Radio Safety

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- Potentially hazardous hobby (any hobby is hazardous)
  - High voltage
  - Falling antenna structures (if not properly constructed)
  - Heavy Batteries/Generators
  - Lightning
  - RF Burns
  - RF Exposure

RF EXPOSURE

Disclaimer: I am not an expert.

History on the RF Exposure Standards

- 1982 the IEEE developed appropriate limits for human exposure to RF energy
- Shortly after the FCC wrote a set of regulations that requires radio services to comply with the limits set in the Standard.
- ARRL fought for Amateur Radio to be except, the FCC agreed
- 1993 FCC made a new set of regulations for all services. FCC took no action until Congress mandated revisions to the RF-Exposure n the Telecommunications Act of 1996.
- 2003, The Commission made several proposals related to compliance with the human exposure limits for fixed, mobile and portable transmitters.
- 2013, The Commission addressed several of the proposals.
    - Evaluating whether a particular RF source would exceed the established exposure limits.
    - Clarified references used determine compliance with it limits, making explicit that SAR limits predominate MPE limits as a compliance metric.

- As of April 2019, the FCC determined “no changes to the current standards are warranted at this time.
- Affects:
  - Part 15 Radio Frequency Devices: Modular transmitters, Operation within 902-928 MHz, 2400-2483.5 MHz, 5725-5850 MHz, 57-71 GHz, 92-95 GHz
  - Part 18 Industrial, Scientific and Medical Equipment
  - Part 22 Public Mobile Services
  - Part 24 Personal Communications Services
  - Part 25 Satellite Communications: Portable earth-station transceivers, Mobile-Satellite Service in 1.5/1.6 GHz and 1.6/2.4 GHz, Control of transmitting stations
  - Part 27 Miscellaneous Wireless Communications Services
  - Part 73 Radio Broadcast Services
  - Part 90 Private Land Mobile Radio Services
  - Part 95 Personal Radio Service: WMTS RF exposure evaluation, MedRadio RF exposure evaluation
  - Part 97 Amateur Radio Service
  - Part 101 Fixed Microwave Service
- Cellphones sold in the US produces RF exposure is well below levels considered to be dangerous

- RF Exposure FAQ developed by ARRL
- Demonstration of RF Exposure Calculator
- Demonstration of RF Monitor

Table 1—Limits for Maximum Permissible Exposure (MPE)

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm^2)	Averaging time (minutes)
(A) Limits for Occupational/Controlled Exposure				
0.3–3.0	614	1.63	*(100)	≤ 6
3.0–30	1842/f	4.89/f	*($900/f^2$)	< 6
30–300	61.4	0.163	1.0	< 6
300–1500			f/300	< 6
1500–100,000			5	< 6
(B) Limits for General Population/Uncontrolled Exposure				
0.3–1.34	614	1.63	*(100)	< 30
1.34–30	824/f	2.19/f	*($180/f^2$)	< 30
30–300	27.5	0.073	0.2	< 30
300–1500			f/1500	< 30
1500–100,000			1.0	< 30

f = frequency in MHz * = Plane-wave equivalent power density

References

RF Exposure calculator
http://www.lakewashingtonhamclub.org/resources/rf-exposure-calculator/

Frequently Asked Questions about the May 3, 2021 changes to the FCC RF-exposure rules
http://www.arrl.org/files/file/Technology/RFsafetyCommittee/RFXFAQ.pdf

The following links are to ARRL information on RF safety. Some of the information, such as the descriptions about how to determine if a station is exempt from doing an evaluation, has been superseded by the recent changes to the FCC rules. See the Frequency Asked Questions link above for more information about the new rules.
The ARRL Handbook's RF safety coverage as a PDF
http://www.arrl.org/files/file/Technology/RFsafetyCommittee/28RFSafety.pdf
The ARRL book, RF Exposure and You, is available for free download:
http://www.arrl.org/files/file/Technology/RFsafetyCommittee/RF%20Exposure%20and%20You.pdf

http://www.arrl.org/the-fcc-s-new-rf-exposure-regulations
http://www.arrl.org/rf-exposure-regulations-news
http://www.arrl.org/rf-exposure
http://www.arrl.org/news/updated-radio-frequency-exposure-rules-become-effective-on-may-3

FCC info
FCC-19-126A1_RF_Exposure.pdf, published by the Federal Communications Commission
https://docs.fcc.gov/public/attachments/FCC-19-126A1.pdf

https://www.fcc.gov/engineering-technology/electromagnetic-compatibility-division/radio-frequency-safety/faq/rf-safety