EXHIBIT J

EXPRESS MAIL LABEL NO. EM472096905US

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United States Patent Application
of
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for

SYSTEM AND METHOD FOR ADAPTABLE TOUCHPAD INPUT DEVICE

TO THE COMMISSIONER OF PATENTS AND TRADEMARKS:

Your petitioners, Paul H. Glad (having a residence address of 1451 Morris Street, Salt Lake City, Utah 84119), Jack Steven Kelliher (having a residence address of 7874 South 965 East, Sandy, Utah 84094), George LaGrange (having a residence address of 1911 East South Moor Drive, Salt Lake City, Utah 84117), Ken Thomas (having a residence address of 1461 Little Creek Drive, West Jordan, Utah 84088), and Jim O'Callaghan (having a residence address of 5340 Cottonwood Land, Salt Lake City, Utah 84117), all citizens of the United States of America, pray that letters patent may be granted to them as the inventors of a **SYSTEM AND METHOD FOR ADAPTABLE TOUCHPAD INPUT DEVICE**, as set forth in the following specification.

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BACKGROUND

1. The Field of the Invention.

This invention relates generally to input devices which receive information from the touch of a human user, and more particularly to systems and methods which allow a number of different types of user inputs to be positioned in a compact location.

2. Related Applications.

U.S. Patent Nos. 5,305,017, 5,339,213, 5,349,303, and 5,565,658 and U.S. Patent Application Nos. 08/351,008, 08/413,199, 08/558,126, 08/556,614, 08/626,284, and 08/813,158 contain information which is related to the present invention and all of these patents and applications are now incorporated herein by reference in their entireties.

OBJECTS THE INVENTION

It is an object of the present invention to provide a system and method for providing an improved input device which receives information from the touch of a human user.

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It is also an object of the present invention to provide a touch pad apparatus which can be used in a variety of applications and which accepts different types of user inputs.

It is another object of the invention to provide such a touchpad which actively defines different zones on a touch sensitive surface so that different zones are defined as the device engages different modes.

It is also an object of the invention to provide such a touchpad input device which is particularly adapted for use on a portable communication device.

Additional objects and advantages of the invention will be set forth in the description which follows, and in part will be apparent from the description, or may be learned by the practice of the present invention. The objects and advantages of the invention may be realized and obtained by means of the instruments and combinations particularly claimed in the appended claims.

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BRIEF DESCRIPTION OF THE DRAWINGS

The above and other objects, features, and advantages of the invention will become apparent from a consideration of the following detailed description presented in connection with the accompanying drawings in which:

FIG. 1 is a front view of a portable communication device in which one preferred touchpad input device of the present invention is installed wherein the touchpad is in keypad mode.

FIG. 1A is a front view of a portable communication device illustrated in FIG. 1 wherein the touchpad is in character recognition mode.

FIGS. 1B-1HH are representations of display screens presented in the preferred embodiment illustrated in FIG. A.

FIGS. 2 and 2A show the preferred embodiment of the present invention with a two-layer grid of electrodes which are connected to a mixed signal integrated circuit mounted on the touchpad's reverse side.

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FIGS. 3A and 3B show the overlay graphics which are used in the preferred embodiments of the invention.

FIGS. 3C and 3D show additional preferred overlay graphics.

FIGS. 4A and 4B show the touchpad operating in the keypad mode and in the character recognition mode, respectively.

FIG. 5 shows the preferred connection between the touchpad of the present invention to a communication device (such as a cellular telephone) mainboard.

FIG. 6 is a block diagram showing one preferred touch sensing structure of the present invention.

FIG. 7 is a detailed schematic diagram of one preferred arrangement for carrying out the preferred embodiment of the present invention described herein.

FIGS. 8A-D are diagrammatic representations of a segmented directional light panel in accordance with the present invention.

DETAILED DESCRIPTION

Reference will now be made to the drawings in which the various elements of the present invention will be given numeral

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designations and in which the invention will be discussed so as to enable one skilled in the art to make and use the invention. It is to be understood that the following description is only exemplary of the principles of the present invention, and should not be viewed as narrowing the scope of the appended claims.

The present invention provides a touchpad which can be used in all different types of devices. In particular, the present invention provides a touchpad ideally suited for the rigorous demands of mobile communication devices such as portable phones, mobile radios and PDAs. Importantly, the present invention can be used in many other applications but the presently preferred embodiments described herein are best suited for installation in a portable communication device or portable computing device.

FIG. 1 provides a front view of a portable communication device in which the touchpad input device of the present invention has been installed.

The embodiments of the present intention simplify the user interface with point and tap selection, simplify data entry with advanced character recognition, and simplify design and assembly.

The embodiments of the present invention provide a multi-functional device which can be installed in a small, compact space. The embodiments of the present invention provide the following functions:

KEYPAD - The user just touches the numbers on the touchpad to dial the phone. Audible clicks (via the speaker) provide sensory feedback. Because only fingers activate the pad, accidental button presses are reduced.

CHARACTER ENTRY - The user writes characters with a finger directly on the touchpad. The present invention recognizes traditional alphabet, numerals, or the user's trained symbols. The present invention also allows input of Asian characters, e.g. Katakana

TOUCHPAD MODE - The user can point the cursor to select options with an intuitive user interface.

SCROLL MODE - The user can quickly search through lists, for example, scroll incoming e-mail messages.

The present invention provides flexibility not previously available. The embodiments provide the user a graphical

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interface which guides users through phone functions. With the preferred embodiments of the present invention, new features can be added in via software, avoiding the need for re-tooling to add buttons for additional functions. The preferred embodiments of the present invention also provide softkeys to provide context-sensitive options to the user.

In contrast to some previously available devices, the present invention can withstand rugged use in harsh and demanding environments and provides long and dependable service. Moreover, the preferred embodiments include no moving parts to break or maintain. The preferred embodiments of the present invention are advantageously very thin, easy to assemble with few components, and lightweight.

The preferred embodiments of the present invention provide a desirable and easy to handle user interface. The user interface of the preferred embodiments of the present invention allow:

A user to enter characters quickly using traditional alphabet to create phone lists, short messages or e-mail.

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A user to write the first letter to speed-search for names stored in your personal phone lists.

A user to point and tap icons which prompt the user, the user is not required to memorize the function of numerous buttons.

A user to search lists and browse e-mail easily with scrolling capability.

In FIGS. 2 and 2A, the preferred embodiment of the present invention is shown with a two-layer grid of electrodes which are connected to a mixed signal integrated circuit (IC) mounted on the touchpad's reverse side. The upper electrode layer is comprised of vertical electrode strips while the lower layer consists of horizontal strips. The "mutual capacitance" between each of the horizontal and vertical electrodes is continually measured by the IC. A human finger near the surface of the touchpad alters the mutual capacitance between the two electrode grids, since a finger has different dielectric properties than air. The position of the finger's centroid is precisely

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determined based upon changes in mutual capacitance as the finger moves across the touchpad's surface.

The preferred structures and method of capacitance-based finger sensing is described herein but it is to be understood that other methods and structures of sensing finger position can be used within the scope of the present invention. For example, sensing approaches relying upon the capacitance of each electrode to earth ground instead of the preferred sensing mutual capacitance from one electrode layer to the other can be used but may not provide the same beneficial results. The preferred mutual capacitance structures and methods give superior resolution and eliminate problems with noisy, jumpy cursor control. The patents previously incorporated herein by reference provide information on the preferred structure and methods providing a high-resolution capacitive touchpad.

The preferred embodiments of the present invention provide the below listed general performance characteristics:

Motion Detection Method:	Mutual capacitance sensing
Position Sensing Resolution:	40 counts/mm [1,000 counts/inch]

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Position Reporting Modes:	Relative and Absolute
Tracking Speed:	Up to 1,016 mm/sec. [40 inches/sec.]
Touch Force:	No contact pressure required
Lifetime:	Minimum 2 x 10^6 strokes (100 km traveled across pad surface [62 miles])
Sample Rate:	100 samples/sec.

The preferred embodiments of the present invention provide the below listed general electrical characteristics:

Power Supply Voltage:	Existing: 5.0 Volts ±10% [Development Option: 3.3 Volts ±10%]
Power Supply Current:	Active Mode: 4.75 mA Typical, 5.0 mA Max
Standby Mode:	1.00 mA Typical Existing Sleep Mode: 0.0 A (mechanically actuated) [Sleep Mode Development Option: 100 mA]
Battery Operation:	No earth ground required

The preferred embodiments of the present invention provide the below listed general environmental characteristics:

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Operating Temperatures:	-30°C to 60°C (-22°F to 140°F)
Storage Temperature:	-40°C to 85°C (-40°F to 185°F)
Thermal Shock:	-40°C to 85°C (-40°F to 185°F)
Operating Humidity:	5% to 95% relative humidity
ESD immunity:	15kV (applied to front surface)
Dust immunity:	N/A-no moving parts

The preferred embodiments of the present invention provide the below listed electrical interface characteristics:

Communication Protocol:	PS/2

The preferred embodiments of the present invention provide the below listed general user interface characteristics:

Keypad Operations:	12 alphanumeric buttons (standard phone layout)
Scrolling Operations:	1 vertical scroll bar
Cellphone Operations:	4 dedicated buttons (RCL, CLR, SND, END)
Advanced Features Operations:	4 context-sensitive soft buttons

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Reference will next be made to FIGS. 3A and 3B to describe the structure of the overlay graphics which are used in the preferred embodiments of the invention described herein. The touch surface of the touchpad is covered with a 0.33mm [0.013 inch] thick laminate, providing an environmentally resistant surface. The preferred hardcoat and texturing process results in a surface that exceeds 9H hardness on the ASTM Film Hardness by Pencil Test. The textures on the touch surface are constructed to allow for optimum finger movement across the pad under a wide variety of conditions.

Still referring to FIGS. 3A and 3B, the graphics overlay of the illustrated embodiment incorporates two distinct levels of texturing. This dual textured surface is used to delineate the button areas on the touchpad. The lighter texture of the virtual buttons provides valuable tactile feedback during keypad and scrolling operations. These areas are also graphically delineated by interactive changes in the overlay color as well as by text. Desirably, the graphics overlay can be produced to

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match custom colors, patterns and company logos. FIGS. 3C and 3D show additional preferred overlay graphics.

Reference will now be made to FIGS. 4A and 4B. FIG. 4A shows the illustrated embodiment with the graphic overlay operating in the keypad mode where zones on the touchpad are designated as a numeric keypad, similar to preciously available keypads, and the numeric key zones are displayed to the user. FIG. 4B shows the illustrated embodiment with the graphic overlay operating in the character recognition mode where the keypad zones on the touchpad are replaced and designated as a active character recognition zone and the active character recognition zone is displayed to the user.

Reference will next be made to FIG. 5 to describe the preferred connection to communication device mainboard carried out by the embodiment of the present invention illustrated herein. A 4-pin connector supports PS/2 and power supply signals. The 4-pin connector is a 1.0mm [0.039 inch] pitch connector which is designed to accept 0.33mm [0.012 inch] thick flexible flat cables (FFC) or flexible printed circuits (FPC) as

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shown in Figure 5. The contacts on the connector simultaneously mate with both sides of the FFC or FPC, providing greater freedom in cable design and routing. Further information regarding the preferred embodiment described herein is set forth below:

	PCB Connector Manufacturer	Fat Flex Cable (Header Part #)	(Part #)
Source 1	JST	04FMS-1.0SP-TF	—
Source 2	Molex	52643-0490	—
	Axon' Cable, Inc. (847-699-8822)	—	FFC 1.00A04/XXXL440606SB (Replace XXX with desired length in mm)

The preferred host connector pinout for the illustrated embodiment is set forth below:

1	2	3	4
Ground	VDD	CLK	DAT

Communication between the touchpad and the communication device's mainboard is based upon an extended PS/2 protocol. The extended PS/2 communication protocol is displayed in Table 1. Each packet consists of (6) bytes.

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Table 1: Extended PS/2 Protocol

	BIT 7	BIT 6	BIT 5	BIT 4	BIT 3	BIT 2	BIT 1	BIT 0
BYTE 0	1	1	1	1	1	1	1	1
BYTE 1	1	1	1	1	1	1	1	1
BYTE 2	X7	X6	X5	X4	X3	X2	X1	X0
BYTE 3	0	Z6	Z5	Z4	Z3	Z2	Z1	Z0
BYTE 4	Y7	Y6	Y5	Y4	Y3	Y2	Y1	Y0
BYTE 5	0	0	X10	X9	X8	Y10	Y9	Y8

NOTES: X10 through X0 is the unsigned absolute x-position.
Y10 through Y0 is the unsigned absolute y-position.
Z6 through Z0 is the unsigned contact strength.
Synchronization is maintained by Byte 0 and Byte 1 (constant values of 1).

In the illustrated embodiments of the present invention, the following bezel design recommendations as preferred guidelines

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for integrating the described touchpad into portable communication devices such as a cellular telephone.

Bezel Wall Thickness:

Minimum Wall Thickness-1.0mm [0.040 inch]: A 1.0mm minimum thickness is recommended to provide tactile feedback to the user, indicating that the finger has encountered a bezel edge.

Maximum Wall Thickness:

However, an extremely thick and steep bezel sidewall may prevent a finger from accessing the outer edges of the touchpad and thereby reduce the functional area of the pad.

Bezel Sidewall Geometry:

A 30 to 45 degree tapered edge on the bezel is recommended to allow for optimum functionality while also providing the user with tactile feedback that they have encountered a bezel edge.

Bezel Window Geometry:

A rectangular or slightly modified rectangular window is preferred.

Alignment in Bezel:

The touchpad should be centered in the bezel window opening to ensure proper functionality.

In the illustrated embodiments of the present invention, the following electrical consideration are preferably considered when

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integrating the described touchpad into portable communication devices such as a cellular telephone.

Conductive Bezel Materials:

Conductive bezel materials may be used provided that the bezel does not overlap the touchpad's edge by more than 2.0mm [0.079 inch].

In the illustrated embodiments of the present invention, the following considerations should be carried out when mounting the described touchpad into portable communication devices such as a cellular telephone and will be appreciated by those skilled in the art. The thin, flat profile of the touchpad can accommodate numerous mounting methods.

It is preferred that the described embodiments of the present invention consider the following ESD/EMI specifications:

ESD Management:

It is sometimes preferred to provide a low impedance path to frame ground in order to dissipate inadvertent electrostatic discharges to the touchpad surface. The 4-pin FFC connector does not provide a path to frame ground. Therefore, there may be a need to incorporate a grounding structure in accordance with one of the following arrangements:

1. Frame Ground Connection Land The communication device touchpad PCB preferably includes a frame ground

land within close proximity to the 4-pin FFC connector. It is preferred that a drain wire be soldered directly to the PCB, thereby providing a direct path to frame ground when properly connected to the communication device's mainboard.

2. Grounding Ring A thin conductive shim may be installed between the overlay and the underside of the communication device bezel. This conductive shim must be connected to the device's frame ground and should not encroach on the touchpad's front surface by more than 2.0mm [0.079 inch].

3. Conductive Bezel If the underside of the bezel can be manufactured such that it is suitably conductive and it is connected to the frame ground of the communication device's mainboard, then this may provide a satisfactory path to dissipate ESD. As previously noted, the conductive portion of the bezel must not encroach on the touchpad's front surface by more than 2.0mm [0.079 inch].

4. Solder Bumps The component side of the touchpad incorporates a series solder bumps around the perimeter of the PCB. These solder bumps are available for use as a path to frame ground when used in conjunction with a grounded metal underchassis. However, the conductive underchassis must not extend beyond the solder bump area of the touchpad such that it shorts out to circuitry or components.

EMI Susceptibility:

The touchpad preferably exhibits low susceptibility to electromagnetic interference in noisy environments.

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Attached hereto as Programming Code Appendix A and Programming Code Appendix B is programing code which provides a functional demonstration of the preferred features of embodiments of the present invention. Other programming code which may be required is available from Cirque Corporation (Cirque Touchpad software for Windows 95 and Cirque Touchpad API), Advanced Recognition Technologies Inc. (Art Smartwriter SDK); Microsoft Corporation (MFC runtime DLLs from Microsoft Visual C++ 4.2).

FIG. 6 is a block diagram showing one preferred touch sensing structure of the present invention. Those skilled in the art can arrive at many different embodiments of the present invention using the information provided in FIG. 6 and otherwise provided herein.

FIG. 7 is a detailed schematic diagram of one preferred arrangement for carrying out the preferred embodiment of the present invention described herein. It is to be understood that the arrangement shown in the detailed schematic diagram of FIG. 7 is merely exemplary and is not to be considered restrictive of the scope of the present invention.

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Reference will next be made to FIGS. 8A-D which diagrammatically represent a segmented directional light panel which is preferred for use with the embodiments of the present invention described herein. The light panel illustrated in FIGS. 8A-D is preferably constructed using a single continuous clear optically conductive media, for example an injection molded clear plastic. Forming the light panel illustrated in FIGS. 8A-D using a harmonic waveform which increases in frequency as the light moves farther from the driving input source for the model of the cross section introduces refractive characteristics. This characteristic allows light to escape the light panel in controlled amounts. The light panel is formed in thin sections which run the length of the light panel from the driving light source to the opposite end. The sections of the light panel oppose each other by a 180 degree phase shift. This characteristic increases the amount of light emitted and eliminates dead areas. The panel can be segmented in such a way that specific areas can be illuminated while others are in a passive state using independently driving light sources. By

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illuminating specific areas, also referred to as zones, as described in connection with FIGS. 4A and 4B. The driving light source is preferably applied through a light funnel.

As will now be appreciated, the present invention provides a touchpad which can be used in many different applications and particularly as an input device in cellular telephones. The present invention provides key features such as character recognition for quick intuitive alphabetic input, fast easy scrolling through phone lists and options and a durable and easy to use keypad. Further details regarding one preferred embodiment of the present invention particularly adapted for use with cellular telephone will now be provided.

As represented in FIG. 1, the cellular telephone preferably has a 5 line by 19 character LCD display. The characters use fixed spacing and the top four lines must scroll up and down. The bottom line is the soft key assignment status and the top four lines are for general text.

There are two distinct modes of input for the touchpad:

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1 - Keypad mode: The touchpad is in absolute mode and functions as the keypad on a phone. In this mode all the printed keys on the pad are active and the pad is backlit. The backlit keypad is shown in Fig 1. A scroll bar is on the right side for scrolling when appropriate.

2 - Character mode: See FIG. 1A. The touchpad is in absolute mode and functions as a handwritten character input device. The top and bottom rows of printed keys still function as keys while the interior 12 keys and scroll bar function as a tablet for handwritten character input. The pad is preferably not be backlit in this area to indicate this mode.

CLR - clears the last character or number entered when pressed for a short time and clears to the beginning of the line or data field when held down for a longer time.

SND - Dials the phone numbers, sends email, or connects to a network to display requested information when pressed.

END - Terminates a call, terminates data entry and proceeds to the next field if any.

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Figure 1 displays normal phone operation with the user pressing the keys on the pad to enter the number and pressing SND to dial it. Figure 1A displays adding a name to the phone book using handwriting character recognition for the character input. The top row of keys is multi functional. Their functions are indicated by the four squares on the bottom of the display. When entering characters they are assigned to be space, period and cursor controls. This assignment gives the user intuitive access to non-alphabetic characters and punctuation. Figure 1B displays the phone number list. The user can scroll through it by using the scroll bar on the right hand side of the pad. It will be appreciated that features such as email messaging, stock and weather reports, and speed dialing, can be added by those skilled in the art using the information set forth herein. Such features which are significantly easier with a touchpad and character recognition for input.

Upon power up, the user is presented with the a "phone screen" in keypad mode which is configured as normal telephone and the user dials number or chooses 1 of4 options. 'RCL'

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recalls the last number dialed,'CLR' clears the digit, 'CLR' held down clears phone number,'SND' dials number.'END' ends the call. See Figure 1C.

In Book - Keypad mode the touchpad displays a phone book. The user scrolls to name and presses 'SND' to dial or selects 1 of the 4 actions. The selected name is highlighted with a surrounding box. 'END' returns to the phone screen. 'CLR' and 'RCL' do nothing. See FIG. 1D.

In book-Add - Character mode the touchpad adds a name to the phone book. The user prints each character on the pad using a finger. 'SPC' inserts a space,'.' inserts the period,'<-' moves left one char,'->' moves right one char,'CLR' deletes one character, holding 'CLR' clears the line. 'END' ends the field and proceeds to the next field. 'RCL' and 'SND' do nothing. See FIG. 1E.

In Book-Add-End - Keypad mode the user keys in a phone number. The arrows move the cursor forward and backward. 'END' proceeds to the next field. 'RCL' goes to the previous number.

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'CLR' deletes one number while holding the 'CLR' down clears the entire field. 'SND' does nothing. See FIG. 1F.

In the Book-Add-End-End - Character mode the user enters email addresses. The user prints each character of the address on the touchpad. 'SPC' adds a space, '.' adds the period, '<-' moves left one char,'->' moves right one char. 'CLR' deletes one char. Holding 'CLR' deletes the line. 'END' ends the field and proceeds to the next field. 'SND' does nothing. See FIG. 1G.

In Book-Del - Keypad mode - 'YES' deletes highlighted name from phone book and returns to the Book screen. 'NO' or 'END' just returns to the Book screen. 'RCL', 'CLR' and 'SND' do nothing. See FIG. 1H.

Book-Chg - Character mode - allows the user to edit the selected phone book entry. 'CLR' deletes a character. Holding 'CLR' deletes the entire line (field). 'END' saves the changes and returns to the Phone screen. 'RCL','CLR' and 'SND' do nothing. See FIG. 1I.

In the Book-Inf - Keypad mode all of the fields are displayed for the selected entry. 'CHG' goes to the Book-Chg

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screen. 'NXT' displays all the fields for the next phone book entry and 'PRE' the previous. 'END' returns to the Book screen. 'SND' calls the number 'RCL' does nothing. See FIG. 1J.

In the Book-Add-End-End - Character mode the user enters email addresses. The user prints each character of the address on the pad. 'SPC' adds a space, '.' adds the period, '<-' moves left one char,'->' moves right one char. 'CLR' deletes one char. Holding 'CLR' deletes the line. 'END' ends the field and proceeds to the next field. 'SND' does nothing. See FIG. 1K.

In the Book-Del - Keypad mode - 'YES' deletes highlighted name from phone book and returns to the Book screen. 'NO' or 'END' just returns to the Book screen. 'RCL', 'CLR' and 'SND' do nothing. See FIG. 1L.

In the Book-Chg - Character mode - the user is allowed to edit the selected phone book entry. 'CLR' deletes a character. Holding 'CLR' deletes the entire line (field). 'END' saves the changes and returns to the Phone screen. 'RCL','CLR' and 'SND' do nothing. See FIG. 1M.

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In the Book-Inf - Keypad mode all the fields are displayed for the selected entry. 'CHG' goes to the Book-Chg screen. 'NXT' displays all the fields for the next phone book entry and 'PRE' the previous. 'END' returns to the Book screen. 'SND' calls the number 'RCL' does nothing. See FIG. 1N.

Mail-Read-Del - Keypad mode - Allows the user to confirm deleting an email message. 'YES' deletes the message from the list and returns to the Mail screen. 'NO' and 'END' return to the Mail screen. 'RCL','CLR' and 'SND' do nothing. See FIG. 1O.

Mail-Read-Rply - Character Mode - Allows the user to reply to an email message by entering in the subject and message fields. The soft keys are for space, period, backward and forward. 'END' will proceed to the message field. 'CLR' deletes a character. Holding 'CLR' deletes the line. 'RCL' and 'SND' do nothing. See FIG. 1P.

The Mail-Read-Rply-End - Character Mode allows the user to enter the message body. The soft keys are for space, period, backward and forward. 'SND' will send the message and return to the Mail screen. 'END' will prompt for save or delete the

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message showing 'SAV' and 'DEL' for the soft keys. 'CLR' deletes a character. Holding 'CLR' deletes the line. 'RCL' recalls previous subject field. See FIG. 1Q.

In Mail-Read-Del - Keypad mode the user confirms deleting an email message. 'YES' deletes the message from the list and returns to the Mail screen. 'NO' and 'END' return to the Mail screen. 'RCL','CLR' and 'SND' do nothing. See FIG. 1R.

In the Mail-Read-Rply - Character Mode the user can reply to the message by entering in the subject and message fields. The soft keys are for space, period, backward and forward. 'END' will proceed to the message field. 'CLR' deletes a character. Holding 'CLR' deletes the line. 'RCL' and 'SND' do nothing. See FIG. 1S.

In the Mail-Read-Rply-End - Character Mode the user enters the message body. The soft keys are for space, period, backward and forward. 'SND' will send the message and return to the Mail screen. 'END' will prompt for save or delete the message showing 'SAV' and 'DEL' for the soft keys. 'CLR' deletes a character.

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Holding 'CLR' deletes the line. 'RCL' recalls previous subject field. See FIG. 1T.

In the Mail-Read-Fwd - Keypad Mode the user can forward the message to a fax number for print out or to an email address either in the phone book or a new address. 'END' will return to the Mail-Read screen. 'RCL', 'CLR' and 'SND' do nothing. See FIG. 1U.

In the Mail-Send - Keypad Mode the user can send a new message to an email address either in the phone book or to a new address. 'END' will return to the Mail screen. 'RCL', 'CLR' and 'SND' do nothing. See FIG. 1V.

In the Mail-Send-Book - Keypad Mode the user scrolls through phone book to select a name to send message to. 'SND' or 'SEL' will go to the Mail-Send-Book-Sel screen. 'END' will return to the Mail-Send screen. 'RCL' and 'CLR' do nothing. See FIG. 1W.

In the Mail-Send-Book-Sel - Keypad Mode the user confirms the correct email address by pressing 'OK' or 'NEW' to specify a new address. 'END' returns to the Mail-Send-Book screen. 'OK'

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or 'SND' go to the Mail-Send-Msg screen and 'NEW' goes to the Mail-Send-New screen. 'RCL' and 'CLR' do nothing. See FIG. 1X.

In the Mail-Send-New - Character Mode the user prints email addresses to send message. 'RCL' will return to the Mail-Send screen. 'SND' or 'END' will go to the Mail-Send-Msg screen to allow the user to enter the subject field. 'CLR' deletes the last character and holding it the entire address field. See FIG. 1Y.

In the Mail-Send-Msg - Character Mode the user can send the message by entering in the subject and message fields. The soft keys are for space, period, backward and forward. 'END' will proceed to the message field. 'CLR' deletes the last character and holding it the line. 'RCL' and 'SND' do nothing. See FIG. 1Z.

In the Mail-Send-Msg-End - Character Mode the user enters the message body. The soft keys are for space, period, backward and forward. 'SND' will send the message. 'END' will prompt for save or delete the message showing 'SAV' and 'DEL' for the soft keys. 'RCL' will return to the subject field Mail-Send-Msg

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screen. 'CLR' deletes the last character and holding it the line. See FIG. 1AA.

In the Menu - Keypad Mode the user is given a menu options to scroll through and select the highlighted option by pressing 'SEL' The options are 'SET-UP, SECURITY, TRAIN, RECOGNIZER, STOCKS, WEATHER, FLIGHTS.' 'END' returns to the Phone screen. 'RCL','CLR' and 'SND' do nothing. See FIG. 1BB.

In the Menu-Setup-Train - Character Mode the user is prompted for each number and letter and the user then prints it on the pad and is prompted for the next letter. When all numbers and letters have been entered the user is returned to the Phone screen. 'CLR' clears the character just entered so that it can be re-entered 'RCL' returns to the previous character to retrain it. 'SND' does nothing. See FIG. 1CC.

In the Menu-Stocks - Keypad Mode - Stock quotes are displayed. The display can scroll. 'END' returns to Phone screen. 'RCL','CLR' and 'SND' do nothing. See FIG. 1DD.

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In the Menu-Flights - Character Mode the user prints flight number and presses 'SND' to display flight information. 'END' returns to the Menu Screen. See FIG. 1EE.

In the Menu-Flights-Snd - Keypad Mode the communications device calls the network and displays flight information. 'END' returns to Phone screen. 'RCL','CLR' and 'SND' do nothing. See FIG. 1FF.

In the Find - Character Mode the user prints the first character of a name to look for and the display shows the name from the phone list. The user can also scroll if desired. 'DEL' goes to the Book-Del screen. 'CHG' goes to the Book-Chg screen. 'INF' goes to the Book-Inf screen. 'SND' dials that person's phone number. 'END' returns to the Phone screen. 'RCL' and 'CLR' do nothing. See FIG. 1GG.

The Mail - Keypad Mode displays the current unread messages that have arrived followed by any saved messages. New messages are preceded with "NEW:" and saved messages with "SAVED." The user can scroll through the message and read the next or previous message by pressing 'NEXT' or 'PREV.' 'SAVE' will save the

message and 'MORE' will display more softkey options: ('RPLY', 'FWRD', 'DEL', 'BACK'). 'RPLY' will proceed to the Mail-Read-Rply screen to reply to the mail. 'FWRD' to the Mail-Read-Fwrd screen to forward to a fax machine. 'DEL' to the Mail-Read-Del screen to delete the mail and 'BACK' to display the previous softkey options. 'END' returns to the Phone screen. 'RCL' and 'CLR' do nothing. See FIG. 1HH.

It is to be understood that the above-described arrangements are only illustrative of the application of the principles of the present invention. Numerous modifications and alternative arrangements may be devised by those skilled in the art without departing from the spirit and scope of the present invention and the appended claims are intended to cover such modifications and arrangements.

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CLAIMS

What is claimed and desired to be secured by United States Letters Patent is:

Sub a'

1. Apparatus for entering data into an electronic device comprising:

a touch input device being electrically coupled to the electronic device and having a programmable surface wherein a plurality of zones in the programmable surface are each programmed to independently transfer input from each of the plurality of zones in the surface area to the electronic device;

a light emitting means electronically coupled to the touch input device for selectively emitting light in the plurality of zones of the programmable surface to thereby distinguish the plurality of zones from each other;

said electronic device receiving electronic data from the touch input device based on contact with the touch input device; and

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a display for displaying information from a memory of the electronic device according to electronic data signals received from the touch input device, thereby enabling a user to view information contained in the memory of the electronic device.

2. Apparatus of Claim 1 wherein the touch input device comprises a means for character input wherein a first zone is programmed for character recognition when predetermined contact patterns are placed on the touch input device.

3. Apparatus of Claim 2 wherein the first zone comprises a programmable means to customize for a particular user the predetermined contact patterns for character recognition.

4. Apparatus of Claim 1 wherein the touch input device comprises a means for character input wherein a second zone comprises contact sensitive input keys that correspond to graphical designations on the programmable surface.

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5. Apparatus of Claim 4 wherein the contact sensitive input keys are programmed to recognize key mapping of alpha zones disposed within numeric keypads.

6. Apparatus of Claim 1 wherein the touch input device comprises a third zone of function keys that remain constant regardless of programming in the plurality of zones.

7. Apparatus of Claim 1 wherein the touch input device comprises a means for character input wherein contact sensitive input keys are configured for audible feedback upon contact with the contact sensitive input keys.

8. Apparatus of Claim 1 wherein the touch input device comprises a means for character input wherein contact sensitive input keys are configured for visual feedback upon contact with the contact sensitive input keys.

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9. Apparatus of Claim 8 wherein the visual feedback of the contact sensitive input keys comprises a light emitted from the input keys upon contact with the contact sensitive input keys.

10. Apparatus of Claim 1 wherein the touch input device comprises a means for character input wherein contact sensitive input keys are configured for tactile feedback upon contact with the contact sensitive input keys.

11. Apparatus of Claim 1 wherein the touch input device comprises a security means programmed into the programmable surface of the electronic device.

12. Apparatus of Claim 11 wherein the security means comprises a gesture/symbol verification program on the programmable surface of the touch input device.

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13. Apparatus of Claim 11 wherein the security means comprises a signature verification program on the programmable surface of the touch input device.

14. Apparatus of Claim 1 wherein the touch input device comprises a means for mode sensitive lighting that is zone dependent, wherein each zone has lighting indicative of a particular zone mode.

15. Apparatus of Claim 1 wherein the touch input device comprises a circuit board that is separated from the touch input device.

16. Apparatus of Claim 1 wherein the touch input device comprises a finger sensing device for managing power resources, wherein finger pressure/contact on the touch input device activates the electronic device.

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17. Apparatus of Claim 1 wherein the touch input device comprises a two-sided touchpad, the two-sided touchpad having a mouse mode on a first side and a dial mode on a second side.

18. Apparatus of Claim 1 wherein the touch input device comprises a scroll key for menu driven memory access, the scroll key for signaling the electronic device and displaying contents of the electronic device memory.

19. Apparatus of Claim 1 wherein the electronic device is selected from the group consisting of microwave ovens, VCRs, medical equipment, lab equipment, and wireless radios.

20. Apparatus for entering data into a communication device comprising:

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a display for displaying data contained in a memory of a communication device according to electronic data that is entered into the communication device;

a touch input device having a programmable surface wherein a plurality of zones in the programmable surface are each programmed for selectively entering data into the communication device, the plurality of zones being programmed independent from one another;

said electronic device being electrically coupled to the touch input device and receiving electronic data from the touch input device based on signals generated at the touch input device; and

wherein the plurality of zones are color coded to distinguish between each of the plurality of zones.

21. Apparatus for entering electronic data into a memory of an electronic device comprising:

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a surface having indicia disposed thereon, the surface being coupled to electronic circuitry configured to respond to physical contact upon the surface;

said electronic circuitry dynamically configured according to the physical contact upon the surface, the electronic circuitry sending electronic signals to the electronic device, the electronic signals corresponding to the location of the contact upon the surface and thereby signaling the electronic device according to the location of the contact upon the surface; and

a display for displaying selective contents of the memory of the electronic device, the contents selected based on the location of contact on the surface.

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ABSTRACT OF THE DISCLOSURE

A touchpad input device which can be incorporated into a variety of devices requiring input from a human user and which is particularly suited for incorporation into a portable communication device.

a:\T5889 Patent Application.wpd

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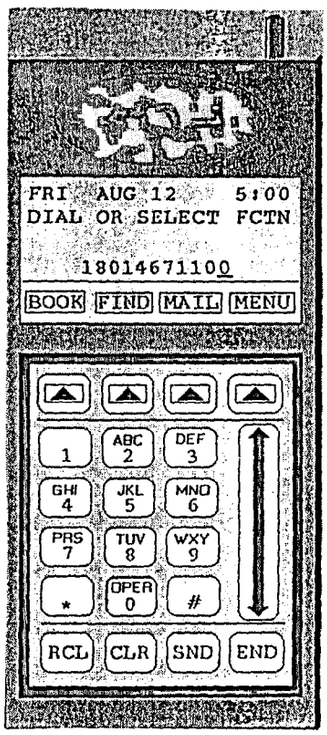


Fig. 1

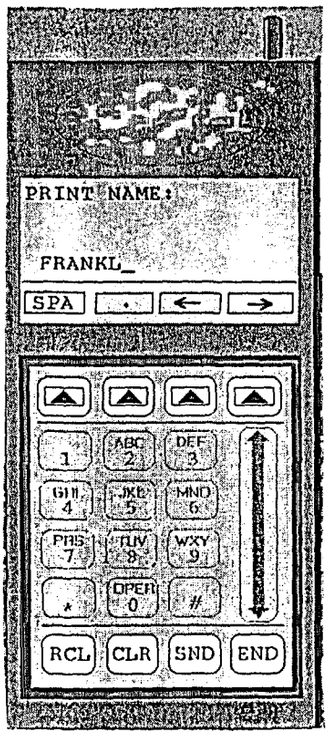


Fig. 1 A

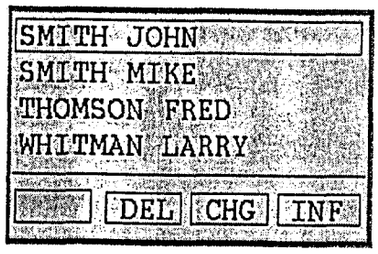


Fig. 1B

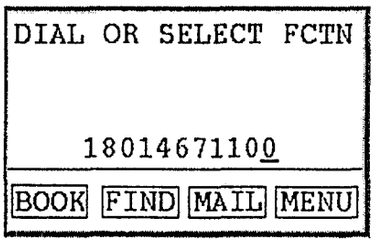


Fig. 1C

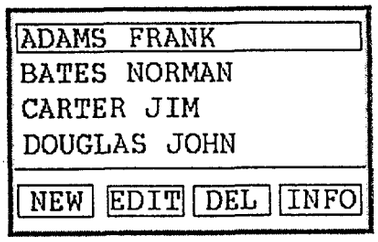


Fig. 1D

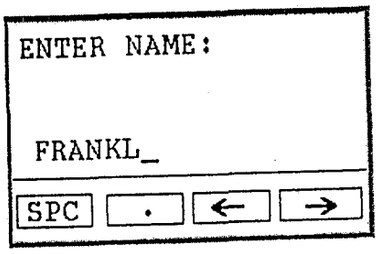


Fig. 1E

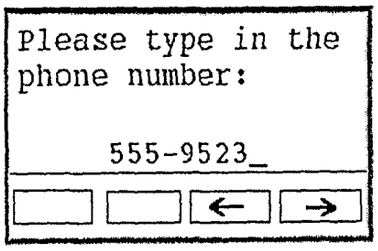


Fig. 1F

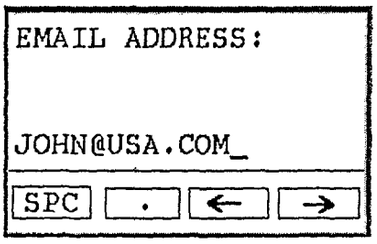


Fig. 1G

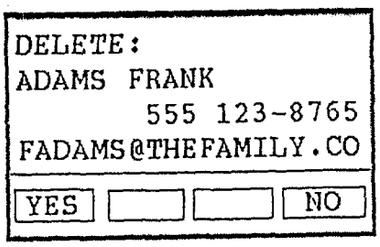


Fig. 1H

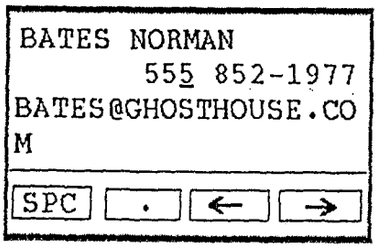


Fig. 1I

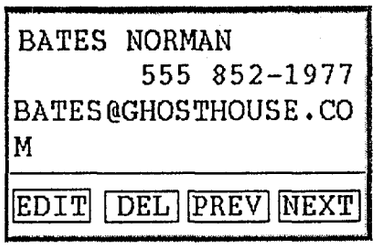


Fig. 1J

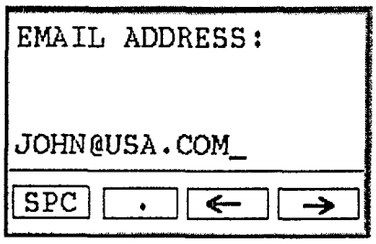


Fig. 1K

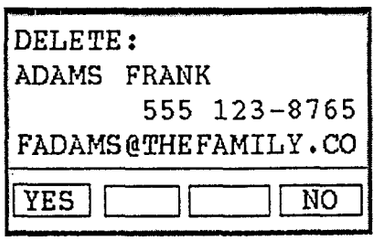


Fig. 1L

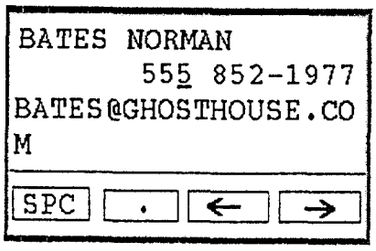


Fig. 1M

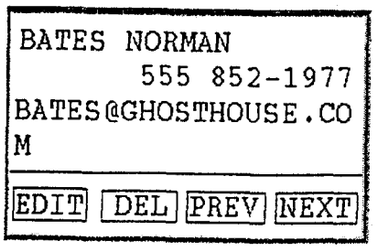


Fig. 1N

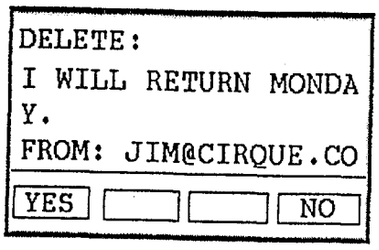
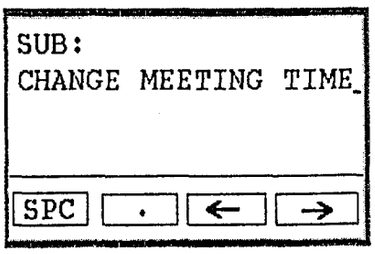


Fig. 1O



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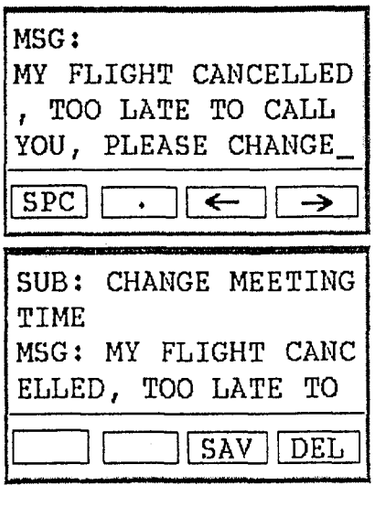
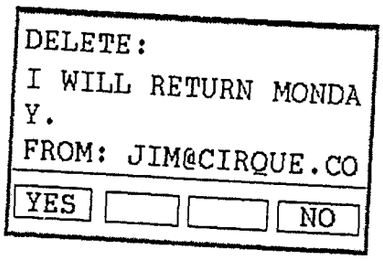


Fig. 1Q



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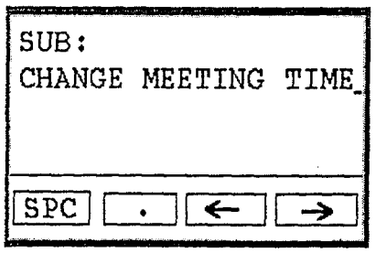
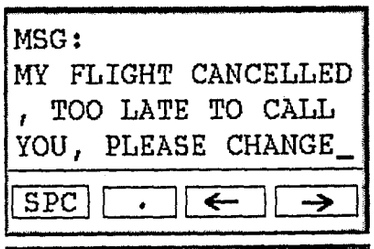
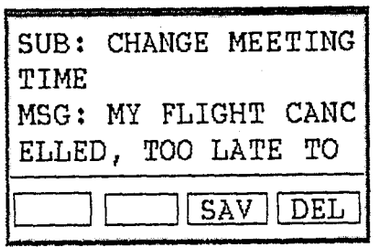


Fig. 1S





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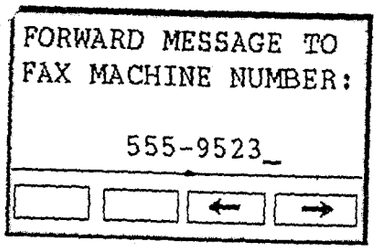


Fig. 1U

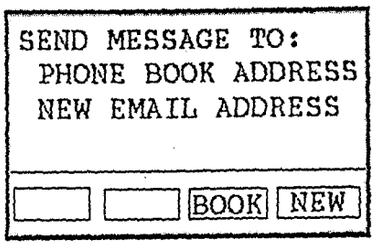
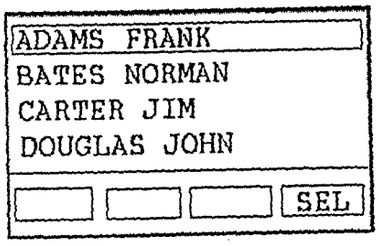


Fig. 1V



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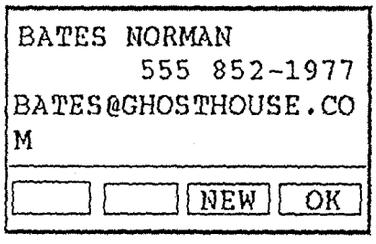
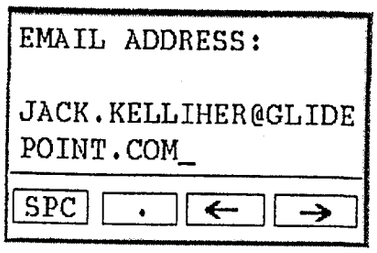


Fig. 1X



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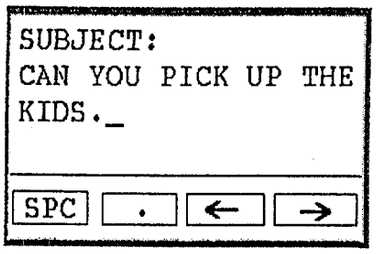
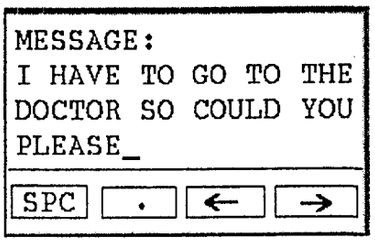


Fig. 1Z



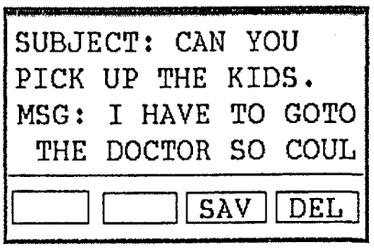


Fig. 1AA

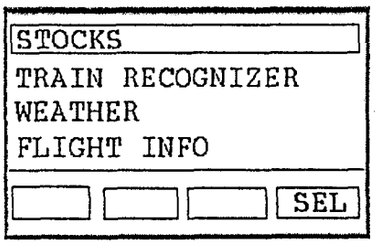


Fig. 1BB

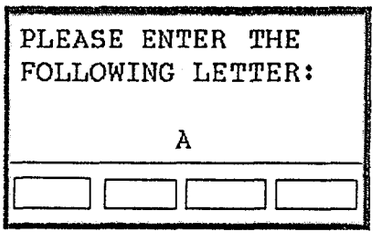


Fig. 1CC

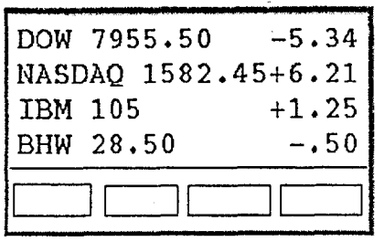


Fig. 1DD

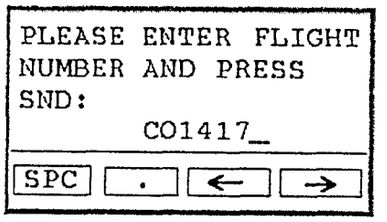


Fig. 1EE

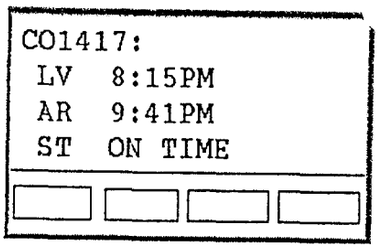
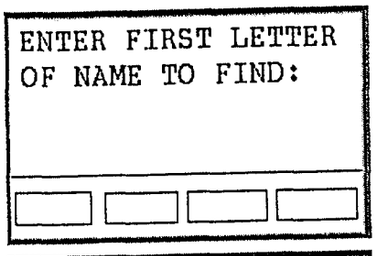


Fig 1FF



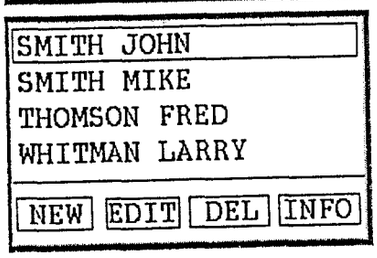
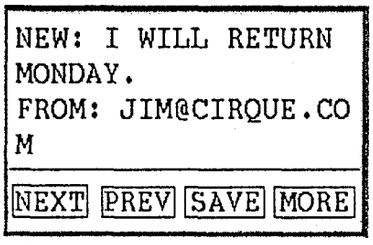


Fig. 1GG



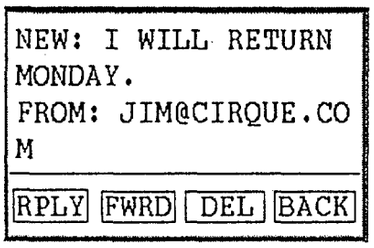


Fig. 1HH

Fig. 2A

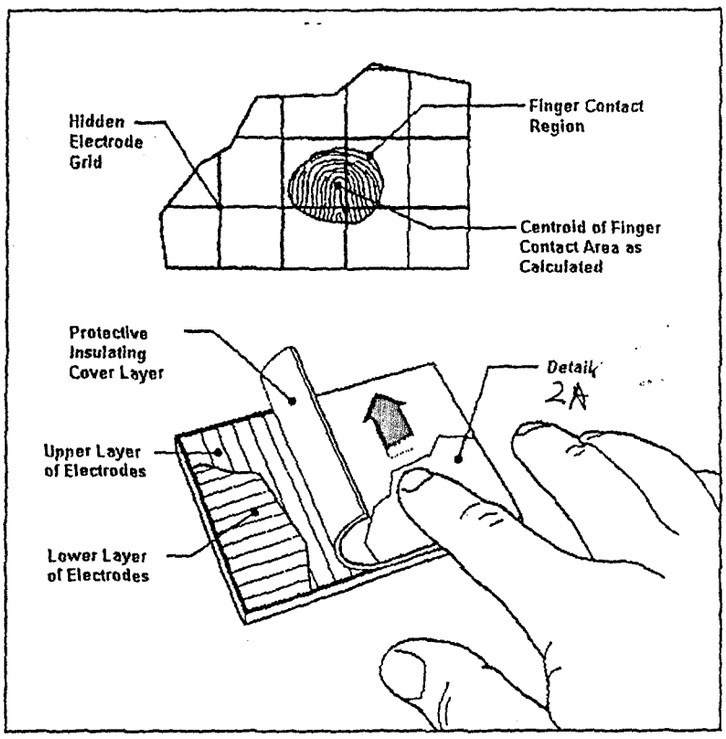


Fig. 2

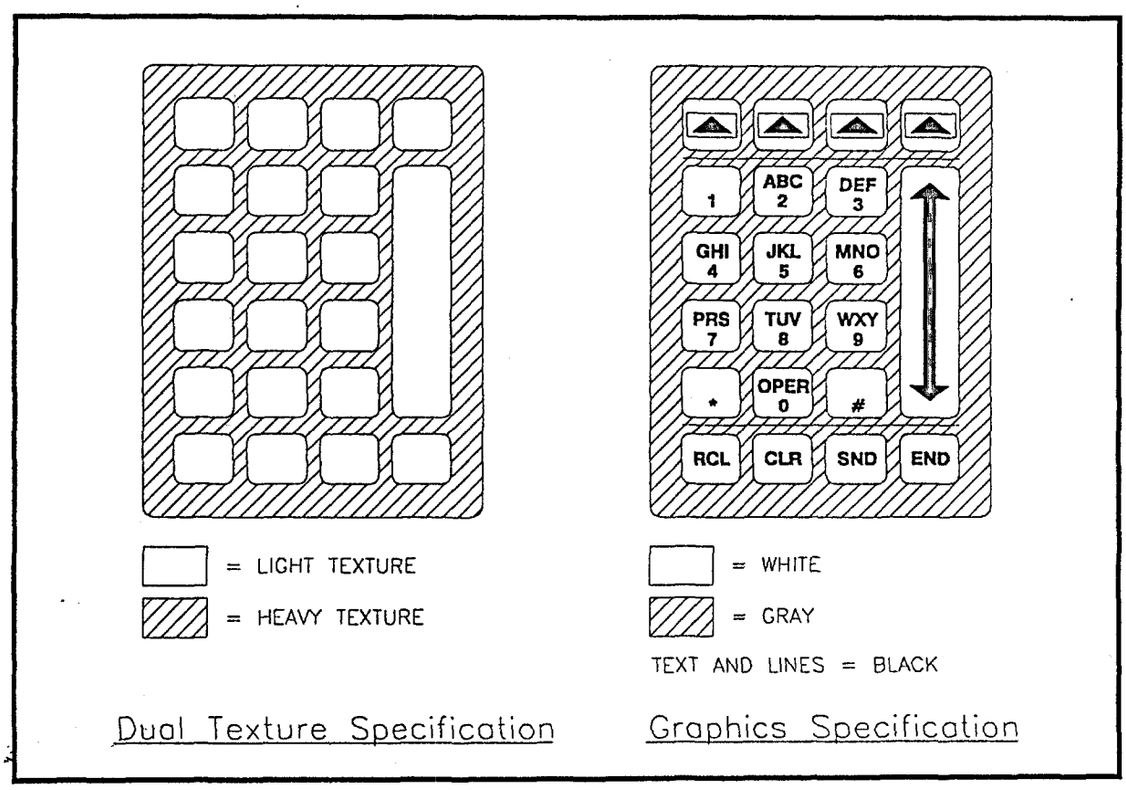
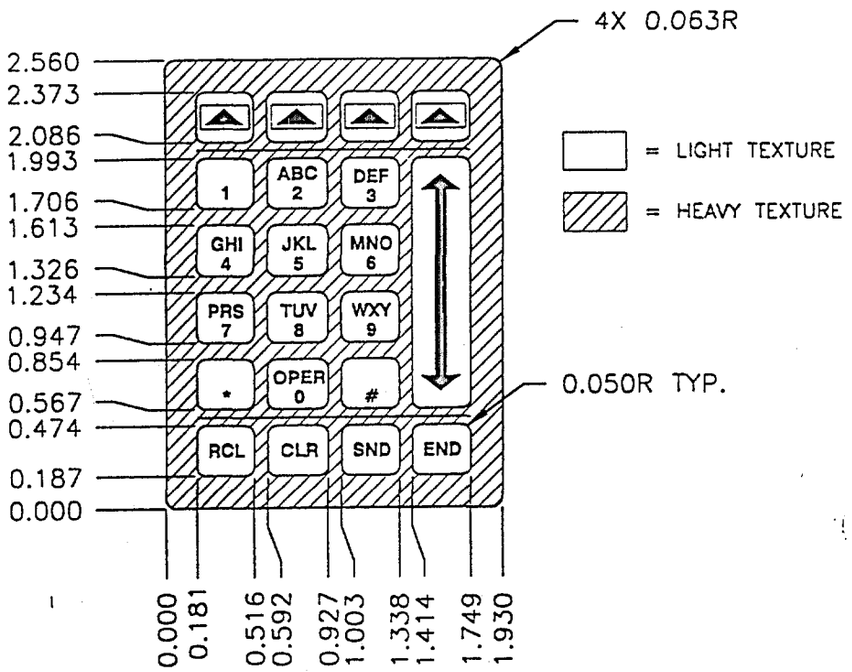


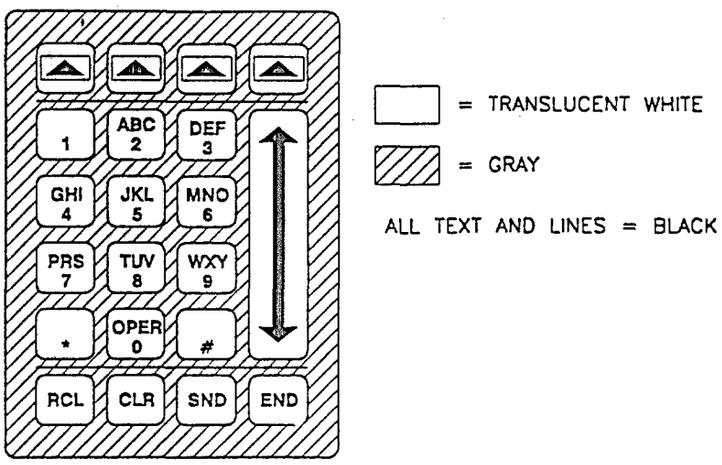
Fig 3A

Fig 3B



TEXTURE SPECIFICATION

Fig. 3C



COLOR SPECIFICATION

Fig. 3D

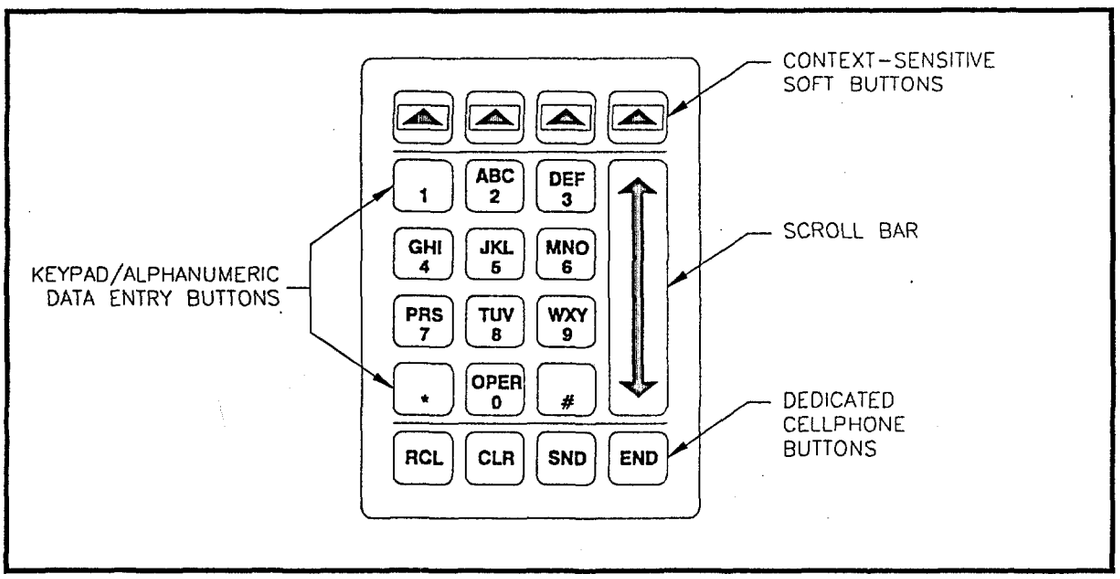


Fig. 4A

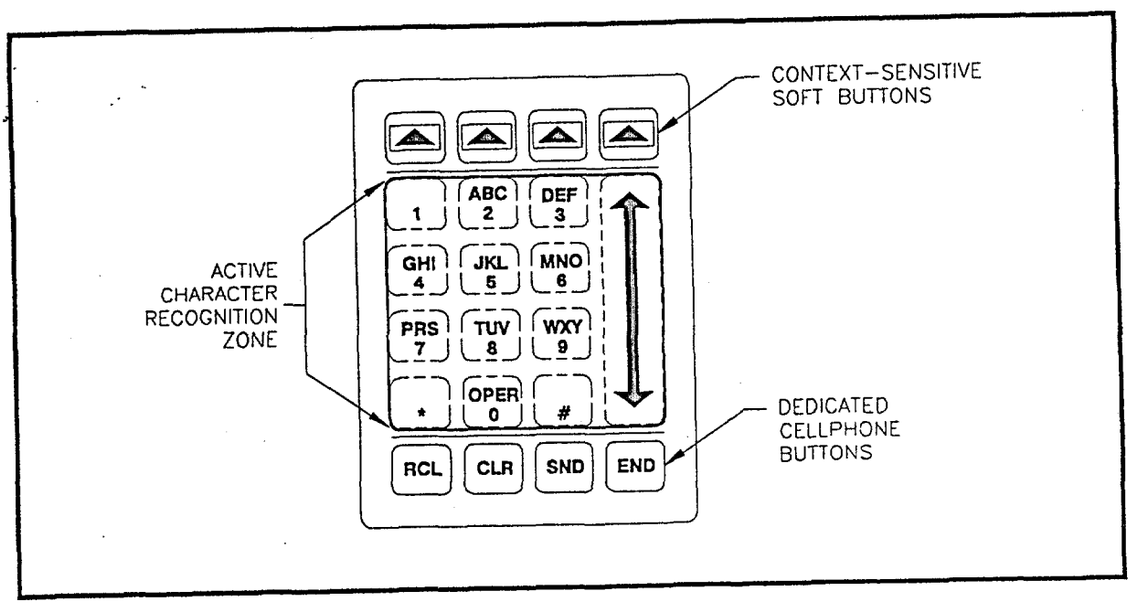


Fig. 4B

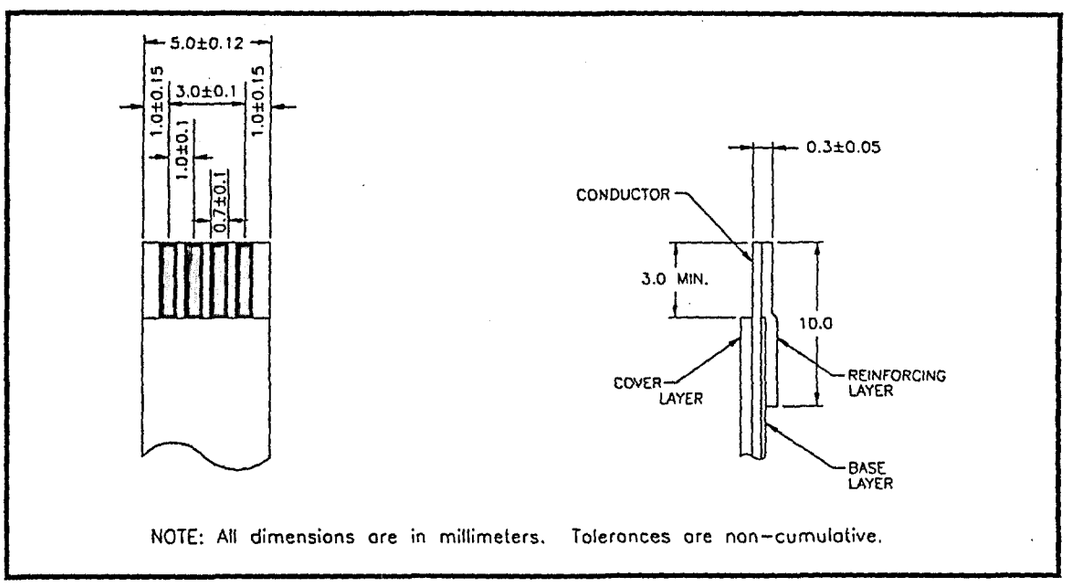
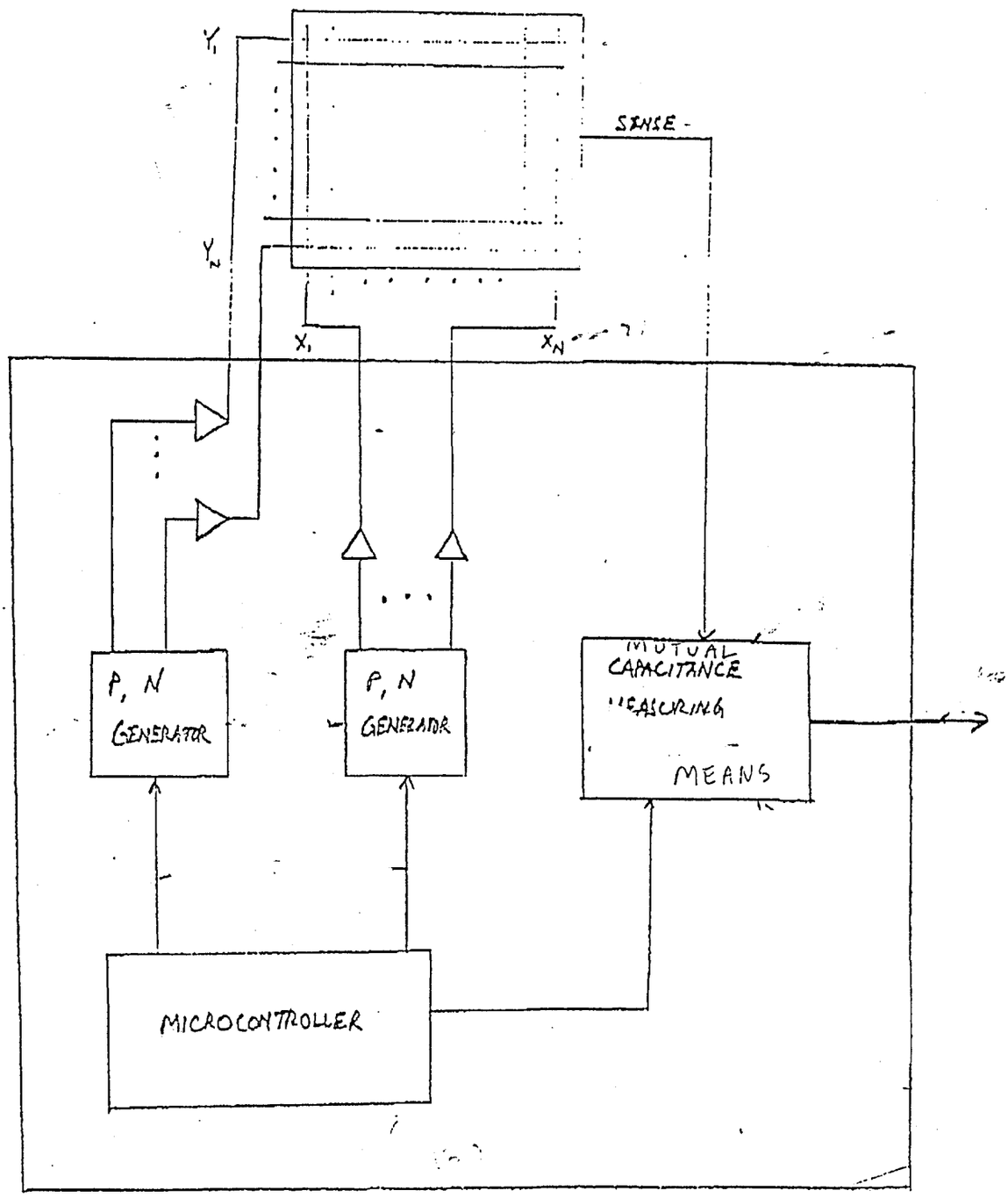


Fig. 5



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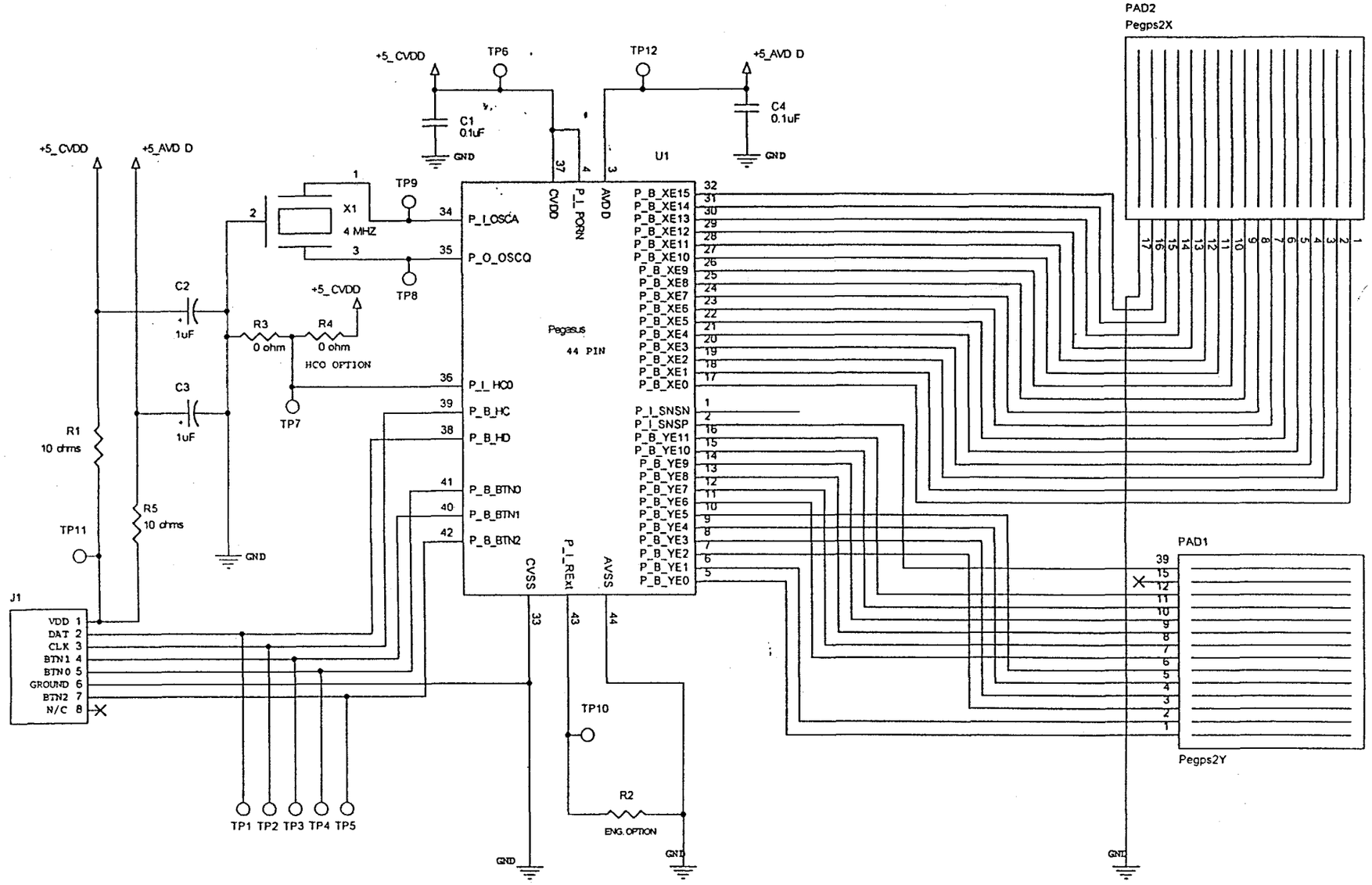
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C1
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C4
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X1
4 MHZ
TP9
TP8
C2
1uF
R3
0 ohm
R4
0 ohm
HCO OPTION
C3
1uF
TP7
R1
10 ohms
R5
10 ohms
TP11
Pegasus
44 PIN
P_I_OSCA
P_O_OSCO
P_I_HCO
P_B_HC
P_B_HD
P_B_BTN0
P_B_BTN1
P_B_BTN2
CVDD
P_I_PORN
AVDD
CVSS
P_I_REXT
AVSS
P_B_XE15
P_B_XE14
P_B_XE13
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P_B_XE11
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P_B_XE8
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P_B_XE4
P_B_XE3
P_B_XE2
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P_B_XE0
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P_I_SNSP
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P_B_YE7
P_B_YE6
P_B_YE5
P_B_YE4
P_B_YE3
P_B_YE2
P_B_YE1
P_B_YE0
PAD1
Pegps2Y
J1
VDD 1
DAT 2
CLK 3
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N/C 8
TP1 TP2 TP3 TP4 TP5
TP10
R2
ENG.OPTION

Fig. 7

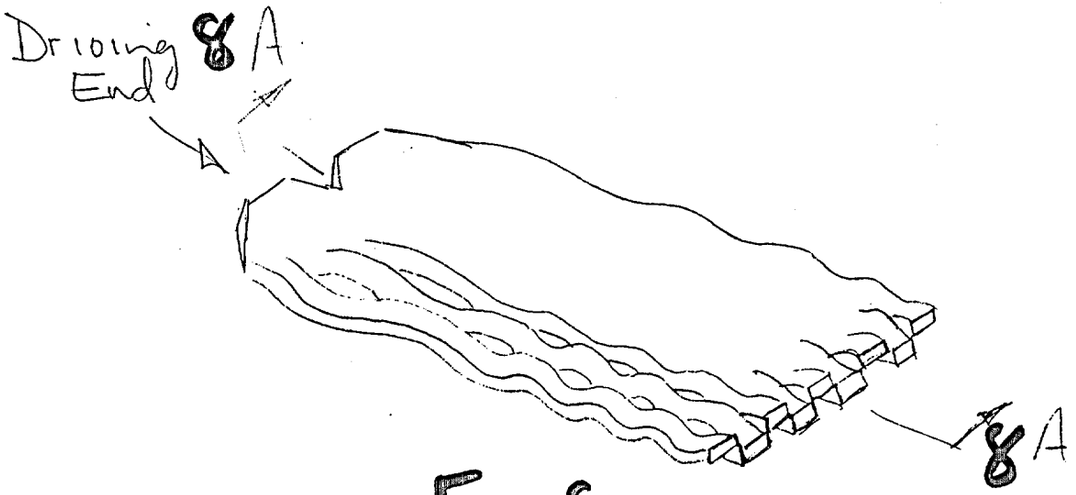

Fig 8

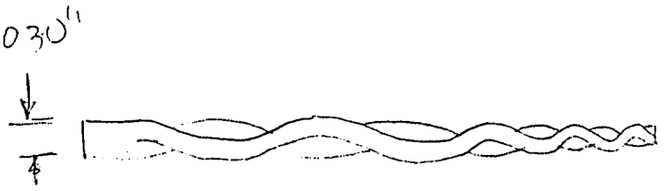

Fig. 8A

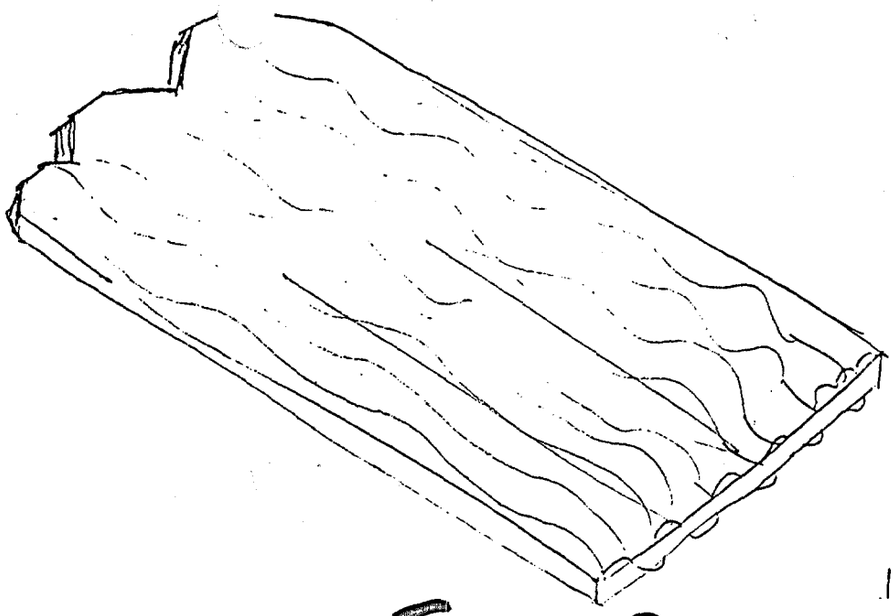

Fig. 8B

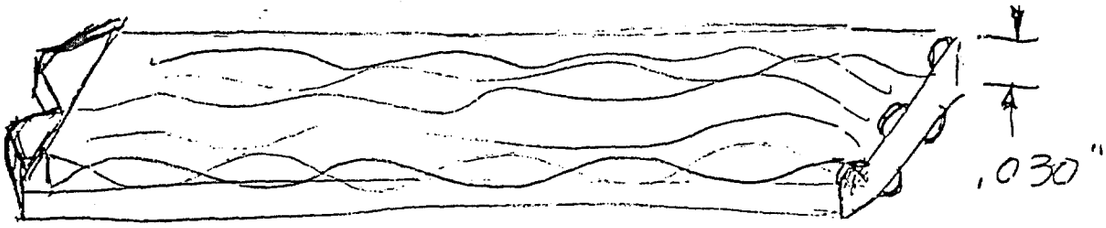

Fig. 8C

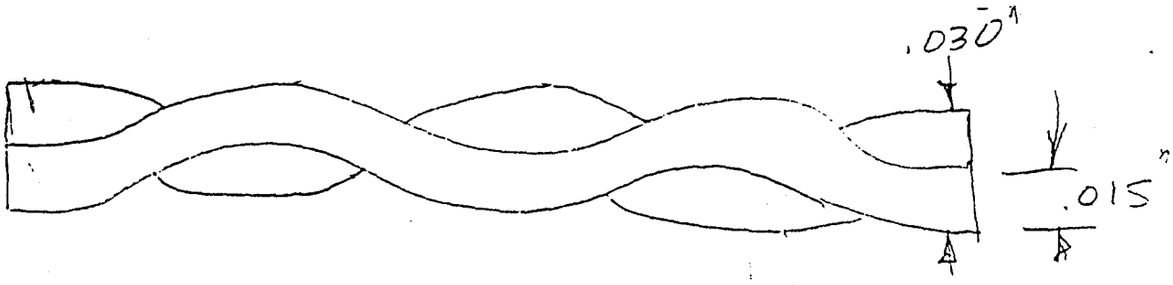

Fig. 8D

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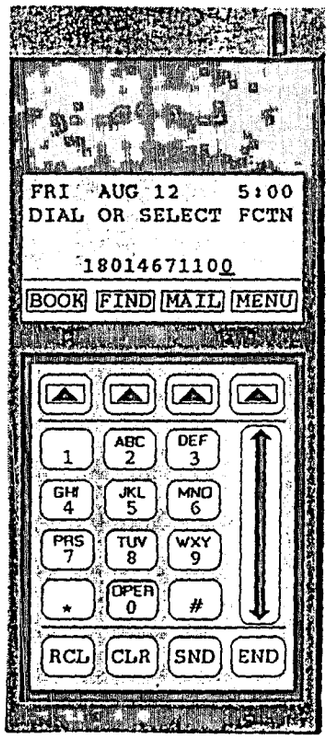

Fig. 1

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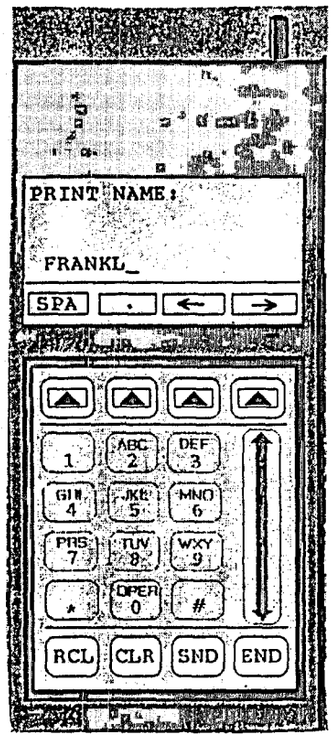

Fig. 1 A

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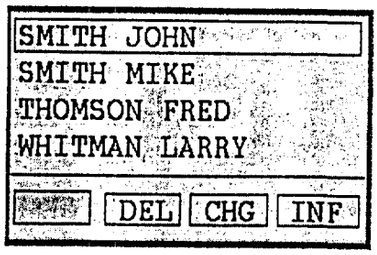

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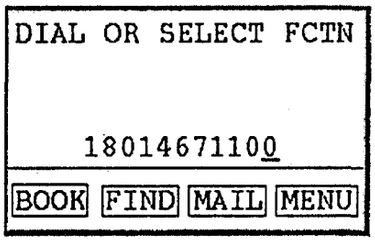

Fig. 1C

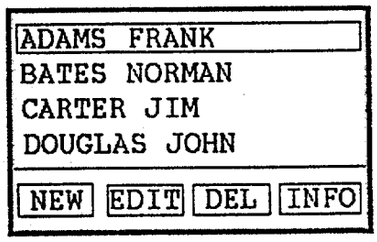

Fig. 1D

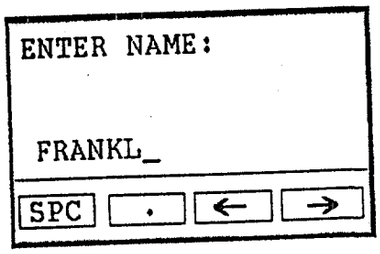

Fig. 1E

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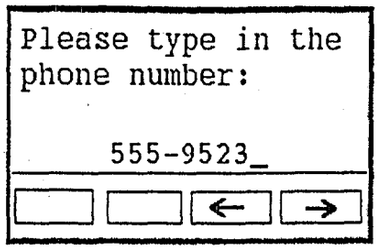

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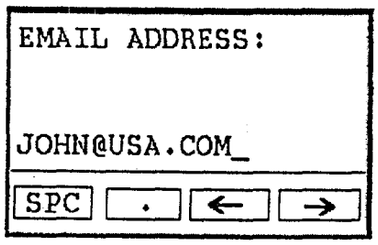

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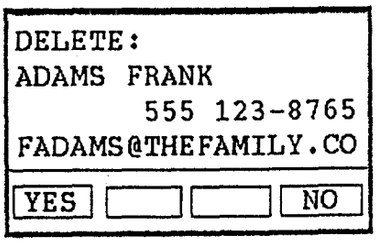


Fig. 1H

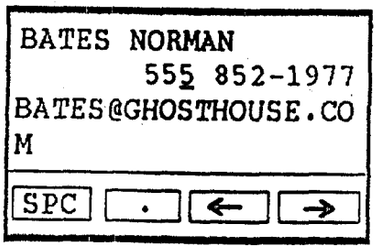


Fig. 1I

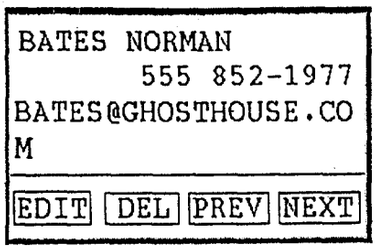


Fig. 1J

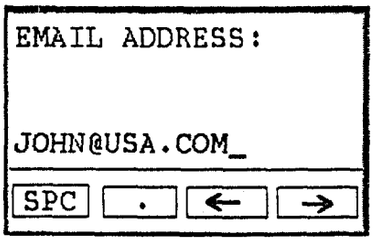
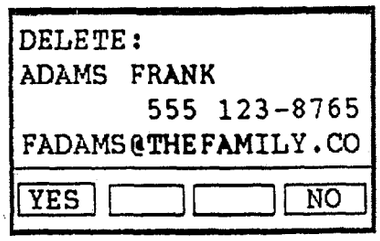


Fig. 1K



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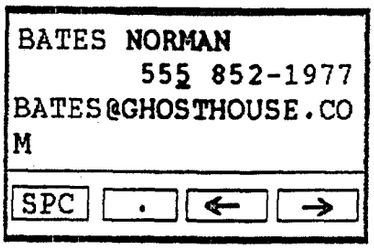

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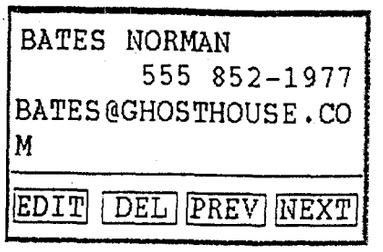

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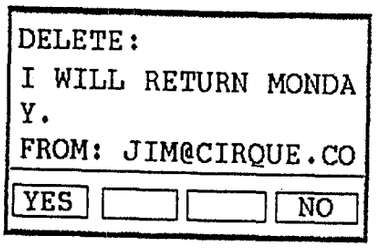
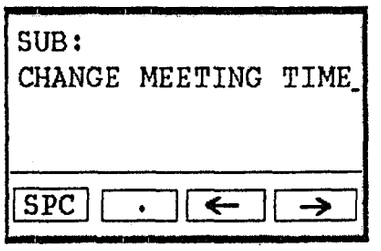


Fig. 1O



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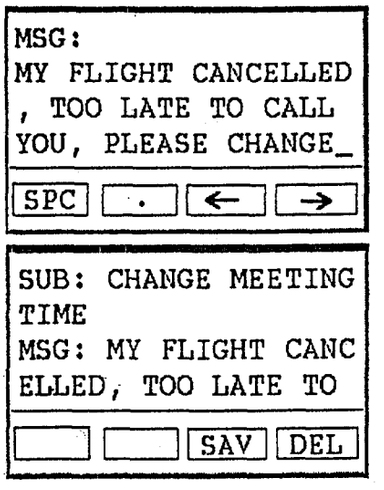

Fig. 1Q

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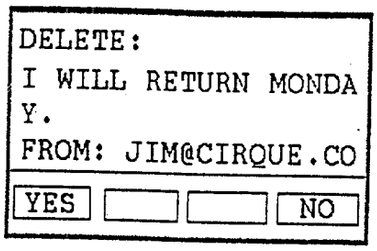

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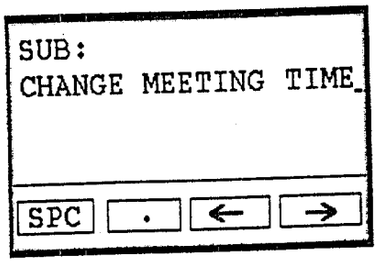

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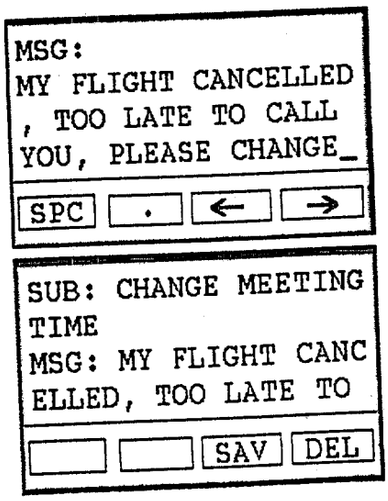

Fig. 1T

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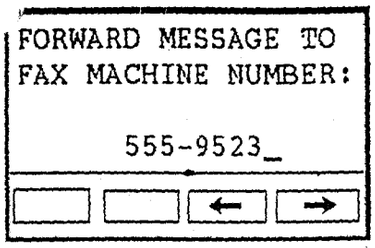

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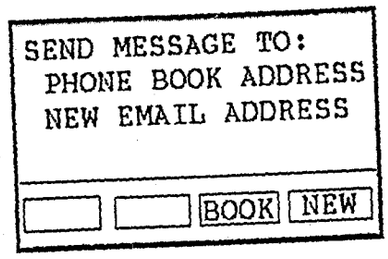

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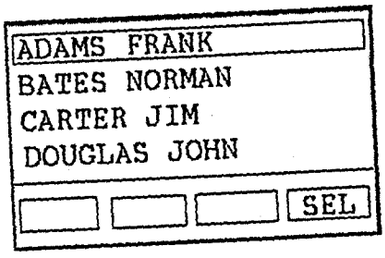

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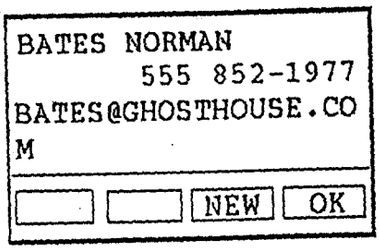

Fig. 1X

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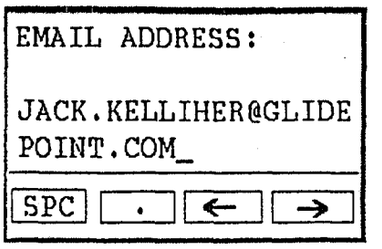


Fig. 11

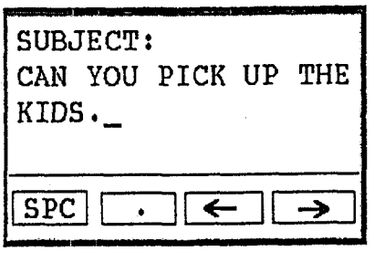
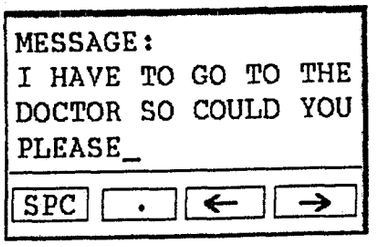


Fig. 12



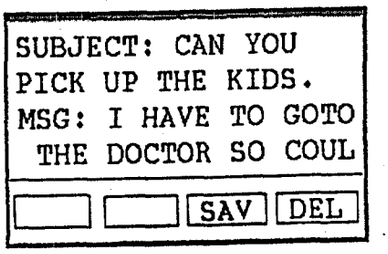


Fig. 11A

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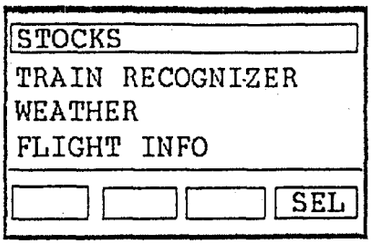
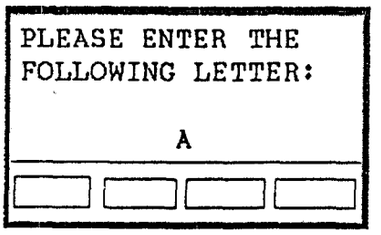


Fig. 1BB



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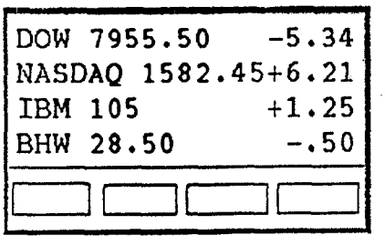

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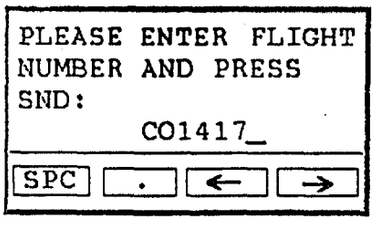

Fig. 1EE

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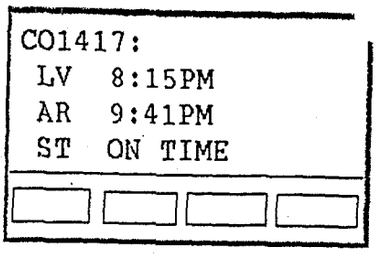

Fig 1FF

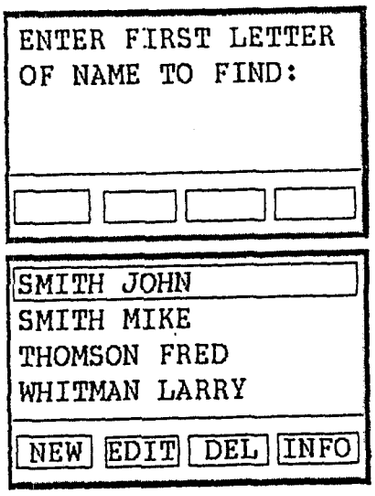

Fig. 1GG

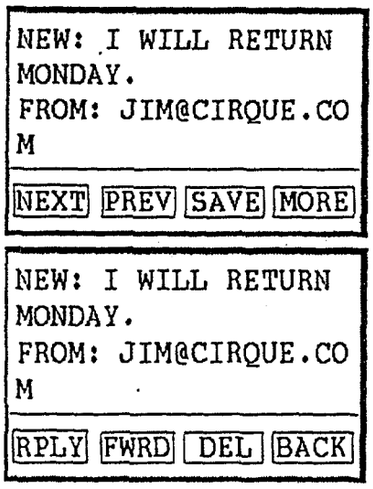

Fig. 1HH

PRINT OF DRAWINGS
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Fig. 2A

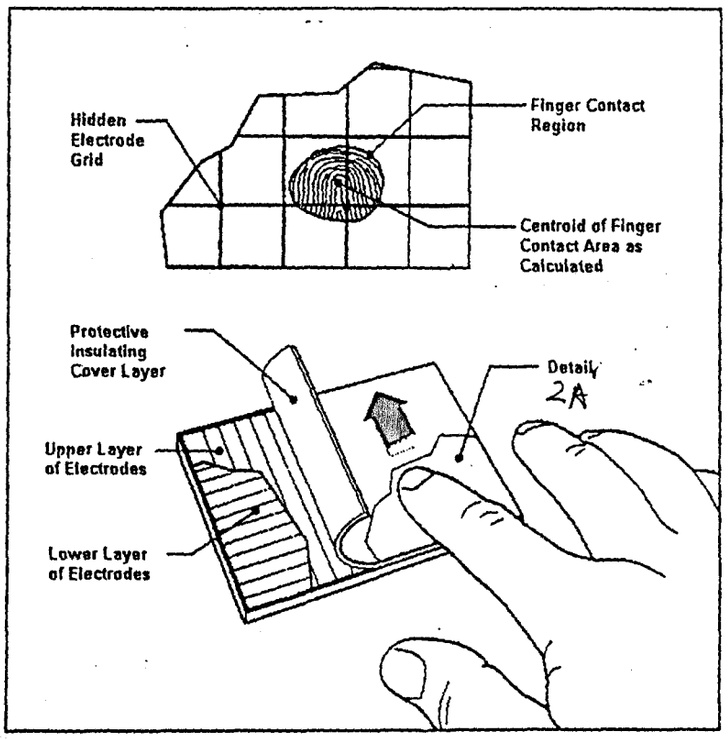

Fig. 2

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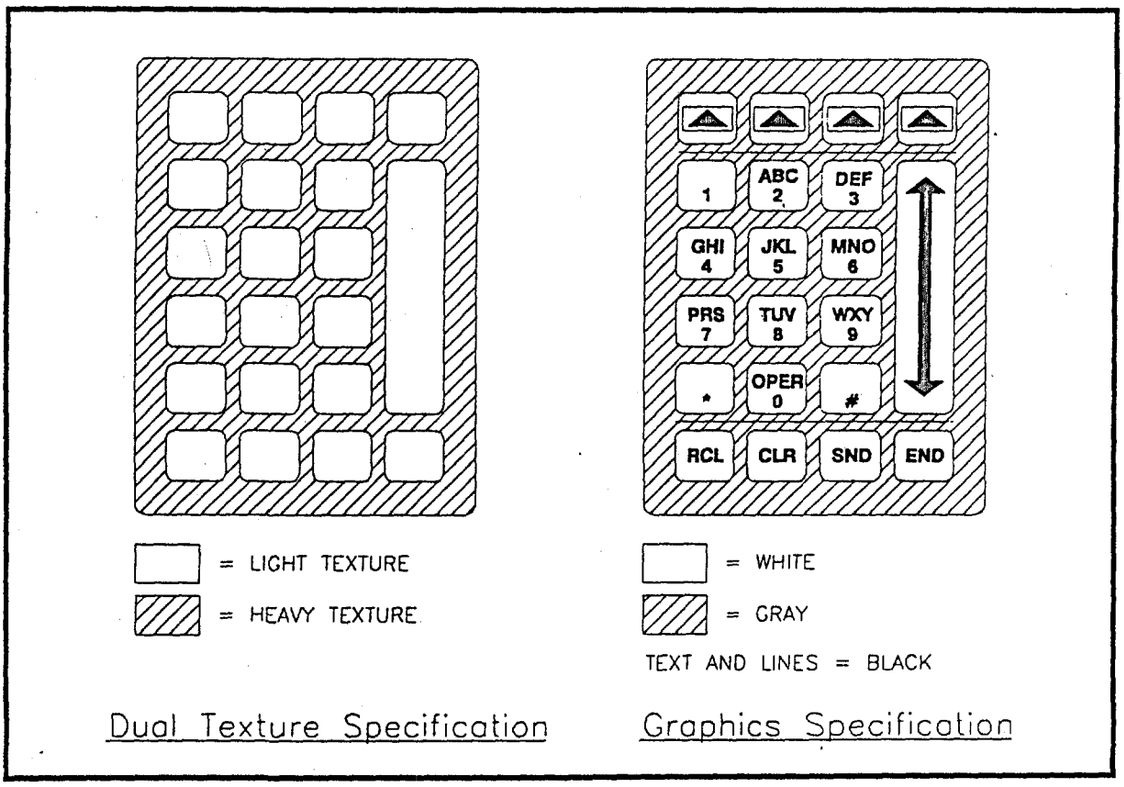

Fig 3A

Fig 3B

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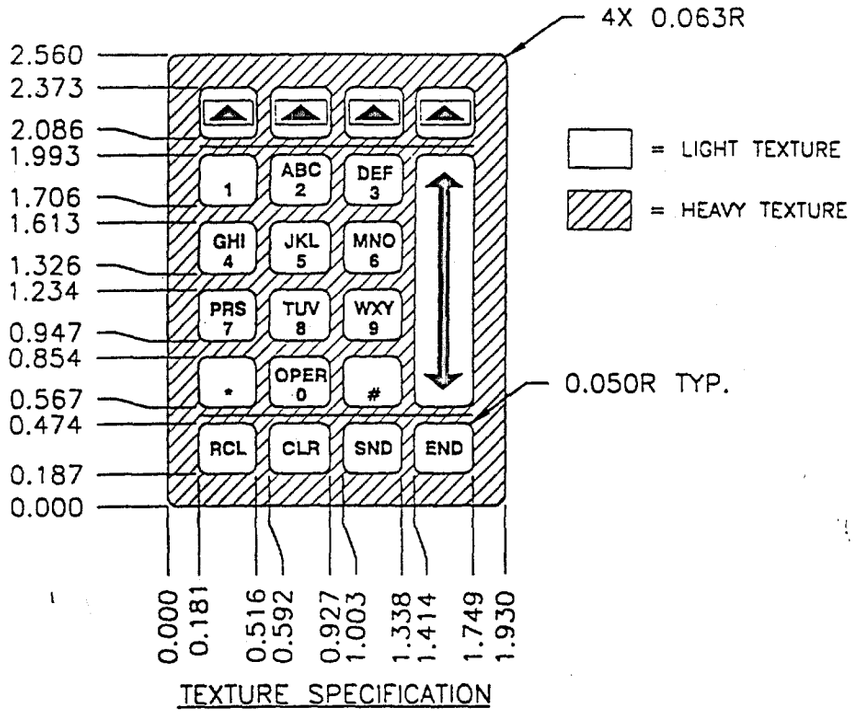
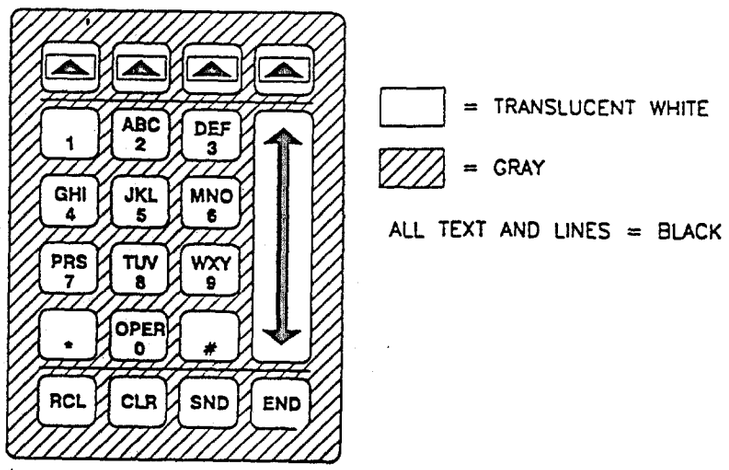


TEXTURE SPECIFICATION

Fig. 3C



COLOR SPECIFICATION

Fig. 3D

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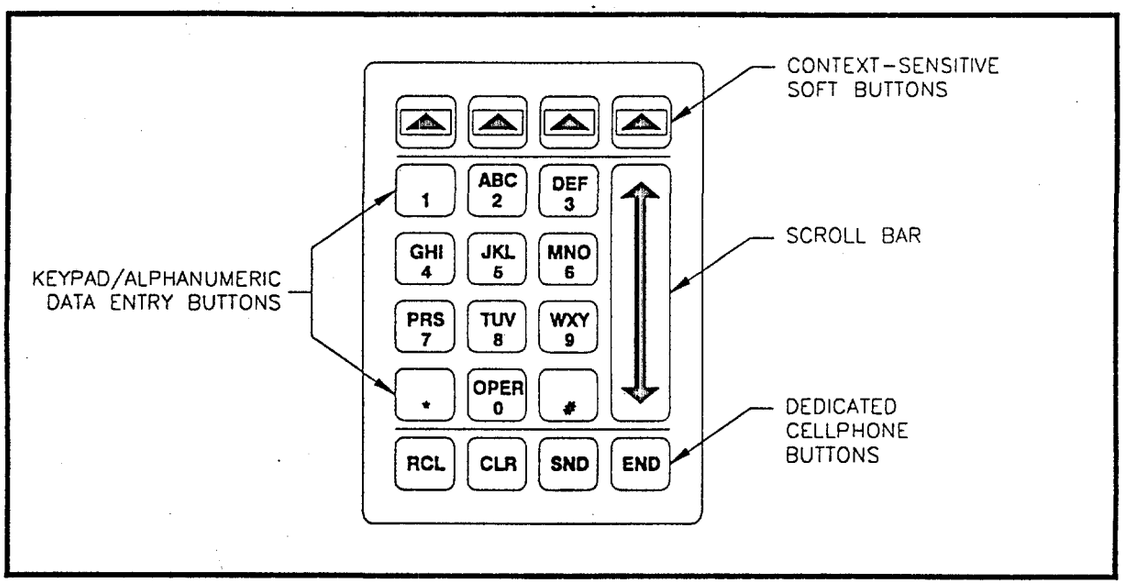

Fig. 4A

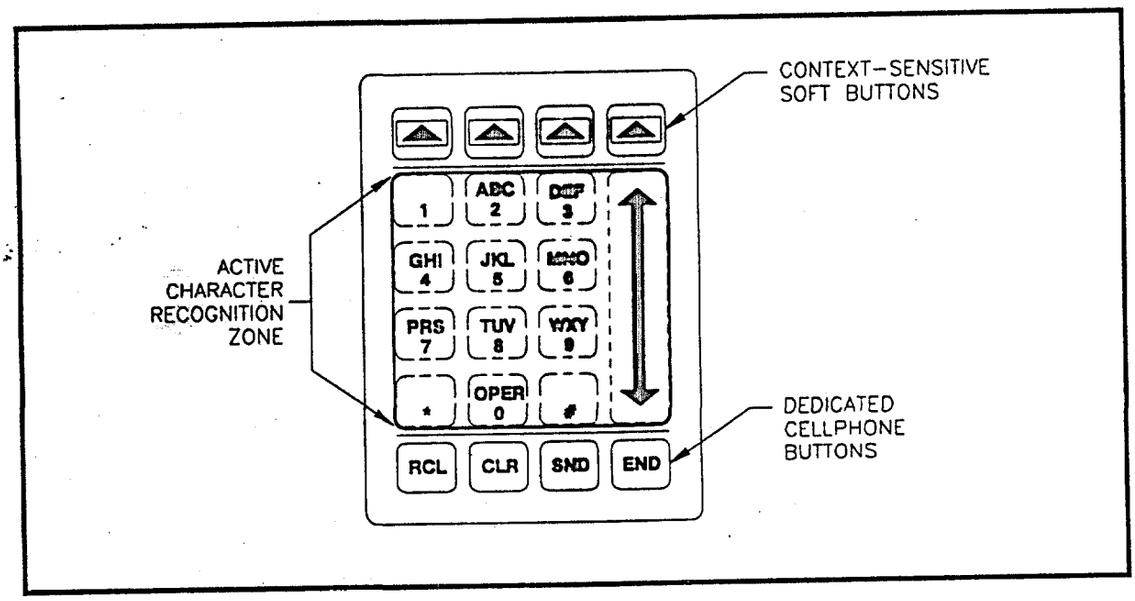

Fig. 4B

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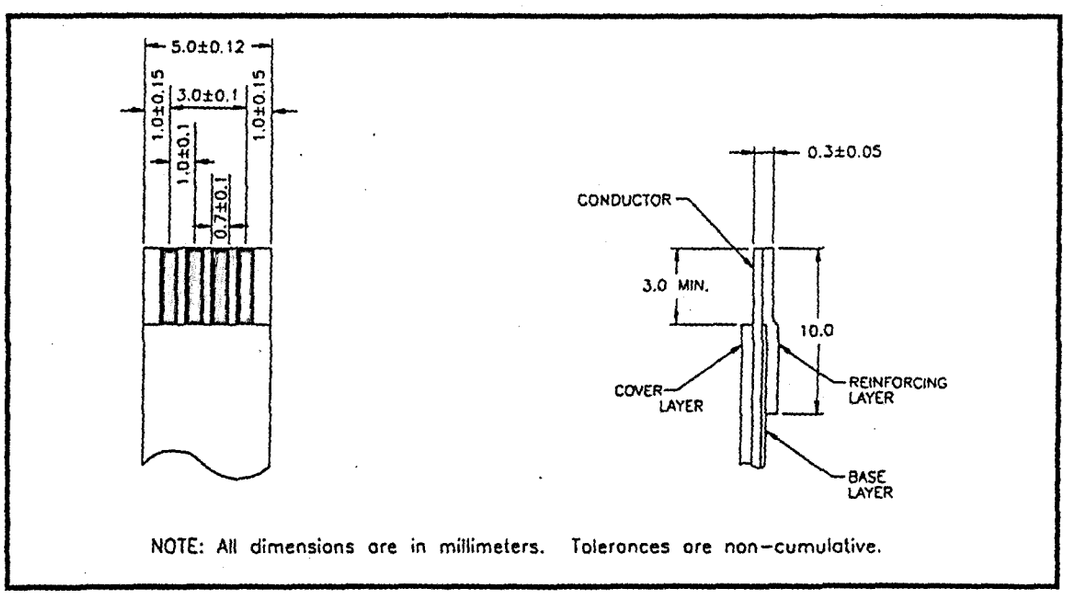

NOTE: All dimensions are in millimeters. Toleronces are non-cumulative.

Fig. 5

PRINT OF DRAWINGS
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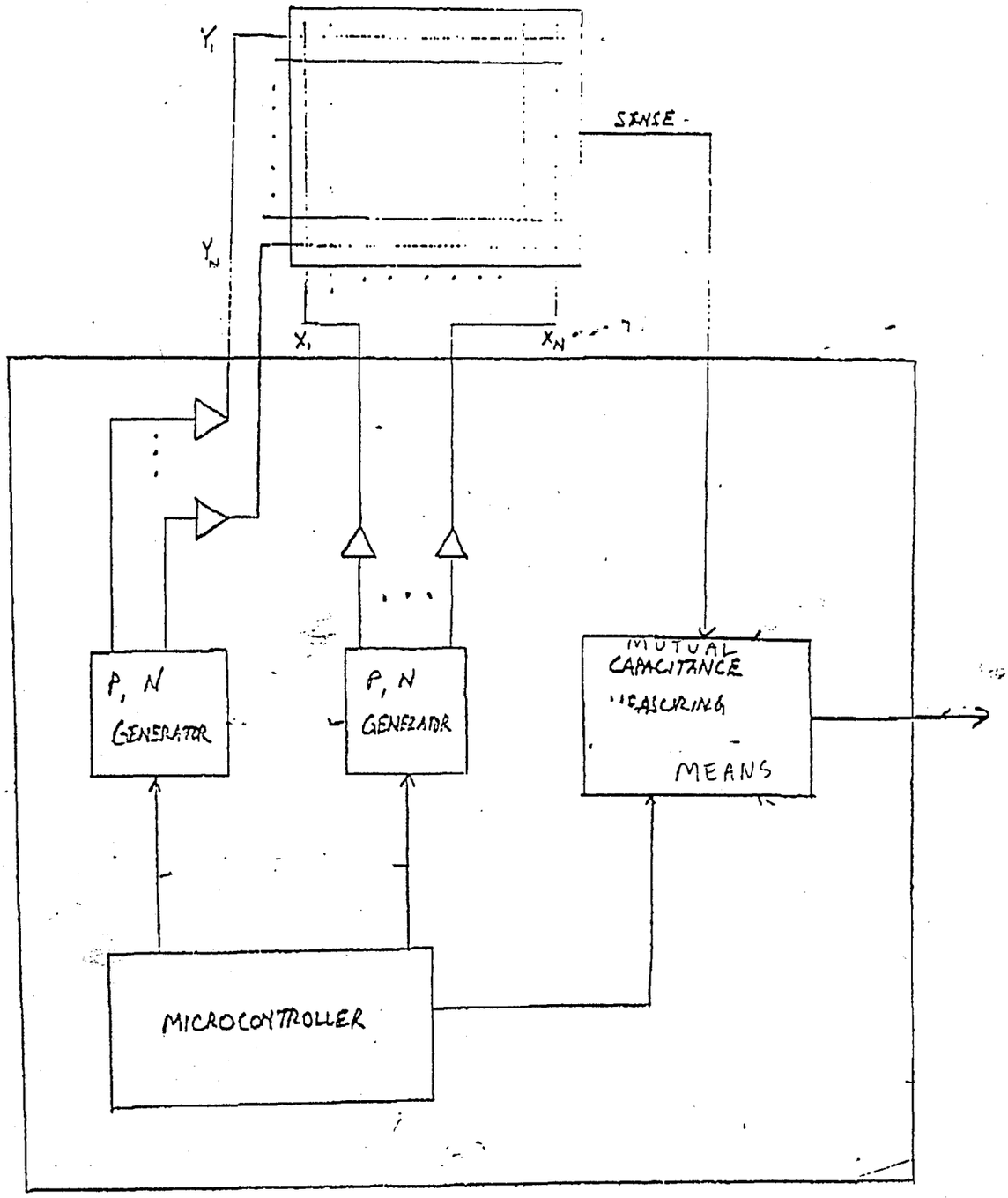

Fig. 6

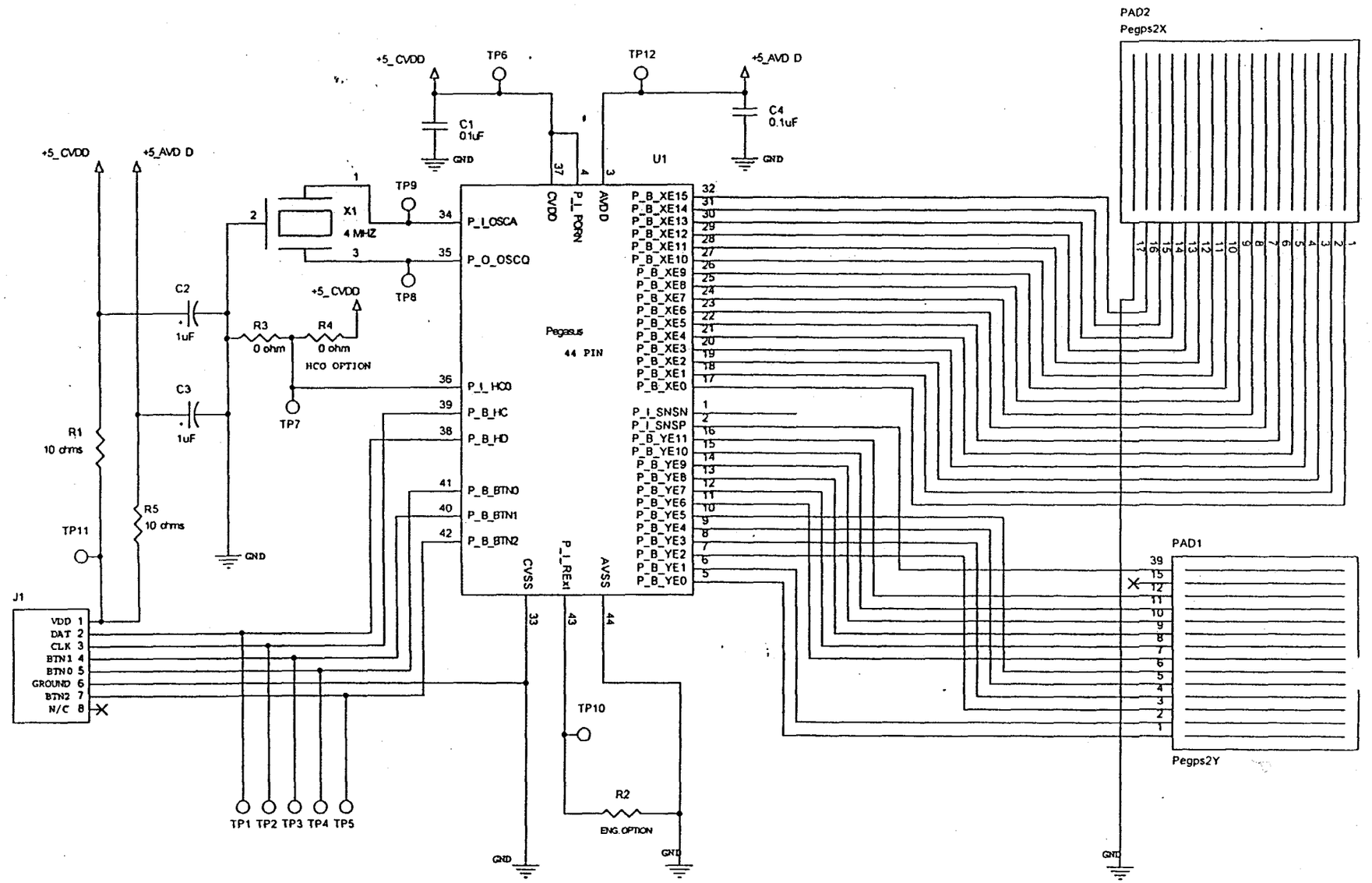

Fig. 7

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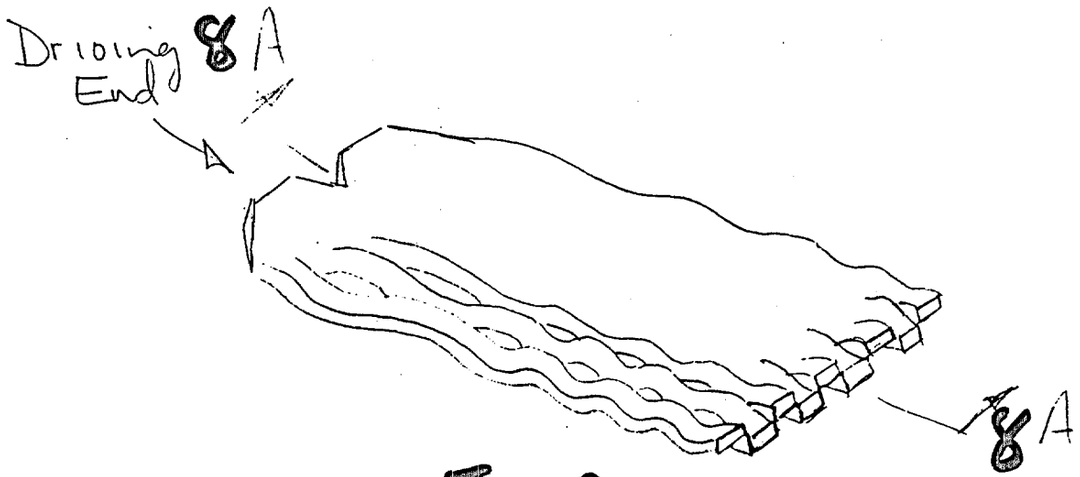

Fig 8

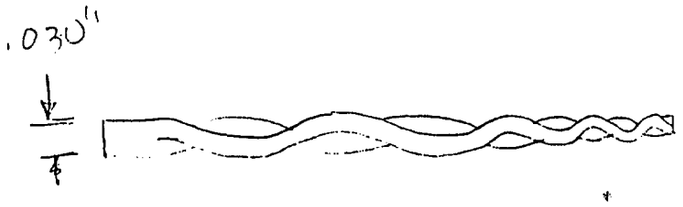

Fig. 8A

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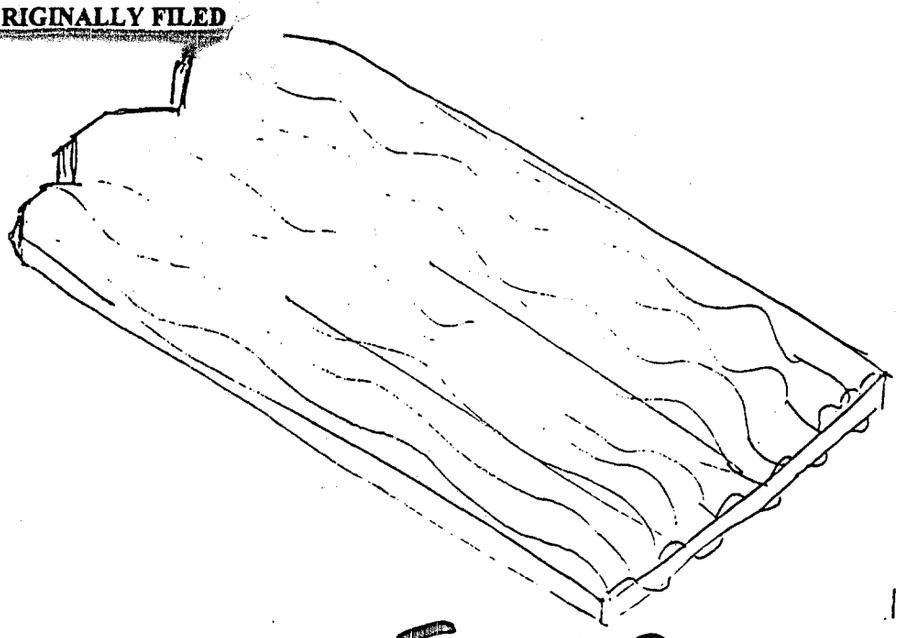

Fig. 8B

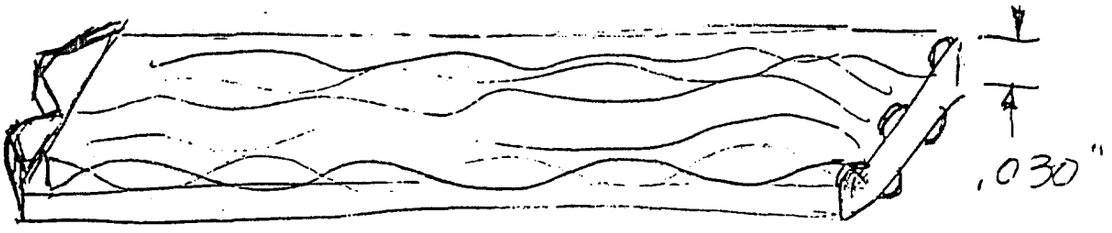

Fig. 8C

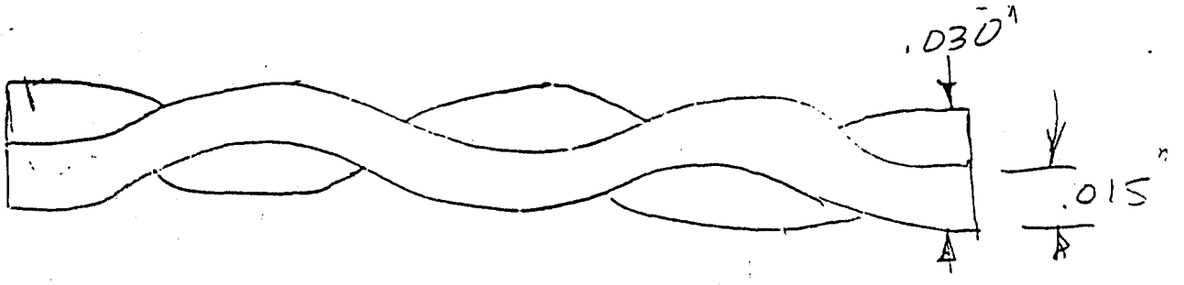

Fig. 8D