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Socket arrangement

The present invention relates to service outlet boxes and in particular, but not exclusively, to under-floor service outlet boxes and socket arrangements therein.

Service outlet boxes are typically used in offices, factories or other commercial premises in which electrical or electronic services are required at a variety of different locations. Such service outlet boxes are typically fitted in the floor. The electrical or electronic services available from such service outlet boxes may for example include telephone, Internet, network and other telecommunication- or data-related services, and electric power. Service outlet boxes for installation within the floor space are particularly beneficial in offices or buildings that require flexible usage of the space within the building. Providing such service outlet boxes in several locations in a floor space may for example enable the floor space to be partitioned with quick-to-fit partition walls and to be readily used without needing to route cables through or from walls in the partitioned space.

A known service outlet box includes a multiplicity of sockets into which plugs from a variety of devices and appliances can be inserted. The sockets are similarly orientated, and when the sockets are used (i.e. plugs are received in the sockets), cables attached to the plugs run generally perpendicular to the width of the outlet box. This arrangement tends to be desirable as it efficiently directs cables to one or more cord outlets in the floor box lid assembly. In this known outlet box, the sockets are aligned with each other in uniform rows and columns. Such an arrangement of sockets may be advantageous in an outlet box

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since it provides a relatively compact arrangement within the space constraints of the outlet box.

When neighbouring rows of sockets are being used (for example when a relatively large number of sockets need to be used simultaneously) the plugs, cables and/or their associated strain reliefs are liable to obstruct each other. This may limit the number of sockets that can be simultaneously used, inconvenience the user and/or cause undesirable stresses on the plug, cables and/or strain reliefs.

Another known outlet box includes two parallel rows of sockets, the sockets in each row being orientated in opposite directions. Thus plugs received in one row of sockets face the opposite direction to plugs received in the other row of sockets. Whilst this may mitigate some of the above-mentioned problems of the plugs obstructing each other, the arrangement tends to be undesirable when many, or all, of the cables from the plugs need to leave the floor box from one side. In particular, the cables may need to be re-directed inside the box (which can cause undesirable stresses on the cables and/or plugs).

The invention seeks to provide an improved, and/or an alternative, service outlet box arrangement. Alternatively or additionally, the invention seeks to mitigate or remove at least one of the above-mentioned disadvantages.

According to a first aspect of the invention, there is provided a service outlet box comprising

a first pair of sockets,

a second pair of sockets,

and the service outlet box having a plug received in a socket of the second pair, the plug being attached to one end of a cable, and the cable extending directly away from the plug,

wherein

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each pair of sockets comprises two sockets located adjacent to each other in a side-by-side relationship,

the sockets in the first pair and the second pair, are orientated in the same direction, and

5 the first pair of sockets are staggered with respect to the second pair, such that the cable extending directly away from the plug passes between the sockets of the first pair.

Such an arrangement is able to reduce the possibility of plugs, cables, strain reliefs or other parts of the plug or
10 associated components, obstructing each other when a relatively large number of sockets are occupied. Thus a relatively large number of similarly-orientated plugs may be able to be readily accommodated, concurrently, in the sockets in the outlet box.

15 The cable preferably extends directly away from the plug without being subjected to any external force. The cable preferably passes between the sockets of the first pair when the cable is in a substantially unstressed state.

The sockets in a pair of sockets are preferably spaced
20 apart in a direction parallel to an edge of the outlet box (for example, in a direction parallel to the width of the box). The sockets are preferably co-planar. The second pair of sockets may be positioned below the first pair of sockets, but is more preferably positioned above the first pair of
25 sockets.

The cable preferably extends away from the plug in a direction substantially perpendicular to an edge of the box. The cable preferably extends in a direction substantially perpendicular to either the width or length of the outlet box.
30 For example, in an embodiment described herein the cable extends in a direction perpendicular to the width of the box, and passes out of a cord outlet on the lid assembly of the box. Such an arrangement may reduce the degree of

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manipulation required to manoeuvre the cable out of the outlet box.

The cable extending directly away from the plug preferably lies substantially in a plane parallel to the top of the outlet box (i.e. typically in a plane parallel to a lid of the floor box when the lid is in the closed position). The cable preferably extends in a direction substantially normal to the direction of insertion of the plug. The plug may comprise a strain relief orientated substantially normal to the direction of insertion of the plug. The plug is preferably arranged to be inserted into the socket in a direction substantially normal to the plane containing the top of the outlet box. The outlet box is typically mounted on or in a level floor structure; thus the plane containing the top of the outlet box tends to be horizontal and the plug is preferably arranged to be inserted in a vertical direction from above the socket.

The plug is preferably a British Standard (BS) 1363 three-pin plug. As will be appreciated by the skilled man, such a plug comprises a housing in which the cable is received (the cable typically containing live, neutral and earth wires). Such a plug also includes three pins protruding at right-angles from the base of the plug housing (an upper pin corresponding to the earth terminal and a pair of lower pins corresponding to the live and neutral terminals). The cable may be supported by a strain relief as it enters the housing of the plug.

The sockets may be arranged to receive different types of plug, but are preferably all arranged to receive the same type of plug. All the sockets are preferably arranged to receive a BS 1363 three-pin plug.

In an embodiment of the invention comprising sockets suitable for receiving a BS 1363 plug, each of the sockets typically comprises three rectangular openings arranged in a

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triangular formation for receiving corresponding pins on the plug. The triangular formation has a height (measured from the upper (earth) opening to the notional line joining the lower (live and neutral) openings) and a width (measured
5 between the lower (live and neutral) openings).

Advantageously, the pairs of sockets are staggered such that no more than two of these openings in each socket overlap with any openings in another socket, in a direction parallel to the width of the triangular formation. More preferably
10 only one, and yet more preferably none, of these openings in each socket overlap with any openings in another socket, in a direction parallel to the width of the triangular formations.

The outlet box is preferably arranged such that a notional line, extending from the upper (earth) pin of the plug in the
15 second socket, and passing midway between the lower (live and neutral) openings, passes between the first pair of sockets. It will be appreciated that such a notional line typically represents the location of the cable extending directly away from the plug.

20 The pairs of sockets are preferably positioned parallel to each other. The pairs of sockets may be aligned with an edge of the service outlet box.

The service outlet box may comprise a third pair of sockets, the third pair of sockets comprising two sockets
25 located adjacent to each other in a side-by-side relationship, and at least one of the first or second pairs of sockets being staggered with respect to the third pair. The third pair of sockets is preferably positioned above or below the second pair of sockets. In an embodiment of the invention described
30 herein, the first and third pairs of sockets are parallel to each other and the second pair of sockets is positioned between the first and third pairs and is staggered with respect to both the first and the third pairs.

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The sockets of the third pair may be similarly-orientated with the sockets of the first and second pairs, but need not necessarily be.

5 The stagger between the pairs of sockets is preferably in a direction substantially parallel to a notional line joining each of the sockets in the first pair of sockets. The magnitude of the stagger is preferably less than the length of that notional line.

10 Each pair of sockets is preferably housed in a modular unit mountable in the service outlet box. In such an embodiment, the modular units containing the first and second pairs are preferably substantially identical, the modular units being themselves staggered in the outlet box. Such an arrangement provides a relatively simple and inexpensive way of providing
15 an outlet box in accordance with the invention. The socket arrangements may, however, be differently positioned in each modular unit such that when the modular units are installed in the outlet box, the pairs of sockets are staggered in accordance with the present invention.

20 The outlet box may be a number of different shapes (referring to the shape of the box in plan view). For example, the box assembly may be substantially rectangular and may or may not be substantially square.

25 Although the present invention has been described with reference to pairs of sockets, it will be appreciated that each pair of sockets may be positioned within a larger array of sockets.

The service outlet box according to the first aspect of the invention has a plug received in a socket of the second pair.
30 The service outlet box may, of course, be supplied without the plug and thus according to a second aspect of the present invention, there is provided a service outlet box for use as the service outlet box described above with reference to the

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first aspect of the invention, the service outlet box comprising

a first pair of sockets, and

a second pair of sockets,

5 wherein

each pair of sockets comprises two sockets located adjacent to each other and in a side-by-side relationship,

the sockets in the first pair and the second pair, are orientated in the same direction, and

10 the first pair of sockets are staggered with respect to the second pair.

According to yet another aspect of the invention there is provided a floor structure comprising at least one service outlet box mounted therein, the service outlet box being in
15 accordance with any aspect of the invention described herein. The floor structure preferably comprises a plurality of cables in the floor, each cable terminating inside the outlet box at a terminal defined by each socket.

It will be appreciated that features described with
20 reference to one or more aspects of the invention may be equally applicable to other aspects of the invention. For example, the service box according to the second aspect of the invention may incorporate any of the features of the service outlet box described with reference to the first aspect of the
25 invention.

Various embodiments of the invention will now be described, by way of example only, with reference to the accompanying schematic drawings of which:

Figure 1 is an isometric view of a base assembly of a
30 screed floor outlet box according to a first embodiment of the invention;

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Figure 2 is an isometric view of a lid frame assembly for the screed floor outlet box according to the first embodiment of the invention;

5 Figure 3a is an exploded view of the base assembly for the screed floor outlet box according to a first embodiment of the invention;

Figure 3b is an exploded view of the lid frame assembly of Figure 2;

10 Figure 4 is a schematic plan view of the socket arrangement in the screed floor outlet box of the first embodiment of the invention;

15 Figure 5 is a schematic plan view of the socket arrangement in the screed floor outlet box of the first embodiment of the invention, showing a plug received in a socket;

Figure 6 is an isometric view of the base assembly of Figures 1 to 3b, when it has a different set of sockets installed;

20 Figure 7 is an isometric view of a base frame of a raised floor box according to a second embodiment of the invention;

Figure 8 is an isometric view of a lid frame assembly for the raised floor box according to the second embodiment of the invention;

25 Figure 9a is an exploded view of the base assembly for the raised floor box according to a second embodiment of the invention;

Figure 9b is an exploded view of the lid frame assembly for the raised floor box according to a second embodiment of the invention;

30 Figure 10 is an isometric view of a base frame of a flush floor box according to a third embodiment of the invention;

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Figure 11 is an isometric view of a lid frame assembly for the flush floor box according to the third embodiment of the invention;

5 Figure 12a is an exploded view of the base assembly for the flush floor box according to a third embodiment of the invention;

Figure 12b is an exploded view of the lid frame assembly for the flush floor box according to a third embodiment of the invention; and

10 Figure 13 is a plan view of a socket arrangement in a raised floor box according to a fourth embodiment of the invention.

Figures 1 to 6 show a screed floor outlet box according to a first embodiment of the invention. The outlet box
15 comprises two main portions: a base assembly 5 and a lid frame assembly 7 mountable on the base assembly.

The base assembly 5 of the outlet box is shown in Figure 1 in its packaged form ready for installation. Accordingly, the base assembly includes a screed cover 3. The screed cover
20 3 is typically kept in place following installation of the base assembly 5 onto a floor and prevents foreign bodies entering the base frame during construction of other parts of the floor, and especially during the laying of the screed. The screed cover 3 is removed when the lid frame assembly 7
25 (Figure 2 and Figure 3b) is installed.

Referring first to the base assembly 5 in detail, the structure of the assembly is primarily defined by a main base frame 9. The main base frame 9 defines a cuboid with a square bottom face 11, four side faces 13, and an open upper face.
30 It is formed from a single piece of galvanised steel plate. During manufacture, an appropriately dimensioned plate is punched out or stamped from a piece of sheet steel (the various openings and fixing holes in the main base frame are

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also formed in the plate during this punching / stamping procedure). The plate is then folded in an appropriate manner such that the main base frame 9 achieves the cuboid form shown in Figures 1, 3a and 6.

5 The four side faces 13 of the main base frame 9 extend perpendicularly upwards from the bottom face 11. The side faces 13 include lateral extensions 13a which are folded through a right angle, and spot welded, onto the neighbouring side face. This corner flange arrangement provides the base
10 frame with extra rigidity and improves the ability to seal the screed box at its corners.

Each side face 13 has a rectangular opening 14 which may be covered by a side-plate 15a or 15b. The side plates are fixed onto the part of the base frame structure surrounding
15 the openings. In the embodiment shown in Figures 1 to 6, two opposing side plates 15a are made of sheet steel and include three openings (not shown) for receiving electrical cables (not shown). The other two side-plates 15b are also made of sheet metal and close the side of the frame to which they are
20 connected.

A laterally inwardly projecting flange 17 is located on the upper edge of each opening 14 in the side faces. These flanges 17 are formed by folding portions of the side faces inwardly towards the middle of the base frame 9. The flanges
25 17 serve a dual-function; they support the accessory tray 19 and also provide the base with increased structural rigidity.

The interior of the main base frame 9 houses four ratchet sleeves 21 (one positioned on the interior of each corner of the base frame). Each ratchet sleeve 21 is a one-piece
30 plastic moulding and is attached to the bottom surface 11 of the base frame 9 by a screw inserted from beneath the base frame. The ratchet sleeves 21 are arranged to accommodate

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ratchet pins 23 in the lid frame assembly (see below with reference to Figures 2 and 3b).

There are also four support pillars 25 attached to the bottom surface of the base frame 9. The support pillars 25 are held in place on bolts inserted from beneath the base frame. Each support pillar 25 has an internal thread running through its central bore. The upper part of the pillar therefore also provides a fixing location for a short bolt inserted through a hole in the accessory tray 19 to fix the tray in place. The support pillars 25 also support the tray 19 at a height above the bottom face of the base frame 9 to allow cables and the like to be accommodated in the floor box. Two segregators 27 and two segregator adjustors 29 are provided inside the base frame 9 to manage and separate cabling (not shown).

The top face of the base frame 9 is open for accommodating the accessory tray 19, the lid frame assembly 7 and other associated components described below.

Figures 4 and 5 (to which particular reference is now made) are schematic drawings showing a plan view of the accessory tray and the sockets of the service outlet box according to the first embodiment of the invention. For the sake of clarity, the lid frame assembly and other surrounding structure is not shown.

The accessory tray 19 has a central cut-out portion 31 (see Figure 3a) through which three pairs 61a, 61b, 61c of plug sockets 63 are exposed. The sockets 63 may be in a number of different forms, in the arrangement shown in Figures 4 and 5, the sockets 63 are for BS 1363 three-pin electrical plugs. Figure 6 shows an alternative arrangement in which the screed floor box contains two pairs 61b' and 61c' of BS 1363 sockets, and a collection 61a' of four data sockets to which telecommunication devices may be attached. Further

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embodiments of the invention (not shown) include other types of sockets, for example sockets for two-pin plugs. The sockets are positioned at the termination of the cables (not shown) which feed into the base of the box. (The term "cable" is intended to encompass any electronic, electrical or optical cord, line, wire, fibres or the like that can convey signals or power from one location to another.) In the first embodiment, and further embodiments, all the sockets share the common characteristic that they are suitable for receiving a plug attached to a cable extending in a direction perpendicular to the direction in which the plug is inserted into the socket.

In the first embodiment of the invention, all the sockets are co-planar.

Referring to Figures 4 and 5, in accordance with a known socket for a BS 1363 three-pin electrical plug, the sockets each comprise three rectangular openings 65 arranged in a triangular formation for receiving corresponding pins on the plug. The triangular formation has a height (labelled h in Figure 4) and a width (labelled w in Figure 4).

Each pair of sockets 61a, 61b, and 61c comprises two sockets 63 located adjacent to each other in a side-by-side relationship. The first pair 61a (located towards the bottom of the page in Figures 4 and 5), the second pair 61b (located towards the centre of the page in figures 4 and 5) and the third pair 61c (located towards the top of the page in Figures 4 and 5) are arranged in parallel rows. The rows are parallel to the lower edge 67 of the outlet box (i.e. parallel to the width W direction of the outlet box).

All the sockets 63 in the outlet box are similarly orientated. The socket orientation is such that when a plug 69 is received in one of the sockets 63 of the second pair of sockets 61b (see Figure 5), the cable 71 runs directly away

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from the plug 69 in a direction perpendicular to the width W of the outlet box 1 and through the cord outlets 41 (not shown in Figures 4 and 5). The part of the cable 71 extending directly away from the plug lies in a plane parallel to the top of the outlet box. In the first embodiment of the invention, the cable 71 therefore lies in a plane parallel to the plane containing the load plate 39 (when the lid is in the closed position).

The pairs of sockets 61a, 61b, 61c are each housed in substantially identical, rectangular, modular units (mounted in the base assembly. The modular unit of the second (central) pair of sockets 61b, is staggered with respect to the first and third (lower and upper) pairs of sockets 61a, 61c. The stagger is in a direction parallel to the width w of the triangular formation (and parallel to the width W of the outlet box). The pairs of sockets are staggered such that none of the rectangular openings 65 in the sockets of the second pair 61b, overlap with any openings 65 in another socket (the overlap being considered in a direction parallel to the width w of the triangular formations).

The pairs of sockets 61a, 61b, 61c are thus staggered such that the cable 71 extending directly away from the plug 69 passes between the sockets of the first pair 61a (see Figure 5). Thus, plugs which are received in the sockets of the first pair tend not to obstruct the cable 71 extending away from the plug 69 in the second pair. This arrangement may therefore mitigate undesirable stresses on the plug 69, when a large number of the sockets are occupied.

In the alternative arrangement shown in Figure 6, it will be appreciated that a cable extending directly away from a plug inserted one of the third (top) pair of sockets 61c' will tend not to be obstructed by plugs received in the sockets of the second (central) pair 61b' of sockets. Equally, a cable

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extending directly away from a plug inserted one of the second (central) pair of sockets 61b' will tend not to be obstructed by the plugs received in the data sockets of the first (bottom) collection 61a' of sockets.

5 Referring now back to Figures 1 and 3a, the exterior of the base assembly 5 has a fixing bracket 33 rotatably mounted on the outside of each corner. Each bracket 33 is moveable between a deployed position (not shown) and a stored position (shown in Figures 1 and Figure 3a). The brackets 33 are each
10 stamped from metal sheeting and are defined by two plate portions folded such that they are at right angles to one another. In the stored position, the two plate portions lie flush with the sides of the base assembly 5. In the deployed position, the brackets protrude outwardly from the corners of
15 the base, and define a fixing plate which is parallel to the bottom surface 11 of the base frame 9. The brackets 33 thereby define fixing locations at which the base frame 9 can be attached to a floor substrate. In the stored position the brackets are rotated upwardly by 90 degrees from the deployed
20 position and thus lie flush with the side faces of the base.

Each fixing bracket 33 is attached to the base assembly using a rivet which passes through the lower plate portion of the bracket, and through a small hole in the base frame 9. The mounting of the fixing bracket on the base frame is a
25 friction-fit (i.e. there is slight resistance to rotation that can be overcome by, for example, the user pulling the top of the fixing bracket away from the frame).

Known screed floor boxes typically comprise a multi-piece base frame (for example a base plate, with cast blocks
30 attached at each corner, and side-walls attached thereto). These floor boxes tend to be secured to the floor substrate directly through the corners of the base plate. The bracket arrangement of the first embodiment of the invention provides

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a number of benefits over the above-described screed boxes.

For example, the brackets in the deployed position extend outside of the interior of the base frame. The screed box of

the first embodiment of the invention does not therefore tend

5 to collect debris and foreign bodies when it is being attached to the floor (as can be a problem in known screed boxes).

Furthermore, the bracket arrangement provides a relatively cheap fixing arrangement, especially when used in combination with the one-piece base frame. Yet further, the brackets may

10 be less prone to damage during transport, handling or installation of the floor box, than the corners of the base plate in known screed floor outlet boxes.

Referring now to Figure 3b and the lid frame assembly 7 in detail, the lid frame assembly 7 generally comprises a lid
15 frame 35, four ratchet pins 23, a lid 37 moulded from plastics material and hinged to one edge of the lid frame 35, and a load plate 39 with a pair of cord outlets 41 associated with the lid.

The lid frame 35 is a single piece plastic moulding, and
20 includes, at the interior of each corner, a hole 43 in which one of the ratchet pins 23 is housed. The ratchet pins are held in the holes 43 by way of a snap-fit which allows the pin to rotate about its axis in the hole, but retains the pin axially in the hole 43.

25 The lid frame 35 has complementary dimensions to the bottom face of the base assembly 5. Thus when the lid frame assembly 7 is lowered onto the base 5, the four ratchet pins 23 are received in the ratchet sleeves 21 in the base assembly 5.

30 The ratchet pin 23 and the ratchet sleeve 21 at each of the four corners of the box, together define a ratchet mechanism that selectively allows movement in a direction along the axis of the ratchet pin 23. The lid frame 35 of the

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box may thus be moved relative to the base 5, by means of the ratchet mechanisms 21, 23. This ensures that the lid both (a) lies flush and level with the surrounding floor and (b) is secured in place. The ratchet mechanisms also allow the lid
5 to self-level over time if there is settlement or movement of the floor or its covering over time.

The ratchet pin 23 may be twisted by 90 degrees about its axis between a locked position and a release position. In the locked position the ratchet mechanism defined by the pin 23
10 and sleeve 21 prevents the lid frame 35 from being lifted off the base of the box. In the release position, the ratchet mechanism is disengaged. Thus, when the ratchet pins 23 of all four ratchet mechanisms are twisted to the release
15 position, the lid frame 35 and lid 37 may be lifted off and completely removed from the base of the box 5. To facilitate twisting of the ratchet pins 23 between the locked position and release position, the top of the each pin is provided with a protrusion 23a which the user can manipulate to rotate the
20 pin about its axis. The orientation of the protrusion 23 also allows the state of the pin to be readily identified.

The lid 37 is hinged to the lid frame 35 along its rear edge (as shown in Figure 3). The lid 37 is therefore moveable from the closed position (as shown in Figures 2 and 3) to an open position (not shown) for providing access to the space
25 inside the box, and thus access to the sockets exposed through the cut-out in the accessory tray 19.

To facilitate opening and closing of the lid 37, a handle 45 is provided of inverted U-shape. The downwardly extending arms of the handle 45 are slideably mounted in two cylindrical
30 housings 47 in the lid (but have inwardly bent ends that are constrained at the top of the cylindrical housings such that they cannot be completely removed). The top of the handle 45 is therefore able to lie flush with the lid surface whilst it

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is not being used, but can be lifted slightly away from the lid surface to provide the user with a better grip when the lid 37 is to be opened.

5 The underside of each of the cylindrical housings 47 is closed. This removes the possibility of the handle arms contacting any electrical cabling inside the outlet box.

10 During use of the outlet box, cables from plugs connected to the sockets, pass out of the box through the lid via the cable outlets 41. The cable outlets 41 are rotatably mounted on the lid 37 and moveable between closed positions (see Figure 2) in which they are flush with the lid assembly 7, and open positions in which they are raised above the surface to allow the cables to pass out of the box.

15 The lid frame assembly 7 includes a metal load plate 39 coupled with the lid 37. The load plate 39 supports and distributes loads experienced by the outlet box during use (for example loads caused by people walking or standing on the box). The load plate 39 is cut-away at the locations of the cord outlets and thus includes three protrusions on its front edge between which two recesses are defined. The central protrusion 48 includes two scalloped recesses 49 in its top face to improve the stiffness/load bearing capacity of the plate and also to enable easy access to the handle. The two side protrusions 51 are flat.

25 When the lid is assembled, the outer protrusions on the load plate 39 are located under corresponding projecting moulded parts of the lid. A dummy module 57 (comprising a unitary plastic moulding) is fitted over the central protrusion 48. In other embodiments, the dummy module may be replaced by, for example a locking module. The provision of the three protrusions gives the lid assembly of the floor box an improved load bearing capacity.

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Figures 7 to 9b show a raised floor box according to a second embodiment of the invention. Features in the second embodiment of the invention that correspond to similar features in the first embodiment of the invention, are shown with the same reference numerals as in the first embodiment, but with the addition of the prefix '1' (or '10' where appropriate).

As described with reference to the screed outlet box of the first embodiment of the invention, the floor box comprises two main portions: a base assembly 105 and a lid frame assembly 107 mountable on the base assembly 105.

Referring first to the base assembly 105 of Figures 7 and 9a, the base assembly comprises a raised floor box pan 109 having a square bottom face 111, a first pair of opposing barrier side faces 115b and a second pair of side faces 115a each having six access holes for receiving underfloor cabling. The upper face of the floor box pan 109 is open and is arranged to receive an accessory tray 119, two segregator plates 127 and four ratchet sleeves 121 as described below.

The accessory tray 119 comprises a unitary plate with two folded-down flanges 132 on two of the opposing edges, and two folded-up flanges 132 on the other two opposing edges. The flanges 132 act as mounting brackets and are fixed onto the side faces 115a, 115b of the floor box pan 109. The accessory tray 119 is mounted on the floor box pan 109 such that the accessory tray is raised from the bottom face of the base frame to allow passage of cabling through the holes and under the accessory tray 119. Two segregator plates 127 are arranged under the accessory tray 119 to manage the cabling and prevent interference between different sets of cables.

The accessory tray 119 has a central cut-out 131 of the same shape as that described with reference to the first embodiment, but rotated by 90 degrees in a clockwise

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direction. Three pairs of sockets (each pair comprising two adjacent BS 1363 sockets in a side-by-side relationship) are mounted on the accessory tray (the sockets are not shown in Figures 7 and 9a). The sockets are similarly-orientated; that
5 orientation being such that when a plug is received in one of the sockets, the cable runs directly away from the plug in a direction parallel to the width of the outlet box and generally to the right in Figures 7 and 9a. The cord is then manipulated through approximately a right-angle to bring it
10 though the cord outlets 141.

The pairs of sockets are staggered in a direction parallel to the width of the triangular formation (and perpendicular to the width of the floor box). The pairs of sockets are thus staggered such that the cable extending
15 directly away from a plug received in a socket of the central pair of sockets, passes between the sockets of the pair of sockets to its right-hand side (referring to the orientation shown in Figures 7 to 9b). Thus, plugs which are received in the sockets of the right-hand pair tend not to obstruct the
20 cable extending away from the plug in the central pair.

In the interior of each corner of the floor box pan 109, a ratchet sleeve 121 is provided for accommodating a ratchet pin 123 in the lid frame assembly 107. The ratchet pin 123 / ratchet sleeve 121 arrangement acts substantially as described
25 herein with reference to the ratchet mechanism of the first embodiment.

The lid frame assembly 107 (see Figures 8 and 9b) is substantially as described with reference to the lid frame assembly of the first embodiment of the invention. In addition
30 however, the lid assembly 107 comprises a pair of cable retainers and a lid locking mechanism as described in more detail below.

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A respective cable retainer 153 is associated with each of the cord outlets 141 and is mounted below each outlet on the lid frame 135. Each cable retainer 153 comprises a pair of L-shaped flexible arms 155. The arms 155 face towards each other and have only a relatively small gap between them (less than the diameter of a cable) in their unstressed positions. In addition, the end of each arm 155 is directed inwardly towards the base of the cable retainer 153. The cable retainers 153 therefore each allow a cable to be easily manoeuvred through the small gap and into the cable retainer 153 (for example by firmly pressing the cable against the arms 155 causing them to flex and separate to allow passage of the cable) but inhibit removal of the cable from the retainer 153. To remove a cable, a user has to flex at least one of the arms inwardly whilst dragging the cable outwardly through the gap between the arms.

The lid locking mechanism 157 is a self-contained module which is fitted to the lid 137 via a tongue and groove arrangement on the locking mechanism / lid. When fitted, the locking mechanism 157 partially covers the central protrusion of the load plate 139 and the scalloped recesses 149 therein. The locking mechanism 157 includes a latch (not shown) which is rotatably mounted between a locking position (in which it engages with a recess in the lid frame) and an unlocked position (in which it is wholly located within the lid locking mechanism). The latch can be moved between the locking and the unlocked positions by insertion of a screwdriver into the top of the lid locking mechanism 157. The lid mechanism therefore provides a simple but effective means by which the floor box can be locked shut to prevent unwanted interference with the cabling therein.

Since the lid locking mechanism is a self-contained module, it can be readily replaced by a similarly dimensioned

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dummy-module not having a locking mechanism fitted, but still being receivable in the tongue-groove arrangement (as is the case in the first embodiment of the invention). Such a dummy-module may, for example, simply be a solid one-piece moulding. This gives the manufacturer and/or vendor greater flexibility in the product range they can offer, at relatively low cost. It may also allow the user to chose, or upgrade (if supplied with both the dummy-module and the locking mechanism module) the functionality of the floor box.

10 Figures 10 to 12b show a flush floor box according to a third embodiment of the invention. Features in the third embodiment of the invention that correspond to similar features in the first embodiment of the invention, are shown with the same reference numerals as in the first embodiment, but with the addition of the prefix '2' (or '20' where appropriate).

Referring to Figures 10 and 12a, the base assembly 205 comprises an accessory tray 219, a mounting plate 259 and four ratchet sleeves 221.

20 The accessory tray 219 is square and has a raised side-wall along each edge. Two opposing side-walls on the accessory tray include flanges 219a which are bent outwardly to enable the accessory tray 219 to be fixed to the underside of the mounting plate 259. The accessory tray 219 has a central cut-out 231 substantially as described with reference to the first embodiment, and the floor box is fitted with three pairs of sockets (not shown) in a staggered formation.

25 The mounting plate 259 is rectangular (being wider than the accessory tray 219, but only slightly longer) and therefore significantly overhangs two sides of the accessory tray 219. The four ratchet sleeves 221 are fixed to the upper surface of the mounting plate 259 at positions above the four corners of the accessory tray 219.

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The lid assembly 207 is substantially identical to the lid assembly of the second embodiment of the invention. The ratchet pins 223 of the lid assembly are received in the ratchet sleeves 221 of the base frame.

5 Figure 13 is a plan view of a raised floor box according to a fourth embodiment of the invention. Features in the fourth embodiment of the invention that correspond to similar features in other embodiments of the invention, are shown with the same reference numerals as in the other embodiments, but
10 with the addition of the prefix '3' (or '30' where appropriate).

The raised floor box comprises a lid frame 335 mounted on a base unit (not visible in Figure 13). The lid frame 335 is considerably deeper than the lid frame in the above-described
15 embodiments and comprises a series of ladder mountings extending into the depth of the box (not visible in Figure 13). Rectangular modular socket units 373a, 373b and 373c are mounted in the lid frame 335. Each of the modular units is arranged to engage part of the ladder mountings such that each
20 modular unit may be held in the lid frame at a particular height. In the embodiment shown in Figure 13, the modular units are all at the same height (all their upper surfaces are substantially planar), but the modules may be arranged at different heights if required.

25 Two of the modules 373c, 373b (shown at the top and centre in Figure 13 respectively) each contain a pair of BS 1363 three pin sockets located adjacent to each other in a side-by-side relationship. The sockets each have a triangular formation of openings, each formation having a height h and a
30 width w . The other module 373a (shown at the base of Figure 13) contains four data sockets.

The socket modules themselves are not staggered in the floor box, but instead the sockets within each module are

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positioned differently on the top of each module. The sockets 363c in the top module 373c, are staggered in a direction parallel to the width w of the triangular formation, relative to the sockets 363b of the central pair of sockets. Thus a
5 cable (not shown) extending directly away from a plug inserted one of the sockets in the top module 373c will tend not to be obstructed by plugs received in the sockets of the central module 373b.

It will be appreciated that features described with
10 reference to one embodiment of the invention may be equally applicable to other embodiments of the invention. For example, according to another embodiment of the invention (not shown) there is provided a screed outlet box arranged in accordance with the first embodiment of the invention, but
15 further including a lid locking module (as described with reference to the second embodiment).

Whilst the present invention has been described and illustrated with reference to particular embodiments, it will be appreciated by those of ordinary skill in the art that the
20 invention lends itself to many different variations not specifically illustrated herein. It will also be appreciated by the reader that integers or features of the invention that are described as preferable, advantageous, convenient or the like are optional and do not limit the scope of the
25 independent claims.

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Claims

1. A service outlet box comprising
5 a first pair of sockets,
a second pair of sockets,
and the service outlet box having a plug received in a
socket of the second pair, the plug being attached to one end
of a cable, and the cable extending directly away from the
10 plug,
wherein,
each pair of sockets comprises two sockets located adjacent
to each other in a side-by-side relationship,
the sockets in the first pair and the second pair, are
15 orientated in the same direction, and
the first pair of sockets are staggered with respect to the
second pair, such that the cable extending directly away from
the plug passes between the sockets of the first pair.
- 20 2. A service outlet box according to claim 1, wherein the
cable extends in a direction substantially normal to the
direction of insertion of the plug.
3. A service outlet box according to claim 1 or claim 2,
25 wherein the plug comprises a strain relief orientated
substantially normal to the direction of insertion of the
plug.
4. A service outlet box according to any preceding claim,
30 wherein the plug is a British Standard (BS) 1363 three-pin
plug.

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5. A service outlet box according to any preceding claim wherein the sockets are orientated such that the cable extends directly away from the plug in a direction substantially perpendicular to an edge of the box.

5

6. A service outlet box according to any preceding claim, wherein the pairs of sockets are positioned parallel to each other.

10 7. A service outlet box according to claim 6, wherein the pairs of sockets are aligned with an edge of the service outlet box.

8. A service outlet box according to any preceding claim,
15 further comprising a third pair of sockets, the third pair of sockets comprising two sockets located adjacent to each other in a side-by-side relationship, and at least one of the first or second pair of sockets being staggered with respect to the third pair.

20

9. A service outlet box for use as the service outlet box according to any preceding claim, the service outlet box comprising

a first pair of sockets, and

25 a second pair of sockets,

wherein

each pair of sockets comprises two sockets located adjacent to each other in a side-by-side relationship,

the sockets in the first pair and the second pair, are
30 orientated in the same direction, and

the first pair of sockets are staggered with respect to the second pair.

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10. A service outlet box comprising a first pair of sockets
and a second pair of sockets substantially as described herein
with reference to and as illustrated by the accompanying
5 drawings.

11. A floor structure comprising at least one service outlet
box mounted therein, the service outlet box being in
accordance with the service outlet box of any preceding claim.
10

12. A floor structure according to claim 11, comprising a
plurality of cables in the floor, each cable terminating
inside the outlet box at a terminal defined by each socket.
15