ARMSTRONG MULTIPLIER WITH WIDEBAND FM OUTPUT:-

→ The FM signal at the o/p of combining network has very small modulation index & hence it cannot produce wideband FM output.

→ If the S/g at the o/p of combining n/w is multiplied in frequency, then wideband FM is obtained with very high transmit carrier frequency. Such carrier frequency is beyond the commercial FM broadcast band.

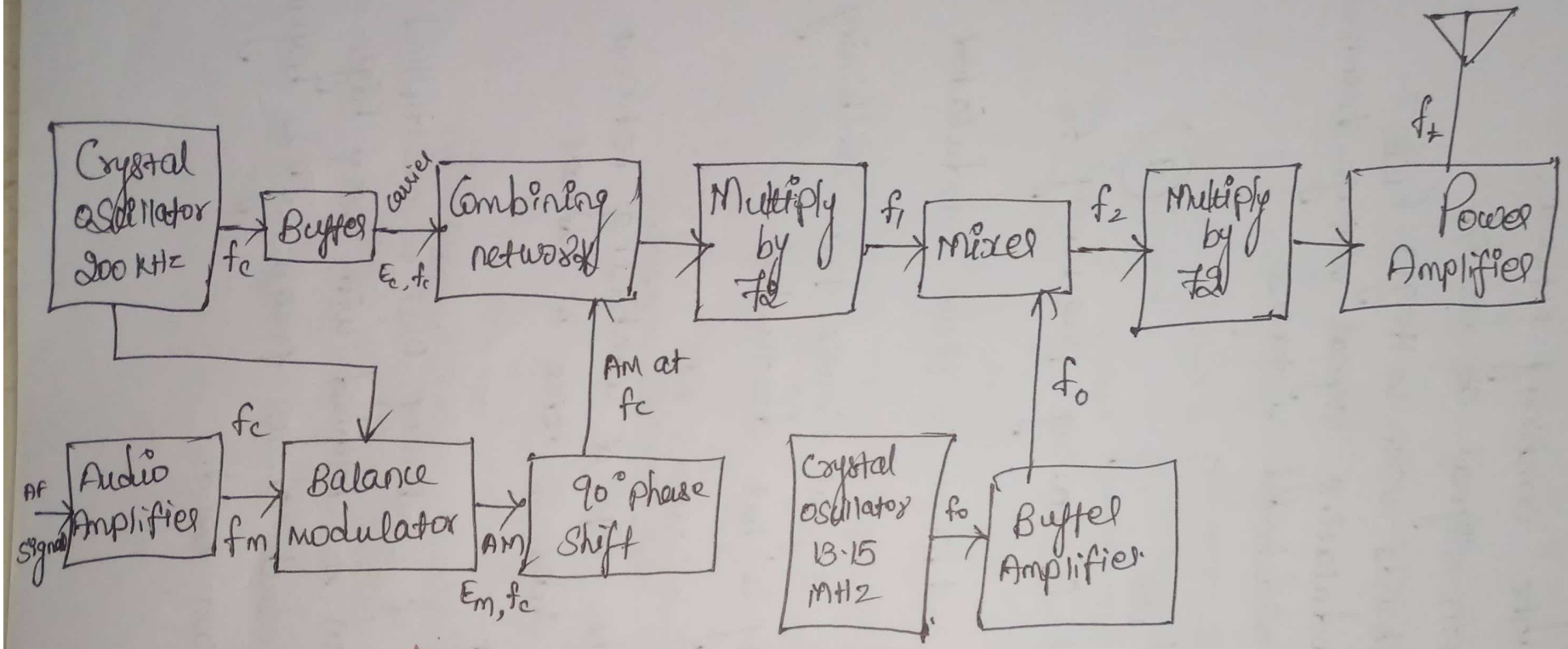

Fig: Block diagram of Armstrong AM transmitter.

→ The Signal at the o/p of combining n/w is multiplied by 72.

→ Hence, we get carrier frequency

$$f_1 = 72 \times 200 \text{ KHz} = 14.4 \text{ MHz}$$

Modulation index = $72 \times m$

Frequency deviation, $\Delta f = 72 \times m f_m$

→ The problem is solved by using proper combination of frequency multipliers & mixers after combining network.

→ This signal from 1st multiplier is mixed with a crystal controlled frequency of 13.15 MHz.

→ It produces the difference frequency,

$f_2 = 14.4\ MHz - 13.15\ MHz$

$= 1.25\ MHz$.

→ Note that mixing does not affect modulation index and frequency deviation.

→ The o/p signal from the mixer is again multiplied by 72 and passed through power amplifier and given to antenna.

→ Thus the signal at the o/p of power amplifier has transmit carrier frequency

$f_t = 1.25\ MHz \times 72$

$= 90\ MHz = 450 \times 200\ KHz$

Modulation index $= 72 \times (72 \times m) = 5184 \times m$

Frequency deviation, $\Delta f = 72 \times (72 \times m f_m) = 5184 \times m f_m$

→ In the above equation :

1. Carrier frequency is multiplied by a factor of 450. But the modulation index & frequency deviation are multiplied by a factor of 5184.

2. Multiplying & mixing operations generate wideband FM signal with carrier frequency in the commercial FM broadcast band.