

TECHNICIAN CLASS

GENERAL CLASS

EXTRA CLASS

TECHNICIAN CLASS

FCC Element 2 Amateur Radio License Preparation



Contains the complete 394-question FCC Element 2 question pool effective July 1, 2010 to June 30, 2014

by GORDON WEST, WB6NOA



- ▶ Fully-illustrated Text Aids Learning
- ▶ Questions Reorganized for Logical Easy Learning
- ▶ Highlighted Key Words in Answer Explanations
- ▶ Fun, Educational Explanations Teach You Ham Radio
- ▶ Over 125 Addresses of Helpful, Educational Websites
- ▶ Frequency Chart Showing Privileges
- ▶ Chapter on Learning Morse Code
- ▶ List of VEC Examiners

Includes **BONUS COUPONS!**

FREE CQ MAGAZINE TRIAL SUBSCRIPTION
FREE BOOK WITH ARRL MEMBERSHIP
DISCOUNT ON YOUR FIRST RADIO!



An Instructor's Guide for Using the Gordon West

2010-2014 Technician Class

Amateur Radio FCC Element 2 Study Manual

Including tips on how to use Gordo's book to earn the
Boy Scouts BSA Radio Merit Badge

Instructor's Guide

Welcome & Thank You!

This *Instructor's Guide* for teaching the 2010-14 Technician class, Element 2, precisely parallels all of the *REORGANIZED* questions, answers, and descriptions in my *Technician Class* study manual. My reorganization of the entire question pool will cut your teaching time in half, and will help your students better understand and learn the material!

First of all – *Thank you* for teaching amateur radio. Whether you are teaching the entry-level Technician class Element 2, or are offering instruction for General class, Morse code, and Extra class, the entire amateur radio service will surely benefit from your decision to become an instructor. I estimate that there are fewer than 500 active ham radio instructors throughout the country. It is my hope that this *Instructor's Guide*, which parallels my 2010-14 *Technician Class* book, will help you develop some lively sessions in your upcoming classes.

If you haven't yet taught a class, using my *Instructor's Guide* in parallel with the student *Technician Class* book will help you organize and begin teaching your first course. You do not need to be a technical expert to teach Technician class – and you'll probably find your first class will have plenty of technical experts taking the course. With their help, everyone learns!



This *Instructor's Guide* for Technician class is based on my 35 years of offering amateur radio training courses. This booklet will encourage you to offer classes as part of your local ham radio club, your local community college system, or perhaps as a park district class. The booklet provides lesson plans that can be used for a 12-week community college semester; your local club's 10-week, 3-hour evening seminars; or my most-asked-for class format – a weekend course that runs from Saturday morning through Sunday afternoon. This booklet covers all three options.

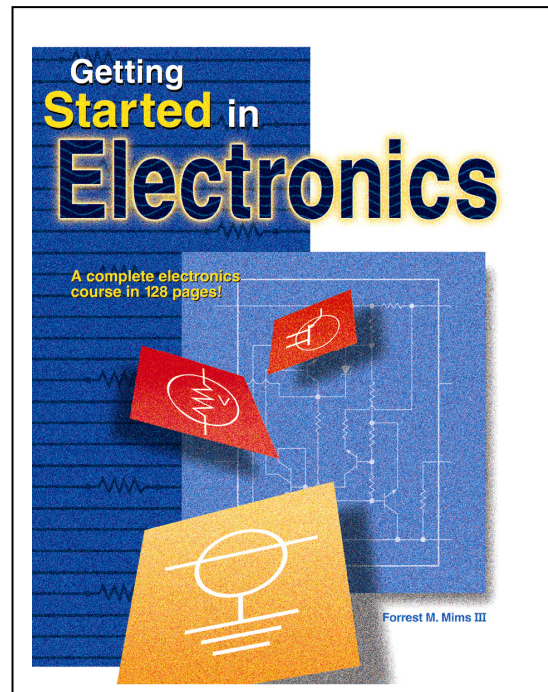
This *Instructor's Guide* parallels my completely reorganized *Technician Class* study manual for the Element 2 Question Pool, valid July 1, 2010 through June 30, 2014. This all new Question Pool is a complete rewrite of the entry-level Q&A. Questions are written to the reading comprehension of middle school students, and the focus is on current ham radio techniques for the new operator. Few old test questions remain, and the entire pool has been reduced from 510 questions down to 394 questions.

I have completely reorganized the questions into 20 topics, bundling similar type questions into logical groups that can be taught as single “hot topics.” This reorganization of the pool will cut your teaching time in half, and give you more time for actual “on-the-air” practical demonstrations.

IMPORTANT: If your students are using an alternate book, the Q&A order will not be the same as they are in this *Instructor's Guide* and in my own book. This guide parallels only the Gordon West *Technician Class* theory book.

My *Technician Class* study manual includes many web addresses for further student study after class. It has lots of "Ham Hints" – practical operating tips for the new operator. And it also presents keywords printed in blue that your students will review just before the exam.

You probably know, there's nothing like "hands-on ham" to get beginners excited about our hobby. Demos are the key to lively classroom sessions that get your students talking on-the-air, learning about how radios work, or understanding the fundamentals of electronics. I want to recommend an excellent book to you that you can use as a "lab book" to help with your classroom demonstrations. It's *Getting Started in Electronics* by Forrest M. Mims, III. You can obtain a copy from The W5YI Group, the same place where you can purchase copies of my *Technician Class* book for your students. You'll see some of the nifty experiments from Forrest's book here in my *Instructor's Guide*, and it will help you put on memorable demonstrations in class that will bring understanding to your students of some of the electronics involved in our hobby.



Our thanks to Forrest Mims for his permission to use some of the illustrations from his book in this *Instructor's Guide*. Please note, all of the material from *Getting Started in Electronics* is copyright © 1983 and 2000 by Forrest M. Mims, III, and may not be used without permission.

This *Instructor's Guide* also tells you where you can purchase books at an instructor's discount, and how to obtain free training materials like ham wall maps, frequency charts, manufacturer discount coupons, and graduation certificates.

So let's get started to see what it takes to teach amateur radio.

Gordo

How This Instructor's Guide Is Organized

After 35 years of teaching ham radio classes, I can tell you what works and what pitfalls to avoid. Some are real classics! In this *Instructor's Guide* for the 2010-14 Element 2 Technician class question pool, I am going to share with you every teaching secret I know. Here's how we are going to teach you, THE TEACHER:

Weekday Evening Classes or Weekend Seminars?	page 5
Go It Alone or Team Teaching?	page 7
Advanced Promotion Before the Course Assures Big Class Size	page 8
Classroom Tips for Teaching Success	page 9
Now It's Time for Your Homework!.....	page 11
Technician Class Instructor Course Outline	page 14
Demos & Props / Show & Tell Will Make Your Classroom Lively	page 16
Using Gordo's Book to Earn the BSA Radio Merit Badge	page 23
Resources	page 26
An Invitation to Sit-In & See for Yourself	page 29
2010-14 Technician Class Student Pre-Study Q &A.....	Page 31

THE REAL LEARNING STARTS HERE

Do you know where the real learning of ham radio occurs? If you think it happens in your classroom, you are partially correct. But the real learning of amateur radio occurs **ON THE AIR**. That's why the live demos in class are so very, very important. It exposes your students to the fun and excitement of live ham radio in action.

For your students, the real learning will occur when they buy their first radio and discover that they need to program it. The real ham radio learning occurs when they're on the roof trying to recall what formula you taught them in ham class for building a quarter wavelength coffee can ground plane. The real learning occurs when the ham is ready to mount the antenna on their vehicle and discovers that it is just inches from the back of the passenger's head.



So remember, getting the Amateur radio license to operate on the air is really like getting a license to begin learning ham radio! You're role is to help the students get started!

Weekday Evenings, or Weekend Seminars?

What is the best time to have your amateur radio beginner course? A 12-week class gives you plenty of time, and 9-week classes fit well into community college curriculums. A weekend class is my ultimate favorite, but it only works when you use the tricks I'm going to share with you on how to get the students working their pre-study homework ahead of class. Let's review the pros and cons of each approach to scheduling your classes:

WEEKNIGHT CLASSES

It takes about 20 hours to completely cover all 394 test questions in the new Element 2 question pool. What a relief that we're no longer training for the old 510 question pool, phased out on June 30, 2006. This new pool concentrates on questions that new hams should know before going on the air with their VHF and UHF privileges.

When you review my book, you'll see that I have taken the 394 total questions and reorganized them into 20 topic groups. By doing this, the question pool is now much more manageable, and all 394 Q & A's can be covered during 8 to 12 classroom sessions, each about 3-hours long, meeting once-a-week in the evening. Good class hours are 7 to 10 pm, but students may vote for 6 to 9 pm as an alternative.

If you offer a weekly ham class course that may last up to 12 weeks, the first week's session may be devoted to the ham radio introductory chapters, and the final week's session for the actual Element 2 exam. Twelve classes held once a week for 3 hours will require minimal homework or pre-study on your student's part. I've found that most students taking a 12-week course only do a minimal amount of homework before each class session, so the real learning only takes place in the classroom.

The 12-week class will result in an approximate 50 percent attrition rate. If you start with 30 students, you'll be lucky to end up with 15 graduates. You can be the best instructor in the world, but keeping your students on a 12-week schedule is next to impossible with everything around them changing on a daily basis. So be prepared to lose half of your students if you decide to hold a 12-week course.

WEEKEND SEMINARS, SATURDAY & SUNDAY

The most popular courses I teach throughout the country continue to be my 2-day weekend seminars. They begin Saturday around 8 am and go 'til 6 pm, and resume on Sunday from 8 am to test-taking around 4 pm, with graduation at 6 pm.

The big selling point for the weekend Technician class intro to ham radio seminar is your students think that in just one weekend they will end up with their license. And they do. But what they might not factor in for this weekend class will be the pre-study you begin to send them *before* class. Weeks before. Sometimes months before!

The pre-study is not hard, and you will see it in the back of this *Instructor's Guide*. The pre-study gets the students to study ahead of time, and leads them by the hand and pencil through their regular Gordon West *Technician Class* book, looking over all of the 394 questions in a

reorganized 20-topic program. We give them the actual page number and sometimes the actual question number to fill in the blanks on their home-study. They think the home-study is so easy that they indeed get totally through it before the class begins. You have now successfully trained these students to pre-study ahead of time and get a big jump on classroom instruction.

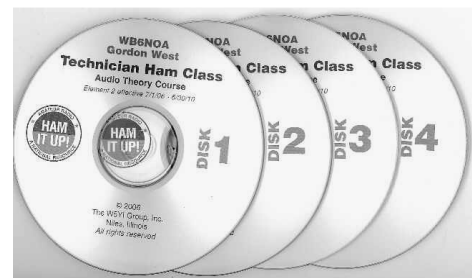
The attrition rate you can expect in a weekend 2-day seminar-style course should be less than 10 percent. You also will draw much larger numbers of students to the weekend seminar compared to the 12-week community college or ham club format. I went from evening classes at 12 to 15 students per class all the way up to an average of 75 students for each weekend course for the entry-level Technician class license. Upgrade weekend classes for learning the Morse code and General class average more than 50 students. For the Extra class, now that there's no longer an additional code test, I usually end up with 30 to 40 in the weekend class.

The biggest thing for you to promote about the weekend class is that the upcoming course is absolutely not a “cram class.” Make sure everyone knows that you are teaching ham radio, not just teaching the 392 Q&As in the *scrambled* Element 2 question pool. If you were to try to teach the 394 questions in numerical order as originally presented by the Question Pool Committee, it might take you THREE WEEKENDS to complete a successful seminar! But by following the 20 logical topic groups in my book, you can easily teach the entire 394 question pool in a weekend if you stick to the time line presented here in your *Instructor's Guide*.

PRE-STUDY FOR WEEKEND SUCCESS

The popular weekend class should be preceded with student pre-study homework. Students are expected to sign up well before the class, and you will send them pre-study, fill-in-the-blank homework before the big weekend seminar. The students will fill in the correct answer from what they read in my 2010-2014 *Technician Class* book. The questions in the pre-study homework precisely follow the reorganized Q&As as presented in my *Technician Class* book.

Pre-Study Q&As that guide students using my *Technician Class* book and/or my exclusive audio theory course on 4 CDs is included at the end of this booklet, starting on page 29. ***Feel free to copy these Pre-Study Q&As and pass it out to your students.*** It is written for the weekend seminar, but can easily be adapted as homework for a weeknight 10 to 12 session course. The pre-study assures that students will open up the book ahead of time. The students will not need to search for any answers – almost all of the pre-study topics illustrate what pages the material may be found in my Tech book.



In addition to the fill-in-the-blanks home-study workbook, I also expect the students listen to the 4 audio CDs that I have recorded that cover Technician theory. While the audio course is “extra credit,” it increases their enthusiasm for the class, and tunes them in on what to expect when they begin operating on the air. When the students listen to the audio course, it really brings ham radio TO LIFE!

You may wish to have your students study the computer course that also is available from The W5YI Group. The computer course carries my same description of the correct answer, and some students prefer to study at their computer rather than simply read the book.

When your weekly or weekend students hit the classroom, you will know immediately which students will be passing the examination with flying colors because they are the ones who have worked their home study ahead of time. A few might not have any home study completed at all, so you may wish to reschedule them for a different class at a date in the future – or at least warn them that without home study the weekend class probably won't be a success for them.

WEEK NIGHTS, WEEKENDS, OR BOTH?

So you need to make a decision – are you going to teach a relaxed 10- or 12-week evening series of ham classes, or are you going to do a one weekend seminar based on home study ahead of time? If you are looking to attract and graduate a larger number of students, I guarantee that the weekend seminar is a great way to go.

Or, do as I do, teach both – offer the traditional 12-week evening course with your local community college or ham club, and then have a few one-weekend licensing seminars for those who can't take 10 or 12 weeks out of their busy schedule for a once-a-week evening class.

GO IT ALONE OR TEAM TEACHING?

To be a great instructor, you must have plenty of pizzazz and presence. It takes a lot more than in-depth knowledge of amateur radio to make you a good presenter. You need to learn how to read your students, and how to get them involved in the material. That's why the props and demos we're soon to talk about are so essential.



If you plan to do the weekend class all by yourself, you better be in great physical and mental shape. By the time Sunday evening rolls around, you'll just about collapse from the frenetic effort required to teach so much material in so little time.

In this *Instructor's Guide*, I will soon be showing you how to make the complex simple. We'll talk about a light bulb beginning to glow, or getting two of your in-class engineers to figure out why in the world the magnet that you dropped through the hollow aluminum tube defies the law of gravity and makes an ever-so-slow exit.

I encourage you to have additional help in the classroom, especially if you're doing one of the weekend marathon sessions. But team teaching is a lot like acting on stage, and you need a script to follow in order to keep the class on schedule and make sure you cover all the material. If you select a good teaching partner, make sure they use the course outline following the book as their guide. You can split up the topics to be covered between you. That way you each can devote more energies to fewer topics. The result will be a better course for your students, and less work for you! Also, you can recruit help from any one or two other hams to put on a couple of special demos that illustrate important material.

But a word of caution – you need to carefully choose your assistant instructors because even the most knowledgeable technical ham may not have the skill to “read” their audience and will put them into nod-off land. The well-meaning, overly-technical ham will go on and on and

on, and this zaps your teaching time line instantly, and it will take you the rest of the class session to catch up. Don't let this happen! While it's great to explore the fascinating world of PSK-31, and while it would be fun to do a one-hour presentation on this new frequency saving digital mode, keep in mind that there may be only one question out of 394 on this subject, and unfortunately, you can only give it a couple of minutes and encourage students to stick around after class and watch a live PSK-31 demo take place.

Advanced Promotion Before the Course Assures Big Class Size

It pays to advertise! You know that, of course. And if you want to attract enough students to your ham radio class, you need to get the word out.

Here's a sample flyer that has been successful for me in promoting entry-level ham classes. Please feel free to use any of the wording that you like to help promote your upcoming class. If you have a local ham radio dealer near you, they will probably be more than happy to put your class flyers right up front. Remember, everybody who graduates from your class will be wanting to buy ham equipment, and I always recommend going to a local dealer that is helping support your class.

If you are teaching your class for a specific audience, such as boaters, emergency squads, pilots, RVers, or model airplane flyers, each of these organizations usually has specialty stores that would probably be more than happy to help promote the class. And don't forget to put a notice on their websites or in their e-mail newsletters.

Once you set your class date, please contact The W5YI Group instructor program and let them know your schedule. Many times prospective hams call the W5YI-VEC asking where there might be a class, and they'll recommend your class to students calling from your area.

Go to: **www.haminstructor.com**
To register your upcoming classes on the W5YI website

Let local amateur radio clubs know you are teaching a class for beginners. Often, they will have students to send you! Clubs also can help get the word out, and every ham club loves to see more members join up, and more newcomers get into our hobby. So regularly work the clubs, support what they are doing, and you'll probably find they will support you in a big way!

Home Study first! In 2 days, you will be a ham radio operator.

HAM RADIO TWO-DAY LICENSE CLASS

Free Training - Only cost is materials & test fee.

COSTA MESA

July 22 & 23 (SAT. & SUN.)
COSTA MESA NEIGHBORHOOD COMMUNITY CENTER

YOUR INSTRUCTOR IS GORDON WEST, WB6NOA

- Pass your ham radio FCC license exam right in class, on the second day.
- Live equipment demonstrations, including emergency radio communications.
- Radio demonstrations of radio internet linking, plus computer communications.
- Training on how to operate through local radio repeater systems.
- Study questions reorganized for easier classroom learning. **New Simple Test!**
- Multiple-choice examinations with no Morse Code test required.


Ham radio operators provide valuable communications in an emergency. Many cities throughout the country use ham radio operators to support Community Emergency Response Team (CERT) training and actual call-outs. This two-day action-packed class will feature live ham radio equipment for everyone to learn how to operate. Pre-study before class and spend two days to pass your amateur radio Element 2 Technician class examination, right in the classroom on Day 2. **New Easier Test!**

- Earn full ham radio Technician class radio privileges.
- Earn radio communications through satellites and the International Space Station (ISS).
- Operate your own ham radio position-reporting system (APRS).
- Operate ham radio television and computer radio photos (ATV and SSTV).
- Become a ham radio emergency responder.

Call GORDON WEST now to learn more about the upcoming class and your pre-study assignments (714) 549-5000, Monday - Thursday, 10:00 a.m. - 4:00 p.m.

GORDON WEST will help you pick an upcoming ham radio licensing class that will match your expected goals. **\$99.00 fee covers all books, computer, and audio CD materials.**
\$14.00 Test Fee on Sunday.

*Pre-registration is required. You may use the form below, but you must first contact GORDON WEST by telephone to decide which class is the best one for YOU. Some classes emphasize ham radio for mariners and RVers for fun and safety. Call GORDON and let him help you choose the right class for your upcoming Technician license.



RADIO SCHOOL REGISTRATION - TECHNICIAN CLASS

Name _____ Phone (DAY) _____ E-mail _____
Address _____ City _____ Zip _____

Please fill out one registration form per person. Make your check payable to:
RADIO SCHOOL, INC. 2414 College Drive, Costa Mesa, CA 92626 (714) 549-9000 DAYS (714) 434-0666 24 HRS.

Costa Mesa, July 22 & 23

Classroom Tips for Teaching Success

Where you hold your class depends on many factors. The organization that is sponsoring you may provide the space. You may have to ask the local school for a classroom. If you're doing a weekend seminar and are attracting students from wide area, you may want to find a hotel with meeting rooms, food service, and hotel rooms for those students who want to stay overnight.



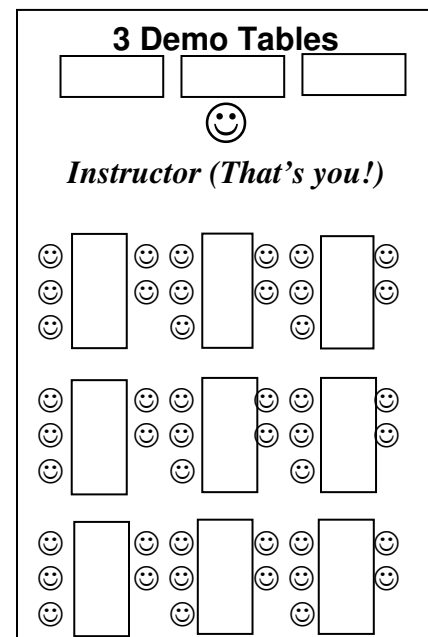
SETTING-UP YOUR CLASSROOM

Try to select a classroom that will allow you to gain access to an outside area to set up some simple antennas. This allows you to go on the air during classroom sessions, which dramatically spices up your teaching with on-the-air demos.

I prefer to run the coax out windows where there's absolutely no chance that someone might trip over the cable. Be careful to never create a hazard by running the coax where someone might trip. Make sure no one can get anywhere near any antennas that you plan to transmit on. Also, make sure that you don't put up any antenna that has protruding metal spikes that could catch on clothing or cause injury to a student who doesn't see it in the evening. SAFETY is your most important consideration when laying out your classroom demos.

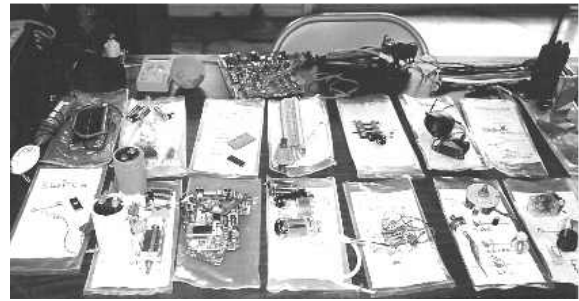
Here's a great trick I want to share with you. This is how I have the students seated within the classroom. I always prefer that students sit at a table. But if the 6-foot or 8-foot tables are horizontal to the instructor, this means you can only get a maximum of 3 students per table.

Turn the tables vertical to you, as shown, and put 3 chairs on one side and 2 on the other to accommodate 5 students. If you have 3 rows of 3 tables per row, try putting 3 chairs on one side, and 2 on the other for an 8-foot table, or 2 and 2 for a 6-foot table. You'll be surprised how many more students you can pack into a very small room without them feeling overcrowded. Leave enough room in between the rows of tables so you can easily walk up and down between the tables, looking over their shoulder to see how well your students are doing.



I usually have three 8-foot tables up front for my demo gear. I call it my "show and tell" stuff, and it is one of my biggest successes for a class that everybody talks about. Bringing loads of demo gear allows you to pass around 2 or 3 small audio transformers at the same time. Then 2 or 3 resistors at the same time. Three coils, 3 transistors, 3 chips, 3 pieces of coax cable – you get the idea – every time you talk about something electronic in class, start the demo gear moving up and down the tables.

Now, beside the insides of a radio in a gazillion pieces all kept in plastic bags and marked so they can inspect everything, make sure you have a minimum of a dual-band radio in the classroom for 2 meters and one other UHF band, plus a worldwide radio to let your students listen in on all of the excitement that is out there. These radios go to live outside antennas, and this further adds to the excitement of your ham class. The more stuff you have, and the more live demos, the more students are going to hear about your technique of teaching, and they will be waiting in line to sign up for your next class!



In the Resources section of this *Instructor's Guide*, I show you listings of web addresses where you might contact amateur radio manufacturers and bring in colorful wall charts. These wall charts will help dress up your classroom and allow you to point things out so everyone can see. **In addition to the wall charts, The W5YI Group may include maps and frequency charts with each textbook you order from them.** This way you can lay the charts out for each student when they first enter the classroom on day one. Visually, this adds excitement when they come in to take their class and see that they already have things waiting for them right at their seat.

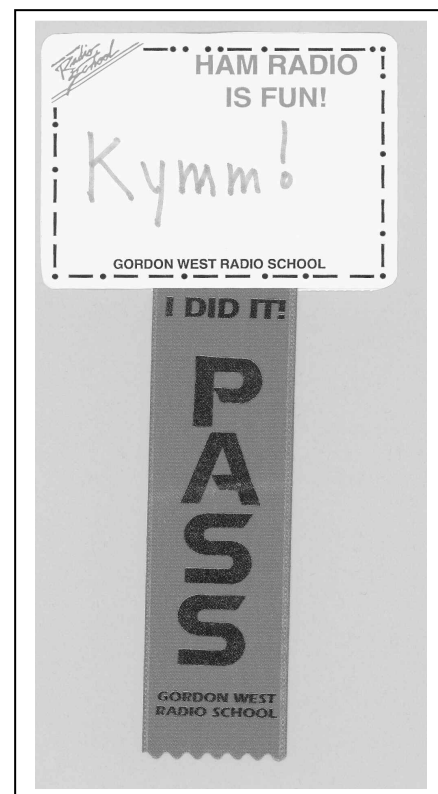
NAME TAGS

Here's a sample of a stick-on student name tag. This is another great icebreaker! In very large letters, print each student's first name on their tag, and have them wear the tag for the first few class sessions. Remember that the first impression you make is always a lasting one, so you want to make your first class session a rousing success. This means make all students feel comfortable, and the big name tag certainly helps.

And I give out an inexpensive ribbon to those who successfully pass my course and get their license. It may seem "corny" but it works. Everyone relaxes and has a good time!

As you get close to your first class session, contact your students via e-mail, letter, or phone, and double check that they know exactly when the class is scheduled, and where the class is going to be held. Go over every detail including parking. Double check to see if you might have some handicapped students who may need a special parking spot, or special accommodations to the classroom.

Remember, that first impression on finding the classroom successfully puts your new students in a good mood to begin their studies. If they get lost and can't locate the classroom immediately, you'll have an uphill challenge to make those students happy. So its a good idea to put up some directional signs to help them find their way.



Now It's Time for Your Homework!

Before I start you out with your class outline, we need to make sure you are absolutely up to date on all that has changed in ham radio over the last couple of years. In my *Technician Class* book, I bring everyone up to date on a little ham history, privileges your students will earn, preparing for the class, taking the class, and ultimately passing the final exam. So instructors, the following is YOUR homework assignment before we begin to teach ham radio in the classroom.

Your assignment:

READ & REVIEW PAGES v AND vi - SKIM CHAPTERS 1 + 2

These first 2 pages will help motivate your students to follow a logical study plan to ultimately obtain their amateur license using their book and working with you, their instructor.

Next, skim Chapters 1 and 2 on pages 1 through 18. Chapter 1 briefly describes to your students the excitement awaiting them as ham radio operators, the need for an FCC license, and encourages them to join a club, read magazines, and get an Elmer to show them the ropes. Chapter 2 fully explains all of the frequencies they will earn with JUST the no-code Technician class license that they will achieve in your upcoming class. Chapter 2 has some excellent band plans that illustrate all of the excitement on the popular VHF and UHF bands. Since YOU have already been on the air, you can skim the privileges, but please note that on page 15 I show them all of the new frequencies they will earn in an easy-to-read table. Combine this with the frequency charts that accompany each book you are bringing in for your students, and you'll have no problem showing them all of the "radio real estate" they will soon be acquiring.

Your assignment:

CHAPTER 3 IS IMPORTANT FOR YOU! A LITTLE HAM HISTORY

I suggest that you carefully read this important chapter to better understand all of the changes to our current amateur radio service. By thoroughly understanding the ham radio history you will get a broad perspective on how relatively easy it is for your new students to pass their first test and get on the air with VOICE. This chapter may help you better understand some of the resentment felt by our senior hams who complain the testing process is not tough enough – certainly not like the old days when they HAD to learn Morse code.

And this is why we suggest you teach a little bit of CW in the classroom – a little code instruction will satisfy some of our senior hams who might worry that we are simply teaching the test and skirting the code issue. Once they see the work that you're putting in to your teaching in the classroom, and they hear the dits and dahs, they will probably join you as a guest instructor. This is good!

Your assignment:

CHAPTER 4 GETS YOU READY TO TEACH THE COURSE

Chapter 4 – *Getting Ready for the Exam*, is another important chapter for you to know and understand *before* you start your class. In this chapter, I typically describe to the students the yearly update process of individual amateur radio question pools. I advise the students that an older book with the old question pool will not reflect the new updated Technician class question pool, valid 2010 through 2014. Let them know that the pool has decreased from 510 questions down to 394 questions, and many questions are asked two and three times over with slightly different wording. This means they are only studying around 150 question topics.

Page 26, *Table 4-1*, shows the new Element 2 syllabus, total questions in each sub-element, and the number of questions taken from each subelement to make up their 35-question exam. Many students will be worried that the electronics portion of the test will be tough for them – but if they look at subelement T5 in this Table, they’ll discover that only 4 test questions on their upcoming exam will be taken from this subelement. They’ll breathe a sigh of relief!

Your assignment: Turn to page 28

WHY I REORGANIZED THE QUESTION POOL

Pay careful attention to pages 28-30. This explains why I decided to reorganize all of the Q&As in the new 2010-14 Element 2 pool into the 20 logical topic groups. Here’s some background.

Each of the three Amateur radio question pools is developed by the National Conference of Volunteer Examination Coordinators’ Question Pool Committee. The abbreviations are NCVEC and QPC. This new question pool is no longer a re-hash of the older pool. The NCVEC made the wise decision to “start fresh” with new technology Technician class entry pool questions, rather than using older questions that date back to the original Novice class exam. This allows you to teach relevant topics like repeater operation, Voice Over Internet Protocol communications, and practical radio concepts rather than abstract subjects like inductive reactance and near field/far field safety formulas.

This new 394 question pool is by no means a “dumbed down” examination for the new ham radio operator. Rather, this fresh new question pool was developed by professional educators to take the reading level down to the middle school level. Complicated diagrams have been omitted, and tricky answers with the last word incorrect have been eliminated. Fresh new topics have been added such as IRLP and repeater linking. On air operating courtesy has several questions, plus repeater programming in a new VHF/UHF handheld. Practical RF safety is always an important topic area with more meaningful questions on antenna safety around high voltage power lines and personal safety gear when taking part in an antenna party.

This new question pool eliminates the need for rote memorization of tough answers just to pass the exam. Rather, each test question has real relevance for the new ham radio operator starting off with a dual band transceiver on 2 meters and 440 MHz. Instead of asking a question about a moonbounce array of 4 long-beam Yagis, this new question pool talks about ¼

wavelength ground plane design, simple halfwave dipoles, and why a longer rubber duck is better than a shorter rubber duck! I have also rearranged the material in a logical teaching order. This arrangement follows the classroom syllabus I have used in teaching my weekend seminars. You won't need to skip around in the book to keep things together!

All 394 questions are in my new *Technician Class* book, rearranged for logical learning and teaching. Refer to pages 205-206 for the cross reference. Then check our pages 41-42 and see the convenient listings of CEPT agreements, third- party agreements and reciprocal agreements I also give you the Q codes on page 75, and with safety always in mind, Tables on pages 198 to 200 provide a simplified chart on Maximum Permissible Exposure limits. All this is in my new book just for you and your students!

TEACH YOUR CLASS BY THESE TOPIC AREAS

Don't skip around in the book – I have completely minimized the need to do that in THIS book. Look again on page 30 and go with the flow of this logical instruction method. This is the same order that I use to present the material in my audio course, and our computer course includes my fun explanations from the book. My book, the audio course, and the software are available through The W5YI Group Instructor Division, and for a discount, too.

To further convince you that my rearrangement is on target, look at pages 60 and 61 and see the original topics T1B, T8D, T3B, and T2A all arranged together covering Tech frequencies. You can imagine the amount of skipping around you would need to do to keep these logical areas all together. I've done the work for you!

Now check out our cartoon friend **Elmer**, who provides numerous *Ham Hints* in shaded boxes surrounded by a CW border. This breaks up the copy and adds a smile to your instruction. **Elmer** and his *Ham Hints* add important substance to specific questions in the pool. Then check out **WEBSITE RESOURCES**, also in a shaded box, specifically for you and your students to obtain additional information with accurate www web locations. These web addresses will assist you in some simple homework assignments for once a week classroom sessions.

So please trust me on this one. I'm out there teaching these classes all over the country, and the reorganized questions are a much more logical way to instruct your students. Stay with the book, page by page, no jumping allowed!

Technician Class Instructor Course Outline

The course outline you are about to read works for both the weekend seminar as well as 10- and 12-week evening classes format. The course outline specifically parallels my *Technician Class* book for 2006-2010. I rearranged all of the Q&A in the new question pool into 15 topic groups based on how you should teach ham radio, presenting the material in a logical order and making it easier to learn!

If your students are using another book, the Q&A won't be in the same order as they are presented in my topic groups, and the "other book" students will quickly get lost.

As a professional instructor yourself, I value your comments about where a couple of questions might be moved around to improve the presentation of the Q&A. We can do this easily when we next reprint our book, so let's hear your suggestions. If your suggestions make the book, I will acknowledge you up front in the beginning of the book, too!

Here are the 15 topic areas grouped into class sessions based on a 12-week course. You should be able to cover all of the topics included in each group during the course of a 3-hour session.

<i>Session Number</i>	<i>Topic Areas – Pages to Cover</i>
1	Introduction to Ham Radio – v through 30
2	About Ham Radio – 31 to 34 Call Signs – 35 to 43
3	Control – 44 to 48 Mind the Rules – 49 to 53 Tech Frequencies – 54 to 62
4	Your First Radio – 63 to 68 Going On the Air! – 69 to 78 Repeaters – 79 to 85
5	Emergency – 86 to 91 Weak Signal Propagation – 92 to 98
6	Talk to Outer Space! – 99 to 104 Your Computer Goes Ham Digital! – 105 to 111
7	Multi-Mode Radio Excitement – 112 to 119 Run Some Interference Protection – 120 to 125
8	Electrons – Go With the Flow! – 126 to 136 It's the Law Per Mr. Ohm! – 137 to 140 Picture This! – 141 to 150
9	Antennas – 151 to 157 Feed Me with Some Good Coax! – 158 to 165
10	Safety First! – 166 to 177
11	Review and Chapter 5 – 178 to 187
12	Exam Prep, Session and Graduation

NOTE: For a shorter class schedule, combine sessions 1 + 2, 6 + 7, and 9 + 10.

DO SOME MORSE CODE

At every class session, I do a little bit of Morse code on my paddles and electronic keyer. This gives students a smooth intro to the code, and they won't be afraid to get the code audio course after they successfully complete their Element 2 Technician no-code exam. By doing this, they will have a real feel for Morse code. Even though the FCC has eliminated the Morse Code test, in-class simple code practice is fun for most students and will give you a moment to relax your vocal cords! You will adapt quickly to sending with one hand and sloshing down something cool and wet with the other.



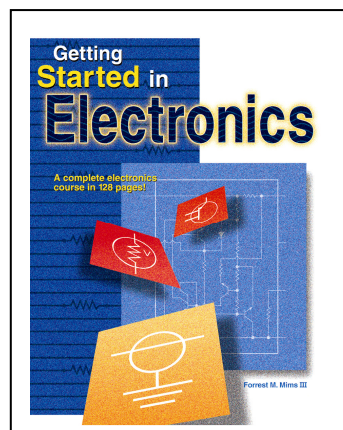
When you do the code in your classroom, you should try to use multiple speakers throughout the room to minimize echoes. Use an electronic key, and key-in the code yourself. This allows you to make dramatic pauses between hard letters, words, sentences, and allows you to re-enter any code character that you see your students might be missing. ***Don't just play code cassettes or a computer code program. Do it live yourself for maximum effect.***

I also recommend you do some code over the air, asking the other station to please QRS so that your students may write down what the other station is sending. This is another great way to keep excitement at its peak in your classroom.

DEMOS & PROPS / SHOW & TELL WILL MAKE YOUR CLASSROOM LIVELY

You know that a picture is worth a thousand words – and a hands-on demonstration is a lot more fun and memorable than a straight “talking heads” lecture. Now let’s take a look and see what graphics, demos, and props you can build into each of my 15 topic areas. Here’s a host of “show and tell” ideas to make your classroom session lively, memorable, and fun!

When you start to figure out your classroom demonstrations, review the Forrest Mims book *Getting Started in Electronics*. It is full of fun experiments that will help you get your points across, especially when it comes to helping your students understand the fundamentals of electricity, electronics, and how components work.



About Ham Radio (pages 31-34)

- ◆ FCC Rulebook, CFR 47, Part 97 (available at quantity discounts from The W5YI Group)
- ◆ Live ham equipment for VHF/UHF.
- ◆ Copy of ham license.
- ◆ Old call book.
- ◆ Computer printout of FCC licensing database.
- ◆ NCVEC Form 605.
- ◆ Sample copy CSCE.

Call Signs (pages 35-43)

- ◆ Large call sign map of USA.
- ◆ Ham call sign license plate.
- ◆ On-air contact to illustrate saying call letters.
- ◆ NCVEC Form 605 for call sign change.
(available free from The W5YI-VEC)
- ◆ Club call sign application. (available free from The W5YI-VEC)
- ◆ Special event call sign application.



Control (pages 44-48)

- ◆ Stand next to an on-air radio control point.
- ◆ Bring in second ham with higher/lower class license to operate.
- ◆ Enter room with 6 HT's on your belt!
- ◆ Ham call sign prefix of the world map. (available from W5YI Group when ordering books)
- ◆ Toy cruise ship and toy airplane.
- ◆ Refer to Page 199 for reciprocal agreements.

Mind the Rules (pages 49-53)

- ◆ Pass around Part 80 of the FCC Rulebook. Give them a rule number, and have them look it up and explain.
- ◆ Have a student read a script, either a legitimate ham news announcement, or an illegal general broadcast to the public.
- ◆ Tune around the 2-meter band and identify proper and maybe some improper ham transmissions.

Tech Frequencies (pages 54-62)

- ◆ Start out by tossing 10 or 15 foam fuzz balls around the room, illustrating radio waves traveling through the air.
- ◆ Describe the velocity of radio waves, and then describe frequency and wavelength.
- ◆ Use a plastic slinky to better illustrate frequency and wavelength. Have a student pull it apart for longer wavelength, and have another student measure frequency by how many oscillations in one second.
- ◆ Use an adjustable tone generator to illustrate audio and radio frequencies.
- ◆ Use a guitar or other stringed instrument to illustrate frequencies.
- ◆ Review manufacturer color frequency privileges charts
(Available free from W5YI Group Instructor Program when ordering books).
- ◆ Listen to signals on different bands.
- ◆ Show HF, VHF, UHF on the board.
- ◆ Make contacts on 1.25 or 70 cm band.
- ◆ Have students identify wavelength when looking at a radio's frequency.
- ◆ Bring in guest in military uniform.
- ◆ Bring in a radio-controlled model boat or car. Show them how the model turns and maneuvers via radio control. You don't necessarily need to be on 6 meters to illustrate radio control, but have a separate receiver to tune into the actual sounds that the radio-control transmitter may send to the model airplane or boat.

Your First Radio (pages 63-68)

- ◆ Turn on your working radios and let them listen to phone and data.
- ◆ Illustrate CW with on and off of the telegraph key.
- ◆ Show off a typical FM mobile radio and identify stages within that radio.
- ◆ Use an inexpensive portable deviation meter and check out a radio that might be under or over modulated.
- ◆ Show off a dummy load.
- ◆ Use plastic boxes to illustrate different stages of a radio system.
- ◆ Tune in WWV for receiver calibration.
- ◆ On HF, click in different filters to show bandwidth.
- ◆ Have different blocks representing different types of radios, and have your students match up the blocks with the particular radio.



Going On The Air! (pages 69-78)

- ◆ Work your live classroom equipment to another station on 2 meters.
(*Illustrate listening before transmit.*)
- ◆ Give signal reports on a repeater.
- ◆ Have students say their name and then spell their name phonetically.
- ◆ Have student read an HF RST report.
- ◆ Have the class listen to an incoming 2-meter simplex signal. You can illustrate full quieting to noisy by slightly unscrewing the antenna SMA connection. There is a point that the signal will drop off rapidly, and this allows you to show them full quieting, half quieting, and all noise on FM.
- ◆ Illustrate how to place a general call on FM.
- ◆ Illustrate how to place a general call on 10 meters SSB with the CQ.
- ◆ Pass around a list of ham abbreviations.

Repeaters (pages 79-85)

- ◆ Illustrate repeater on ceiling as silver foil-covered box with 2 antennas. Use a small laser pointer.
- ◆ Bring in a portion of a real repeater.
- ◆ Show a telephone handset for repeater RX and TX.
- ◆ Show dual-band handheld.
- ◆ Make an actual repeater call.
- ◆ Listen to CW repeater ID.
- ◆ Listen to a CTCSS received by an HT with a big external low-frequency-response speaker.
- ◆ Illustrate listening to the input of a repeater.
- ◆ Dial in a repeater and work politely into a conversation between the courtesy tone.
- ◆ Dial around and listen to different repeater conversations.
- ◆ Pass around a 35-watt HT power amp for mobile operation.
- ◆ Dial into a 440 MHz closed repeater system and monitor.
- ◆ Use a laser pointer to demonstrate simplex.
- ◆ Make a repeater autopatch phone call.
- ◆ Draw a typical 2-meter band plan from color frequency chart.
- ◆ Transmit a slow-scan picture on 2 meters.
- ◆ Use laser pointer again to demonstrate line of sight.
- ◆ Use thick but bendable Plexiglas to demonstrate refraction and ducting with a laser pointer.
- ◆ Play portions of my audio course on recorded record-breaking tropo contacts.

Emergency (pages 86-91)

- ◆ Play excerpt from my audio course of a station calling for help.
- ◆ Play excerpt of earthquake and hurricane emergency traffic.
- ◆ Give examples of non-emergency but priority calls over a repeater.
- ◆ Hand around rechargeable batteries and alkalines – describe battery life, battery natural decay for rechargeables, and small AA cell battery rechargers.
- ◆ Show a RACES patch.
- ◆ Conduct third-party traffic locally with student.
- ◆ Decline money payment.
- ◆ Review third-party list, Page 110.

Weak Signal Propagation (pages 92-98)

- ◆ Bring out those soft fuzz balls and start throwing them around the room. This will get everyone's attention to what radio waves may be doing all around them.
- ◆ Bounce the fuzz ball off the ceiling to illustrate skywaves, and roll it on the floor to show groundwaves and ground-wave obstructions.
- ◆ Bring out a prism to illustrate refraction of wavelengths as seen in different colors of sunlight.
- ◆ Tune into WWV at 18 minutes past the hour for solar report.
- ◆ Tune into skywave comms on HF.
- ◆ Tune into groundwave signals on HF and 2 meters.
- ◆ Reverse binoculars held over a white sheet to show sunspots.
- ◆ Illustrate minimum ionospheric activity just like minimum temperatures just before dawn as you wear a very heavy coat.
- ◆ Tune into HF CW to illustrate what a beacon may sound like.
- ◆ Look for beacons on 10 meters and 6 meters.
- ◆ With a multimode VHF/UHF radio, tune into beacons on 2 meters in your area.

Outer Space! and Ham Digital (pages 99-111)

- ◆ Bring in your lap-top computer with a multimode VHF/UHF radio, or an HF radio on an outside antenna. Tie it in with a terminal node controller, my favorite is the SCS PTC2 Pro. Dial the radio around for incoming computer signals, watch the TNC decode it, and then watch the faces on your students!
- ◆ Illustrate simple data using CW and a flashing light.
- ◆ Tune around the band, best on HF, listening to RTTY, AMTOR, PACTOR II, PSK-31, CLOVER, and any other digital mode including CW.
- ◆ Log onto APRS and show them live positions coming up on local maps.
- ◆ Check into a repeater with IRLP and place a call to a ham in a different portion of the world. Be sure to set this up ahead of time to offer a no-problem, no-surprise connection. In other words, stage your operating well ahead of time to insure everything goes smoothly between your computer, your students, and the outside world of radio!
- ◆ Play audio recordings of actual space contacts – including satellite, space shuttle, and International Space Station (*these are all on my audio course.*)
- ◆ Show space station QSL cards.
- ◆ Play moon bounce audio.
- ◆ Show photos of giant quad of Yagis aimed at the moon.
- ◆ Show tiny ground plane that just won't make it!



Bandwidth & Interference (pages 120-125)

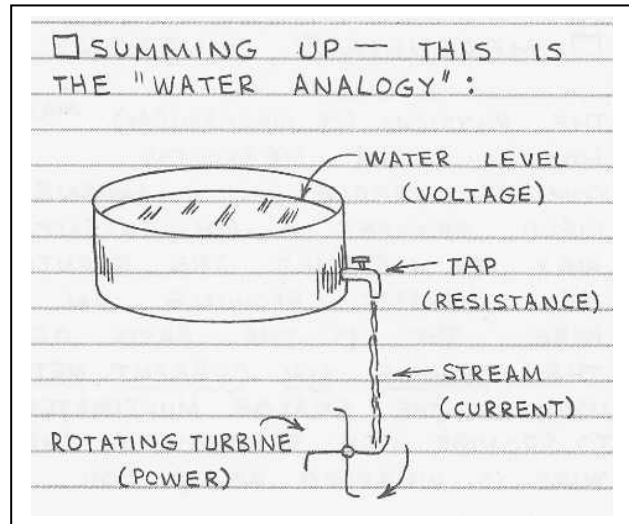
- ◆ Tune around on HF and illustrate bandwidth of different emissions.
- ◆ Decode PSK-31. (Mims book, pages 22-23.)
- ◆ Use a mobile FM radio to demo bandwidth of FM voice, and then ATV video on 70 cm.
- ◆ Bring in an ATV demo.

- ◆ Illustrate overload by transmitting too close to a turned-on boom box.
- ◆ Show off various filters external to the radio or TV.
- ◆ Tune in SSB in AM mode to illustrate what SSB interference sounds like on a phone.
- ◆ Show off a low-pass filter for HF.
- ◆ Show off a cable TV box with a gazillion splitters in line!
- ◆ Show off a bandpass filter.
- ◆ Talk about decibels using audio.

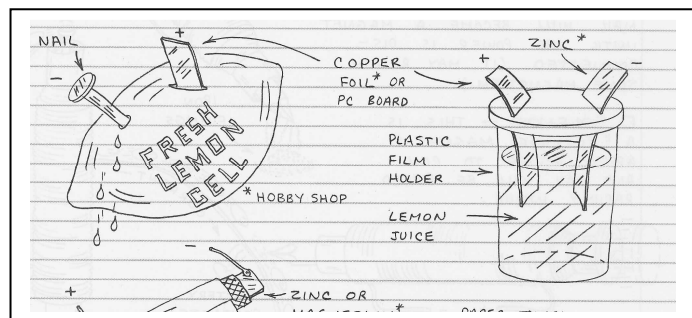
Volts & Amps (pages 126-140)

This is the section of the course where the Mims book will be very helpful to you!

- ◆ Colored water and clear tubing makes for some great safe demos. The water is voltage; squeezing the bulb creates current; and a kink in the clear tubing illustrates resistance. Drive a little paddle wheel to show power. Here's an illustration from page 14 of Mims's book showing how you might build a model to demonstrate electricity fundamentals.
- ◆ A volt meter and an ammeter.
- ◆ Describe current and light up a 12-volt light bulb.
- ◆ Show off an inverter, and then show off a power supply.
- ◆ Show off / illustrate a multimeter – both digital and d'Arsonval (needle).
- ◆ Show fuses good and bad, and meter them in the resistance mode to check.
- ◆ Spark a fuse to blow it on purpose (Mims book, pages 24-31)
- ◆ Work with several needle-type multimeters (Mims book, page 26)
- ◆ Pass around DC power supply filters.
- ◆ Show current flow with a 12-volt bulb and a diode in series, passing and blocking current.
- ◆ Talk about the dangers of electrocution with current flowing from your fingers and out through your feet when doing the laundry in the garage (Mims book, page 19).
- ◆ Work the Ohm's Law formulas on the board, and illustrate with a simple 12-volt DC light bulb.
- ◆ Pass around various resistors, and talk about resistor color code although it's not needed for the exam (Mims book, page 28-31). Demo the effect of a fixed resistor and 12-volt lightbulb.
- ◆ Plenty of little batteries (Here's an illustration from page 16 in *Getting Started in Electronics* for a lemon battery project that'll get kids really excited!)
- ◆ Pass around schematic diagrams of equipment and have them identify components.
- ◆ Demo a variable resistor on the 12-volt light bulb with current flowing through both.

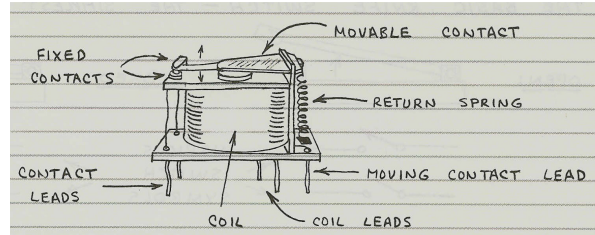


Courtesy of Forrest M. Mims, III



Courtesy of Forrest M. Mims, III

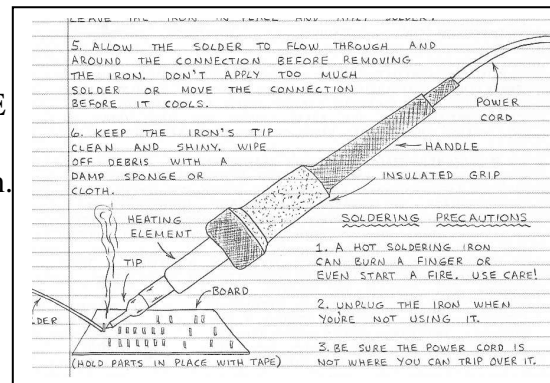
- ◆ Illustrate capacitors and spark a big electrolytic carefully. See Mims book, page 32, for how to make a capacitor with aluminum foil and waxed paper.
- ◆ Show off a variable capacitor.
- ◆ Show off coils. (Mims book, pages 38 – 39.)
- ◆ Demonstrate the power of a coil by dropping a rare earth magnet ball down the end of an aluminum tube, only to see the ball slowly float down as Lenz Law impedes the physical flow of the ball's energy.
- ◆ Pass around transformers. (Mims book, pages 40-41.)
- ◆ Pass around diodes and illustrate diodes.
- ◆ Pass around transistors and large-scale integrated chips.
- ◆ Pass around switches.
- ◆ Have plenty of goodies to pass around. Instead of just talking about a component, show them what it looks like and feels by passing them around. When everybody has one component, go around the room and do a spot quiz to see if they can identify what that component is, and what it does!
- ◆ Buy Forrest Mims's book *Getting Started in Electronics!* It's a gold mine of ideas to demonstrate and teach electricity and electronics!!



Courtesy of Forrest M. Mims, III

Antennas and Coax (pages 151-165)

- ◆ Start by making a simple dipole.
- ◆ Have students build their own different dipole on different bands.
- ◆ Have students built a quarterwave ground plane using soda cans as a vertical, and then use an MFJ SWR analyzer to the results after the coax has been soldered.
- ◆ Use a soft, inflatable ball to demonstrate antenna radiation patterns.
- ◆ Bring in a guitar or ukulele to demonstrate resonance.
- ◆ Bring in parts of a multi-band vertical to demonstrate traps and capacity hats.
- ◆ Use a flood lamp to demonstrate directional antennas.
- ◆ Use a light bulb to demonstrate omni directional antennas.
- ◆ Bring in old TV antenna and demonstrate director, reflector, and driven element - CAUTION: PUT RUBBER BALL ON ALL ELEMENT ENDS TO PROTECT EVERYONE AROUND.
- ◆ Show off an automatic antenna coupler in action.
- ◆ Demonstrate a center-loaded, high-Q, mobile antenna system.
- ◆ Pass around a balun.
- ◆ Show a corroded antenna connection.
- ◆ Discuss and demonstrate safe soldering techniques (Mims book, page 98)

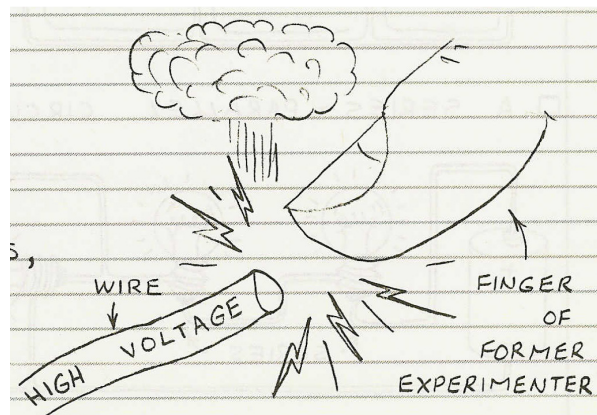


Courtesy of Forrest M. Mims, III

- ◆ Demonstrate directivity of a halfwave dipole.
- ◆ Show antenna modeling on your computer.
- ◆ Bring in a small cubical quad antenna.
- ◆ Illustrate polarization with wire.
- ◆ Talk about the little rubber duck antenna.
- ◆ Show off antenna adapters necessary for an HT on an outside antenna.
- ◆ Bring in a duplexer and triplexer.
- ◆ Show off various sizes of coaxial cable.
- ◆ Use a watt meter to illustrate coax cable losses.
- ◆ Show off parallel conductor and twin-lead.
- ◆ Illustrate standing waves with a rope.
- ◆ Show a standing wave ratio meter.
- ◆ Determine SWR on a student-built antenna.
- ◆ Show off hard hat and safety glasses and a climbing belt.
- ◆ Demonstrate grounding techniques and ground foil.
- ◆ Demonstrate green wire on a 3-blade plug.
- ◆ Show off component hit by lightning.
- ◆ Walk outside and spot high-voltage, unprotected power lines.
- ◆ Show off old unsafe leather climbing belt.
- ◆ Show off old rusted turn buckles.
- ◆ Show off one way to launch a non-conductive line over a tree.

Safety First! (pages 166-177)

- ◆ Turn on a flood lamp or auto headlamp and have a student come up and feel the warmth. If they touch it, they will get burned. This illustrates a basic principle of radiation.
- ◆ Talk about the handheld and show keeping the antenna away from your head.
- ◆ Go outside and examine a mobile vehicle installation for safe placement of the dual-band antenna.
- ◆ Talk about microwave ovens and what they do to food on the inside.
- ◆ Use the microwave oven to illustrate duty cycle.
- ◆ Work the charts in the book, going over controlled and uncontrolled environments.
- ◆ Give them questions on the charts in the book that are different than the actual book questions.
- ◆ Discuss safety when working with electricity.
- ◆ Reinforce all test questions dealing with personal operator safety around transmitting antennas.

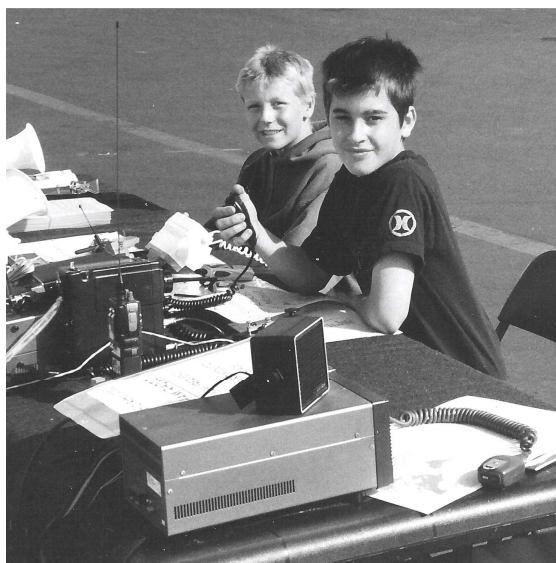


Courtesy of Forrest M. Mims, III

Morse Code

(Chapter 6 - pages 188-194)

- ◆ Each class session should have a live Morse code oscillator – and both straight key as well as electronic key. Refer to page 172 – 173 in my book showing Morse code.
- ◆ Teach some simple CW characters and words: AT, EAT, SOS, TEAM, ANTENNA, and TEST are good ones to start with. Page 177 shows the order of learning on my CW CDs.
- ◆ Show on the student frequency sheet additional bands for Technician with CW privileges.
- ◆ Demonstrate 10 meters for those who earn code credit and all the skywaves it might do!



Remember – kids (and adults, too) love the excitement of live ham radio demos! They are the key ingredient for a successful, memorable ham radio course!!

Using Gordo's Book and Audio CD Course to Earn the Boy Scouts Radio Merit Badge

Earning Merit Badges is an important pursuit for active Boy Scouts. Ham radio instructors involved with Scouting can use Gordo's *Technician Class* book to help their Scouts earn their Radio Merit Badge. We have reviewed the latest Requirements for the Radio Merit Badge as posted on the BSA website. The following pages show the BSA Requirements related to Amateur Radio and provide a key for using the 2010-14 Gordon West *Technician Class* study manual and Audio Theory Course on CD for earning the Radio Merit Badge. (You can review the complete BSA requirements, including options for broadcast and shortwave listening activities, at: <http://usscouts.org/mb/mb093.asp>)



Boy Scout Radio Merit Badge Suggestions

Radio Merit Badge Requirements

Resources Found in Gordo's 2010-14 Technician Class book and Audio Theory CD Course

1. Explain what radio is. Then discuss the following:
 - A. The differences between broadcast radio and hobby radio. Chapter 3 , p .19-24; CD 1 track 1
 - B. The differences between broadcasting and two-way communications. About ham radio, pg 31-34; CD 1 track 2
 - C. Radio call signs and how they are used in broadcast radio and amateur radio. Call signs, pg 35-43; CD 1 track 2
 - D. The phonetic alphabet and how it is used to communicate clearly. Call signs, pg 36 CHART; CD 1 track 2

2. Do the following:
 - A. Sketch a diagram showing how radio waves travel locally and around the world. Explain how the broadcast radio stations, WWV and WWVH can be used to help determine what you will hear when you listen to a shortwave radio? Propagation, pg 92 CHART; CD 3 track 1
 - B. Explain the difference between a DX and a local station. Discuss what the Federal Communication Commission (FCC) does and how it is different from the International Telecommunication Union. Call signs, pg 39 map; CD 1 track 2

3. Do the following:
 - A. Draw a chart of the electromagnetic spectrum covering 100 kilohertz (kHz) to 1000 megahertz (MHz). Spectrum chart, pg 6; CD 1 track 1
 - B. Label the MF, HF, VHF, UHF, and micro-wave portions of the spectrum on your diagram. Frequency chart, pg 58; CD 1 track 1
 - C. Locate on your chart at least eight radio services such as AM and FM commercial broadcast, citizens band (CB), television, amateur radio (at least four amateur radio bands), and public service (police and fire). Charts of radio services, pg 6 and 58; CD 1 track 1

4. Explain how radio waves carry information. Include in your explanation: transceiver, transmitter, amplifier, and antenna. Radio Communications System chart, pg 69; CD 2 track 2 – also pgs 112-119; CD 3 track 4

5. Do the following:
 - A. Explain the differences between a block diagram and a schematic diagram. Block diagram, pg 113; CD 4 track 2; schematic diagrams, pgs 141-144; CD 4 track 2
 - B. Draw a block diagram for a radio station that includes a transceiver, amplifier, microphone, antenna, and feed line. Multi Mode radios, pg 114; transmitter, pg 118; receiver, pg 128; 12.8 DC input, pg 122; feed line and antenna, CD 3 track 4
 - C. Explain the differences between an open circuit, a closed circuit, and a short circuit. Ohms Law, pg 136, electron flow CD 3 track 6 also pg 166, open switch CD 4 track 1

Radio Merit Badge Requirements

- D. Draw eight schematic symbols. Explain what three of the represented parts do. Find three electrical components to match to three of these symbols.
6. Explain the safety precautions for working with radio gear, including the concept of grounding for direct current circuits, power outlets, and antenna systems.
7. Visit a radio installation (an amateur radio station, broadcast station, or public communications center, for example) approved in advance by your counselor. Discuss what types of equipment you saw in use, how it was used, what types of licenses are required to operate and maintain the equipment, and the purpose of the station.
8. Find out about three career opportunities in radio. Pick one and find out the education, training, and experience required for this profession. Discuss this with your counselor, and explain why this profession might interest you.
9. For Amateur Radio, Do the following:
 1. Tell why the FCC has an amateur radio service. Describe some of the activities that amateur radio operators can do on the air, once they have earned their FCC license.
 2. Using proper call signs, Q signals, and abbreviations, carry on a 10 minute real or simulated radio contact using voice, Morse code, or digital mode. (Licensed amateur radio operators may substitute five QSL cards as evidence of contacts with amateur radio operators from at least three different call districts.) Properly log the real or simulated ham radio contact and record the signal report.
 - 3 Explain at least five Q signals or amateur radio terms you hear while listening.
 4. Explain some of the differences between the Technician, General, and Extra Class license requirements and privileges. Explain who administers amateur radio exams.
 5. Explain how you would make an emergency call on voice or Morse code.
 6. Explain the differences between handheld transceivers and home "base" transceivers. Explain the uses of mobile amateur radio transceivers and amateur radio repeaters.

Resources

- Electrons, pg 134 and schematic symbols
pg 142; CD 3 track 6
- Safety , pgs 166-177; CD 4 track 5; also
RF exposure levels pg 177; also Maximum
Permissible Exposure limits
pgs 200 & 201 W5YI Safety Charts
- VISIT A HAM OPERATOR AND TALK
RADIO! Use list of Examiners to find a
local ham , page 198; CD 1 track 1
- VISIT A HAM OPERATOR AND TALK
RADIO! Use list of Examiners to find a
local ham, page 198; CD 1 track 1
- Chapter 1, pgs 1-18; CD 1 tracks 1 + 2
- On The Air, pgs 69-78; CD 2 track 2
- Q Signals, full page listing Page 75;
CD 2 track 2
- Emergency, pgs 86-91 voice, pg 189 for CW
- Your First Radio, pgs 63-68; CD 2 track 1
also, Repeaters and base stations, pgs 79-85
CD 2 track 3

Resources

So, where do we get all of these materials to put on a class and do these different demos? Chances are, you probably have a bin full of “stuff” that would make great demo items. If you invite your ham friends to help with the class, you will find each may have a specialized area of operation, and they would love to bring that particular demo into the classroom. You can’t do it all yourself – get your ham pals to bring in their specialty gear and talk about their operating modes!

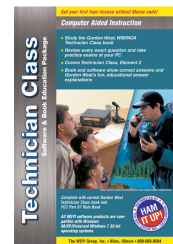
GORDON WEST BOOKS, AUDIO TAPES, & W5YI SOFTWARE PACKAGES AT AN INSTRUCTOR DISCOUNT:

The W5YI Group (800-669-9594, or www.w5yi.org) distributes all of the Gordon West amateur radio study materials for the Technician, General, and Extra class licenses. They offer a special Instructor Discount Program to ham radio instructors registered with W5YI. Here’s a summary of the products:

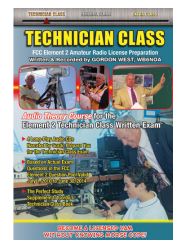
Technician Class, General Class, and Extra Class study manuals. Each book contains the exact questions and answers used to make up the exams, plus explanations of the correct answers. The books also contain a great deal of additional information on ham radio, including frequency privileges, list of VECs, and much, much more.



Educational Book & Software Packages. W5YI also has each book packaged with Windows® software that allows students to study the Q & A at their PC and take practice exams. The software scores their exams showing where they are weak and need more study. Interactive explanations and keywords appear when a student answers incorrectly. Each package includes a free copy of W5YI’s FCC Part 97 rule booklet.



Audio Theory CDs for each license class recorded by Gordon West. Each set of CDs (4 each for Technician and General, and 6 for Extra) discusses the theory covered in each FCC exam element. They are a great way to get the students to pre-study and listen in on the excitement of ham radio for their upcoming class. All of the theory cassette tapes contain live sounds of radio, plenty of sound effects, and Gordo’s humor to keep students playing the cassettes over and over again.



Code CDs. Teaching the code? If you're planning to teach Morse code, Gordo has an in-depth set of 6 audio CDs that students love because of the humor that is on them – they make learning the code *fun*. He also has a 2 CD code teacher. As an instructor, you may also use these CDs to play over the airwaves, especially on the 2-meter band. All of the code characters are sent Farnsworth method at 15 wpm character rate, slowed to 5 wpm word rate. Refer to Chapter 6 of *Technician Class*, “Learning Morse Code,” pages 188 through 194, on the progression of letters, lesson plans, and steps to make code learning FUN.

EXOTIC DEMO TOOLS & PROPS

If you are not into building your own plasma tube, or your own Tesla coil, a commercial educator/experimenter company called **Information Unlimited Amazing Devices (800-221-1705, or www.amazing1.com)** has you covered *big time!* They have assembled systems or kits for Tesla's, levitation, induction and conduction, spark gap, neon tube conductor analyzers, and a host of other “eyeshocking” devices that are relatively safe around your students, yet will have everyone coming back for a second look. One device, called the phaser tube, allows me to show conductivity by having students joining hands in series and watching the neon tube begin to glow further and further up as better contact is made. Another good prop is the Tesla coil, but keep in mind this device has plenty of high voltage around it. *Always* take your high-voltage demos off-line when teaching a class for kids – they are indeed curious!

Free With Each Book Purchase:

FREQUENCY CHARTS, WALL MAPS, GRADUATION CERTIFICATES, DISCOUNT COUPONS & MORE...

Order your books through The W5YI Ham Instructor Program and they will include as much material that they may have on hand.

To order the Gordon West *Technician Class* book, go to
www.w5yi.org or call 1-800-669-9594
To register as an instructor or to have your class posted on our website, go to:
www.haminstructor.com

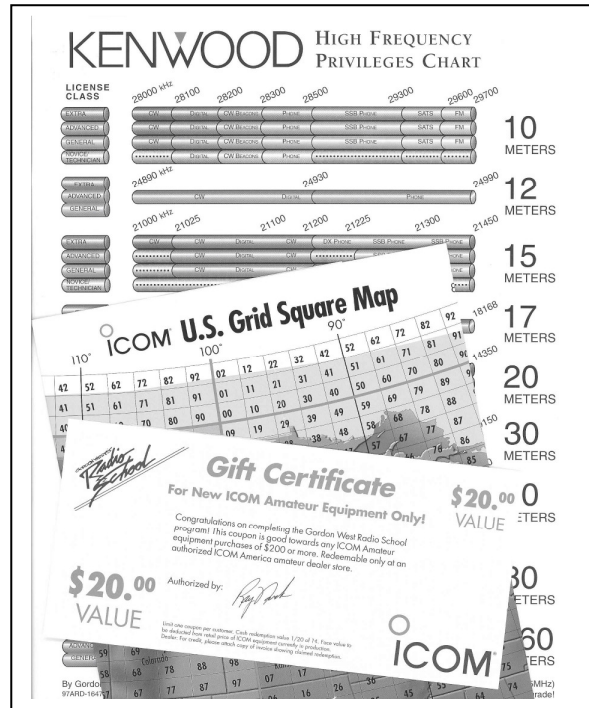
In addition, here is a listing of various manufactures, dealers, and others that may supply you with materials that contain excellent illustrations and simplified technical explanations to help with your demonstrations.

Alinco	radio catalogs	www.alinco.com
Aluma Towers	lightweight tower catalogs	www.alumatower.com
Amateur Electronic Supply	160-page full ham catalog	www.aesham.com
American Radio Relay League	ARRL materials	www.arrl.org
Batteries America	battery catalog	www.batteriesamerica.com
CQ Communications	promotional copies of CQ	www.cq-amateur-radio.com
Gap Antenna Products	catalog on vertical antennas	www.gapantenna.com
Gordon West Radio School	contact Gordo	wb6noa@arrl.net
Ham Radio Outlet	120-page full ham catalog	www.hamradio.com
ICOM America	band charts	www.icomamerica.com
KB3IFH QSL Cards	sample QSL cards	www.kb3ifh.homestead.com
Kenwood USA	frequency charts, maps, catalogs	www.kenwoodusa.net
LDG Electronics	automatic antenna tuner charts	www.ldgelectronics.com
MFJ Enterprises	catalogs on all sorts of accessories	www.mfjenterprises.com
QSLs by W4MPY	sample QSL cards	www.w4mpy.com
QSLs by Star Printing	sample QSL cards	www.qth.com/wx9x
Radio Works	antenna catalogs	www.radioworks.com
Universal Radio	100-page full ham catalog	www.universal-radio.com
W5YI Group	VEC info / License prep materials	www.w5yi.org
Yaesu Electronics	frequency charts, world maps	www.vertexstandard.com

And, finally, the U.S. Department of Commerce, N.T.I.A., Office of Spectrum Management Frequency Chart is available from the Superintendent of Documents at the U.S. Government Printing Office.

We'll be happy to supply you with band plan charts, grid square maps, manufacturer's discount coupons, and more for each of your ham class students when you order your student's study manuals from The W5YI Group.

A special word of thanks to "the big four" – GRE Alinco, Icom, Kenwood, and Yaesu – for their continuous free classroom materials with our books to instructors in support of the Gordon West / W5YI Ham Instructor Program!



When your students graduate, I want to know about it! I have a very nice certificate suitable for framing (below) – plus free ham operating materials from equipment manufacturers. All I need is a large, self-addressed envelope with 12 first-class stamps inside for each student to cover postage and handling, and I'll send one their way. They can write me at:

Gordon West Radio School
2414 College Drive
Costa Mesa, CA 92626



AN INVITATION TO SIT-IN & SEE FOR YOURSELF

Now that we are at the end of this *Instructor's Guide* for you, the instructor, on how to teach a ham radio class, allow me to invite you to sit in on any one of my ham classes throughout the country – or any of the seminars that I present at hamfests or club get-togethers. Feel free to adopt any of the demos that I do, and please share with me any demonstrations that you have developed so I might adopt them myself and pass them on to others.

Also, beginning on the next page, is my Pre-Study Q&A for the 2006-10 Technician class. Feel free to make copies of it for your students. You can use it for the weekend seminar format, or you can adapt it as homework for a weeknight course. If you can get your students to pre-study your classes will be much more fun with more time for demos, and your student pass rate will soar!



All of my theory books, audio theory CDs, code CDs, and the W5YI computer programs are available at a discount to you. We offer you these discounts because you are our most valuable resource for the growth of Amateur Radio, the Elmer/instructor. Get all of my materials at a discount, and use any small amount of profit towards continuous improvement of your presentations and classes. If you are teaching for a club, the club may want to purchase the materials and offer them to the students as a group discount. Or it may want to use the profits to help pay the cost of conducting the classes, or to pay the classroom or testing facility fee.

If you have your own ideas on what should be in the three amateur radio question pools, feel free to send me your revised Q & A's. Become an active contributor to future question pools that are revised every 4 years.

Work closely with your local amateur radio dealers. They can assist by providing space for your class announcements, as well as providing demo gear during your upcoming course. Chances are, when you start turning brand new licensed students over to them, they'll want to provide a lot more for you in appreciation of what *you* are doing to help ham radio grow.

Remember – teaching ham class is supposed to be fun for you, too! The more excitement you generate, the more fun for everyone!!



Finally, don't hesitate to call me personally and share with me your comments on what we all may do to better our ham radio presentation to students throughout the country. I can be reached Monday through Friday, 10 am to 4 pm Pacific time, by calling me at 714-549-5000. Say hi to my wife, Suzy, N6GLF, too. Or write me a note at:

Gordon West Radio School
2414 College Drive
Costa Mesa, CA 92626

or you may e-mail me at:
WB6NOA@ARRL.NET

So what are you waiting for? Start looking over my *Technician Class* book, play the tapes, create your home study pre-course workbook, and let's get started with your upcoming ham radio class. I'm right here with you!

73

Gordon West
WB6NOA



The natural curiosity of kids makes teaching them ham radio particular fun. Adults. RVers. Boaters. Hunters. There's something for everyone in our Amateur Radio hobby. And the rewards for you – the instructor – are tremendous as you help our hobby grow!

Gordon West's Pre-Study Q&A for the 2006-10 Technician Class Course

Welcome to your weekend class pre-study homework. Your upcoming weekend class is absolutely NOT a cram session, followed by the test. Rather your weekend course will take your textbook questions and answers and relate them to the real world of ham radio operating.

This pre-study material comes straight out of the Gordon West *Technician Class* book for the 2010 through 2014 Element 2 question pool, and his Audio Theory Course. The fill-in-the-blank questions in this pre-study guide follow the exact order of the book. We even give you page numbers to quickly spot the correct answer!

In addition to the Gordon West *Technician Class* book, this pre-study material is covered in the exclusive audio CD course. The CD audio course is a fun way to hear the radio sounds behind some of these questions.

This pre-study homework is fill-in-the blank. Your actual Element 2 written examination will be a multiple choice exam – all the easier.

This fill-in-the blank homework also parallels the computer home study course. Taking sample exams on the computer is fun, educational, and a double-check that you will do well on the upcoming written examination.

Begin reading over your *Technician Class* book, and start filling in the home study answers. The page numbers will help! Be sure to bring your completed home study to the first class session.

To order the Gordon West *Technician Class* book, or his Audio Theory Course go to
www.w5yi.org
or call 1-800-669-9594

GETTING INTO HAM RADIO (book pgs. 1–4; CD #1, Track 1)

1. How many hams worldwide? _____
2. How many hams in the USA? _____
3. How many questions on your upcoming Technician Class test? _____
4. How many bands will your new handheld radio have? _____
5. What does ATV stand for? _____
6. Ham radio is a hobby and _____.
7. American Radio Relay League website: _____

TECHNICIAN CLASS PRIVILEGES (book pgs. 5-18; CD #1, Track 1)

1. Frequency range for HF? _____
2. Frequency range for VHF? _____
3. Frequency range for UHF? _____
4. You have voice privileges on this worldwide HF worldwide band. _____
5. Six meters, work the moon? _____ MHz
6. Two meters, the most popular band _____ MHz
7. How many meters is the 222 MHz band? _____
8. The 70 cm band is very popular! _____ MHz
9. What two bands in a dual band hand held? _____
10. CW – only privileges on these three bands? _____
11. Do this when you receive your call letters: Get on the _____ !

A LITTLE HAM HISTORY (book pgs. 19-24)

1. Ham radio has been around for _____ years.
2. First ham license issued around _____.
3. What requirement has been totally eliminated from the ham radio test? _____
4. When did the FCC restructure the Amateur service? _____
5. When did self-testing ham exams begin? _____
6. How many grades of ham radio licenses? _____
7. How many examiners to give you the Element 2 exam? _____
8. Can you jump over the entry level Tech test and go direct to the General Class test? _____

GETTING READY FOR THE EXAM (book pgs. 25–30; CD #1, Track 1)

1. How many test questions for Technician? _____
2. How many questions in the total Technician Question pool? _____
3. May the test wording be changed or modified? _____
4. Passing score? _____ %
5. How many questions could you miss and still pass? _____
6. You receive this paper when you pass? _____
7. The questions on the CDs and in the book have been _____
for faster and smarter learning.
8. What color are key words to study before the test? _____
9. Got a question? Call Gordo at this number: _____

HAM RADIO AND CALLSIGNS (book pgs. 31–43; CD #1, Track 2)

1. Minimum age for a ham radio license? _____
2. Who regulates and enforces the ham service? _____
3. Licenses are issued for _____ years.

4. Grace period for an expired license? _____
5. Give your call sign every _____ minutes.
6. Phonetic alphabet for H I ? _____
7. Which language to identify your call sign? _____
8. Which ITU region are we in? _____
9. May we send third party traffic to Haiti? _____
10. Country call sign prefix for United Kingdom? _____
11. Does the US have reciprocal operating agreements with The Netherlands? _____

CONTROL (book pgs. 44–48; CD #1, Track 3)

1. Every transmitting station needs a _____ operator.
2. What type of control when using a handheld radio? _____
3. Mountaintop repeaters normally operate _____ control.
4. May a Technician control op transmit on General Class frequencies? _____
5. When may a control operator be “on the clock” while transmitting? _____

MIND THE RULES (book pgs. 49–52; CD #1, Track 4)

1. What part of the Rules covers ham radio? _____
2. Prohibited transmissions? _____
3. How much power should you transmit? _____
4. May intentional SECRET code be transmitted over ham radio? _____
5. Normally, music is _____?
6. When may the FCC inspect your station? _____
7. What might result if the FCC can't reach you by mail?

TECHNICIAN CLASS FREQUENCIES (book pgs. 54-62; CD #1, Track 5)

1. What two letters stand for a radio emission? _____
2. Radio waves are considered _____.
3. Velocity of radio waves through free space? _____
4. Unit of radio frequency? _____
5. The abbreviation kHz stands for _____.
6. Frequency bands are usually called out in a _____.
7. Frequency and wavelength are inversely proportional. What is that magic number? _____
8. 52 megahertz is located in which meter band? _____
9. 28.4 MHz is located in which meter band? _____
10. 146.52 MHz is located on which meter band? _____
11. 223.5 MHz is located on which meter band? _____
12. 432 MHz is located on which meter band? _____
13. To go from METERS to MEGAHERTZ, or MEGAHERTZ to METERS the magic division number is _____.
14. 28.5 MHz is how many kilohertz? _____
15. Ten meter worldwide voice privileges extend from 28._____ to 28._____MHz.

YOUR FIRST RADIO (book pgs. 63-68; CD #2, Track 1)

1. Get your radio pre_____ by your local ham dealer or club.
2. Store favorite frequencies in your radio's _____.
3. Don't use a rubber duck inside your _____.
4. What type of modulation do we use for 2 meters and the 440 MHz band? _____
5. In noisy environments, hook this in to your handheld. _____
6. What is the advantage of SSB over FM when working satellites? _____
7. What device takes output on one band and produces output on another band? _____

8. The www for ham equipment reviews? _____

GOING ON THE AIR (book pgs. 69–78; CD #2, Track 2)

1. Speak into your radio's _____.
2. Listen to radio audio on this _____.
3. Which circuit silences background white noise? _____
4. Transmitting on the same frequency is called _____.
5. We use duplex when transmitting when transmitting through a _____.
6. When you test over the air, always give this. _____
7. What does CQ mean? _____
8. Interference from another station on frequency is called by which Q code? _____
9. This Q code means change frequency. _____
10. Someone asks “What is your QTH?” _____
11. Your friend is going QRT. This means _____
12. The locator system based on 1 degree latitude by 2 degrees longitude? _____
13. UHF signals on 440 MHz sometimes take a _____ off nearby buildings.

REPEATERS (book pgs. 79–85; CD #2, Track 3)

1. Repeaters transmit on their output and listen on their _____.
2. What is the term to describe transmitting on a repeater channel? _____plex.
3. What is the usual repeater offset for the 2 meter band? _____
4. What is the usual repeater offset for the 70 cm band? _____
5. Most repeaters also require CTCSS. What's this? _____
6. What else do you need to program in your handheld to access a local repeater? _____
7. Who maintains these free repeaters? _____

EMERGENCY (book pgs. 86-92; CD #2, Track 4)

1. Which communications have the highest priority? _____
2. What does RACES stand for? _____
3. What does ARES stand for? _____
4. What does the term “check” mean? _____
5. What words do we use to indicate an emergency on the 2 meter band? _____
6. What words to indicate an emergency on the 10 meter worldwide band? _____
7. What Morse Code characters are sent in an emergency? _____

WEAK SIGNAL PROPAGATION (book pgs. 93-98; CD #3, Track 1)

1. What do we call radio signals that travel through space? _____
2. Use “Knife-edge” propagation to transmit over _____.
3. A warm air inversion creates this type of propagation. _____
4. Catch a falling star and try this? _____
5. How many layers of the Ionosphere during the day? _____
6. What layer disappears at night? _____
7. When can you get 10 meter propagation? Day or night? _____
8. Skip is not reflections, but rather, _____
9. Signals that hug the Earth are called _____ waves.

OUTER SPACE COMMS (book pgs. 99-104; CD #3, Track 2)

1. How many miles above the Earth to qualify as a space station? _____
2. What does LEO stand for? _____
3. Signals that contain information about an on board satellite computer? _____
4. What causes satellite signals to fade in and out? _____
5. Compensate for this shift when the satellite is approaching. _____

6. In the V/U mode, what band do you transmit on? _____
7. How much power should you use when transmitting to a satellite? _____
8. AMSAT's website to join them? _____

DIGITAL (book pgs. 105-111; CD #3, Track 3)

1. Is Morse Code a digital mode? _____
2. The device connected between your transceiver and computer? _____
3. What portion of your computer might decode digital signals? _____
4. What does "BER" stand for? _____
5. A _____ ham station connects other ham stations into the internet?
6. What does VoIP stand for? _____
7. What do IRLP and Echolink have in common? _____
8. Another name for fast scan television? _____

MULTIMODE RADIOS (book pgs. 112–119; CD #3, Track 4)

1. To operate satellite SSB, which emission mode? _____
2. What emission has the narrowest bandwidth? _____
3. We find a product detector in what type of radio receiver? _____
4. How wide is the SSB voice signal? _____
5. What does RIT stand for? _____
6. The ability of a receiver to hear signals close together? _____
7. How wide is fast scan television? _____

INTERFERENCE (book pgs. 120–125; CD #3, Track 5)

1. On 10 meters, if your mic gain is too high, it could create this. _____
2. On 2 meters, speaking too softly will create under-_____.
3. A whistle on your handheld tied in to your car's 12 volts is likely from _____

4. What type of filter would you use to minimize harmonic emissions on your high frequency transmitter? _____ -
5. When your neighbor spots that new antenna, tell them it is _____
6. What snap on device may minimize interference on audio equipment? _____

ELECTRONS (book pgs. 126–135; CD#4, Track 1)

1. The name for EMF? _____
2. The flow of electrons _____
3. The opposition to the flow of electrons _____
4. What device stores a chemical charge? _____
5. Most ham radios require _____ volts for mobile operation.
6. Measure current with this _____.
7. _____ is measured in series, and _____ is measured in parallel.
8. A good conductor _____
9. A good insulator _____
10. The amount of voltage that comes out of you home socket _____
11. A device that allows current to flow in only one direction _____
12. The unit of resistance _____
13. A variable resistance device _____
14. What device stores energy in a magnetic field? _____
15. Which device stores energy in an electric field?
16. The unit of capacitance? _____
17. A device that turns on or off a circuit? _____
18. A device that might amplify a signal? _____
19. FET stands for _____

OHM'S LAW (book pgs. 137-140; CD #4, Track 1)

1. Draw 2 different types of Ohm's Law Circles.
2. Power equals _____ X _____.
3. Voltage equals _____ X _____.
4. If you are calculating current, it is Voltage divided by _____.
5. If you are calculating resistance, it is Voltage divided by _____.
6. In all of the problems, you are always dividing the larger number by the _____ number.
7. Could they ever substitute different numbers than what is in the book and on the audio course on your upcoming examination? _____

DIAGRAMS (book pgs. 141–150; CD#4, Track 2)

1. Draw the symbol for a resistor _____
2. Draw the symbol for a variable capacitor _____
3. Draw the symbol for an antenna _____
4. Draw a transistor symbol _____
5. Draw a chassis ground symbol _____
6. Draw a transformer symbol _____
7. Draw a diode symbol _____
8. Draw an LED symbol _____
9. Doubling your power output results in how much db gain? _____
10. A ten times increase in power will result in how much db gain? _____
11. What does LED stand for? _____
12. How many watts are 500 milliwatts? _____
13. A cold solder joint looks like this _____.
14. What will happen if you measure voltage with your multimeter on the resistance scale?

ANTENNAS (book pgs. 151-157; CD #4, Track 3)

1. What type of antenna is half wavelength, parallel to the Earth? _____
2. From tip to tip, how long is a half wave dipole for 10 meters? _____
3. Tip to tip, how long is a half wave dipole for 2 meters? _____
4. The electric field in a vertical antenna is _____ to the Earth.
5. What is the formula for calculating the length of a half wave dipole, if you know the frequency in MHz? _____
6. Which antenna concentrates energy in just one direction? _____
7. What's a popular sport that uses handheld, directional antennas? _____
8. If your antenna and that of the other station are cross polarized, your signal will get ____?

COAX (book pgs. 158-165; CD #4, Track 4)

1. Coax cable is round or flat? _____
2. Impedance of coax cable for ham use? _____ Ohms
3. Common coaxial cable connector for a mobile high frequency radio? _____
4. Common coaxial cable connector for a handheld radio? _____
5. Don't nick this _____
6. The larger the diameter of the cable, the lower the signal _____.
7. The ratio of forward power to reflected power is _____.
8. An SWR meter 4:1 means _____.
9. What device prevents signal radiation when testing your transmitter? _____

SAFETY FIRST! (book pgs. 166-177; CD #4, Track 5)

1. Good way to guard against shock? _____
2. The green wire in an AC power cord provides what? _____
3. An intentional weak link in a wiring circuit _____

4. Should you replace a blown 10 amp fuse with a 40 amp fuse? _____
5. Precautions around a 12 volt lead acid battery? _____
6. Wear this when climbing an antenna tower _____
7. Make sure your antenna is well away from these _____
8. If on the ground looking up, always wear these to protect your eyes _____
9. Never climb a tower that has not been cranked _____
10. Use this for good RF grounding, not round wires _____
11. What is the device to help erect an antenna tower top section? _____
12. What frequency has the lowest MPE limit? _____ meters.
13. A good place for a magnetic mobile antenna on your car _____
14. If you touch a transmitting antenna you could get _____
15. Below what power level are most radio signals considered safe? _____

PASSING THE EXAM (book pgs. 179–188; CD #4, Track 6)

1. What number to call to locate an exam site? _____
2. Typical exam cash cost? _____
3. Complete this NCVET form _____
4. Always be sure to _____ your paperwork.
5. What letters in your first call sign? _____
6. What number in your first call sign? _____
7. Trade in your first call sign for one with your initials under the _____ call sign program.
8. Its good to learn the code. What chapter covers learning Morse Code? _____
9. What page will help you locate a VEC examination coordinator? _____
10. What pages discuss RF safety and safe distances? _____
11. Pages _____ include the cross reference list showing Question Pool question numbers and book pages?

Congratulations on completing your pre-study assignment! If you were able to complete most of this homework, you'll do just fine on your upcoming Technician Class exam.

Be sure to send me your information, found on page 187, for your graduation certificate and manufacturer coupons and band charts. Please don't forget the stamps on the inside of a LARGE envelope. Let me know how well you did on the test.

Continue to review the book before class and before taking your exam. I look forward to hearing from you soon!

Gordon West, WB6NOA



Instructor's Guide
For the Gordon West 2010-2014 Technician Class

Written by: Gordon West, WB6NOA

Edited by: Pete Trotter, KB9SMG

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www.haminstructor.com

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