(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
20 December 2001 (20.12.2001)

PCT

(10) International Publication Number
WO 01/96974 A2

(51) International Patent Classification[7]: G06F

(21) International Application Number: PCT/IL01/00547

(22) International Filing Date: 14 June 2001 (14.06.2001)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
0014668.8 15 June 2000 (15.06.2000) GB

(71) Applicant *(for all designated States except US)*: **TELE-FIX.COM, INC.** [US/IL]; c/o Tele-fix.Com, Ltd., 11 Ben Gurion Street, 51260 Bnei Brak (IL).

(72) Inventors; and

(75) Inventors/Applicants *(for US only)*: **NUDEL, Pinchas** [IL/IL]; 2 Hess Street, 55284 Kiryat Ono (IL). **ZADIK, Yair** [IL/IL]; 27 Barkan Street, 81500 Yavne (IL). **PUSH, Yaakov** [IL/IL]; 15 Natan Street, 52450 Ramat Gan (IL). **NAVOT, Omri** [IL/IL]; 8 Ha'irit Street, 76568 Rehovot (IL).

(74) Agents: **COLB, Sanford, T.** et al.; Sanford T. Colb & Co., P.O. Box 2273, 76122 Rehovot (IL).

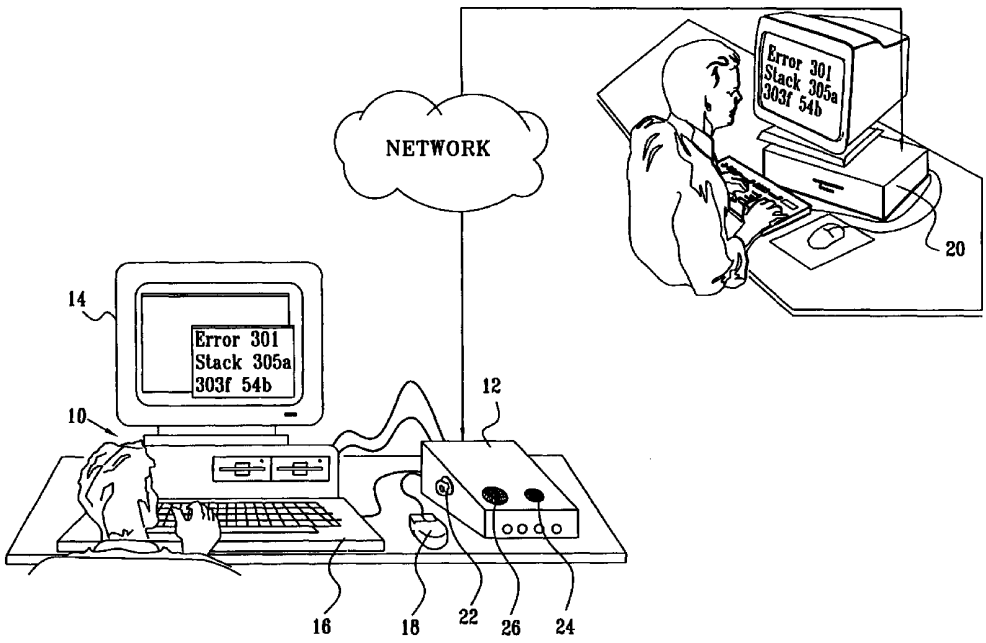
(81) Designated States *(national)*: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW.

(84) Designated States *(regional)*: ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

Published:
— *without international search report and to be republished upon receipt of that report*

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: REMOTE CONTROL UNIT



(57) Abstract: A remote diagnostic unit for connection between a local computer and at least one input device and comprising a modem for connecting to a remote computer via a data link, the unit being operable to substitute input from the at least one input device with input from a remote computer connected via said link, thereby to remotely control the local computer.

WO 01/96974 A2

Remote Control Unit

Field of the Invention

The present invention relates to remote control units, and in particular embodiments to remote diagnostic units and more particularly (but not exclusively) to diagnostic units for personal computers which allow support to be provided remotely over a data link.

Background of the Invention

The average computer user does not have a technical background. If difficulties occur during use of the computer he is often unable to make an accurate diagnosis of what is wrong or precisely carry out instructions that may be given by support staff over the phone.

It is known to provide software that can be made resident on the computer and which is able to obtain diagnostic information from a computer and send it via a data link to a support center. Furthermore it is known to arrange the data link so that audio can be sent along with the data, thus allowing the user to be in voice contact with support staff.

An example of such a known system is US Patent No. 5,983,369. In addition to the above points, the patent discloses taking control of the computer over the data link so that support staff are able to take remedial action directly, without involving the computer user.

An advantage of the above prior-art system is that it enables remote support to be given without requiring any special hardware at the user side. However a disadvantage thereof is that it runs under the local operating system and thus if the local operating system is out of action the support system does not operate. The computer and operating system must be sufficiently operational to run the diagnostic software and the data link.

Furthermore such prior art systems cannot carry out functions that go beyond the scope of the operating system, including those requiring control of the Bios. The precise list of such functions will vary depending on the operating system.

In addition, faults involving computer viruses cannot be dealt with using such an arrangement because these inhibit functioning of the operating system. In addition, faults

involving the data link cannot be dealt with because without the data link, remote support cannot be supplied.

Thus, prior art systems are limited in the range of faults they are able to deal with.

Another disadvantage is that, because the prior art is based on software that is run under the operating system within the computer, it is necessary for the software to coexist with all of the settings and with all of the other programs on the computer. Thus the very presence of the software is liable to create the fault it is supposed to be solving.

Summary Of The Invention

It is thus an object of the present invention to provide the possibility for remote diagnosis and or correction of a computer fault, which possibility is available for a wider range of faults than has been possible in the past.

In accordance with the present invention there is provided a unit for connection between a local computer and at least one local input device and comprising a link device for connecting to a remote computer via a data link, said unit being operable to substitute input from the at least one local input device with input from a remote computer connected via said link, thereby to remotely control said local computer.

Preferably, the connectable to a video adapter of said local computer via a feature connector of said video adapter.

Alternatively, the connectable to a video adapter of said local computer via a VGA connector of said video adapter.

The unit is preferably operable to obtain a screen image of said local computer in digital format from said feature connector and further comprising an image compressor for compressing said screen image, using an algorithm adapted for image compression, into a form suitable for sending to said remote computer via said data link.

In one embodiment, image compression comprises reduction of color information from the data. The term "reduction" includes complete removal. In another embodiment image compression comprises reduction in the image resolution. Preferably there is also provided a physical key for toggling said unit between a first state in which remote control is not allowed and a second state in which remote control is allowed.

Preferably, in said first state, said at least one local input device is connected to a respective input of said computer, and in said second state said at least one local input device is

disconnected from said respective input in favor of signals obtained over said data link. The unit may thus be operable to record, when in said first state, commands of said at least one local input device.

The unit preferably comprises audio transducers and an audio interface for converting between analog and digital audio signals.

Preferably, the voice transducers are a microphone and a speaker, and which is operable to send digital audio signals from said interface over said data link together with other data and to receive digital audio signals from said link.

The unit may be connected to said local computer via a serial link and able to upload data files to said computer via said serial link.

In one embodiment said data files are an operating system and which is further operable to send commands to cause installation of said operating system on said local computer.

A device according to embodiments of the present invention is preferably operable to remotely reset said local computer via said data link.

A unit according to embodiments of the present invention is preferably operable to alter the BIOS of said local computer.

In one embodiment the unit is operable to compress an image without losing information of the image.

Brief Description of the Drawings

For a better understanding of the invention and to show how the same may be carried into effect, reference is now made, purely by way of example, to the accompanying drawings, in which:

Fig. 1 is a generalized diagram showing a computer using a device according to a first embodiment of the present invention and connected via a data link to a support center;

Fig. 2 is a simplified block diagram of a device according to a first embodiment of the present invention;

Fig. 3 is a simplified block diagram showing an embodiment similar to that of Fig. 2 with the controller shown in greater detail; and

Fig. 4 is a simplified block diagram showing a device according to an embodiment of the present invention connected to a support center via a data link.

Description of the Preferred Embodiments

Reference is first of all made to Fig. 1, which is a generalized diagram showing a computer 10 connected to a remote diagnostic unit 12 according to a first embodiment of the present invention. Although the remote diagnostic unit 12 is here shown as an external device, the skilled person will appreciate that it could also be an internal card. The computer has peripherals including a screen 14, a keyboard 16 and a mouse 18 but the peripherals are connected to the computer 10 via the remote diagnostics unit 12.

The remote diagnostic unit 12 is connected via a remote data link, for example a direct telephone link or the Internet, or any other connection that can support data, to a support system, typically a computer 20, at a support center.

As will be explained below, the computer 20 is able to display the screen output of the computer 10 and is able to control the computer 10 via its own keyboard and mouse. Thus the operator of the computer 20 at the support center is able to obtain full diagnostic information of the user's computer 10 and take any remedial action that could have been taken at the user's computer 10.

Returning to the remote diagnostic unit 12, it will be appreciated that, because such a device offers full remote access to computer 10 it is a tempting target for hackers and a major security risk. Therefore in one embodiment a regime of password protection may be employed, however passwords are not always sufficient to keep out the determined hacker and thus a physical key 22 is included with the unit 12. The key 22 in one position or by its absence disables the data link or otherwise prevents remote control of the computer. Only with the key 22 in a second position is remote control permitted. For example, as described in greater detail below, the key 22 may toggle between a first state in which local mouse commands and key strokes are sent to the mouse and keyboard inputs of the computer 10 and a second state in which remote mouse commands and keystrokes are sent in their stead.

The key 22 may also serve as a switch to operate the unit 12 to initiate dialing to the support center or to send data along a line already established by a telephone or the like. This function of the key could be replaced by a button or other kind of switch.

The use of the key 22 may be combined with a regime of passwords to protect against hackers impersonating support personnel and persuading users over the phone to switch on the remote diagnostic unit 12.

The remote diagnostic unit 12 also preferably includes a built-in microphone 24 and a built-in loudspeaker 26. These allow for voice communication between the user and support personnel over the data link simultaneously with the support operation. Although the computer 10 may have its own speaker and microphone, these may be non-operational due to the very fault that it is desired to diagnose and overcome.

Reference is now made to Fig. 2 which is a generalized block diagram of the remote diagnostic unit 12. The remote diagnostic unit 12 comprises a modem 30 connected to a controller 32. The controller 32 is in turn connected to a keyboard/mouse interface 34, a display interface 36 and an audio interface 38.

The keyboard/mouse interface is preferably connected to the keyboard 16 and the mouse 18, thus permitting the controller to substitute keystrokes and mouse commands received via the data link for those produced locally. The unit 12 is connected to the mouse and keyboard inputs of the computer 10 so that the controller can send either the local or remotely produced keystrokes and mouse commands to the computer as desired. Thus, whether control is local or remote is entirely transparent to computer 10. Furthermore, this arrangement enables the controller 32 to intercept all keyboard and mouse commands. Thus, the unit 12 is preferably able to report on previous keystrokes and mouse commands to assist in the diagnosis process.

The display interface 36 is preferably connected to the feature connector of the VGA card. The advantage of using the feature connector, rather than the analogue output is that the screen data is in digital format and easier to process for transmission over the data link. Thus the screen data can be sent as is to the support side and may appear on the remote screen in the same way that it appears on the local screen 14.

In an alternative embodiment the display interface 36 may be connected to the "VGA out" connector of the graphics card. If so then the data received, which is analog, should preferably be digitized before it can be further processed for transmission.

The audio interface 38 is preferably connected to the built in speaker 26 and the built-in microphone 24 (Fig. 1). The audio interface preferably converts between analog audio signals and digital audio data so that audio data can be added to data from the

computer 10 and the peripherals by the controller 32 for sending down the data link. Similarly, audio data received from the data link can be sent to the audio interface. Thus, a conversation between the computer user and support personnel can be superimposed on data being sent via the data link and thus an audio connection and a data connection can be maintained over a single line, preferably simultaneously. Because neither the data link nor the audio link depend on computer 10, such a simultaneous audio and data connection is possible even when computer 10 is not able to function.

A local remote toggle 40, is connected to the keyboard & mouse interface 34. The toggle 40 is preferably associated with the physical key 22 and switches the interface 34 between a first mode in which the local keystrokes and mouse commands are sent directly to the computer and a second mode in which remote keyboard and mouse commands are sent to the local computer and the local keystrokes and mouse commands are ignored. In the first mode, the local keystrokes and mouse commands may preferably be recorded so that in case of a problem, immediately prior activities can be considered as part of the diagnosis. Recorded keystrokes and mouse commands may be stored in memory in the interface 34 or may be sent to the controller 32. Preferably, the computer memory is not used for storage of diagnostic data as this may cause difficulties in retrieving the data when it is most needed.

In one embodiment, the modem 30 is used as the general modem with the computer 10 and thus provides a general Internet/dialup connection for the computer 10. Thus the toggle 40 switches between a first mode in which a standard modem connection is provided and all of the data arriving at the modem is sent as a datastream to the computer 10 and a second mode in which the controller 32 actively identifies types of data such as keyboard and mouse activities and sends them to the keyboard & mouse interface 34. From the interface 34 they may be sent as before to the computer 10 over the respective keyboard and mouse inputs in place of the locally generated mouse commands and keystrokes. Thus remote control of the computer 10 is achieved entirely transparently to the computer 10.

The controller 32 is operable to compress data before sending it via the modem 30 and the data link and to decompress (expand) incoming information. Preferably screen data, being image data, is compressed separately from the rest of the data because the most efficient algorithms for compression of image data are not the same as those for compression of other types of data. Furthermore certain aspects of the screen image may

be dispensed with as they are not required for diagnostics. For example the resolution of the screen can be reduced. This step alone can lead to a considerable reduction in the amount of data being sent.

A serial port connection between the unit 12 and the local computer 10 is provided in certain embodiments. This may allow for uploading of files from the datalink as will be explained below or it may allow the general use of the modem by the computer, as discussed above.

Reference is now made to Fig. 3, which is a simplified block diagram showing an embodiment similar to that of the device of Fig. 2 but shown in greater detail. Parts that are the same as those shown in previous figures are given the same reference numerals and are not described again, except as necessary for an understanding of the present embodiment. The controller 32 comprises a memory 42. The memory 42 is typically a volatile memory for holding of data but may also include non-volatile memory or semi-volatile memory to store programs and routines for carrying out diagnostic interrogation of the computer.

The controller 32 also comprises a CPU 44 which carries out processing of the signals for sending and also processes received signals for sending to the computer. In a preferred embodiment, instead of a CPU, a digital signal processor DSP is used. This has the advantage that it is particularly adapted for processing of signals for transmission and following transmission. As is known to the skilled person, a DSP is particularly adapted for signal compression and decompression and also for providing error detection and error correction over the communication channel and for encoding the signal for optimum transmission rate or accuracy over the channel.

In one possible example, as part of the image compression process, in order to reduce the amount of data being transmitted and therefore increase the speed of the link, color data is removed, this being generally superfluous for diagnostic purposes. In addition, the resolution level may be reduced. As an alternative, it is also possible to use compression techniques, well known to the skilled man, which do not lose any information of the image.

Also shown in greater detail in Fig. 3 is the display interface 36. As discussed above, in a preferred embodiment the display interface 36 is connected to the feature connector of the graphics card of the computer 10. The feature connector outputs the graphics signal in digital form, that is to say in the form of the digital data from the memory

map before it has been converted into an analogue signal for the screen. The signal is received in the form of a digital data stream at a data connection, separate vertical and horizontal synchronization signals at two other connections and a clock signal Dot clk. The data is inserted via memory inserter logic 46 into the memory 42 via a data connection. The inserter logic 46 also has a further connection for addressing the memory so that the sequence of memory cells used can be controlled and the data is inserted using addressing and using the synchronization signals so that the image may be stored in bit-mapped form.

The memory inserter logic 46 is also directly connected to the CPU 44 so that the CPU can be informed when an entire image is ready for processing. This is helpful because, in general, image compression algorithms act on an entire image. Thus, upon arrival of an entire image, the entire bit map is transferred to the CPU 44 for the start of compression processing.

The CPU 44 is directly connected to the memory 42 via a data connection and an addressing connection. The CPU 44 is also directly connected to the keyboard and mouse interface 34, allowing the CPU 44 to be able to identify keyboard and mouse inputs and treat them separately.

It will be noted that in the embodiment of Fig. 3, by contrast to what is shown in Fig. 2, the audio interface 38 is not connected via the controller 32 but rather is connected directly to the modem 30. This is because some modems generally comprise sufficient signal processing circuitry for processing audio data for transmission.

Reference is now made to Fig. 4 which is a simplified physical block diagram showing the layout of a unit at the user end and a unit at the support end, herein denoted as a customer unit and a center unit. Parts that are the same as those shown in previous figures are given the same reference numerals and are not described again, except as necessary for an understanding of the present embodiment. A customer unit 50 comprises an interface board 52 to which are connected the keyboard 16, mouse 18, the mouse connector and keyboard connector of the local computer 10, and the feature connector 54 of the graphics card of the local computer 10. The mouse and keyboard connectors can be switched between local and remote control under the influence of local/remote toggle 40. As well as being connected via the keyboard and mouse ports, the PC 10 is additionally connected to the customer unit 50 via a serial data port.

The modem 30 connects the customer unit 50 to a center unit 60 via a data connection such as a direct telephone line or an Internet connection. The center unit 60 is generally similar to the customer unit 50 in that it comprises a modem 62, an interface board 64 and a controller 66. The remote interface board 64 has connections for a keyboard 68 and mouse 70 which may be used to control the local computer 10. A separate monitor interface 72 is connected to a monitor 74. The controller 66 and monitor interface 72 receive and decompress the user's screen data and thus provide a reconstruction of the user's screen display at monitor 74. Unlike the customer unit 50, the center unit 60 does not need to send screen data.

The center unit may be either an external unit or an internal card or a standalone unit able to operate a keyboard, a mouse, a monitor and a datalink, or software within a computer.

In operation a user discovers a fault with his computer that he is not able to deal with. He first of all establishes a connection with a support center by pressing a button on the diagnostic unit 12. A telephone number is stored within the memory of the diagnostic unit 12 as is the software necessary to operate the modem and manage a data link of the appropriate type. The user obtains voice contact with an operator and is directed to turn the key 22 to the position for remote control. Thus his current screen display appears on the operator's monitor. The user's computer 10 preferably now responds to keystrokes and mouse commands made by the operator and thus the operator is able to carry out diagnosis of the fault and take corrective action. Again, preferably, statistical information about the computer 10 and information on recent keystrokes and mouse commands may be retrieved by the operator from the diagnostic unit 12.

In one embodiment interaction is entirely via keystrokes and mouse commands from the operator and no diagnostic routines are stored within the diagnostic unit 12.

In another embodiment a selection of diagnosis routines etc. may be located in the controller 32 which the operator can access and use to interrogate the computer.

In a yet further embodiment the diagnostic unit 12 is able to use a connection to the computer 10, typically an RS232 serial connection, to upload files to the computer. The files would typically be sent through the data link from the operator to be run or installed on the local computer 10. In general such a feature is useful only if the local operating system is still active and allows for installation of new programs, replacement of corrupted

files and the like. However, the link can also be used to upload and install a new operating system, for example in the case of complete deletion of the hard disk by a computer virus.

Remote alteration of the BIOS is preferably carried out using the same keystrokes as are used for standard local alteration of the BIOS. In general, alteration of the BIOS is not possible from within the operating system and thus it may be necessary to remotely reset the local computer 10 for this purpose. As will be appreciated in the prior art systems this is not possible because without the operating system the datalink is lost.

It is appreciated that various features of the invention which are, for clarity, described in the contexts of separate embodiments may also be provided in combination in a single embodiment. Conversely, various features of the invention which are, for brevity, described in the context of a single embodiment may also be provided separately or in any suitable subcombination.

It will be appreciated by persons skilled in the art that the present invention is not limited to what has been particularly shown and described hereinabove. Rather, the scope of the present invention includes both combinations and subcombinations of the various features described hereinabove as well as variations and modifications thereof which would occur to persons skilled in the art upon reading the foregoing description and which are not in the prior art.

For example, the communications link could be wired or wireless (e.g. radio, cellular, satellite etc). The scope of the present invention also extends to a method as described herein, as well as to a computer program which can be run in an execution environment of the unit or the support centre (or both) to perform the above mentioned method.

In addition, and insofar as embodiments of the invention described above are implementable, at least in part, using a software-controlled programmable processing device such as a Digital Signal Processor, microprocessor or other processing device, it will be appreciated that a computer program for configuring the programmable device to implement the foregoing described methods is envisaged as an aspect of the present invention. The computer program may be embodied as source code and undergo compilation for implementation on a processing device, or may be embodied as object code.

Suitably, the computer program is stored on a carrier medium in machine or device readable form, for example in solid-state memory or magnetic memory such as disc or tape and the processing device utilises the program or a part thereof to configure it for operation. The computer program may be supplied from a remote source embodied in a communications medium such as an electronic signal, radio frequency carrier wave or optical carrier wave. Such carrier media are also envisaged as aspects of the present invention.

Claims

1. A unit for connection between a local computer and at least one local input device and comprising a link device for connecting to a remote computer via a data link, said unit being operable to substitute input from the at least one local input device with input from a remote computer connected via said link, thereby to remotely control said local computer.

2. A unit according to claim 1, connectable to a video adapter of said local computer via a feature connector of said video adapter.

3. A unit according to claim 1, connectable to a video adapter of said local computer via a VGA connector of said video adapter.

4. A unit according to claim 2, operable to obtain a screen image of said local computer in digital format from said feature connector and further comprising an image compressor for compressing said screen image, using an algorithm adapted for image compression, into a form suitable for sending to said remote computer via said data link.

5. A unit according to claim 4, wherein image compression comprises reduction of color data.

6. A unit according to claim 4 or claim 5, wherein image compression comprises reduction in the image resolution.

7. A unit according to claim 1, further comprising a physical key for toggling said unit between a first state in which remote control is not allowed and a second state in which remote control is allowed.

8. A unit according to claim 7, wherein, in said first state, said at least one local input device is connected to a respective input of said computer, and in said second state said at least one local input device is disconnected from said respective input in favor of signals obtained over said data link.

9. A unit according to claim 7, operable to record, when in said first state, commands of said at least one local input device.

10. A unit according to any preceding claim, further comprising audio transducers and an audio interface for converting between analog and digital audio signals.

11. A unit according to claim 10, wherein said voice transducers are a microphone and a speaker, and which is operable to send digital audio signals from said interface over said data link together with other data and to receive digital audio signals from said link.

12. A unit according to any preceding claim, further being connected to said local computer via a serial link and able to upload data files to said computer via said serial link.

13. A unit according to claim 12 wherein said data files are an operating system and which is further operable to send commands to cause installation of said operating system on said local computer.

14. A unit according to any preceding claim operable to remotely reset said local computer via said data link.

15. A unit according to any preceding claim operable to alter the BIOS of said local computer.

16. A unit according to any preceding claim, operable to compress an image without losing information of the image.

17. A unit for connection between a local computer and at least one local input device, substantially as hereinbefore described with reference to the accompanying drawings.

18. A remote control unit for a computer, the unit comprises means for establishing at least a data communication link (which may be wired or wireless) to remote processing

means, said unit being operable to allow control (and/or operation) of said computer by said remote processing means.

19. A computer system comprising a remote control unit according to claim 18, a computer and remote processing means, the arrangement being such that said remote control unit is capable of establishing at least a data communications link between said remote processing means and said computer.

20. A method of controlling a computer, comprising the steps of: establishing at least a data communications link between a remote control unit for said computer and remote processing means, and permitting remote control of said computer by said remote processing means.

21. A computer program comprising one or more software portions configured to perform the method of claim 20 when run in an execution environment maintained by said remote control unit, or by said remote processing means, or by said remote processing means and said remote control unit.

22. Apparatus for enabling remote control of a local personal computer comprising:

an interface device arranged for communication over a data link with a remotely located personal computer including at least a display, a keyboard and a mouse, said interface device including circuitry permitting display information from said local personal computer to be displayed on said display of said remotely located personal computer and circuitry permitting control information from said keyboard and said mouse of said remotely located personal computer to control operation of said local personal computer.

23. Apparatus according to claim 22 and wherein said circuitry permitting display information from said local personal computer to be displayed on said display of said remotely located personal computer includes compression circuitry for compressing a screen image.

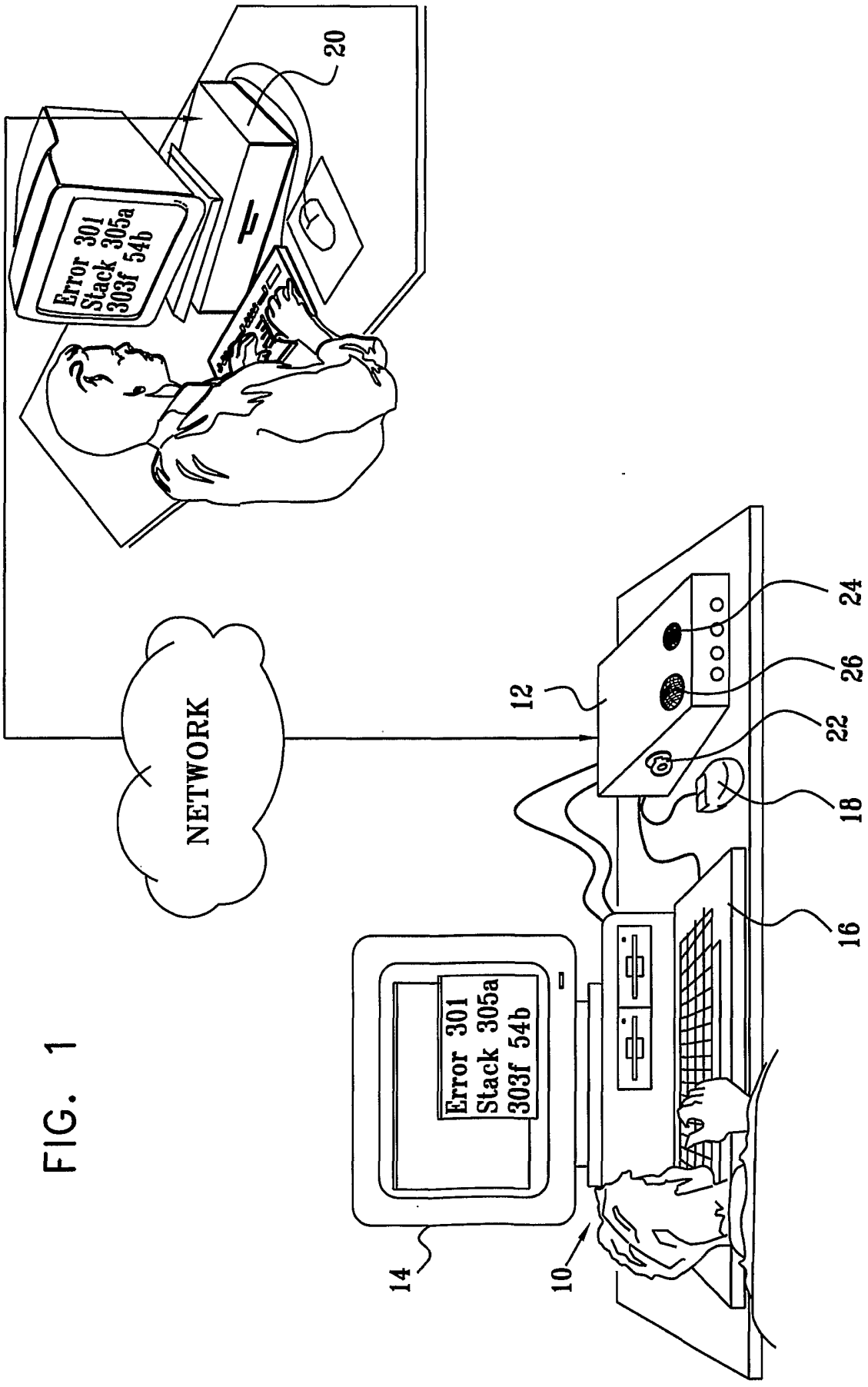
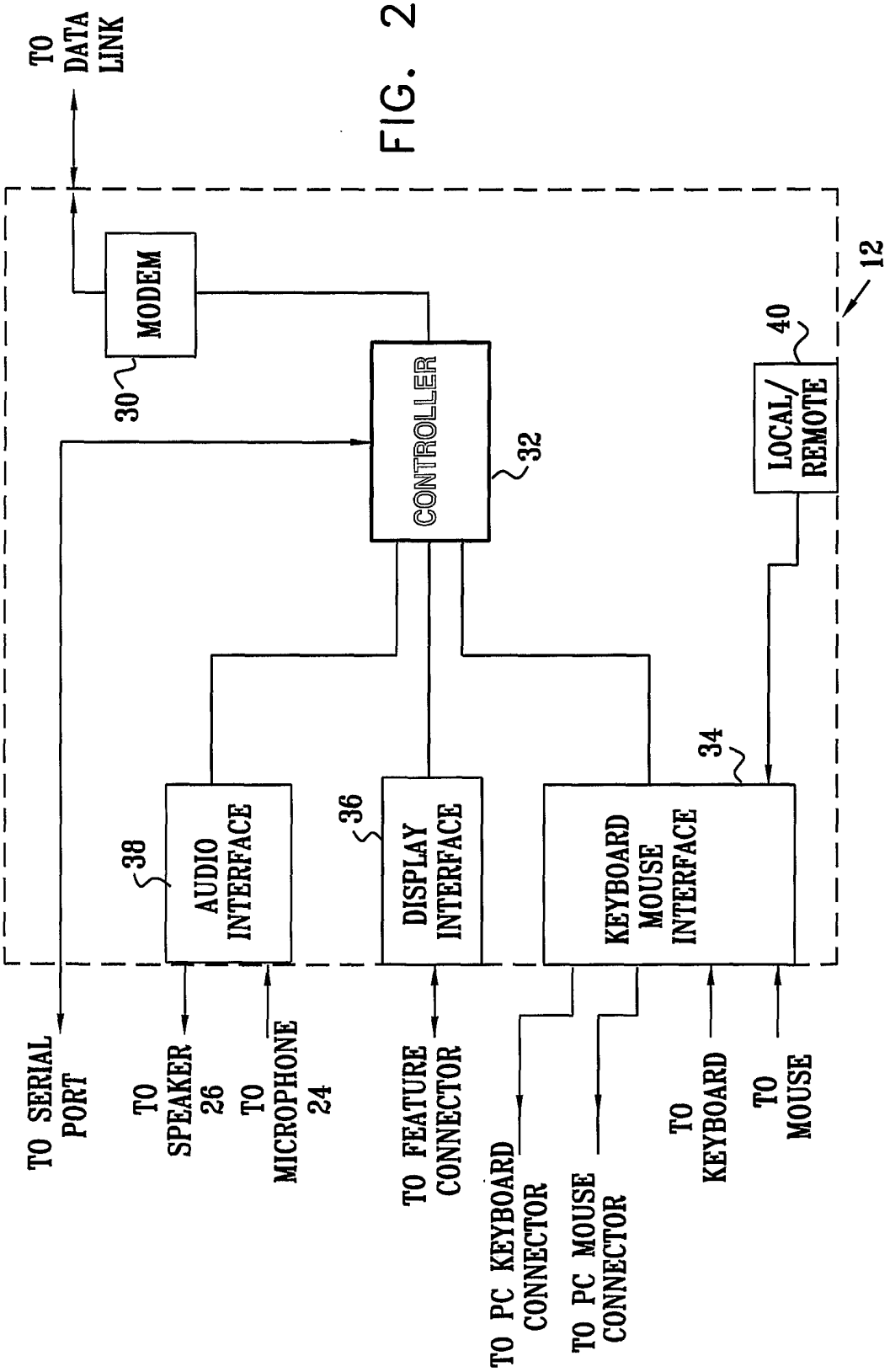

Error 301
Stack 305a
303f 54b
20
NETWORK
12
24
26
22
18
16
Error 301
Stack 305a
303f 54b
14
10

FIG. 1

FIG. 2


TO DATA LINK
MODEM
30
CONTROLLER
32
LOCAL/ REMOTE
40
12
AUDIO INTERFACE
38
DISPLAY INTERFACE
36
KEYBOARD MOUSE INTERFACE
34
TO SERIAL PORT
TO SPEAKER 26
TO MICROPHONE 24
TO FEATURE CONNECTOR
TO PC KEYBOARD CONNECTOR
TO PC MOUSE CONNECTOR
TO KEYBOARD
TO MOUSE

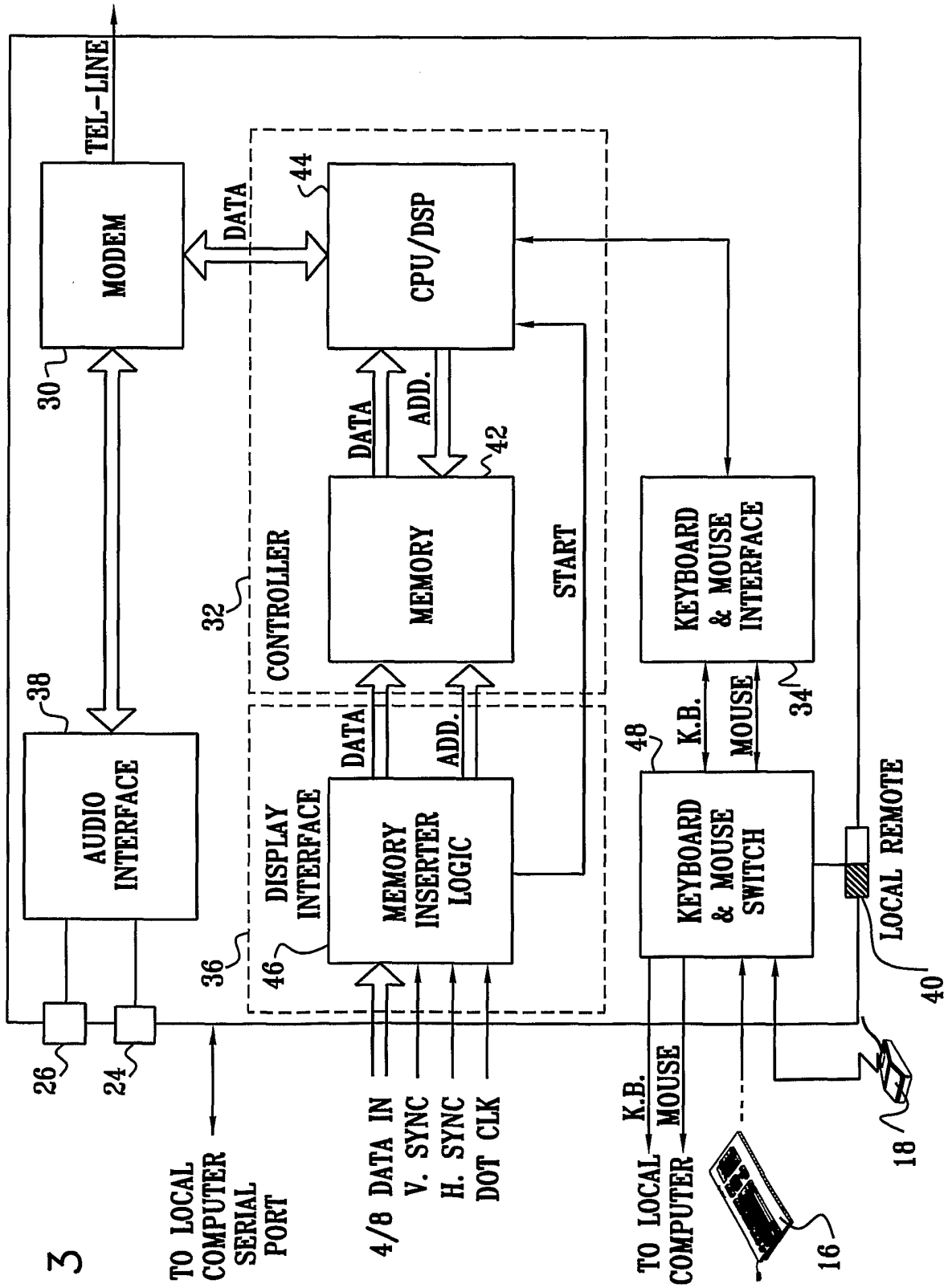
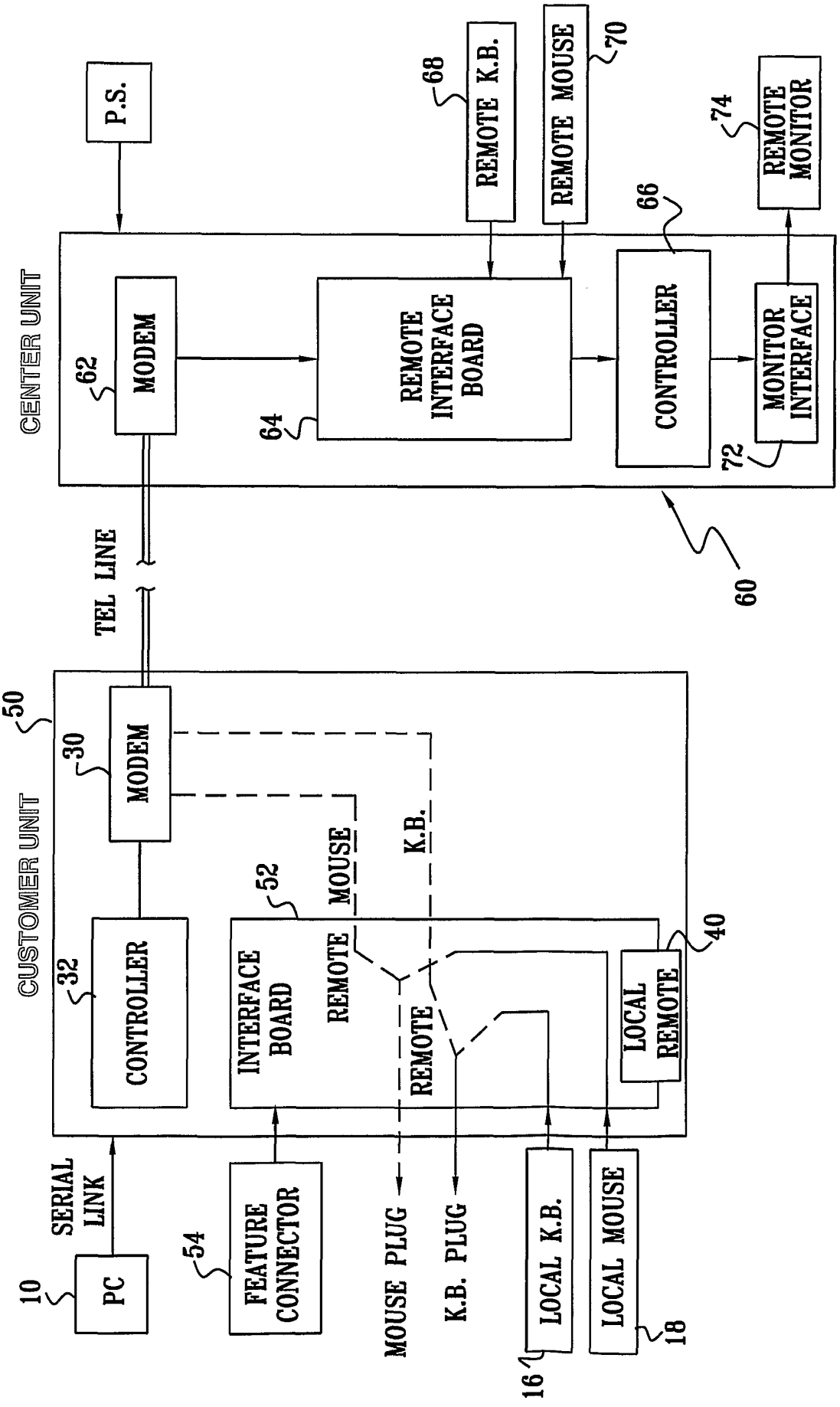

TEL-LINE
MODEM
30
DATA
44
CPU/DSP
DATA
ADD.
42
MEMORY
START
32
CONTROLLER
KEYBOARD & MOUSE INTERFACE
34
38
AUDIO INTERFACE
DISPLAY INTERFACE
DATA
ADD.
MEMORY INSERTER LOGIC
36
46
48
K.B.
MOUSE
KEYBOARD & MOUSE SWITCH
LOCAL REMOTE
40
26
24
TO LOCAL COMPUTER SERIAL PORT
4/8 DATA IN
V. SYNC
H. SYNC
DOT CLK
K.B.
MOUSE
TO LOCAL COMPUTER
16
18

FIG. 3

FIG. 4


CENTER UNIT
P.S.
MODEM
62
REMOTE INTERFACE BOARD
64
REMOTE K.B.
68
REMOTE MOUSE
70
CONTROLLER
66
MONITOR INTERFACE
72
REMOTE MONITOR
74
60
TEL LINE
CUSTOMER UNIT
50
MODEM
30
CONTROLLER
32
INTERFACE BOARD
52
MOUSE
K.B.
REMOTE
REMOTE
LOCAL REMOTE
40
SERIAL LINK
PC
10
FEATURE CONNECTOR
54
MOUSE PLUG
K.B. PLUG
LOCAL K.B.
16
LOCAL MOUSE
18