BELL SYSTEM PRACTICES
Outside Plant Construction and Maintenance

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CABLE SPLICING—GENERAL
LONG PAIR TWIST QUADDED CABLE

Contents **Page**

1. GENERAL

1.01 A quad consists of four individually insulated conductors arranged in twisted pairs with the two pairs then twisted together. The twist by which the two wires of a pair are combined is referred to as the pair twist and the twist by which the two pairs are combined to form a quad is called the quad twist.

1.02 Like colors of insulation are used on the two wires of each twisted pair.

1.03 The term long pair twist designates a cable in which the pair twist ranges from 16″ to 52″ in length and the quad twist ranges from 5″ to 9″ in length.

2. PAIR TYPES

2.01 The colors of insulation used in long pair twist quadded cables are as follows:

Quad Type	Color of Insulation	
	Pair 1	Pair 2
1	White	Blue
2	Green	Red
3	Orange	Red
4	White	Red

These colors constitute the "toll entrance" color code which is now commonly used. The "universal" color code formerly used employs only pairs of Types 1, 2 and 3.

3. ARRANGEMENT OF QUADS

3.01 In cables with "toll entrance" color code, the individual pairs are bound with white string on the Types 1, 2 and 3 quads and blue strings on the Type 4 quads. The sequence of

types in a layer is 3, 1, 2, 4, 1, 2, 4, 1 etc. If this sequence of types appears clockwise in one layer it will so appear in all layers, and vice versa. As illustrated in Paragraph 5.01, this sequence applies whether the layer consists of quads of one gauge or a combination of two gauges.

3.02 In cables with "universal" color code, the Type 3 quad has orange binding strings and the Type 1 quad following the Type 3 quad has blue binding strings. All remaining Type 1 and Type 2 quads in each layer have white binding strings except that every fifth quad in the layer counting from the Type 3 quad has black binding strings. The sequence of types in a layer is 3, 1, 2, 1, 2 etc. The sequence of quads in each layer as to color of binding strings is orange, blue, white, white, black, white, white, white, white, black, white, white, white, black etc. If the blue bound quad appears in a clockwise direction relative to the orange bound quad in one layer, it will so appear in all layers and vice versa. The cable may contain program pairs and a tracer quad; however their presence in the layer will not affect the arrangement and color grouping of the remaining quads, as illustrated in Paragraph 5.02.

3.03 In either color code, like colored quads in adjacent layers are distinguishable by the presence of a thread of contrasting color in the binding strings of one of the layers.

3.04 The one Type 3 quad in each layer is provided as a starting point for identification purposes.

3.05 In cables having centers composed of less than 3 quads, a Type 3 quad will not appear in the center. The quads in the center of the cable for the different arrangements are of the following types:

Number of Quads in Center	Type of Quad
1	2
2	1 & 2
3	1, 2 & 3

4. ELECTIVE COMPLEMENTS OF EXCHANGE CONDUCTORS

4.01 In some cases exchange conductors are included in the same sheath with quadded conductors. The exchange complements are insulated and assembled as follows:

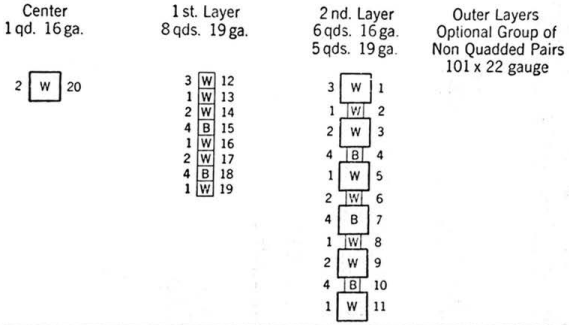
Gauge of Exchange Complement	Type of Insulation	Method of Assembly
19	strip paper	Layer
22	pulp or strip paper	Layer
24	pulp or strip paper	Layer & Unit
26	pulp	Unit

4.02 The arrangement and color groups of the exchange complements are essentially the same as that described in the section on non-quadded composite exchange cables.

5. EXAMPLES

5.01 The following is a typical example of a Lead Covered Paper Insulated Quadded Cable with a core consisting of 7 quads 16 gauge, 13 quads 19 gauge and an exchange complement of 101 pairs 22 gauge. This cable employs the "toll entrance" color code and has four types of quads.

ARRANGEMENT OF CORE



EACH QUAD IS REPRESENTED BY A SQUARE. THE RELATIVE SIZE OF THE SQUARE INDICATES THE GAUGE	
Numerals at left of squares indicate types of quads, viz.	Letters indicate colors of binding strings on pairs, viz.
colors of insulation Type — Pair 1 — Pair 2 1 — White — Blue 2 — Green — Red 3 — Orange — Red 4 — White — Red	B-Blue W-White
Numerals at right of squares indicate numbering, provided for the splicer's use in segregating layers and in boarding.	

5.02 The following is an example of a typical Lead Covered Paper Insulated Quadded Cable with a make-up consisting of 19 quads 16 gauge, 120 quads 19 gauge, and one 22-gauge tracer quad. This cable employs the "universal" color code.

ARRANGEMENT OF CORE

Center 1 qd. 16 ga.	1st layer 6 qds. 16 ga.	2nd layer 12 qds. 16 ga.	3rd layer 22 qds. 19 ga.	4th layer 27 qds. 19 ga.	5th layer 33 qds. 19 ga.	6th layer 38 qds. 19 ga. 1 qd. 22 ga.
2 W 139	3 O 133	3 O 121	3 O 99	3 O 72	3 O 39	3 O 1
	1 B 134	1 B 122	1 B 100	1 B 73	1 B 40	1 B 2
	2 W 135	2 W 123	2 W 101	2 W 74	2 W 41	2 W 3
	1 W 136	1 W 124	1 W 102	1 W 75	1 W 42	1 W 4
	2 K 137	2 K 125	2 K 103	2 K 76	2 K 43	2 K 5
	1 W 138	1 W 126	1 W 104	1 W 77	1 W 44	W Tracer
		2 W 127	2 W 105	2 W 78	2 W 45	1 W 6
		1 W 128	1 W 106	1 W 79	1 W 46	2 W 7
		2 W 129	2 W 107	2 W 80	2 W 47	1 W 8
		1 K 130	1 K 108	1 K 81	1 K 48	2 W 9
		2 W 131	2 W 109	2 W 82	2 W 49	1 K 10
		1 W 132	1 W 110	1 W 83	1 W 50	2 W 11
			2 W 111	2 W 84	2 W 51	1 W 12
			1 W 112	1 W 85	1 W 52	2 W 13
			2 K 113	2 K 86	2 K 53	1 W 14
			1 W 114	1 W 87	1 W 54	2 K 15
			2 W 115	2 W 88	2 W 55	1 W 16
			1 W 116	1 W 89	1 W 56	2 W 17
			2 W 117	2 W 90	2 W 57	1 W 18
			1 K 118	1 K 91	1 K 58	2 W 19
			2 W 119	2 W 92	2 W 59	1 K 20
			1 W 120	1 W 93	1 W 60	2 W 21
				2 W 94	2 W 61	1 W 22
				1 W 95	1 W 62	2 W 23
				2 K 96	2 K 63	1 W 24
				1 W 97	1 W 64	2 K 25
				2 W 98	2 W 65	1 W 26
					1 W 66	2 W 27
					2 W 67	1 W 28
					1 K 68	2 W 29
					2 W 69	1 K 30
					1 W 70	2 W 31
					2 W 71	1 W 32
						2 W 33
						1 W 34
						2 K 35
						1 W 36
						2 W 37
						1 W 38

Each quad is represented by a square, the relative size of the square indicating the gauge.			
Numerals at left of squares indicate types of quads, viz.			Letters indicate colors of binding strings on pairs, viz.
Colors of insulation			B – Blue K – Black O – Orange W – White
Type	Pair 1	Pair 2	
1	White	Blue	
2	Green	Red	
3	Orange	Red	
Tracer	White	Orange	

Numerals at right of squares indicate numbering provided for the splicers use in segregating layers and boarding.