

CD-SERIES OF MULTIUNIT PULP (MUP) CABLE DESCRIPTION, USE, AND REEL LENGTHS

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1. GENERAL

1.01 This section covers the description, use, and reel length information of CD-series of MUP (*MultiUnit Pulp*) and pseudo-MUP cables.

1.02 This section is reissued to:

- Indicate that the factories are being converted to apply TUFFPULP in lieu of standard pulp on CD-type cables
- Include CDMZ 2100-pair cable makeup
- Indicate that CDA-1200, CDM-2100, CDT-3000, and CDT-3600 pair cables are now furnished with bonded stalpeth in lieu of stalpeth sheath
- Redraw Fig. 8.

Arrows are used to indicate significant changes.

1.03 CD-series cables are coded in accordance with the cable letter codes provided in Section 626-020-011.

1.04 Ordering information for CDA, CDM, and CDT cables that are to be connectorized at the factory (ie, CONECS cables) is given in Section 626-500-101.

1.05 The description and ordering information for *MUP* cables with *steampeth* sheath is given in Section 626-101-030.

2. DESCRIPTION

GENERAL

2.01 Conductors: The conductors are annealed copper in the following gauges:

GAUGE	CODE
22	CDA (Pseudo-MUP)
24	CDM (MUP)
26	CDT (MUP)

NOTICE

Not for use or disclosure outside the
Bell System except under written agreement

2.02 Pulp: This material is wood pulp which is applied directly to the wire.

2.03 TUF PULP Insulation: A very thin and virtually invisible layer of binder adhesive is applied to the conductor just prior to applying the wood pulp insulation. The binder makes the pulp adhere to the conductor preventing unravelling, increasing the tensile strength, and improving its crush resistance. TUF PULP looks identical to standard pulp but the insulation will not unravel or strip from the conductor.



During the factory conversion period, pulp or TUF PULP will be furnished, depending on when and where the cable is manufactured.

2.04 Solid-Color Design: The pulp solid color may be natural (designated white), green, red, or blue. Some wires have periodic bands of black or orange stain.

2.05 Tip and Ring: Most pairs are made up of one colored wire and one white wire (with or without stain). For pulp cable, an easy way to remember which is tip and which is ring is "Red is Ring". This implies that all white wires are tip and all wires of other colors (green or blue) are ring. For pairs with both wires colored (R-BL and R-G), again, "Red is Ring".

MUP MAKE-UP

2.06 For MUP cable (24- and 26-gauge), the 100-pair multiunits consist of four 25-pair units, and the 50-pair multiunits consist of two 25-pair binder groups (one 12-pair and one 13-pair unit). See Fig. 1 and 2 for colors of unit binders.

2.07 MUP Advantages: In comparison with the replaced AD-series cables which use 50- or 100-pair units, the MUP design offers the following advantages.

- (1) The match of 25-pair units and 25-pair modular connectors speeds splicing and avoids unnecessary pair handling.

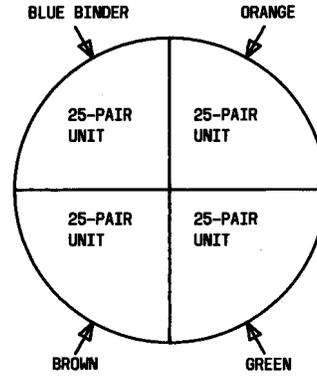
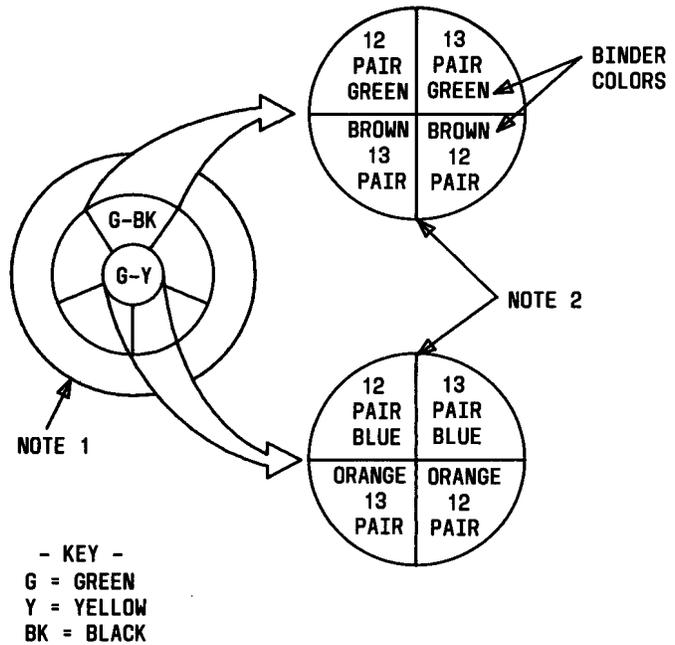


Fig. 1—Unit Binder Colors of 100-Pair CDM and CDT MUP Multiunits



NOTES:

- 1. EXCEPT FOR THE TWO 50-PAIR MULTIUNITS SHOWN, ALL OTHER MULTIUNITS ARE 100 PAIRS EACH.
- 2. INITIAL 1500 PAIR MUP CABLES USED BLUE, ORANGE, GREEN AND BROWN UNIT BINDERS FOR BOTH 50 PAIR MULTIUNITS.

Fig. 2—Unit Binder Colors of Lay-Up of CDM and CDT 50-Pair Multiunits in CDM and CDT 1500-Pair Cable

- (2) At splices, 25-pair groups (units or binder groups) can be picked out on sight for assignment or rearrangement. This saves ring-out time and minimizes pair handling and consequent insulation damage.
- (3) Four or five pairs in each unit are identifiable on sight for immediate restoration if a cable is cut.

PSEUDO-MUP MAKEUP

2.08 The MUP design tried on 22-gauge cable produced a cable with substandard crosstalk capabilities. The solution was to leave the present, well-characterized, design (50-pair units, white-green, white-red, and white-blue) unchanged, except for unit binders. One can gain the MUP advantage of instant 25-pair group recognition with a modified splicing procedure called "pseudo-MUP splicing."

CORE CONSTRUCTION

A. MUP Identification

2.09 There is only one pair lay-up for 100-pair multiunits (Fig. 3) and one for 50-pair multiunits (Fig. 4). These multiunits cannot be distinguished by the ring color of an outer layer of pairs as in AD-type, pulp insulated cables. In MUP cable, multiunit identification is provided as follows.

Each multiunit has a two-color binder. In the center or in any layer, a green binder indicates a marker multiunit. This multiunit is flanked by multiunits with, alternately, red and blue binders. The marker multiunits are situated radially over each other. This follows the unit coloring scheme used in pulp cables and makes it easy to remember. The second multiunit binder color indicates layer — yellow for outside layer; then, alternately, black and yellow. See Fig. 5.

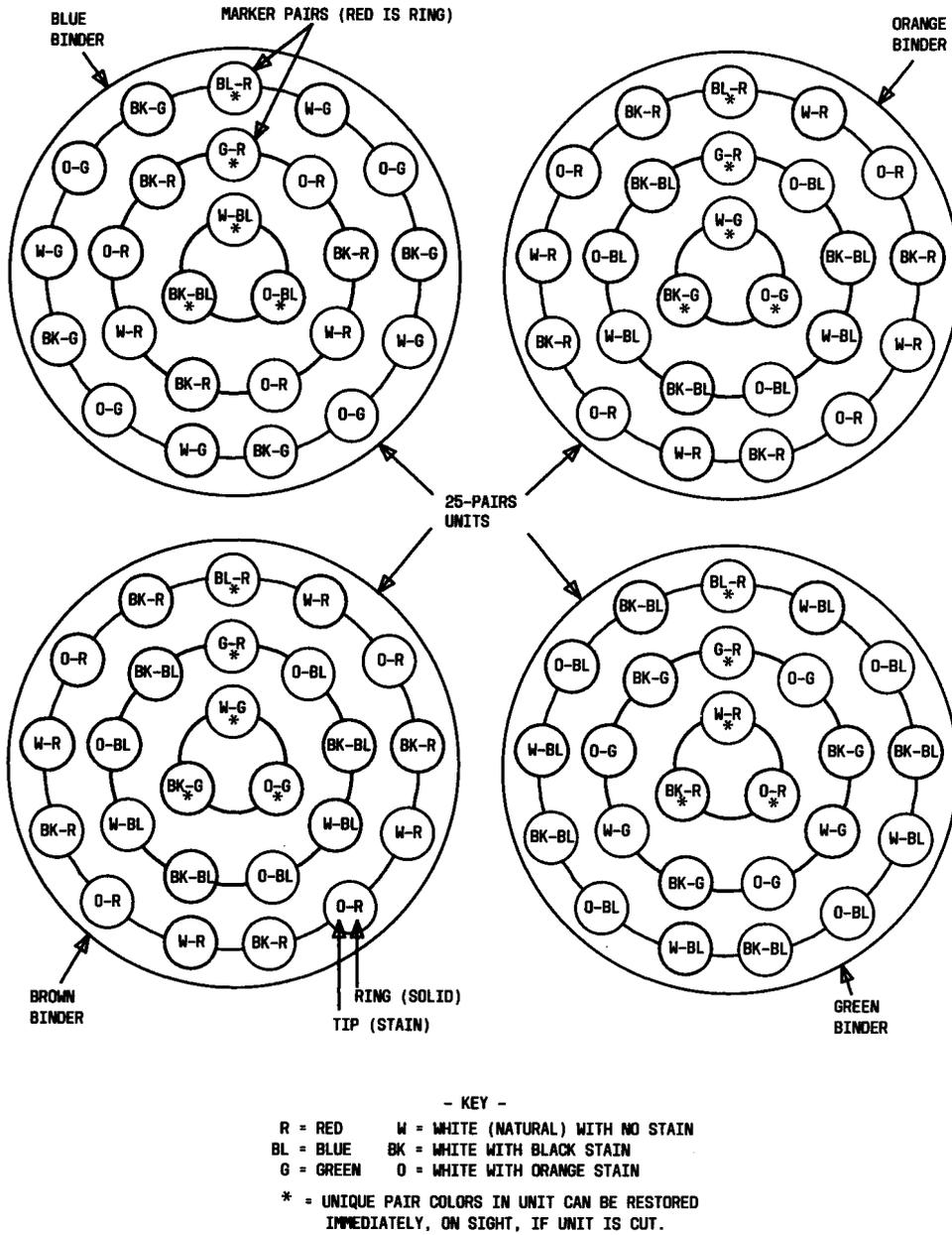


Fig. 3—Pair Lay-Up of 100-Pair Multiunit (MUP Design)

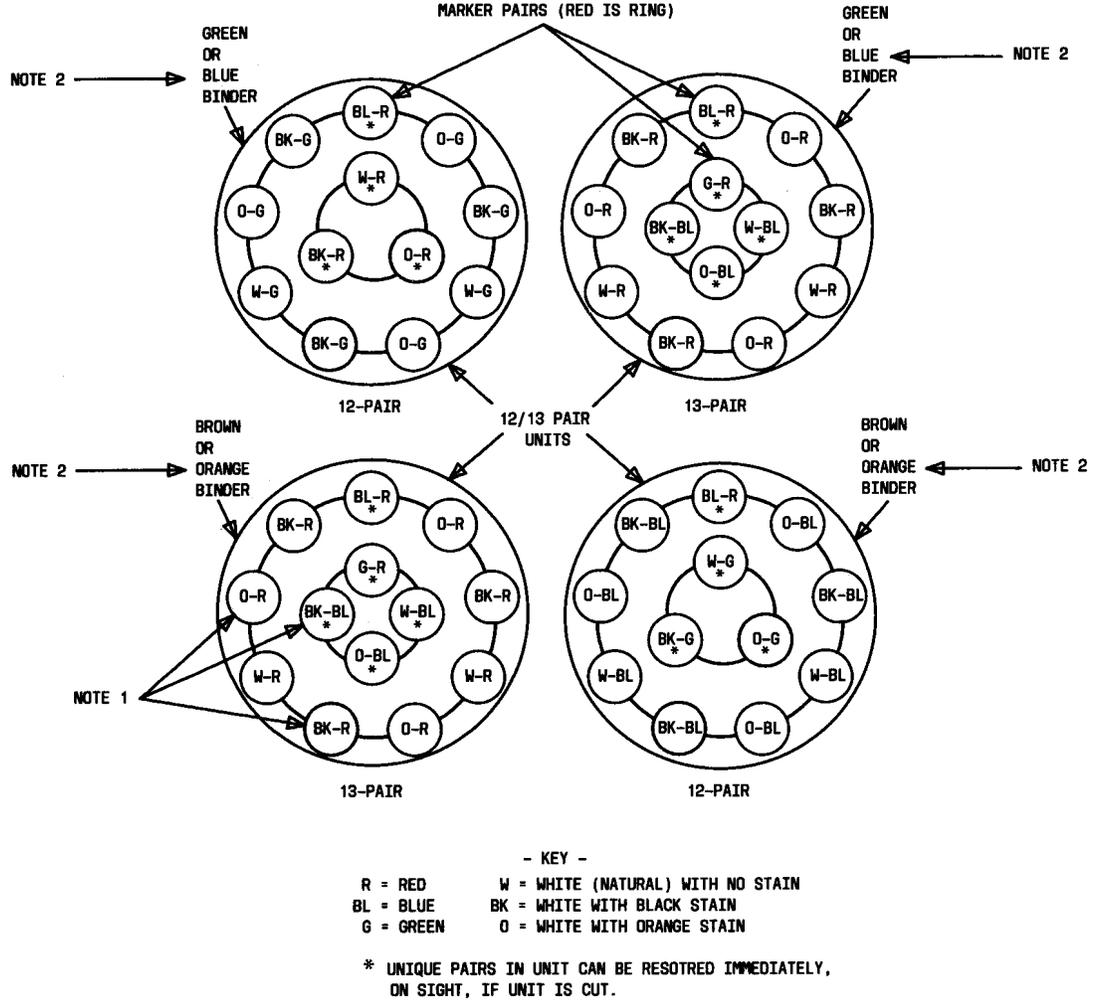


Fig. 4—Pair Lay-Up of CDM and CDT 50-Pair Multiunit (MUP Design)

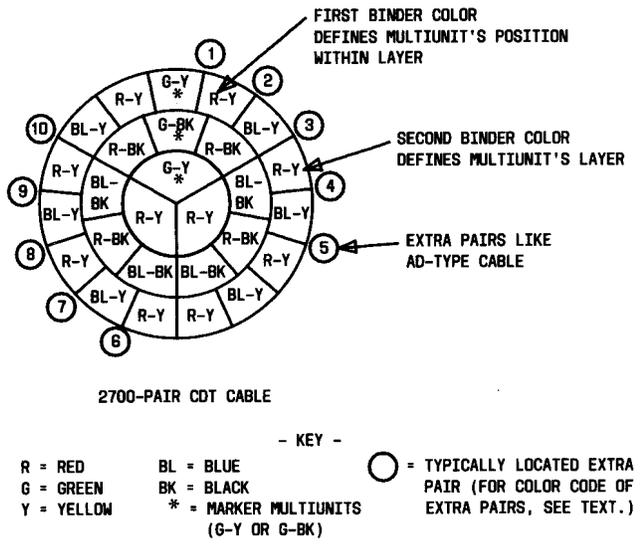
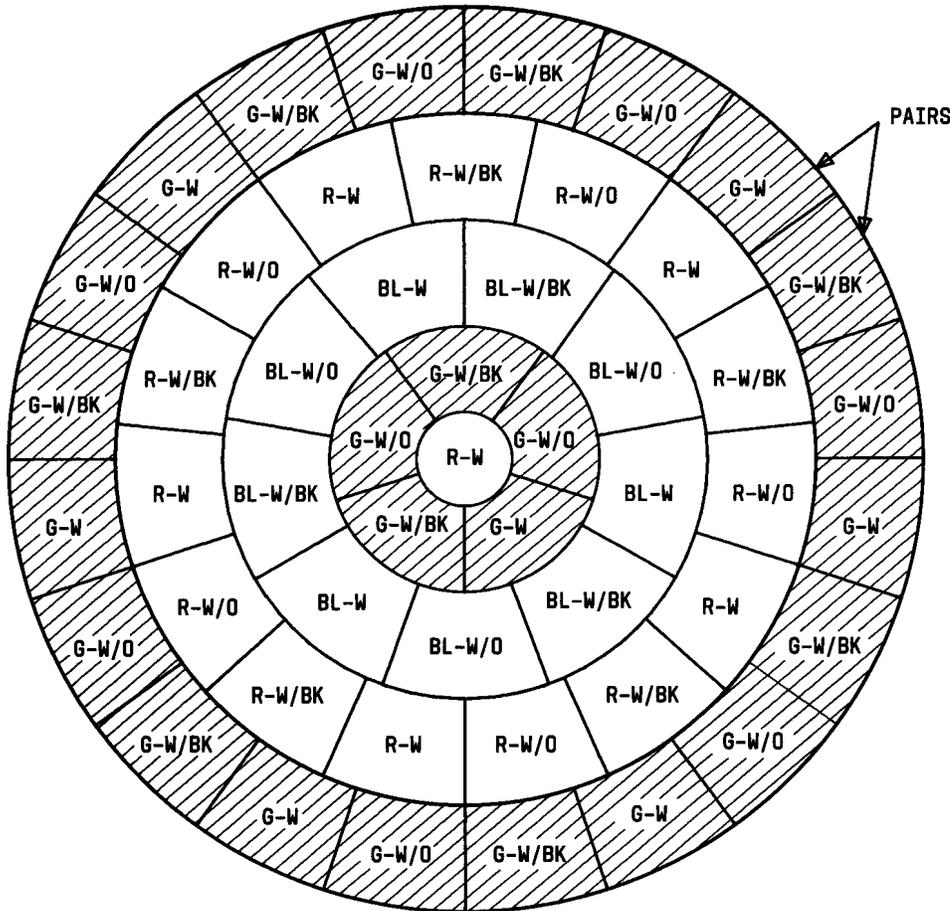


Fig. 5—Multiunit Identification for MUP Cables

B. Pseudo-MUP Identification

2.10 The standard unit in 22-gauge cable has 50 pairs. Of these pairs, 25 have the same color insulation and can be treated as a group like a MUP unit. For example, in a "green" unit which has a green-yellow or green-black binder, the 20 green-white pairs in the outside layer and 5 green-white pairs in the first layer around a (differently colored) single pair center should be

spliced as a 25-pair group (Fig. 6). The remaining 25 pairs will have either red-white or blue-white insulation and should be spliced as the second 25-pair group. A comparable situation exists in "blue" and "red" units. Note that the red, blue, or green binder around each unit denotes the predominant pair-color of the unit, and that the first 25-pairs of the 50-pair unit are to be the same color as the binder. In pseudo-MUP cable, units are identified by plastic binders like those used for multiunit identification in MUP cable.



NOTE:
 "GREEN" UNIT IS SHOWN: THERE ARE CORRESPONDING
 "RED" AND "BLUE" UNITS.

INSULATION COLORS

- G = GREEN
- R = RED
- BL = BLUE
- W = WHITE (NATURAL) WITH NO STAIN
- W/O = WHITE WITH ORANGE STAIN
- W/BK = WHITE WITH BLACK STAIN

Fig. 6—Pair Lay-Up of 50-Pair Unit for Pseudo-MUP—CDA Cables

C. Extra Pairs—MUP and Pseudo-MUP Cables

2.11 Extra or Spare Pairs and Allowed Defects: In pulp insulated cable, a small number of extra pairs are provided which can be substituted for defects occurring during manufacture

or installation. The allowable number of defective pairs in the cable as shipped (no grounds permitted) is less than the number of extra pairs provided. This is to ensure meeting the Western Electric Company guarantee. See Table A.

TABLE A

CD-SERIES CABLE SIZES AND EXTRA PAIRS

I (NOTE 1) NOMINAL CABLE SIZES (NOTE 2)	II ADDITIONAL PAIRS GUARANTEED AT FACTORY	III MINIMUM NO. OF GOOD PAIRS AS SHIPPED (I) + (II)	IV EXTRA PAIRS TO ALLOW FOR FACTORY DEFECTS	V TYPICAL TOTAL PAIRS IN THE CABLE (III) + (IV)
600	1	601	3	604
900	1	901	4	905
1200	2	1202	4	1206
1500	2	1502	4	1506
1800	2	1802	5	1807
2100	3	2103	5	2108
2400	3	2403	6	2409
2700	3	2703	7	2710
3000	4	3004	7	3011
3600	4	3604	10	3614

Note 1: Roman numerals appearing in column headings identify column by number.

Note 2: Used for ordering and record purposes, Western Electric Company guarantee, etc.

2.12 The extra pairs are located in the interstices between units or multiunits of the outer layer. A standard color code (Table B) is used for ten different extra pairs. If more than ten extra pairs are included, the color code shown for pairs No. 2 through 10 is repeated in sequence for extra pairs 11 through 19. Note that pair No. 1 (red-blue) is used only once.

2.13 Extra pairs appear in sequence and in a single turn around the cable core in the direction given by moving from the outer layer green-yellow bound unit or multiunit towards the red-blue extra pair. For example, extra pairs No. 2 and 11 are both G-W and they can be differentiated by their **position** around the core (No. 2 follows the R-BL pair).

TABLE B

EXTRA PAIR COLORS

PAIR NO.	STANDARD CODE (1966 TO DATE)
1	Red-blue*
2 or 11	Green-white
3 or 12	Red-white
4 or 13	Blue-white
5 or 14	Green-white/black stain
6 or 15	Red-white/black stain
7 or 16	Blue-white/black stain
8 or 17	Green-white/orange stain
9 or 18	Red-white/orange stain
10 or 19	Blue-white/orange stain

* Red-blue extra pair is used only once in each cable.

D. Core Lay-Ups—MUP and Pseudo-MUP Cables

2.14 Figures 7 and 8 illustrate the available pair sizes and core lay-ups of CD-series cables.

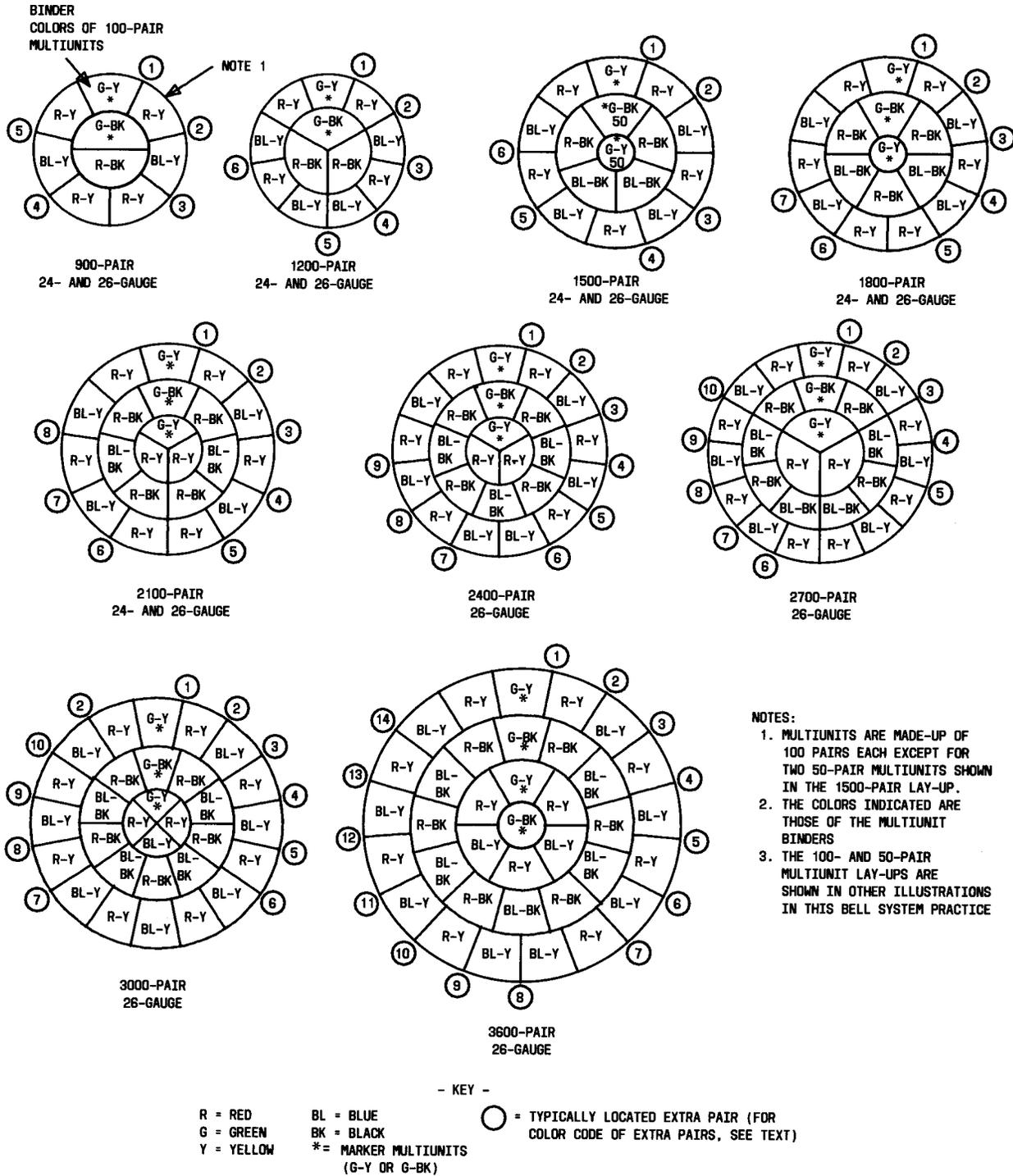
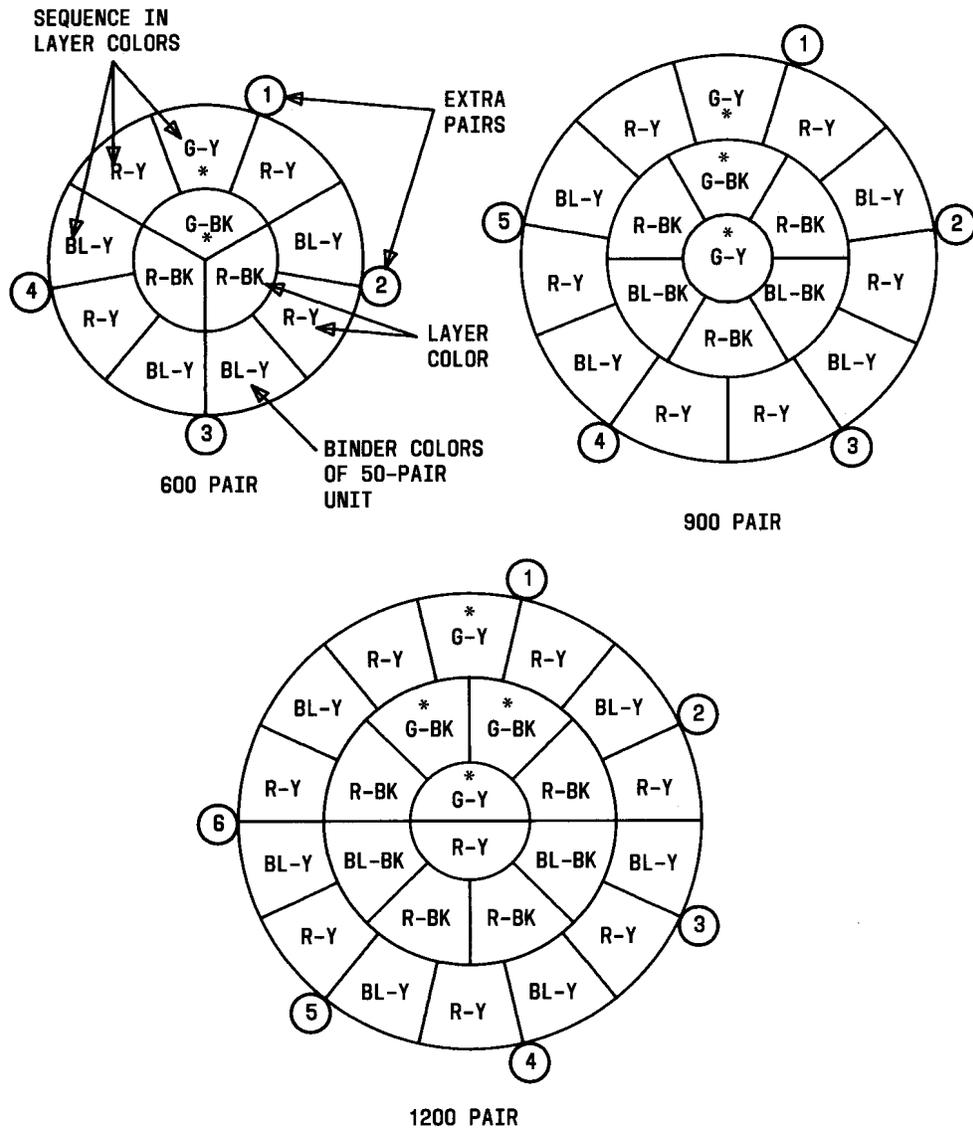


Fig. 7—CDM and CDT MUP Cable Lay-Ups



- KEY -

- G = GREEN
- R = RED
- B = BLUE
- Y = YELLOW
- BK = BLACK
- * = MARKER UNITS (G-Y OR G-BK)

Fig. 8—CDA Pseudo-MUP Cable Lay-Ups

E. ♦New Sheath For Large Size CD-Series Cables♦

2.15 A modified and improved version of stalpeth sheath for CDA-1200, CDM-2100, CDT-3000, and CDT-3600 pair cables is being introduced. Its use will be extended to smaller cables at a later date. The new sheath is called bonded stalpeth sheath and is allocated the code letter "Z."

2.16 The bonded version of stalpeth sheath differs from the regular version in having a thin plastic coating on the steel which causes the steel to bond (adhere) to the polyethylene jacket as the jacket is applied. In the sheath there is no longer any need (or a place for) a thermoplastic flooding between the steel and the jacket. In the bonded stalpeth sheath, the usual soldering of the overlapped steel seam is also omitted, being no longer necessary or feasible; however, the seam is sealed with an adhesive.

2.17 Bonded stalpeth sheath resists buckling during installation better than regular stalpeth, and it also allows even less moisture to diffuse into the cable core.

2.18 Installation hardware and procedures for bonded stalpeth sheaths are the same as for regular sheaths with one exception—to remove

the sheath, the steel and jacket have to be taken off as a unit.♦

3. USE

3.01 MUP cables are intended for general use in exchange, subscriber, and trunk plant for voice or carrier frequency. However, for full-fill two-way T-carrier transmission, screened cable is needed. (See Section 626-800-090.)

3.02 ♦MUP's advantages are realized by engineering with 25-pair groups corresponding to units (or binder groups). See Paragraph 2.07(2).

3.03 Random splicing of *all* pairs in units (or binder groups) is necessary. In 25-pair modular splices, note that the *ring* colors are red, blue, or green and *tip* colors are all white except for one blue and one green (25-pair units) or two blue and one green (25-pair binder group from a 50-pair multiunit). Particularly, ring colors include no white color and tip colors include no red color.♦

4. ELECTRICAL CHARACTERISTICS

4.01 The electrical characteristics of CD-series cables are listed in Tables C and D.

TABLE C

ELECTRICAL CHARACTERISTICS

GAUGE AND CABLE CODE	DC RESISTANCE (OHMS/ LOOP MI AT 68° F)	CAP: (nF/MI) AT 60° F 900 OR 1000 Hz)	CONDUCTANCE (μ S/MI AT 900 Hz)	INSULATION RESISTANCE GREATER THAN (MEGOHM MI)	DIELECTRIC STRENGTH (GREATER THAN)	
					BETWEEN CONDUCTORS (VOLTS RMS)	BETWEEN CONDUCTORS AND SHEATH
22-Ga CDA	173	83	2	500	350	CDAL = 1000V rms CDAC = 1000V rms CDAZ = 1000V rms CDAE = 1000V rms CDAH = 20,000 Vdc
24-Ga CDM	274	83	2	500	350	CDML = 1000V rms CDMC = 1000V rms CDMZ = 1000V rms CDME = 1000V rms CDMM = 1000V rms CDMH = 20,000 Vdc
26-Ga CDT	440	83	2	500	350	CDTL = 1000V rms CDTC = 1000V rms CDTZ = 1000V rms CDTE = 1000V rms CDTM = 1000V rms CDTH = 20,000 Vdc

TABLE D

ATTENUATION AT 50°F

FREQUENCY (kHz)	dB/1000 FT (APPROX)		
	22-GA	24-GA	26-GA
	CDA	CDM	CDT
1	0.34	0.43	0.58
48	1.44	2.04	2.57
96	1.76	2.50	3.10
136	1.99	2.82	3.48
168	2.15	3.03	3.71
208	2.40	3.29	3.99
256	2.59	3.61	4.31
772	5.09	6.79	8.20
1600	7.20	—	—

5. PHYSICAL CHARACTERISTICS AND REEL LENGTH

DEFINITIONS

5.01 Coded Cable Designations: When ordering CD-series cables, use all of the cable letter code (paragraph 1.03). For example, a stalpeth sheath CD-type letter-coded cable with 2400 pairs, 26-gauge is ordered as CDTC-2400.

5.02 Maximum Reel Lengths: These are the longest lengths of pulp-insulated cable that can be obtained on the specified reel.

Note: When considering the use of 487 reels, be certain that construction equipment is available to handle these large reels. (See Section 649-210-134.)

5.03 Pulp Shipping Length Policy: Whenever an order requests a specific cut length ("X-type") of pulp exchange cable, the following will apply.

- (a) No reel of cable will be shipped shorter than the length ordered without reference to and concurrence from the operating company. If concurrence to ship a reel of cable shorter than the ordered length is received, the company will be billed only for the length shipped.

- (b) Shipment of reels of cable up to 10 feet in excess of ordered lengths may be made without referral to the operating company. Where such shipments take place, the customer will be billed only for the length ordered.

- (c) It is not expected that cables which exceed this 10-foot tolerance will need to be shipped. If such an occasion does arise, advance concurrence of the operating company will be obtained and the billing will be negotiated.



In reading the length tables, the user will observe a few situations where the maximum length increases as the diameter of the cable increases. This is not an error, but is a phenomenon of the manner in which cable distribution behaves within the limiting reel dimensions, as observed in actual practice.

REEL LENGTH DATA

5.04 Information on pair sizes, diameters, weights, and reel lengths of CD-series cables is given in Tables E through L. The diameter and weights shown are approximate.

TABLE E

**CD-TYPE (COPPER) PULP STALPETH OR BONDED STALPETH
SHEATH CABLE (Notes 1 & 2)**

CABLE CODE	NO. OF PAIRS	GAUGE	MAXIMUM LENGTH ON 420 REEL (FEET)	MAXIMUM LENGTH ON 487 REEL (FEET)	OUTSIDE DIAMETER (INCHES)	WEIGHT PER FOOT (POUNDS)
CDAC	600	22	1736	3025	2.32	3.22
	900	22	1320	1985	2.78	4.70
CDAZ*	1200	22	936	1425	3.17	6.19
CDMC	900	24	2145	—	2.24	3.06
	1200	24	1395	2405	2.55	4.00
	1500	24	1326	1985	2.82	4.93
	1800	24	1018	1624	3.05	5.88
CDMZ*	2100	24	680	1275	3.40	7.17
CDTC	900	26	2796	—	1.87	2.02
	1200	26	2109	—	2.12	2.63
	1500	26	1738	3029	2.33	3.23
	1800	26	1654	2570	2.53	3.82
	2100	26	1310	2460	2.71	4.41
	2400	26	1223	1985	2.88	5.01
2700	26	1018	1622	3.04	5.59	
CDTZ*	3000	26	936	1425	3.17	6.21
	3600	26	680	1183	3.40	7.37

Note 1: Bond wires and pulling eyes are furnished on factory shipments when specified on agreement with the service center. Cables are shipped under air pressure.

Note 2: All pulp codes are nonstock with eight-week interval.

*Z = Bonded Stalpeth.

TABLE F

CD-TYPE (COPPER) PULP CABLE-STALPETH SHEATH WITH AT
(Notes 1 & 2)

CABLE CODE	NO. OF PAIRS	GAUGE	MAXIMUM LENGTH ON 420 REEL (FEET)	OUTSIDE DIAMETER (INCHES)	WEIGHT PER FOOT (POUNDS)
CDAC-AT	600	22	1296	2.61	6.36
	900	22	1021	3.08	8.45
CDMC-AT	900	24	1654	2.53	6.10
	1200	24	1218	2.84	7.45
	1500	24	931	3.11	8.72
CDTC-AT	900	26	2118	2.15	4.56
	1200	26	1755	2.41	5.50
	1500	26	1299	2.63	6.38
	1800	26	1216	2.83	7.25
	2100	26	1015	3.01	8.07
	2400	26	936	3.17	8.88

Note 1: Bond wires and pulling eyes are furnished on factory shipments when specified on the order or on agreement with the service center. Cables are shipped under air pressure.

Note 2: All pulp codes are nonstock with eight-week interval.

TABLE G

CD-TYPE (COPPER) PULP PASP SHEATH CABLE
(Notes 1 & 2)

CABLE CODE	NO. OF PAIRS	GAUGE	MAXIMUM LENGTH ON 420 REEL (FEET)	MAXIMUM LENGTH ON 487 REEL (FEET)	OUTSIDE DIAMETER (INCHES)	WEIGHT PER FOOT (POUNDS)
CDAH	600	22	1648	2559	2.50	3.45
	900	22	1011	1885	2.97	4.98
	1200	22	754	1425	3.38	6.51
CDMH	900	24	1757	2880	2.42	3.27
	1200	24	1313	1984	2.73	4.25
	1500	24	1014	1885	3.00	5.21
	1800	24	945	1526	3.27	6.19
CDTH	900	26	2222	—	2.03	2.19
	1200	26	1729	3011	2.29	2.82
	1500	26	1650	2563	2.51	3.45
	1800	26	1310	2460	2.71	4.07
	2100	26	1004	2027	2.90	4.69
	2400	26	1020	1627	3.07	5.30
	2700	26	941	1517	3.22	5.90
3000	26	755	1425	3.39	6.52	

Note 1: Bond wires and pulling eyes are furnished on factory shipments when specified on the order or on agreement with the service center. Cables are shipped under air pressure.

Note 2: All pulp codes are nonstock with eight-week interval.

TABLE H

CD-TYPE (COPPER) PULP CABLE-PASP SHEATH WITH MP
(Notes 1 & 2)

CABLE CODE	NO. OF PAIRS	GAUGE	MAXIMUM LENGTH ON 420 REEL (FEET)	OUTSIDE DIAMETER (INCHES)	WEIGHT PER FOOT (POUNDS)
CDAH-MP	600	22	1309	2.70	3.83
	900	22	933	3.13	5.45
CDMH-MP	900	24	1297	2.62	3.64
	1200	24	1222	2.87	4.67
	1500	24	940	3.21	5.69
	1800	24	684	3.47	6.72
CDTH-MP	900	26	2130	2.19	2.49
	1200	26	1636	2.44	3.17
	1500	26	1309	2.70	3.84
	1800	26	1222	2.87	4.49
	2100	26	1018	3.05	5.14
	2400	26	940	3.21	5.78

Note 1: Bond wires and pulling eyes are furnished on factory shipments when specified on the order or on agreement with service center. Cables are shipped under air pressure.

Note 2: All pulp codes are nonstock with eight-week interval.

TABLE I

CD-TYPE (COPPER) PULP CABLE-PASP SHEATH WITH BT
(Notes 1 & 2)

CABLE CODE	NO. OF PAIRS	GAUGE	MAXIMUM LENGTH ON 420 REEL (FEET)	OUTSIDE DIAMETER (INCHES)	WEIGHT PER FOOT (POUNDS)
CDAH-BT	600	22	1011	2.97	6.21
	900	22	682	3.44	8.18
CDMH-BT	900	24	1224	2.89	5.96
	1200	24	939	3.20	7.23
	1500	24	684	3.47	8.45
CDTH-BT	900	26	1648	2.50	4.51
	1200	26	1317	2.76	5.38
	1500	26	1012	2.98	6.23
	1800	26	937	3.18	7.03
	2100	26	954	3.37	7.83
	2400	26	688	3.54	8.59

Note 1: Bond wires and pulling eyes are furnished on factory shipments when specified on the order or on agreement with the service center. Cables are shipped under air pressure.

Note 2: All pulp codes are nonstock with eight-week interval.

TABLE J
CD-TYPE (COPPER) PULP LEAD SHEATH CABLE
 (Notes 1 & 2)

CABLE CODE	NO. OF PAIRS	GAUGE	MAXIMUM LENGTH ON 420 REEL (FEET)	OUTSIDE DIAMETER (INCHES)	WEIGHT PER FOOT (POUNDS)
CDAL	600	22	2133	2.20	6.02
	900	22	1304	2.67	8.51
	1200	22	1021	3.08	10.98
CDML	900	24	2109	2.12	5.70
	1200	24	1634	2.43	7.30
	1500	24	1309	2.70	8.83
	1800	24	1011	2.97	10.46
CDTL	900	26	3274	1.75	3.96
	1200	26	2536	2.00	5.02
	1500	26	2139	2.22	6.07
	1800	26	1755	2.41	7.06
	2100	26	1402	2.60	8.09
	2400	26	1319	2.77	9.08
	2700	26	1006	2.92	10.03
3000	26	929	3.09	11.02	

Note 1: Bond wires and pulling eyes are furnished on factory shipments when specified on the order or on agreement with the service center. Cables are shipped under air pressure.

Note 2: All pulp codes are nonstock with eight-week interval.

TABLE K

CD-TYPE (COPPER) PULP POLY-JACKETED LEAD SHEATH CABLE

CABLE CODE	NO. OF PAIRS	GAUGE	MAXIMUM LENGTH ON 420 REEL (FEET)	OUTSIDE DIAMETER (INCHES)	WEIGHT PER FOOT (POUNDS)
CDAE	600	22	1744	2.36	6.25
	900	22	1216	2.83	8.80
	1200	22	942	3.24	11.32
CDME	900	24	1727	2.28	5.91
	1200	24	1401	2.59	7.56
	1500	24	1222	2.87	9.12
	1800	24	933	3.13	10.78
CDTE	900	26	2649	1.89	4.13
	1200	26	2118	2.15	5.22
	1500	26	1747	2.37	6.30
	1800	26	1398	2.57	7.32
	2100	26	1317	2.76	8.36
	2400 2700	26 26	1007 929	2.93 3.09	9.38 10.35

TABLE L

CD-TYPE (COPPER) PULP ALVYN SHEATH CABLE

CABLE CODE	NO. OF PAIRS	GAUGE	MAXIMUM LENGTH ON 420 REEL (FEET)	OUTSIDE DIAMETER (INCHES)	WEIGHT PER FOOT (POUNDS)
CDMM	900	24	2148	2.25	3.09
	1200	24	1396	2.56	4.06
	1500	24	1223	2.88	5.15
	1800	24	932	3.12	6.09
CDTM	900	26	2796	1.87	2.03
	1200	26	2109	2.12	2.65
	1500	26	1740	2.34	3.27
	1800	26	1395	2.55	3.89
	2100	26	1313	2.73	4.49
	2400 2700	26 26	1008 930	2.94 3.10	5.23 5.82