propagation, nor the design of antennas. Summarizing briefly, the higher the elevation of the site, the greater the range, particularly when the height of the antenna above ground is low. Also, the higher the antenna above ground, the greater the range, particularly when the site is not elevated. (Height of the antenna above ground becomes less important when the station is located atop a hill.)

The range also is dependent upon the same factors at the other end of the circuit, as well as the character of the intervening terrain. It also is dependent upon the transmitter power, receiver sensitivity, and antenna gain of the other station. Because some stations employ more transmitter power and many have less receiver sensitivity, it is possible to hear more stations than can be worked. The very high sensitivity of the receiver in the COMMUNICATOR tends to make this condition the more noticeable.

To obtain the best possible performance from the COMMUNICATOR at a given site, a good antenna is important. For general coverage fixed-station work with vertical polarization, a ground-plane type antenna designed for 2 meter operation is recommended. A good directional array such as the Gonset "Twin-Six" dual Yagi array will greatly increase the range and reduce QRM problems. This array may be orientated for either vertical or horizontal polarization.

When using coax, RG-8/U or RG-11/U is recommended in preference to the smaller types in order to minimize line loss. If the antenna is located more than about 120 feet from the COMMUNICATOR, a worthwhile reduction in line loss can realized by the use of 450 ohm open wire "Gonset Line" stocked by jobbers for TV use. Enough RG-11/U is used to get the line outside the building, then a balun consisting of a half wave phase inverter section of coax (27 inches long) is used to convert to the open line. Four spacers then are removed and the open line is tapered from 1 inch down to ½ inch at the point where it attaches to the two ends of the inner conductor in the balun loop. The tapered section must be kept pulled taut. If the antenna is designed for connection to coax, a similar balun may be employed at the antenna end.

For mobile work a 19 inch car top whip will provide good performance as a ground-plane type antenna. (152-174 Mc. commercial whips are a little short for best results.) If the car does not have a metal top, a coaxial "sleeve" type antenna my be used, but this antenna is quite frequency sensitive and will not give maximum performance over the entire 2 meter band.

For portable use, emergency work or casual mobile operation, the quarter wave whip furnished with the COMMUNICATOR may be used by screwing it directly into the coax fitting on the unit.

Surprisingly good results have been obtained using the COMMUNICATOR in this manner with it setting on the front seat of a metal-top sedan, though of course much better results will be obtained with a regular mobile type antenna connected via coaxial line.

In some cases an ordinary side-cowl auto radio antenna will give nearly as good results as a car top whip. The antenna is extended to approximately 58 inches (3/4 wave) and undesirable out-of-phase radiation from the lower quarter wave is partially suppressed by proximity to the windshield support post. Best results with this arrangement require that the lead-in be of the type using polyethylene insulation. (Most of the better quality auto radio antennas employ this type lead in.) An extension cable of RG-59/U or TV-59 using the proper fittings will permit use of the auto radio antenna either for its intended purpose or for occasional "picnic" use of the COMMUNICATOR as a mobile unit.

When working mobile, it will be noticed that a "flutter" is apparent on both the transmitted and received signal, particularly when the signal is weak. The a-v-c in the COMMUNICATOR receiver has been designed with a fast time constant which minimizes the effect when the received signal is moderately strong, but it will still occur to some extent, particularly when travelling at high speed and the "flutter" rate is high. When working mobile-to-mobile the effect is of course accentuated, as the amount of flutter is thereby compounded by the transmitter flutter being superimposed upon the receiver flutter (assuming both vehicles are in motion).

This "flutter" is typical of two meter mobile operation and is not caused by any peculiar characteristic of the COMMUNICATOR.

RECEIVER AUDIO SYSTEM

The second detector, noise clipper, and audio system of the COMMUNICATOR receiver have been designed for maximum intelligibility of weak signals. Because the individual characteristics have been engineered to complement each other as an overall system, often it will be found that it is possible to copy weak signals which are not intelligible on a receiver having a comparable measured noise figure (which is the figure of merit commonly employed as a yardstick of receiver sensitivity). This is true even in a quiet location where a noise clipper ordinarily would not be needed for suppression of impulse type noise.

It is recommended that the noise clipper be left on all the time, the in-out switch being provided primarily to assist in aligning the r-f and i-f trimmers on background noise when a signal generator is not available.

TRANSMITTER AUDIO SYSTEM

It will be noted that a Class A single-ended beam tetrode is used in preference to a Class B modulator. The reason for this is that when "square wave" audio is involved, as when heavy speech clipping is employed at high modulation percentages, the former type modulator compares very favorably with the latter, with the advantage of more constant plate current drain and elimination of a driver stage and its transformer. It also facilitates designing the modulator for integral speech clipping, making the incorporation of a separate speech clipper unnecessary, as well as adjustment thereof.

The speech system of the COMMUNICATOR is designed so that to obtain maximum practical speech clipping one need only talk closer to or louder into the microphone, up to the point where the maximum tolerable distortion is obtained. No splatter will occur. No adjustment of a clipping level control is required.

With voice waveforms and sufficient audio input to produce heavy speech clipping, the percentage modulation is held to approximately 85 or 90 per cent, and under no conditions is it possible to exceed this modulation percentage. This means that "splatter" from negative peak clipping is avoided, and no critical adjustments are involved. Assuming that a noise clipper