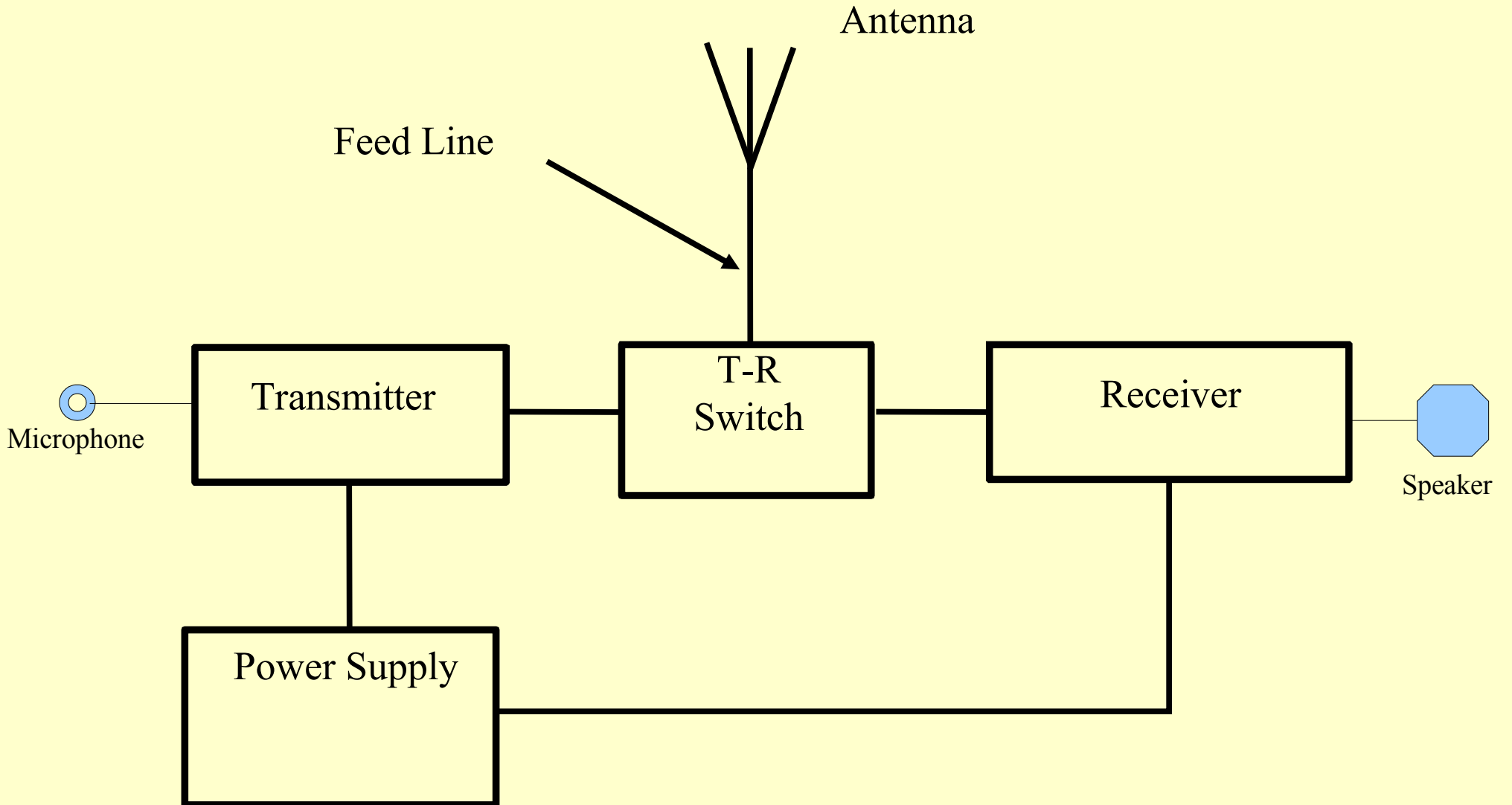


A Basic Station



Low-Pass Filter



A low-pass filter goes between your transmitter and antenna. It removes harmonic radiation from your signals.

High-Pass Filter

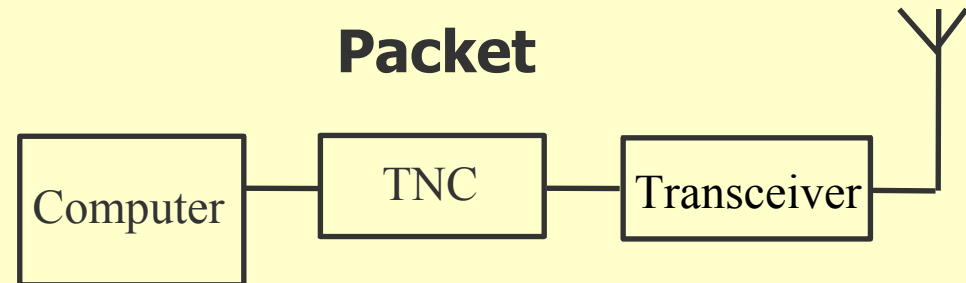


A high-pass filter goes between a TV and antenna.

It is the first step in trying to prevent RF overload from an amateur HF station transmission.

Data Communications - Packet

- ◆ Packet uses a terminal node controller (TNC) to interface a computer and transceiver.
- ◆ A TNC breaks the data to be transmitted into packets which includes error checking information.
- ◆ On VHF an FM transceiver may be used for packet.



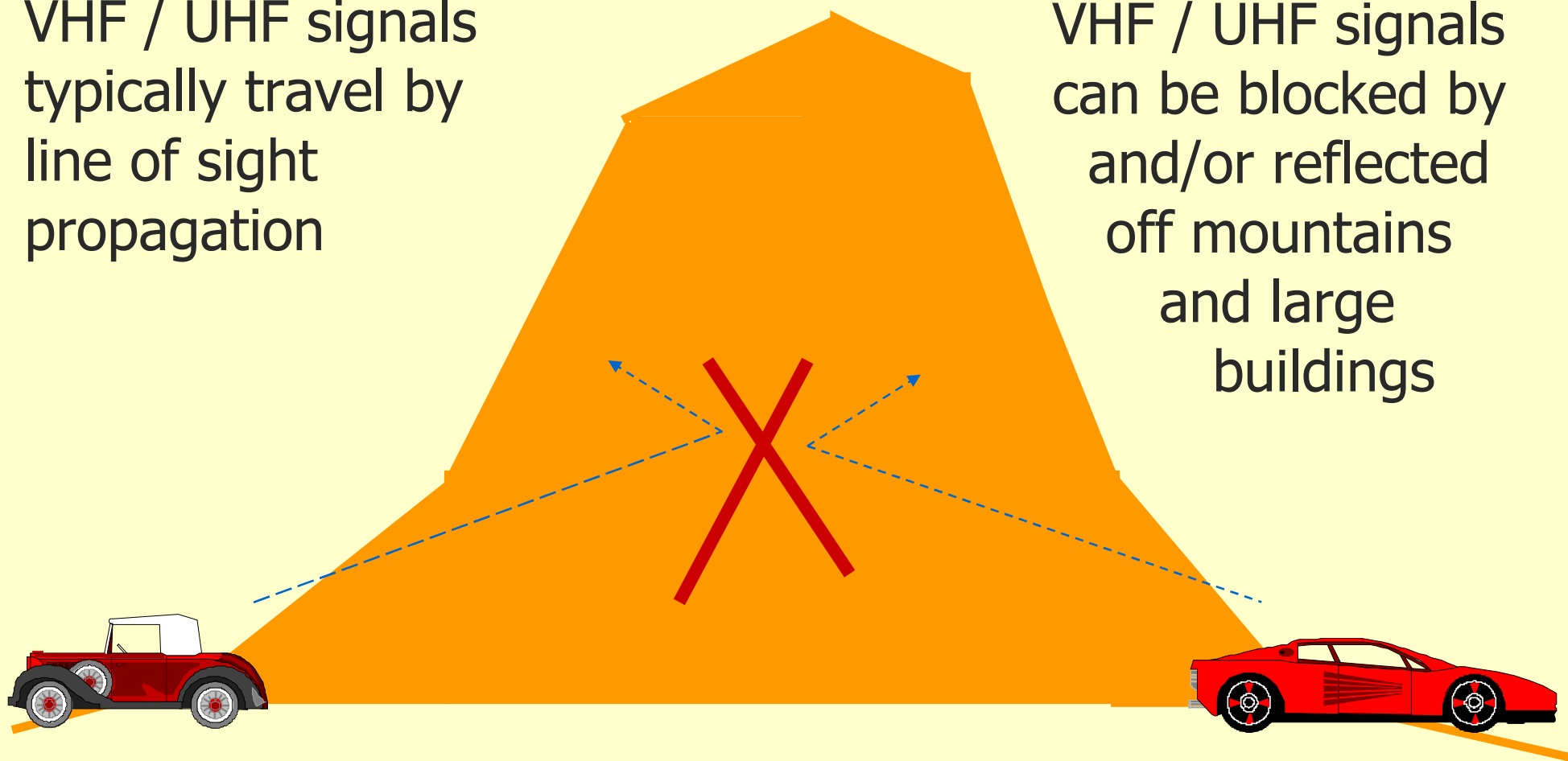
CTCSS Tone Frequencies

67.0	107.2	173.8
69.3	110.9	179.9
71.9	114.8	186.2
74.4	118.8	192.8
77.0	123.0	203.5
79.7	127.3	206.5
82.5	131.8	210.7
85.4	136.5	218.1
88.5	141.3	225.7
91.5	146.2	229.1
94.8	151.4	233.6
97.4	156.7	241.8
100.0	162.2	250.3
103.5	167.9	254.1

VHF/UHF Propagation

VHF / UHF signals typically travel by line of sight propagation

VHF / UHF signals can be blocked by and/or reflected off mountains and large buildings



Repeaters

- ◆ A repeater is an amateur station that simultaneously receives a signal on one frequency and retransmits it on a different frequency.
- ◆ Why? A powerful repeater transmitter located at altitude greatly increases the usable range of mobile and hand-held stations.
- ◆ A repeater that retransmits the signal on a different band is called a “crossband repeater”.

Repeaters



- ◆ In order to use a repeater, you must first know the repeater's input (or output) frequency and offset.
- ◆ The offset, is the difference in the repeater's receive and transmit frequencies.
- ◆ On 2 meters the usual offset is 600 KHz and on 70 cm it is 5.0 MHz.
- ◆ Most modern radios will set the offset for you automatically.

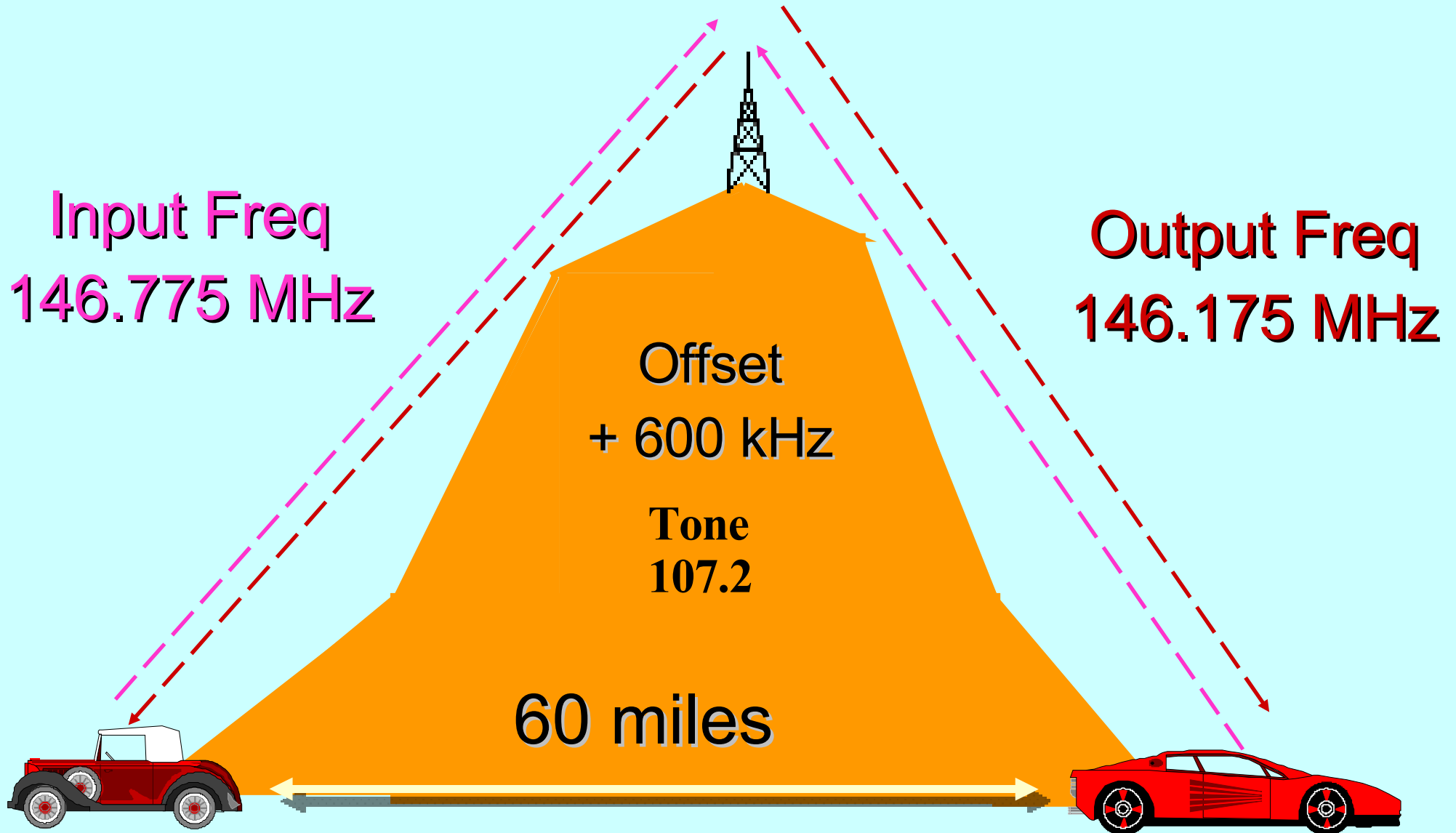
Repeater Access

- ◆ Continuous Tone Coded Squelch System (CTCSS) tones are sub-audible tones added to an FM carrier which may cause a receiver to accept the signal.
- ◆ Some repeater systems require CTCSS tones to access.
- ◆ If someone tells you a “tone” is needed to access a repeater then you must use a CTCSS tone to operate it.

CTCSS Tone Frequencies

67.0	107.2	173.8
69.3	110.9	179.9
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Repeater Operation



Repeater Operation

- ◆ A repeater has a time-out timer to limit the amount of time the repeater can transmit continuously.
- ◆ At the end of each transmission through a repeater, you will typically hear a “courtesy tone” (a short beep, or series of beeps).
- ◆ When you hear the courtesy tone the time-out timer has been reset and you can begin your transmission.
- ◆ A repeater may identify itself with automatic Morse code tones or a voice announcement.

Using a Repeater

- ◆ To determine if a repeater is already being used ask if the frequency is in use, then give your call sign. (In reality, no one does this.)
- ◆ To break into a conversation simply give your call sign during a break between transmissions.
- ◆ Pause briefly between transmissions to listen for anyone wanting to break in.

Using a Repeater

- ◆ Keep transmissions brief in case someone with an emergency needs to use the repeater.
- ◆ Support the repeater owner with a donation or club membership.
- ◆ If you would like to use a “closed” repeater system contact the control operator and ask to join.

Repeater Coordination

- ◆ When a new repeater is planned to be installed in an area the frequency of the new repeater must be assigned a frequency by a “frequency coordinator”.
- ◆ When two coordinated repeaters interfere with one another it is up to both repeater licensees to resolve the interference.

Simplex Operation

- ◆ Simplex operation is simply transmitting & receiving on the same frequency.
- ◆ Simplex operation is encouraged when two stations are close enough to communicate without using a repeater.
- ◆ You can check if simplex operation is possible by listening on the repeater's input frequency.

Doppler Shift

(ignore mathematics)

Movement of the source alters the wavelength and the received frequency of sound, even though source frequency and wave velocity are unchanged.

Stationary source of frequency f_{source}

$$f_{\text{source}} = \frac{v}{\lambda}$$

Sound velocity v

Source approaching: $f'' = \frac{v}{\lambda''} = \frac{v}{v - v_s} f_{\text{source}}$
 In period T , source moves closer by $v_s T$, so

Receding source:

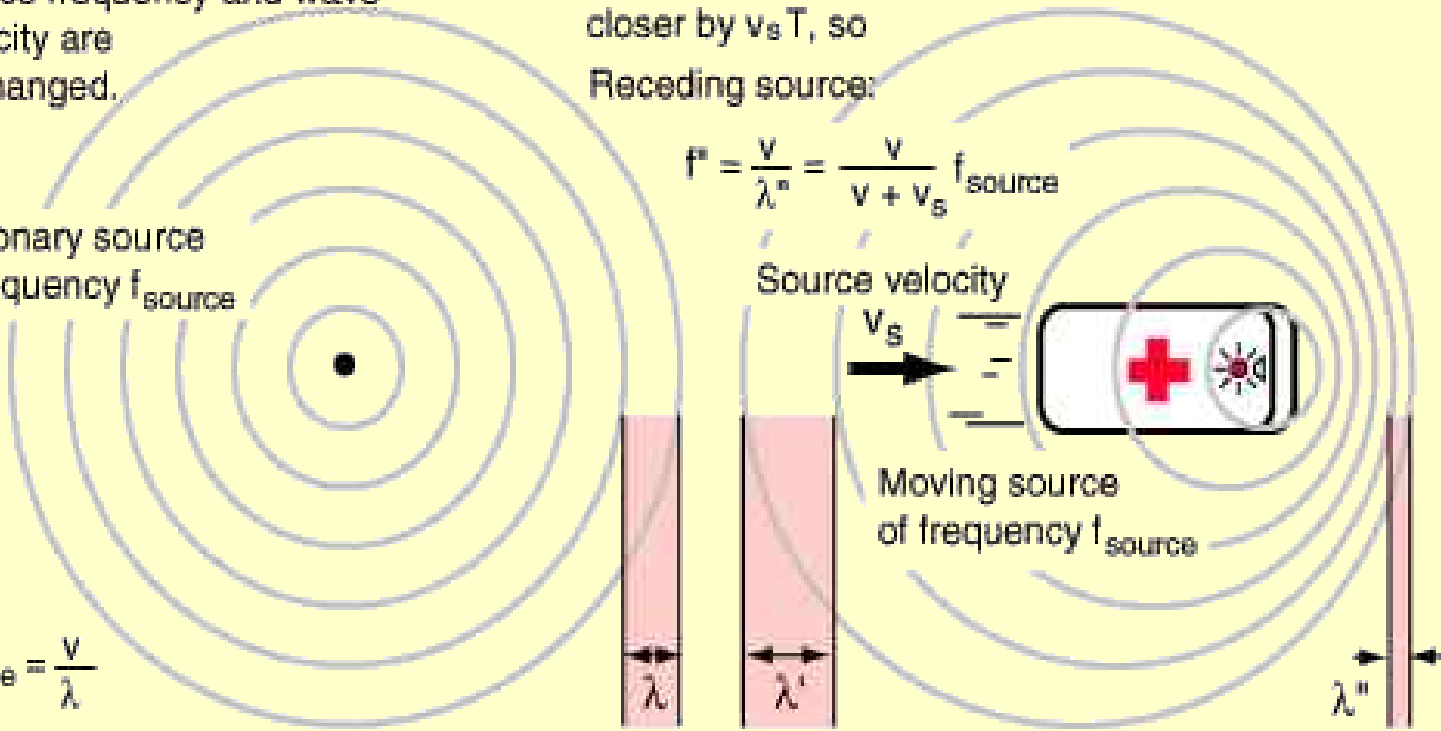
$$f'' = \frac{v}{\lambda''} = \frac{v}{v + v_s} f_{\text{source}}$$

Source velocity v_s



Moving source of frequency f_{source}

$$\lambda = vT \quad \lambda' = (v + v_s)T \quad \lambda'' = (v - v_s)T$$



Telephone RF filter

