A computer work station assembly comprises a display (18) having a viewing screen (19) a display actuator (16), and mounting apparatus (38, 40) for supporting copy material and at least the display with respect to a work surface such that the display actuator, the copy material, and the display may be disposed in line with the viewing screen of the display disposed relatively above and longitudinally spaced from the display actuator so as to minimize reflections on the viewing screen which would distract a work station operator and so as to position the display viewing screen at a predetermined focal distance from a work station operator.
FOR THE PURPOSES OF INFORMATION ONLY

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

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Technical Field

The present invention relates in general to computer display and keyboard work station assemblies, and in particular to copy holding mounting apparatus for such assemblies.

Background of the Invention

As a result of recent advances in computer technology, including the advent of microprocessor computers, the use of modular cathode-ray-tube (CRT) display and keyboard work station assemblies has proliferated. In conventional assemblies, the keyboard is disposed immediately in front of the display with the screen of the display positioned immediately above the rear of the keyboard. Such assemblies suffer from two major disadvantages.

First, the input material or copy from which an operator works must be placed to one side of the keyboard/display assembly. Consequently, operators must repeatedly move their heads back and forth from the copy to the CRT screen when entering data for actuation of the display. In such systems, operator focus time is slowed with each "read" since the combined head and eye movement required to switch from the copy material to the CRT display screen encompasses a twin axis. This causes production to be slowed, the incidence of errors to be increased, and fatigue of the operators to be accelerated.

Second, in conventional assemblies, the CRT screen is too low and too close to the operator. The conventional CRT screen placement permits excessive reflections on the screen surface, which distracts operators, and places the screen in an intermediate focal distance from the eyes of an operator which is not compatible with the vision requirements of many people and which
is particularly irritating to those people who wear bifocal glasses.

Summary of the Invention

These and other disadvantages of the prior art are overcome by mounting apparatus for a work station assembly constructed in accordance with the present invention, which comprises support apparatus for supporting copy material and at least the display with respect to a work surface such that the keyboard, or display actuator, the display, and the copy material may be disposed in line, with the display viewing screen disposed relatively above and longitudinally spaced from the display actuator so as to minimize reflections on the viewing screen as viewed by a work station operator and so as to position the viewing screen at a predetermined focal distance from a work station operator.

In accordance with a further aspect of the present invention, support apparatus is provided for supporting copy material mounted thereon such that the copy material is disposed intermediate the display and display actuator and such that the copy material is positioned relatively higher than the display actuating means and relatively lower than the viewing screen, and at an inclined attitude with respect to a work station operator.

In accordance with a still further aspect of the present invention, support apparatus is also provided for supporting the display actuator at a level below the level of the work surface which is at a predetermined height relative to a work station operator so as to facilitate operation of the display actuator.

Advantageously, the support apparatus comprises at least one platform defining a horizontal surface for each of the display and display actuator devices which is supported by the support apparatus, and first and
second vertical positioning surfaces against which a rear surface of the display actuator and a front surface of the display, respectively, abut when the display and display actuator are operatively mounted on the mounting apparatus.

Other features and advantages of the invention will be set forth in, or apparent from, the detailed description of preferred embodiments found hereinbelow. 

**Brief Description of the Drawing**

Figure 1 is a front perspective view of a first embodiment of mounting apparatus constructed in accordance with the present invention.

Figure 2 is a rear perspective view of the embodiment illustrated in Figure 1.

Figure 3 is a side elevation view of the embodiment illustrated in Figure 1 showing a display and display actuator disposed in operative relationship therewith.

Figure 4 is a front perspective view of a second embodiment of mounting apparatus constructed in accordance with the present invention.

Figure 5 is a rear perspective view of the embodiment illustrated in Figure 4.

Figure 6 is a side elevation view of the embodiment illustrated in Figure 4 showing a display and display actuator disposed in operative relationship therewith.

Figure 7 is a front perspective view of a guide member adapted for use with mounting apparatus constructed in accordance with the present invention.

Figure 8 is a front elevation view of a portion of the member illustrated in Figure 7.

**Detailed Description of Preferred Embodiments**

Referring to Figures 1-3, a first embodiment of mounting apparatus constructed in accordance with the present invention will now be described. The apparatus,
generally denoted 20, is shown mounted on a conventional table 10 which defines a work surface 12.

Apparatus 20 generally comprises a first platform 30 mounted on work surface 12 for supporting copy material 14, which typically is in the form of work sheets, notebooks and the like, and contains input data to be fed into a conventional computer or other device (not shown) via a conventional keyboard 16 in order to actuate a conventional display 18. Apparatus 20 further generally comprises a second platform 40 mounted on work surface 12 in line with and adjacent to platform 30 for supporting display 18 in a predetermined spatial relationship with respect to keyboard 16 and an operator. Platforms 30 and 40 advantageously are separable, modular units, as shown, for use with model of keyboard 16 and display 18 which are "hard-wired" together, to facilitate shipping and storage, and to allow the use together of units of different dimensions such that apparatus may be custom fit to different types of keyboards 16, displays 18, tables 10, and operators. However, it will be appreciated by those of ordinary skill in the art that platforms 30 and 40 also are advantageously constructed as an integral one-piece unit for use with plug-compatible models of keyboard 16 and display 18.

Platform 30 advantageously comprises a vertically oriented front panel 32 defining a front positioning surface 33 connected to two vertically oriented trapezoidal side panels 34 having inclined upper edges, and a top panel 36 connected to the upper edges of panels 32 and 34 so as to define an inclined support surface 38. As shown, top panel 36 advantageously extends beyond front panel 32 to define an overhanging portion 37, and is provided with an upwardly projecting lip or flange 39 against which copy material 14 abuts when mounted on platform 30. To allow selective
longitudinal positioning of copy material 14 relatively closer to or further away from keyboard 16 is advantageously accomplished by the flange 39 being slidably mounted on top panel 36 in a conventional manner, such as by means (not shown) of bolts which project from flange 39 and pass through longitudinal slots in panel 36 and which cooperate with clamping nuts disposed on the underside of panel 36 to releasable clamp flange 39 in a desired position.

Front panel 32 advantageously is of sufficient height to allow keyboard 16 to be disposed on work surface 12 with respect to platform 30 such that the rear surface of keyboard 16 abuts positioning surface 33 and overhang portion 37 of top panel 36 clears the top of keyboard 16. Alternatively, in order to simplify construction, top panel 36 is configured such that the front edge thereof is coterminal with the top edge of front panel 32 and front panel 32 is dimensioned so as to be slightly shorter in height than the rear surface of keyboard 16. In this embodiment of platform 30 (not shown), the rear surface of keyboard 16 acts as a stop for copy material 14 when keyboard 16 is operatively positioned with respect to mounting apparatus 20, and thus top panel 36 of platform 30 advantageously is not provided with flange 39 as in the embodiment illustrated in Figures 1-3.

Platform 30 advantageously is further configured so as to define a vertically oriented rear positioning surface 35 against which display 18 abuts when display 18 is operatively mounted on platform 40. Surface 35 serves, in cooperation with surface 33, to position display 18 such that the viewing screen 19 thereof is a predetermined longitudinal distance from keyboard 16, and thus is at a predetermined focal length from an operator conventionally positioned with respect to keyboard 16. Surface 35 can be defined by the rear edge
of top panel 36, as shown, or can be defined by a separate panel or the like (not shown), which advantageously can be slidably mounted to platform 30 in a conventional manner (not shown) such that the distance between surfaces 33 and 35 can be varied to accommodate different operators. As will be appreciated by those of ordinary skill in the art, front positioning surface 33 advantageously also is defined by a separate panel (not shown) rather than by front panel 32, to allow positioning of keyboard 16 relative to an operator independently of the positioning of display 18.

Top panel 36 of platform 30 preferably is dimensioned such that support surface 38 is large enough to accommodate standard sizes of copy material 14. Platform 30 is preferably further configured such that the angle of inclination of support surface 38 is sufficient to facilitate visual inspection by an operator of copy material 14 mounted thereon, and to position the rear edge of panel 36 longitudinally of surface 33 so as to define surface 35, or so as not to interfere with the operation of surface 35 in embodiments of mounting apparatus 20 which utilize other structure to define surface 35.

Advantageously, top panel 36 is also pivotably mounted to front panel 32 and lateral panels 34 in a conventional manner (not shown) such that the angle of inclination of surface 38 may be adjusted to accommodate individual operators.

Platform 40 advantageously is of any conventional construction which defines a horizontal planar support surface 42 which is disposed at a predetermined height above work surface 12 such that the viewing screen 19 of a display 18 mounted thereon is centered with respect to the line of sight of an operator. In the case of an IBM Model No. 5251 display 18 and a work surface 12 disposed at the recommended typing height of approximately
26-27 inches (66-68.6 cm) above the floor, a platform 40 having a support surface 42 disposed approximately six to seven inches (15.2-17.8 cm) above work surface 12 has proven satisfactory in minimizing reflections on viewing screen 19 which are distracting to an operator positioned for conventional seated operation of keyboard 16.

As will be appreciated by those of ordinary skill in the art, platform 40 advantageously is sectioned into upper and lower sections and the sections joined in a conventional manner (not shown) to allow vertical displacement of the upper platform section with respect to the lower platform section, and thereby allow the height of support surface 42 to be adjusted to accommodate individual operators.

Mounting apparatus 20 preferably is further provided as shown with openings 50 disposed in selected vertically oriented panels through which pass the cables 52 which electrically connect conventional models of keyboard 16 to conventional models of CRT display 18 and which connect display 18 to the associated computer and/or power source (not shown). For models of keyboard 16 having a cable 52 connected at the rear thereof, an opening 50 in front panel 32, as shown, is advantageous. For models of display 18 having a cable 52 connected at the front thereof, an opening 50 defined by the absence of a rear panel for platform 30, as shown, is advantageous. Preferably, in embodiments of mounting apparatus 20 in which platforms 30 and 40 are separable units, openings 50 constitute notches or slots as shown, formed in the bottom edges of platform 30 and which communicate with work surface 12 such that models of keyboard 16 and display 18 having cable 52 "hardwired" or permanently attached may be operatively disposed with respect to mounting apparatus 20 without disconnecting cables 52.
Referring now to Figures 4-6, a second embodiment of mounting apparatus constructed in accordance with the present invention will now be described. The embodiment of Figures 4-6 is similar to the embodiment of Figures 1-3, and like elements have been denoted by like references numerals with primes attached. For clarity of description, only those features which differ in the two embodiments will be described hereinbelow.

Mounting apparatus 20' is particularly adapted for use with a work surface 12 which is disposed at a level which is higher than that at which keyboard 16 can be conveniently operated by an operator, and advantageously comprises, as shown, a unitary platform 70 having a first platform section 71 defining a horizontal support surface 72 for supporting keyboard 16, a second platform section 40' defining a horizontal support surface 42' for supporting display 18 in a predetermined spatial relationship with respect to keyboard 16 and an operator, and a third platform section 30' defining an inclined support surface 38' for supporting copy material 14.

As shown, platform 70 is preferably further configured such that the bottom or base 74 thereof has a step-like configuration comprising a horizontal rear section 76 which engages work surface 12, a horizontal front section 80 which defines support surface 72, and a vertical section 78 which connects front section 80 to rear section 76, which defines vertical positioning surface 33', and which abuts the edge 13 of work surface 12 when platform 70 is operatively disposed on work surface 12. Front base section 80 extends outwardly from work surface 12 at a predetermined level therebelow so as to position support surface 72 at a predetermined height relative to an operator which facilitates operation of keyboard 16 thereby. In accordance with recommended typing practices, support
surface 72 advantageously is disposed approximately 26-27 inches (66.68.6 cm) above the floor on which work surface 12 is supported.

Advantageously, front base section 80 comprises a panel 82 defining support surface 72 which extends transversely between the lateral panels 34 of platform 70 and is slidably mounted thereto in a conventional manner (not shown) such that panel 82 may be displaced vertically so as to adjust the relative height of surface 72.

Preferably, vertical section 78 defines a slot or opening 50' through which the cable 52 electrical connecting keyboard 16 to display 18 passes.

Referring to Figure 1 and Figures 7-8, mounting apparatus constructed in accordance with the present invention advantageously further comprises a guide member 90 releasably and slidably mounted thereon for securing copy material 14 to inclined support surface 38 and for facilitating reading of the text of copy material 14 supported on surface 38. Guide member 90 preferably is made of a clear plastic material such as acrylic or the like so that an operator can reference lines of text on copy material 14 above and below the line being read. As shown, guide member 90 preferably comprises an elongate band 92 which extends transversely across and parallel to support surface 38, and depending lateral legs 94 which straddle platform 30 and engage lateral panels 34 thereof. Preferably at least one of the legs 94 is flexibly joined to band 92 such that the at least one leg 94 must be flexed outwardly with respect to the other leg 94 under tension in order for legs 94 to operatively engage platform lateral panels 34. Preferably, legs 94 are angled or bent such that base portions 96 thereof are inclined inwardly with respect to each other and the distal portions 98 are inclined outwardly away from each other, and substantially
only the vertex portions 99 engage lateral panels 34. Further, at least vertex portions 99 are spaced apart from each other in the unflexed condition of legs 94 by a distance which is less than the distance between lateral panels 34.

It will be appreciated from the foregoing description by those of ordinary skill in the art that mounting apparatus constructed in accordance with the present invention, and a work station assembly comprising such apparatus, aligns keyboard 16, the associated display 18, and the copy material 14 containing the data to be used to actuate display 18 in an optimum relationship with respect to each other and with respect to an operator. Transcribing time and errors are decreased, and productivity is thus increased, because shifts of focus by an operator are minimized, and because display 18 and copy material 14 are disposed at optimal focal distances from an operator.

Although the invention has been described with respect to exemplary embodiments thereof, it will be understood that variations and modifications can be effected in the embodiments without departing from the scope or spirit of the invention.
I CLAIM:

1. A work station assembly comprising:
   a display having a viewing screen;
   means for actuating said display; and
   mounting means for supporting copy material and at
   least said display with respect to a work surface
   such that said display actuating means, said display
   and the copy material may be disposed in line, with
   said viewing screen disposed relatively above and
   longitudinally spaced from said display actuating means
   so as to minimize reflections on said viewing screen
   as viewed by a work station operator and so as to posi-
   tion said viewing screen at a predetermined focal dis-
   tance from a work station operator.

2. The work station assembly of Claim 1 wherein
   said mounting means includes means for supporting said
   display actuating means at a level below the level of
   the work surface which is at a predetermined height
   with respect to a work station operator so as to facili-
   tate operation of said display actuating means.

3. The work station assembly of Claim 1 or 2
   wherein said mounting means includes means for support-
   ing copy material mounted thereon such that the copy
   material is disposed intermediate said display and
   said display actuating means and such that the copy
   material is positioned relatively higher than said dis-
   play actuating means and relatively lower than said
   viewing screen and at an inclined attitude with respect
   to a work station operator.

4. The work station assembly of Claim 3 wherein
   said mounting means comprises at least one platform de-
   fining at least one horizontal surface which supports
   at least said display, and first and second vertical
   positioning surfaces against which a rear surface of
   said display actuating means and a front surface of
   said display respectively abut when said display
12

actuating means and said display are operatively mounted on said mounting means.

5. The work station assembly of Claim 4 wherein said at least one platform further defines an inclined surface for supporting copy material, and a surface projecting upwardly from said inclined surface against which copy material operatively mounted on said inclined surface abuts.

6. The work station assembly of Claim 5 wherein said inclined surface extends beyond said first vertical surface and said upwardly projecting surface overlies said display actuating means when said display actuating means is operatively disposed with respect to said at least one platform.

7. The work station assembly of Claim 4 wherein said display is a computer controlled CRT display and said display actuating means is a keyboard electrically connected to said CRT display by cable means, and said at least one platform defines first and second openings through which said cable means passes disposed in vertical surfaces transversely disposed to an imaginary longitudinal axis connecting said keyboard and said CRT display.

8. The work station assembly of Claim 7 wherein at least one of said openings is configured such that said keyboard and said CRT display may be operatively disposed with respect to said at least one platform without disconnecting said cable means from at least one of said keyboard and said CRT display.

9. The work station assembly of Claim 1 or 2 further comprising guide means releaseably and slidably mounted to said mounting means for securing copy material to said mounting means and for facilitating visual inspection of the text of copy material supporting on said mounting means.
10. The work station assembly of Claim 9 wherein said mounting means comprises a platform having an inclined upper surface for supporting copy material and lateral surfaces depending from the side edges of said upper surface, and said guide means comprises an elongate band having depending lateral legs which straddle said platform and engage said lateral surfaces thereof when said guide means is operatively mounted on said platform, and at least one of said legs being flexibly joined to said band such that said at least one leg must be flexed outwardly under tension in order for said legs to operatively engage said platform lateral surfaces.

11. The work station assembly of Claim 10 wherein said guide means depending legs are angled or bent such that the base portions thereof are inclined inwardly toward each other and the distal portions thereof are inclined outwardly away from each other, with at least the vertices thereof spaced apart in the unflexed condition of said depending legs by a distance which is less than the distance between said platform lateral surfaces.

12. Mounting means for a work station comprising a display having a viewing screen and means for actuating the display, said mounting means comprising means for supporting copy material and at least the display with respect to a work surface such that the display actuating means, the display and the copy material may be disposed in line, with the viewing screen disposed relatively above and longitudinally spaced from the display actuating means so as to minimize reflections on the viewing screen as viewed by a work station operator and so as to position the viewing screen at a predetermined focal distance from a work station operator.
13. The mounting means of Claim 12 further comprising means for supporting the display actuating means at a level below the level of the work surface which is at a predetermined height relative to a work station operator so as to facilitate operation of the display actuating means.

14. The mounting means of Claim 12 or 13 further comprising means for supporting copy material mounted thereon such that the copy material is disposed intermediate the display and the display actuating means and such that the copy material is positioned relatively higher than the display actuating means and relatively lower than the viewing screen and at an inclined attitude with respect to a work station operator.

15. The work station assembly of Claim 2 wherein said mounting means defines a base having a step-like bottom configuration comprising a rear section which engages the work surface, a front section which extends outwardly from the work surface at said level below the level of the work surface and which defines a surface for supporting said display actuating means, and a vertical section which connects said front and rear sections and which abuts an edge of the work surface when said mounting means is operatively disposed on the work surface.

16. The mounting means of Claim 13 comprising a base having a step-like bottom configuration comprising a rear section which engages the work surface, a front section which extends outwardly from the work surface at said level below the level of the work surface for supporting the display actuating means, and a vertical section which connects said front and rear sections and which abuts an edge of the work surface when said mounting means is operatively disposed on the work surface.
INTERNATIONAL SEARCH REPORT

International Application No. PCT/US80/01687

I. CLASSIFICATION OF SUBJECT MATTER (If several classification symbols apply, indicate all)

According to International Patent Classification (IPC) or to both National Classification and IPC

U.S. CL. 340/711
INT. CL & G06F 3/14

II. FIELDS SEARCHED

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Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched

III. DOCUMENTS CONSIDERED TO BE RELEVANT

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* Special categories of cited documents:
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  "E" earlier document but published on or after the international filing date
  "L" document cited for special reason other than those referred to in the other categories
  "O" document referring to an oral disclosure, use, exhibition or other means

"PP" document published prior to the international filing date but on or after the priority date claimed
"TT" later document published on or after the international filing date or priority date and not in conflict with the application, but cited to understand the principle or theory underlying the invention
"XX" document of particular relevance

IV. CERTIFICATION

Date of the Actual Completion of the International Search: 23 March 1981
Date of Mailing of this International Search Report: 07 APR 1981

International Searching Authority: ISA/US

Signature of Authorized Officer: [Signature]

Form PCT/ISA/210 (second sheet) (October 1977)
**Further Information Continued from the Second Sheet**

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**Observations Where Certain Claims Were Found Unsearchable**

This international search report has not been established in respect of certain claims under Article 17(2) (e) for the following reasons:

1. Claim numbers______ because they relate to subject matter not required to be searched by this Authority, namely:

2. Claim numbers______ because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

**Observations Where Unity of Invention is Lacking**

This International Searching Authority found multiple inventions in this international application as follows:

1. As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims of the international application.

2. As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims of the international application for which fees were paid, specifically claims:

3. No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claim numbers:

**Remark on Protest**

- The additional search fees were accompanied by applicant's protest.
- No protest accompanied the payment of additional search fees.