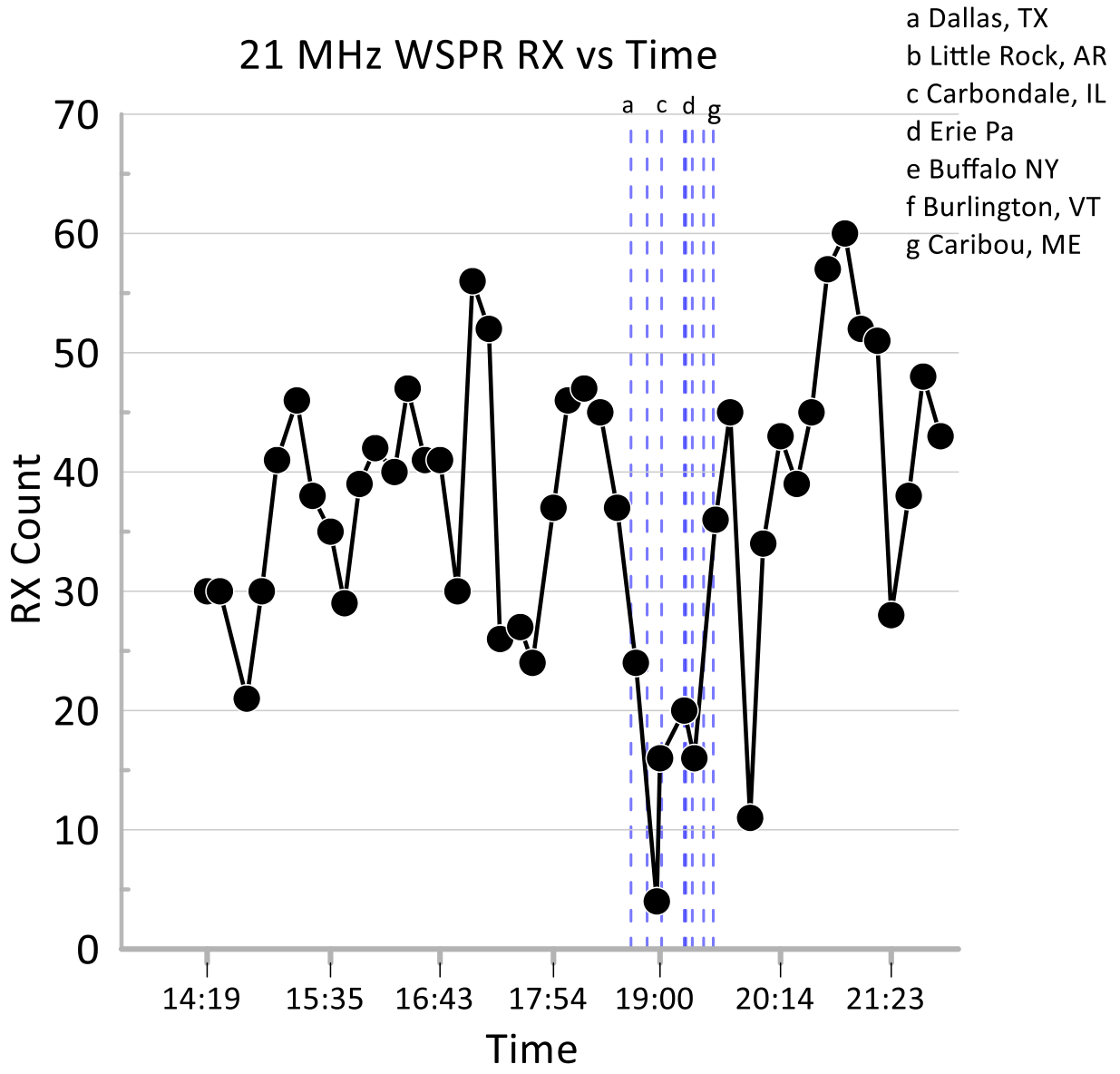
April 8, 2024


21 MHz WSPR RX vs Time
a Dallas, TX
b Little Rock, AR
c Carbondale, IL
d Erie Pa
e Buffalo NY
f Burlington, VT
g Caribou, ME
a c d g
RX Count
70
60
50
40
30
20
10
0
14:19
15:35
16:43
17:54
19:00
20:14
21:23
Time

Coaxial Cable

Selection and Testing

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Coaxial Cable

- Coaxial cable is an important part of a ham station.
- All transmission lines (coax, etc.) show a loss of signal with length.
- The strength of your signal is determined by the choice of your coax cable.

Methods for compensating for transmission line loss

- TX- increase transmitter power
- RX- Use a preamp.
  - Mounting at antenna is best
  - Best suited for VHF, UHF frequencies.
- TX, RX - use a lower loss cable or shorten the cable.

Matched loss for various cables

Mached Loss per 100 ft

Freq (MHz)	RG-174	RG-58	RG-8x	LMR-240UF	LMR400	LMR 600	LMR900	450 Ohm
1	0.69	0.39	0.28	0.29	0.12	0.07	0.06	0.02
10	2.16	1.30	0.92	0.92	0.40	0.23	0.17	0.08
30	3.78	2.32	1.63	1.60	0.69	0.41	0.30	0.14
50	4.90	3.07	2.14	2.08	0.89	0.53	0.39	0.18
146	8.43	5.57	3.76	3.58	1.53	0.92	0.68	0.34
222	10.54	7.09	4.76	4.42	1.90	1.16	0.84	0.44
440	15.03	10.67	7.02	6.27	2.70	1.68	1.20	0.67

Thicker cables have lower loss

Power rating for various cables

Coax Power Rating (W)

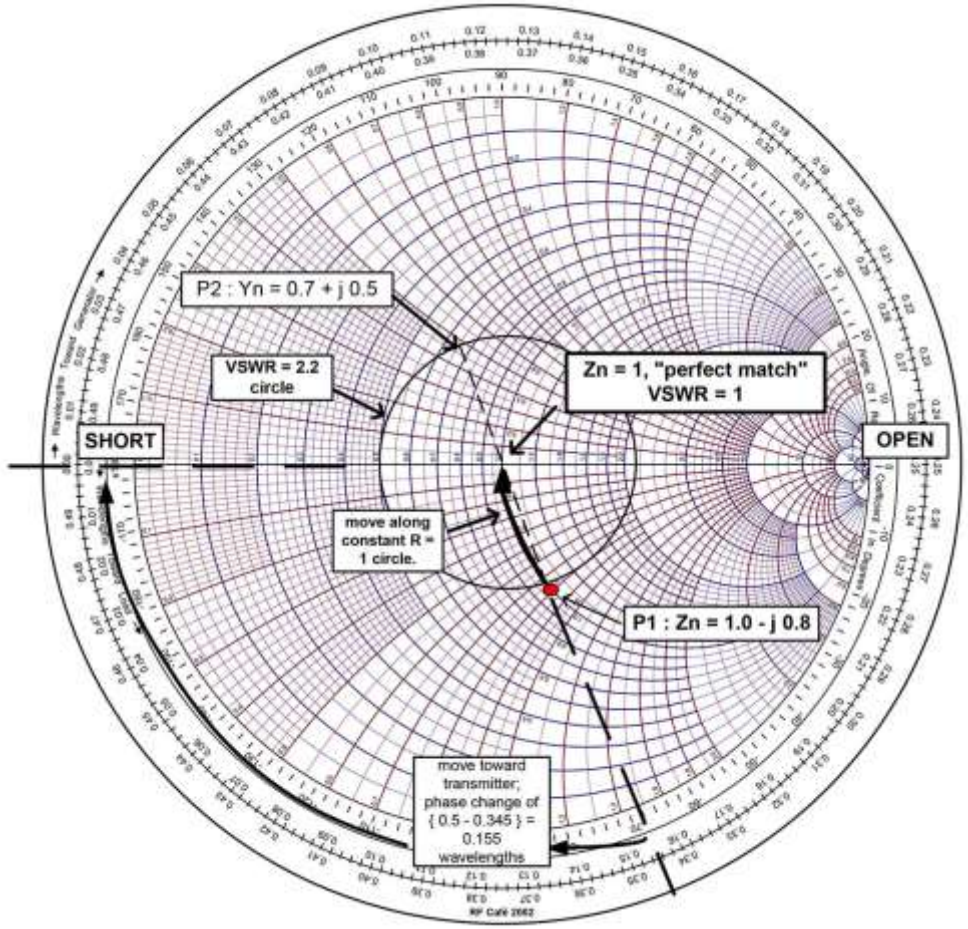
MHz	LMR 100A	LMR195	LMR 240	LMR400	LMR600
30	230	890	1490	3330	5510
50	180	680	1150	2570	4240
150	100	390	660	1470	2410
220	83	320	540	1200	1970
450	57	220	380	830	1350

LMR 100A ~ RG174 LMR195~RG58

Lower loss cables have higher power ratings.

SWR and Cable Loss

Many Z values have the same SWR



SWR and Cable Loss

100 ft RG174 @ 146MHz

Z ohms	SWR Radio	SWR Ant	Mached Loss	Total Loss
25	1.04	2.00	12.46	12.97
50	1.00	1.00	12.46	12.46
150	1.06	3.00	12.46	13.71
200	1.07	4.00	12.46	14.39
300	1.08	6.00	12.46	15.55
450	1.10	9.00	12.46	16.89

100 ft LMR400 @146MHz

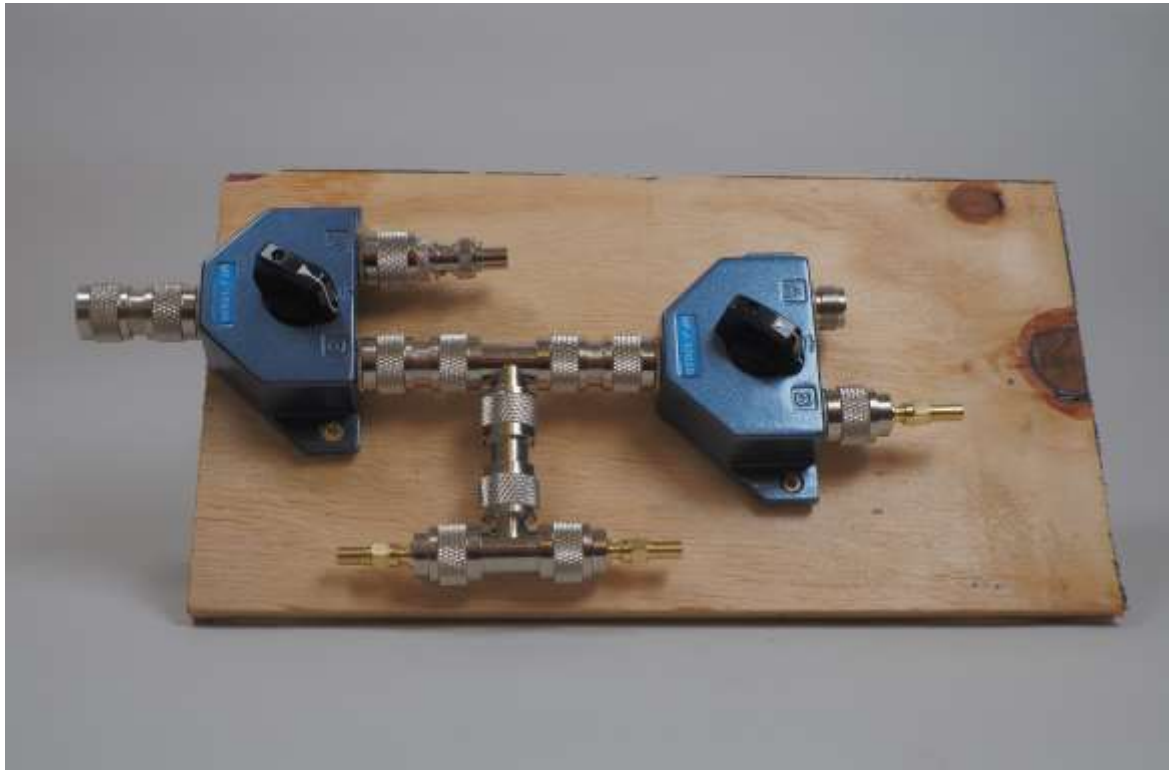
Z ohms	SWR Radio	SWR Ant	Mached Loss	Total Loss
25	1.61	2.00	1.55	1.82
50	1.00	1.00	1.55	1.55
150	2.07	3.00	1.55	2.24
200	2.44	4.00	1.55	2.65
300	2.99	6.00	1.55	3.41
450	3.54	9.00	1.55	4.37

SWR at antenna increases cable loss
SWR at the radio does not indicate SWR at the antenna
A tuner at the radio does not mitigate cable loss due to SWR
Remote tuners can help to minimize cable loss due to SWR

Tools for testing coax cables

- Coax should be checked for performance.
  - New cables may be faulty (Both home made and commercial)
  - Old cables may be damaged (water intrusion etc.)
  - Many recommend replacing cables every 7 years.

Tools for testing coax cables



This device presents an SWR of
1.5, 2.0 or 3.0

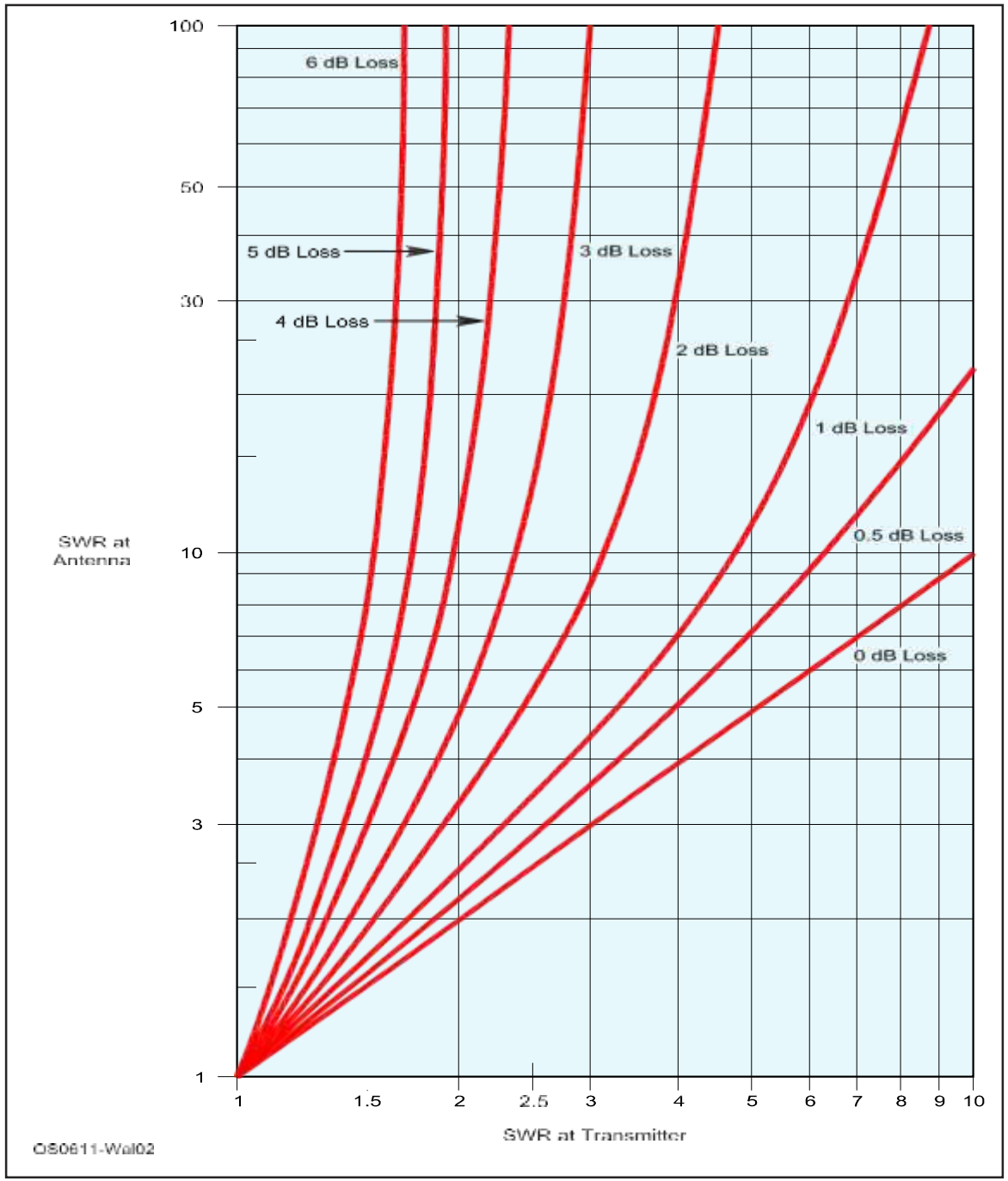
Placing this at the far end of a coax run and measuring the SWR at the near end gives and indication of loss.

If the SWR at the near end is less than that set on the device there is loss.

The lower the SWR the more loss.

SWR@TX and Antenna

K5VDW
QST November 2006



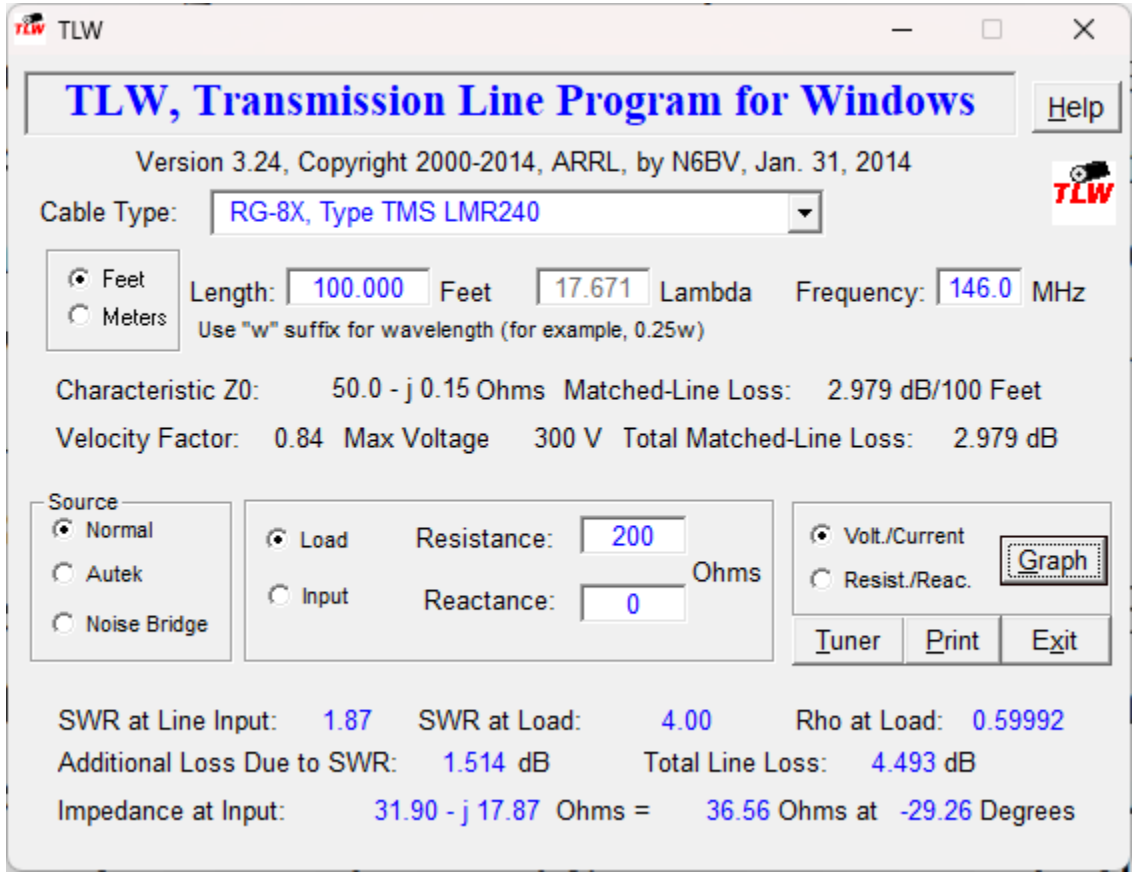
Tools for testing coax

Tests that can be performed

- Short between shield and center conductor. (multimeter)
- Location of short or other fault (TDR function on Antenna Analyzer)
- Measure length or VF of cable.
- Cable Loss
- Cable Impedance

Useful software

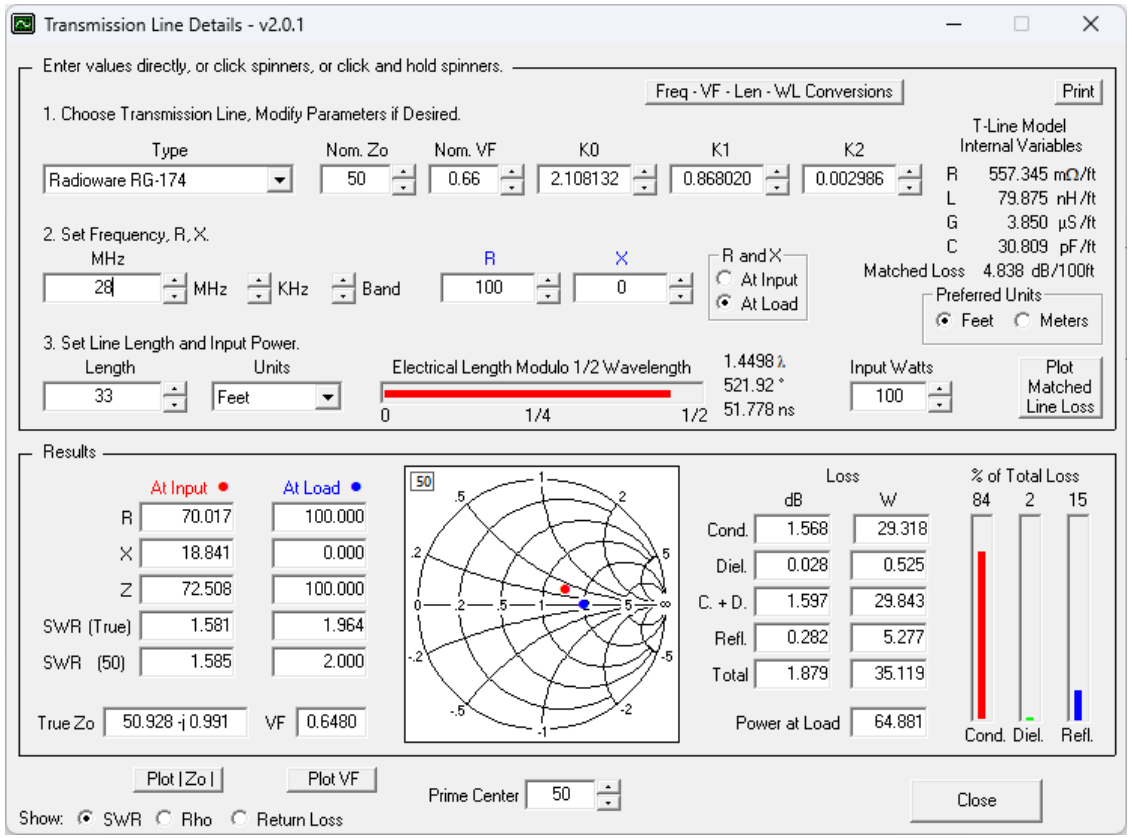
- TLW

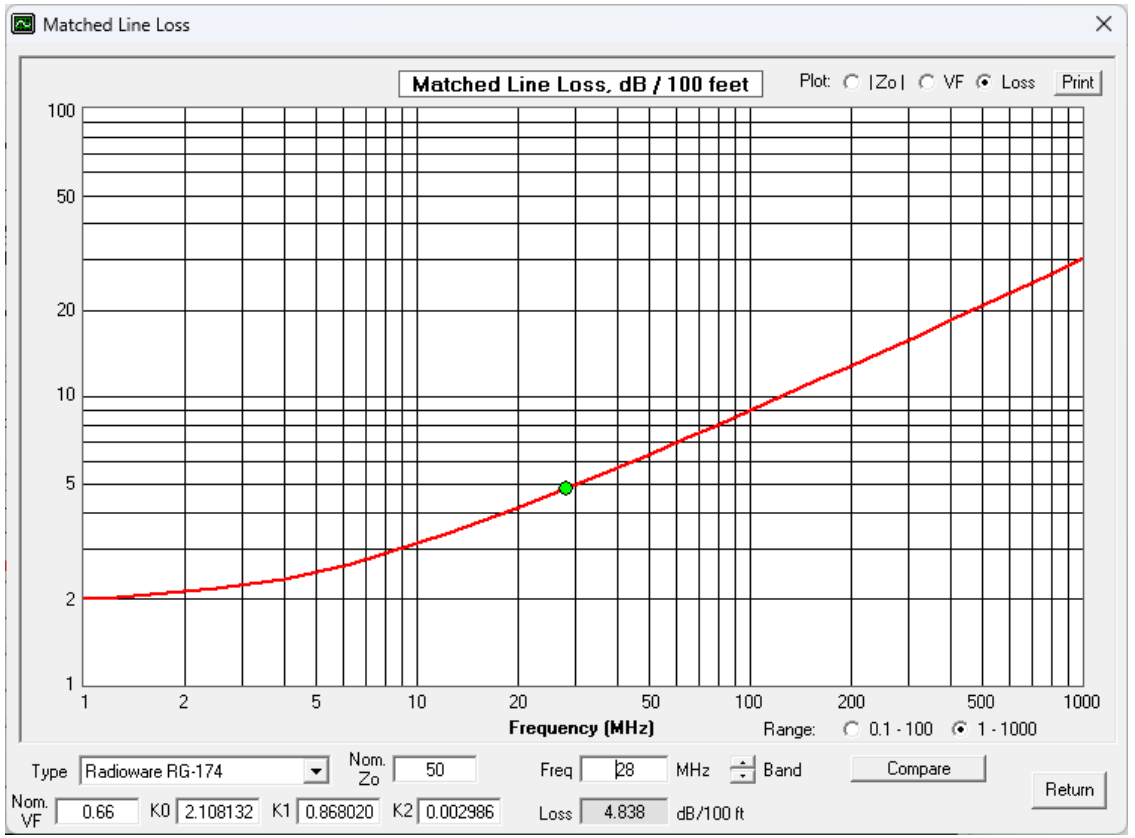


Included with ARRL handbook

Useful software

- Transmission line details





https://ac6la.com/tldetails1.html