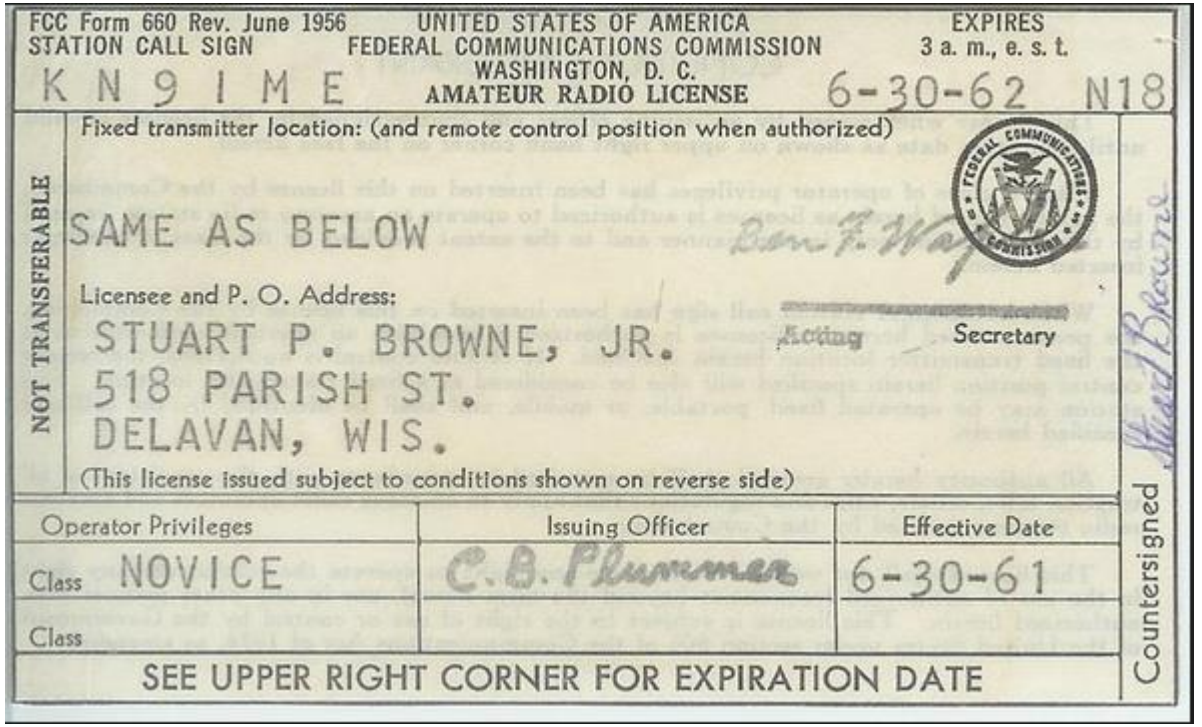

AMATEUR
RADIO
What’s a Ham?


Ham
Radio !!!

Licensed by the FCC



FCC Form 660 Rev. June 1956 — UNITED STATES OF AMERICA — EXPIRES 3 a. m., e. s. t.

STATION CALL SIGN: K N 9 I M E

FEDERAL COMMUNICATIONS COMMISSION
WASHINGTON, D. C.
AMATEUR RADIO LICENSE

EXPIRES: 6-30-62 N18

NOT TRANSFERABLE

Fixed transmitter location: (and remote control position when authorized)

SAME AS BELOW

Licensee and P. O. Address:

STUART P. BROWNE, JR.
518 PARISH ST.
DELAVAN, WIS.

(This license issued subject to conditions shown on reverse side)

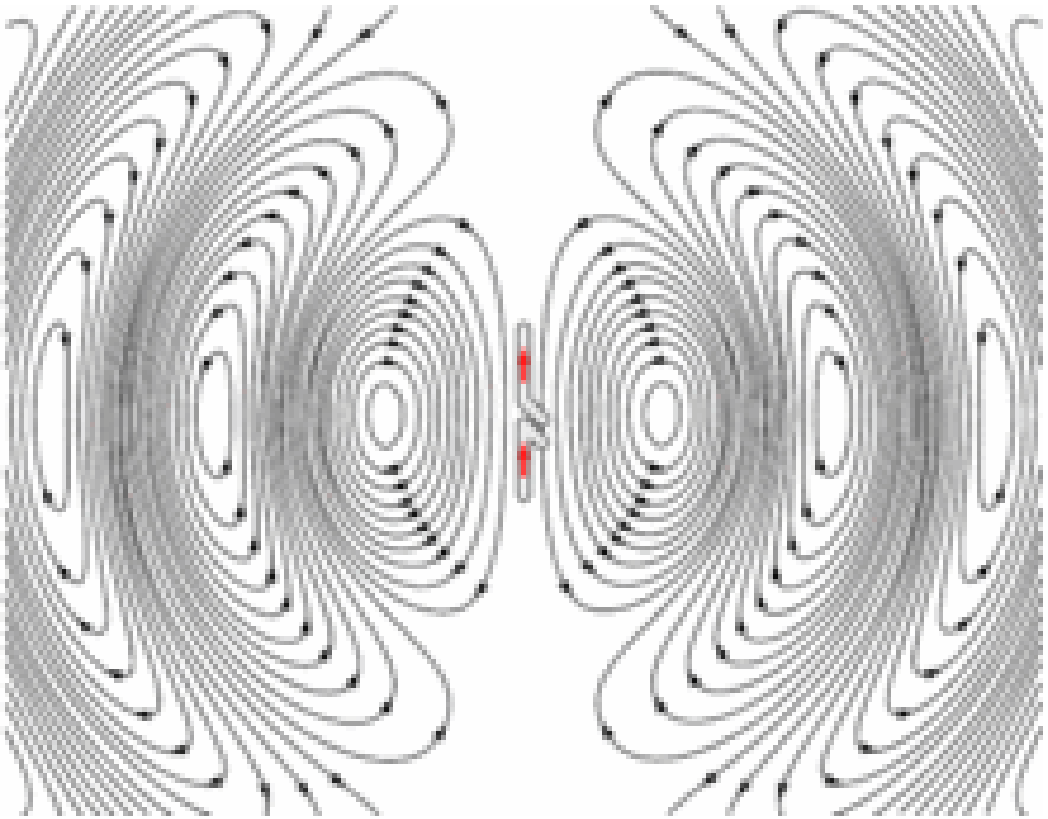
Acting Secretary

Operator Privileges	Issuing Officer	Effective Date
Class NOVICE	C.B. Plummer	6-30-61
Class		

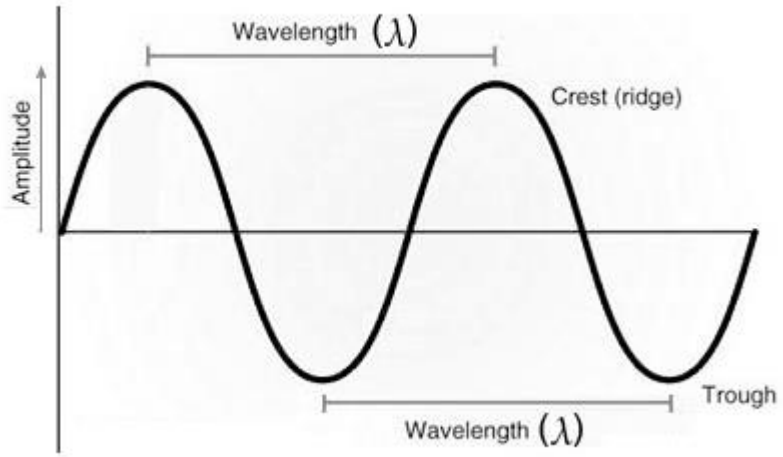
SEE UPPER RIGHT CORNER FOR EXPIRATION DATE

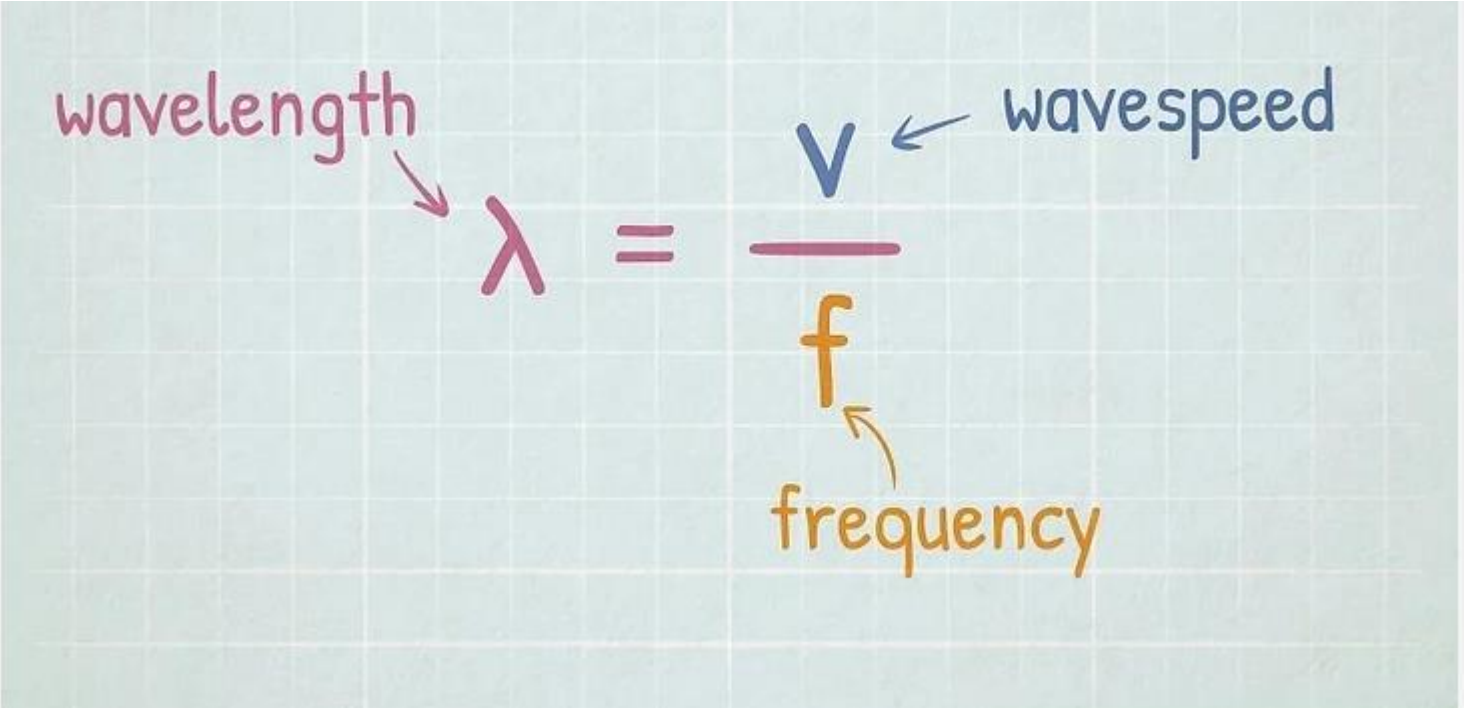
Countersigned

ELECTROMAGNETIC ENERGY



WAVELENGTH


Wavelength (λ)
Crest (ridge)
Amplitude
Trough
Wavelength (λ)


wavelength
wavespeed
λ = v / f
frequency

US Amateur Radio Bands

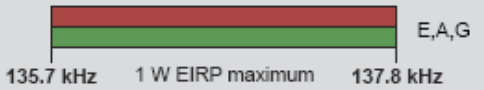
US AMATEUR POWER LIMITS

FCC 97.313 An amateur station must use the minimum transmitter power necessary to carry out the desired communications.
(b) No station may transmit with a transmitter power exceeding 1.5 kW PEP.

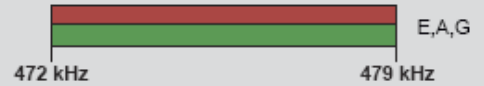
ARRL The national association for AMATEUR RADIO®

Amateurs wishing to operate on either 2,200 or 630 meters must first register with the Utilities Technology Council online at **https://utc.org/plc-database-amateur-notification-process/**. You need only register once for each band.

2,200 Meters (135 kHz)



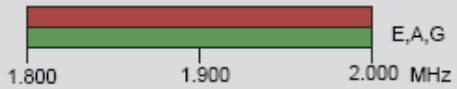
630 Meters (472 kHz)



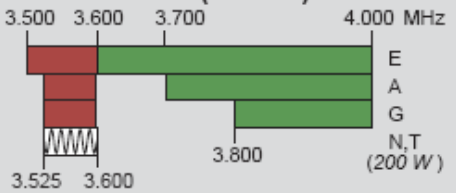
5 W EIRP maximum, except in Alaska within 496 miles of Russia where the power limit is 1 W EIRP.

160 Meters (1.8 MHz)

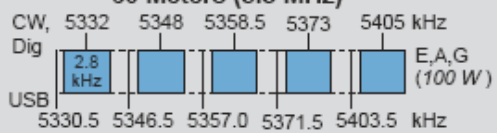
Avoid interference to radiolocation operations from 1.900 to 2.000 MHz



80 Meters (3.5 MHz)

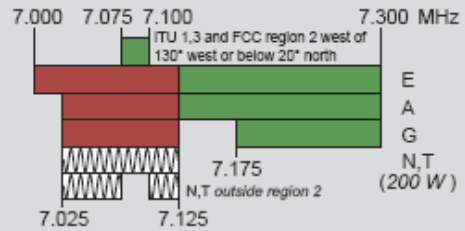


60 Meters (5.3 MHz)



General, Advanced, and Amateur Extra licensees may operate on these five channels on a secondary basis with a maximum effective radiated power (ERP) of 100 W PEP relative to a half-wave dipole. Permitted operating modes include upper sideband voice (USB), CW, RTTY, PSK31 and other digital modes such as PACTOR III. Only one signal at a time is permitted on any channel.

40 Meters (7 MHz)



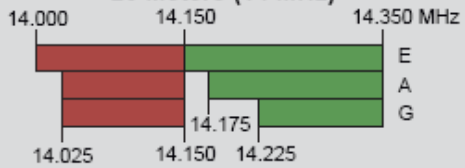
See Sections 97.305(c), 97.307(f)(11) and 97.301(e). These exemptions do not apply to stations in the continental US.

30 Meters (10.1 MHz)

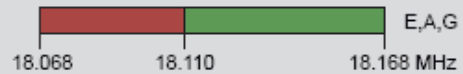
Avoid interference to fixed services outside the US.



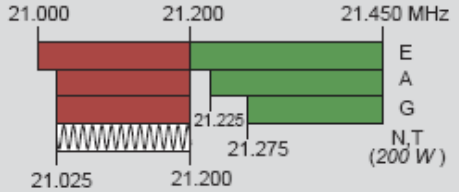
20 Meters (14 MHz)



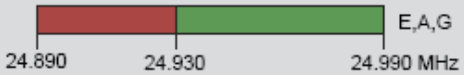
17 Meters (18 MHz)



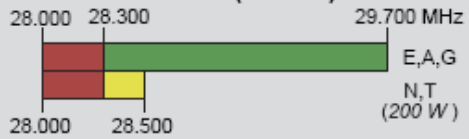
15 Meters (21 MHz)



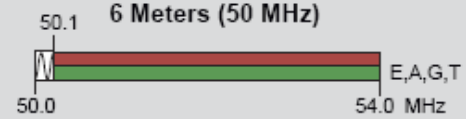
12 Meters (24 MHz)



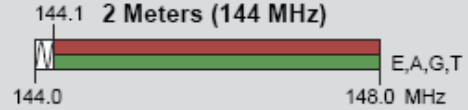
10 Meters (28 MHz)



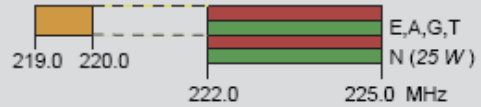
6 Meters (50 MHz)



2 Meters (144 MHz)

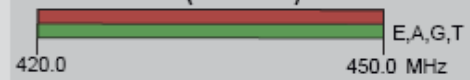


1.25 Meters (222 MHz)

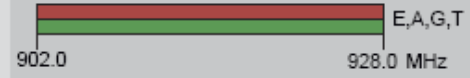


*Geographical and power restrictions may apply to all bands above 420 MHz. See *The ARRL Operating Manual* for information about your area.

70 cm (420 MHz)*



33 cm (902 MHz)*



23 cm (1240 MHz)*



All licensees except Novices are authorized all modes on the following frequencies:

2300-2310 MHz	10.0-10.5 GHz ‡	122.25-123.0 GHz
2390-2450 MHz	24.0-24.25 GHz	134-141 GHz
3300-3500 MHz	47.0-47.2 GHz	241-250 GHz
5650-5925 MHz	76.0-81.0 GHz	All above 275 GHz

‡ No pulse emissions

KEY

Note:
CW operation is permitted throughout all amateur bands.

MCW is authorized above 50.1 MHz, except for 144.0-144.1 and 219-220 MHz.

Test transmissions are authorized above 51 MHz, except for 219-220 MHz

- = RTTY and data
- = phone and image
- = CW *only*
- = SSB phone
- = USB phone, CW, RTTY, and data
- = Fixed digital message forwarding systems *only*

E = Amateur Extra
A = Advanced
G = General
T = Technician
N = Novice

See *ARRLWeb at www.arrl.org* for detailed band plans.

ARRL
We're At Your Service

ARRL Headquarters:
860-594-0200 (Fax 860-594-0259)
email: hq@arrl.org

Publication Orders:
www.arrl.org/shop
Toll-Free 1-888-277-5289 (860-594-0355)
email: orders@arrl.org

Membership/Circulation Desk:
www.arrl.org/membership
Toll-Free 1-888-277-5289 (860-594-0338)
email: membership@arrl.org

Getting Started in Amateur Radio:
Toll-Free 1-800-326-3942 (860-594-0355)
email: newham@arrl.org

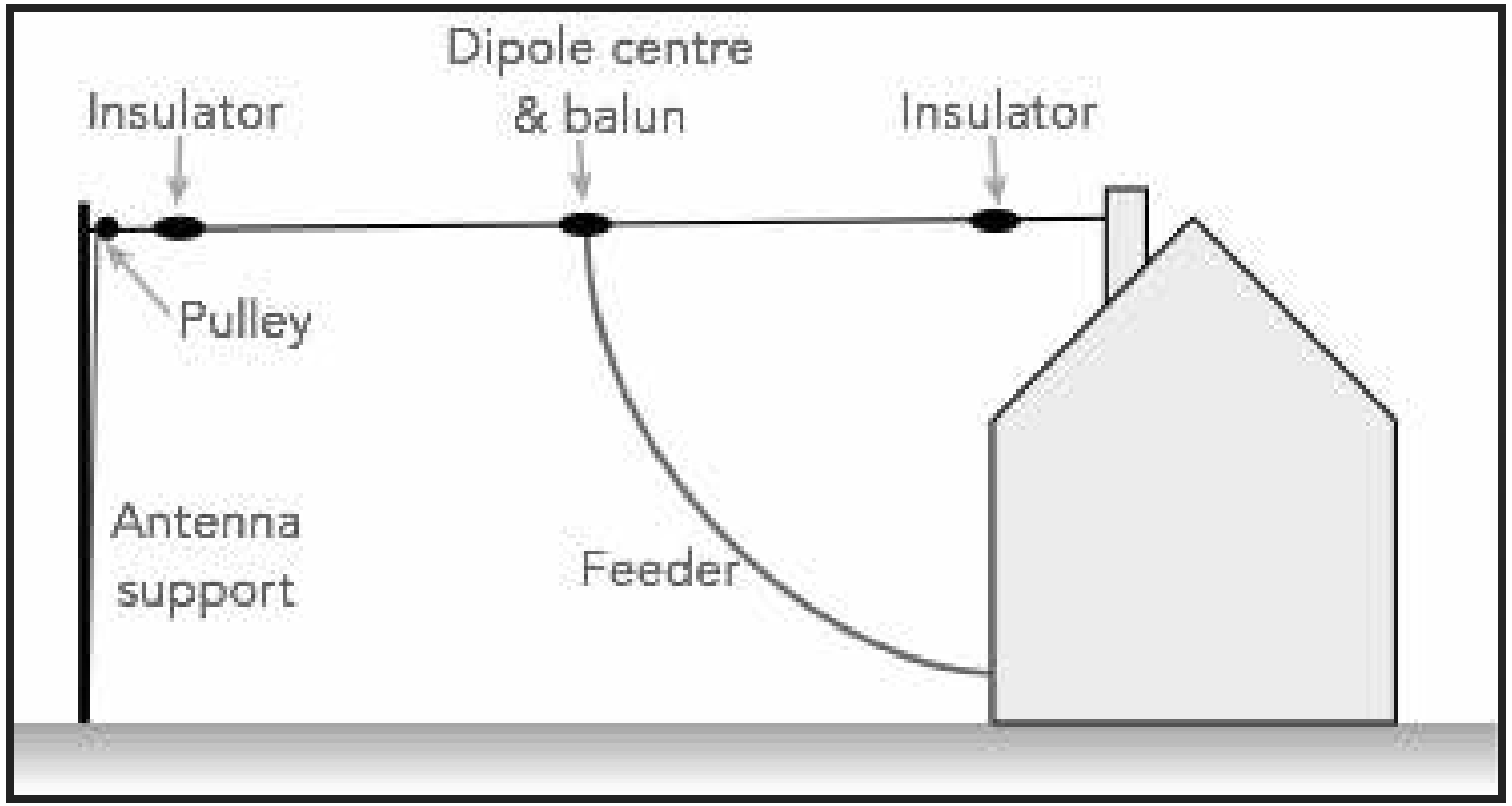
Exams: 860-594-0300 email: vec@arrl.org

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HAM RADIO ANTENNAS – HEX BEAM

THE COMMON WIRE ANTENNA



DIPOLE RESONATE LENGTH

Ham Radio HF/VHF Antenna Lengths Chart in Feet				
Ham Band (Meters)	**Frequency (Mhz)**	**1/4 wave (Feet)**	**1/2 wave Dipole (Feet)**	**1 wave Loop (Feet)**
160	1.800	130' 0"	260' 0"	558' 4"
	1.850	126' 6"	253' 0"	543' 3"
	1.900	123' 2"	246' 4"	528' 11"
	2.000	117' 0"	234' 0"	502' 6"
80	3.500	66' 10"	133' 9"	287' 2"
	3.750	62' 5"	124' 10"	268' 0"
	3.900	60' 0"	120' 0"	257' 8"
	4.000	58' 6"	117' 0"	251' 3"

Ham Band (Meters)	**Frequency (Mhz)**	**1/4 wave (Feet)**	**1/2 wave Dipole (Feet)**	**1 wave Loop (Feet)**
30	10.100	23' 2"	46' 4"	99' 6"
	10.150	23' 1"	46' 1"	99' 0"
20	14.000	16' 9"	33' 5"	71' 9"
	14.150	16' 6"	33' 1"	71' 0"
	14.300	16' 4"	32' 9"	70' 3"
	14.350	16' 4"	32' 7"	70' 0"
17	18.068	12' 11"	25' 11"	55' 7"
	18.168	12' 11"	25' 9"	55' 4"
15	21.000	11' 2"	22' 3"	47' 10"
	21.200	11' 0"	22' 1"	47' 5"



YAGI BEAM ANTENNAS

Building the Log Periodic Antenna





K0DV (Doug's) Antenna





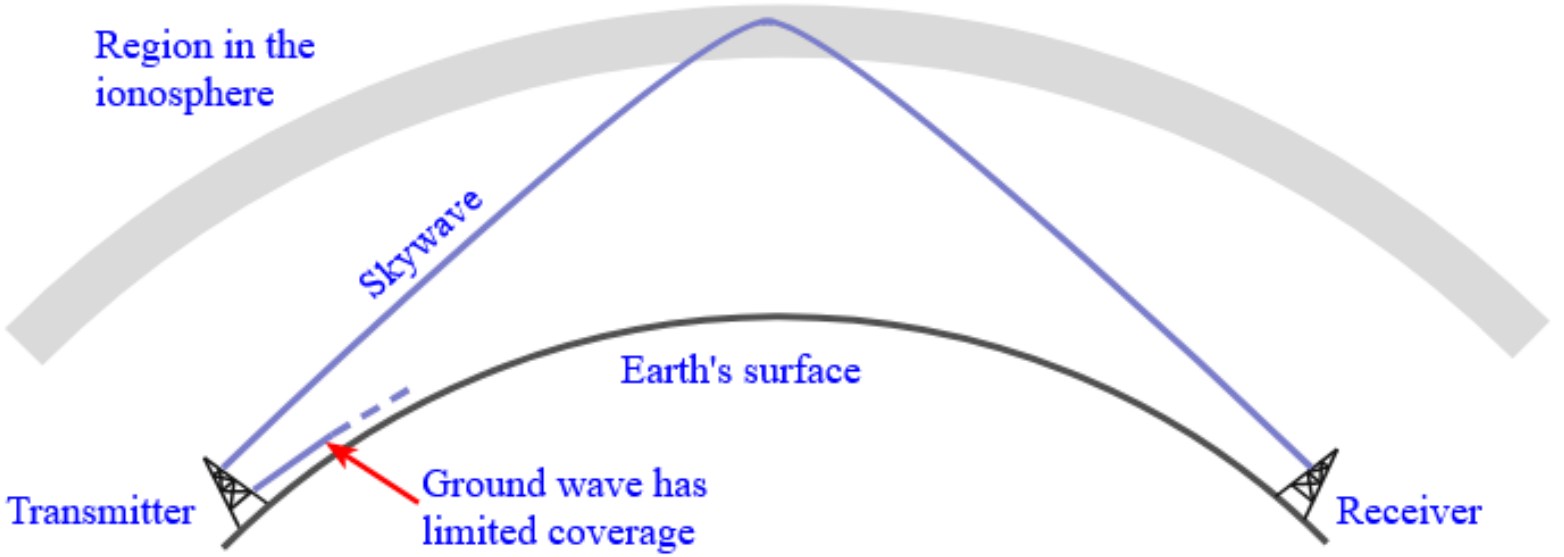
Using a Rope Tram



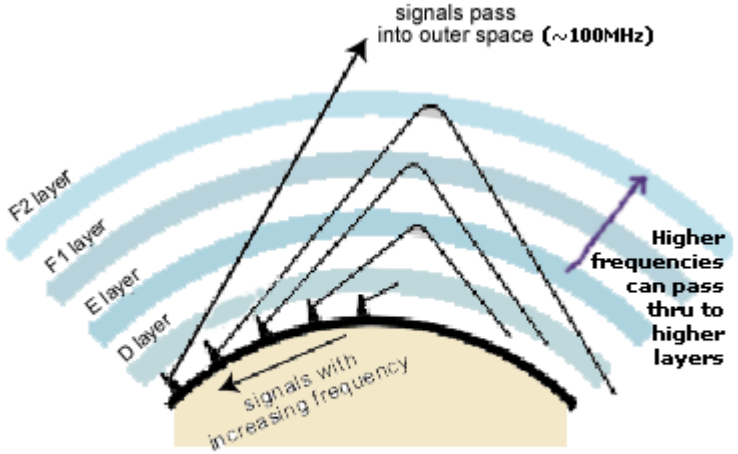
It’s up and it’s a beauty



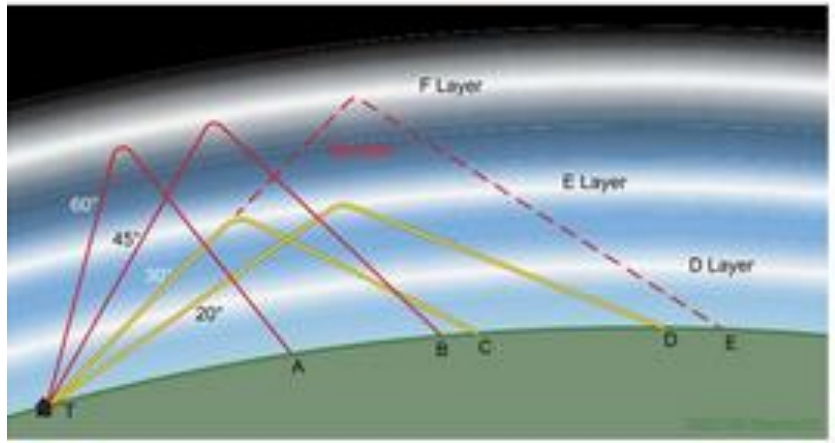
IONOSPHERIC SKIP



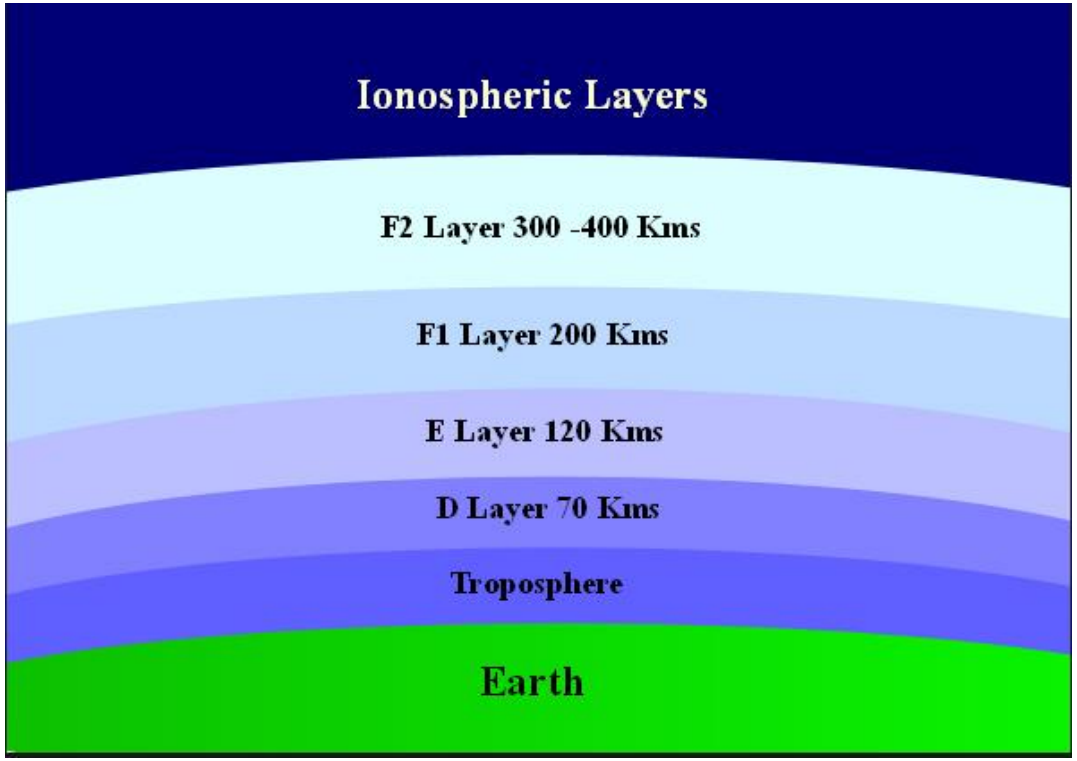
IONOSPHERIC LAYERS



How the ionospheric layers refract different frequencies



IONOSPHERIC REGIONS

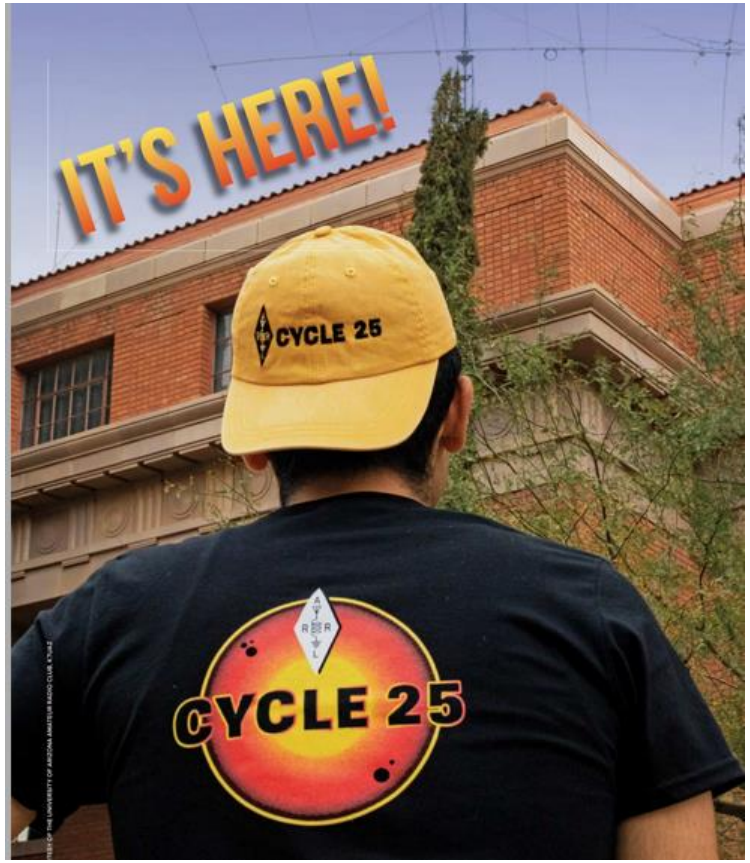


STORMS ON THE SUN

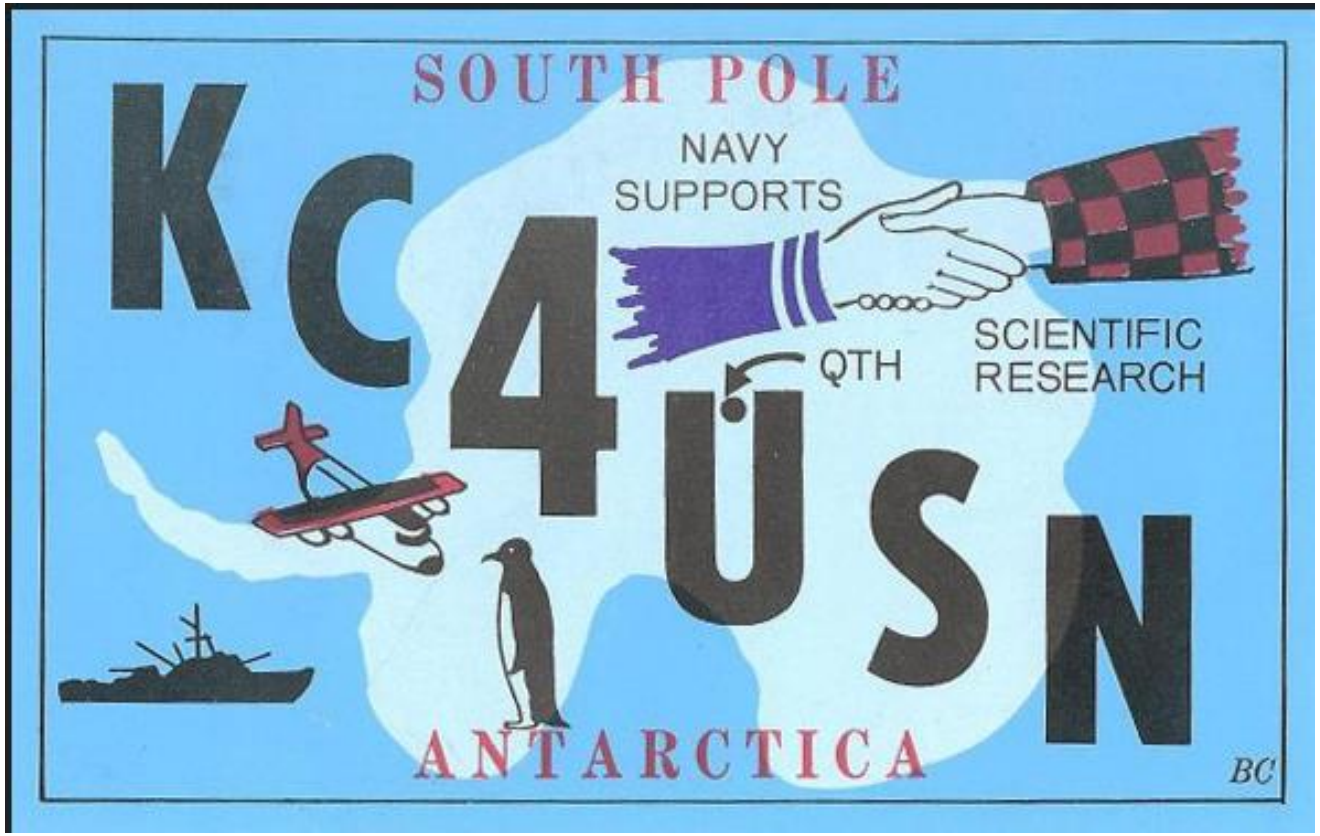


SOLAR CYCLE 25





QSL CARDS


SOUTH POLE
KC4USN
NAVY
SUPPORTS
QTH
SCIENTIFIC
RESEARCH
ANTARCTICA
BC

HAMS SERVE THE PUBLIC

Use Your License to Serve the Community



ARRL's volunteer Amateur Radio operators help their communities in good times and bad, through community events, disaster response, and various programs.

Public Service News –

Amateur Radio Credited with Rescue of Back-Country Hiker in Tennessee
(04/28/2021)

ARRL, American Red Cross Renew Memorandum of Understanding
(04/22/2021)

St. Vincent Radio Amateurs on Alert During Volcano Emergency
(04/13/2021)

Online Comm Academy 2021 is set for April 10 – 11
(03/31/2021)

Spring Red Cross Emergency Communications Drill Set
(02/26/2021)

"Whirlwind Boom" Emergency Communications Exercise Set in Northern Florida
(02/24/2021)

HAMS HELP IN EMERGENCIES





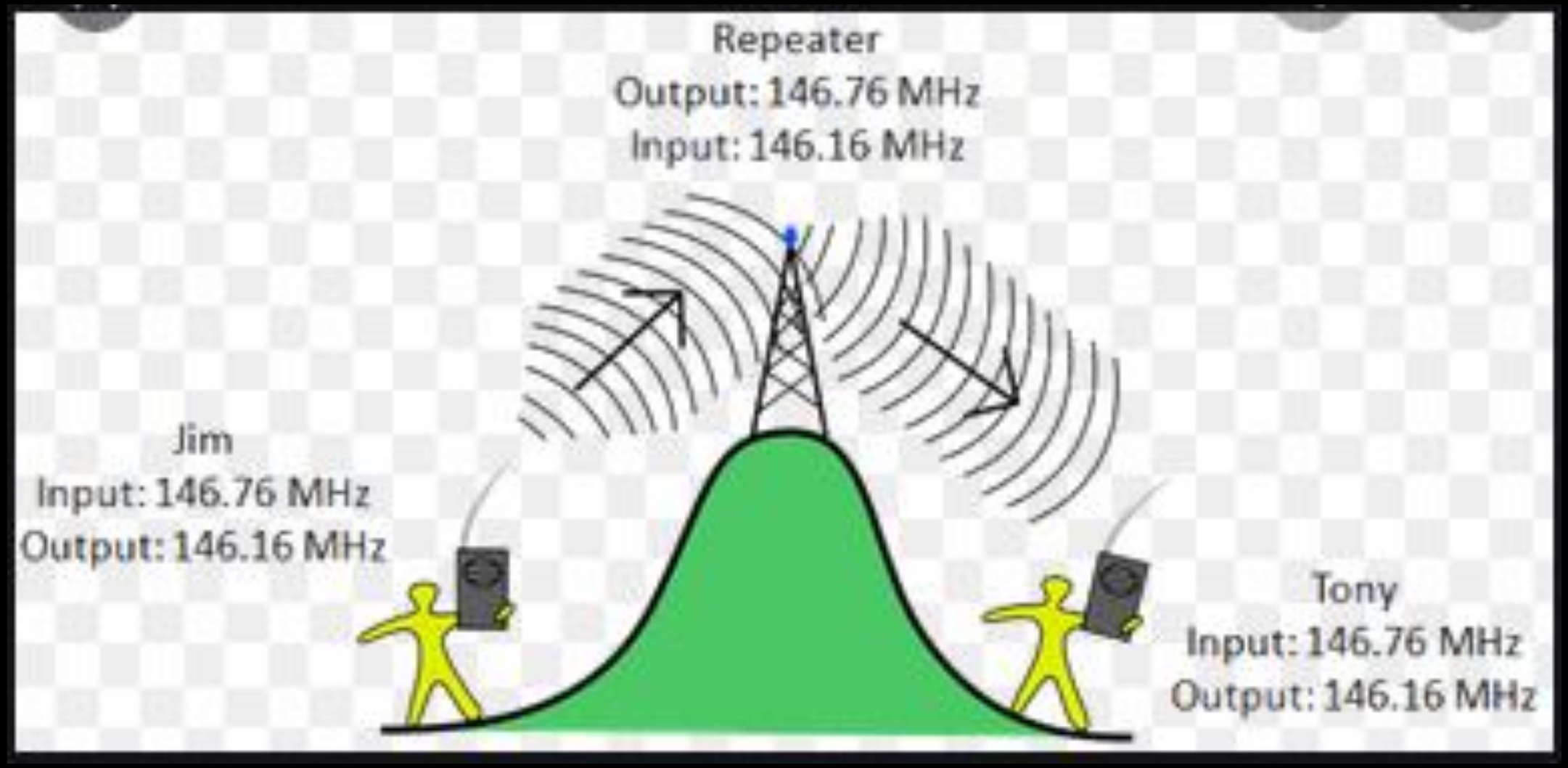
HAM SKY WATCHERS







HAND-HELD HAM TRANCEIVERS


Repeater
Output: 146.76 MHz
Input: 146.16 MHz
Jim
Input: 146.76 MHz
Output: 146.16 MHz
Tony
Input: 146.76 MHz
Output: 146.16 MHz

ARRL Field Day

ARRL Field Day is the most popular on-the-air event held annually in the US and Canada. On the fourth weekend of June, more than 35,000 radio amateurs gather with their clubs, groups or simply with friends to operate from remote locations.




Lookout Park
Cedar Falls


MOTOR
HARLEY-DAVIDSON
CYCLES
KØCQH
Dave


ARRL
KDØDK


CAUTION

HEATHKITS®



Top quality
ham equipment
in kit form . . .
designed especially to
meet your requirements!

Heath amateur radio gear is designed *by* hams—*for* hams, to insure maximum "on the air" enjoyment. Good design and top-quality components guarantee reliability. Heathkits are easy to build and are easy on your budget! You save by dealing direct, and you may use the Heath Time Payment Plan on orders totaling $90.00 or more. Write for complete details.

HOME BREW



SOFTWARE DEFINED RADIOS (SDR) TRANCEIVERS – XMIT & RCRV



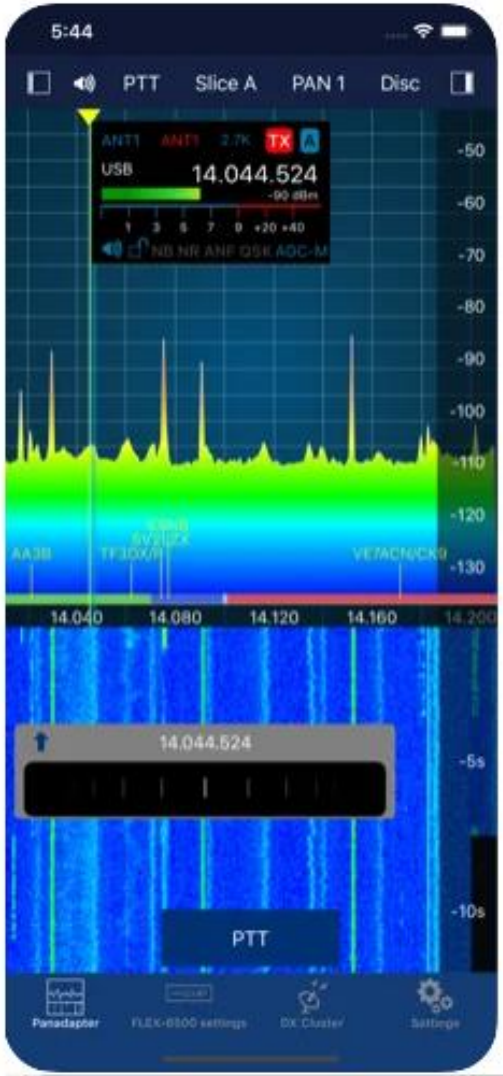
Remote Ham Radio

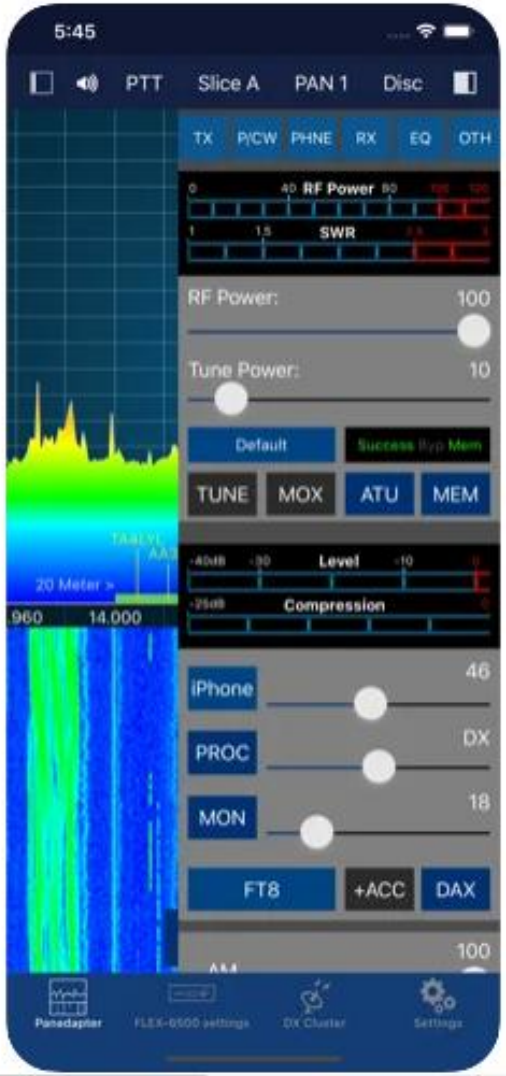


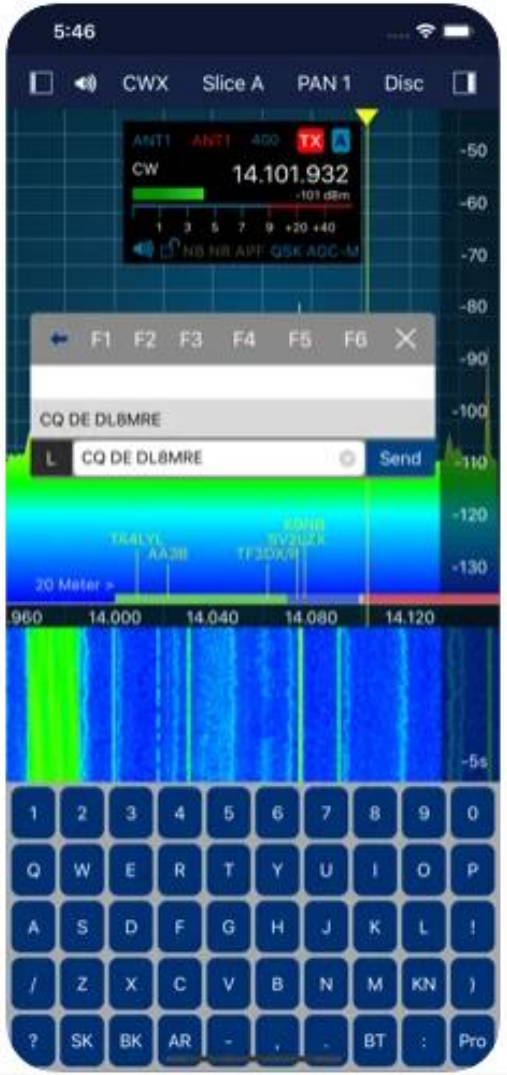

SmartSDR
for
iOS

Screenshots iPhone iPad

SmartSDR for IOS (Apple) iPhone





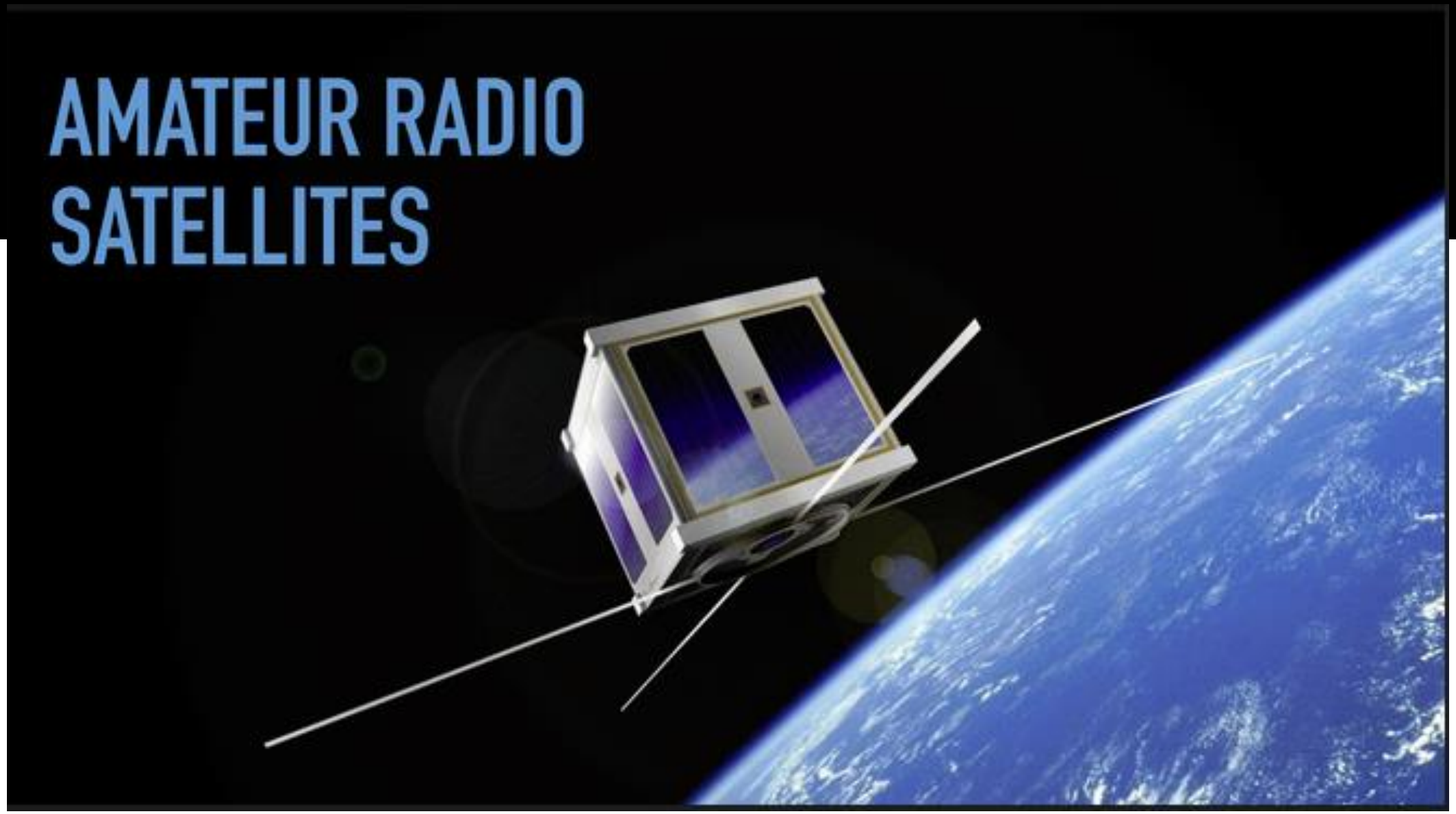





The Radio Amateur's Journal
TAKE PLEASURE IN AWARDING THIS
CERTIFICATE OF MERIT TO
Enrico Giannerini IZ5CML
IN RECOGNITION OF THE ACHIEVEMENT OF WINNING THE
2018
CQ DX Marathon
IN THE Unlimited CATEGORY FOR
Italy (#1 Country)
A TOTAL SCORE OF 288 POINTS WAS COMPUTED ON THE BASIS
IN WITNESS OF

CONTESTS

AMATEUR RADIO SATELLITES

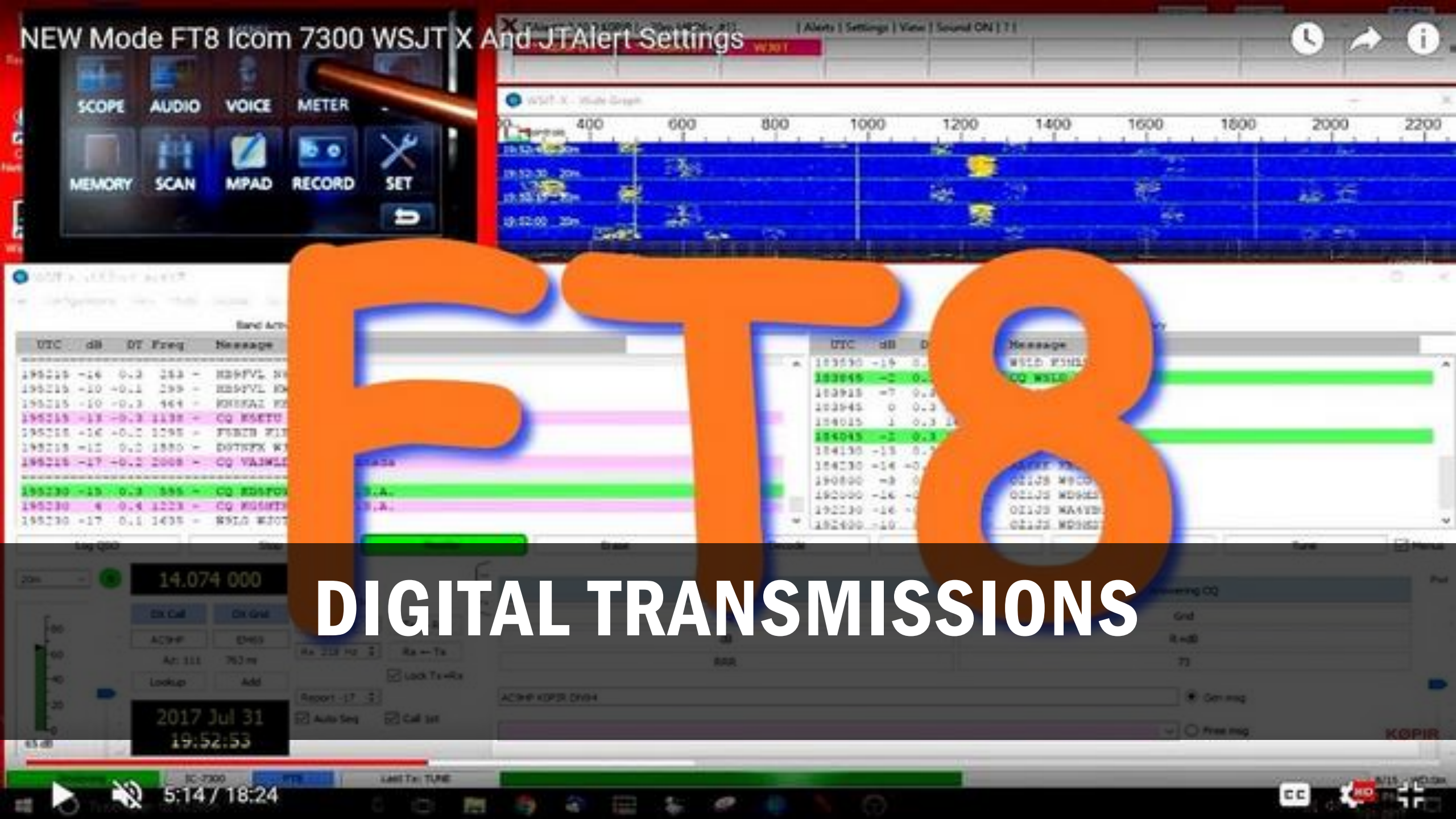



MOON BOUNCE

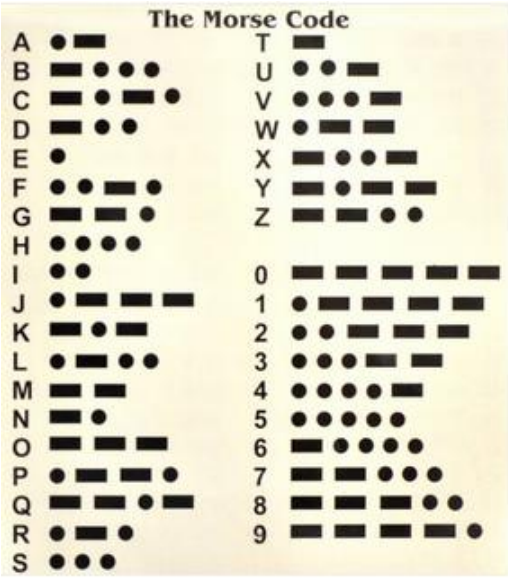
AMATEUR RADIO TELEVISION






NEW Mode FT8 Icom 7300 WSJT X And JTAlert Settings
SCOPE
AUDIO
VOICE
METER
MEMORY
SCAN
MPAD
RECORD
SET
FT8
DIGITAL TRANSMISSIONS
14.074 000
2017 Jul 31
19:52:53
5:14 / 18:24

INTERNATIONAL MORSE CODE





HAM FESTIVALS



Friedrichshafen
Germany



DAYTON HAM FEST

DES MOINES



CLUBS

Northeast
Iowa Radio
Amateur
Association

WØMG



CLUBS





BATTLESHIP IOWA AMATEUR RADIO ASSOCIATION
61
NI6BB
IOWA BB-61

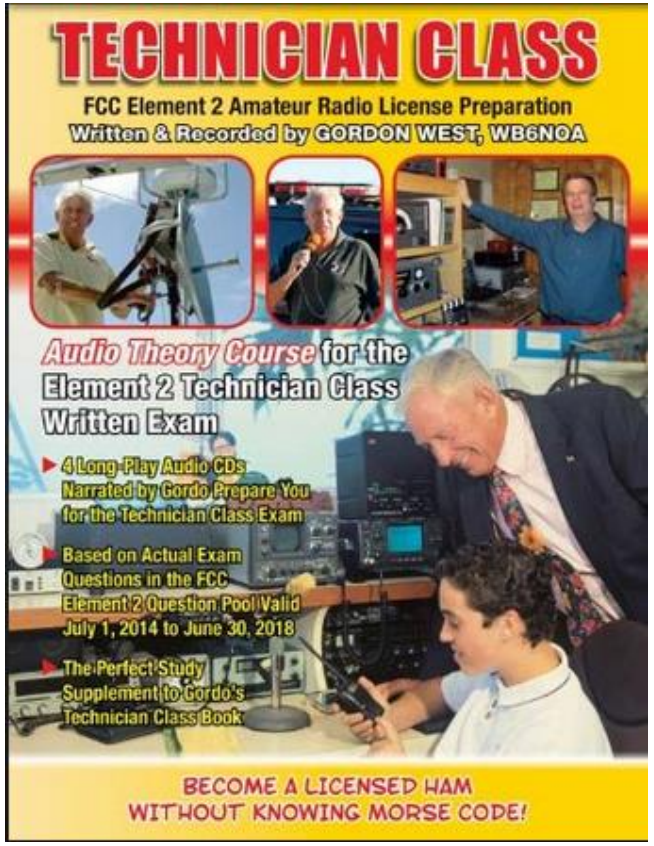
250 S. Harbor Blvd
San Pedro, CA 90731

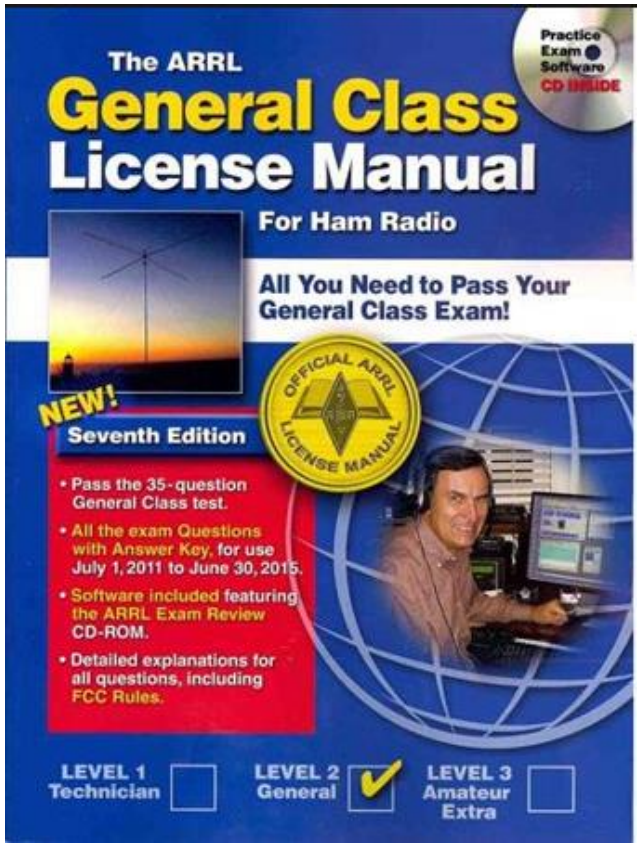


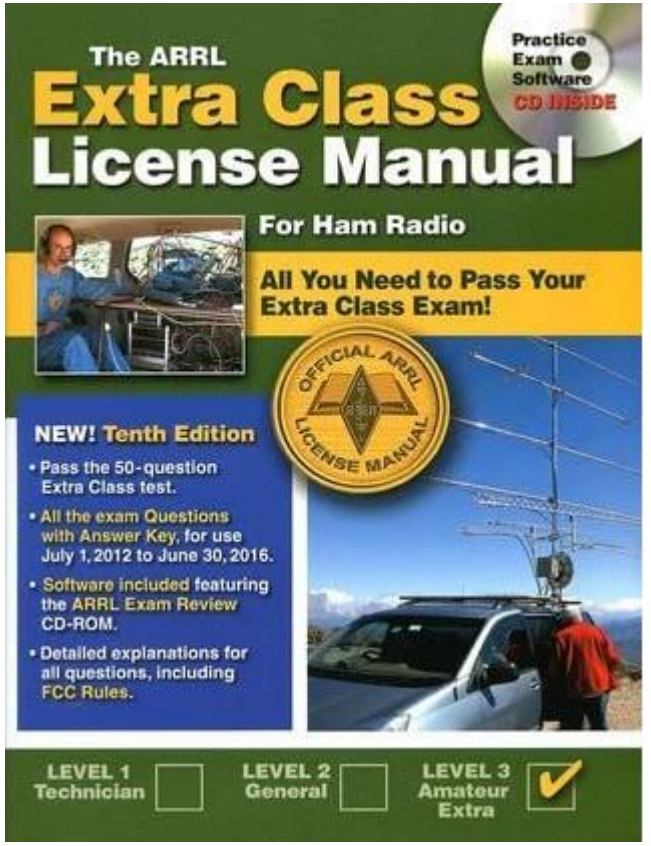


HAM RADIO LICENSE TRAINING

SELF-STUDY


TECHNICIAN CLASS
FCC Element 2 Amateur Radio License Preparation
Written & Recorded by GORDON WEST, WB6NOA
Audio Theory Course for the Element 2 Technician Class Written Exam
4 Long-Play Audio CDs Narrated by Gordo Prepare You for the Technician Class Exam
Based on Actual Exam Questions in the FCC Element 2 Question Pool Valid July 1, 2014 to June 30, 2018
The Perfect Study Supplement to Gordo's Technician Class Book
BECOME A LICENSED HAM WITHOUT KNOWING MORSE CODE!


The ARRL
General Class License Manual
For Ham Radio
Practice Exam Software CD INSIDE
All You Need to Pass Your General Class Exam!
NEW!
Seventh Edition
OFFICIAL ARRL LICENSE MANUAL
• Pass the 35-question General Class test.
• All the exam Questions with Answer Key, for use July 1, 2011 to June 30, 2015.
• Software included featuring the ARRL Exam Review CD-ROM.
• Detailed explanations for all questions, including FCC Rules.
LEVEL 1 Technician
LEVEL 2 General
LEVEL 3 Amateur Extra

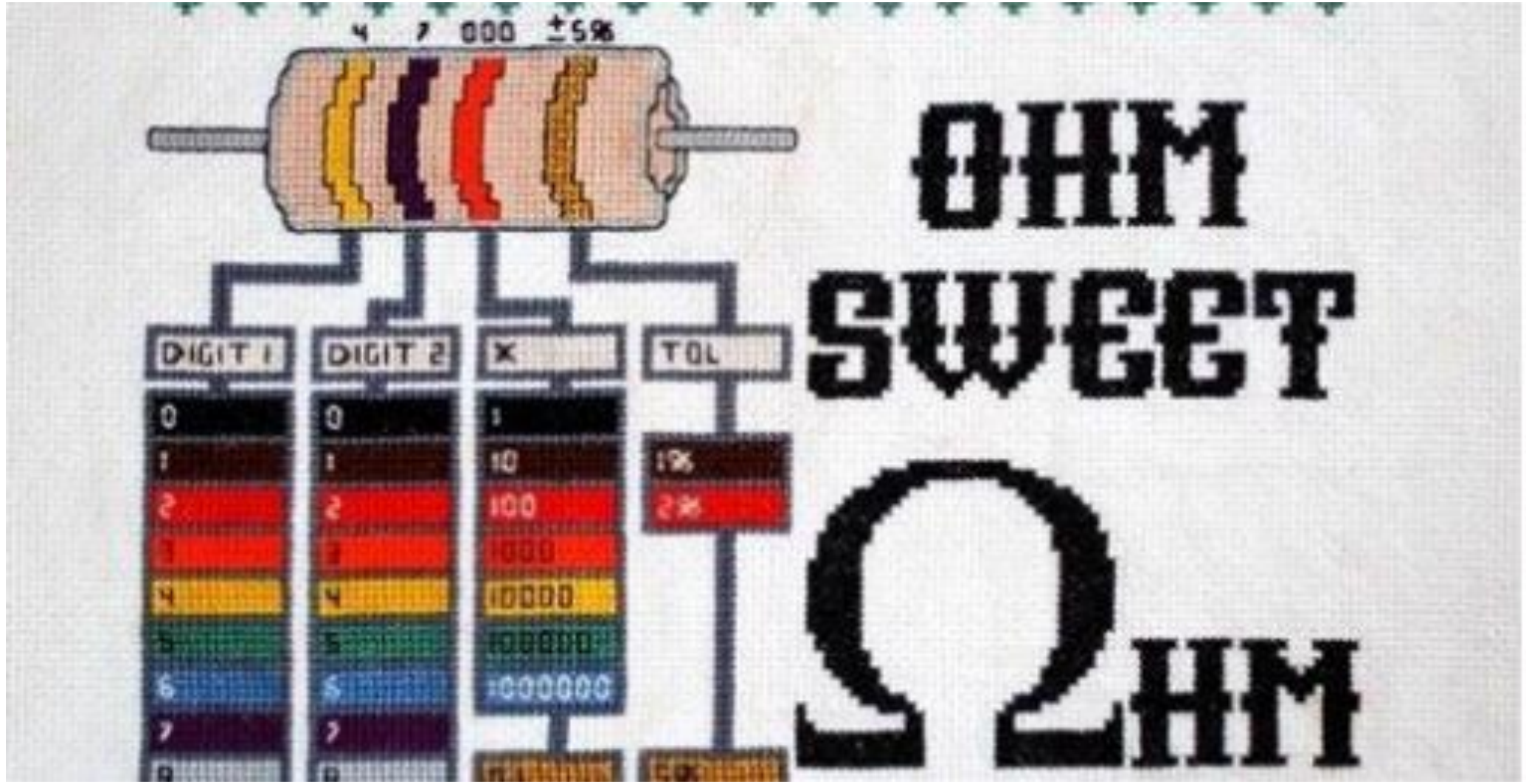

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HAM RADIO COURSES



SCOUTING – MERIT BADGES




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DIGIT 2
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K8DMJ Doug at 14
Year: 1957



Too Many Pizzas



Seriously?


Happiness is the
Ham Shack
17:16


AMATEUR
RADIO
Questions?