



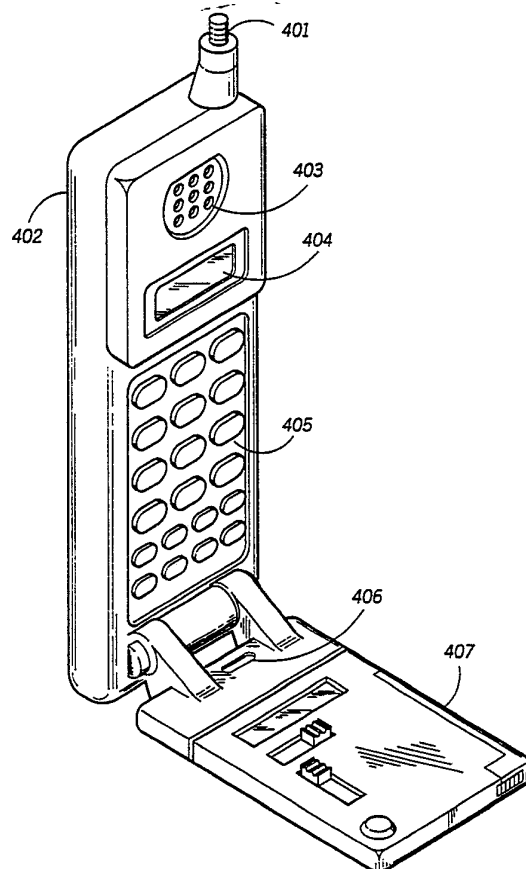
INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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<p>(21) International Application Number: PCT/US91/00752 (22) International Filing Date: 5 February 1991 (05.02.91) (30) Priority data: 489,123 5 March 1990 (05.03.90) US (71) Applicant: MOTOROLA, INC. [US/US]; 1303 East Algonquin Road, Schaumburg, IL 60196 (US). (72) Inventors: POWELL, Michael, W. ; 2850 Black Pine Court, Lantana, FL 33436 (US). FERNANDEZ, Sergio ; 1226 Barnstaple Circle, West Palm Beach, FL 33474 (US). McKEE, John, M. ; 1236 Hillsboro Mile B1-204, Hillsboro Beach, FL 33062 (US).</p>		<p>(74) Agents: INGRASSIA, Vincent, B. et al.; Motorola, Inc., Intellectual Property Dept., 1500 N.W. 22nd Avenue, Boynton Beach, FL 33426-8753 (US). (81) Designated States: AT (European patent), BE (European patent), CA, CH (European patent), DE (European patent), DK, DK (European patent), ES (European patent), FI, FR (European patent), GB (European patent), GR (European patent), IT (European patent), JP, KR, LU (European patent), NL (European patent), NO, SE (European patent).  <b>Published</b> <i>With international search report.</i></p>

(54) Title: RADIO TELEPHONE WITH SECONDARY CHARGING CAPABILITY

(57) Abstract

A radio frequency system where in combination, a radio telephone (105, 402) is powered by a first energy source (301) and a selective call receiver (106, 407) is powered by a second energy source (314). The devices in combination function interdependently as a coupled unit or independently as separate units. The combination comprises a regulator (312) for charging the second energy source (314) with power that is provided by the first energy source (301) and communication interface (313, 315) for transferring information between the radio telephone and the selective call receiver.



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## RADIO TELEPHONE WITH SECONDARY CHARGING CAPABILITY

## Field of the Invention

This invention relates in general to radio telephones and more particularly to a portable radio telephone having a detachable selective call receiver.

5

## Background of the Invention

Communication systems typically use a transmitter that broadcasts a signal for reception by a receiver. The signal that is broadcast by the transmitter is used to convey  
10 information to a receiver that is selected by decoding an address corresponding with the targeted receiver. In a radio telephone system, the radio telephone user addresses other radio telephone units or land-line telephones by entering a telephone number that corresponds to the phone system address  
15 of the user to be contacted. Once the connection is complete, two way voice or data communications can take place. In the case where data reception is desired, the information must be received via a modem then presented to the user. This is typically not practical when using a portable cellular radio  
20 telephone because the modem and data terminal required results in a physical inconvenience (more equipment to carry) and added expense to the user. In existing cellular radio telephone systems, the high cost of initiating or receiving a call at the cellular unit has prevented many potential users  
25 from subscribing to cellular services.

The existing infrastructure used by cellular service operators cannot directly accommodate standard selective call paging. Presently, cellular carriers are hesitant to support changes in their system's operation, signalling protocol, or  
30 frequency allocations to support a lower revenue service (paging) in their network. This position relegates the consumer to a decision of paying for an unnecessarily expensive system (cellular radio telephone) or compromising their communication requirements by giving up two way

communication capability with the choice of paging. The subscription cost to a paging service is significantly lower than that of a cellular radio telephone service.

Paging systems typically use a receiver that has at least one unique selective call address. This receiver is commonly referred to as a selective call receiver or pager. When a pager receives and decodes its address, the pager typically alerts the user to the presence of incoming information and operates to present this information. Paging systems are an excellent vehicle for delivering voice, numeric, alphanumeric or coded information to a subscriber.

Paging systems are designed to maximize the efficiency of air time by the selection of a coding scheme that allows "battery saving." Battery saving is typically characterized by the periodic on/off strobing of the decoding and receiving sections of a selective call receiver. This allows the battery life to be extended by reducing the average power consumption of the selective call receiver. Power or battery saving features are of special interest to paging receiver manufacturers. Market pressures keep driving the size of pagers down while energy storage technology (battery) manufacturers have been relatively slow to decrease the size of primary and secondary storage cells used to power pagers.

#### Summary of the Invention

In carrying out the above, there is provided in combination, a radio telephone powered by a first energy source and a selective call receiver powered by a second energy source, the combination comprising charging means for charging the second energy source with power provided by the first energy source and communication means for transferring information between the radio telephone and the selective call receiver.

## Brief Description of the Drawings

FIG. 1 is a system diagram of the radio telephone/selective call receiver system in accordance with the preferred embodiment.

FIG. 2A is a block diagram of a prior art radio telephone.

FIG. 2B is a block diagram of a prior art selective call receiver.

FIG. 3A is a block diagram of the radio telephone.

FIG. 3B is a block diagram of the selective call receiver.

FIG. 4 is an front isometric view of the radio telephone/selective call receiver unit.

FIG. 5A is an front isometric view of the articulated portion of the radio telephone/selective call receiver unit showing the selective call receiver attached.

FIG. 5B is an front isometric view of the articulated portion of the radio telephone/selective call receiver unit showing the selective call receiver detached.

## Description of a Preferred Embodiment

Referring to FIG. 1, the preferred embodiment of the radio telephone/selective call receiver system comprises a telephone 101 connected by the standard telephone network to a system controller 102 which oversees the operation of the radio frequency transmitter/receiver 103 and encodes and decodes the inbound and outbound addresses into formats that are compatible the the respective land line and cellular radio telephone addressing requirements. The system controller 102 can also function to encode paging messages for transmission by the radio frequency transmitter/receiver 103. Telephony signals are transmitted to and received from a radio telephone 105 by at least one antenna 104 coupled to the radio frequency transmitter/receiver 103. The radio frequency transmitter/receiver 103 may also be used to transmit paging messages to the selective call receiver 106.

Referring to FIG. 2A, a block diagram is shown of the battery 201 powered radio telephone. A radio frequency signal is received or transmitted by the antenna 202. The antenna is coupled to the receiver 203 and transmitter 204 by a diplexer  
5 205. The received signal is routed from the receiver 203 to the control circuitry 206 that recovers any information contained within the received signal. This recovered information is then used to activate the alert 207 (a ringer in the case of a cellular radio telephone) and after answering  
10 the call, sustain the connection. When a connection is completed, the user aurally communicates with the other party via the speaker 208 and a microphone 209. Recovered audio from the control circuitry 206 is routed to the speaker which converts electrical energy into acoustical energy thus  
15 enabling the user to hear any communications. The microphone 209 is used to convert acoustic energy into electrical energy for use by the control circuitry 206 in modulating the radio frequency carrier produced by the transmitter 204. The user may initiate a call by selecting the proper control 210 and  
20 dialing the number of the party to be contacted. When dialed, the number is presented on a display 211 to provide visual feedback for the user.

Referring to FIG. 2B, a block diagram is shown of the battery 212 powered selective call receiver. The selective  
25 call receiver operates to receive a signal via an antenna 213. The received signal is routed from the antenna 213 to the receiver 214. The receiver 214 demodulates the received signals using conventional techniques and forwards the demodulated signal to the control circuitry 215, which decodes  
30 and recovers information contained within the received signal. In accordance with the recovered information and user controls 216, the selective call receiver presents at least a portion of the information, such as by a display 217, and signals the user via a sensible alert 218 that a message has been  
35 received.

Referring to FIG. 3A, a block diagram is shown of the battery 301 powered radio telephone. A radio frequency signal is received or transmitted by the antenna 302. The antenna is

coupled to the receiver 303 and transmitter 304 by a diplexer 305. The received signal is routed from the receiver 303 to the control circuitry 306 that recovers any information contained within the received signal. This recovered  
5 information is then used to activate the alert 307 (a ringer in the case of a cellular radio telephone) and after answering the call, sustain the connection. When a connection is completed, the user aurally communicates with the other party via the speaker 308 and a microphone 309. Recovered audio  
10 from the control circuitry 306 is routed to the speaker which converts electrical energy into acoustical energy thus enabling the user to hear any communications. The microphone 309 is used to convert acoustic energy into electrical energy for use by the control circuitry 306 in modulating the radio  
15 frequency carrier produced by the transmitter 304. The user may initiate a call by selecting the proper control 310 and dialing the number of the party to be contacted. When dialed, the number is presented on a display 311 to provide visual feedback for the user. The battery 301 is connected to a  
20 regulator 312 that controls the power delivered to the selective call receiver's power source when the radio telephone is coupled with the selective call receiver. Information may be exchanged between the selective call receiver and radio telephone via a communication means. The  
25 communication means allows information exchange via an interface 313 that consists of conventional signal generating, encoding, and decoding means (eg. a serial data encoder/decoder), and a coupling means (eg. a physical contact, optical or acoustic transceiver, etc.). It is clear  
30 to one skilled in the art that the coupling means can be constructed in a variety of different ways using any media capable of carrying information transmissions.

Referring to FIG. 3B, a block diagram is shown of the battery 312 powered selective call receiver. The selective  
35 call receiver operates to receive a signal via an antenna 313. The received signal is routed from the antenna 313 to the receiver 314. The receiver 314 demodulates the received signals using conventional techniques and forwards the

demodulated signal to the control circuitry 315, which decodes and recovers information contained within the received signal. In accordance with the recovered information and user controls 316, the selective call receiver presents at least a portion of the information, such as by a display 317, and signals the user via a sensible alert 318 that a message has been received. The selective call receiver is able to exchange information (communicate) with the radio telephone by using an interface 315 capable of coupling to the interface 313 in the radio telephone.

Referring to FIG. 4, the front isometric view of the radio telephone/selective call receiver shows the antenna, radio telephone portion 402, loudspeaker 403, display 404, control pad 405 including a dialing keypad and associated operational controls, a microphone 406, and a removably detachable selective call receiver 407. Electrical contacts (not shown) located on the back of the radio telephone portion 402 of the unit are provided for charging the individual power sources contained within the radio telephone and the selective call receiver. Charging is accomplished by folding the lower articulated portion including the selective call receiver upward against the control pad 405 then inserting the folded unit into a charging apparatus (not shown). Alternatively, a portable power adapter can be coupled into a power jack located on the radio telephone portion 402 of the unit for charging or supplying external power.

Referring to FIG. 5A, the front isometric view of the articulated portion of the radio telephone/selective call receiver unit shows the attachment means 501 on which the articulated portion pivots when the complete unit is assembled. The top section 502 of the articulated portion of the radio telephone/selective call receiver unit contains the microphone 503 that is used by the radio telephone. The bottom section 504 comprises a selective call receiver with integral display means 505, function controls 506, and an alert transducer (not shown).

Referring to FIG. 5B, the front isometric view of the articulated portion of the radio telephone/selective call

receiver unit shows the selective call receiver 507 detached from the top section 502 of the articulated portion of the radio telephone/selective call receiver unit 508. Mechanical contacts 509 that reside within the retaining slot for the selective call receiver, provide a means for electrically connecting to and coupling electrical power from the radio telephone to contacts (not shown) located on the top of the selective call receiver. This power is used to replenish charge in the selective call receiver's power source. When the selective call receiver is detached from the radio telephone, a flap 510 is provided to protect the electrical contacts 509 as well as the rails that form the retaining slot. This flap 510 folds flat and locks against the retaining area. The means for transferring information 511 is implemented using an optical transmission link to avoid problems associated with mechanical contacts such as corrosion. The use of optical coupling in the shielded environment provided within the retaining slot between the radio telephone and selective call receiver units allows this system a much wider immunity to electromagnetic, acoustic, or mechanical vibration/shock interferences. The end result is a more reliable system.

The information that is transferred from the selective call receiver to the radio telephone can contain a phone number that was received in a message by the selective call receiver. This phone number can be used to automatically or by invoking a user controlled function, respond to the individual that sent the original message. In response to the message containing the phone number, the radio telephone generates a signalling sequence recognized by its system as a call initiation. This call means gives the user of the radio telephone/selective call receiver unit the ability to respond to messages containing phone numbers without manually entering the phone number received by the selective call receiver. Another advantage of this implementation of a call means in conjunction with the means for transferring information (or communication means) is that when the selective call receiver is disconnected from the radio telephone and a message is

received containing a telephone number, the user can respond to that or any other received messages having either phone numbers or referencing predetermined numbers contained within the memory of the radio telephone when they re-connect the selective call receiver to the radio telephone.

When disconnected, the selective call receiver 507 and radio telephone are fully functional as their own independent entities. This feature offers the user additional utility in that they may on occasion choose to carry only the radio telephone or selective call receiver 507. An example of this would be an executive that carries the complete unit in their briefcase would want to be in touch with his office. The executive could detach the selective call receiver 507 from the radio telephone, store the radio telephone in their locked briefcase, and carry the selective call receiver 507. Because the selective call receiver 507 is much less bulkier than the entire unit and offers a silent alerting (vibratory alert) message storage capability (this feature eliminates audible interruptions and allows the user to defer answering the message), the user is offered an increased level of convenience.

When the radio telephone and selective call receiver 507 units are connected, the energy source in the selective call receiver 507 is charged using power that is provided by energy source in the radio telephone. The radio telephone's energy source is coupled to a power regulator that limits the current and voltage to provide approximately a C/10 (read "C over ten", this denotes the capacity in amp•hours of a secondary energy source divided by 10.0) charging rate to the energy source in the selective call receiver 507. This effectively extends the useful life of the selective call receiver's 507 energy source until the time that the power regulator's input power drops below the level required to supply the required charging current and voltage at its output.

## CLAIMS

1. In combination, a radio telephone powered by a first energy source and a selective call receiver powered by a second energy source, comprising:

charging means for charging said second energy source  
5 with power provided by said first energy source; and  
communication means for transferring information  
between said radio telephone and said selective call receiver.

2. The combination according to claim 1 wherein said  
10 charging means and said communication means are selectably  
decoupled and said radio telephone and said selective call  
receiver function independently.

3. The combination according to claim 1 wherein said  
15 communication means further comprises call means for  
initiating a call on the radio telephone in response to said  
information transferred from said selective call receiver.

4. The combination according to claim 3 wherein the  
20 information includes a phone number transferred between said  
selective call receiver and said radio telephone.

5. An apparatus including a radio telephone and a  
selective call receiver, said radio telephone capable of being  
25 powered by a first energy source and said selective call  
receiver capable of being powered by a second energy source,  
said apparatus comprising:

means for transferring information between said  
selective call receiver and said radio telephone; and  
30 means for charging said second energy source with power  
provided by said first energy source.

6. The apparatus according to claim 5 wherein said means  
for transferring information comprises:  
35 means for coupling at least a first signal between said  
selective call receiver and said radio telephone.

7. The apparatus according to claim 5 wherein said means for charging comprises:

means for electrically connecting said radio telephone and said selective call receiver; and

5 means for controlling the power delivered to said second energy source from said first energy source.

8. The apparatus according to claim 5 wherein said radio telephone comprises an apparatus that functions as a radio  
10 telephony transceiver when coupled with said selective call receiver.

9. The apparatus according to claim 5 wherein said selective call receiver comprises an apparatus that functions  
15 as a selective call paging receiver when coupled with said radio telephone.

10. The apparatus according to claim 5 wherein said radio telephone and said selective call receiver are physically  
20 separable.

11. The apparatus according to claim 5 wherein radio telephone comprises an apparatus that functions as a radio  
25 telephony transceiver when detached from said selective call receiver.

12. The apparatus according to claim 5 wherein said selective call receiver comprises an apparatus that functions  
30 as a selective call paging receiver when detached from said radio telephone.

13. A system comprising:

a radio telephone including a first energy source;

a selective call receiver for receiving selective call messages and including a second energy source;

5 charging means for charging said second energy source with power provided by said first energy source; and

communication means for transferring information between said radio telephone and said selective call receiver.

10 14. The system according to claim 13 wherein said selective call receiver is capable of being selectively coupled to said radio telephone.

15 15. The system according to claim 13 wherein said communication means for transferring information comprises:

first means for coupling at least a first signal between said selective call receiver and said radio telephone.

20 16. The system according to claim 13 wherein said charging means for charging comprises:

means for electrically connecting said radio telephone and said selective call receiver; and

means for controlling the power delivered to said second energy source from said first energy source.

25

17. The system according to claim 13 wherein said communication means further comprises call means for initiating a call on the radio telephone in response to said information transferred from said selective call receiver.

30

18. The system according to claim 16 wherein said information includes a phone number transferred between said selective call receiver and said radio telephone.

35 19. The system according to claim 13 wherein said radio telephone comprises an apparatus that functions as a radio telephony transceiver when coupled with said selective call receiver.

20. The system according to claim 13 wherein said selective call receiver comprises an apparatus that functions as a selective call paging receiver when coupled with said radio telephone.

5

21. The system according to claim 13 wherein said radio telephone and said selective call receiver are physically separable.

10

22. The system according to claim 13 wherein radio telephone comprises an apparatus that functions as a radio telephony transceiver when detached from said selective call receiver.

15

23. The system according to claim 13 wherein said selective call receiver comprises an apparatus that functions as a selective call paging receiver when detached from said radio telephone.

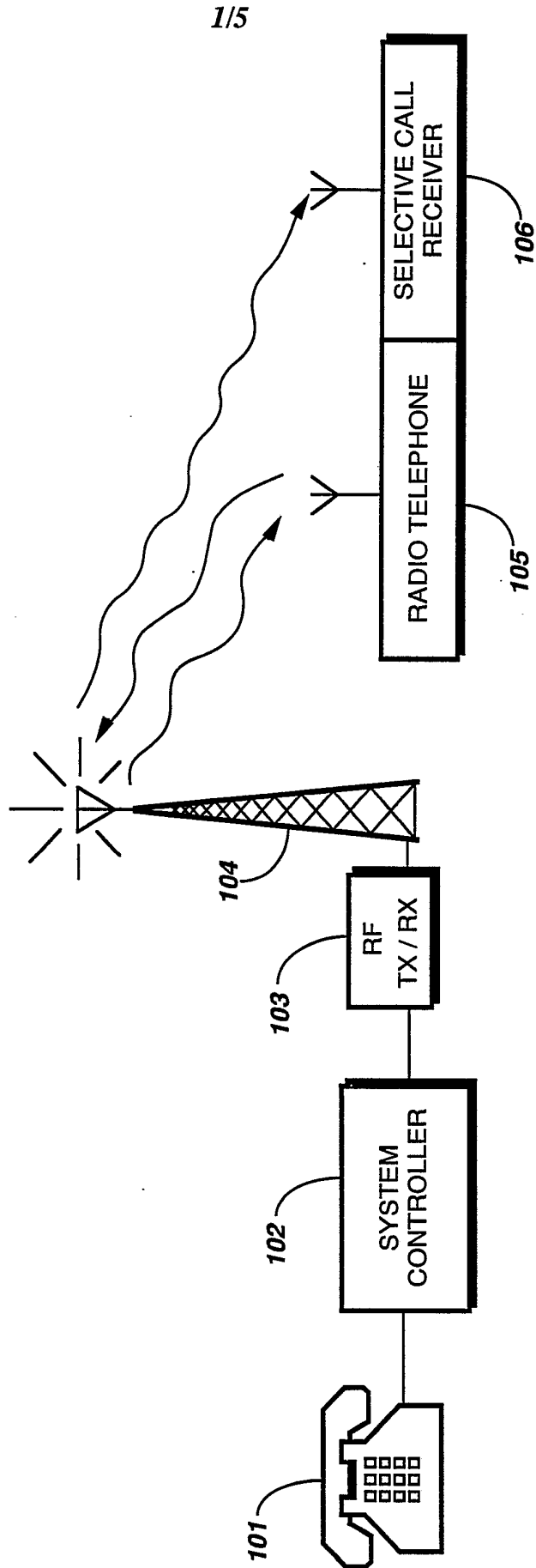
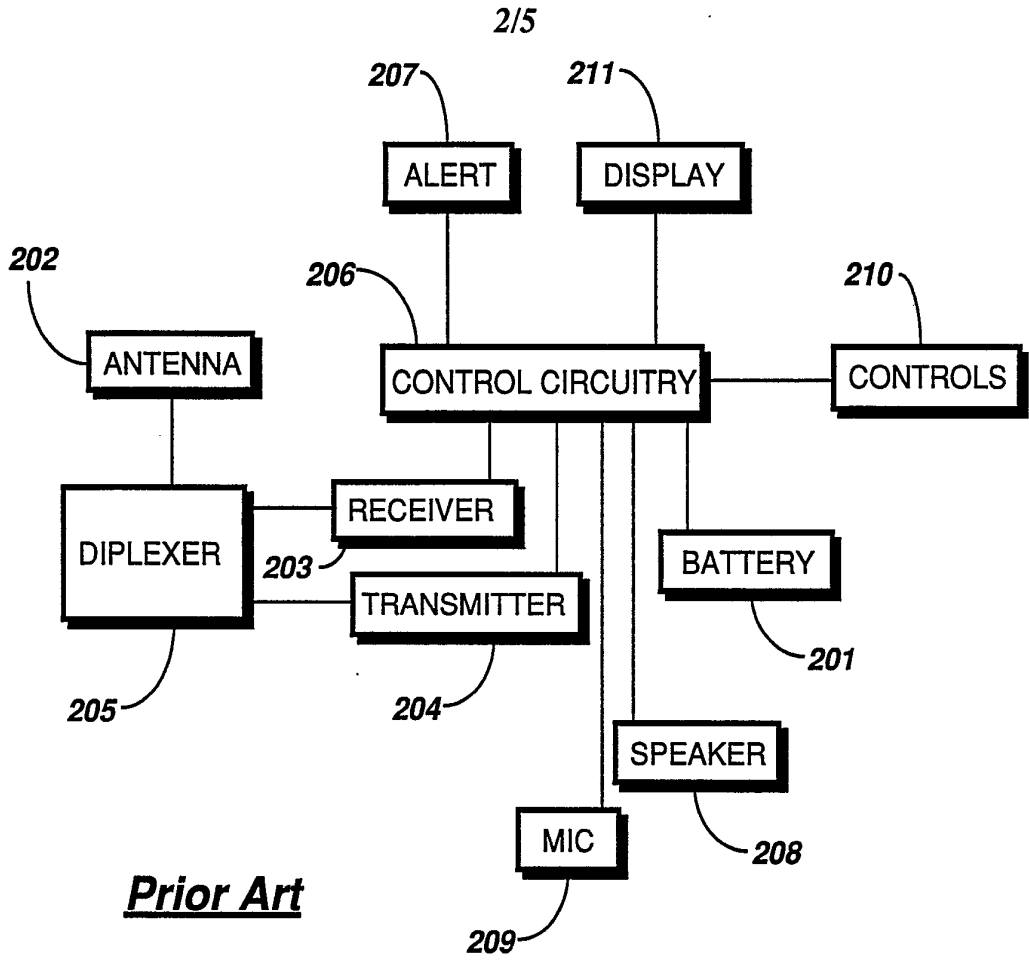
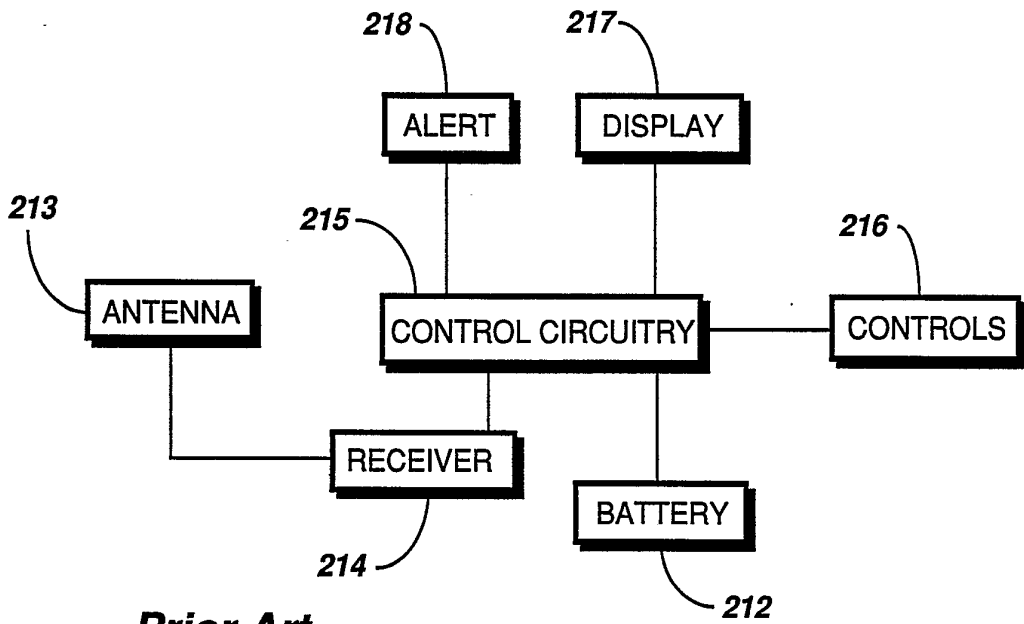


FIG. 1



*Prior Art*

**FIG. 2A**



*Prior Art*

**FIG. 2B**

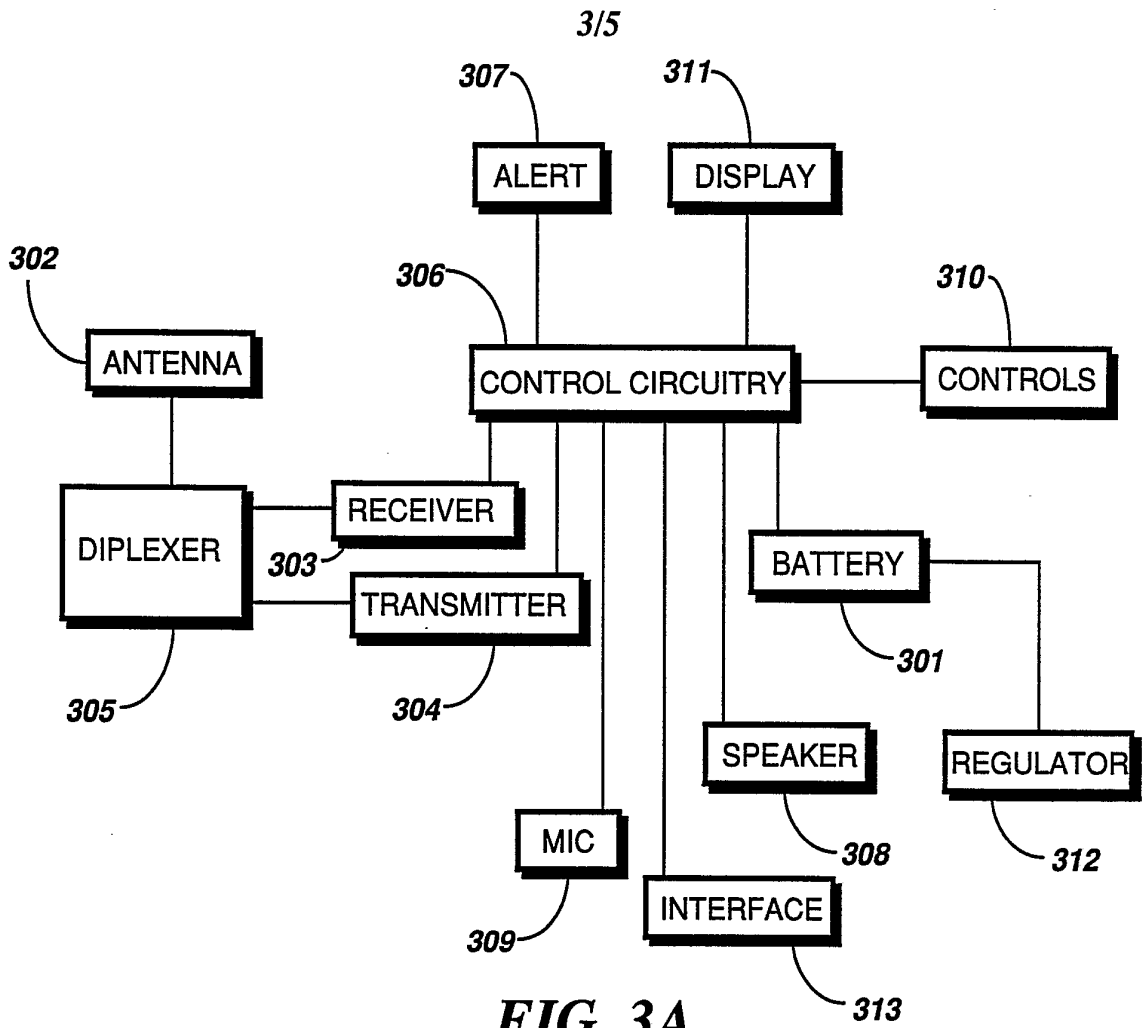


FIG. 3A

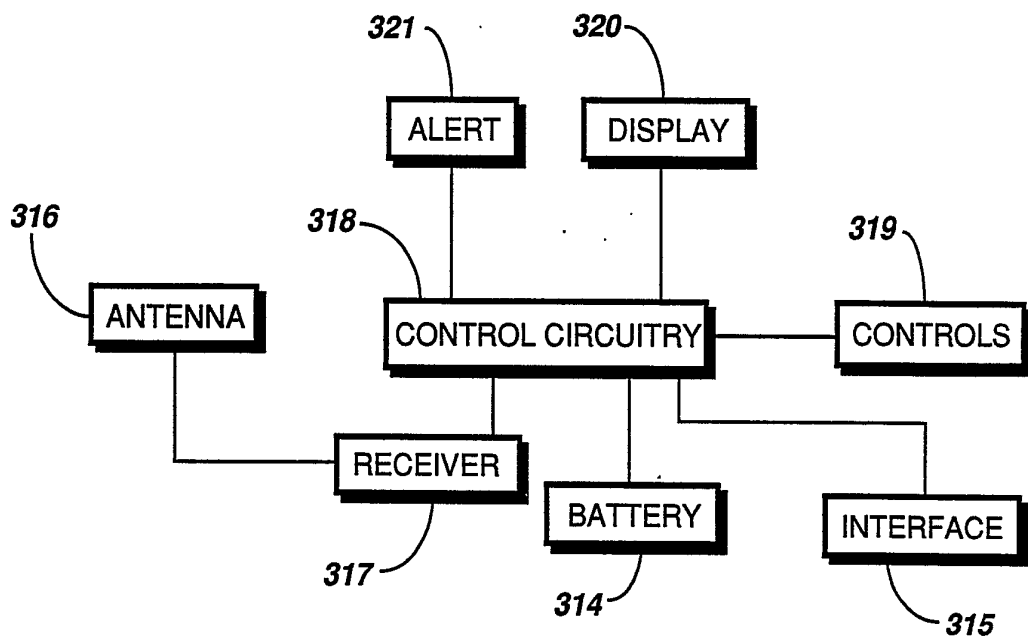
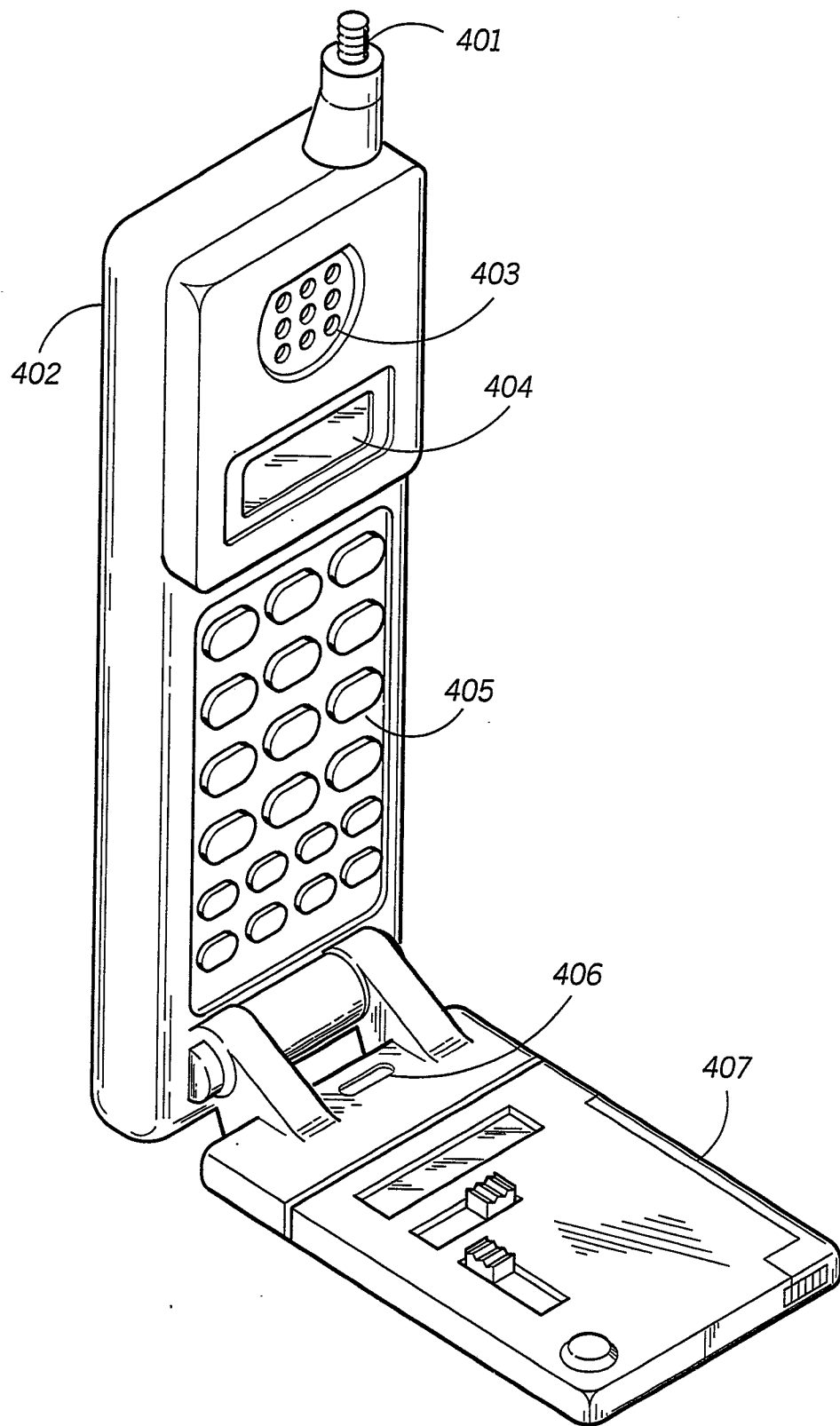


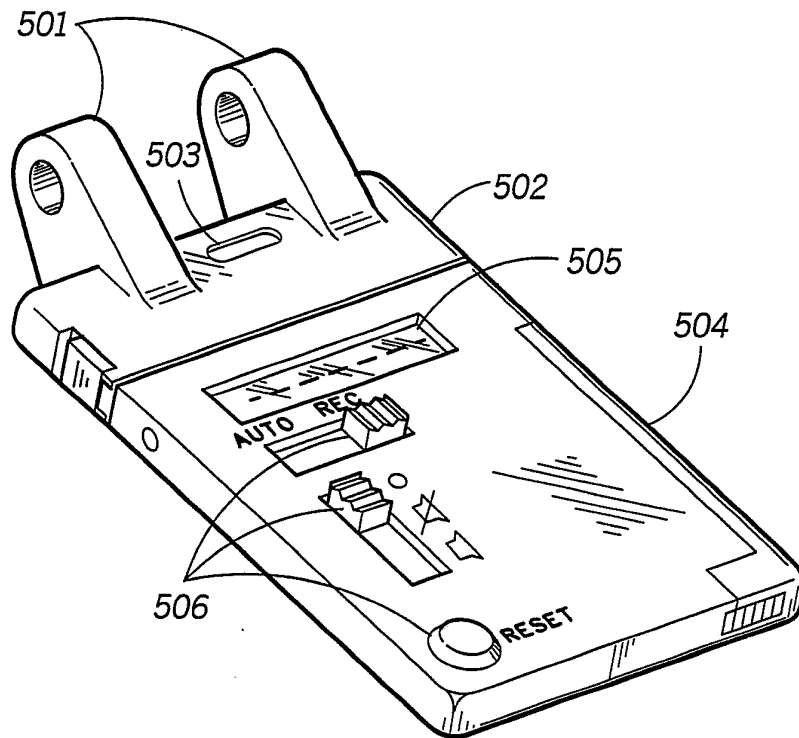
FIG. 3B

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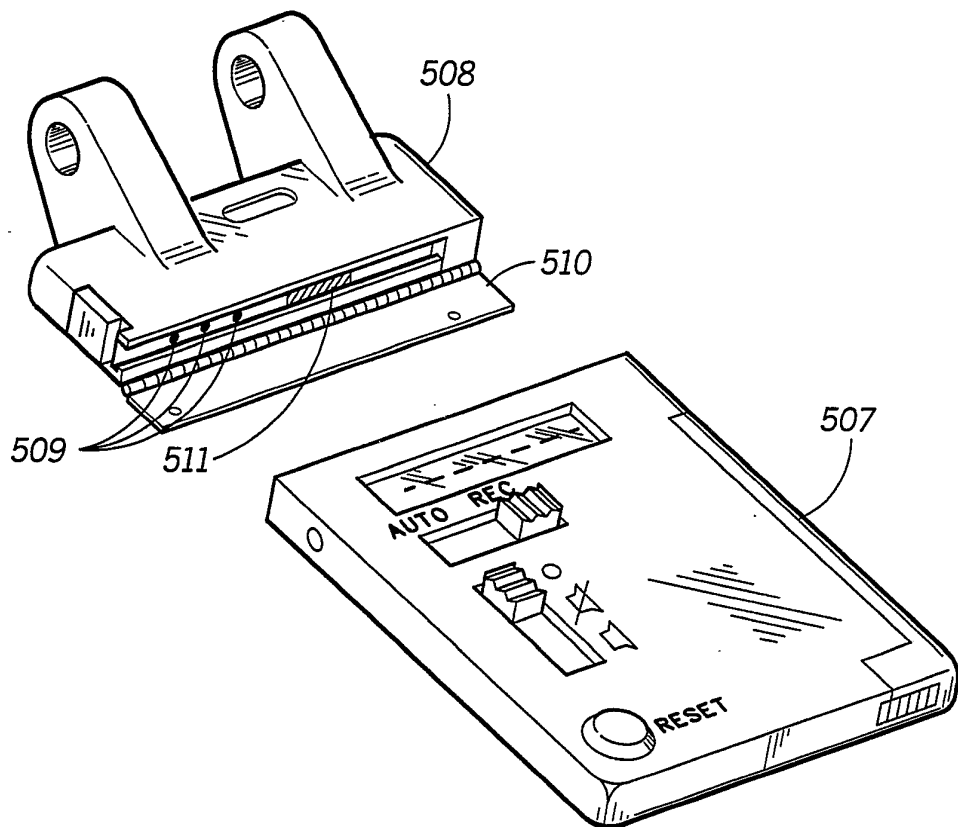


**FIG. 4**

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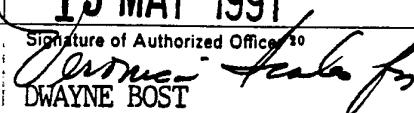
**FIG. 5A**



**FIG. 5B**

# INTERNATIONAL SEARCH REPORT

International Application No PCT/US91/00752

<b>I. CLASSIFICATION OF SUBJECT MATTER</b> (if several classification symbols apply, indicate all) <sup>3</sup>				
According to International Patent Classification (IPC) or to both National Classification and IPC				
IPC(5): H04M 11/00 US CL : 379/57,58				
<b>II. FIELDS SEARCHED</b>				
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US	379/56-58,61,63; 455/54; 340/825.44; 320/2			
Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched <sup>5</sup>				
<b>III. DOCUMENTS CONSIDERED TO BE RELEVANT</b> <sup>14</sup>				
Category <sup>6</sup>	Citation of Document, <sup>16</sup> with indication, where appropriate, of the relevant passages <sup>17</sup>	Relevant to Claim No. <sup>15</sup>		
X	EP, A, 0263666, "Cordless telephone with pager-has control circuit in parent device stopping ringing signal and pager calling signal when telephone is unhooked", 13 April 1988, see publication summary; column 8, lines 11-36, line 43 through column 9, line 7.	1-23		
X Y	US, A, 4,656,653 (ODA ET AL) 07 April 1987, see figures 1,7: column 2, line 66 through column 3, line 11.	1-8,10,11,13- <u>19,21,22</u> 9,12,20,23		
Y	EP, A, 0212761, "Communications System", 04 March 1987, see publication summary; Figure 2; column 4, lines 1-7; column 5, lines 28-30.	9,12,20,23		
Y	US, A, 4,563,626 (Ohtake) 07 January 1986 see figure 2; column 1, lines 54-68.	1,2,3,7,13,16		
Y	JP, A, 63-224422 (Yamauchi et al) 19 September 1988; see pages 3,4,6 (of English Translation), figure 4.	1-23		
<table style="width: 100%; border: none;"> <tr> <td style="width: 50%; border: none; vertical-align: top;"> <p><sup>18</sup> * Special categories of cited documents: <sup>15</sup></p> <p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier document but published on or after the international filing date</p> <p>"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)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p> </td> <td style="width: 50%; border: none; vertical-align: top;"> <p>"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</p> <p>"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step</p> <p>"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.</p> <p>"&amp;" document member of the same patent family</p> </td> </tr> </table>			<p><sup>18</sup> * Special categories of cited documents: <sup>15</sup></p> <p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier document but published on or after the international filing date</p> <p>"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)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p>	<p>"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</p> <p>"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step</p> <p>"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.</p> <p>"&amp;" document member of the same patent family</p>
<p><sup>18</sup> * Special categories of cited documents: <sup>15</sup></p> <p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier document but published on or after the international filing date</p> <p>"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)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p>	<p>"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</p> <p>"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step</p> <p>"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.</p> <p>"&amp;" document member of the same patent family</p>			
<b>IV. CERTIFICATION</b>				
Date of the Actual Completion of the International Search <sup>2</sup>		Date of Mailing of this International Search Report <sup>2</sup>		
26 APRIL 1991		15 MAY 1991		
International Searching Authority <sup>1</sup>		Signature of Authorized Officer <sup>10</sup>		
ISA/US		 DWAYNE BOST		