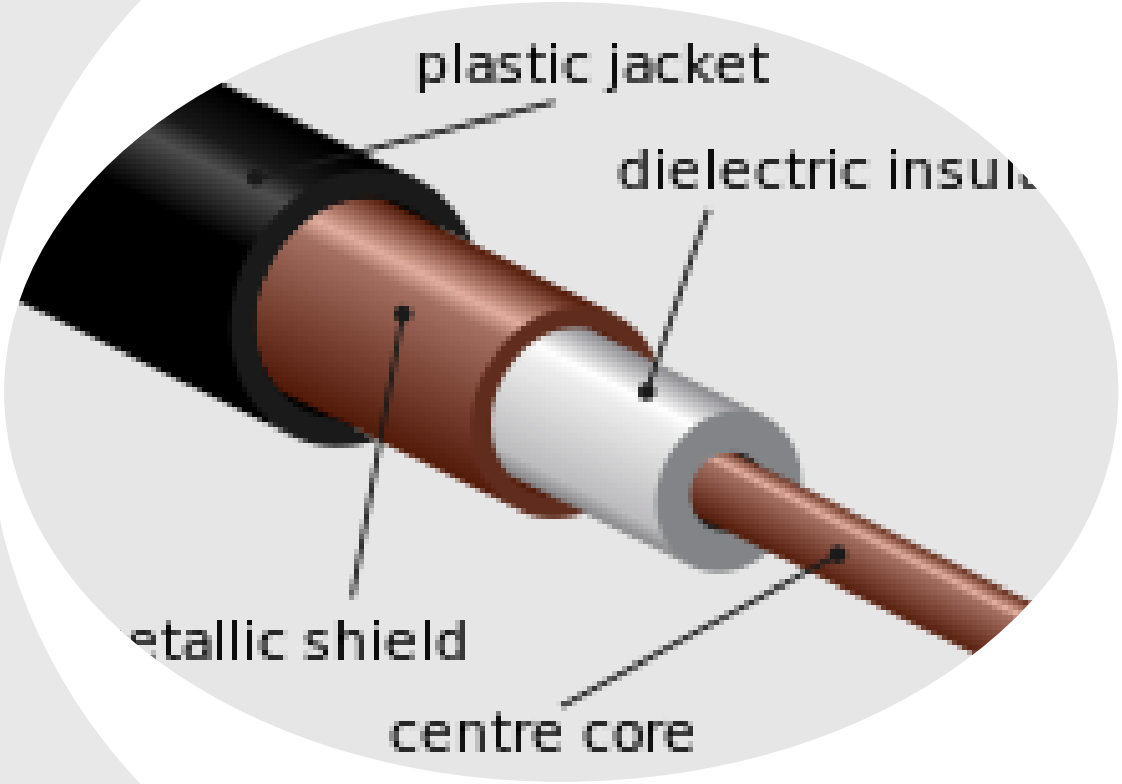

COAXIAL CABLE AND CONNECTORS

BARC OPERATING AFTERNOON

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JOHN WESTERKAMP, W8LRJ

- Always interested in radio and have always been a SWL
- Extra Class Operator and BARC Member since April 2018

- Bachelor of Electrical Engineering from University of Dayton
- Ph.D. in Electrical Engineering from Purdue University
- Specialized in Digital Signal Processing/Communications
- Electrical Engineering Faculty at U.D. for 17 years
- Computers and Networking for 10 years
- Retired and enjoying a great hobby

- **LRJ stands for Lori, Rachel, and Jacob (wife and two kids)**
- Nephew is Jordan Westerkamp, football player University of Nebraska

COAXIAL CABLE APPLICATIONS

- RG-58 typical for very short runs like mobile units in vehicle.
- RG-8X often used for patch cables on HF systems.
- RG-8/U is very common for long HF feedlines.
- LMR-400 (or LMR-600) and Belden 9913 for VHF/UHF feedlines. (Nobody is sure what LMR stands for; maybe Lockheed Martin Radar?)
- Hardline (or Heliax) used for very long VHF/UHF runs like on a repeater tower. Often > ½ inch diameter with 7/8 inch and 1-2 inches most common.

- Expense increases as you go down the list.
- Use the best you can afford.

COAXIAL CABLE ATTENUATION AND POWER

	Attenuation (dB per 100 feet)									
	MHz:	30	50	100	146	150	440	450	1000	2400
	#2632 RG-174	5.5	6.6	8.8	13.0		25.0		30.0	75.0
	#0985 LMR-100A®	3.9	5.1		8.8	8.9	15.6	15.8		
X	#2619 RG-58A/U	2.5	4.1	5.3	6.1	6.1	10.4	10.6	24.0	38.9
	#3603 LMR-200®	1.8	2.3		3.9	4.0	6.9	7.0		16.5
	#2910 RG-59		2.4	3.5			7.6		12.0	
X	#2247 RG-8X	2.0	2.1	3.0	4.5	4.7	8.1	8.6		21.6
	#3604 LMR-240®	1.3	1.7		3.0	3.0	5.2	5.3		12.7
	#3605 LMR-240 Ultra®	1.3	1.7		3.0	3.0	5.2	5.3		12.7
X	#2248 RG-8/U FOAM		1.2	1.8					7.1	
	#2929 RG-213		1.5	2.1	2.8	2.8	5.1	5.1	8.2	
	#0390 RG-214	1.2	1.6	1.9	2.8	2.8	5.1	5.1	8.0	13.7
X	#3606 LMR-400®	0.7	0.9		1.5	1.5	2.7	2.7		6.6
	#3607 LMR-400 Ultra®	0.7	0.9		1.5	1.5	2.7	2.7		6.6
	#6512 DRF-400	0.7	0.9		1.5			2.7		6.7
	#5297 Bury-FLEX™		1.1	1.5					4.8	
	#0812 9086			1.4			2.8	2.8		
X	#0075 9913	0.8			1.5		2.8			7.5

Values indicated are *approximate* and for comparison purposes only.
LMR® is a registered trademark of Times Microwave Systems.

Power Capacity (In watts 104°F, 40°C)									
MHz:		30	50	150	220	450	900	1500	2000
#0985	LMR-100A®	230	180	100	80	60	40	30	25
#2619	RG-58U	400	300	160		80			
#3603	LMR-200®	1020	790	450	370	260	180	140	120
#2910	RG-59	500	400	250					
#2247	RG-8X	350	280	150		80			
#3604	LMR-240®	1490	1150	660	540	380	260	200	170
#3605	LMR-240 Ultra®	1490	1150	660	540	380	260	200	170
#2929	RG-213	1800	1200	620		300			
#0390	RG-214	1800	1200	620		300			
#3606	LMR-400®	2100	1700	1000	830	550	380	290	250
#3607	LMR-400 Ultra®	2100	1700	1000	830	550	380	290	250
#6512	DRF-400	3300	2570	1470	1200	830	580	440	370
#0075	9913	2200	1700	900		450	280	200	160

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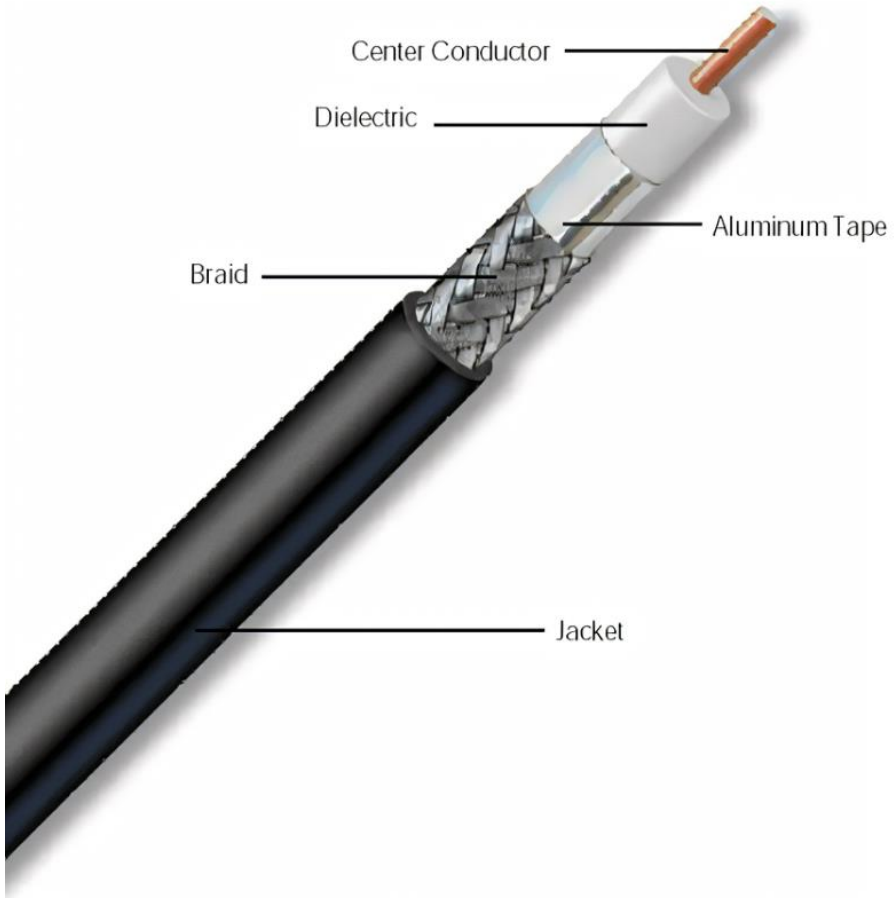
TYPICAL COAXIAL CABLE



- Typical LMR-400 cross-section.
- Solid center conductor (better, but not flexible)
- Stranded center conductor (much easier to work with)
- Dielectric is usually foam.
- Note the double shielding with an inner aluminum tape and an outer braided shield.
- The double-shielding provides added isolation from interfering radiation.
- An outer jacket that is rubberized or plenum mainly to keep everything together and safe from your hands.

- Note that Times Microwave is the only maker of LMR-400 and other LMR cables.
- R&L sells a JetStream equivalent, but be sure to check the specs.

PL-259 AND SO-239 CONNECTORS

PL-259 (male)
Also known as UHF

SO-239 (female)

- The most common antenna coaxial connector.
- These two connectors are found on most mobile radios and HF rigs.
- That may sound weird because they are sometimes referred to as UHF connectors.
- But the name dates back to when 30 MHz was considered UHF.

SMA (SUBMINIATURE VERSION A) CONNECTORS

Female

Male

- The SMA is another popular connector that you will see used quite a bit in the Ham world.
- The SMA is a lightweight connector that is extensively used on smaller radios like handhelds, especially for RF connections for frequencies up to 18 GHz.
- SMAs are strong and use a threaded connection.
- They come in a wide variety of formats, male, female, straight, right-angled, bulkhead fitting, etc., making them a popular option of radio manufacturers.
- SMA connectors are built to have a constant 50 ohm impedance across the connector.
- BE CAREFUL! There is also an RP-SMA (reverse polarity) where the male connector is actually female inside but looks male (and vice-verse). Read the ad on Amazon carefully!

BNC CONNECTORS (BAYONET NEILL–CONCELMAN)

Male

Female

- A BNC (Bayonet Neill–Concelman) connector is used in a wide variety of ham radio products.
- It used to be the standard connector for HT's before everyone started switching over to SMA.
- They are easy to use due to the "twist and lock" operation — easy to put on, easy to take off.
- The BNC Connector does come in both 50 Ω and 75 Ω options, so it's important to figure out which connector you need.
- There are a few radios that still use this connector, and if you own one, you should probably keep a few SMA-BNC Adapters.

TYPE N CONNECTOR

Male

Female

- Type N connectors are probably some of the best connectors on the market, unfortunately they haven’t gained wide acceptance.
- They are waterproof and designed to handle frequencies up to 11 GHz.
- They are most often used in base station setups or repeater installations.
- Often used on 440 MHz and higher connections.