WHITE PAPER

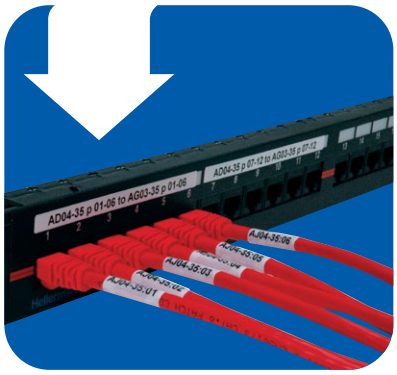
ANSI/TIA-606-B

HellermannTyton

BACKGROUND

American National Standards Institute (ANSI)
Telecommunications Industry Association (TIA)
Electrical Industries Alliance (EIA)
International Standards Organization (ISO)
International Electrotechnical Commission (IEC)

ANSI/TIA-606-B is designed to be a generic labeling standard that applies to all types of premises. The standard is backward compatible with the legacy ANSI/TIA/EIA-606-A Addendum 1 and is compatible with the international standard ISO/IEC TR14763-2-1 identifiers.



The original TIA-606-A was designed to identify and record the general administration, but did not address the specific needs of the data center design and installation.

TIA-606-A was just reaffirmed back in 2007. The TIA-606-A Addendum 1 was published in 2008. The addendum reconciled the 606-A with the TIA's 942 data center standard. The current 606-A did not really consider data centers and the 942 did not consider administration. The two concepts came together in Addendum 1 to the 606-A. The development of the ANSI/TIA-606-B combined the TIA-606-A and the Addendum 1 while harmonizing with the requirements of the ISO/IEC TR14763-2-1.

Labeling is a key factor in the installation and maintenance of an efficient and professional installation. The 606 standard continues to expand and address how and where to identify key components of Information Transport System (ITS).

The new 606-B standard not only services the data center, but also commercial, residential, industrial and healthcare facilities. It now establishes guidelines for owners, end users, manufacturers, consultants, contractors, designers, installers, and facilities administrators involved in the administration of the telecommunications infrastructure. In addition, by harmonizing with ISO/IEC TR14763-2-1, the updated standard can be implemented internationally. The new standard is meant to increase the value of the system owner's investment by reducing labor costs associated with maintaining complex infrastructure systems, which results in extending the useful economic life of the system and by providing effective service to the users in a variety of industries, markets and international countries.

CHANGES FROM THE LAST REVISION

1. Adopts identification scheme specified in TIA-606-A Addendum 1.
2. Allows existing TIA-606-A identifier formats to continue to be used where they are already in use.
   NOTE: An identifier is simply the "printed" text that will appear on a label as related to the standard.
3. Harmonized with ISO/IEC 14763-2-1.
4. Creates new identification format for Cabling Subsystem 1 link identifiers (Horizontal links), Cabling Subsystem 2 and 3 links (Backbone cables) as well as telecommunications outlets, equipment outlets, splices, consolidation points and outdoor telecommunication spaces.
   NOTE: In order to be generic to all types of premises, terminology was adopted from the TIA-568-C.O. standard in which Cabling Subsystem 1 is now what was commonly referred to as the "Horizontal Link". The (1) does not mean anything in particular except to differentiate Cabling Subsystem 1 links from Cabling Subsystem 2 and 3 links which we commonly referred to as "Cross Connects" or "Backbone" cables. Campus cabling has its own cabling separate from the cabling subsystem 2 and 3 links, which are the 2 layers of backbone cabling allowed in premises cabling. The standard allows one level of cross connection in Cabling Subsystem 1 and two levels of cross connection in Cable Subsystem 2 and 3 cabling. Clause 10.2.1 The language also makes the standard more generic in that it not only can service the data center, but can also service commercial, residential, industrial and medical facilities.
5. Extends administration to all inter-building telecommunications cabling.
6. Creates new identifiers for telecommunications outlets, equipment outlets, splices, consolidation points and outdoor telecommunication spaces (maintenance holes, pedestals, hand holes, etc.).
7. Administers Cabling Subsystem 2 and 3 links by pair groups, corresponding to ports (pairs, strands and grouping identifiers) rather than copper pairs or single fibers. See clause 6.1.2.
8. Administration of grounding and bonding systems beyond the TMGB and TGB.
9. Provides information on implementing automated infrastructure management systems.

CLASSES

The standard still breaks out the criterion by classes of administration.

CLASS 1 = Locations served by a single Equipment Room (ER) This ER is the only Telecommunications Space (TS) administered whereas there are no Telecommunication Rooms (TRs) and no Cabling Subsystem 2 and 3 cabling or outside plant cabling systems to administer.

CLASS 2 = Fulfils the administration needs of a single building that are served by multiple Telecommunications Room (TR)s with one or more TR's within a single building. This includes all the elements of a class 1 system plus identifiers for Cabling Subsystem 2 and 3 cabling, multi-element bonding and grounding systems and fire stopping.

CLASS 3 = Serves a campus environment with multiple buildings and building pathways, spaces, and outside plant elements.

CLASS 4 = Attends the needs of a multi-site (multi-campus) administration.

There are slight differences in requirements depending on what level is administered. In a Class 1 system, for example, the floor and room number do not need to be identified since there is only one room to manage. Obviously, as the complexity of the system increases, additional identifiers are needed. In Class 3 and 4 systems there are added requirements, such as building and campus identifiers, outside plant and inter-campus elements such as wide area network connections.

THE BASICS

The basic premise of the TIA-606-B compliant data center implementation is actually very simple and can be broken down using a few common examples.

A typical patch panel and port identifier might be as follows:

1A.AD02-40:02

1A. = Floor 1, room A
AD02 = The grid location within the data center for a particular rack or cabinet
-40 = A patch panel located 40 rack units from the bottom of that rack or cabinet
:02 = A specific port within the patch panel located at AD02-40. (This can also be a range of ports 01-24 as example)

Optionally, we can remove the space location to the front of this identifier. If we are on floor 1, space A, and this is the only space, there is no need to include that portion on the printed identifier. The actual printed identifier might look as follows:

AD02-40:02

Since we are harmonizing to the ISO/IEC TR 14763-2-1, we can optionally add a "+" sign which specifies that the next portion of the identifier is a location aspect. The "+" sign only needs to appear in the records section and not on the actual label.

+AD02-40:02

An "=" in front of an identifier specifies a function aspect (Example: = XO for telecommunications outlet).

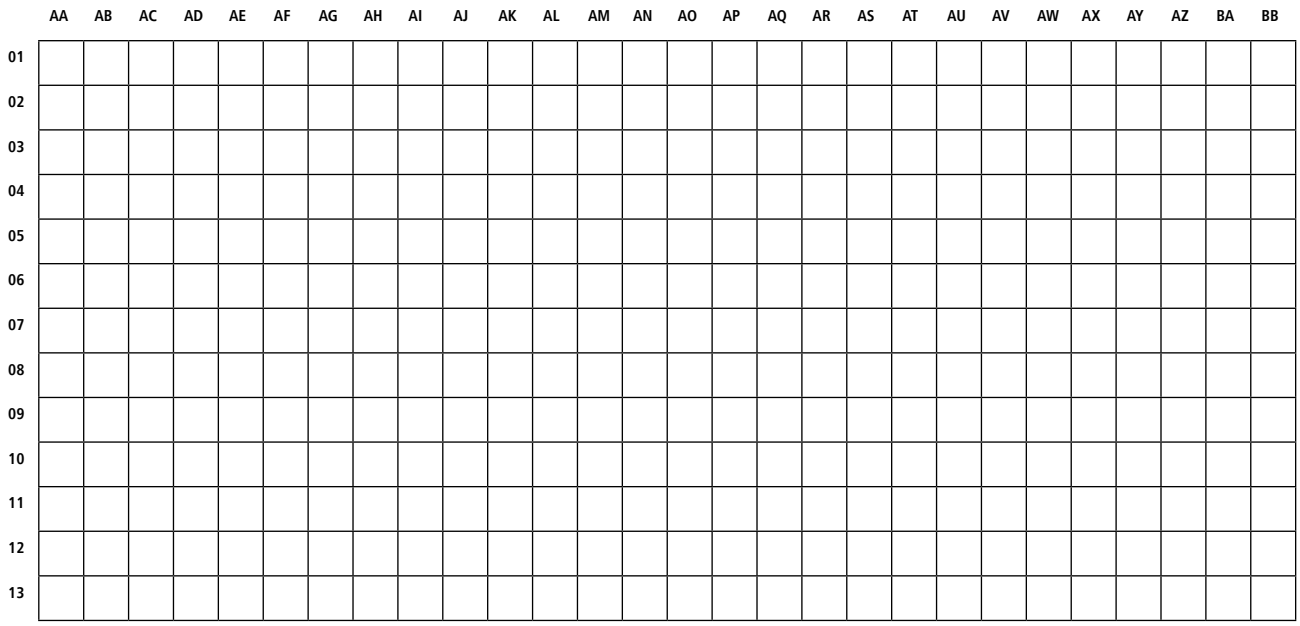
SPACE LABELING

1A = Floor 1, Space A, which is a alpha-numeric sequence that can be edited to suit the needs of the installation. Example: 3TRA would represent Telecom Room A on the third floor. An example of an ISO/IEC TR 14763-2-1 compatible format is: +3TRA.

CABINET AND RACK IDENTIFIERS

The standard recommends the use of GRID COORDINATES to distinguish the rack or cabinet in a space. In rooms that have access floor systems, recognition for the space shall employ the access floor grid identification scheme using alpha and numeric characters to mark the X and Y coordinates within the space.

'X' COORDINATE



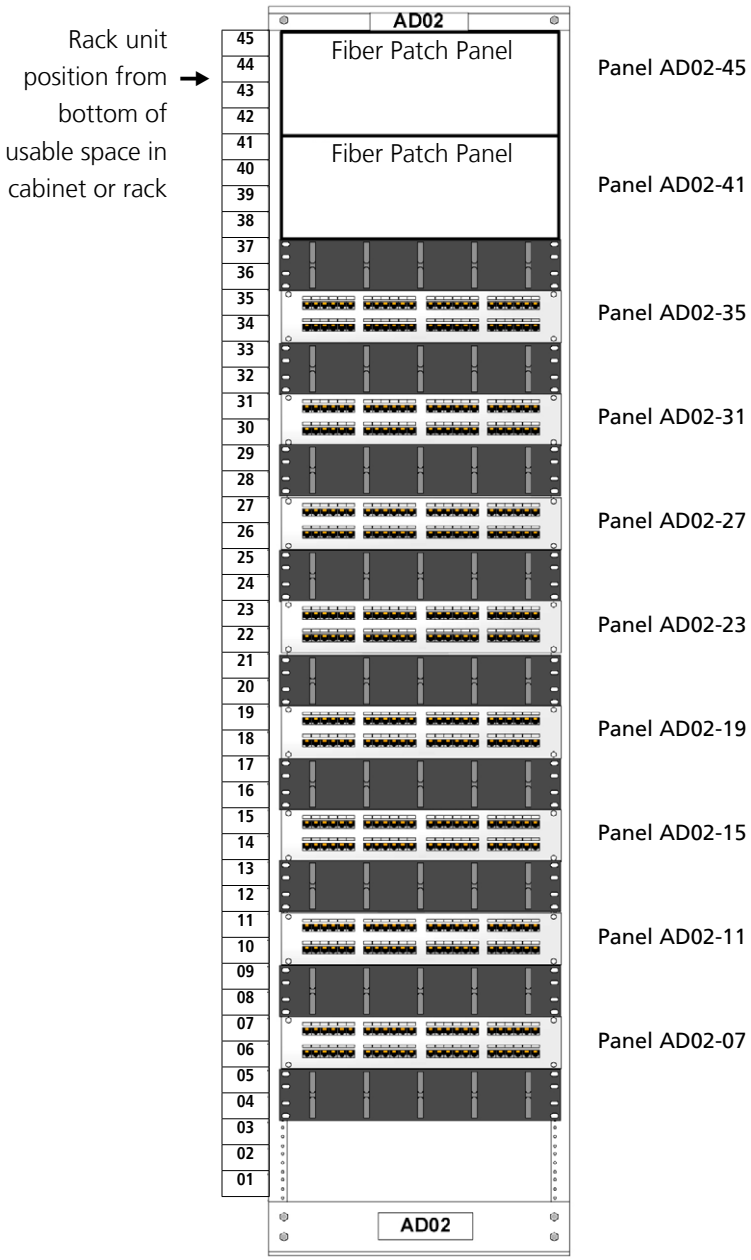
'Y' COORDINATE

So, a rack located at grid coordinates AD02, would be marked as ADO2. Typically, the label is placed on the top and bottom, front and rear of the rack or cabinet using machine printed labels.

Where grid coordinates are not used, the racks can be marked by row and rack number.

PATCH PANEL IDENTIFIERS

Within each rack, there will be patch panels. The patch panels shall be labeled with the identifier of the patch panels at the far end of the cables, if practical. These should be marked using rack units from the bottom of the cabinet. Since the floor/space marking is optional in a Class 2 system, the rack and panels can be marked by simply combining the grid coordinates of the rack with the rack units of the panels within that rack. A patch panel 35 rack units from the bottom of a rack located at grid coordinates AD02 would be identified as **AD02-35**.



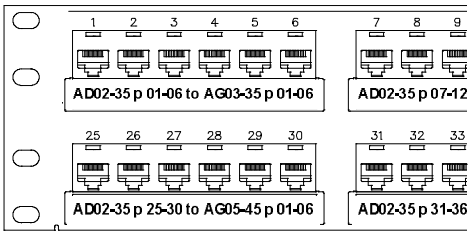
NOTE: The standard also allows the marking of panels and sub-panels using alpha characters starting with A and excluding "I", "O" and "Q" as outlined in sections 5.1.3.1.1 and 5.1.4.1.

PATCH PANEL PORT IDENTIFIERS

The patch panels should be labeled with the identifier of the patch panels at the far end of the cables, if practical. Each port, the first port or the last port, or the last of each subpanel shall be labeled. Patch panel labels shall contain the patch panel identifier. Where space permits, the patch panel also should have labels to specify the classification at the far end ports using this format. Each panel will have a series of ports that need to be acknowledged.

Thus, a typical patch panel/port identifier on a set of six ports within the patch panel might be marked as:

AD02-35 p 01-06 to AG03-35 p 01-06



This can be interpreted as the near end set of six port as being located in a patch panel 35 rack units from the bottom of rack or cabinet at grid location AD02 and these ports are going to the "far-end" set of six ports located in a patch panel 35 rack units from the bottom of rack or cabinet at grid location AG03.

NOTE: The near end room name and near end patch panel identifier can be omitted since this information is implicit and inferred from the required cabinet/ rack and patch panel labels. See section 5.1.3.1.3.1. The far end room name may also be omitted if the far-end patch panel is in the same room. This means that the length of the identifier can be truncated to save space yet keep the format intuitive to the user.

Example:
One could shorten the example above to **"p 01-06 To AG03-35 p 01-06"**

Patch panels that support Cabling Subsystems 2 or 3 should indicate the name of the space; Main Distribution Area (MDA), Intermediate Distribution Area (IDA), Horizontal Distribution Area (HDA) or TR to which the cables run. Section 5.1.3.1.3.1.

Ports 01-06 to HDA01 AJ17-45 Ports 01-06

Section 5.1.4.4. All ports on patch panels and all positions on termination blocks shall be labeled with the corresponding port number or position number and optionally with additional identifier fields as practical. All subpanels shall be labeled with their subpanel identifier. An example of a sub-panel identifier is usually indicated by an alpha character:

Certain applications may provide electrical power in addition to data transmission over balanced twisted pair cables. Visual identification of ports with power MAY be accomplished through the use of this symbol.

Ports A1-A6 & B1-B6 to AG10-B Ports 01-12

Ports A1-A6 = Sub panel A, ports A1-A6
Ports B1-B6 = Sub panel B, ports A1-A6
AG10-B = Sub panel B in rack at grid location AG10
Ports 01-12 = Ports 1 to 12 in sub panel B

SPECIALIZED APPLICATIONS

The new standard does address unusual and constantly changing circumstances. As an example from section 5.1.3.1.1, several manufacturers have come out with cabinets that use zero rack mount space by incorporating vertical rails in the cabinet to save space. In short, additional patch panels reside on either side of the cabinet in a vertical position.

In this case, how does one identify these vertical patch panels? A simple way to mark the vertical panels is to use rack units combined with an alpha character for location within the rack or cabinet. The TIA-606-B now designates an additional alpha letter indicating the side as A, B, C, D, or F, L, R, B (Front, Left, Right, Back) as examples. This can be used when Rack Units (RU) are designated. The user can then name the horizontal and vertical patch panels by rack unit. The rack unit of the vertical patch panel is determined by the rack unit location, of the height of the top of the vertically mounted patch (by height at the top). A separate alpha designation for Right (R) or Left (L) to distinguish the vertical patch panels as being either on the left or right side of the cabinet.

EXAMPLE: **AG09-L35:01-06**

In this case, the credential is describing a patch panel at 35 rack units from the bottom of the rack, on the left side of the cabinet, at grid location AG09, ports 1 to 6.

Using pre-terminated copper or fiber solutions, Zero U, high density cabinets can allow additional ports where you need them and aligns connectivity with the servers. This allows for moves, adds, and changes without interrupting rack mounted equipment in a fully populated cabinet. This is a new trend in cabinet management to maximize data center real estate and the new TIA-606-B standard is flexible enough to allow proper identification of these vertical panels.

CABLING SUBSYSTEM 1 LINK / HORIZONTAL LINK IDENTIFIERS

The main focus of the 606-B standard is to be able to track the ITS from the data center to the work area. Using the new format, a horizontal link identifier that terminates at both ends on panels within the same data center would be printed as follows:

NEAR END = AG09-35:01 / AJ06-35:01
FAR END = AJ06-35:01 / AG09-35:01

If standing at rack location AG09, reading this near end cable identifier will describe both the near end and far end locations.

AG09 = Rack or cabinet at grid location AG09 within the data center
- 35 = Patch panel located 35 rack units from the bottom in rack AG09
:01 = Port 01 in patch panel located 35 rack units from the bottom of rack AG09

/ = Separator for near end/far end location description

AJ06 = Rack or cabinet at grid location AJ06 within the data center
-35 = Patch panel located 35 rack units from the bottom in rack AJ06
:01 = Port 01 in patch panel located 35 rack units from the bottom of the rack in AJ06

The ISO/IEC TR14763-2-1 identifiers would appear as follows for a Cabling Subsystem 1 Link;

AG09-35:01 / AJ06-35:01=W

The "W" is the letter code for cables as specified in IEC 81346-2.

NOTE: In commercial buildings, industrial premises, data centers and multi-tenant buildings, each individual telecommunications outlet or equipment outlet shall be labeled with the Cabling Subsystem 1 link identifier. The labeling SHALL appear on the connector, faceplate and Multi User Telecommunications Outlet Assembly (MUTOA) in a way that clearly identifies the individual connector associated with the particular identifier. Section 5.1.7.3.

In sections 5.1.8.1 to 5.1.11.2 when using the Cabling Subsystem 1 link identifiers, it is optional to identify Equipment Outlets (EO's) and telecommunication outlets (TO's) by using a two letter code to identify the outlet.

XO = Equipment room outlets
XC = Consolidation points
XL = Zoned Distribution Areas (ZDA) ports
XSz = Splice where "z" is the appropriate distance along the cable of the splice from the termination point in the telecommunications room or HDA.

An example of a Cabling Subsystem l link identifier using the option to identify the outlet might look as follows:

AG09-35:01 / AJ06-35:01=XL:5

The port on the consolidation point may optionally be identified by a colon ":" and the port after the XL.

GROUNDING AND BONDING

The standard addresses grounding and bonding beyond the (Telecommunications Main Grounding Busbar) TMGB and (Telecommunications Grounding Busbar) TGB with the optional addition of the (Rack Grounding Busbar) RGB, (Mesh Bonding Network) MBN, (Bonding Conductor for Telecommunications) BCT, (Telecommunications Bonding Backbone) TBB, as well as being able to attach objects such as an identifier for a cabinet or rack or electrical panel as some common examples. See sections 5.1.12 to 5.2.

A practical example might be a rack grounding Busbar identifier where you may have more than one Rack Grounding Busbar (RGB) in the cabinet rack or wall segment is shown below.

2A=RGB1

2A = Floor 2, Room A
RGB = Rack Grounding Busbar #1

The standard also allows the addition of an identifier that identifies an object to which the bonding conductor is attached. This might include an electrical panel, a pathway, building steel, a cable tray or equipment such as a Local Area Network (LAN) switch. Typically this is the TIA-606-B identifier of the equipment. In this example, we add the grid location of the rack or cabinet to which the RGB is attached:

2A=RGB1/AJ05

2A = Floor 2, Room A
RGB = Rack Grounding Busbar #1
AJ05 = Rack at grid location AJ05 which is the object attached to the RGB

BUILDING CABLING SUBSYSTEM 2 AND 3 CABLE IDENTIFIERS

The backbone cabling is handled very similar to Cabling Subsystem 1 link identifiers explained earlier in this document. A typical identifier will include the identifier for the space at one end of the cable, the space terminating the other end of the cable and one or two alpha numeric characters to identify a single pair or port.

1A.AJ06-27:01 / 2A.AJ09-27:01

1A = Floor 1, Space A
AJ06 = Rack or cabinet at grid location AJ06
27 = Patch panel located 27 rack units from the bottom of the frame
:01 = Port 1

For Class 3 and 4 installations, the installer is just adding campus and building identifiers.
Example of a backbone cable identifier:

A-ENG-1A:AJ06-27:01-06 / B-ADM-1A.AJ09-27:01-06

A = Campus A
ENG = Engineering Building
B = Campus B
ADM = Administration Building

NOTE: Administration of Cabling Subsystem 2 and 3 identifiers is by pair groups or ports rather than copper pairs or single fibers. Each port or pair on a building Cabling Subsystem 2 and 3 cable shall have a unique identifier. Individual optical fibers and balanced pairs are typically color coded rather than individually marked.

FIRESTOPPING

The TIA-606-B legacy format for marking a fire stop would be printed as follows:

2-FSL01(6)

2 = 2nd Floor
-FSL = First Stop Location
01 = Location #
(6) = 6 hour burn rating

The comparable format for ISO/IEC 14763-2-1 would be printed as follows:

SF02-2A/3A=U(3)=F

SF02 = Building SF02
2A = Floor 2, space A
/ = Located between telecom rooms 2A and 3A
3A = Floor 3, space A
=U = U following the equal sign specifies the element is a pathway
(3) = Sleeve 3
F = Specified the element is a Fire stop location

SPECIAL PURPOSE CABLE MANAGEMENT SOFTWARE

The new ANSI/TIA-606-B standard also covers automated infrastructure management systems which may include technology used to detect and to record infrastructure changes (e.g. pre-printed serialized bar codes, human readable text, RFID chip technology and electrical continuity contacts. There are no specific labeling requirements and each can be labeled in a variety of ways that suit each installation, but should contain the records described in the 606-B. These specialized software programs should be able to directly generate the labels or be able to export data to other devices or labeling software that can generate the machine printed labels.

OUTSIDE PLANT AND PATHWAY IDENTIFIERS

The new standard also addresses outside plant and pathways by identifying inter-building and outside plant pathways as well as entrance pathway identifiers. As an example, a maintenance hole, handholes, pedestal or outdoor cabinet might be identified as follows:

LAX1-MH101(37.797413,-122.414925)

The Maintenance Hole on campus LAX1 is located at Global Positioning System (GPS) coordinates 37.797413 -122.414925. The use of GPS is optional and could be replaced site locations such as site MH12 which would represent Maintenance Hole 12 on campus LAX1. See section 9 under Optional Identifiers For Infrastructure Elements.

LAX1-MH12

Termination Type	Color	Pantone #	Typical Application
Demarcation Point	Orange	150C	Central Office Connection
Network Connection	Green	353C	User Side of Central Office Connection
Common Equipment	Purple	264C	Connection to PBX, Mainframe Computer, LAN, Multiplexer
Cabling Subsystem 3	White		Terminations of Building Cabling Subsystem 3 Cable Connecting MC ot ICs
Cabling Subsystem 2	Gray	422C	Termination of Building Cabling Subsystem 2 Cable Connecting IC ot HCs
Campus Inter-building Cabling	Brown	465C	Termination of Campus Inter-building Cable Between Buildings
Cabling Subsystem 31	Blue	291C	Terminations of Cabling Subsystem 1 Cable In TSs
Miscellaneous	Yellow	101C	Alarms, Security, or Energy Management

10.2.2 Table 4 Colors

ALTERNATE LABEL FORMATS

Section 4.6 allows the use of a direct link to an identifier within the records using a printed label with a short and simple numeric code or a machine readable label such as an RFID chip or a pre-printed barcode label. So, as example, in the record, the identifier for a particular port might be: **A-ENG-1A:AJ06-27:01-06 / B-ADM-1A. AJ09-27:01-06**

The actual label might simply be printed with the number 132, (in human readable text or barcode) but the number 132 is a direct link and cross reference to the detailed identifier **(A-ENG-1A:AJ06-27:01-06 / B-ADM-1A.AJ09-27:01-06)** in the actual database. This can reduce the number of characters required to print on the cable or equipment label.

COLORS

Using colors is recommended, but not a requirement. Many smaller installers find it costly to stock and purchase many colors of labels in order to meet a requirement that might not fit their particular situation. The 606-B is not color dependent and allows the installer to fully identify without requiring the use of a color. If color is used, the installer should use the pantone color scheme as outlined in section 10.2.2, table 4.

RECORDS

Most installers are aware of the cost of installing and maintaining an efficient and cost effective ITS. Labeling is crucial in this area. Yet, there is an aspect that is often neglected – record keeping. Maintaining records of your ITS installation is the most valuable part of any labeled configuration. In the standard, you must link a record for each identifier that is printed on a label. If the records are complete and accurate and contain the recommended data as outlined in the labeling standard, the customer will have a well documented infrastructure that can be understood and managed by anyone responsible for making moves, adds or changes.

So, the label is important, but if you do not attach the relevant data to that identifier, much of that value is lost. A database can be something as simple as an Excel spreadsheet. Each identifier makes up a row in the spreadsheet and each element associated with that identifier is recorded in the columns going across the database.

As an example, each Cabling Subsystem 1 link (Horizontal link) record shall include the following:

Location of work area outlet connector
Cabling Subsystem 1 link identifier.
Outlet connector type (8 position, 110, SC or duplex as example)
Cross connect hardware (Patch panel, T568B Cate 53, etc)
Cable type (4pr. UTP, Cat 5e, plenum, or 2 strand 62.5/125 multi-mode, FDDI grade, riser)
Cable length
Service record of link
It may also include any other data that the installer or customer feels is pertinent to the installation such a the color code of the outlet connectors, wiring scheme, Multiple User Telecommunications Outlet Assembly (MUTOA) Consolidation Point (CP) or Transition points.
(It could be shown in the form of an Excel Spreadsheet like below)

Example of spread-sheet implementation of class 1 administration system: horizontal link records sorted by building room number.

Horizontal Link Identifier	Cable Type	Building Location of Outlet	Outlet Connector Type	Color Code of Outlet Connector	Other Outlet Connectors at this Location	Wiring Scheme	Horiz. Cable Length	Service Record	MUTOA	CP	Trans. Point
1A-W01	Cat 5e Plenum	R111	8 Pos Mod	Beige	1A-A01 1A-B01	568A	129ft	Tested 4/22/01	No	No	No
1A-A01	Cat 5e Plenum	R111	8 Pos Mod	Orange	1A-W01 1A-B01	568A	127ft	Tested 4/22/01	No	No	No
1A-B01	62.5/125, Two Strand, Plenum	R111	SC Duplex	Blue	1A-W01 1A-A01	N/A	128ft	Tested 5/23/01	No	No	No
1A-W02	Cat 5e Plenum	R112	8 Pos Mod	Beige	1A-A02 1A-B02	568A	112ft	Tested 4/22/01	No	No	No
1A-A02	Cat 5e Plenum	R112	8 Pos Mod	Orange	1A-W02 1A-B02	568A	112ft	Tested 4/22/01	No	No	No
1A-B02	62.5/125, Two Strand, Plenum	R112	SC Duplex	Blue	1A-W02 1A-A02	N/A	113ft	Tested 5/23/01	No	No	No

If the ITS is not efficient to administer, the cost of any mistakes far outweigh the initial cost of recording all the data initially at the time of installation. In the long run, the expense of not recording administration data can be very high. The outlay of testing and tracking cables can be expensive and can result in a backlog of cables that are abandoned in the plenum in lieu of simply pulling a new cable. Even an installation that appears intuitively simple, may grow over time and eventually become an unmanageable mess if the ITS is not recorded properly.

The TIA-606-B standard is the culmination of years of work by many experts, installers, engineers and customers to make the best system possible. There are still elements that must be addressed, but it is a standard that is now having global attention. It is a paradigm that will continue to develop and change the way we think about administration and labeling.

About HellermannTyton

HellermannTyton is a global manufacturer of identification, cable management and connectivity solutions for the commercial data, telecommunications, electrical, and industrial markets. HellermannTyton offers an integrated approach to design, operation, and delivery to optimize service and solutions for local and global customers. The company's engineered solutions and innovative products are designed and constructed to meet the strictest quality standards while delivering reliable implementation at the lowest cost.

For more information, call HellermannTyton at 800.537.1512 or visit www.hellermann.tyton.com for published details.

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