



Subchassis is fitted in cabinet as above. Avoid shorting out the wiring, components or the points.

reaches the surface and is propagated along the interface between earth and air. A range of more than 100 miles is possible if sufficient power is applied.

Audio Transmission

Underground wireless telephone is something else again. No RF is employed. Instead, *audio* signals are pumped into the earth and travel through soil and water in all directions. The earth then becomes a giant *sheet resistance* and conducts the audio signal just as would a sheet of metal foil (although offering much more resistance). Receiving probes put down almost anywhere in this sheet pick up the signal.

The Terraquaphone's range depends on many variables. They include the homogeneity of land or water in terms of resistance, moisture content (a Terraquaphone test in Arizona where the soil is quite dry achieved only 600 feet), absence of rocks (insulators), and the amount of dissolved salts in a body of water.

The Secret is Spacing

Since the sheet resistance concept is probably new to most EI readers, a word of explanation is in order. The two probes stuck into the ground will measure a certain resistance between them,

as we mentioned before. The total resistance is actually composed of the resistance directly between the two probes shunted by an infinite number of other resistances, growing larger and larger as the resistance paths between the probes become more circuitous. Since the signal fed into the earth is developed across these resistances, it is necessary to place the pickup probes so they include as much signal path between them as possible. In general, the two sets of probes should be parallel to each other. The spacing of each pair is determined by the distance between the two Terraquaphones. The farther apart they are, the greater the range. Other things being equal, usable two-way communications usually is possible over a distance 30 to 50 times the probe spacing. A spacing of 30 feet then would mean a 1,500-foot range.

If probe spacing, sheet resistivity and orientation remain the same, signal strength diminishes as the square of the distance. Thus, doubling the distance between two Terraquaphones cuts signal strength to one-fourth its original level.

Since it is impossible to know exactly what sort of conductivity there is in any specific area, a certain amount of experimentation is required to achieve optimum results.

For a boat installation, the Terraquaphone's probes should be mounted on the bow and stern of the craft. Two boats wishing to communicate should be parallel to each other, with beam facing beam. —

