TELECOMMUNICATIONS CABLING ARRANGEMENT

FIELD OF THE INVENTION

This invention relates to an improved modular communication cabling system for use in buildings and office areas, such as within office furniture components having raceways therethrough, to route a plurality of communications circuits or links to working areas wherein selected circuits can be accessed.

BACKGROUND OF THE INVENTION

Commercial buildings typically include large open floor areas which are subdivided into a selected arrangement of workstations or working areas, such as by space-dividing furniture components, for example portable wall panels. The wall panels generally are connected end-to-end, either in straight or corner configurations, to define a large number of workstations. Each workstation is outfitted with additional furniture components such as storage cabinets, worksurfaces or the like which are either supported on the wall panels or are freestanding. Additionally, freestanding furniture components such as tables and desks may also be used to subdivide office areas into open workstation areas.

Such furniture is commonly referred to as "systems" furniture, and is used extensively due to its flexibility in defining a wide variety of office configurations depending upon the specific requirements of an office area. Since these requirements can change over time, such systems furniture also can be reconfigured, for example, to change the arrangement, number and/or size of the workstations.

Such workstations also include equipment and components which may require both power and communications connections. For example, workstations may include computers having modem or LAN connections, telephones, facsimile machines or the like, all of which may require connection to separate power and/or communications circuits. The number and type of

components may vary over time, or from one workstation to the other.

With respect to electrical power, modular electrical power systems have been developed which are readily mountable within wall panels to supply power thereto. These modular electrical systems also are reconfigurable to readily accommodate changes in the arrangement of workstations. These power systems, however, do not supply communication circuits.

Thus, the routing of communications circuits continues to be a problem. In particular, the communications circuits provided to each workstation typically are defined by cabling which extends throughout the office area from a cabling closet of the building. The telecommunications cabling is often routed to the individual workstations through floor and/or ceiling spaces, as well as through beltline and floor raceways defined within the wall panels or other furniture components.

More specifically, long lengths of cabling are fed throughout the raceways and clearance spaces to the individual workstations and typically terminate in standard connectors, such as six or eight position modular jacks or amphenol connectors. Additional short lengths of communication cables commonly referred to as patch cords or station cords are mated to these standard connectors by one end thereof, while the other end thereof has a conventional jack which is accessible from the workstation.

Due to the large number of workstations in a typical office area and the amount of equipment in each workstation requiring communications connections, a significant amount of cabling and installation time is required to wire an office area. Furthermore, when the configuration of the workstations is modified or the equipment being used is changed, these existing cabling systems may require significant changes thereto.

However, existing communications systems have limited flexibility to accommodate changes in configuration or capacity. For example, if a workstation is moved farther away from a wiring closet, the old cable often is removed and a new longer cable is provided.

To overcome these limitations, an earlier version of the communication cabling system of the present invention is disclosed in U.S. Patent Application No. 08/814 280, and WO 96/73339 which corresponds thereto. The disclosure of these applications in their entirety are incorporated herein by reference.

The present invention disclosed herein is a communication cabling system wherein multi-circuit communication distribution assemblies (hereinafter CDAs) are joined serially together at the opposed ends thereof by connector units. The CDAs define a plurality of separate communication circuits, and the connector units which are serially-connected together include access ports or openings which each provide access to at least one of the circuits. A tap module may be inserted into a selected one of the access ports to connect to the circuit corresponding to this port.

While the system disclosed herein is structurally and functionally similar to the system disclosed in aforementioned U.S. Patent Application Serial No. 08/814 280, the system disclosed herein includes improvements and modifications, particularly to facilitate the construction and use thereof.

More particularly, each CDA of this invention can be readily adapted to carry a selected number of circuits therethrough. To accomplish this result, the connector unit at each end of the CDA includes a block-like shielded housing which includes a predetermined number of mounting sites such as separate sockets at a back end thereof. The mounting sockets define the number of circuits which can be accommodated through the housing.

Each CDA also includes a plurality of cable assemblies such as six in a preferred embodiment, which plug into the housings. Each cable assembly preferably defines one circuit of four twisted conductor pairs although two or more circuits could be defined by a single cable assembly. Each cable assembly includes plug-like contact assemblies at opposite ends of an elongate flexible cable. The contact assembly plugs into one of the mounting sockets of the housing, and includes a plurality of exposed contacts which extend through the housing for later connection to the contacts of another CDA.

The housing defines a predetermined number of mounting sockets wherein at least one, and preferably six cable assemblies are connected thereto. Each cable assembly is independently supported by the housing such that selected ones of the mounting sockets may be used which provides flexibility in designing the overall system to accommodate the specific needs of each workstation.

When two housings are joined together, the contact assemblies of one housing matingly engage the corresponding contact assemblies of the other housing such that the circuits pass through the housings. To facilitate the connection of two housings, each housing also includes a tongue projecting forwardly therefrom for snap fitting engagement with a corresponding slot on the other of the housings. The tongues provide for preliminary alignment of the housings and contacts and lock the housings together by simply plugging two connector units together.

To also facilitate installation of the communication cabling system in wall panels, the cables which extend rearwardly from a housing are staggered or offset relative to each other. This staggered arrangement allows the cables to be pressed horizontally together by a suitable strap into a narrow vertical stack, or

alternatively pressed vertically together into two parallel side-by-side half stacks which define a wider but shorter cross-sectional size. This allows the CDAs to be readily fitted into different size raceways and passages, such as provided in different wall panels and other office furniture components.

Each connector unit also includes a support block which ties all of the contact assemblies together to strengthen the connector unit. The support block also is preferably color coded to readily identify a 6-circuit set or group of CDAs from another 6-circuit set of CDAs which may be routed through the same raceway or clearance space.

With this cabling arrangement as disclosed in more detail herein, communications circuits can be readily routed to and/or through office areas. The system provides significant flexibility when reconfiguring office areas or adapting to the changing requirements of individual workstations.

Other objects and purposes of the invention, and variations thereof, will be apparent upon reading the following specification and inspecting the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1A is a perspective view of a communication cabling arrangement of the invention as mounted in a first space-dividing wall panel arrangement.

Figure 1B is a perspective view of an alternative configuration for the communication cabling arrangement as mounted in the wall panels of Figure 1A.

Figure 1C is an enlarged fragmentary side elevational view of passages defined in the wall panels of Figures 1A and 1B.

Figure 2A is a perspective view of the communication cabling arrangement as mounted in a second space-dividing wall panel arrangement.

Figure 2B is a perspective view of an alternative configuration for the wall panels of Figure 2A and of the communication cabling arrangement disposed therein.

Figure 2C is an enlarged fragmentary side elevational view of passages defined in the wall panels of Figures 2A and 2B.

Figure 3 is an exploded perspective view of a series of communication distribution assemblies of the communication cabling arrangement of this invention.

Figure 4 is an enlarged perspective view of a single communication distribution assembly (CDA).

Figure 5 is a fragmentary plan view of a connector unit on one end of a CDA.

Figure 6 is an end elevational view of the connector unit in cross-section as taken generally along line 6-6 of Figure 5.

Figure 7 is an end elevational view illustrating individual cables of a CDA arranged in a vertical stack.

Figure 8 is an end elevational view illustrating the individual cables of the CDA arranged in a parallel pair of stacks.

Figure 9 is a perspective view of a cable assembly.

Figure 10 is a plan view of the cable assembly of Figure 9.

Figure 11 is a partial side elevational view of a contact plug at one end of the cable assembly of Figure 10.

Figure 12 is an exploded plan view of a contact support and a contact assembly prior to being joined together.

Figure 13 is a perspective view of the components of Figure 12 illustrating an additional contact carrier joined to the contact assembly.

Figure 14 is a front perspective view of the components of Figure 13 assembled together.

Figure 15 is an enlarged cross-sectional view of the contact support and contact assembly as taken generally along line 15-15 of Figure 14.

Figure 16A is an enlarged cross sectional view of the contact support in cross section as taken generally along line 16A-16A of Figure 14.

Figure 16B is a top cross-sectional view of the contact support as taken generally along line 16B-16B of Figure 14.

Figure 17 is a perspective view of the front leading end of the contact support.

Figure 18A is a plan view of a contact alignment body of the contact assembly.

Figure 18B is an end elevational view of the front leading edge of the contact alignment body.

Figure 19 is an enlarged fragmentary end elevational view of a tapered end of the contact alignment body and a tip of a tap unit.

Figure 20 is an enlarged fragmentary side elevational view of two contact groups disposed in contact with each other when serially adjacent connector units of two adjacent CDAs are joined together.

Figure 21 shows the contact groups of Figure 20 which are separated by a tap unit.

Figure 22 is an enlarged cross-sectional view of a contact as taken along line 22-22 of Figure 15.

Figures 23A and 23B are perspective views of an outer access side and an inner side, respectively, of a shielded housing for the connector unit.

Figures 24A and 24B are respectively outer and inner side elevational views of two housings prior to being joined together.

Figure 25 is an elevational view of a front end of the housing.

Figure 26 is an elevational view of a back end of the housing.

Figure 27 is a bottom view of the left-side housing of Figure 24A.

Figure 28 is a cross-sectional view of the housing as taken along line 28-28 of Figure 27.

Figure 29 is a cross-sectional view of the housing as taken along line 29-29 of Figure 25.

Figure 30 is a cross-sectional view of the two housings as taken along line 30-30 of Figure 25.

Figure 31A is a cross-sectional view of the two housings in cross section as taken along line 31A-31A of Figure 25.

Figure 31B is a cross-sectional view of the housings of Figure 31A in a partially engaged position.

Figure 32 is a cross-sectional view as taken along line 32-32 of Figure 25.

Figure 33 is an enlarged, fragmentary perspective view of the outer side of the housing.

Figure 34 is an enlarged, fragmentary perspective view of the bottom of the housing.

Figure 35 is an enlarged, fragmentary perspective view of the housing.

Figure 36 is a perspective view of an inner face of a connector block for the connector unit of the CDA.

Figure 37 is a plan view of the inner face of the connector block.

Figure 38 is a perspective view of an outer side of a circuit-identifying keying block.

Figure 39 is a perspective view of an inner side of the keying block.

Figure 40 is a perspective view of a tap module.

Figure 41 is an enlarged perspective view of a tap assembly of the tap module.

Figure 42 is an end elevational view of the tap assembly.

Figure 43 is a plan view of an insert or blade of the tap assembly.