Radio License Exam Course: Technician Class

Corky Searls – 10/2018

Session 1:

1) Introduction (15 Minutes 0:00)
   a) Brian Silverstein: Welcome and thanks to students.
   b) Students: Name; Why amateur radio; What you hope to get from the class?
   c) Class summary
      1. Goals/expectations for the class – Pass Technician Class license exam
         i. Get your Amateur radio license
         ii. Use your license to get involved in at least one of the many facets of Amateur radio
         iii. Learn through hands-on involvement
      2. What it is:
         i. Teach you how to pass the exam – Focus on the questions
         ii. Provide a context for the answers to the exam questions
      3. What it is not:
         i. Course in electrical or radio frequency communications engineering
         ii. Course in physics or math
      4. What is required of students:
         i. Basic 6th grade math/arithmetic skills
         ii. Active participation in the discussions and reviews
         iii. Do the homework – Practice exams (HamExam.com)
         iv. Ask questions if something is not clear
         v. Enjoy yourself
   d) What is Amateur Radio?
      1. Powerful communications service available to any private citizen
      2. A service available to provide opportunities for experimentation and development
      3. Amateur as separate from business or pecuniary interests
      4. Activities Include
         i. Social – the original worldwide social media, Clubs, Contests
         ii. Technical – Design, build, test components, radios, modes, etc.
         iii. Service – Emergency or public service communications
      5. Modes of communications:
         i. Voice – Analog and digital
         ii. Digital – like Internet using radio without need for additional infrastructure
         iii. Morse Code
         iv. Image
      6. License Classes
         i. Technician – All VHF and UHF privileges, with some HF
         ii. General – All VHF and UHF privileges, with most HF
         iii. Extra – All amateur privileges

2) Technician License Exam – What is it. (5 Minutes 0:15)
   a) Technician Class – 35 questions (Passing score 75% or 26 correct)
   b) Fixed question pool that changes every 4 years
   c) The questions with answers and confusers are all known in advance – in the book

d) Ten Elements (P iii, 13-15)
    1. FCC Rules – 6
    2. Operating procedures – 3
    3. Radio wave characteristics – 3
    4. Amateur radio practices and station setup – 2
    5. Electrical principles – 4
    6. Electrical components – 4
    7. Station Equipment – 4
    8. Modulation modes – 4
    9. Antennas and feedlines – 2
    10. Electrical safety – 3
e) Elements divided into sub-elements with one question from each
f) Calculators

3) Exam Prep (5 Minutes 0:20)
    a) Review the guidance for taking multiple-choice tests
    b) Practice taking exams
    c) * Demonstrate Hamtest setup for specific elements
    d) Some things will make sense others will simply need to be memorized (i.e., "I do not understand what they are asking, but I know the answer is choice D")

4) Class Sessions (5 Minutes 0:25)
    a) HamExam.org, aa9pw.com, ARRL websites – flash cards (sample tests)
    b) Two short lectures to provide context for discussions
        1. Radio Waves and propagation
        2. Electrical & Electronic Principles
    c) Study Sessions
        1. Session 1: Sections 1, 4, 2, 3, 8
        2. Session 2: Sections 7, 5, 6, 9, 0
        3. Session 3: Review, Q&A
    d) Exam

5) Element T1 – FCC Rules – 6 Groups (30 Minutes 0:30)
    a) Amateur Radio Service
        1. Phonetics – pp T1-3
    b) Authorized frequencies
    c) Operator Licensing & License Classes
    d) Authorized and prohibited transmissions
    e) Control Operator and control types
    f) Station Identification, Repeaters, Third-Party communications

6) Element T4 – Amateur radio practices and station setup – 2 Groups (10 Minutes 1:00)
    a) Station setup (Have operational station with GPS, computer, and SWR/Power Meter)
    b) Operator controls

7) Element T2 – Operating procedures – 3 Groups (15 Minutes 1:10)
    a) Station Operation
    b) Operating Practices
        1. Q Signals – pp T2-7
    c) Public Service & Emergency operations

8) Wave Theory lecture (15 Minutes)
    a) Frequency/Wavelength/phase/velocity/Polarization(Chart)
    b) Bands/Color (Chart)
    c) Adding information – Modulation (SDR Waterfall?)
        1. On/Off Keying
        2. AM
        3. FM
        4. Phase
    d) Propagation
        1. LOS
        2. Repeaters
        3. Earth/Magnetosphere/Ionosphere (Chart of Ionosphere w/ layers)
        4. Reflection/Refraction

9) Element T3 - Radio wave characteristics – 3 Groups (15 Minutes 1:25)
    a) Radio wave characteristics and propagation
    b) Electromagnetic wave properties
    c) Propagation modes

10) Element T8 – Modulation modes – 4 Groups (20 Minutes 1:40)
    a) Modulation schemes & bandwidth (pp. T8-2)
        1. CW – 150 Hz
        2. SSB - 2 KHz to 3 KHz
        3. AM – 6 KHz
        4. FM – 10 KHz to 15 KHz
        5. Video – 6 MHz
    b) Satellite Operation
    c) Operating Activities
    d) Digital Communication
        1. Voice
        2. Data

11) Prep for Thursday class (5 Minutes 2:00)
    a) Review multiple choice test guidelines
    b) Practice – Take exams, ARRL or HamTest
    c) Register with FCC for FRN – We would prefer not to have SS #’s on paperwork

Session 2:

12) Welcome, review and questions from previous session (10 Minutes 0:00)

13) Element T7 – Station Equipment – 4 Groups (20 Minutes 0:10)
    a) Station Equipment – (Full basic station)
    b) Transmitter/Receiver Problems

c) Antenna measurements & Troubleshooting
d) Basic Repair & Testing (Bring VOM)

14) Basic Electronics Lecture (15 minutes 0:30)
a) Battery
b) Light
c) Current & Voltage in Circuits
    1. Series
    2. Parallel
d) Compute Current – E = I x R (pp T5-12)
e) Compute Power (Energy produced) – P = I x E
f) Unit prefixes (pp T5-6)
g) Switch
    1. Manual – SPST
    2. Electronic control – Transistor
h) Circuit Components
    1. Passive components
        i. Fuse
        ii. Resistor – fixed and variable
        iii. Capacitor
        iv. Inductor & Antenna
    2. Semiconductors
        i. Diode
        ii. LED
        iii. FET

15) Element T5 – Electrical principles – 4 Groups (20 Minutes 0:45)
a) Electrical principles – Units and terminology
b) Mathematics for Electronics
c) Electrical principles – Current and components
d) Ohm's Law – formulas and usage

16) Element T6 – Electrical components – 4 Groups (20 Minutes 1:05)
a) Electrical components – Passives
b) Semiconductors
c) Circuit diagrams
d) Electrical component function

17) Element T9 – Antennas and feedlines – 2 Groups (10 Minutes 1:25)
a) Antennas
b) Feed Lines

18) Element T0 – Electrical safety – 3 Groups (15 Minutes 1:35)
a) Power circuits and hazards
b) Antenna safety
c) RF hazards