VI.A. Radio Communications and ATC Light Signals

References: FAA-H-8083-3; FAA 8083-25; AIM

Objectives
The student should develop knowledge of the elements related to radio communications and ATC light signals as described in the necessary PTS.

Key Elements
1. Understanding
2. Who, Where, What
3. Plan Ahead

Elements
1. Selection and Use of Appropriate Frequencies
2. Procedure and Phraseology for Radio Communications
3. ATC Clearance and Instructions
4. ATC Light Signals

Schedule
1. Discuss Objectives
2. Review material
3. Development
4. Conclusion

Equipment
1. White board and markers
2. References

IP’s Actions
1. Discuss lesson objectives
2. Present Lecture
3. Ask and Answer Questions
4. Assign homework

SP’s Actions
1. Participate in discussion
2. Take notes
3. Ask and respond to questions

Completion Standards
The student can properly use the radios through a flight of any kind. The student understands proper procedures, phraseology, clearances, and light signals.
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Instructors Notes:

Introduction:
Attention
Everyone wants to sound like a real, professional pilot. This lesson will explain how we do that and make us more professional pilots.

Overview
Review Objectives and Elements/Key ideas

What
Radio communication is the communication between the pilot and different ATC controllers throughout the phases of a flight.

Why
Operating in and out of a controlled airport, as well as in a good portion of the airspace system, requires an aircraft have two-way radio communications. For this reason, a pilot should be knowledgeable or radio procedures. Radio communications is a critical link in the ATC system. By understanding proper radio communication procedures, the link can be strong providing safer flying for everyone.

How:
1. Selection and Use of Appropriate Frequencies
   A. Preflight Planning
      i. Always plan ahead as to frequencies needed
      ii. Look up the frequencies of all the facilities you might use and/or need during the flight
         a. This information can be found in the AFD, Sectional Charts, etc.
         b. Ground is always 121 point something
      iii. Put all this information in your Nav Log, preferably in the order you will use it to make things easy
   B. During Flight frequencies may need to be found - keep organized and find them before they’re needed
      i. Know who you are calling
   C. The AFD contains all pertinent frequencies within/around the airport(s) you are operating in
      i. Weather, Tower/CTAF, Clearance Del, Ground, Unicom, Nav aids, FSS, Approach/Departure
   D. Charts provide frequencies as you navigate
      i. Communications Boxes (FSS)
      ii. Airport data lists tower/CTAF, Unicom, weather frequencies
      iii. VOR frequencies are shown in blue outlined boxes
         a. HIWAS, TWEB, ASOS/AWOS available on some VORs
      iv. Class B, C, TRSA, and some radar approach frequencies are provided below Tower frequencies/info
   E. After in contact with controllers, frequencies will be provided to reach further controllers
   F. CE - Use of improper frequencies
      i. Caused by inadequate planning, misreading frequencies, or mistuning the radio
      ii. Double check and read out loud frequencies also repeat frequencies when advised to change
      iii. Monitor the frequency before transmitting

2. Procedure and Phraseology for Radio Communications
   A. Understanding is the single most important thought in pilot-controller communications
      i. It is essential that pilots acknowledge each radio call with ATC with the appropriate aircraft call sign
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ii. Brevity is important, but if necessary use whatever words will get your message across
iii. Good phraseology enhances safety and is the mark of a professional pilot
   a. Pilot/Controller Glossary is very helpful in learning what certain words/phrases mean (AIM)

B. Radio Technique
   i. LISTEN before you transmit
   ii. THINK before transmitting - Know what you want to say before you say it (write it down if needed)
   iii. After transmitting, wait a few seconds before calling again (The controller may be busy)
   iv. Be alert to the sound/lack of sounds in the receiver
      a. Check your volume, frequency, and make sure the microphone isn’t stuck on transmit
   v. Be sure you are within the performance range of your equipment and the ground station equipment
      a. Remember higher altitudes increase the range of VHF “line of sight” communications

C. Radio calls can be broken down into:
   i. Whom you are calling
   ii. Who you are
   iii. Where you are
   iv. What you want to do

D. CE - Improper procedure and phraseology for radio communications
   i. Think before you transmit and understand the controller may be busy
   ii. Tailor your calls to match the controller’s workload

3. ATC Clearances and Instructions
   A. Acknowledge all ATC clearances by repeating key points followed by your call sign
      i. You must read back all hold short instructions
      ii. Always repeat altitudes and headings
      iii. When advised to change frequencies acknowledge the instruction and change ASAP
   B. If a clearance is blocked or not understood, do not guess/ignore, ask the controller to “Say Again”
   C. Once you, the PIC, obtain an ATC clearance you cannot deviate from it unless in an emergency (91.123)
      i. If you cannot accept a clearance from ATC advise them of the reason and obtain a new clearance
   D. The PIC is directly responsible for, and the final authority to the operation of the airplane
      i. Obtain proper clarification on any clearance not understood or that would create a bad situation
   E. CE – Failure to acknowledge or properly comply with, ATC clearances and instructions
      i. Ask the controller to repeat if you did not understand the message
      ii. Learn to divide attention in order to properly hear and comply with all messages

4. ATC Light Signals
   A. Arriving Aircraft
      i. Transmitter Failure - Receive no response to calls, and receive calls but none directed to you
         a. Determine the direction and flow of aircraft, enter the pattern and look for light signals
         b. Acknowledge light signals by rocking wings during the day and flashing lights at night
         c. After landing, call the tower to advise them of the situation
      ii. Receiver Failure - Receiving no calls on tower/ATIS frequencies
         a. Transmit to the tower your position, situation, intention to land
         b. Use the same procedures as above
   B. Departing Aircraft
      i. Attempt to fix any radio failure before leaving, if it can’t be fixed call tower by phone and request to depart without two way communications
      ii. If authorized, you will get departure info and requested to monitor tower/watch for light signals
      iii. During daylight, acknowledge transmissions/s signals by promptly executing the action requested
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a. Rock wings/blink lights as well
iv. If the radio fails after departing the ramp, watch for light signals/monitor ground and return

C. CE - Failure to understand or properly comply with ATC light signals
i. Know the light signals and their meanings
ii. Practice light signals if possible

Common Errors:
- Use of improper frequencies
- Improper procedure and phraseology when using radio communications, not stating their call sign/N#, and at non-towered airports, stating their position, runway for takeoff, and the airport of operation.
- Failure to acknowledge or properly comply with, ATC clearances and instructions
- Failure to understand or properly comply with ATC light signals

Conclusion:
Brief review of the main points
Proper radio communications begins with understanding. As long as you, the pilot, and the controller understand what each other are saying radio communication is effective and clearances can be obeyed properly.

PTS Requirements:
To determine that the applicant:
1. Exhibits instructional knowledge of the elements of radio communications and ATC light signals by describing:
   a. selection and use of appropriate radio frequencies.
   b. recommended procedure and phraseology for radio communications.
   c. Receipt of, acknowledgement of, and compliance with ATC clearances and instructions.
   d. interpretation of, and compliance with, ATC light signals.
2. Exhibits instructional knowledge of common errors related to radio communications and ATC light signals by describing:
   a. use of improper frequencies.
   b. improper procedure and phraseology when using radio communications, not stating their call sign/N#, and at non-towered airports, stating their position, runway for takeoff, and the airport of operation.
   c. failure to acknowledge, or properly comply with, ATC clearances and instructions.
   d. failure to understand, or to properly comply with, ATC light signals.
3. Demonstrates and simultaneously explains radio communication procedures from an instructional standpoint.
4. Analyzes and corrects simulated common errors related to radio communications and ATC light signals.
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### ATC Light Gun Signals

<table>
<thead>
<tr>
<th>COLOR</th>
<th>ON THE GROUND</th>
<th>IN THE AIR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Green</td>
<td>Cleared For Takeoff</td>
<td>Cleared To Land</td>
</tr>
<tr>
<td>Green</td>
<td>Cleared For Taxi</td>
<td>Return For Landing (to be followed by steady green)</td>
</tr>
<tr>
<td>Red</td>
<td>Stop</td>
<td>Give Way To Other Aircraft and Continue Circling</td>
</tr>
<tr>
<td>Red</td>
<td>Taxi Clear Of The Runway</td>
<td>Airport Unsafe, Do Not Land</td>
</tr>
<tr>
<td>White</td>
<td>Return To Starting Point</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>Red</td>
<td></td>
<td>Exercise Extreme Caution</td>
</tr>
</tbody>
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