(54) Title: LOW COST COMMUNICATION TERMINAL
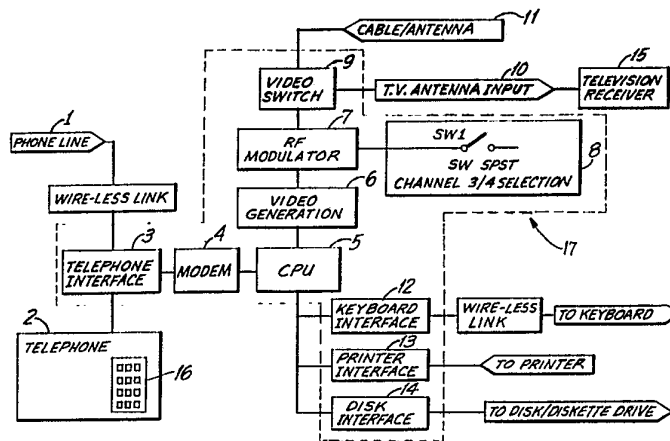
(57) Abstract

The invention relates to an inexpensive telecommunications device utilizing existent components located in the home or office, such as a television receiver (15) and a telephone (2), for creating an interactive display terminal (17) for accessing information stored in remote computer databases. In one embodiment according to the invention, the terminal (17) is configured with the necessary logic components to communicate with a host computer system via telephone lines (1). Alternatively, the device may be directly connected to an inhouse data retrieval network. The terminal (17) is software controlled at the host database and can be dedicated to a particular host computer database system, or may be utilized with various host systems. A multiple screen memory, which is programmable at the host database, may be utilized for storing multiple television screens of information. Peripheral components, such as a printer or disk drive, may be attached to the terminal (17). The device, when disconnected from the host database, may be programmed to operate in a stand-alone capacity. A data compression technique is employed to reduce the communication time between the host computer system and the terminal (17).

## + DESIGNATIONS OF "SU"

Any designation of "SU" has effect in the Russian Federation. It is not yet known whether any such designation has effect in other States of the former Soviet Union.

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## LOW COST COMMUNICATION TERMINAL

### FIELD OF THE INVENTION

The invention broadly relates to a low cost terminal for the interactive access of information from computerized host databases, and more particularly, to a low cost telecommunications terminal having a
5  telephone interface to access information over telephone lines, which uses a telephone keypad to control the terminal, and a display device to display the information.

### BACKGROUND OF THE INVENTION
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In recent years, there has been a marked surge in the popularity of numerous commercial database systems, such as the Prodigy® data retrieval service. These database services provide various information and
15  popular services that may be sought by the public-at-large, such as travel information, news retrieval, or stock quotation indices.  The computerized databases are designed to be accessed by end-users from the home or office.

20           In a typical database system, the desired information is accumulated at a host computer system or network, in which the information is stored in databases or files that may be accessed by the end-user.  In order to access this information or to use
25  the services provided by the host computer network, a retrieval terminal or some other means to access information from the remote host database is required by the end-user.

Systems have been previously developed for
30  accessing computerized databases through a telephone communication network by an apparatus that implements telephone functions and displays the requested data on a display monitor.  As an example, Sargent (U.S. Patent No. 4,873,662) discloses a system for displaying
35  information retrieved over a telephone network on a

terminal apparatus. Bendig (U.S. Patent No. 4,451,701) similarly proposes a system for providing interactive communication with a remote database over a telephone exchange, which utilizes a television receiver to display the data retrieved. Schussler et al. (U.S.
5 Patent No. 4,150,254) also relates to another system for displaying information received from a remote data bank via a telephone exchange, on a user's television receiver.

However, the above-mentioned systems suffer a
10 number of drawbacks. All of these systems require an additional peripheral device (and its associated cost) in order to utilize and control the operation of the device. The prior systems that utilize the telephone keypad as a control means do so only to establish
15 connection to a remote database. Consequently, the necessary addition of a peripheral keyboard or keypad to control the terminals inevitably increases the expense of these known systems.

Furthermore, in several of the prior systems,
20 and specifically the Sargent and Schussler et al. systems, the display device that is utilized does not comprise a readily available component (for example, a conventional television receiver) but rather entails a modified or specifically equipped display device. The
25 use of such a specialized display device inevitably increases the cost of the overall system to the consumer/user.

An additional drawback of the previously-known systems is that they lack a reprogrammable memory
30 capability. A system without such a feature possesses significant limitations. For example, any required future enhancements, repairs or modifications to the units must be serviced by field personnel, or recalled from the consumer marketplace back to the manufacturer
35 for such changes. Such a costly servicing of the prior

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systems may be avoided, in many cases, if a
reprogrammable memory capability had been available,
which would allow modifications to be easily
implemented from a remote location.  Thus, the lack of
programmable memory leaves the systems wanting in
5 expansibility due to their inflexibility.

Finally, these known systems are not designed
to be used principally with existing accessory devices
already possessed by the consumer, such as a telephone
and television receiver.  This would advantageously
10 serve to render the device inexpensive.

As is known, home personal computers are
often employed as a database access means.  By
connecting the personal computer to an external modem,
the end-user is able to telephonically access
15 information located in the host computer database.  In
fact, the recent popularity and increased use of
personal home computers by the public-at-large has
fueled the development and expanded use of commercial
database systems.

20 Although providing a feasible way for
accessing the stored information, the home
computer/modem/monitor combination presents a number of
significant drawbacks.  For example, although the cost
of home computers has significantly decreased over the
25 years, the purchase price of most computers may be a
deterrent for the average consumer who might consider
subscribing to a commercial host database system.
Moreover, there are occasions when the potential end-
user of the host database system has no need or desire
30 to purchase a personal computer other than for
accessing the database system.  The purchase of a home
computer is thereby rendered impracticable for such an
end-user.

Additionally, certain required peripherals,
35 such as an external modem and display monitor, must be

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o purchased separately from the computer.  These
additional components are necessary to enable the
computer to access and display the information
retrieved from the host database.  Thus, the cost to
the consumer is further increased.

5          The above described cost barrier presents
significant problems for host database operators, in
that the potential market for end-users of the database
system is significantly reduced.  Because host database
operators have had a somewhat limited market for
10 offering their information or system database services,
subscription costs to the end-users currently
subscribing to such services has remained at an
inflated level.  Thus, many potential subscribers who
would normally subscribe to a commercial database
15 service will not do so because of the cost of using the
service.

           There are other concerns related to using
personal computers as the access terminal.  It would be
advantageous for the host database operator to prevent
20 unauthorized end-users from accessing the database.
Also, it would be more cost efficient if host operators
could vary the advertising viewed by the end-user each
time the end-user logs onto the database system.
Although achievable with current personal computers, it
25 is necessary to include extra components with the
system, which further adds to the cost to the end-user.

           Apart from the stated concerns directed
towards the access of information stored in remotely
located commercial host database systems, it has become
30 typical for businesses or other organizations to create
"in-house" information databases.  Typically, the
database is stored at a centralized computer location.
The stored information is shared or accessed by the
direct connection of personal computers to the central

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computer.  This is exemplified, for example, by a "LAN"
network.

However, in order for the individual
employees to make the most effective use of the
information found in those centralized computers,
5 corporations must invest significant capital to
purchase a sufficient number of access terminals.  This
is often cost prohibitive to the business.  Thus, the
corporate database may not be used at its maximum
efficiency, thereby placing an added financial burden
10 onto the corporation.

Because of the size or bulkiness of most home
personal computers, host database systems are not
currently accessible to the end-user in certain
desirable locations.  For example, in the limited space
15 environment of commercial airliners, automobiles, or
even pleasure boats, there may be occasions when a
passenger or occupant wishes to access information from
host databases.  However, space limitations aboard
those craft prohibit the placement of a personal
20 computer or similar unit.

Accordingly, it is an object of the present
invention to provide an apparatus that is not complex
in its use in order to facilitate the interactive
access of information from computerized host databases
25 for the ordinary consumer/user.

A more specific object of the present
invention to provide a apparatus for the interactive
access of information from computerized host databases
that employs conventional embodiments such as a
30 telephone and television for accessing and displaying
the information retrieved.

It is a further object of the present
invention to provide an apparatus for the interactive
access of information from remote computerized
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° databases that is compact in its size so as to not
require much additional space.

It is still another object of the present
invention to provide an apparatus which is capable of
operating in a stand alone manner for interactively
5 accessing and manipulating information from a
computerized database.

Yet another object of the current invention
is to provide a apparatus which may be programmably
controlled and modified by a host database operator for
10 interactively altering the accessing of information
from a computerized database.

The foregoing objects and advantages of the
invention are illustrative of those which can be
achieved by the present invention and are not intended
15 to be exhaustive or limiting of the possible advantages
which can be realized. Thus, these and other objects
and advantages of the invention will be apparent from
the description herein or can be learned from
practicing the invention, both as embodied herein or as
20 modified in view of any variations which may be
apparent to those skilled in the art. Accordingly, the
present invention resides in the novel parts,
constructions, arrangements, combinations and
improvements herein shown and described.

25
SUMMARY OF THE INVENTION

The above and other objects according to the
invention is accomplished by providing a
telecommunication terminal which utilizes technology
30 presently available and commonly used. In one
embodiment of the terminal according to the invention,
the cost of achieving these objects is kept to a
minimal level through the utilization of the end-user's
own conventional television receiver and a push-button
35 telephone as the display device and the communication

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ᵤ link, respectively, connecting the terminal to the host
database system.  The terminal may include a telephone
interface for connecting to a push button telephone and
for connecting the terminal to a communications
exchange, a modem device, a central processing unit, a
5 video signal generator, and a RF modulator, thereby
providing display of information on the screen of an
unmodified television receiver by simply connecting the
output of the terminal to the cable/antenna terminals
of the television receiver.  In this regard, the
10 elimination  of a separate keyboard and video monitor
constitutes a significant cost savings to the end-user.
        Connection with a remote database, program
selection and overall control of the terminal is
accomplished through the simple use of the keypad of
15 the telephone attached to the terminal, replacing the
need for an expensive accessory keyboard.  The
invention, which contains the necessary logic
circuitry, can communicate with a host computer base
through a telephone line. Control software located at
20 the host database is responsive to signals received
from the keypad, allowing the end-user to control
operation of the device and display the information and
services offered by the database service.
        Additionally, the device may include control
25 software so as to program the terminal's registers and
memory while the terminal is communicating with the
host database, thereby allowing for future modification
of the device.  Communication between the terminal and
the host database is further enhanced by the use of
30 data compression and error detection/correction
techniques.
        In another embodiment, the terminal is
directly connected to an in-house data storage
location, providing a cost efficient means for
35 retrieving information stored therein.  It should be

ᵛ noted that because of the invention's compact size, it
requires very little additional space, regardless of
its application.  Furthermore, when integrated with a
mini-screen and push button telephone circuitry, the
terminal can become a stand-alone device.

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BRIEF DESCRIPTION OF THE DRAWINGS
            The invention will be further described by
way of reference to the following drawings, in which:
            Figure 1 is a block diagram illustrating the
10 interconnection of the terminal, according to the
invention, to external components so as to create an
interactive work station; and
            Figure 2 is a block diagram of the primary
components of one embodiment of the communications
15 terminal according to the present invention.


DETAILED DESCRIPTION OF THE DRAWINGS
            Referring now to the drawings, wherein like
numerals refer to like components, there is disclosed
20 in Figure 1 a block diagram related to the general
arrangement of the components comprising  the various
embodiments of a low cost telecommunications terminal17
("terminal" or "LCT") according to the invention.
            The terminal17 may include, for example, a
25 telephone2 having, but not limited to, a twelve key
keypad16 with appropriate tone addressing circuitry.
The telephone2 may be connected by an acoustic coupler
to a telephone interface3, or alternatively it may be
connected serially or in parallel by wire to a
30 telephone interface3.  Because the terminal17 may
function when the telephone2 is connected either in a
serial or in a parallel mode, it is not required that
the telephone2 be connected directly to the telephone
interface3 of the terminal17 to operate (as in a serial
35 mode), but only that the telephone2 be connected to any

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ᵕ telephone jack of the subscriber's telephone line1 to
which the terminal17 is connected (as in a parallel
mode).  For example, in serial mode, the telephone2 may
be connected directly to the terminal17 which in turn
is connected to a telephone jack of the subscriber's
5 telephone line1. Alternatively, in parallel mode, the
terminal17 may be placed in a separate location from
the telephone2, as long as both the terminal17 and the
telephone2 are connected to the same subscriber
telephone line1, whereby the terminal17 would still be
10 coupled to the telephone2.

         Advantageously, the telephone keypad16 serves
as a keyboard for allowing the end-user of the database
system to selectively control the operation of the
terminal17.  Alternatively, a keypad individually
15 adapted for use with the terminal17 may also be
employed.  For example, one may use a tone generating
keypad (not shown) in lieu of, or in addition to, the
telephone keypad16.  The keypad16 may be either
directly hardwired with the terminal17; or it may be
20 remotely coupled as by use of radio waves.  As will be
further explained, control software provided by the
host database responds, under the control of the
terminal17, to the tones created by the keypad16 in
order to operate the terminal17.

25         The telephone interface3 of the terminal17
may comprise, for example, a FCC part #68 approved data
access arrangement ("DAA").  The DAA includes a
standard internal dual tone multi-frequency ("DTMF")
decoder IC for data/voice communication.  The DAA may
30 further contain standard circuity, known to those
skilled art, for polarity protection and level
detection of the telephone line.  The DAA may also
contain 2 to 4 wire translation and/or equalization to
permit full duplex operation over the subscriber's
35 telephone line1.

An internal semiconductor device or a
mechanical relay (not shown), under the control of a
CPU5 commutates the telephone2 and the coupled DTMF
decoder onto and off of the subscriber telephone line1.
Additionally, the telephone interface3 may include
5  voltage limit circuitry (not shown) for preventing or
minimizing line surge damage.

An individual telephone line connects the
telephone interface3 to the telephone company's
terminal jack (not shown) of the subscriber's telephone
10 line1 so that the terminal17 may communicate with a
remote host data base.  This connection may be
accomplished either by a hardwire connection or by
means of a wireless remote coupling using technology
familiar to one skilled in the art.  The terminal17 may
15 function with, for example, either a pulse dialing or
tone dialing subscriber telephone line, or an ISDN type
line.  Alternatively, a private branch telephone
exchange system ("PBX") providing telephone switching
in an office or building may also be employed.

20 Notably, the terminal17 also features an
internal modem4 so that the terminal17 may communicate
and transmit information to and from the host database
via the subscriber's telephone line1.  The modem4 may
carry asynchronous or synchronous data from the
25 subscriber's telephone line1 and through the DAA, where
it is then converted to digitally encoded information
for use by the CPU5 (described below).  Alternatively,
the modem4 will convert the digital information
presented from the CPU5 into low frequency analog
30 signals for the DAA to transmit to the host database
via the subscriber's telephone line1.

The modem4 may be constructed using known low
cost electronics for performing standard modulation
techniques, in either full or half duplex mode.  These
35 modulation techniques may include, but are not limited

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to, amplitude, frequency ("FSK") and phase ("PSK")
modulation. The modem4 may comprise, for example,
standard industry models such as a 300/1200 baud modem
conforming to either Bell 212A, Bell 103, Bell 202 or
international protocol V.22, V.21., but it will be
5 apparent to one skilled in the art that the particular
model or type of modem employed is not so limited.

     A central processing unit ("CPU")5,
microprocessor IC, or other commonly-known,
commercially available microcomputer device, serves to
10 control the overall operation of the terminal17. The
particular CPU5 which is used may include, but is not
limited to, read-only (ROM) and random access (RAM)
memory arrays. The RAM memory, which may be volatile
or non-volatile, may serve the function of storing both
15 the data transmitted from the host database that is
displayable to the end-user and the programming
information that is manipulated by the CPU5 itself.
Advantageously, all of the memory contents, that is,
both the ROM and RAM memories, may be programmably
20 altered by the host software. The memory storage
arrays may consist of either dynamic or static
technologies; however, both types of technologies may
co-exist according to design considerations. It should
be understood that while a preferred embodiment of the
25 present invention may employ both ROM and RAM memory
technologies, other memory storage techniques may be
employed, depending upon the memory units utilized.

     The memory storage circuitry may vary,
according to need or desire. For example, the memory
30 may include only battery-backed RAM. Moreover, any
type of conventional electronically erasable/alterable
and programmable read only memory arrays ("EEPROM" or
"EAPROM") may also be utilized, thereby providing an
alternative to ROM storage ICs.

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         The CPU5 may further include various timers, data and memory management means, and addressing circuitry known to those skilled in the art; input/output circuitry for enabling the CPU5 to communicate with the various other components that
5 comprise the terminal17; and serial and parallel interfaces (12, 13, 14) for attaching peripheral components to the terminal17, such as a keyboard, printer or a disk drive device (not shown).

         The video generation unit6 (or "video
10 generator") includes a video processor which receives digital signals from the CPU5 and converts ("encodes") the digital signals into corresponding video signals, including, but not limited to NTSC, HDTV or IDTV compatible video signals. As later discussed in
15 greater detail, the video signals are transmitted to an RF modulator7 for radio frequency modulation. The signals are thereby converted for output to a standard television set or compatible monitor.

         The video processor may contain, for example,
20 a character generator, character memory, programmably alterable buffer memory, scan line counters, and vertical and horizontal timing generators. Further, the video generator6 may also include row/table addressing circuitry, color specification bits,
25 character attribute control, intensity controls, local scan delay counters, and row or column offset counters.

         The output signal from the video processor is inputted to a video summing circuit which combines the various sync, intensity and data information for the
30 signal. The video summing circuit may comprise circuitry known to those skilled in the art. The values used for the various counters, generators, and controls may be contained in software settable registers or buffer memory internal to the terminal17,
35 which are configurable from the CPU5 under the control

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� of the host software.  Alternatively, these values may
permanently reside within the circuitry of the video
processor.  It will be apparent to those skilled in the
art that the video processor implements all of the
logic functions required for the generation of the
5 necessary timing signals and video output signals.
Likewise, commonly used video terminal attributes are
supported by the video processor including display
refresh, data update functions and display character
RAM for external character generation.
10          A radio frequency ("RF") modulator7,
preferably of the type commonly encountered by those
skilled in the art but not so limited, receives the
encoded video signal from the video generator6 and
modulates the signal using standard RF techniques to
15 produce an output television signal.  The output signal
may comprise, for example, a composite video signal
which is amplitude modulated and an audio signal which
is frequency modulated, tuned to any desired frequency.
In one mode, the output signal is modulated to 61.3MHz
20 or 67.3MHz (commonly known as channel 3 or 4) for input
to a television receiver15.  Alternatively, the output
signal may entail separate video and audio output
signals, thereby allowing separate output of the video
signal to VCR's or monitor type television sets.  A
25 switch8 may be employed to switch the output signal
between channels 3 and 4, unless the mode of operation
of the terminal17 utilizes a different output
frequency.  For example, an output signal modulated in
the range of the 910-918 MHz bandwidth permits the use
30 of a radio waves means to communicate between the
terminal17 and a television receiver15, thereby
eliminating the use of switch8.
          Advantageously, the RF modulator7 may contain
color processing circuits to allow for the generation
35 of color-encoded data.  The RF modulator7 receives such

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color data information from the video generator6.  The
RF modulator7 may also contain vestigial sideband
filter circuitry for filtering undesirable signal
components.

The RF modulator7 unit may further include a
5  switch9 for switching the signal input to the
television receiver15 between either the signals
transmitted from the terminal17 and signals transmitted
from a typical cable/antenna (not shown) attachment to
the television receiver15.  The switch9 is controlled
10  by the CPU5, and contains high frequency switching
circuitry common to one skilled in the art.

The terminal17 may also include several
peripheral interfaces.  Any of these interfaces may be
configured according to current industry standards, or
15  may be configured for custom peripherals.  For example,
one enhanced mode of the terminal17 may include a
keyboard interface12, a printer interface13, and a disk
interface14.  The peripheral interfaces allow the
terminal to be used with or without traditional
20  computer peripherals, such as a keyboard, monitor
and/or printer.  Thus, in addition to use with a
television receiver15 and telephone2, the terminal17
may be used in a stand-alone capacity, similar to a
personal computer.  Even when such peripherals are not
25  employed, however, the terminal17 continues to function
in a telecommunications capacity.  In its preferred
embodiment, the terminal17 is designed to be used
principally with a telephone2 and television
receiver15, rendering the device inexpensive.

30  The operation of the terminal17 will now be
explained.  In accordance with the present invention,
the end-user, after turning on the LCT or terminal17
unit, depresses a specific key on the telephone
keypad16 to initiate use of the terminal17.
35  Advantageously, the terminal17 may be programmed such

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that the CPU5 may prevent operation of the terminal17
unless and until a proper sequence of keys (e.g.,
corresponding to a "password") are depressed, thereby
securing access to the terminal17 only by persons
entering the proper "password."

5          Upon gaining access to the terminal17 the
end-user may then enter the telephone number of the
desired computer database, or alternatively, may make a
selection from a preprogrammed list of automatically
dialed computer databases that may appear on the
10 display screen, by depressing the corresponding key on
the telephone keypad16.  When any of the keys are
depressed on the telephone keypad16, the telephone
interface3 receives the keypad tone information and
translates it into corresponding digital high and low
15 level signal states which are well known to those
skilled in the art.  Of course, it is understood that
the invention is not limited in operation to the use of
such logic signal states described above, since those
skilled in the art can readily adapt the various
20 circuits to operate with other types of logic.

These digital signals from the telephone
interface3 are always presented to the CPU5.
Advantageously, after the terminal17 has been accessed
by the end-user, the CPU5 may then selectively switch
25 the telephone2 coupled with the DTMF decoder off of the
subscriber telephone line1.  Because the CPU5's
functions also includes a dialing means and a telephone
call dialing control means for initiating and
maintaining a telephone call from the numbers entered
30 into the keypad16, the terminal17 may then
automatically dial and connect with a computer system's
host database.

In one mode of operation, after access to the
terminal17 has been achieved, the telephone2 along with
35 the DTMF decoder is switched off and disconnected from

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⌄ the subscriber telephone line1 circuit, and the DTMF
tones are now translated and transmitted internally to
the CPU5 in order to control operation of the
terminal17. This permits the use of DTMF tones as a
data communication means linking the telephone keypad16
5 and the terminal17, which signals are in turn relayed
through the CPU5 to the remote host database in order
to control the transmission of the desired information
therefrom.

Accordingly, while commutated to the
10 subscriber telephone line1, the CPU5 may in turn
transmit the digital signals through the modem4 and
over the subscriber telephone line1 to the host
computer. Transmission of the signal to the host
computer occurs, for example, when the end-user wishes
15 to receive additional information from the database
other than that already retrieved.

Likewise, the information received by the
terminal17 is then converted into digital information
by the modem4, processed by the CPU5, transformed into
20 corresponding video signals by the video generator6 and
modulated for output to the television receiver15 by
the RF modulator7. When accessed, the information will
appear on the end-user's television receiver15 or other
display device. Individual screens of data are stored
25 within the internal memory storage employed by the
terminal17.

The end-user is able to control the data
screens so as to selectively scan the database by
depressing certain keys on the telephone keypad16.
30 When directed by the end-user, the main menu, sub menu
or other information may appear for further access by
the end-user. The end-user can also direct the
terminal17 to print a hard copy of the screen to a
peripheral printer when one is attached to the
35 terminal17.

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           Since each terminal17 is provided with a
reprogrammable memory capability, the terminal17 may
store multiple "screens" of video information and
display these "screens" on the television receiver15's
screen when selected.  Advantageously, the memory
storage can be reprogrammed by the host system operator
(through the host operator control software) at the
time that the end-user is accessing the database.  Such
reprogramming would be transparent to the end-user.

           For example, by dedicating a number of
"screens" for reprogramming each time the terminal17
accesses the database, the host database operator may
display different messages, such as paid advertising or
promotions, each time the end-user activates the
terminal17.  Because of the increased advertising
revenue that can be generated, the operating costs of
the host database system can be reduced, which could be
further passed on to individual end-users in the form
of lower subscription fees.  The subscription market
for the database may thereby be increased.

           Additionally, the internal operation of the
terminal17 can be reprogrammed by the host database
operator.  For example, internal program operation,
communication tables and techniques, resident screen
information, character generation fonts, figures or
dots, may be remotely modified by the host database
operator.  In one example of this feature, the
functions associated with specific keys of the keypad16
may be altered by the control software, whereby the
individual keys would now be altered to correspond to
new or different database telephone numbers or
selection offerings.

           Advantageously, the controlling software that
is utilized by the host operator also enables the host
to control access to the different host databases
according to identification means located within the

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individual terminal17.  In one mode of operation, the
individual identification code of the terminal17 may be
located in the internal ROM of the terminal17, but one
skilled in the art will realize that placement of the
individual identification means is not so limited.

5      Once the terminal17 has been linked to a host
database, the end-user would be presented with any
information that the host system desires to provide for
access.  The database may be supplied, for example, by
a sponsor publication in a particular market, or it may
10  be supplied by a publication group in a regional or
national market.  This may include local, national, and
international news retrieval; wire service information;
weather; stock market or other market information;
classified ads; retail shopping services; banking
15  services; or any other information or service provided
for the end-user within a local, regional or national
area.

       As exemplary of one proposed use of the
terminal17 according to the invention, the terminal17
20  may be employed to retrieve news information stored in
a newspaper's database.  The end-user may activate the
terminal17 and access the database via, for example, a
dedicated key on the telephone keypad16.  Upon
connection with the news service database, the
25  information (which may be tailored to the specific end-
user) would be downloaded into the terminal17 memory
while the end-user scans through different screens of
data by selectively depressing certain keys on the
keypad16.

30     Further access to information within an
individual database may be controlled through a menu
driven selection of topics.  As discussed, host
database operators are provided with control software
so that the database may interactively communicate with
35  the terminal17 via the commands generated by the

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telephone keypad16.  To access a particular topic, the
user may press the number on his or her keypad16
corresponding to the desired menu selection.  If a
particular topic as selected contains sub-categories,
such as advertisement classifications, a sub-menu or
5 any other applicable information may appear to further
define the end-user's request.  Using the news
retrieval example previously recited, an end-user may
be presented with a topic menu comprising, for example,
sports, international events, financial news, etc.  The
10 end-user, desirous of the previous night's football
scores could depress a key corresponding to access of
the sports subject located on the menu, and thereafter
view the scores using sub-menus selected by the
keypad16.
15          Notably, the terminal17 may function
independently from the host computer.  In one mode of
operation, after the desired information is downloaded
from the host database into the internal memory
storage, the terminal17 may be disconnected from the
20 host computer system.  The end-user may still scan and
manipulate the information in the terminal17's multiple
"screens" of video information within the terminal17,
without requiring the interaction of the host computer
system.
25          The terminal17 may also be equipped with
additional input/output interfaces such as would allow
connection to various manufacturer's peripheral
devices, game computers and personal computers.  Thus,
for end-users who already own a personal computer, the
30 terminal17 could substitute for a conventional modem to
communicate data from the host database system to the
personal computer.
          Alternatively, in another embodiment of the
invention, wherein the terminal17 is primarily intended
35 for "in-house" use, such as within the internal offices

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of a business, factory, etc., the subscriber telephone
line may comprise a common hardwired network that is
not connected to any telephone exchange.  For example,
the terminal17 may be coupled to a remote database in
another part of the company without using a telephone
5 exchange system, but rather through the utilization of
a simple hardwire connection.  Thus, the terminal17
would provide a cost-efficient replacement for personal
computers or other types of terminals now employed for
retrieving information from a company's in-house
10 centralized database.

In another mode of operation, the terminal17
may be programmed so as to monitor and record the
telephone number and the length of time of all outgoing
telephone calls placed on the subscriber's telephone
15 line1.  Accordingly, such information could be later
retrieved and displayed by the end-user, and perhaps be
printed on a printer attached to the terminal17.

The terminal17 may also be programmed to
monitor a telephone call while it is in progress, in
20 effect acting as a speaker phone.  This may be
accomplished in a mode of operation whereby the
terminal17 allows the audio signals passing through the
telephone interface3 to the telephone2 to also be
transmitted through the terminal17 to the speaker in
25 the television receiver15, thus permitting the
telephone conversation to then be monitored.

The terminal17 may further include a
communications speed enhancer technique for reducing
the transmission time for transmitting and receiving
30 coded information over the subscriber's telephone
line1.  Specifically, this data compression technique
involves particular codes which contain a marker, a
character and a repeat count, which are transmitted in
place of repetitive data.  This technique can be
35 implemented by analyzing the data to be transmitted and

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creating a "token" table of repetitive words or·
phrases, based upon their occurrence in the data
transmission.

In one mode of operation, the token table,
which may be updated at any time, would reside in both
5 the transmitter (host computer system, in one mode) and
the receiver (the terminal17, in the same mode) of the
data link.  Each repetitive or "token" phrase is
assigned a separate code and is stored in the token
tables in both the host computer system and the
10 terminal17.  In essence, entire phrases or words are
"compressed" into an associated code, and it is these
codes that are transmitted in place of the entire
phrase or word.  Transmission time is thereby reduced.
To identify the transmission of a token's code to the
15 receiving unit, the code is preceded by a marker (an
"esc" command, for instance).

As example of this data compression
technique, the transmission of "111111" may
alternatively be transmitted as "[esc][6][1]", whereby
20 "[esc]" would be the marker designating that the data
following it is encoded, "[6]" would designate the
repeat count, which is followed by the data that is to
be repeated, herein coded as "[1]."

Advantageously, the transmission of an entire
25 phrase such as "Enter your account number" may likewise
be compressed by assigning a code to the phrase as a
whole.  For example, the code "1" may designate this
phrase and would be stored in the token tables of both
the receiver and transmitter.  The transmission of this
30 entire phrase would then only require the transmission
of [esc][1], significantly reducing the amount of data
necessary to be transmitted.  Through the use of the
token table on the receiving unit, the original phrase
is reconstructed without any loss of data.
35 Additionally, the terminal17 may also be programmed to

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employ data error detection/correction techniques common to one skilled in the art to ensure accurate transmission of any and all data over the subscriber's telephone line1.

In Figure 2, the components corresponding to those of Fig. 1 have the same reference numerals as in Figure 1. Figure 2 is a diagram illustrating the invention in a basic design, without some of the features described in the enhanced embodiment depicted in Figure 1. Specifically, the embodiment illustrated by Figure 2 shows the terminal17 as described above, but without any of the peripheral interfaces such as the keyboard interface12, the printer interface13 or the disk interface14. Additionally the telephone interface3 is hardwired to the terminal jack (not shown) of the subscriber's telephone line1. Insofar as the operation of Figure 2 is the same as Figure 1, it need not be described.

From the foregoing discussion, it will be obvious that numerous modifications, substitutions and equivalents will now occur to those skilled in the art, all of which fall within the spirit and scope contemplated by the invention. Accordingly, it is intended that the invention be limited only by the scope of the appended claims.

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u                          **CLAIMS**

What is claimed is:

1.  A telecommunications device for creating
an interactive terminal for accessing information from
a computerized database using a communication exchange,
5 comprising:

        a display device for displaying
        information retrieved from said
        computerized database;

        a telephone connected to said
        communication exchange, said
10      telephone having a keypad for
        selectively generating output
        signals;

        interface means connected to said
        telephone and to said communication
        exchange for communicating signals
        thereover, said interface means
15      responsive to receiving said output
        signals generated by said
        telephone;

        modem means connected to said
        interface means for modulating and
        demodulating corresponding analog
20      and digital data signals to and
        from said interface means;

        control means connected to said
        modem means for controlling the
        operation of said
        telecommunications device, said
        control means having a plurality of
25      peripheral interfaces for
        supporting input/output devices;

        programmable memory means for
        storing signals corresponding to
        data within said telecommunications
        device;
30
        video signal processing means
        connected to said control means for
        transforming digital data signals
        output by said control means into
        corresponding video data signals
        including character generation;
35

radio frequency modulating means
connected to said video processing
means for modulating said video
data signals over a carrier
frequency, said radio frequency
modulating means having a tuning
circuit for tuning the output
across various frequencies; and

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switching means connected to said
radio frequency modulating means
for switching the input to said
display device between the output
signals of said telecommunications
device and the output signals of an
antenna/cable connected to said
display device.

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2.    A telecommunications device according to
claim 1 wherein said display device comprises a
television receiver.

15       3.    A telecommunications device according to
claim 1 wherein said interface means includes a
switching means for switching said telephone onto and
off of said communications exchange such that signals
generated by said keypad are still coupled to said
20 control means when said telephone is switched off of
said communications exchange.

4.    A telecommunications device according to
claim 1, wherein said computerized database employs
control software responsive to said output signals
25 generated by said telecommunications device.

5.    A telecommunications device according to
claim 1, wherein said programmable memory means
includes a first memory storage having contents
programmably alterable under the control of said
30 computerized database.

6.    A communications device according to
claim 1, wherein said modem means includes means for
implementing amplitude modulation, frequency
modulation, and phase modulation.

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7.    A telecommunications device according to claim 1, wherein said control means includes a keyboard.

8.    A telecommunications device according to claim 1, wherein said control means includes a disk storage device.

9.    A telecommunications device according to claim 1 wherein said control means includes a printing device.

10.    A telecommunications device according to claim 1, wherein said control means includes a second memory storage for storing a coded signal corresponding to an individual identification of said telecommunications device for controlling access to said computerized database.

11.    A telecommunications device according to claim 10 wherein said control means includes means for programmably altering contents of said second memory storage under the control of said computerized database.

12.    A telecommunications device for creating an interactive terminal for accessing information from a computerized database using a communication exchange, comprising:

keypad means for selectively generating output signals;

interface means coupled to said keypad means and to said communication exchange for communicating signals thereover, said interface means responsive to receiving said output signals generated by said keypad means;

modem means connected to said interface means for modulating and demodulating corresponding analog and digital data signals to and from said interface means;

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control means connected to said
modem means for controlling the
operation of said
telecommunications device, said
control means having a plurality of
peripheral interfaces for
supporting input/output devices;

5        programmable memory means for
storing signals corresponding to
data within said telecommunications
device;

video signal processing means
connected to said control means for
transforming digital data signals
10       output by said control means into
corresponding video data signals
including character generation;

radio frequency modulating means
connected to said video processing
means for modulating said video
15       data signals over a carrier
frequency, said radio frequency
modulating means having a tuning
circuit for tuning the output
across various frequencies;

a television receiver for
displaying information retrieved
20       from said computerized database;
and

switching means connected to said
radio frequency modulating means
for switching the input to said
television receiver between the
25       output signals of said
telecommunications device and the
output signals of an antenna/cable
connected to said television
receiver.

13. A telecommunications device according to
30 claim 12, wherein said computerized database employs
control software responsive to said output signals
generated by said telecommunications device.

14. A telecommunications device according to
claim 12, wherein said programmable memory means
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ᵤ includes a first memory storage means having contents
programmably alterable under the control of said
computerized database.

15.   A communications device according to
claim 12, wherein said modem means includes means for
₅ implementing amplitude modulation, frequency
modulation, and phase modulation.

16.   A telecommunications device according to
claim 12 wherein said control means includes a second
memory storage for storing a coded signal corresponding
₁₀ to an individual identification of said
telecommunications device for controlling access to
said computerized database.

17.   A telecommunications device according to
claim 16 wherein said control means includes means for
₁₅ programmably altering the contents of said second
memory storage under the control of said computerized
database.

18.   A method for accessing information from
a computerized database by transmitting subscriber
₂₀ inputs, and receiving, storing and displaying said
accessed information via a telecommunications device,
comprising the following steps:

                        generating output signals by
                        selectively depressing the keys of
                        a keypad of a telephone connected
₂₅                      to a communication exchange;

                        receiving said output signals by an
                        interface device connected to said
                        telephone and to said communication
                        exchange;

                        modulating and demodulating
₃₀                      corresponding analog and digital
                        data signals to and from said
                        interface device by a modem device;

                        controlling the operation of said
                        telecommunications device by a
₃₅                      central control device;

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storing signals corresponding to
said information within said
telecommunications device by a
programmable memory array;

transforming digital data signal
output by said control device into
corresponding video data signals by
5       a video signal generating device
connected to said control device;

modulating said video data signals
over a carrier frequency by a radio
frequency modulating device
connected to said video processing
10      device, said radio frequency
modulating device having a tuning
circuit for tuning the output
across various frequencies;

displaying said information
retrieved from said computerized
database by a display device; and
15

switching the input to said display
device between the output signals
of said telecommunications device
and the output signals of an
antenna/cable connected to said
display device, by a switching
device connected to said radio
20      frequency modulating device.

19.   The method according to claim 18,
wherein said step of displaying said altered
information comprises the step of displaying said
25 retrieved information on a television receiver.

20.   The method according to claim 18,
wherein said step of receiving said output signals by
an interface device  includes the step of switching
said telephone off of said communications exchange such
30 that signals generated by said keypad are still coupled
to said control means.

21.   The method according to claim 18,
further including the step of communicating data
between said telecommunications device and said
35 communications exchange.

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22.   The method according to claim 18,
wherein said step of controlling the operation of said
telecommunications device includes the step of
transmitting and/or receiving said retrieved
information via a plurality of peripheral interfaces
5 coupled to said control device.

23.   The method according to claim 18,
further comprising the step of employing control
software in said computerized database responsive to
said output signals generated by said
10 telecommunications device.

24.   A method according to claim 18, wherein
said controlling step includes the step of controlling
access to said computerized database via programmable
identification means located within said
15 telecommunications device.

25.   A method according to claim 24, wherein
said access control step further includes the step of
remotely altering said programmable identification
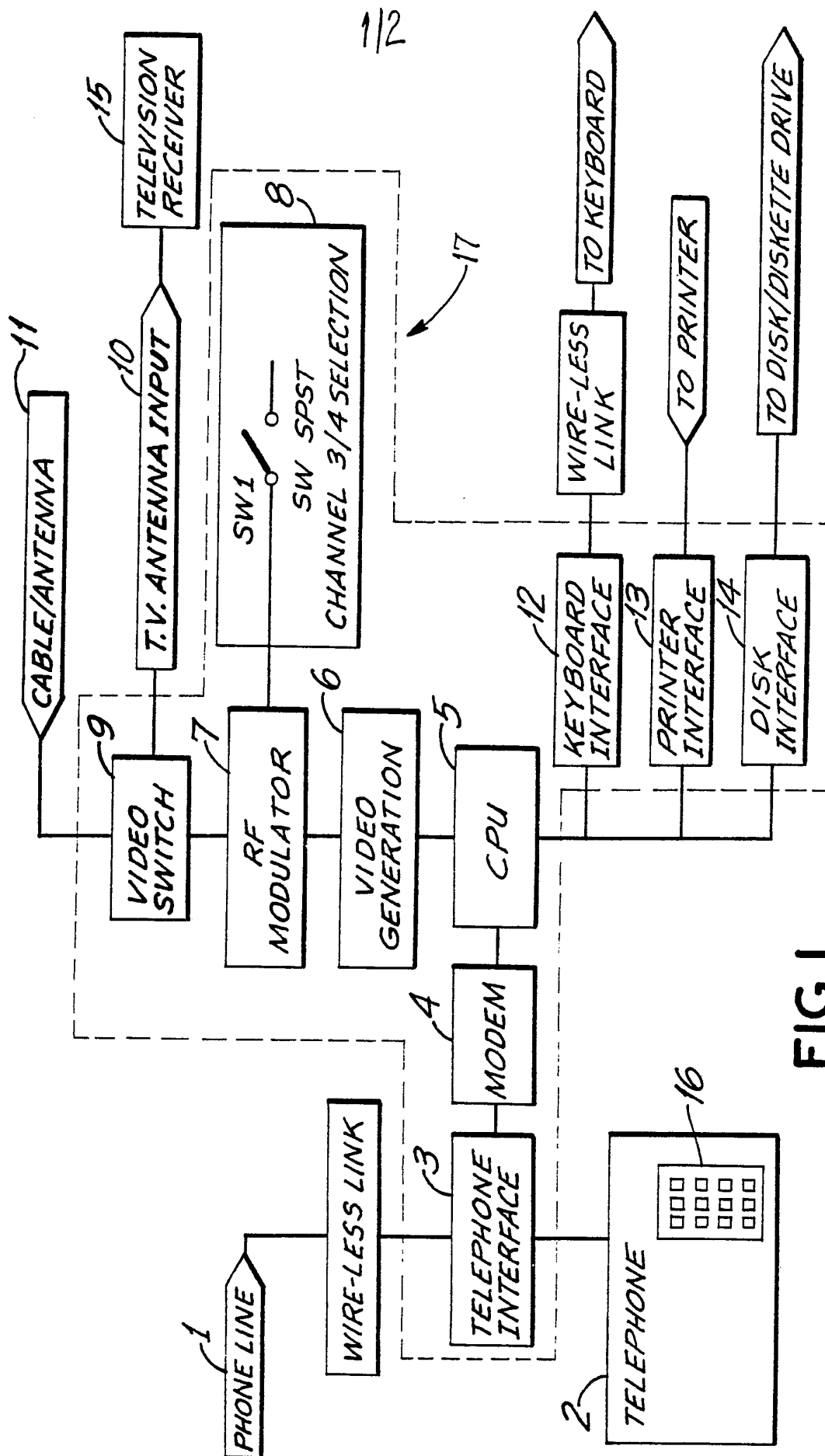means from said computerized database.

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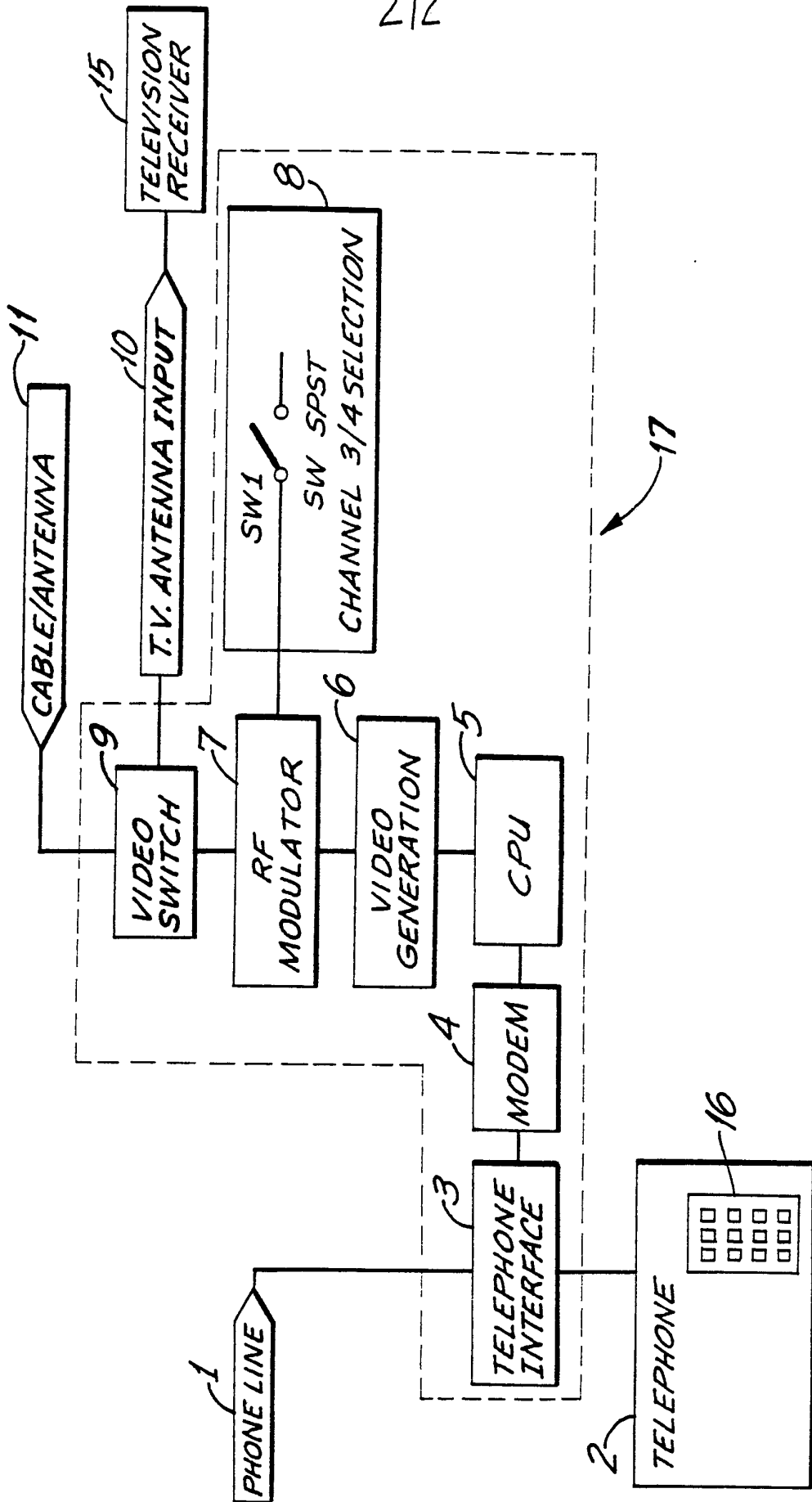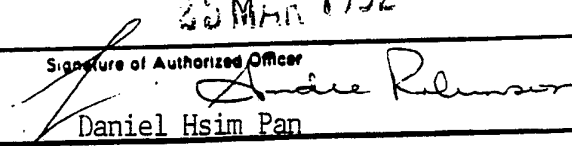CABLE/ANTENNA 11

TELEVISION RECEIVER 15

T.V. ANTENNA INPUT 10

SW1

SW SPST CHANNEL 3/4 SELECTION 8

17

VIDEO SWITCH 9

RF MODULATOR 7

VIDEO GENERATION 6

CPU 5

MODEM 4

TELEPHONE INTERFACE 3

WIRE-LESS LINK

PHONE LINE 1

TELEPHONE 2

16

WIRE-LESS LINK

TO KEYBOARD

TO PRINTER

TO DISK/DISKETTE DRIVE

KEYBOARD INTERFACE 12

PRINTER INTERFACE 13

DISK INTERFACE 14

FIG.1

2/2



**FIG.2**

# INTERNATIONAL SEARCH REPORT

International Application No. **PCT/US91/08987**

**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

IPC(5): G06F 13/10,15/40,15/56,15/62,3/05,3/023,3/14,9/06
US CL : 395/700; 395/200, 395/500, 395/600, 364/408, 360/92

**II. FIELDS SEARCHED**

Minimum Documentation Searched [7]

| Classification System | Classification Symbols |
|---|---|
| U.S. | 395/700, 395/200, 395/500, 395/600 |

Documentation Searched other than Minimum Documentation
to the Extent that such Documents are Included in the Fields Searched [8]

APS DATABASE

**III. DOCUMENTS CONSIDERED TO BE RELEVANT** [9]

| Category * | Citation of Document, [11] with indication, where appropriate, of the relevant passages [12] | Relevant to Claim No. [13] |
|---|---|---|
| Y,P | US, A, 5,001,554 (JOHNSON ET AL.) 19 MARCH 1991 See figs. 1-15, col. 3, lines 15-68, col. 4, lines 1-68, col. 5, lines 1-68, col. 6, lines 1-68, col. 7, lines 1-51, col. 8, lines 12-63, col. 9, lines 5-68, col. 10, lines 10-63, col. 12, lines 8-68, col. 14, lines 25-68, col. 15, lines 1-68, col. 16, lines 1-50, col. 20 lines 4-68, col. 21, lines 1-37. | 1-25 |
| Y,P | US, A, 5,025,373 (KEYSER, JR.) 18 JUNE 1991 See figs. 1-8, col. 2, lines 55-68, col. 3, lines 1-68, col. 4, lines 1-68, col. 5, lines 1-66, col. 7, lines 1-68, col. 8, lines 1-68, col. 9, lines 1-68, col. 10, lines 1-68, col. 11, lines 1-68, col. 12, lines 3-52, col. 13, lines 10-68, col. 14, lines 1-64, col. 15, lines 39-66, col. 16, lines 7-67, col. 17, lines 1-68, col. 18, lines 1-22. | 1-25 |
| Y | US, A, 4,734,856 (DAVIS) 29 MARCH 1988 See col. 1, lines 1 - col. 17, line 53, col. 18, lines 30-68, col. 19, line 1-col. 24, line 68, col. 26, line 10- col. 33, line 59, claims 1-2. | 1-25 |

* Special categories of cited documents: [10]

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published 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

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

**IV. CERTIFICATION**

| Date of the Actual Completion of the International Search | Date of Mailing of this International Search Report |
|---|---|
| 06 FEBRUARY 1992 | 25 MAR 1992 |
| International Searching Authority | Signature of Authorized Officer |
| ISA/US | Daniel Hsim Pan |

Form PCT/ISA/210 (second sheet) (Rev.11-87)