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Insertion-Removal Tool for Low-Profile Modular CWDM Micro-Optics Assembly

Kevin Leigh
Hewlett Packard Enterprise

George D. Megason
Hewlett Packard Enterprise

Paul Kessler Rosenberg
Hewlett Packard Enterprise

Insertion-Removal Tool for Low-Profile Modular CWDM Micro-Optics Assembly

Abstract

CWDM micro-optics are small and can be easily contaminated. Disclosed is an insertion/removal tool with self-locating features to engage with the connector for a low-profile CWDM micro-optics assembly which is to be installed onto, or removed from, a mating socket on a substrate.

Description

This disclosure relates to the field of tooling for electronic component assembly.

CWDM (coarse wavelength division multiplexing) optical transceivers are used with many Ethernet switches and other products. A CWDM micro-optics assembly allows multiple wavelengths to be multiplexed onto a fiber in an optical transceiver. In some examples, an optical transceiver module contains a socket to accept an optical jumper cable with a passive CWDM micro-optics connector. The socket aligns the CWDM micro-optics assembly and the opto-electronics within the socket well, on the transceiver electrical substrate. The optical transceiver uses a heat sink to extract heat from an IC for the laser driver and trans-impedance amplifier, and the shape and size of the heat sink may vary. Once installed, the heat sink is preferred not to be removed in order to prevent thermal glue from being accidentally spilled into the socket well, contaminating the opto-electronics.

The CWDM micro-optics are very small and need to be easily removed/installed without being contaminated, e.g., accidentally touched by fingers or other objects, on the CWDM optical transceiver modules during high-volume manufacturing. The CWDM micro-optics, including the latch that allows modularity, also need to be low profile enough to be implementable inside hot-pluggable modules, so that users can easily install/service the modules.

The disclosure describes a robust insertion/removal tool for CWDM micro-optics, essential for the success of producing high quality CWDM optical transceiver modules in high volume. The tool can be used for manual operation, and is easily adapted for attachment to bench-press tool and automated assembly lines. Tools with similar features of this invention can also be used to efficiently insert/remove, with minimal contamination, an optical jumper cable assembly for optical transceiver designs that may or may not use a CWDM micro-optics.

According to the present disclosure, and as understood with reference to the Figure, provided is an insertion/removal tool 30 with self-locating features to engage with the CWDM micro-optics connector 20 to be installed onto, or removed from, a socket 10 mounted on a substrate 15. The tool 30 transforms vertical forces that displace a plunger 35 to lateral forces to displace a pair of side-arms 40 to open/close cantilever latches 25 retaining the CWDM micro-optics connector 20 on the socket 10. The tool 30 limits the applied displacement/force to prevent damage to the CWDM micro-optics connector 20. And the tool 30 incorporates a locking feature to hold the cantilever latches 25 open after actuation.

Consider removal of the CWDM micro-optics connector 20 from the socket 10 using the tool 30. In a first view 5A, the tool 30 is positioned over the CWDM micro-optics connector 20.

In a second view 5B, the tool 30 engages the connector 10. As the tool 30 is pushed down, the side-arms 40 rotate outward at the bottom, and inward at the top, allowing the engagement hooks at the bottom of the side-arms 40 to slip over lips of the cantilever latches 25.

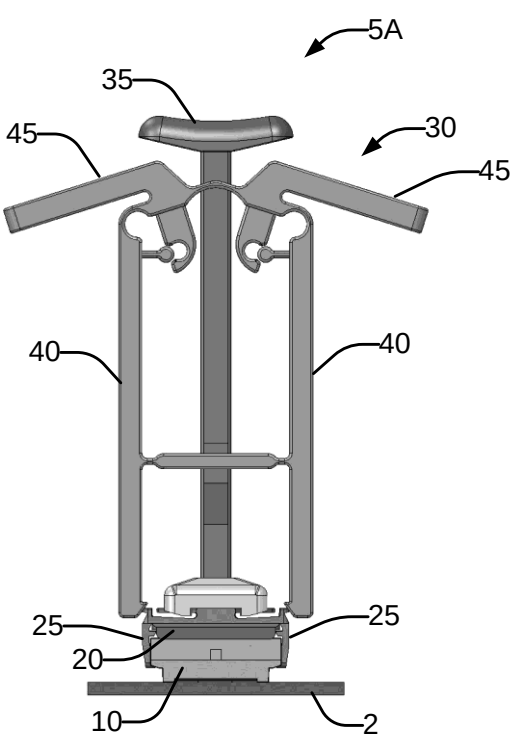
In a third view 5C, gull-wing levers 45 are raised while the plunger 35 is pushed down. This causes the upper part of the side-arms 40 to be pushed outward, and the lower part of the side-arms 40 are pushed inward, while the side-arm bridge provides the pivot point. The engagement hooks of the side-arms 40 firmly grasp the lips of the cantilever latches 25. Consequently, the hooks of the cantilever latches 25 start to disengage from the lips of the socket 10.

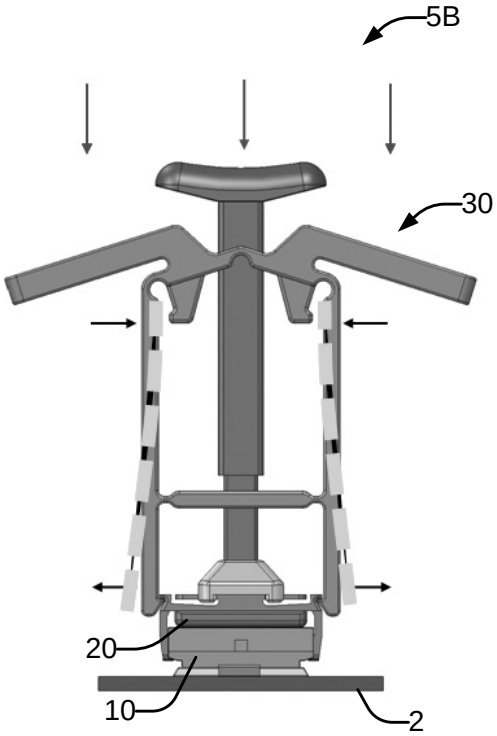
In a fourth view 5D, the connector 20 is removed and lifted. The body of the tool 30 includes snap features which retain the connector 20 during transport. After removal, the gullwing levers 45 are pressed down, the lower part of the side-arms 40 rotate outward, and the cantilever latches 25 are released.

In various embodiments, the tool 30 may be self-locating when brought down on connector 20 with cantilever latches, and may limit the applied displacement/force to prevent damage to the connector 20. Hinges of the tool 30 may be living hinge type and/or ball-and-socket joint hinge type. The tool 30 may incorporate a locking feature to hold latches open after actuation.

In alternative embodiments, the top of the plunger 35 may have different shapes and/or sizes, and may be detachable from the tool 30. The side-arms 40 may have different shapes and/or sizes. The gull-wing levers 45 may have holes for attachment, e.g., to alter the gullwing tips for ease of installation/removal, or to attach to an automated assembly line.

The disclosed tool advantageously provides ease of installation and removal of the optical jumper, in turn allowing different jumper lengths to be used for different system configurations.


5A
35
45
30
45
40
40
25
25
20
10
2


5B
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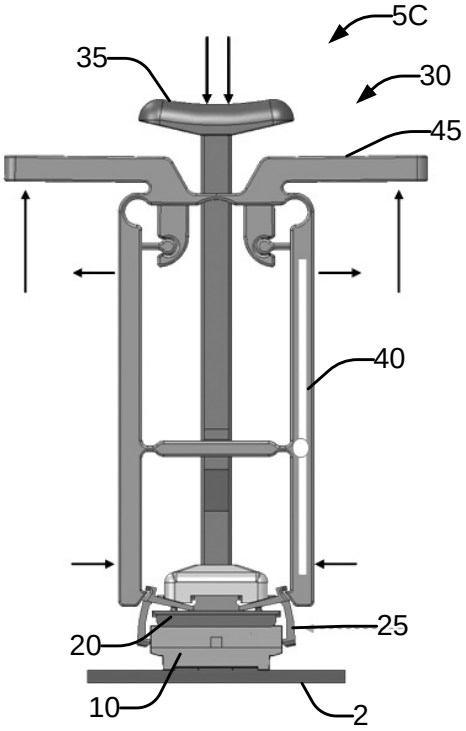
20
10
2


5C
35
30
45
40
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25
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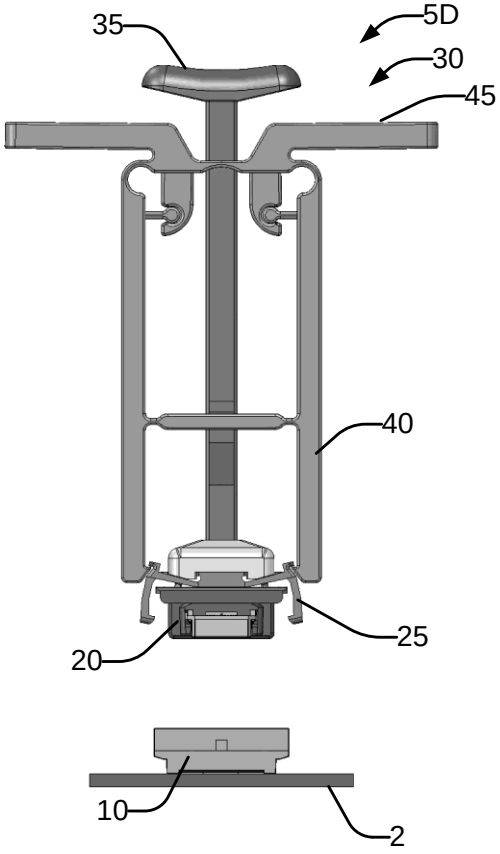
2


5D
35
30
45
40
20
25
10
2

Disclosed by Kevin Leigh, George D. Megason, and Paul Kessler Rosenberg, Hewlett Packard Enterprise