SUPERSEDING MIL-STD-686A
14 September 1965

## MILITARY STANDARD

## CABLE AND CORD, ELECTRICAL; IDENTIFICATION MARKING AND COLOR CODING OF



DEPARTMENT OF DEFENSE WASHINGTON, D.C. 20301

Cable and Cord, Electrical; Identification Marking and Color Coding of.
MIL-STD-686B

1. This Military Standard is approved for use by all Departments and Agencies of the Department of Defense.
2. Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: US Army Communications - Electronics Command, ATTN: DRSEL-ED-TO, Fort Monmouth, NJ 07703, by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

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## 1. SCOPE

1.1 Scope. This standard establishes a uniform identification code of all electricat cables and cords used by the Departments of the Army, Navy, and Air Force except for the following.
a. High-tension and low-tension cables for vehicular use covered by MIL-C-3702 and MIL-C-13486.
b. Cables used for construction.
c. Cables and cords for transmission of telephone, telegraph, and teletype signals covered by MIL-STD-685.
d. Flexible coaxial cables.

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## 2. REFERENCED DOCUMENTS

2.1 Issues of documents. The following documents of the issue in effect on date of invitation for bids or request for proposal, form a part of this standard to the extent specified herein.

## STANDARDS

## MILITARY

$$
\begin{gathered}
\text { MIL-STD-104 - Limits for Electrical Insulation Color. } \\
\text { MIL-STD-685 - Identification of Cable Used for Transmission of Telephone, } \\
\text { Telegraph, and Teletype Signals. }
\end{gathered}
$$

(Copies of specifications, standards, drawings, and publications required by contractors in connection with specific procurement functions should be obtained from the procuring agency or as directed by the contracting officer.)

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3. DEFINITIONS
3.1 American wire gage (AWG). A system for describing the size of wires used for electrical purposes.
3.2 Cable, multiconductor, electrical. Two or more insulated conductors (solid or stranded) contalned in a common covering or jacket.
3.3 Cord, electrical. Two or more insulated tinsel conductors contained in a common covering. or twisted or molded together. without a common covering; or two or more stranded conductors wound in a specifically-designed spiral construction for extra flexibility.
3.4 Conductor. Wire (solid or stranded) with insulation covering, suitable for carrying an electric current.
3.5 Equipment ground. An insulated conductor intended for grounding noncurrentcarrying metal parts of equipment.
3.6 Homogeneous cable. Cable composed of identical insulated conductors.
3.7 Heterogeneous cable. Cable composed of dissimilar insulated conductors. These differences may be due to physical composition, voltage rating, temperature rating, types of conductors, (e.g., ) audiofrequency or radiofrequency), or use of more than one size of conductor.
3.8 Insulation. A material, such as natural or synthetic rubber or a thermoplastic compound having high electrical resistance, which is suitable for separating adjacent conductors in an electric circuit and preventing possible future contact between the conductors.
3.9 Jacket. The outer sheath or covering material, such as natural or synthetic rubber, lead. sheath, steel tape, or a thermoplastic compound, applied over a singleinsulated conductor or over an assembly of insulated conductors for protection against crushing, cutting, and abrasion of the conductors and thefr insulation.
3.10 Portable-power cable. Portable cable consisting of three, four, or five insulated conductors (one of which serves as an equipment ground) used to transmit power from a power source to equipment such as portable-electric tools.

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## 4. GENERAL REQUIREMENTS

### 4.1 Electrical cables.

4.1.1 Multiconductor cables. Multiconductor-electrical cables shall be identified in accordance with the applicable portions of the detailed requirements of this standard.
4.1.2 Single-conductor cables. Single-conductor cables shall be identified in accordancewth 5.3.
4.2 Electrical cords. Electrical cords shall be color coded in accordance with table 1 .

TABLE I. Color code for electrical cords. 1/ 2/ 3/

| Conductor No. | Insulation color |
| :---: | :---: |
| 1 | 81ack |
| 2 | White |
| 3 | Green 3/ |
|  |  |
| 4 | - Red |
|  |  |
| 5 | Blue |
|  |  |
| 6 | Orange |
| 7 |  |
| 7 | Brown |
| 8 | Gray |
| 9 | Yellow |
| 9 | Yeltow |
| 10 | Purple |
| - |  |

1/ When eiectrical cords are composed of conductors of miscellaneous sizes, the color code specified above shall be followed consecutively starting with the conductor having the largest circuiar mil area and extending through the conductors having the smallest circular mil area.

2/ The white conductor shall always be used as the neutral conductor and shall be insulated from the equipment chassis/connector.

3/ To be used as equipment ground only (see 3.5). Green or green with yellow stripe is acceptable.
4.3 Color limits. The colors specified in this standard shall fall within the ifinits of the standard color chips of MIL-STD-104.

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## 5. DETAILED REQUIREMENTS

5.1 Multiconductor electrical cables. Multiconductor electrical cables shall be identified at the time of manufacture in accordance with the following paragraphs:
5.1.1 Homogeneous cables. The identification of homogeneous cables is illustrated in figure 1 .
5.1.1.1 Data to be marked on cable jacket. Except as specifiedin 5.3, the following data shalibe marked along one side of the entire length of the cable jacket with one foot separations, in accordance with 5.2.
a. Government-specification number and government-type designation, if one exists. (The maximum rated working voltage and number and size (AWG) of conductors shall be added when this data is not incorporated in the government-type designation.)
or
b. Manufacturer's name, commercial-type designation, maximum rated working voltage, and number and size (AWG) of conductors when there is no existing government specification.

### 5.1.1.2 Data to be marked on insulation of individual conductors.

5.1.1.2.1 Designations. The conductor number and color designation as indicated. in table IIA or table IB (for Navy shipboard use), and as illustrated in figure 1 , example (a) shall be marked on the insulation of each conductor with an outside diameter of 0.065 inch (including insulation), or larger, in accordance with 5.2 , except for portable-power cables, which shall be identified as specified. in 5.1.i.2.2. The conductor number and color designation for each conductor shall be marked on the side of the conductor at intervals of 2 inches throughout the length of the conductor, except for navy shipboard applications the interval shall be 3 inches maximum with alternate legends inverted so that the information can be read fromeither side of the cable. The individual conductors of 2 - through 6 -conductor cables may be color coded as specified in 5.1.1.2.3, in lieu of marking with the conductor number and color designation.
5.1.1.2.2 Portable-power cables. Portable-power cables shall be color coded as follows:
a. Two conductor cables - one black, one red.
b. Three conductor cables - one black; one white, and one green, with green conductor used for grounding.
c. Four conductor cables - one black, one white, one green, and one red, with green conductor used for grounding.
d. Five conductor cables - one black, one white, one green, one red, one blue, with green conductor used for grounding.
5.1.1.2.3 Small-diamter conductors. Except as specified in 5.1.1.2.2, and 5.1.1.3 insulated conductors with an outside diameter of less than 0.065 inch (inciuding insulation) shali be color coded in accordance with table IIA, table IIB (for Navy shipboard use) and tabies IIC and IID' (for wire size identification) as illustrated in figure 1 , example (b).
5.1.1.3 Aerospace cable: Identification of aerospace cable shall be in accordance with table II.

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(a) Conductors with outer diameter . 065 inch or larger.

(b) Conductors with outer diameter smaller than .065 inch.


FIGURE 1. Examples of identification marking and color coding of homogeneous multiconductor electrical cables.
5.1.1.3.1 Aerospace cable, wire size color code system. When approved by the procuring activity, a wire size color code system as specified below may be used to facilitate control of the wire size. When a wire size color code is used, the wire insulation shall be identified with the appropriate color by one of the following methods. Only one method may be used for each vehicle and shall be in accordance with table II.
a. Solid colored.
b. Distinctively color banded.
c. Distinctively striped.

TABLE II. Color code for aerospace cable.

|  | Size |  | Color | Size |  | Color |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| $1 /$ | 26 | - | Black | 10 | - | Brown |
|  | 24 | - | Blue | 8 | - | Red |
|  | 22 | - | Green | 6 | - | Blue |
|  | 20 | - | Red | 4 | - | Yellow |
|  | 18 | - | White | 2 | - | Red |
|  | 16 | - | Blue | 1 | - | White |
|  | 14 | - | Green | 0 | - | Blue |
|  | 12 | - | Yellow |  |  |  |

1/ Use of this size wire requires procuring activity approval.

### 5.1.2 Heterogeneous cables.

5.1.2.1 Data to be marked on cable jacket. Except as specified in 5.3 and 5.1.1.3, the following data shallbe marked along one side of the entire length of the cable jacket with one foot separations, in accordance with 5.2.
a. Government-specification number and government-type designation, if one exists. (The maximum rated working voltage and number of conductors of each AWG size shall be added when not incorporated in a government-type designation.)
b. Manufacturer's name, commercial-type designation, maximum rated working voltage, and number of conductors of each AWG size when there is no existing government specification.

TABLE IIA. Identification code for electrical cables. 1/


See footnotes at end of table.

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TABLE IIA: Identification code for electrical cables $1 /$ - Continued.

| Conductor No. | Color designation |  | Conductor No. | Color designation |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
|  | Body | Single narrow 2/ band or stripe |  | Body | Single narrow band or stripe |
| 10 | Orange | Black | 35 | Green | Blue |
| 11 | Blue. | Black | 36 | Orange | Blue |
| 12 | Black | White | 37 | Yellow | --- |
| 13 | Red | White | 38 | Yellow | Black |
| 14 | Green | White | 39 | Yellow | White |
| 15 | Blue | White | 40 | Yellow | Red |
| 16 | Black | Red | 41 | Yellow | Green |
| 17 | White | Red | 42 | Yellow | Orange |
| 18 | Orange | Red | 43 | Yellow | Blue |
| 19 | Blue | Red | 44 | Black | Yellow |
| 20 | Red | Green | 45 | White | Yellow |
| 21 | Orange | Green | 46 | Red | Yellow |
| 22 | Orange | White | 47 | Green | Yellow |
| 23 | Green | Red | 48 | Orange | Yellow |
| 24 | Black | Green. | 49 | Blue | Yellow |
| 25 | White | Green | 50 | Violet |  |
|  |  |  |  | voret |  |

1/ For cables composed of more than 50 conductors, the above color designations shall be repeated in sequence with appropriate subgroupings to the extent necessary to provide identification of all conductors. The second sequence shall start with No. 51.

2/ When a braid covering is specified, a colored thread may be used in lieu of the colored band or stripe.

3/ For 2 conductor direct current portable power cable, the positive lead shall be red and the negative black.

TABLE IIB. Identification code for electrical cables for shipboard use by the Department of the Navy.

| Conductor No. | Base color | First tracer color | Second tracer color |
| :---: | :---: | :---: | :---: |
|  |  |  |  |
| 1 | Black | -..- | --- |
| 2 | White | --- | --- |
| 3 | Green | --- | --- |
| 4 | Red | --- | --- |
| 5 | Blue | -- | -.- |
| 6 | Orange | -..- | -.- |
| 7 | White | Black | --- |
| 8 | Red | BTack | --- |
| 9 | Green | Black | --- |
| 10 | Orange | Black | -... |
| 11 | B1ue | Black | - -- |
| 12 | Black | White | -.- |
| 13 | Red | White | --- |
| 14 | Green | White | --- |
| 15 | Blue | White | ... |
| 16 | Black | Red | --- |
| 17 | White | Red | --- |
| 18 | Orange | Red | --- |
| 19 | Blue | Red | --- |
|  |  |  |  |

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TABLE IIB. Identification code for electrical cables for shipboard use by the Department of the Navy - Continued.


TABLE IIB. Identification code for electrical cables for shipboard use by the Department of the Navy - Continued.

| Conductor No. | Base color | First tracer color | Second tracer color |
| :---: | :---: | :---: | :---: |
|  |  |  |  |
| 79 | Red | White | Orange |
| 80 | Green | White | Orange |
| 81 | Blue | Black | Green |
| 82 | Orange | White | --- |
| 83 | Green | Red | --- |
| 84 | - Black | Green | --- |
| 85 | White | Green | --- |
| 86 | Biue | Green | --- |
| 87 | Black | Orange | --- |
| 88 | White | Orange | --- |
| 89 | Red | Orange | --- |
| 90 | Green | Orange | --- |
| 91 | Blue | Orange | --- |
| 92 | Black | Blue | --- |
| 93 | White | Blue | --- |
| 94 | Red | Blue | --- |
| 95 | Green | Blue | --- |
| 96 | Orange | Blue. | --- |
| 97 | Yellow | --- | --- |
| 98 | Yellow | Black | --- |
| 99 | Yellow | White | --- |
| 100 | Yellow | Red | --- |
| 101 | Yellow | Green | -- |
| 102 | Yellow | Orange | --- |
| 103 | Yellow. | Blue | --- |
| 104 | Black | Yellow | --- |
| 105 | White | Yellow | --- |
| 106 | Red | Yellow | --- |
| 107 | Green | Yellow | --- |
| 108 | Orange | Yellow | --- |
| 109 | Blue | Yellow | --- |
| 110 | Black | Yellow | Red |
| 111 | White | Yellow | Red : |
| 112 | Green | Yellow | Red : |
| 113 | Orange | Yellow | Red |
| 114 | Blue | Yellow | Red |
| 115 | Black | Yellow | White |
| 116 | Red | Yellow | White |
| 117 | Green | Yellow | White |
| 118 | Orange | Yellow | White |
| 119 | Blue | Yellow | White |
| 120 | Black | Yellow | Green |
| 121 | White | Yellow | Green |
| 122 | Red | Yellow | Green |
| 123 | Orange | Yellow | Green |
| 124 | Blue | Yellow | Green |
| 125 | Black | Yellow | B1ue |
| 126 | White | Yellow | Blue |
| 127 | Red | Yellow | Blue |
|  |  |  |  |

Note: In the case of cables having more than one layer of conductors, the numbering shown above shall be from the innermost to the outermost $i \mathrm{e}$. , the No. 1 conductor shall be the centerconductor lor one of the center conductors where two or more are used as a center) of the concentric lay.

### 5.1.2.2 Data to be marked on insulation of individual conductors.

5.1.2.2.1 Cables without telephone or coaxial conductors. Heterogeneous cables which do not contain telephone or coaxial conductors (see figure 2) shall be identified as follows:
a. Conductors with an outside diameter of 0.065 inch or larger (including insulation) shall be identified in accordance with 5.1.1.2.1. When these conductors are of mixed-gage sizes, the identification code given in 5.1.1.2.1 shall be followed consecutively starting with the largest circular mil area conductor.
b. Conductors with an outside diameter of less than 0.065 inch (including insulation) shali be identified in accordance with 5.1.1.2.3. When these conductors are of mixed-gage sizes, the color code given in $5=1,1=2.3$ shall be followed consecutively starting with the largest circular mil area conductor and continuing through the smallest circular mil area conductor.
c. In any cable containing less than 51 conductors, no two conductors shall be designated the same, whether identified by printed markings or by color coding. When conductors with outside diameters of less than 0.065 inch (including insulation) are inciuded in cables which also contain conductors with outside diameters larger than 0.065 inch (including insulation) the sequence given in tables IlA and IIB (for Navy shipboard use) shall start with the conductor having the largest circular mil area as No. 1 , and continue uninterrupted through the conductor having the smallest circular mil area, regardless of whether the findividual conductors are fdentified by printing or by color coding.
5.1.2.2.2 Cables with telephone or coaxial conductors. When telephone conductors or coaxial cables are included in heterogeneous cables, they shall be identified in accordance with the applicable codes for telephone or coaxial cables, and the jackets shall be numbered sequentially with the other conductors in the cable (see figure 3).
5.1.3 Cables having unshielded and shielded conductors. Within a group of conductors of the same size, unshielded conductors shalt be coded first, followed by individually shielded conductors. Commonly shielded conductors shall be coded after individually shielded conductors.
5.1.4 Cables with pairs or triples. Cables having pairs or triples. shall be color coded according to table IIA, except those for Navy shipboard use (see 5.1.4.1). Pairs shall be color coded in sequence-black and white for the first pair; green and red for the second pair. Triples shall be color coded in sequence -- black, white, and green for the first triple; red; blue, and orange for the second triple.
5.1.4.1 Cables with pairs or triples for Navy shipboard use. Each pair shall consist of one black and one white conductor. Each triple shall consist of one black, one white, and one green conductor Identification (see table IlB) shall be applied to the overall shield of each shielded pair or triple. Unshielded pairs or triples shall be identified similarly by coding the overall covering of each pair or triple.
5.1.5 Cables with singles, pairs, and triples. Cables having singles, pairs, and triples shall be color coded in a continuing cotor sequence, with singles first, pairs second, and triples third, (see table IIA or IIB).

### 5.2 Identification marking.

5.2.1 Types of marking. Cable jackets and insulated conductors shall be marked at the time of manufacture by means of surface printing or stamping.

### 5.2.2 Size of marking. The size of marking shall be in accordance with table Ill.

5.2.3 Marking colors. Characters to be imprinted on the cable jacket or conductor insulation shall be marked in either black or white to provide the best contrast with the color of the jacket or insulation.

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(a) Cable containing conductors with outșide diameters . 065 inch or larger.

(b) Cable containing conductors with outside diameters smaller than .065 inch.

(c) Cable containing conductors with outside diameters . 065 inch or larger and conductors with outside diameters smaller than . 065 inch.

LEGEND


BLACK WHITE


RED GREEN
blue ORANGE
WHITE WITH BLACK STRIPE

FIGURE 2. Examples of identification marking and color coding of heterogeneous multiconductor cables which do not contain telephone or coaxial conductors.

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NOTE:
Jacket designated number 5 is a shielded telephone pair. Jacket designated number 7 is an r-f coaxial cable.

FIGURE 3. Examples of identification marking and color coding heterogeneous multiconductor cables which contain telephone or coaxial conductors.

TABLE III. Printing type/size of identification marking. $\underline{1 /}$


1/ Dimensions are in inches.
2/ For heat shrinkable tubing, the height of the type face shall be governed by the "as supplied" insulation diameter.

3/ Other type face heights may be used only when approved by the contracting activity.

4/ For horizontal lettering, this quantity is the actual height. For vertical lettering, this quantity is the width of the letter. The letter height would be approximately 3 times this quantity.

5/ All industry standard sizes.

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### 5.2.4 Identification coding.

a. The standard means of coding shall be, as follows:

1. Solid-colored insulation, with colored-stripe tracer, when required.
2. Color-coded $1 / 2$ to 1 mil polyester tape, with or without $1 / 2$ to 1 mi heat-sealable adhesive.
3. Color-coded 1 mil polyester tape with $1 / 2$ to 1 mil heat-sealable adhesive in 8 AWG or larger, when tracers are required:
4. Color-coded, filled tapes in 8 AWG and larger, when tracers are not required.
5. Coding by marking.
6. Color code by green braid (uninsulated ground wires only).
b. Color shall be in accordance with MIL-STD-104, class 1 for plastics and elastomers, ciass. 2 for thermosetting compounds. Where black, blue, brown; purple, and/or red (i.e. two or more of these colors) are used in the same cable, the colors (other than black) shall be light to nominal. Gray shall be dark (or slate). when in the same cable with white.
5.2.4.1 Stripe tracers. The tracers shall be either of the same material as the insulation or a permanent-colored ink. The colors shall be easily distinguishable. All materials used for striping shall be nonconductive. Length of lay and stripe width of colored stripes shall be in accordance with 5.4.
5.2.5 Permanence and legibility. The marking shall be legible and durable and shall not rub off or be otherwise made illegible by exposure to its environment or by contact incident to normal handifig, shipmient, and storage. The marking shall be accomplished in a manner which will not adversely affect the cable characteristics, and shall remain legible after being subjected to the applicable specification marking tests.
5.3 Armored cables and single conductor unarmored cables. In single conductor unarmored cables, and when armor is used as an outer cable covering, the data specified in 5.1.1.1 and 5.1.2.1 shall be printed on marker tape with durable ink in capital characters at least 0.062 inch high. The marking shall be repeated throughout, the length of the marker tape with separations of not more than one foot. For single-conductor unarmored cables, the tape shall be located under the jacket. For armored cables, the tape shall be located under the jacket or between the armor and jacket, unless otherwise specified by the procuring activity. As an alternate, when applicable, the data specified in 5.1.1.1 and 5.1.2.1 may be printed on the jacket prior to installation of the armor. For Navy application, the following information only shall be included, if deemed necessary: (The serial number is not necessarily a footage marker.)

Name of manufacturer
Name and location of plant
Year of manufacture
Specification and issue letter
Progressive serial number

### 5.4 Striping or banding.

5.4.1 Colored helical stripes.or circumferential bands. Stripes and bands shall be appifed"in the same direction and shall conform to the color code designated in tables IIA and IIB.

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5.4.2 Sequence. In the sequence of applying helical stripes or circumferential bands on wire, the first stripe or band shall be distinguishably wider than the second band within the group. Helical stripes shall run parallel to each other and shall be continuous, clearly defined and constant in width and spacing throughout the length of the wire. Circumferential bands shall be parallel to each other around the circumference of the wire, shall be clearly defined, shall be constant in width and spacing, and shall be continuous in repeated color groupings for the length of the wire unless specified (see 5.4.3).
5.4.2.1 Stripe or band width. The width of the stripe or bands shall be measured perpendicular to the centerthe of the stripe or band. The width of the wide (first) stripe or band shall be not less than 0.040 inch when the diameter over the marked surface exceeds 0.047 inch; when the diameter over the surface on which the stripe or band is applied is less than 0.047 inch, then the width of the first stripe or band shall be not less than two-thirds (2/3) the nominal diameter of the surface. The narrow (second) stripe or band shall be not less than one-half (1/2) nor more than three-quarters (3/4) the width of the wide (first) stripe or band.
5.4.2.2 Stripe or band spacing. On single stripe or band coloring, the spacing between each stripe or band shalt be not less than twice the width of the individual stripe or band. On multiple stripe or band coloring, the spacing between stripes or bands within a grouping shall be not less than the width of the narrow stripe or band.
5.4.2.3 Length of lay (spacing between groups). The length of lay of each stripe shall not exceed 1.25 inches.

NOTE: Length of lay is defined as the longitudinal distance along a wire from the starting point of one grouping of stripes to the starting point of the next repetition of the grouping.
5.4.2.4 Spacing between groups of bands. The spacing between groups of bands shall be at regular intervals along the wire. The spacing separating a grqup of bands from the next grouping shall be greater than the spacing between the bands within a group, but shall not exceed 3 inches.
Custodians:
Army - CR
Navy - AS
Air Force-85
Review activities:
Army - MI
Navy - EC
Air Force-85, 99
DLA-ES
User activities:
Navy-SH, MC
Agent:
DLA-ES

Preparing activity: Army - CR
(Project 6145-0807)

Army - MI
Air Force - 85, 99
DLA - ES
User activities:
Navy - SH, MC
gent:
DLA - ES


## 6. REMARKS



