CLAIMS

1. An electrical coupling unit having:

an electrical connector for push-fit electrical connection in an axial direction of the coupling unit to a mating electrical connector of a receiving unit, the electrical connector and the mating electrical connector having respective engagement formations which permit the push-fit connection only when the electrical connector is in a predetermined rotational alignment about the axial direction with the mating electrical connector;

a backshell in a fixed rotational relationship with the electrical connector and extending rearwardly therefrom to house, in use, one or more electrical leads extending rearwardly from the electrical connector; and

a coaxial actuation sleeve surrounding the backshell, the actuation sleeve being axially movable to effect the push-fit connection;

wherein the backshell and the actuation sleeve are operatively connected such that: movement of the actuation sleeve in a forward axial direction towards the receiving unit is resisted by contact of the electrical connector with the mating electrical connector to produce rotation of the backshell, thereby rotationally aligning the electrical connector with the mating electrical connector and allowing push-fit electrical connection of the electrical connector to the mating electrical connector; and

characterised in that the backshell and the actuation sleeve are operatively connected by one or more cam formations which, on contact of the electrical connector with the mating electrical connector, convert forward axial movement of the actuation sleeve into the rotation of the backshell.

2. An electrical coupling unit according to claim 1, wherein the engagement formation of the electrical connector comprises a key or keyway, and the engagement formation of the mating electrical connector comprises the other of a key or keyway.

3. An electrical coupling unit according to claim 1 or 2, having plural cam formations circumferentially distributed around the unit.

4. An electrical coupling unit according to any one of the previous claims, wherein the, or each, cam formation comprises a cam follower provided by one of the backshell and the actuation sleeve, and a first cam surface provided by the other of the backshell and the actuation sleeve along which the cam follower moves, the first cam surface being angled

such that the backshell moves axially rearwardly relative to the actuation sleeve as the backshell rotates.

5. An electrical coupling unit according to claim 4, wherein the, or each, cam formation further comprises an alternative second angled cam surface which, on contact of the electrical connector with the mating electrical connector, converts forward axial movement of the actuation sleeve into the rotation of the backshell but in the opposite rotational direction;

wherein the cam follower is selectably positionable at either the first or the second cam surface to select the direction of rotation of the backshell.

6. An electrical coupling unit according to any one of the previous claims, wherein the backshell and the actuation sleeve are operatively connected by a first spring formation which is loaded by a rearward axial movement of the backshell relative to the actuation sleeve to cushion the contact of the electrical connector with the mating electrical connector sleeve.

7. An electrical coupling unit according to claim 6, wherein the first spring formation is a wave spring coaxial to the coupling unit.

8. An electrical coupling unit according to any one of the previous claims further having a coaxial hood surrounding the electrical connector, wherein the hood engages the mating electrical connector on forward axial movement of the actuation sleeve to axially align the electrical connector with the mating electrical connector before contact of the electrical connector with the mating electrical connector.

9. An electrical coupling unit according to claim 8, wherein the hood is spring mounted on the actuation sleeve by a second spring formation which cushions the engagement of the hood with the mating electrical connector.

10. An electrical coupling unit according to claim 9, wherein the second spring formation is a wave spring coaxial to the coupling unit.

11. A test apparatus for repeated connection and disconnection of electrical connectors, the test apparatus having:

a first mounting platform;

an array of coupling units according to any one of the previous claims mounted via their respective actuation sleeves to the first mounting platform;

electrical leads extending rearwardly from the electrical connectors of the coupling units;

a second mounting platform for mounting a receiving unit having mating electrical connectors to be push-fit connected to the electrical connectors of the coupling units; and

a drive arrangement controllable to move the first mounting platform in the axial directions of the coupling units.

12. A test apparatus according to claim 11 further having a control unit which controls the drive arrangement, receives the electrical leads, and is adapted to electrically test thereby the receiving unit.

13. A test apparatus according to claim 11 or 12, further having an environmental test chamber in which the receiving unit is located when mounted to the second mounting platform, the test chamber controlling one or more parameters selected from the group consisting of: the temperature within the chamber, the humidity within the chamber, the air pressure within the chamber, and mechanical vibration applied to the receiving unit.

14. Use of the test apparatus of any one of claims 11 to 13 for testing an aircraft engine electronic controller as the receiving unit.