# RADIO STATION VE3EMO
## PROVINCIAL EMERGENCY OPERATIONS CENTRE



*EMO Amateur Radio Emergency Service Group*

# EMERGENCY RADIO...

## GETTING THE MESSAGE THROUGH

As the incidence of disasters and emergencies of all types and causes increases, so does the need for emergency agencies to provide help in stricken areas. Major emergencies can strike anywhere, anytime, without warning.

Often, existing means of communications, be they landline telephone, cellular phone or wireless radio links, become unusable because they are overloaded or simply no longer exist. They get overloaded when too many persons try at the same time to dial for help or to check on a friend or family member in a disaster area. They can become non-existent when wires and towers topple and electrical supplies fail, due to acts of nature or terrorism.

When emergency agencies are required in a zone of disaster, their regular means of communications can be affected by the same disruptive causes as others. That creates a need for a supplemental or back-up communications system, one that comes complete with equipment and trained operators who are licenced by the Canadian government, all at no cost to the public or the agency involved. In fact, these men and women are volunteers, members of the Amateur Radio Emergency Service (ARES) sponsored and operated by Radio Amateurs of Canada.

Amateur Radio is in need of persons who recognize how crucial our back-up service is to those agencies that respond in times of emergency and to the members of the public we serve. If you have not yet obtained your Amateur Radio Operator Certificate, you are strongly urged to do so in order that you, too, may become a trained emergency radio operator. *Courtesy Radio Amateurs of Canada*

# BASIC AMATEUR RADIO COURSE

(updated November 28 2007)

The following series of Power Point Presentations *(8 modules, 386 slides)* has been prepared by the Emergency Management Ontario Amateur Radio Emergency Service Group (EMO ARES) as an aide to train interested volunteers in becoming Amateur Radio Operators. This course is offered free of charge to all Radio Clubs, ARES Groups, and individuals in the interest of public safety and community service.

*Note: Files on this course require Powerpoint Viewer and PDF Viewer (free downloads)*

Module One: Regulations & Policies *(PPT file 540kb 31 slides) updated Nov. 18 2007*

Regulations and Policies - 001
1-1 radio licences, applicability, eligibility of licence holder
1-2 licence fee, term, posting requirements, change of address
1-3 licence suspension or revocation, powers of radio inspectors, offences and punishments
1-4 operator certificates, applicability, eligibility, equivalents, reciprocal recognition
1-5 operation, repair and maintenance of radio apparatus on behalf of other persons
1-6 operation of radio apparatus, terms of licence, applicable standards, exempt apparatus
1-7 content restrictions - non-superfluous, profanity, secret code, music, non-commercial
1-8 installation and operating restrictions - number of stations, repeaters, home-built, club stations
1-9 participation in communications by visitors, use of station by others
1-10 interference, determination, protection from interference
1-11 emergency communications (real or simulated), communication with non-amateur stations
1-12 non-remuneration, privacy of communications
1-13 station identification, call signs, prefixes
1-14 foreign amateur operation in Canada, banned countries, third-party messages
1-15 frequency bands and qualification requirements
1-16 maximum bandwidth by frequency bands
1-17 restrictions on capacity and power output by qualifications
1-18 unmodulated carriers, retransmission
1-19 amplitude modulation, frequency stability, measurements
1-20 International Telecommunication Union (ITU) Radio Regulations, applicability
1-21 operation outside Canada, ITU regions, reciprocal privileges, international licences
1-22 examinations - Department's fees, delegated examinations, fees, disabled accommodation
1-23 antenna structure approval, neighbour and land-use authority consultation
1-24 radio frequency electromagnetic field limits
1-25 criteria for resolution of radio frequency interference complaints

Industry Canada Supporting Documentation

RIC-2 : Standards for the Operation of Radio Stations in the Amateur Radio Service (*PDF file 48.7kb)*
RIC-3: Information on the Amateur Radio Service (*PDF file 79.6kb)*
RIC-4: Technical Requirements Respecting Identification of Radio Stations (*PDF file 20.3kb)*
RIC-7: Basic Qualification Question Bank for Amateur Radio Operator Certificate Examinations (*PDF file 277kb)*
RIC-9: Call Sign Policy and Special Event Prefixes (*PDF file 663kb)*

## Module Two: Operating & Procedures *(PPT file 3.29mb 67 slides)*

Operating and Procedures - 002
2-1 voice operating procedures - channelized VHF/UHF repeater
2-2 phonetic alphabet
2-3 voice operating procedures - simplex VHF/UHF and HF
2-4 tuneups and testing, use of dummy load, courteous operation
2-5 Morse code (CW) operating procedures, procedural signs

2-6 RST system of signal reporting, use of S meter
2-7 Q signals
2-8 emergency operating procedures
2-9 record keeping, confirmation practices, maps/charts, antenna orientation

Additional Help

Discover the Magic Of HF Radio (*PPT file 4.26mb)*
*Published by the ARRL Mentor Program*

> *Welcome to Worldwide Communications, This presentation is designed to introduce the new or recently upgraded ham to HF radio.*
>
> *Topics include;*
> *Differences between HF, VHF and UHF,Propagation, Building a Station, About Transceivers, Meter Functions, Controls, Antennas, Standing Wave Ratio (SWR), Matching Networks, Feedlines, Safety, Grounding, RF Safety, Physical Safety, Get On The Air*

An introduction to Repeater Systems (*PPT file 4.26mb)*
*Courtesy Northern Alberta Amateur radio Club*

> *Nice overview of how repeaters work and protocols*

Continuous Tone Coded Squelch System (CTCSS) (*PDF file 69.0kb)*

An Introduction to Amateur Satellites (*PDF file 1.38mb)*
*Courtesy AMSAT.ORG*

> *An execellent overview on the Amateur Radio Satellite Program*

## Module Three: Station Assembly, Practice & Safety (*PPT file 2.33mb 46 slides)*

Note: This module to be divided into two lessons

Station Assembly, Practice and Safety - 003
3-1 functional layout of HF stations
3-2 functional layout of FM transmitters
3-3 functional layout of FM receivers
3-4 functional layout of CW transmitters
3-5 functional layout of SSB/CW receivers
3-6 functional layout of SSB transmitters
3-7 functional layout of digital systems
3-8 functional layout of regulated power supplies
3-9 functional layout of Yagi-Uda antennas
3-10 receiver fundamentals
3-11 transmitter, carrier, keying, and amplitude modulation fundamentals
3-12 carrier suppression, SSB fundamentals
3-13 frequency and phase modulation fundamentals
3-14 station accessories for telegraphy, radiotelephony, digital modes
3-15 digital mode fundamentals (RTTY, ASCII, AMTOR, packet)
3-16 cells and batteries, types, ratings, charging
3-17 power supply fundamentals
3-18 electrical hazards, electrical safety, security
3-19 electrical safety ground, capacitor discharge, fuse replacement
3-20 antenna and tower safety, lightning protection
3-21 exposure of human body to RF, safety precautions

Additional Help

PL-259 Installation (*PPT file 9.09mb*)
*Produced by N5NA*

> *The mobile antenna is mounted now how do you put on the coax connector? This is a close-up of installing a PL-259 on RG-58 in PowerPoint format.*

Battery Care and Maintenance (*HTML file 795kb*)
*Courtesy Ohio State University Medical Center*

> *Batteries in portable consumer devices such as a laptop, camcorder, cellular phone, etc., are typically made using either Nickel Cadmium (NiCad), Nickel Metal Hydride (NiMH) or Lithium Ion (Li-Ion) battery cell chemistry. Each type of rechargeable battery chemistry has its own unique characteristics:*

Soldering Tutorial (*PDF file 310kb*)
*By Tom Hammond N0SS*

> *Good equipment and a good soldering technique are both essential to successful assembly of any device. Please read thes tips before you start*

Do You Need an Antenna Tuner? (*PDF file 795kb*)
*By Steve Ford, WB8IMY*

> *Maybe yes, maybe no. It all depends on the type of antenna and feed line you're using*

Mobile Installation (*PPT file 20mb*)
*Produced by W8CM*

> *Give your students some practical information with this VHF/UHF Mobile Installation PowerPoint presentation by Mike Baker, W8CM. Mike presented this at Hamcom 2006 and will give new hams (and old timers) ideas for installing their new equipment!*

What is AIRMAIL? (*PPT file 3.73mb*)
*Tutorial by VE7DIE, Larry Joe*

> *A radio messaging program for HAMS!*
> *A standalone Email program*
> *A host interface to Outlook (Express)*
> *All of the above!*

Winlink 2000 Digital Messaging Tutorial (*PPT file 2.01mb*)
*By Steve Waterman, K4CJX*

> *E-MAIL VIA HAM RADIO using Winlink 2000 is a proven, existing, operational, dependable, redundant, secure, reliable Amateur radio e-mail messaging network that is being made available to the ARES® & RACES communities.*

Getting Started with Sound Card Digital Modes (*PDF file 164kb*)
*By Murray Greenman ZL1BPU*

> *This presentation is about setting your Amateur radio station up to operate the wide range of modern radio software which uses the PC sound card to generate and receive signals. The most basic setting up information and hints are included.*

Last Mile Communications Using Digital Radio Technologies (*PPT file 7.15mb)*
*By KS4JU*

*Why Digital Radio?*

- *More Robust*
- *Can work better in noisy RF environments*
- *Built in filtering or data redundancy improve communications*
- *Can be more efficient with less power and smaller antennas.*
- *Greater Connectivity*
- *Some modes can be linked over the Internet to reach more potential users*
- *Communicate More Efficiently*
- *Greater bandwidth capability for more information*
- *Potential for sending documents, photos and other attachments.*
- *Provides more accurate communications*

## Module Four: Circuit Components (*PPT file 264kb 18 slides)*

Circuit Components - 004
4-1 amplifier fundamentals
4-2 diode fundamentals
4-3 bipolar transistor fundamentals
4-4 field-effect transistor fundamentals
4-5 triode vacuum tube fundamentals
4-6 resistor colour codes, tolerances, temperature coefficient

Additional Help

Introduction to PN Junction Diodes (*PDF file 315kb)*

Bipolar Junction Transistors (*PDF file 51.6kb)*
*Published by The School of Computer Science and Electrical Engineering*

*How transistors work*

Fundamentals of Transistors (*PDF file 2.00mb)*
*By Leonard Krugman*

*Introduction to transistors targeted at "the technician and amateur". Shows basic transistor circuits.*

Resistor Colour Code Practice: *(exe file 679kb)*
*(Right click and save in a directory of your choice)*

Introduction to Solid-State Devices and Power Supplies (*PDF file 2.41mb)*
*Published by US Navy*

## Module Five: Basic Electronics & Theory (*PPT file 3.73mb 74 slides)*

Note: This module to be divided into two lessons

Basic Electronics and Theory - 005

5-1 metric prefixes - pico, micro, milli, centi, kilo, mega, giga
5-2 concepts of current, voltage, conductor, insulator, resistance
5-3 concepts of energy and power, open and short circuits
5-4 Ohm's law - single resistors
5-5 series and parallel resistors
5-6 power law, resistor power dissipation
5-7 AC, sinewave, frequency, frequency units
5-8 ratios, logarithms, decibels
5-9 introduction to inductance, capacitance
5-10 introduction to reactance, impedance
5-11 introduction to magnetics, transformers
5-12 introduction to resonance, tuned circuits
5-13 introduction to meters and measurements

Additional Help

Introduction to Matter, Energy, and Direct Current (*PDF file 3.16mb)*
*Published by The U.S.Navy NEETS program*

> *This is an excellent entry level electronics training program but you must be aware that some of the material is specific to the Navy. The basics are all here, all you have to do is study to get the same high quality training as the sailors who repair sophisticated Communications, Radar, and SatComm systems. One other note: The Navy teaches "Electron Flow" where Colleges teach "Conventional Current Flow" and this can be confusing to some who have a college background, but the numbers still come out the same, simply the direction of flow in the circuit is reversed. Either way the theory is still the same.*

Capacitors (*PDF file 3.16mb)*

> *Capacitance, capacitor circuits, Charge flow, Storing charge, Stored charge: effect of voltage, Capacitance formula, Stored charge, Designing capacitors, Energy stored in a capacitor, How much energy is stored, Stored energy, Charging through a resistor, Discharging a capacitor, Analysing capacitor discharge*

Capacitors, Magnetic Circuits, and Transformers (*PDF file 3.16mb)*

> *A detailed text on capacitors, inductors, and transformers. Great info for those wanting a deep understanding of these passive components. Good theory and practical applications, especially on transformers and inductors.*

Inductors (*PDF file 110kb)*
*Published by The School of Computer Science and Electrical Engineering*

Module Six: Feedlines (*PPT file 1.69mb 26 slides)* Antenna Systems (*PPT file 1.01mb 27 slides)*

Note: Feedlines and Antenna Systems are two separate files and lessons

Feedlines and Antenna Systems - 006
6-1 feed line characteristics, characteristic impedance
6-2 balanced and unbalanced feed lines, baluns
6-3 popular antenna feed line and coaxial connector types
6-4 line losses by line type, length and frequency
6-5 standing waves, standing wave ratio, SWR meter
6-6 concept of impedance matching

6-7 isotropic source, polarization via element orientation
6-8 wavelength vs physical length
6-9 gain, directivity, radiation pattern, antenna bandwidth
6-10 vertical antennas - types, dimensions, characteristics
6-11 Yagi antennas - types, dimensions, characteristics
6-12 wire antennas - types, dimensions, characteristics
6-13 quad/loop antennas - types, dimensions, characteristics

Additional Help

Understanding Antennas For The Non-Technical Ham (*PDF file 854kb)*
*A book by Jim Abercrombie, N4JA*

> *This is a book length web article provided by the author free for all hams.*

Introduction to Wave Propagation, Transmission Lines and Antennas
(*PDF file 2.40mb)*
*Published by US Navy*

Antenna Fundementals Propagation *(mpg file 120mb)*
*Published by the National Film Board*

> *An excellent series of videos produced by the Royal Canadian Air Force (Circa 1950s) on Antenna Theory including Propagation, Directivity and Bandwith. Each film runs about 15 minutes and provides excellent tutorials on antenna theory*

Antenna Fundementals Directivity *(mpg file 119mb)*
*Published by the National Film Board*

> *An excellent series of videos produced by the Royal Canadian Air Force (Circa 1950s) on Antenna Theory including Propagation, Directivity and Bandwith. Each film runs about 15 minutes and provides excellent tutorials on antenna theory*

Antenna Fundementals Bandwidth *(mpg file 110mb)*
*Published by the National Film Board*

> *An excellent series of videos produced by the Royal Canadian Air Force (Circa 1950s) on Antenna Theory including Propagation, Directivity and Bandwith. Each film runs about 15 minutes and provides excellent tutorials on antenna theory*

Wire Gauge Chart (*PDF file 172kb)*

Baluns & What They Do (*PDF file 924kb)*
*By Roy Lewallen, W7EL*

## Module Seven: Radio Wave Propagation (*PPT file 5.81mb 82 slides)*

Radio Wave Propagation - 007
7-1 line of sight, ground wave, ionospheric wave (sky wave)
7-2 ionosphere, ionospheric regions (layers)
7-3 propagation hops, skip zone, skip distance
7-4 ionospheric absorption, causes and variation, fading, phase shift, Faraday rotation
7-5 solar activity, sunspots, sunspot cycle
7-6 MF and HF, critical and maximum useable frequencies, solar flux
7-7 VHF and UHF, sporadic-E, aurora, ducting

7-8 scatter - HF, VHF, UHF

Additional Help

FIELD ANTENNA HANDBOOK *(PDF file 4.64mb)*
*Marine Corps Reference Publication*

"Of all the variables affecting single-channel radio communications, the one factor that an operator has the most control over is the antenna. With the right antenna, an operator can change a marginal net into a reliable net. Marine Corps Reference Publication (MCRP) 6-22D, Antenna Handbook, gives operators the knowledge to properly select and employ antennas to provide the strongest possible signal at the receiving station of the circuit".

Solar Activity & HF Propagation (*PDF file 964kb)*
*By Paul Harden, NA5N*

> *Paul Harden NA5N is one of those rare individuals who really understands his subject and has a talent for explaining in a way we can all understand. He's also a whizz at presentation. This feature is set to become a classic, full of hints and tips - you will become your local club's propagation guru!*

Propagation Video *(exe file 1.05mb)*
*(Right click and save in a directory of your choice)*

Sailing the Ionosphere (*PDF file 89.2kb)*
Fred Backer VK2FJB discusses the ionosphere. How it affects radio propagation and how it can be used to the benefit of radio amateurs.

## Module Eight: Interference & Suppression (*PPT file 731kb 15 slides)*

Interference and Suppression - 008
8-1 front-end overload, cross-modulation
8-2 audio rectification, bypass capacitors, ferrites
8-3 intermodulation, spurious, key-clicks
8-4 harmonics, splatter, transmitter adjustments
8-5 use of filters: low-pass, high-pass, band-pass, band-reject

Additional Help

Cutting Through Interference from Radio Transmitters (*PDF file 155kb)*
*Published by Industry Canada*

Real Video Presentation: Cutting Through... Radio Interference
*(external link to Industry Canada Webste)*

Understanding and Solving RF Interference and Noise Problems (*PDF file 3.44mb)*
*By Jim Brown, K9YC*

> *A Ham's Guide to RFI, Ferrites, Baluns, and Audio Interfacing*

## Exam Preparation

### Basic Examination Test

100 multiple choice questions taken from a database of 958 questions
Required Passing Grade = 70% HF Privileges = 80%

Regulations & Policies - 25 questions
Operating Procedures - 9 questions
Station Assembly, Practice & Safety - 21 questions
Circuit Components - 6 questions
Basic Electronics & Theory - 13 questions
Feedlines & Antenna Systems - 13 questions
Radio Wave Propagation - 8 questions
Interference & Suppression - 5 questions

*These tools will help you prepare for your amateur radio basic examination.*

IPC-2007.exe *(exe file 3.89mb)*
Industry Canada software examination generator for amateur radio student practice:
IPC-2007.exe
*(Right click and save in a directory of your choice)*

ExHaminer.exe *(exe file 187kb)*
A self-test program for candidates to the Canadian Amateur Radio certification:
ExHaminer.exe
Be sure to download the Question Bank: Questions Basic.txt *(text file 493kb)*
*(Right click and save both files in the same directory)*

Application for Amateur Radio Operator Certificate (*PDF file 134kb)*
*Published by Industry Canada*

*This form must be filled out by the applicant and given to the delegated examiner upon successful completion of examination. please print clearly and fill in all fields. Choose three available callsigns from the database listed below, priority will be given to your first choice if available when application is received by Industry Canada.*

Choose your Callsign *(Link to external site)*

*A database of available amateur radio callsigns posted on the Radio Amateurs of Canada website.*

Certificate Examinations
There are two means by which an individual may obtain the Amateur Radio Operator Certificate with Basic, Morse code (5 w.p.m.), Morse code (12 w.p.m.) and Advanced Qualifications. They may:

(1) be examined by an accredited examiner; or
(2) be examined at the local district office of Industry Canada.

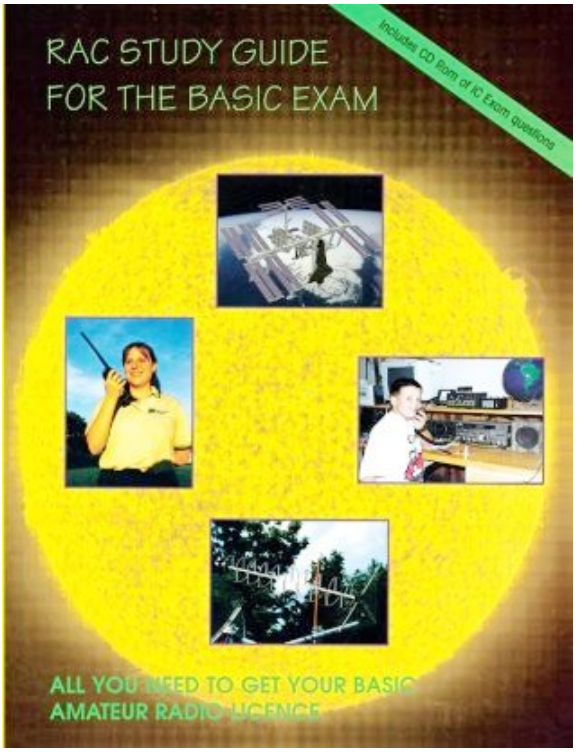
Accredited Examiners

A list of Accredited Examiners is provided to RAC by Industry Canada on an 'as-supplied' basis. Once received, it is posted to the RAC website. The first line in the spreadsheet provides the date that the file was sent from Industry Canada to RAC.
List of Accredited Examiners - sorted by province/city/lastname in EXCEL format

Amateur Radio Clubs & ARES Groups

Many Amateur Radio Clubs and ARES Groups offer Amateur Radio Courses, a comprehensive list of Amateur Radio Clubs can be found on the HFRadio.Net website: www.hfradio.net/clubs.shtml, a list of Registered ARES Groups in Canada can be forund on the Radio Amateurs of Canada Website: www.rac.ca/fieldorg/racares.htm

## Addtional Useful Information




*Available from the RAC Online Store*

*! NEW !*

RAC
Study Guide
for the Basic
Exam
Seventh
Edition
by
John
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VA3JI
&
Geoffrey Read
Smith VA3GS

Content far exceeds the current requirements for the Basic Qualification examination. Covers all the new exam questions.

*Published by Radio Amateurs of Canada*
*Price - $50.00*
*ISBN*
*1-895400-17-1*

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Radio Communications in the Digital Age (*PDF file 953kb)*
*By The Harris Corporation*

Chapter 1: Principles of Radio Communications
Chapter 2: The Ionospere and HF Propagation
Chapter 3: Elements in an HF Radio System
Chapter 4: Noise and Interference
Chapter 5: Data Communications via HF Radio
Chapter 6: Adaptive Radio Technology
Chapter 7: Securing Communications
Chapter 8: HF Systems and Applications
Chapter 9: Future Directions

The Electronic Experimenter's Manual (*PDF file 4.16mb)*
*By David A Findlay*

*"A true "hobbyist manual". Includes discussions on tools, parts, and setting up a workshop. Also details on how to lay out and fabricate a chassis (even one from a foil-covered cigar box!), male simple PCB's, and wire circuits together. Also has sections on some tools and test equipment you can build yourself, as well as some simple projects. Great beginners book.*

The Radio Handbook, 15th edition (*PDF file 59.4mb)*
*By William Orr, W6SAI*

*This is sort of an ARRL handbook on steroids. Very complete, covering basic theory though practical construction of mostly ham radio equipment, though much applies to any vintage electronic project. Has some transistor and semiconductor info but 90% vacuum tube, even a circuit for a tube-based VHF walke-talkie! There are even sections on "high-fidelity techniques" and "electronic computers"! Even includes a math section and info on how to set up your workshop (I like the "workshop-in-a-closet"!)*

This training course is a project in work and module contributors are welcomed & encouraged. If you would like to help refine or add content to any of the modules please submit presentations to: jim.taylor@emoares.org for review and inclusion, thank you.

EMO ARES Training Team

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EMO A.R.E.S. operates under the direction of Emergency Management Ontario

ONTARIO

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