ICOT (MLM AND MCM) T1/T1C CARRIER CABLES— DESCRIPTION, USE, AND REEL LENGTHS

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1. GENERAL

1.01 ICOT cables coded MLM (waterproof) and MCM (air core) are screened, low-capacitance cables with 24-gauge copper conductors and standard color-coded plastic insulation. The waterproof ICOT cable has a bonded ASP sheath with the option of UM protection. The air core version of ICOT cable is available with a bonded stalpeth or PASP sheath. This section covers the description, use, and reel lengths of ICOT cables.

1.02 When this section is reissued, the reason for reissue will be listed in this paragraph.

1.03 A detailed description, selection, and use of outer protections are covered in Section 626-759-025.

2. DESCRIPTION

FILLING COMPOUND

2.01 Filling compound throughout the core distinguishes MLM waterproof cable from MCM air core cable.

2.02 The compound and the manner of filling the core are the same as for other waterproof cables; for instance, the AL series. (See Section 626-101-010.)

METALLIC SCREEN

2.03 ***Screen Construction:*** All ICOT cable cores are bisected by a transverse screen. The screen consists of 4-mil thick aluminum insulated with a plastic coating. The screen allows ICOT cable to provide full-fill, single-cable operation of T1/T1C digital carrier systems. However, there may have to be some reduction in maximum repeater spacing with T1C on 54-pair ICOT cables and on 106-pair air core ICOT cable with a PASP sheath. Information will be published as soon as it is available.

CONDUCTORS, INSULATION, CONDUCTOR DEFECTS, AND CORE BINDER

2.04 ***Conductors and Insulation:*** ICOT cable has ***D***ual ***E***xpanded ***P***lastic ***I***nsulated ***C***onductors (DEPIC). The conductors are 24-gauge

annealed copper and the insulation consists of an inner layer of white plastic foam with an outer skin of colored solid plastic. The foam layer conserves plastic and also allows a smaller core diameter. DEPIC can be identified by slicing away the colored plastic skin to expose the white foam layer.

2.05 ***Pair Color Code:*** ICOT cable pairs are standard PIC color coded in accordance with Bell System Cable and Wire Color Code Rule Form E-4911. (See Section 626-101-005.)

2.06 ***Conductor Defects:*** No shorts, crosses, grounds, or opens are permitted in ICOT cables as shipped from the factory. There is a 100 percent guarantee on all pairs, including the service pairs.

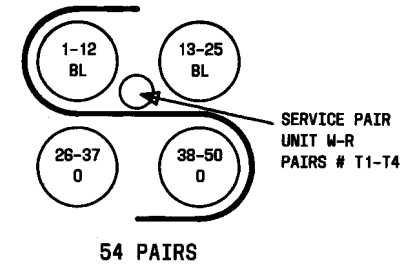
2.07 ***Core Binder:*** The Western Electric Company, Inc., facility where ICOT cable is manufactured can be identified by the color combination of the core binder as follows:

PLANT	COLORS
Atlanta	Brown-Brown
Omaha	White-Yellow or Yellow-Yellow
Phoenix	White-White
Baltimore	Black-Yellow or Brown-Brown

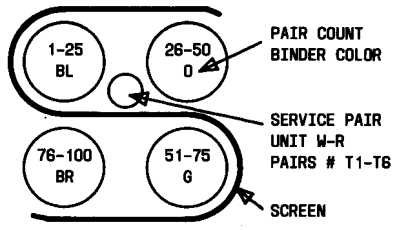
CORE CONSTRUCTION

A. Lay-Ups of 314 and Less Pairs

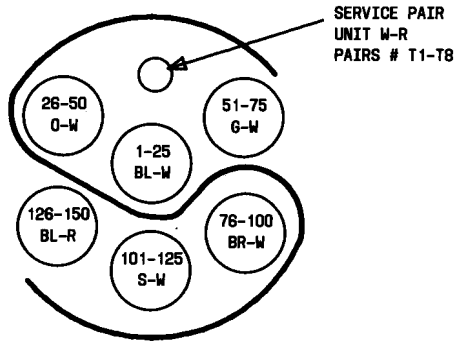
2.08 ***Binder Group Color Code:*** The sequence of counting the 25-pair color groups of pairs is indicated by unit binders with the same color sequence as the pairs (blue-white, orange-white, green-white, etc). This system of designations is used on the Bell System Cable and Wire Color Code Form E-4911. Figure 1 shows the lay-ups of air core and waterproof ICOT cables in pair sizes 54 through 314 pairs. These cables are made up of standard 12-, 13-, and 25-pair units. (See paragraph 2.11 for information on the white-red service pairs binder groups.)



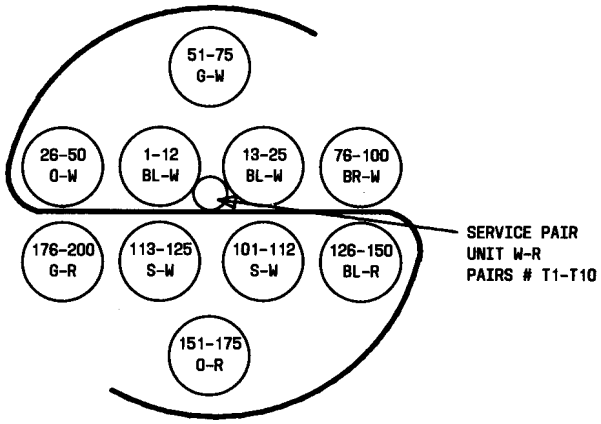
54 PAIRS



106 PAIRS



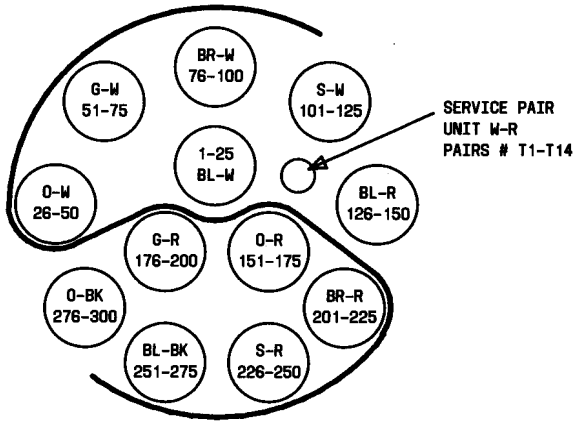
158 PAIRS



210 PAIRS

-KEY-

BL	= BLUE	W	= WHITE
O	= ORANGE	R	= RED
G	= GREEN	BK	= BLACK
BR	= BROWN	Y	= YELLOW
S	= SLATE	V	= VIOLET



314 PAIRS

Fig. 1—54- Through 314-Pair ICOT Cable Lay-Ups

B. Lay-Ups of 418 and More Pairs

2.09 These sizes of ICOT cables are made up from multiunits; ie, 50- or 100-pair multiunits for 418- and 616-pair cable and 75-pair multiunits for 922-pair size (Fig. 2). Alternate designs (lay-ups) are shown for the 418- and 616-pair cables. However, every design has the standard PIC color code for pair identification.

2.10 ***Multiunit Lay-Ups:***

(a) ***50-Pair Multiunit***—These multiunits have white binders and consist of four units with 12, 13, 12, and 13 pairs. The first two units have like color binders and constitute a 25-pair color group—similarily, the last two units. Unit binder colors follow the standard PIC color-code sequence as do the pairs within each color group. (See paragraphs 2.11 for information on the white-red service pair unit.)

(b) ***100-Pair Multiunit***—These multiunits have white binders. Each 100-pair multiunit is composed of ***four*** 25-pair units. The unit binders have the standard PIC color-code sequence. Pairs within each 25-pair unit also have the standard PIC color code. (See paragraph 2.11 for information on the white-red service pair unit.)

(c) ***75-Pair Multiunit***—The 922 pair (Fig. 2) ICOT cable is made up with 75-pair multiunits. Multiunits for pairs 1 through 600 have white binders. The remaining multiunits have red binders. Each 75-pair multiunit is composed of ***three*** 25-pair units. The unit binders have the standard PIC color-code sequence. Pairs within each 25-pair unit also have the standard PIC color code. (See paragraph 2.11 for information on the white-red service pair unit.)

C. Service Pairs

2.11 The service pairs in each ICOT cable (Fig. 1 and 2) are in a separate unit with a white-red binder situated on the low pair count side of the screen. The pairs are regular 24-gauge ICOT pairs with standard PIC color coding and start with blue-white pair No. 1. Adequate service pairs are provided in sizes up to 418-pair cable for two fault-locate lines for each apparatus case. Two additional pairs are provided (for order wire and pressure monitor). A single fault-locating line per apparatus case is included in the 616- and 922-pair sizes. Four additional pairs are provided (for order wire, pressure monitor, and two miscellaneous pairs which may be used to serve the 1A sensor system).

D. Core Assembly

2.12 The core of ICOT cables (24-gauge DEPIC) is assembled with a bisecting aluminum screen with edges wrapped around the outside of the core and a plastic core wrap overall.

E. Sheaths

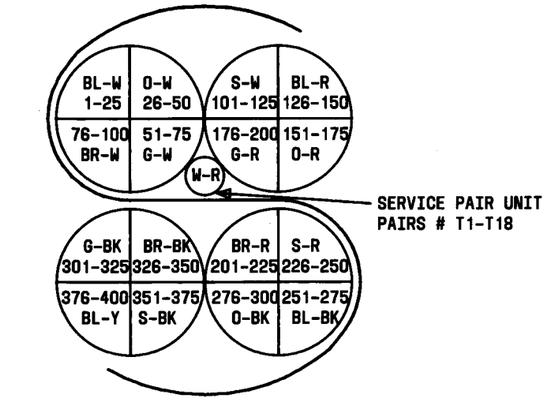
2.13 Modified and improved versions of ASP sheath for waterproof cable and stalpeth sheath for air core cable are being introduced. ICOT cable will be one of the first designs to benefit. The new sheaths are called bonded ASP and bonded stalpeth, and they have been allocated code letters Y and Z. The code letters for regular stalpeth and ASP are C and W, respectively.

2.14 The bonded versions of ASP and stalpeth sheaths differ from the regular versions 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 both sheaths 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.

2.15 In bonded ASP sheath, the bonding together of the steel and jacket virtually eliminates jacket slippage and pushback problems which were liable to occur during plowing, particularly at high temperatures. Bonded stalpeth sheath resists buckling during installation better than regular stalpeth, and it also allows even less moisture to diffuse into the cable core.

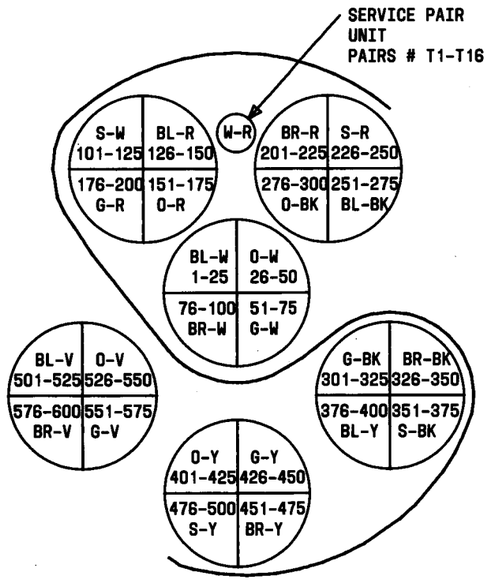
2.16 Installation hardware and procedures for bonded sheaths are the same as for regular sheaths with one exception—to remove the sheath, the steel and jacket have to be taken off as a unit.

2.17 All waterproof ICOT cable has the bonded ASP sheath, but there is the option of unsoldered metal (UM) protection. Air core ICOT cable is supplied with either bonded stalpeth or PASP sheath.

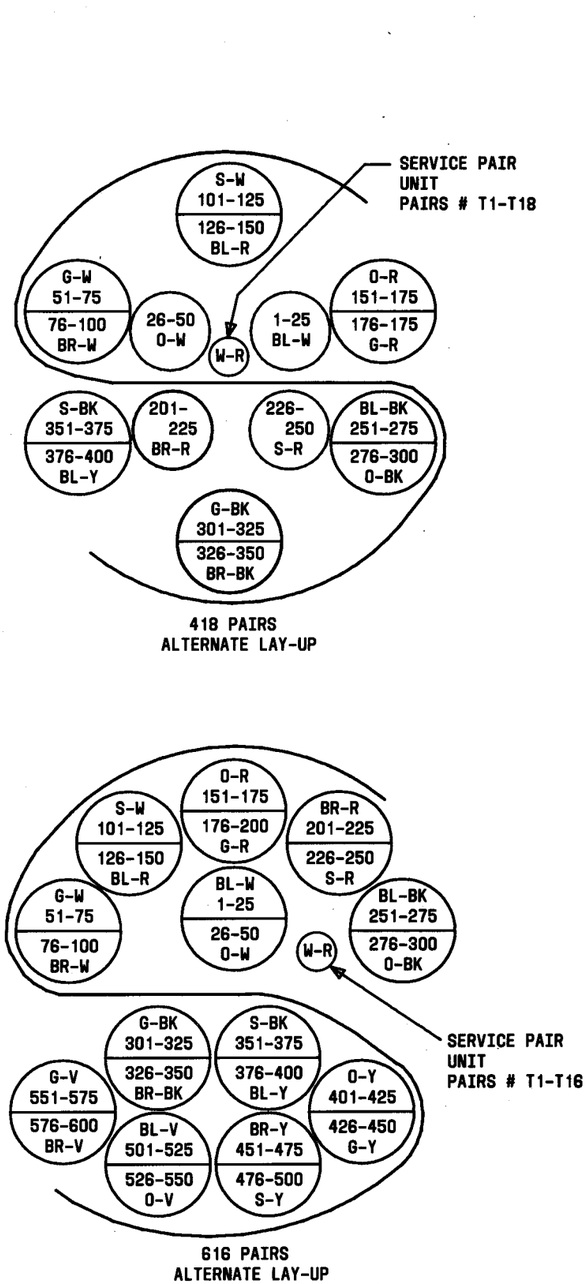


418 PAIRS
STANDARD LAY-UP

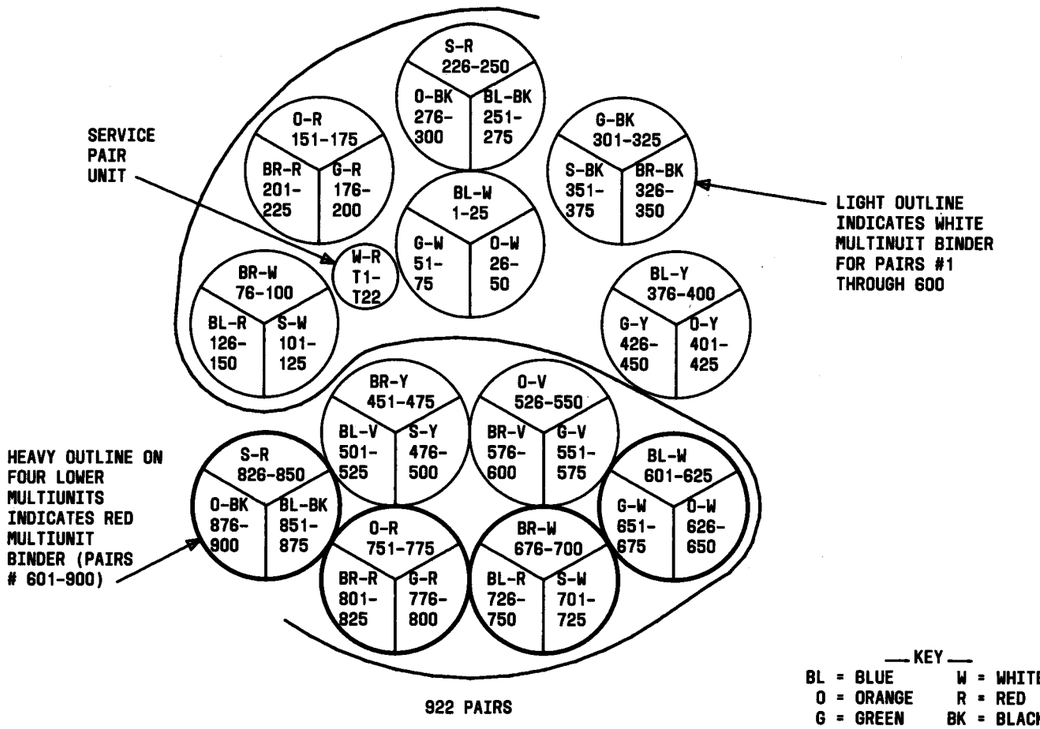
418 PAIRS
ALTERNATE LAY-UP



616 PAIRS
STANDARD LAY-UP



616 PAIRS
ALTERNATE LAY-UP



922 PAIRS

KEY

BL = BLUE	W = WHITE
O = ORANGE	R = RED
G = GREEN	BK = BLACK
BR = BROWN	Y = YELLOW
S = SLATE	V = VIOLET

Fig. 2—418- Through 922-Pair ICOT Cable Lay-Ups

3. USE

3.01 ICOT (24-gauge, low-capacitance) cables are designed specifically for use in the suburban, intercity, and outstate trunk plant. These cables are screened for full-fill T1/T1C operation with the T-carrier service pair complements included in the cable lay-ups. T-carrier repeaters that were developed for use with MAT cable are used with ICOT cables.

3.02 Rules and software programs for the use of VF or ICOT pairs are being prepared. At this time ICOT cable should not be used where extensive VF trunk development is anticipated.

3.03 For engineering T1/T1C carrier for new plant, it is recommended that ICOT cables be substituted for 22-gauge screened cables.

4. ELECTRICAL CHARACTERISTICS

4.01 ***Carrier Interfaces:*** ICOT cables are compatible with MCR MAT cable for either midspan or repeater point interfaces. ICOT cables are not compatible with conventional 83 nF/mi capacitance cable for midspan splice interfaces. Interfaces between an ICOT or MAT cable span and an 83 nF/mi cable span are permissible only through T1/T1C office repeater bays, span-terminating assemblies, or T1/OS bays in central offices. Express Office Repeater Panels (EORP) may be used only at MAT-MAT, ICOT-ICOT, MAT-ICOT, or 83 nF/mi-83 nF/mi cable junctions.

4.02 The electrical characteristics of screened ICOT air core and waterproof cables are listed in Tables A and B.

TABLE A

ELECTRICAL CHARACTERISTICS

GAUGE AND CABLE CODE	DC RESISTANCE (OHMS/ LOOP MILE AT 68° F)	AVG CAP. (nF/MILE AT 60° F 900 OR 1000 Hz)	DIELECTRIC STRENGTH (GREATER THAN)	
			BETWEEN CONDUCTORS (VOLTS DC)	BETWEEN CONDUCTORS AND SHEATH (VOLTS DC)
24 Ga MLM (waterproof)	274	60	3000	10,000 ASP or ASP with UM
MCM (air core)	274	52	3000	10,000 Stalpeth 20,000 PASP

TABLE B

ATTENTUATION AT 75°F AND 55°F

FREQUENCY (kHz)	dB/1000 FT (APPROX) AT 75°F		dB/1000 FT (APPROX) AT 55°F	
	MLM	MCM	MLM	MCM
1	0.37	0.35	0.36	0.34
48	1.62	1.46	1.55	1.40
96	1.80	1.61	1.74	1.55
136	1.94	1.73	1.87	1.67
168	2.06	1.83	1.99	1.77
208	2.19	1.97	2.12	1.91
256	2.34	2.13	2.28	2.07
772	3.87	3.55	3.79	3.46
1600	5.46	5.06	5.36	4.95

5. PHYSICAL CHRACTERISTICS AND REEL LENGTHS

5.01 ***Sheath Markings:*** Cable length marks, manufacturer identification, date of sheathing, and cable code markings are applied on the outer polyethylene jacket.

5.02 ***Code Designations:*** As of January 1, 1980, all screened cable designed for digital carrier have service pairs as outlined in paragraph 2.11. In order to differentiate between those cables manufactured without service pairs, all screened cable, including ICOT, should be ordered by ***actual pair size.*** For example, a bonded ASP sheath waterproof ICOT cable with 600 carrier pairs and 16 service pairs is ordered as MLMY-616. When UM protection is required on the cable, add the respective letter code after the pair size, eg, MLMY-616-UM.

5.03 ***Average Shipping Length:*** This length is the approximate average of the various PIC reel lengths used to fill an order for a gross quantity of a particular cable type without causing an accumulation of uneconomical remnant lengths at the factory. The average shipping length is a theoretical length which is close to the actual average length experienced during manufacture of a given code.

Average shipping length refers to the manner in which cable is shipped, not to a particular reel length; hence, no reel sizes are associated with the term. Use of average shipping length in the ordering of cable is further described under the CABLE SHIPPING LENGTH POLICY heading.

5.04 ***Maximum Length:*** For PIC cable, maximum length represents the longest length of a particular PIC cable that can normally be manufactured and shipped within the limitations of the manufacturing process or capacity of the 420 reel. If ***average shipping length*** cannot be used due to special field conditions, longer lengths can be obtained. In such cases, the ***maximum length*** is used to determine the largest number of reels that may be shipped. However, it is desirable to restrict the number of such lengths to a reasonable minimum; otherwise, the factories will accumulate excessive numbers of remnant lengths that cannot be disposed of economically, which ultimately will affect cable prices.

CABLE SHIPPING LENGTH POLICY

Western Electric Co., Inc, cable length policy applies to direct shipments from factory to the operating company. For service center policy, consult the local service center.

5.05 ***Gross Quantity (Total) Order of Cable—Average Shipping Length:*** Whenever an order requests a gross quantity of cable, it will normally be filled by a selection of various reels, approximately equivalent to the ***average shipping length,*** and the following applies.

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

(b) Shipments of items up to 1 percent (but not less than 10 feet) or 100 feet in excess of ordered quantities, whichever is less, may be made without referral to the operating company. It is not expected that this tolerance will be exceeded. If this necessity arises, however, advance concurrence of the operating company will be obtained and the billing will be negotiated.

Example 1: An order for 8000 feet of MLMY-210 requesting average shipping lengths could result in Western Electric shipping up to 8080 feet (1 percent of order excess).

Example 2: An order for 25,000 feet of MLMY-210 requesting average shipping lengths could result in Western Electric shipping 25,100 feet (100-foot excess).

(c) The number of reels shipped per item shall not, without operating company concurrence, exceed the number determined by dividing the ordered quantity by the average shipping length as shown on the cable length tables.

Example: An order for 25,000 feet of MLMY-210 requesting average shipping lengths could result in the shipment of 25,100 feet (100-foot excess) on not more than twelve reels without operating company concurrence. Average shipping length in cable length tables for MLMY-210 is 2120 feet. (Length ordered divided by average shipping length = 11.8 reels = 12 reels.)

5.06 ***Gross Quantity (Total) Order of Cable—Maximum Shipping Length:*** Whenever an order requests a gross quantity of cable and special circumstances ***warrant*** the use of ***longer-than-average shipping lengths.*** Maximum length shall be ordered and the following applies.

(a) No items on an order will be shipped shorter than the length ordered without reference to and concurrence from the operating company. If concurrence to ship an item shorter than the ordered length is received, billing will be for the length shipped.

(b) Shipments of items up to 2 percent or 200 feet, whichever is less, in excess of ordered quantities may be made without referral to the operating company. It is not expected that this tolerance will be exceeded. If such an occasion does arise, however, advance concurrence of the operating company will be obtained and billing will be negotiated.

Example 1: An order for 8000 feet of MLMY-210 could result in shipment of 8160 feet without operating company concurrence (2 percent of order excess).

Example 2: An order for 25,000 feet of MLMY-210 could result in shipment of 25,200 feet without operating company concurrence (200-foot excess).

(c) The number of reels shipped per item shall not, without operating company concurrence, exceed the number determined by dividing the ordered quantity by the ***maximum length*** as shown in the cable length tables when the number of maximum reels is three reels or less. When the number determined by the cable length tables exceeds three maximum reels, the number of reels shipped per item shall not, without operating company concurrence, exceed the number determined by dividing the ordered quantity by the ***maximum length*** by more than one reel or 10 percent rounded to the next whole number, whichever is greater.

Example 1: An order for 6000 feet of MLMY-210, requesting maximum shipping lengths, could result in the shipment of 6,120 feet (2 percent of order excess) or not more than two reels without operating company concurrence. Maximum length in cable length tables for MLMY-210 is 3180 feet.

Example 2: An order for 25,000 feet of MLMY-210, requesting maximum shipping lengths, could result in the shipment of 25,200 feet (200-foot excess) on not more than nine reels without telephone company concurence. (Length ordered divided by maximum shipping length = 7.9 reels = 8 reels plus one reel excess—total 9 reels.)

5.07 ***Cut Length:*** PIC cable is priced, and the interval determined, on the basis that there would be limited ordering of PIC cable cut to specific lengths. Whenever an order requests a specific cut length (ie, "X-type" of exchange cable), the following applies.

(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 ten 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 ten-foot tolerance will need to be shipped. If such an occasion does arise, however, advance concurrence of the operating company will be obtained and the billing negotiated.

REEL LENGTH DATA

5.08 Information on pair sizes, reel lengths, and weights of MLM waterproof ICOT cables are listed in Tables C and D. Reel length data for MCM air core ICOT cables are listed in Tables E and F.

TABLE C

MLMY ICOT WATERPROOF SCREENED BONDED ASP SHEATH CABLE (NOTE 1)

CABLE CODE	NO. OF PAIRS	PULLING EYES	AVERAGE SHIPPING LENGTH (FEET)	MAXIMUM LENGTH (FEET) (420 REEL)	OUTSIDE DIAMETER (INCHES)	WEIGHT (LBS/FT)
MLMY	54	No	5250	7880	0.99	0.46
↑	106	Note 2	3490	5240	1.28	0.80
	158	Note 2	2650	3980	1.50	1.10
	210	Note 2	2120	3180	1.69	1.40
	314	Note 2	1510	2270	2.02	1.99
	418	Note 2	1060	1590	2.28	2.54
	616	Note 2	820	1220	2.71	3.61
↓ MLMY	922	Note 2	620	940	3.23	5.16

Note 1: Bond wires are furnished on factory shipments when specified on the order or on agreement with the service center.

Note 2: Furnished on factory shipments when specified on the order or on agreement with the service center.

TABLE D

MLMY-UM ICOT WATERPROOF SCREENED CABLE BONDED ASP SHEATH WITH UM (NOTE 1)

CABLE CODE	NO. OF PAIRS	PULLING EYES	AVERAGE SHIPPING LENGTH (FEET)	MAXIMUM LENGTH (FEET) (420 REEL)	OUTSIDE DIAMETER (INCHES)	WEIGHT (LBS/FT)
MLMY-UM	54	Note 2	3490	5240	1.19	0.64
↑	106	Note 2	2650	3980	1.50	1.04
	158	Note 2	2120	3180	1.72	1.39
	210	Note 2	1770	2650	1.93	1.75
	314	Note 2	1510	2270	2.27	2.42
	418	Note 2	880	1330	2.54	3.03
↓ MLMY-UM	616	Note 2	660	990	2.98	4.21

Note 1: Bond wires are furnished on factory shipments when specified on the order or on agreement with the service center.

Note 2: Furnished on factory shipments when specified on the order or on agreement with the service center.

TABLE E

MCMZ ICOT AIR CORE SCREENED BONDED STALPETH SHEATH CABLE (NOTE 1)

CABLE CODE	NO. OF PAIRS	PULLING EYES	AVERAGE SHIPPING LENGTH (FEET)	MAXIMUM LENGTH (FEET) (420 REEL)	OUTSIDE DIAMETER (INCHES)	WEIGHT (LBS/FT)
MCMZ	54	No	5250	7880	0.99	0.36
↑	106	Note 2	3490	5240	1.29	0.61
	158	Note 2	2650	3980	1.53	0.84
	210	Note 2	2120	3180	1.72	1.06
	314	Note 2	1330	1990	2.08	1.51
	418	Note 2	1060	1590	2.36	1.93
	616	Note 2	820	1220	2.82	2.74
↓ MCMZ	922	Note 2	590	880	3.35	3.94

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

Note 2: Pulling eyes are furnished on factory shipments when specified on the order or on agreement with the service center.

TABLE F

MCMH ICOT AIR CORE SCREENED PASP SHEATH CABLE (NOTE 1)

CABLE CODE	NO. OF PAIRS	PULLING EYES	AVERAGE SHIPPING LENGTH (FEET)	MAXIMUM LENGTH (FEET) (420 REEL)	MAXIMUM LENGTH (FEET) (487 REEL)	OUTSIDE DIAMETER (INCHES)	WEIGHT (LBS/FT)
MCMH	54	No	5250	7870	—	1.07	0.46
↑	106	Note 2	2650	3980	—	1.43	0.76
	158	Note 2	2120	3180	5230	1.65	1.03
	210	Note 2	1770	2650	3120	1.88	1.30
	314	Note 2	1330	1990	2600	2.15	1.77
	418	Note 2	1060	1590	1930	2.48	2.27
	616	Note 2	660	990	1270	2.96	3.18
↓ MCMH	922	Note 2	440	660	840	3.50	4.42

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

Note 2: Pulling eyes are furnished on factory shipments when specified on the order or on agreement with the service center.