

[54] SWITCH ASSEMBLY WITH IMPROVED
PLUG-ACTUATING MEANS AND
CONNECTION MATRIX INCLUDING
STACKED PRINTED CIRCUIT BOARDS

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[58] Field of Search 200/5 R, 6 A, 6 C, 159 A, 16 R;
317/101 CW, 101 CB, 101 CE

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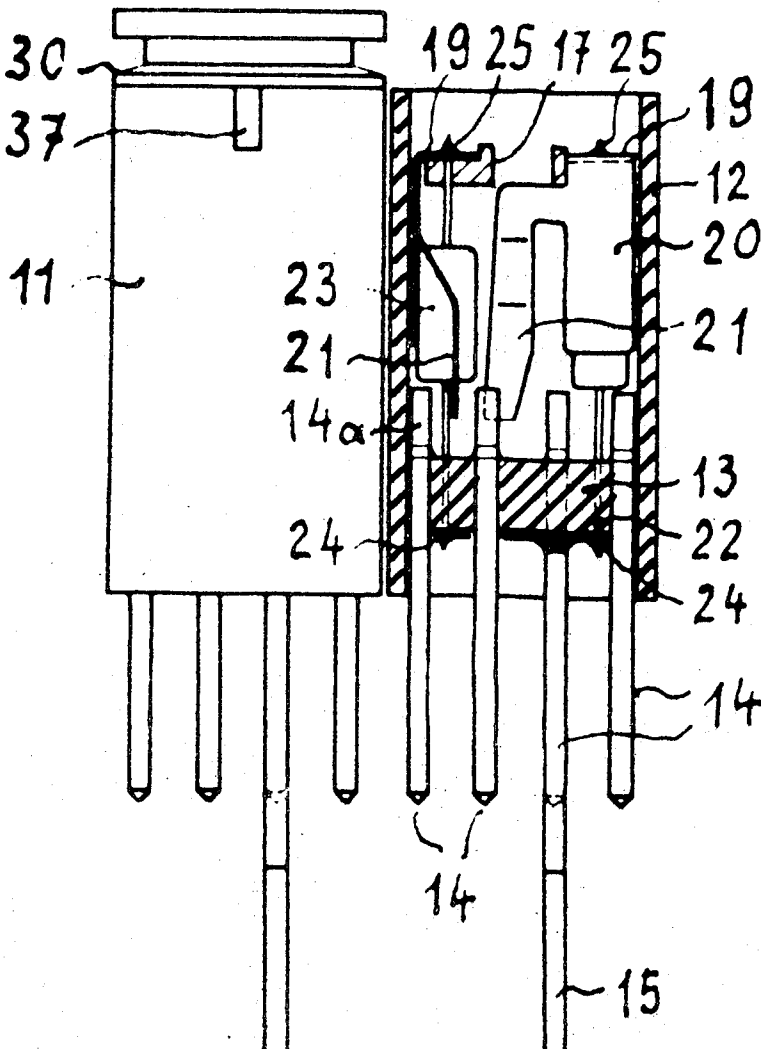
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[57] ABSTRACT

A multicontact data feeder is disclosed, the data feeder being utilized with a connection matrix having an input channel and a plurality of output channels. The data feeder comprises a switching body means having a hollow internal cavity; fixed contact pins for electrical connections to the input channel and the plurality of output channels of the connection matrix, said fixed contact pins extending into said hollow internal cavity of said switching body means; spring contact means disposed within said hollow internal cavity of said switching body means for each of said fixed contact pins, said spring contact means, when actuated, effecting electrical connections between said fixed contact pins; plug member means adapted to be inserted into said hollow internal cavity of said switch body means, said plug member means including cam means for selective ones of said spring contact means, said plug member means, when inserted into said hollow internal cavity of said switching body means serving to deflect selective ones of said spring contact means against the associated fixed contact pins, whereby a given data distribution mode is effected.

4 Claims, 7 Drawing Figures



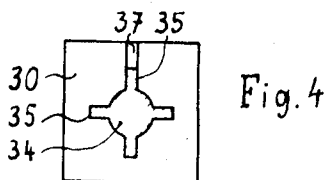


Fig. 4

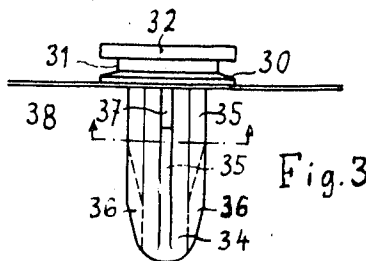


Fig. 3

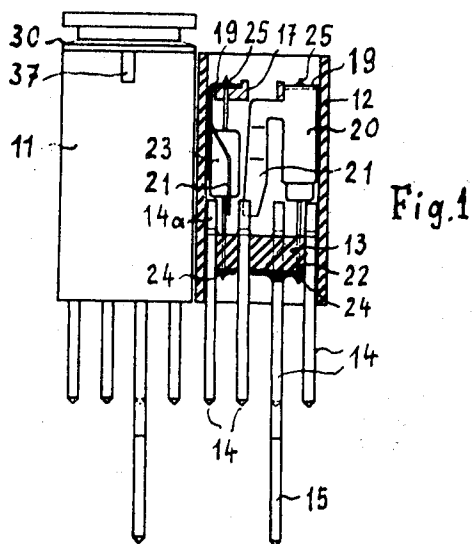


Fig. 1

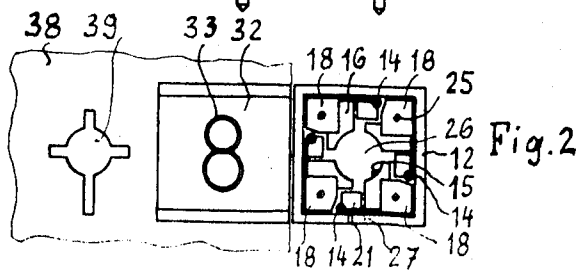
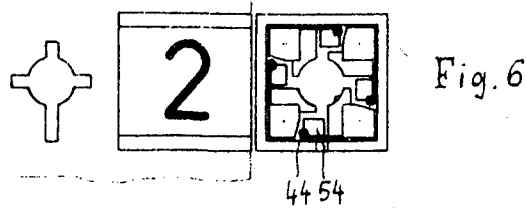
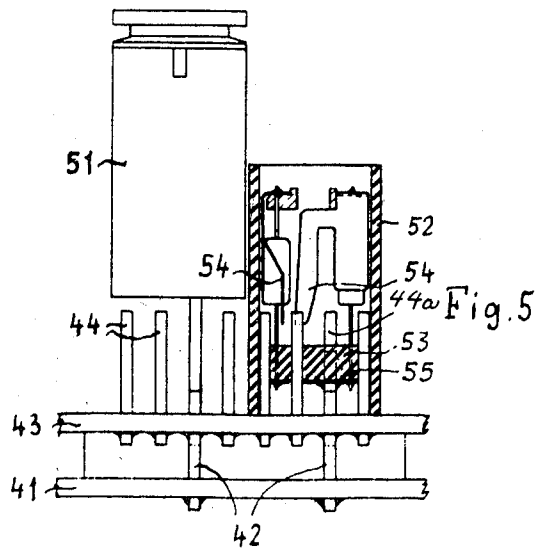
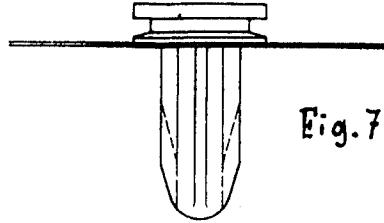


Fig. 2

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SWITCH ASSEMBLY WITH IMPROVED PLUG-ACTUATING MEANS AND CONNECTION MATRIX INCLUDING STACKED PRINTED CIRCUIT BOARDS

BACKGROUND OF THE INVENTION

Connection matrices such as crossbar or rail distributors are known in the art for purposes of feeding or distributing input data, which data is generally in a coded format. When crossbar distributors are utilized, it is necessary that such distributors be provided, at each feed location, with an input channel or rail for the input bit as well as output channels or rails for each of the desired output bits. The contemplated distribution of data for each bit of input data requires that a direct electrical connection be effected between the input channel or rail and various ones of the output channels or rails in accordance with a given data distribution mode, with electrical decoupling and isolation between the channels being provided through the utilization of diodes.

So as to produce these required electrical connections, it is known to utilize a plug which, in a fashion analogous to the crossbar distributor itself, is provided with an input plug pin, and an output plug pin for each of the output bits. Fixed connections between the input plug pin and various ones of the output plug pins, such connections representing one data distribution mode, are disposed in the handle of the plug, as are the various required decoupling diodes, with the switching connections effecting this given data distribution mode being visibly indicated on the facing side of the plug handle. However, additional plugs are required for each different switching connection and data distribution mode and thus, at least one complete set of plugs must be provided for each feeding location of the main distributor. The particular plug effecting a given desired data distribution mode then must be selected from the set of plugs and so utilized. This technique may be quite practical when working with a small range of values requiring few data distribution modes, but is quite cumbersome and accompanied by drawbacks when a large range of values requiring many data distribution modes are present.

In view of the above, the prior art has accordingly proposed to produce the necessary connections required for a given data distribution mode by means of a selector switch built into the handle of the housing of a multicontact plug with the respective position of the selector switch corresponding to a given data distribution mode being visible in the window of a handle housing. The provision of a multicontact plug in this fashion eliminates the need for a plurality or set of individual plugs yet, even this multicontact type of data feeder is suitable only for small value ranges requiring few data distribution modes since the selector switch must have a switch position for each different data distribution mode and the space available in the housing of the handle of the multicontact plug is such that only a small selector switch with a limited number of positions can be accommodated.

This particular problem is not changed if one were to utilize circuit boards with a cross pattern of conductors thereon in place of a crossbar distributor as the primary connection matrix. If such circuit boards were utilized, an exchange would be required between the plug pins and the plug sockets in that the plug pins would be disposed at the circuit boards whereas the plug sockets would be disposed at the data feeder plug itself. In this fashion, the required electrical connections for a given data distribution mode would have to be built in or effected between the plug sockets in the housing of the plug handle.

SUMMARY OF THE INVENTION

With the above background in mind, it should be apparent that a need exists in the art for a data feeder of the general type described which eliminates the aforementioned disadvantages of the prior art constructions. It is the primary object of the instant invention to provide such a data feeder. Another, more specific, yet equally important object of the instant invention concerns the provision of a data feeder

wherein the number of output connections per data input bit are limited only slightly, wherein the various interconnections effecting different data distribution modes can be easily exchanged, and which data feeder can be utilized with plug pins for data input at crossbar or rail distributors as well as with plugs or jacks for data input at circuit boards.

These objects as well as others which will become apparent as the description proceeds, are implemented by the subject invention which is manifested by the provision of a multicontact data feeder having a connection matrix and a switching body along with a contact element for each bit channel, the contact elements producing the various interconnections required for feeding the data between the input and the various outputs of the connection matrix.

The novel inventive data feeder is further characterized by the feature that the switching body is equipped with a hollow cavity having spring contacts disposed therein, such spring contacts forming the various contact elements which cooperate with fixed contact pins. For each different data distribution mode, a plug member is provided which can be plugged into the switching body, this plug member indicating the particular data distribution mode that is effected and further being equipped with cams constructed of insulating material which extend into the hollow cavity of the switching body and serve to close the various contact elements effecting the desired data distribution mode. The switching body itself can suitably be constructed such that it can be plugged into the primary connection matrix. In this fashion, the data feeder can be utilized to effect the necessary connections in a connection matrix such as the above-mentioned crossbar distributors with the fixed contact pins being secured to the switching body and serving as plug pins for the crossbar distributor. Alternatively, if circuit boards are utilized as the connection matrix rather than a crossbar distributor, fixed contact pins can be secured to the circuit boards and these pins themselves can be inserted into jacks or the like in the switching body.

The plug member utilized for insertion into the switching body for effecting the various data distribution modes, preferably is constructed of a plastic material having a head plate disposed exteriorly of the switching body and having cams extending from the head plate, the cams extending into the cavity of the switching body effecting the various contacts. The head plate of the plug can be provided with grip grooves or the like on its sides and can be provided on the top surface thereof with a particular symbol or other indicia representative of the associated data distribution mode effected.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention itself will be better understood and features and advantages thereof other than those already described will become apparent from the following detailed description of a preferred inventive embodiment, such description referring to the appended sheets of drawings, wherein:

FIG. 1 depicts two juxtaposition data feeders constructed in accordance with the instant invention, each data feeder being capable of handling four bits, such data feeders being provided with plug pins for use with crossbar distributors and one of the data feeders being depicted in sectional view;

FIG. 2 is a plan view of the data feeders of FIG. 1;

FIG. 3 is an elevational view of a snap-locking-type data plug member;

FIG. 4 is a cross-sectional view of a data plug member;

FIG. 5 depicts two juxtapositioned data feeders also capable of handling four bits, such data feeders being utilized with circuit boards and one of such data feeders being depicted in cross-sectional view;

FIG. 6 depicts a plan view of the data feeders of FIG. 5; and

FIG. 7 depicts a data plug member.

DETAILED DESCRIPTION OF PREFERRED INVENTIVE EMBODIMENTS

Now, by referring to the drawings and particularly to FIGS. 1 and 2 thereof, the data feeder therein illustrated can be seen to comprise switching module embodying a prismatic housing 11 having a square cross section and four sidewalls 12 as well as a bottom portion 13. Four short plug pins 14 of equal length as well as a longer plug pin 15 are secured to the bottom portion 13 of housing 11. Plug pins 14 and 15 extend downwardly and serve to plug the data feeder into a crossbar distributor utilized as a connection matrix for four-bit data in the exemplary embodiment. Four ribs 16 extend upwardly from bottom portion 13 and terminate in a shoulder 17. Ribs 16 and shoulder 17 are centrally disposed about the longitudinal axis of housing 11 and serve to divide the internal housing cavity into four chambers utilized for mounting diodes and into a central star-shaped or substantially cross-shaped chamber into which a plug member snap-lockingly is inserted. A contact spring 18, sometimes also referred to as spring contact, is provided on top of each shoulder 17, the contact spring 18 having a horizontal supporting plate 19, a vertical guide flap or tab 20 which serves to hold the spring in the housing, and a downwardly extending contact arm 21. Exteriorly of the bottom portion 13, a contact plate 22 is disposed and is soldered to the long plug pin 15. Four diodes 23 are disposed in the housing as indicated and are electrically connected at the bottom of the housing at soldering locations 24 to the contact plate 22 and are electrically connected at the top of the housing by means of a soldering contact 25 leading to the horizontal supporting plate 19 which defines a contact spring plate. The plug pins 14 protrude into the housing cavity through the housing bottom 13 and the upper portion 14a thereof disposed in the interior of the housing forms a fixed contact element for cooperation with the contact spring arm 21.

So as to effect the various bit interconnections required for feeding of data in a given data distribution mode, a plug member constructed of insulating material is inserted into the hollow cavity 26 of the switching body and such plug member serves to press the respective contact spring arms 21 against the fixed or stationary contact pins 14. One such plug member is depicted in FIGS. 3 and 4 and is seen to comprise a head 30 having a gripping groove 31 disposed on the side thereof and a cover plate 32 on which is provided a symbol or other indicia 33 for indicating the particular data distribution mode. Each plug further exhibits a cylindrical peg 34 having four radially extending ribs 35. If any of the output channels are not utilized in a given data distribution mode, a portion 36 of the ribs 35 can be broken or cut off or, alternatively, the plug members can be initially manufactured having shortened ribs in the required locations. One of the four ribs 35 enlarges into a key or tab 37 towards the head 30. If the plug member is accurately inserted into the switching body, then the key or tab 37 comes to rest in a groove or notch 27 at the upper edge of a housing wall 12. Only in this position can the plug member be inserted into the hollow cavity or compartment of the hollow switch or switching body throughout its entire length, and only in this correct position, will the various contacts for the output bit channels be closed. As should be apparent, if it were desired to change the data distribution mode, i.e., the various interconnections between the pin members, it would only be necessary to replace the plug member itself with a different plug member. Of course, each data feeder as above described is utilized at a single feeding location of a primary external connection matrix. Yet, if the primary connection matrix is provided with a plurality of feeding locations, a plurality of data feeders would be utilized and, in some instances, it might be desirable to exchange all data distribution modes simultaneously and to store a present plurality of data distribution modes for later use. This can be achieved in a quite simple manner by merely laying a template or plastic foil 38 having punched-out plug holes 39 over the various switching bodies 11 utilized. The plug members 30 can be inserted through the

plug holes 39 into the switching bodies. By virtue of the provision of such a foil template, it is possible to simultaneously remove a plurality of individual plug members from the respective switching bodies and these plug members would remain in position in the foil, thus storing the particular cumulative set of data distribution modes. In some later application, the foil containing the plug members therein could be placed on the switching bodies and the plug members could be pushed or inserted into the switching bodies once again. Since the particular data distribution mode for each plug member is depicted by means of a digit or other indicia on the head of the plug member, visual reading of the cumulative modes effected is clear and distinct.

Now, by referring to FIGS. 5, 6, and 7, a variant embodiment of the switching body for plugging on circuit boards rather than crossbar distributors is illustrated. Two such circuit boards suffice to provide a connection matrix with the lower board containing the lead-in or input conductors and the upper board containing the output conductors. The plug pins 42 and 44 provided at the input locations are soldered to the circuit boards 41 and 43. Specifically, one plug pin 42 is soldered to lower circuit board 41 as well as to upper circuit board 43. The remaining four plug pins 44 are soldered into circuit board 43, this embodiment as illustrated being utilized for four-bit data. Again, each switching body utilized has a prismatic housing 51 preferably of square cross section having four walls 52 and a bottom 53 as previously described in which housing are disposed four contact springs. The difference between this embodiment and the embodiment of FIGS. 1 and 2 can be seen in the fact that bottom 53 has four plug holes or jacks for detachably receiving plug pins 44 which are inserted into the hollow cavity of the switching body when the same is plugged on the circuit board, plug pins 44 having the pin portions 44a thereof disposed opposite contact springs 54 as fixed contacts and forming contact elements with the contact springs 54. The plug pin 42 from the input conductor comes into contact with contact plate 55 provided on the exterior of bottom 53, with contact springs 54 being connected with the contact plate 55 via diodes. Connection of contact springs with the contact plate can also be achieved by means of metal wires rather than diodes if it is desired to provide the diodes at the circuit boards themselves.

As should be apparent, the data feeders of the novel invention as depicted in both preferred embodiments, can be mass produced, the two variant embodiments differing from one another only in the manner of holding the plug pins in the bottom of the housing.

The data feeders depicted herein in the disclosed inventive embodiment have been described as being utilized to feed or distribute an input into four bits due to the central arrangement of the contact elements, since this number of bits has been found to be sufficient in most cases and, at the same time, affords a very space-saving and conveniently manageable shape. Yet, it should be understood that the novel invention is not limited to data feeders capable of handling only four-bit data as the number of data bits which could be handled is virtually unlimited. For example, the various contact elements could be arranged adjacent one another in a single row and, if necessary, in several lines or rows. The data plug member associated therewith would then have a comb extending away from the head plate or would have several parallel combs provided with cams disposed in one row serving to close the respective contact elements when in operation.

As should now be apparent from the foregoing description, the objects initially set forth at the outset to this specification have been successfully achieved.

Accordingly, what is claimed is:

1. A multicontact data feeder for a connection matrix having an input channel and a plurality of output channels, said data feeder comprising at least one switching body means defining a hollow internal cavity; contact pins for electrical connections to the input channel and the plurality of output channels of the connection matrix, said contact pins extending

into said hollow internal cavity of said switching body means; spring contact means disposed within said hollow internal cavity of said switching body means for at least given ones of said contact pins, said spring contact means, when actuated, effecting electrical connections between said contact pins; a single actuator means common to all said spring contact means intended to be actuated, said single actuator means comprising a separate plug member means totally separatable from but removably insertable into said hollow internal cavity of said switching body means, said plug member means including cam means for selective ones of said spring contact means, said separate, removably insertable plug member means, when inserted into said hollow internal cavity of said switching body means serving to deflect selective ones of said spring contact means against the associated contact pins, whereby a given data distribution mode is effected.

2. A multicontact data feeder as defined in claim 1, wherein the connection matrix comprises a plurality of circuit boards, and wherein said contact pins are fixedly secured to the input channel and the plurality of output channels of the circuit boards and are adapted to be inserted into said switching body.

3. A multicontact data feeder as defined in claim 1, wherein said separate plug member means is removably held by a snap-locking action at said switching body means when removably

inserted into said hollow internal cavity of said switching body means.

4. A multicontact data feeder, especially for use in electronic data processing, comprising a switching module containing a hollow switch body means defining therein an internal compartment, stationary contact pins extending into said internal compartment of said switch body means, movable contact means disposed in said hollow internal compartment of said switch body means for each of said stationary contact pins, said movable contact means, when actuated, effecting electrical connections with said stationary contact pins, a common actuator means for all said movable contact means intended to be actuated, said common actuator means comprising a separate plug member which can be completely detached from said switch body means and also releasably insertable into said hollow internal compartment of said switch body means, said separate plug member including actuating means for actuating selective ones of said movable contact means, said separate releasably insertable plug member means, when inserted into said hollow compartment of said switch body means, serving to selectively deflect given ones of said movable contact means against the associated stationary contact pins.

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