

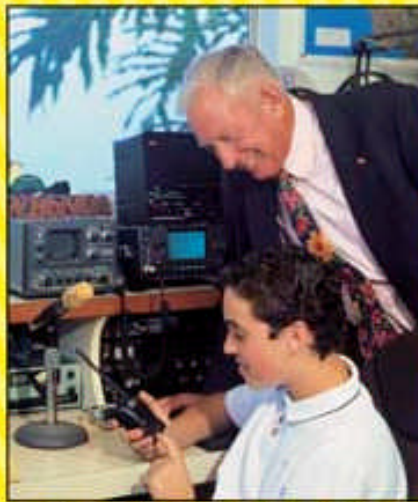
Technician Class

Amateur Radio Element 2
FCC License Preparation



Contains the Complete 392-question FCC Element 2 question pool effective July 1, 2006 to June 30, 2010

- ⚡ Questions are Reorganized for Logical, Easy Learning
- ⚡ Fun, Educational Explanations Teach You Ham Radio
- ⚡ Over 150 Addresses of Helpful, Educational Websites
- ⚡ Highlighted *Key Words* for Every Explanation
- ⚡ Fully-illustrated Text
- ⚡ Frequency Chart Showing Privileges
- ⚡ List of VEC Examiners
- ⚡ Chapter on Learning Morse Code



BECOME A LICENSED HAM WITHOUT KNOWING MORSE CODE!



INCLUDES BONUS COUPONS & CD!

- ⚡ CD TEACHES VHF PROPAGATION
- ⚡ FREE CQ MAGAZINE TRIAL SUBSCRIPTION
- ⚡ FREE BOOK WITH ARRL MEMBERSHIP
- ⚡ DISCOUNT ON YOUR FIRST RADIO!

An Instructor's Guide for Using the Gordon West
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 2006-10 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 2006-10 ***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.

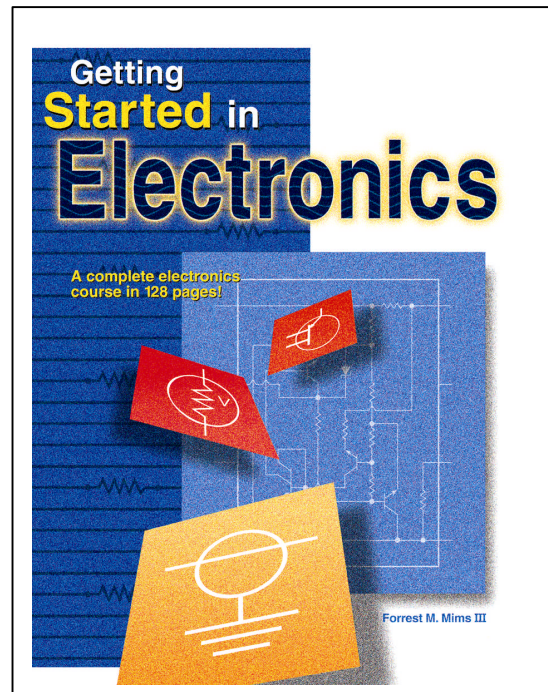
This ***Instructor's Guide*** parallels my completely reorganized ***Technician Class*** study manual for the Element 2 Question Pool, valid July 1, 2006 through June 30, 2010. This all new Question Pool is a complete rewrite of the entry-level Q&A. Questions are written to the reading comprehension 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 392 questions.

I have completely reorganized the questions into 15 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 2006-10 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:

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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 392 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 392 total questions and reorganized them into 15 topic groups. By doing this, the question pool is now much more manageable, and all 392 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 392 questions in a

reorganized 15-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.

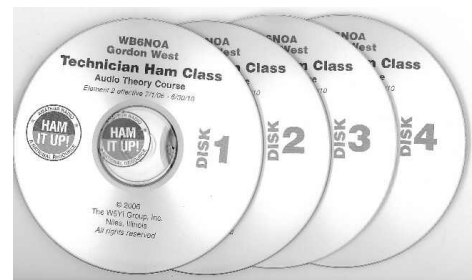
The attrition rate you can expect in a weekend 2-day seminar-style course should be less than 10 percent. You also will draw much larger numbers of students to the weekend seminar compared to the 12-week community college or ham club format. I went from evening classes at 12 to 15 students per class 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 is 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 392 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 15 logical topic groups in my book, you can easily teach the entire 392 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 2006-2010 *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 392 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) 549-5000 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.



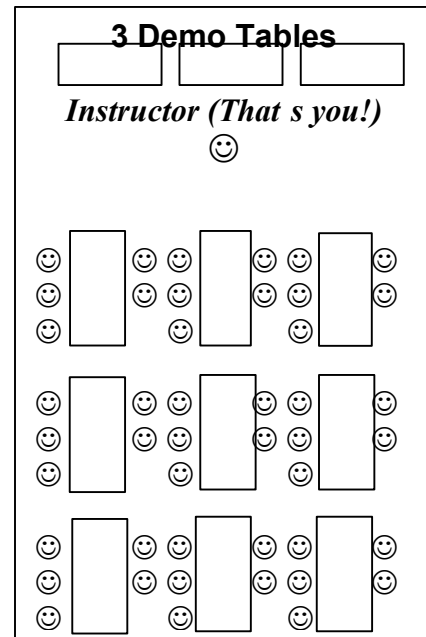
SETTING-UP YOUR CLASSROOM

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.

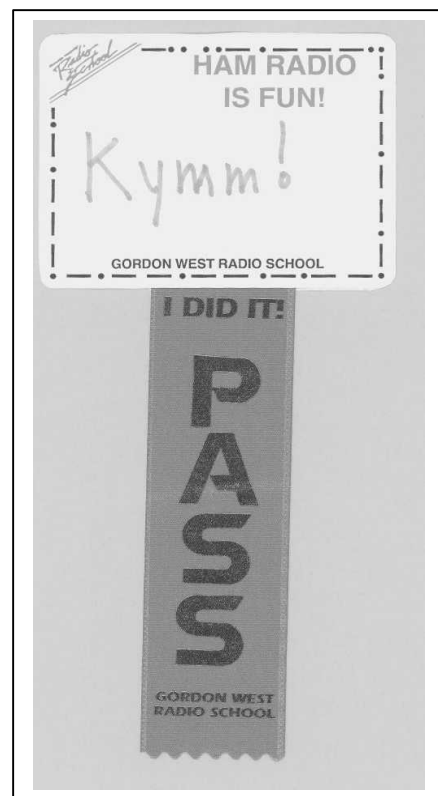
NAME TAGS

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.

Several years ago I developed a video specifically for instructors on how to teach a ham class. The video is available from The W5YI Group. Call 800/669-9594 to find out how to get your copy of this videotape that will show you how I get things going on the first night in ham class.



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 2006 through 2010. Let them know that the pool has decreased from 510 questions down to 392 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 T4 in this Table, they will discover that only 5 test questions on their upcoming exam will be taken from this subelement. They will breathe a sigh of relief! No more schematic and block diagrams, either!

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 2006-10 Element 2 pool into the 15 logical topic groups. Here is 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 392 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 $\frac{1}{4}$

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 392 questions are in my new *Technician Class* book, rearranged for logical learning and teaching. Refer to page 205 for the cross reference. Then check our page 199 and see the convenient listings of CEPT agreements, third-party agreements and reciprocal agreements. I also give you the Q codes on page 200, and with safety always in mind, Tables on pages 195 to 197 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 55 and 56 and see the original topics T2A, T3C, T2B, and T3A all arranged together covering rules and regulations. 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 32 Your Ham Radio License 33 to 38 Your New Ham Radio Call Sign 39 to 46
3	You Are in Control 47 to 52 Mind Our Rules 53 to 61 Technician class frequencies 62 to 69
4	Your First Radio 70 to 78 Going On the Air 79 to 87 Fun on Repeaters 88 to 101
5	Repeater Review 88 to 101 Emergency 102 to 114
6	Weak Signals 115 to 121 Digital & Space 122 to 131
7	Bandwidth & Interference 132 to 141
8	Volts & Amps 142 to 149
9	Antennas 150 to 159
10	Your Safety 160 to 170
11	Review and Chapter 6 183 to 192
12	Exam Session and Graduation

NOTE: For a shorter class schedule, combine sessions 1 + 2, 7 + 8, 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 may eliminate 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.



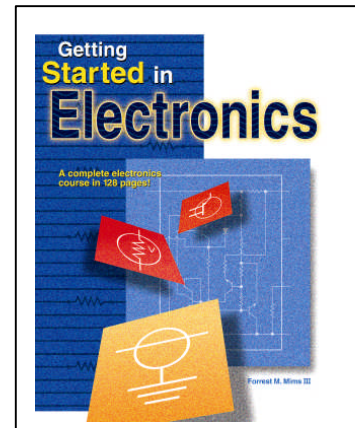
When you do the code in your classroom, you should try to use multiple speakers throughout the room to minimize echoes. Use an electronic key, and key-in the code yourself. This allows you to make dramatic pauses between hard letters, words, sentences, and allows you to re-enter any code character that 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 & Your License (pages 31-38)

- ◆ 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.



Your New Call Sign (pages 39-46)

- ◆ 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.

You Are In Control (pages 47-52)

- ◆ 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 Our Rules (pages 53-61)

- ◆ 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.

Technician Class Frequencies (pages 62-69)

- ◆ 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 70-78)

- ◆ 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 79-87)

- ◆ 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.

Fun On Repeaters (pages 88-101)

- ◆ 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.

Emergencies & Third-Party Operation (pages 102-114)

- ◆ 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 Signals (pages 115-121)

- ◆ 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.

Digital & Space (pages 122-131)

- ◆ 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 132-141)

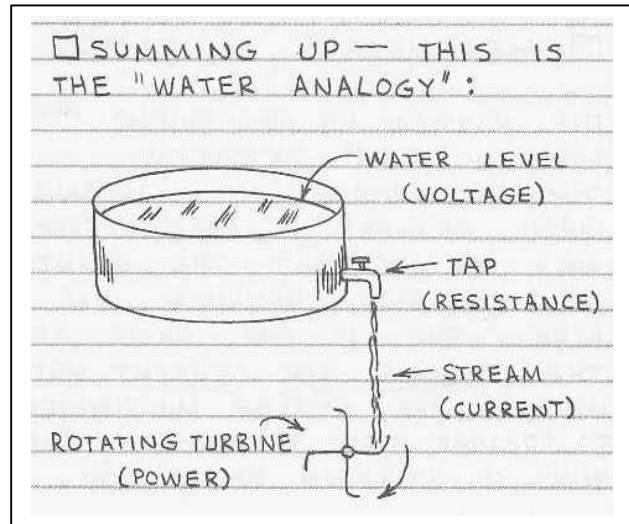
- ◆ Tune around on HF and illustrate bandwidth of different emissions.
- ◆ Decode PSK-31. (Mims book, pages 22-23.)
- ◆ Use a mobile FM radio to demo bandwidth of FM voice, and then ATV video on 70 cm.
- ◆ Bring in an ATV demo.

- ◆ 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.

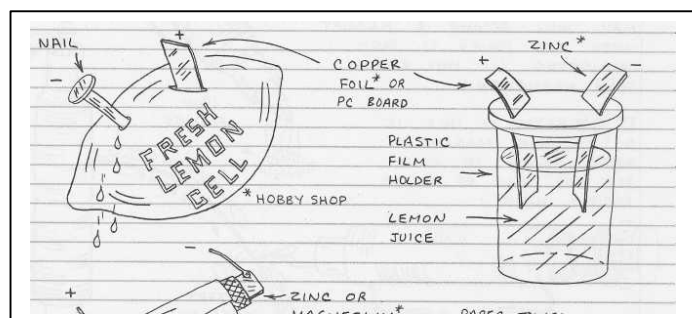
Volts & Amps (pages 142-149)

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.

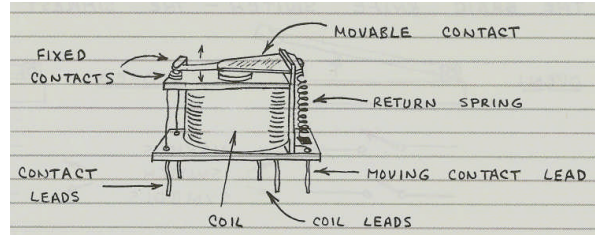


Courtesy of Forrest M. Mims, III



Courtesy of Forrest M. Mims, III

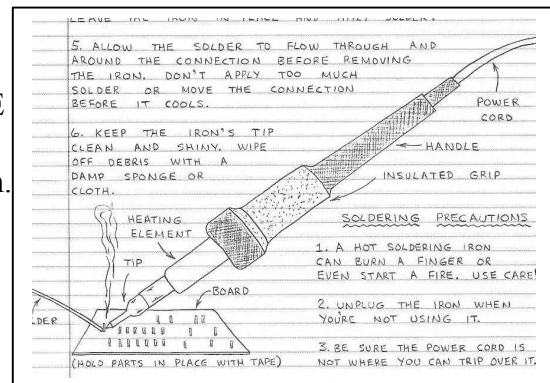
- ◆ Illustrate capacitors and spark a big electrolytic carefully. See Mims book, page 32, for how to make a capacitor with aluminum foil and waxed paper.
- ◆ Show off a variable capacitor.
- ◆ Show off coils. (Mims book, pages 38-39.)
- ◆ Demonstrate the power of a coil by dropping a rare earth magnet 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 (pages 150-159)

- ◆ Start by making a simple dipole.
- ◆ Have students build their own different dipole on different bands.
- ◆ Have students build 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)

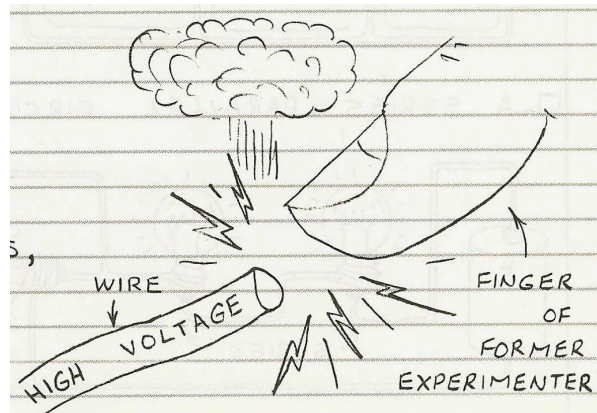


Courtesy of Forrest M. Mims, III

- ◆ 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.

Your Safety (pages 160-170)

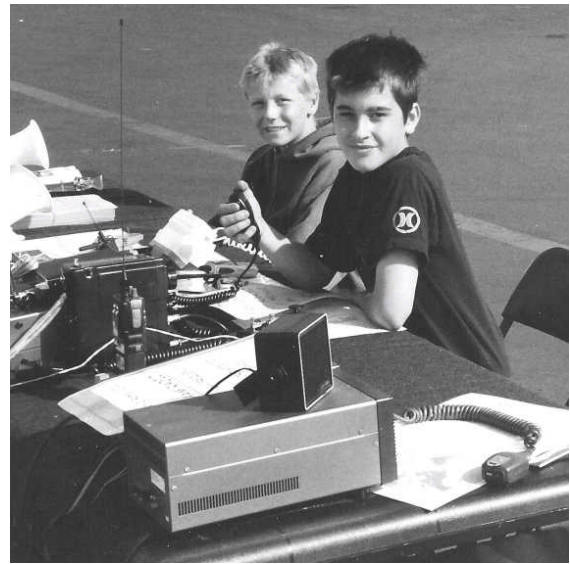
- ◆ Turn on a flood lamp or auto headlamp and have a student come up and feel the warmth. If they touch it, they will get burned. This illustrates a basic principle of radiation.
- ◆ Talk about the handheld and show keeping the antenna away from your head.
- ◆ Go outside and examine a mobile vehicle 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 (pages 171-181)

- ◆ 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 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 Requirements for the Radio Merit Badge as posted on the BSA website and, based on those requirements, provide the following guide to using the Gordon West *Technician Class* study manual for 2006-10 to earn the merit badge. (You can review the BSA requirements at www.boy scoutstrail.com/boy-scouts/meritbadges/radio.asp)

Scout Radio Merit Badge Suggestions

<u>Radio Merit Badge Requirement</u>	<u>Resources Found in Gordo s 2006-10 Technician Class book</u>
1. Know about the different Radio services	Pages 39-46 and 122-132
2. Understand radio wave propagation	Page 116, and 115-121
3. Know about radio:	
a. The Spectrum Chart.....	Page 6
b. Label Spectrum.....	Page 6
c. Locate services.....	Page 6
d. Discuss DX and ITU	Page 31, 40, 42-43
4. Learn about a radio	Pages 70-78
5. Safety	Pages 160-170
6. Explain the following:	
a. Diagrams.....	Page 132
b. Radio system	Page 170
c. Electrical circuits	Pages 142-149
d. Schematic symbols	Page 202
7. Discuss Amateur Radio:	
a. On-air fun.....	Pages 1-5
b. On-air QSO.....	Page 79, 101
c. Q signals	Page 200
d. Privileges and exams	Pages 5-17, 47-52, 66-69, Chapter 6
e. Emergency calls	Pages 102-114
f. Types of ham stations.....	Pages 47-52, 79-87
8. Visit a live ham radio station	Pages 122-131

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!

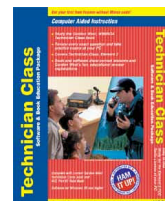
GORDON WEST BOOKS, AUDIO TAPES, & W5YI SOFTWARE PACKAGES AT AN INSTRUCTOR DISCOUNT:

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:

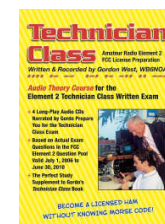
Technician Class, General Class, and Extra Class study manuals. Each book contains the exact questions and answers used to make up the exams, plus explanations of the correct answers. The books also contain a great deal of additional information on ham radio, including frequency privileges, list of VECs, 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 cassettes 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 5 of *Technician Class*, Learning Morse Code, pages 171 through 182, 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.

Aluma Towers	lightweight tower catalogs	www.alumatower.com
Amateur Electronic Supply	160-page full ham catalog	www.aesham.com
CQ Communications	promotional copies of CQ	www.cq-amateur-radio.com
Gap Antenna Products	catalog on vertical antennas	www.gapantenna.com
Glen Martin Engineering, Inc.	roof tower catalog	www.glenmartin.com
Ham Radio Outlet	120-page full ham catalog	www.hamradio.com
ICOM America	band charts	www.iconamerica.com
Kenwood USA	frequency charts, maps, catalogs	www.kenwood.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
SGC, Inc.	tuner and radio catalogs	www.sgcworld.com
Universal Radio	100-page full ham catalog	www.universal-radio.com
W5YI Group	VEC info / License prep materials	www.w5yi.org
W & W Associates	battery catalogs	www.wwassociates.com
Yaesu Electronics	frequency charts, world maps	www.yaesu.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 three Yaesu, Kenwood, and Icom 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 you 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 prestudy 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 prestudy material comes straight out of the Gordon West *Technician Class* book for the 2006 through 2010 Element 2 question pool. The fill-in-the-blank questions in this prestudy 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 prestudy 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 prestudy 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 homestudy 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 homestudy answers. The page numbers will help! Be sure to bring your completed homestudy to the first class session.

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

GETTING INTO HAM RADIO (Pages 1-4)

1. How many hams worldwide? _____
2. How many hams in the United States? _____
3. How many questions on your upcoming Technician Class exam? _____
4. How many bands will your new handheld have? _____
5. What was the world's first and largest antenna tower? _____
6. You will soon talk to astronauts on the _____
7. Ham radio is both a hobby as well as a _____
8. Join your local ham radio club and look for the club's _____

TECHNICIAN CLASS PRIVILEGES (Pages 5-18)

1. Frequency range for VHF? _____
2. Frequency range for UHF? _____
3. Frequencies above UHF are considered _____ waves.
4. Frequency range for sounds we hear? _____
5. 6 meter Technician Class privileges? _____ MHz to _____ MHz
6. 2 meter Technician Class privileges _____ MHz to _____ MHz
7. 1-1/4 meter Technician Class privileges _____ MHz to _____ MHz
8. 70 cm Technician Class privileges _____ MHz to _____ MHz
9. What are the most popular dual band meter bands? _____

A LITTLE HAM HISTORY (Page 19-24)

1. Radio has been around for _____ years?
2. First ham license issued around _____?
3. In 1979, this requirement was eliminated for operation above 30 MHz: _____ test
4. The FCC restructured our USA ham license on April 15, _____
5. May foreigner obtain a US ham license? _____
6. Highest level of US ham license? _____
7. What Element number do you study for Technician Class? _____
8. Can you jump over the entry level Tech test for the General test? _____
9. Does the Technician entry level require a Morse Code test? _____

GETTING READY FOR THE EXAM (Pages 25-30)

1. Total number of questions on your upcoming multiple choice Technician Class exam? _____
2. Passing score? _____%
3. How many questions could you miss and still pass? _____
4. How many members comprise an examination team? _____
5. You receive this paper when you pass: _____
6. How many total Technician class questions in the pool? _____
7. How many questions on radio and electronics fundamentals? _____
8. How many exam questions on electrical and RF safety? _____
9. Technician Class subelement T2 covers this topic? _____
10. Gordon's phone number if you need help or inspiration? _____

HAM RADIO AND YOUR LICENSE (P31-38)

1. Who enforces the ham radio rules? _____
2. Ham radio FCC rule Part number? _____
3. One fundamental purpose for ham radio? _____
4. Minimum age to become a ham? _____
5. Three grades of ham radio licenses? _____
6. What does VE mean? _____
7. Licenses are good for _____ years?
8. How long is a CSCE valid for license upgrade purposes? _____
9. Try this web page out for ham radio info and fun: [www._____](http://www._____.com)

CALL SIGNS (Page 39-46)

1. New call signs are issued in _____ order.
2. US call signs must begin with which four letters? _____
3. What number would be in a call sign issued to a ham in Florida? _____
4. Identify your station every _____ minutes and when you sign off.
5. What system allows a call sign made up of your initials? _____
6. Call sign lookup internet? [www._____](http://www._____.com).com

CONTROL OPERATOR DUTIES (P47-52)

1. A control operator must be present when a ham station is used for _____?
2. Repeaters may operate under _____ control.
3. What agreement must be in place to operate in a foreign country? _____

RULES AND REGULATIONS (Pages 53-61)

1. Who enforces our rules and regulations? _____
2. When may you conduct your own business operation over ham radio? _____
3. When are codes and ciphers allowed? _____
4. What about bad or indecent language? _____
5. Generally, is music allowed on the air? _____
6. How much power output SHOULD you run? _____
7. When may the FCC inspect your home station? _____
8. Where to obtain a printed copy of Part 97? www. _____ org

TECHNICIAN FREQUENCIES (Page 62-69)

1. Top end of voice frequencies? _____ Hertz
2. Frequencies above 20,000 Hertz are considered _____ waves.
3. Velocity of a radio wave in space? _____
4. Another name for cycles per second? _____
5. Kilo means _____ cycles.
6. Mega means _____ cycles.
7. VHF extends from 30MHz to _____ MHz.
8. UHF extends from 300MHz to _____ MHz.
9. 6 meter band limits _____?
10. 2 meter band limits _____?
11. 70 cm band limits _____?

YOUR FIRST RADIO (Page 70-78)

1. Another name for a combined transmitter and receiver _____?
2. This will help you hear your handheld in a crowd? _____
3. Put your favorite frequency in your radio s _____ channel.

4. This control silences background noise _____.
5. Have plenty of these when operating your handheld in the field _____.
6. This device transmits output power in a mobile _____.
7. Go to this page in the book to find equipment sellers _____.
8. Your first radio, a handheld, should have how many bands? _____
9. Two most popular bands in a dual band handheld? _____ and _____
10. Ask the radio dealer to please _____ popular repeater channels in your new equipment.

GOING ON THE AIR (Page 79-87)

1. Don't transmit before you _____?
2. Call this on 6 meters to seek a contact? _____
3. Say this on 2 meters and 70 cm to seek a contact? _____
4. Say this to break into an on-going conversation. _____
5. Popular wearing apparel when operating at a public service event. _____
6. What is that voluntary guideline for specific types of operation on a band? _____
7. What is the Q code for interference from another station? _____
8. What is the Q code for powerline interference? _____
9. What is the Q code for location? _____
10. What is the Q code for change frequency? _____
11. What is the Q code for signing off? _____
12. What is a ham name for finding a hidden transmitter? _____

FUN ON REPEATERS (page 88-101)

1. What device can extend range? _____
2. You need to know this to operate through a repeater? _____
3. Common repeater split for 2 meters? _____
4. Common repeater split for 70 cm? _____
5. Another name for CTCSS? _____
6. Why is the repeater sending Morse code? _____
7. A system of repeaters tied together? _____
8. A repeater system available for everyone to use? _____
9. A repeater system requiring membership? _____

10. All repeaters should be _____ by a local volunteer group?
11. Transmitting and receiving on the same frequency to minimize tying up a repeater ____?
12. Look up your local repeater www. _____ .com

EMERGENCY! (Page 102-114)

1. Which traffic has the highest priority? _____
2. Use this to signal an emergency using Morse code? _____
3. Say this on the international worldwide bands in an emergency? _____
4. Say this in an emergency on a 2 meter repeater? _____
5. Do this after you have checked into an emergency net? _____
6. Are tactical call signs allowed in an emergency? _____
7. Radio traffic on behalf of someone other than the two control operators? _____
8. Which organization usually serves Federal government agencies? _____
9. Which emergency group usually serves Red Cross, Salvation Army and National Weather Service? _____
10. Radio traffic relating to someone's well being? _____

WEAK SIGNALS (Page 115-121)

1. How far is VHF range? _____
2. When communicating simplex in a big city, should you choose UHF or VHF? _____
3. 6 meter long range excitement may be from radio wave refracting off the _____?
4. What mode do we normally use for weak signal work? _____
5. Do we use lower sideband or upper sideband on VHF and UHF? _____
6. What is that letter-number designator assigned to a geographic location? _____
7. Fun webpage for 6 meter activity? www. _____ .org?

DIGITAL & SPACE (Page 122-131)

1. What kind of ham station is tied into the internet? _____
2. What does VoIP mean? _____
3. What system allows radio to radio internet linking? _____
4. What system allows your computer to link into the internet? _____
5. You won't need this for a digital radio station? _____

6. What does PSK mean? _____
7. What system allows you to automatically transmit your position over radio? _____
8. Support this organization that supports satellites? _____
9. What class of license to operate through satellites? _____
10. How much power should you run working through a satellite? _____
11. What does LEO stand for? _____
12. International Space Station may be heard on what 2 meter frequency? _____

BANDWIDTH & INTERFERENCE (Page 132-141)

1. Emission with narrowest bandwidth? _____
2. Typical bandwidth of an FM signal? _____
3. What is being transmitted using NTSC? _____
4. Bandwidth for a single sideband voice signal? _____
5. A break in your cable TV coax could lead to _____?
6. What type of connector is on cable box coax? _____
7. What filter goes on a TV for outside antenna reception? _____
8. What kind of filter goes on a telephone to reduce interference? _____
9. What type of filter goes on the power cable to minimize alternator whistle? _____
10. Use this to help track down noise spurs? _____

VOLTS & AMPS (PAGE 142-149)

1. Electromotive force (EMF), voltage, is represented by what single letter? _____
2. How many volts in a car battery? _____
3. Current in amps is represented by what letter? _____
4. Direct current, out of a battery, flows in just _____ direction.
5. What is a good conductor? _____
6. What is a good insulator? _____
7. The unit of resistance is the ohm, represented by which letter? _____
8. Draw the Ohm s Law magic circle. _____
9. Pages 145 and 146 make it easy to compute Ohm s Law, right? _____
10. The unit of power is the watt. Which letter represents power? _____
11. Draw the magic circle, easy as P I E _____
12. How many volts in a kilovolt? _____

ANTENNAS (Pages 150-159)

1. What is the relative performance of a handheld s rubber duck antenna? _____
2. When communicating through a repeater, keep you antenna straight _____.
3. How long is a $\frac{1}{4}$ wavelength 2 meter antenna? _____ inches
4. What do they call a $\frac{1}{2}$ wave antenna horizontal to the earth? _____
5. What do they call an antenna that beams energy in one general direction? _____
6. What is the impedance of ham coax cable? _____
7. Is an SWR reading 3:1 good or bad _____
8. What type of antenna purposely does not radiate a signal? _____

YOUR SAFETY (Pages 160-170)

1. Voltage above what level is considered dangerous? _____
2. The green wire in a three wire house plug connects to where? _____
3. What value fuse would you use to replace a blown 5 amp fuse? _____
4. Watch out for this when putting up any antenna? _____
5. Make sure your radio station is well _____
6. Wear these when working on the ground with someone up a tower above you _____.
7. What will concentrated radio waves do to the body at microwave frequencies? _____
8. If you touch a transmitting antenna, you could get _____?
9. What is the maximum power level above 30 MHz before you need to conduct a formal RF exposure evaluation? _____
10. The greater the transmit, the _____ radiation exposure.

CW THE DOTS AND DASHES (Pages 171-182)

1. CW will always be a ham radio signaling art mainly because the signal is easy to transmit and receive. T/F _____
2. The FCC is considering eliminating the CW test. T/F _____
3. Currently, what is the CW test speed for General and Extra Class Upgrades? _____
4. What CW character is dash-dash-dot-dot? _____
5. What do they call the method of sending CW characters at 15 wpm, spaced to 5 wpm? _____
6. The best way to learn CW is by sound, not sight. T/F _____

GETTING READY FOR THE TEST (Pages 183-192)

1. How many examiners, minimum, comprise an accredited test team? _____
2. Bring identification. Also bring a cash test fee of approximately \$ _____
3. Could the test questions be reworded from what is in the book? _____
4. What FCC form will you fill out? _____
5. When can you go on the air after passing the test? _____
6. Draw a picture of your face when your examiners say you have passed your entry level
Element 2 Technician class exam. Don't forget the eyebrows!

Congratulations on completing your prestudy 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 192, 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



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For the Gordon West 2006-10 Technician Class

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