A workstation comprising a desktop assembly for supporting a display and an input device, a base for securing the workstation to an aircraft structure, and means for extending and retracting the desktop assembly between a deployed position and a stowed position.
COMPUTER WORKSTATION FOR USE IN AIRCRAFT

FIELD OF THE INVENTION

[0001] This invention relates to computer workstations and, more particularly, to such workstations that are suitable for use in aircraft.

BACKGROUND OF THE INVENTION

[0002] Aircraft passengers and crew frequently have a need to operate computers during flight. Laptop computers can be placed on seatback trays, but are subject to movement and limited battery life that can be inconvenient for the operator.

[0003] In addition, computer workstations can be provided for operators who are involved in command and control functions. Due to the limited space in such craft, the workstations are often located in areas that confine computer operators and accelerate their fatigue. For example, in one type of surveillance aircraft, a controller sits perpendicular to the longitudinal axis of the aircraft. When the aircraft flies in a “nose up” attitude, the controllers are forced to lean sideways to offset this orientation of the aircraft. The controllers in these positions experience fatigue, neck and back pain, headaches and other fatigue-related discomforts during prolonged missions which typically last 12 hours or longer.

[0004] When operators enter and leave a workstation chair, the ingress and egress becomes difficult due to the fact that the chairs are typically bolted in place with only limited movement capability such as seat-back tilt and swivel displacement being possible. Workstations are currently heavy units that require special local reinforcement to the floor support structure.

[0005] It would be desirable to provide a computer workstation for use on an aircraft that overcomes the disadvantages of prior workspaces.

SUMMARY OF THE INVENTION

[0006] Workstations constructed in accordance with this invention comprise a desktop assembly for supporting a display and an input device, a base for securing the workstation to an aircraft structure, and means for extending and retracting the desktop assembly between a deployed position and a stowed position.

[0007] The workstation can further comprise means for counterbalancing the weight of the desktop assembly for easy movement between the stowed position and the deployed position.

[0008] The means for extending and retracting the desktop assembly between a deployed position and a stowed position can comprise a door assembly having first and second sides, each of the sides including first and second channels for receiving rollers attached to the desktop.

[0009] The workstation can further comprise means for adjusting the position of the display, which can include first and second display mounting brackets for supporting the display, wherein the first and second display mounting brackets are pivotally mounted to the desktop and at least one of the first and second display mounting brackets includes a curved opening for receiving a locking member.

[0010] Tubular members can be connected to the base for securing the base to seat rails in an aircraft floor.

BRIEF DESCRIPTION OF THE DRAWINGS

[0011] FIG. 1 is an isometric view of a dual workstation constructed in accordance with this invention.

[0012] FIG. 2 is a schematic representation of a workstation constructed in accordance with this invention in various states of deployment.

[0013] FIG. 3 is an isometric view of another workstation constructed in accordance with this invention.

[0014] FIG. 4 is an isometric view of a desktop with keyboard locking mechanism that can be used in workstations constructed in accordance with the invention.

[0015] FIG. 5 is a side view of a display panel mounting bracket.

[0016] FIG. 6 is a side view of the latch mechanism of the desktop.

[0017] FIG. 7 is an isometric view of a base door assembly including a retraction and extension mechanism that can be used in workstations constructed in accordance with the invention.

[0018] FIG. 8 is a side view of a counterbalance mechanism that can be used in workstations constructed in accordance with the invention.

[0019] FIG. 9 is a side view of a counterbalance mechanism and details of a locking mechanism in combination with the door and desktop.

[0020] FIG. 10 is an isometric rear view of a workstation constructed in accordance with the invention.

DETAILED DESCRIPTION OF THE INVENTION

[0021] Referring to the drawings, FIG. 1 is a pictorial representation of two workstations 10 and 12, each constructed in accordance with this invention. Workstation 10 includes a desktop assembly 14 connected to a base assembly 16 by structural members 18 that serve as means for extending and retracting the desktop assembly. The desktop is configured to support an input device, such as a keyboard 20. The keyboard can be connected to a sliding mechanism 22 that permits the keyboard to move toward and away from an operator. A display 24 is mounted to a means 26 for adjusting the angle of the display. The display may be fitted with a touch sensitive front panel, as shown, to enable additional means of operator input or interaction. In the extended position shown in FIG. 1, the desktop is shown to make contact with an armrest 28 on seat 30. This provides improved stability of the desktop and may alternatively provide a positive latch if required. The base includes standard aircraft tie-down bolts 32 that can be adjusted to varying track widths on any aircraft type. The unit may be located forward or aft in half-inch increments anywhere along the aircraft floor without local reinforcement.

[0022] Workstation 12 is similarly configured and includes a desktop assembly 34 connected to a base assembly 36 by structural members, not shown in this view, that serve as means for extending and retracting the desktop assembly.
The desktop is configured to support an input device, such as a keyboard 38. The keyboard can be connected to a sliding mechanism 40 that permits the keyboard to move toward and away from an operator. A display 42 is mounted to a means 44 for adjusting the angle of the display. In the extended position shown in FIG. 1, the desktop is shown to make contact with an armrest 46 on seat 48.

[0023] FIG. 2 is a schematic representation of several workstations 60, 62 and 64 constructed in accordance with this invention in various positions configured during flight. Workstation 60 is shown in the retracted position behind a seat 66. In the retracted position, an occupant of a seat 68 has easy access to the aisle of the aircraft. Workstation 62 is shown in the retracted position behind a seat 68. Even when seat 68 is in the reclining position, an occupant of a seat 70 has room to recline and raise a footrest 72. Workstation 64 is shown in the extended position behind a seat 68. In the extended position, an occupant of a seat 74 can operate the computer that is associated with the workstation. This view shows that the desktop 76 makes contact with the armrest 78 of seat 74. The angle of the flat panel display 80 can be adjusted to optimal viewing by the operator.

[0024] FIG. 3 is a pictorial representation of two additional workstations 90 and 92 constructed in accordance with this invention. Workstation 90 is shown in the retracted position, wherein it is completely contained in a base unit 94. The base unit includes a frame 96 and a cover 98 that is locked in a closed position by latch 100. Workstation 92 is shown in the extended position, wherein the door assembly 102 of base unit 104 serves to support the desktop 106. The desktop makes contact with a bearing area 108 in armrest 110. A latch mechanism in the desktop 106 and door assembly 102 prevents movement of the desktop during flight. A release lever 112 allows the operator to release the locking mechanisms for retraction.

[0025] The width of the base and the width of the desktop assembly can be easily adjusted in design to accommodate mounting of a workstation in various environments, and to match the width of existing commercial seating without modification to the seat unit. The desktop and base units are designed with key dimensions that would be adjusted to accommodate a seat width or particular installation.

[0026] The floor-mounted unit contains structure capable of all flight and crash load conditions. The base unit 94 is constructed with integral square tabular sections 96 on the front and aft edges of the base unit. Standard track tie-down bolts carry all loads from the base unit directly into the aircraft seat rails. This unit further contains a counterbalance mechanism that minimizes the force required by the operator during extension and retraction of the desktop assembly. The base of the unit is comprised of structural members that accommodate a full range of floor track spacing found in aircraft. The workstations can be configured as double desktop units on a common base mount. Alternatively, a workstation may be implemented as a single unit, where applicable, or in greater numbers on a common base where required.

[0027] The workstation can be configured to match a commercial aircraft seat or seats. The initial configuration utilized commercial business class seats in pairs. The design allows the desktop and base unit to vary in width to accommodate a wide variety of business class, first class, special mission or custom seats produced by any qualified seat manufacturer for a particular aircraft requirement. Means for locking the desktop assembly in a stowed position and the extended position are also provided.

[0028] FIG. 4 is an isometric view of a desktop 120 that can be used in workstations constructed in accordance with the invention. The desktop provides a keyboard support that can serve as a means for retaining a keyboard and for retracting the keyboard when not in use. A full function keyboard 122 can be retained by a sliding mechanism that permits movement of the keyboard along tracks 124 and 126 and constrains the keyboard during turbulence but allows position adjustment to suit ergonomic considerations. The desktop also includes a shelf structure 128 that defines an opening 130, which can accommodate the keyboard during stowage or when using the desktop itself for other functions such as writing or map review. The shelf structure further provides a mounting place for DVD, CDWR, removable drives, data ports, etc. for operator removable storage/input media or other interactive devices. Display mounting brackets 132 and 134 are mounted on opposite sides of the shelf structure and attached to a flat panel display 136. The display mounting brackets can pivot around axis 138 to provide for adjustment of the display angle and to permit lowering of the display to a stowed position. The desktop also includes a bracket 142 for attachment to a side assembly of the workstation. A second similar bracket, not shown in this view would be located on the opposite side of the desktop. Bracket 142 includes two rollers 144 and 146 that fit within slots in the side assembly.

[0029] FIG. 5 is an elevation view of a display panel mounting bracket 134. Bracket 134 includes a flange 150 having a curved opening 152 that can receive a locking member so that the angle of the display can be adjusted to permit easy viewing. One embodiment of the invention allows flat panel displays of 18 inches and larger to be positioned for the user. The display can have a touch sensitive panel included for tactile inputs or other overlay screens for safety or navigational purposes. The angular position of the display is adjustable to provide optimum positioning for ergonomic interface.

[0030] FIG. 6 is a side view of the latch mechanism 140 of the desktop. Two latch mechanisms are used, one on each side of the desktop. Each latch assembly includes an arm 160 that pivots about a common shaft 162 and is operated by movement of a lever 164. A spring 166 forces the arm to a first position so that a paw 168 at the end of the arm engages a latch attached to a side of the door 180. Upon full extension of the desktop the paws 168 engage a striker plate on each side of the door 180 to prevent the desktop from retracting until the lever 164 is pulled by the operator.

[0031] FIG. 7 is an isometric view of the door 180 of the workstation base, including a side wall assembly 182 that forms a portion of the retraction and extension mechanism. The side wall assembly includes two channels 184 and 186 that receive rollers 144, 146 such as those on bracket 142 of the desktop assembly of FIG. 4. The rollers can move in the channels to permit retraction and extension of the desktop. A counterbalance mechanism is also attached to the side wall assembly. The counterbalance includes sprockets (2 each per side) 190, chain 191, and rod 192 that is connected to the chain 191 on both sides of the door 180.
FIG. 8 is a side view of a counterbalance mechanism. The counter balance mechanism includes spring spools 196 and 197 for retaining flat wound springs. The ends of these springs are joined in common to a cable 198 that is routed around pulley 199 and anchored on spool 193. The springs provide a constant force to the cable during extension or retraction that counteracts the weight of the desktop assembly. FIG. 9 shows the rotation lock mechanism 170 through 177 that operates to provide a positive lock for the door 180 assembly when extended. This mechanism operates in concert with the desktop lock described in FIG. 6 above. When the door 180 is pulled toward the operator, the travel stop link 170 slides in slot 175 on pin 173 until reaching the end of travel. At this location the spring 172 rotates the cam lock 176 on pin 177 until it prevents reverse motion of the door. When the operator releases the desktop and guides it back down the door tracks 184 and 186, it comes in contact with the cam 174 that retracts the cam lock 176 releasing the door lock. The door 180 may now be rotated away from the operator to the closed (stowed) position.

The counterbalance mechanism serves as means for counterbalancing the weight of the desktop assembly for easy movement between the stowed position and the deployed position.

FIG. 10 is an isometric rear view of a workstation constructed in accordance with the invention. Low voltage relays 212 are provided for controlling the supply of electrical power and network connections to the workstation. Power and voltage conversion units 210, 214, 216 allow for use of commercial displays and drives that may be adjusted for a particular requirement. The workstation can be used in combination with a remote processor.

The invention provides an airborne occupant with a full computer workstation and personal workspace. The concept may be applied to commercial and/or military applications and is dimensionally flexible to allow adaptation to many commercial or military seating arrangements. This concept may also be implemented to provide a workstation environment where the actual computer processor is remotely located from the user and seating arrangement. The workspace and equipment are retractable into a floor-mounted enclosure that provides a stowed and locked position for egress during takeoff, landing and emergencies.

Part of the desktop includes an area that accommodates interface or peripheral devices such as DVD/CDRW drives, removable hard drives, USB ports, etc. This area may be configured to suit the needs of a particular user.

A single low voltage switch can be mounted on the desktop and used to control a relay 212 that switches all power into the workstation. Circuit protection may be provided locally at the workstation or remotely at a power distribution panel.

Communications may be arranged in a number of ways as required by the users. One embodiment of the invention utilizes commercially based headsets with built-in noise cancellation. The interface converts the analog signals to digital for the greatest flexibility and minimizes the wiring required.

The concept allows the maximum use of existing commercial equipment and components to minimize cost. Spacing of the units may be configured to allow use of existing commercial overhead storage bins that provide lighting, gasket air and emergency oxygen, in addition to needed storage space. Seats designed for a particular model type mate with existing floor track positions and mounting. Sidewall liners exist that match the commercial seating and background or general lighting may be used. The sidewall liners are the curved panels that form the finished interior wall with window openings and shades. Using commercial parts reduces design costs.

The present invention creates a seating and workstation configuration, which is particularly suited to be installed in a modular fashion. The retracted position assists ingress and egress into walkways adjacent to the workstation. Adjacent workstations may choose to be in any position independently without interference. During landing and take-off, the workstation can be retracted and latched to enhance safety.

New technology advances incorporated in this design significantly reduce the weight, space, power and cooling requirements for workstations.

While the present invention has been described in terms of several embodiments, it will be apparent to those skilled in the art that various changes can be made to the disclosed embodiments without departing from the scope of the invention as defined by the following claims.

1. A workstation comprising:
   a desktop assembly for supporting a display and an input device;
   a base for securing the workstation to an aircraft structure;
   and
   means for extending and retracting the desktop assembly between a deployed position and a stowed position.

2. The workstation of claim 1, further comprising:
   means for counterbalancing the weight of the desktop assembly for easy movement between the stowed position and the deployed position.

3. The workstation of claim 2, wherein the means for counterbalancing the weight of the desktop assembly comprises:
   a constant force device.

4. The workstation of claim 3, wherein the constant force device comprises a flat wound constant force spring.

5. The workstation of claim 1, wherein the means for extending and retracting the desktop assembly between a deployed position and a stowed position comprises:
   a door assembly having first and second sides, each of the sides including first and second channels for receiving rollers attached to the desktop.

6. The workstation of claim 1, further comprising:
   means for locking the desktop assembly in the deployed position.

7. The workstation of claim 6, wherein the means for locking the desktop assembly in the deployed position comprises:
   a lever arm having a paw for engaging a striker plate; and
   means for moving the lever arm.
8. The workstation of claim 1, further comprising:
means for adjusting the position of the display.
9. The workstation of claim 8, wherein the means for
adjusting the position of the display comprises:
first and second display mounting brackets for supporting
the display, wherein the first and second display mount-
ing brackets are pivotally mounted to the desktop and
at least one of the first and second display mounting
brackets includes a curved opening for receiving a
locking member.
10. The workstation of claim 1, further comprising:
sliding means for retaining a keyboard on the desktop.
11. The workstation of claim 1, further comprising:
first and second channels connected to the base for
securing the base to seat rails in an aircraft floor.
12. A workstation comprising:
a desktop assembly for supporting a display and an input
device;
a base for securing the workstation to an aircraft structure;
and
a mechanism for extending and retracting the desktop
assembly between a deployed position and a stowed
position.
13. The workstation of claim 12, further comprising:
a constant force device for counterbalancing the weight of
the desktop assembly for easy movement between the
stowed position and the deployed position.
14. The workstation of claim 13, wherein the constant
force device comprises a flat wound constant force spring.
15. The workstation of claim 12, wherein the mechanism
for extending and retracting the desktop assembly between
the deployed position and a stowed position comprises:
a door assembly having first and second sides, each of the
sides including first and second channels for receiving
rollers attached to the desktop.
16. The workstation of claim 12, further comprising:
a locking device for locking the desktop assembly in the
deployed position.
17. The workstation of claim 16, wherein the locking
device comprises:
a lever arm having a paw for engaging a striker plate; and
means for moving the lever arm.
18. The workstation of claim 12, further comprising:
first and second display mounting brackets for supporting
the display, wherein the first and second display mount-
ing brackets are pivotally mounted to the desktop and
at least one of the first and second display mounting
brackets includes a curved opening for receiving a
locking member.
19. The workstation of claim 12, further comprising:
sliding means for retaining a keyboard on the desktop.
20. The workstation of claim 12, further comprising:
first and second channels connected to the base for
securing the base to seat rails in an aircraft floor.
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