

**MAT\* MCR CABLE**  
**DESCRIPTION, USE, AND REEL LENGTHS**

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1. GENERAL	1	1.01 MAT MCR-type cable is a screened, low-capacitance cable with 25-gauge copper conductors, color-coded plastic insulation, and a stalpeth or PASP sheath. This section covers the description, use, and reel lengths of MAT cables.
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SECTION 626-105-007

2. DESCRIPTION

GENERAL

2.01 **Conductors and Insulation:** The 25-gauge annealed copper conductors of ♦MCR♦ MAT cable have *Dual Expanded Plastic Insulated Conductor* (DEPIC) insulation. This insulation is a two-layer structure with an inner layer of white foam surrounded by colored solid plastic. The insulated wires are twisted into pairs and the pairs have standard PIC color code.

2.02 **Metallic Screen:** ♦The cable core is bisected by an insulated aluminum screen with edges extending around the core.♦ The screen allows MAT cable to provide full-fill, single-cable operation of T1 and T1C systems.

2.03 **♦Bonded Stalpeth and PASP Sheaths:** Detailed information on the description and use of plastic sheaths is given in Section 626-020-020.

Bonded stalpeth sheaths will be available in late 1980.♦

CORE CONSTRUCTION

2.04 ♦The "building block" for all MAT cable cores is a 100-pair multiunit consisting of four 25-pair units. Pairs within each 25-pair unit have the standard PIC color code.

A. Lay-Ups of 412 and 616 Pairs

2.05 The 412- and 616-pair MAT cables (Fig. 1) have standard PIC color code. (See Section 626-101-005 for color code details.)

B. Lay-Ups of 1024 Pairs or More

2.06 For cables of 1024 pairs or more, the four 25-pair units in each multiunit have colored binders in the sequence blue, orange, green, and brown (Fig. 2).♦

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**2.07** The sequence in which multiunits are counted is the same for all PIC cables with more than 900 pairs. The scheme is called "mirror-image PIC." It allows the screened cable to be spliced together without unit crossovers, irrespective of the direction of installation. More information on the core count is provided in Section 640-010-005, Splicing T Carrier Cables.

**2.08 Core Lay-Ups:** The multiunit lay-ups of 1024-, 1228-, 1432- and 1840-pair sizes of MAT cables are shown in Fig. 2. Each multiunit has a two-color binder. When the *first multiunit binder color* is green, it indicates a marker multiunit. The green binder is used in the center or in one multiunit in each layer and is flanked by multiunits with red binders followed by blue binders, then red binders again, etc. Marker multiunits are situated radially over each other. The *second multiunit binder color indicates layer:* yellow for the outside layer, then alternate black and yellow binders for the remainder of the layers.

**Note:** To maintain the "mirror-image PIC" symmetry in some screened cables, it is necessary to have two marker units in a layer. The 1024- and 1432-pair MAT cables are examples (Fig. 2).

#### C. Extra Pairs

**2.09** MAT cables contain extra pairs to substitute for missing or defective pairs *on the same side of the screen.* These extra pairs are positioned in outer multiunit interstices. The maximum number for each pair size cable is shown in Fig. 1 and 2. On the low pair count side of the screen, extra pair No. 1 is always present and more extra pairs are added in the sequence No. 2, 3, 4, and 5. On the high pair count side of the screen, the order is No. 10, then No. 9, 8, 7, and 6.

**2.10** The color code of extra pairs is derived from the tip series of PIC color code as shown in Fig. 1 and 2. (MAT cable pair counting sequence is covered in Section 640-010-015.)

**2.11** The method for substituting good extra pairs for missing or defective pairs is given in Section 640-010-005.

#### D. Service Pairs

**2.12** All MAT cables have an extra unit or units of regular MAT cable pairs for T-carrier service. In each unit the pairs have the standard PIC color sequence, always starting with pair No. 1, W-BL. The total number of such pairs is:

- One per 50 pairs for fault locate
- Four per cable for order wire, pressure alarm, etc.

**Note:** The service pairs are included in the pair count.

**2.13 Cables With 25 or Less Service Pairs:** The pairs are assembled in one unit, given a W-R binder, and are located on the low pair count side of the screen.

**2.14 Cables With More Than 25 Service Pairs:** The pairs are assembled into two equal size units. One is given a W-R binder and located on the low pair count side of the screen. The other is given a BL-O binder (the first two "ring" colors are opposed to the first two "tip" colors, W-R) and located on the high pair count side of the screen.

#### E. Pulp-Insulated Pairs

**2.15** During 1980, optional pulp-insulated pair(s) may be included in MAT cable. These pairs are for trial purposes only, and they should be ignored by companies not participating in the trials. They should not be spliced through or terminated on the distribution frame.

#### F. Core Assembly

**2.16** The core is assembled with a bisecting aluminum screen with edges wrapped around the outside of the core, and a core wrap overall.

#### 3. USE

**3.01** The MAT system, based upon MAT cable, achieves efficient and economical use of ducts in metropolitan areas. MAT cables are screened for full-fill single cable T1 or T1C carrier operations. *Electrically*, MAT cable performs somewhat better

than 22-gauge pulp for T carrier transmission and its VF performance is close to that of 24-gauge cable. *Mechanically*, the design offers 50 percent savings in copper over 22-gauge, and allows some 30 percent more pairs in a duct. It is this combination of electrical and mechanical characteristics that optimizes the cable for metropolitan trunk systems.

#### 4. ELECTRICAL CHARACTERISTICS

##### 4.01 Carrier Frequency Characteristics:

Both the T1 and T1C digital lines are compatible with MAT cable. MAT cable is designed specifically to provide up to 6300 feet of T1 repeater spacing on underground trunks. At the high frequencies of T1C system, the advantage of MAT cable over 22-gauge pulp is even more pronounced. Maximum repeater spacing on MAT is 6340 feet as against 6100 feet for pulp. Due to the lower capacitance and DEPIC insulation of MAT cable, the wideband transmission characteristics for MAT differ from those of current production PIC and

pulp-insulated cables. The nominal impedance of the balanced transmission pair at T1 and T1C frequencies is approximately 120 ohms vs approximately 100 ohms for PIC and pulp. The loss vs frequency shape also differs due to the higher dc wire resistance at low frequencies and the lower dielectric loss at high frequencies. For these reasons new equalizer designs and, hence, new repeater codes for T1 and T1C are required. The single exception is the T1C office repeater which can serve MAT, PIC, or pulp cable.

##### 4.02 Cable Crosstalk Characteristics:

Improvements in the design of MAT cable multiunits have significantly reduced far-end crosstalk (FEXT) at T1 and T1C frequencies. While FEXT is not a limiting design constraint for T1 or T1C, the reduced FEXT noise has allowed a greater allocation of noise margin to be assigned to near-end crosstalk (NEXT) for single cable operation of T1C.

**4.03** The electrical characteristics of MAT cable 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)
25 Ga MCRZ MCRH	346 346	64 64	2000 2000	5,000 Bonded Stalpeth 10,000 PASP

TABLE B

ATTENUATION AT 55° F

FREQUENCY (kHz)	dB/1000 FT (APPROX)
1 48	0.43 2.07
96 136	2.34 2.51
168 208	2.64 2.77
256 772 1600	2.95 5.02 7.22

5. PHYSICAL CHARACTERISTICS

DEFINITIONS

**5.01 Code Designations:** When ordering MAT cable, use the **♦MCR♦** letter code. (Cable codes are explained in Section 626-020-011.) For example, bonded stalpeth sheath MAT cable with 1840 pairs is ordered as **♦MCRZ-1840 pairs♦**. (See reel length data tables for codes.)

**5.02 Maximum Reel Length:** This is the longest length of cable that can be obtained on the reel specified in the reel length data tables.

**5.03 Manufacture Identification Markings:** The date of manufacture, pair size, cable code **♦(MCR)♦**, length, and factory identification markings are applied on the outer polyethylene jacket of the sheath.

CUT LENGTH POLICY

**5.04** Whenever an order requests a specific cut length, ie, "X-type," of MAT 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 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, advance concurrence of the operating company will be obtained, and the billing will be negotiated.

REEL LENGTH DATA

**5.05** Information on pair size, diameters, weights, and reel lengths of MAT cable are listed in Tables C and D. The diameters and weights are approximate.

♦TABLE C♦

MAT CABLE 25-GAUGE—BONDED STALPETH SHEATH (NOTE 1)

CABLE CODE	NO. OF PAIRS	MAXIMUM LENGTH ON 420 REEL FEET (NOTE 2)	OUTSIDE DIAMETER (INCHES)	WEIGHT PER FOOT (POUNDS)
MCRZ ↑ ↓ MCRZ	412	3128	1.80	1.44
	616	2109	2.12	2.04
	1024	1297	2.62	3.18
	1228	1218	2.84	3.76
	1432	1017	3.03	4.32
	1840	755	3.39	5.45

**Note 1:** All MAT cables are shipped under air pressure. Pulling eyes and bond wires are furnished on factory shipments only when specified on the order.

**Note 2:** Facilities for manufacturing longer lengths of MAT cable on No. 487 reels do not exist at this time. However, in cases of extreme need, it may be possible to make temporary modifications to the factory process to produce such lengths. Please contact your exchange cable product control center representative for availability.

◆ TABLE D ◆

MAT CABLE 25-GAUGE-PASP SHEATH (NOTE 1)

CABLE CODE	NO. OF PAIRS	MAXIMUM LENGTH ON 420 REEL (FEET) (NOTE 2)	OUTSIDE DIAMETER (INCHES)	WEIGHT PER FOOT (POUNDS)
MCRH ↑	412	2665	1.93	1.60
	616	1846	2.26	2.22
	1024	1320	2.78	3.44
↓ MCRH	1228	1014	3.00	4.03
	1432	938	3.19	4.62
	1840	688	3.54	5.76

*Note 1:* All MAT cables are shipped under air pressure. Pulling eyes and bond wires are furnished on factory shipments only when specified on the order.

*Note 2:* Facilities for manufacturing longer lengths of MAT cable on No. 487 reels do not exist at this time. However, in cases of extreme need, it may be possible to make temporary modifications to the factory process to produce such lengths. Please contact your exchange cable product center representative for availability.

