

SERVICE MANUAL

- HUDSON -

AUTO - RADIO

M'f'g'd by
ZENITH RADIO CORP.
 CHICAGO, U.S.A.

MODEL 680

NOV. 1934

General

This receiver is designed for 1935 Hudson and Terraplane cars and consists of two units, one housing the set proper and the other a special 6-inch dynamic speaker. In most cases the set is installed at the factory as standard equipment but in the event it is purchased later, mounting instructions are outlined in the following pages. In such cases the antenna and motor noise problem must also be given careful consideration to insure a satisfactory job to the customer.

The circuit employed is a 6 tube Superheterodyne with the following tube complement:

- 1—6D6 R. F. Amplifier
- 1—6C6 1st Detector and Oscillator
- 1—6D6 I. F. Amplifier
- 1—75 A. V. C. and 2nd Detector
- 1—42 Power Amplifier
- 1—84 Rectifier

Installation

The receiver unit is provided with two clinch nuts in the bottom of the case for mounting to the steering column bracket. In 1935 Hudsons and Terraplanes the set mounts above and slightly to the right on the steering column support bracket. Two special 5/16—18x1/2" hex head machine screws are inserted through the bracket and screwed to the underside of the case. **CAUTION:** Do not use other size bolts.

After the receiver has been tightened in position the ash tray in the center of the instrument panel is removed and the control head screwed in its place. The tuning cables are then fastened to the receiver by inserting the left cable in the center connector and the right cable in the outer connector. Rock the control knobs while the cables are being inserted so as to insure the couplings interlocking properly, then tighten the knurled nuts securely to prevent loosening through vibration. **CAUTION:** Be sure the cables are not pushed in so far that the sheath touches any part of the chassis otherwise the set might become microphonic. Pilot Lamp: Insert pin top and end of shielded lead from control head into pin jack midway between the control couplings on the receiver. Tighten shield carefully under wing nut.

Fasten speaker assembly to bulkhead by means of the rear mounting stud and wood block behind speaker. Tighten from motor side of bulkhead. Insert the two speaker tips into the corresponding tip jacks on the front of receiver case. The ground sheath over the cable must be **SECURELY** fastened under the washer and wing nut adjacent to the pin jacks.

Now connect the "A" cable to the shielded lead and male connector extending from the receiver after inserting the fuse sleeve and fuse in the female end. Next connect the hot terminal of the "A" cable to the hot battery connection of the dash light switch located on the lower left side of the instrument panel.

To place the radio dial on proper calibration, tune in a local station and turn the pointer to the corresponding frequency. This is done by use of a small screwdriver in the rear of the control head where a set screw is found upon pulling out the pilot light socket assembly. The pilot light wire is provided with a plug which fits into the plug receptacle in the receiver case, as above mentioned. The short braided cable with a female Delco-Remy connector is the antenna lead. This is connected as described under "Antenna."

Antenna

Due to the all metal top employed on these cars an aerial in the roof would be useless. Therefore, a running board aerial must be installed, unless the car is already equipped. A special type constructed of copper tubing may be obtained from the Hudson Motor Company. It is provided with the necessary brackets which fasten to the running board. This aerial must be placed under the left running board to be as far as possible from ignition noise. A special cable to connect from the copper tube to the receiver is also available. Ordinary unshielded or improperly shielded wire must not be used. The antenna stage is resonated with a certain definite lead-in capacity and, therefore, only the Hudson shielded cable will be satisfactory for both greatest efficiency and a minimum of ignition interference.

The shield on the aerial lead-in must be grounded to the OUTSIDE edge of the running board. If this is not done noise will be quite apparent. Keep antenna as far as possible toward rear of car.

This special type of running board aerial is effectively streamlined and will not give rise to wind noises or collect snow or dirt. Its construction is also such that the installation is rigid and permanent and may be used on any type car body.

Ignition Interference

All automobiles develop high frequency disturbance through radiation from the coil, distributor and plugs and it is necessary to minimize this interference by means of suppression. A suppressor is placed in the center distributor lead and, if necessary, on each spark plug. By-pass condensers must be used on the generator, coil and at all electrical gauges and the leads kept as short as possible. Each car, however, presents an individual problem where the technician must use some ingenuity, carefully following instructions.

Apply the standard suppression parts furnished with the receiver. This usually consists of a resistor for the distributor in addition to a coil condenser and a generator condenser. Lay all high tension leads close to the motor to lessen the possibility of radiation. Be sure the coil condenser is connected from the BATTERY side to ground. The points will become burned and pitted if placed on the coil side. Apply additional condensers to oil, water, gas or other electrical gauges. Carefully shield the aerial lead-in to the receiver, from the running board or the wind-shield post, with large loom and copper shielding. The capacity here MUST be as low as possible. The lead-in shield is grounded at the outer edge of the running board or at a point on the frame as close as possible to the lead-in post if a top antenna is used. Bond the instrument panel thoroughly to the car frame and body on each side.

The spark plug suppressors should be the last parts installed since they may not be necessary due to the added filtering incorporated in the 1935 Receiver.

After the hood is clamped in place to prevent radiation, the receiver should be turned on and dial tuned off a station with the volume control at maximum.

If motor noise is prevalent determine whether it is being conducted through the chassis or from the antenna. This test is made by disconnecting the antenna and grounding it to the shield. If ignition noise is heard upon again starting the motor it indicates chassis pickup which may be removed as follows:

Check distributor points and clean. Set to between .013" minimum and .015" maximum clearance. Next build-up the distributor rotor arm to a clearance of between .002" to .004" clearance to the distributor cap contacts. Solder may be used for this purpose, but it will eventually burn off and the noise will return. In the event low tension leads are bunched or in the same pipe housing with high tension leads, they should be separated as far as possible or removed from the same pipe. Removal and segregation is very effective. In some cases it might be necessary to shield and bond the low tension coil or distributor leads.

Motors mounted on rubber must be bonded with heavy braid to produce a short path to ground in order to break any radiating oscillatory circuit. Such bonds should be placed between the front motor support and frame and between the radiator top hose pipe and to the cylinder head where the water jacket is bolted. Move control cables slightly so that inner shaft contacts outer armour and tape in position under instrument panel.

When chassis pickup has been reduced to a minimum the antenna is then re-connected. Be sure the lead-in shield is grounded as previously mentioned.

Where a running board antenna is used it must be installed under the board farthest from the distributor and high tension system. If a top antenna is used it is usually necessary to by-pass the dome light lead. This should be done as close as possible to the windshield post through which it is wired. It will NOT help remove noise from this source if connected at any distance from the post. Another method is to break the dome lead and install an auxiliary switch at this point. In that case the condenser is not necessary. In many cases a condenser from one side of the ammeter to ground is very effective. Be sure to keep the radio battery cable out of the motor compartment. Running this cable through the motor side may cause severe interference.

The suggestions given need not all be necessary for a satisfactory installation. Therefore, they should be followed in order until the most effective remedy has been found. In any event these rules should prove helpful in all cases.

Service

The Hudson superheterodyne receiver employs the following tubes in position shown on "Tube Layout", 6D6 R. F. Amplifier, 6C6 1st Detector and Oscillator, 6D6 I. F. Amplifier, 75 A. V. C. and 2nd Detector, 42 Power Amplifier and 84 Rectifier. The following subjects cover in an elementary manner the ordinary complaints encountered in service and in the corresponding corrections. It is suggested they be considered in the order listed when making a preliminary examination.

- | | |
|----------------|---------------------------|
| 1. Inoperative | 5. Dial off calibration |
| 2. Weak | 6. Intermittent operation |
| 3. Distortion | 7. Ignition noise |
| 4. Rattles | 8. Noisy reception |

After the trouble has been isolated the following procedure will prove effective. (Consult illustrations.)

1. Inoperative
 - (a) Examine fuse and replace if blown. Make certain fuse insulating sleeve is over fuse. If fuse continues to blow, look for short in chassis wiring, defective tube or defective vibrator.
 - (b) Defective tube—check all tubes on a tube tester and replace any that are shorted or below normal reading.
 - (c) Loose or broken receiver battery cable.
 - (d) Broken lead in chassis.
 - (e) Tube or vibrator out of socket.
 - (f) Broken antenna wire or antenna grounded.
 - (g) Speaker plugs loose or out of receiver.
2. Weak
 - (a) Grounded or partially grounded antenna.
 - (b) Defective tube.
 - (c) Weak storage battery.
 - (d) Broken connection.
 - (e) Defective vibrator.
 - (f) Defective speaker.
3. Distortion
 - (a) Defective tube.
 - (b) Defective speaker.
 - (c) Defective vibrator.
4. Rattles
 - (a) Loose wires, rods, instruments, screws, washers, etc., on instrument panel or dash.
 - (b) Loose speaker or speaker bolts.
 - (c) Dirt in speaker.
 - (d) Speaker assembly loose on bulkhead.
5. Dial off calibration
 - (a) See paragraph on resetting indicator under "Alignment".
6. Intermittent operation
 - (a) Loose radio supply connection.
 - (b) Short in antenna or lead-in.
 - (c) Defective tubes.
 - (d) Loose speaker connector.
 - (e) Loose or defective vibrator.
 - (f) Loose connection in receiver chassis.

7. Ignition interference

- (a) Suppressor defective or missing entirely.
- (b) Defective condenser at coil, ammeter or electrical gauges.
- (c) Lead-in shield not grounded.
- (d) Motor bonds broken or not tight electrically.
- (e) Chassis to case grounds broken.
- (f) Motor noise filter in set defective.
- (g) Pilot lamp shielding disconnected or broken.
- (h) Speaker shielding loose or frayed.

8. Noisy reception

- (a) See "Ignition Interference"
- (b) Defective vibrator.
- (c) Loose antenna connection
- (d) Loose fuse holder.
- (e) Defective tubes.
- (f) Loose tube shields.
- (g) Antenna shorting to frame of car.
- (h) Natural atmospheric or electrical disturbances.
- (i) Loose or defective high or low tension wiring.

To Remove Receiver from Car

- 1. Disconnect antenna lead from receiver at Delco-Remy connector
- 2. Disconnect "A" lead at fuse receptacle.
- 3. Remove tuning cables by loosening knurled cable clamps at receiver
- 4. Take out pilot light lead and shield connections.
- 5. Do likewise with speaker connections.
- 6. Take out the two mounting bolts from beneath mounting bracket

To Remove Speaker

- 1. Loosen wing nut to remove ground lead.
- 2. Pull the two speaker plugs from receiver case.
- 3. Remove speaker mounting nut from motor side.
- 4. Take speaker unit out from under cowl.

To Remove Control Unit

- 1. Take out three head mounting screws from front of instrument panel
- 2. Draw head out from rear.

To Remove Chassis from Case

(Chassis does NOT have to be removed from case for ordinary repairs or service as removal of top lid permits easy access to tubes and vibrator.)

- 1. Remove top and bottom covers.
- 2. Remove ground lug from "A" filter.
- 3. Remove hot lead from "A" filter.
- 4. Disconnect "A" filter bond from case.
- 5. Remove leads from speaker jacks and ground lead to outer case.
- 6. Disconnect three bonds from chassis to case on bottom side.
- 7. Remove four rubber mounting screws from sides of case.

Following is a list of performance factors that will be of value in making accurate measurements.

Intermediate Frequency 252.5 K. C.
Sensitivity in Microvolts 1 to 1½
Power output in Milliwatts 3000
Power consumption—40 watts at 6 volts

Tube Operating Voltages:

Position	Tube	EF	EK	EG ¹	EG ²	EG ³	EP
R. F. Amplifier	6D6	5.5	4.1	*	4.1	76	200
1st Det.-Osc.	6C6	5.6	4.5	0	4.5	76	200
I. F. Amplifier	6D6	5.6	4.1	*	4.1	76	200
2nd Det. A. V. C.	75	5.6	1.3	0	0	—	165
Power Amp.	42	5.6	0	3	0	200	192
Rectifier	6Z4	5.6	200	—	—	—	—

f—Filament; k—Cathode; g¹—Control Grid; g²—Suppressor Grid; g³—Screen Grid; p—Plate; *—Depends on applied signal strength. All voltages measured from indicated points to ground. Battery voltage 6 volts. (Check voltages with condenser gang in full mesh.)

Alignment

Every Zenith automobile receiver is balanced on an accurate crystal controlled oscillator before leaving the factory and, unless a part is changed or the calibration has shifted, the adjustments should never be tampered with. Where it is absolutely necessary, however, a good test oscillator capable of delivering a modulated signal at 1600, 1400, 600 and 252½ K. C. will be essential. Proceed as follows:

I. F. Alignment:

To balance the I. F. Circuit, connect the 252½ K. C. test oscillator signal to the grid of the 6C6 tube through a 0.5 mfd. condenser and to ground. Adjust the 1st I. F. primary trimmer to maximum output from either the speaker or an output meter. Follow in the same manner with the secondary, and the primary and secondary of the 2nd I. F. transformer. This completes the I. F. circuit adjustment.

R. F. Alignment:

1. Next attach the test oscillator thru a 150 mmf. condenser to the antenna and ground leads.
2. Turn condenser plates completely out of mesh.
3. Set test oscillator to 1600 K. C.
4. Adjust the oscillator condenser trimmer (see fig. 1) to approximate resonance at 1600. Disregard dial setting for this operation.
5. Set test oscillator to 1400 K. C. and turn gang condenser to resonance and peak the three trimmers accurately. Now set pointer on dial to 1400 K. C. by turning indicator screw from rear of head through pilot light socket hole.
6. Set test oscillator to 600 K. C. and tune set to pick up the signal. Rock the dial over this point while adjusting the padder condenser (see fig. 1) for greatest output.

If the dial is off calibration at the low frequency end after this is done the indicator may be moved slightly in either direction to give a uniform accuracy over the entire scale.

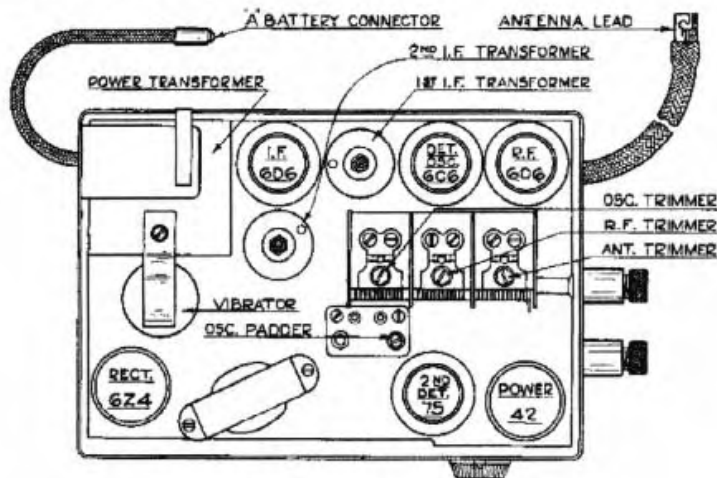
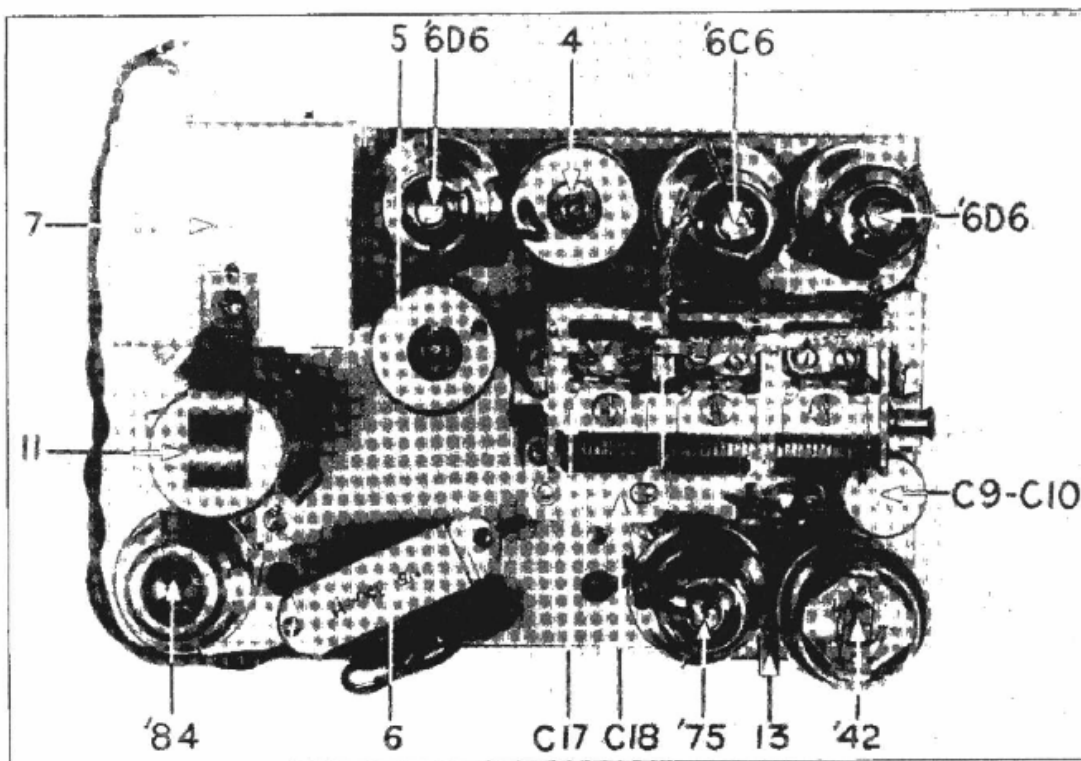


Fig. 1—TUBE POSITION



Parts and Prices

Chassis No. 5617

RESISTORS (CHASSIS ONLY)

Zenith Number	Hudson Number	Description	Price
63-306	48013	10M Ohm 1/2 Watt.	.20
63-308	48015	40M Ohm 1/2 Watt.	.20
63-400	48017	250M Ohm 1/4 Watt.	.20
63-401	48018	500M Ohm 1/4 Watt.	.20
63-402	48019	500M Ohm Vol. Control & Switch Assembly	1.00
63-420	48009	500 Ohm 1/2 Watt.	.20
63-421	48010	700 Ohm 1/2 Watt.	.20
63-422	48011	200 Ohm 1/2 Watt.	.20
63-423	48012	600 Ohm 1/4 Watt.	.20
63-424	48014	35M Ohm 1 Watt.	.20
63-425	48016	75M Ohm 1/4 Watt.	.20
63-428	48084	1200 Ohm 1/4 Watt.	.20

CONDENSERS (CHASSIS ONLY)

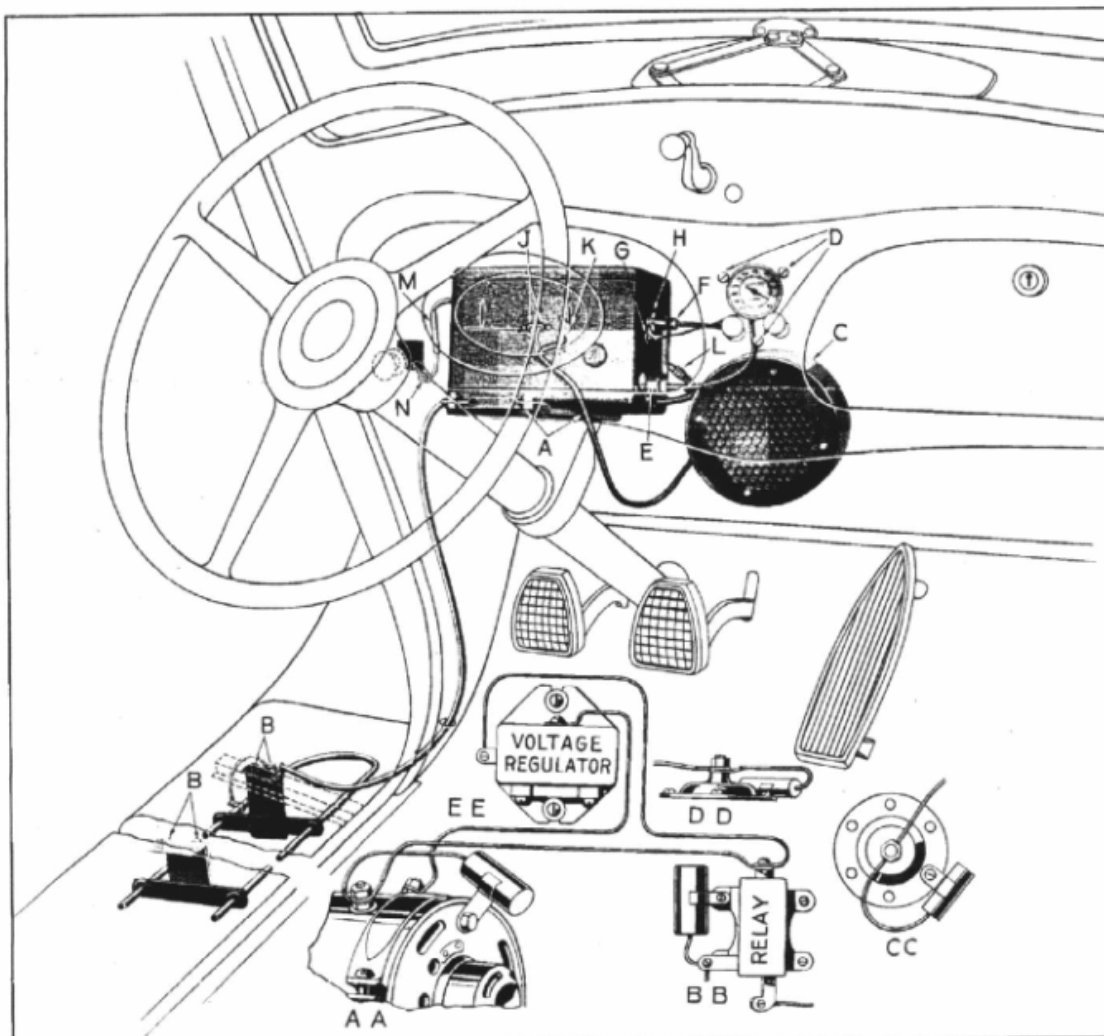
22-82	46375	.001 Mfd. 600 V.	.25
22-162	46378	.0001 Mfd. 600 V.	.20
22-170	46370	.1 Mfd. 400 V.	.15
22-190	48021	.1 Mfd. 200 V.	.20
22-182	46858	.00025 Mfd. 600 V.	.12
22-212	48020	.05 Mfd. 400 V.	.20
22-250	46372	.05 Mfd. 200 V.	.15
22-251	46774	.5 Mfd. 100 V.	.40
22-327	48022	.02 Mfd. 200 V.	.15
22-344	48023	Three-Gang Variable	4.00
22-347	48024	4 x S. Mfd. 350 V.	1.75
22-348	48025	.001 Mfd. 600 V.	.20

22-350	48026	.25 Mfd. 120 V.	.20
22-354	48027	.007 Mfd. 750 V.	.20
22-355	48028	.01 Mfd. 1500 V.	.20
22-357	48029	.01 x .02 Mfd. 750 V.	.50
22-358	48030	.002 Mfd. 600 V.	.20
22-359	48031	Ladder	.45

MISCELLANEOUS CHASSIS PARTS COILS AND CHOKES

20-96	48032	Antenna Coil Assembly	.60
20-97	48033	R. F. Coil Assembly	.75
20-98	48034	Oscillator Coil Assembly	.60
20-103	48035	Filament "A" Choke	.15
95-262	48036	1st I. F. Transformer	1.25
95-263	48037	2nd I. F. Transformer	1.25
8-2778	40773	R. F. Choke	.15
8-3364	40952	Motor Noise Filter	1.00
40-161	48038	Tone Control Knob (Knob Spring only, see 56-107)	.10
52-54	48040	"A" Battery Cable	.35
52-55	48041	Antenna Cable	.35
54-78	48042	1/4 x 20 Knurled Coupling Shaft Nuts	.08
78-100	48043	Socket 6D6	.10
78-101	48044	Socket 75	.10
78-102	48045	Socket 42	.10
78-113	48046	Socket 6D6	.10
78-114	48047	Socket 6Z4	.10
78-115	48048	Socket Vibrator	.10
80-107	48049	Tone Control Knob Spring	.01
85-68	48050	Tone Control Switch	.40

Radio Kit—1935—Hudson and Terraplane



The Radio Kit Part No. 47734 Includes:—

- 1—Receiver Complete
- 1—Speaker Complete
- 1—Control Head complete with cables
- 1—Pilot Light Bulb
- 1—Feed Cable Assembly and Fuse
- 1—Aerial Tube
- 2—Aerial Mounting Brackets
- 4—Aerial Insulation Grommets
- 1—Aerial Lead In with shield and clip
- 1—Distributor Suppressor
- 2—Small Condensers (one required on Terraplane Special Models)
- 2—Large Condensers
- 3—Ground Straps

Bolts, Nuts, Screws and Lock Washers for mounting units

In order to complete the installation on Terraplane Special Models, a spark plug suppressor and charge control kit (Part No. 47975) is required in addition to the Radio Kit. This includes six spark plug suppressors and a generator charge control for use with the air cooled generator.

Installation Operation

- 1—Remove finish plate on center of instrument panel attached with four studs and nuts on back of instrument panel.
- 2—Terraplane Special models only—Remove ignition coil and reinstall after receiver, speaker and control head is in place.
- 3—Put Radio Receiver in place on top of the steering column support bracket with the knurled knobs F and E on the right and secure in place with two cap screws "A". (On right hand drive installations, remove the two corks from the cover of the receiver and place in threaded holes in bottom. Turn receiver over and mount with knurled knobs on left of case.)
- 4—Punch a hole through the front dash pad using the $\frac{3}{8}$ " hole located to the left of the center of the dash reinforcement ribs as a guide. (Use the hole to right of center for right hand drive cars.)
- 5—Place wooden spacer on speaker mounting stud and insert stud through hole in dash and dash pad, securing with a washer and nut on engine side of dash.
- 6—Remove knobs from control head and put head in place from back of panel attaching with three screws "D". Put knobs in place.
- 7—Insert cable from right control knob into knurled collar "F" and tighten collar. The cable should be inserted far enough to insure engagement of the tongue in the tuning condenser drive member but should not bottom. Bottoming of the cable will prevent free floating of the condensers on their mounting and cause howling when the car is in motion.
- 8—Insert the cable from the left control knob with the knurled collar "E" and tighten collar.
- 9—Insert pilot light plug in pin jack "G" and secure spade of shielding under wing nut "H".
- 10—Insert speaker lead plugs in pin jacks "J" and secure shielding spade under wing nut "K".
- 11—Attach feed wire to Battery Terminal of lighting switch "N" and connect to socket "M", being sure fuse is in place in socket.
- 11—Push aerial lead in up through hole in body floor panel in line with bottom of left hand (right hand on right hand drive cars) front door front pillar post, leading up behind and over kick panel, behind radio receiver and connecting to socket "E".
- 12—Place the aerial tubing on the floor on the left side of the car (right side for right hand drive cars), with the open ends of the tube to the back and the aerial lead in clip on the tube away from the car.
- 13—Place the mounting bracket, which has holes to match the holes in the front running board bracket, on the tube with the bolt flange up and the lower hole on the side toward the car.
- 14—Place two rubber ferrules on each end of the tube moving them forward far enough to put the rear bracket in place. Do not put the ferrules in the holes in the bracket.
- 15—Attach the aerial brackets to the running board brackets with bolts "B", at the same time attaching the aerial lead in shield to the inner bolt holding the front bracket.
- 16—Force the rubber grommets into the holes in the brackets so that the extreme front end of the aerial tube is $7\frac{3}{4}$ inches ahead of the front mounting bracket.

17—Attach aerial lead to clip on aerial tube.

- 18—Attach small condenser on gasoline tank gauge unit with unit mounting screw attaching condenser terminal to gauge unit terminal. (Insert "DD".) NOTE:—The gauge unit can be reached by removing the plate in the body floor panel over the middle of the gasoline tank. This plate can be reached by removing the sedan rear seat cushion or through the rear deck opening of coaches and coupes.
- 19—Attach small condenser on radiator tank gauge unit attaching to flange screw and connecting terminal to gauge post. (Insert "CC".) NOTE: This condenser not required on Terraplane Special models.
- 20—Install large condenser on generator—mount on screw on rear face of generator attaching terminal to post marked "A" on generator.
- 21—Attach large condenser to upper right (of car) leg of generator relay attaching condenser terminal to lower right relay terminal to which wire to starting motor terminal is attached.
- 22—When installing radio on Terraplane Special models with air cooled generator, mount generator charge regulator above relay with two screws to two threaded holes in dash provided for the purpose. Resistor bar should be on lower face. Remove ground cup from generator "F" terminal. See illustration inserts for wiring diagram. Connect "F" terminal on top of charge regulator to "F" terminal (engine side) of generator. Connect right terminal of regulator to top (generator) terminal of relay. Adjust generator output to 22 amps. cold—17 amps. warm. There are three ground straps in the kit:—

Part No.	Ground Strap Length Center to Center of Eyes
47961	$8\frac{1}{4}$ "
47963	$10\frac{1}{2}$ "
47965	18"

- 23—Install Part No. 47961 ground strap from front end gear cover cap screw to fender apron bolt on top of right hand frame side rail.
- 24—Install Part No. 47963 ground strap from left, mounting stud of radiator inlet neck to top water pump mounting cap screw on Terraplane DeLuxe and all Hudson 8 models.
- 25—Install Part No. 47965 ground strap from left mounting stud of radiator inlet neck on Hudson Six to top water pump mounting cap screw, using Part No. 62013 clip to hold strap to inlet hose front clamp and away from fan. No radiator ground strap necessary on Terraplane Special Models.
- 26—Install suppressor in center terminal of distributor.
- 27—Install suppressors (6) on spark plugs of Terraplane Special models only. NOTE:—The standard distributor rotor will function satisfactorily without interference with radio reception.
- 28—Turn the tuning control knob to the right (clockwise) as far as possible. Remove the dial bulb and insert a screw driver engaging the slot in the screw in the center of the back of the dial and turn until the dial hand reads 54 (540 K. C.).
- 29—Turn on volume and tune set to known local station. Readjust dial hand position accurately by method explained under paragraph 27. Reinsert dial lamp.