BASIC AIRCRAFT RADIO OPERATIONS AND PROCEDURES
LESSON PLAN

OBJECTIVE:

To develop the student's understanding of aircraft radio equipment, operation, procedures and requirements as well as LESC's Standard Operating Procedures.

ELEMENTS:

Basic aircraft radio operation.
Aircraft radio procedures.
Identifying and using proper aircraft radio frequencies.
Proper aircraft radio phraseology.
Aircraft radio contact requirements.
LESC Radio Procedures.

SCHEDULE:

Basic radio theory……10 min.
Aircraft radio equipment familiarization…15 min.
Aircraft radio services……..…..10 min.
Aircraft radio contact requirements……..5 min.
Aircraft radio procedures demo/practice..10 min.
Debriefing……..…10 min.
Total time……. 1 hour

EQUIPMENT:

White board, markers, eraser.
Aircraft radio and Instruction Manual.
Federal Aviation Regulations.
Aeronautical Information Manual.
Sectional Chart.
LESC Standard Operating Procedures.

INSTRUCTOR ACTIONS:

- Discuss lesson objective.
- Discuss basic radio theory.
- Familiarization of aircraft radio equipment and controls.
- Discuss aircraft radio contact requirements per FAR 91.126, 91.127, 91.129, 91.130, 91.131, 91.135.
- Discuss how to identify the proper aircraft radio frequency to be used.
- Discuss available aircraft radio services.
- Discuss the use of emergency aircraft radio frequencies.
- Discuss the proper aircraft radio phraseology per AIM 4-2.
- Discuss Traffic Advisory Practices at Airports Without Operating Control Towers per AIM 4-1-9
- Demonstrate proper aircraft radio phraseology.
- Evaluate student performance of aircraft radio procedures.
- Discuss LESC Radio Procedures per LESC SOP.
- Administer written exam.
- Answer questions.

STUDENT ACTIONS:

- Discuss lesson objective, take notes, ask questions.
- Take written exam.
- Perform proper aircraft radio procedures.

COMPLETION STANDARDS:

By means of written and oral testing, the student should demonstrate understanding of basic radio theory, aircraft radio equipment and controls. The student will identify the proper aircraft radio frequencies and procedures to be used. The student will demonstrate the proper aircraft radio phraseology and follow the LESC Standard Operating Procedures.

TEACHING BASIC AIRCRAFT RADIO OPERATIONS AND PROCEDURES

A basic understanding of radio theory will aid the student in effective aircraft radio communications. The communications portion of the civil aircraft band is Amplitude Modulated and spans 118.0 to 136.0 MHz in the VHF spectrum. The navigation portion of the civil aircraft band is a little larger and spans 108.0 to 136.0 MHz.

Be sure that the student is aware that VHF radio communications are line of sight, and that any obstructions greatly attenuate the transmitted signal. Because any airframe component (including the canopy) will reduce the effectiveness of your transmitter, an externally mounted antenna should be used when available. Line of sight limitations also make your aircraft radio more effective at altitude than on the ground. A hand held radio will reach several hundred miles from 6,000 feet with an externally mounted antenna, but may not talk around the corner on the ground. Keep this in mind when preparing for an off-field landing. It is quite likely that the only radio contact you will be able to make while on the ground will be with other airborne aircraft and not your chase crew.

Impress upon the student the need to be familiar with the radio equipment. Commonly used features of the radio equipment such as adjusting the volume or squelch and changing frequencies should require little effort. Most of the time, these functions will need to be performed in or near the airport traffic pattern. The aircraft radio is a tool to provide the pilot with more information and a level of safety. It shouldn't bring added stress or distraction at these critical phases of flight. Plenty of practice on the ground will aid in reducing the distraction while using the radio in flight.

Key to effective radio communications is understanding the intent of each transmission. Prevent over modulation and speak in a clear, normal tone of voice. Don't rush your transmissions either. Failure to do this may cause garbled, unintelligible transmissions and necessitate a retransmit.

Your student will need to be familiar with the Aeronautical Information Manual Chapter 4, Section 2 concerning Radio Communications Phraseology and Techniques. This section covers everything from common sense radio operating techniques, to the phonetic alphabet and provides examples of phraseology to be used at airports with an operating control tower.

For the phraseology to be used at airports without an operating control tower, the student will need to become familiar with AIM 4-1-9.

Each student should be made aware of the radio requirements for each category in the National Airspace System. These are spelled out in the following FARs.

91.126 – Class G airspace.
91.127 – Class E airspace.
91.129 – Class D airspace.
91.130 – Class C airspace.
91.131 – Class B airspace.
91.135 – Class A airspace.

A good method of insuring this is to sit down with a sectional chart and have the student describe the radio requirements for several different localities.

With the sectional chart still open, have the student identify airports with and without control towers and determine the correct frequency to use. Also have the student determine if FSS is available and the appropriate frequency to use. Have the student identify ATIS, ASOS/AWOS services and frequencies when available. Discuss Navigation Aids that also provide voice communications with your students. This is a valuable service available that most soaring pilots don't take advantage of, since we seldom use NAVAIDs. These NAVAIDs can provide direction finding capability as well as contact with Flight Service Stations that may be out of normal radio range. Emphasize the value of these services to a pilot who is lost, or will be landing / has landed in a remote area. Have the student identify a nearby NAVAIDs that provides this service and have them tell you what facility is providing the service.

The correct usage of the Emergency or "Guard" frequency 121.50 MHz should be discussed with students as well as the correct phraseology. While Emergency Locator Transmitters typically use this frequency, they are also continuously monitored by a controlling facility capable of providing emergency service.

While on the topic of available aircraft radio services pay particular attention to the services offered by Flight Service Stations. Most pilots associate FSS

with powered and more specifically IFR flights. However FSS does more than receive and process IFR flight plans, provide pilot briefings, en route communications, relay ATC clearances, originate NOTAMs and broadcast aviation weather and National Airspace System (NAS) information. They also provide VFR search and rescue services, assist lost aircraft and aircraft in emergency situations as well as monitor the NAVAIDs mentioned above.

Once you have covered these topics with your student, have them simulate the correct procedures and phraseology for several nearby airports selected from the sectional chart.

Once the student has shown proficiency in the proper procedures and phraseology, it's an easy step to acquaint them with the Standard Operation Procedures used by LESC. Have the student simulate an approach to landing to runway 11R, including calling for a wind advisory and pattern entry announcement, ensuring uses the correct frequencies. Discuss the radio calls if the pattern is reversed and runway 29L is to be used. The student should be made aware that our tow planes and other power traffic in the area will be monitoring the MULTICOM frequency 122.90 MHz. While on tow, the student should also be monitoring MULTICOM should the need to contact the tow pilot arise. One off tow, the student should change to 123.50 MHz for glider operations. It is very important that the student is aware that any emergency situation should be announced on the MULTICOM frequency.

It is also wise to be familiar with the frequencies used at nearby airports should the need arise to land there.

The student should now be ready to operate the radio in the vicinity of Skylark airport. From this time forward the student should be making all the radio calls to gain proficiency.

BASIC AIRCRAFT RADIO OPERATIONS AND PROCEDURES WRITTEN EXAM

1. What is the civil aircraft voice communication band frequency range?
    A. 108.0 to 136.0 MHz.
    B. 118.0 to 136.0 MHz.
    C. 180.0 to 360.0 MHz.
    D. 108.0 to 136.0 KHz.

2. What is the civil aircraft radio navigation band frequency range?
    A. 108.0 to 136.0 MHz.
    B. 118.0 to 136.0 MHz.
    C. 180.0 to 360.0 MHz.
    D. 108.0 to 136.0 KHz.

3. Which portion of the radio spectrum do civil aircraft radio communication use?
    A. HF.
    B. VHF.
    C. UHF.
    D. VLF.

4. What form of modulation is used by civil aircraft radios?
    A. Single Side Band (SSB).
    B. Frequency Modulation (FM).
    C. Amplitude Modulation (AM).
    D. Continuous Wave (CW).

5. What is the effective range of an aircraft radio at 10,000 feet MSL?
    A. 200 miles.
    B. 500 miles.
    C. 1000 miles.
    D. Line of sight.

6. What is the effective range of an aircraft radio at 10,000 feet MSL?
    A. 1 mile.
    B. 10 miles.
    C. 1000 yards.
    D. Line of sight.

7. What are the radio requirements for Class G airspace?
    A. Must have ATC clearance.
    B. Must establish two way radio communication with ATC.
    C. Plane to plane communications.
    D. No radio VFR radio requirements.

8. What are the radio requirements for Class B airspace?
    A. Must have ATC clearance.
    B. Must establish two way radio communication with ATC.
    C. Plane to plane communications.
    D. No radio VFR radio requirements.

9. What are the radio requirements for Class D airspace?
    A. Must have ATC clearance.
    B. Must establish two way radio communication with ATC.
    C. Plane to plane communications.
    D. No radio VFR radio requirements.

10. What are the radio requirements for Class A airspace?
    A. Must have ATC clearance.
    B. Must establish two way radio communication with ATC.
    C. Plane to plane communications.
    D. No radio VFR radio requirements.

11. What are the radio requirements for Class C airspace?
    A. Must have ATC clearance.
    B. Must establish two way radio communication with ATC.
    C. Plane to plane communications.
    D. No radio VFR radio requirements.

12. What are the radio requirements for Class E airspace?
    13. Must have ATC clearance.
    14. Must establish two way radio communication with ATC.
    15. Plane to plane communications.
    16. No radio VFR radio requirements.

17. What frequency should LESC pilots use while on tow?
    A. 123.500 MHz.
    B. 123.300 MHz.
    C. 122.900 MHz.
    D. 122.800 MHz.

18. You are getting low and need to land at French Valley Airport. Which frequency should you use when announcing your intentions?
    A. 123.500 MHz.
    B. 123.300 MHz.
    C. 122.900 MHz.
    D. 122.800 MHz.

19. What frequency is used by LESC to obtain surface wind information at Skylark Airport?
    A. 123.500 MHz.
    B. 123.300 MHz.
    C. 122.900 MHz.
    D. 122.800 MHz.

20. What frequency would you use to obtain weather information at Hemet-Ryan airport?
    A. 123.500 MHz.
    B. 123.000 MHz.
    C. 118.375 MHz.
    D. 123.300 MHz.

21. Write down the radio call used when requesting winds at Skylark Airport.
    _____
    _____
    _____
    _____

22. Write down the radio call used when entering the pattern at Skylark Airport.
    _____
    _____
    _____
    _____

23. What frequency is used to contact March Air Force Base?

24. What is the Emergency or “Guard” radio frequency?
    A. 121.500 MHz
    B. 122.800 MHz.
    C. 122.900 MHz.
    D. 123.300 MHz.

25. What frequency should be used to contact Flight Service in the area of the Homeland VOR?
    A. 121.500 MHz
    B. 122.200 MHz
    C. 243.000 MHz
    D. 255.400 MHz

26. What Flight Service Station provides voice communications via the Julian VORTAC?
    A. Riverside
    B. Los Angeles
    C. San Diego
    D. Warner Springs