

Practical Ham Radio for the Antique Radio Person

Al Klase

NJARC

17 May 2019

NHARC Hams

- Who's licensed?
- Who has a station?
 - Home
 - Mobile
 - Portable
- Who's made a contact in the last month?
- Who's still interested?

Quick History

- The Navy – Marconi – The Amateurs
- 1912 Amateur Regulations
 - 200 Meters and Down (1500 KHz and Up)

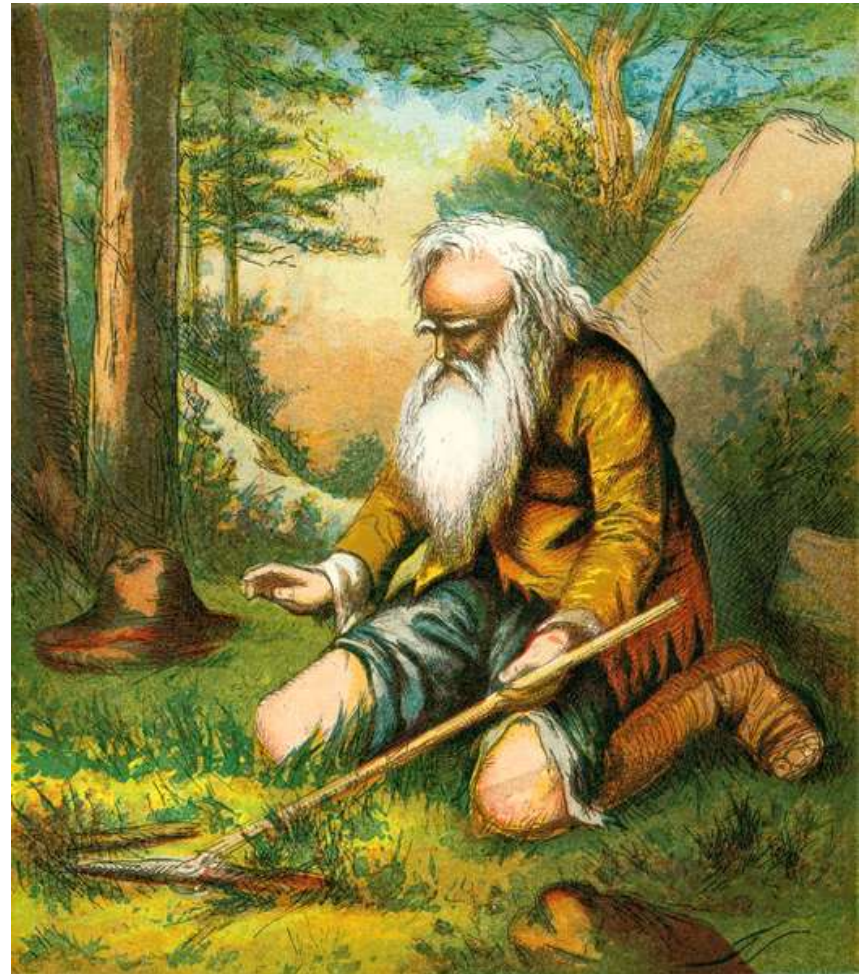
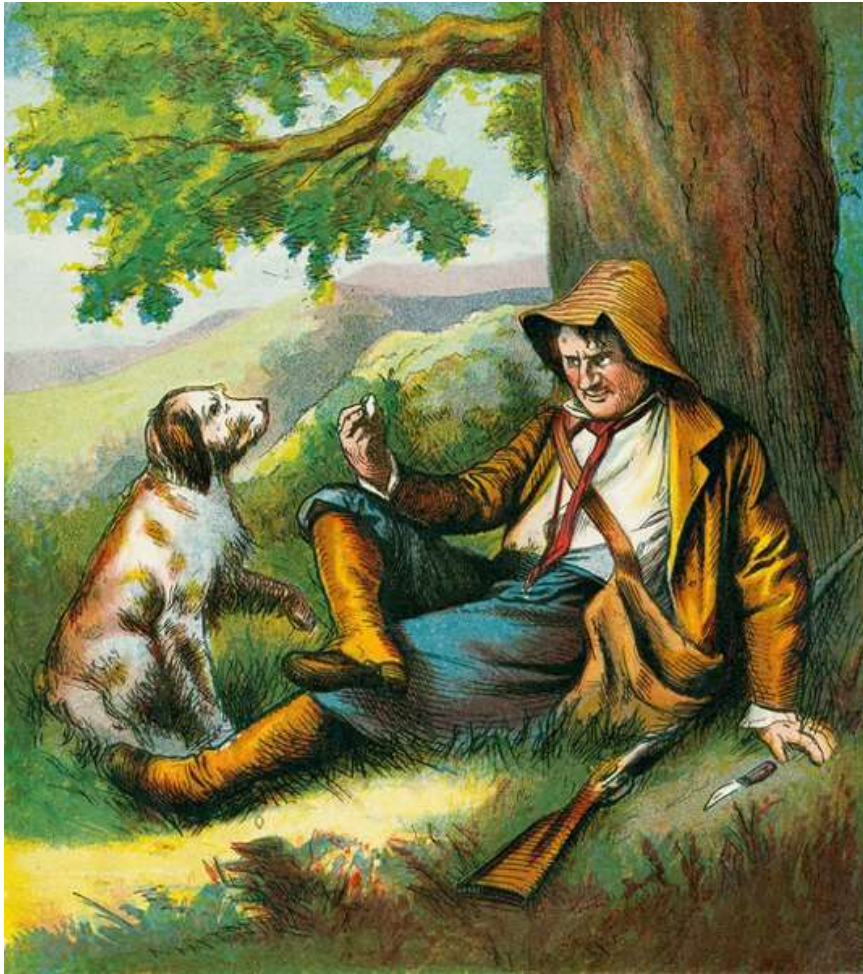
N3FRQ

- Licensed 1987
 - “Technician Plus”
 - 5 WPM Morse
 - Mostly 2-meter (144 MHz) FM Mobile
 - A little CW
 - A little 10-meter SSB
- Code Requirement Lifted Y2K
 - Amateur Extra in one sitting.
- I’ve maintained an HF station ever since.
 - 7 acres w/trees near Flemington, NJ
 - Brownstone in Jersey
 - Single-family house in JC
- I was never overly active.
 - MRCA Field Exercises
 - The Moose and Squirrel Cold-War Clandestine and Log-Range-Reconnisance-Patrol Net – Since December 2010.

Different Strokes.....

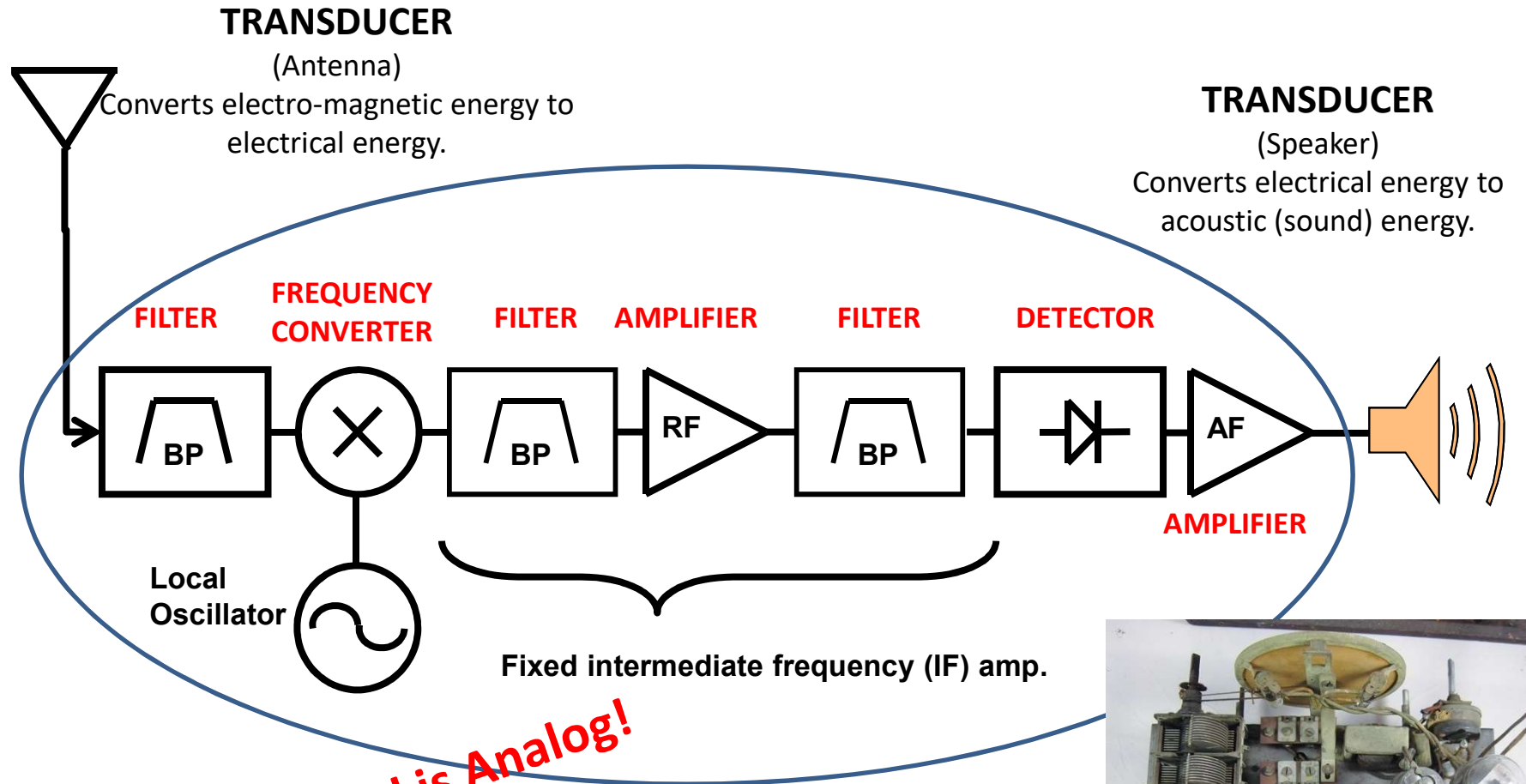
- Rag Chew
- Nets
- DXing
- Contests
- Public Service
- VHF/UHF
 - Repeaters
 - Satellite
 - Moon Bounce

What Happened?



A Complex Analog System

A Typical Mid-20th-Century AM Radio Receiver



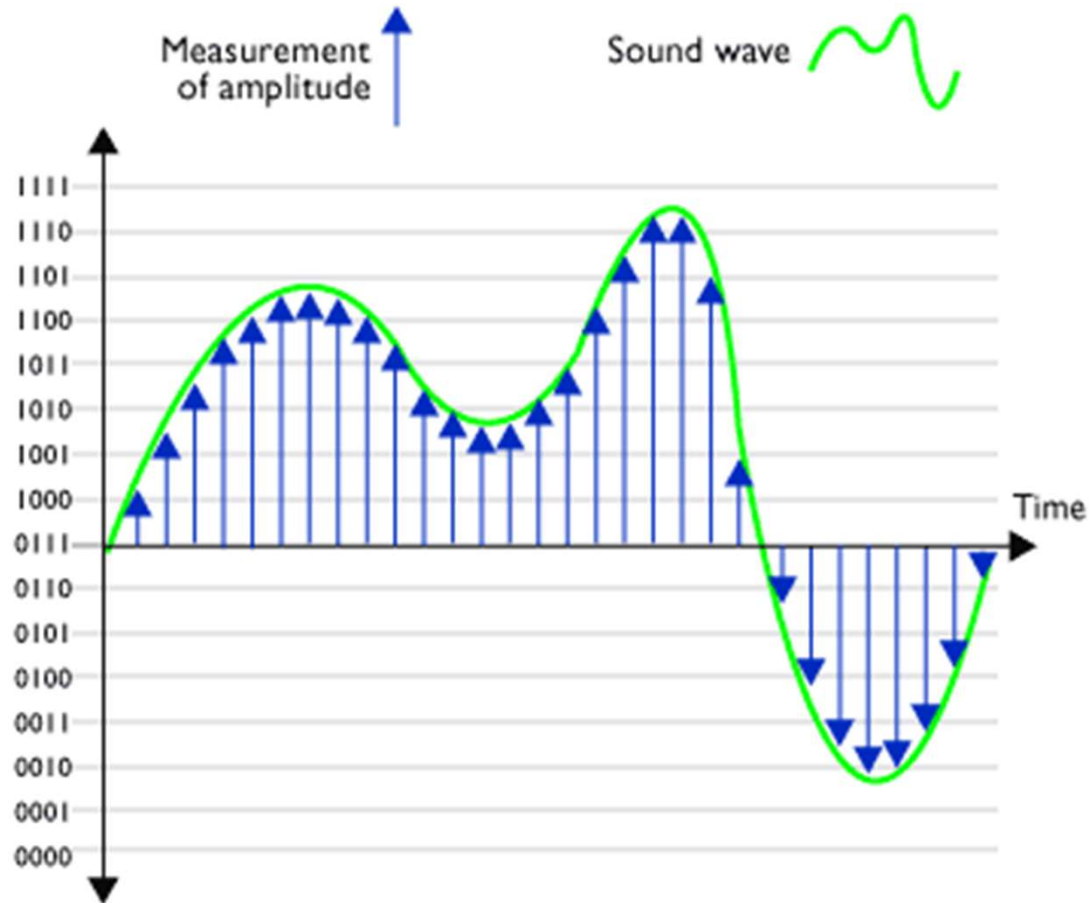
The Real World is Analog!

**ANALOG SIGNAL PROCESSING
By Hardware Devices**



Digital Sampling

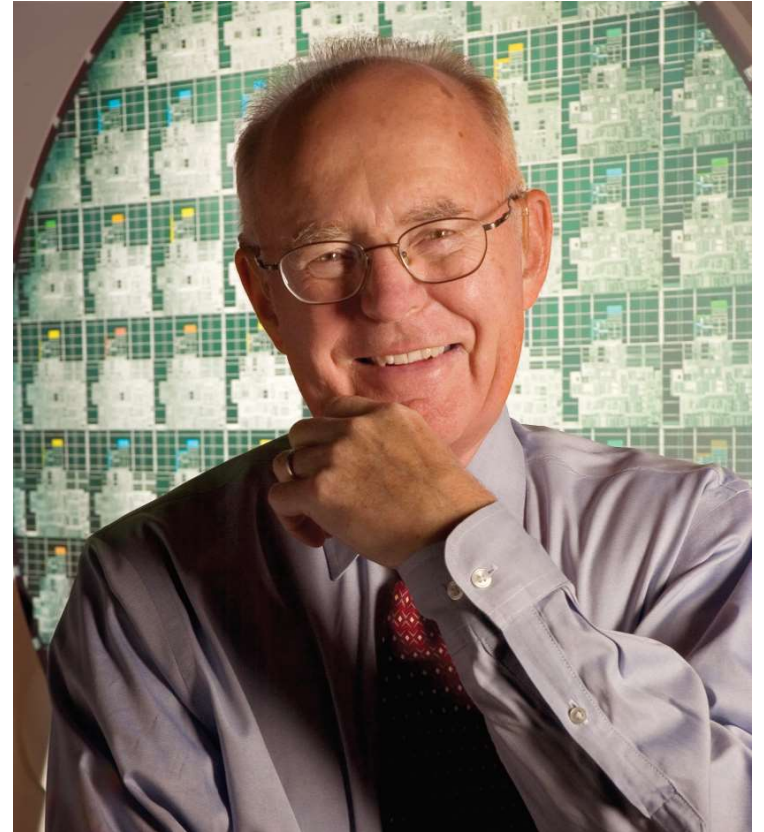
Analog-to-Digital Conversion



100-1001-1010-1011-1100-1100-1100-1100-1011-1010-1010-1001-1001-1010
A ***Time Series*** of digital samples accurately represents the analog waveform.

Moore's Law

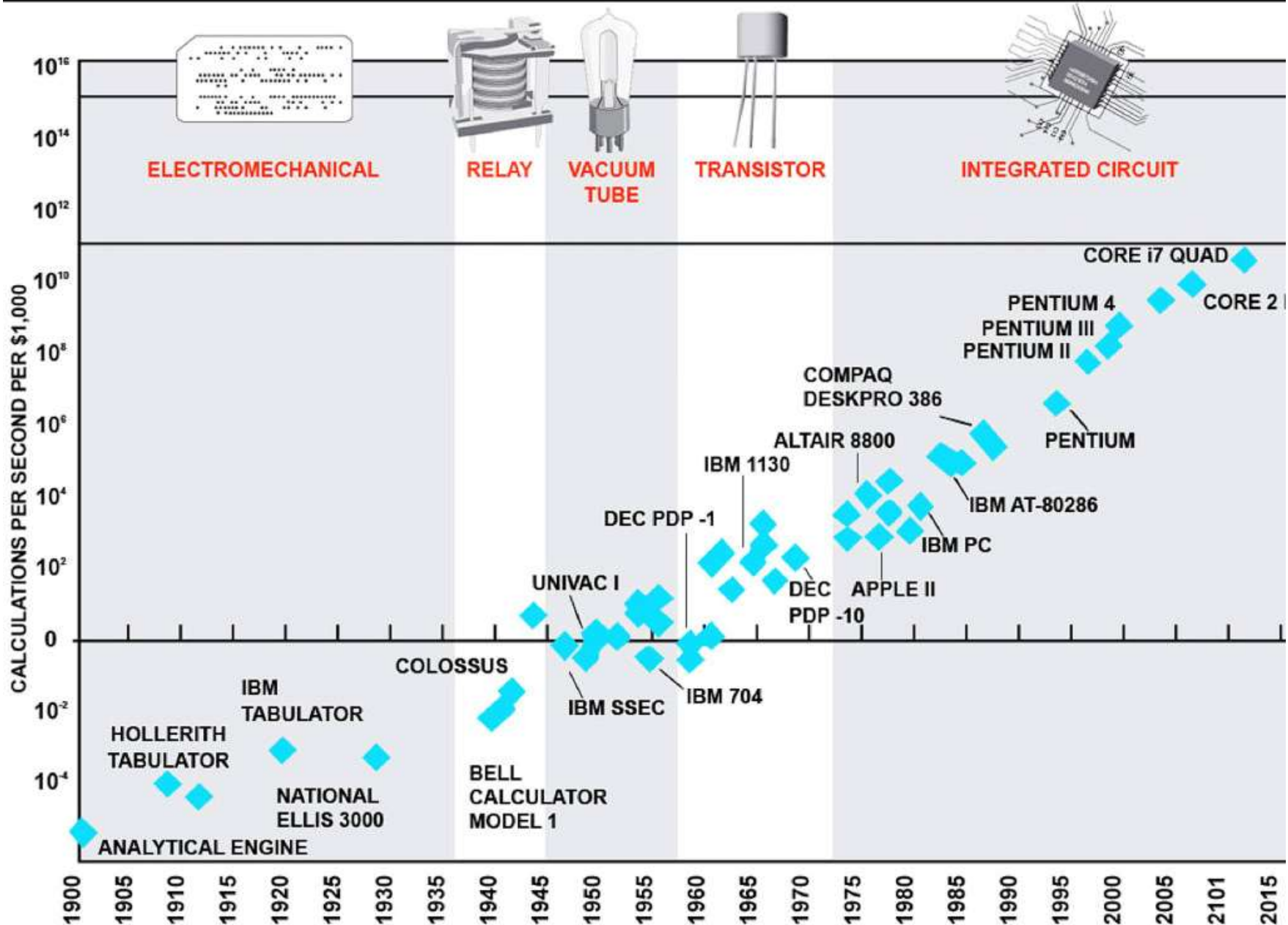
- The number of components per square inch of an integrated circuit doubles every two years.
- **WIN !** - Devices become cheaper
- **WIN !** - Circuits run faster.
- **WIN !** - Less power consumption



Gordon Moore - 2005

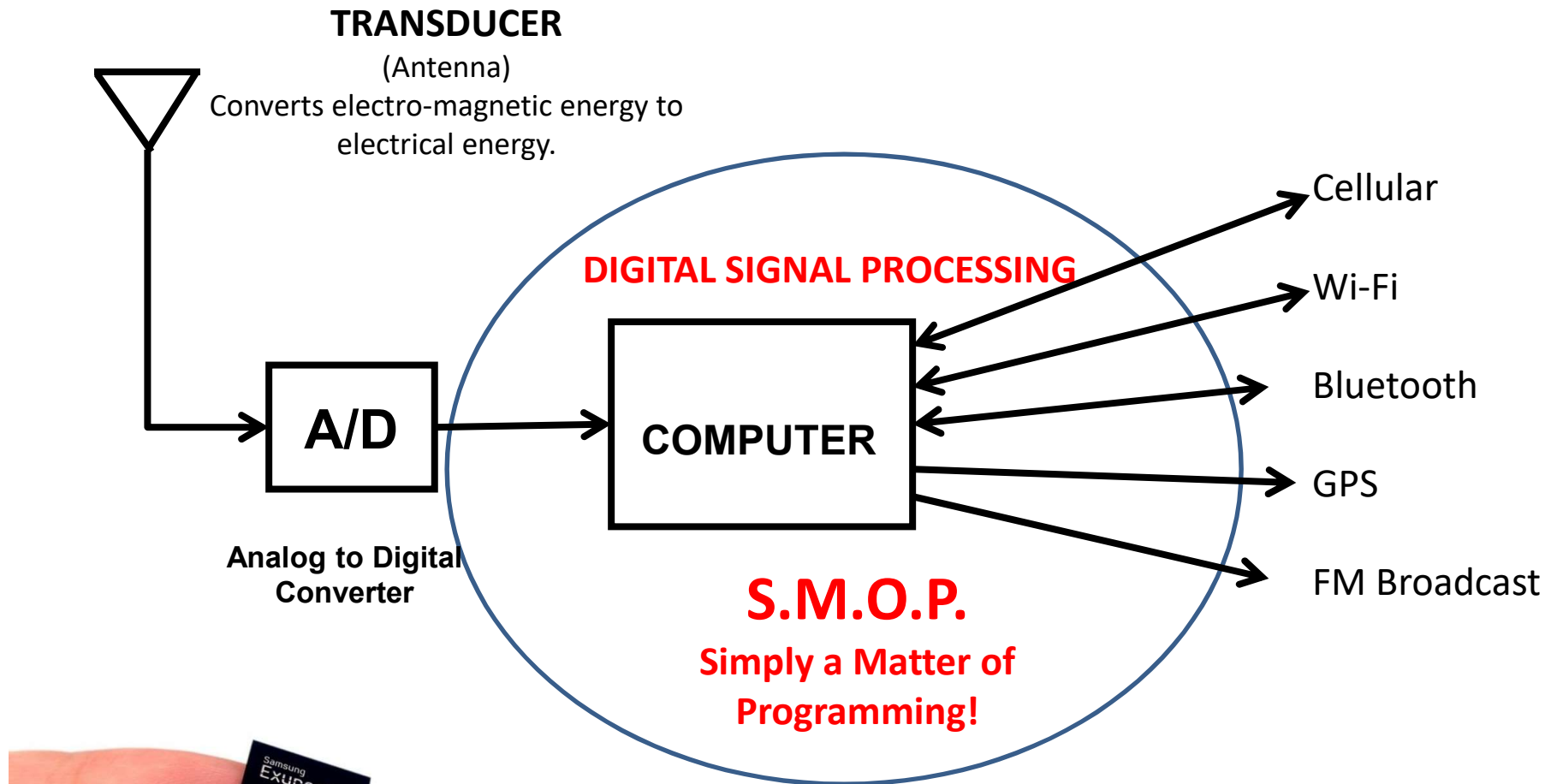
- 1965: Director of R&D - Fairchild Semiconductor
- 1968: Cofounds Intel Corp. with Robert Noyce.

115 Years of Moore's Law



In the Digital Domain

21st C-entury Cellphone Radio System

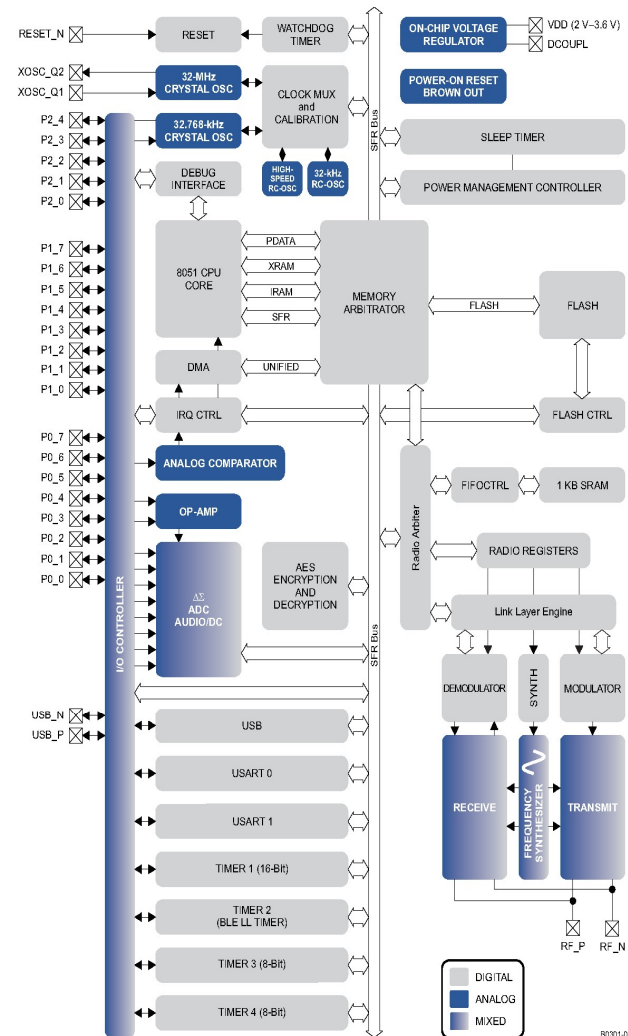


Inside are two Cortex-A53 cores. The SoC also packs in LTE support (Cat.4 LTE 2CA modem). In addition, the 100 square mm unit also has Wi-Fi, Bluetooth, FM (frequency modulation) and GNSS (global navigation satellite system).

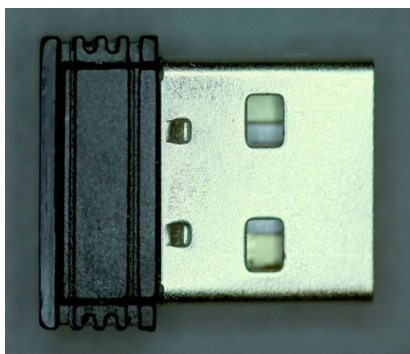
SoC

A System on a Chip

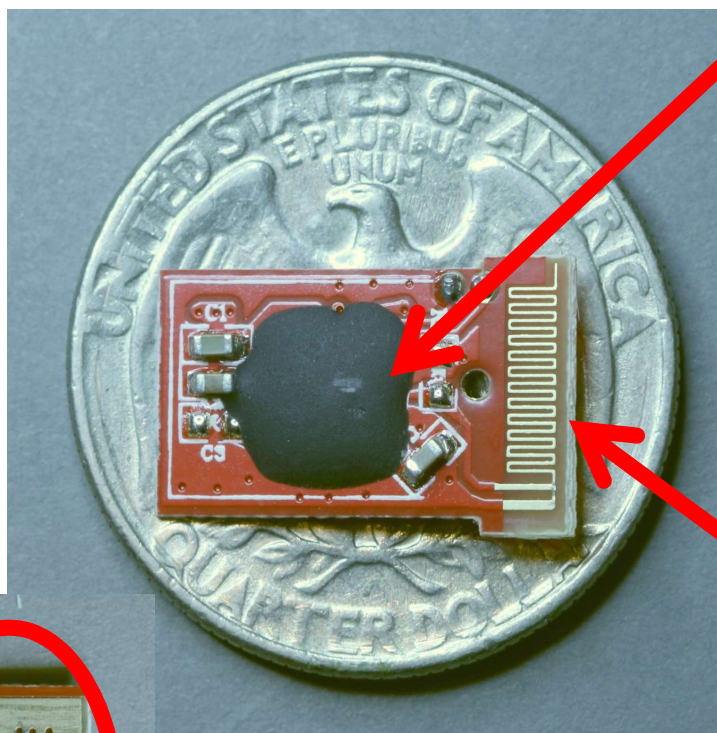
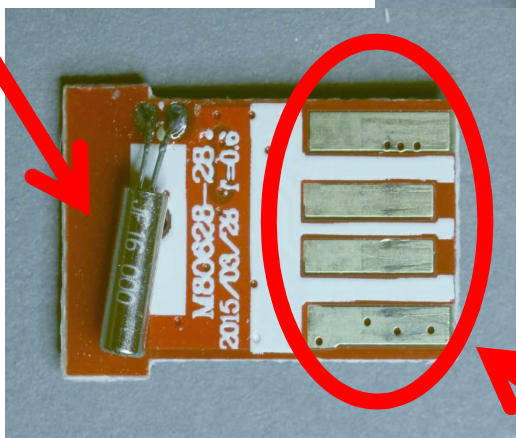
- Traditional integrated circuits are produced using various fabrication processes tailored to specific functions.
 - Random Logic (Processors, etc.)
 - Memory
 - RAM (Random Access Memory)
 - ROM (Read Only Memory)
 - Flash (Non-volital re-writeable data storage)
 - Analog
 - Audio Circuits
 - Radio Circuits
- Modern SoC processes offer all in one device!



A USB Two-Way Radio to Connect to a Wireless Keyboard



16 MHz Quartz-Crystal
Frequency Reference



Complete Radio System
One Integrated Circuit
Bonded Directly to Circuit Board
Protected by Epoxy

Known as Chip-on-Board Construction
Eliminates the cost of an IC package.

The Antenna
Launches and Intercepts Radio
Waves

Can be small do to:
High Frequency – 2.4 GHz
Yields
Short Wavelength – 125 MM

So an effective Quarter-Wave
antenna can be folded to fit.

**Retail Price
About a Buck!**

USB Signal and Power Connections

The Advantages of Being an Old Timer

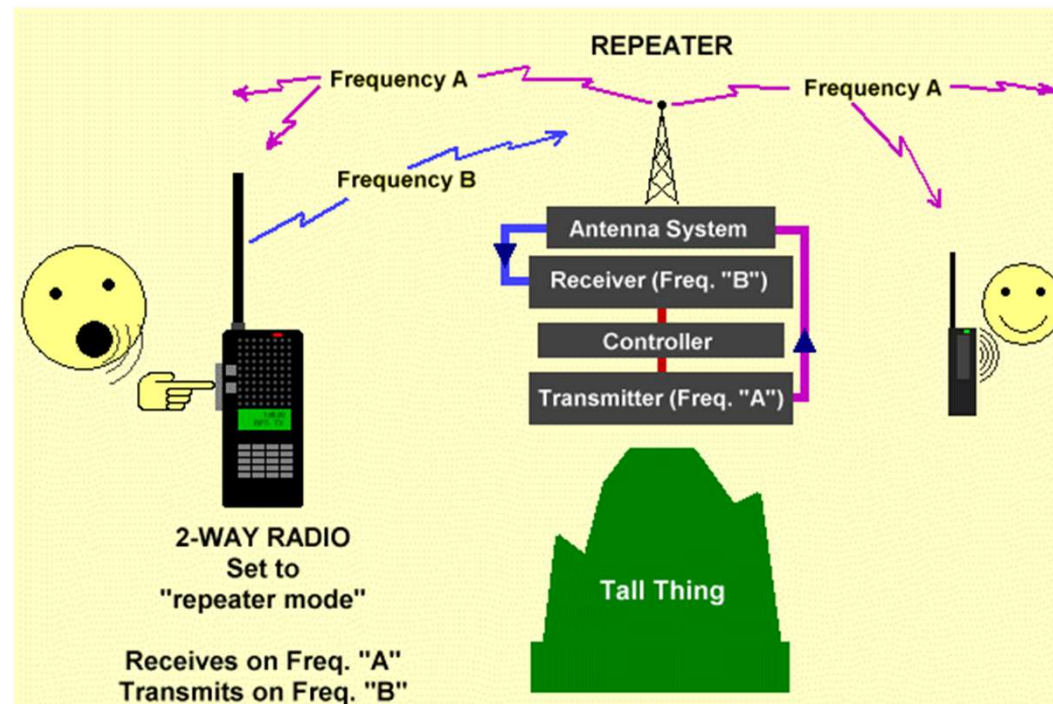
- Time to play!
- Availability during work hours.
- Years and years of wisdom.

Frequencies

- High Frequencies
 - Skywave Propagation
 - Worldwide communications without a network.
- VHF/UHF
 - 6 meters (50 MHz), 2-meters (144 MHz), 220 MHz, 440 MHz, Microwaves.
 - Most activity is on 2-meter and 440 repeaters (FM).
 - Crazy people actually work DX.

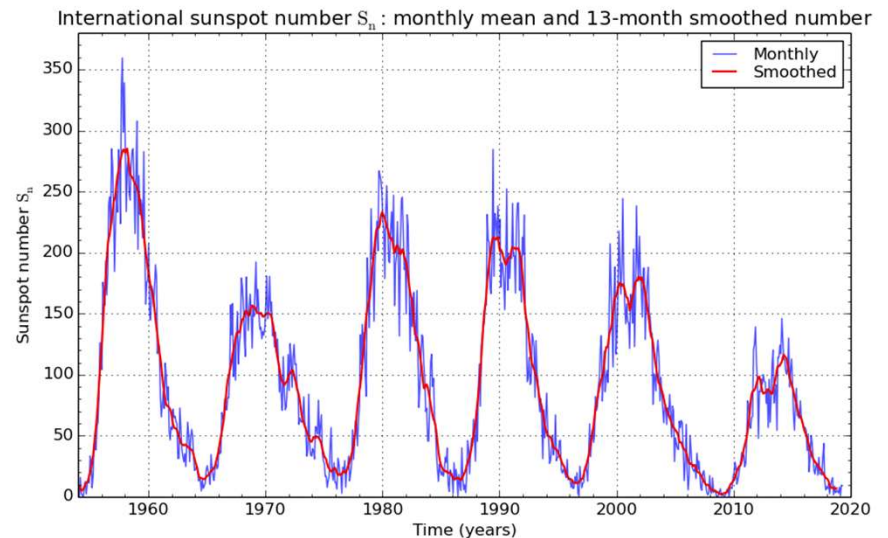
UHF/VHF Repeaters

- Traditional Two-Way Radio
 - Receive Frequency A (Repeater Output)
 - User Transmit Frequency B (“Offset”)
 - Tone Squelch
 - Activates the Repeater output
 - May also quiet the remote receiver



There's Nobody On

- 75- meters
 - 3885 +/- AM Window
- 60-meters Moose and Squirrel Net
 - Tuesdays, Thursdays, and Saturdays
 - 12 Noon 5357 USB
- 40-meters
 - 7255 ECARS
 - 7258 MIDCARS
 - 7290-95 AM Window
- 20-meters
 - 14286 AM Calling Frequency
 - 14300 Marine Mobile Service Network



Radio Stations are Defined by Their **Antenna Systems**



K3LR – West Middlesex, Pa



Heinrich Hertz
1857 - 1894

Hertz

Ca. 1888

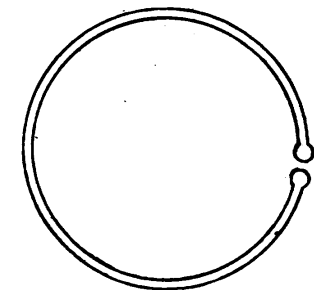
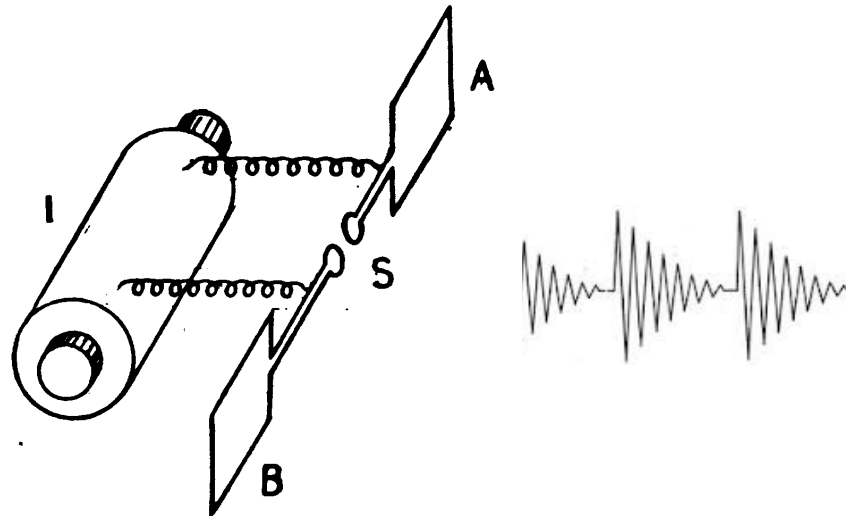
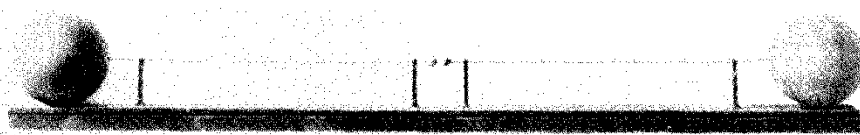
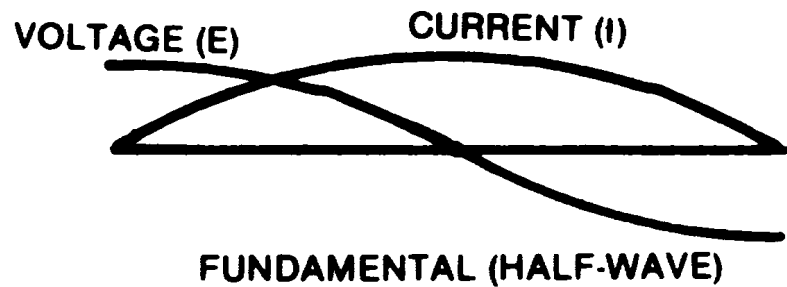


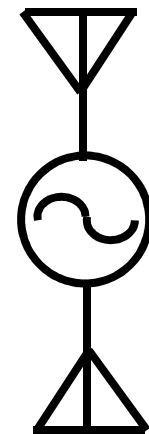
FIG. 10.—A Hertzian
ring resonator.



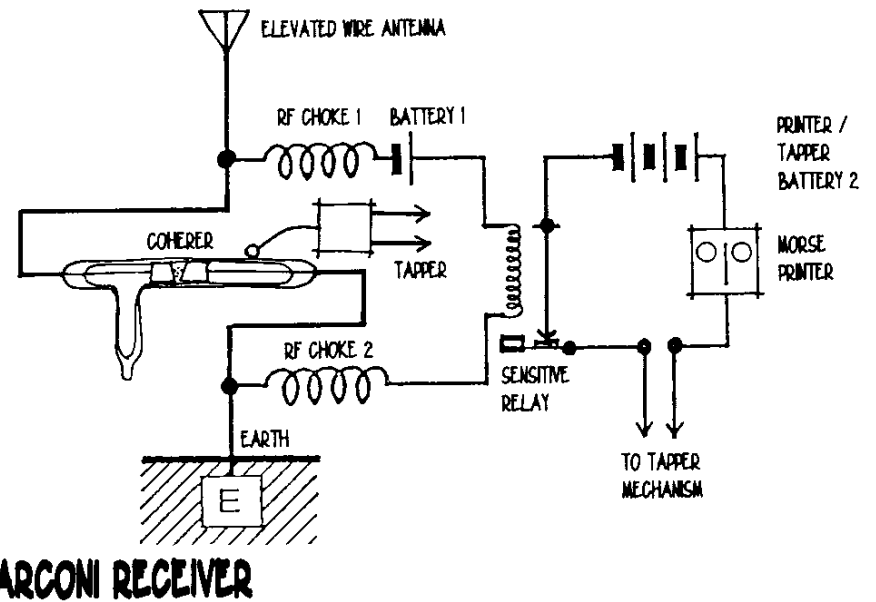
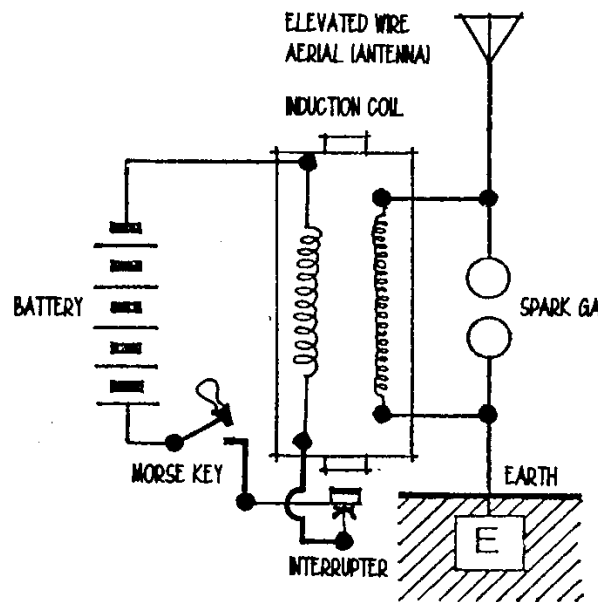
$\lambda/2 = \sim 2$ meters
150 Mhz



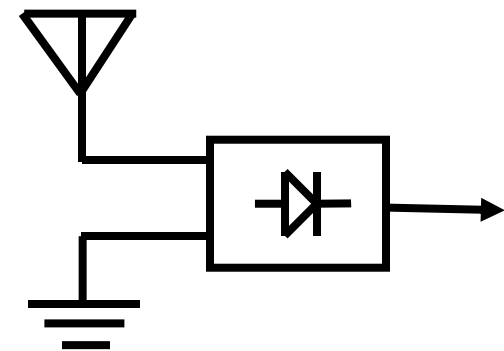
Antennas Launch and
Intercept Radio Waves!



Marconi 1896

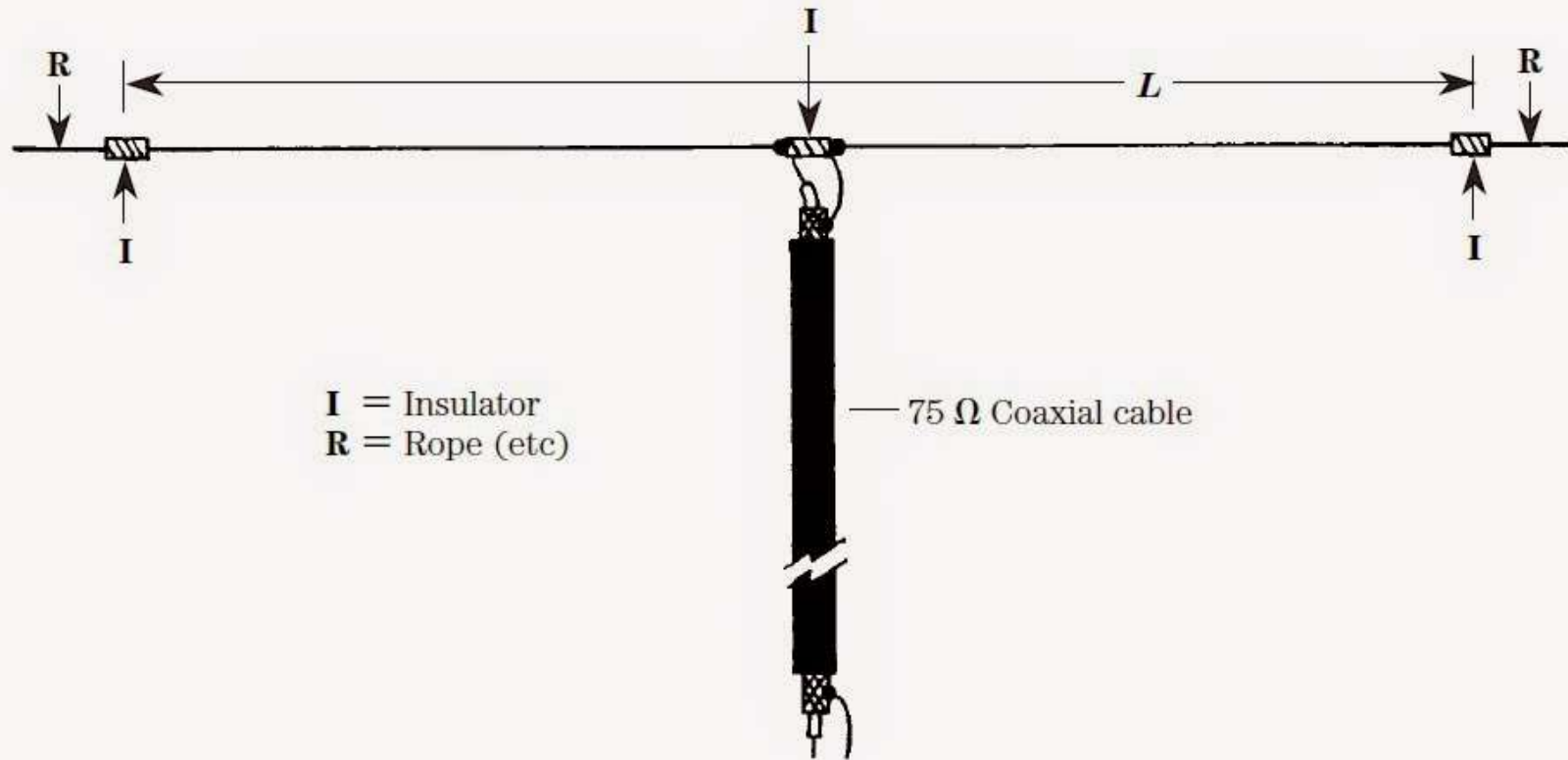


Transmitting Station



Receiving Station

Dipole Antenna w/Coaxial Feedline



Simple half-wave dipole antenna.

Half Wave = 468 feet/MHz

Inverted-L

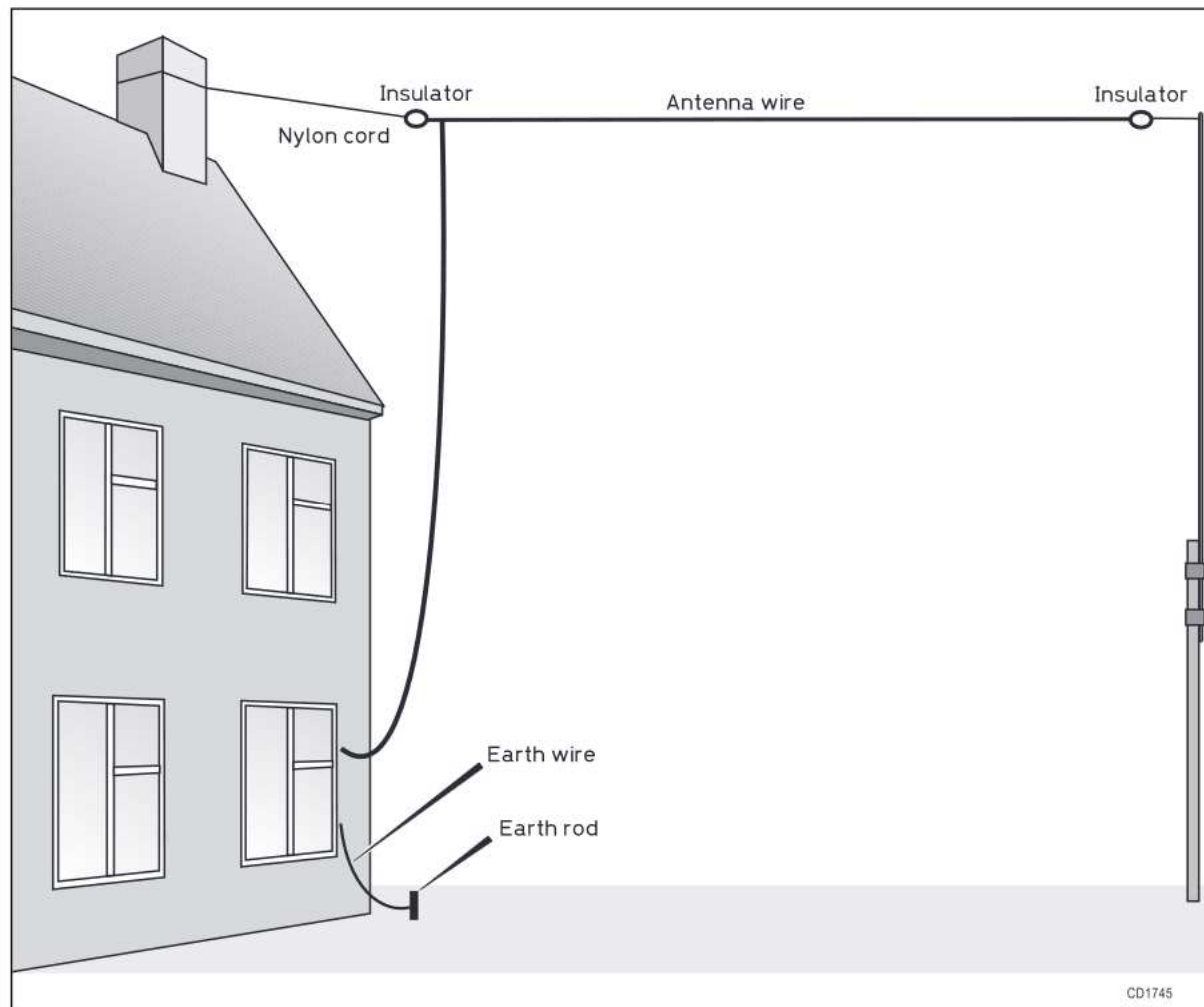
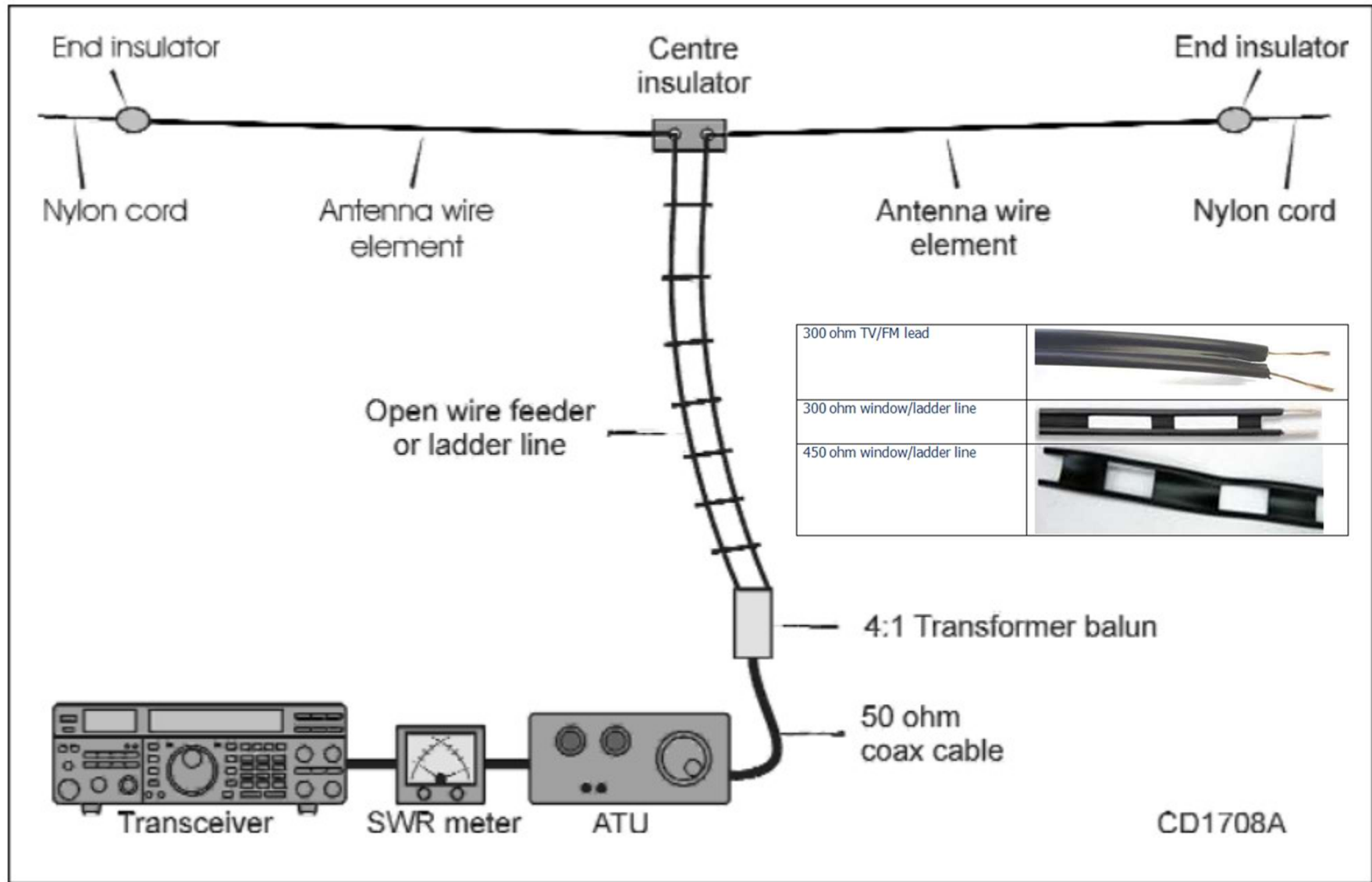
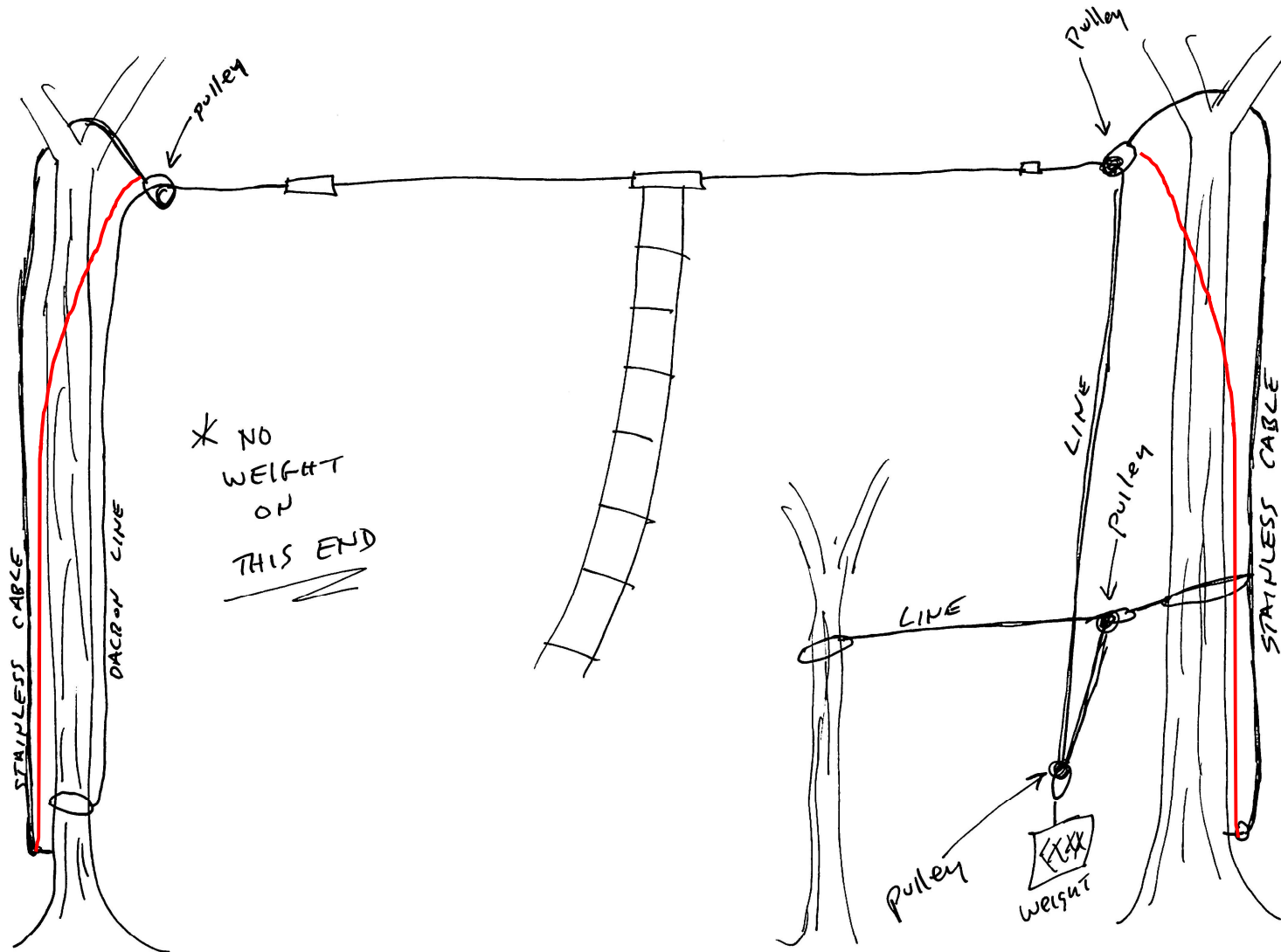


Fig 15.1: The end-fed antenna, the simplest of all multi-band antennas

A practical HF Antenna System

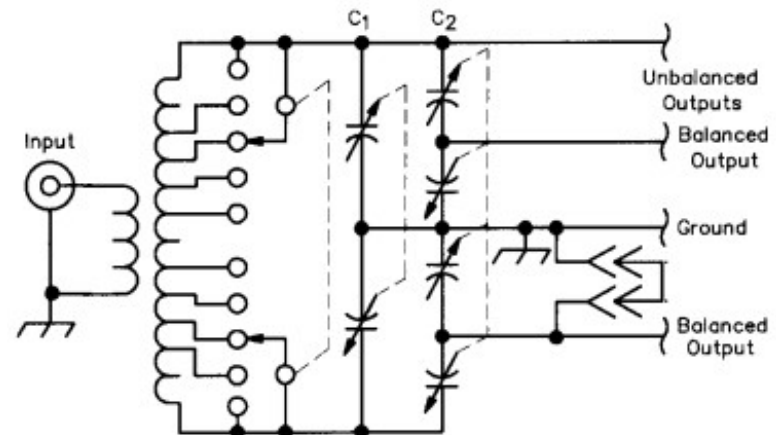


Antenna Support



Antenna Tuners

Old-School - Johnson Matchbox



21st Century Auto-Tuners



SG-230 Smartuner™
54-14

The SG-230 Smartuner™ automatic antenna coupler is ideal for marine, mobile, and base station installations.

- Frequency range: 1.6-30 MHz
- 200 Watts PEP / 80 Watts Continuous Maximum
- 12VDC Operation
- Tune power: 3 watts Nominal
- Supplied in a sealed ABS plastic case with 9 ft. control cable (RF coax, DC power, ground and optional accessory wires).

\$595.00

Quantity:

[Add To Cart](#)



LDG Electronics Z-11PROII Automatic Antenna Tuner 1.8-54 MHz,
0.1-125 Watts, 2 Year Warranty

★★★★☆ ~ 3

\$184¹⁰

FREE Shipping

Only 3 left in stock - order soon.



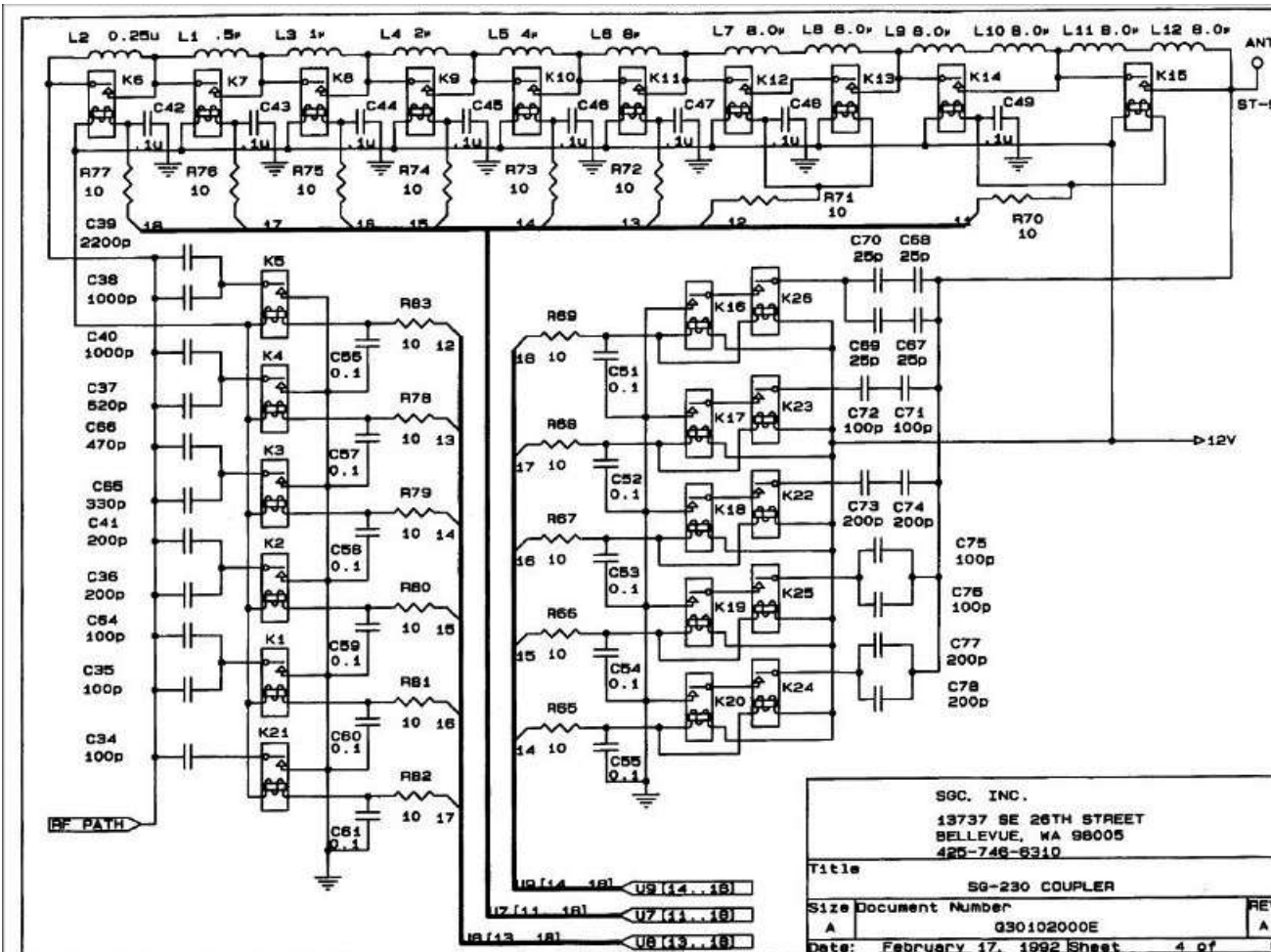
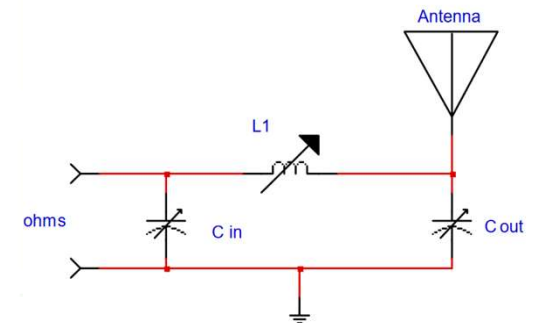
MFJ-993BRT REMOTE AUTO TUNER, HF, 300W

\$367⁹⁴

✓prime

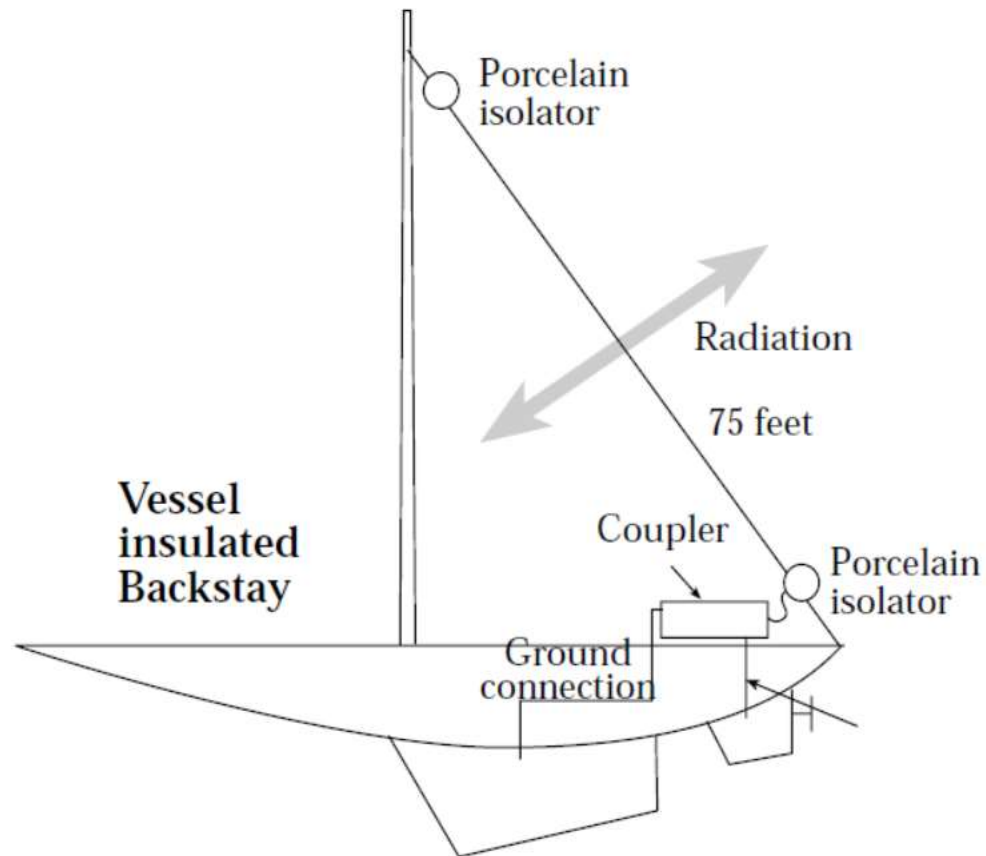
Only 2 left in stock - order soon.

SGC SG-230 Auto-Tuner



SGC Auto Tuner Applications

Figure 4.5.11 Vessel insulated back stay



<https://www.sgcworld.com/Publications/Manuals/230man.pdf>

Some More Tuner Applications

Random Wire

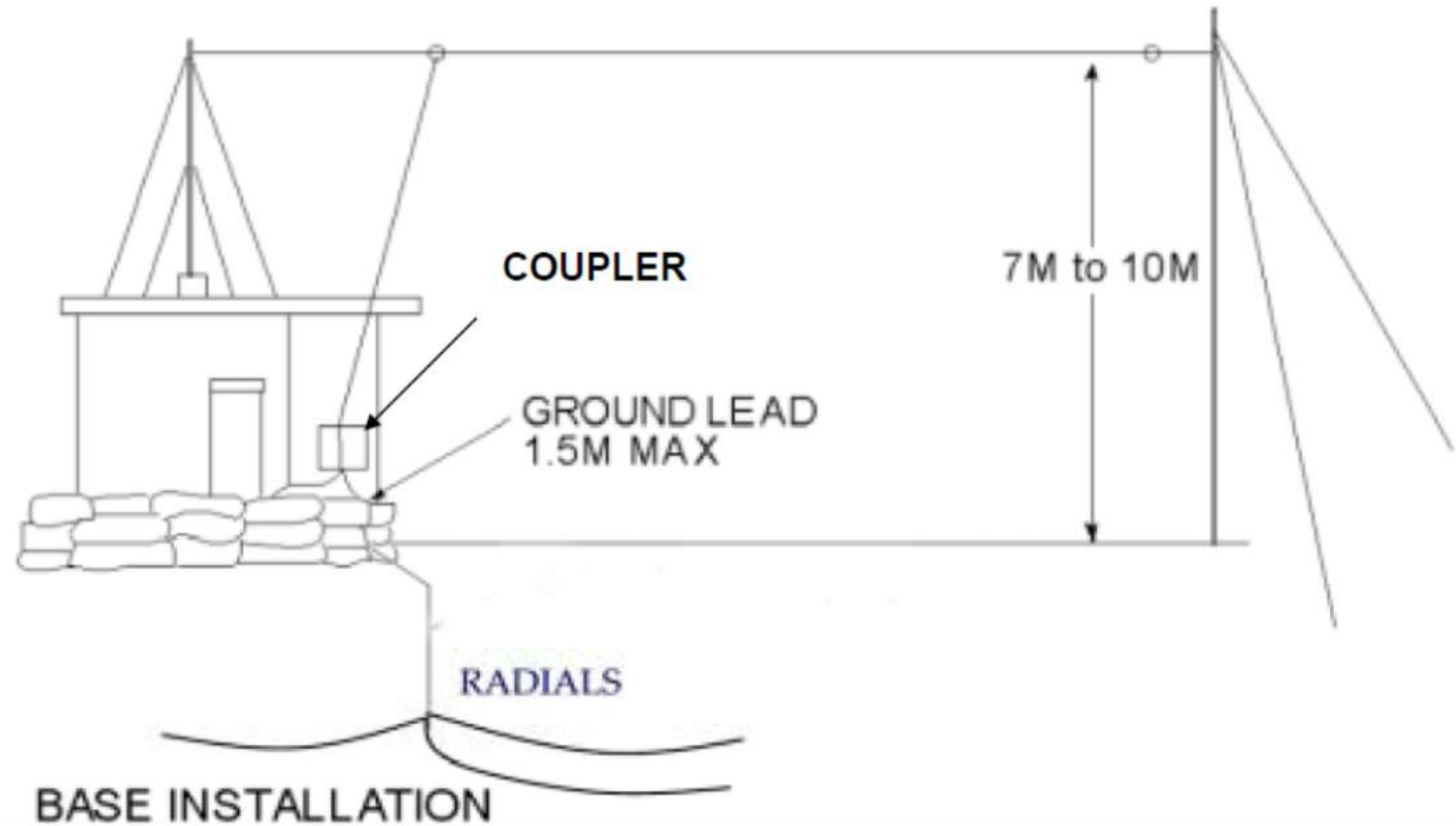
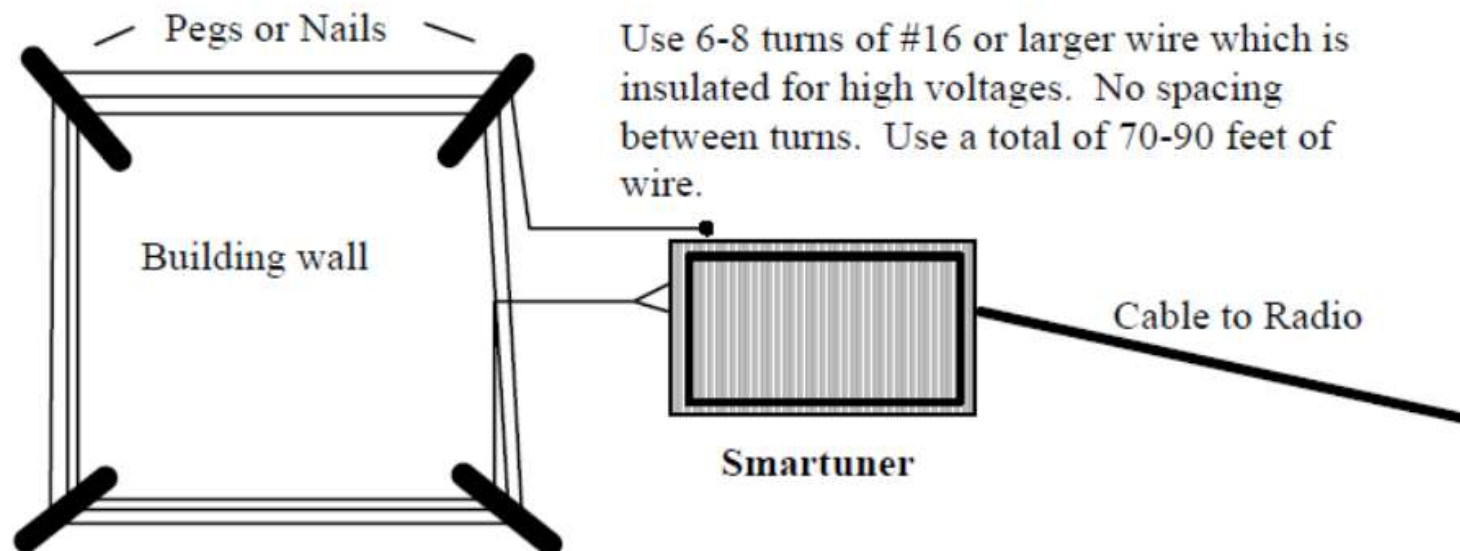
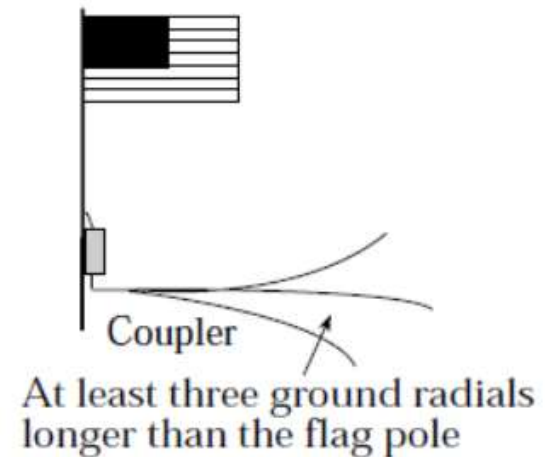
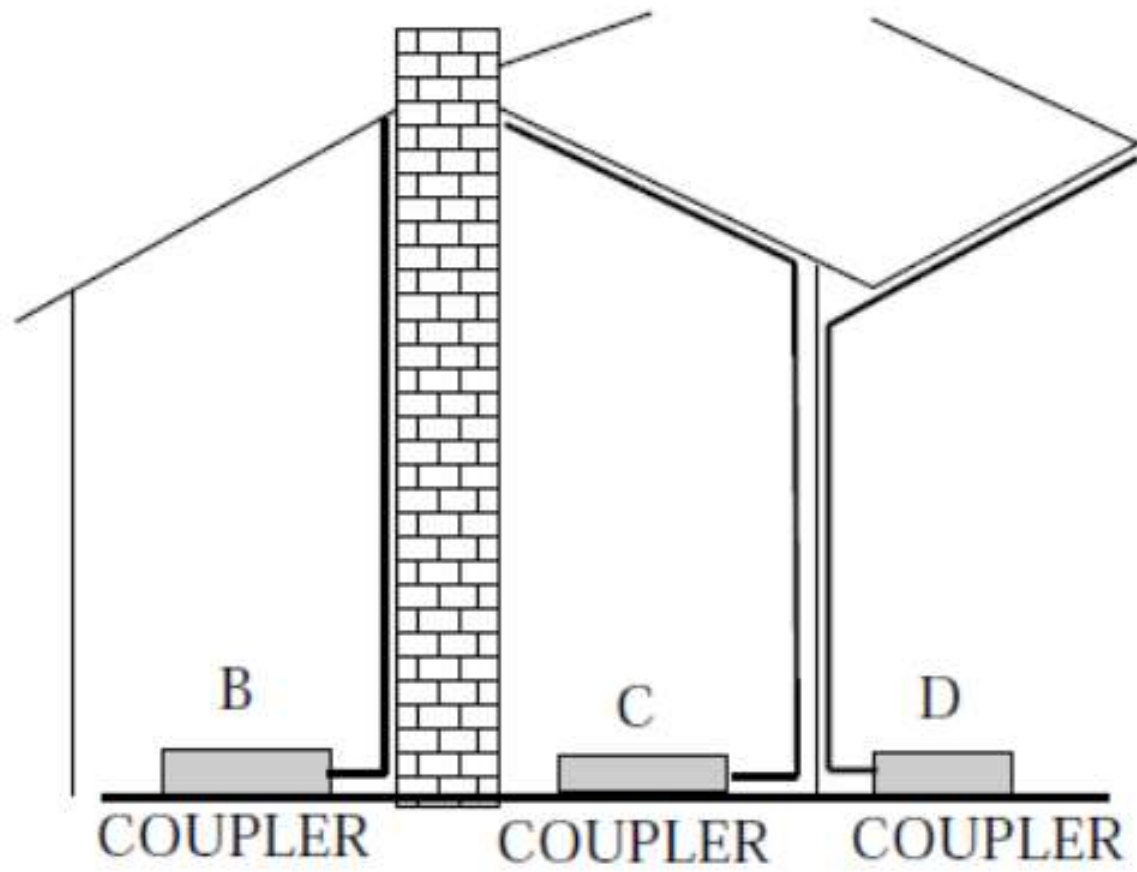


Figure 4.6.1 Small loop antenna (3x4 feet)



A. If a flagpole is made of PVC pipe, it is easy to tape a large gauge wire to the inside of the pipe and use a good counterpoise. Typical flagpoles are 25 to 35 feet in height and offer excellent performance on all bands.





Getting/Upgrading a License

- Question pools, sample tests, study guides an the web.
- Testing:
 - FCC created the VEC system to provide initial licensing examination for prospective new hams and upgrade examination opportunities for those already licensed. FCC authorized VEC organizations oversee the work of their certified Volunteer Examiners (VEs) and serve as a liaison between the exam applicants and the FCC.
 - VE sessions at many hamfests.
- License Classes:
 - Technician – All privileges above 30 MHz + Limited HF
 - 35-question multiple choice written examination
 - General
 - 83% of all amateur HF privileges.
 - Extra - All privileges
 - 50-question multiple-choice theory exam

21st Century Stuff

Who am I talking to?

Callsign Lookup

<https://www.qrz.com/>



[login](#) [help/register](#) 15:55:35 UTC 13 May 2019

Enter Query... by Callsign Search

Database

News

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Swapmeet

Resources

Contact

Login

View : Grid List

Featured Member



13 May 2019 1546 GMT				VHF	Conditions
SFI	77	SN	24	Item	Status
A	4	K	2	PIntry	Aurora Band Closed
X-Ray	A9.3			6m EsEU	Band Closed
304A	95.4	@ SEM		4m EsEU	Band Closed
Ptn Flx	0.20			2m EsEU	Band Closed
Etc Flx	2560.00			2m EsNA	Band Closed
Aurora	/n=			EME Deg	Excellent
Aur Lat	No Repor			MUF	
Bz	-6.3 SW	358.3		HS	

https://www.qrz.com/

W2RTM



New Jersey Antique Radio Club
2201 Marconi Rd
Wall, NJ 07719
USA

Page managed by **N2YEG** Lookups: 834



[Biography](#)

[Detail](#)

[Logbook](#)

W2RTM is the Official Amateur Station of the [New Jersey Antique Radio Club](#), located at the site of Marconi's 1914 High Power Receiver Station. This area became the U.S. Army's Radar Laboratory (Camp Evans) in 1941, and is now the campus of the [InfoAge Science History Learning Center](#), in Wall, NJ.



Hotel at Marconi Wireless Station, Belmar, NJ

The New Jersey Antique Radio Club's **Radio Technology Museum** is one of many participants at the InfoAge Science History Learning Center. The center is open to visitors Wednesday, Saturday and Sunday. 1:00 PM to 5:00 PM.

https://www.qrz.com/

[Biography](#)[Detail](#)[Logbook](#)[Log a NEW contact with W2RTM...](#)

Lookups	837	(966)
QRZ Record#	2201367	
QRZ Admin	N2YEG	
Last Update	2019-04-24 11:59:51	
Class	Club	Codes: HVBF
Trustee	WILLIAM S ZUKOWSKI - N2YEG	
Effective	2018-03-26	
Expires	2028-03-23	
Grid Square	FN20xe	
Geo Source	Geocoded Address	
US State	New Jersey	
US County	Monmouth	
Bearing	177.6° S (from N3FRQ)	
Distance	37.4 mi (60.2 km)	
Long Path	24819.4 mi (39943.0 km)	
Sunrise	09:42:23 UTC	
Sunset	00:02:47 UTC	
GMT Offset	-5 hours	
FCC Record #	4013254	View FCC Record...
QSL by Mail?	No (e.g. Will this ham QSL by Postal Mail?)	
Other Callsigns	Alias	Comment
	KD2PFW	

Map

Satellite

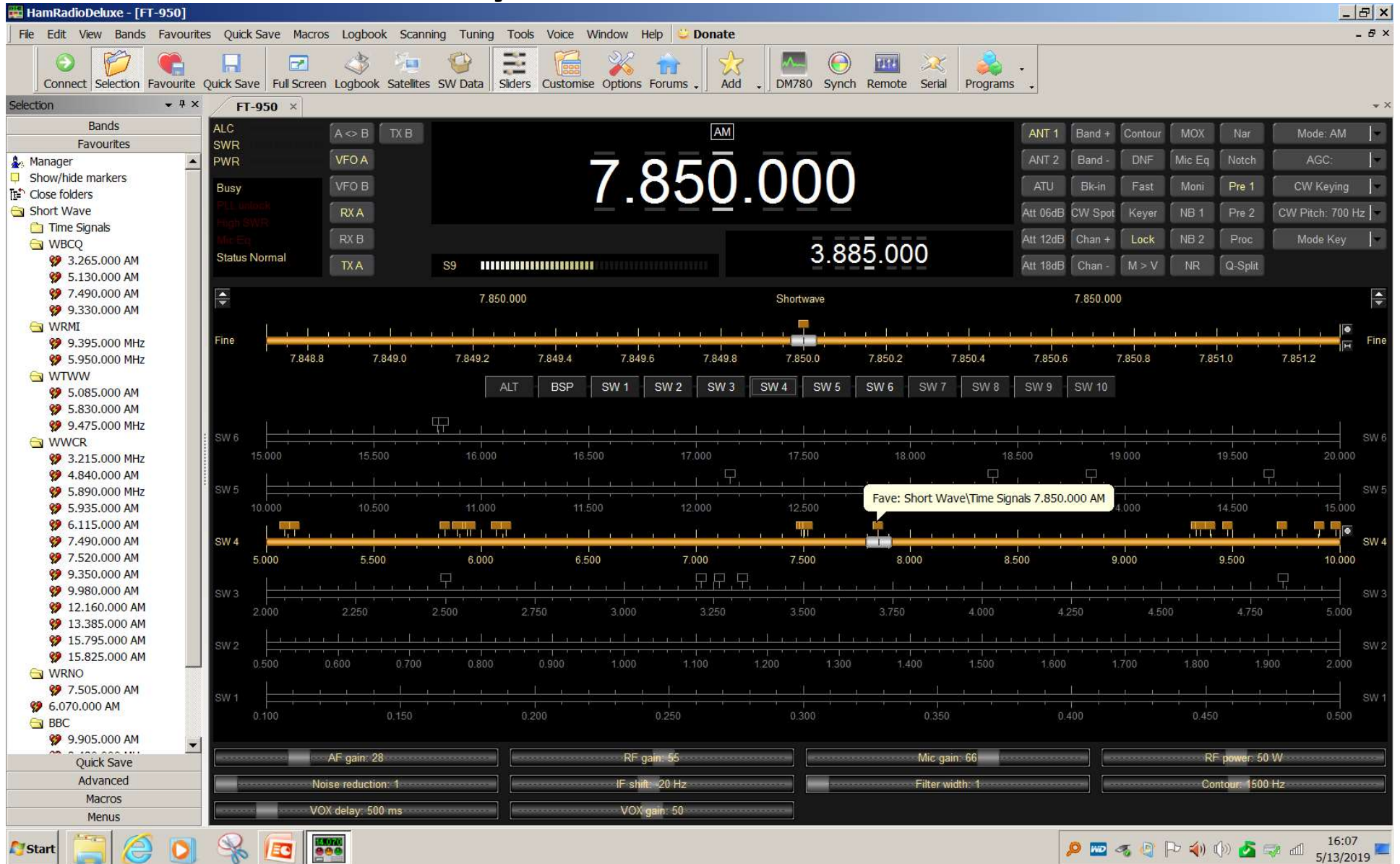
Explore on HamGrid Maps

Typical Mid-Range HF Transceiver

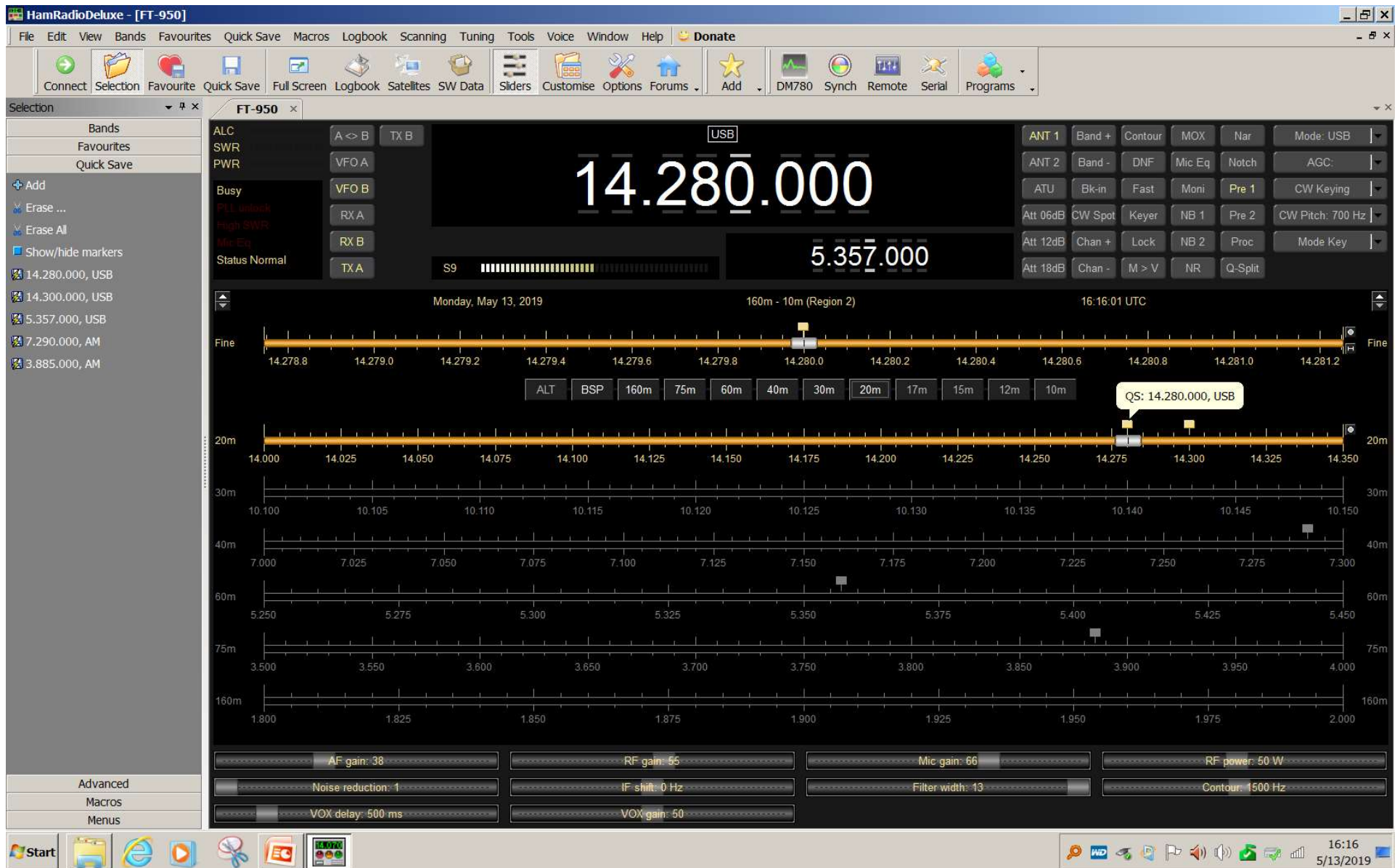


- 160 – 6 meters 100 Watts PEP
- Wideband Receive
- Digital Signal Processing
- Lots of buttons
- Lots of functions
- Can be controlled from a computer.

Ham Radio Deluxe by Simon Brown

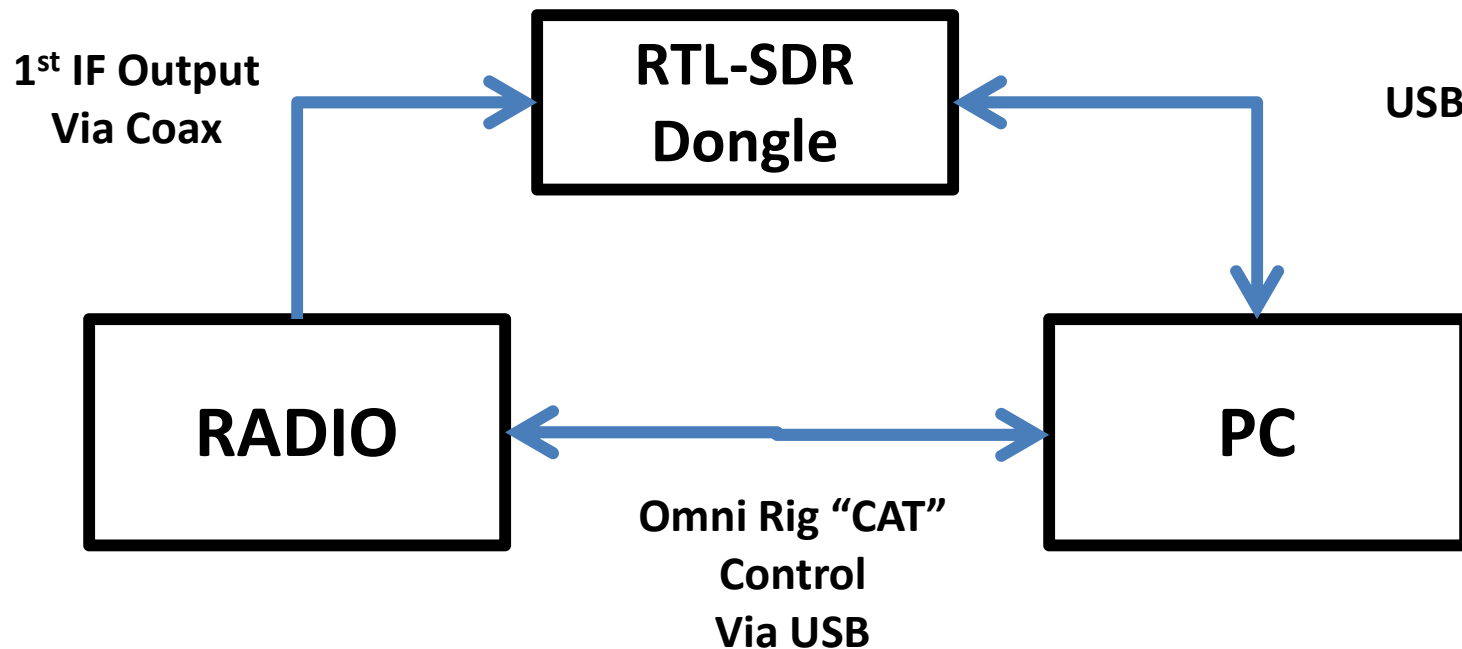


HRD

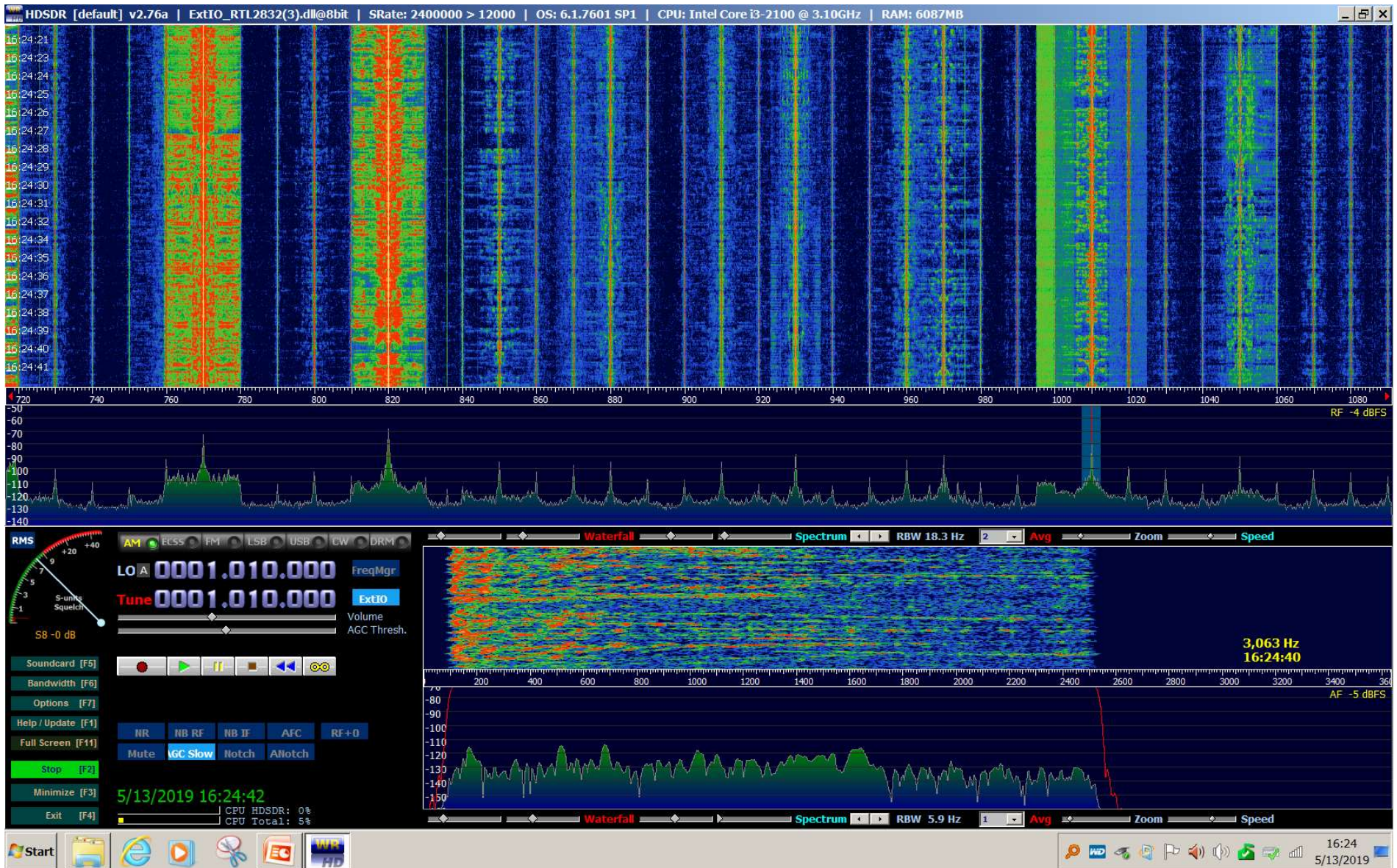


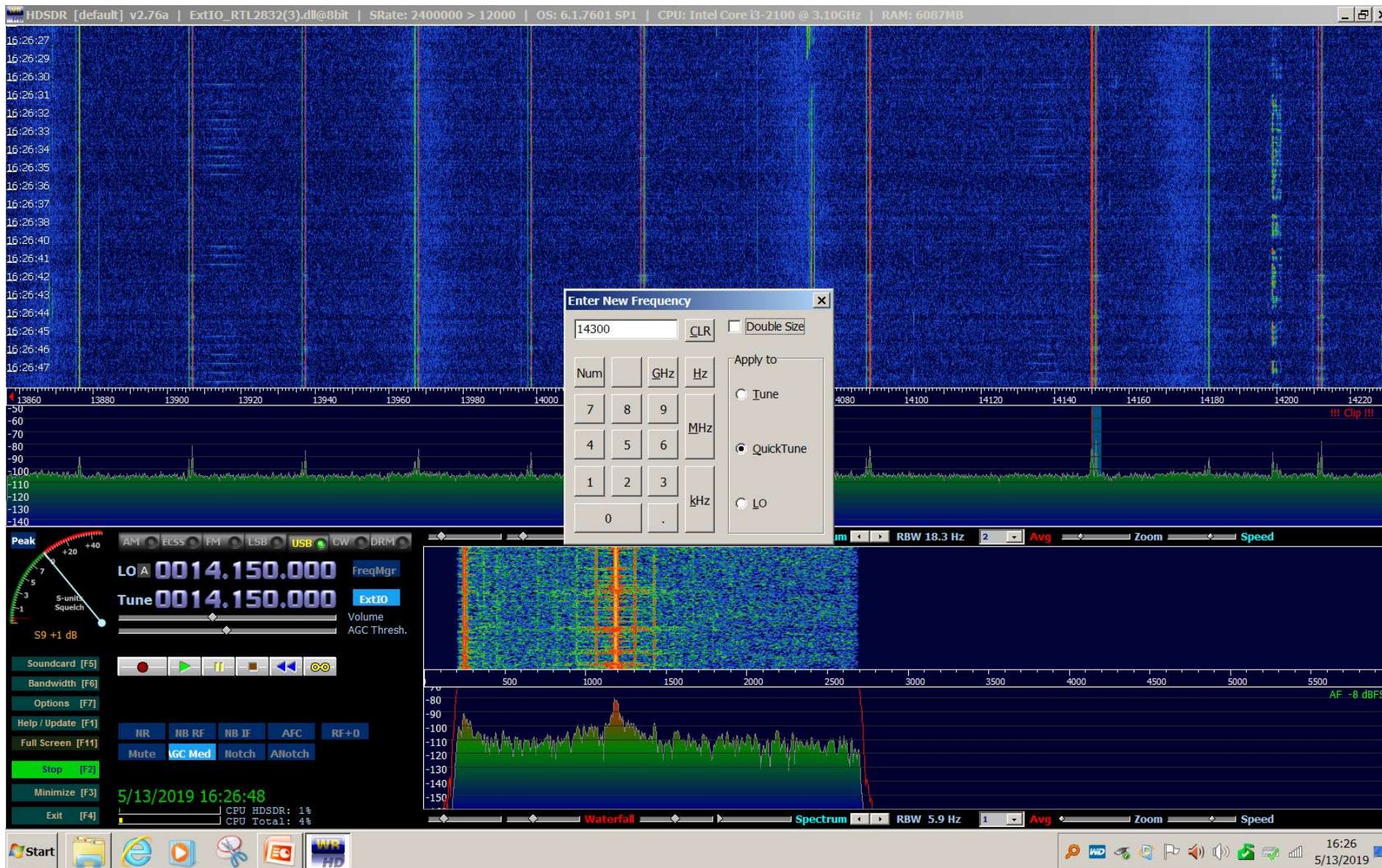
HDSDR

- Software Defined Radio Control Program



Spectrum Scope via HDSDR





<http://reversebeacon.net/>

REVERSE BEACON NETWORK

[welcome](#) [main](#) [dx spots](#) [nodes](#) [FT8](#) [downloads](#) [about](#) [contact us](#)

[show/hide my last filters](#)

showing spots for DX call: N3FRQ

rows to show: ▼

[search spot by callsign](#)

de	dx	freq	cq/dx	snr	speed	time
KM3T	 N3FRQ	3521.0	CW CQ	8 dB	17 wpm	1508z 16 May
KM3T-2	 N3FRQ	3521.0	CW CQ	8 dB	16 wpm	1508z 16 May
W8WTS	 N3FRQ	3521.0	CW CQ	8 dB	17 wpm	1508z 16 May
N9YKE	 N3FRQ	14021.0	CW CQ	14 dB	16 wpm	1505z 16 May
W9XG	 N3FRQ	14021.0	CW CQ	6 dB	17 wpm	1504z 16 May
K9TM-4	 N3FRQ	14021.0	CW CQ	13 dB	17 wpm	1504z 16 May
K3PA	 N3FRQ	14021.0	CW CQ	18 dB	17 wpm	1504z 16 May
KQ8M	 N3FRQ	7023.0	CW CQ	6 dB	17 wpm	1455z 16 May
AA4VV	 N3FRQ	7023.0	CW CQ	10 dB	16 wpm	1455z 16 May
W8WWV	 N3FRQ	7023.0	CW CQ	26 dB	17 wpm	1455z 16 May
K9TM-4	 N3FRQ	14021.0	CW CQ	15 dB	16 wpm	1449z 16 May
K3PA	 N3FRQ	14021.0	CW CQ	24 dB	17 wpm	1449z 16 May

“Digital Modes”

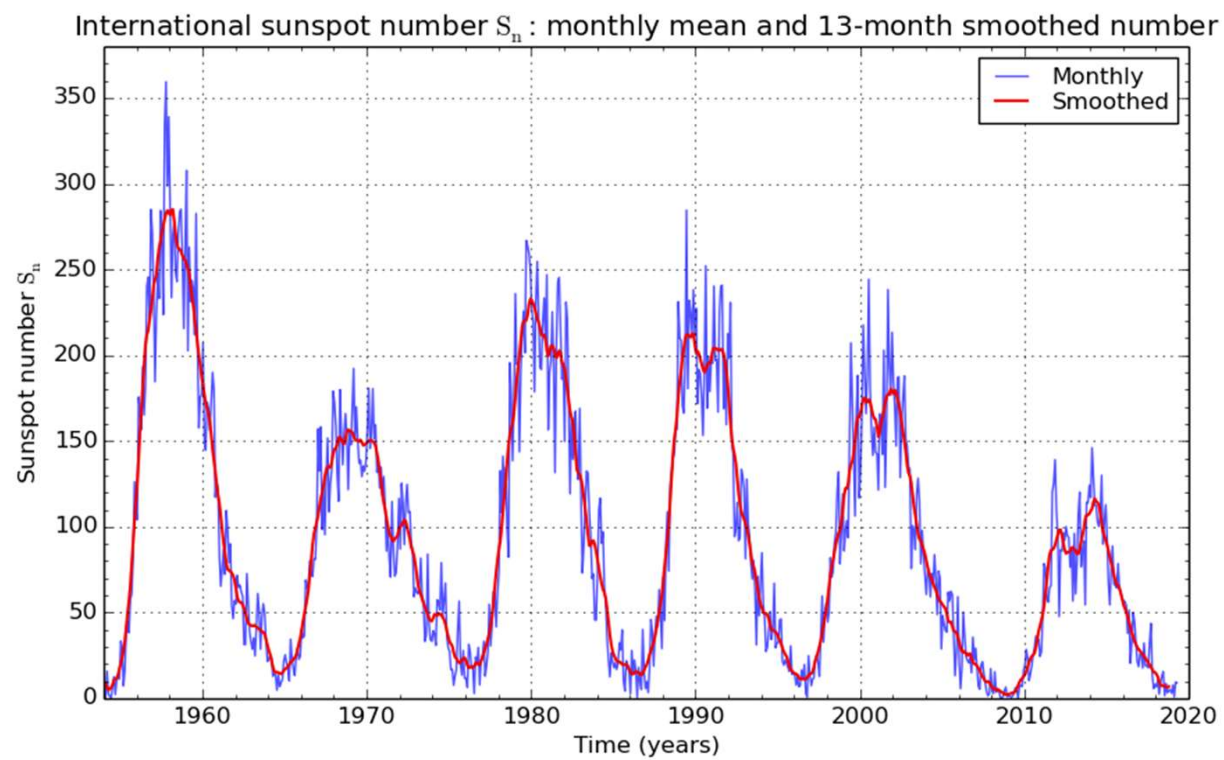
- Your PC acts as a modulator/demodulator
- RTTY
- PSK-31
- RT-8

Web Resources

- QRZ Callsign Lookup <https://www.qrz.com/>
- Propagation Charts http://www.sws.bom.gov.au/HF_Systems/6/6/1
- SGC-230 Tuner Manual
 - <https://www.sgcworld.com/Publications/Manuals/230man.pdf>
- Practical Antenna Article
 - <http://www.ocarc.us/docs/antennas/practical>
- Reverse Beacon Network <http://reversebeacon.net/>

What do you wanna do?

- HF or VHF/UHF
- Casual O.T.A. gatherings
- Scheduled Monitoring
- Full-scale net



SILSO graphics (<http://sidc.be/silso>) Royal Observatory of Belgium 2019 May 7