

TELECOMMUNICATION SYSTEM DIGITAL SIGNAL
DISTRIBUTION MODULE

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BACKGROUND OF THE INVENTION

The present invention relates to a telecommunication
5 system digital signal distribution module, and more particularly to
such a telecommunication system digital signal distribution module,
which provides diversion, jumper connection, isolating, testing,
and monitoring functions. The telecommunication system digital
signal distribution module comprises a plurality of detachable
10 cartridge modules each holding a first circuit board of function
design, a second circuit board and a third circuit board of standard
design.

The wire connections between telecommunication systems
are commonly of fixed design. However, it is inconvenient to
15 change the wire connections when upgrading or advancing the
system function. FIGS. from 5 through 7 show modular
distribution cabinet (under Taiwan patent application serial no.
87208577, published on December 21, 1999), which enables one
telecommunication system to be detachably connected to another.
20 According to this modular distribution cabinet, all wires and
jumper pins are arranged in circuit board cartridge modules.
When changing the function specification or replacing the circuit
board cartridge modules, the wiring of the circuit board cartridge

modules must be constructed again. It is inconvenient and expensive to re-construct the wiring of the circuit board cartridge modules. FIG. 8 shows another structure of modular distribution cabinet according to the prior art. According to this design, the manufacturing cost of the circuit board cartridge modules is high.

According to the aforesaid two different designs of modular distribution cabinet, different function designs of circuit board cartridge modules are installed in a common cabinet. However, when changing the function of one circuit board cartridge module or maintaining one circuit board cartridge module, the cost is high, and the cartridge module loop off time is long because the wires at the jumper pins must be disconnected and then installed again after the changing or maintenance work.

SUMMARY OF THE INVENTION

The present invention has been accomplished under the circumstances in view. It is one object of the present invention to provide a telecommunication system digital signal distribution module, which enables functional circuit board cartridge modules to be conveniently removed from the distribution module for maintenance or replacement. According to the present invention, the telecommunication system digital signal distribution module comprises a cabinet having a cartridge module receiving unit, a jumper connection unit and a bottom cover, a plurality of

functional circuit board cartridge modules respectively installed in the cartridge module receiving unit, the functional circuit board cartridge modules each holding a first circuit board having an electric plug on the outside, a second circuit board installed in the cabinet below the cartridge module receiving unit and the jumper connection unit above the bottom cover, the second circuit board having a plurality of electric sockets, which receive the electric plugs of the functional circuit board cartridge modules, a plurality of top plug pins respectively suspended in the jumper connection unit for the connection of lead wires of an external telecommunication system, and a plurality of bottom plug pins, and a third circuit board installed in the cabinet and spaced between the second circuit board and the bottom cover, the third circuit board comprising a plurality of electric sockets, which receive the bottom plug pins of the second circuit board, and a plurality of bottom plug pins, which extend out of respective plug holes on the bottom cover for connection to another telecommunication system. When one functional circuit board cartridge module is disconnected from the second circuit board, the signal communication function between the third circuit board and the other functional circuit board cartridge modules/third circuit board is maintained functional.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is an exploded view of the present invention.

FIG. 2 is an assembly view of the present invention.

FIG. 2A is an exploded view of a cartridge module according to the present invention.

FIG. 3 is a side view of the present invention.

5 FIG. 4 is a circuit diagram of the first circuit board in one cartridge module according to the present invention.

FIG. 5 is an exploded view of a telecommunication system modular distribution cabinet according to the prior art.

10 FIG. 6 is a side view of the telecommunication system modular distribution cabinet shown in FIG. 5.

FIG. 7 is an elevational view of the telecommunication system modular distribution cabinet shown in FIG. 5.

FIG. 8 illustrates another structure of telecommunication system modular distribution cabinet according to the prior art.

15 **DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT**

Referring to FIGS. 1, 2 and 2A, a telecommunication system digital signal distribution module in accordance with the present invention is generally comprised of a plurality of cartridge modules 1 each holding a respective first circuit board 12, a housing 2, a second circuit board 3, and a third circuit board 4. Each cartridge module 1 comprises a shell 11 defining a receiving chamber 111, which holds one first circuit board 12.

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Referring to FIG. 2A and FIGS. 1 and 2 again, the shell 11

comprises two inside locating rods 1112 for securing the respective first circuit board 12, a plurality of top insertion holes 113, and two springy members 112 bilaterally disposed on the outside. The springy members 112 each comprise a longitudinal rail 1122 and a hooked portion 1121 at a top end of the longitudinal rail 1122. The receiving chamber 111 is divided into a plurality of separate spaces 1111. The first circuit board 12 comprises two locating holes 122 respectively forced into engagement with the locating rods 1112 in the shell 11 of the corresponding cartridge module 1, an electric plug 123 disposed outside the shell 11 for connection to the second circuit board 3, and receptacle means 121 respectively received in the spaces 1111 inside the shell 11. The housing 2 comprises cartridge module receiving unit 21, a jumper connection unit 22, and a bottom cover 23. The cartridge module receiving unit 21 comprises a plurality of vertical insertion grooves 211 bilaterally arranged in pairs for receiving the longitudinal rails 1222 of the springy members 112 of the cartridge modules 1, and a plurality of retaining portions 212 respectively aimed at the vertical insertion grooves 211 for engagement with the hooked portions 1121 of the springy members 112 of the cartridge modules 1. The jumper connection unit 22 comprises rows of plug holes 221, and a plurality of lead wire receiving holes 222. The bottom cover 23 comprises rows of plug holes 231. The second circuit board 3

comprises a plurality of electric sockets 32, which receive the electric plugs 123 of the first circuit boards 12 of the cartridge modules 1, two locating notches 31 respectively disposed at two opposite lateral sides thereof for positive positioning in the housing 2, a plurality of top plug pins 33 respectively inserted through the plug holes 221 in the jumper connector unit 22 for the connection of lead wires (not shown), and a plurality of bottom plug pins 321 respectively connected to the third circuit board 4. The third circuit board 4 is mounted in the housing 2 and spaced between the bottom cover 23 and the second circuit board 3, comprising a plurality of metal contact holes 41, a plurality of electric sockets 42, which receive the bottom plug pins 321 of the second circuit board 3, a plurality of bottom plug pins 43 respectively downwardly extended from the metal contact holes 41 and respectively inserted through the plug holes 231 on the bottom cover 23 for receiving power supply and external signal input/output circuit, and a plurality of bottom mounting rods 44 for mounting.

Referring to FIG. 3 and 4 and FIG. 2 again, after insertion of the cartridge modules 1 into the insertion grooves 211 in the cartridge module receiving unit 21 of the housing 2, the electric plug 123 of each first circuit board 12 is respectively connected to the electric sockets 32 at the second circuit board 3, enabling the

functional circuit (see FIG. 4) of the first circuit board 12 to be electrically connected to the second circuit board 3. The top plug pins 33 of the second circuit board 3 are respectively extended through the plug holes 221 and suspended in the jumper connection unit 22 for the connection of the lead wires of a different telecommunication system. Plug means (not shown) may be inserted into the top insertion holes 113 into the receptacle means 121 for signal diversion. Further, the bottom plug pins 43 of the third circuit board 4 are extended out of the bottom cover 23 through the plug holes 231 for connection to an external signal input/output circuit, for enabling signal to be transmitted through the third circuit board 4 to the second circuit board 3 or the first circuit board 12 in each cartridge module 1. When necessary, plug means may be inserted into the top insertion holes 113 on the shell 11 of each cartridge module 1 for monitoring or testing the telecommunication system.

As indicated above, the cartridge modules 1 are detachably installed in the cartridge module receiving unit 21 of the housing 2. By squeezing the springy members 112 inwards, the respective cartridge module 1 is disengaged from the corresponding retaining portions 212, and can then be easily removed from the housing 2 for maintenance.

While only one embodiment of the present invention has

been shown and described, it will be understood that various modifications and changes could be made thereunto without departing from the spirit and scope of the invention disclosed.



What the invention claimed is:

1. A telecommunication system digital signal distribution module comprising:

5 a housing, said housing comprising a cartridge cabinet receiving unit, a jumper connection unit, and a bottom cover, said cartridge cabinet receiving unit comprising pairs of vertical insertion grooves;

a plurality of functional circuit board cartridge modules respectively inserted in the vertical insertion grooves in said
10 cartridge cabinet receiving unit, said functional circuit board cartridge modules each holding a first circuit board;

a second circuit board installed in said housing to receive said functional circuit board cartridge modules for signal communication, said second circuit board having a part suspended
15 in said jumper connection unit for jumper connection to a first external telecommunication system; and

a third circuit board installed in said housing and connected to said second circuit board for receiving a second external telecommunication system for enabling said second external
20 telecommunication system to be communicated with said first external telecommunication system;

wherein said functional circuit board cartridge modules each comprise a shell having a plurality of through holes, and a



first circuit board installed in said shell, said first circuit board comprising an electric plug connected to said second circuit board, said first circuit board comprising a plurality of receptacle means for receiving a respective plug being inserted in the through holes
5 on said shell for signal diversion.

2. The telecommunication system digital signal distribution module of claim 1 wherein the shell of each of said functional circuit board cartridge module comprises a plurality of separated spaces for receiving the receptacle means of the respective first
10 circuit board, and a plurality of locating rods for the positioning of the respective first circuit board, and the first circuit board of each of said functional circuit board cartridge module comprises a plurality of locating holes respectively forced into engagement with the locating rods in the respective shell.

15 3. The telecommunication system digital signal distribution module of claim 1 wherein the shell of each of said functional circuit board cartridge module comprises two springy members disposed at two opposite lateral sides thereof, said springy members each comprising a longitudinal rail for insertion into the
20 pair of vertical insertion grooves in the cartridge module receiving unit of said cabinet, and a hooked portion for hooking on a respective retaining portion in the cartridge module receiving unit of said cabinet.



4. The telecommunication system digital signal distribution module of claim 1 wherein the first circuit board of each of said functional circuit board cartridge module comprises an electric plug extended out of the respective shell and connected to a
5 respective electric socket on said second circuit board.

5. The telecommunication system digital signal distribution module of claim 1 wherein said second circuit board comprises a plurality of bottom plug pins respectively connected to electric sockets on said third circuit board for signal transmission.

10 6. The telecommunication system digital signal distribution module of claim 1 wherein said second circuit board comprises a plurality of top plug pins respectively suspended in said jumper connection unit of said cabinet for jumper connection.

7. The telecommunication system digital signal distribution
15 module of claim 1 wherein said third circuit board comprises a plurality of bottom plug pins respectively extended out of respective plug holes on said bottom cover for connection to power supply and I/O signal contacts of said second external telecommunication system.

20 8. The telecommunication system digital signal distribution module of claim 7 wherein the bottom plug pins of said third circuit board are connected with coaxial cable connector means.