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(54) **Current mode bus coupler with planar coils and shields.**

(57) A current mode bus coupler (10) for electromagnetically coupling a terminal unit, i.e., an electronic subsystem, with a data bus cable (24) comprising a twisted wire pair is disclosed. The current mode bus coupler (10) includes a planar coil (16), upper and lower slotted planar shields (20 and 22) and a ferromagnetic core (12). The planar coil 16 and planar shields (20 and 22) are formed in a sandwich (14) of alternating dielectric and conductive layers. Apertures (36, 37 and 38) are formed in the sandwich (14) for receiving the legs of the ferromagnetic core (12), and the planar coil (16) spirals around one of the apertures (37). The ferromagnetic core (12) has at least two legs, one of which is inserted into the aperture (37) around which the planar coil (16) is formed. The ferromagnetic core (12) is disengagable and disassemblable so that the core can be inserted

in a loop formed by separating the conductors of the twisted wire pair data bus. The planar shields (20 and 22) which would be connected to a common ground form upper and lower layers of the sandwich (14) and shield the planar coil (16) from external electromagnetic and electrostatic fields. The upper planar shield (20) lies between the planar coil (16) and the twisted wire pair data bus in which the ferromagnetic core (12) is inserted. The apertures of the planar shields (20 and 22) are slotted (58 and 60) so that the shields, which are conductive, do not form short circuits about the legs of the ferromagnetic core (12). The sandwich (14) can include additional planar coils (18) formed about the same (or other) aperture and connected in series by conductively plated through-holes (48).

**EP 0 507 360 A3**

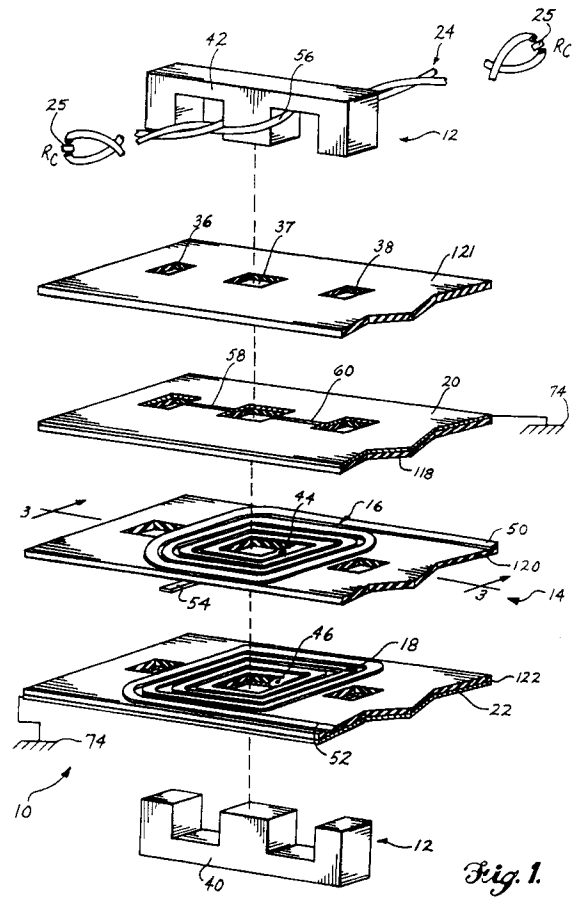


Fig. 1.



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## EUROPEAN SEARCH REPORT

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| DOCUMENTS CONSIDERED TO BE RELEVANT                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                                                 |                                                     |                                               |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------|-----------------------------------------------|
| Category                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Citation of document with indication, where appropriate, of relevant passages                                                                   | Relevant to claim                                   | CLASSIFICATION OF THE APPLICATION (Int. Cl.5) |
| Y                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | IBM TECHNICAL DISCLOSURE BULLETIN<br>vol. 28, no. 2, July 1985, NEW YORK<br>pages 625 - 626 'Slit -plate transformer'<br>* the whole document * | 1-6                                                 | H01F23/00                                     |
| A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | ---                                                                                                                                             | 17                                                  |                                               |
| Y                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | EP-A-0 053 638 (BOEING)<br>* page 5, line 1 - line 10; figure 2A *                                                                              | 1-6                                                 |                                               |
| A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | -----                                                                                                                                           | 14                                                  |                                               |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                 |                                                     | TECHNICAL FIELDS<br>SEARCHED (Int. Cl.5)      |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                 |                                                     | H01F<br>H04L                                  |
| The present search report has been drawn up for all claims                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                 |                                                     |                                               |
| Place of search<br>THE HAGUE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                                                 | Date of completion of the search<br>14 JANUARY 1993 | Examiner<br>MARTI ALMEDA R.                   |
| <b>CATEGORY OF CITED DOCUMENTS</b><br>X : particularly relevant if taken alone<br>Y : particularly relevant if combined with another document of the same category<br>A : technological background<br>O : non-written disclosure<br>P : intermediate document<br>T : theory or principle underlying the invention<br>E : earlier patent document, but published on, or after the filing date<br>D : document cited in the application<br>L : document cited for other reasons<br>.....<br>& : member of the same patent family, corresponding document |                                                                                                                                                 |                                                     |                                               |