

Muscle Shoals Amateur Radio Club

Extra License Class
Training
Session 1

Overview

- “ Introductions
- “ Format
- “ Syllabus
- “ Questions

Introductions

- “ EMA Director, George Grabyran
- “ Coordinator and Instructors
- “ MSARC Officers
- “ Students

Format

- “ Review questions and topics from previous week.
- “ Discussion of new topic(s).
- “ Pass out questions relating to new topic(s).
The entire question pool is linked from our club website (msarc.org).

Syllabus

- “ Week 1 – 9/4/18: Commission’s Rules (6 question areas)
- “ Week 2 – 9/11/18: Operating Procedures (5 question areas)
- “ Week 3 – 9/18/18: Radio Wave Propagation (3 question areas)
- “ Week 4 – 9/25/18: Amateur Radio Procedures (5 question areas)
- “ Week 5 – 10/2/18: Electrical Principles (4 question areas)
- “ Week 6 – 10/9/18: Circuit Components (6 question areas)
- “ Week 7 – 10/15/18: Practical Circuits (8 question areas)
- “ Week 8 – 10/23/18: Signals and Emissions (4 question areas)
- “ Week 9 – 10/30/18: Antennas and Feed-lines/Transmission Lines (8 question areas)
- “ Week 10 – 11/6/18: Safety (1 question area)
- “ Week 11 – 11/13/18: Review and VE application presentation
- “ Week 12 – 11/20/18: Exams (50 questions!)

READY?

Topics

- “ **E1 - COMMISSION’S RULES**

[6 Exam Questions - 6 Groups]

- “ **E1A** Operating Standards: frequency privileges; emission standards; automatic message forwarding; frequency sharing; stations aboard ships or aircraft.

- “ **E1B** Station restrictions and special operations: restrictions on station location; general operating restrictions, spurious emissions, control operator reimbursement; antenna structure restrictions; RACES operations; national quiet zone.

- “ **E1C** Definitions and restrictions pertaining to local, automatic, and remote control operation; control operator responsibilities for remote and automatically controlled stations; IARP and CEPT licenses; third party communications over automatically controlled stations.

Topics (continued)

- “ **E1D** Amateur satellites: definitions and purpose; license requirements for space stations; available frequencies and bands; telecommand and telemetry operations; restrictions and special provisions; notification requirements.
- “ **E1E** Volunteer examiner program: definitions; qualifications; preparation and administration of exams; accreditation; question pools; documentation requirements.
- “ **E1F** Miscellaneous rules: external RF power amplifiers; business communications; compensated communications; spread spectrum; auxiliary stations; reciprocal operating privileges; special temporary authority.

E1A-Operating Standards

- “ frequency privileges;
- “ emission standards;
- “ automatic message forwarding;
- “ frequency sharing; and
- “ stations aboard ships or aircraft.

Band Edge

“ When using a transceiver that displays the carrier frequency of phone signals, stay 3kHz from the end of the band. If using USB, stay 3kHz from the top of the band. Likewise, if using LSB, stay 3kHz from the bottom of the band.

Examples

- “ Your transceiver displays a carrier tuned to 14.349MHz (USB) and you hear a station calling CQ. What do you do? Why?
- “ Your transceiver displays a carrier tuned to 3.601MHz (LSB) and you hear a DX station calling. What do you do? Why?
- “ With your transceiver displaying the carrier frequency of CW signals, you hear a DX station's CQ on 3.500MHz. What do you do? Why?

60 Meters

- “ The maximum power output permitted on the 60 meter band is 100 watts PEP effective radiated power relative to the gain of a half-wave dipole.
- “ The carrier frequency of a CW signal must be set at the center frequency of the channel to comply with FCC rules for 60 meter operation.
- “ 60 meter amateur band requires transmission on specific channels rather than on a range of frequencies.
- “ The maximum bandwidth for a data emission on 60 meters is 2.8kHz.

Responsibility

- “ If a station in a message forwarding system inadvertently forwards a message that is in violation of FCC rules, the control operator of the originating station is primarily accountable for the rules violation.
- “ If your digital message forwarding station inadvertently forwards a communication that violates FCC rules, discontinue forwarding the communication as soon as you become aware of it.

International Waters

- “ If an amateur station is installed aboard a ship or aircraft, its operation must be approved by the master of the ship or the pilot in command of the aircraft.
- “ Any FCC-issued amateur license required when operating an amateur station aboard a U.S.-registered vessel in international waters.
- “ Any person holding an FCC-issued amateur license or who is authorized for alien reciprocal operation must be in physical control of the station apparatus of an amateur station aboard any vessel or craft that is documented or registered in the United States.

E1B-Station restrictions and special operations

- “ restrictions on station location;
- “ general operating restrictions, spurious emissions, control operator reimbursement;
- “ antenna structure restrictions;
- “ RACES operations;
- “ national quiet zone.

- “ A Spurious Emission is an emission outside its necessary bandwidth that can be reduced or eliminated without affecting the information transmitted.
- “ The location that is of environmental importance or significant in American history, architecture, or culture might cause the physical location of an amateur station apparatus or antenna structure to be restricted.
- “ An amateur station must be at least 1 mile away from an FCC monitoring facility to protect it from harmful interference.

- “ An Environmental Assessment must be submitted to the FCC before placing an amateur station within an officially designated wilderness area or wildlife preserve, or an area listed in the National Register of Historical Places.
- “ An area surrounding the National Radio Astronomy Observatory is the National Radio Quiet Zone.

“ If you are installing an amateur station antenna at a site at or near a public use airport, you may have to notify the Federal Aviation Administration and register it with the FCC as required by Part 17 of FCC rules

Modulation Index

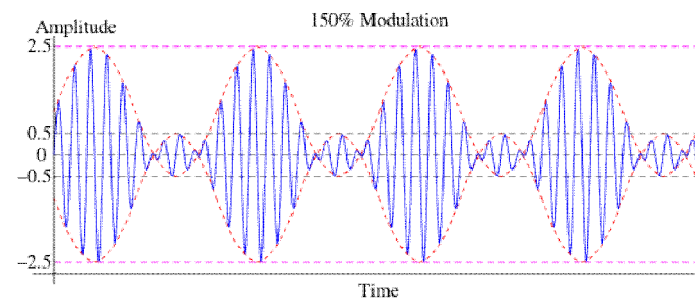
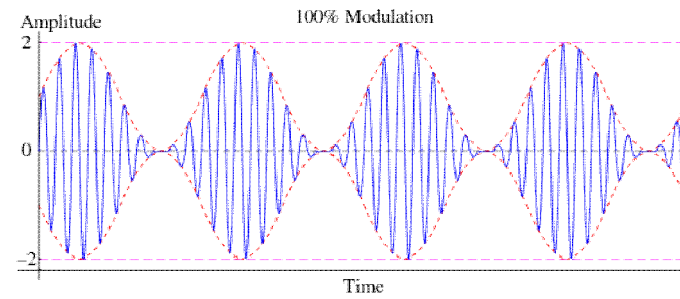
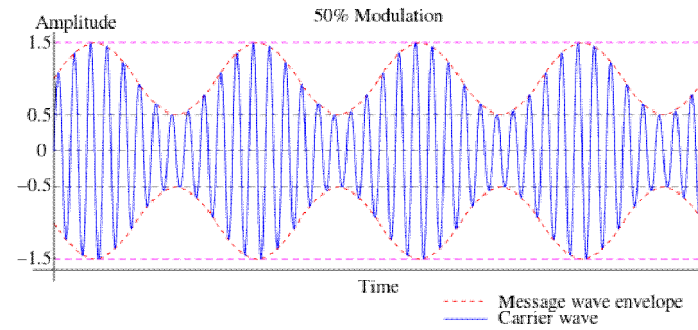
- “ 1.0 is the highest modulation index permitted at the highest modulation frequency for angle modulation below 29.0 MHz.
- “ But... what is a modulation index?

Modulation Index (continued)

- “ The AM modulation index is a measure based on the ratio of the modulation excursions of the RF signal to the level of the unmodulated carrier.
- “ Modulation Index is basically the ratio by which the modulated signal varies from the unmodulated signal and is given as a percentage. The ideal index would be 100% which ensure a high Signal to Noise Ratio in AM. a value higher than this would cause distortion and a special circuit required at the receiver. The formula is as follows where h is the modulation index, M the modulation amplitude, and A carrier amplitude

$$h = \frac{\text{peak value of } m(t)}{A} = \frac{M}{A}$$

Modulation Index (continued)



“ The FCC may place certain limitations on an amateur station if its signal causes interference to domestic broadcast reception, assuming that the receivers involved are of good engineering design, such as: the amateur station must avoid transmitting during certain hours on frequencies that cause the interference

RACES

- “ Radio Amateur Civil Emergency Service
- “ Any FCC-licensed amateur station certified by the responsible civil defense organization for the area served may be operated under RACES rules.
- “ All amateur service frequencies authorized to the control operator are authorized to an amateur station operating under RACES rules.

- “ Spurious Emission is any radio frequency not deliberately created or transmitted, especially in a device which normally does create other frequencies. An harmonic is a spurious emission.
- “ What is the permitted mean power of any spurious emission relative to the mean power of the fundamental emission from a station transmitter or external RF amplifier installed after January 1, 2003 and transmitting on a frequency below 30 MHz?
- “ At least 43 dB below

E1C - Miscellaneous

- “ Definitions and restrictions pertaining to local, automatic and remote control operation;
- “ Control operator responsibilities for remote and automatically controlled stations;
- “ IARP and CEPT licenses;
- “ Third party communications over automatically controlled stations.

Station Control

- “ A station controlled indirectly through a control link is a remote control station.
- “ The use of devices and procedures for control so that the control operator does not have to be present at a control point is an automatic control of a station.
- “ The control operator responsibilities of a station under automatic control differ from one under local control since under automatic control the control operator is not required to be present at the control point.

Station Control (continued)

- “ An automatically controlled station may NEVER originate third party communications.
- “ A control operator must be present at the control point at a remotely controlled amateur stations.
- “ Direct manipulation of the transmitter by a control operator is local control.
- “ The maximum permissible duration of a remotely controlled station’s transmissions if its control link malfunctions is 3 minutes.

Station Controls (continued)

- “ The range of frequencies available for an automatically controlled repeater operating below 30 MHz is 29.500 MHz - 29.700 MHz.
- “ Only amateur stations which are auxiliary, repeater, or space stations may automatically retransmit the radio signals of other amateur stations.

Reciprocity

- “ IARP is an international amateur radio permit that allows U.S. amateurs to operate in certain countries of the Americas.
- “ CEPT agreement allows an FCC-licensed U.S. citizen to operate in many European countries, and alien amateurs from many European countries to operate in the U.S.
- “ Communications incidental to the purpose of the amateur service and remarks of a personal nature may be transmitted to amateur stations in foreign countries.
- “ You must bring a copy of FCC Public Notice DA 11-221 in order to operate in accordance with CEPT rules in foreign countries where permitted.

E1D - Amateur satellites

- “ Definitions and purpose;
- “ License requirements for space stations;
- “ Available frequencies and bands;
- “ Telecommand and telemetry operations;
- “ Restrictions, and special provisions; and
- “ Notification requirements.

Amateur Satellite Service

- “ Amateur Satellite Service is radio communications service using amateur radio stations on satellites.
- “ A telecommand station is an amateur station that transmits communications to initiate, modify or terminate functions of a space station.
- “ Telemetry is a one-way transmission of measurements at a distance from the measuring instrument

Amateur Satellite Service (continued)

- “ An Earth station in the amateur satellite service is an amateur station within 50 km of the Earth's surface intended for communications with amateur stations by means of objects in space.
- “ Any license class with appropriate operator privileges is authorized to be the control operator of a space station.

Amateur Satellite Service (continued)

- “ A space station must be capable of terminating transmissions by telecommand when directed by the FCC.
- “ Any amateur station so designated by the space station licensee, subject to the privileges of the class of operator license held by the control operator may be a telecommand station.
- “ Any amateur station, subject to the privileges of the class of operator license held by the control operator are eligible to operate as Earth stations.

Amateur Satellite Service Bands

- “ HF bands: Only 40 m, 20 m, 17m, 15 m, 12 m and 10 m bands.
- “ VHF band: only 2 meters.
- “ UHF bands: 70 cm and 13 cm

E1E - Volunteer Examiner program

- “ Definitions;
- “ Qualifications;
- “ Preparation and administration of exams;
- “ Accreditation;
- “ Question pools; and
- “ Documentation requirements.

VE program

- “ A minimum of 3 qualified VE’s are required to administer an amateur operator examination.
- “ Volunteer Examination Coordinator (VEC’s) is an organization that has entered into an agreement with the FCC to coordinate amateur operator license examinations.
- “ The test pool is maintained by all VEC’s Volunteer Examination Coordinators.

VE program (continued)

- “ Volunteer Examiner accreditation process is the procedure by which a VEC confirms that the VE applicant meets FCC requirements to serve as an examiner.
- “ The minimum passing score on amateur operator license examinations is 74%.
- “ Each administering VE is responsible for the proper conduct and necessary supervision during an amateur operator license examination session.

VE program (continued)

- “ If a candidate fails to comply with the examiner’s instructions during an amateur operator license examination, the VE must immediately terminate the candidate’s examination.
- “ A VE not administer an examination to any relatives of the VE as listed in the FCC rules.
- “ The VE team must return the application document to the examinee if the examinee does not pass the exam?

VE program (continued)

- “ An acceptable method for monitoring the applicants if a VEC opts to conduct an exam session remotely is to use a real-time video link and the Internet to connect the exam session to the observing VEs.
- “ Part 97 rules state that VEs and VECs may be reimbursed out-of-pocket expenses for items such as: preparing, processing, administering, and coordinating an examination for an amateur radio license.

E1F - Miscellaneous rules

- “ External RF power amplifiers;
- “ Business communications;
- “ Compensated communications;
- “ Spread spectrum;
- “ Auxiliary stations;
- “ Reciprocal operating privileges; and
- “ Special temporary authority.

- “ Spread spectrum transmissions permitted only on amateur frequencies above 222 MHz.
- “ A person with an amateur radio license from Canada is authorized the operating terms and conditions of the Canadian amateur service license, not to exceed U.S. Extra Class privileges.
- “ Under what circumstances may a dealer sell an external RF power amplifier capable of operation below 144 MHz if it has not been granted FCC certification?
 - . It was purchased in used condition from an amateur operator and is sold to another amateur operator for use at that operator's station
- “ The “Line A” is a line roughly parallel to and south of the U.S.-Canadian border
 - . Amateur operation between 420 MHz-430 MHz is not allowed in Line A

- “ FCC may issue a Special Temporary Authority (STA) to an amateur station to provide for experimental amateur communications.
- “ An amateur station send a message to a business when neither the amateur nor his/her employer has a pecuniary interest in the communications.
- “ An amateur stations are prohibited from communications transmitted for hire or material compensation, except as otherwise provided in the rules.

- “ The following conditions apply when transmitting spread spectrum emission:
 - . A station transmitting SS emission must not cause harmful interference to other stations employing other authorized emissions
 - . The transmitting station must be in an area regulated by the FCC or in a country that permits SS emissions
 - . The transmission must not be used to obscure the meaning of any communication
- “ The maximum permitted transmitter peak envelope power for an amateur station transmitting spread spectrum communications is 10 W

- “ One of the standards that must be met by an external RF power amplifier if it is to qualify for a grant of FCC certification is it must satisfy the FCC's spurious emission standards when operated at the lesser of 1500 watts or its full output power.
- “ Technician, General, Advanced or Amateur Extra Class operators may be the control operator of an auxiliary station. (A Novice Class operator may NOT!)

Done for tonight

“ For next week:

- . Review exam test pool E1A-E1F
- . We will discuss E2 – Operation Procedures

“ Questions, Comments?