

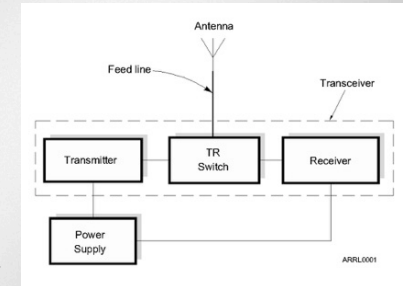
# Technician License Course Chapter 3

## Lesson Plan Module 7 – Types of Radio Circuits



# The Basic Transceiver

- Combination of “transmitter” and “receiver”
  - Abbreviated “XCVR” (X = trans)
  - Antenna switched between transmitter and receiver by the TR switch



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# Transmit/Receive (TR) Switch

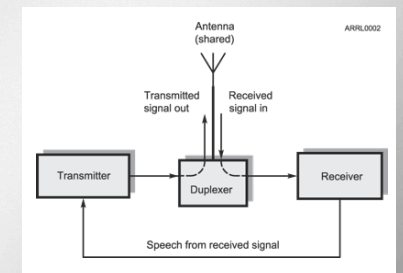
- TR switch allows a single antenna to be switched to the transmitter when sending and to the receiver when receiving.
  - In a transceiver, the TR switch is inside the unit and operates automatically.
  - Transceivers cannot transmit and receive at the same time like a repeater.



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# The Basic Repeater

- Relays signals from low-power stations over a wide area
  - Simultaneously re-transmits received signal on the same band
  - TR switch replaced with duplexer which allows antenna to be shared without switching



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## What Happens During Radio Communication? (Review)

- Transmitting (sending a signal):
  - Information (voice, data, video, commands, etc.) is converted to electronic form.
  - The information in electronic form is added to a radio wave.
  - The radio wave carrying the information is sent from the station antenna into space.



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## What Happens During Radio Communication? (Review)

- Receiving:
  - The radio wave carrying the information is intercepted by the receiving station's antenna.
  - The receiver extracts the information from the received wave.
  - The information is then presented to the user in a format that can be understood (sound, picture, words on a computer screen, response to a command, etc.).



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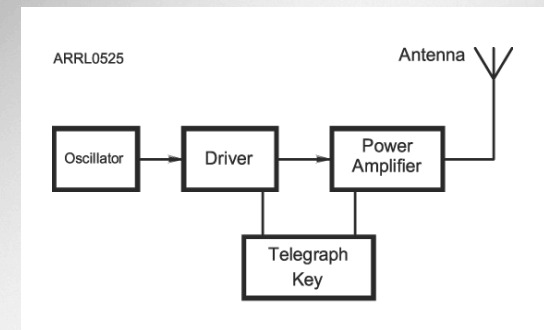
## What Happens During Radio Communication? (Review)

- Adding and extracting the information can be simple or complex.
- This makes ham radio fun...learning all about how radios work.
- Don't be intimidated. You will be required to only know the basics, but you can learn as much about the "art and science" of radio as you want.



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## Simple Morse (CW) Transmitter Block Diagram

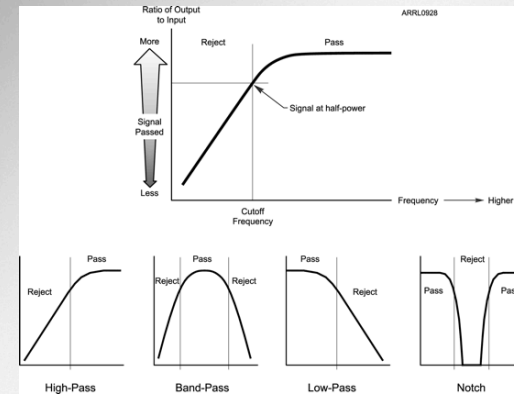


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# Filters

- Circuits that act on signals differently according to their frequency.
- Filters can reject, enhance, or modify signals.

# Types of Filters



# Adding Information - Modulation

- When we add some information to the radio wave (the *carrier*), we *modulate* the wave.
  - Morse code (CW), speech, data
- Different modulation techniques vary different properties of the wave to add the information:
  - Amplitude, frequency, or phase
- Modulator and demodulator circuits
  - Modulators add information to an RF signal, demodulators recover the information

# Changing Frequency - Mixers

- Signal frequencies can be changed by combining with another signal, called *mixing*
  - Also referred to as *heterodyning*
- Two signals are combined in a *mixer*
  - Generates *mixing product* signals
  - Sum and difference of the input signals
  - Shifts frequency by adding or subtracting
- Different than a *multiplier* which multiplies a signal's frequency by some integer, usually 2 or 3

## Sensitivity and Selectivity

- Two essential tasks for a receiver:
  - Hear a signal and hear only one signal
- *Sensitivity* is a measure of how well the receiver can detect weak signals
- *Selectivity* is a measure of the receiver's ability to discriminate between signals
- *Preamplifiers* make a receiver more sensitive
  - Preamplifiers added between antenna and receiver



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## Transverter

- Short for “transceiving converter” (XVTR)
- Converts a transceiver to operate on another band
  - Usually to a higher frequency
  - External mixers shift frequency
- Typical examples
  - HF SSB/CW at 28 MHz converted to/from 222 MHz
  - VHF SSB/CW at 144 MHz converted to/from 10 GHz



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