The ADVENTURES OF ZACK & MAX
VOLUME 1
The Odyssey Begins

www.icomamerica.com
Welcome to the World of Ham Radio!

Thank you for your interest in The Adventures of Zack and Max - The Odyssey Begins. This is your first step in discovering the excitement of amateur radio (also known as ham radio). This story is designed to provide you with basic information about ham radio – its history, its applications, and its relevance in the world today.

We hope you have fun reading this story. We had fun creating it, and encourage you to get involved in this wonderful hobby. Whether you’re a student or an adult, we feel this book tells the story of ham radio well enough for you to read it again and again. And, if you do find it interesting and informative, please pass it on to a friend! For information on how to become a ham, see the inside back cover of this book. Enjoy!

About ICOM, Inc.

ICOM, Inc., founded by Tokuzo Inoue, JA3FA, is a worldwide leading manufacturer of Amateur and other radio equipment. Headquartered in Osaka, Japan, ICOM entered the radio business over 45 years ago, creating some of the first transistorized amateur radio transceivers. Today, ICOM is proud to continue its advancement of the hobby by offering a wide range of amateur radios — from cutting-edge, digital technology, base transceivers to innovative handheld radios. ICOM is always working to improve its products by employing the latest technology, listening to customer suggestions, and drawing from experience in the radio industry.

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All characters are purely imaginary and any resemblance to any real person, living or dead, is entirely coincidental.
Zack, his dad, and Max went out for a long hike in the country one sunny day in June.

What a beautiful day!

Look over there. What's that?

Those are Ham radio operators.

Ham?...

...That's ME!

What's HAM radio, Dad?

Ham radio is a hobby that allows people to talk on a radio. They can talk as close as within a building or as far away as the other side of the world. There are more than 2.8 million Hams all over the world!

Why do they call it Ham radio?

No one really knows for sure...
Ham radio is also called AMATEUR radio. It's by government law that Ham radio cannot be used for profit. And you can't play music over Ham radio.

Really. But I hear music on my radio all the time.

That's not Ham radio.

That's COMMERCIAL broadcast radio. People play those songs to make profits by selling advertising. There's no advertising on Ham radio. And your radio does not pick up Ham frequencies.

Frequencies?

Radio is part of the electromagnetic spectrum, just like x-rays and light. All electromagnetic energy travels in waves at the speed of light. In radio, the bigger the wave, the lower the frequency and the further on earth you can talk.

So are Ham radio waves bigger or smaller than one's from my home radio?

Both. There are BANDS of frequencies set aside for Ham radio use. Some bands use low frequency waves - these are big waves, bigger than a house - and some use high frequency waves. Some Ham waves are so small they are called 'microwaves'.
It's true! Our microwave oven cooks by using radio waves. That's why it's so important that Ham radio operators take precautions to send—or transmit—their radio signals in a way that no one gets hurt.

Microwaves!? Like our microwave oven?

Uh-huh. Get out!

Ham radio's been around a long time and people have had years to make it safe.

Early Giants of Radio

How long?

...There were many inventors who contributed to the development of radio. Armstrong, Tesla, and DeForest are a few of the giants. But most people credit Marconi as the father of radio.

In the early days radios were primitive. There were no rules about who could broadcast. It was chaos.

Ham radio got its real start just after the year 1900...
Finally, in 1912 the military stepped in and claimed the best airwaves for "at-sea" use. Hams were left with the shortwaves.

So the radio in my room would not be there if it weren't for Hams?

Possibly.

It was Hams who advanced radio theory and helped make the short-wave radio the popular industry that it is today. The FM station you hear on your radio is a form of shortwave radio.

Emergency Communications

Hams helps out during emergencies. Hear that, Max?

Ham radio has other uses too, Zack. The biggest use is for emergency communications. If there were an earthquake or tornado or hurricane, often the only way people can communicate and organize help is by Ham radio.

But why are these people out here in the woods?

These people are taking part in 'Field Day'. In June, Hams practice their emergency communications preparedness.
There is often no electricity available during a disaster. Hams have to create their own power. They use portable generators, solar panels, water or wind power; and batteries to generate their own electricity.

I...I don't think I could do that!

Dad. This looks like fun!

It is, and it's hard work too. These antenna towers are not easy to put up.

Not yet, Zack. Not all Ham radios need that tall of an antenna. Some antennas are as easy to set up as running a long straight wire to a tree.

Can we go see what all those people are doing?

Sure. Hams like it when people ask questions about their hobby.

There are small portable antennas that you can hold in your hand, too.
Hi! Are you here for Field Day?

Yes. Are you Madison Bailey?

How did you know that?

I know your dad. Where is he now?

Over there, in Station 6, the 20 meter CW tent.

The What!?

Madison, this is my son, Zack. Zack, why don’t you talk with Madison about Ham radio while I go speak with her dad?

Hi. You can call me Mady.

Aw, Dad, I wanna go with you, to learn more about Ham radio.

I’m sure Mady can answer some questions for you. You’re a Ham, right Mady?

You bet! KC7JPA, general class.

KC-what?

KC7JPA.
That’s my call sign.
Ham radio is fun! Watch! W7PZ. This is KC7JPA.

How's it going, Dad?

Great! I just made contact with Mexico and France on 20 meters. Meet me for lunch at 13 hundred hours.

Did he say he just spoke with someone in France? That's neat! Even my Dad's cell phone doesn't work out here in the woods.

KC7JPA. This is W7PZ.

Okay, see you then. KC7JPA, out.

W7PZ, clear.

It was scary - only one town away. My Dad is a member of Skywarn. That's a group of Hams who help warn people who are in danger of being hurt by severe weather.

That's what makes Ham radio so great for emergency use. Last summer my Dad and I took a trip to Oklahoma, to visit my Aunt Stacey. On the way, there was a tornado warning!

The tornado hit the town! But thanks to Skywarn, no one was hurt.

Wow, I've never seen a tornado.
Ham radio helps in other ways too, Mady.

Hi Bill!

Bill is a member of our radio club.

Gee. Ham radio is important!

Yeah, and pretty soon, I'll get to go out on searches.

Oh? Are you going to be a firefighter, too?

No. I'm gonna be an astronaut, like Kathy Sullivan, N5YYV. She even used Ham radio on the Space Shuttle!

There's a Ham radio on the Space Shuttle?

Yeah! Hams talk to the Space Shuttle and the International Space Station all the time.

Wow! That's neat!
"CQ Field Day, CQ Field Day, November, 7, India, Hotel."

Each of these tents is radio station. Each station is working a different BAND.

Hey, I thought you weren’t a Ham.

Did he say Indian Hotel???

India, Hotel. That means the letters I and H. Using words can be easier to understand than letters.

November, 7, India, Hotel is N7IH, which is our club call sign.

Hams have a lot of fun with their call signs. My friend’s call sign is KB9PBJ. We call him Kilo, Bravo, 9, Peanut Butter and Jelly.

For official identification, Hams use a standard “Phonetic Alphabet”
Is that a radio they’re using? It doesn’t look like any radio I’ve ever seen.

Ham radio is a hobby, and Hams hold contests to see how far and how often they can make a “QSL” or two-way contact.

Then, Hams may exchange QSL cards by mail or by the Internet to acknowledge the contact.

That’s a radio all right. We call it a BASE STATION. Ham radio isn’t just for emergencies or search and rescues. Many people use Ham radio just for fun, too. It’s pretty neat knowing you can talk to some other Ham in a country 6,000 miles away with nothing but air between the two of you.

DJ is working to get as many contacts as possible and Sharon is entering call signs into a computer for future contact verification. These competitions can get very intense. Let’s listen.

That doesn’t sound like anything to me...

Whisky 1 station. This is N7IH. Please repeat.

Just Wait. There’s a lot of TRAFFIC on the airwaves today.

N7IH. This is W1AW. We are 8A CT. QSL?
Roger, you are 8, Alpha, Connecticut. We are 5 Alpha, Western Washington. W1AW, thanks for the contact and good luck with your contest.

Hey how did he do that? That person came in really clear.

IF-DSP Filter

There are a number of reasons why the call could have come in so strong: the station could be close by; or the other operator could be using a very powerful station; or DJ could have tweaked the IF-DSP...

The what?

Wow! Just like my computer!

And, MP3's are a type of IF-DSP processing.

I listen to MP3's on my Mpeg player all the time. IF-DSP must be really powerful!

You're right! That radio has a powerful processor inside that helps us receive super clear signals.

DJ is shaping the incoming radio signal to get rid of noise and focus in on the signal he wants to listen to.
IF-DSP is changing the way amateur radio is used. It makes it easy to pull in really far away stations or to isolate a single signal, like you're hearing today.

It's still a new technology - this kind of radio performance was not available until just last year.

Bill, what was the other way you were gonna say that can help us hear signals clearly?

More than you think. A good hailstorm will bounce and scatter radio signals. Even rain clouds can affect signals.

It could have been favorable atmospheric conditions.

What does the atmosphere have to do with radio signals?

But the biggest way the atmosphere affects radio signals isn't by weather but by the different reflective properties of the layers in the sky.

There are transition zones in the sky, so the closer to earth you are, the thicker the atmosphere - usually. Each area affects radio signals differently. And radio signals travel in a straight line. On Very High Frequencies the signals usually travel directly into space.
Some Hams bounce signals...... Off of the moon, called MOONBOUNCE, and even meteor showers. Hams use very large antennas to catch those returning signals.

Every country has its own call sign code system. A French Ham’s call sign would begin with an F. A Ham in Mexico would start with X.

And in the US, it starts with K, W, N or A-something, right?

Pretty much, unless that Ham is calling from a US territory, or from Alaska or Hawaii, Alaska’s call starts with KL, Hawaii is KH.

So that’s how you tell if a Ham is from America.

Wooaaaahh. That rocks!

Huh? France? I guess so. But, probably not, his call sign was American.

So that guy who came in loud and clear could have been in France?
And my call sign starts with A5. I'm Yeshey, A51AA.

Can you identify where I come from by my call sign?

I have no idea.

Bill, W9WL. Nice to meet you.

A5?

Go take a break, Rick. I'll take over for a while.

Wow!

I am from Bhutan. It borders India and China. The Himalaya mountains run through my country, they are very beautiful!

380 contacts in 4 hours. Not bad, not bad. I could use some coffee.

Hey Yeshey, you're up

It is my turn to put in a 4-hour shift. Goodbye. Enjoy your Field Day.

I'll catch up with you guys later. It was nice meeting you, Zack.

Rick, would you like me to get you some coffee? I have to meet my Dad at 1300 hours in the meal tent, anyway.

No, thanks Mady. I'm going to head over there myself. Want to come along?

Sure. You coming, Zack?

Sure.
Man, what-a-great-day!

Guess what I like the most about Ham radio?

You can talk to astronauts???

Helping others in an emergency?

That's neat! I always wanted to make Japanese friends. I want to find out about hot new video games in Japan!

What is that sound?

That's CW. Morse Code.

Morse Code is a digital language. Patterned signals replace the letters of the alphabet.

Do I have to know Morse Code to become a Ham?

Not to get your Basic License, but you need to know most code to upgrade to the top licenses.

What I like the most about being a Ham is making friends with people from all over the world!

You met Yeshey from Bhutan. He is a good friend of mine. I met thru Ham radio I also have a friend from Japan, his name is Hiroshi, and I have another friend from Peru. Her name is Maria.
Digital Communications

There are other, more modern means of digital, or DATA, communications today. RTTY has been around for years. The IC-756PROIII has a feature that decodes RTTY and lets you read text messages right on its screen!

You don’t have to build huge antenna towers anymore. You can use a sensitive data mode -- PSK31 to tie your radio to your computer.

It combines 2 hobbies together!

**APRS** or Automatic Positioning Reporting System is popular now, too. It’s based on GPS, or Global Positioning System. This digital mode uses space satellite data to pinpoint and track Hams as they move.

**Hey, I'm Over here**

So you know where your friends are while you’re talking with them.

Ham radio is always moving forward and expanding, using new technologies and exploring new ways to communicate. Like ATV, or Amateur TV.

TV! Wow!

Like I said before, they’ve got a Ham radio on the International Space Station... Can I see who I’m talking to?

Yeah, you can talk to astronauts on the space station. If they’re transmitting ATV, you can see them too.
Wow, whoever that guy is, his CW is FAST.

That sounds like someone who knows what they're doing. Probably about 45 words per minute. Let's go see who it is.

Dad!!

Hi Zack.

Cool! I've got a new flat screen that would work great!

WOW, your Dad is really good!

How did you...

...I've been a Ham since I was your age, but I haven't been active in the hobby since we moved here.

I was hoping you and I could get involved with Ham radio - me for the second time, you for the first.

Cool! Can we talk to Hams in France? And astronauts on the Space Shuttle? and Moonbounce? and Search and Rescue... APRS™...
Well, maybe not everything all at once, but sure, you bet we can get going.

The computer is a necessary tool for Amateur radio operations. You are the computer expert, you can teach me some of the things you know. We can teach each other.

Okay, Dad.

Okay, I'm ready!

Of course, you'll have to get your amateur license.

No, you're not. You've got to study.

Study?

The test is not hard, but you will have to study and learn about Ham radio before you can get on the air. Remember our talk about the microwave oven?

Oh, yeah. Wouldn't want to cook Max!
We'll get some study guides, and we'll go over everything together.

You can even practice the test on the Internet.

Internet! Okay!

**EPILOGUE**

Rise and shine, kiddo.
It's Saturday.

Mmm-m-m-m.
Why get up so early on a SATURDAY?"

I want to show you something on the Internet. Something you've been waiti-

**WHAT'S MY CALL SIGN? WHAT'S MY CALL SIGN?**

Better get dressed. YOU'RE ready to get on the radio. And WE'RE going down to the radio store to pick one out for you.

Max, I think we're about to begin our first adventure!

KD7QEZ.
AMATEUR RADIO BAND PLAN

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UHF/VHF

HF Bands

Developed by Gordon West, WB6NOA
RadioSchool, Inc.,
for exclusive use by
ICOM America, Inc.
February, 2002.
Here’s where you can learn more about how to become a licensed ham radio operator:

**Amateur Radio Relay League (ARRL)**
www.arrl.org  
1-800-32NEWHAM  
326-3942

The ARRL provides information for anyone interested in Amateur Radio. Through books, tapes, maps, and a list of ARRL-affiliated ham clubs, you will be able to find the answers to all your questions about Amateur Radio. To find out more about Amateur Radio and the ARRL check out [www.arrl.org](http://www.arrl.org).

**Gordon West Radio School**  
1-714-549-5000  
E-mail: wb6noa@arrl.net

Gordon West offers free classes for kids, plus free instructor training seminars. West has trained 8 out of 10 HAMS through his books, tapes and classes.

Or check with your school’s science teacher, school librarian, or your local public library.

Here’s where you can learn more about amateur radio and purchase Icom radios in the U.S.

<table>
<thead>
<tr>
<th>State</th>
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| ALABAMA     | GigaParts, Inc.  
Huntsville, AL | 856-535-4442      |
| ARIZONA     | Ham Radio Outlet  
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|             | PA E.E.  
Tucson, AZ   | 520-888-3333      |
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| CONNECTICUT | Lentini Communications  
Newington, CT | 860-666-6226     |
| DELAWARE    | Ham Radio Outlet  
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|             | Eli’s Amateur Radio  
 Ft. Lauderdale, FL | 954-525-0103    |
|             | Mike’s Electronics  
 Ft. Lauderdale, FL | 954-491-7110    |
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Hialeah, FL | 305-822-2238      |
|             | RF Components (Export)  
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|             | YV-5 Communications (Export)  
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Preston, ID | 208-852-0830      |
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Wheaton, IL | 630-668-9577      |
| INDIANA     | Ham Station  
Evansville, IN | 812-422-0231      |
| KANSAS      | Associated Radio Communications  
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| MICHIGAN    | ComDev Radio  
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| NEVADA      | A.E.S. Las Vegas  
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