

Amateur Tools, Equipment and Resources

A suggested list of tools and test equipment that the Amateur is going to find useful in their hobby, starting with the basics for Technicians and on to the highest end equipment that a few Amateur Extras might have

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Tools for the Technician & Beyond

Tools = Hardware required to install, construct, repair or modify a device

Test Equipment = Hardware needed to check that the device works correctly

Software = Computer programs that either enhance the amateur experience or may be required to operate

Resources = Places to go to get more information to affect changes, repairs, etc.

Tools - Amateur Technician and Beyond (might make some power cables, coaxes, etc., install a radio in a car? Might do VHF/UHF POTA/SOTA, might make some antennas)



- **Wire cutters:** Side, end cutters
- **Pliers:** Needle nose, flat nose, other specialty
- **Screw drivers :** flat, Phillips, Torx, Hex, socket
- **Socket sets :** Metric and SAE
- Channel locks
- Crescent wrench
- **Crimp tools -** Anderson, Coax, cable



More Hand Tools:

- Allen wrench (key) set
- Box cutter
- Heavy duty scissors
- Plastic tweaker set – flat, hex, etc
- Headlamp with magnifier set
- File set, flat, round, triangular, etc.



Electrical Tools:

- Power Supply – 13.8v 35A for testing radios
- Battery powered drill & stepper bits
- Dremel tool and bits/saws/grinders



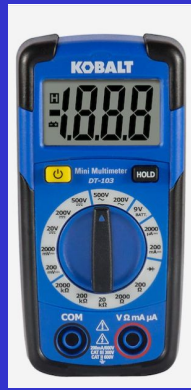
Electrical Tools

- Soldering iron, solder
- Solder wick or Solda-Pullit solder sucker
- Inverter - 12VDC to 115 VAC 300W
- Accurate Clock (WWVB, PC, cellphone)



Test Equipment:

- **Continuity tester** – Checking cables, switches, coax, etc.
- **Multimeter** – Voltage, Current, resistance, continuity, transistors, diodes, etc



Resources for All Amateurs

People! (local groups)

- [Inland Empire VHF Radio Amateurs \(groups.io\)](#)
- [Amateur Radio Emergency Services \(groups.io\)](#)
- [Spokane DX Association \(groups.io\)](#)
- [WA Digital Radio Enthusiasts \(groups.io\)](#)
- [KBARA](#), [KARS](#), [SRG](#)

The Internet

- Any ham radio / electronics technical subject
- Google search, user manuals, Adobe Acrobat PDF search
- Bookmarks/Favorites (personal library)
- Groups.io (web interface!)
- Text / Slide / Video Presentations (ARRL, YouTube...)

Equipment for the General and Beyond

Tools - Amateur General and Beyond (might be programming radio's, make power supply repairs, be into HF, POTA/SOTA)

- **Soldering iron/station** : Weller various models
- **Soldering/desoldering iron/station** : WEP 948
- Micro Torch - LX771 Multifunction
- IC puller/inserter
- RTL SDR dongle or equivalent



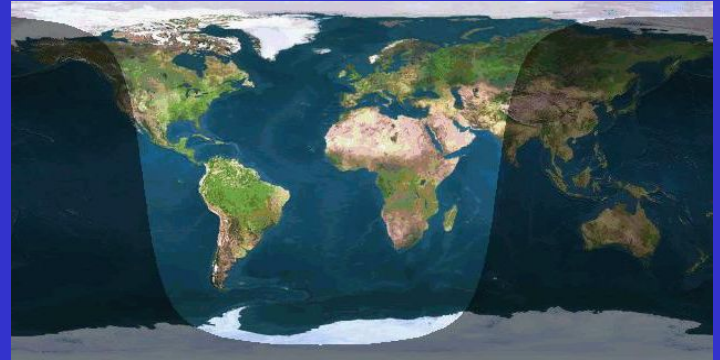
Tools

- Baofeng UV-5R TX test tones w/MON, CALL, VFO, BAND keys
- Eton Elite Executive RX: AM/FM/SSB 0.15-30 MHz, FM broadcast
- FOSPower Emergency RX: DC In AAA / 4 Ah Li-Ion (Solar / AC Adapter / Crank); DC Out 5V USB; AM / FM / WX / Flashlight



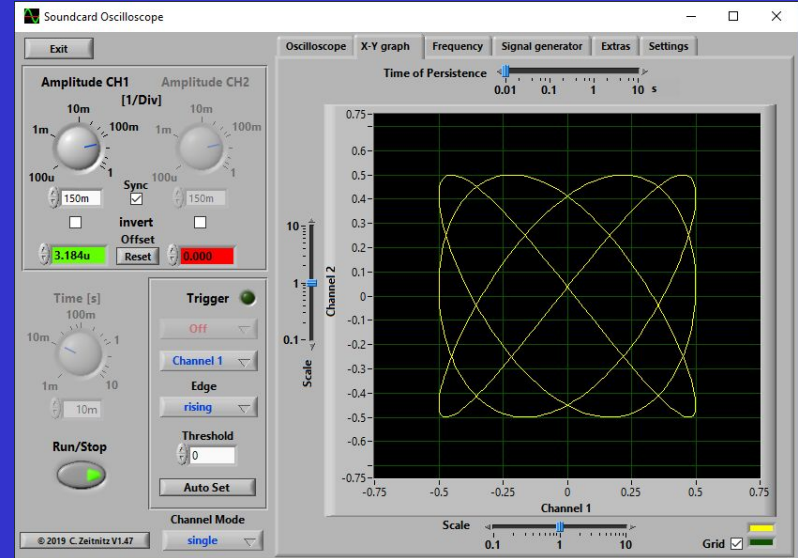
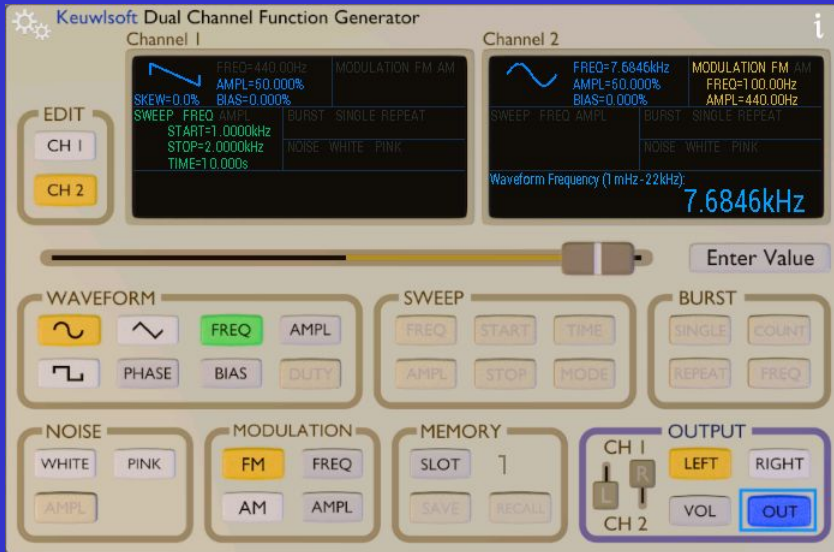
Tools

- Stanley “FatMax” Metric/inches tape measure
- Bolt cutter
- [N3FJP](#) Logging, rig control, & contest software suite
- [N1MM](#) Logging, rig control software
- [Greyline](#) map for laptop



Software Instruments

- Android Function Generator: 2-ch audio waveforms, sweep... free!
- Windows Soundcard Scope: Similar, plus scope & spectrum analyzer...\$12.



Amateur Radio Modes and Related Software

- **What:** Analog/Digital Voice, Text, Image, Any Data
- **How:** Echolink, IRLP, DMR, D-STAR, YSF, Winlink, Fldigi, VARA, FT8, ATV, SSTV, Fax, Packet, APRS, Zoom, Discord...
- **Where:** Home, Vehicle, Carry
- **Why:** Contests, DX, Emergency Prep, Knowledge, Fun, Friends, Fellowship, Fame

Tools

- **Antenna tuner** : MFJ-945E, MFJ-921, and for higher power rating: Dentron MT-2000, MFJ- Versa Tuner V
- Auto tuning antenna tuner : MFJ-994B Intellituner
- **Antenna switch** : Daiwa CS-201 or MFJ 1702



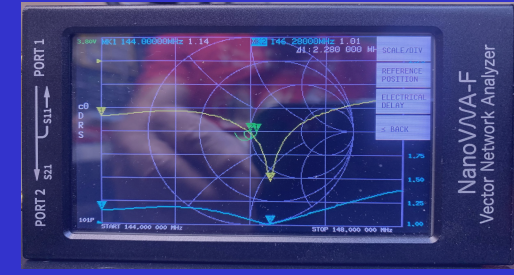
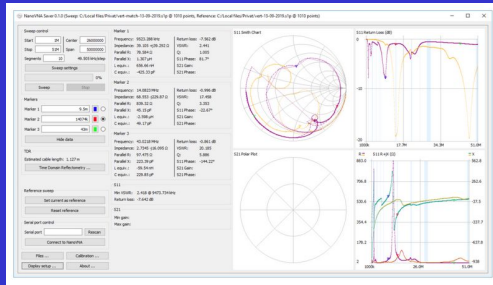
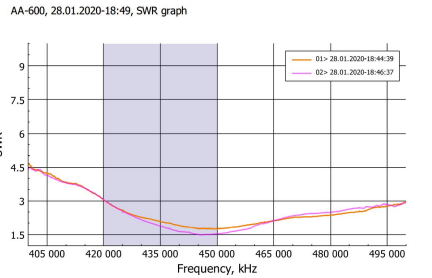
Tools

- Heavy Duty Vehicle 12VDC / 110 VAC / 5V USB Supply
- Voice Recorder



Test equipment - (Might be making some HF/VHF/UHF antennas)

- **Antenna Analyzer** : Nano VNA, Nano VNA “F”, NanoVNASaver, AA-55 Zoom Rig Expert , AA-600 Rig Expert & software for laptop
- MFJ-269C Pro antenna analyzer/freq counter



Test Equipment

- Dummy loads - SMA 1W, MFJ 50W
- Inline Watt/power digital meter for DC
- AC/DC Clamp Meter w/AC Line Splitter
- Intertek P4400.01 Kill A Watt Meter: Volts, Amps, Watts, Volt-Amps, Frequency, Power Factor, kilowatt-hours, timer



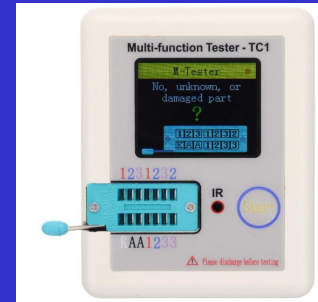
Test Equipment

- **Frequency counter CTCSS meter** : Surecom SF-401Plus or Leixen N8, or Xinhon Frequency counter CTCSS meters
- Digital power meter : Surecom SW-102
- Nissei RS-40 SWR/Power Analog meter



Test equipment

- **Variable Voltage switching supply** : Ratelco 2046B, Topward TPS-4000 Dual Variable voltage, TekPower TP1830SB, Astron VS series, or a Switching PSU QW-MS305D,
- **Multifunction Tester - TC1** - FET /Transistor
- **Component tester kit**- Diode, Transistor, capacitance, etc.



Test Equipment

- Jackery Explorer 160 Whr supply: 12VDC; 5V USB; 110V AC.
- Westinghouse iGen160 (similar)
- Handheld Scanner (e.g. Pro-60, many models)



It's All Just Audio

- Tigertronics SignalLink USB Integrated Sound Card: PSK31, MT-63, FT8, JT4, JT9, JT65, QRA64, ISCAT, MSK144, WSPR, JTMS, FSK441, FSK315, ISCAT, JT6M, SSTV, Packet, APRS, VARA.
- Kantronics KPC3+ (like SignalLink, older alternative)
- Byonics TinyTrak3Plus (APRS mobile tracker, GPS to TT3+ to rig)



Equipment Likely for the Extra

Tools

- Weller EC3001 or equivalent fine solder station
- Andrew CPT-L4ARC1i LD4-50 Heliax prep tool
- Microscope and/or magnifying glass
- Rat-Pac 6-8 way antenna switch with remote or Delta
- Low Pass filter/Bandpass filter
- Ames DTT-1372 Digital Thermometer & probes



Test Equipment Extra (probably into HF, testing to component level, repairing radio's, amplifiers, etc.)

- **Watt/SWR meter** : Daiwa CN-901 1.8-200MHz, MFJ-894 1.6-525 MHz, Dentrion W-2 HF
- BIRD Thermaline 600W oil filled dummy load
- **Field Strength meter** : Multitronics ME-61 or MFJ-801 Field strength meter
- Eico 242 Solid State Fet VOM



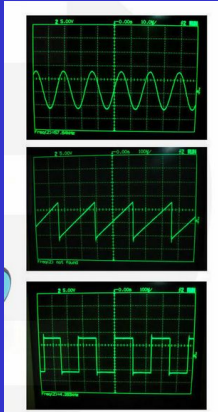
Test Equipment

- Oil-filled 1 kW Dummy Load
- External Speaker
- LCR-T4 L/C/R/Transistor Component Meter (~\$15 on eBay)



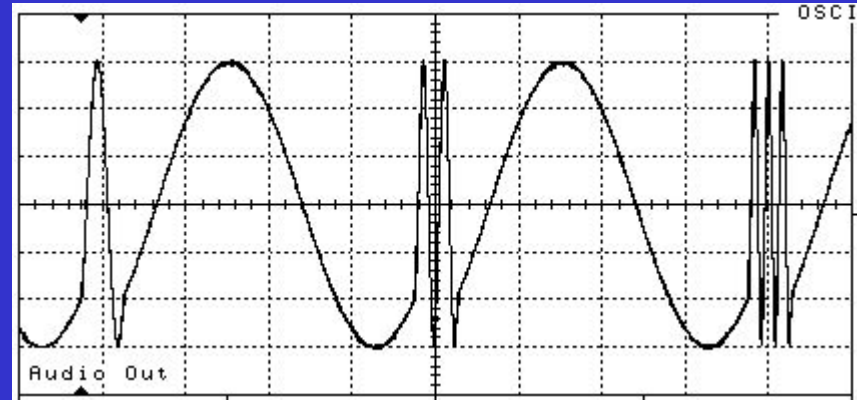
Test Equipment

- ESR Capacitor tester : MESR-100 ESR
- K18 Wireless Bug detector
- **Signal generators** : TAG101D 2MHz , Tronson TSG-17, Fordham 100kHz-150MHz, HP 200B RF Signal Generator, etc
- **Function Generator**



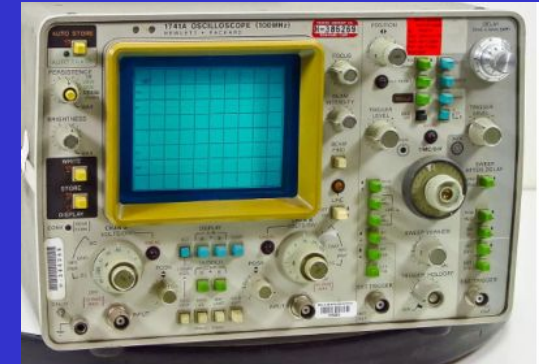
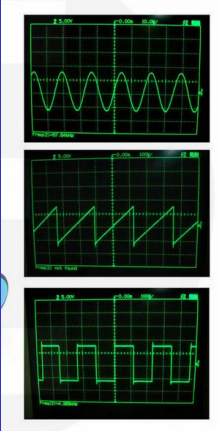
HP 8904A Multifunction Synthesizer

DC - 50 kHz, 4-channel, sine, square, triangle, pulse, noise, sum / AM / FM, phase-continuous. Tests modems, FM stereo, ILS, VOR, DTMF...



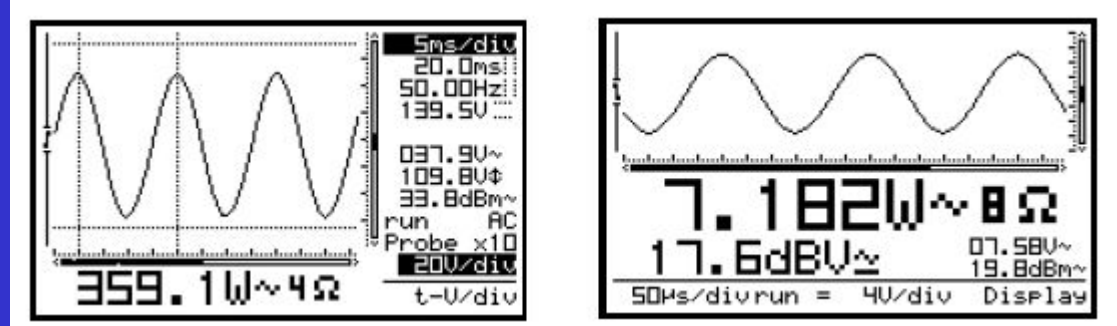
Test Equipment

- Frequency counter : Victor VC-1365
- Oscilloscope : Tektronix 2245A 4ch 100MHz, HP 180C, Phillips PM3214 25 Mhz
- HP 1741A Storage scope



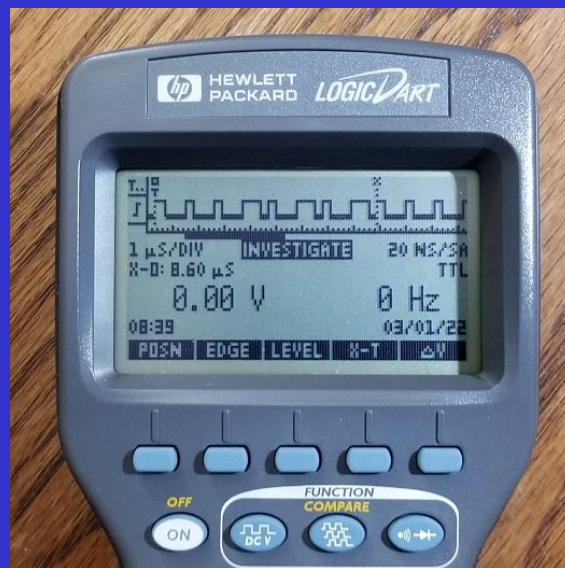
Velleman HPS40 Handheld Oscilloscope (2009)

10 MHz, markers, auto-scale, DCV / ACV / W / dBm / frequency / period measurements, PC connectivity



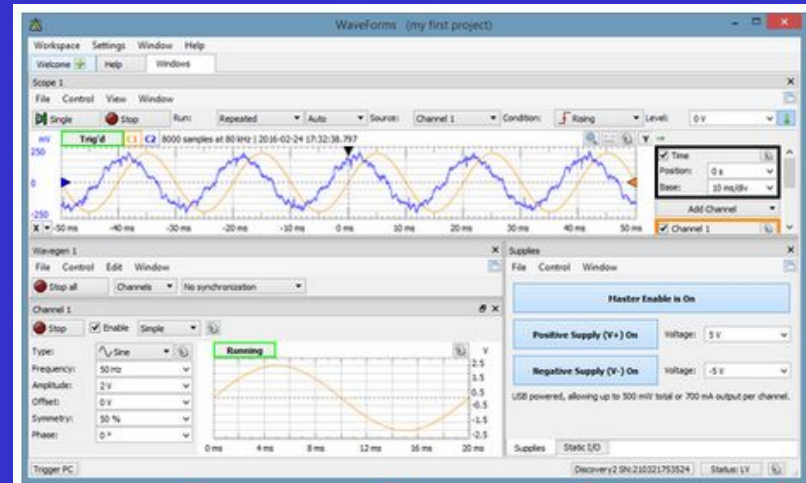
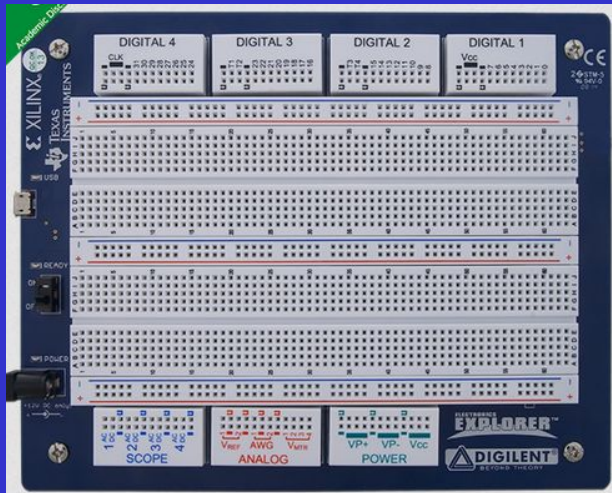
HP E2310A Logic Dart (1998)

Handheld logic state analyzer, 2048 samples at up to 100 Ms/s. Used to analyze how LED strips (e.g. animated house Christmas light displays) are controlled and how the I2C "I Squared C" microcontroller bus works.



Digilent Electronics Explorer Board

PC-Connected Electronics Lab: 10 MHz, 4-channel oscilloscope, 2-channel Arbitrary Waveform Generator, Logic Analyzer, Pattern Generator, Voltmeter, Spectrum Analyzer, Network Analyzer, Power Supplies, etc.



CT Systems 3000B Service Monitor

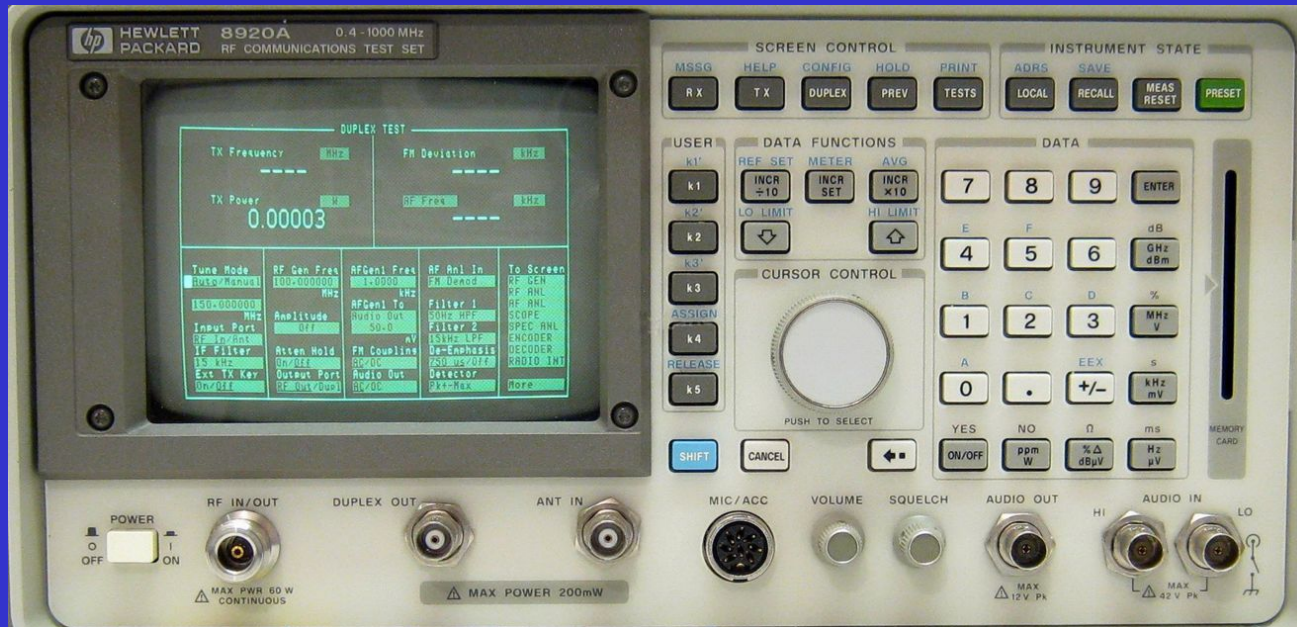


- Audio Synthesizer generates sub audible tones
- Audio input voltage
- Frequency error, modulation frequency, sub audible tone frequency display
- SINAD, noise, and distortion display
- Modulation waveform and measurement
- Signal strength meter
- RF power from 1- 100 W
- RF voltage variable from 0.03 μ VRMS to 316 mVRMS
- 400 Hz to 999.9999 MHz

SINAD is an abbreviation for Signal-to-Noise And Distortion. It is a measure of audio quality.

HP 8920A RF Test Set (1990)

0.4-1000 MHz, RF/Audio Generation/Analysis, Signaling, Spectrum Analyzer, IBASIC, VHF club presentation 2021-11 (including *how* radio tests are done).

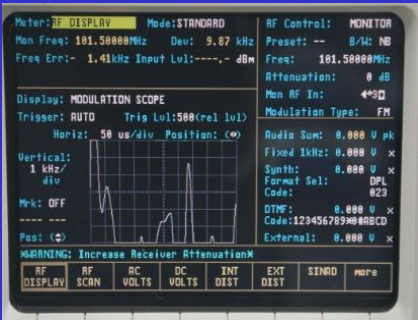
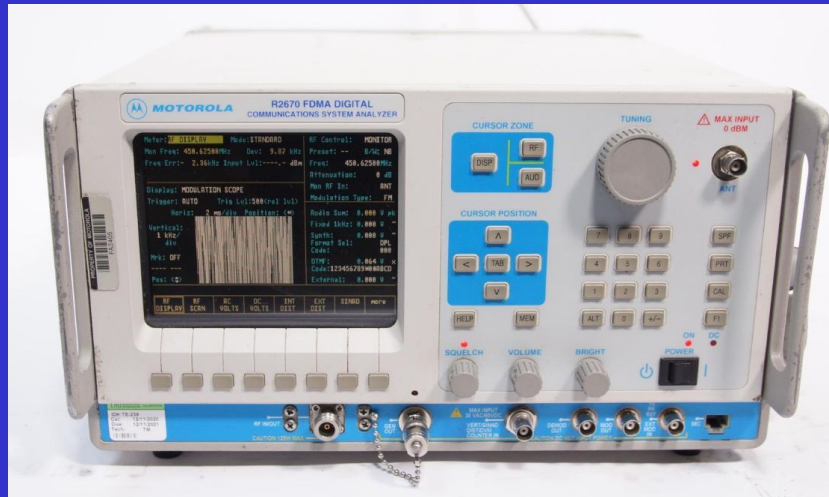
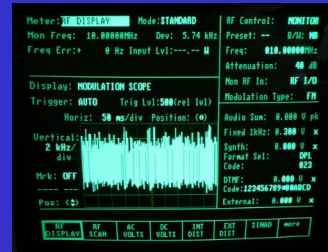


Motorola R-2670 FDMA Digital Communication System Analyzer

RF Signal Generator 50 kHz Oscilloscope
Frequency Counter AC/DC Voltmeter
RF Watt Meter SINAD meter
Distortion Meter Frequency Error Meter
Sweep Generator Modulation Analyzer
Signaling simulator RF Scan/Counter
Audio Generator Signal Strength Meter
Cable fault locator Tracking Generator
Sensitive Measurement Receiver
Full Band Duplex Offset Generator
High performance Spectrum Analyzer with markers



Motorola/General Dynamics R-2670 FDMA Digital Communication System Analyzer



Questions?
Other Suggestions?