Channels & Bandpass

Adjacent channel interference
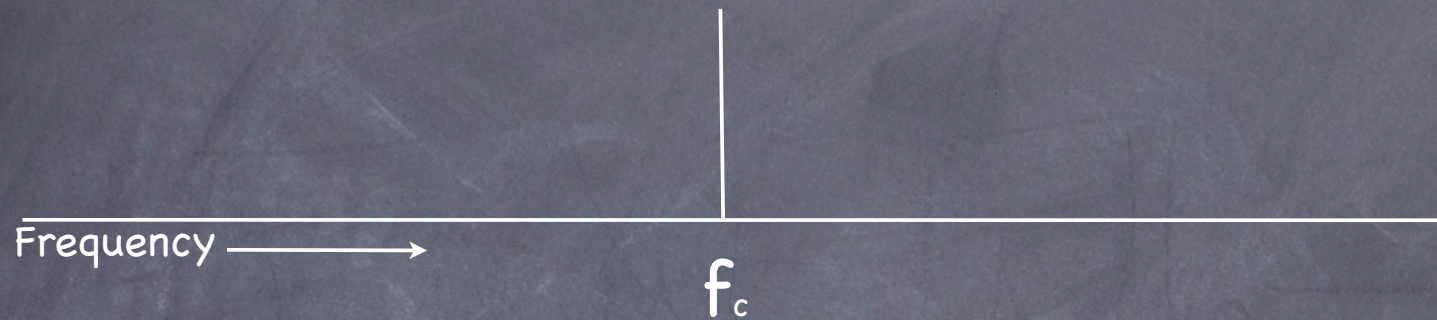
Channels

- Early FM communications used ±15 kHz deviation

- Channels were separated by 30 kHz

- Now we use ±5 kHz deviation and 15 kHz channels

  - BUT: know about FM vs WFM vs NFM terms

- We gained 2X channels using ±5 kHz deviation
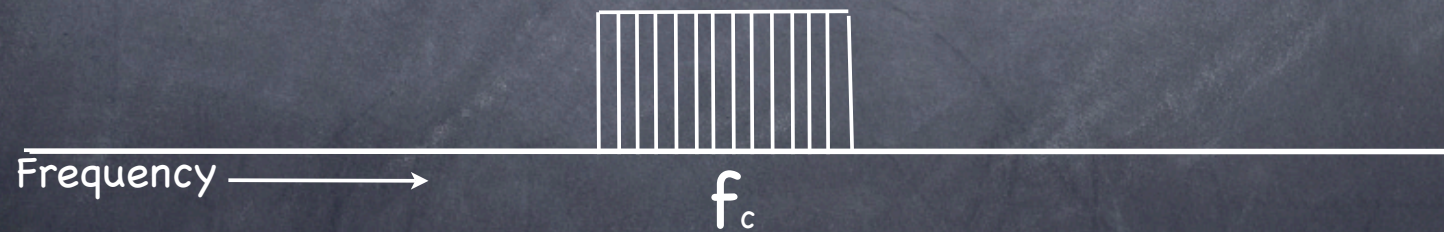
Transmitted Spectrum

Current ±5 kHz deviation typical V/UHF radio

Frequency modulation (FM) encodes information, such as a voice, into the RF signal by deviating the transmission frequency about a known reference frequency, the carrier frequency.
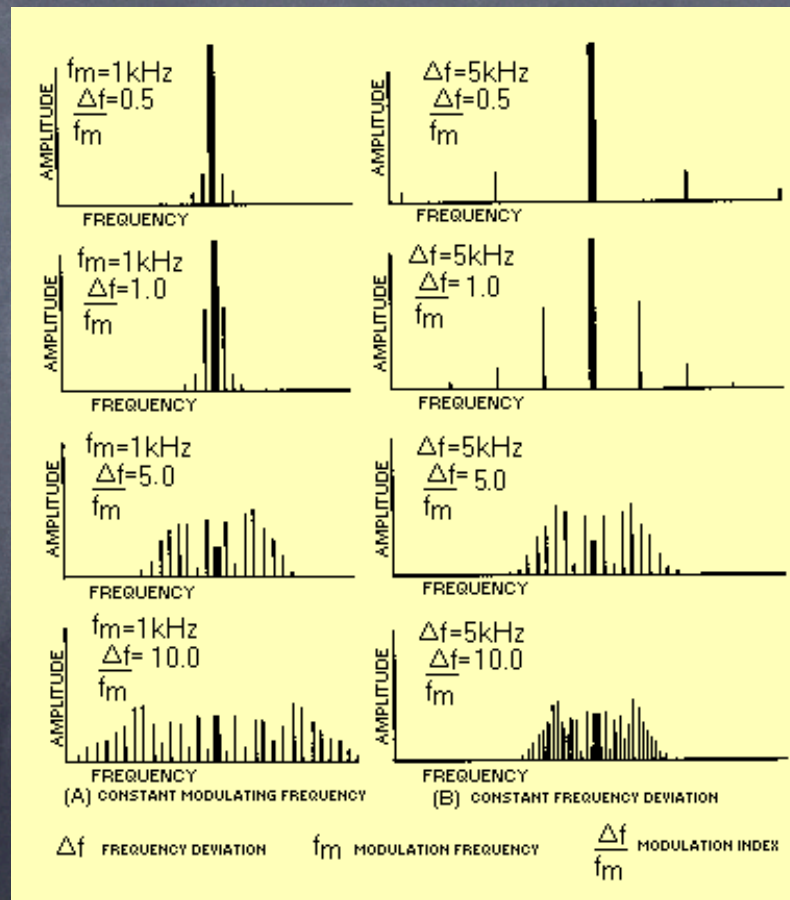
Carrier with no modulation

Frequency ⟶

f_c

Carrier with FM voice modulation

Frequency ⟶
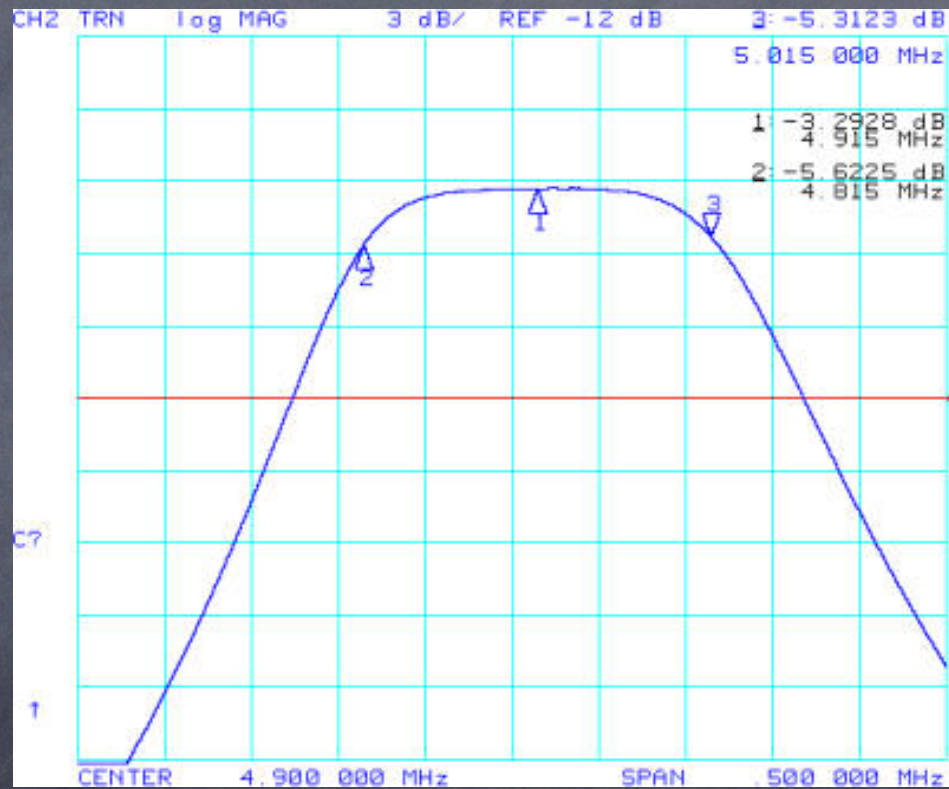
f_c

Transmitted Spectrum
(visualization)

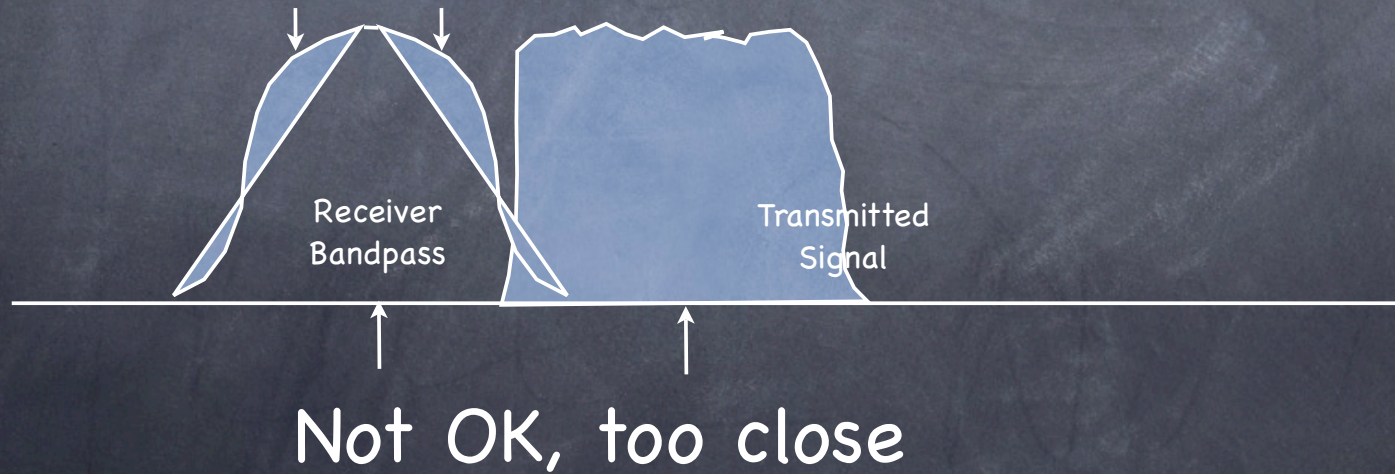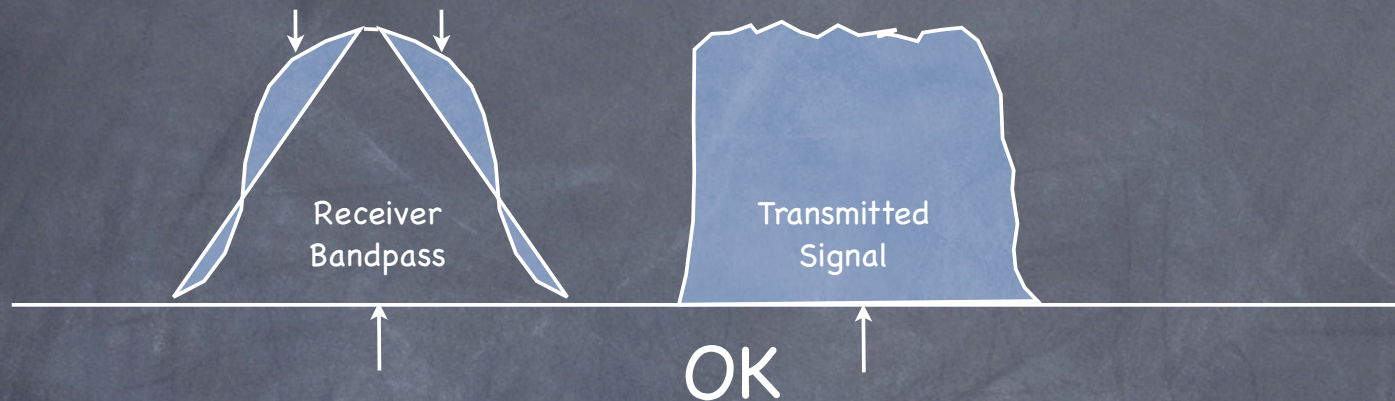# Receiver Bandpass

Adjacent Channel

- How close can you get? Need to protect

- Must consider the passband vs transmitted BW

- And allow for some "engineering tolerance"

    - and for some transmitter variation

Practical Numbers

- For V/UHF communications radios using ±5 kHz deviation

  - including repeaters

- Bandpass must be wide enough to accept the full spectrum of desired signal

- Transmitters must be adjusted to fit the receiver bandpass "comfortably" ... not too wide and not too narrow (low audio level)

- Channels are currently set for 15 kHz spacing (or 20 kHz in some regions)

  - sometimes in crowded areas you'll see 12.5 kHz spacing.

- 5 kHz is clearly too close, but distance also matters (weaker signal)

- Result: interference to desired signal & erroneous activation of repeater

Viewing the Problem

Receiver Bandpass

Transmitted Signal

OK

Receiver Bandpass

Transmitted Signal

Not OK, too close

Current 2 meter Band Plan
ARRL – 15 kHz channels

144.00-144.05   EME (CW)
144.05-144.10   General CW and weak signals
144.10-144.20   EME and weak-signal SSB
144.200   National calling frequency SSB
144.200-144.275   General SSB operation
144.275-144.300   Propagation beacons
144.30-144.50   New OSCAR sub-band
144.50-144.60   Linear translator inputs
144.60-144.90   FM repeater inputs
144.90-145.10   Weak signal and FM simplex (145.01,03,05,07,09 are widely used for packet)
145.10-145.20   Linear translator outputs
145.20-145.50   FM repeater outputs
145.50-145.80   Miscellaneous and experimental modes
145.80-146.00   OSCAR sub-band

146.01-146.37   Repeater inputs
146.40-146.58   Simplex
146.52   National Simplex Calling Frequency
146.61-146.97   Repeater outputs
147.00-147.39   Repeater outputs
147.42-147.57   Simplex
147.60-147.99   Repeater inputs

Notes:
The frequency 146.40 MHz is used in some areas as a repeater input.
This band plan has been proposed by the ARRL VHF-UHF Advisory Committee.

To find a clear spectrum, use your radio's scan function.
Instead of channel scan, try band scan and limit the range.
Let it collect results to memory, then evaluate for open sections.
Most all two meter radios have this ability.

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Nearby Repeaters

From Repeater Book

NOTEs:
5 kHz (as we use in FM) is too wide for HF
DSTAR is narrower and can be used on HF
    *and can also fit between standard FM repeaters

147.300 – WR4MG
146.850 – WA4ORT
146.670 – WM4B
147.015 – WX4EMA
145.340 – WX4EMA – DSTAR
145.370 – WB4JOE
145.430 – AA4RI
146.895 – KD4UTQ
147.060 – WA4DDI
146.775 – WA4DDI
145.290 – KK4CCA
145.110 – WA4ORT (off the air)
146.805 – K4PDQ

References

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