

Fig. 8. Cutaway drawings of series LT, N, UHF, BNC, QDS and push-on connectors.

double flat requiring a special hole in the panel or a bent tab on the connector requiring a notched hole in the chassis. When large thick chassis are used, the connector may be screwed into, press fit or soldered to the chassis as desired.

Outdoor use of connectors

While steps have been taken in all of the more modern coaxial connectors to achieve moisture-proofing, none of the connectors may be classified as entirely waterproof and suitable for outdoor use unless protected by additional coverings. The most common practice used to protect the mating surface between plug and receptacle is to pack one side with silicone grease. The connectors are then mated and any excess grease is forced to the outside of the connector where it may be wiped off. The grease tends to dry and form voids after a period of time however, and should be replaced periodically. If not replaced, the voids within the grease may become water traps during periods of temperature change with high humidity. In some cases packing will adversely effect the operation of the cable at UHF frequencies. This is because matched connectors for use above 1000 mc utilize high impedance compensating air sections at the mating surfaces. Silicone grease has a greater dielectric constant than air and packing the mating surface results in a low impedance section with resultant mismatch.

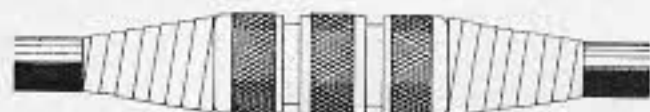
An alternate and preferred method of weatherproofing is to utilize connectors with

threaded mating surfaces such as type N or UHF. The mating threads on the receptacle side can be coated with a waterproof varnish such as Glyptal just prior to making the connection. Then, after assembly, the outer surface of the mated pair may be covered with the same varnish. UHF series connectors may be coated with varnish on the outside but not on the threaded surface, because in these connectors the rf current path takes place along the threaded surface. Unfortunately, the use of Glyptal varnish may only be used once since it renders connectors useless for future mating.

A third method of waterproofing coaxial connector assemblies is to wrap a good quality pressure-sensitive vinyl tape over the junction as shown in Fig. 9. As in the case of silicone grease protection, the tape should be periodically replaced.

For best results, the tape wrap should be installed in the following manner:

1. After the two lengths of cables are connected together, tightly wind tape behind each connector to obtain a smooth contour between connector and cable.
2. Tightly wrap several layers of tape over the entire assembly. Use a 50% overlap and wind each of the layers in opposite directions; a minimum of four layers should be used for maximum protection.
3. The completed tape covering should extend beyond each connector a minimum of eight times the diameter of the cable.



WIND PLASTIC ELECTRICAL TAPE AROUND CABLE IMMEDIATELY BEHIND CONNECTORS TO PROVIDE A SMOOTH CONTOUR BETWEEN CABLE AND CONNECTORS.



WRAP SEVERAL LAYERS OF TAPE WITH A 50% OVERLAP OVER THE CONNECTORS AND BUILT-UP JUNCTIONS. EACH OF THE LAYERS SHOULD BE WRAPPED IN REVERSE DIRECTIONS.

Fig. 9. Taping coaxial cable junctions.

The best method to remove the tape is to unwrap it. A knife may be used for this purpose, but care must be taken not to cut into the plastic jacket of the cable. The recommendation here is to cut the tape in the immediate vicinity of the metal connector and peel it off.

Coaxial connector assembly

The coaxial connector is a highly engineered device and even the smallest mechanical dimension or material characteristic may be of great electrical or mechanical significance. Accordingly, the cable assembly operation must carry out the objective of the original design if the connector is expected to operate to its fully intended capabilities.

Where the assembly instructions show the cable's dielectric butting the connector's dielectric, every precaution should be taken that the assembly method insures a positive butt. If the connector is to be used at ultra high

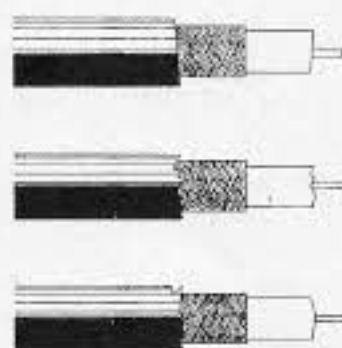
frequencies with a low SWR, the development of air pockets because of loose butt joints or rounded dielectric corners will give rise to impedance mismatches proportional to the frequency of operation. In high voltage cables air pockets or loose joints materially reduce the peak voltage capability of the entire assembly.

Loose butt joints usually develop unless the dielectric trimming process is made one of the last assembly operations. Rounded corners develop because of excess heating during soldering or through a mistaken notion that all "sharp edges should be avoided." It is extremely important that the dielectric be cut at perfect right-angles to the center conductor; no notches should be permitted. Correct methods of stripping the cable dielectric and jacket are shown in Fig. 10.

Air pockets between the inner conductor and the dielectric of the cable usually develop due to excessive heat when soldering the center contact of the connector onto the inner conductor of the cable. Some of the dielectric is softened, and through movement of the inner conductor, a larger hole is formed.

Finally, precautions should be taken during the assembly process to insure that the center contact of the connector rests at its proper lateral position as shown in Fig. 11. In many connectors, the exact axial distance between a point on the connector shell and the tip of the pin is an electrical matching circuit. In type N connectors this is the case where the male pin steps down before entering the female pin of the mating connector, leaving a deliberate radial notch—compensated by the overhung iris in the inside dimension of the outer conductor.

Many times, misalignment results from assembling connectors to both ends of a relatively long cable while it is still coiled. When



INCORRECT



CORRECT



INCORRECT



CORRECT



Fig. 10. Stripping coax cable jacket and dielectric.

Fig. 11. Installing center contact.

RG-/U	Cable Group	RG-/U	Cable Group	RG-/U	Cable Group
5	D	62	B	148	H
6	E	63	J	149	H
8	F	71	B	159	A
9	F	79	J	164	N
10	G	81	K	165	F
11	H	82	M	166	G
13	H	87	F	210	B
17	N	89	J	212	D
18	P	100	C	213	F
21	D	114	J	214	F
29	A	116	G	215	G
31	F	118	L	216	H
32	G	124	E	218	N
35	P	133	J	219	P
38	D	140	B	222	D
39	E	141	A	223	A
55	A	142	A	225	F
58	A	143	D	227	G
59	B	144	H	228	L

Table 8A. Coaxial cable assembly groups.

it is uncoiled, the ends of the center conductor may assume a different position with respect to the ends of the outer braid. For similar reasons, a connector should not be assembled to cable under temperature extremes.

Except for the UHF series of connectors, the only soldering operations encountered during connector to cable assembly is in joining the center contact of the connector to the inner conductor of the cable. However, there are two major precautions which must be observed during this operation. It is imperative that a good solder bond be made between the pin and the inner conductor of the cable over the entire depth of the pin. Otherwise, a significant inductive reactance may be created because the hole in the pin and the inner conductor form the conductors of a miniature short-circuited coaxial line having significant electrical length at UHF frequencies.

Also, any excess solder must be removed so that the step contour between the pin and the

cable conductor corresponds essentially to the original dimensions. A change in dimensions because of excessive solder acts like a shunt capacitor and is in effect a circuit change within the connector.

Complete assembly instructions for type BNC, N and UHF connectors are provided in Fig. 12 through 22. Note that standard series N connectors come in two different versions, one with a v-groove gasket, the other with a cylindrical gasket, but that the assembly sequence is basically the same.

During connector assembly, there are five basic rules which must be followed to obtain proper operation.

1. Closely follow the recommended assembly instructions to insure proper SWR and voltage ratings.
2. Do not apply more heat than necessary during soldering operations. Use crimped or clamped connections on cable braid to prevent heat distortion of the dielectric.
3. Do not exert excessive force in tightening fittings containing rubber or plastic gaskets as permanent deformation will result; occasional light retightening is preferred.
4. Carefully remove all filings, loose solder and other foreign objects from the connectors prior to assembly; observe cleanliness during all operations. Extraneous matter in connectors reduces power and voltage ratings and increases the SWR of the assembly.
5. Use extreme care in the assembly and grounding of connectors operating at high voltages to reduce corona and radiated noise.

Cable Group	Center Conductor	Maximum Dimensions				RG-/U Cables	Impedance (ohms)
		Dielectric	Braid	Jacket	Armor		
A	0.040	0.121	0.177	0.216	—	29, 55, 58, 141, 142, 159, 223	50
B	0.030	0.151	0.206	0.251	—	59, 124, 140, 62, 71, 210	75 93
C	0.096	0.151	0.206	0.251	—	100	35
D	0.061	0.194	0.263	0.342	—	5, 21, 38, 143, 212, 222	50
E	0.030	0.194	0.263	0.342	—	6, 39	75
F	0.096	0.295	0.357	0.435	—	8, 9, 31, 87, 165, 213, 214, 225	50
G	0.096	0.295	0.357	0.435	0.511	10, 32, 116, 166, 215, 227, 229	50
H	0.061	0.295	0.357	0.435	—	11, 13, 144, 148, 149, 216	75
J	0.030	0.295	0.357	0.435	—	133	95
K	0.081	0.334	0.379	—	—	63, 79, 89, 144	125
L	0.198	0.640	0.670	0.745	0.813	81	50
M	0.127	0.650	0.755	—	—	118, 228	50
N	0.198	0.695	0.761	0.888	—	82	50
P	0.198	0.695	0.761	0.888	0.963	17, 218	50
						164	75
						18, 219	50
						35	75

Table 8B. Coaxial cable assembly groups.

SERIES UHF
AMPHENOL 83-1SP

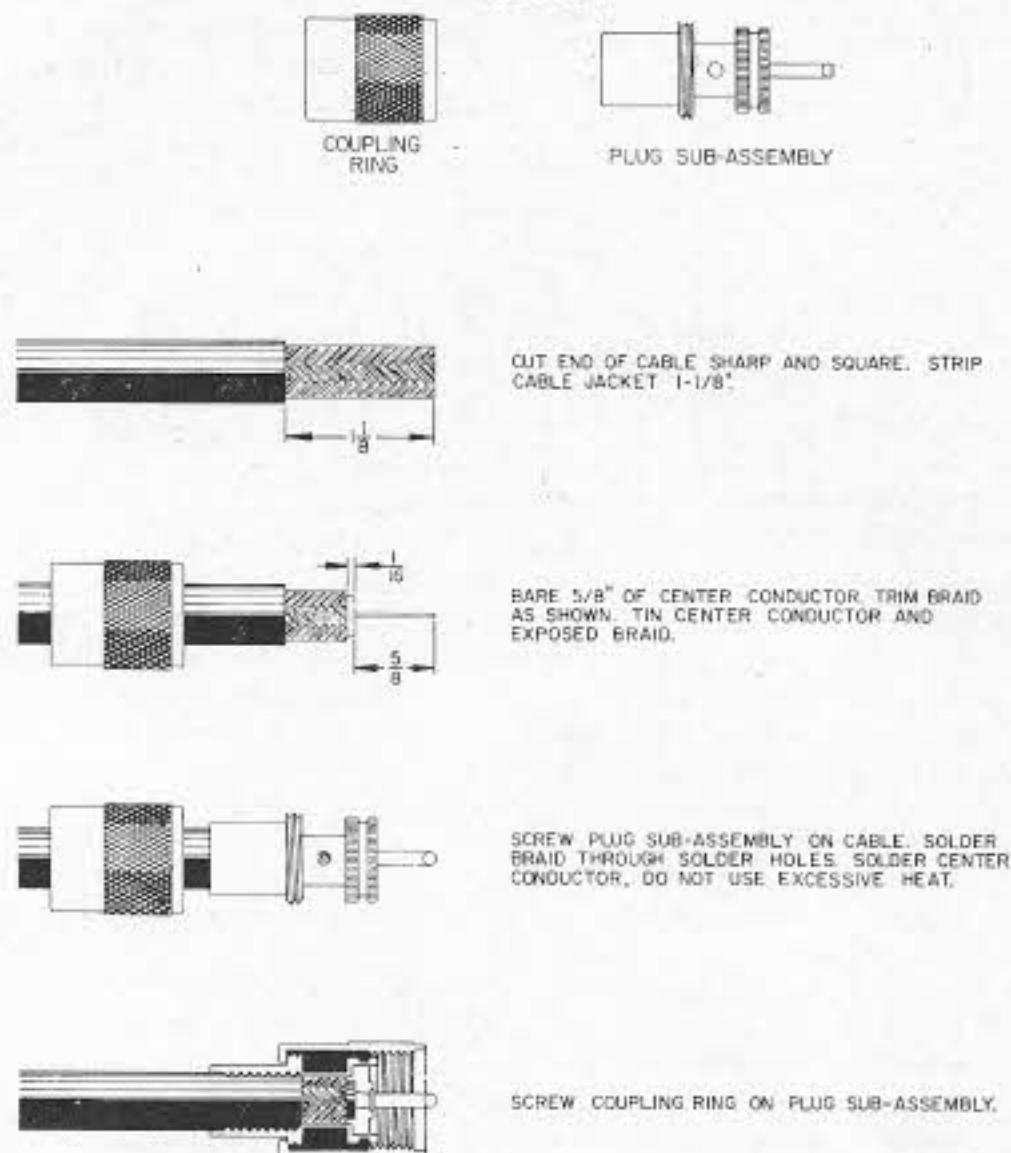


Fig. 12. Series UHF assembly instructions for Amphenol 83-1SP.

Coaxial connector assembly group charts

The "Coaxial Cable Assembly Group Charts" in Table 8 are useful in selecting coaxial connectors for various size coaxial cables. The first part of the charts list 57 of the most popular coaxial cables and the lettered assembly group to which they belong. RG-8/U for example, is in assembly group "F."

The second part of the chart lists the dimensions of each of the cables within a group and their characteristic impedance. Cables within group "F" for example, include RG-8, -9, -31, -87, -165, -213, and -214/U.

The primary use of these charts is in the selection of coaxial connectors. In the "Coaxial Connector Index" in Table 9, only one type of RG-/U cable is listed for each connector. However, the same connector may be used with any other coaxial cable in the same assembly group. For example, the UG-21E/U type N improved plug is listed for cable type RG-8/U. This indicates that the UG-21E/U plug is

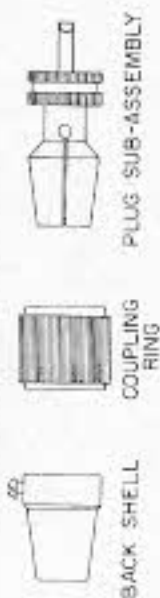
suitable for any of the other cables in the "F" assembly group.

These charts are also useful when selecting connectors for cables which are not listed. In this event, the various dimensions of the cable are compared to the group chart to determine which group is most applicable; suitable connectors are then selected accordingly.

As an aid in connector selection, identification and assembly, the "Connector Index" in Table 9 lists all of the type BNC, N and UHF coaxial connectors currently available along with description, type, equivalent Amphenol part number and applicable RG-/U cables. Many of these connectors have very subtle differences which may be recognized only from the information in the "engineering data" column of the table.

Type designation refers to standard (S), improved (I) and captivated contact (CC) assembly techniques. This index is indispensable in determining what method to use when assembling a particular connector.

SERIES UHF
UG-203/U OR AMPHENOL 63-776



CUT END OF CABLE SHARP AND SQUARE. STRIP CABLE JACKET 1-1/8"



BARE 5/8" OF CENTER CONDUCTOR. TRIM BRAID AS SHOWN. TIN CENTER CONDUCTOR.

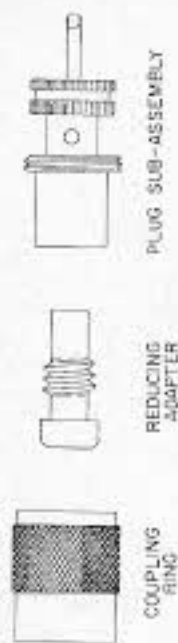


SCREW PLUG SUB-ASSEMBLY ON CABLE. SOLDER BRAID THROUGH SOLDER HOLES. SOLDER CENTER CONDUCTOR. DO NOT USE EXCESSIVE HEAT.



SLIP COUPLING RING OVER PLUG SUB-ASSEMBLY. ALLOW SUFFICIENT CLEARANCE TO PERMIT FREE ROTATION OF COUPLING NUT AND TIGHTEN SET SCREW.

SERIES UHF REDUCING ADAPTERS



CUT END OF CABLE SHARP AND SQUARE. STRIP CABLE JACKET 3/4"



SLIDE COUPLING AND ADAPTER ON CABLE. FAN BRAID SLIGHTLY AND FOLD BACK AS SHOWN.



POSITION ADAPTER AS SHOWN. PUSH BRAID DOWN OVER BODY OF ADAPTER AND TRIM TO 3/8" BARE 5/8" OF CENTER CONDUCTOR. TIN EXPOSED CENTER CONDUCTOR. AVOID EXCESSIVE HEAT.



SCREW PLUG SUB-ASSEMBLY ON ADAPTER. SOLDER BRAID THROUGH SOLDER HOLES TO SHELL. USE JUST ENOUGH HEAT TO BOND BRAID TO SHELL. SOLDER CENTER CONDUCTOR TO CONTACT.



SCREW COUPLING RING ON PLUG SUB-ASSEMBLY.

Fig. 13. Assembly instructions for UHF series UG-203/U.

Fig. 14. Assembly instructions for UHF series reducing adapters.

