

MAURICE MARTIN KM5RF

Ellis County Amateur Radio Club
WD5DDH

02/16/2023



Coax and Connectors

WHAT THIS PRESENTATION WILL COVER COVER

- 1. DIFFERENT TYPES OF COAX AND LOSS**
- 2. COAX CONNECTORS PRIMARLY CRIMP BRAID AND CENTER SOLDER AND ENCAPSULATED.**
- 3. THE DIFFERENT TYPES OF CONNECTOR PREP TOOLS**
- 4. WEATHERPROOFING THE CONNECTOR**

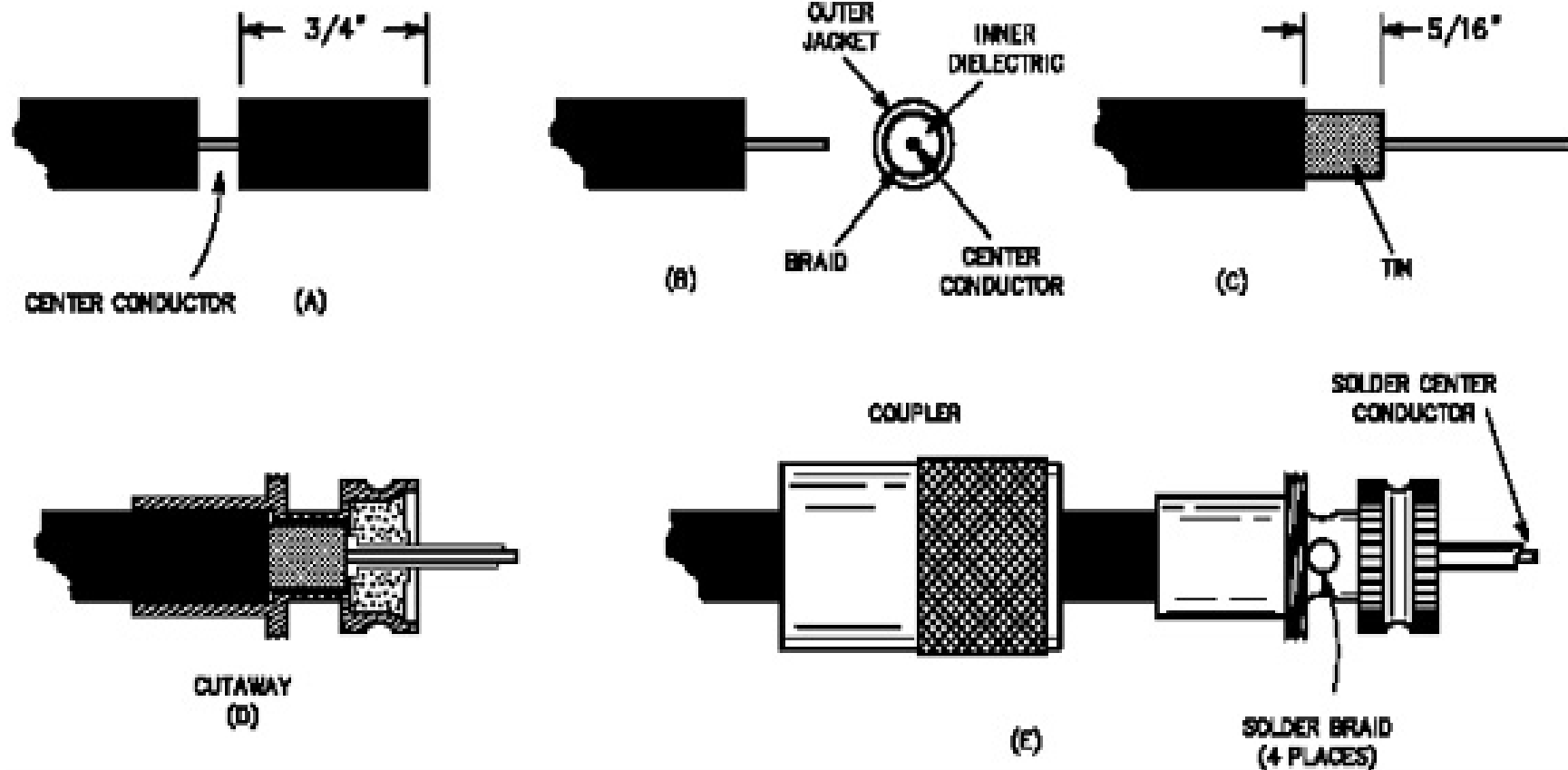
I DON'T CARE WHAT YOUR BUDDY SAYS IT
WILL WORK FOR NOW. WE CAN FIX IT
TOMMORROW. TIME TO LOOK FOR ANOTHER
ELMER.





OH NO NOT AGAIN !!




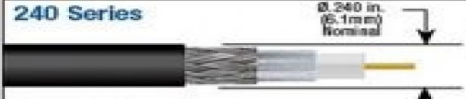
PL 259 solder braid solder center conductor. For RG 8 LMR 400 etc. (.405 Diameter)

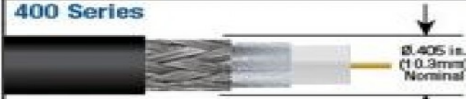



100 Series  50 Ohm Impedance	NOMINAL ATTENUATION		
	MHz	db/100ft	db/100m
	900	22.8	74.8
	1800	33.2	108.8
	2500	39.8	130.6


195 Series  50 Ohm Impedance	NOMINAL ATTENUATION		
	MHz	db/100ft	db/100m
	900	11.1	36.5
	1800	16.0	52.5
	2500	19.0	62.4
	5800	29.9	93.1

200 Series  50 Ohm Impedance	NOMINAL ATTENUATION		
	MHz	db/100ft	db/100m
	900	9.9	32.6
	1800	14.2	46.6
	2500	16.9	55.4
	5800	26.4	86.5

240 Series  50 Ohm Impedance	NOMINAL ATTENUATION		
	MHz	db/100ft	db/100m
	900	7.6	24.8
	1800	10.9	35.6
	2500	12.9	45.4
	5800	20.4	66.8

400 Series  50 Ohm Impedance	NOMINAL ATTENUATION		
	MHz	db/100ft	db/100m
	900	3.9	12.8
	1800	5.7	18.6
	2500	6.8	22.2
	5800	10.8	35.5

600 Series  50 Ohm Impedance	NOMINAL ATTENUATION		
	MHz	db/100ft	db/100m
	900	2.5	8.2
	1800	3.7	12.1
	2500	4.4	14.5
	5800	7.3	23.8

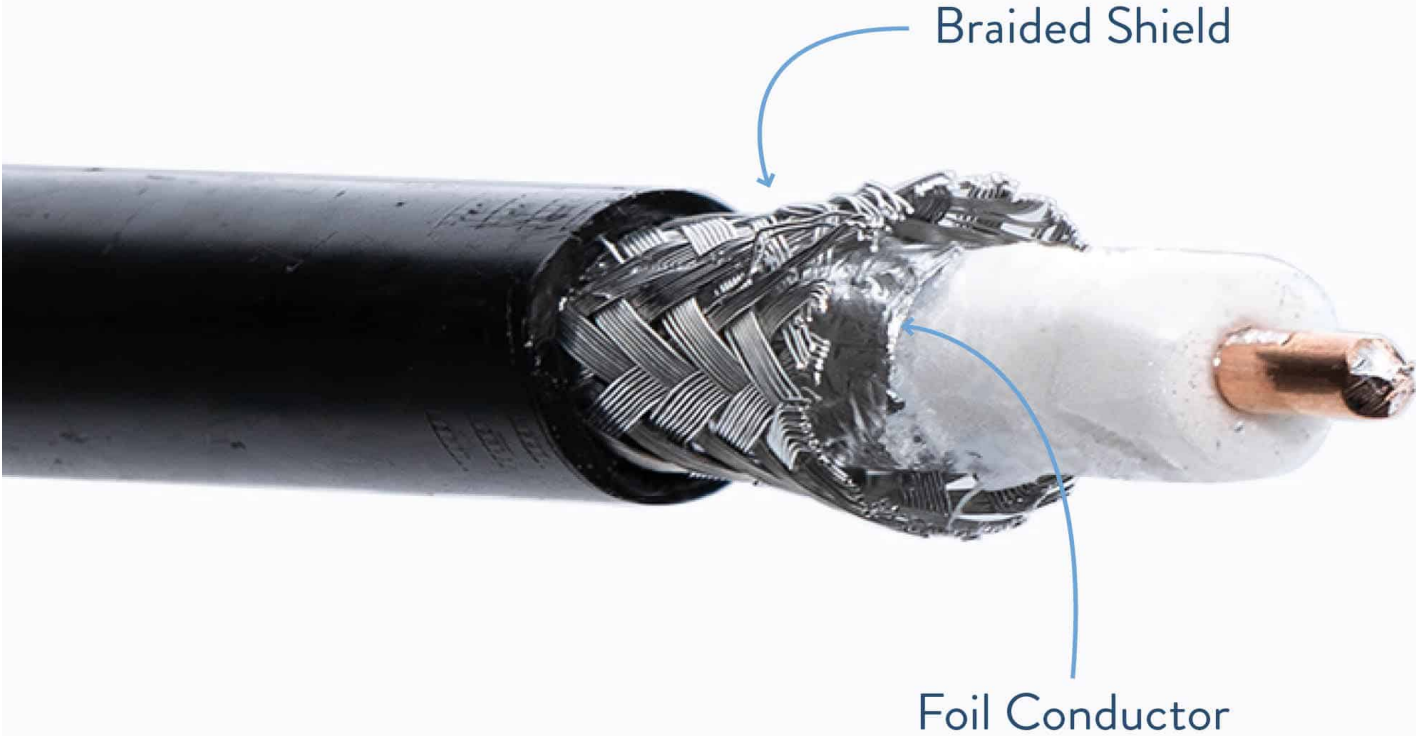
900 Series  50 Ohm Impedance	NOMINAL ATTENUATION		
	MHz	db/100ft	db/100m
	900	1.7	5.6
	1800	2.5	8.2
	2500	2.9	9.8
	5800	4.9	16.0

TwoWayRadio.com
The Best Two-Way Radio Site on the Planet!

Attenuation in dB per 100 feet

Cable Group	30 MHZ	50 MHZ	100 MHZ	150 MHZ	450 MHZ	1000 MHZ	2400 MHZ
LMR-100A®	3.9	5.1	7.2	8.9	15.8	24.1	38
LMR-200®	1.8	2.3	3.2	4	7	10.4	16.5
LMR-240 Ultra®	1.3	1.7	2.9	3.6	5.3	9.5	12.7
LMR-240®	1.3	1.7	2.4	3	5.2	7.9	12.7
LMR-400 Ultra®	0.8	1.1	1.5	1.5	3.2	5	7.9
LMR-400®	0.7	0.9	1.3	1.5	2.7	4.1	6.6
RG-174	5.5	6.6	8.8	10.3	18.1	27.4	43
RG-213	1	1.5	2.1	2.8	4.4	7.1	12
RG-214	1.2	1.6	1.9	2.4	5.1	8	13.7
RG-316	4.3	5.6	7.9	4.4	17.2	26.1	45
RG-58A/U	2.5	4.1	5.3	6.1	10.6	24	38.9
RG-8/U FOAM	1	1.2	1.8	2.4	4.4	7.1	12
RG-8X	2	2.1	3	4.7	8.6	12.9	21.6
RG218/U	0.4	0.6	0.8	1	2	3.8	6.4

Low Loss Cable Construction



ULTRAFLEX COAX

HOW MANY PEOPLE HAVE THIS CABLE IN A UV ENVIRONMENT ?

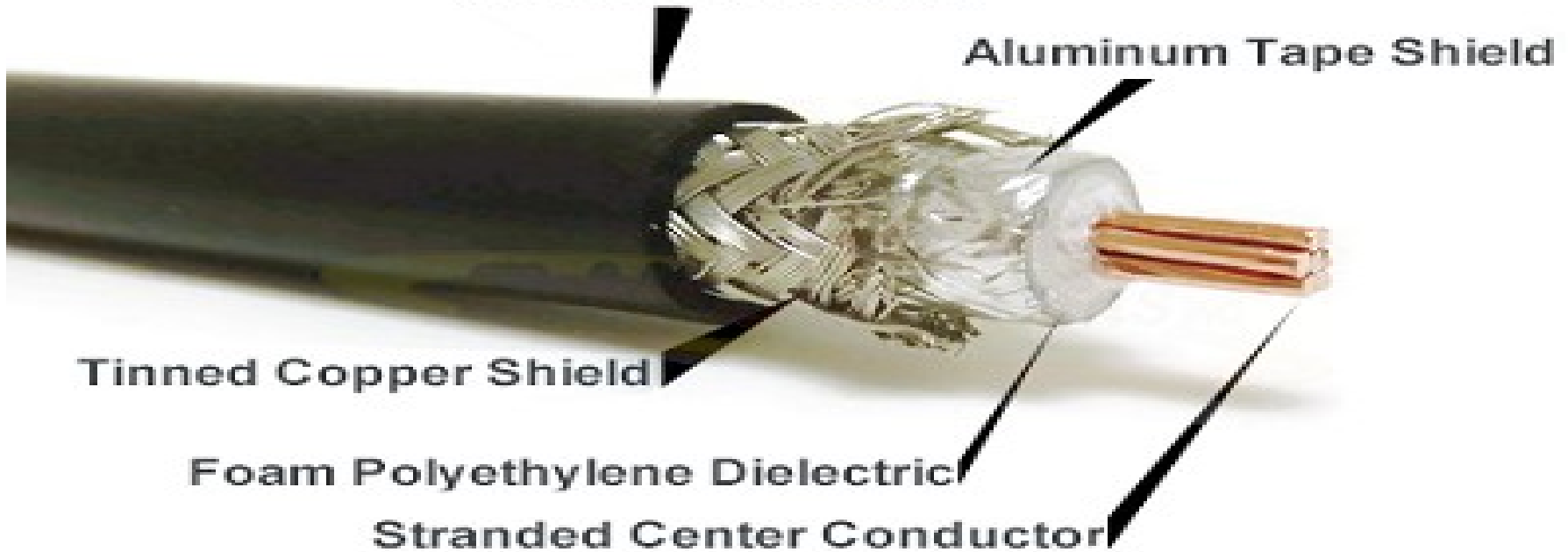
**Black Thermoplastic Elastomer
(Rubberized Jacket)**

Aluminum Tape Shield

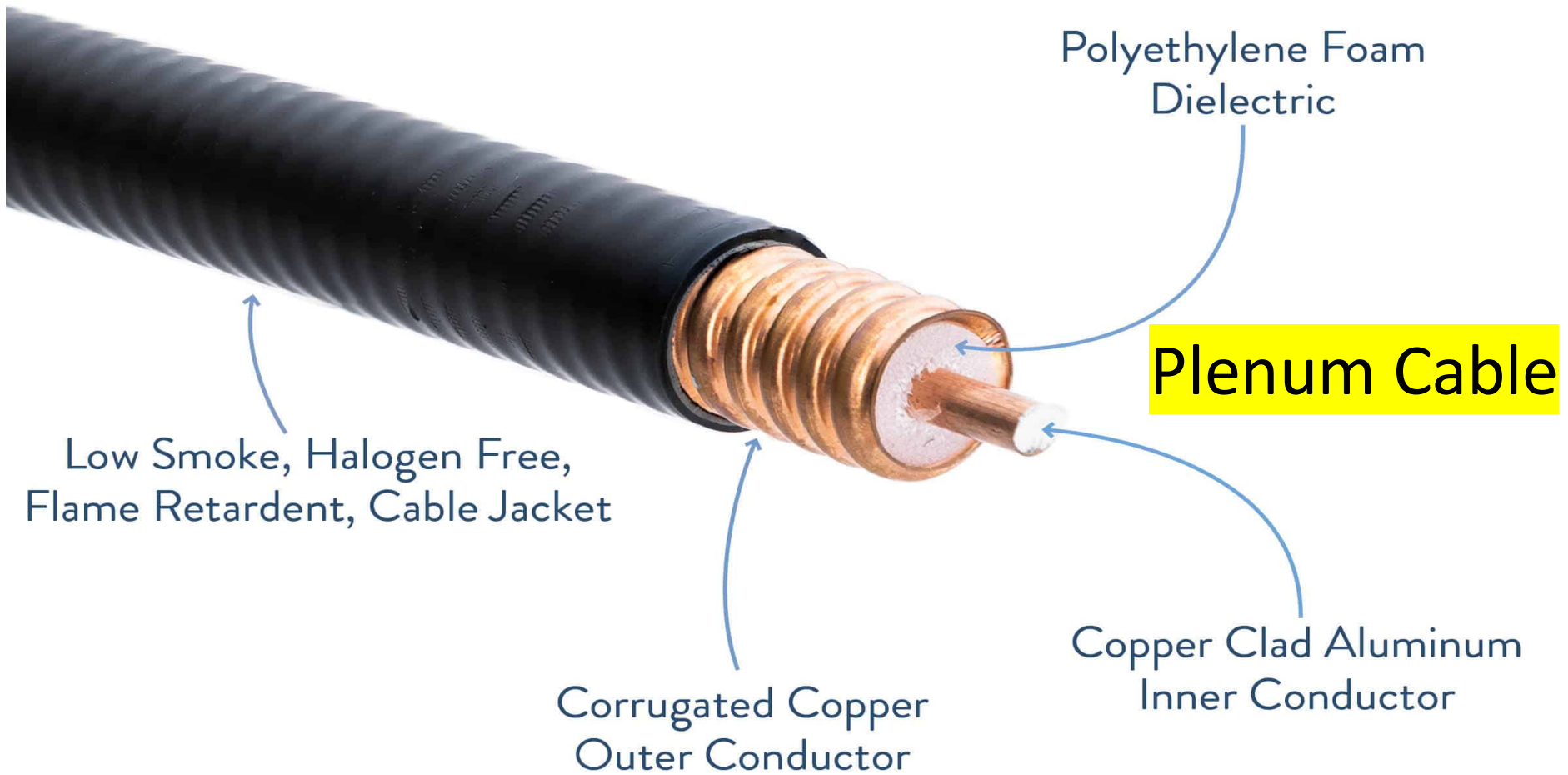
Tinned Copper Shield

Foam Polyethylene Dielectric

Stranded Center Conductor



Low PIM Cable Construction



Plenum Cable

**AVA5P-50-C HELIAX Andrew Virtual Air
7/8" Coaxial Cable (AVA5-50) This is what
is installed in many repeater sites.
NOTE HOLLOW CENTER CONDUTOR**



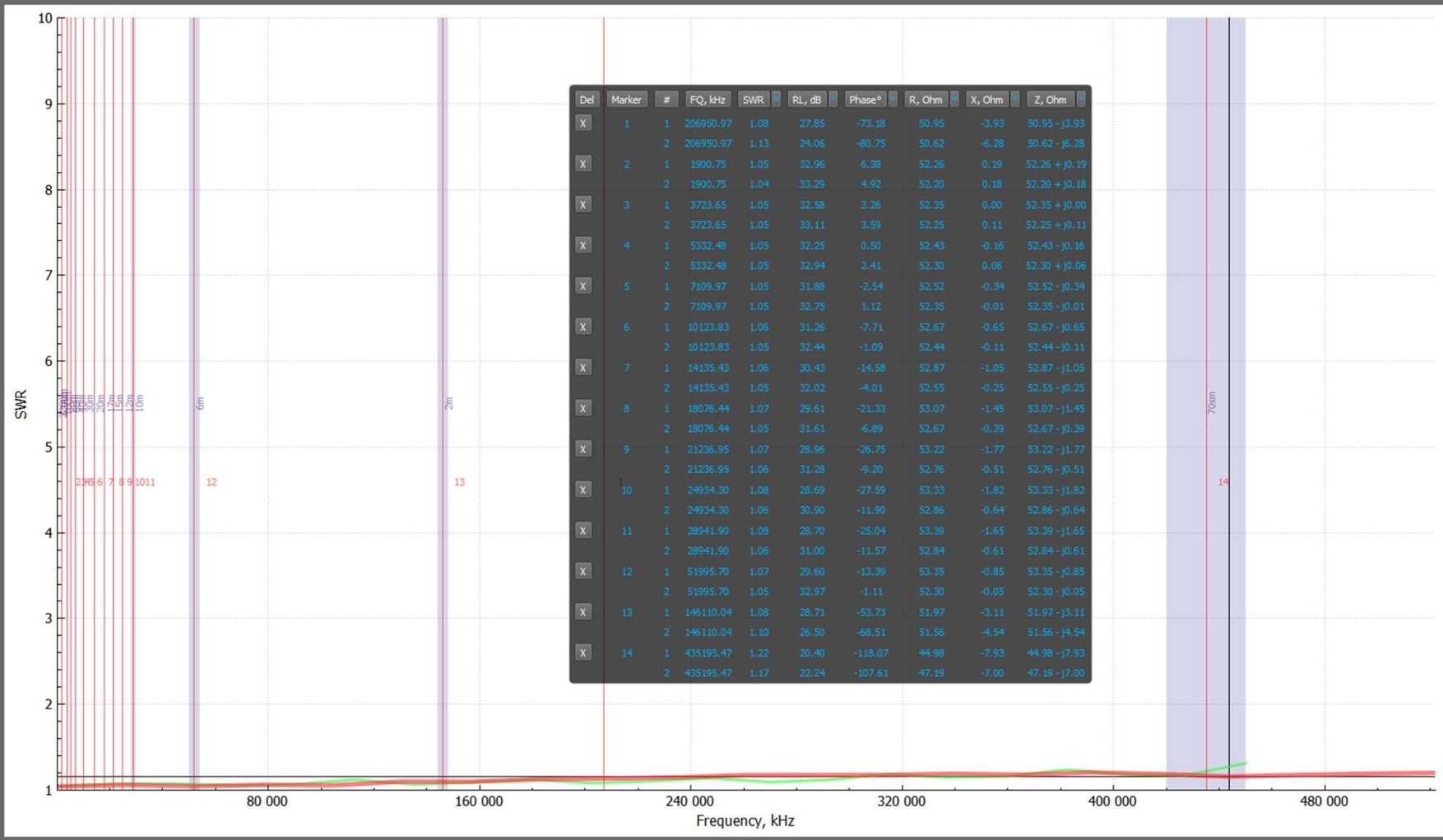
MHz	DB ATTENUATION 100FT
150	0.417
174	0.451
200	0.485
300	0.6
400	0.698
450	0.744

ANDREWS LDF4-50A ½ HARDLINE SOLID CENTER CONDUCTOR





SWR Phase Z=R+jX Z=R||jX RL TDR Smith



Frequency, kHz

Limits Center, range

Start 100

Stop 521 892

Points 20

Calibration Full range

Run

Single Continuous

Presets (limits), kHz

Start	Stop	Points
7000	29000	20
6000	29000	20
0	60750	60
6000	29000	60

Add Delete Move up

Measurements

Name
01> 14.02.2023-10:39:05
02> 14.02.2023-10:44:28

Open Save Delete Clear

Settings Export Import Print Screenshot Screenshot from AA Data from AA

COAXIAL CABLE CONNECTORS:

0 to 4GHz
BNC



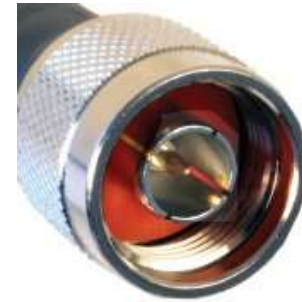
0 to 200 MHz
PL259



0 to 18 GHz
SMA



0 to 11 GHz
N TYPE



Mating connectors:



How many have these in line on a permeant install ?

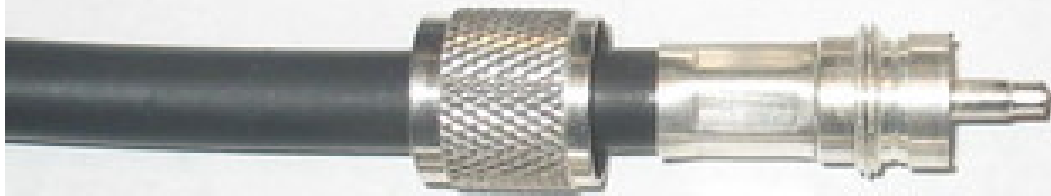
Be honest !!!



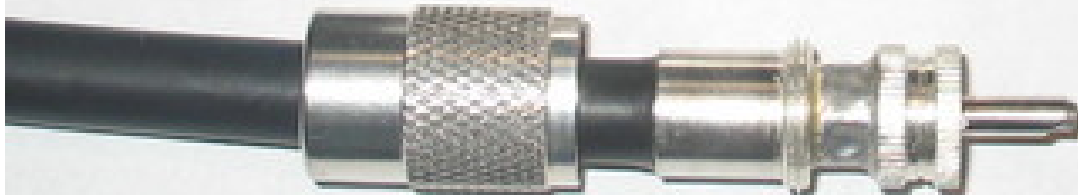
N-TYPE CRIMP



PL 259 CRIMP



PL 259 SOLDER ON



NOTE ONLY CRIMP ONCE AS CLOSE TO FERRULE END AS POSSIBLE.

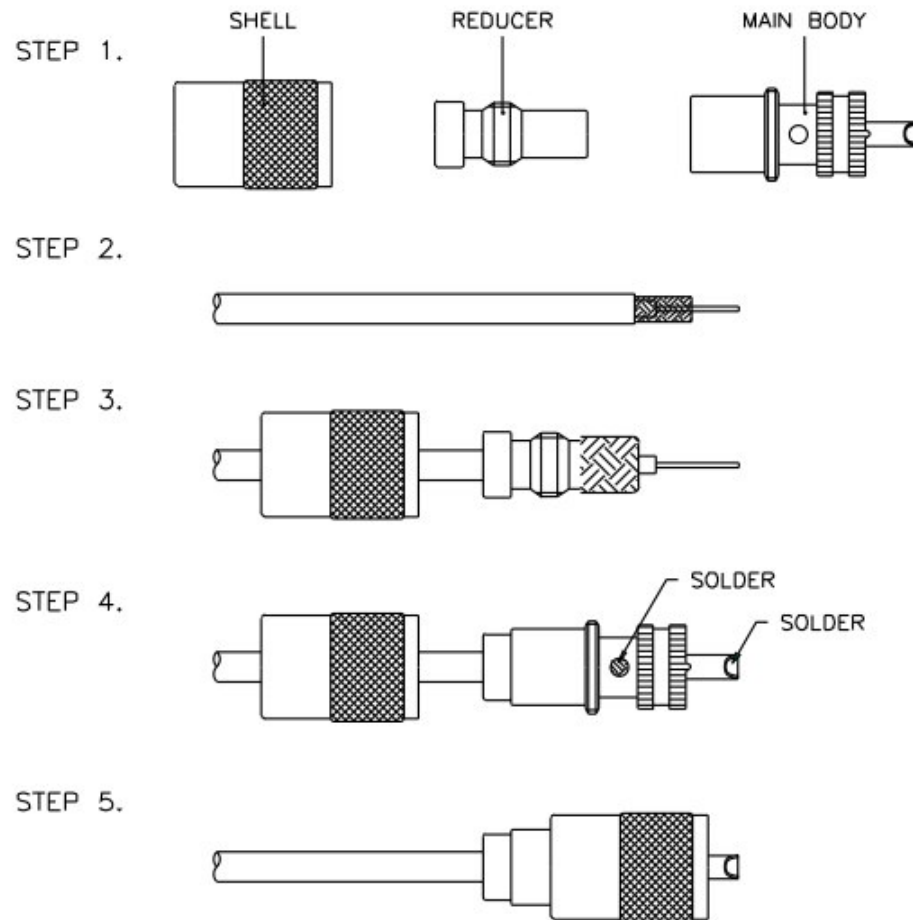
CLAMP TYPE PL-259 THE GOOD OL DAYS



CLAMP TYPE TYPE-N CONNECTOR



PL 259 Solder with reducer for RG 8X LMR 240 ECT.

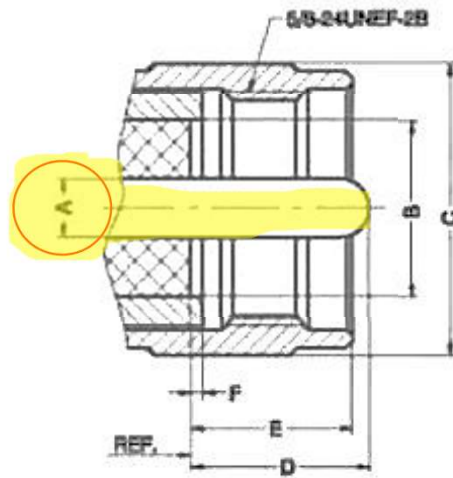


PL-259 SOLDER



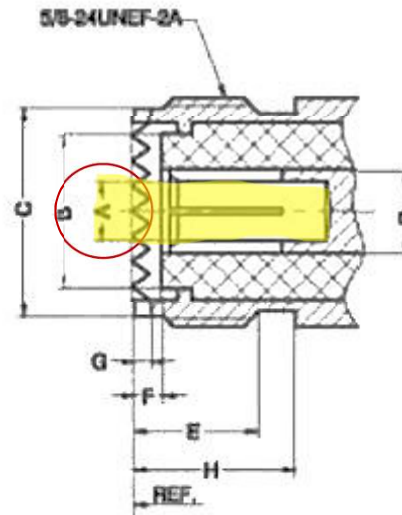
INTERFACE MATING DIMENSIONS

Pin connector



Code	Pin connector Millimeters	
	Min.	Max.
A	3.91	4.01
B	11.56	12.22
C	-	21.00
D	-	11.10
E	-	9.91
F	-	0.89

Socket connector



Code	Socket connector Millimeters	
	Min.	Max.
A	4.04	-
B	11.56	12.22
C	14.00	14.25
D	-	-
E	7.90	-
F	1.02	-
G	0.89	-
H	11.10	-

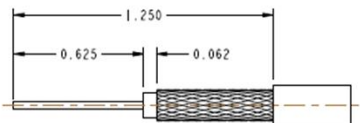
NOT MIL-SPEC DIMENSION NOT MANY MIN-MAX

NOTES:

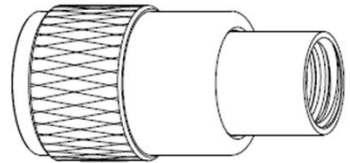
1. MATERIALS AND FINISHES:
 BODY - BRASS, SILVER PLATING
 COUPLING NUT - BRASS, NICKEL PLATING
 CONTACT - BRASS, SILVER PLATING
 INSULATOR - LCP
 2. ELECTRICAL:
 A. IMPEDANCE: 50 OHM
 B. DIELECTRIC WITHSTANDING VOLTAGE: 1000 VRMS
 3. MECHANICAL:
 A. DURABILITY: 500 CYCLES MIN.
 B. TEMPERATURE RANGE: -65° C TO +165° C
 4. PACKAGING:
 A. QUANTITY: SINGLE PACK
 B. MARKING: BAG TO BE MARKED
 "AMPHENOL RF, 83-1SP, AND DATE CODE"
- ▶ SHOWS CABLE ENTRY DIMENSIONS.

83-1SP	
DRAWING NO.	REV
THIRD ANGLE PROJ.	RELEASE TO MFG.

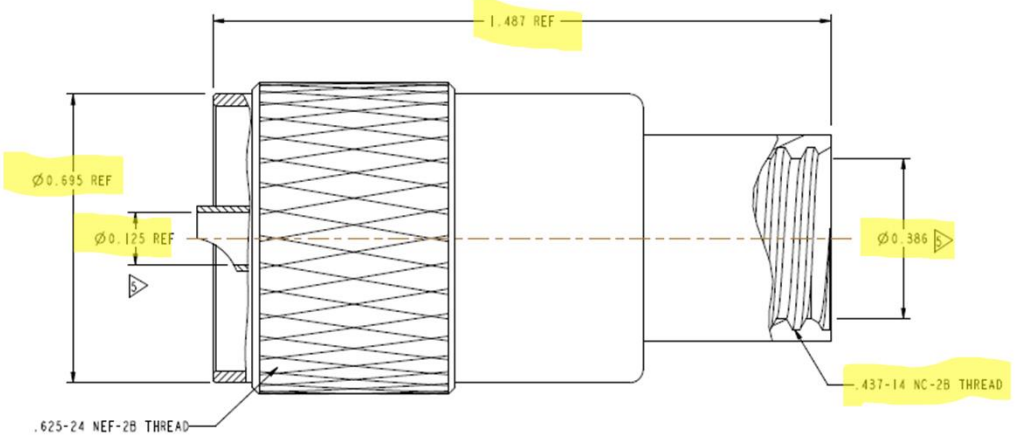
REVISIONS				
REV	DESCRIPTION	DATE	ECO	APPR
--	RELEASE TO MFG.	--	--	--
T	SEE SHEET 1	7/14/11	48601	AAP
U	INS MATERIAL LCP WAS INCORRECTLY CALLED PTFE & REDRAW	--	49907	MB



RECOMMENDED CABLE STRIPPING DIMENSIONS



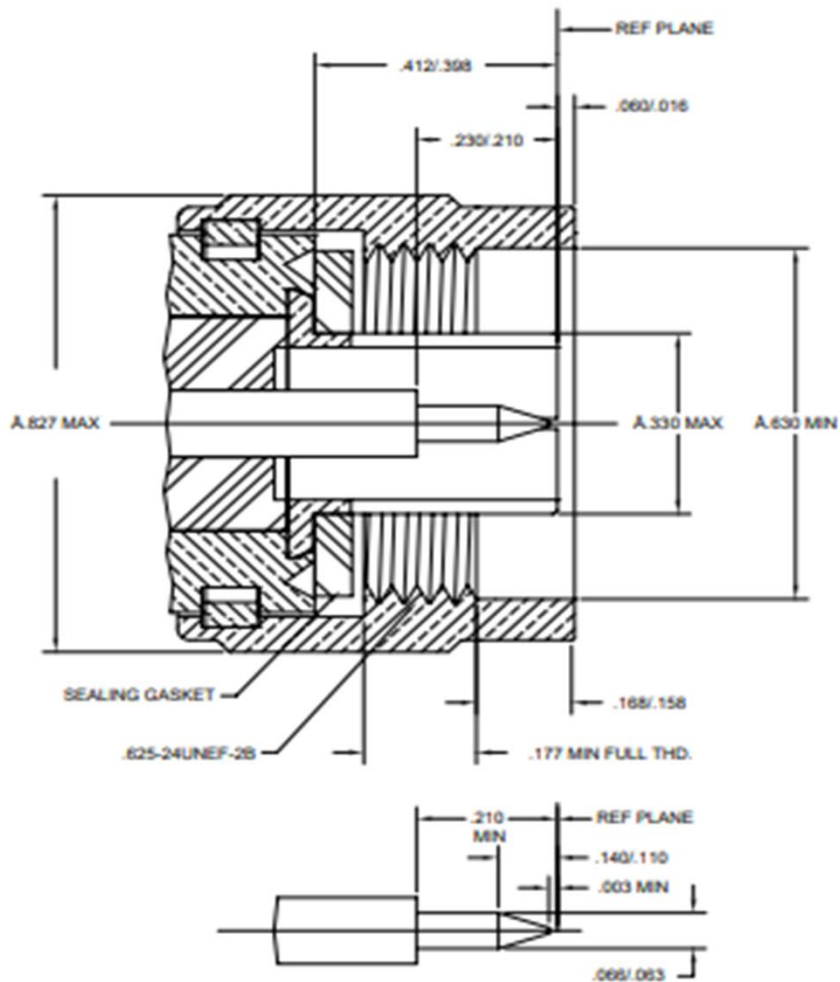
SCALE 2.000



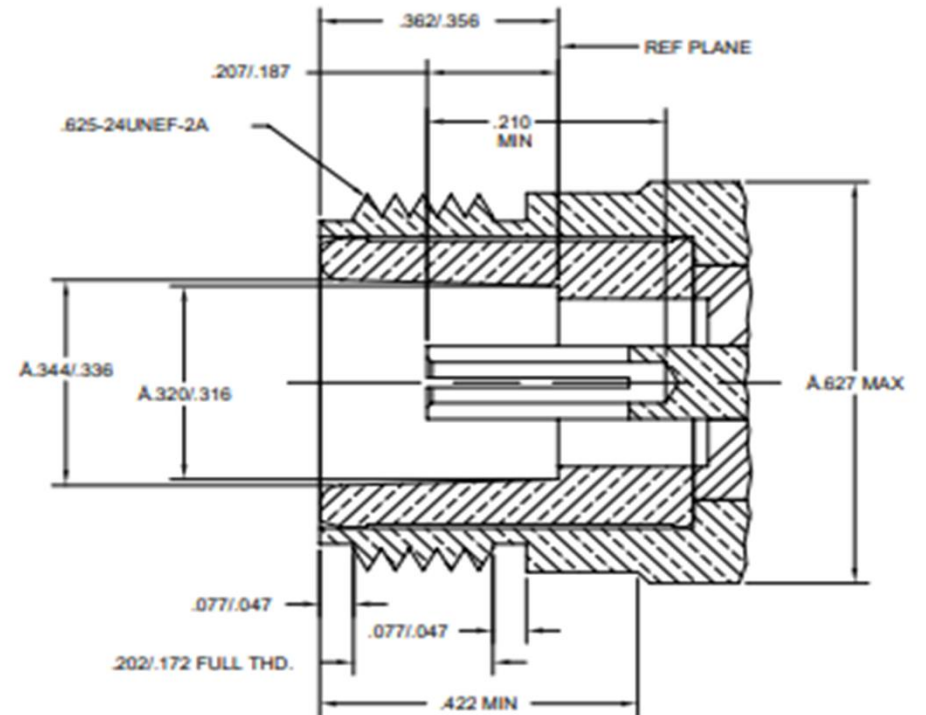
CUSTOMER OUTLINE DRAWING
 ALL OTHER SHEETS ARE FOR INTERNAL USE ONLY

UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE IN INCHES AND TOLERANCES ARE: 2 PLACE DECIMAL 3 PLACE DECIMAL ANGLES $\pm .015$ (0.381 mm) $\pm .005$ (0.127 mm) $\pm 1^\circ$	MATERIAL	DRAWN	DATE	TITLE	Amphenol RF Danbury, CT, USA Tainan, Taiwan Shenzhen, China www.amphenolrf.com	
	SEE NOTES	A. ARUN PRABU	01-Apr-09	UHF (M) RG 8 CABLE GROUP		
NOTICE - These drawings, specifications, or other data (1) are, and remain the property of Amphenol Corp. (2) must be returned upon request; and (3) are confidential and not to be disclosed to any person other than those to whom they are given by Amphenol Corp. The furnishing of these drawings, specifications, or other data by Amphenol Corp., or to any other person to anyone for any purpose is not to be regarded by implication or otherwise in any manner licensing, granting rights or permitting such holder or any other person to manufacture, use or sell any product, process or design, patented or otherwise, that may in any way be related to or disclosed by said drawings, specifications, or other data.	REFERENCE	ENGINEER	DATE		SCALE: 4.0:1 SHEET 2 OF 2	
			O. BARTHELMES	5/9/03		
		APPROVED	DATE			
		K. CAPOZZI	6/30/11			
		CAD FILE	CODE ID	DWG SIZE	DRAWING NO.	REV
		Root Folder/UHF/83-1SP	74868	B	83-1SP	U

PLUG



JACK



TYPE-N CONNECTORS HAVE MIL-SPEC DIMENSIONS NOTICE MIN AND MAX.

Times Microwave UHF Male Crimp Connector
- LMR-400 - EZ-400-UM
CRIMP BRAID ONLY PIN IS ENCAPULATED

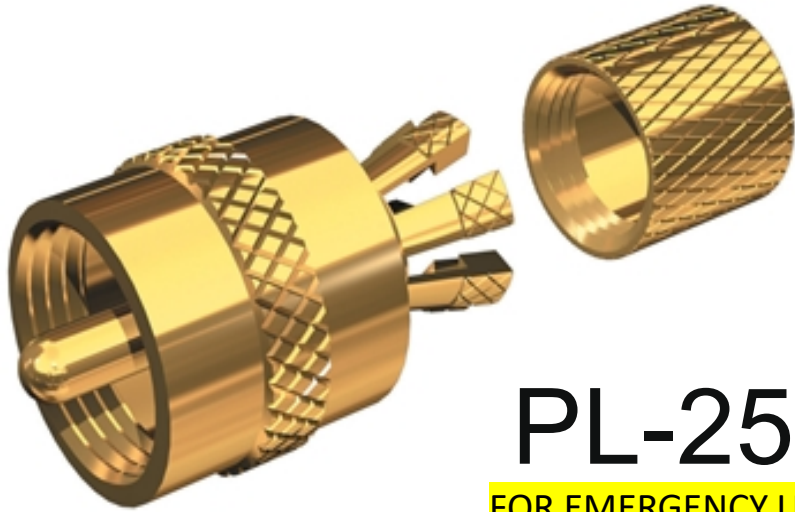


N Female Crimp Connector

WHY WOULD WE USE ONE?



RG8X & LMR 240



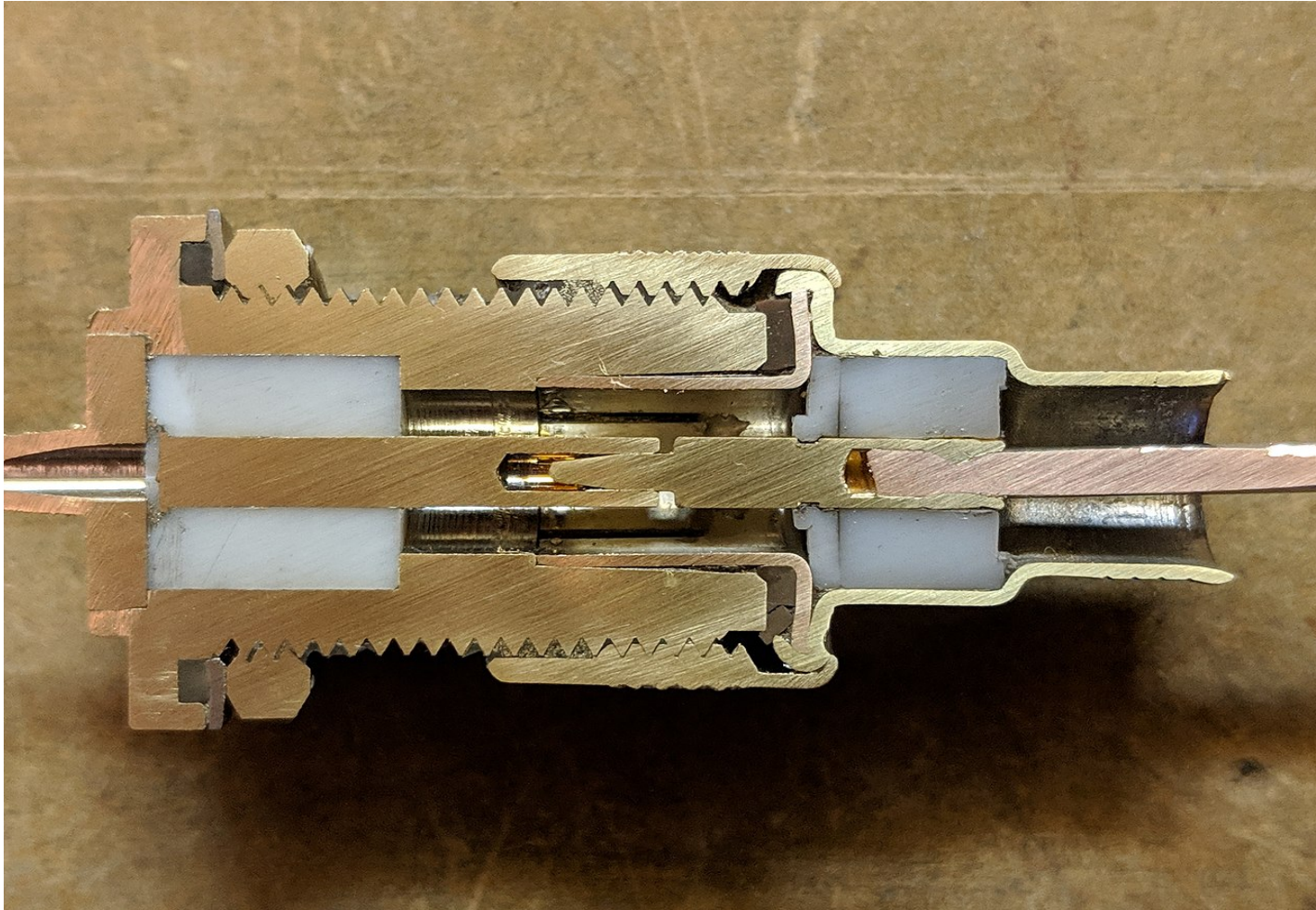
PL-259-CP-

FOR EMERGENCY USE ONLY POTA ??

G



TYPE-N MECHANICAL CHARACTERISTICS



OLD TYPE OF N CONNECTOR



N-TYPE NEW

WHAT IS MISSING?



7/16 DIN Connectors used on broadcast and cellular base station antenna and high power amplifiers.
Up to 7.5 GHz

Male Body



Female Body



7/16 DIN Connectors

Run from these installs.

Generally RG 178U .072 Jacket Diameter with .012 Center Conductor.

AMC/UMCC/IP

X





RG8-X LMR 240 Comparison buying assembly's vs building your own.

DX Engineering RG-8X (LMR 240 equivalent) PL-259 Low-Loss 50-ohm Coax Cable Assemblies DXE-8XDX100	77.99
DX Engineering RG-8X (LMR 240 equivalent) 50-ohm Bulk Coaxial Cable DXE-8X per foot .065.	65.00
DX Engineering Next Generation Crimp/Solder 8X PL-259 Connectors DXE-PL259CS8X-6	4.49 X 2 = 8.98
Total to build your own	73.98
	Saving of 4.01

RG8 LMR 400 Comparison buying assembly's vs building your own.

DX Engineering 400MAX PL-259 Low-Loss 50-ohm Coax Assemblies DXE-400MAXDX100	169.99
DX Engineering 400MAX Low-Loss 50-ohm Bulk Coaxial Cable DXE-400MAX per foot 1.45	145.00
DX Engineering Next Generation Crimp/Solder 8U PL-259 Connectors DXE-PL259CS8U-6	4.66 X 2 = 9.32
Total to build your own	154.32
	Savings of 15.67

Why build your own ?

Custom jumpers, custom lengths with no rolled up RF chokes under your desk, (those of you know who you are) connector repairs. Feedline to antenna repair (take it off and send it back? don't think so **The satisfaction of knowing how to correctly install connectors.**

HEAT SHRINK AFTER CHECKING THE CONNECTOR
INSTALL. FOR WEATHEPROOFING AND STRAIN
RELIEF PURPOSE.



COAX CABLE CUTTERS

CCT-03



CCT-02



BOTH ARE 58.00 BUY THIS AT HOME DEPOT OR LOWES FOR 17.00.

HKS Coax Ratchet Crimping Tool Set for Coaxial RG Cable RF Connector with 5 Changeable Dies

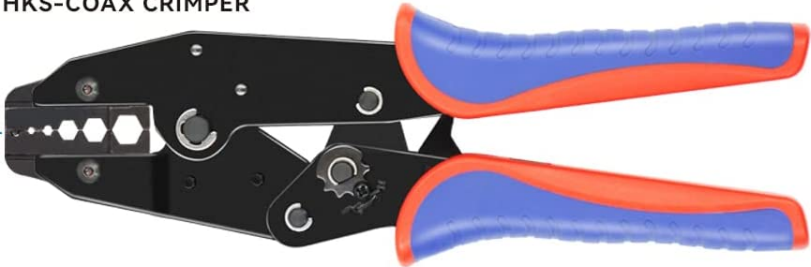
39.98 ON AMAZON



Package Includes

7 Pcs

HKS-COAX CRIMPER




HEXAGONAL WRENCH

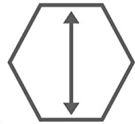
Built-in



05H



FOR RG6/29/54/55/56/8U
58/59/71/142/174/188/233/316
Fiber Optic
.068"/.102"/.213"/.256"/.319"
1.72/2.6/5.4/6.5/8.1mm




Figures indicates the length between this segment.

457




FOR RG5/6/8/11/13/
21/22/55/58/63/83/133/
142/213/214/233/LMR400
Fiber Optic
.213"/.323"/.433"
5.4/8.2/11mm

336J




FOR RG122/174/188/
316/400/Belden8218
Fiber Optic
.042"/.068"/.078"/.128"/
.151"/.178"
1.07/1.72/2/3.25
/3.84/4.52mm

02H



FOR RG6/54/55/56/58/
59/62/144/233/8X
Fiber Optic
.213"/.256"/.068"
5.4/6.5/1.72mm

336C



FOR RG6/21/54/55/56/
58/59/71/142/233/316/8X
Fiber Optic
.256"/.319"/.068"/.213"
6.5/8.1/1.72/5.4mm

Jaw Application

Valley Enterprises Replacement Crimper Die for Anderson Power Connectors 15, 30, and 45AMP, Replacement for Ratcheting Crimping Tool # DL-530N



AMAZON 19.99

Times Microwave Coaxial Connector Crimping Tool CT-U



3190-202 USED FOR
LMR 400



3190-203 USED
FOR LMR 600

**DXE-UT-240C-P1 PL-259
RG8X & LMR240**



**DXE-UT-405C-N1 N-TYPE
RG-8 & LMR400**

DXE-UT-405C-P1 PL-259 RG-8 & LMR 400



**42.99 AT DX ENGINEERING
WILL WORK WITH ULTRAFLEX
AND STANDARD COAX!!**

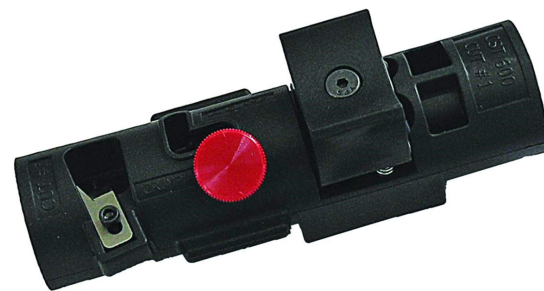
Times Microwave Coaxial Cable Prep Tool
CST-240A FOR **NON FLEX** RG-8X & LMR 240



Times Microwave Coaxial Cable Prep Tool
CST-400 FOR **NON FLEX** RG-8 & LMR 400



Times Microwave Coaxial Cable Prep Tool
CST-600 FOR LMR 600



Andrew Universal 1/2 in. Cable Prep Tool -
CPT-12U
USED FOR HARDLINE CONNECTOR PREP
ON DRILL



ANDREW 221213 CONNECTOR/SPLICE WEATHERPROOFING KIT

EPS300-1/2-48"-BLACK-75 PCS 3:1 SHRINK RATIO WITH ADHESIVE ON INTERIOR GOOD FOR SEALING AND STRAIN RELIEF. 1/2" FOR PL 259 LMR 400, 3/8" FOR 8X & LMR 240, 3/4" FOR COMPLETELY OVER N TYPE **10.00 ON EBAY**



ANDREW 221213 CONNECTOR/SPLICE WEATHERPROOFING KIT BUTYL TAPE **10.00 ON EBAY**



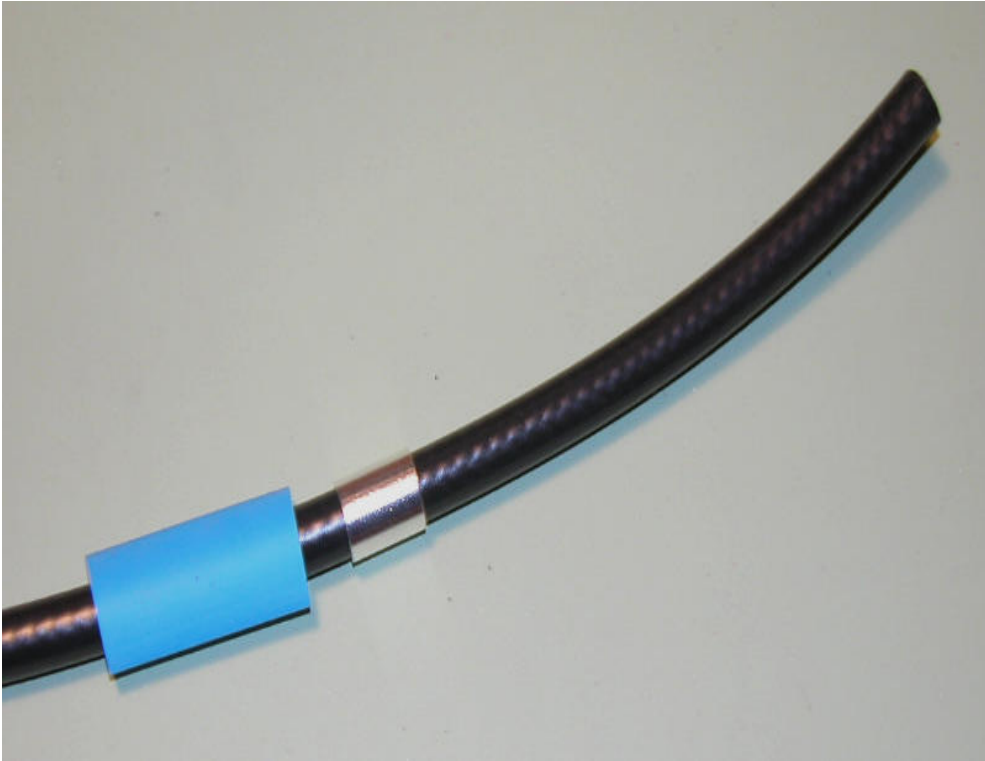
3M™ Cold Shrink Coax Sealing Kits 98-



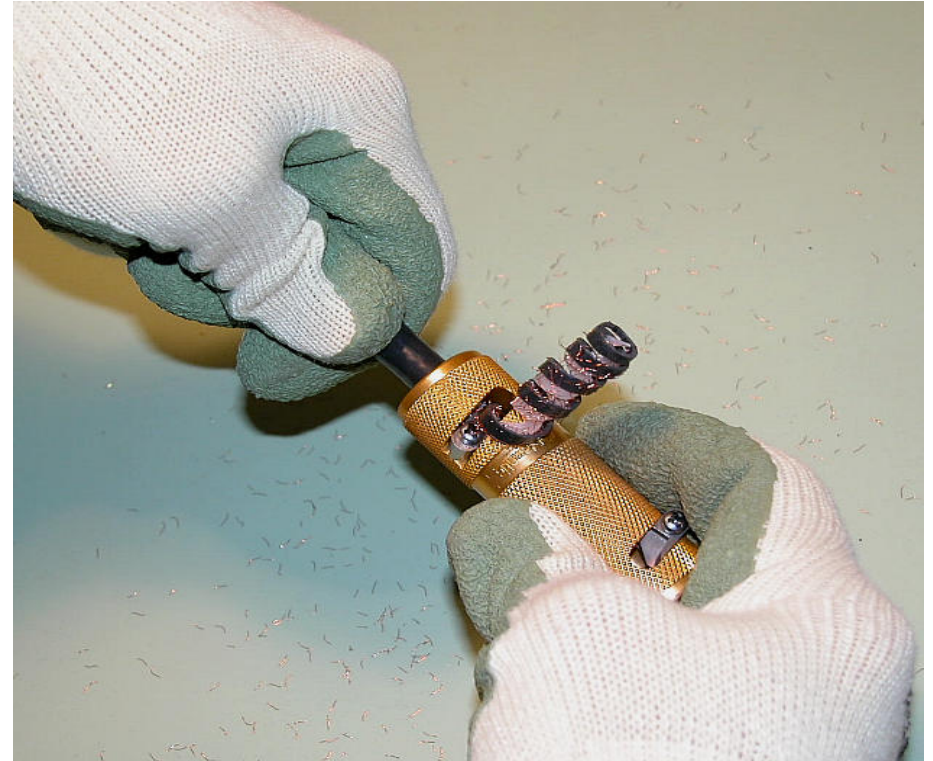
3M Super 88 Vinyl Electrical Tape, .75 in x 66 ft **6.00**



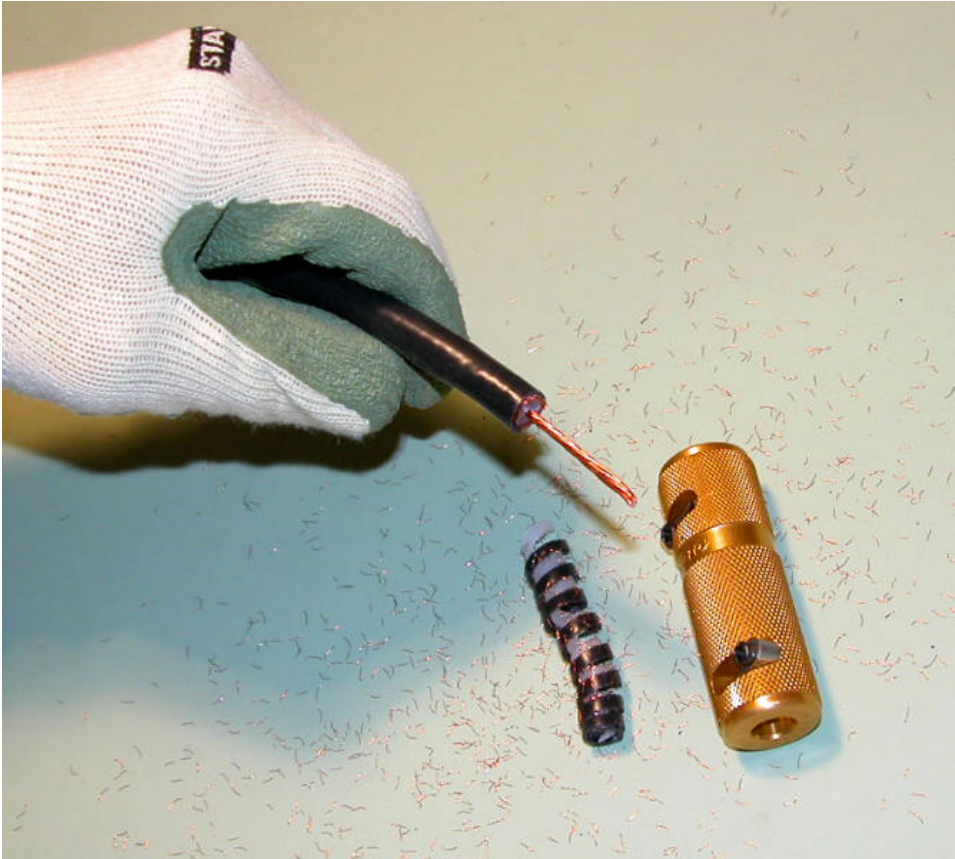
CUT END OF COAX WITH TOOL TO OBTAIN A STRAIGHT CUT AND NOT TO DISFORM THE DIELECTRIC.
SLIDE SHRINK TUBING AND CRIMP BARREL OVER COAX.



DO THE FIRST CUT TO EXPOSE THE CENTER CONDUCTOR



LOOKING AT CENTER CONDUCTOR EXPOSED



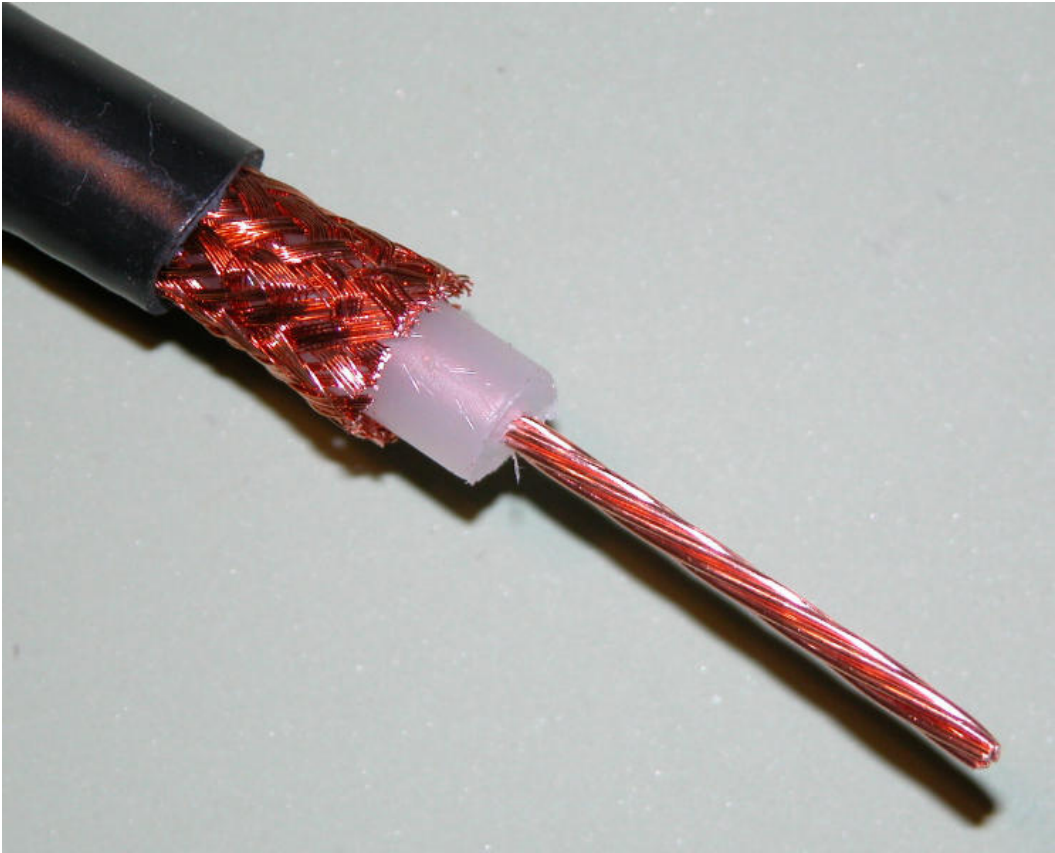
TRIM OFF OUTER JACKET



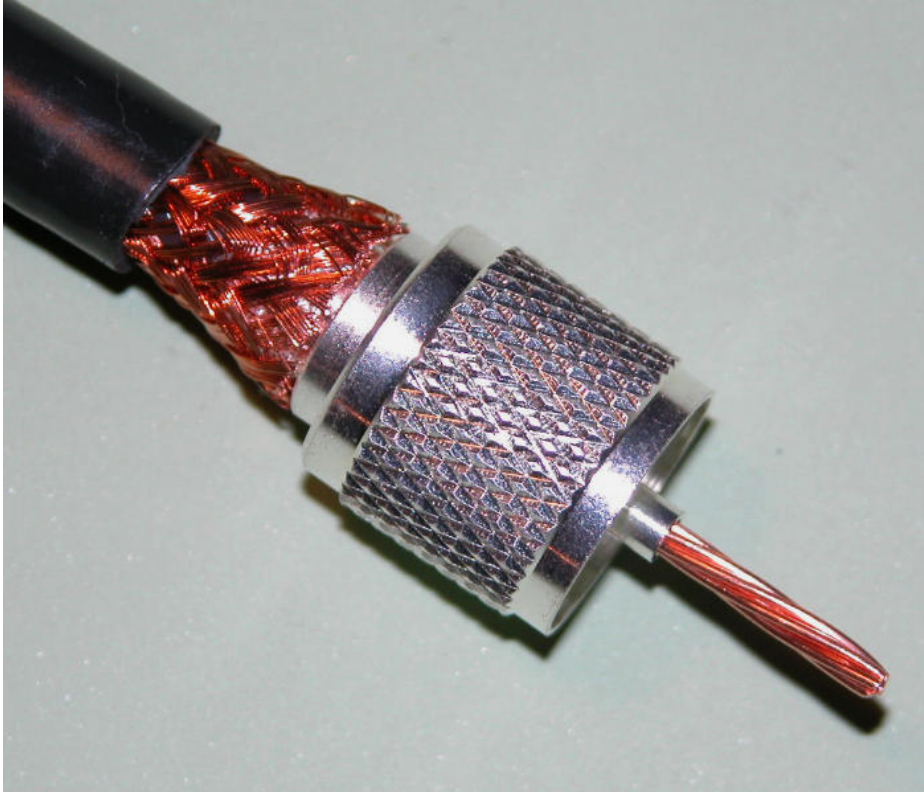
LOOKING AT COAX WITH OUTER JACKET REMOVED



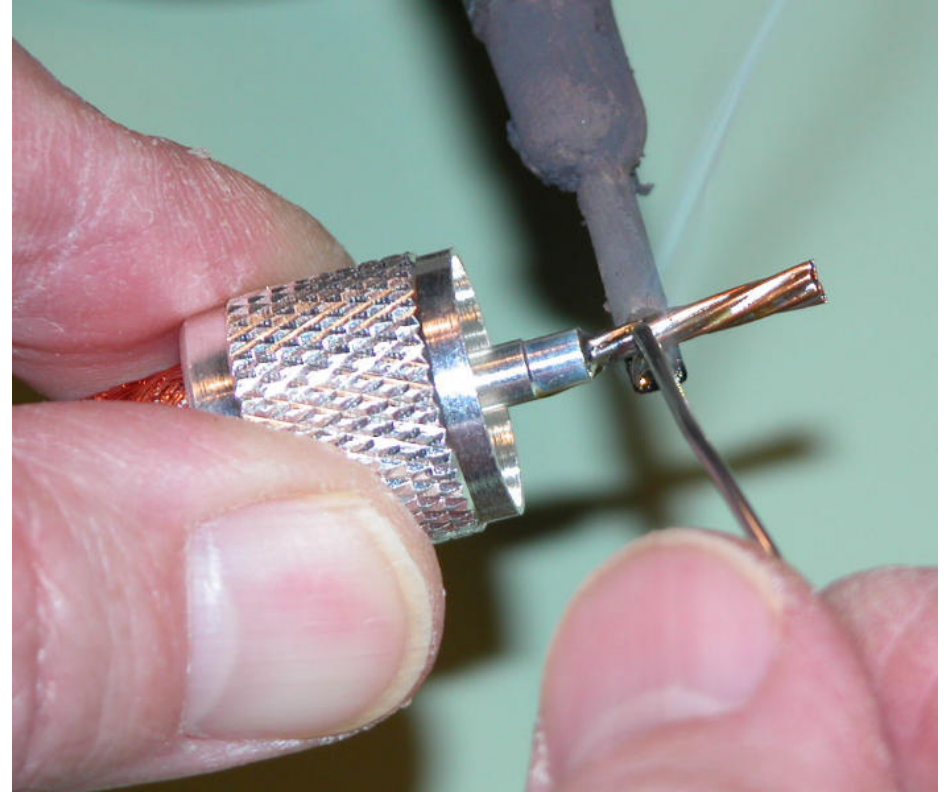
USING SHARP NIPPERS TRIM BACK ¼ OF BRAID



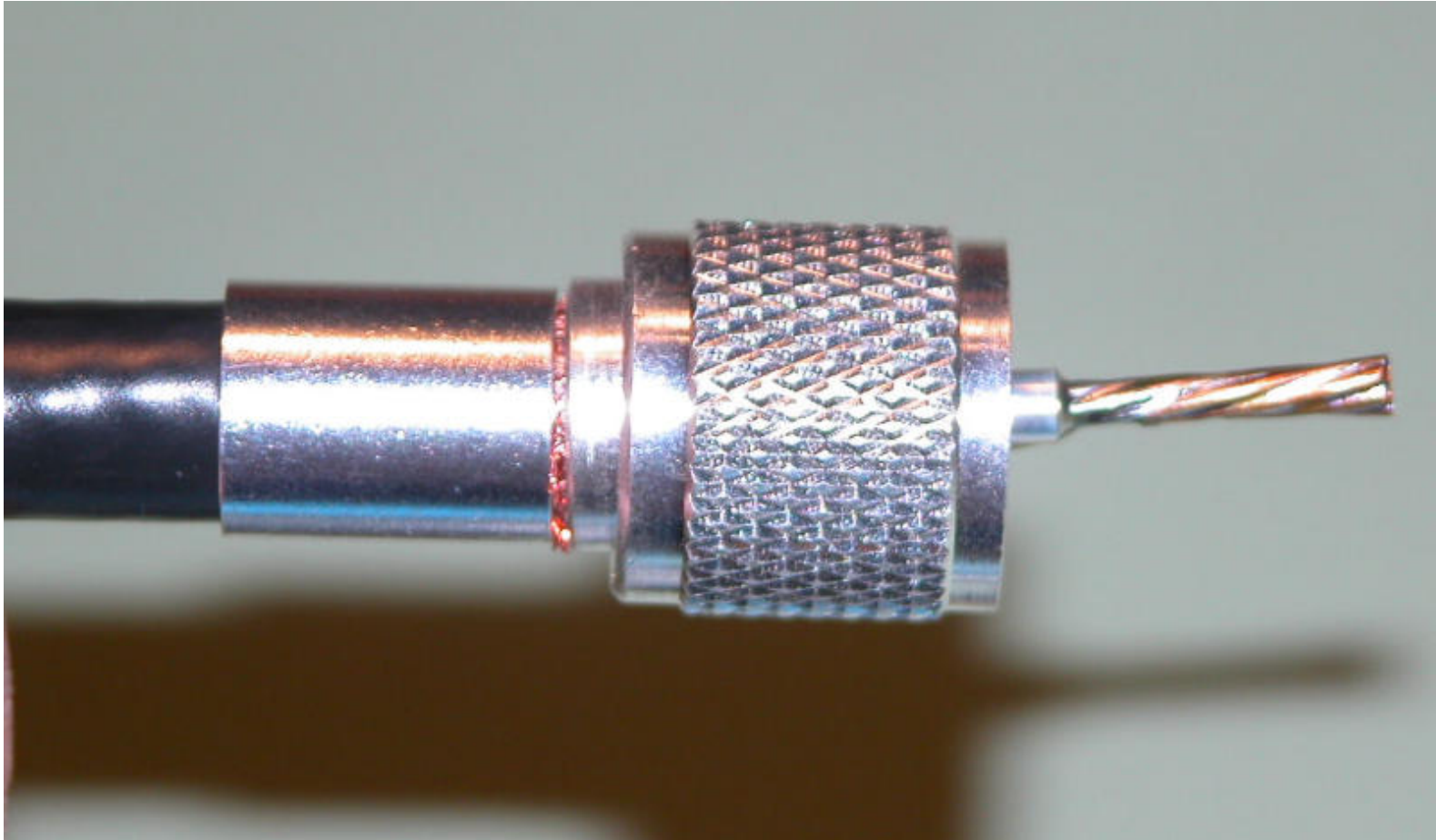
SLIP CONNECTOR ON COAX & SEAT CONNECTOR
BRAID SHOULD BE CLOSE TO CRIMP AREA



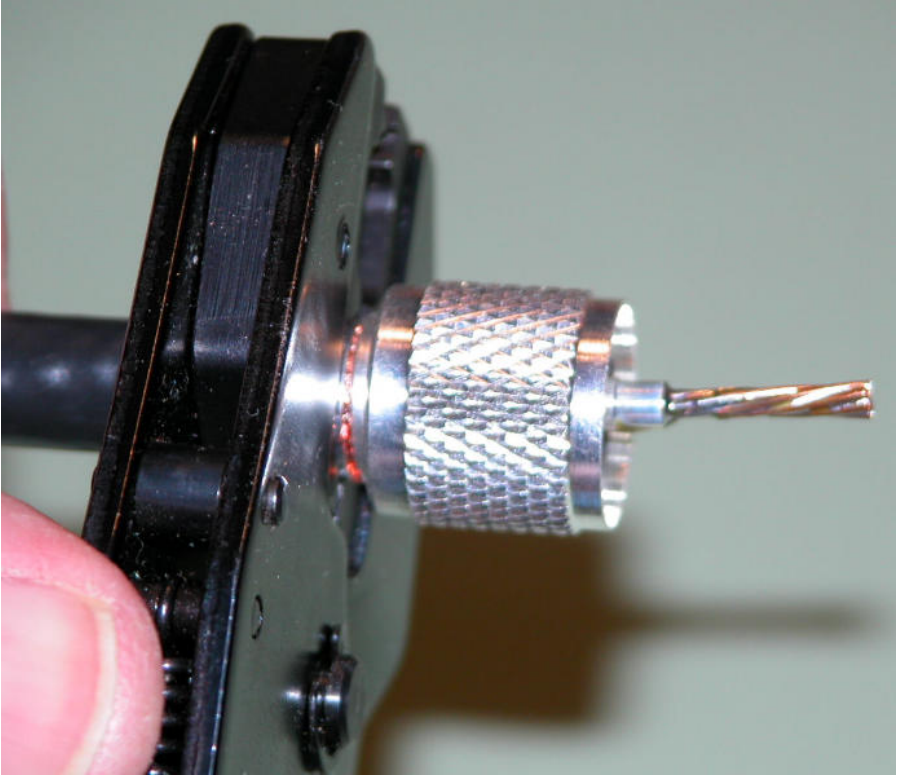
SOLDER CENTER CONDUCTOR AT SLIGHT ANGLE
AND CHECK CABLE WITH METER CONDUCTIVITY.



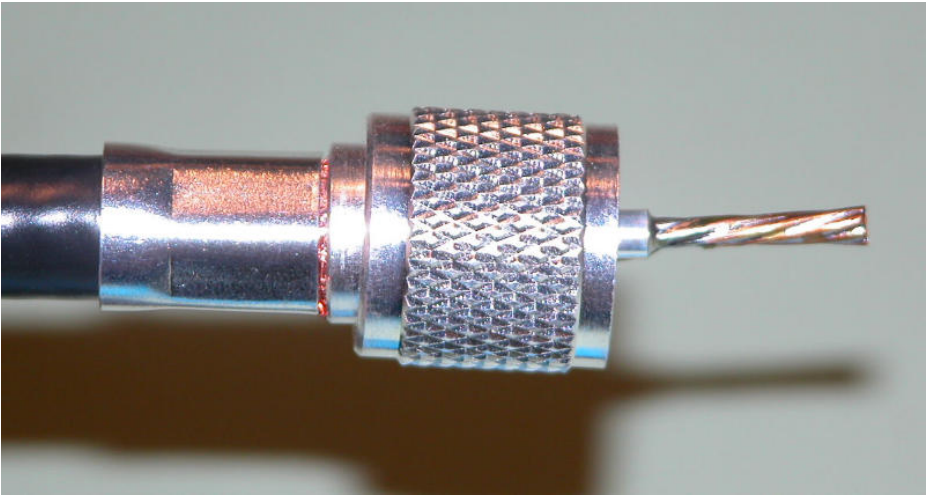
SLIDE CRIMP BARREL UNTIL IT TOUCHS THE CONNECTOR **NOT AS SHOWN !!**



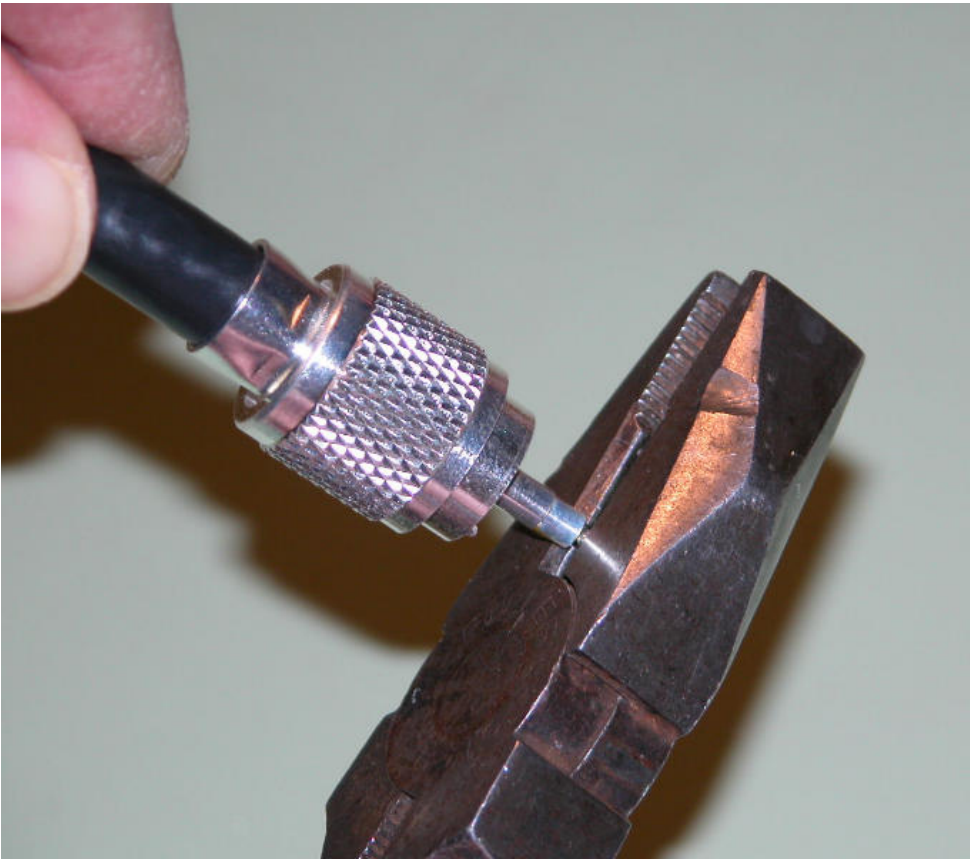
CRIMP BARREL AS CLOSE TO CONNECTOR POSSIBLE



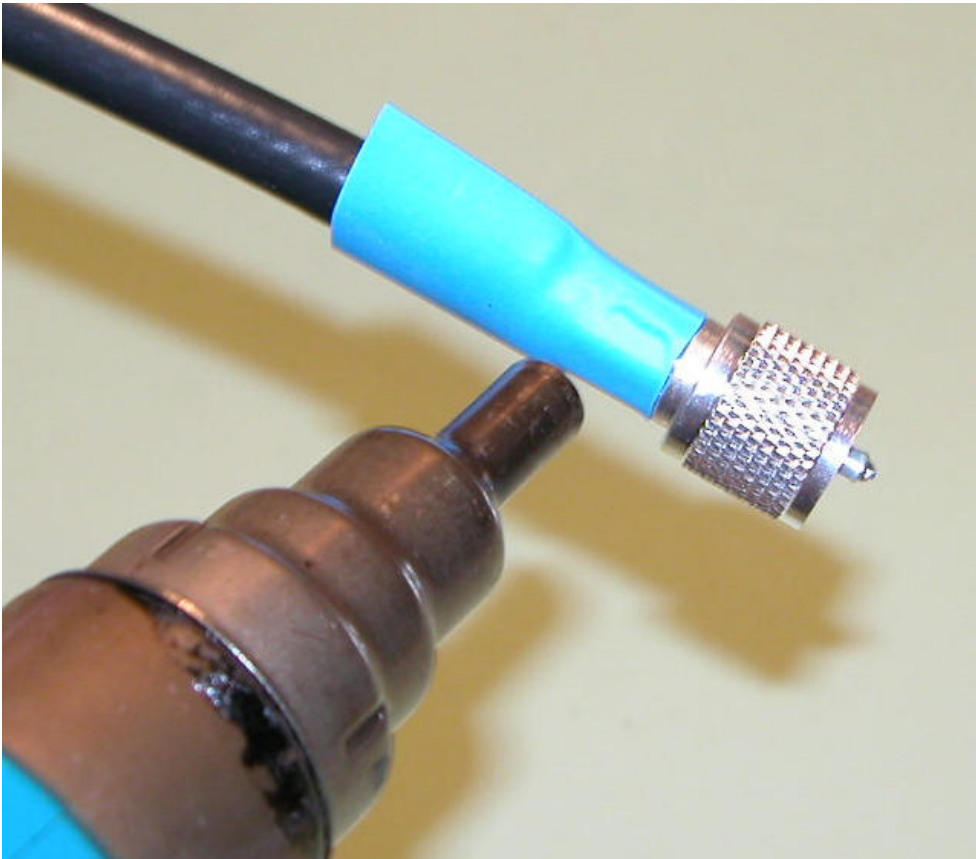
COMPLETED CRIMP



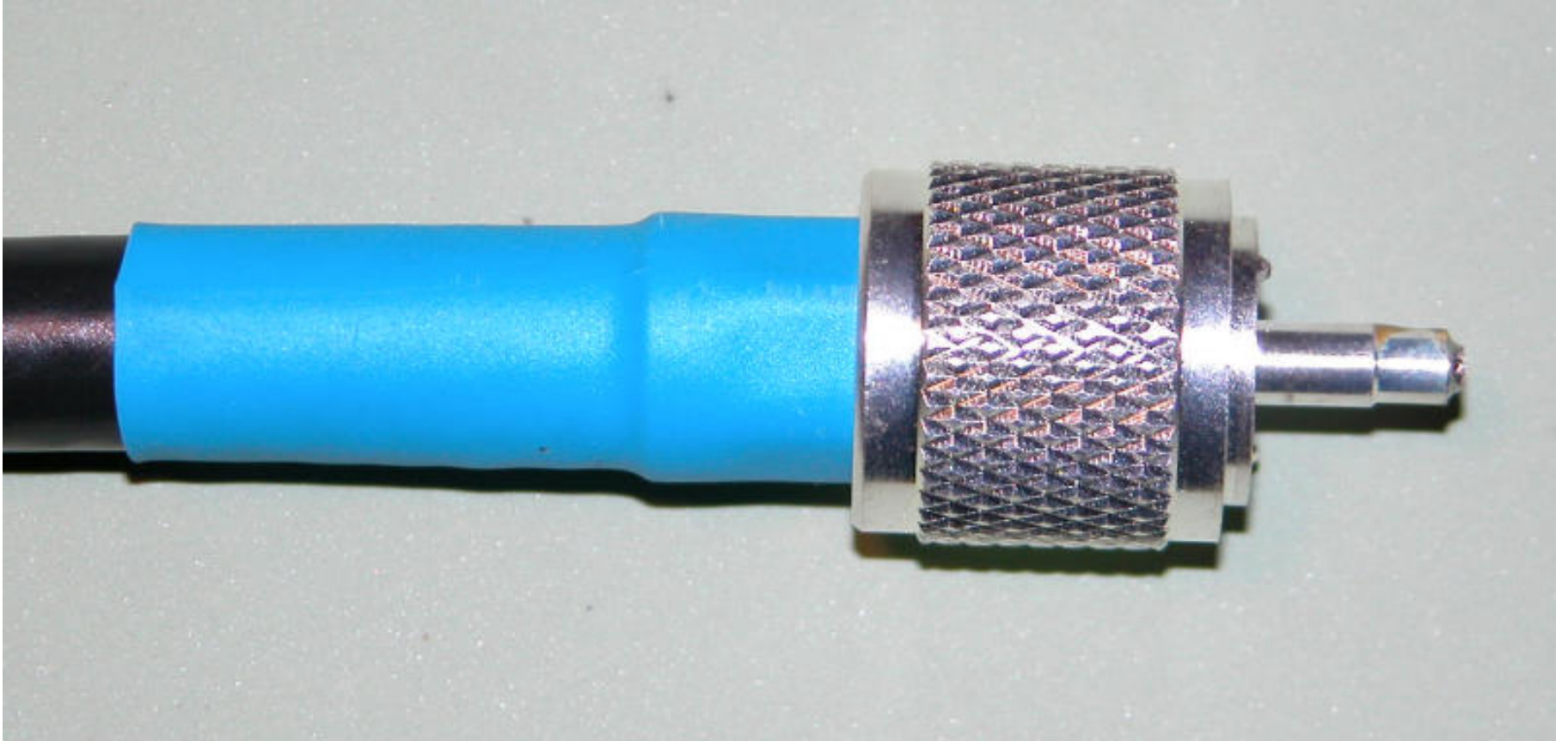
TRIM CENTER CONDUCTOR DON'T CUT TIP



SLIDE SHRINK TUBE IN PLACE AND HEAT.



FINISHED PRODUCT NOW TO THE OTHER END



Replacement Coaxial Connector Crimp Rings

About .80 to reuse a connector.





RF Weatherproofing







CABLE GLANDS ARE YOUR FRIEND USE THEM

DON'T DRILL HOLES IN YOUR BRICK LMR 400
WILL GO THROUGH THE GROUT SPACE.
HAPPY WIFE HAPPY LIFE.

