



US005243530A

# United States Patent [19]

Stanifer et al.

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[54] **STAND ALONE MULTIPLE UNIT TRACKING SYSTEM**

[75] Inventors: **Samuel D. Stanifer, Camarillo; Marcus W. Woodard, Oxnard, both of Calif.**

[73] Assignee: **The United States of America as represented by the Secretary of the Navy, Washington, D.C.**

[21] Appl. No.: **736,560**

[22] Filed: **Jul. 26, 1991**

[51] Int. Cl.<sup>5</sup> ..... **G06F 15/50**

[52] U.S. Cl. .... **364/452; 364/516; 340/990**

[58] Field of Search ..... **364/452, 449, 514, 516; 340/990, 991, 992, 993, 995; 342/389, 457; 73/178 R; 370/94.1**

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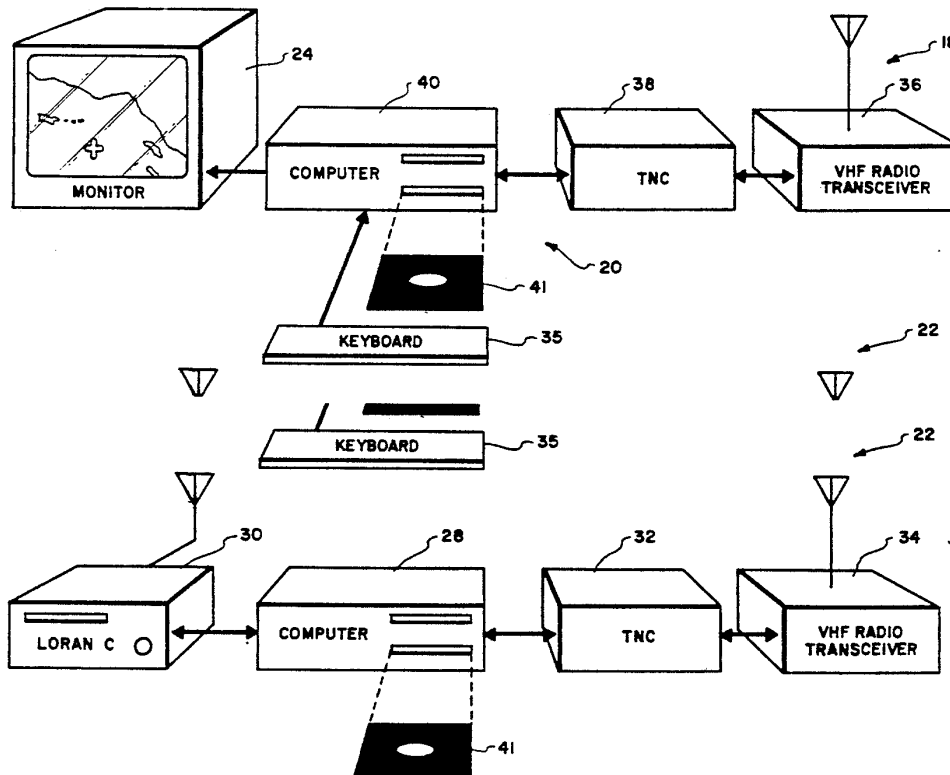
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[57] **ABSTRACT**

A stand alone multiple unit tracking system which utilizes a packet radio link to periodically transmit information identifying the geographic position of ships, aircraft and other land mobile vehicles. The stand alone multiple unit tracking system comprises a base station, relay stations and a plurality of remote stations placed on board ships, aircraft or the like. The remote stations transmit latitude and longitude position information to the base station through relay stations, if required, using packet radio techniques.

**6 Claims, 8 Drawing Sheets**



**Liberty Mutual  
Exhibit 1025**

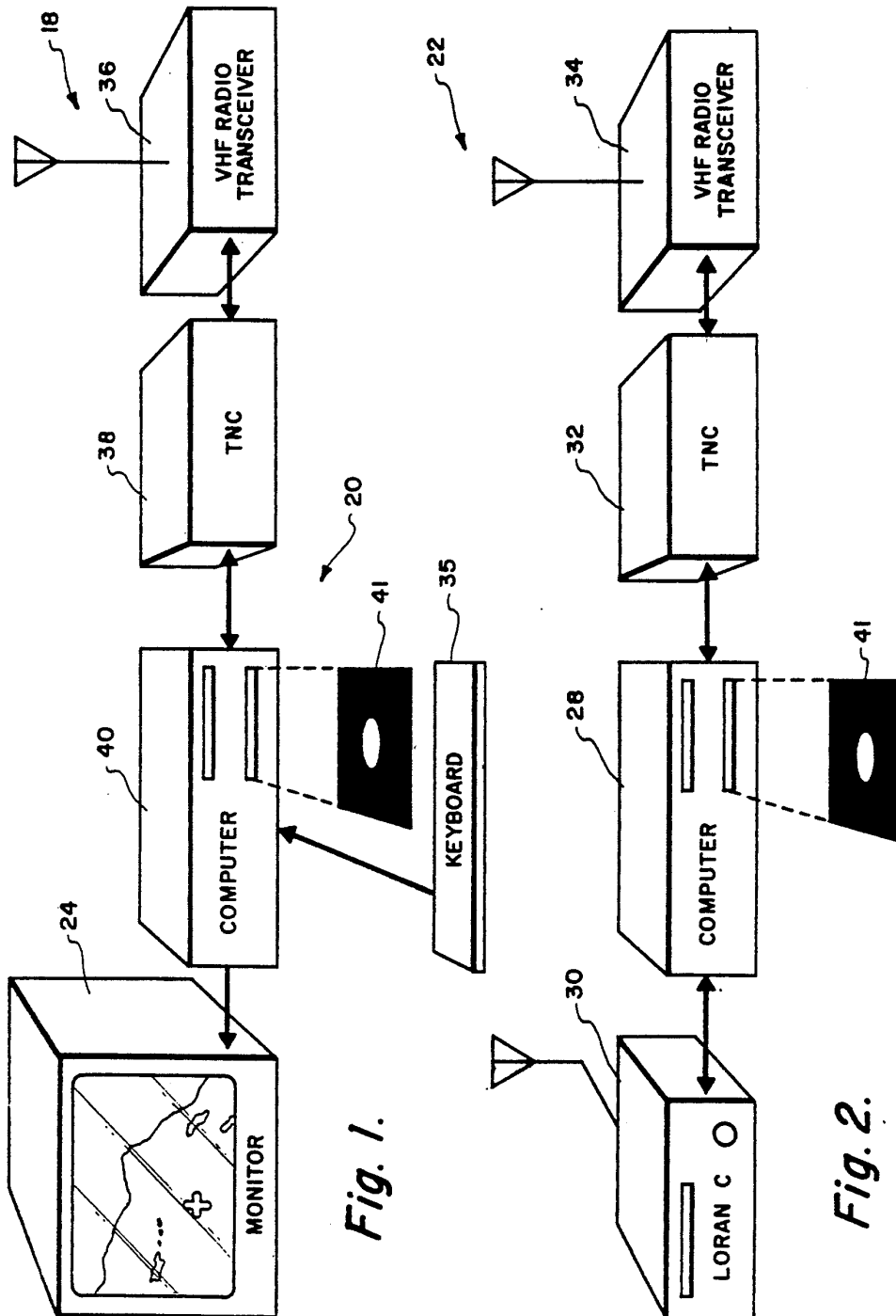


Fig. 1.

Fig. 2.

50 52	56	58	60	62	64	54
FLAG	ADDRESS	CONTROL	PID	INFO.	FCS	FLAG
01111110	112/560 BITS	8 BITS	8 BITS	N*8 BITS	16 BITS	01111110

*Fig. 3.*

	INFORMATION			STATUS		
	INITILIZE TNC	REPORT MODE	POSITION REPORT <sup>1</sup>	TERMINATE	QUIESCENT STATE	NORMAL STATE
CONTROL	10 <sub>H</sub>	10 <sub>H</sub>	0 OR 10 <sub>H</sub>	10 <sub>H</sub>	15 <sub>H</sub>	11 <sub>H</sub>
PID	F0 <sub>H</sub>	F0 <sub>H</sub>	F0 <sub>H</sub>	F0 <sub>H</sub>	N/U	N/U
INFO. 1	51 <sub>D</sub>	52 <sub>D</sub>	49 <sub>D</sub>	53 <sub>D</sub>	N/U	N/U
2	85 <sub>D</sub> <sup>2</sup>	21 <sub>D</sub> <sup>2</sup>	60 <sub>D</sub> <sup>3</sup>	21 <sub>D</sub> <sup>2</sup>		
3	6 <sub>D</sub> <sup>2</sup>		45 <sub>D</sub> <sup>3</sup>			
4			146 <sub>D</sub> <sup>3</sup>			
5			50 <sub>D</sub> <sup>3</sup>			
6			52 <sub>D</sub> <sup>3</sup>			
7			5 <sub>D</sub> <sup>3</sup>			
8			187 <sub>D</sub> <sup>3</sup>			

1. POSITION REPORT INDICATES A POSITION OF -119.1228 DEGREES LONGITUDE BY 34.1042 DEGREES LATITUDE.
2. VALUES DEPEND ON NUMBER OF REMOTE STATIONS/SITES.
3. VALUES VARY WITH REMOTE STATION POSITION.

*Fig. 5.*

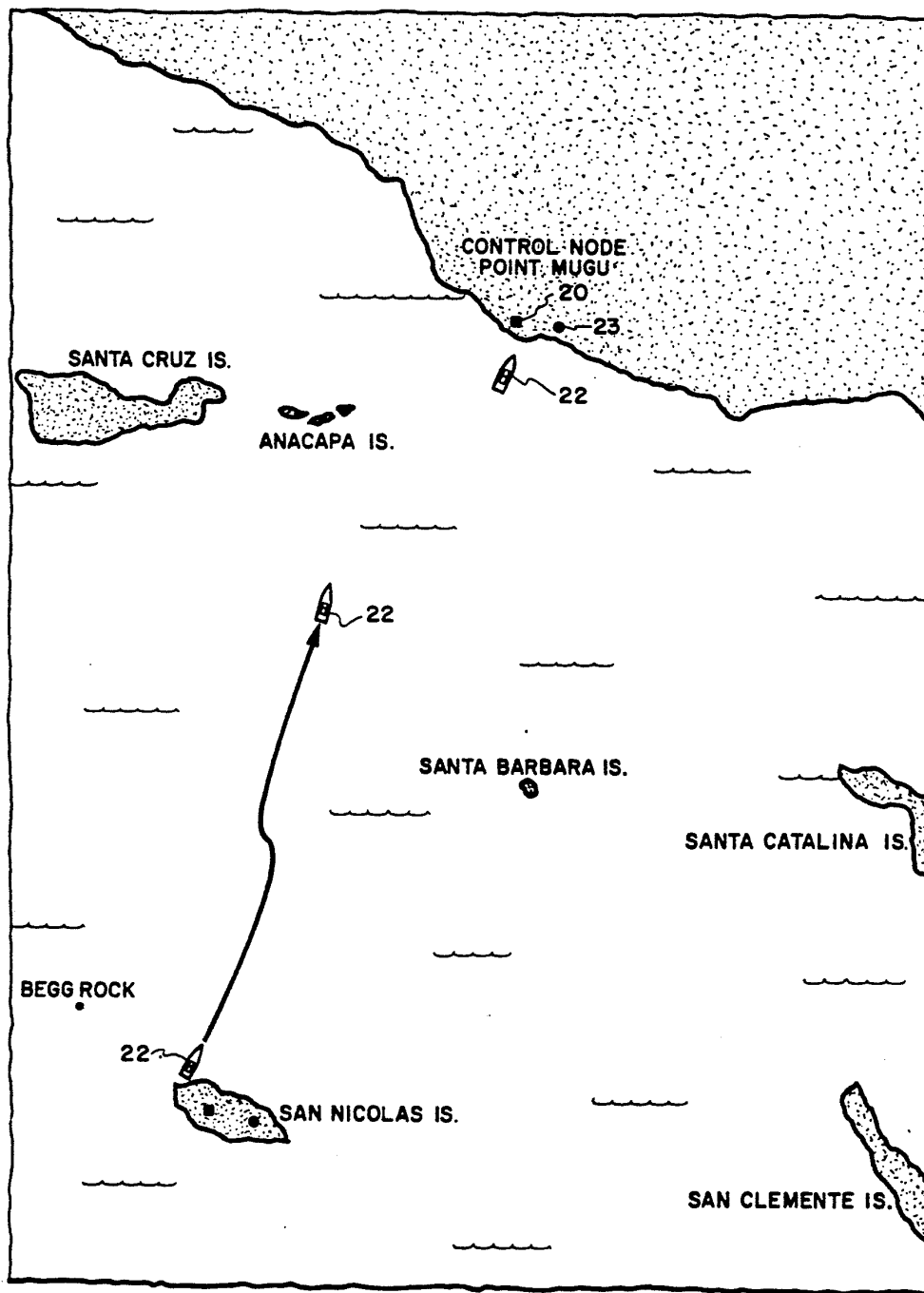


Fig. 4.

COLUMN BYTE	BASE STATION BAST 2	REMOTE SITE REMS
0	OUTPUT BUFFER NUMBER	NOT USED
1	REPORT INTERVAL	NOT USED
2	BIT 0 - REPORTER BIT 1 - RELAYER	RELAYS PACKED FLAG
3	RETRY COUNTER	NOT USED
4	=0 - NO RELAY >0 - LAST RELAY REFERENCE	=0 - NO RELAY >0 - LAST RELAY REFERENCE
5	MSB ADDRESS CHARACTER	MSB ADDRESS CHARACTER
6	ADDRESS CHARACTER	ADDRESS CHARACTER
7	ADDRESS CHARACTER	ADDRESS CHARACTER
8	ADDRESS CHARACTER	ADDRESS CHARACTER
9	ADDRESS CHARACTER	ADDRESS CHARACTER
10	LSB ADDRESS CHARACTER	LSB ADDRESS CHARACTER
11	RELAYER 1 INDEX	RELAYER 1 INDEX
12	RELAYER 2 INDEX	RELAYER 2 INDEX
13	RELAYER 3 INDEX	RELAYER 3 INDEX
14	RELAYER 4 INDEX	RELAYER 4 INDEX
15	RELAYER 5 INDEX	RELAYER 5 INDEX
16	RELAYER 6 INDEX	RELAYER 6 INDEX
17	RELAYER 7 INDEX	RELAYER 7 INDEX
18	RELAYER 8 INDEX	RELAYER 8 INDEX

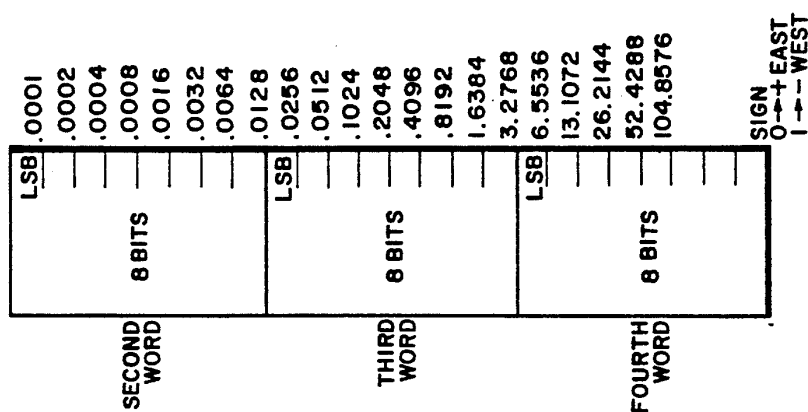


Fig. 6A.

Fig. 7.

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