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<p>(21) International Application Number: PCT/FI95/00251 (22) International Filing Date: 11 May 1995 (11.05.95) (30) Priority Data: U940289 19 May 1994 (19.05.94) FI (71) Applicant (for all designated States except US): PICOPAK OY [FI/FI]; Teollisuuskatu 1, FIN-08150 Lohja (FI). (72) Inventor; and (75) Inventor/Applicant (for US only): AINTILA, Ahti [FI/FI]; Salmenmäentie 30 A 24, FIN-08100 Lohja (FI). (74) Agents: LAINE, Seppo et al.; Seppo Laine Oy, Lönnrotinkatu 19 A, FIN-00120 Helsinki (FI).</p>		<p>(81) Designated States: US, European patent (AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE). Published <i>Without international search report and to be republished upon receipt of that report.</i></p>
<p>(54) Title: ARRANGEMENT FOR CONNECTING A DRIVE CIRCUIT TO A PLANAR DISPLAY OR MATRIX PRINTER AND METHOD FOR CONNECTING A DRIVE CIRCUIT TO A PLANAR DISPLAY OR MATRIX PRINTER</p>		
<p>(57) Abstract</p>		
<p>The present invention relates to an arrangement on a flexible carrier vehicle for connecting a drive circuit to a planar display or matrix printer and a method for connecting said drive circuit to a planar display or matrix printer. The connection arrangement comprises a mounting area (1) for the drive circuit, output line conductors (2) terminating at said mounting area (1) and input line conductors (5, 6, 7) terminating at said mounting area (1). According to the invention, the connection arrangement includes chaining of the input line conductors (5, 6, 7) of the drive circuit for drive circuits operating in parallel.</p>		

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Arrangement for connecting a drive circuit to a planar display or matrix printer and method for connecting a drive circuit to a planar display or matrix printer

5 The present invention relates to an arrangement according to the preamble of claim 1 for connecting a drive circuit to a planar display or a matrix printer.

The invention also concerns a method for connecting a
10 drive circuit to a planar display or a matrix printer.

Conventionally, in conjunction with planar displays such as liquid-crystal displays or electroluminescent displays, the connections of electrical drive circuits
15 are implemented using the Tape Automated Bonding method (TAB) for connecting the output lines of the drive circuit semiconductor elements to the edge conductor areas of a planar display. The drive circuits are mounted on a laminated tape acting as a flexible carrier vehicle,
20 and the input lines of TAB-mounted drive circuits are chained with each other and connected to the rest of the display driver circuitry by means of an elongated circuit board. Such an arrangement is costly to manufacture.

25 It is an object of the present invention to provide an entirely novel arrangement for connecting the input lines of TAB-mounted drive circuits to the driver electronics.

The goal of the invention is achieved by means of complementing the conventional drive components mounted on the
30 TAB carrier vehicle with a chained conductor pattern of the input lines of the drive circuits.

More specifically, the connection arrangement according to the invention is characterized by what is stated in
35 the characterizing part of claim 1.

Furthermore, the method according to the invention is characterized by what is stated in the characterizing part of claim 2.

5 The invention offers significant benefits.

For instance, the chained connections can be implemented without the need for a separate circuit board. In spite of the omission of the conventional circuit board, each
10 drive circuit can still be replaced individually when necessary. Owing to the interlaced pattern of the conductor runs, even at high conductor densities, the conductor pattern can be made using a coarser pitch than that normally dictated by the conductor spacing at the
15 connections to the display device. Moreover, the arrangement can be implemented without the need for separate tooling specifically for each display device type.

The invention is next examined in greater detail with
20 reference to attached drawings, in which:

Figure 1a illustrates the component side of a connection arrangement according to the invention;

25 Figure 1b illustrates the other side of the connection arrangement shown in Fig. 1a;

Figure 2 illustrates two adjacent sets of connection arrangements according to the invention ready for bonding
30 to the edge of a low-resolution display device; and

Figure 3 illustrates two adjacent sets of connection arrangements according to the invention ready for bonding to the edge of a high-resolution display device.

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With reference to Fig. 1a, the output line pattern 2 of a drive component for a display device (or a matrix

printer) starts from the drive component mounting area 1 made onto a thin, flexible, laminated carrier tape. The output line pattern 2 is first tapered into a dense conductor pattern 3 and then flared into a sparse conductor pattern 4 so as to match the conductor pitch of the connection arrangement with the pitch of the display device conductor pattern. In the case that the display device requires a densely-pitched interfacing conductor pattern, the conductor pattern can simply be trimmed at the dense area 3 of the conductor pattern, whereby the connection arrangement achieves interfacing to the display device with a desired pitch of conductors.

With reference to Fig. 1b, supply lines to the mounting area 1 of the drive circuit are implemented by means of power supply lines 5, whose routing is chiefly arranged on the other side of the TAB carrier with respect to the conductor pattern illustrated in Fig. 1b. For the chaining of the data lines, the TAB carrier is provided with conductor pattern 6, whose routing is chiefly arranged on the component side of the carrier vehicle as illustrated in Fig. 1a. Correspondingly, the control signal conductors 7 are taken to the opposite side of the carrier vehicle, and the required signals are taken to the component side of the carrier vehicle through contact pad vias 8 made on the component side of the carrier vehicle.

The arrangement shown in Figs. 1a and 1b dispenses with the use of separate circuit boards when a number of drive circuits are chained to drive a planar display, for instance. A suitable connection method for bonding the drive circuit to the component side of the connection arrangement is reflow solder bonding. In this method, the tin-lead solder alloy is appropriately applied onto the carrier vehicle by electrolytic or electrochemical deposition requiring the entire conductor pattern to be

electrically interconnected by means of thin conductor strips 9. Prior to the testing of the drive circuits, the interconnecting strips 9 must be galvanically separated from the conductor pattern proper. To accomplish this, the strips 9 may be grouped into arrays that can be cut off by means of a number of small punches.

With reference to Fig. 2, two connection arrangements of Fig. 1 are adjacently combined for interfacing to a low-resolution display, whereby the sparse conductor pattern 4 is used for connections.

With reference to Fig. 3, the dense conductor pattern 3 is used for alternative needs, and to achieve a sufficiently dense interfacing conductor pitch, the conductors of the connection arrangements are partially superimposed. The interfacing connections are implemented by superimposed soldering of the via areas 10 of the circuit input lines. The output line conductors 2 of the drive module can be conductively glued or soldered to the edge contact areas of a planar display. The other end of the chained input line conductor pattern is provided with a cable termination (not shown), whereby the display control processor can directly control the drive circuits placed on the mounting areas 1.

Claims:

1. An arrangement on a flexible carrier vehicle for connecting a drive circuit to a planar display or matrix printer, said connection arrangement comprising

- a mounting area (1) for the drive circuit,
- output line conductors (2) terminating at said mounting area (1)
- input line conductors (5, 6, 7) terminating at said mounting area (1)

characterized in that

- besides said input line conductors (5, 6, 7), said connection arrangement includes chaining for drive circuits operating in parallel.

2. A method for connecting a drive circuit to a planar display or a matrix printer, in which method

- the drive circuit is placed on a mounting area (1),

- the control signals of the drive circuit are taken to the planar display device or matrix printer via output line conductors (2), and

- the drive circuit is controlled by input line conductors (5, 6, 7) terminating at the mounting area (1) of said drive circuit,

characterized in that

- the input line conductors (5, 6, 7) of the drive circuit are chained for drive circuits operating in parallel.

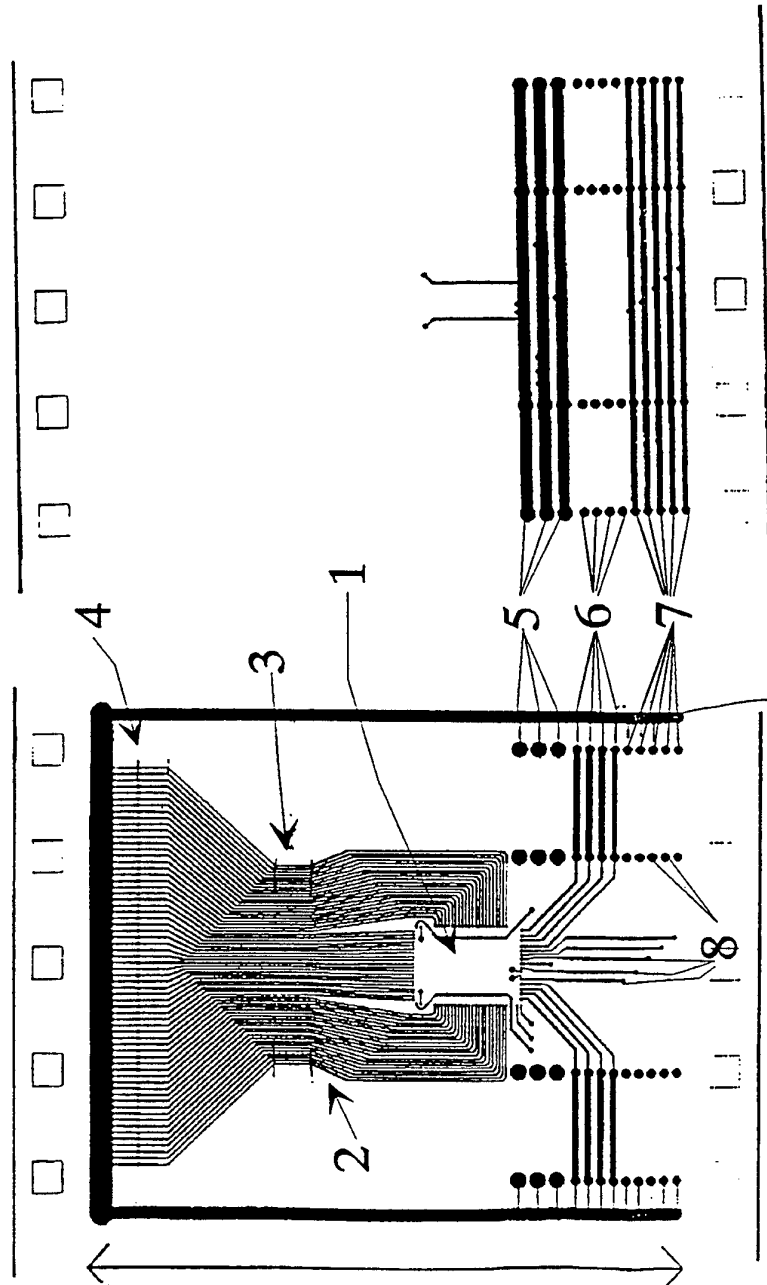


Fig. 1b

Fig. 1a

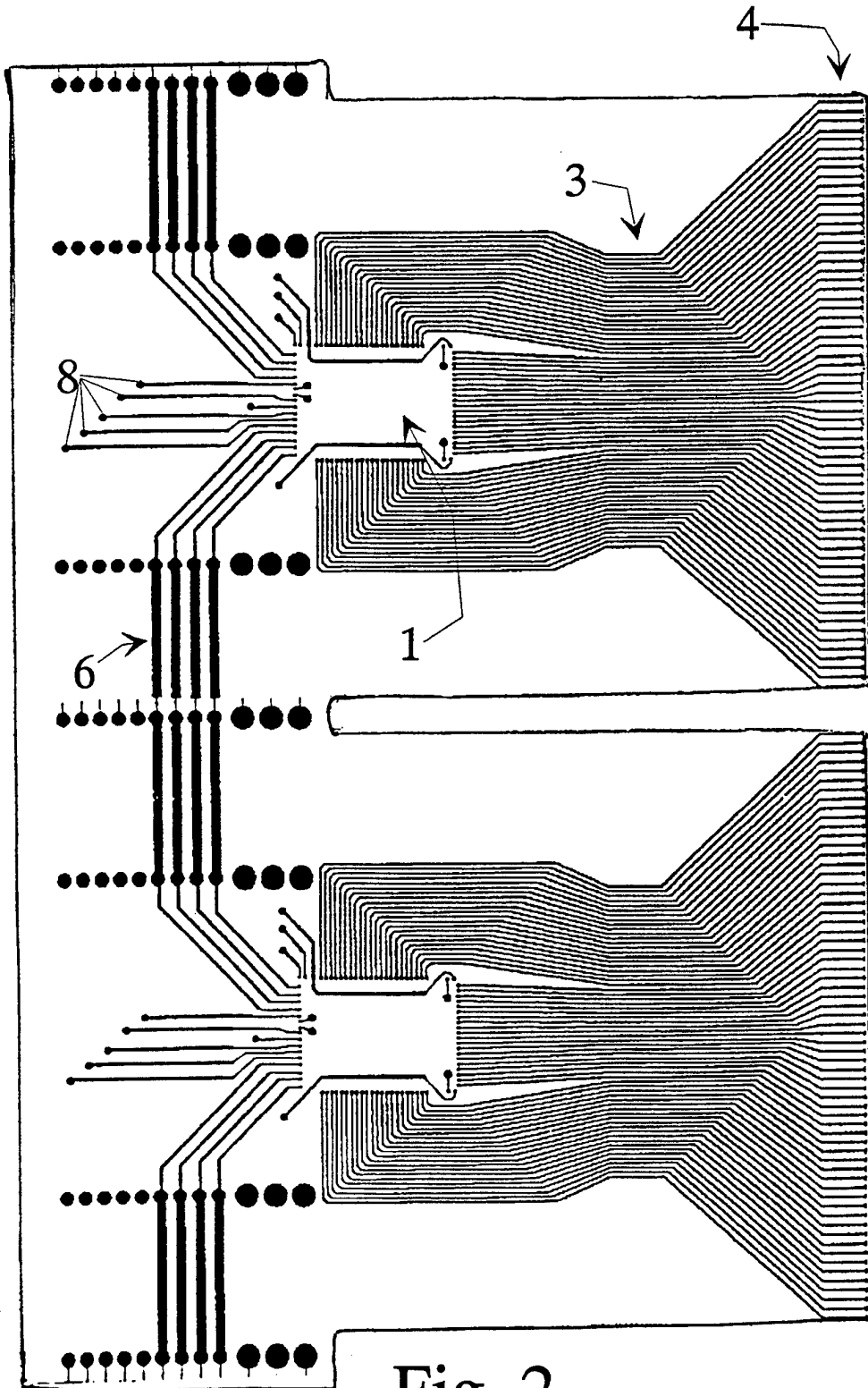


Fig. 2

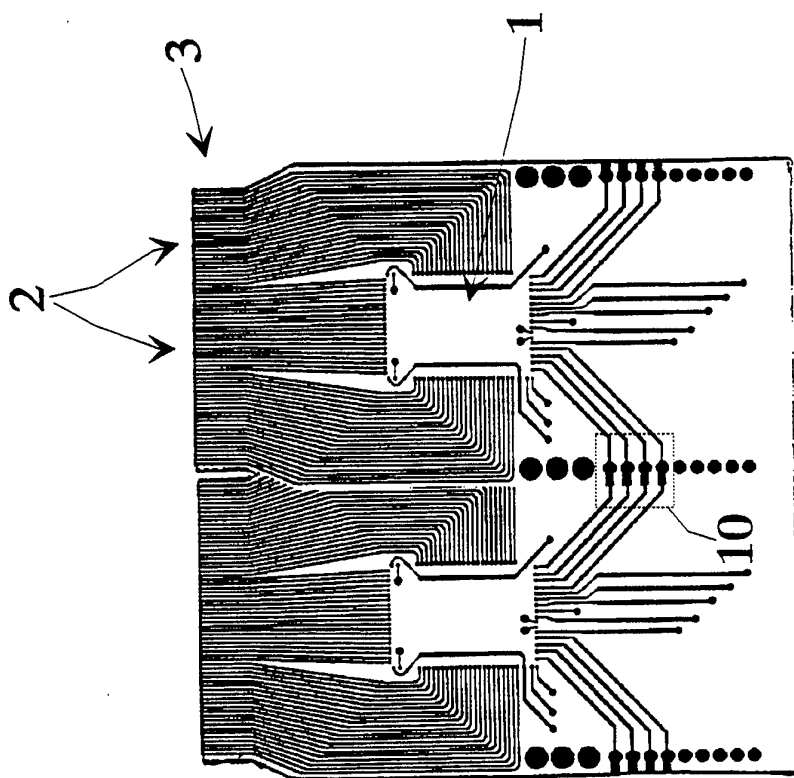


Fig. 3