is employed on the receiver at the other end of the circuit when the received signal is weak, upward modulation exceeding approximately 50 or 60 per cent is clipped at the receiver and therefore is of questionable utility anyhow.

For those who insist upon heavier modulation, it can be accomplished by the simple process of substituting a 5881 for the 6V6-GT. No circuit changes are required. The carrier power will be slightly less than when a 6V6-GT is used (about 10 per cent) due to the heavier plate current drain upon the power supply. Also, the "transmit" hours life of the vibrator (and to a slight extent the 6X4 rectificers) will be reduced, though not seriously if the transmit periods are kept short. When the unit is used mostly or exclusively on 6 volts, the substitution is not recommended.

The audio characteristics of the transmitter, from microphone input through the modulator, have been engineered to provide maximum utilization of the carrier power from the standpoint of intelligibility under unfavorable receiving conditions.

TVI AND OTHER INTERFERENCE

When operated in an area in which television signals are of sufficient strength to provide a completely snow-free picture, ordinarily no difficulty with TVI will be encountered if the COMMUNICATOR and antenna are both located a reasonable distance from the TV set and TV antenna respectively. Use of coaxial line with the COMMUNICATOR will tend to minimize TVI. In some cases mild TVI may be experienced on channel 10, due to the frequency relationship. Often moving frequency to another part of the 2 meter band will cure the trouble.

Spurious radiations from the COMMUNICATOR are minimized through the use of a double tuned output circuit. The loaded Q of the antenna coupling circuit is sufficient to provide considerable rejection of frequencies removed from the carrier by as little as 8 Mc. Spurious radiations are further minimized through the use of high Q tunable tank circuits in the multiplier chain, rather than the "broad band" slug tuned tank circuits sometimes employed.

In spite of these precautions a few microwatts of power will be radiated on some frequencies which are a multiple other than 18 of the crystal frequency. In some instances this infinitesimal amount of power will be sufficient to interfere with nearby taxicab, police, etc. receiving installations designed for reception of mobile units, particularly if one or both antennas are well elevated. In other cases the interference to other services may be due to receiver image response.

Such interference can be avoided simply by choosing crystal frequencies within the 2 meter band which do not interfere. Usually such services will be glad to co-operate to the extent of giving a telephone check as to which crystal frequencies interfere and which do not.

USING 9 MC CRYSTALS

In some cases interference to another service, such as TVI on channel 10, can be dodged more easily by altering the oscillator-multiplier to employ a 9 Mc. crystal and a multiplication factor of 16, rather than an 8 Mc. crystal and multiplication factor of 18. When using 9 Mc. crystals it is necessary to alter the first tuned circuit as follows:

Remove 10 mmf. fixed padder C-69 across first tuned circuit. Remove coil and replace with 8½ turns of Barker & Williamson No. 3003 "Miniductor", resulting in a coil having 4 less turns.

Tune as with 8 Mc. crystals except be sure that first condenser peaks at approximately half capacity, as it is possible to get a "peak" on the tuning eye (wrong frequency) at minimum capacity and again at full capacity. Least QRM to channel 10 usually will be obtained with 9 Mc. crystals when operating between approximately 144.8 and 145 Mc.

USING 24 MC CRYSTALS

Because of their lower price, better availability, and greater stability, the COMMUNICATOR was designed for use with 8 Mc. fundamental crystals. However, by making minor modifications to the oscillator circuit, 24 Mc. overtone type crystals may be employed, with a considerable reduction in potential interference to other services operating receivers close by.

Modification consists of removing the 10 mmfd. condenser C-1 which is connected from 6CL6 grid to cathode, and shunting the 50 mmfd. condenser C-2 from cathode to ground with .001 ufd. disc ceramic.

The unit is tuned as before except that the "Osc-Tripler" tuning condenser will be found to "kick out" suddenly on one side of the setting giving maximum eye closure, because what was previously the 24 Mc. tripler tank circuit becomes the tank circuit for the tuned-plate oscillator. To make sure the crystal always starts without sluggishness when switching from receive to transmit, the tuning condenser should be tuned past the point where the oscillator kicks out, then backed up slowly until the oscillator kicks in again.

Early production COMMUNICATORS have a recessed crystal socket which prohibits use with holders employed with some overtone crystals. The two spacer bushings between the crystal socket and panel should be removed to bring the holder up flush with the panel. This change also allows the crystal to run cooler.

NOTE: When the oscillator is modified to use a 24 Mc. overtone crystal the "crystal spotter" function must be sacrificed.

IMAGE RESPONSE

In a unit as compact as the COMMUNICATOR and in the interest of avoiding excessive circuit complexity, some compromises of necessity must be made. Use of a 6 Mc. i-f system permits better selectivity with single conversion than would be obtained with a higher frequency i-f system. However, use of the 6 Mc. i-f aggravates the problem of images, and occasional reception of image signals of considerable amplitude may be expected in areas where the aircraft frequencies between 132 and 136 Mc. are actively employed.

RECEIVER SELECTIVITY

The selectivity of the receiver is about as great as can be utilized with a receiver having a tunable high frequency oscillator and designed for mobile use (with accompanying wide variations in heater supply voltage during operation). Also, it is about as great as can be utilized successfully for "net" operation without resorting to very close tolerance transmitter crystals. Reception of transmitters using overtone crystals prone to drift would also be complicated by greater selectivity. The bandwidth of the i-f system of the COMMUNICATOR is a compromise between these factors and QRM considerations. Use of four i-f transformers re-