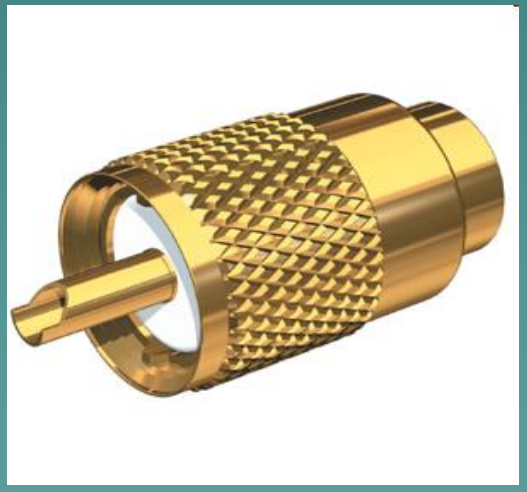
UHF Coaxial Connectors

"*Taming the loss myth*"



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Response to a local ham inquiry, from 2010

How to do this test ?

- Find expected losses for a typical 150 foot piece of coax and measure actual losses
- Then apply a 15 foot section with 5 joints and 10 new connectors and measure new losses.
- Show losses as dB re gain of 150 foot cable. (IE, -dB)

Test Instrument: HP 3589A, VNA

Vector Network Analyzer,

0 to 150 MHz sweep, RBW to .01 Hz, output 0 dBm

Main coax: 150 feet of ECI Mini RG 8X

Tests at 1 MHz, 10 MHz and 50 MHz

Main coaxial cable: 150 feet

ECI Electrocom, RG 8X Mini, #16, 95% shielded

RG 8X Mini 16/19 SBC
Foam Polyethylene Dielectric
95% Bare Copper Braid
PVC Jacket,
Flame Rated **FT-1** or **FT-4**

MHz	dB/100 ft
50	2.8
100	4.0
200	5.3
400	9.0

Estimated 50 MHz loss of 150 ft = 4.20 dB

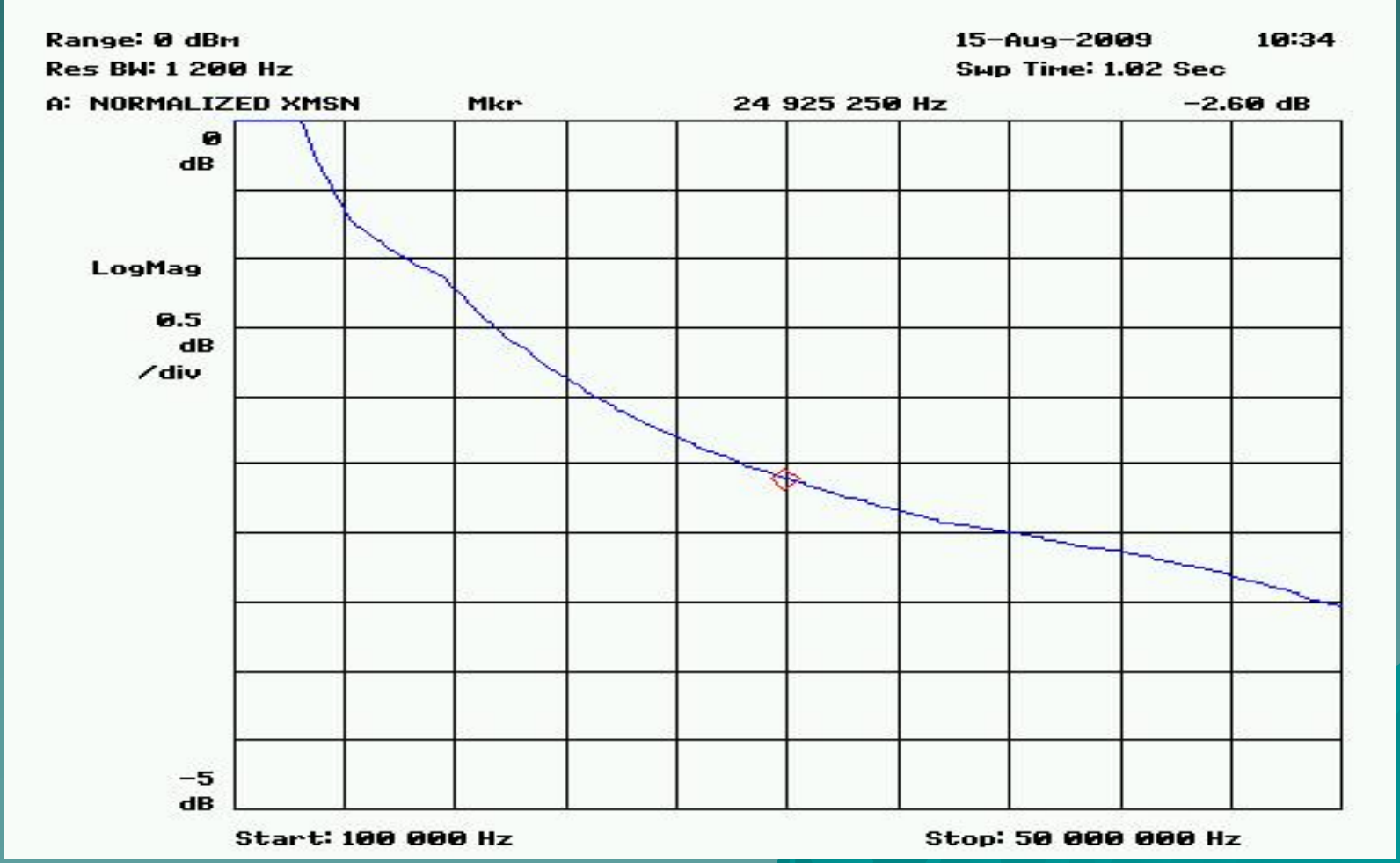
Actual loss = 3.5 dB .. Better than advertized !

Measured Cable Losses: 10 MHz - 1.25 dB

30 MHz - 2.8 dB

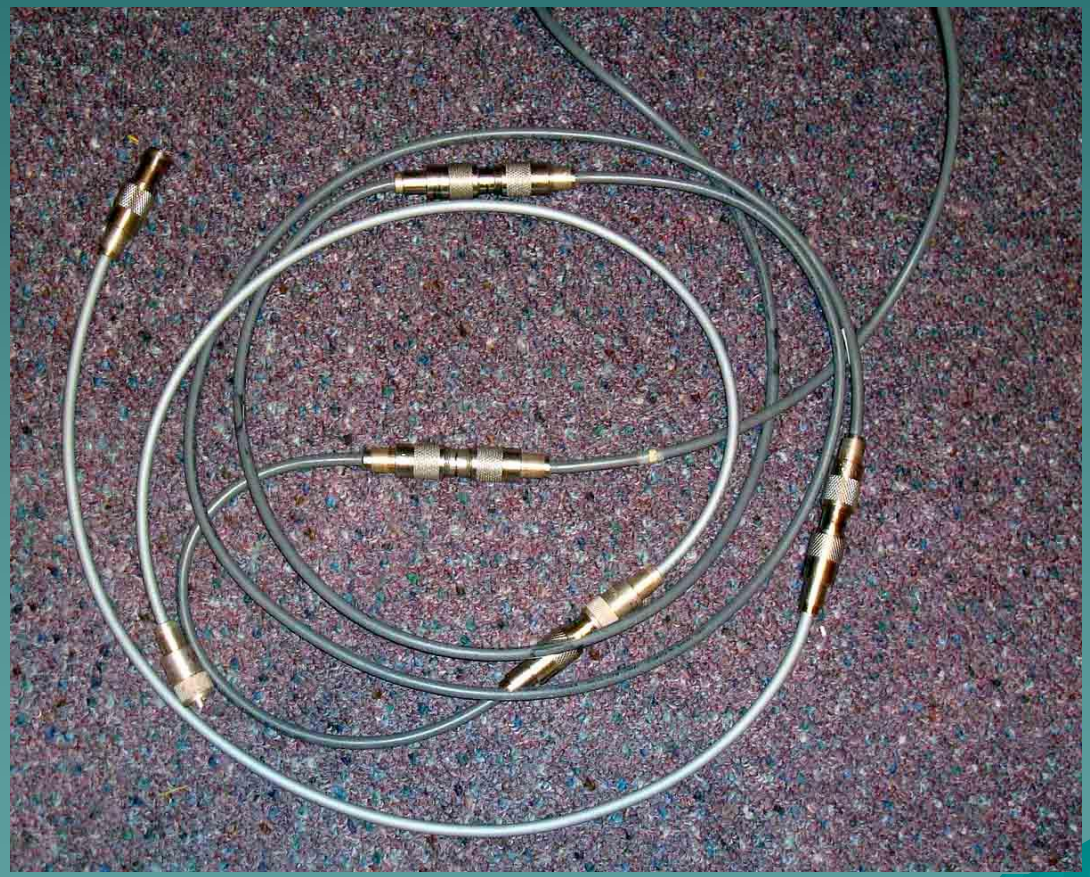
50 MHz – 3.5 dB

(actually, very decent cable !)



Connector loss assembly : 5 jumpers of ECI 3060 , total of 15 ft with 10 UHF connectors and 10 barrel joiners.

Estimated cable loss, 50 MHz, 15 feet = .38 dB, much less at 10 MHz (see final table)



PRODUCT SPECIFICATION SHEET

JSC Part Number:	3060
Center Conductor:	16 AWG 19/29 BARE COPPER
Dielectric Insulation & Nominal O.D.:	FOAM POLYETHYLENE (.157)
Jacket Material & Nominal O.D.:	BLACK, CLEAR, GREY, WHITE VINYL (.240)

Nominal Attenuation:

MHz	db/100 FT
50	2.5
100	3.6
200	5.4
400	7.9
900	12.6

Nominal Velocity of Propagation:	78%
RG Type:	MINI 8/U TYPE
Sheild:	95% BARE COPPER BRAID

Connector and cable assembly losses:

10 MHz = .5 dB, 50 MHz = 1 dB

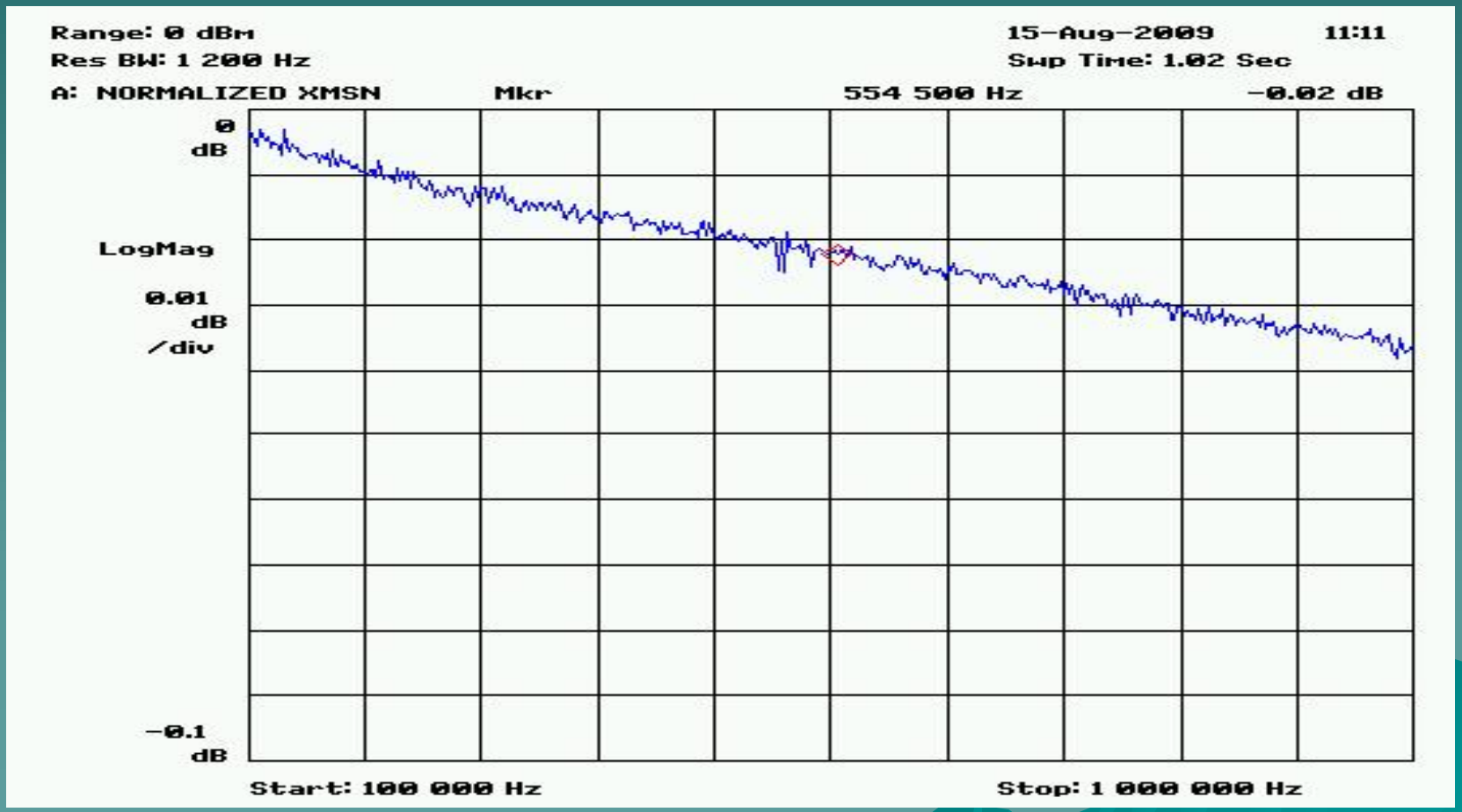
How to apply connector losses ?

- This is to complicated…. Instead, do it like this:
- Use math of the analyzer
- Apply main cable , and "Normalize" the cable response so it looks like zero across the spectrum.
- Insert cable assembly and show the "Difference" only.
- Much nicer way to show affect on the overall cable. Our new length is only 10% longer, so cable effect is diluted.

NOTE: Adding 15 feet of cable, and 10 new connectors and 5 joiners
No allowance made for "Where" the connectors are. In this case, they are all at one end. (typical of most installations) Makes a difference if distributed throughout the run.

1 MHz Result : - .035 dB , overall, because of connector assembly (IE, 10 connectors and 15 feet RG8X).

This dB is re: the gain of the 150 feet of coax.



10 MHz Result : - .175 dB , overall, because of connector assembly. This dB is re: the gain of the 150 feet of coax.

If original cable loss is -1.25 dB, new net loss with connectors is - 1.4 dB

50 MHz Result : - .45 dB , overall, because of connector assembly. This dB is re: the gain of the 150 feet of coax.

If original loss was -3.5 dB, new net loss is now approx -4 dB.

And now …..

- The summary table with all losses derived for the experiment
- Apply to a sample 100 watts input for demonstration.

Measured and estimated losses

Item	1 MHz	10 MHz	50 Mhz
150 ft RG8X (dB)	-0.25 *	-1.25	-3.5
15 ft RG8X + 10 Connectors added (dB)	-.035 *	-0.175	-0.45
Cable loss only, estimate (dB)	-0.022 *	-0.11 *	-0.32 *
Connectors only (10 +barrels) in 165 ft coax (dB)	-0.013 *	-0.065	-0.13
Loss per single connector in 165 ft coax (dB)	**-0.00065**	**-0.0032**	**-0.0065**
Loss per single connector in 165 ft coax (watts) **	0.015 *	0.07 *	0.15 *
Cable Loss, 165 ft (watts) **	6.07	26.9	58.5
Total Loss, cable plus 10 connectors (watts) **	6.22	27.6	60
S unit drop at Receiver (based on 6 dB/ S unit)	.05	.22	.61

* Derived loss ** For 100 watts input

Moral of the tests ?

- Relax folks.. Quality PL259's, professionally installed, do not create problems for your HF signals.
- PL259 losses are greatly diluted by coax loss at HF
- Even with major coax losses, S meter impact at the other end(receiver) is tiny.