UNDERSTANDING & COMPARING ANALYZERS

By Greg N5XO

Let's get something out of the way right up front…

If you're still using an SWR meter as your primary "diagnostic tool," you're basically checking your engine light with a flashlight.

It'll tell you *something* is wrong… but it won't tell you **what, where, or why**.

An analyzer changes everything.

WHY THESE FOUR?

Before we dive in, let me explain *why these specific units made the cut*.

I'm not reviewing gear I saw on YouTube…
I'm reviewing gear I **own and use regularly**.

These four represent four very different approaches:

- Budget VNA power (NanoVNA variants)
- Purpose-built antenna analyzer (RigExpert)
- Full bench/lab-grade solution (Siglent)

And here's the real-world truth from my shack:

- 👉 My **go-to for quick antenna checks and tuning** is the **RigExpert AA-1500ZOOM**
- 👉 When I want to dig deeper—especially **coax, loss, and detailed behavior**—I grab one of the **NanoVNA's**
- 👉 Between the two NanoVNA options, I **prefer the SAA-2N**
  Simple reason: the **N connectors are far more field durable** than the SMA connectors on the H4

So what you're getting here isn't theory…

👉 This is **what actually gets used—and why**

WHY THIS MATTERS (FOR NEW AND EXPERIENCED HAMS)

An SWR meter gives you:

- Forward power
- Reflected power
- A number (SWR)

An analyzer gives you:

- SWR across a range
- **Impedance (R + jX)** — the *real story*
- Resonant frequency
- Cable length and faults
- Return loss
- Phase
- Sweep data

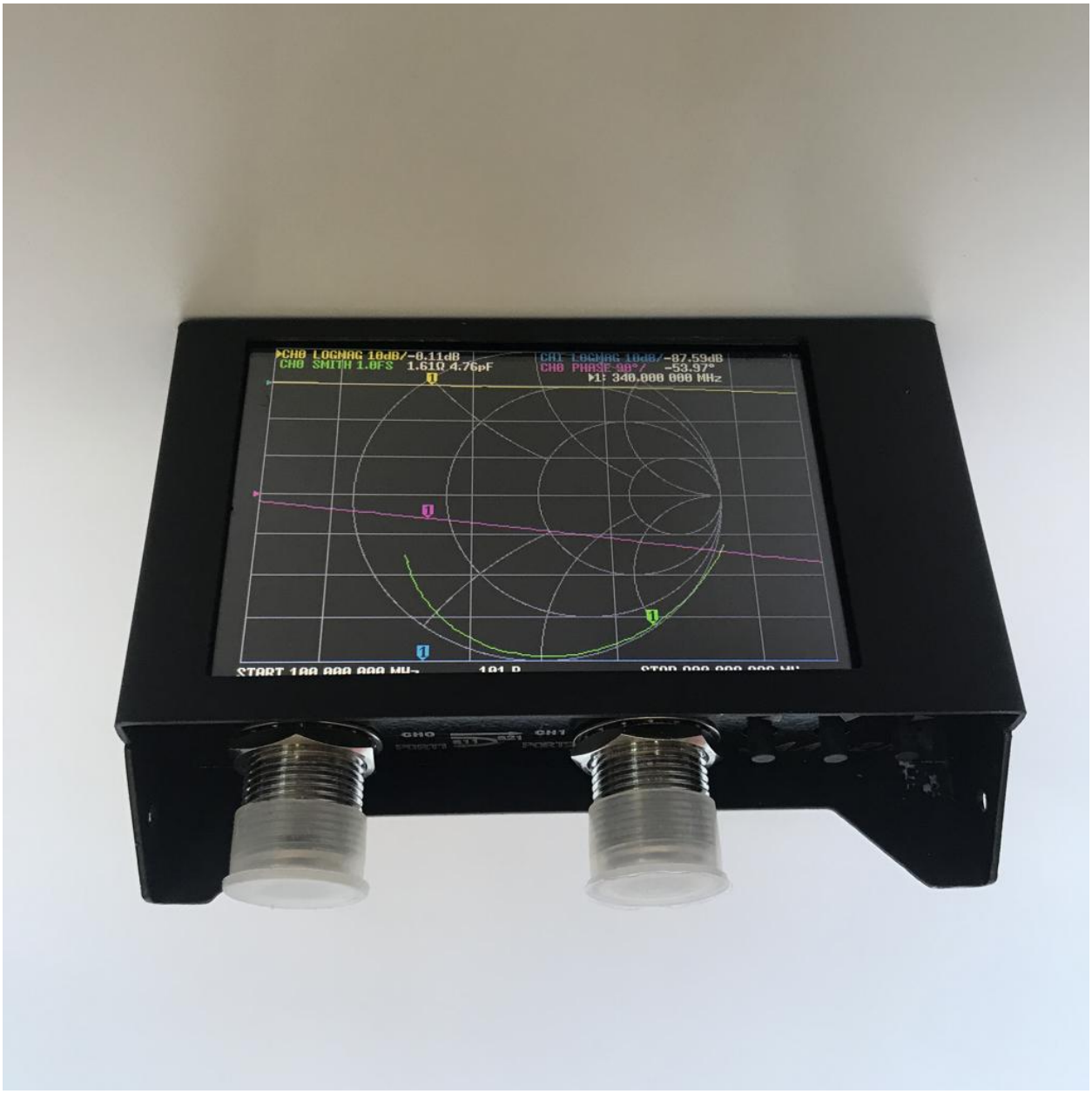
👉 Translation:
You go from **guessing and trimming wire** to **engineering your station**

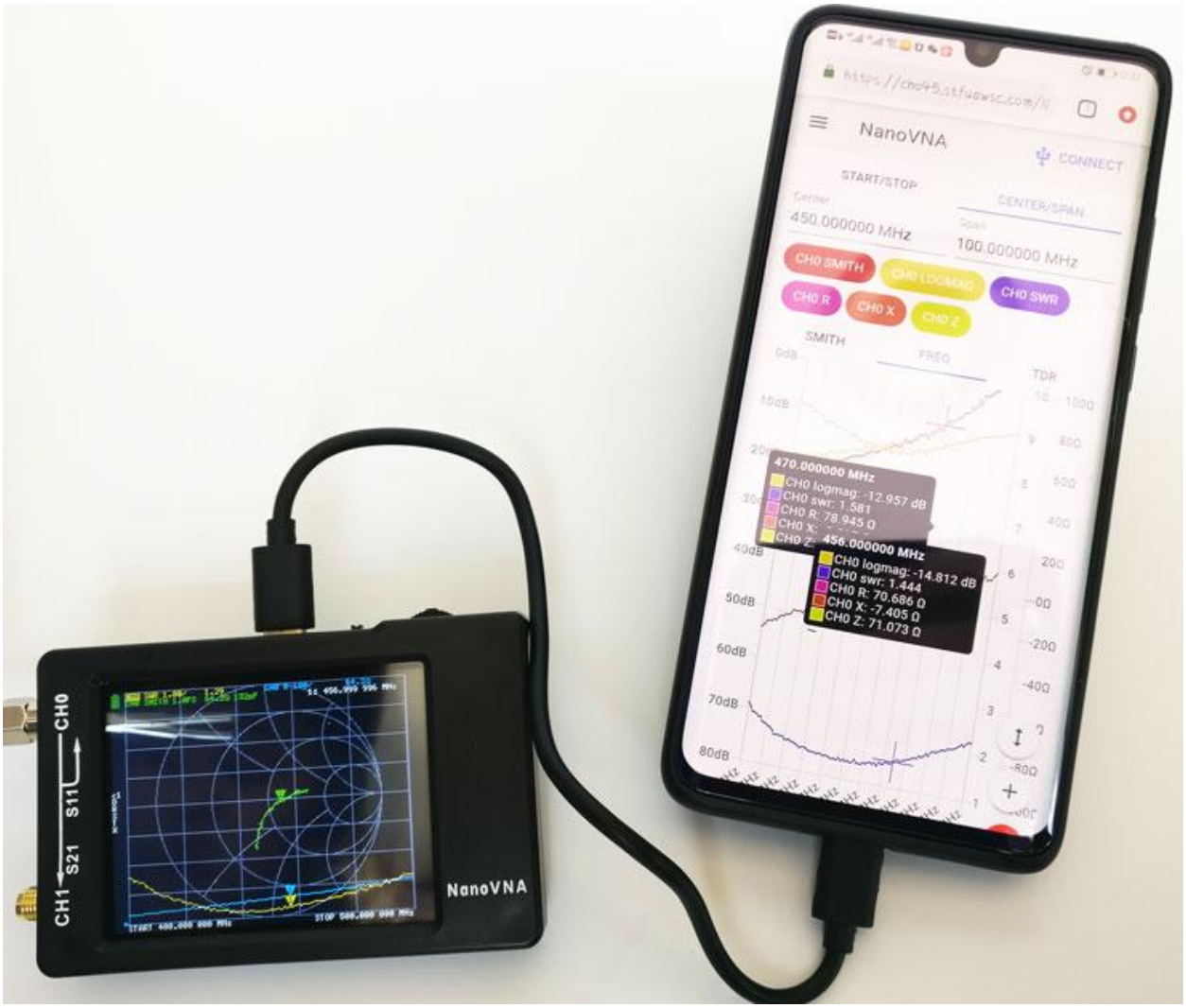
THE CONTENDERS

- AURSINC NanoVNA SAA-2N V2.2 (3 GHz)
- SEESII NanoVNA-H4 (1.5 GHz)
- RigExpert AA-1500ZOOM
- Siglent SVA1015X

1. AURSINC NanoVNA SAA-2N V2.2

(The “Serious Capability in a Small Box” Tool)


CH0 LOGMAG 10dB/-0.11dB
CH0 SMITH 1.0FS 1.61Ω 4.76pF
CH1 LOGMAG 10dB/-87.59dB
CH0 PHASE 90°/ -53.97°
▶1: 340.000 000 MHz
CH0
CH1



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Frequency Coverage:

50 kHz – 3 GHz

What it does:

- Full **VNA functionality (S11 / S21)**
- Smith chart
- Impedance
- Cable loss and length
- Return loss

Accuracy:

- Very good when calibrated properly
- Requires discipline to get repeatable results

Real-world use (my shack):

This is my **go-to NanoVNA**.

👉 Why?
Those **N connectors hold up in the field**—no fragile SMA adapters dangling around waiting to ruin your day.

Strengths:

- Covers everything from HF through SHF
- Extremely flexible
- Great for deep diagnostics

Weaknesses:

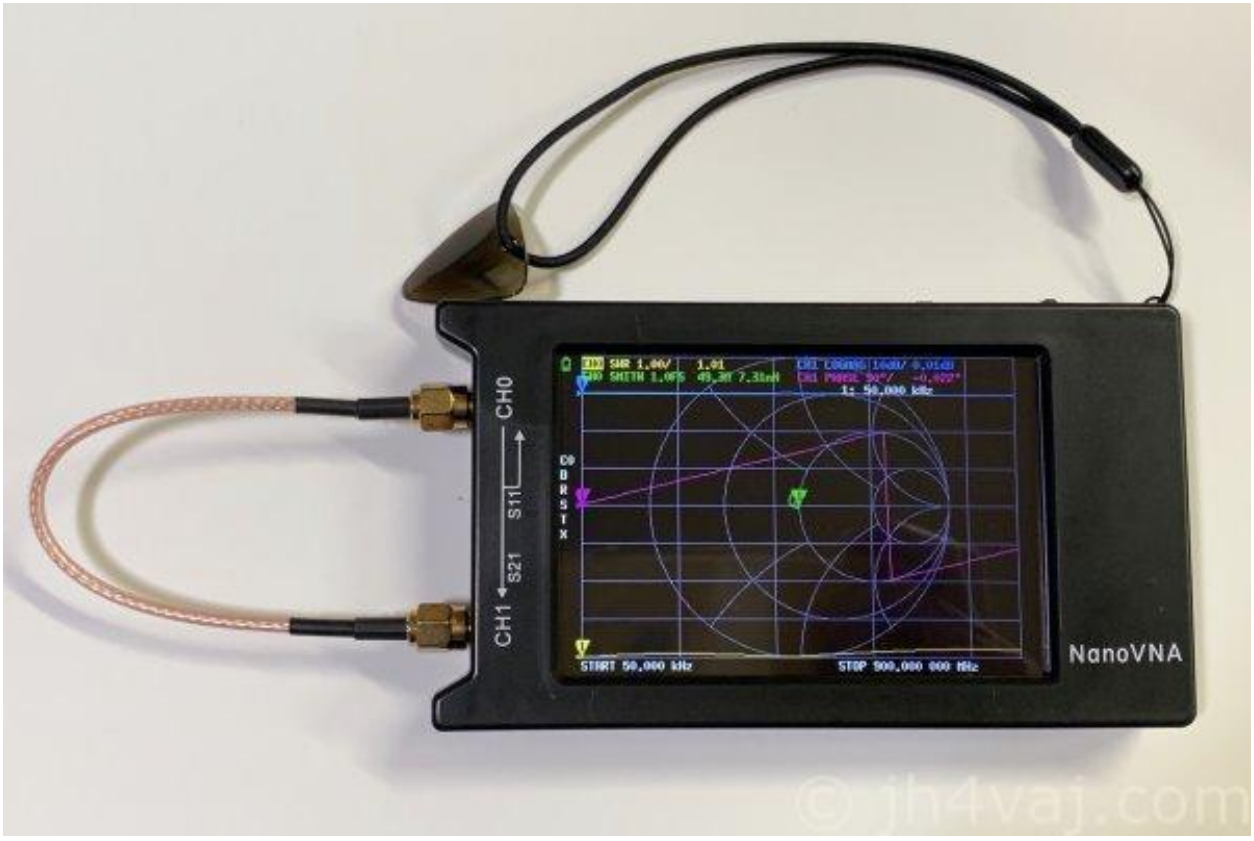
- Learning curve
- Small screen
- Calibration required often

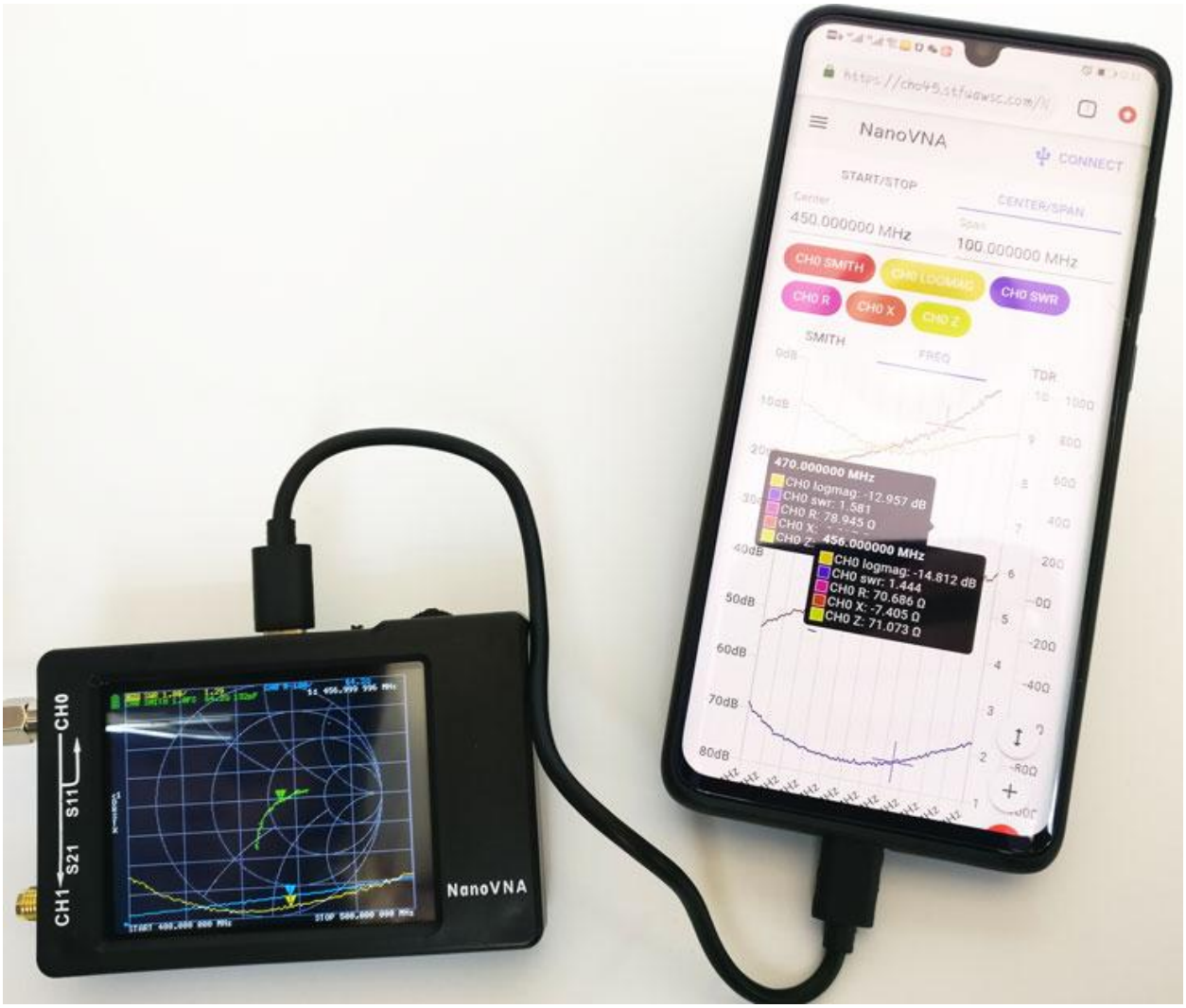
Cost vs Productivity:

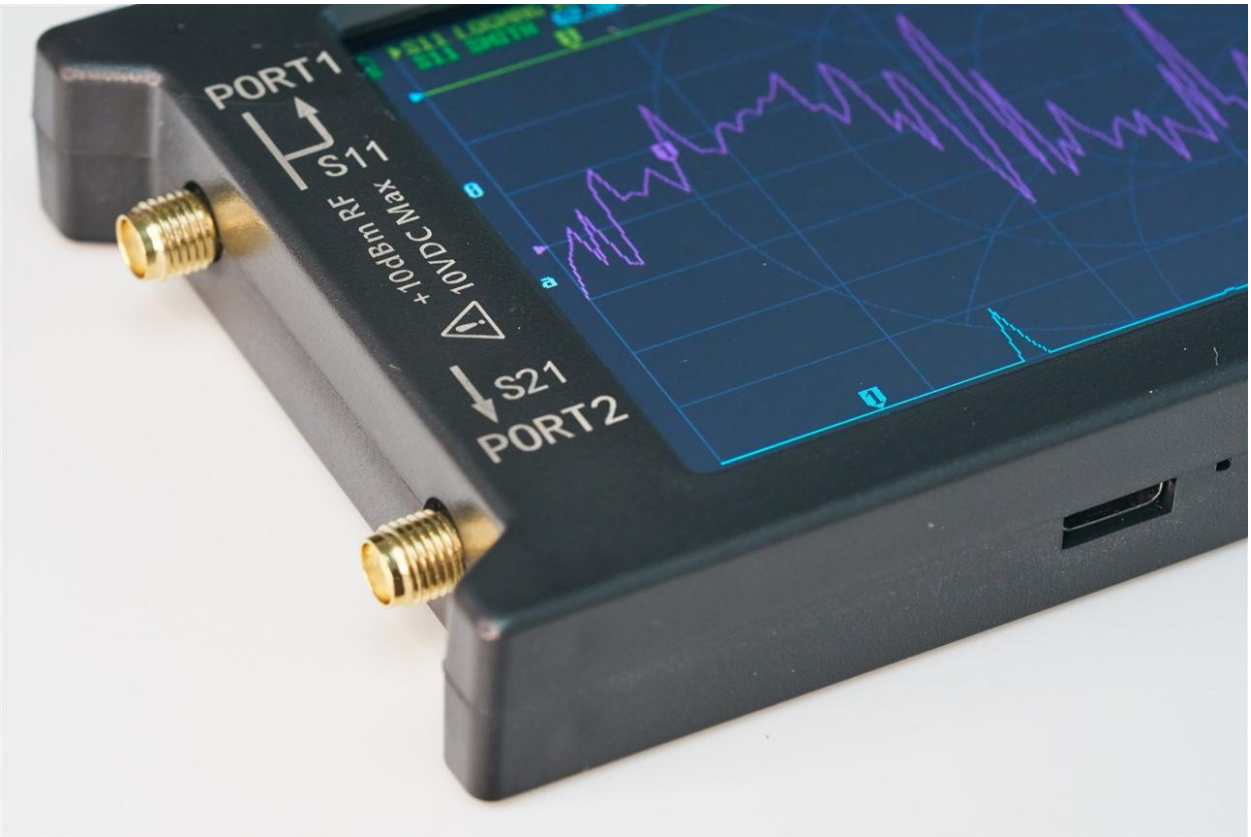
- ~$120–$200
- **Extremely high value** if you learn to use it properly

2. SEESII NanoVNA-H4 (V4.4)

(The “Cleaner, Friendlier NanoVNA”)




NanoVNA
CONNECT
START/STOP
CENTER/SPAN
450.000000 MHz
100.000000 MHz
CH0 SMITH
CH0 LOGMAG
CH0 SWR
CH0 R
CH0 X
CH0 Z
SMITH
FREQ
TDR
470.000000 MHz
CH0 logmag: -12.957 dB
CH0 swr: 1.581
CH0 R: 78.945 Ω
456.000000 MHz
CH0 logmag: -14.812 dB
CH0 swr: 1.444
CH0 R: 70.686 Ω
CH0 X: -7.405 Ω
CH0 Z: 71.073 Ω
CH0
S11
S21
CH1
NanoVNA



4

Frequency Coverage:

~9 kHz – 1.5 GHz

What it does:

- Same core VNA functionality
- Smith chart
- Impedance sweeps

Accuracy:

- Good—but still calibration dependent
- Slightly more consistent UI experience

Real-world use:

I use this one when I want a **quick VNA look with better visibility**

…but…

👉 The **SMA connectors are the weak link**
In a lab? Fine.
In the field? Not my favorite.

Strengths:

- Larger screen
- Easier to use than earlier NanoVNA models
- Great entry-level VNA

Weaknesses:

- Frequency stops at 1.5 GHz
- SMA connectors = fragile in real-world use

Cost vs Productivity:

- ~$90–$150
- Excellent entry-level value

3. RigExpert AA-1500ZOOM

(The “Turn It On and Get Answers” Tool)


Main menu
Smith chart
SWR chart
R,X chart
MultiSWR
SWR meter
Cable length & VF
Settings
Press 1 for help.
REPEAT
OK
SETTINGS
HELP 1
CALIBRATE
SMITH 2
BANDS
FREQ 3
RETURN LOSS
SWR 4
TDR
RXZ 5
EDIT
SAVE 6
MULTs
MULTI 7
TOOLS
METER 8
SYS.IMP
LOAD 9
CABLE LOSS
LGTH 0
RigExpert

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Frequency Coverage:

0.1 – 1500 MHz

What it does:

- SWR sweeps
- Impedance (R + X)
- Return loss
- Cable testing (distance-to-fault)

Accuracy:

- Very stable
- Highly repeatable
- Minimal setup required

Real-world use (my shack):

👉 This is my **go-to tool for antenna tuning**

Why?

Because when I walk out to a tower or antenna:

I don't want to:

- Calibrate
- Scroll menus
- Interpret charts

I want to:

👉 **Turn it on and fix the antenna**

Strengths:

- Fast and simple
- Reliable
- Designed for antenna work specifically

Weaknesses:

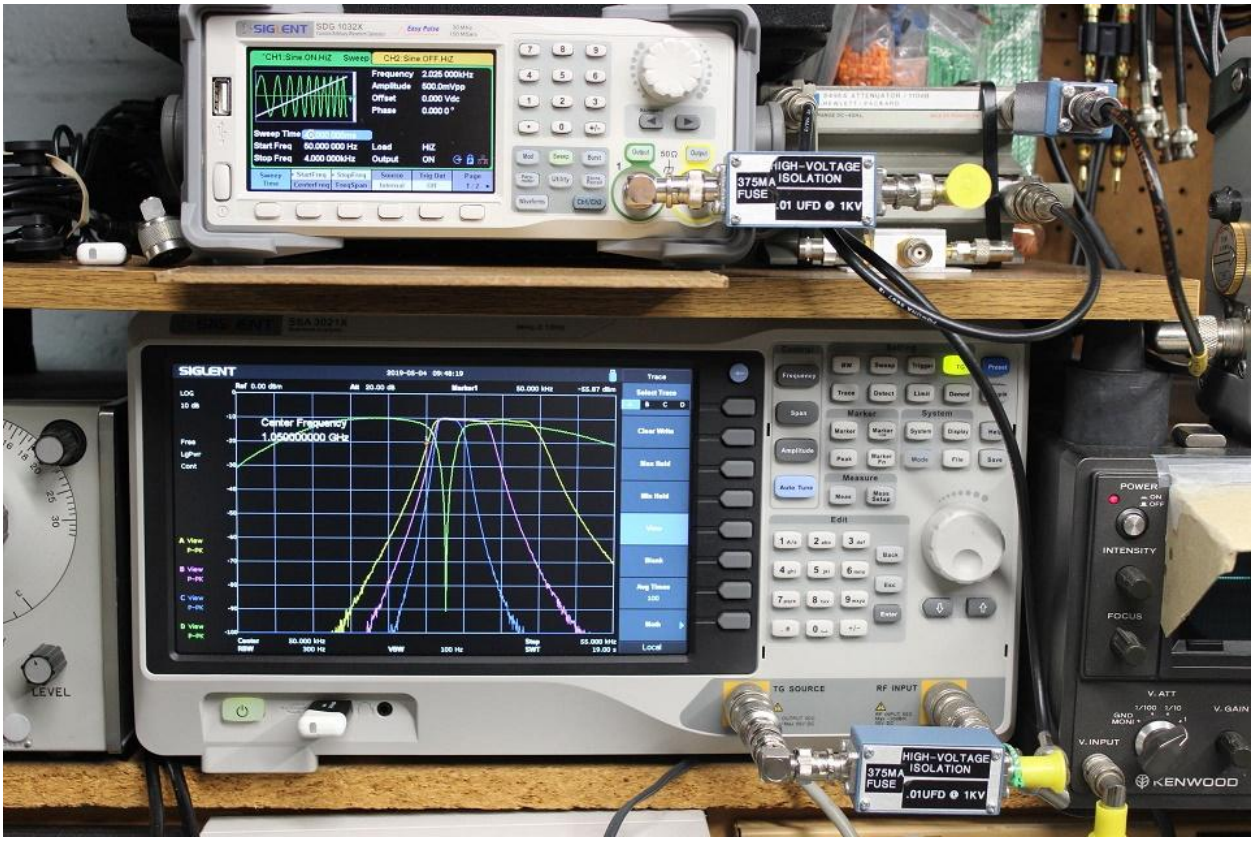
- Not a full VNA
- Limited deeper RF analysis capability

Cost vs Productivity:

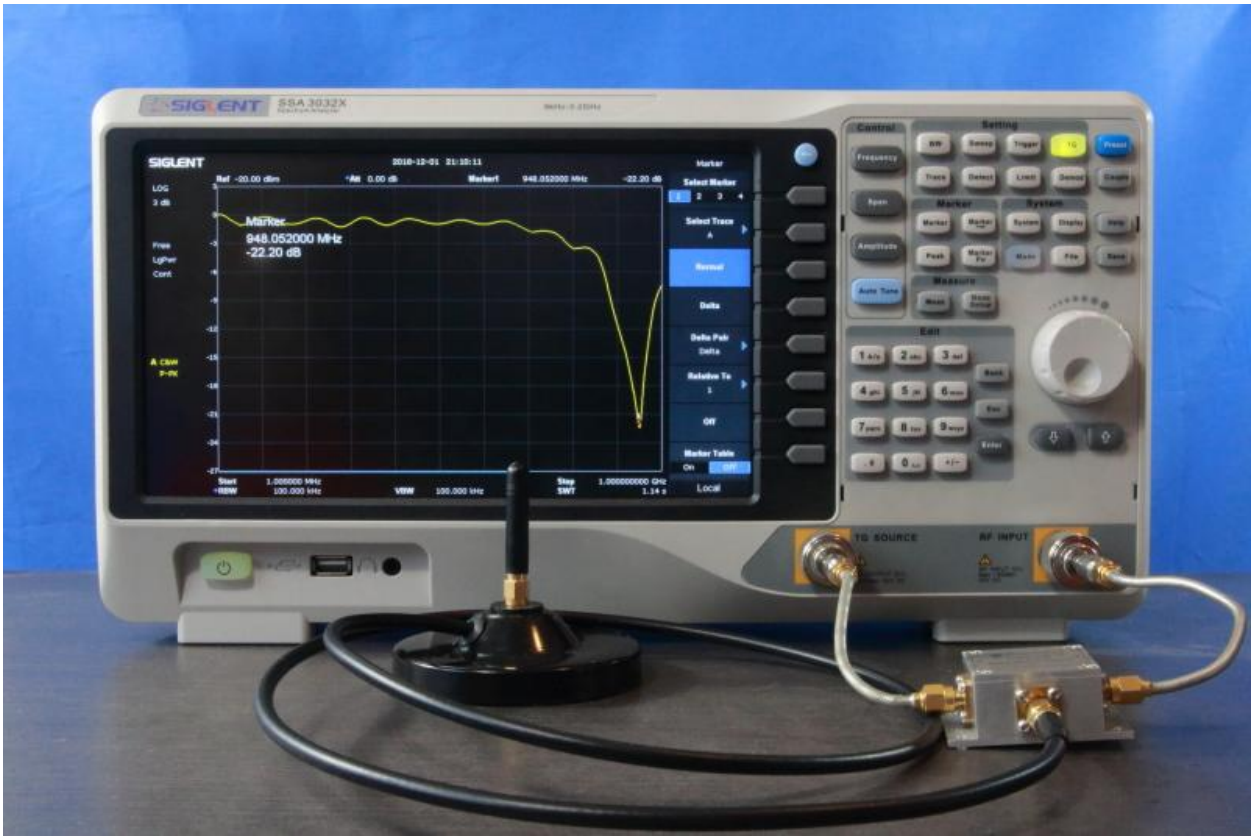
- ~$800–$1000
- **High productivity tool**—especially for field work

4. Siglent SVA1015X

(The “No More Guessing” Machine)




SIGLENT
SVA 1015X
9kHz-1.5GHz
Control
Setting
Marker
System
Measure
Edit
Frequency
Span
Amplitude
Auto Tune
Preset
TG SOURCE
PORT 1
RF INPUT
PORT 2


SIGLENT
SSA 3032X
Marker
948.052000 MHz
-22.20 dB

What it does:

- Spectrum analyzer
- Vector network analyzer
- Return loss
- Cable loss
- Signal analysis (harmonics, noise, spurs)

Accuracy:

- **Lab-grade**
- Repeatable and consistent
- Not dependent on field conditions

Real-world use:

This is where I go when I want to **understand everything going on in the station**

Not guess. Not assume.

👉 **Know**

Strengths:

- Large, clear display
- Multi-function tool
- Extremely accurate
- Reveals problems you didn't know you had

Weaknesses:

- Not portable
- Higher cost
- Requires some learning

Cost vs Productivity:

- ~$1200–$2000
- **Massive productivity gain over time**

HANDHELD vs BENCH — REALITY CHECK

Handheld tools:

- Great for:
  - Field tuning
  - Portable work
  - Quick checks
- Limitations:
  - Smaller displays
  - Calibration sensitivity
  - Less repeatable precision

Bench tools:

- Built for:
  - Precision
  - Diagnostics
  - Full system understanding

👉 The difference is simple:

Handhelds help you **fix antennas**
Bench analyzers help you **understand systems**

FINAL COMPARISON

Tool	Best Use	My Role for It	Accuracy	Value
NanoVNA SAA-2N	Deep analysis / SHF	Primary NanoVNA	Medium-High	Excellent
NanoVNA-H4	General VNA work	Secondary / quick view	Medium	Excellent
RigExpert AA-1500ZOOM	Antenna tuning	Daily go-to	High	High
Siglent SVA1015X	Full station analysis	Bench truth tool	Very High	Exceptional

FINAL THOUGHTS (THE N5XO VERSION)

Here's the honest answer…

👉 You don't pick one of these—you eventually use **all of them**

- Need fast antenna tuning? → **RigExpert**
- Need to dig into coax or impedance? → **NanoVNA**
- Need to really understand your station? → **Siglent**

And the big takeaway:

Most problems are not where you think they are.

- It's not always the antenna
- It's not always SWR
- It's usually something you can't see…

Until you have the right tool.

THE TAKEAWAY

An SWR meter tells you:

"Something's off."

These tools tell you:

"Here's exactly what's off—and here's how to fix it."

And once you start working that way…

👉 Your station performance changes dramatically.

– Greg N5XO