tuner.

NOTES IN CONNECTION WITH ALIGNMENT TABLE I

After reinstalling the receiver in the car, allow it to operate for approximately 15 minutes to reach normal operating temperature. Extend antenna to maximum. Check the antenna trimmer alignment on a weak station at approximately 1200 kc. Adjust trimmer for minimum noise level on station used for test.

GENERAL SERVICE

Where symptoms are manifested by intermittent operation, check all cables and their connections for breaks, loose or dirty contacts, chafing, grounding, and probable short circuits.

Static noise, varying in speed as the auto motor is accelerated, indicates ignition interference. Check parts and installation of distributor and ignition coil noise suppression units. Also, make certain the car motor compartment hood is bonded efficiently with two bonding springs provided.

Interference noise in the form of a ripple, varying in frequency with motor acceleration, is caused by the auto battery generator. Cures are also outlined here in section headed "Interference Elimination," regarding the generator noise condenser and voltage regulator condenser.

For other services where the trouble is in the receiver chassis, for r-f and i-f alignment, tube changes, etc., the receiver will be taken out of the car.

TAKING RECEIVER OUT OF CAR

To take the receiver out for servicing, consult the installation detail drawings of Figures 1 and 2 while following the outlined procedure below.

1. Disconnect the following leads and cables: speaker cable and plug at speaker receptacle, antenna lead at antenna receptacle, lead to ignition switch at switch accessory post, and lead to instrument lights at the load side terminal of the instrument light control.

2. Remove the volume, tone, and tuning control knobs. The volume and tone control knobs are the push-on type so that they are merely pulled off, while the tuning control knob must first be made free by loosening the No. 6-32 Allen Headless setscrew holding it fast at the flat section of its shaft.

3. Remove the special mounting nuts from the volume and tuning control shaft bushings, using the special spanner wrench supplied in the original receiver installation kits.

4. Remove the hex nut, washers, and cap screw from the mounting at the cowl. It may be necessary to enlist the aid of a helper in this step so that while one operator removes the screw the other can support the receiver, finally moving it away from the instrument panel to clear the control shafts. The receiver will then be free from its mounting and may be removed from the car.

5. To take out the speaker, remove the hex nut, lockwasher, and flatwasher from each of the four speaker mounting studs. The speaker is now free of the mounting and can be removed from the instrument panel.

ALIGNMENT CHART II

For Core or Coil Replacement Only

Step	Signal Generator Setting	Dial Setting	Remarks
1	1675 kc	*1600 kc	Screw Ant., R-F, converter, and oscillator cores out of their coils
2	1675 kc	*1600 kc	Adjust oscillator trimmer C10 at 1675 kc
3	1675 kc	*1600 kc	Adjust converter trimmer C7, R-F trimmer C3, and antenna trimmer C1 for maximum
4			Replace cores to their approximate original positions
5	1400 kc	1400 kc	Adjust oscillator core, L5, to scale at 1400 kc
6	1400 kc	1400 kc	Adjust converter, RF core, and antenna core (L4, 3, and 2 respectively), for maximum
7	600 kc	**600 kc	"Rock-in" shunt oscillator coil, L7, for maximum
8	Recheck step 6 at 1400 kc		
9	1200 kc	1200 kc	Check receiver for calibration and gain
10	Repeat steps 5, 6, 7, and 8		If receiver is off calibration or weak

* Maximum high frequency end of dial.

** "Rocking" consists of adjusting the indicated adjuster while turning the dial a small amount back-and-forth through peak output. The object is to find the maximum peak.

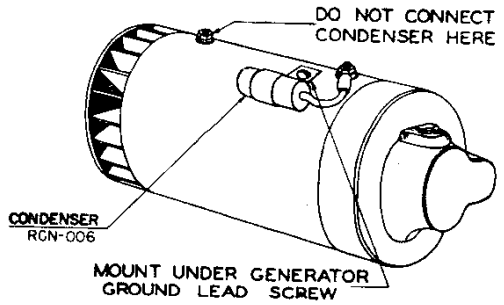


Fig. 5. Generator Noise Condenser

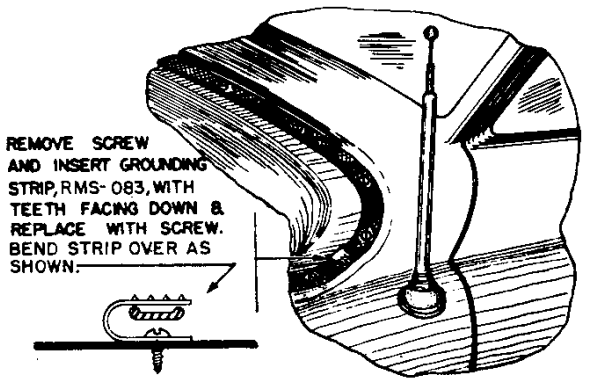


Fig. 6. Hood Bonding

NOTES IN CONNECTION WITH ALIGNMENT TABLE II

1. After alignment is complete, the maximum high frequency tuning range should be checked. If the range is greater or less than 1605 kc, the screw stop for the tuner core-bar should be adjusted to limit the frequency coverage to 1605 kc.

2. After all adjustments have been made, glue core screws with speaker cement.

3. After reinstalling the receiver in the car, allow it to operate for approximately 15 minutes to reach normal operating temperature. Extend antenna to maximum. Check the antenna trimmer alignment on a weak station at approximately 1200 kc. Adjust trimmer for minimum noise level on station used for test.

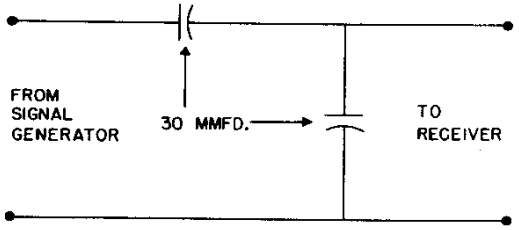


Fig. 7. Dummy Antenna

STAGE GAINS AND VOLTAGE CHECKS

Stage gain measurements may be made with a vacuum tube voltmeter to check circuit performance and to locate stages which are not operating properly. The gain values listed may have a tolerance of 10%.

1. R-F STAGE GAIN

Antenna Post to 6SK7 (V1) Grid.....9.5 at 1000 KC
6SK7 (V1) Grid to 7B8 (V2) Grid.....8.5 at 1000 KC

2. CONVERSION GAIN (1000 TO 265 KC)

7B8 (V2) Grid to 6SK7 (V3) Grid.....17 at 1000 KC

3. I-F GAIN

6SK7 (V3) Grid to 6SQ7 (V4) Diode Plate.....15 at 265 KC

4. AUDIO GAIN

The power output across the speaker voice coil should be approximately one watt (1.89 volts) with not more than 70 millivolts at 400 cycles input across volume control R19. Volume control must be fully on (clockwise) and tone control in maximum treble (clockwise) position.

5. OSCILLATOR GRID BIAS

The d-c voltage developed across the oscillator grid leak R5 should be approximately -9 volts as measured by a vacuum tube voltmeter.

6. SOCKET PIN VOLTAGES

Socket pin voltages (Figure 10) may have a tolerance of 10%. All voltages are based upon a power supply input of 6.6 volts at the receiver terminals.

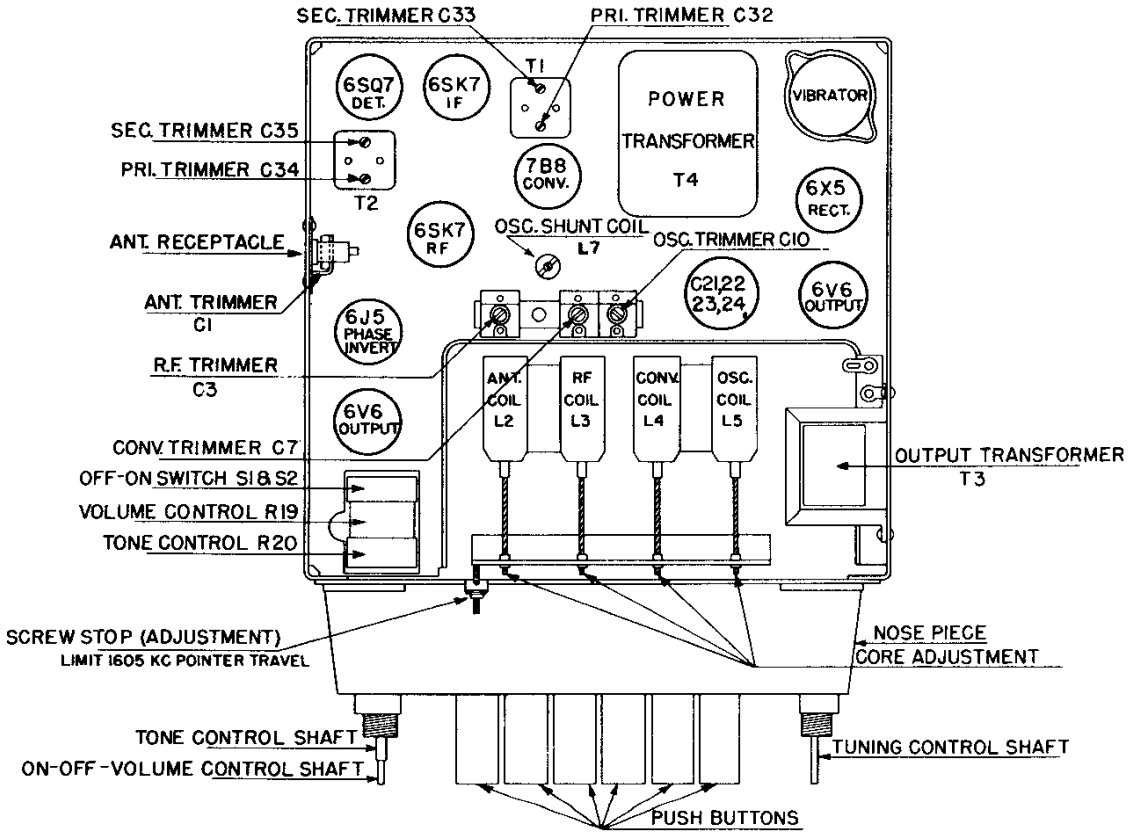


Fig. 8. Top View of Chassis

MODEL 233
KAISER-FRAZER

GENERAL ELECTRIC CO.

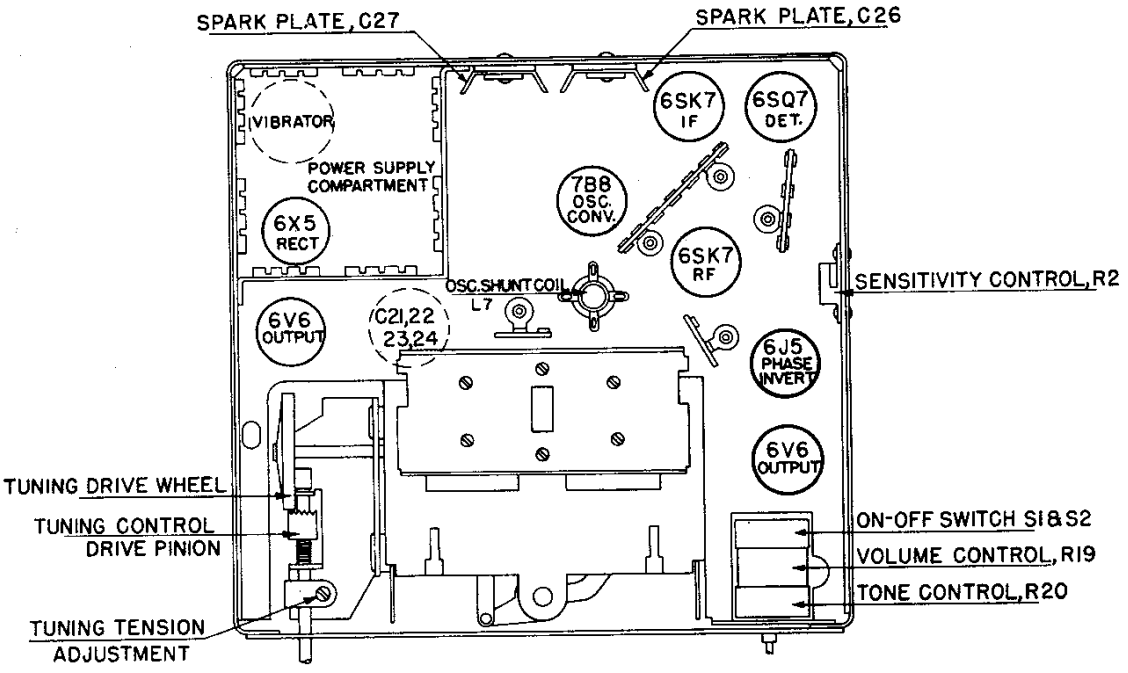
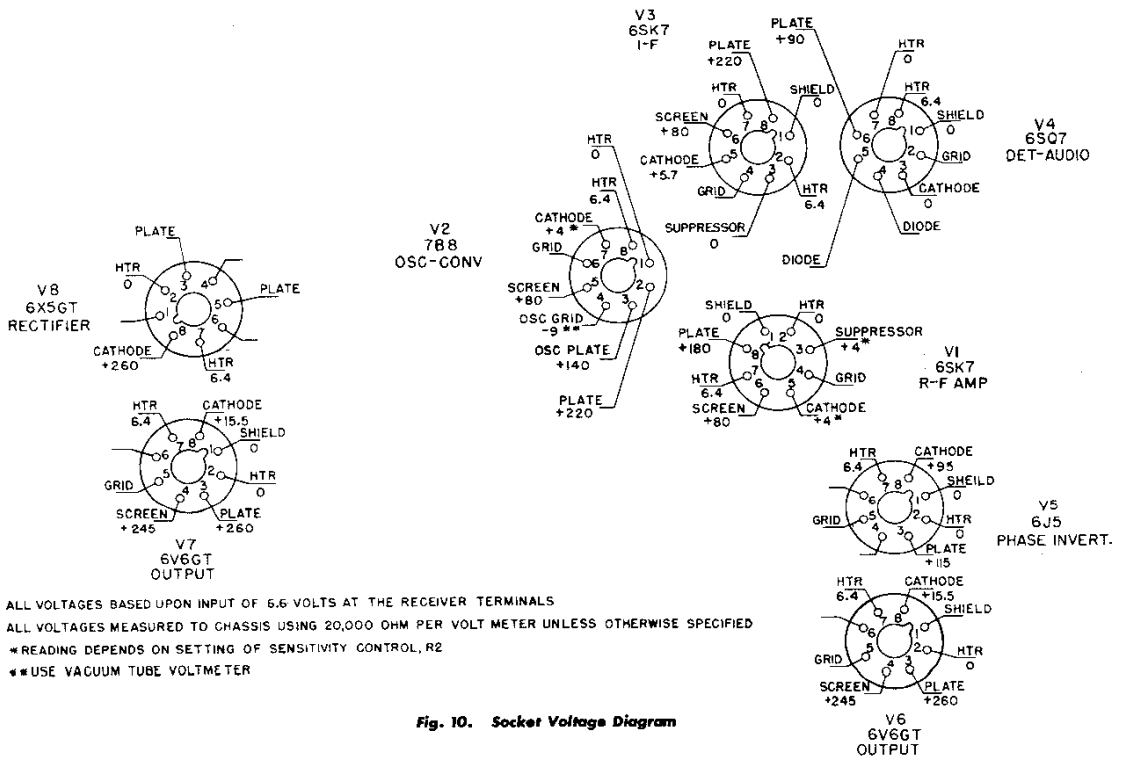


Fig. 9. Bottom View of Chassis



ALL VOLTAGES BASED UPON INPUT OF 6.6 VOLTS AT THE RECEIVER TERMINALS
ALL VOLTAGES MEASURED TO CHASSIS USING 20,000 OHM PER VOLT METER UNLESS OTHERWISE SPECIFIED
* READING DEPENDS ON SETTING OF SENSITIVITY CONTROL, R2
** USE VACUUM TUBE VOLTMETER

Fig. 10. Socket Voltage Diagram

GENERAL ELECTRIC CO.

MODEL 233
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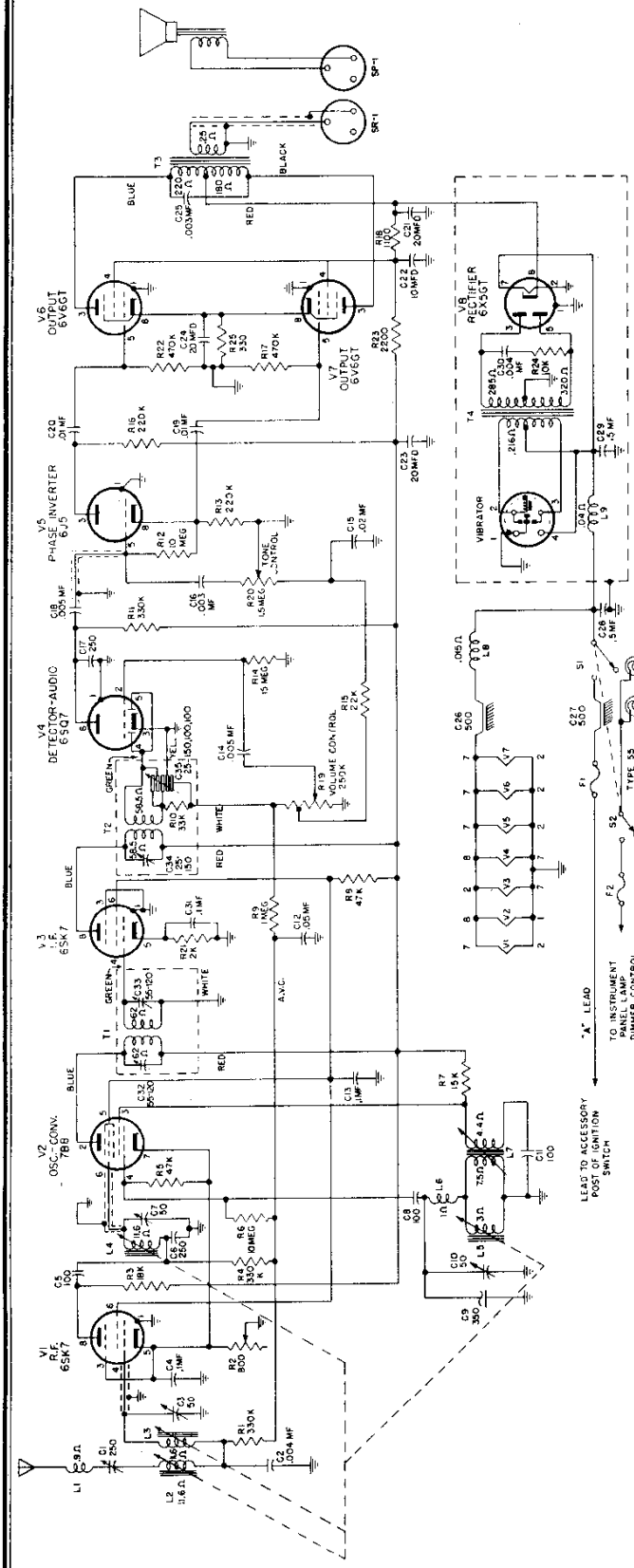

Fig. 11. Schematic Diagram

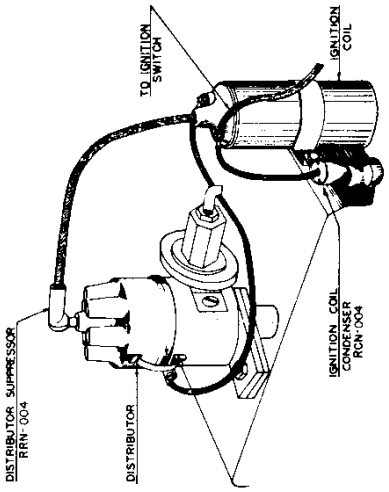

Fig. 4. Distributor and Ignition Coil Suppression

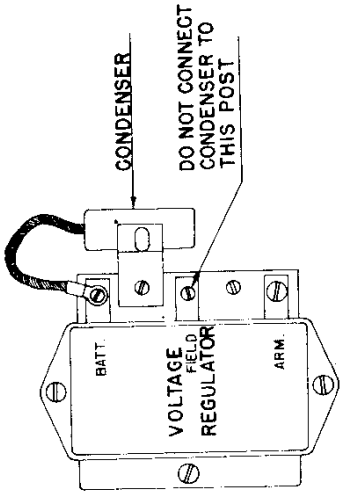

Fig. 3. Voltage Regulator Condenser

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KAISER-FRAZER

GENERAL ELECTRIC CO.

REPLACEMENT PARTS LIST

Cat. No.	Symbol	Description
UNIVERSAL REPLACEMENT PARTS		
UCC-623	C16	CAPACITOR—.003 mf., 600 v., paper
UCC-625	C14, 18	CAPACITOR—.005 mf., 600 v., paper
UCC-630	C19, 20	CAPACITOR—.01 mf., 600 v., paper
UCC-631	C15	CAPACITOR—.02 mf., 600 v., paper
UCC-635	C12	CAPACITOR—.05 mf., 600 v., paper
UCC-640	C4, 19, 20, 31	CAPACITOR—.1 mf., 600 v., paper
UCC-645	C28, 29	CAPACITOR—.5 mf., 600 v., paper
UCU-1028	C5	CAPACITOR—100 mmf., 600 V., mica
URD-077	R7	RESISTOR—15,000 ohms, ½ w., carbon
URD-079	R3	RESISTOR—18,000 ohms, ½ w., carbon
URD-081	R15	RESISTOR—22,000 ohms, ½ w., carbon
URD-089	R5	RESISTOR—47,000 ohms, ½ w., carbon
URD-105	R13, 16	RESISTOR—220,000 ohms, ½ w., carbon
URD-109	R1, 4, 11	RESISTOR—330,000 ohms, ½ w., carbon
URD-113	R17, 22	RESISTOR—470,000 ohms, ½ w., carbon
URD-121	R9	RESISTOR—1 meg., ½ w., carbon
URD-145	R6, 12	RESISTOR—10 meg., ½ w., carbon
URD-1056	R21	RESISTOR—2,000 ohms, ½ w., carbon
URE-057	R23	RESISTOR—2,200 ohms, 1 w., carbon
URE-073	R24	RESISTOR—10,000 ohms, 1 w., carbon
URE-089	R8	RESISTOR—47,000 ohms, 1 w., carbon
URE-1050	R18	RESISTOR—1,100 ohms, 1 w., carbon
URF-037	R25	RESISTOR—330 ohms, 1 w., carbon
SPECIALIZED REPLACEMENT PARTS		
RAC-054		COVER—For vibrator power supply compartment
RAP-009		PLATE—Mounting plate for centering volume control
RAP-010		PLATE—Backing plate for dial scale
RAP-011		PLATE—Backing plate for dial window
RCC-092	C25	CAPACITOR—.003 mf., 1600 v., paper
RCC-093	C30	CAPACITOR—.004 mf., 1600 v., paper
RCE-075	C21, 22, 23, 24	CAPACITOR—20 mf., 350 v.; 10 mf., 300 v.; 20 mf., 300 v.; 20 mf., 25 v.; electrolytic
RCN-004		CAPACITOR—For ignition coil noise suppression
RCN-005		CAPACITOR—For voltage regulator noise suppression
RCN-006		CAPACITOR—For auto battery generator noise suppression
RCN-008	C9	CAPACITOR—350 mmf., compensator
RCU-190	C2	CAPACITOR—.004 mf., 600 v., mica
RCU-279	C6, 17	CAPACITOR—250 mmf., 600 v., mica
RCU-283	C5	CAPACITOR—.001 mf., 600 v., mica
RCU-284	C8	CAPACITOR—100 mmf., 600 v., mica
RCY-028	C1	TRIMMER—250 mmf., antenna trimmer
RCY-050	C3, 7, 10	TRIMMER STRIP—50 mmf., 50 mmf., 50 mmf., r-f, conv., and osc. trimmers
RDE-033		ESCUTCHEON—Dial scale window escutcheon

Cat. No.	Symbol	Description
SPECIALIZED REPLACEMENT PARTS (Cont'd)		
RDK-145		KNOB—Tone control knob
RDK-146		KNOB—Volume control knob
RDK-147		KNOB—Tuning control knob
RDP-043		POINTER—Dial scale pointer
RDS-079		DIAL SCALE
RDW-011		WINDOW—Dial scale window
RDX-042		PUSHBUTTON—Pushbutton with retaining spring
*REI-020		CORE—Tuning core (coded red)
*REI-021		CORE—Tuning core (coded green)
*REI-022		CORE—Tuning core (coded yellow)
*REI-023		CORE—Tuning core (coded blue)
REV-002		VIBRATOR
RII-015		INSULATOR—Textolite strip insulator for tuning core stem support
RIS-002		LIGHT SHIELD—Rubber strip (channeled) used as dial light barrier
RJS-015		SOCKET—Octal socket for 6SK7, 6AQ7, 6J5, 6V6GT, and 6X5GT tubes
RJS-069		SOCKET—Loktal socket for 7B8 tube
RJS-071		SOCKET—Vibrator socket
RJS-121		SOCKET—Antenna connector socket
RJS-122		SOCKET—Dial lamp socket and leads
RJX-024		SOCKET AND CABLE—Speaker socket and cable
RJX-025		CABLE ASSEMBLY—Cable and fuse ferrule (lead to instrument light control)
RKP-005		INSTALLATION KIT—Knobs, mounting hardware, ignition and noise filter components, etc.
RLC-048	L6	COIL—Oscillator series coil
RLC-079	L7	COIL—Oscillator shunt coil
RLI-063	L1	CHOKE—Antenna noise choke coil
RLI-064	L8	CHOKE—Motor noise choke coil
*RLX-017	L2, 3	COIL—Antenna and r-f coil in shield assembly (coded red)
*RLX-018	L2, 3	COIL—Antenna and r-f coil in shield assembly (coded green)
*RLX-019	L2, 3	COIL—Antenna and r-f coil in shield assembly (coded yellow)
*RLX-020	L2, 3	COIL—Antenna and r-f coil in shield assembly (coded blue)
*RLX-021	L4, 5	COIL—Oscillator and converter coil in shield assembly (coded red)
*RLX-022	L4, 5	COIL—Oscillator and converter coil in shield assembly (coded green)
*RLX-023	L4, 5	COIL—Oscillator and converter coil in shield assembly (coded yellow)
*RLX-024	L4, 5	COIL—Oscillator and converter coil in shield assembly (coded blue)
RMM-083		NUT—Special, fits over control shaft bushings for mounting
RMS-083		SPRING—Contact spring for motor compartment hood bonding
ROE-001		SPEAKER—6 x 9 inches, oval, PM
RRC-048	R2	POTENTIOMETER—0-800 ohms (Sensitivity control)
RRC-093	R19, 20, S1, 2	POTENTIOMETER AND SWITCH—250,000 and 1.5 meg. dual (Volume, Tone, and On-Off controls)
RRD-1014	R14	RESISTOR—15 meg., ½ w., carbon
RRN-004		DISTRIBUTOR SUPPRESSOR
RTL-086	T1	TRANSFORMER—1st I-F transformer
RTL-087	T2	TRANSFORMER—2nd I-F transformer
RTO-056	T3	TRANSFORMER—Audio output transformer
RTP-065	T4	TRANSFORMER—Power transformer
RWX-013		CABLE ASSEMBLY—Cable and fuse ferrule (lead to ignition switch)

*Be certain to specify color code marking to insure proper coil tracking.