WIRING SYMBOLS, WIRING ABBREVIATIONS, AND DEFINITIONS

WIRING AND CABLING

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1. GENERAL

1.01 This section covers the wiring symbols and abbreviations in general use in equipment work. It also includes a list of definitions of wiring terms.

1.02 The "A" section and "AA" section on this subject have been issued jointly as one section bearing both numbers. Although this is the first issue of A804.009, it has been shown as issue 8 to agree with the present issue of AA612.001.

1.03 The requirements covered in this section shall be followed except as modified by applicable specifications and drawings.

1.04 Changes in requirements which have been made with this issue are explained under "Reasons for Reissue" at the end of the section. Arrows have been used to indicate changes or additions to the text.

2. WIRING SYMBOLS USED ON MANUFACTURING DRAWINGS

2.01 Various symbols and letters are used on manufacturing drawings, the meaning of those most commonly used is listed below:

Symbol	Meaning
A	Leads in handmade roof cable.
AT	Leads not to be connected until after shop tests are completed.
ATl	Leads to be connected by the installer during installation tests.
ATR	Leads not to be connected until relay tests are complete.
B	Terminal nearest base of terminal strip.
Bl	Terminal nearest panel or mounting plate (for 38-type resistances, varistors, etc.).
C	*Wiring run in a separate switchboard cable or sewed local power cable from all "C2" leads as well as from all other leads not marked on the circuit schematic drawings. (No segregation is required in local cables, in the formed ends of switchboard cables, in loose wire forms, in loose wiring run on cable racks, or within the unit on surface wired equipment. All "C" leads may be grouped together in the same cable with other "C" leads or "C5" leads in accordance with information shown in Section AA612.018 Selection of Switchboard Cables).
Cl	*Wiring taped and run in a separate cable form for electrical reasons, and placed inside of the regular form when to run on the outside of the form would interfere with the hinge action or other required movement of the regular form. (The same rules followed for the segregation and grouping of "C2," "C4," and "C5" leads apply for "Cl" wiring. As brought out above, "Cl" wiring is a special treatment for "C2," "C4," or "C5" leads in keyshelf or other hinged forms).
C2	*Wiring run in a separate switchboard cable and separate local cable so that the required segregation is maintained throughout its entire length, i.e., in switchboard cable, in the formed ends of switchboard cable, in local cable, in sewed local power cable, and in

Symbol	Meaning
	loose wire forms including loose wiring run on cable racks. All leads marked "C2" should be segregated from all "C" leads, other "C2" leads (except identical "C2" leads in other identical circuits), "C4" leads and "C5" leads as well as from all other leads not marked on the circuit schematic drawings. (No segregation is required within the unit on surface wire equipment).
C4	*Wiring carrying commercial power, within a unit, which must be kept separate from all other wiring. (No segregation is required within the unit on surface wired equipment. All C4 leads may be grouped together).
C5	*Wiring run in a separate switchboard cable and separate local cable so that the required segregation is maintained throughout its entire length, i.e., in switchboard cable, in the formed ends of switchboard cable, in local cable, in sewed local power cable and in loose wire forms. All leads marked "C5" should be segregated from all "C2" leads and "C4" leads as well as from all other leads not marked on the circuit schematic drawings. (No segregation is required in loose wiring run on cable racks or within the unit on surface wired equipment. All "C5" leads may be grouped together in the same cable with other "C5" leads but throughout their switchboard or sewed local power cable portion, they may be run with "C" leads in accordance with information shown in Section AA612.018 Selection of Switchboard Cables).
CU	Coaxial shielded cable.
D	*Single leads run in the open from terminal to terminal parallel or perpendicular to the edges and plane of the mounting plate or panel in the shortest possible manner consistent with the above requirements. (Color, gauge, and type of wire to be specified.)
D1	*Single leads run in the open directly from terminal to terminal with a minimum amount of slack consistent with the type of terminals and the apparatus arrangement and mounting conditions encountered. (Color, gauge, and type of wire to be specified.)
D2	*Planned wiring, that is, wiring which must be run in certain specified paths. (Complete information as to color, gauge, type of wire, pairing, paths, whether the leads are to be kept out in the open or (if the insulation permits) dressed back against the mounting plate or any other peculiarity to be specified in each case).
D3	*Wiring run loose and dressed back near or against the mounting plate or panel and run parallel to the edges of the plate or panel in the same manner commonly used for surface wiring "SW" and "SW1." This type of wiring differs from "SW" and "SW1" wiring in that pairing is not disregarded and wires other than type "G" or 24 gauge type "BG" are used. Except where pairs, triples, or quads are specified, the colors are as follows: Green - General wiring (except battery and ground leads) Red - Battery leads Black - Ground leads (Gauge, type of wire, colors of pairs, triples and quads to be specified. General paths for groups of wires may also be specified) *Details regarding method of running are covered in Section AA612.005 Forming and Fanning Cables
E	Adjacent rows (perpendicular to the fanning strip) of terminals.
EU	Shielded, extruded polyethylene insulated wire (Pe). Usually No. 22 gauge type BF. For 750A to 753A, and 755A to 757A cable, symbols EU1, EU2 may be used as necessary. In all cases, the drawing note will specify the gauge of wire and code of cable.
F	Leads to the same piece of apparatus brought from a form at separate stitches. Used for maintenance reasons on local cables to differentiate between two or more wires of the same color leaving a form at one point. The F stitch is always the separate stitch toward the tip of the cable arm in the form. Where there are a number of wires of this type, F, F1, F2, F3, etc.,

Symbol	Meaning
	indicates the order in which they are brought out, the lowest numbered wires being brought out nearest the regular stitch.
FF	Leads to the same piece of apparatus which must be identified by an extra stitch when the apparatus is served by a single regular stitch, but which require no additional extra stitches for identification when the apparatus is served by two or more regular stitches. (For example; 62- or 63-type induction coils to which leads may be brought out from one or more regular stitches depending upon the method of mounting.)
GT	Ground tracer.
J	Indicates manner in which a key is mounted. Used, for example, to mark "top end of key - keyshelf open" or "end of key nearer hinge looking at terminal side," J, J1, J2, etc. being used where several such notes are required on the same drawing. The use in each case is defined on the manufacturing drawing.
K	Top or left row (perpendicular to the fanning strip) of terminals.
K1	Top or left terminal on 203- and 700A-type terminal strips.
K2	Top left terminal on 224-type terminal strip looking at local cable side of strip.
K3	Bottom left terminal on 224-type terminal strip looking at local cable side of strip.
K4	Right-hand terminal lug looking at rear of terminal strip.
L	Strap placed on first equipped circuit of group only.
Ⓛ	Live leads to be insulated when not connected.
LP	Leads looped and not cut when apparatus is wired only.
LW	Loose wiring not to be sewed into cable forms but run loose and held into cable formation by fanning rings or other wiring devices. (Does not apply to loose wire run on cable racks).
OC	Omit connection and consider as a continuous lead when associated apparatus is not furnished on surface wired equipment.
OL	Omit lead unless apparatus for both ends is provided on surface wired equipment.
P	Paired wires.
PT	Leads furnished as part of apparatus.
Q	Quadruple wires.
RU	Rubber covered (720 cable) or polyethylene covered (754 cable) shielded cables. Unless otherwise specified 720 cable will be furnished. Where other than 720 cable is desired an equipment note on the schematic will specify the code of the cable required.
SH	Shank connection - a connection made behind a terminal hole.
SKR	Skinner connection - a connection made by extending the bare portion of a skinner terminating on a terminal to an adjacent terminal or next terminal in line in order to avoid the use of a strap or loop.
SS	Surface strapping is strapping located near the end rather than at the base of the terminal to facilitate frequency changing or removal by the maintenance force. When surface strapping is placed on terminal strips, the strap should be located in the notch of the terminal. When used on apparatus other than terminal strips, the strapping should be placed just back of the hole in the terminal.
SW	Surface wiring restricted to type G wire having easily pushed back insulation, run loose and dressed back against the mounting plate or panel unless other means are provided for controlling the dress, such as fanning devices. Details regarding method of running are covered in Section AA612.005 Forming and Fanning Cables. Colors of leads are as follows: Green - General wiring (except battery and ground leads) Red - Battery leads (except step-by-step switches) Ground leads on step-by-step switches Black - Ground leads (except step-by-step switches) White - Battery leads on step-by-step switches

Symbol	Meaning
⌐	(Gauge of wire to be specified.) Other colors may be used when required for specific purposes or to facilitate manufacture.
SW1	Surface wiring, (general use surface wiring) restricted to 24-gauge type BG wire, run loose and dressed back against the mounting plate or panel. Details regarding method of running are covered in Section AA612.005 Forming and Fanning Cables. Colors of leads are as follows: Green - General wiring (except battery and ground leads) Red - Battery leads (except step-by-step switches) Ground leads on step-by-step switches Black - Ground leads (except step-by-step switches) White - Battery leads on step-by-step switches Other colors may be used when required for specific purposes or to facilitate manufacture.
→ T	Tripple wires.
TW	Wires twisted together.
U	Shielded, textile-insulated wire, usually No. 22 type P. For other gauges or types of insulation, symbols U1, U2, etc., may be used as necessary. In all cases, the drawing note will specify the gauge and code of wire.
1W	One-conductor cross-connection wire.
2W	2-conductor cross-connection wire.
3W	3-conductor cross-connection wire.
4W	4-conductor cross-connection wire. (Spiral)
4W(P)	4-conductor cross-connection wire. (Mult. Twin)
Ⓦ, Ⓧ, etc.	Optional apparatus or wiring.
⌀	Leads not in switchboard cable, to be run by installer.
---○	Coaxial shield connection.
○○	Coaxial shield connection to P-414829 terminal punching.

Symbol	Meaning
⊗-○	Coaxial shield connection to apparatus cover.
⊂⊃	Leads run in switchboard cable.
---⊂⊃	Shield connection with ground tracer.
—⊂⊃	Shield connection without ground tracer.
→ ⊗-⊂⊃	Shield connection to apparatus cover.
—×—	Splice.
-----	Connection furnished as part of apparatus.
⌀	Common strapping.
—●—	Riser to level of apparatus.

3. ABBREVIATIONS FOR WIRE INSULATIONS

3.01 Abbreviations for wire insulations were not standardized in the past and several abbreviations frequently were used for the same type of insulation. Also in certain cases, the same letter was used to abbreviate different terms, as for example, B for braid and black, C for covered, conductor, and copper, and S for silk and single. To avoid confusion, insulation abbreviations have now been adopted in which the letters used have the following fixed meanings:

A - Acetate Yarn
Ab - Cellulose Aceto-butyrate Tape
B - Braid or Braided
C - Cotton
D - Double (Serving)
E - Enamel or Enameled
G - Glass
L - Lacquered
N - Nylon Yarn
→ Pe - Polyethylene (Extruded)
Pvc - Polyvinyl Chloride (Extruded coating)
→ R - Rubber
S - Silk
T - Tinned

3.02 In forming an abbreviation for a wire insulation, the letters are arranged from left to right in the order of the application of the insulating materials from the conductor out, as for example, EDACL for enamel double acetate cotton lacquered wire. If neither D nor B appear in an abbreviation, a single serving of the insulation is implied. The use of the letter S to indicate a single serving has been omitted. Likewise, the use of the letter B for black, and C for copper, covered, and conductor is discontinued. The letter T for tinned is used only in

those cases where a question might arise as to whether a wire is tinned or untinned. Otherwise the use of tinned copper wire will be assumed and the abbreviation T omitted from wiring drawings.

3.03 In forming abbreviations for wires having a braided covering, the letter immediately preceding the B indicates the material of which the braid is made. For example, DACB is insulated with two acetate yarn servings and a cotton braid.

3.04 The new abbreviations shall be interpreted as the letters indicate, for example, DACL wire will be known as double acetate cotton lacquered wire; DNCCB wire as double nylon, cotton (served), cotton braided wire, etc.

3.05 As a matter of convenience, the following list contains abbreviations which have been used in the past, as well as the new abbreviations. In preparing new drawings and specifications, the new abbreviations should be used, except for coded wires which are specified by the code type letters only.

Kind of Insulation	Abbreviations Previously Used	Present Abbreviations
Acetate Cotton	-	AC ←
Cotton Braid	-	CB
Cotton Polyvinyl Chloride	-	CPvc ←
Double Acetate Yarn Cotton Lacquered	-	DACL
Double Acetate Yarn Cotton Braid	-	DACB
Double Acetate Yarn Cotton Braid Lacquered	-	DACBL
Double Cotton Lacquered	-	DCL
Double Cotton	DCC, DCCC	DC
Double Cotton Braid	DCB	CBCB
Double Nylon Yarn Single Cotton, Cotton Braid	-	DNCCB
Double Nylon Yarn Single Cotton, Cotton Braid Lacquered	-	DNCCBL
Double Silk	DSC, DSCC	DS
Double Silk Single Cotton	DS & CC, DSSCCC, DSCC	DSC
Double Silk Single Cotton Cotton Braid	-	DSCCB
Double Silk Cotton Braid Lacquered	-	DSCBL
Double Silk Cotton Lacquered	-	DSCL
Double Silk Cotton Silk Braid	DSSCCSB	DSCSB
Double Silk, Silk Braid Lacquered	-	DSSBL
Enamel	BE, BECC	E
Enamel Single Acetate Yarn Cotton Braid	-	EACB
Enamel Single Cotton	BESC, BESCCC	EC
Enamel Double Acetate Yarn Cotton Braid Lacquered	-	EDACBL
Enamel Double Acetate Yarn Cotton Lacquered	-	EDACL
Enamel Double Cotton	BEDCC, BEDC, BEDCCC	EDC
Enamel Double Cotton Lacquered	-	EDCL
Enamel Double Silk	BEDS, BEDSCC	EDS
Enamel Double Silk Single Cotton	BEDS & CC, BEDSSC, BEDSSCCC	EDSC
Enamel Double Silk Cotton Lacquered	-	EDSCL
Enamel Double Silk, Silk Braid Lacquered	-	EDSSBL
Enamel Single Silk	BESS, BESSCC	ES
Enamel Single Silk Cotton Braid	BBE	ESCB

Kind of Insulation	Abbreviations Previously Used	Present Abbreviations
Enamel Single Silk Double Cotton	BESS & DC	ESDC
→ Polyethylene	-	Pe
→ Polyvinyl Chloride Cotton Lacquered	-	PvcCL
Polyvinyl Chloride Cotton Braid Lacquered	-	PvcCBL
→ Polyvinyl Chloride Glass Braid Lacquered	-	PvcGBL
Single Acetate Yarn Single Cotton	-	AC
Single Acetate Yarn Single Cotton Braid	-	ACB
Single Cotton	SC, CC, SCCC	C
Single Cotton Cotton Braid Lacquered	-	CCBL
Single Silk	SS, SSCC	S
Single Silk Single Cotton	SS & CC, SSCC, SSSCCC	SC
Single Silk Cotton Braid	BSS & CC, SS & CB	SCB
Tripple Acetate Yarn Single Cotton Silk Braid Lacquered	-	3ACSBL
Triple Cellulose Acetobutyrate Tape Double Glass Braid Lacquered	-	3AbGBGBL
Double Cellulose Acetobutyrate Tape Glass Braid Cotton Braid Lacquered	-	DAbGBCBL

4. DEFINITIONS OF WIRING TERMS

ARM A branch or leg of the main section of a cable form.

BARE STRAP A strap made of bare wire. (See STRAP).

BUTT The point at which the sheath or covering of a cable terminates.

BUTT LEG The leg nearest the butt or main body of a cable form having two or more legs or branches.

C WIRING Those switchboard or local cable wires which are required to be segregated for electrical reasons, such as wiring carrying tones. (Designated C, C2, C4, and C5 on the circuit schematics, depending upon the extent to which the segregation is required.)

CABLE FORM A formation of wires not encased in a woven fabric (or plastic) covering or lead sheath. The wires may be held in formation either by sewing with twine or by means of fanning rings or fanning strips. Cable forms are of two types, those made of bulk wire and the formed ends of switchboard cables.

COMMON LEAD Any lead supplying battery, ground, ringing, tone, etc., to several pieces of apparatus, regardless of code, in the same circuit on one or more mounting plates, or in a number of circuits on the same mounting plate or several plates. The connections between the several pieces of apparatus are made by means of common straps or loop leads.

COMMON STRAPS Wires connecting terminals on two or more pieces of apparatus (in the same or in different circuits) for the purpose of supplying battery, ground, or other common potential to the apparatus, or to serve as a common lead for testing, listening, ringing, etc. (Removable units of the same coded piece of apparatus, as for example, the magnets on crossbar switches, are considered separate pieces of apparatus for the purpose of this definition.)

D WIRING Wiring not sewed in cable forms for electrical reasons. This wiring is designated D, D1, D2, or D3 depending upon the method of running.

DOUBLE STRIPPER That portion of a cable between two given points from which the outer covering is stripped or removed. The length of the double stripper is the distance between the stripper butts.

DRESSING The process of arranging skinners with respect to terminals.

F STITCH A supplementary stitch on a local cable form for separating wires of the

same color which are to be connected to different terminals of the same piece of apparatus. (Designated F, F1, F2, F3, etc.)

F STITCH LEADS Those wires which are to be placed under F stitches on the cable form.

FANNED FORM An arrangement where the wires are brought directly from the butt of the cable or from a point along the sewed part of a cable form through a fanning strip or other separating device, to the terminals of the apparatus without being otherwise secured.

FRONT When used to designate the location of framework parts or apparatus in switchboards and desks, "Front" is the side of the switchboard or desk nearer the operator. At relay racks, single-sided dial frames, etc., the apparatus, cover, or can side is considered as the "Front."

INDIVIDUAL STRAPS Wires connecting two or more terminals on the same piece of apparatus. On terminal strips, individual straps are limited to two terminals. Straps connected to more than two terminals are considered as common straps.

LEFT When used to designate equipment for switchboards, desks, frames, or racks, it shall be interpreted as being taken when facing the front of such switchboards, desks, frames, or racks.

LEG (See ARM).

LOCAL CABLE A cable composed wholly or in part of bulk wire held in cable formation by sewing with twine.

LOOP LEADS Color-coded switchboard wire run from terminal to terminal of same or adjacent apparatus and sewed in the cable form instead of being run directly from terminal to terminal.

LOOSE WIRE FORM Wiring held in cable formation by fanning rings or other wiring devices.

REAR When used to designate the location of framework parts or apparatus in switchboards and desks, "Rear" is the side of the switchboard or desk farthest away from the operator. At relay racks, single-sided dial frames, etc., the wiring side is considered as the "Rear."

RIDGED Designation used to identify conductor in 720 cable for tip side of line.

RIGHT When used to designate equipment for switchboards, desks, frames, or racks, it shall be interpreted as being taken when facing the front of such switchboards, desks, frames, or racks.

SEWED FORM A formation of cable wires, bulk wires, or both bulk wires and cable wires compactly sewed in such a manner that the wires are brought out approximately opposite their associated terminals at the apparatus.

SHINER The end of the skinner from which the insulation has been stripped to provide for connection to the terminal. (Also, sometimes used as the exposed portion of the conductor between the insulation and soldered connection.)

SINGLE STRIPPER That portion of the end of a cable from which the outer covering is stripped or removed. The length of the single stripper is the distance between the butt and the end of the stripper before the conductors are unwound.

SKINNER That portion of a wire which extends from the sewed portion of the form to the end of the wire in sewed forms, and from the butt of the cable to the end of the wire in fanned forms.

SKINNER LENGTH The length of the wire from the point where it leaves the sewed portion of a sewed form to the point of connection to the apparatus. In the fanned form, it is the length of the wire from the butt of the cable to the point of connection to the apparatus.

SKINNING The operation of removing the insulation from skinners or conductors.

SLANTING FORM The arm of a switchboard short multiple cable form where the edge of the cable form nearest the apparatus to which the wires are soldered is slanting and not parallel to the row of terminals on the apparatus.

SLEEVED STRAP A strap made of sleeved wire. (See STRAP).

SPARE WIRES Extra wire placed in switchboard and lead covered cable for use in cases where, through breakage or through other unusual cases, some of the regular wires in the cables are not available for use.

SPLICE STRIPPER (See DOUBLE STRIPPER).

STRAIGHT FORM The arm of a switchboard short multiple cable form where the edge of the form nearest the apparatus to which the wires are connected is straight and parallel to the row of terminals on the apparatus.

STRAP (See COMMON STRAPS and INDIVIDUAL STRAPS). Straps may be of tinned wire, either bare or with braided sleeving, run from terminal to terminal of the same or adjacent apparatus and not included in a sewed form.

STRIPPER That portion of a cable from which the outer covering is stripped or removed.

STRIPPING The operation of removing the outer covering or sheath of a cable together with the inner wrapping, thus exposing the wires.

SURFACE WIRING Wiring which is run loose and dressed back against the mounting plate or panel in the most convenient manner. There are two types of surface wiring viz., SW and SW1 wiring.

SWITCHBOARD CABLE Any cable with a fabric (or plastic) sheath or covering.

SWITCHBOARD WIRE Colored bulk wire of the type used in local cable.

TIP END The end of the cable arm farthest from the butt or main body of the cable. On a cable which has no butt, the end away from terminal strip.

TIP LEG The leg farthest from the butt or main body of a cable form having two or more legs or branches.

U WIRING Magnetically shielded wire or cable. Designated U, U1, U2 etc., CU, EU, or RU depending upon the type of wire or cable.

UNEQUIPPED WIRES Regular wires, other than spare wires, which are formed out for future apparatus but which are not used initially. The unused wires in universal local cables are classed as unequipped wires.

UNUSED WIRES Regular wires, other than spare wires, which are not required for future use and which are generally left dead in the form or at apparatus fanning strips.

REASONS FOR REISSUE

1. With this issue the "AA" Section and the "A" Section on this subject have been issued jointly as one section bearing both numbers.

2. Paragraph 1.03 has been added to recognize the condition where other specifications and drawings modify the general requirements.

3. The definitions of "C" wiring, "D" wiring, "SW" and "SW1" wiring, "RU" wiring and "SKR" have been revised.

4. The following wiring symbols and their definitions have been added: EU, K4, OC, OL and the symbol for shield connection to apparatus cover.

5. In paragraph 3.01 the abbreviations for extruded polyethylene insulation (Pe) and rubber (R) have been added.

6. The following wire insulation abbreviations have been added in paragraph 3.05: AC, CPvc, Pe, PvcCL, and PvcGBL.

7. In the definition for individual straps reference has been made to straps on terminal strips.

8. The definition for "SHINER" has been added.

9. The terms "SLANTING SKINNERS," and "STRAIGHT SKINNERS" were changed to read "SLANTING FORMS."