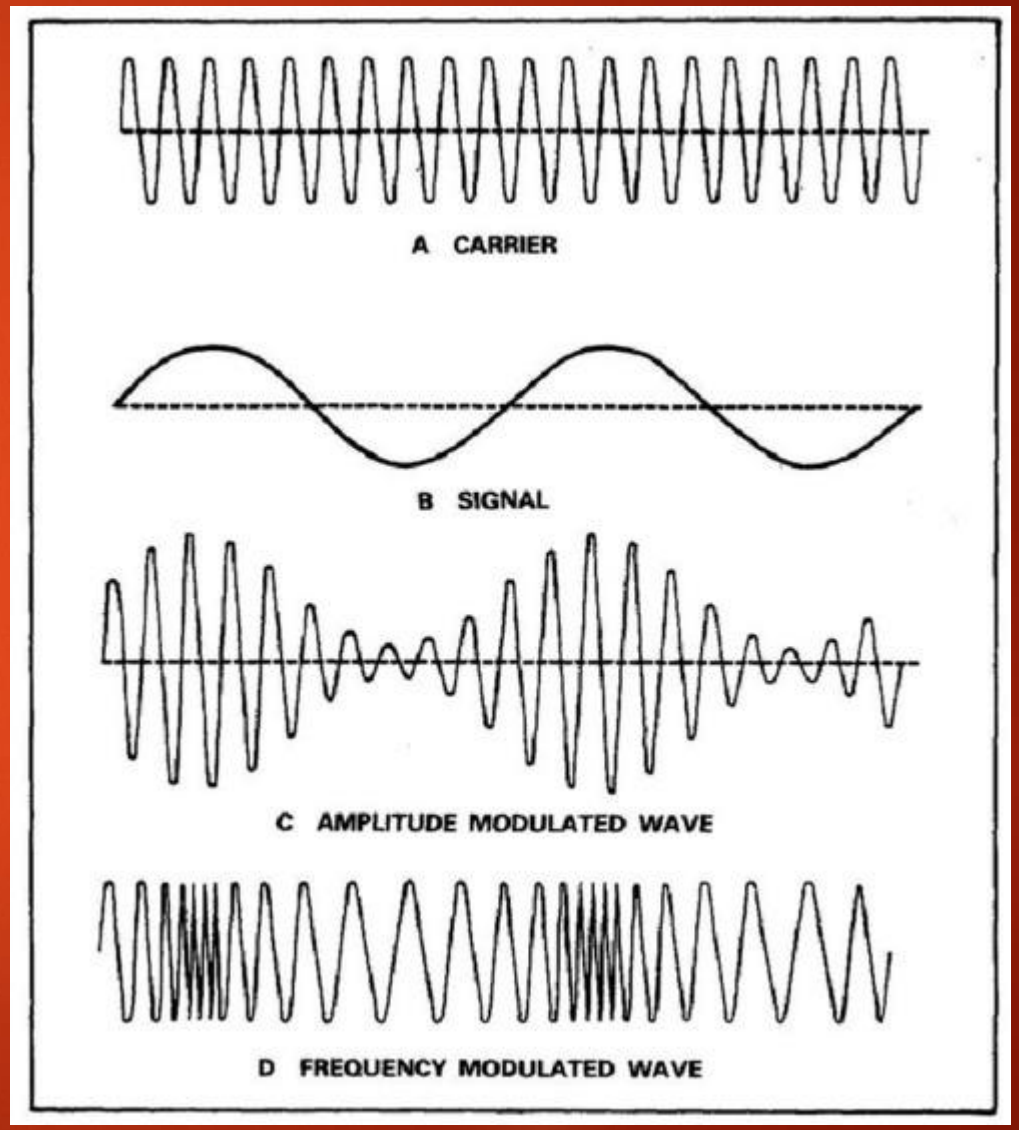
Aircraft Radio Communications

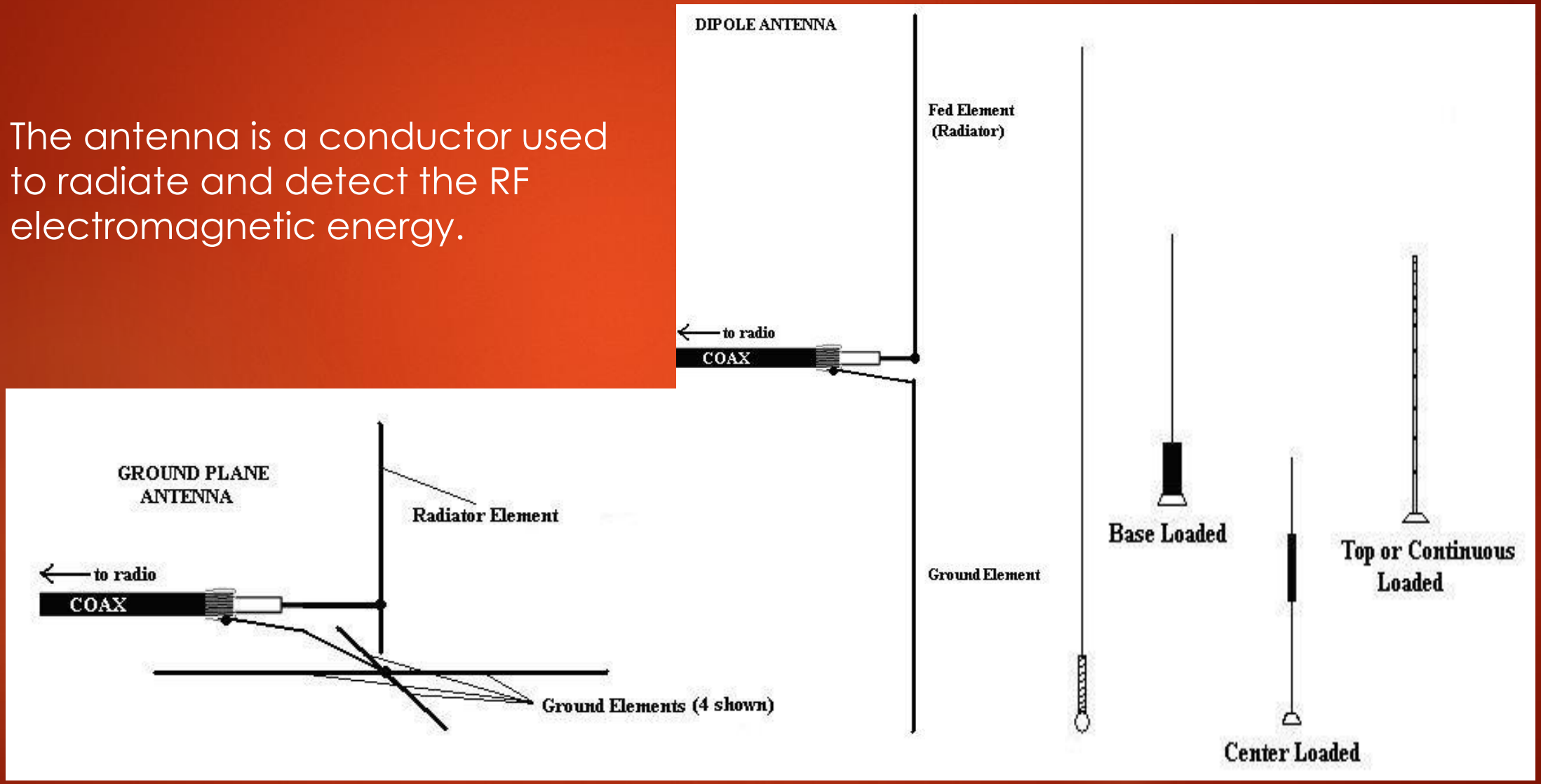
Radio Frequency Basics

- Radio Frequency, referred to as RF is electromagnetic energy used to pass information, or intelligence from the transmitter to the receiver.
  - Carrier
    - The base frequency used to pass intelligence.
  - Modulation
    - AM – Intelligence is passed by varying the amplitude of the carrier.
    - FM – Intelligence is passed by varying the frequency of the carrier,



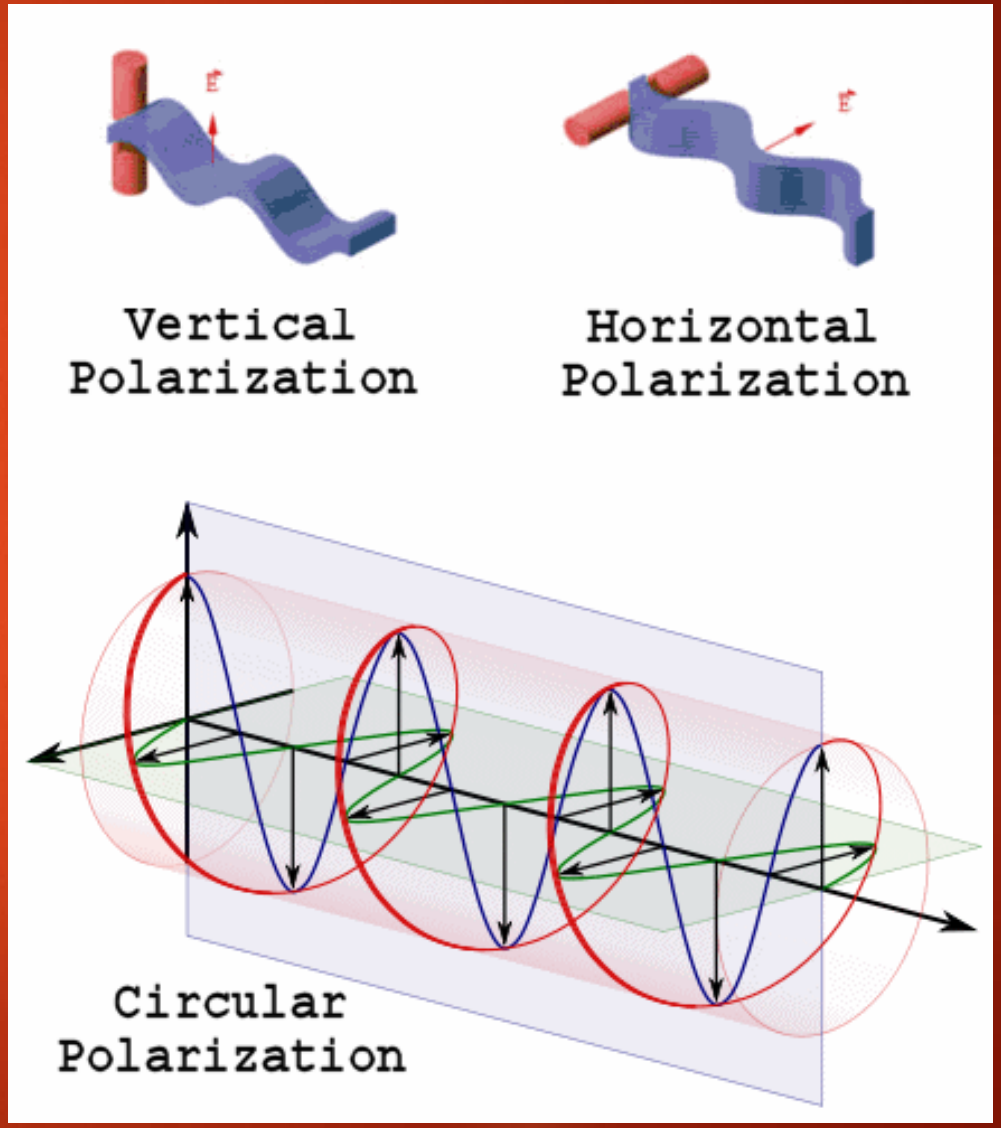
Radio Frequency Basics

- The antenna is a conductor used to radiate and detect the RF electromagnetic energy.

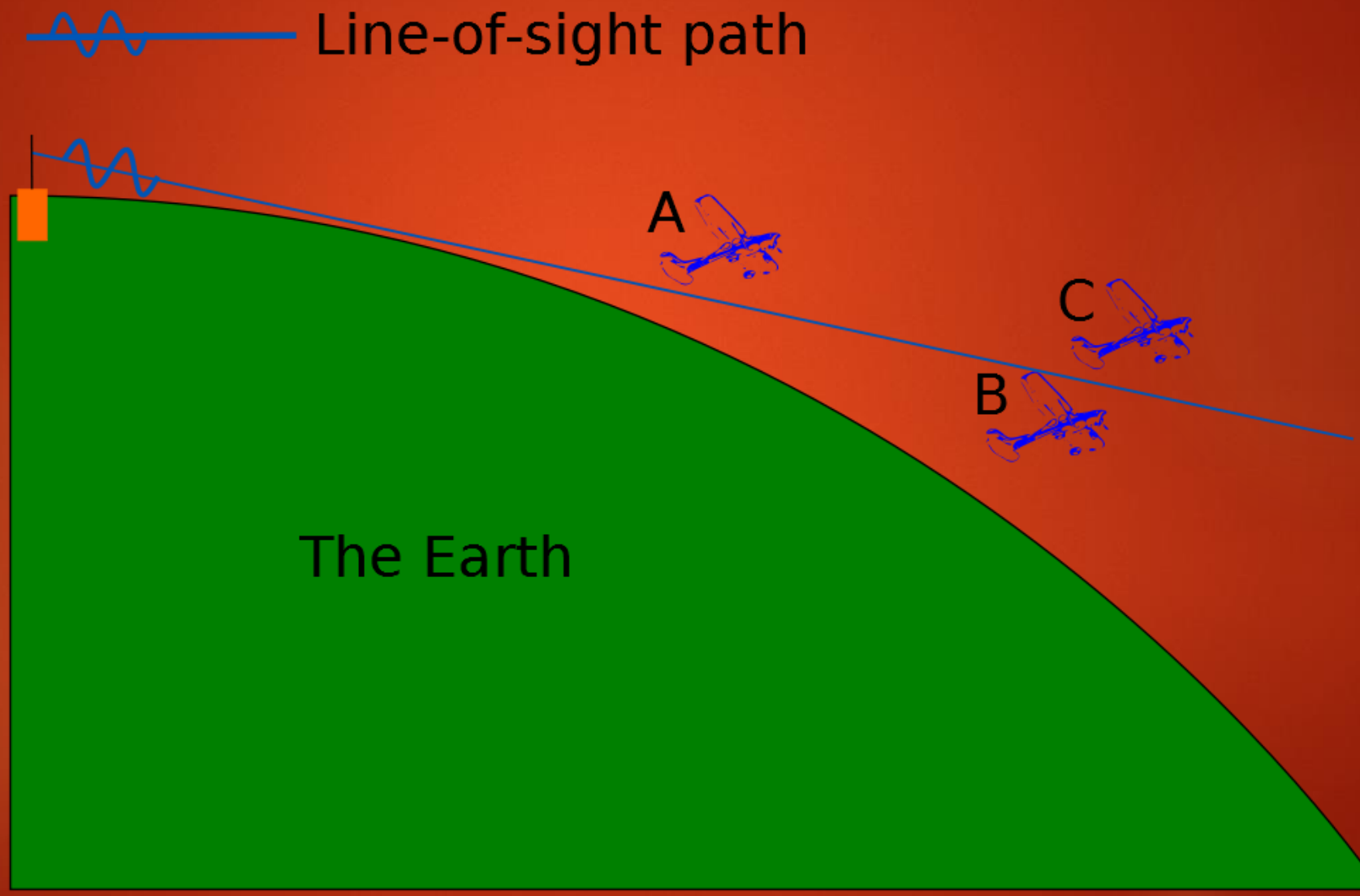


Radio Frequency Basics

- Antenna Polarization is the orientation of the electromagnetic energy waves being transmitted and detected.



Radio Frequency Basics



Civilian Aircraft Radios

- The Very High Frequency, VHF Civil Aviation Band extends from 108.000 to 136.000 MHz and utilizes Amplitude Modulation, AM.
  - 108.000 - 177.950 MHz used for Aviation Navigation.
    - 108.000 -112.000 MHz Aviation Terminal VOR and ILS Navigation (80 Channels).
    - 112.000 -117.950 MHz Aviation VOR Navigation (120 Channels).
  - 118.000-136.000 MHz used for Aviation Communication (720 Channels).
    - Reserved Frequency Usage:
      - 121.500 MHz Aviation Distress.
      - 121.600 MHz Civil Air Patrol (Authorized use only).
      - 122.700, 122.725, 122.800, 122.850, 122.950, 122.975, 123.000, 123.050 and 123.750 MHz UNICOM.
      - 122.900 and 122.925 MHz MULTICOM.
        - AIM TBL 4−1−2 UNICOM/MULTICOM Frequency Usage

Radio Communications Phraseology and Techniques

- **AIM TBL 4–2–2, Phonetic Alphabet/Morse Code**
- The **Pilot/Controller Glossary**, a separate chapter of the AIM, is very helpful in learning what certain words or phrases mean and should be studied and reviewed from time to time to sharpen your communication skills
  - Good phraseology enhances safety and is the mark of a professional pilot.
  - Jargon, chatter, and "CB" slang have no place in Aircraft Communications.

Character	Morse Code	Telephony	Phonic (Pronunciation)
A	•—	Alfa	(AL–FAH)
B	—•••	Bravo	(BRAH–VOH)
C	—•—•	Charlie	(CHAR–LEE) or (SHAR–LEE)
D	—••	Delta	(DELL–TAH)
E	•	Echo	(ECK–OH)
F	••—•	Foxtrot	(FOKS–TROT)
G	——•	Golf	(GOLF)
H	••••	Hotel	(HOH–TEL)
I	••	India	(IN–DEE–AH)
J	•———	Juliett	(JEW–LEE–ETT)
K	—•—	Kilo	(KEY–LOH)
L	•—••	Lima	(LEE–MAH)
M	——	Mike	(MIKE)
N	—•	November	(NO–VEM–BER)
O	———	Oscar	(OSS–CAH)
P	•——•	Papa	(PAH–PAH)
Q	——•—	Quebec	(KEH–BECK)
R	•—•	Romeo	(ROW–ME–OH)
S	•••	Sierra	(SEE–AIR–RAH)
T	—	Tango	(TANG–GO)
U	••—	Uniform	(YOU–NEE–FORM) or (OO–NEE–FORM)
V	•••—	Victor	(VIK–TAH)
W	•——	Whiskey	(WISS–KEY)
X	—••—	Xray	(ECKS–RAY)
Y	—•——	Yankee	(YANG–KEY)
Z	——••	Zulu	(ZOO–LOO)
1	•————	One	(WUN)
2	••———	Two	(TOO)
3	•••——	Three	(TREE)
4	••••—	Four	(FOW–ER)
5	•••••	Five	(FIFE)
6	—••••	Six	(SIX)
7	——•••	Seven	(SEV–EN)
8	———••	Eight	(AIT)
9	————•	Nine	(NIN–ER)
0	—————	Zero	(ZEE–RO)

Radio Communications Phraseology and Techniques

- Commonly used acronyms and definitions:
  - **ATC** (Air Traffic Control) is a service provided by ground-based controllers who direct aircraft on the ground and through controlled airspace, and can provide advisory services to aircraft in non-controlled airspace. The primary purpose of ATC worldwide is to prevent collisions, organize and expedite the flow of air traffic, and provide information and other support for pilots.
  - **FSS** (Flight Service Station) is an air traffic facility that provides information and services to pilots before, during, and after flights, but unlike ATC, is not responsible for giving instructions or clearances or providing separation. They do, however, relay clearances from ATC for departure or approaches.

Radio Communications Phraseology and Techniques

- **CTAF** (Common traffic advisory frequency) is the name given to the VHF radio frequency used for air-to-air communication at non-towered airports.
- **UNICOM** (Universal Communications) station is an air-ground communication facility operated by a non-air traffic control private agency to provide advisory service at uncontrolled aerodromes and airports and to provide various non-flight services, such as requesting a taxi, even at towered airports.
- **MULTICOM** is a frequency allocation used as a CTAF by aircraft near airports where no air traffic control is available.

Radio Communications Phraseology and Techniques

- **ATIS** (Automatic Terminal Information Service) is a continuous broadcast of recorded *noncontrol* aeronautical information in busier terminal areas (i.e. towered airports). ATIS broadcasts contain essential information, such as weather information, which runways are active, available approaches, and any other information required by the pilots, such as important NOTAMS.
- **AWOS** (Automated airport weather stations) are automated sensor suites which are designed to serve aviation and meteorological observing needs for safe and efficient aviation operations, weather forecasting and climatology.

Radio Communications Phraseology and Techniques

- The single, most vital part of communication is understanding.
  - Pilots will acknowledge each radio communication with ATC by using the **appropriate aircraft call sign**.
  - **Brevity** is important, and contacts should be kept as brief as possible.
    - Since concise phraseology may not always be adequate, use whatever words are necessary to get your message across.
  - **Listen** before you transmit so you don't interfere with someone else's transmission.
  - **Think** before keying your radio. Knowing what you want to say will make it easier and quicker.
- Pilots need to maintain vigilance in monitoring the correct and appropriate aircraft radio communication frequencies for potential traffic conflicts and hazards.

Airport Operations Without an Operating Control Tower

- The key to communicating at an airport without an operating control tower is selection of the correct CTAF, which may be a UNICOM, MULTICOM, FSS frequency and is identified in appropriate aeronautical publications.
- Aircraft operating to or from another nearby airport may be making self-announce broadcasts on the same UNICOM or MULTICOM frequency. The airport name should therefore be given at the beginning and end of each self-announce transmission.
- **Recommended self-announce phraseologies:**
  - *"Hemet traffic, **glider** 88W is on right downwind for landing runway 22, Hemet Traffic."*
  - *"Hemet traffic, Callaire 07V is departing runway 22, right departure, glider in tow, Hemet Traffic."*

Airport Operations Without an Operating Control Tower

- **Recommended UNICOM/FSS procedures and phraseologies:**
  - Obtain any available airport information from AWOS.
  - Inbound:
    - *"Hemet (UNICOM or Flight Service), **glider** 88W is 10 miles northeast of the airport at 6000 with 1900 Zulu AWOS information. Any advisories, Hemet (UNICOM/Flight Service)."*
    - *"Hemet (UNICOM or Flight), **glider** 88W is on right downwind for landing runway 22, Hemet Traffic."*
  - Outbound:
    - *"Hemet (UNICOM/Flight Service), Callaire 07V is taxing for departure on runway 22 with 1830 Zulu AWOS information. Any advisories, Hemet (UNICOM/Flight Service)."*
    - *Hemet (UNICOM/Flight Service), Callaire 07V is departing runway 22, right departure, glider in tow, (UNICOM/Flight Service)."*

Airport Operations With an Operating Control Tower

- All aircraft follow the guidance of ATC when operating to and from an airport with an operating control tower.
  - The level of services/guidance provided by ATC will vary depending on the airport's capabilities.
    - I general, a pure glider won't be allowed access to Class B airspace unless they declare an emergency simply because the level of guidance is much higher and gliders can't maintain a constant altitude or expeditiously follow taxi instruction after landing.
    - Most airports with an operation tower maintain ATIS rather than AWOS.
    - Controllers may be very busy handling multiple aircraft, so extra vigilance is needed to adhere to proper/expected procedures and protocols.
      - The FAA recommends that Student Pilots identify themselves as such when contacting ATC so extra attention and guidance may be given as needed.
    - Due to varying workloads and traffic at different airports, your mileage may vary.

Airport Operations With an Operating Control Tower

- With the increase in traffic density and ATC workload, you will need to obtain the latest information from the ATIS.
  - At a minimum, make a note of the current version – ATC will expect you to read it back.
  - It's also advisable to note any advisories as ATC may ask if you are familiar.
  - Make a note of any arrival, departure and ground control frequencies also in use.
  - Don't forget to set your Transponder appropriately – standby, ground, air or altitude encoding (it's part of your radio communications as well) .

Airport Operations With an Operating Control Tower

- **Recommended ATC phraseologies:**
  - Inbound:
    - You are required to contact ATC before entering their airspace;
      - *"Ramona, **motorglider** 6TT is 10 miles north of the airport at 6000 with information Kilo, inbound for touch and go, Ramona."*
    - Follow ATC guidance:
      - *"Roger, Ramona, **motorglider** 6TT is proceeding to cross mid-field and join the left downwind for runway 27 for touch and go, will remain in the pattern, Ramona."*
  - Outbound:
    - *"Ramona, **motorglider** 6TT is departing runway 27, will be making a left crosswind to remain in the pattern for runway 27, touch and go, Ramona."*

References

- **Aeronautical Information Manual (AIM)**
  - Chapter 4. Air Traffic Control
    - Section 1. Services Available to Pilots
      - 4−1−2. Control Towers
      - 4−1−3. Flight Service Stations
      - 4−1−8. Approach Control Service for VFR
      - Arriving Aircraft
      - 4−1−9. Traffic Advisory Practices at Airports Without Operating Control Towers
      - 4−1−11. Designated UNICOM/MULTICOM Frequencies
      - 4−1−12. Use of UNICOM for ATC Purposes
      - 4−1−13. Automatic Terminal Information Service (ATIS)
    - Section 2. Radio Communications Phraseology and Techniques
      - 4−2−1. General
      - 4−2−2. Radio Technique
      - 4−2−3. Contact Procedures
      - 4−2−4. Aircraft Call Signs
      - 4−2−6. Ground Station Call Signs
      - 4−2−7. Phonetic Alphabet
  - PILOT/CONTROLLER GLOSSARY
- **AC No: 90-50D. REQUIREMENTS FOR 760 CHANNEL VHF RADIO FOR AERONATICAL OPERATIONS**