

BELL SYSTEM PRACTICES
Station Installation and Maintenance

SECTION C57.205
Issue 1, 1-15-52
AT&T Co Provisional

MOBILE TELEPHONE SERVICE

MOBILE STATION INSTALLATION

METHODS

1. GENERAL

1.01 This provisional section outlines some of the methods which may be used to reduce the time and expense of installing mobile telephone station equipment in vehicles. Since mobile stations are removed and reinstalled on an average of once every 1-1/2 years, the reduction of installation time and salvage of material are important as a means of reducing the wiring loss when the station is removed.

1.02 This section is intended to supplement Section C57.201 and is suggested as a basis for field trials leading to the development of more efficient installation techniques. Reference should be made to Section C57.201 for more detailed instructions and for information not covered or superseded in this section. Reference is also made to the photographs on Pages 7 to 18, inclusive.

1.03 The procedures outlined herein pertain primarily to installations in sedans, coupes and convertible types of vehicles. Installations on trucks, boats, station wagons, etc., must generally be handled as special cases; however, the development of efficient methods for sedan installations will suggest a number of improvements which can be applied to all installations.

2. PREPARATION

- 2.01 Preparation for the installation consists of the following:
- (a) See that the necessary equipment units, cables, tools and supplies and protection cloths are on hand.
 - (b) If a test bench is available, check the units to see that they are functioning properly.
 - (c) Prepare the designation strip (if any) and F.C.C. Form 452-C.

2.02 Except when warranted by special circumstances, it is desirable to reduce to a minimum the time spent in planning the details of individual installations. This can be done by developing "semi-standardized" installations for different makes or types of vehicles, with uniform arrangement of equipment, cable runs, etc. used for every vehicle except where severe space limitations, anticipated interference with vehicle operation, etc. make modification necessary.

3. LOCATING AND MOUNTING BASE PLATES

3.01 Equipment should be located in the trunk space with regard to:

- (1) Ease and economy of installation.
- (2) Accessibility for maintenance.
- (3) Freedom from damage if heavy equipment is carried in the trunk.
- (4) Leaving trunk space as free as practicable for luggage, etc.
- (5) Protection against damage to cables.

3.02 Among the possible locations, two have been found particularly suitable:

- (1) Units side by side in flat part of trunk (as shown in Fig. 10 of C57.201) with cable connections toward the center of the trunk or toward the rear of the car. If the units are mounted with the connections close to the trunk lid, heavy equipment is not likely to be piled on to the cables or connections.
- (2) Units end to end on raised portion of trunk over the rear axle and differential (as shown in Fig. 11 of C57.201, except with units against the trunk front wall).

3.03 The use of shelves or brackets for mounting the equipment adds to the cost of the installation. For this reason, shelves should not be used indiscriminately but should be confined to those installations where they are necessary or where over-all economies will result. In some vehicles, the gasoline tank is mounted just under the floor of the trunk; in this case, it may be desirable to use a shelf fastened to the floor of the trunk on either side of the tank so as to avoid danger of puncturing the tank when drilling for the mounting screws, or to avoid danger of floor vibration driving a mounting screw point through the tank subsequent to completion of the installation.

3.04 When a shelf is not used, and the trunk floor is irregular, washers or blocks may be used to "build up" under the base plates to permit firm mounting. These build-ups do not normally show; if they appear conspicuous, they may be painted with black paint.

3.05 Build-ups may be accomplished as follows:

<u>Approximate Size</u>	<u>Material Used</u>
Up to 1/2"	Common washers.
1/2" to 1-5/8"	Wood blocks (up to flat side of 2" x 4").
Over 1-5/8"	Strap iron such as guard brace from a cable terminal. Sawed-off section of pipe.

3.06 Base plates may be fastened to the vehicle with No. 14 self-tapping sheet metal screws of suitable length. Care must be taken to insure that "blind" drilling for these screws does not puncture the gas tank or injure the car wiring and that there is sufficient clearance between point of tightened self-tapping metal screws and the top of the gas tank so that normal trunk floor vibration will not cause screws to puncture the gas tank at some future date. Base plates fastened in this manner will not normally be loosened by vibration; if they are, bolts should be substituted. When the base plates are fastened directly to the trunk floor, it is not necessary to ground them to the car frame with grounding braid.

3.07 If a shelf is required, it is generally preferable to make it up out of 3/4" pine boards (or plywood if greater width is needed) to fit the particular vehicle. The shelf may be fastened to the car with self-tapping screws and the base plates attached with wood screws. If this is done, the base plates should be grounded to the car body with grounding braid.

4. RUNNING POWER AND CONTROL CABLES

4.01 The method of running the control cables should be determined with regard to the ease and economy of installation, protection for the cables, ease of removal without damage to the cables and neatness of the installation. Since the average life of an installation is only about 18 months, particular attention should be given to ease of installation and removal and care in removal of cables so that these expensive items may be reused. This suggests use of the simplest routes and methods of attachment that will provide the necessary security and protection required. Clamps should be held to a

minimum; where needed, they should be attached by self-tapping screws.

4.02 The two general methods of running the power and control cables which appear to be most satisfactory are:

(a) Underneath the car using one 1-1/4" or 1-1/2" non-metallic conduit. This run is made on the battery side of the chassis away from the car exhaust in such a position as not to be damaged by high road obstructions particularly in low-slung vehicles. The conduit is lashed about once every 12-18 inches to the frame or other non-moving parts of the car using regular lashing wire.

(b) Inside the car body and underneath the floor mats next to the raised portion of the floor over the drive shaft. In most cars, the rise over the drive shaft provides a considerable space in the angle between the rise and the flat portion of the floor. The control cables may be run down one side of the "hump" and the power cables on the other, if desired. If necessary the cables may be protected at points of potential wear by means of tape or flexible loom, the cables being fastened or left loose as may appear most desirable considering the contour of the floor and other physical aspects that may be involved.

(c) Do not cut off excess cable lengths but coil and tape the excess and push aside, since this extra length may be needed when the cable is removed for reuse on other stations.

4.03 Occasionally, it is possible to run the cables through an overhead channel from the fire wall to the trunk. Experience has indicated that in this type of a run the cables may be damaged by contact with sharp metal edges in the channel. Furthermore, on newer cars, this channel is generally small and excessive time is required to install and remove the cables. Experience has also indicated that the cable insulation is generally damaged when cables are removed thereby preventing their reuse. This type of run is therefore not recommended.

5. INSTALLATION OF FUSE BLOCK AND CONNECTION TO BATTERY

5.01 When working in the engine compartment, be sure to cover the fender and other appropriate parts with a protection cloth before starting work operations.

5.02 A suitable location for the fuse block is selected on the engine side of the fire wall where it is most convenient for terminating the power cable. After the fuse block

is mounted, connection is generally made to the starter terminal in preference to the battery due to increased corrosion activity at the battery terminals. Also, there is the possibility of the mobile telephone power cable being left off by garage or service station people when the battery is changed. When accessibility of the starter terminal warrants, however, connect directly to the battery. The fuse should be left out of the block until the installation is complete.

6. MOUNTING THE CONTROL UNIT

6.01 The control unit is mounted under the dash in the manner specified in C57.201 and the control cable is connected to the unit. If the control cable has been run under the floor mat, the control unit end will be accessible without further drilling. If the cable has been run underneath the car, it will be necessary to locate or drill a suitable hole through the fire wall. Protect the cable with a grommet or tape at the point where it passes through the fire wall.

6.02 Cable clamps secured by self-tapping screws should be used to attach the cable firmly to the vehicle at the control unit end in order to minimize the possibility of future trouble due to vibration or mechanical interference.

7. MOUNTING THE ANTENNA

7.01 A top-mounted antenna (KS-15510 or equivalent) should be located along the longitudinal center line of the top, the exact point being determined with regard to the dome light, roof struts, and ease of running the coaxial line. It is permissible to locate the antenna somewhat behind the center of the top and still obtain good radiation provided it is at least the length of the whip away from the edge of the rear window or the sharp drop-off of the top. Always protect the top with a cloth as shown in Figs. 17 and 18 on Page 15 before starting drilling operations.

7.02 When mounting a KS-15510 antenna, drill a small hole first, then enlarge to the proper size. If the top is of thin metal, it may be necessary to drill the hole a fraction of an inch smaller than required and enlarge it to exact size with a milling or reaming tool.

7.03 If possible, feed the antenna cable directly back into the trunk. If this cannot be done after one or two attempts, loosen the window frame and feed the cable down into the car. Then fish from this point into the trunk.

7.04 For soft top convertibles which have a rather long horizontal surface on the trunk cover before the vertical drop-off or slope the KS-15510 antenna may be used. For optimum performance in such installations, make sure that there will be a reasonably flat and horizontal surface on the trunk cover, at least 18 inches in all directions. Where these conditions do not exist, the Communication Products Cos. G-12910 vehicular coaxial antenna or the Ward Products SPPB-71 antenna may be used. Chromium bumper mounts may be obtained for the G-12910 antenna by ordering "(Quantity) Assembly, Bumper Mount, Cat. No. 35-509."

7.05 The SPPB-71 antenna is available for those urban or private system installations where it is desired to conceal the fact that the vehicle is equipped with two-way radio service. This antenna is designed for front cowl mounting and resembles the typical broadcast receiver antenna. It may also be mounted in the rear near the side of the trunk compartment. It is somewhat directional, however, and may not permit good transmission in marginal areas. Due to its sharp tuning characteristics in the 25-50 mc region it is not suitable for two-frequency operation.

7.06 It may be necessary to use a coaxial vehicular antenna for a few special installations such as on trucks and boats. When this is necessary, the antenna should be attached as simply as possible, preferably using cable clamps and self-tapping screws.

8. MOUNTING AND TESTING EQUIPMENT

8.01 Upon completion of the cable run and mounting of control unit and antenna, install the equipment units on the base plates and insert the fuse in the fuse block.

8.02 The equipment is tested in accordance with standard instructions to insure that it is working properly. Over-all tests of receiver and transmitter performance should be made at this time.

8.03 Before the unit leaves the installation center, make a check to insure that the transmitter identification card (F.C.C. Form 452C) is properly filled out and attached to either the control unit or cable near the transmitter.

TYPICAL MOBILE TELEPHONE INSTALLATION

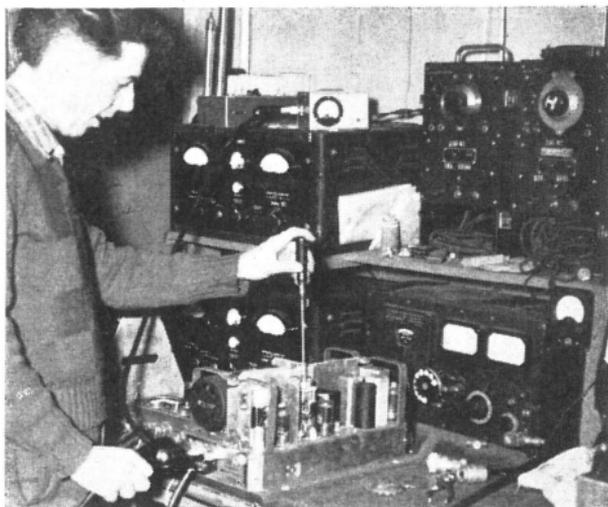


Fig. 1—Equipment is bench-tested prior to installation

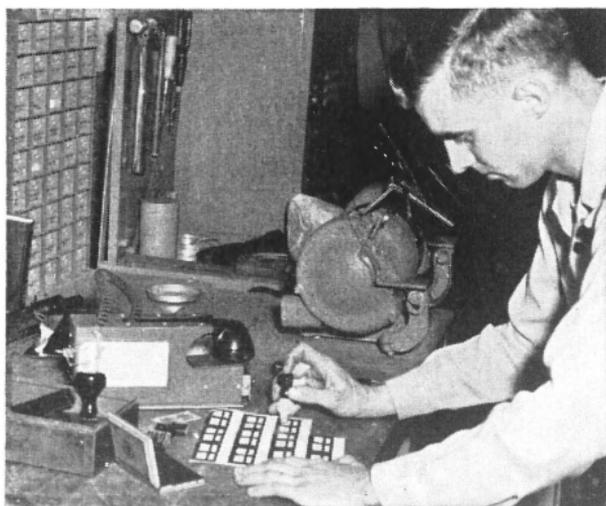


Fig. 2—Designation strip and F.C.C. Form 452-C are filled out

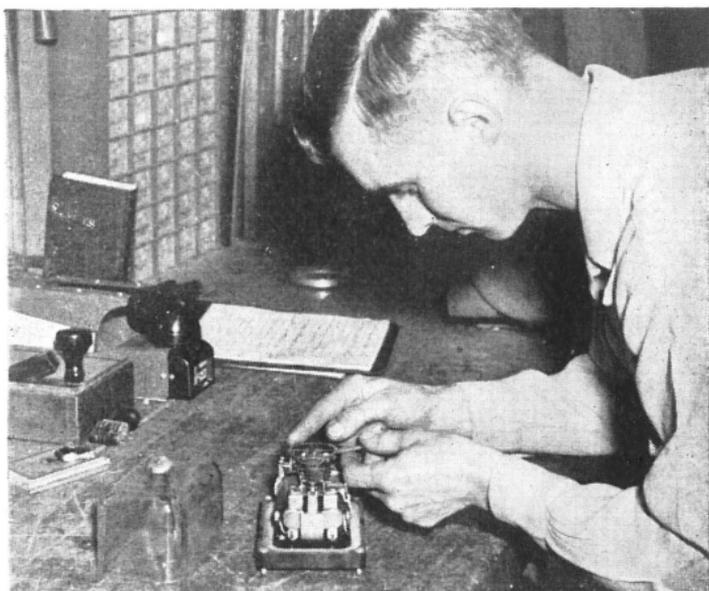


Fig. 3—The selector is set up for the customer's number



Fig. 4—Base plate locations are determined



Fig. 5—After “Gas Tank Inspection” holes are drilled for fastening the base plates



Fig. 6—The plates are fastened down with self-tapping sheet-metal screws

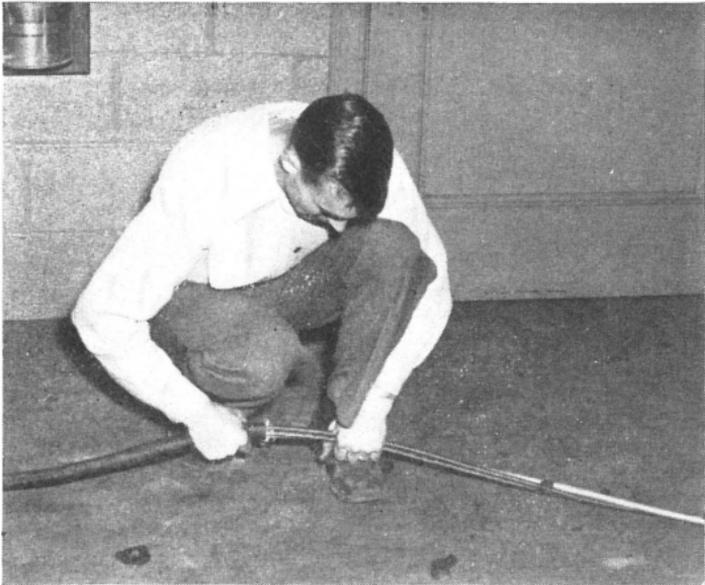


Fig. 7—Control and power cables are pushed through non-metallic conduit after ends are taped



Fig. 8—An exit hole from the trunk compartment is drilled for the cables



Fig. 9—The cables, in the conduit, are pushed through the exit hole

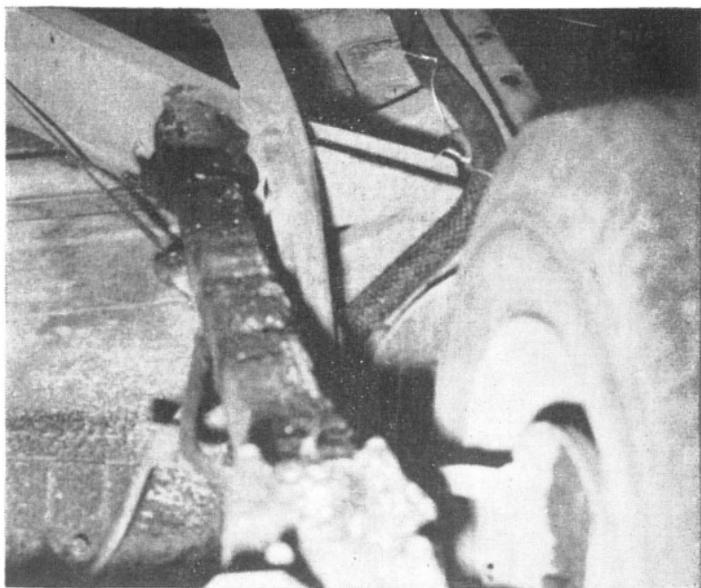


Fig. 10—The cables are fastened underneath the chassis by means of wire ties

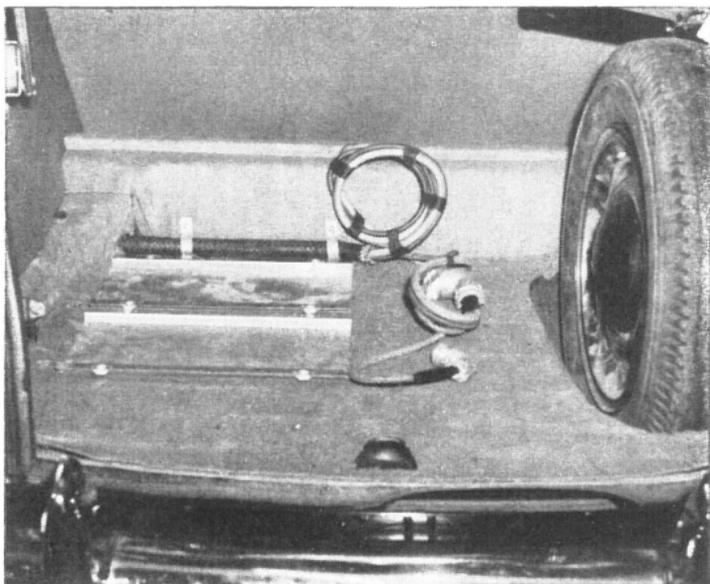


Fig. 11—Cable clamps are placed, excess cable taped, and the cable and plugs arranged for connection to the equipment

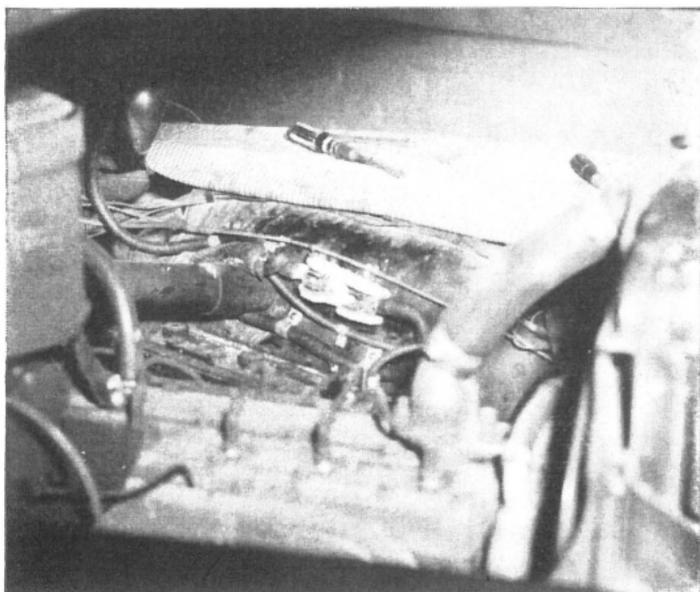


Fig. 12—The fuse block is mounted in the motor space, and connected up

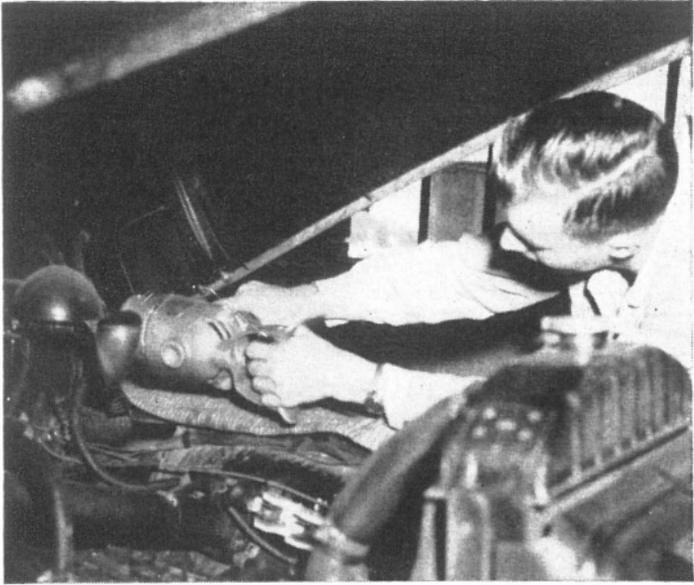


Fig. 13—A hole is drilled through the fire-wall for the control cable (which now has been pulled up into the motor space)



Fig. 14—The control unit bracket is mounted

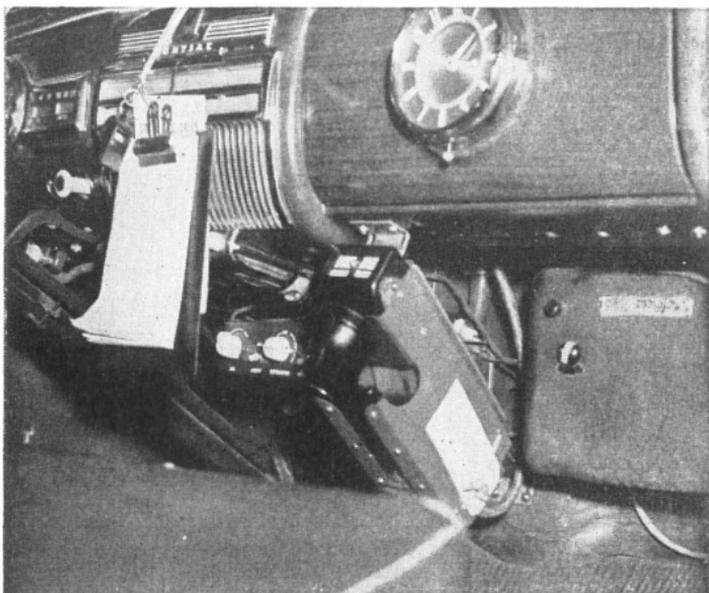


Fig. 15—The control unit is connected and installed

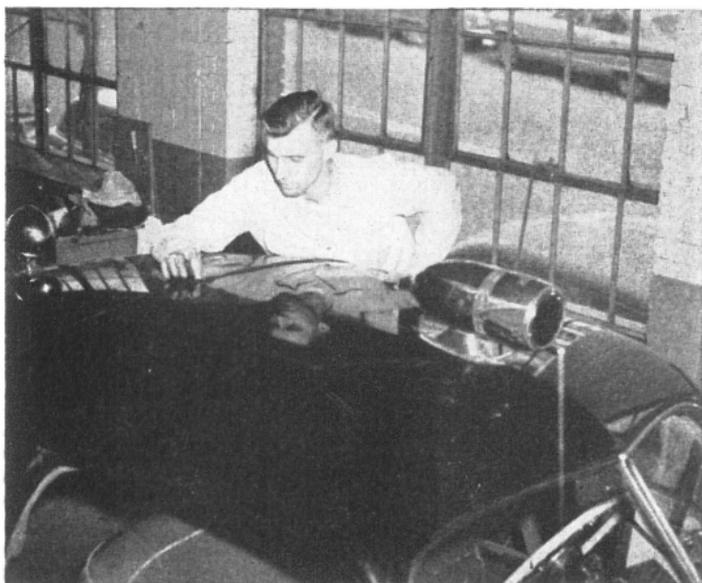


Fig. 16—The longitudinal center of the roof is determined with a string and a satisfactory position along this line determined for the antenna

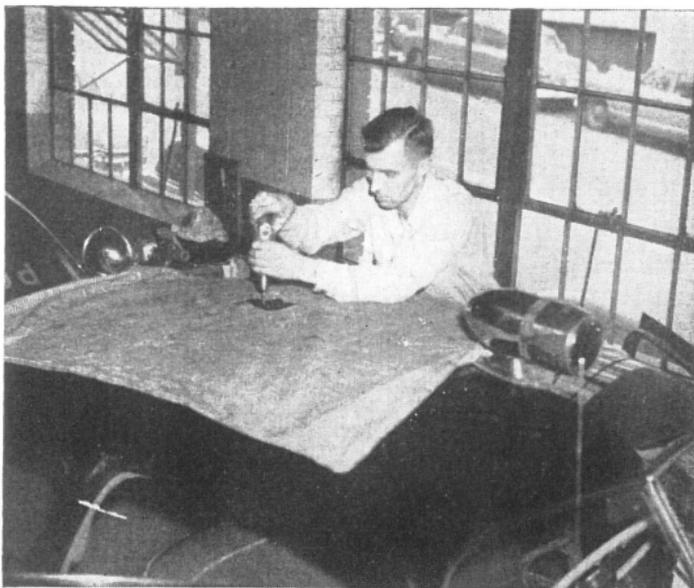


Fig. 17—After a cloth has been placed on the roof, a small hole is drilled

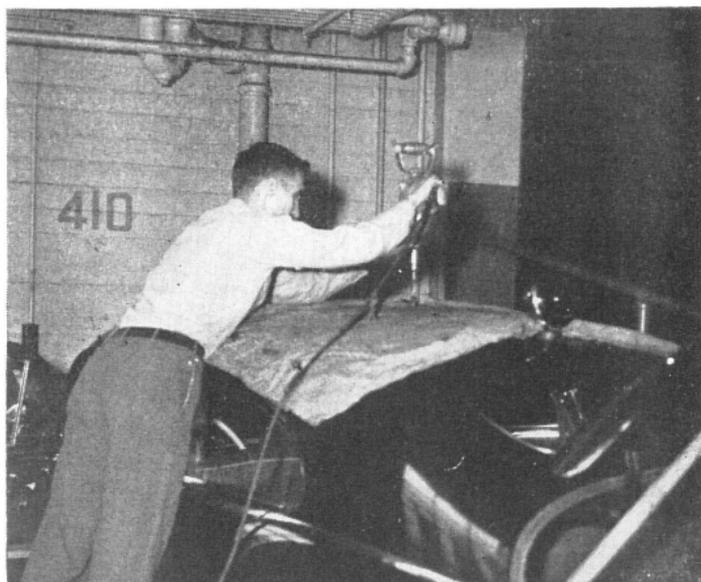


Fig. 18—The hole is made larger to accommodate the antenna

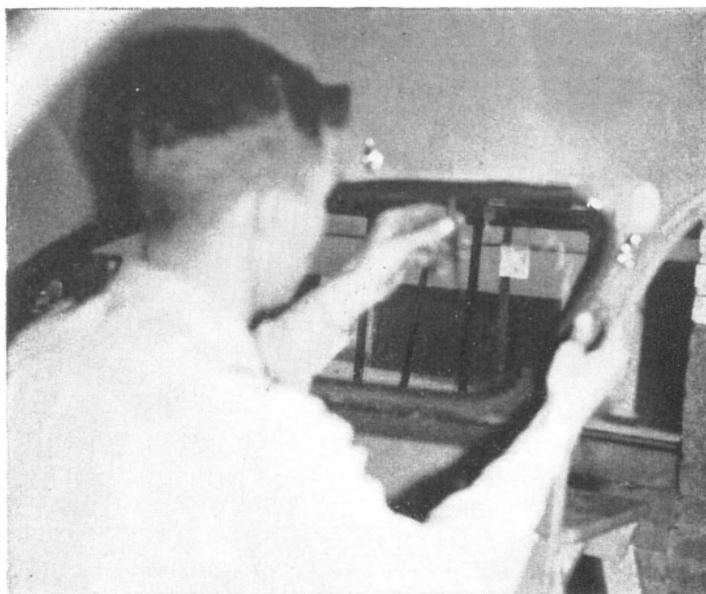


Fig. 19—The window frame is loosened to facilitate fishing antenna cable. (This is unnecessary if fish tape can be run directly from antenna hole into trunk)

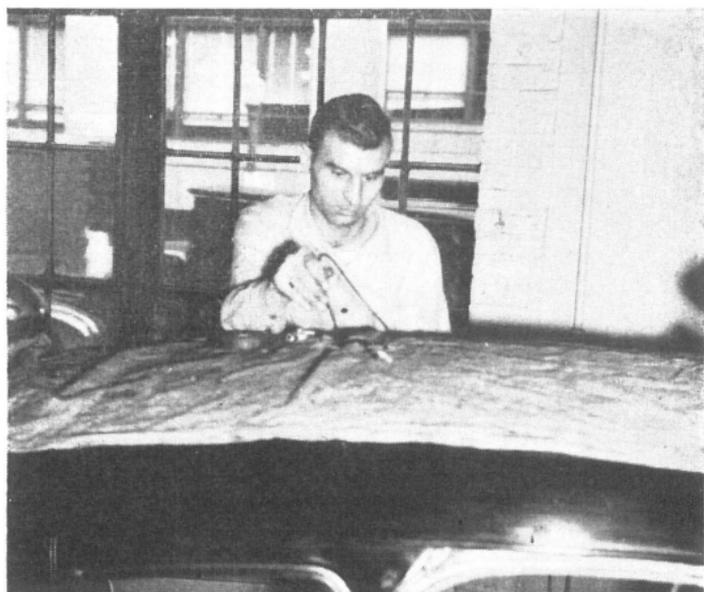


Fig. 20—Antenna cable is fished down into the car

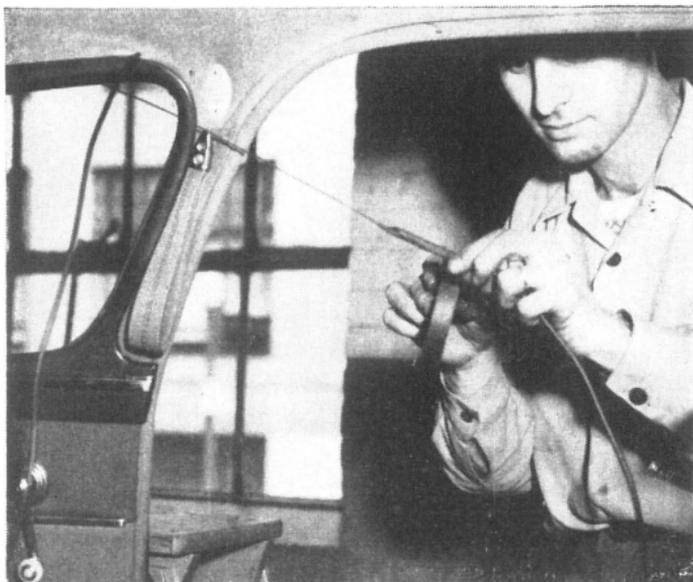


Fig. 21—The fishline is pushed back into trunk and antenna cable is taped to it

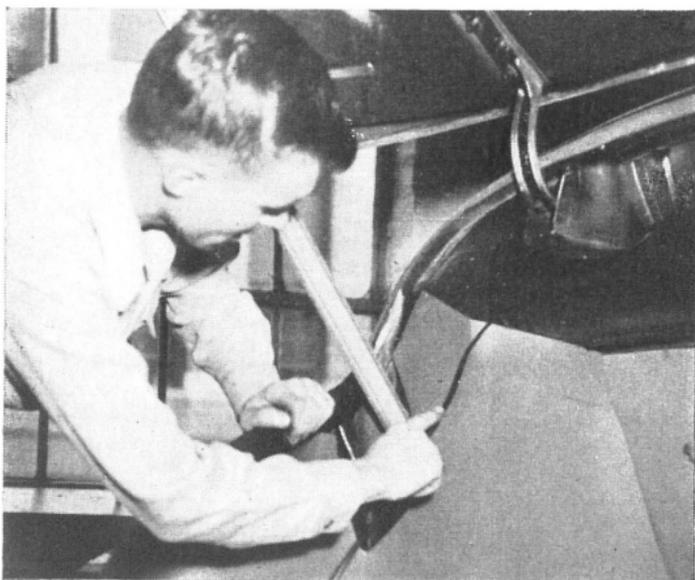


Fig. 22—The antenna cable is pulled back into the trunk compartment

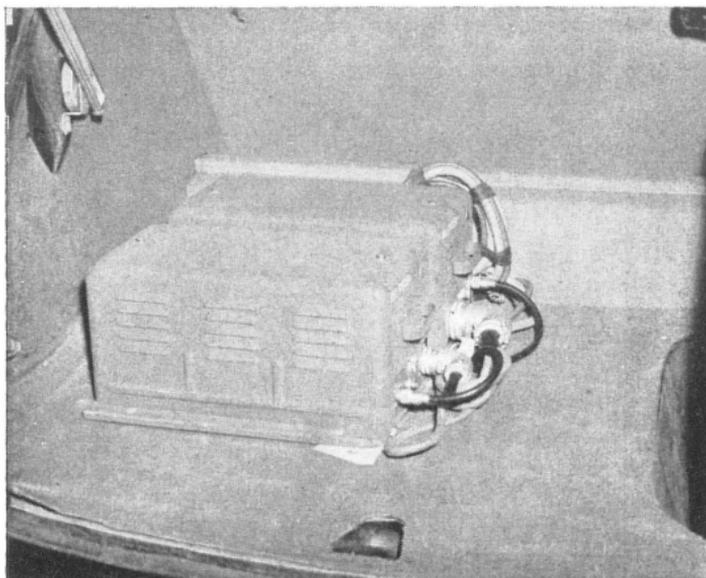


Fig. 23—Equipment is mounted, connected and tested