Eleven to Ten

Converting 27MHz CB sets to the 10 metre amateur band

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To the comparative old timers; that is the early G8_____s and later G3_____s the present multitude of black, grey and blue boxes must often cause nostalgic reflections back to the good old days of their amateur beginnings. In the late 60s and early 70s the normal way of getting on the air was either by rolling your own or modifying government surplus gear or ex-commercial equipment. The early days of two-metre expansion (when 144MHz was opened to the Class B brigade) meant that the majority of rigs were ex-PMR, Pye, Storno, Cossor etc. Nowadays an all singing and dancing rig capable of working at least six repeaters via a linear and multi-element beam seems an essential requirement of the newly licensed G6_____, and the state of two-metre operating confirms this fact. Many operators must have longings for the good old days and those who have moved on to Class A have such an escape open to them, namely mobile FM on 29MHz.

With the advent of CB, equipment capable of easy modification to 29MHz is available cheaply. Some of the transceivers around are of a reasonably high standard, giving scope for modification to good performance at very low cost. Cheap mobile aerials are also readily available.

40 channels

A typical block diagram of a 40 channel (10kHz spacing) CB set would be as in **Fig. 1.** For simplicity an AM set is chosen. Details on converting an AM set to FM (with a performance typical of 145MHz gear) will be given later.

The basic transmitter and receiver circuits are fairly conventional in that a low power PA is driven by a simple driver, both stages being modulated. The predriver stage is excited by a frequency synthesiser which also includes a safety circuit. This cuts the transmitter off if the synthesiser goes out of lock. The synthesiser consists of a voltage controlled oscillator operating (in this case) at the output frequency minus the first IF (generally 10.695MHz). The synthesiser is locked to a multiple of 10kHz, derived from 10.240MHz crystal. This 10.240MHz oscillator circuit also drives the second receiver mixer, giving a second IF of 455kHz. The VCO frequency is mixed with the 10.695MHz oscillator to transmit on the same spot as the RX input frequency. Suitable T/R switching is provided and the rig operates like just about any other transceiver. The main difference between the conventional amateur arrangement and the one discussed above is that the injection frequency to the first RX mixer is lower than the received channel, whereas it is normal amateur practice to operate receiver oscillators on the high side of the signal frequency. The variety of CB equipment is extremely wide but certain basic similarities are found. The major variations are in the frequency synthesisers. Since our aim is to transfer the operating frequency to a point some 2MHz higher we will consider the synthesiser stages first.

Basically, there are three main techniques used in synthesiser circuitry in CB sets although certain other oddball circuits exist. The three methods are as follows:

a) To prevent any form of conversion to additional frequencies a form of Read Only Memory is incorporated in the PLL whch is dedicated to giving only the forty channels recognised by the FCC in America. Typical devices are the (see Appendix 1) 7137, 7130 and 7131. These devices are invariably operated by programmed input lines usually by a 6 bit code.

b) Another form of pre-programmed device uses a so called 'random' code which is a variation of the 7 bit BCD code, eg. 9106 & 9109.

c) The major proportion of the sets used phase locked loop circuits controlled by a straight binary input and these are comparatively simple to re-tune. A brief explanation of binary arithmetic is given in Appendix 4.

Dedicated v binary

In type (a) & (b) the device is

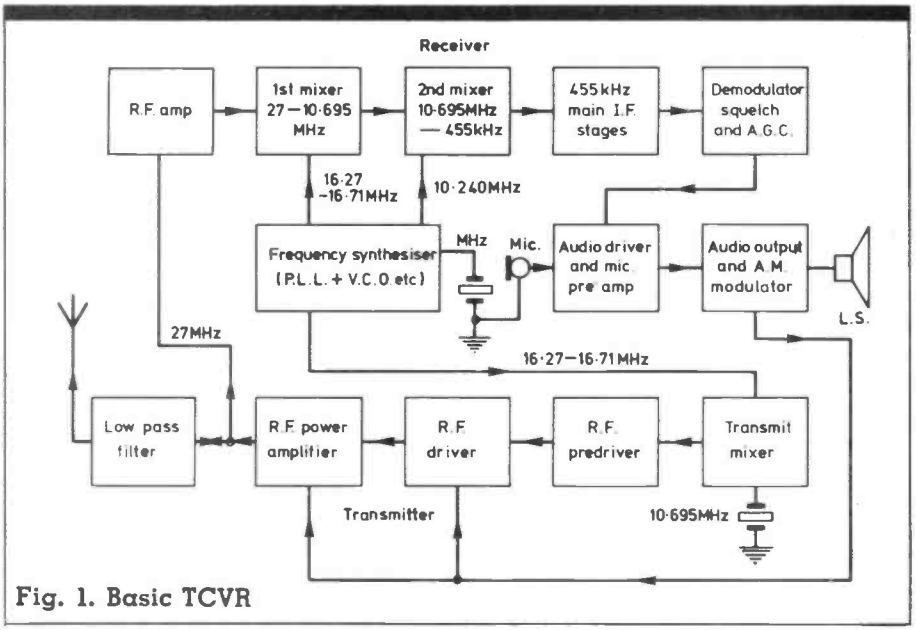

Fig. 1. Basic TCVR